APPENDIX F2

Collation of hydrogeological related data and information post-Draft EIS

Olympic Dam expansion project – collation of hydrogeological-related data and information post-Draft EIS

- Final
- 9 March 2011

Olympic Dam expansion project – Collation of hydrogeological-related data and information not included in Draft EIS

- Final
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Terms and abbreviations

ALA or ZAL or €a:
Andamooka Limestone aquifer

AHD:
Australian Height Datum

ANZECC:
Australian and New Zealand Environment Conservation Council

ARMCANZ:
Agriculture and Resource Management Council of Australia and New Zealand

artesian Eromanga Basin:
that part of the Eromanga Basin where groundwater pressures are artesian

artesian Eromanga (GAB) aquifers:
the aquifers of the artesian Eromanga Basin

EIS:
Environmental Impact Statement

GAB:
Great Artesian Basin (in this document the term refers to the "artesian Eromanga Basin"

GDE:
groundwater dependent ecosystem

GFS:
groundwater flow system

NATA:
National Association of Testing Authorities

non-artesian Eromanga Basin:
that part of the Eromanga Basin where groundwater pressures are non-artesian, aquifers may be confined or unconfined

non-artesian Eromanga aquifers:
the aquifers of the non-artesian Eromanga Basin, i.e. groundwater pressures may be sub-artesian or the aquifers host the water table

OD:
Olympic Dam

RSF:
rock storage facility

SA EPA:
South Australian Environment Protection Authority

SEIS:
Supplementary Environmental Impact Statement

SML:
Special Mining Lease

SWL:
standing water level

TDS:
salinity, expressed as total dissolved solids

THA or ZWC:
Tent Hill aquifer (lower Arcoona Quartzite and Corraberra Sandstone)

THZ:
Torrens Hinge Zone

TSF:
tailings storage facility

TSS:
total suspended solids

Victorian EPA:
Victorian Environment Protection Authority

1. Introduction

This factual report has been prepared to present the results of additional hydrogeological data collection that has been undertaken by SKM since the preparation of the draft EIS and that are of relevance for the proposed expansion of Olympic Dam, and the Supplementary EIS.

Various hydrogeological investigations have been carried out in support of the draft EIS with several investigations continuing in parallel, and subsequent, to Draft EIS preparation. Although the later information and interpretations were not available for the Draft EIS, they are available to assist with responses to submissions made in regard to the Draft EIS.

Hydrogeological field investigations completed by SKM in parallel to preparation of the Draft EIS have included:

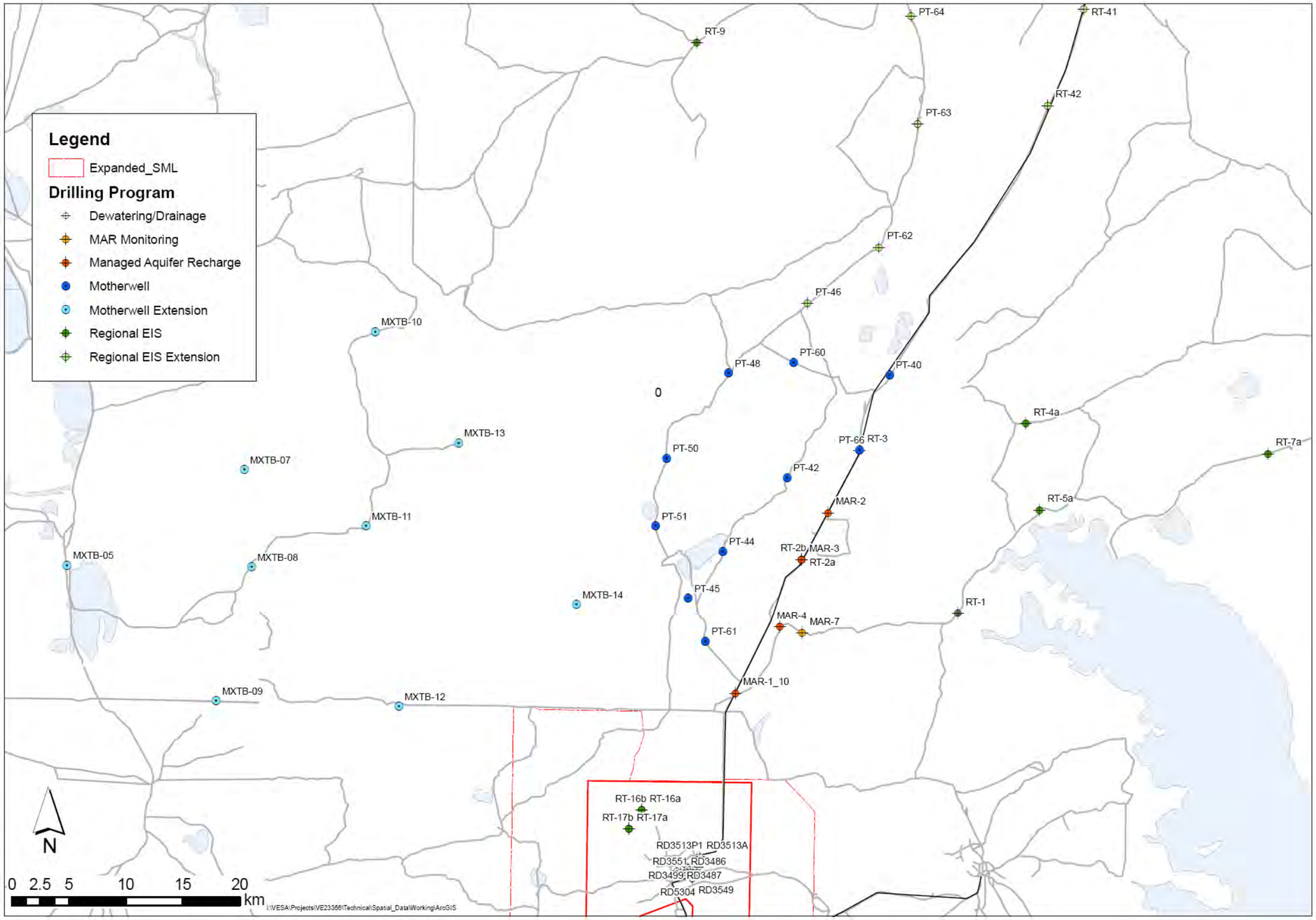
1) Drilling, well construction and aquifer testing for EIS-related hydrogeological investigations (Attachment A).
2) Drilling, well construction and aquifer testing for mine pit dewatering and depressurisation trial (Attachment B).
3) A groundwater baseline sampling and analytical program (Attachment C).
4) Drilling, well construction and aquifer testing for saline groundwater supply investigations of the Andamooka Limestone aquifer (Attachment D).

In addition to this additional information, a log for the Margaret Creek Bore #1, which is located near Billa Kalina Spring northwest of Olympic Dam, is provided as Appendix E. The log has been recently prepared and is based on drill cuttings that are around 100 years old. It is likely that the existing operational Margaret Creek Bore #2 draws water from Eromanga Basin sediments.

Table 1.1 summarises the types of hydrogeological information collected for the investigations documented in this report.

Section 2 presents a summary of the methodologies employed in the gathering of data and information presented in the Appendices.

Figure 1.1 presents a locality plan for all of the drilling and testing locations referred to in this report.



- **Figure 1.2**
  Locality plan for EIS-related groundwater studies

Table 1.1 Hydrogeological information collected in additional investigations

	EIS investigations (Stuart Shelf)	Motherwell investigations	Baseline WQ sampling	EIS investigations (THZ)	Dewatering investigations	Motherwell Extension investigations [1]
DATA	*December 2007*	*May 2008*	*July-Sept 2008*	*August 2008*	*October 2008*	*Sept-Oct 2008*
Well logs	16 new wells (9 locations)	24 new wells (20 locations)		5 new wells	14 new wells	16 new wells (9 locations)
Water levels	16 new wells	23 new wells	53 existing wells	5 new wells	14 new wells	16 new wells
Water chemistry	16 new wells	23 new wells	54 existing wells	5 new wells	14 new wells	16 new wells
Yield estimates	16 new wells	23 new wells		5 new wells	14 new wells	16 new wells
Aquifer testing data	2 new wells	4 new wells			2 new wells	
ANALYSIS						
Cross-sections						✓
Major ion (Piper plots)	✓		✓		✓	✓
Other WQ analyses	✓	✓	✓			
Water level contours	✓		✓	✓		✓
Mapping well yields					✓	✓
Mapping salinity			✓			✓
Mapping WQ parameters			✓			

Notes: 1. 9 locations completed from a planned 15

2. Work program summaries

2.1. General

Drilling and testing of wells occurred under the supervision of SKM during 2008. Drilling targets were selected by BHP Billiton.

2.2. Clearances

All wells were sited on previously disturbed land or land clear of vegetation and all were given environmental and heritage clearance. Water produced during drilling and subsequent aquifer tests was contained in sumps.

Environmental and heritage assessments were undertaken by authorised BHP Billiton environmental personnel in consultation with local Native Title Claimant groups. The purpose of the permit system is to 'clear' areas prior to any disturbance arising from activities such as drilling. Environmental and heritage clearance permits contain information on the area to be disturbed by a drilling activity. These permits also identify site-specific conditions relating to the protection of any significant environmental or heritage features identified near the site.

Within previously cleared areas, sumps were constructed to contain drill cuttings, and water produced during drilling and subsequent aquifer tests. Water that could not be contained in the sumps was allowed to run over the ground provided no vegetation, access routes or infrastructure would be adversely affected. In situations where uncontained water or airlifting spray threatened areas of environmental concern, drilling was temporarily terminated for protection to be established in the form of earth wall bunds or more favourable weather conditions.

2.3. Equipment

Drilling works were undertaken by Gorey and Cole Drillers (G&C) using a Schramm T685WS drilling rig equipped for conventional down-the-hole (air) hammer drilling with auxiliary boosted air compressors. The Schramm rig has air capacity (with auxiliary booster and compressor) of 350 psi (2200cfm) to depths greater than 600 m.

Different types and sizes of drill bits were used during the drilling of each hole to reach target depths at desired hole diameters:

- The drilling of each well was commenced with a 17½" or 14¾" tri-cone roller to accommodate steel surface casings.
- Following the installation of surface casing, hammer bits ranging in size from 14¾", $9^{7}/_{8}$", 12¼", $7^{7}/_{8}$" and $5^{5}/_{8}$" were utilised.

Airlift yields were estimated using a 90° v-notch weir (or through a bucket test when flow could not be channelled through a v-notch weir), and field measurements of water quality parameters (EC, pH, temperature) were undertaken using calibrated electronic meters.

2.4. Water well construction

2.4.1. Overview

All wells were constructed to the standards specified in the Minimum Construction Requirements for Water Bores in Australia (Land and Water Biodiversity Commission, 2003).

2.4.2. Monitoring wells

All monitoring wells were drilled using conventional air hammer techniques.

Surface casing (16", 12" or10" DN steel) was installed within shallow unconsolidated sediments and pre-collars installed before the first water cut (12" DN with sometimes telescoped 10" DN steel). All casings were cemented in place and tails drilled out at $9^{7}/_{8}$", and $7^{7}/_{8}$" diameter.

2.4.3. Field supervision and data collection

SKM hydrogeologists supervised the drilling and completion of all wells. Information collected during drilling included:

- Lithology, based on drill cuttings collected at 2 m intervals.
- Penetration rate, based on time for drilling each rod length.
- Airlift water yield, measured whilst drilling and between rod changes.
- Groundwater temperature, electrical conductivity (EC as mS/cm) and pH, measured during airlift at each rod change and water cut encountered.
- Unload pressure, i.e. measurement of the pressure (PSI) required to lift groundwater from the borehole at each rod change (normally recorded by the driller).
- Depth to groundwater, when possible during and after drilling.
- Airlift recovery depth to groundwater post drilling.
- Daily activity, such as time drilling, tripping in and out of the borehole, the time of bit changes, well construction, and rig breakdown.

Composite well logs are presented in Attachment A. Data concerning drilling penetration rates, airlift yield and EC profile logs are presented in Attachment B. Laboratory analytical reports are presented as Attachment C. Field purge sheets completed during sampling are presented as Attachment D.

2.4.4. Well development

Each well was developed via airlifting following completion of construction using the rig's on-board compressor. Development was undertaken in order to remove drilling fluids and cuttings/fines and to induce hydraulic connection between the bore and the aquifer.

Airlift development of observation wells was achieved using a 2" poly airline, submerged to just above the screened interval. Each well was developed for a minimum of one hour or until groundwater parameters of EC, pH and temperature had stabilised to within 10% of previous readings.

2.4.5. Aquifer testing

Airlift recovery tests were also performed on the majority of the observations wells. The wells were airlifted for an average of two hours and then depth to water was recorded for 1 hour or until water levels had recovered back, or near, to static.

2.4.6. Site rehabilitation

To comply with environmental permit conditions, site rehabilitation was undertaken after drilling, construction and testing works.

Rehabilitation involved fencing off drill sites, including sumps and bunds with removable plastic bunting and star pickets for a period of three weeks after cessation of work; after which all introduced material (drill cuttings and imported soil for the construction of turkey nets) was removed for appropriate disposal on the SML.

2.5. Baseline groundwater sampling

2.5.1. Overview

A total of 57 groundwater monitoring wells were sampled over the winter months from July to September 2008.

The monitoring wells were selected to provide information about the main hydrostratigraphic units of each of the three main geological provinces that feature in the broader Olympic Dam region, namely :

Stuart Shelf

- Andamooka Limestone Aquifer (ALA)
- Yarloo Shale Aquitard
- (Upper) Arcoona Quartzite Aquitard

- Tent Hill Aquifer (THA)

Adelaide Geosyncline

- ABC Quartzite (equivalent to Arcoona Quartzite)
- Brachina Formation (equivalent to the THA)
- Amberoona Formation

Eromanga Basin

- Cadna-owie Formation / Algebuckina Sandstone

Groundwater was also sampled from wells installed in the tailings materials of the existing ODO TSF.

2.5.2. Groundwater levels

Groundwater levels at each operational monitoring well were measured prior to sampling using an electronic water level probe. Because of the high salinity of groundwater, water level data were density corrected prior to conversion to m AHD.

2.5.3. Groundwater sampling

Monitoring wells were purged and sampled using the low flow, minimal drawdown (micropurge) sample technique with the following exceptions:

- Monitoring wells H1-1, H1-2, H3-1, H3-2, H4-2 and LR4 were sampled by disposable polyethylene bailer because of low well yield and/or shallow depth precluding the use of micro-purge sampling;
- Monitoring wells QT2, LR4, PT17, RT16b, RT17b, PT31, MAR3-20, RT02b, PT66, MAR4-20a, MAR4-20b, PT40, PT60 and MAR7 were all sampled by disposable polyethylene bailer because of deep static water levels (SWLs) precluding the use of micro-purge sampling;
- Production bore LP2 was sampled from the dedicated sampling spigot (1” ball valve) installed on the discharge line because this is an active pumping bore with permanent pipe work installed, which precludes access to the borehole for micropurge sampling equipment.

For low flow sampling a micro purge bladder pump (QED MP10) was utilised comprising a submersible stainless steel tube with an internal bladder controlled by compressed air. The pump intake was placed in the centre of the screened interval. New rolls of Low Density Polyethylene (LDPE) tubing were used and dedicated for each monitoring well. Sample tubing was recovered, labelled and stored in a central location onsite for future use. The bladder pump was decontaminated with a 10% Decon-90 solution and triple rinsed with clean potable water prior to use at the next location.

Field physical and chemical parameters were recorded regularly during sampling. Once stable geochemical conditions were achieved, as indicated by the last two consecutive readings, a groundwater sample was collected. The stability of field parameters indicates that the groundwater sample collected is representative of groundwater in the aquifer at the depth setting of the intake.

A summary of the stabilised field parameters at the time a groundwater sample was collected is presented in Section 6.

Groundwater samples were placed in new laboratory-supplied sample bottles containing appropriate preservatives, and then placed into an esky containing ice, for transport to Labmark Environmental Laboratories. Labmark is certified by the National Association of Testing Authorities (NATA) for the analyses undertaken for this sampling program. Blind coded intra-laboratory duplicates and inter-laboratory duplicate groundwater samples were also collected and sent to Labmark and Australian Laboratory Services (ALS) (also NATA certified for the analyses undertaken), respectively. Four rinsate blank samples were collected to test the effectiveness of field decontamination procedures.

Groundwater samples collected for dissolved metals analysis were filtered in the field using a dedicated 0.45 micron filter for each sample and were placed into pre-acidified containers. Samples for total metals (Fe only) were not filtered and were placed directly into pre-acidified laboratory bottles.

A separate groundwater sample (1 L, un-filtered, acidified with nitric acid) was collected from wells LT02/LP2, LR1, LR2, LR8, LR9, LT19, LT41, PT24a, RT16a and RT17a, then placed into a 20 L steel drum containing ice and vermiculite for transport to Australian Radiation Services (ARS) for radionuclide analyses (^{226}Ra).

2.5.4. Laboratory analyses

Based on historical results in the vicinity of the current TSF, and consistent with analyses undertaken for previous monitoring events, the analytical program undertaken for all monitoring wells is outlined in Table 2.1. Monitoring wells QR2, PT64 and LR4 were the only wells for which a complete analysis was not undertaken, due to well complications, dryness and low yield respectively.

- **Table 2.1 Field and laboratory analyses conducted**

Field Parameter	Laboratory Analyses
SWL pH EC Eh Temperature Total CO_2 (TSF only)	pH TDS EC Silica (Si) Major Cations (Ca, Mg, Na, K) Major Anions (Cl, SO_4, HCO_3, CO_3) Nutrients – (NO_2, NO_3, Total Nitrogen, TOC, TKN) Acidity (as $CaCO_3$) Alkalinity (OH, HCO_3, CO_3 – each reported as $CaCO_3$) Dissolved Metals - Aluminium – Al, Antimony – Sb, Arsenic – As, Beryllium – Be, Barium – Ba, Bismuth – Bi, Boron – B, Cadmium – Cd, Chromium – Cr, Cobalt – Co, Copper – Cu, Gold – Ag, Iron – Fe, Lead – Pb, Lithium – Li, Manganese – Mn, Molybdenum – Mo, Nickel – Ni, Selenium – Se, Strontium – Sr, Thallium – Tl, Thorium – Th, Tin – Ti, Titanium – Ti, Uranium – U, Vanadium – V, and Zinc – Zn) Radionuclide's (^{226}Ra) (analysis undertaken by ARS for wells below and around the existing ODO TSF only)

Notes:

SWL:	Static Water Level
EC:	Electrical Conductivity
Eh:	Redox Potential
TDS:	Total Dissolved Solids
ARS:	Australian Radiation Services
TSF:	Tailings Storage Facility

2.6. Laboratory analysis of groundwater quality

Water samples were collected from each well during development after consecutive readings stabilised to within 10% of previous readings. Additional samples were collected using disposable bailers at least 3 days post drilling completion to obtain a representative sample of native groundwater. The bailed samples were submitted to the analytical laboratory for testing along with several drilling and development samples. The samples were collected into laboratory prepared containers, stored on ice and submitted to ALS Environmental Pty Ltd (ALS) for analysis of the following analytes (ALS is a NATA accredited laboratory for the analyses undertaken):

- *General*:
  pH, EC, salinity as total dissolved solids (TDS), suspended solids (SS), turbidity and alkalinity.
- *Major ions*:
  Sulfate, chloride, calcium, magnesium, sodium, potassium, fluoride, and carbonate (as $CaCO_3$).
- *Dissolved metals*:
  Iron, aluminium, arsenic, barium, cobalt, copper, lead, manganese, molybdenum, strontium, uranium, zinc and boron.

- *Total Metals*:
  Iron.
- *Nutrients*:
  Nitrite (as N), nitrate (as N) and nitrite + nitrate (as N).

2.7. Establishing baseline water quality levels

In order to determine pre-development groundwater chemistry conditions around OD, wells in the sampling program have been placed into groupings based on hydrostratigraphic units (see previous section) and location. The geographical classifications used are:

1) in the vicinity of existing ODO TSF;
2) in the vicinity of the proposed ODX TSF and RSF (sub-regional);
3) within the broader regional groundwater flow systems (regional).

To attempt to characterise each grouping, the water quality analyte measurements have been presented as a range and as geometric means.

As a means of further evaluating groundwater quality, analytical data have been compared to published guideline values that are set by government regulators to protect specific environmental values. It should be noted, however, that the natural salinities of the groundwaters in the study area often far exceed the salinities of the environments for which these criteria have been set (ie. potable water, freshwater or marine systems). As a consequence, an exceedance of a particular guideline value for one or other analytes may be quite irrelevant where (as is common) the high salinity of the groundwater means that beneficial use for the waters is generally limited to industrial purposes only (refer SKM, 2010; Section 3). The results of this approach are presented in Attachment C.

3. References

Land and Water Biodiversity Commission. 2003. Minimum construction requirements for water bores in Australia. Queensland Department of Natural Resources Mines and Energy.

SKM. 2010. Olympic Dam expansion project – Supplementary Environmental Impact Assessment groundwater studies. Prepared for BHP Billiton Olympic Dam Corporation P/L by Sinclair Knight Merz Pty Limited. Appendix F1 of the Supplementary EIS.

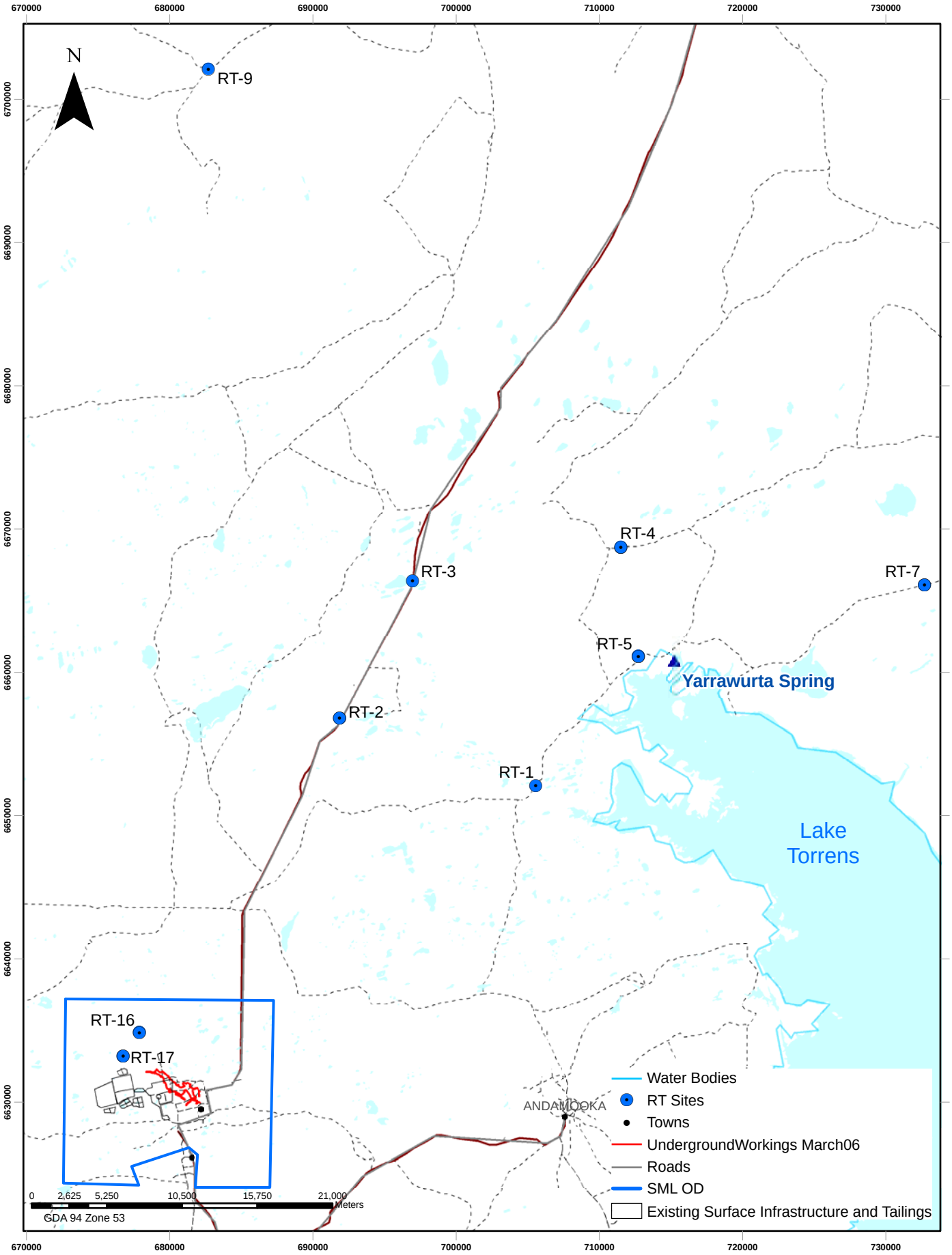
4. Statement of limitations

The services provided by Sinclair Knight Merz Pty Limited in preparing this report and undertaking the various studies contributing to the findings of the report have been conducted in a manner consistent with the level of quality and skill generally exercised by members of its profession and consulting practice.

This report has been prepared solely for use by BHP Billiton and may not contain sufficient information for the purposes of other parties or for other uses. Any reliance on this report by third parties shall be at such party's sole risk.

The information in this report is considered to be accurate with respect to conditions encountered at the time field investigations were undertaken, and conclusions are based on the data available at the time of report preparation. Interpretations of data and information presented in the appendices were valid at the time reporting of the studies took place. A different interpretation may now be appropriate given the time that has expired since the reports were prepared and the fact that new information may now be available.

Attachment A
EIS-related investigations



EIS drilling program

INVESTIGATION WELLS

rem

R:\GIS\BHP\Regional EIS\Maps\Figure 4.1 Investigation wells

EIS drilling program

Target	Screened Unit	Depth (m)	Intention	Outcome
RT-1	Pwc	474	Full penetration and screening of the Corraberra Sandstone.	The hole was terminated in the Tregolana Shale after full penetration of the target formation. Paired with the Andamooka Limestone LR-10 well, this is now a nested site.
RT-2a	€a	295	Full penetration and screening of the Corraberra Sandstone.	A collapsed hole after 295m forced an Andamooka Limestone completion.
RT-2b	Pws	342	Full penetration and screening of the Corraberra Sandstone.	Completed within in the upper Tent Hill sequences of Red Arcoona Quartzite and provides a nested site.
RT-3	€a	149	Completion below watertable.	Completed and screened within the unconfined Andamooka Limestone after penetration of the first major water cut
RT-4a	€a	58	Provide a nested site to compare deep lithological sequences beneath the unconfined Andamooka Limestone to the north of Yarrawurta Springs.	Hole terminated after first water cut and screened in the upper Andamooka Limestone.
RT-4b	Pwx	522		A production zone of 320m was screened entirely within the Yarloo Shale after no major water cuts were encountered in this unit.
RT-5a	€a	66	Provide a nested site to compare deep lithological sequences beneath the unconfined Andamooka Limestone to the west of Yarrawurta Springs.	Hole terminated after first major water cut in the upper Andamooka Limestone. The hole was left open for production.
RT-5b/c	€a/ Pwa-Pwr	634		Drilling was terminated in the Brachina Formation after no major water cuts were encountered after the base of the Andamooka Limestone. Completion screened and gravel packed 200m of ABC Range Quartzite and Brachina Formation (RT-5c). This completion was isolated with a 240m seal form a second PVC installation within the lower dolomitic Andamooka Limestone (RT-5b). The second installation, owing to groundwater salinity measurements taken while drilling that showed distinctly different salinities encountered within the upper Andamooka Limestone and deeper (>140m) dolomitic stratum.
RT-7a/b	Pws	198	Provide a nested site to compare deep lithological sequences beneath the unconfined Andamooka Limestone east of Yarrawurta Springs.	Two PVC completions were made in this well; the deepest, RT-7b, within the lower part of the formation and is isolated from the shallower completion of RT-7a within a more weathered zone.
RT-9	Pwr	71	Target a sandstone unit reportedly 15-20m below ground level underlying Bulldog Shale, supposedly harboring a perched groundwater table or mound.	The sandstone unit was not intersected; drilling continued and was terminated after the first water cut, which was screened.
RT-16a	€a	68	Final depths were based on lithological logging of RT-16b and targeted karst within the Andamooka Limestone.	The final depth and screened interval was entirely within the Andamooka Limestone.
RT-16b	Pwm	252	Full penetration and screening of the Corraberra Sandstone.	Final depth was reached in the Tregolana Shale after full penetrating of the Corraberra Sandstone. RT-16 is now a nested site.
RT-17a	€a	84	Final depths were based on lithological logging of RT-17b and targeted karst within the Andamooka Limestone.	The final depth and screened interval was entirely within the Andamooka Limestone.
RT-17b	Pwc	264	Full penetration and screening of the Corraberra Sandstone.	Final depth was reached in the Tregolana Shale after full penetrating of the Corraberra Sandstone. RT-17 is now a nested site.

Investigation well completion summary

Well Number	Surveyed Location (MGA94_Zone53)			DWLBC Permit Number	BHP Number	Dates Drilled		Drill Method	EOH Depth (m)	Final Pre-collar Casing			Monitoring casing				Gravel pack	Seal	Aquifer monitored
	Easting	Northing	TOC (mAHD)			Start	Completed			Depth Setting (m)	Diameter (mm)	Material	Blank Interval (m)	Slotted/Production Interval (m)	Diameter (mm)	Material			
RT-1	705545.1	6652082.7	50.082	122678	RD2789	13-Jul-07	23-Jul-07	Air Hammer	474	192	200	STL	0-438, 444-450, 456-462, 468-474	438-444, 450-456, 462-468	50	PVC	420-474	388-420	Pwc
RT-2a	691869.1	6656801.7	95.578	122684	RD2790	17-Nov-06	28-Jun-07	Air Hammer	295	25	250	STL	0-113.5	113.5-119.5	50	PVC	-	80-102	€a
RT-2b	691848.8	6656794.5	95.556		RD2883	29-Jun-07	12-Jul-07	Air Hammer	342	166	200	STL	0-330	330-342	50	PVC	318-342	270-316	Pws
RT-3	696948.5	6666399.4	100.822	122656	RD2791	12-Dec-06	17-Dec-06	Air Hammer	149	34	200	STL	-	34-149 (Open hole)	-	-	-	-	€a
RT-4a	711500.1	6668734.5	72.164	122677	RD2792	21-Aug-07	23-Aug-07	Air Hammer	58	6	200	STL	0-42	42-58 (Isolated Open Hole)	50	PVC	-	22-42	€a
RT-4b	711497.0	6668745.9	72.224	122681	RD2793	10-Aug-07	22-Aug-07	Air Hammer	552	172	200	STL	0-486	486-522	50	PVC	472-522	402-472	Pwx
RT-5a	712725.5	6661144.8	48.820	122679	RD2794	06-Aug-07	07-Aug-07	Air Hammer	66	36	200	STL	-	36-66 (Open hole)	50	PVC	-	-	€a
RT-5b	712713.8	6661127.0	48.475	122676	RD2795	24-Jul-07	07-Aug-07	Air Hammer	634	142	200	STL	0-164, 178-200	155-167	50	PVC	146-178	134-146, 178-420	€a
RT-5c													0-500	500-634 (blank-slot-blank…)	50	PVC	420-634	134-146, 178-420	Pwa/Pwr
RT-7a	732710.4	6666104.8	65.011	122680	RD2937	24-Aug-07	29-Aug-07	Air Hammer	198	10	200	STL	0-24	24-36	50	PVC	30-70 (Open hole)	3-13, 141-166	Pfa
RT-7b													0-190	190-196	50	PVC	166-196	3-13, 141-166	Pfa
RT-9	682696.7	6702115.4	59.292	122667	RD2800	10-Jan-06	12-Jan-06	Air Hammer	71	5	150	STL	0-47, 59-71	47-59	50	PVC	n/a	n/a	Pwa
RT-16a	677878.8	6634871.5	102.423	127994	RD2880	09-Jun-07	10-Jun-07	Air Hammer	68	12	200	STL	0-62	62-68	50	PVC	Open hole	55-60	€a
RT-16b	677884.1	6634858.8	102.453	122665	RD2879	03-Jun-07	09-Jun-07	Air Hammer	252	72	150	STL	0-198, 210-216	198-210	50	PVC	185-216	168-178	Pwc
RT-17a	676745.6	6633219.6	101.557	127945	RD2882	17-Jun-07	19-Jun-07	Air Hammer	84	6	150	STL	0-66, 78-84	66-78	100	PVC	60-84 (Open hole)	50-60	€a
RT-17b	676758.7	6633223.9	101.938	127943	RD2881	11-Jun-07	18-Jun-07	Air Hammer	264	90	200	STL	0-236, 248-264	236-248	50	PVC	224-264	214-224	Pwc

Summary of airlift yields (L/s) of RT wells

Stuart Shelf

Regional Target	*Andamooka Limestone*	*Yarloo Shale*	*Arcoona Quartzite (red)*	*Arcoona Quartzite (white)*	*Corraberra Sandstone*	*Tregolana Shale*
RT-1	10	0.1	0.1	0.5-1	1	-
RT-2a	12		>1			
RT-2b	20	-	16.5-38[1]			
RT-3	<0.1					
RT-4a	5					
RT-4b	20-30	0.5-1				
RT-16a	<0.1					
RT-16b	-		<0.5	3-5	>7	-
RT-17a	-					
RT-17b	3		-	-	5	-

Adelaide Geosyncline

Regional Target	*Andamooka Limestone*	*Amberoona Formation*	*Bunyeroo Formation*	*ABC Range Quartzite*	*Brachina Formation*	
RT-7	x	~1				
RT-5a	~10					
RT-5b	~50, 5		<0.1	<0.1	<0.1	
RT-9					0.1	

Notes: [1]measured as combination yield form €a and Pws (red)

Summary of groundwater salinity as electrical conductivity (mS/cm) of RT wells

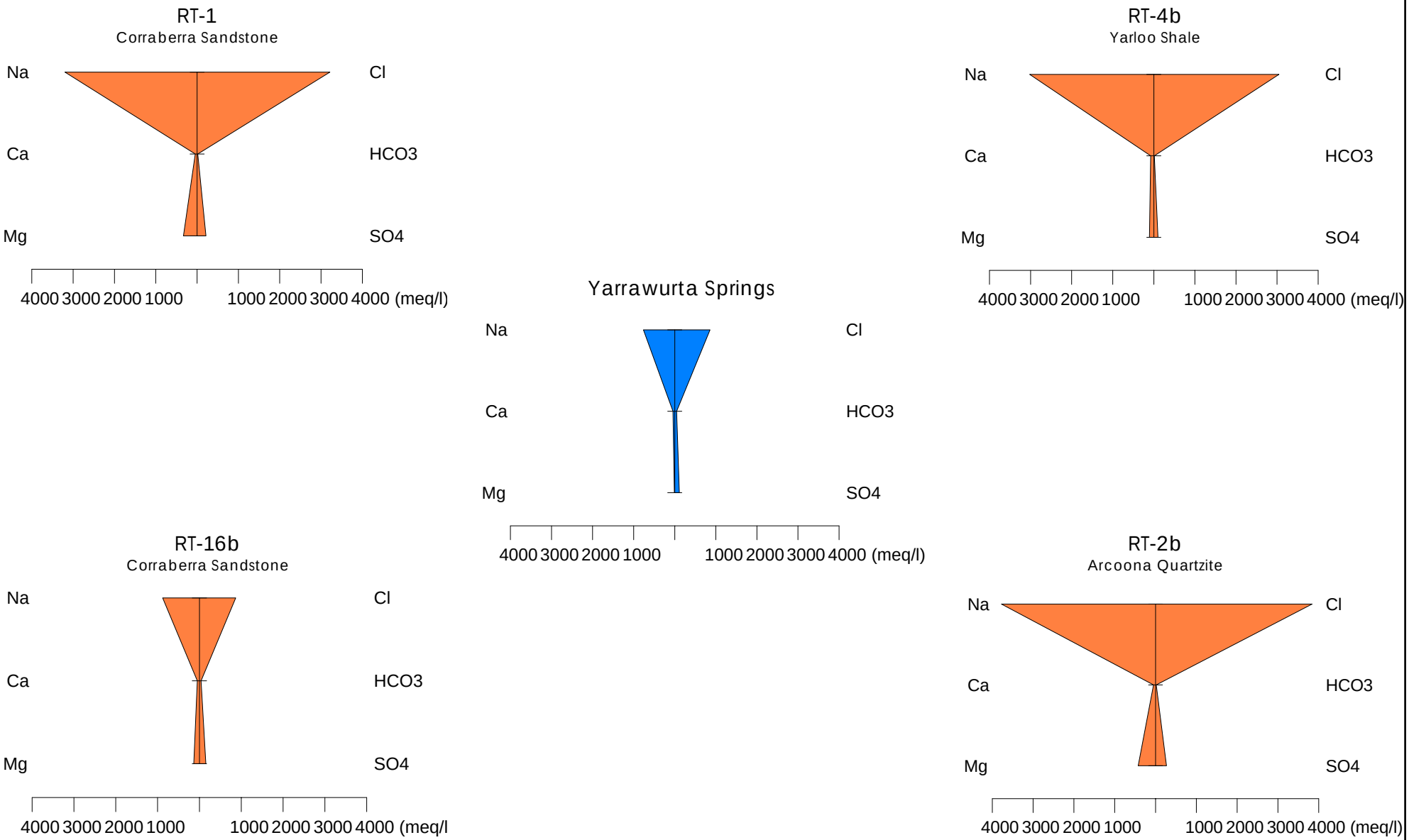
Stuart Shelf

Well Number	*Andamooka Limestone*	*Yarloo Shale*	*Arcoona Quartzite (red)*	*Arcoona Quartzite (white)*	*Corraberra Sandstone*	*Tregolana Shale*
RT-1	47.8-62.1, 107. 5-167.4	68-171.4	46	65-143	94-110	-
RT-2a	34.5-44.7		44.3-68			
RT-2b	35.6-53.7, 104.4-222.3	-	206-223.9			
RT-3						
RT-4a	44.3					
RT-4b	41.5-44, 70.5-76.2	72.9-153				
RT-16a	-					
RT-16b	-		29-40	45-73	67-72	-
RT-17a	-					
RT-17b	28.7-33.7		-	-	75-79.3	-

Adelaide Geosyncline

Well Number	*Andamooka Limestone*	*Amberoona Formation*	*Bunyeroo Formation*	*ABC Range Quartzite*	*Brachina Formation*	
RT-7		76				
RT-5a	89.5					
RT-5b	63.3-74.7, 124.4-217.3		189.6-216.3	210.8-216.7	198.2-216	
RT-9					52.3	

Notes: EC measurements are and accumulation of water within the well column while drilling, there fore when an upper aquifer has not been sealed off this may will the EC measured while drilling through lower formations.

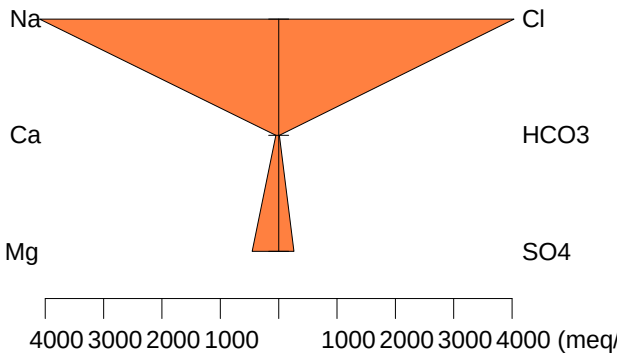


EIS drilling program

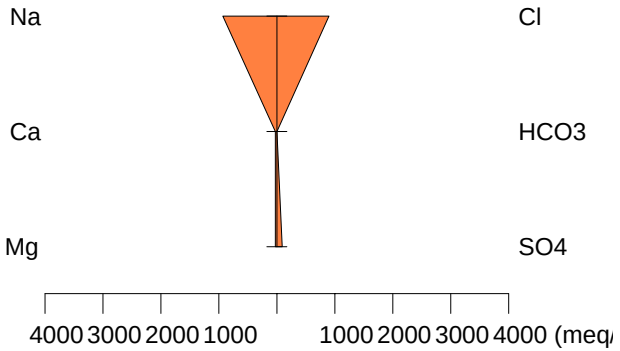
STUART SHELF STIFF PATTERNS

P:\BHP Billiton (EV)\02 (EIS drilling program)\Report\Figures\Figure 4.5 Stiff Plots Stuart Shelf

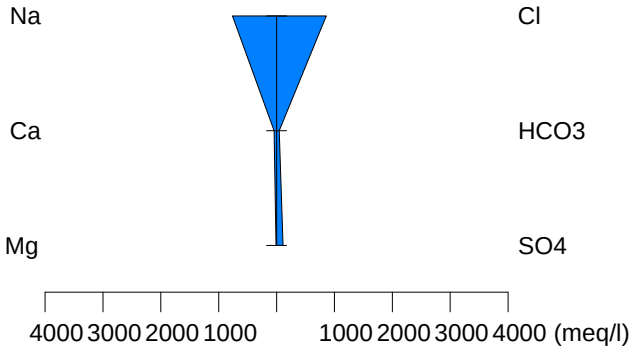
RT-5c
ABC Range Quartzite



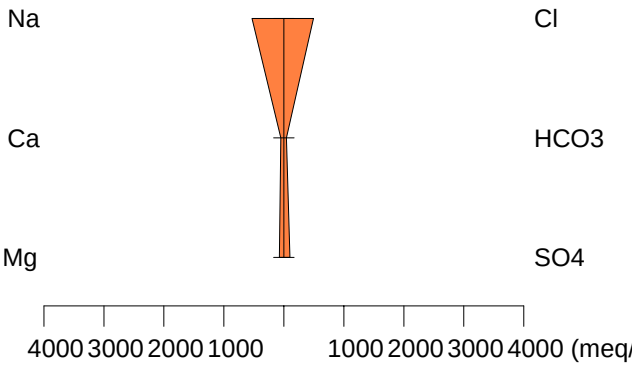
RT-7a
Amberoona Formation



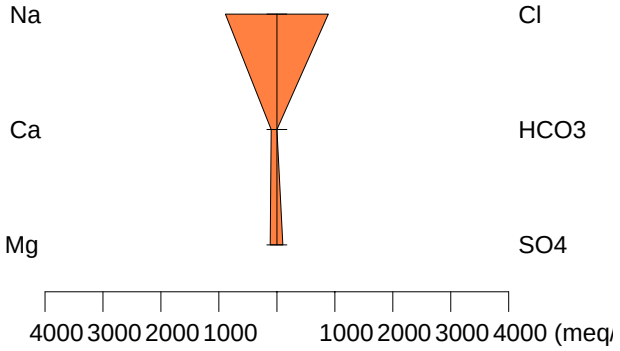
Yarrawurta Springs



RT-9
ABC Range Quartzite

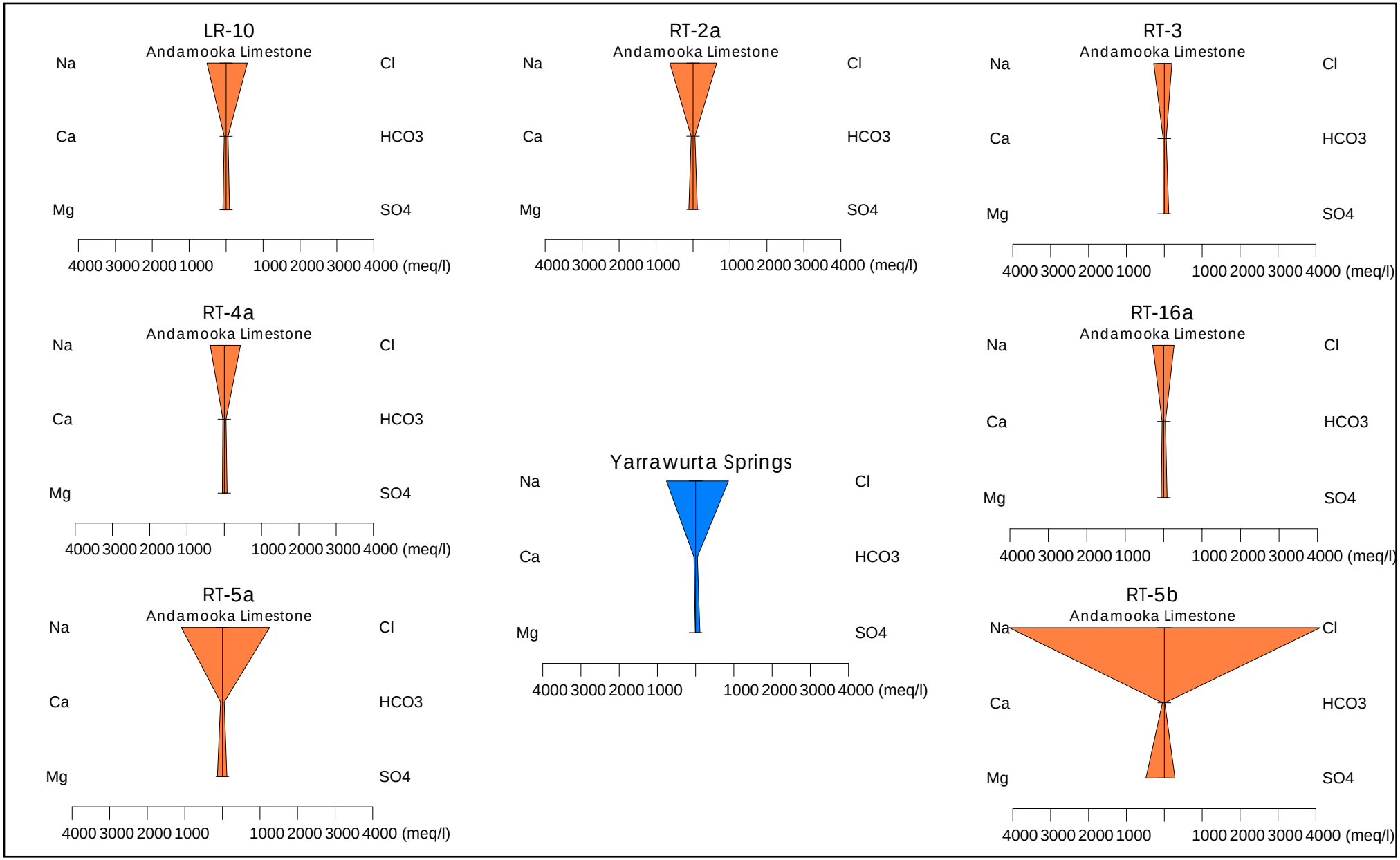


RT-7b
Amberoona Formation



EIS drilling program

ADELAIDE GEOSYNCLINE STIFF PATTERNS



EIS drilling program

ANDAMOOKA LIMESTONE STIFF PATTERNS

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-1/RD2789

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **13/7/07** DATE COMPLETED: **23/7/07**

WELL PERMIT NUMBER: **122678**
TOTAL DEPTH (m bgl): **474m**
REFERENCE POINT (m AHD): **50.08**
STATIC WATER LEVEL
Date: **20/7/07** Depth (m bgl): **23.996**
PROJECTION: **GDA94 Zone53**
EASTING: **705542** NORTHING: **6652084**

DRILLING INFO. | MATERIAL PROPERTIES | FIELD RECORDS / CONSTRUCTION INFO.

METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	17.5"	0.40		0.0		QUATERNARY SEDIMENTS: Red clay with calcarious sandy silt	Qh					PVC Stickup	
		0.55		10.0		QUATERNARY SEDIMENTS: Interbedded layers of brown, yellow and grey-green silty clay, with minor gypsum inclusions						12" STL surface casing 0-6m, grouted 0-6m	
		0.60		20.0		QUATERNARY SEDIMENTS: Grey-green/brown calcarious sandy-clay							
		0.60		30.0		QUATERNARY SEDIMENTS: Brown silty-clay, with grey-green clay							
		0.43				ANDAMOOKA LMST: White limestone with minor brown silt		wc	3.0	55			
		0.38		40.0		ANDAMOOKA LMST: Plasticy grey-green clay with brown silt, highly calcarious and limestone			4.0	55			
		0.40				ANDAMOOKA LMST: White-light grey consolidated limestone and grey dolomite			4.0	49			
		0.46		50.0		ANDAMOOKA LMST: White consolidated limestone with 50% red shale and minor green shale			5.0	62			
		0.40				ANDAMOOKA LMST: White consolidated limestone with pink and green marbalised dolomite			5.0	50			
		0.33		60.0		ANDAMOOKA LMST: Grey dolomite with green-pink and white dolomitic limestone			5.0	48			
		0.33							5.0	49			
		0.35		70.0					5.0	50			
		0.33							5.0	52			
		0.35		80.0					5.0	108			
		0.33						wc	6.0	108			
		0.35		90.0					6.0	118			
		0.25							7.0	110			
		0.32		100.0					7.0	125			
		0.27							7.0	132			
		0.26		110.0					7.0	135			
		0.25							8.0	113			
		0.30		120.0		ANDAMOOKA LMST: Grey dolomite			8.0	124			
						ANDAMOOKA LMST: Grey dolomite with visible macropores and minor pink and dary grey sandstone			8.0	156			
		0.26		130.0				wc	10.0	168			
		0.22				ANDAMOOKA LMST: Dark grey and pink dolomite			10.0	167			
		0.19		140.0		ANDAMOOKA LMST: Dark grey dolomite with red and grey shale			10.0	116			
		0.21				YARLOO SHALE: Dark grey/red shale and grey shale			10.0	171			
		0.46		150.0					10.0	145			
		0.40							10.0	152			
	12"	0.32		160.0									
				170.0									
				180.0									

LOGGED: K Furness DATE: 23/7/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-1/RD2789

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **13/7/07** DATE COMPLETED: **23/7/07**

WELL PERMIT NUMBER: **122678**
TOTAL DEPTH (m bgl): **474m**
REFERENCE POINT (m AHD): **50.08**
STATIC WATER LEVEL
Date: **20/7/07** Depth (m bgl): **23.996**
PROJECTION: **GDA94 Zone53**
EASTING: **705542** NORTHING: **6652084**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer air	8"	0.17		190.0		YARLOO SHALE: Mainly red quartzite and white quartzite, minor red shale and grey/green shale	Pwx		10.0	162			8" STL pre-collar 0-192m, grouted 186-192m
		0.75		200.0		YARLOO SHALE: Red shale with grey/green quartzite and shale			10.0	164			
		0.86		210.0		YARLOO SHALE: Red shale with minor grey/green shale			0.1	68			
		1.00		220.0		YARLOO SHALE: Grey shale with mica and red shale, minor red and white quartzite at 240m							
		1.00		230.0									
		0.86		240.0									
		0.67		250.0									
		0.86		260.0					0.1	70			
		0.75		270.0									
		0.75		280.0		YARLOO SHALE: Grey/green shale, red shale, more quartzite, ligher at 302m							
		0.75		290.0									
		0.67		300.0									
		0.55		310.0									
		0.60		320.0									
		0.38		330.0		ARCOONA QTZT (RD): Red shale, red quartzite, grey shale with mica, minor white quartzite							
		0.43		340.0									
		0.50		350.0		ARCOONA QTZT (RD): White quartzite with red shale and red quartzite							
		0.60		360.0		ARCOONA QTZT (RD): Red shale, grey shale, some red and							
		0.60											
		0.60											
		0.67											
		0.60											
		0.60											
		0.60											
		0.67											
		0.60											
		0.60											
		0.60											
		0.55											
		0.60											

LOGGED: K Furness DATE: 23/7/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

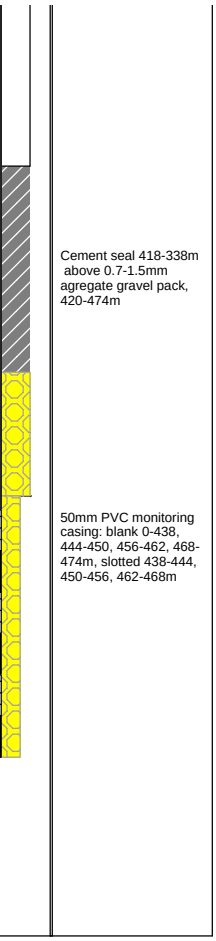
RT-1/RD2789

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **13/7/07** DATE COMPLETED: **23/7/07**

WELL PERMIT NUMBER: **122678**
TOTAL DEPTH (m bgl): **474m**
REFERENCE POINT (m AHD): **50.08**
STATIC WATER LEVEL
Date: **20/7/07** Depth (m bgl): **23.996**
PROJECTION: **GDA94 Zone53**
EASTING: **705542** NORTHING: **6652084**

DRILLING INFO. | MATERIAL PROPERTIES | FIELD RECORDS / CONSTRUCTION INFO.

METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
		0.60		370.0		white quartzite			0.1	82			
		0.46				ARCOONA QTZT (RD): Grey quiartzite, fractured	Pws (red)						
		0.60		380.0		ARCOONA QTZT (RD): Mainly red quartzite and red shale, minor white quartzite, with % white sandstone increasing from 380m							
		0.60		390.0									
		0.60											
		0.60		400.0									
		0.50		410.0		ARCOONA QTZT (RD): Red and white quartzite, red shale, red and 10% white sandstone			0.1	46			
		0.55				ARCOONA QTZT (RD): Green/grey, white and red quairtzite with white sandstone							
		0.46		420.0				wc					
		0.55		430.0		ARCOONA QTZT (WHT): Hard fractured red quiartzite with grey-green quartzite	Pws (white)		0.5	75	Fracture at 421, 423 and 426.5m		
		0.46				ARCOONA QTZT (WHT): Green/grey, white and red quairtzite with white and pink sandstone			0.5	65			
				440.0				wc					
		0.32				ARCOONA QTZT (WHT): White-grey quartzite, fractured			1.0	143	Fracture at 437m and 439-440m		
		0.29		450.0		ARCOONA QTZT (WHT): White and pink fine grained, hard sandstone, with green quartzite and minor shale			1.0	100			
	6"	0.19					Pwc		1.0	100			
		0.24		460.0		ARCOONA QTZT (WHT): Grey/green shale			1.0	107			
		0.32				CORRABERRA SDST: White and green quartzite fused sandstone (fine grained, hard), with pyrite at 458-460.	Pwm		1.0	94			
		0.29		470.0		TREGOLANA SHALE: Dark grey shale and minor dark red sandstone			1.0	105			
				480.0		EOH at 474m			1.0	110			
				490.0									
				500.0									



LOGGED: K Furness DATE: 23/7/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-2a/RD2790

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **JND**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **17/11/06** DATE COMPLETED: **28/6/07**

WELL PERMIT NUMBER: **122684**
TOTAL DEPTH (m bgl): **295**
REFERENCE POINT (m AHD): **95.58**
STATIC WATER LEVEL
Date: **5/7/07** Depth (m bgl): **55.19**
PROJECTION: **GDA94 Zone53**
EASTING: **691418** NORTHING: **6656145**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer air	12" 10"	0.20 0.40 0.53 0.53 0.53 0.53 0.53 0.27 0.27 0.27 0.27 0.53 0.27 0.32	150 155 275 280 300	0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0		QUATERNARY SEDIMENTS: Fine to coarse, red/brown, some coarse gravel BULLDOG SHALE: Light brwn/gry clay w brwn/yllw shale BULLDOG SHALE: Light grey to blue/green shales & clays BULLDOG SHALE: Light brown to red & grey, minor brown clay BULLDOG SHALE: Light grey BULLDOG SHALE: Sudden change of colour of cuttings at 32m. Fragments vary from brown/red to grey (siltstone) BULLDOG SHALE: Light brown BULLDOG SHALE: Grey & dark brwn/rd layers of shale/siltstone. Light grey shale band at 71-72m ANDAMOOKA LMST: Dolomitic crystalline. Grey/blue to white, light pink sdst layer at 103m to 104m ANDAMOOKA LMST: Light pink & wht, interlayered with bands of shale, dark brown/red & light grey. Heavy shale at 110m-112m ANDAMOOKA LMST: As above, reduced amount of red/brown shale ANDAMOOKA LMST: White broken ground from 116-118, light pink sdst at 118m ANDAMOOKA LMST: Large lmst rocks, grey, up to 4cm, dolomitic veins ANDAMOOKA LMST: White, large fragments up to 2cm & some pink, light green stained, some gypsum, light green clay present ANDAMOOKA LMST: As above w dark brown/red shale 132 - 138m, limestone has a green stain. Possibly marks the top of the transitional zone	Q Kmb Ca	wc wc wc	0.5 3.8 3.8 6 6 6	35 36 36 40 36 36 38	cavity poor returns cavity	Well cover 10" STL surface casing 0-7m, grouted 5-7m 8" STL pre-collar 0-25m, grouted 23-25m Bentonite/grout seal (80-102m) held suspended via basket 50mm Diam class 18 PVC casing from 0-113.5. Slotted 50mm Diam PVC from 113.5-119.5 Cement seal at 122m in cavity (below casing)	

LOGGED: J van den Akker DATE: 17/05/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-2a/RD2790

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **JND**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **17/11/06** DATE COMPLETED: **28/6/07**

WELL PERMIT NUMBER: **122684**
TOTAL DEPTH (m bgl): **295**
REFERENCE POINT (m AHD): **95.58**
STATIC WATER LEVEL
Date: **5/7/07** Depth (m bgl): **55.19**
PROJECTION: **GDA94 Zone53**
EASTING: **691418** NORTHING: **6656145**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.						
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	6"	0.15	250	160.0		ANDAMOOKA LMST: cavity 139-142m			>6	41			
						ANDAMOOKA LMST: White, minor gypsum, contains moderate brittle light green limestone, minor green clays and calcite, contains some pink quartzite fragments			12	43			
		0.15	210	170.0		ANDAMOOKA LMST: None to minor returns. As above			12	42			
		0.11		180.0		ARCOONA QTZT (RD): As above- mixture of cuttings.: white & pink Qtz + green & white lmst			12	45	poor returns		
		0.13							10-12	44			
		0.13		190.0		ARCOONA QTZT (RD): Increase in dark gry qtzt 195 to 201m. Pink qtzt at ~190m. Still a moderate amount of lmst (Large fragments)			10-12	44			
		0.06	370	200.0					10-12	45			
		0.08	300	210.0		ARCOONA QTZT (RD): Qtzt, dark grey and white, some pink. Moderate lmst- contamination? Broken ground 218-220m, producing large fragments of gry & wht lmst, & calcite at 218-222m.			10-12	50			Hole backfilled with cuttings from 122-295m
		0.32	360	220.0				wc		57			
		0.27	350						10-12	58	no cuttings		
		0.27	360	230.0		ARCOONA QTZT (RD): Wht & gry/brwn qtzt, some pink, with shale, rd/brwn, micaceous, distinct shale layer at 232m			12	66	no cuttings		
		0.18	360	240.0		ARCOONA QTZT (RD): Dark grey/brown and white. Shale % increases with depth, micaceous, some lmst still present at 258-270m (contamination?) but mostly shale.	Pws		12	63			
		0.20		250.0					>12	65	no cuttings 246-254m		
		0.18	450						>12	68			
		0.18	490	260.0					>12	68			
		0.15	450	270.0		ARCOONA QTZT (RD): Mostly shale, dark red/brown and grey, micaceous, interbeded within quartzite, dark grey/brown, white and red/pink			>12				
			450	280.0					>12	64			
			500	290.0					>12	68			
				300.0		EOH at 295m							

LOGGED: J van den Akker DATE: 17/05/07

CHECKED: _____ DATE: _____

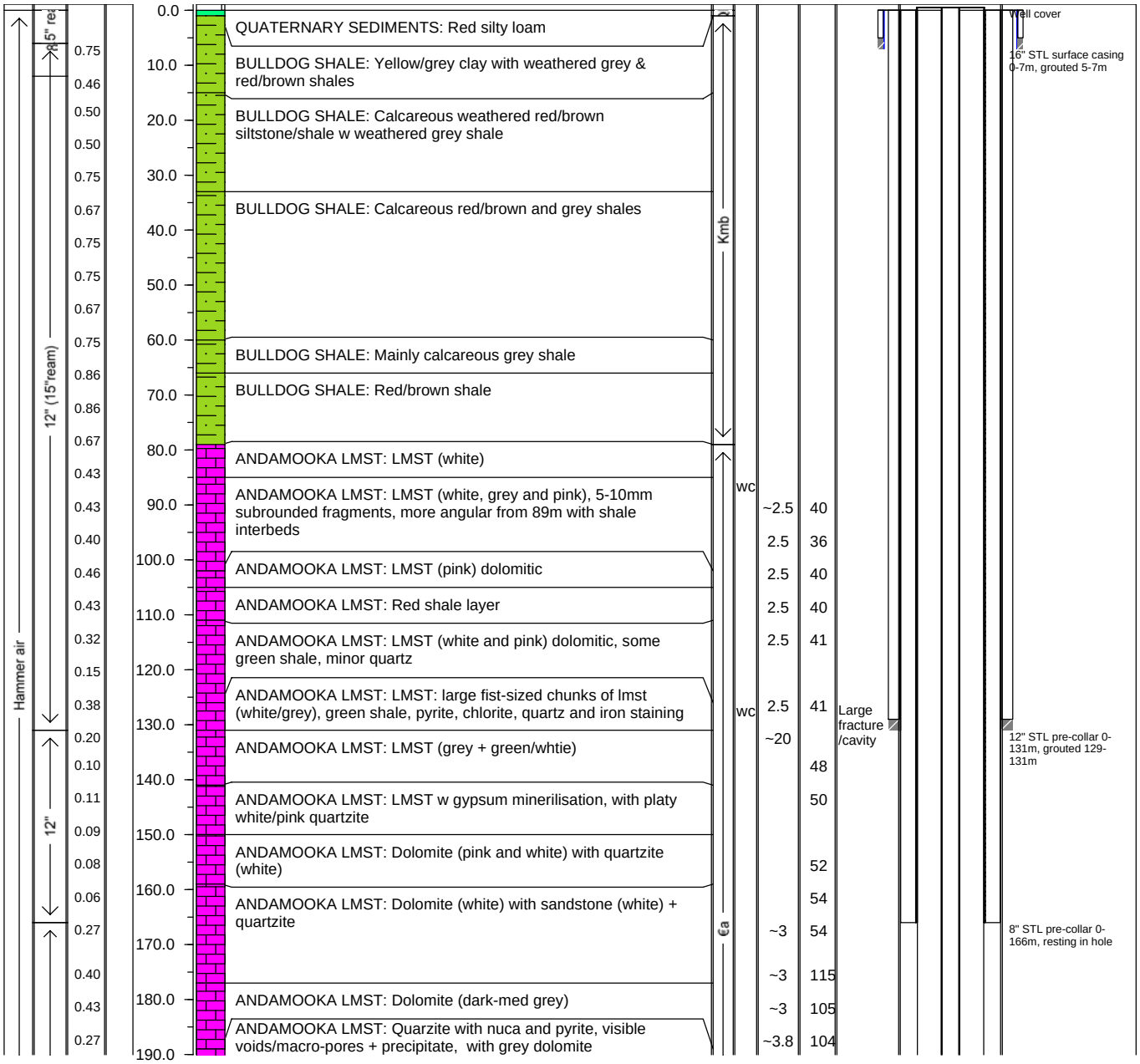
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-2b/RD2883

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **JND**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **29/6/07** DATE COMPLETED: **12/07/07**

WELL PERMIT NUMBER:
TOTAL DEPTH (m bgl): **295**
REFERENCE POINT (m AHD): **95.56**
STATIC WATER LEVEL
Date: **5/7/07** Depth (m bgl): **55.19**
PROJECTION: **GDA94 Zone 54**
EASTING: **691848** NORTHING: **6656794**



LOGGED: D Currie DATE: 17/05/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-2b/RD2883

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **JND**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **29/6/07** DATE COMPLETED: **12/07/07**

WELL PERMIT NUMBER:
TOTAL DEPTH (m bgl): **295**
REFERENCE POINT (m AHD): **95.56**
STATIC WATER LEVEL
Date: **5/7/07** Depth (m bgl): **55.19**
PROJECTION: **GDA94 Zone 54**
EASTING: **691848** NORTHING: **6656794**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	8"	0.35	650	200.0		ANDAMOOKA LMST: Dolomite + Quartzite with pyrite and precipitate, visivle macro-pores		wc	8-10	206			
		0.50							>15	215			
		0.32		210.0		ANDAMOOKA LMST: Dolomite (grey/tan) with minor quartzite and mica		wc	>20	216			
		0.30						wc	>20	217			
		0.27		220.0		ARCOONA QTZT (RD): Dolomite (grey, shale (red), quartzite 9red) and minor sandstone			>20	222			
		0.25							>20	208			
		0.29		230.0		ARCOONA QTZT (RD): Quartzite (red) with sandstone (red) + shale (red)			>20	220			
		0.27							>20	217			
		0.33		240.0		ARCOONA QTZT (RD): Dolomite (grey0 ~50%, sandstone 9red), quartxite (white and red)			16.5	219			
		0.27				ARCOONA QTZT (RD): Mainly Shale (red) with sandstone (red), quartzite (white) and little dolomite			16.5	220			
		0.29		250.0					24	224			
		0.32		260.0		ARCOONA QTZT (RD): Calcarious shale (grey) with mica inclusions, shale (red) and quartzite (white)			21	215			
		0.30				ARCOONA QTZT (RD): Shale (red) with white quartzite and santstone			26	219			
		0.32		270.0					32				
						ARCOONA QTZT (RD): Dolomite (grey), shale (grey-green) with quartzite			28	220			
		0.32		280.0					28	209			
		0.29				ARCOONA QTZT (RD): Shale (red), quartzite (red) with minor sandstone (red)			28	211			
		0.27		290.0		ARCOONA QTZT (RD): Shale (grey-green, minor red), and quartzite (white)			28	211			
		0.30							28	212			
		0.30		300.0		ARCOONA QTZT (RD): Shale (mainly red) with quartzite (white) and porous sandstone (red)			28	208			
		0.29							28	206			
		0.25		310.0		ARCOONA QTZT (RD): Shale (grey-green, minor red), with white quartzite (white)			30	207			
		0.26							30	206			
		0.30		320.0		ARCOONA QTZT (RD): Shale (red), with sandstone (red) and quartzite (red, minor white)			28	210			
		0.25							32	207			
		0.23		330.0					38	206			
				340.0		EOH at 342m							
				350.0									

Pws

Bentonite/grout seal 270-316m above gravel pack 318-242m

50mm Diam class 18 PVC casing blank 0-330m, slotted 330-342m

LOGGED: D Currie DATE: 17/05/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

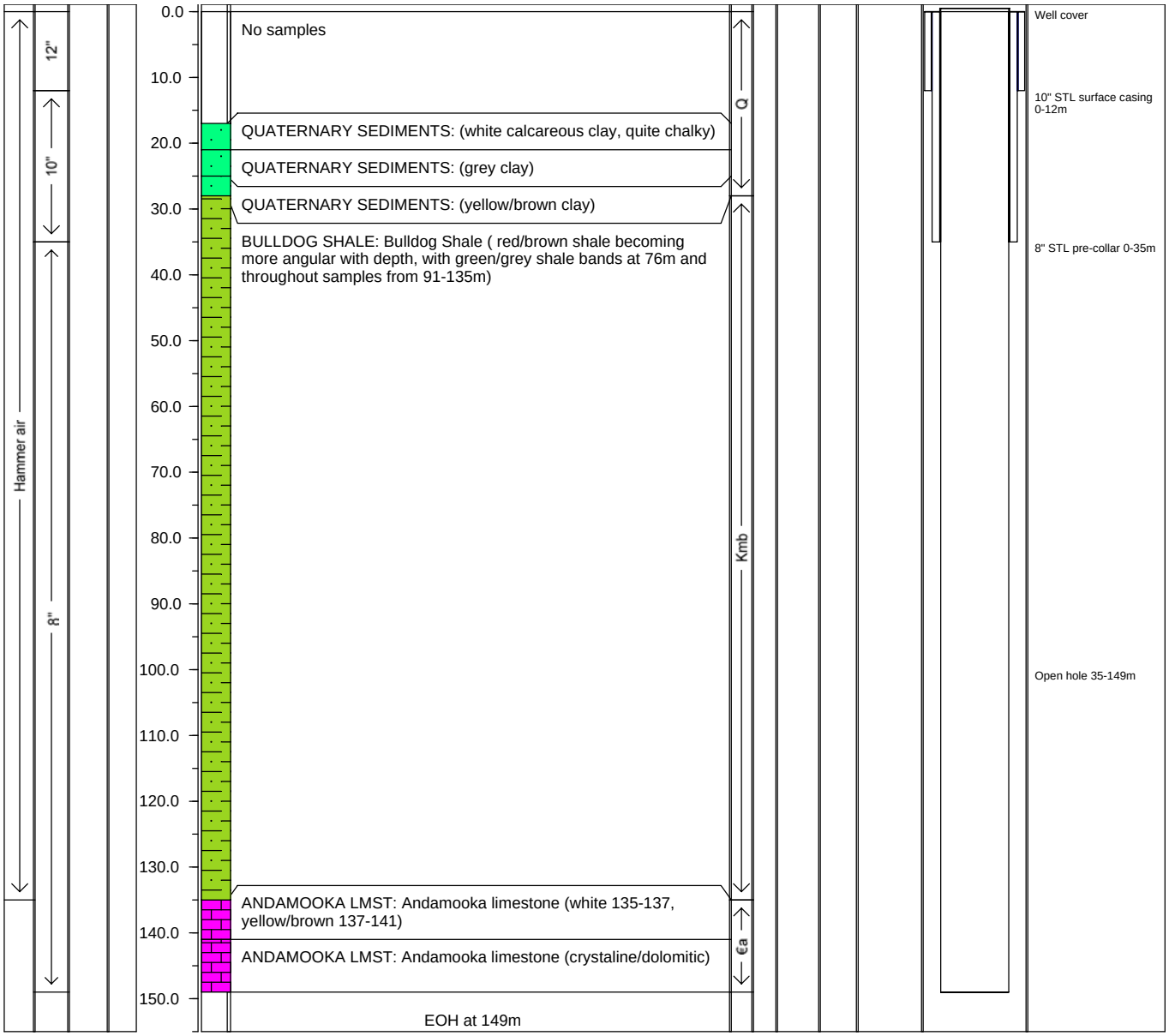
BOREHOLE / WELL NUMBER

RT-3/RD2791

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **JND**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **12/12/06** DATE COMPLETED: **17/12/06**

WELL PERMIT NUMBER: **122656**
TOTAL DEPTH (m bgl): **149**
REFERENCE POINT (m AHD): **100.82**
STATIC WATER LEVEL
Date: **18/9/07** Depth (m bgl): **59.92**
PROJECTION: **GDA94 Zone53**
EASTING: **696948** NORTHING: **6666399**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: J van den Akker DATE: 17/12/06

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-4a/RD2792

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **21/8/07** DATE COMPLETED: **23/8/07**

WELL PERMIT NUMBER: **122677**
TOTAL DEPTH (m bgl): **58**
REFERENCE POINT (m AHD): **72.16**
STATIC WATER LEVEL
Date: **24/8/07** Depth (m bgl): **32.2**
PROJECTION: **GDA94 Zone53**
EASTING: **711502** NORTHING: **6668733**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer air	8"	1.00		0.0		QUATERNARY SEDIMENTS: Cream-light brown silt/ silty clay, some gravels and gypsum crystals	Qh					PVC Stickup	
		0.40		10.0		QUATERNARY SEDIMENTS: Light grey silt/silty clay						8" STL surface casing 0-6m, grouted 4-6m	
		0.19		20.0		ANDAMOOKA LMST: Yellow-tan limestone, some grey clay and gypsum at 18-22m	Ea					Cement seal 22-42m above basket at 42m	
		0.22		30.0		ANDAMOOKA LMST: Cream, pink and minor yellow limestone							
	6"	0.21		40.0		ANDAMOOKA LMST: Cavity (no returns).		wc	5		Cavity 44-58m	50mm PVC monitoring casing: blank 0-42, open hole 42-58m	
		0.38		50.0									
		0.24		60.0		EOH at 58m			5	44			

LOGGED: T McCarthy DATE: 23/8/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-4b/RD2793

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **10/8/07** DATE COMPLETED: **22/8/7**

WELL PERMIT NUMBER: **122681**
TOTAL DEPTH (m bgl): **522**
REFERENCE POINT (m AHD): **72.22**
STATIC WATER LEVEL
Date: **11/8/07** Depth (m bgl): **31.64**
PROJECTION: **GDA94 Zone53**
EASTING: **711502** NORTHING: **6668733**

DRILLING INFO. | MATERIAL PROPERTIES | FIELD RECORDS / CONSTRUCTION INFO.

METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	15" (ream)	0.36		0.0		QUATERNARY SEDIMENTS: Light gery clay, non-calcarious, and red silt with mica and gypsum 0-2m	Qh					PVC Stickup	16" STL surface casing 0-6m, grouted 0-6m
		0.33		10.0									
		0.50		20.0		QUATERNARY SEDIMENTS: Grey clay/silt, non-calcarious , with gypsum							
		0.30		30.0		ANDAMOOKA LMST: Tan limestone with red siltstone, grey clay and gypsum							
		0.30		40.0									
		0.27				ANDAMOOKA LMST: Tan limestone							
		0.46		50.0				wc	20-30	42	Cavitey 44-50m		
		0.86				ANDAMOOKA LMST: Pink, some white and tan limestone			20-30	43			
		0.24		60.0					20-30	43			
		0.23				ANDAMOOKA LMST: Cavity (no returns)		wc	20-30		Fracture 64-65m		
				70.0		ANDAMOOKA LMST: white, pink and tan limestone. Highly mineralised- gypsum, pyrite, petrified wood							12" STL pre-collar 0-72m, resting in hole
	12"	0.30		80.0					0.5	43			
		0.30				ANDAMOOKA LMST: Dark grey/red limestone with green shale, gypsum, pyrite and chlorite			0.5	44			
		0.25		90.0					3	44			
		0.24				ANDAMOOKA LMST: White limestone and pink dolomite			3	44			
		0.27		100.0					3	44			
		0.23				ANDAMOOKA LMST: White limestone and grey dolomite			3	44			
		0.24		110.0					3	44			
		0.21				ANDAMOOKA LMST: Grey dolomite, some white, with green shale at 140-142m, grey/brown sandstone at 144-146m and 152-154m			5	44			
		0.21		120.0					5	44			
				130.0									
				140.0									
				150.0					5-7	71			
		0.18							5-7	76			
		0.14		160.0					5-7	73			
				170.0		YARLOO SHALE: Red-brown to purple shale (~60%) and grey shale (~40%), hard to very hard, medium plasticity. Minor cream-pink quartzite at 194-200m and 288-290m. Grading to brown with minor grey shale from 344m.	Ca					8" STL pre-collar 0-172m, resting in hole
				180.0									
				190.0									Cement plug at base of 8" STL casing
				200.0									
				210.0					0.5	96			
		0.67							0.5				
		0.60		220.0					0.5				
		0.60							0.5				
		0.67		230.0					0.5	77			
		0.60							0.5				
		0.67		240.0					0.5				
		0.55							0.5				
		0.60		250.0					<0.5				
mmer air		0.60		260.0					<0.5				

LOGGED: T McCarthy DATE: 22/8/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-4b/RD2793

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **10/8/07** DATE COMPLETED: **22/8/7**

WELL PERMIT NUMBER: **122681**
TOTAL DEPTH (m bgl): **522**
REFERENCE POINT (m AHD): **72.22**
STATIC WATER LEVEL
Date: **11/8/07** Depth (m bgl): **31.64**
PROJECTION: **GDA94 Zone53**
EASTING: **711502** NORTHING: **6668733**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer	8"	0.60 0.60 0.75 0.50 0.50 0.75 0.55 0.55 0.55 0.60 0.55 0.67 0.67 0.55 0.75 0.60 0.67 0.50 0.60 0.55 0.60 0.50 0.60 0.67 0.55 0.50 0.67 0.60 0.50 0.60 0.55 0.50 0.67 0.75 0.46 0.60 0.60		270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0 490.0 500.0 510.0 520.0 530.0		YARLOO SHALE: Grey-green shale with white to light grey quartzite (~10-30%) and sandstone. Some brown shale. EOH at 522m	Pwx	<0.5 ... 137 ... 153 0.5-1 0.5-1 0.5-1 0.5-1	73			50mm PVC monitoring casing: blank 0-486, 468-474m, slotted 486-552m

LOGGED: T McCarthy DATE: 22/8/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

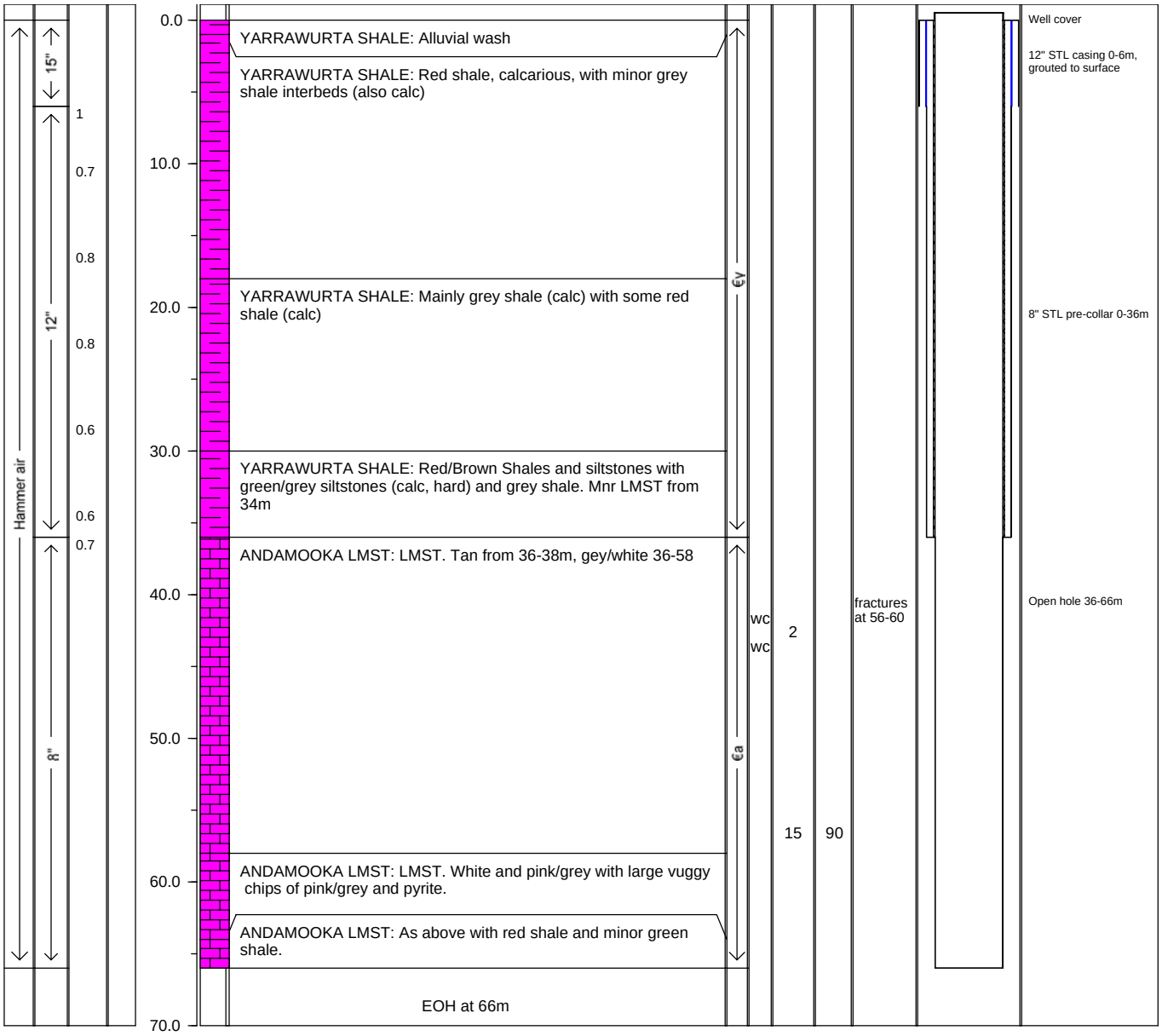
BOREHOLE / WELL NUMBER

RT-5a/RD2795

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB Saline Water Supply**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **7/07/07** DATE COMPLETED: **10/08/07**

WELL PERMIT NUMBER: **122679**
TOTAL DEPTH (m bgl): **66**
REFERENCE POINT (m AHD): **48.82**
STATIC WATER LEVEL
Date: **10/08/07** Depth (m bgl): **10m (approx)**
PROJECTION: **GDA94 Zone 53**
EASTING: **712714** NORTHING: **6661128**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 17/08/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

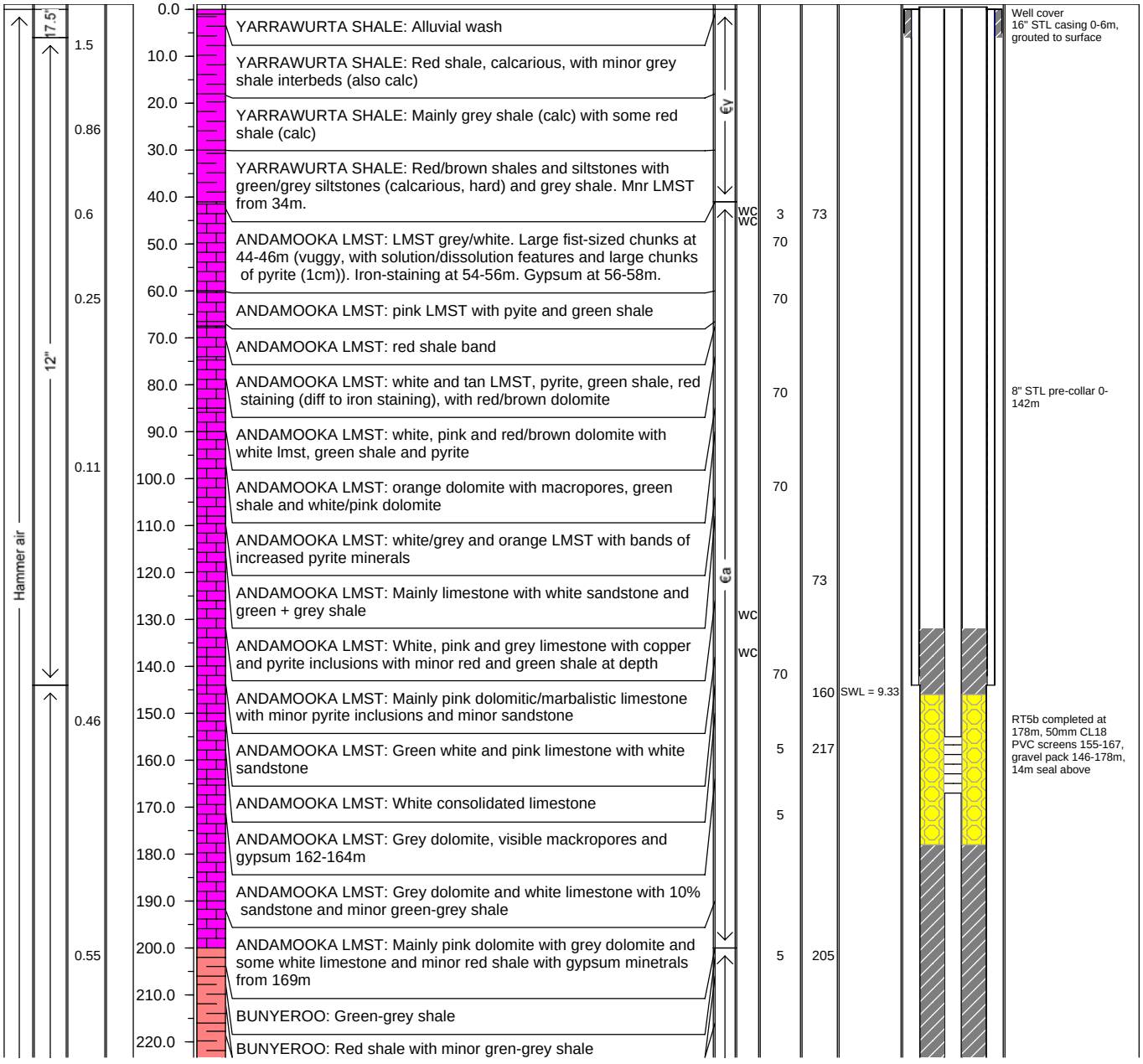
BOREHOLE / WELL NUMBER

RT-5b/c/RD2794

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB Saline Water Supply**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **24/07/07** DATE COMPLETED: **7/08/07**

WELL PERMIT NUMBER: **122680**
TOTAL DEPTH (m bgl): **634**
REFERENCE POINT (m AHD): **48.4757**
STATIC WATER LEVEL
Date: **10/08/07** Depth (m bgl): **b = 22.67m, c = 21.88m**
PROJECTION: **GDA94 Zone 53**
EASTING: **712713.816** NORTHING: **6661127.009**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 17/08/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

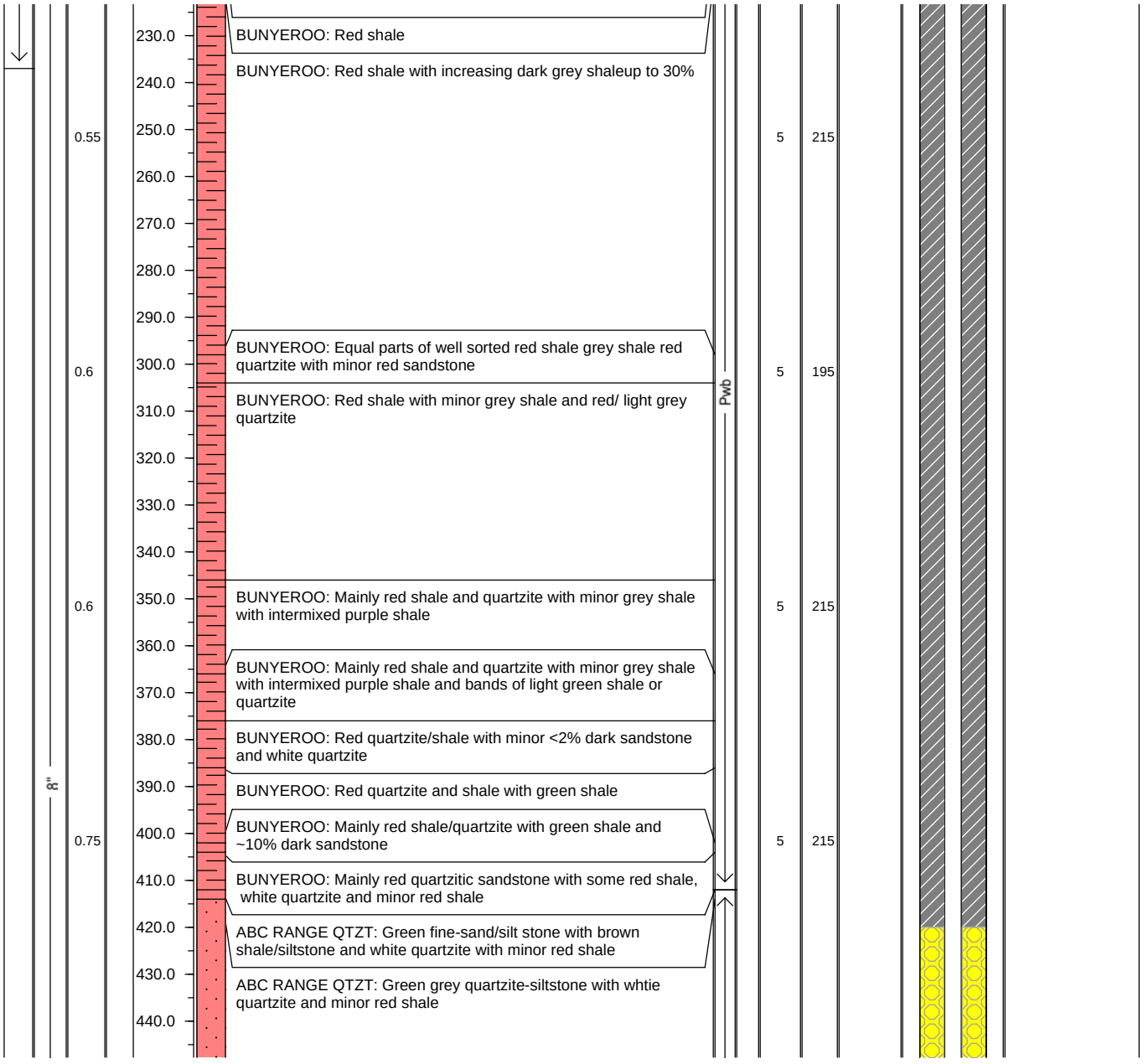
BOREHOLE / WELL NUMBER

RT-5b/c/RD2794

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB Saline Water Supply**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **24/07/07** DATE COMPLETED: **7/08/07**

WELL PERMIT NUMBER: **122680**
TOTAL DEPTH (m bgl): **634**
REFERENCE POINT (m AHD): **48.4757**
STATIC WATER LEVEL
Date: **10/08/07** Depth (m bgl): **b = 22.67m, c = 21.88m**
PROJECTION: **GDA94 Zone 53**
EASTING: **712713.816** NORTHING: **6661127.009**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 17/08/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-5b/c/RD2794

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB Saline Water Supply**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **24/07/07** DATE COMPLETED: **7/08/07**

WELL PERMIT NUMBER: **122680**
TOTAL DEPTH (m bgl): **634**
REFERENCE POINT (m AHD): **48.4757**
STATIC WATER LEVEL
Date: **10/08/07** Depth (m bgl): **b = 22.67m, c = 21.88m**
PROJECTION: **GDA94 Zone 53**
EASTING: **712713.816** NORTHING: **6661127.009**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
		0.5		450.0					5	206			
				460.0		ABC RANGE QTZT: Green-grey squartzite, white quartzite with minor red and green-grey shale + pyrite, all well sorted								
				470.0									
				480.0									
				490.0		ABC RANGE QTZT: Green-grey shale, white quartzite, green-grey quartzite and minor red shale							
		0.5		500.0		ABC RANGE QTZT: As above with increased red shale	Pwa		5	202			RT5c completed at 634m , alternating screen/blank 50mm CL18 PVC screens 502-634, gravel pack 420-634m, cement seal above gravel 178-420m
				510.0		ABC RANGE QTZT: Green-grey shale, white quartzite, green-grey quartzite and minor red shale							
				520.0									
				530.0									
				540.0		ABC RANGE QTZT: Whtie and green quartzite with purple shale and very monore green-grey shale							
		0.43		550.0					5	210			
				560.0									
				570.0									
				580.0									
				590.0									
		0.5		600.0		BRACHINA FORMATION: Mainly Purple shale with minor quartzites	Pwr		5	215			
				610.0									
				620.0		BRACHINA FORMATION: White and light green quartzite minor purple shale and very minor green grey shale							
				630.0									
		0.25		640.0		EOH at 634m			5				

LOGGED: K Furness DATE: 17/08/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-7a/b/RD2937

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **24/8/07** DATE COMPLETED: **29/8/07**

WELL PERMIT NUMBER: **122680**
TOTAL DEPTH (m bgl): **198**
REFERENCE POINT (m AHD): **65.01**
STATIC WATER LEVEL
Date: **24/8/07** Depth (m bgl): **14**
PROJECTION: **GDA94 Zone53**
EASTING: **732711** NORTHING: **6666160**

DRILLING INFO. | MATERIAL PROPERTIES | FIELD RECORDS / CONSTRUCTION INFO.

METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer air	17.5"	0.83		0.0		QUATERNARY SEDIMENTS: Silty/silty clay - light brown/cream, some sands and gravels throughout, calcareous	Qh			74		PVC Stickup	
		0.67		10.0		QUATERNARY SEDIMENTS: Silty/silty clay - cream/light brown, gravels throughout, some sandstone and gypsum, calcareous		wc				16" STL surface casing 0.6m, resting in hole	
		1.00		20.0		QUATERNARY SEDIMENTS: Silty clay - brown, low plasticity, non calcareous			~1			8" STL pre-collar 0-10m, resting in hole	
		3.00		30.0		QUATERNARY SEDIMENTS: Clayey silt- light brown/cream				73		Cement/bentonite seal 3-13m on gravel pack 13-30m	
		1.00		40.0		AMBEROONA FORMATION: Shale - light brown/grey, heavily weathered				67		Gravel bridge at 30m, void 30-141m	
		1.67		50.0		AMBEROONA FORMATION: Shale - grey, heavily weathered				74		First 50mm PVC monitoring casing: blank 0-24m, slotted 24-36m	
		2.50		60.0		AMBEROONA FORMATION: Shale - grey				76			
		3.17		70.0		AMBEROONA FORMATION: Shale - grey/black, non carbonatious				77			
		2.17		80.0		AMBEROONA FORMATION: Grey/black, some clay fines, sansdtone and limestone fines throughout, iron oxide staining on some sandstone/limestone fines, carbonatious fines, shale non carbonatious				56			
		2.17		90.0						72			
		2.17		100.0						74			
		3.00		110.0						74			
		3.67		120.0						52			
		3.67		130.0						74			
		1.67		140.0			Pfa			77			
	6"	2.33		150.0						76			
		1.50		160.0						75			
		2.50		170.0						82			
		2.67		180.0						77			
		2.50		190.0						74			
		2.67		200.0		EOH at 198m				74		Cement/bentonite seal 141-166m on gravel pack 166-196m	
		2.83								76			
		2.83								78			
		2.83								74			
		2.83								75			
		1.67								75			
		1.50								74			
		1.33								74		Second 50mm PVC monitoring casing: blank 0-190m, slotted 190-196m	
		3.67								81			
		7.83								87			
		2.83								83		Collapsed hole 196-198m	

LOGGED: T McCarthy DATE: 29/8/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

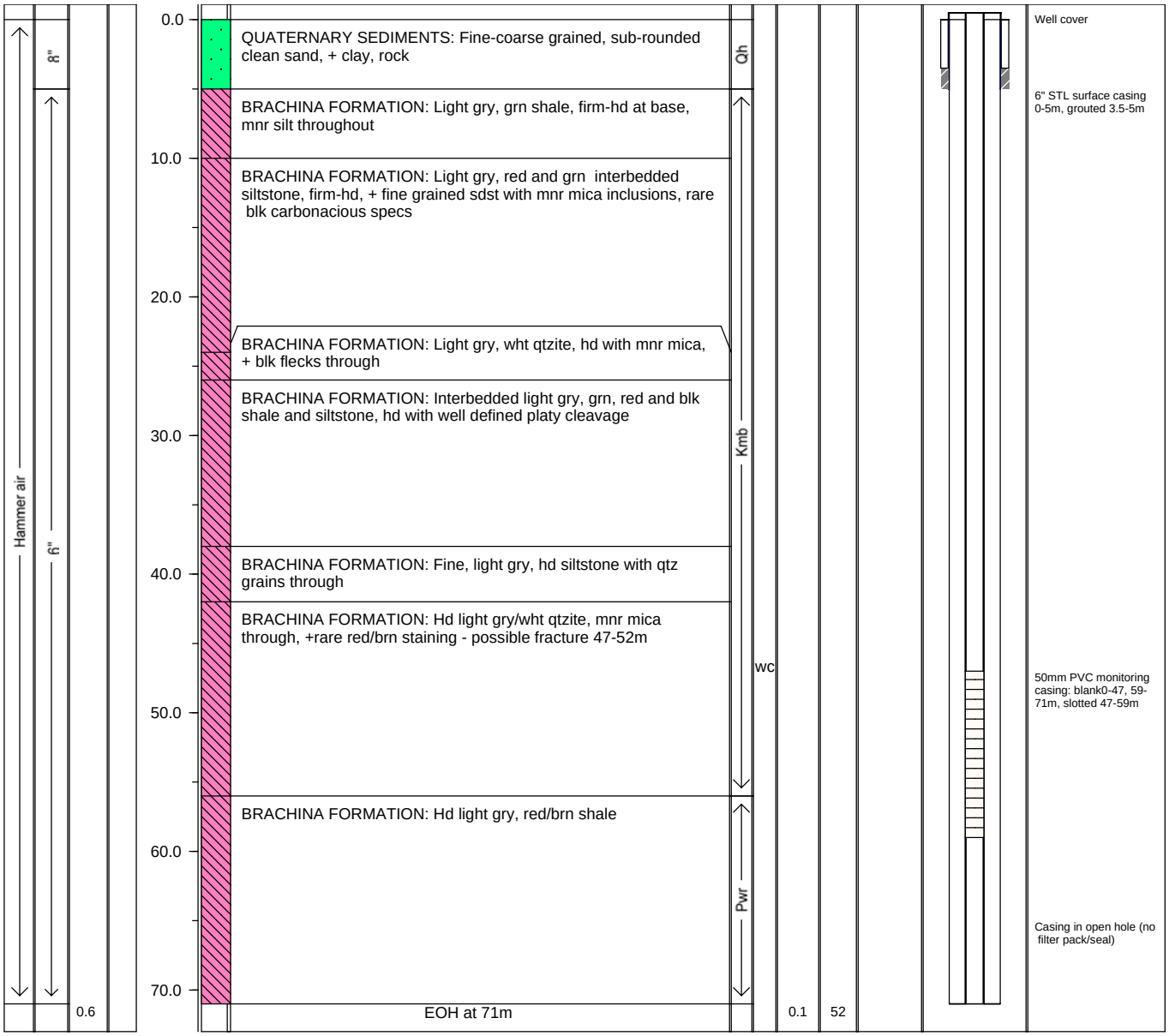
BOREHOLE / WELL NUMBER

RT-9/RD 2800

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **JND**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **10/01/07** DATE COMPLETED: **12/01/07**

WELL PERMIT NUMBER: **122667**
TOTAL DEPTH (m bgl): **71**
REFERENCE POINT (m AHD): **59.292**
STATIC WATER LEVEL
Date: **12/01/07** Depth (m bgl): **51.97 mTOC**
PROJECTION: **GDA94 Zone 54**
EASTING: **682097** NORTHING: **6701878**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: R Martin DATE: 07/06/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

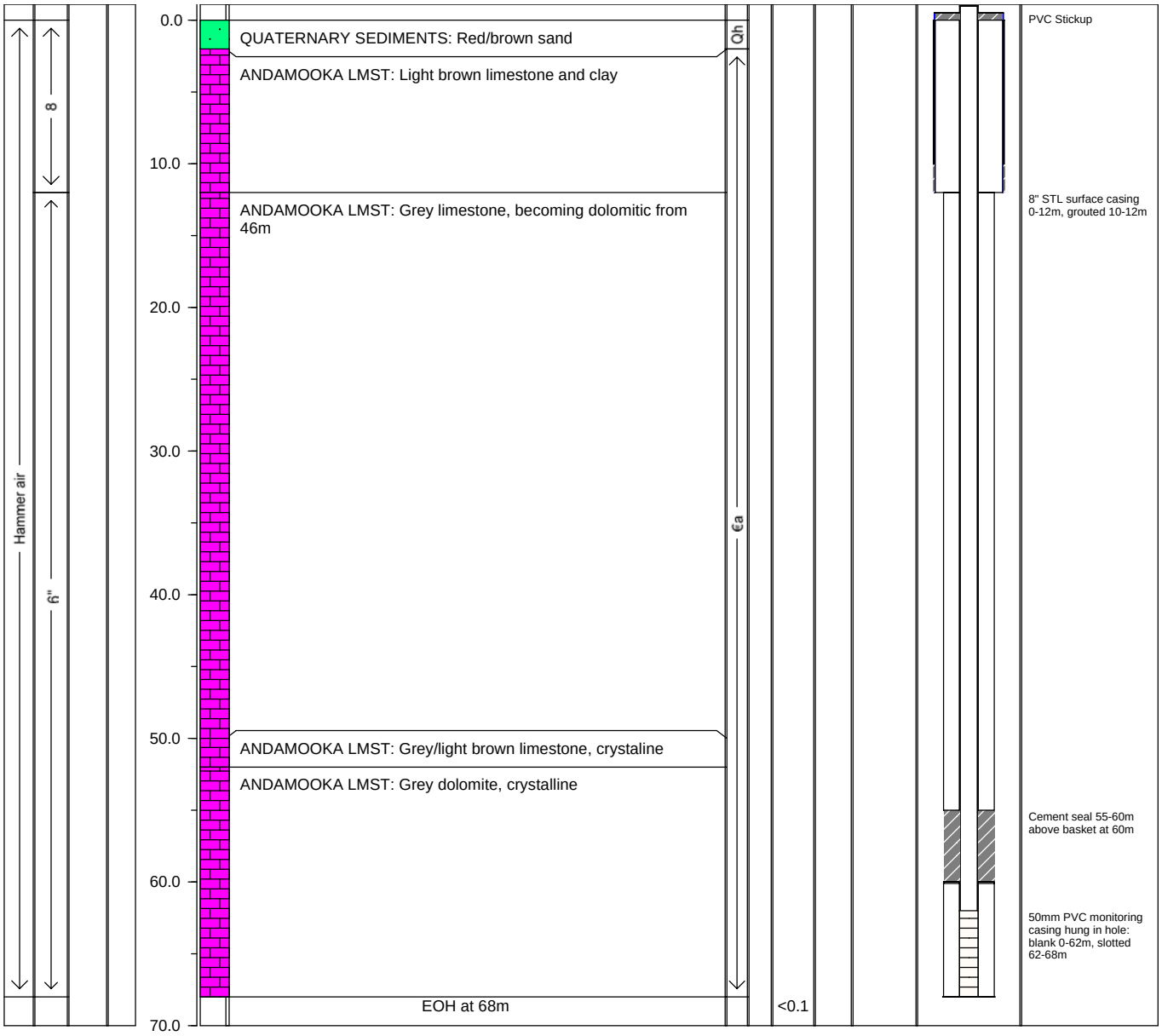
BOREHOLE / WELL NUMBER

RT-16a/RD3309

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **9/6/07** DATE COMPLETED: **10/6/07**

WELL PERMIT NUMBER: **127994**
TOTAL DEPTH (m bgl): **68m**
REFERENCE POINT (m AHD): **102.42**
STATIC WATER LEVEL
Date: Depth (m bgl): **59.25 (mTOC)**
PROJECTION: **GDA94 Zone53**
EASTING: **677889** NORTHING: **663458**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 23/6/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-16b/RD2694

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **3/6/07** DATE COMPLETED: **9/6/07**

WELL PERMIT NUMBER: **122665**
TOTAL DEPTH (m bgl): **252m**
REFERENCE POINT (m AHD): **102.453**
STATIC WATER LEVEL
Date: **11/9/07** Depth (m bgl): **59.08**
PROJECTION: **GDA94 Zone53**
EASTING: **677889** NORTHING: **663458**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer air	10"	0.43		0.0		ANDAMOOKA LMST: Yellow/brown limestone						Well cover	
		0.35		10.0		ANDAMOOKA LMST: Grey limestone						10" STL surface casing 0-12m, grouted 10-12m	
		0.40		20.0		ANDAMOOKA LMST: Dark brown clay							
				30.0		ANDAMOOKA LMST: Grey/light brown limestone	€a						
				40.0									
				50.0		ANDAMOOKA LMST: Grey dolomite, crystalline, and white quartzite with sandstone at 76m							
				60.0									
				70.0								8" STL pre-collar 0-72m, grouted 70-72m	
				80.0		ARCOONA QTZT (RD): Red shale and sandstone							
				90.0				wc					
				100.0									
				110.0									
				120.0			Pws (red)	wc	<0.5				
				130.0									
				140.0									
				150.0					<0.5	36			
		0.55		160.0		ARCOONA QTZT (RD): Red shale with white quartzite and sandstone			<0.5	40			
		0.55							<0.5	33			
		0.60		170.0					<0.5	30		Cement seal 168-178m above gravel pack 178-216m	
		0.60							<0.5	29			
		0.46		180.0		ARCOONA QTZT (WHT): White quartzite and sandstone with some red sandstone/quartzite and minor shale			0.5	45	yield inc. on contact with red and white arecoona		
				190.0			Pws (white)	wc	3-5				
									4-5				
		0.38		200.0					4-5	71			
		0.35							4-5	71			
		0.46		210.0					4-5	73		20mm PVC monitoring casing hung in hole: blank 0-98, 210-216m, slotted 198-210m	
		0.43							6	66			
		0.46		220.0		CORRABERRA SDST: Red and white quartzite, red sandstone with increasing % sandstone at 226m	Pwc		6	67			
		0.46		230.0					6	71			
		0.55				CORRABERRA SDST: Red sandstone and dark grey shale			6	72			
				240.0					6	64		Collapsed hole	
						TREGOLANA SHALE: Dark grey shale	Pwm						
				250.0		EOH at 252m			6				

LOGGED: J van den Akker DATE: 8/6/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-17a/RD3311

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **17/6/07** DATE COMPLETED: **19/6/07**

WELL PERMIT NUMBER: **127945**
TOTAL DEPTH (m bgl): **84m**
REFERENCE POINT (m AHD): **101.557**
STATIC WATER LEVEL
Date: **6/9/07** Depth (m bgl): **52.73**
PROJECTION: **GDA94 Zone53**
EASTING: **676761** NORTHING: **6633226**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer air	8" / 6"	0.75 0.55 0.55 2.00 0.50 0.55 0.50 0.46 0.67 0.55 0.60 0.50 0.43		0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0		QUATERNARY SEDIMENTS: White-red sandy-clay with white calcarious nodules QUATERNARY SEDIMENTS: Yellow/white silty-clay, calcarious with quartz fragments QUATERNARY SEDIMENTS: Calcarious red-yellow silty sand with white nodules QUATERNARY SEDIMENTS: Hard yellow dolomite QUATERNARY SEDIMENTS: Yellow silt ANDAMOOKA LMST: White silty-clay with quartzite inclusions and sand ANDAMOOKA LMST: Tan/grey dolomite and calcarious silty-clay, quartzite inclusions, with increasing layers of grey and white sandstone with grey shale with depth ANDAMOOKA LMST: White quartzite with pink and grey dolomite ANDAMOOKA LMST: Grey and tan dolomite, with preciitate and quartz minerals from 72-75m followed by increasing coarse white/pink sandstone and red shale with depth EOH at 84m	Qh Ea	wc	est. 2-3	29	Cavities at 12m, no returns Fracture 74m	PVC Stickup 6" STL surface casing 0-6m, grouted 4-6m Cement seal 50-60m above above bucket at 60m 50mm PVC monitoring casing: blank 0-66, 78-82m, slotted 66-78m Collapsed hole from 82-84m	

LOGGED: K Furness DATE: 23/6/07

CHECKED: _____ DATE: _____

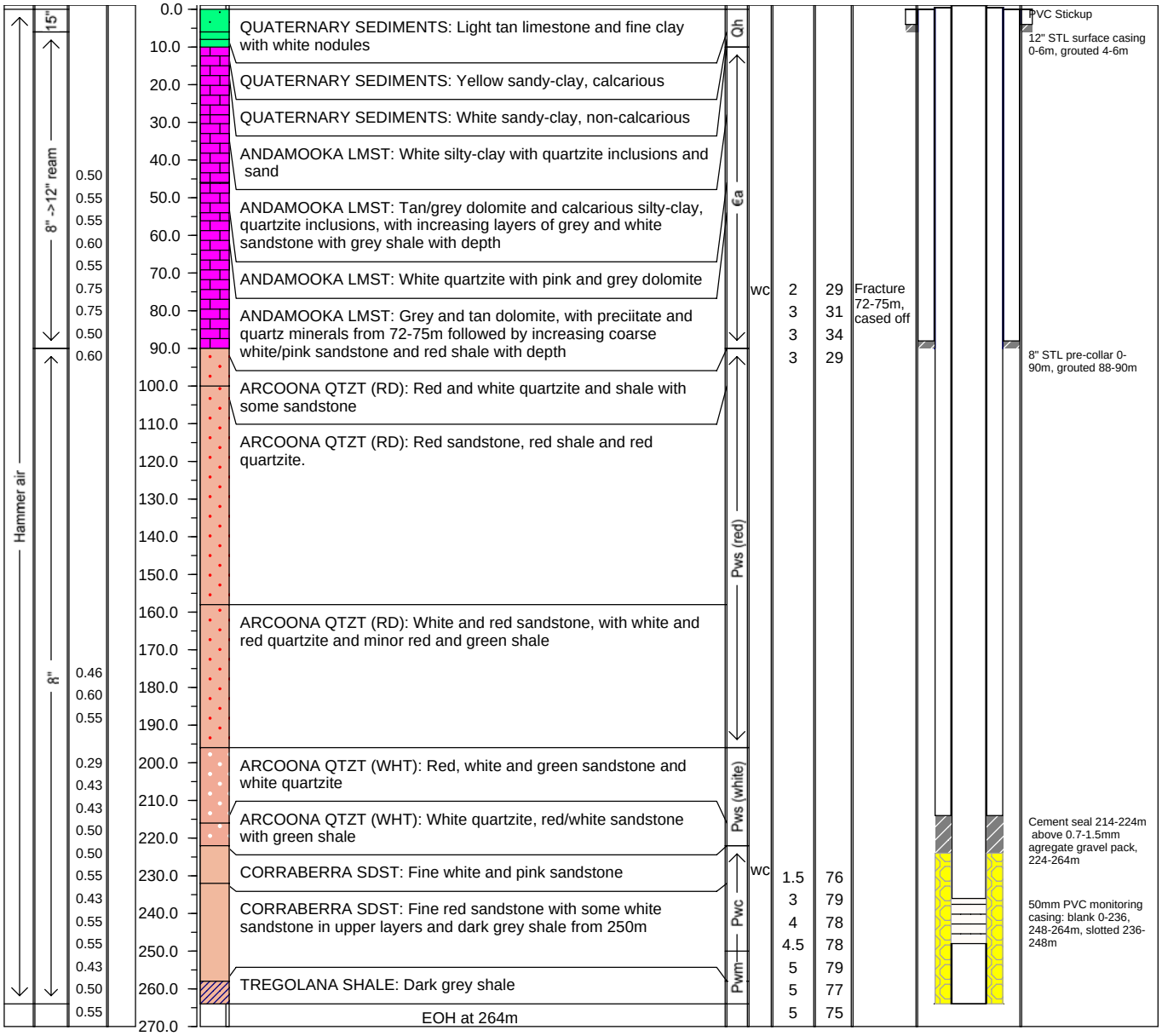
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-17b/RD3310

PROJECT NUMBER: **EV-02**
PROJECT NAME: **BHPB EIS Drilling Program**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **G+C**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **11/6/07** DATE COMPLETED: **18/6/07**

WELL PERMIT NUMBER: **127943**
TOTAL DEPTH (m bgl): **264m**
REFERENCE POINT (m AHD): **101.93**
STATIC WATER LEVEL
Date: **6/9/07** Depth (m bgl): **72.24**
PROJECTION: **GDA94 Zone53**
EASTING: **677342** NORTHING: **6633048**



LOGGED: K Furness DATE: 23/6/07

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-41

PROJECT NUMBER: **VE23064**
PROJECT NAME: **REM Project**
LOCATION: **Olympic Dam**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR HAMMER**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **11/08/2008** DATE COMPLETED: **13/08/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **102**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **16/08/2008** Depth (m bgl): **19.64**
PROJECTION: **GDA 1994, Zone 54**
EASTING: **716560** NORTHING: **6705063**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air/Tri Cone	12"	0.23		0.0		QUATERNARY SEDIMENTS: Silty sand (red) sandstone gravels and organic matter (roots) present	Qh						Well cover
		0.60		10.0		QUATERNARY SEDIMENTS: Sandy clay (yellow, grey, red) med plasticity with some gypsum							Cement plug 10-12 m
		1.20				BULLDOG SHALE: Shale (grey and yellow) highly weathered, soft with some gypsum							
		0.60		20.0		BULLDOG SHALE: Shale (grey and yellow) moderatly weathered, soft with some gypsum							
		1.00				BULLDOG SHALE: Shale (light-med grey, yellow) moderatly weathered, soft							
		1.00		30.0		BULLDOG SHALE: Shale (dark grey) moderatly weathered, soft, platy							
		1.00				BULLDOG SHALE: Shale (grey, yellow) highly weathered, soft							
		1.20		40.0		BULLDOG SHALE: Shale (dark grey) highly weathered, soft, platy							
		0.86				BULLDOG SHALE: Shale (med grey) highly weathered, soft, platy with some sandstone (white) hard							
		0.86		50.0		BULLDOG SHALE: Shale (green-grey and purple-brown) med weathered, soft-hard					Possible Seepage from 48 m		
		1.00				BULLDOG SHALE: Shale (green-grey and purple-brown) platy	Kmb						
		1.00		60.0									
		1.00											
		1.00		70.0									Cement-bentonite 70-80 m
		1.00											
		1.00		80.0									Gravel pack 80-102 m
		1.00											
		0.86	180	90.0									4" PVC slotted casing 90-96 m
		0.86	180	100.0				WC	<0.1	8.26	Poor water sample		
Air Hammer	8"	0.86	180			EOH at 102 m			1	56.7			

LOGGED: Kate Furness DATE: 13/08/08

CHECKED: _____ DATE: _____

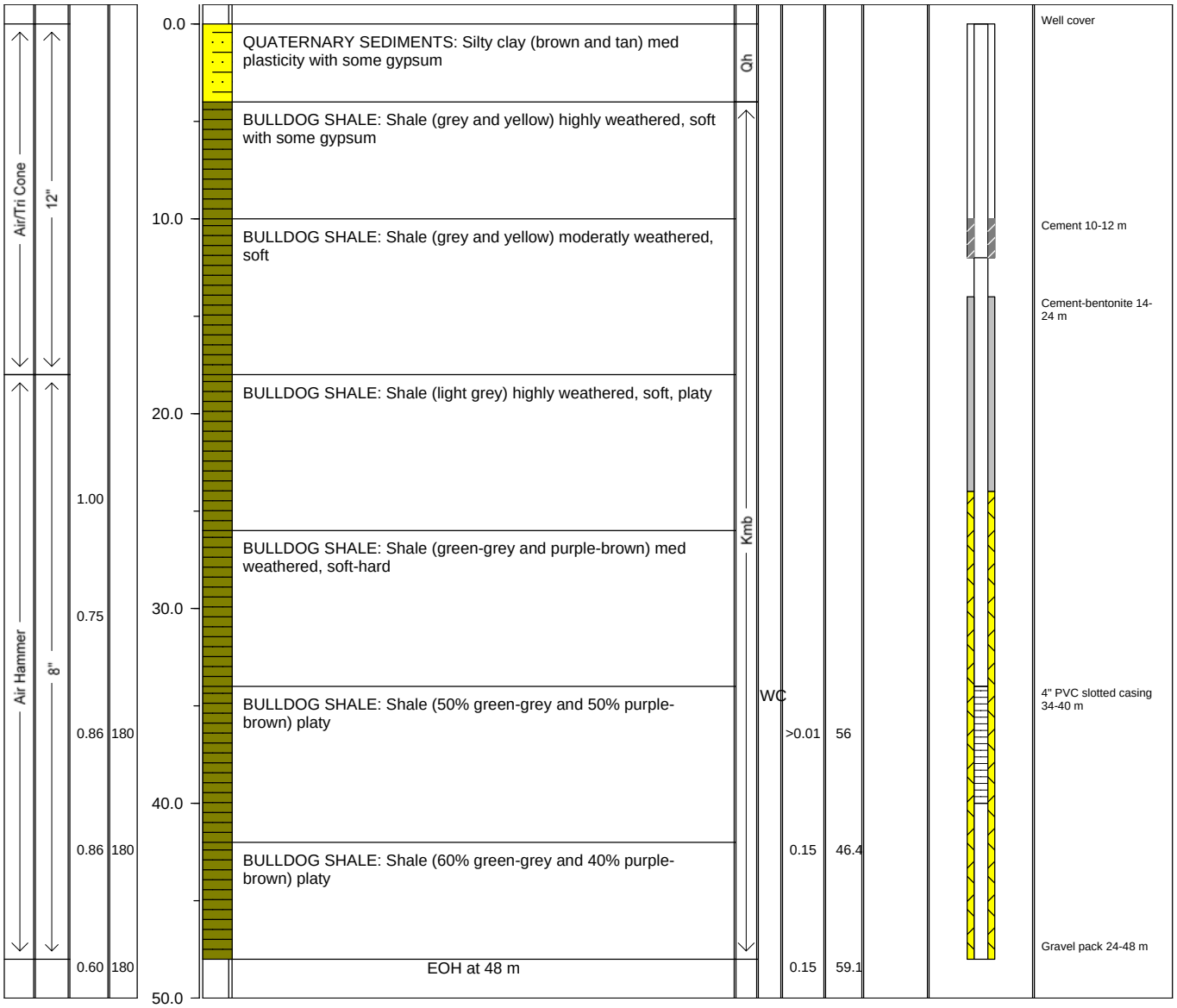
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT-63

PROJECT NUMBER: **VE23064**
PROJECT NAME: **REM Project**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR HAMMER**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **18/08/2008** DATE COMPLETED: **18/08/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **78**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **23/08/2008** Depth (m bgl): **23.7**
PROJECTION: **GDA 1994, Zone 54**
EASTING: **702071** NORTHING: **6695060**



LOGGED: Kate Hyland DATE: 18/08/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT-62

PROJECT NUMBER: **VE23064**
PROJECT NAME: **REM Project**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR HAMMER**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **13/08/2008** DATE COMPLETED: **15/08/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **66**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **19/08/2008** Depth (m bgl): **49.23**
PROJECTION: **GDA 1994, Zone 54**
EASTING: **698652** NORTHING: **6684173**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air/Tri Cone	12"			0.75		QUATERNARY SEDIMENTS: Sandy silt (white, orange) calcarious with gravel/nodules (white) soft	Qh					Well cover	
				0.43		QUATERNARY SEDIMENTS: Clayey silt (white) fine, soft with gravel/nodules (white)							
				0.46		QUATERNARY SEDIMENTS: Sandy clayey silt (light brown-grey) highly weathered shale, soft						Cement 16-18 m	
				0.60		BULLDOG SHALE: Shale/clay (dark grey) highly weathered, soft							
				0.60		BULLDOG SHALE: Shale (dark grey) high-moderate weathering, soft	Kmb						
Air Hammer	8"			0.05		BULLDOG SHALE: Shale (med grey) high-moderate weathering, soft						Cement-bentonite 37-47 m	
				0.50		BULLDOG SHALE: Shale (med grey) high-moderate weathering, soft with 10% sandstone (grey) fine-med grained, angular fragments							
				0.60		BULLDOG SHALE: Shale (light grey-brown highly weathered, soft						Gravel pack 47-62 m	
				6.5		BULLDOG SHALE: Shale (red-brown) highly weathered, soft							
				0.60		BULLDOG SHALE: Shale (red-brown-tan) highly weathered, soft							
				6.63		CADNA-OWIE FORMATION: Sandstone (white) hard, angular, weathered, with 30% quartzite (white-grey) hard, sub-angular with 10% shale (grey) weathered, (soft) and abundant (~5%) pyrite	J-K	WC	1	22.36		4" PVC slotted casing 57-63 m	
						CADNA-OWIE FORMATION: Sandstone (white) hard, angular, weathered, with 30% quartzite (white-grey) hard, sub-angular with 10% shale (med grey) weathered and 10% (dark grey) firm-med, (soft) and abundant (~5%) pyrite						Collapsed at 62 m	
						CADNA-OWIE FORMATION: Sandstone (white) hard, angular, weathered, with 50% quartzite (white-grey) hard, sub-angular with minor shale (med grey and dark grey) firm and abundant (~5%) pyrite			2.5	23.23			
						EOH at 66 m							

0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0

LOGGED: Kate Furness DATE: 15/08/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RT-42

PROJECT NUMBER: **VE23064**
PROJECT NAME: **REM Project**
LOCATION: **Olympic Dam**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR HAMMER**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **09/08/2008** DATE COMPLETED: **18/09/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **72**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **13/08/2008** Depth (m bgl): **21.76 m**
PROJECTION: **GDA 1994, Zone 54**
EASTING: **713445** NORTHING: **6696563**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air/Tri Cone	12"	0.09		0.0		QUATERNARY SEDIMENTS: Sandy silt (white, red, brown) fine grained with gravels/nodules (white) calcarious, soft, with abundant gypsum	Qh	WC	<0.1		Water encounted at 6 m, likely perched water table		Well cover Cement grout 0-5 m
		0.18		10.0		QUATERNARY SEDIMENTS: Sandy silt (light red-brown) fine grained, with gravels/nodules (white) soft, some gypsum							Cement-bentonite 5-7 m Gravel pack 7 ~30 m, likely collapsed hole as gravel pack did not make it to depth
		0.50				QUATERNARY SEDIMENTS: Clay (white-grey) high plasticity, soft, minor sands and gravels							
		0.35		20.0		BULLDOG SHALE: Silty Clay (light grey-brown) med plasticity, soft							
		0.60				BULLDOG SHALE: Shale (grey) highly weathered, soft, with sandy clay (white, red, yellow, pink) soft, med plasticity, with minor gypsum							
		0.67		30.0		BULLDOG SHALE: Shale (grey) highly weathered, soft, with sandy clay (white, red, yellow, pink) soft, med plasticity, with 10% quartz (pink-orange, white) hard, angular with minor gypsum							
Air Hammer	8"	0.60	240	40.0		BULLDOG SHALE: Shale (blue-grey with ~20% purple-brown) soft, minor weathering, with some quartz and quartz sands (pink) with 10% clay (white) med plasticity and 10 % charcole/petrified wood (black)	Kmb	WC	<0.1				
		0.67	240			BULLDOG SHALE: Shale (red-brown with some blue-grey and minor yellow and red) with some sandy clay (white, pink) and 10% quartzite (white-pink) sub rounded-sub angular fragments			0.2	14.23	Poor water sample		
		0.86	240	50.0		BULLDOG SHALE: Shale (red- brown and blue grey) soft-med, 10% quartzite (white, pink) and some charcole/petrified wood (black) light							
		0.67	240	60.0					0.2	17.84			4" PVC slotted casing 60-66 m
		0.55	180			BULLDOG SHALE: Shale (red- brown and blue grey) firm, platy, 10% quartzite (grey, green, pink) platy and some charcole/petrified wood (black) light			0.45	27			
		0.60	180	70.0		EOH at 72 m			0.83	21.42			

LOGGED: Kate Furness DATE: 18/08/2008

CHECKED: _____ DATE: _____

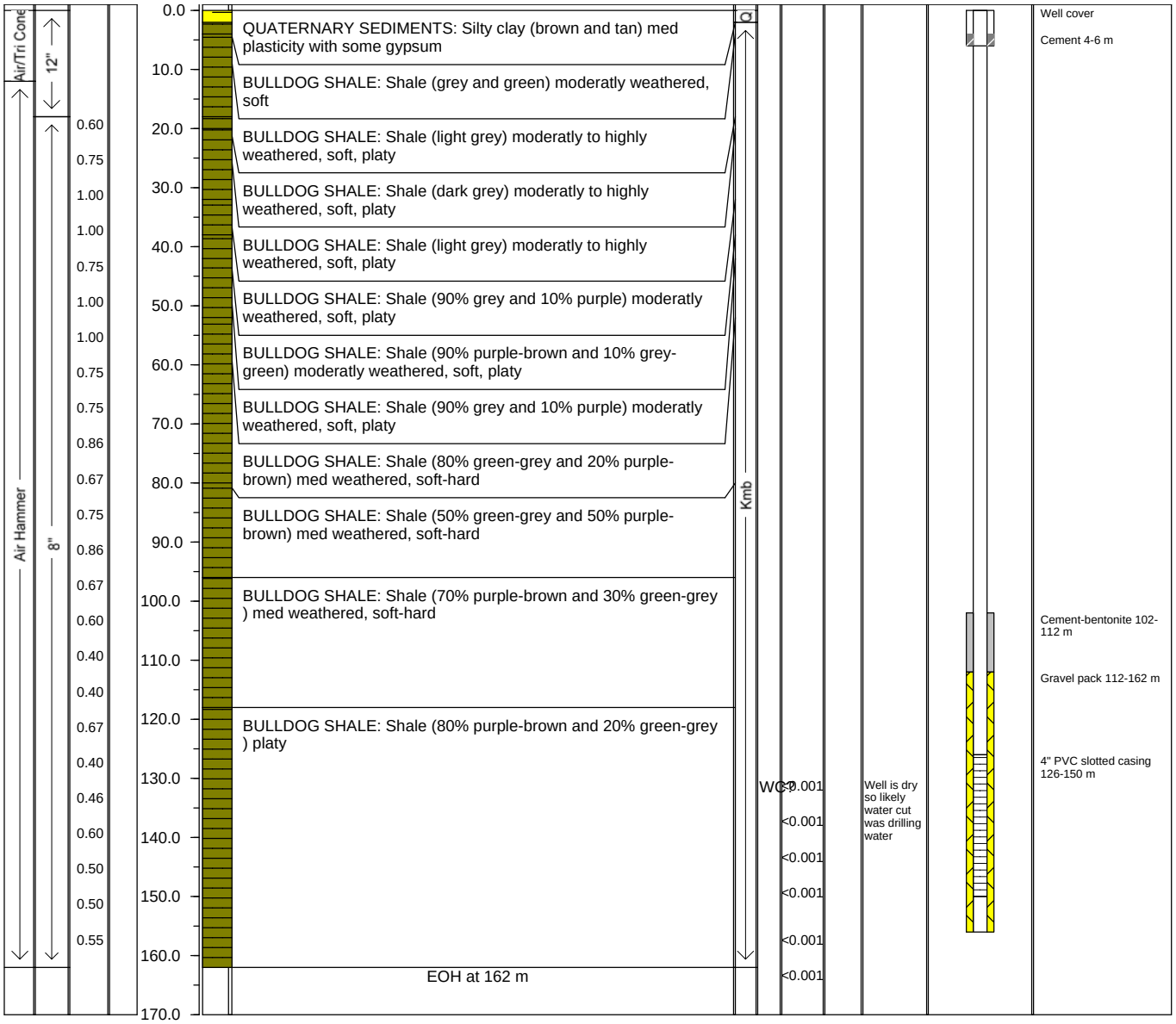
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT-64

PROJECT NUMBER: **VE23064**
PROJECT NAME: **REM Project**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR HAMMER**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **21/08/2008** DATE COMPLETED: **21/08/2008**

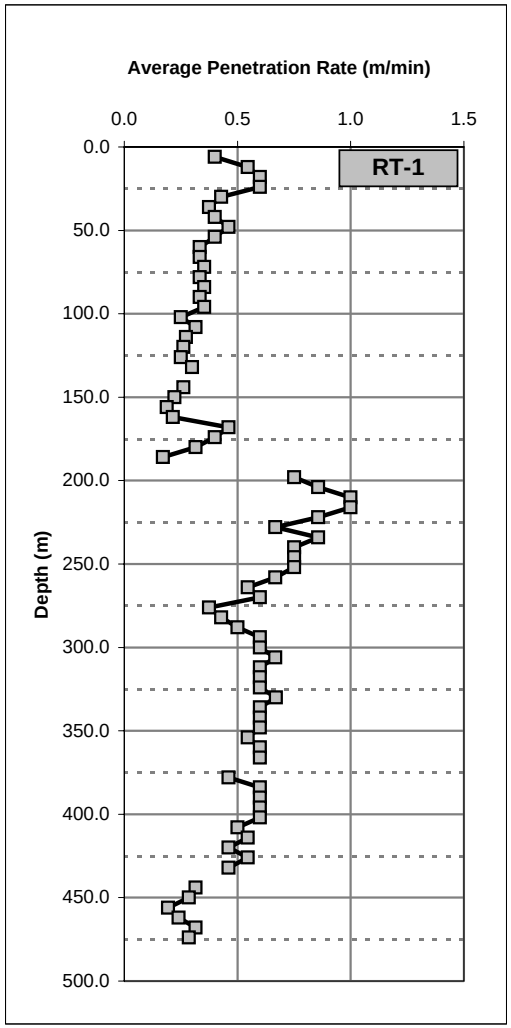
WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **162**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: Depth (m bgl):
PROJECTION: **GDA 1994, Zone 54**
EASTING: **701463** NORTHING: **6704421**

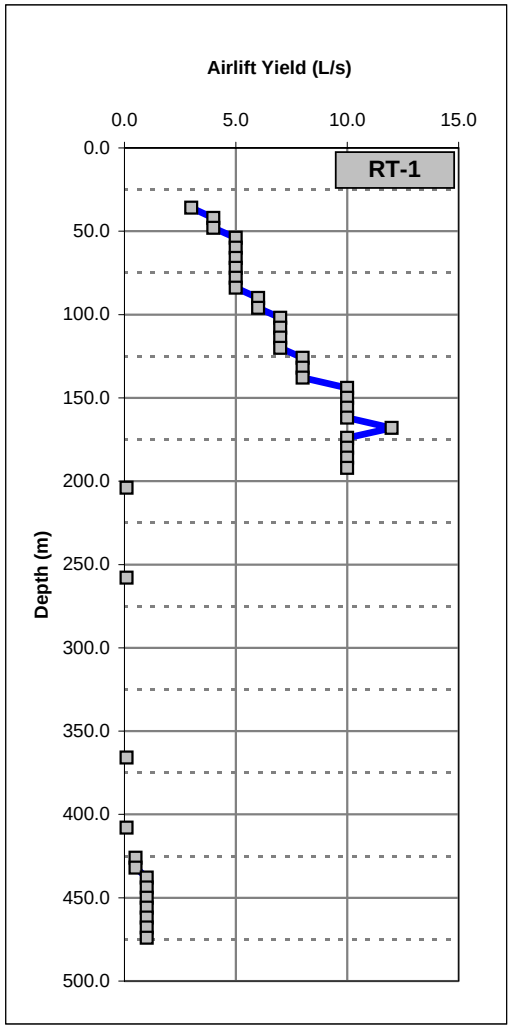


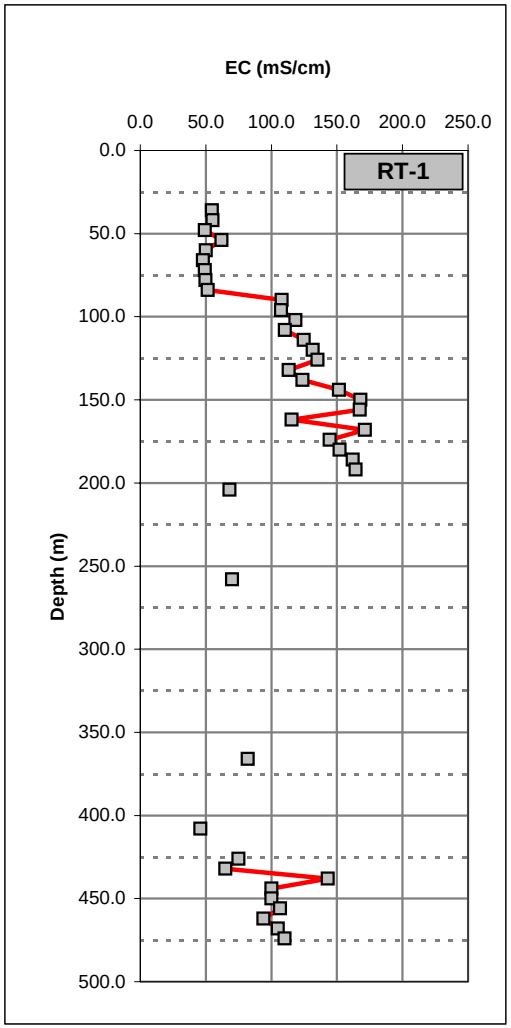
LOGGED: Kate Hyland DATE: 21/08/2008

CHECKED: _____ DATE: _____

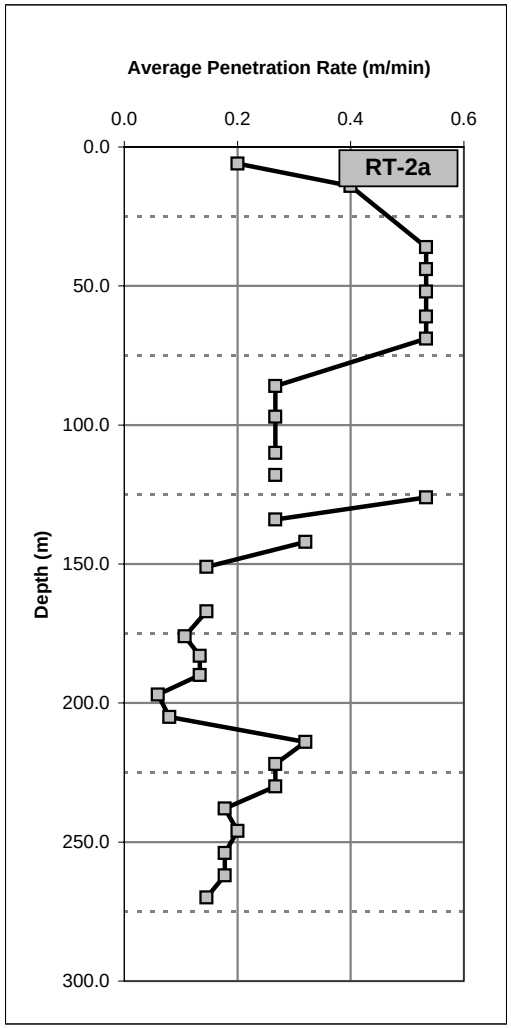
RT-1 Drillhole Summary: Graphical Log

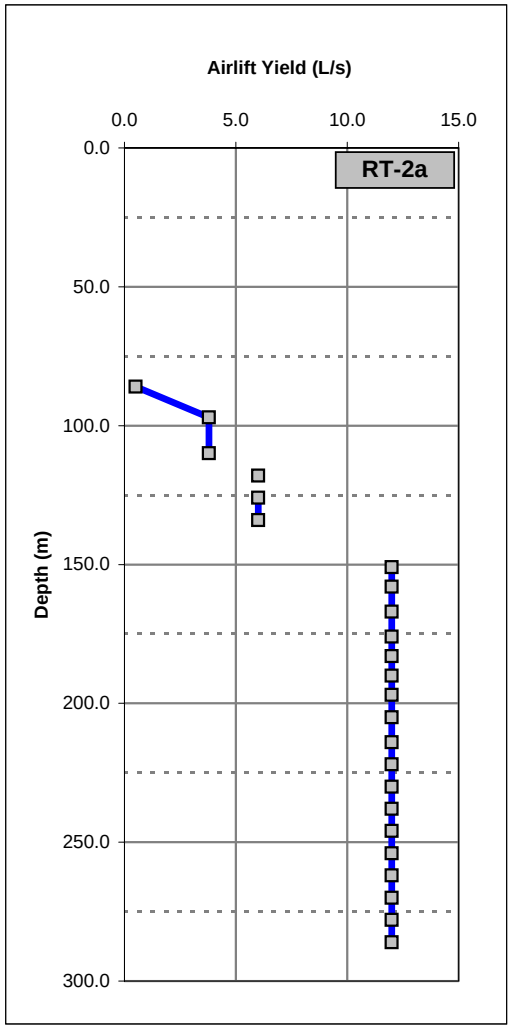


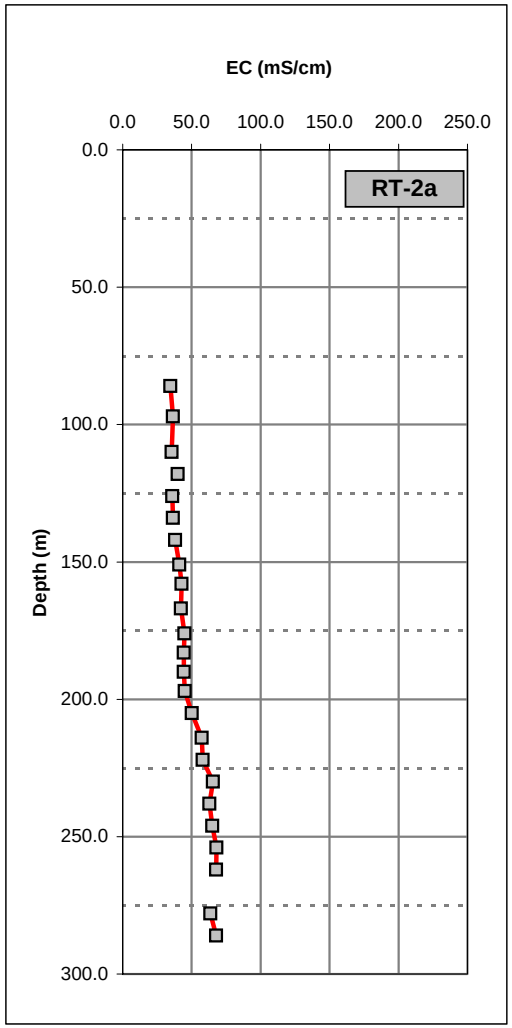




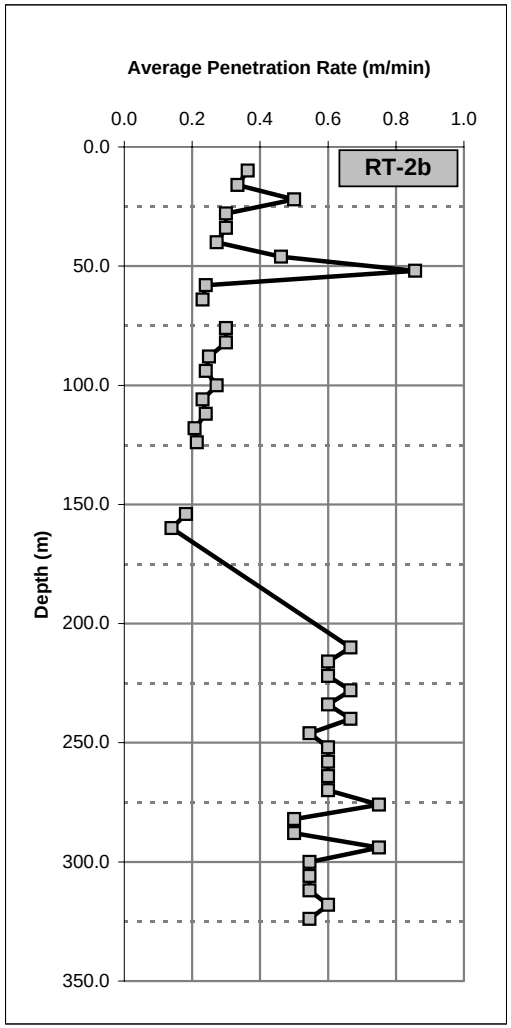
RT-2a Drillhole Summary: Graphical Log

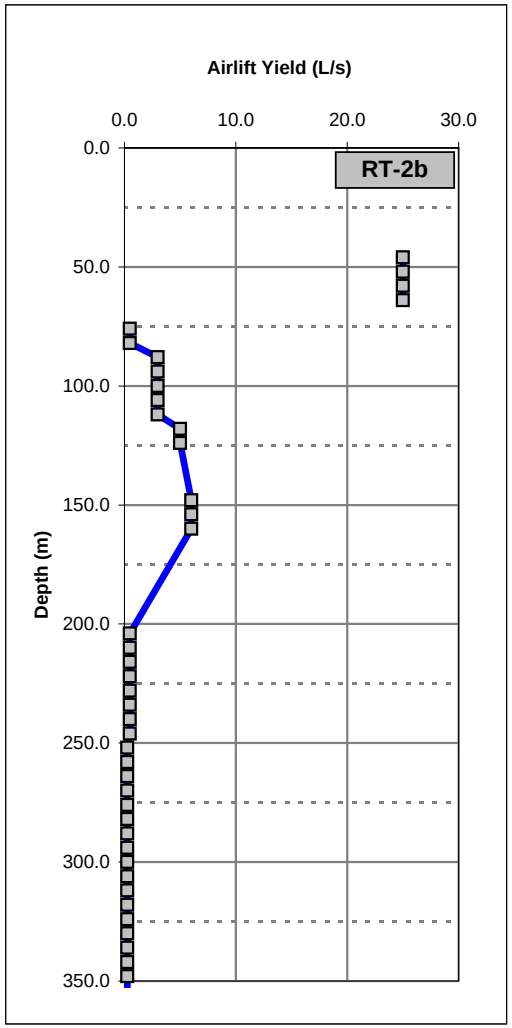


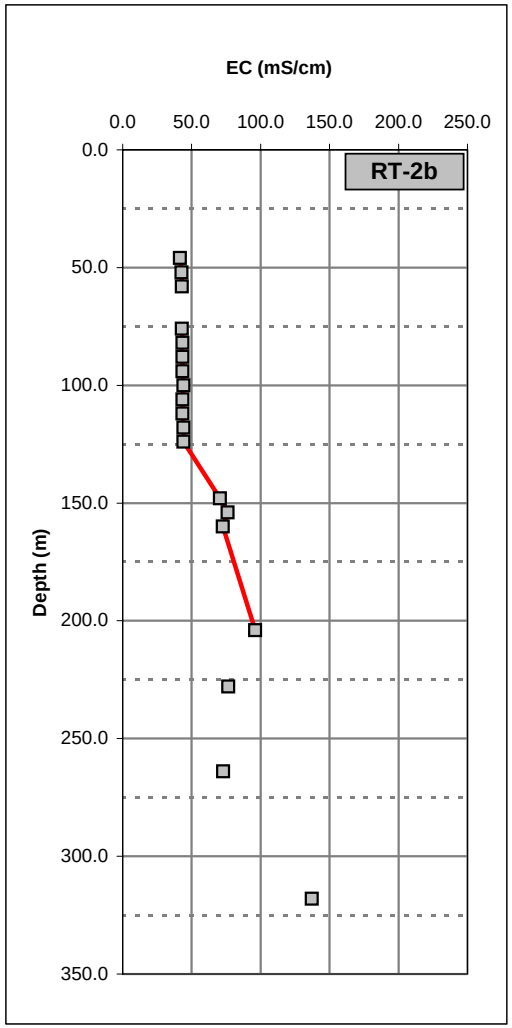




RT-2b Drillhole Summary: Graphical Log

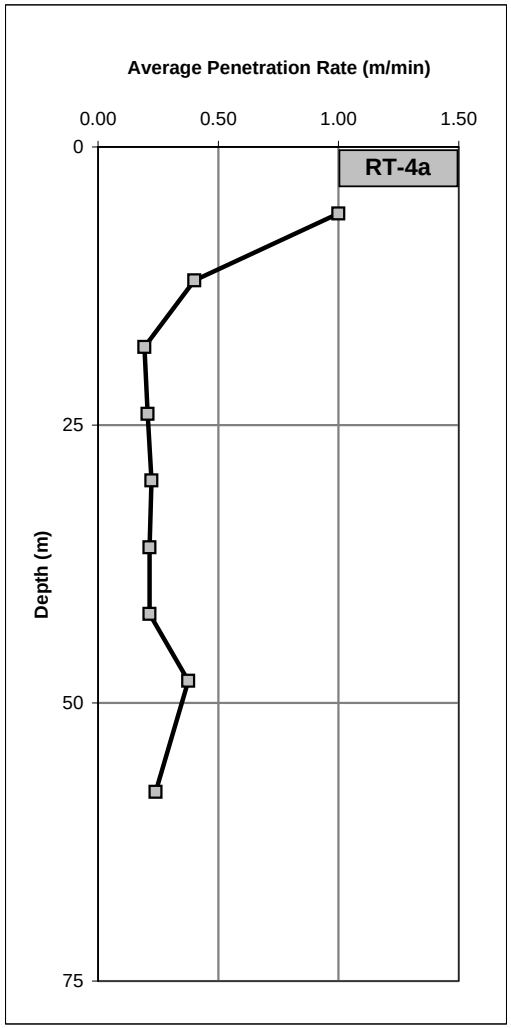


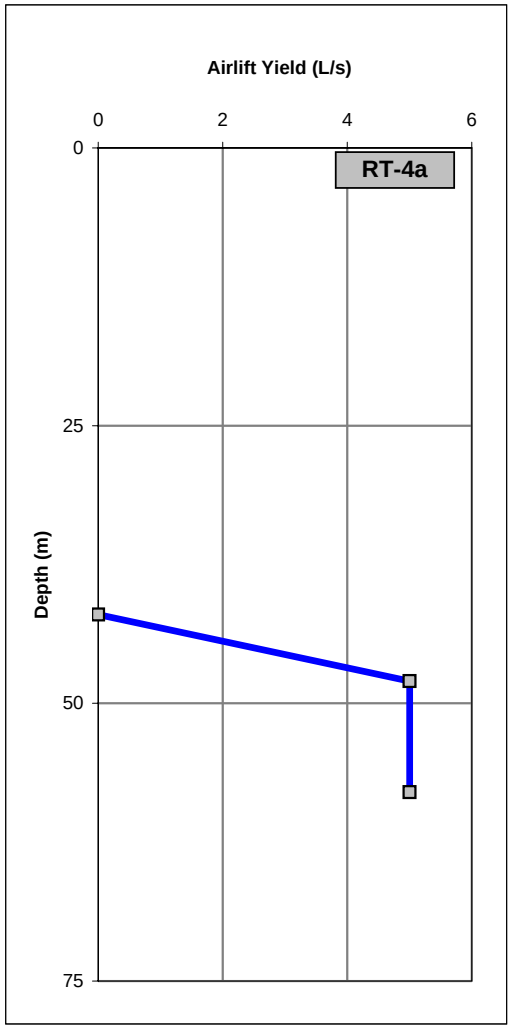


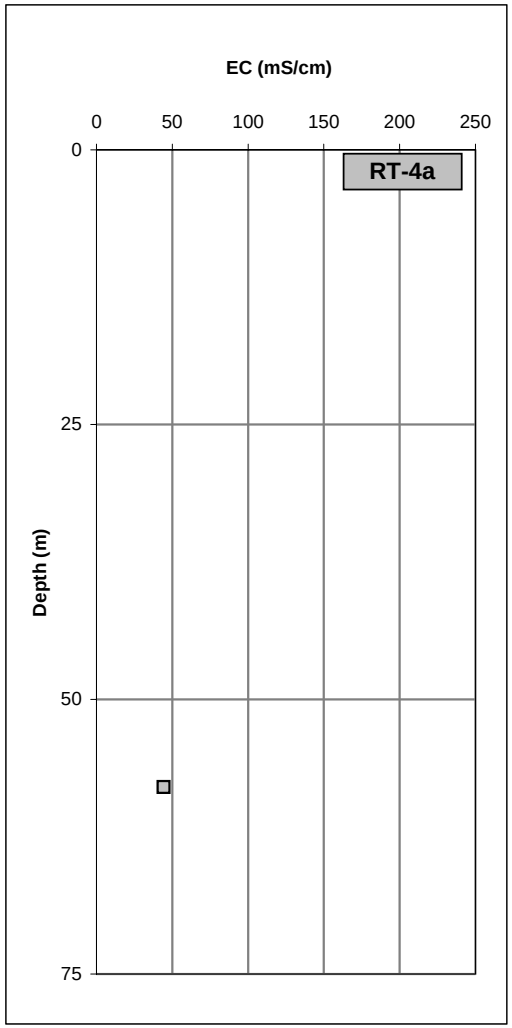


RT-4a Drillhole Summary: Graphical Log

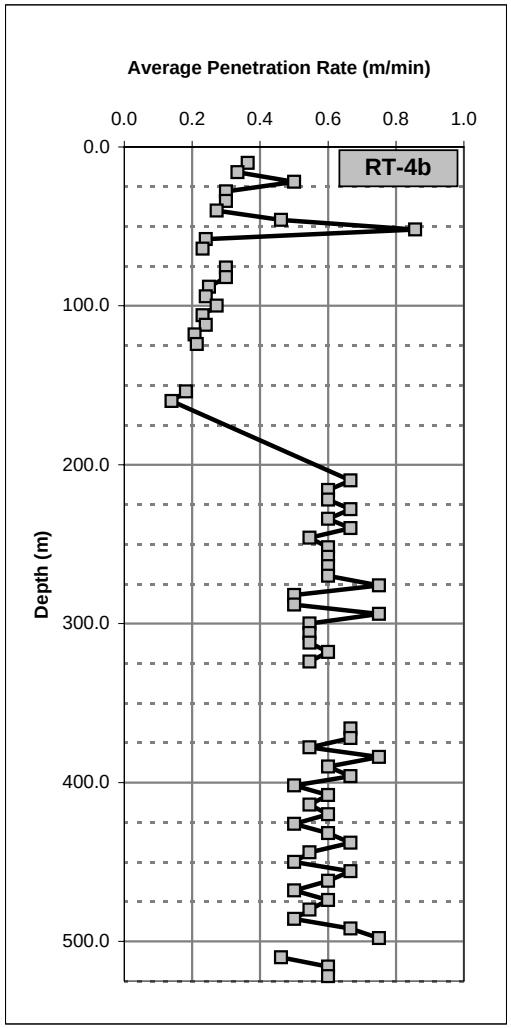
Note: RT-3 log not available

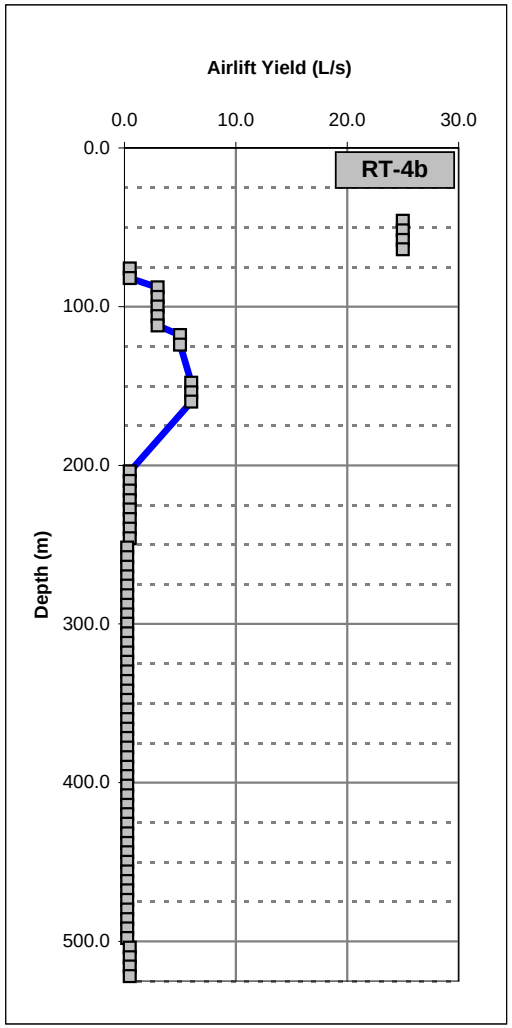


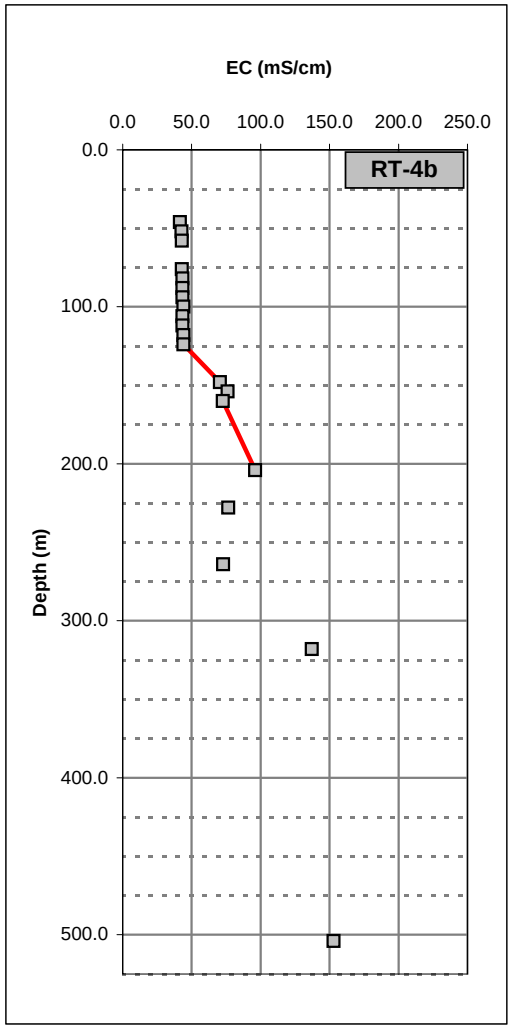




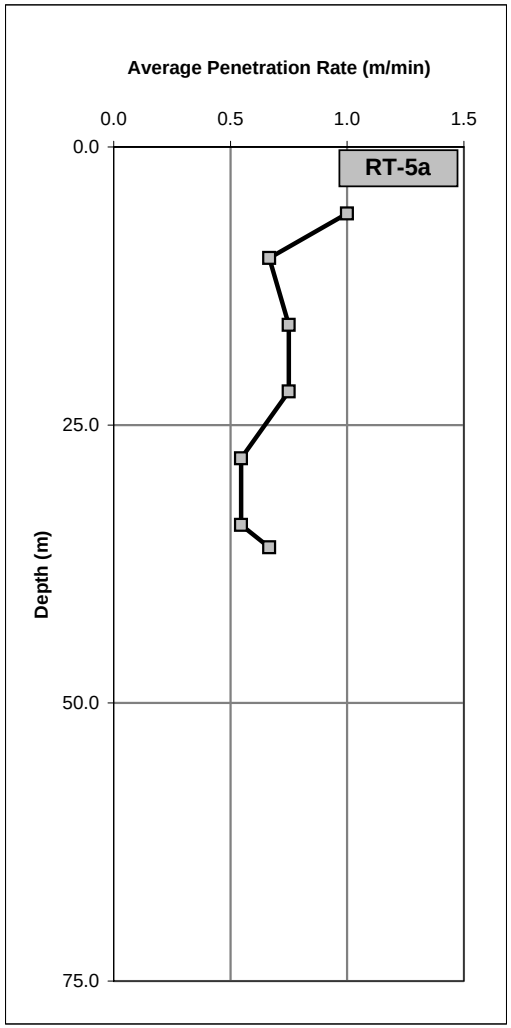
RT-4b Drillhole Summary: Graphical Log

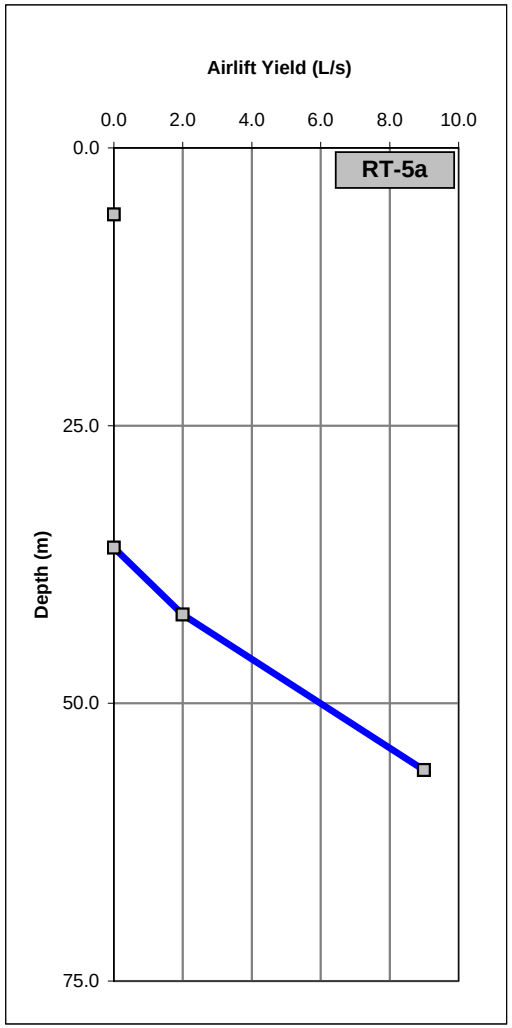


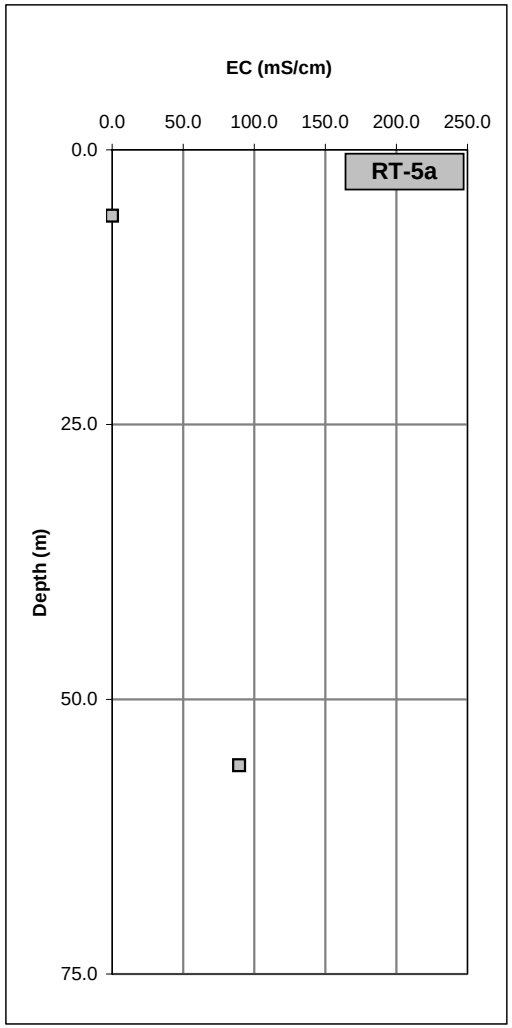




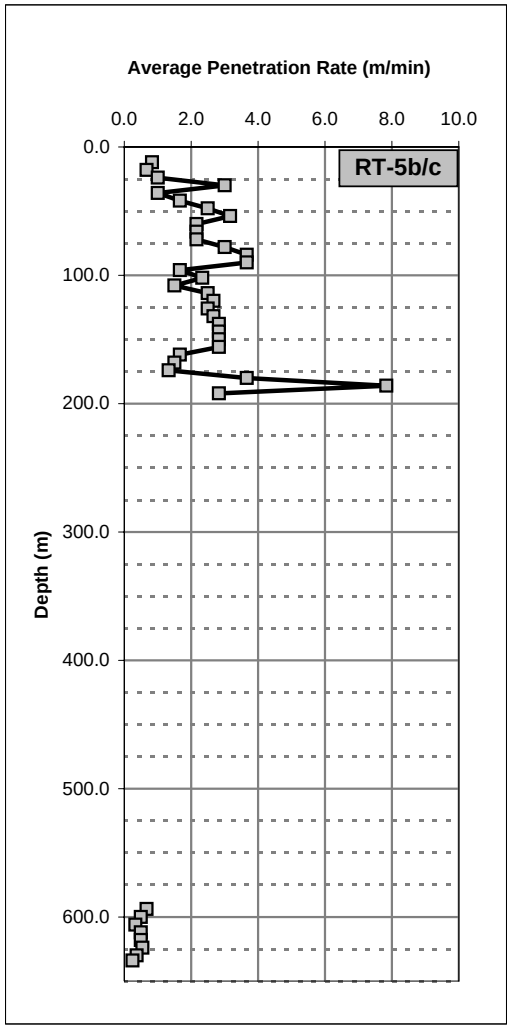
RT-5a Drillhole Summary: Graphical Log

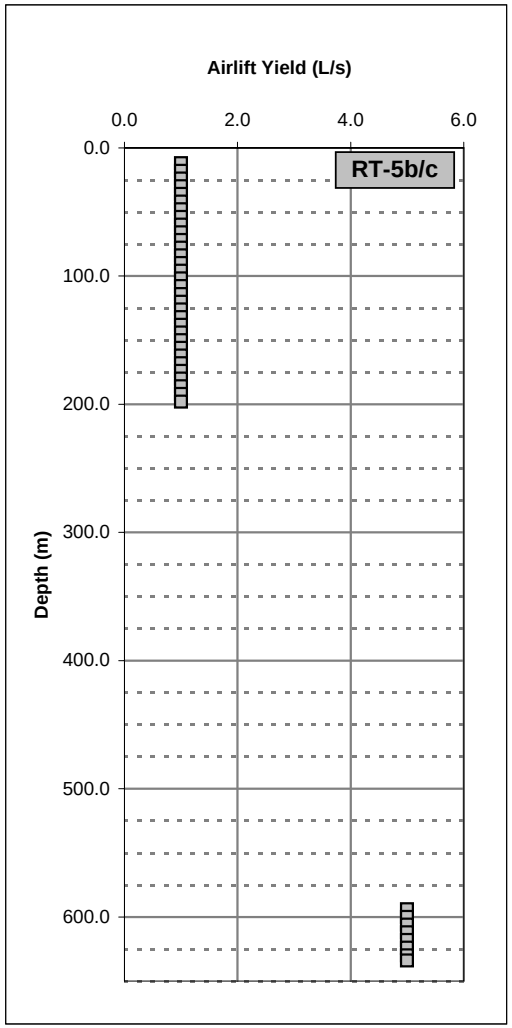


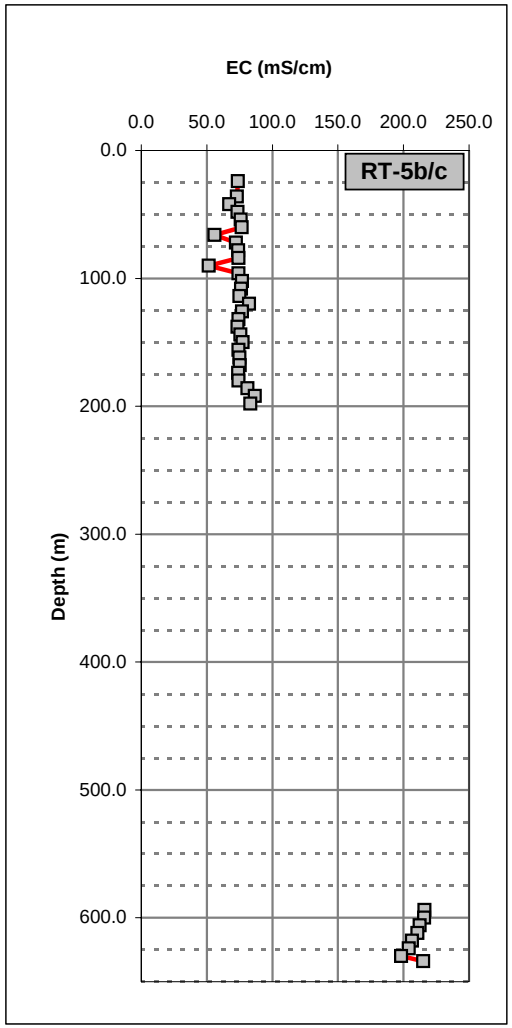




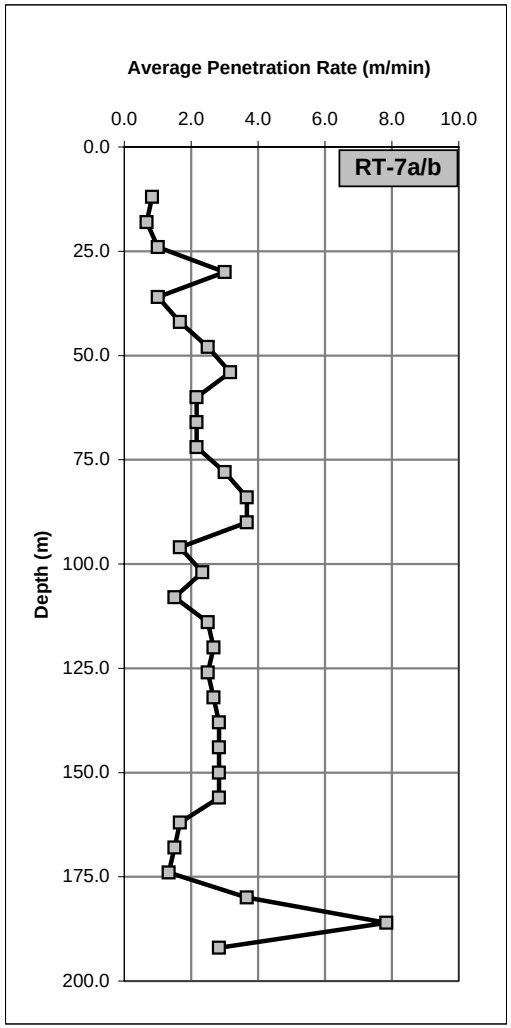
RT-5b/c Drillhole Summary: Graphical Log

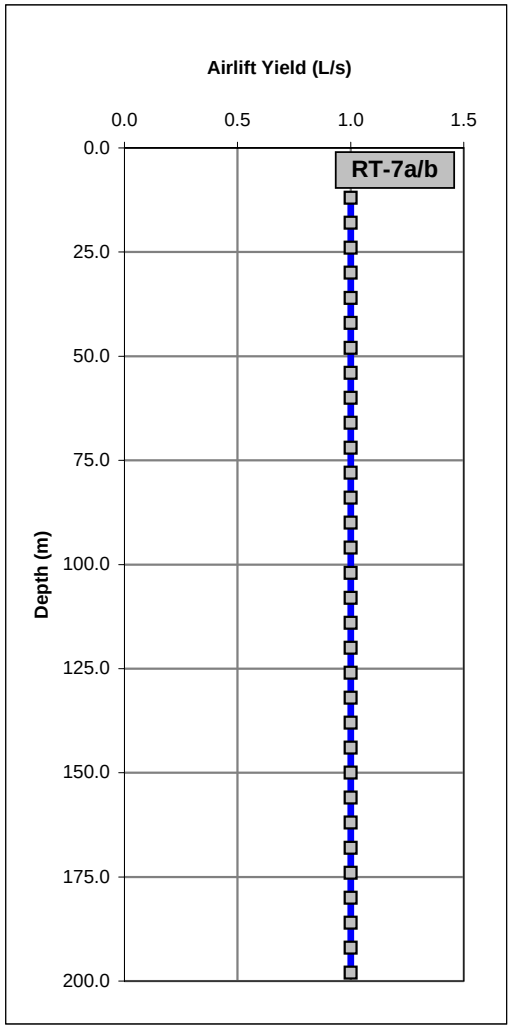


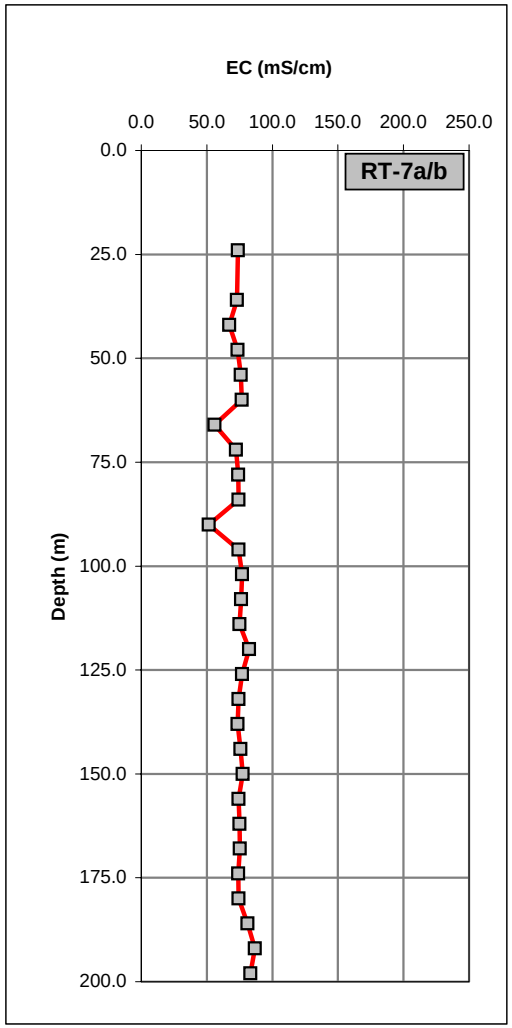




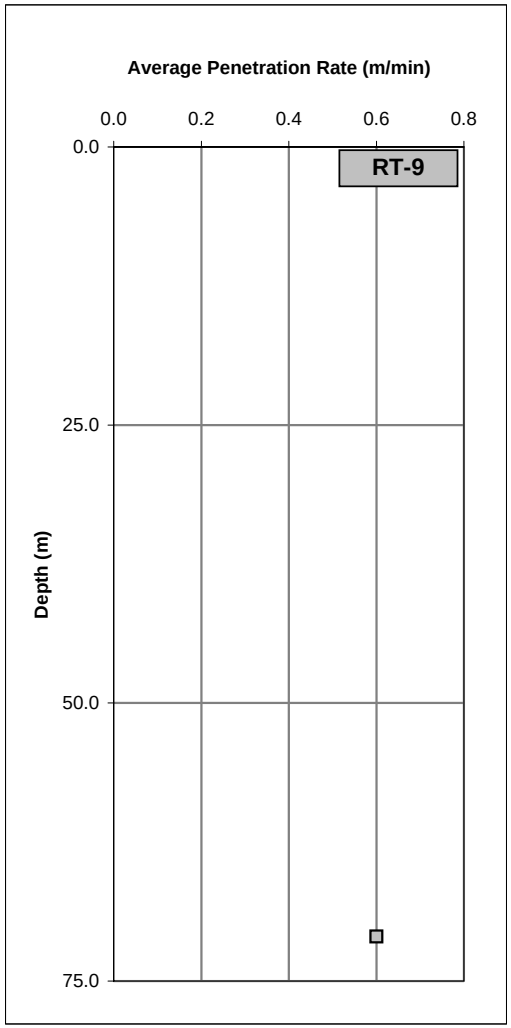
RT-7a/b Drillhole Summary: Graphical Log

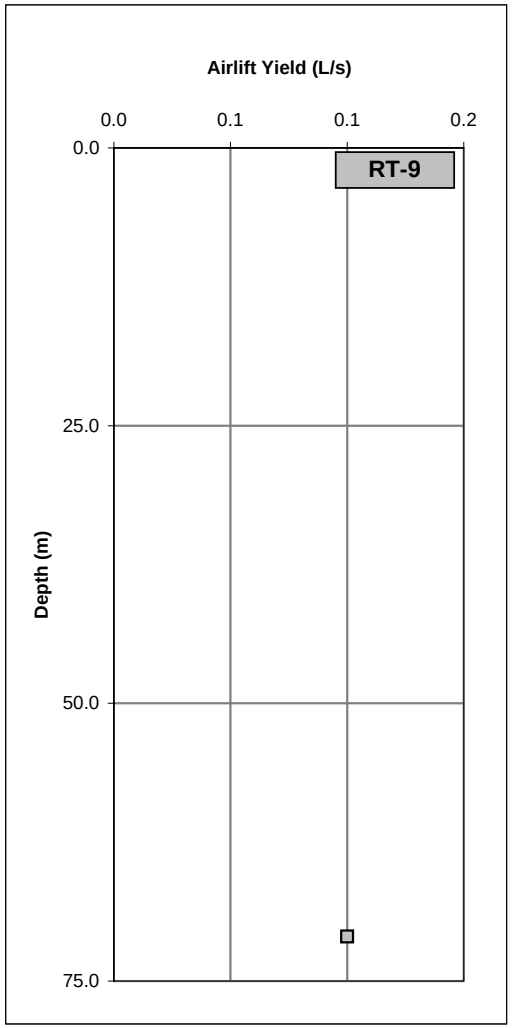


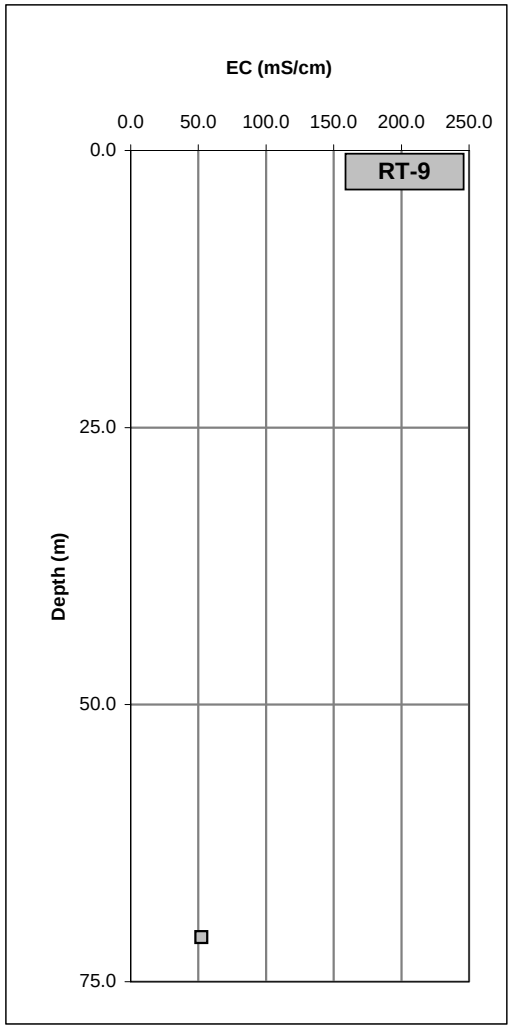




RT-9 Drillhole Summary: Graphical Log

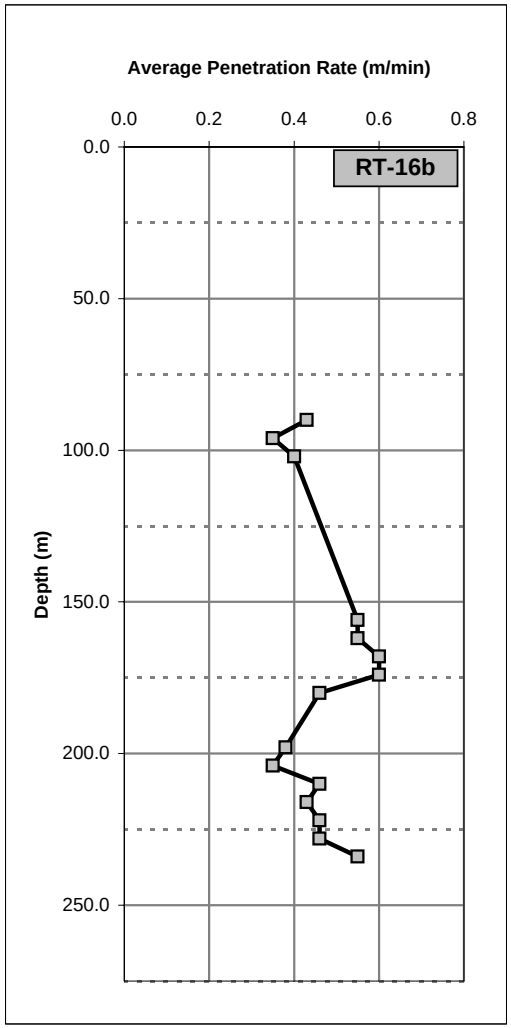


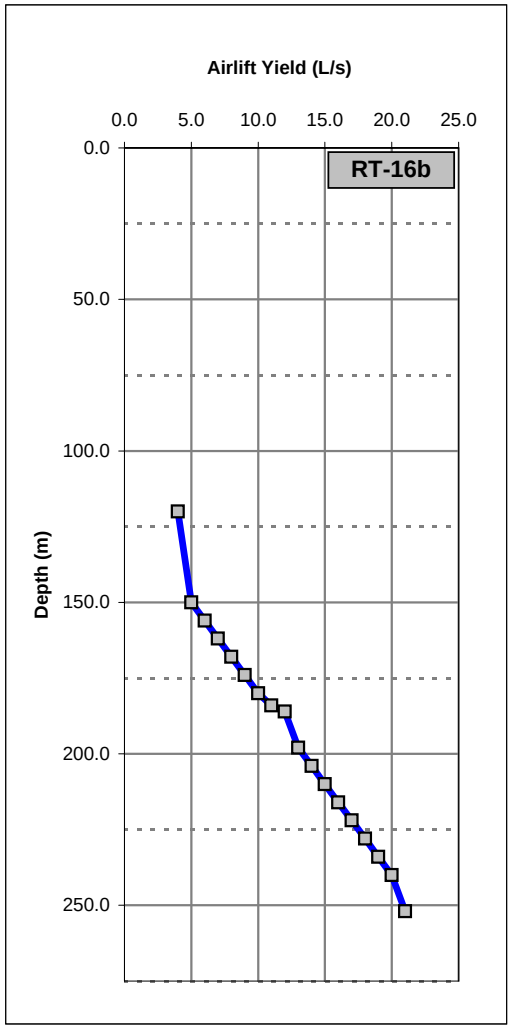


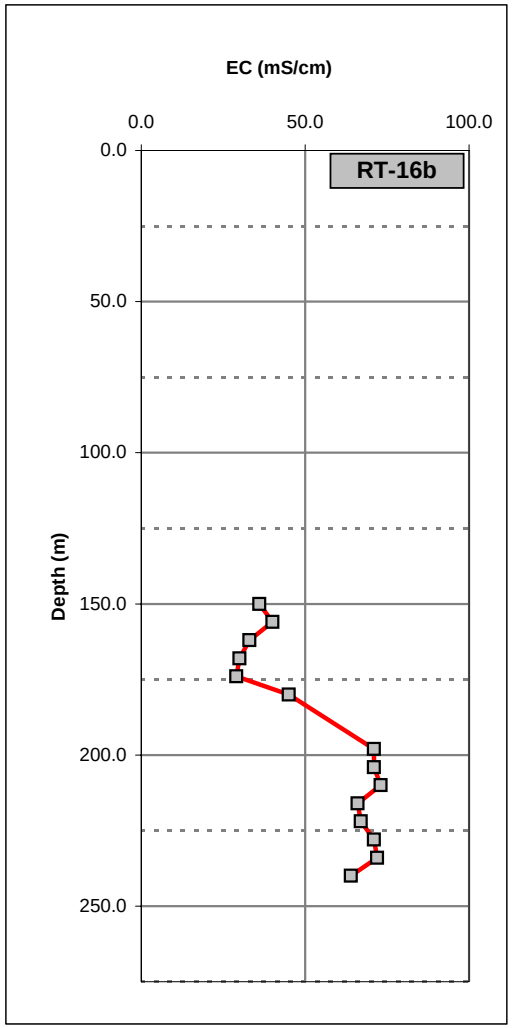


RT-16b Drillhole Summary: Graphical Log

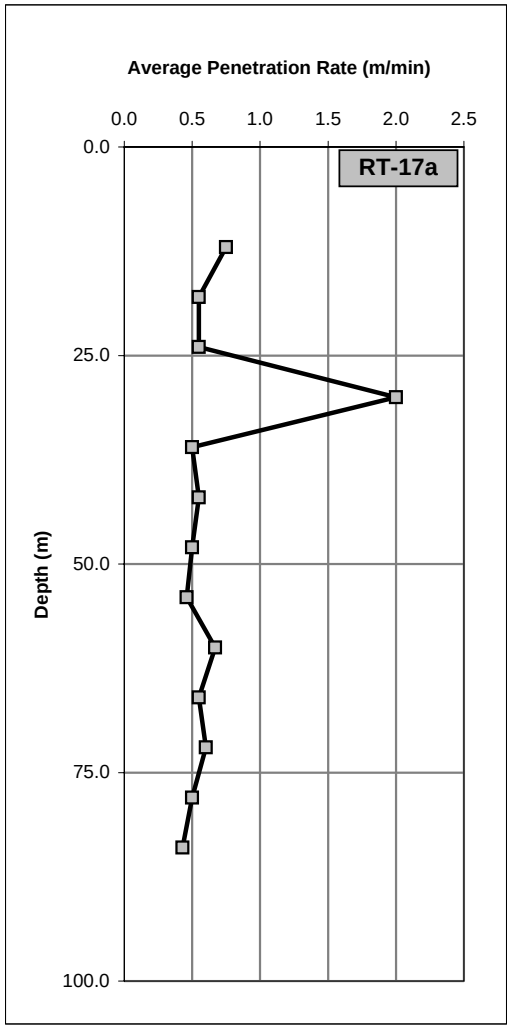
Note: RT-16a: no returns

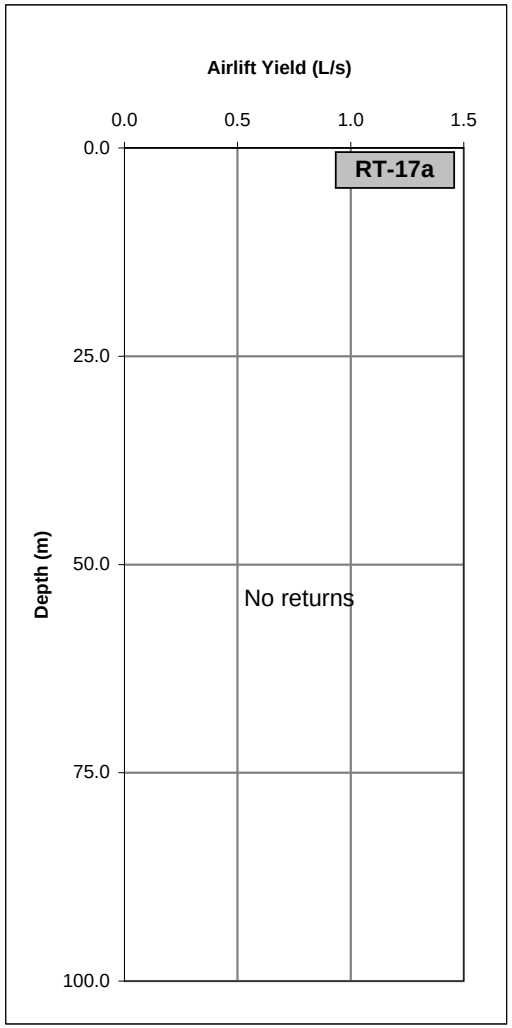


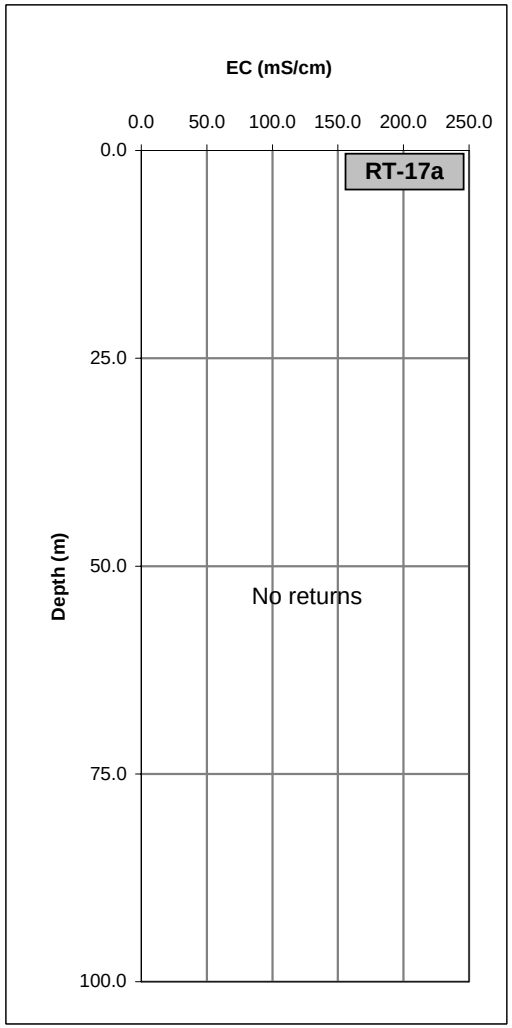




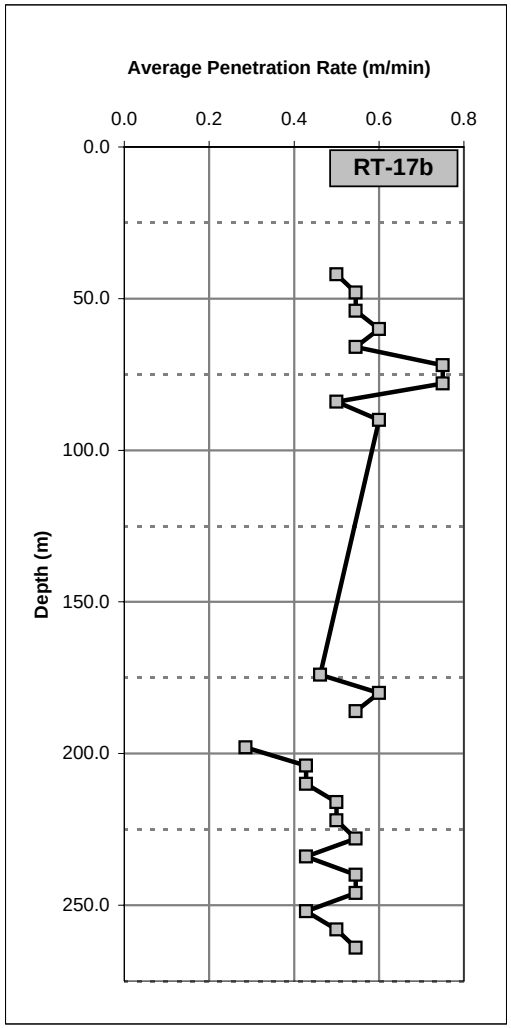
RT-17a Drillhole Summary: Graphical Log

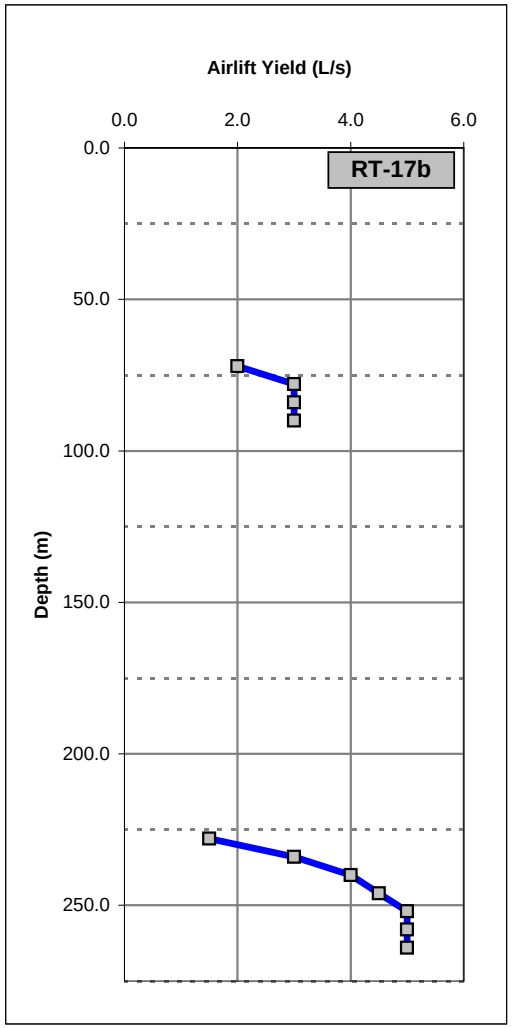


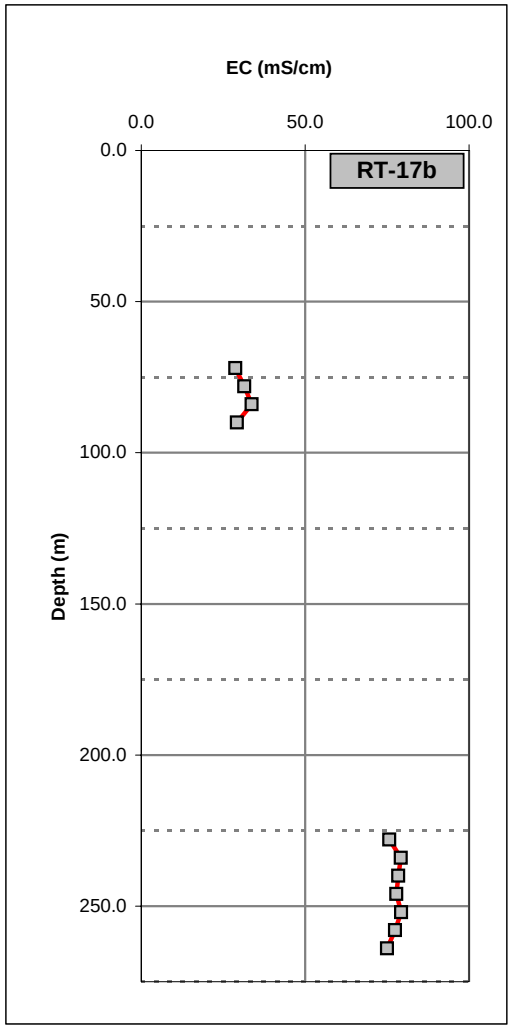




RT-17b Drillhole Summary: Graphical Log







OLYMPIC DAM RT-2

CONSTANT RATE TEST
Pumped Well

Well Number : RT-2b (Pumped Well)
Pumping Commenced on 7/7/07 at 09:39am
Pumping Ceased on 7/7/07 at 5:pm
Measurement Point = 0.10m above ground level
Standing Water Level = 55.21m below measurement point
Distance from Pumped Well = 12m
Pumping Rate: 3024 m^3/day

CONSTANT RATE DATA

RT-2a (Monitoring well)

Logger			Measured		
time (min)	Water level (mTOC)	Drawdown (m)	time (min)	Water level (mTOC)	Drawdown (m)
0.00	55.21	0.09	0.00	55.21	0.00
30.00	55.16	0.04	30.00	55.25	0.03
60.00	55.14	0.02	60.00	55.24	0.03
90.00	55.13	0.01	90.00	55.23	0.02
600.00	55.12	0.00	150.00	55.26	0.05
630.00	55.11	-0.01	180.00	55.25	0.03
660.00	55.12	0.00	210.00	55.24	0.03
690.00	55.11	-0.01	240.00	55.25	0.03
720.00	55.12	0.00	270.00	55.25	0.04
750.00	55.12	0.00	330.00	55.25	0.04
780.00	55.13	0.01	390.00	55.26	0.05
810.00	55.19	0.07	450.00	55.26	0.05
840.00	55.13	0.01	510.00	55.26	0.05
870.00	55.14	0.02	570.00	55.27	0.06
900.00	55.15	0.03	690.00	55.27	0.05
930.00	55.15	0.03	810.00	55.27	0.05
960.00	55.12	0.00	930.00	55.27	0.05
990.00	55.14	0.02	1050.00	55.27	0.06
1020.00	55.15	0.03	1170.00	55.27	0.06
1050.00	55.15	0.03	1290.00	55.28	0.06
1080.00	55.13	0.01	1410.00	55.28	0.06
1110.00	55.17	0.05	1530.00	55.28	0.06
1140.00	55.17	0.05	1650.00	55.28	0.07
1170.00	55.16	0.04	1770.00	55.29	0.07
1200.00	55.16	0.04	2070.00	55.30	0.09
1230.00	55.16	0.04	2370.00	55.30	0.09
1260.00	55.16	0.04	2970.00	55.30	0.09
1290.00	55.17	0.05	3750.00	55.32	0.11
1320.00	55.17	0.05	4170.00	55.33	0.12
1350.00	55.17	0.05	4770.00	55.33	0.12
1380.00	55.17	0.05	5370.00	55.34	0.13
1410.00	55.17	0.05	7170.00	55.36	0.14
1440.00	55.17	0.05	19590.00	55.39	0.18
1890.00	55.17	0.05			
1920.00	55.18	0.06			
2220.00	55.18	0.06			
2340.00	55.18	0.06			
2370.00	55.19	0.07			
2400.00	55.19	0.07			
2910.00	55.19	0.07			
2940.00	55.19	0.07			
2970.00	55.20	0.08			
3000.00	55.20	0.08			
3360.00	55.20	0.08			
3390.00	55.21	0.09			
3420.00	55.20	0.08			
3540.00	55.21	0.09			
4020.00	55.21	0.09			
4050.00	55.21	0.09			
4080.00	55.22	0.10			
4110.00	55.21	0.09			
4140.00	55.22	0.10			
4170.00	55.22	0.10			
4200.00	55.22	0.10			
4230.00	55.21	0.09			
4260.00	55.21	0.09			
4290.00	55.21	0.09			
4320.00	55.22	0.10			
4740.00	55.22	0.10			

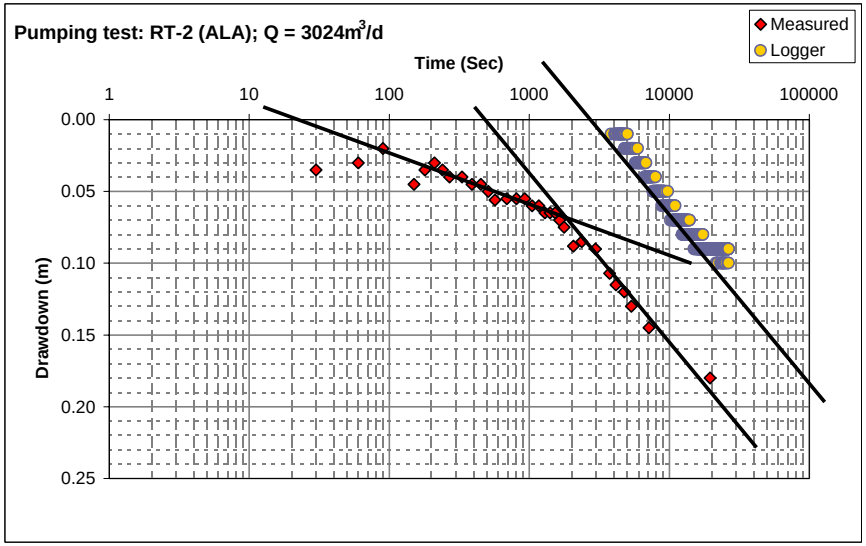
RECOVERY TEST DATA

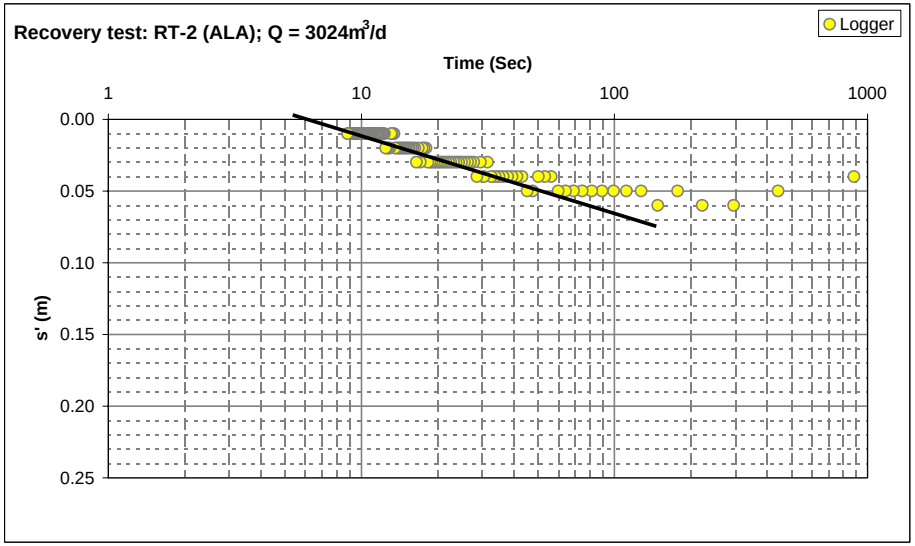
RT-2a (Pumped well)

t (min)	t' (min)	t/t'	Waterlevel (mTOC)	Drawdown (m)
26550.00	0.00		55.31	0.19
26580.00	30.00	886.00	55.25	0.13
26610.00	60.00	443.50	55.26	0.14
26640.00	90.00	296.00	55.27	0.15
26670.00	120.00	222.25	55.27	0.15
26700.00	150.00	178.00	55.26	0.14
26730.00	180.00	148.50	55.27	0.15
26760.00	210.00	127.43	55.26	0.14
26790.00	240.00	111.63	55.26	0.14
26820.00	270.00	99.33	55.26	0.14
26850.00	300.00	89.50	55.26	0.14
26880.00	330.00	81.45	55.26	0.14
26910.00	360.00	74.75	55.26	0.14
26940.00	390.00	69.08	55.26	0.14
26970.00	420.00	64.21	55.26	0.14
27000.00	450.00	60.00	55.26	0.14
27030.00	480.00	56.31	55.25	0.13
27060.00	510.00	53.06	55.25	0.13
27090.00	540.00	50.17	55.25	0.13
27120.00	570.00	47.58	55.26	0.14
27150.00	600.00	45.25	55.26	0.14
27180.00	630.00	43.14	55.25	0.13
27210.00	660.00	41.23	55.25	0.13
27240.00	690.00	39.48	55.25	0.13
27390.00	840.00	32.61	55.25	0.13
27420.00	870.00	31.52	55.24	0.12
27450.00	900.00	30.50	55.25	0.13
27480.00	930.00	29.55	55.24	0.12
27510.00	960.00	28.66	55.25	0.13
27540.00	990.00	27.82	55.24	0.12
28080.00	1530.00	18.35	55.24	0.12
28110.00	1560.00	18.02	55.23	0.11
28140.00	1590.00	17.70	55.23	0.11
28170.00	1620.00	17.39	55.23	0.11
28200.00	1650.00	17.09	55.24	0.12
28230.00	1680.00	16.80	55.23	0.11
28260.00	1710.00	16.53	55.24	0.12
28290.00	1740.00	16.26	55.23	0.11
28650.00	2100.00	13.64	55.23	0.11
28680.00	2130.00	13.46	55.22	0.10
28710.00	2160.00	13.29	55.22	0.10
28740.00	2190.00	13.12	55.22	0.10
28770.00	2220.00	12.96	55.23	0.11
28800.00	2250.00	12.80	55.23	0.11
28830.00	2280.00	12.64	55.23	0.11
28860.00	2310.00	12.49	55.23	0.11
28890.00	2340.00	12.35	55.22	0.10
29910.00	3360.00	8.90	55.22	0.10
29940.00	3390.00	8.83	55.22	0.10
29970.00	3420.00	8.76	55.21	0.09
30000.00	3450.00	8.70	55.21	0.09
30030.00	3480.00	8.63	55.22	0.10
30060.00	3510.00	8.56	55.22	0.10
30090.00	3540.00	8.50	55.21	0.09
30120.00	3570.00	8.44	55.21	0.09
31050.00	4500.00	6.90	55.21	0.09
31080.00	4530.00	6.86	55.21	0.09
31110.00	4560.00	6.82	55.20	0.08
31140.00	4590.00	6.78	55.20	0.08
31170.00	4620.00	6.75	55.21	0.09

4770.00	55.22	0.10
4800.00	55.23	0.11
4830.00	55.23	0.11
4860.00	55.22	0.10
4890.00	55.23	0.11
5700.00	55.23	0.11
5730.00	55.24	0.12
5760.00	55.24	0.12
5790.00	55.23	0.11
5820.00	55.24	0.12
5850.00	55.24	0.12
5880.00	55.24	0.12
5910.00	55.24	0.12
5940.00	55.23	0.11
5970.00	55.24	0.12
6750.00	55.25	0.13
6780.00	55.24	0.12
6810.00	55.25	0.13
7620.00	55.25	0.13
7650.00	55.26	0.14
7680.00	55.26	0.14
7710.00	55.25	0.13
7740.00	55.26	0.14
7770.00	55.26	0.14
9000.00	55.26	0.14
9030.00	55.27	0.15
9060.00	55.26	0.14
9240.00	55.26	0.14
9270.00	55.27	0.15
9390.00	55.26	0.14
9420.00	55.27	0.15
9450.00	55.26	0.14
9480.00	55.27	0.15
9510.00	55.27	0.15
10830.00	55.28	0.16
10920.00	55.28	0.16
10950.00	55.27	0.15
10980.00	55.28	0.16
11010.00	55.27	0.15
11040.00	55.28	0.16
12360.00	55.28	0.16
12390.00	55.29	0.17
12420.00	55.28	0.16
12450.00	55.28	0.16
12480.00	55.28	0.16
12510.00	55.28	0.16
12540.00	55.29	0.17
12570.00	55.29	0.17
12600.00	55.29	0.17
12630.00	55.28	0.16
12840.00	55.28	0.16
12870.00	55.29	0.17
12990.00	55.29	0.17
13020.00	55.28	0.16
13050.00	55.29	0.17
15390.00	55.29	0.17
15420.00	55.30	0.18
15570.00	55.30	0.18
15600.00	55.29	0.17
15630.00	55.29	0.17
15660.00	55.29	0.17
16020.00	55.30	0.18
16050.00	55.29	0.17
16080.00	55.30	0.18
16110.00	55.30	0.18
16140.00	55.29	0.17
16170.00	55.29	0.17
16200.00	55.30	0.18
16230.00	55.30	0.18
16260.00	55.29	0.17
16290.00	55.30	0.18
17280.00	55.30	0.18
17310.00	55.29	0.17
17340.00	55.30	0.18
17370.00	55.30	0.18
17400.00	55.29	0.17
23310.00	55.30	0.18
23340.00	55.31	0.19
23370.00	55.30	0.18
26520.00	55.30	0.18

31200.00	4650.00	6.71	55.20	0.08
31230.00	4680.00	6.67	55.20	0.08
31260.00	4710.00	6.64	55.20	0.08
31290.00	4740.00	6.60	55.20	0.08
31320.00	4770.00	6.57	55.20	0.08
31350.00	4800.00	6.53	55.21	0.09
31380.00	4830.00	6.50	55.21	0.09
31410.00	4860.00	6.46	55.20	0.08
31440.00	4890.00	6.43	55.20	0.08
31470.00	4920.00	6.40	55.21	0.09
31500.00	4950.00	6.36	55.20	0.08
31620.00	5070.00	6.24	55.21	0.09
31650.00	5100.00	6.21	55.20	0.08
32700.00	6150.00	5.32	55.20	0.08
32730.00	6180.00	5.30	55.20	0.08
32760.00	6210.00	5.28	55.20	0.08
32790.00	6240.00	5.25	55.20	0.08
32820.00	6270.00	5.23	55.19	0.07
32850.00	6300.00	5.21	55.19	0.07
32880.00	6330.00	5.19	55.19	0.07
32910.00	6360.00	5.17	55.19	0.07
32940.00	6390.00	5.15	55.20	0.08
32970.00	6420.00	5.14	55.19	0.07
34050.00	7500.00	4.54	55.18	0.06
34080.00	7530.00	4.53	55.18	0.06
34110.00	7560.00	4.51	55.19	0.07
34140.00	7590.00	4.50	55.18	0.06
34170.00	7620.00	4.48	55.18	0.06
34200.00	7650.00	4.47	55.19	0.07
34230.00	7680.00	4.46	55.19	0.07
34260.00	7710.00	4.44	55.18	0.06
34290.00	7740.00	4.43	55.18	0.06
36900.00	10350.00	3.57	55.18	0.06
36930.00	10380.00	3.56	55.18	0.06
36960.00	10410.00	3.55	55.18	0.06
36990.00	10440.00	3.54	55.18	0.06
37020.00	10470.00	3.54	55.17	0.05
37050.00	10500.00	3.53	55.18	0.06
37080.00	10530.00	3.52	55.18	0.06
37110.00	10560.00	3.51	55.18	0.06
37140.00	10590.00	3.51	55.18	0.06
37170.00	10620.00	3.50	55.18	0.06
37200.00	10650.00	3.49	55.18	0.06
37230.00	10680.00	3.49	55.17	0.05
37260.00	10710.00	3.48	55.18	0.06
37290.00	10740.00	3.47	55.18	0.06
37320.00	10770.00	3.47	55.17	0.05
37350.00	10800.00	3.46	55.17	0.05
37380.00	10830.00	3.45	55.17	0.05
37410.00	10860.00	3.44	55.18	0.06
37440.00	10890.00	3.44	55.17	0.05
37470.00	10920.00	3.43	55.18	0.06
37500.00	10950.00	3.42	55.18	0.06
37530.00	10980.00	3.42	55.17	0.05
37560.00	11010.00	3.41	55.18	0.06
38010.00	11460.00	3.32	55.17	0.05
38040.00	11490.00	3.31	55.17	0.05
38070.00	11520.00	3.30	55.18	0.06
38100.00	11550.00	3.30	55.17	0.05
38130.00	11580.00	3.29	55.17	0.05
38160.00	11610.00	3.29	55.18	0.06
38190.00	11640.00	3.28	55.18	0.06
38220.00	11670.00	3.28	55.17	0.05
38250.00	11700.00	3.27	55.17	0.05
38280.00	11730.00	3.26	55.17	0.05
40200.00	13650.00	2.95	55.17	0.05
40230.00	13680.00	2.94	55.17	0.05
40260.00	13710.00	2.94	55.16	0.04
40290.00	13740.00	2.93	55.16	0.04
40320.00	13770.00	2.93	55.16	0.04
40350.00	13800.00	2.92	55.17	0.05
40380.00	13830.00	2.92	55.16	0.04
53130.00	26580.00	2.00	55.16	0.04
67770	41220.00	1.64	55.16	0.04
67800	41250.00	1.64	55.15	0.03
73950	47400.00	1.56	55.15	0.03
73980	47430.00	1.56	55.14	0.02
78330	51780.00	1.51	55.14	0.02
78360	51810.00	1.51	55.13	0.01
78390	51840.00	1.51	55.11	-0.01





Mid time

Q =	3,024	kL/day	r =	12	m
δs =	0.045	m	t =	0.000231	days

$KD = \frac{2.3Q}{4\pi\delta s}$ = 12299 m^2/day

$S = \frac{2.25KDt}{r^2}$ = 0.044

Late time

Q =	3,024	kL/day	r =	12	m
δs =	0.12	m	t =	0.000231	days

$KD = \frac{2.3Q}{4\pi\delta s}$ = 4612 m^2/day

$S = \frac{2.25KDt}{r^2}$ = 0.017

Mid time

Q =	3,024	kL/day	r =	12	m
δs' =	0.055	m	t =	0.0000752	days

$KD = \frac{2.3Q}{4\pi\delta s'}$ = 10063 m^2/day

$S = \frac{2.25KDt}{r^2}$ = 0.012

Notes: Logger data and measured data do not agree at early-time, possibly because of slight inconsistencies in pumping start time. Either data set is suitable though for calculating KD, but use of logger data will result in an estimate of S (or Sy) one order of magnitude higher than will arise from use of measured data

OLYMPIC DAM RT-5

CONSTANT RATE TEST
Pumped Well

Well Number : RT-5a (Pumped Well)
Pumping Commenced on 10/8/07 at 03:08pm
Pumping Ceased on 11/8/07 at 10:49am
Measurement Point = 0.30m above ground level
Standing Water Level = 10.95(RT-5a), 21.37(RT-5b), 21.61(RT-5c)m below measurement point
Distance from Pumped Well = 0(RT-5a), 22(RT-7b/c)m
Pumping Rate: 873 m^3/day

CONSTANT RATE DATA

RT-5a (Pumped well)

time (min)	Water level (mTOC)	Drawdown (m)
0.00	10.95	0.00
2.50	11.30	0.35
7.00	11.31	0.36
12.00	11.32	0.37
17.00	11.32	0.37
22.00	11.33	0.38
30.00	11.32	0.37
37.00	11.32	0.37
47.00	11.32	0.37
57.00	11.33	0.38
68.00	11.33	0.38
77.00	11.34	0.39
87.00	11.34	0.39
112.00	11.34	0.39
130.00	11.35	0.40
387.00	11.39	0.44
977.00	11.38	0.43
1103.00	11.38	0.43
1181.00	11.38	0.43

RECOVERY TEST DATA

RT-5a (Pumped well)

t (min)	t' (min)	t/t'	Waterlevel (mTOC)	Drawdown (m)
1184.00	0.00		11.09	0.14
1185.00	1.00	1185.00	11.08	0.13
1186.00	2.00	593.00	11.07	0.12
1187.00	3.00	395.67	11.06	0.11
1190.00	6.00	198.33	11.05	0.10
1192.00	8.00	149.00	11.05	0.10
1201.00	17.00	70.65	11.04	0.09
1208.00	24.00	50.33	11.03	0.08
1219.00	35.00	34.83	11.02	0.07
1227.00	43.00	28.53	11.02	0.07
1241.00	57.00	21.77	11.00	0.05
1262.00	78.00	16.18	10.99	0.04
1281.00	97.00	13.21	10.97	0.02
1304.00	120.00	10.87	10.96	0.01
1608.00	424.00	3.79	10.88	-0.07
2424.00	1240.00	1.95	10.78	-0.17
2611.00	1427.00	1.83	10.78	-0.17

RT-5b (monitored well)

time (min)	Water level (mTOC)	Drawdown (m)
0.00	21.37	0.00
10.00	21.37	0.00
27.00	21.31	-0.06
42.00	21.30	-0.07
50.00	21.27	-0.10
54.00	21.26	-0.12
63.00	21.25	-0.13
73.00	21.24	-0.14
79.00	21.23	-0.15
84.00	21.23	-0.15
89.00	21.21	-0.16
108.00	21.19	-0.18
127.00	21.17	-0.20
391.00	20.93	-0.44
1112.00	20.37	-1.00
1175.00	20.35	-1.02

RT-5b (monitored well)

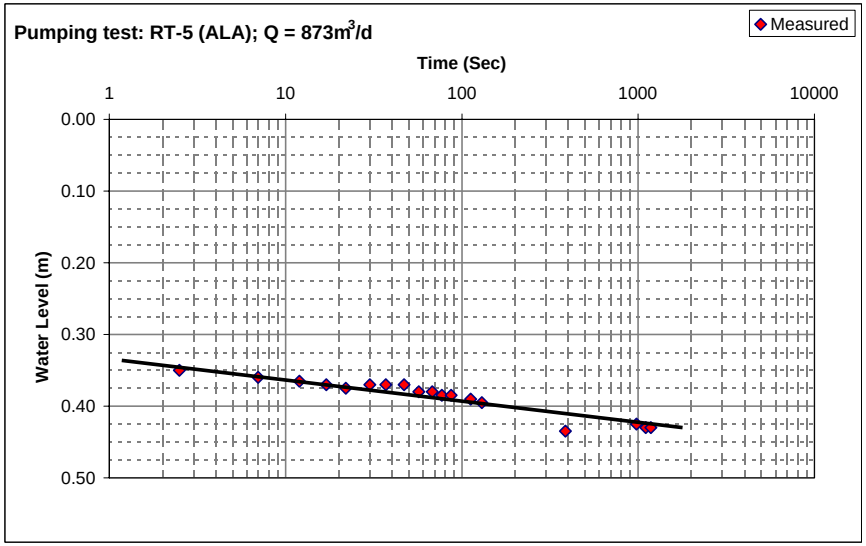
t (min)	t' (min)	t/t'	Waterlevel (mTOC)	Drawdown (m)
1182.00	-2.00		20.35	-1.02
1189.00	5.00	237.80	20.34	-1.03
1194.00	10.00	119.40	20.34	-1.03
1200.00	16.00	75.00	20.34	-1.03
1203.00	19.00	63.32	20.34	-1.04
1212.00	28.00	43.29	20.33	-1.04
1217.00	33.00	36.88	20.33	-1.04
1225.00	41.00	29.88	20.33	-1.04
1233.00	49.00	25.16	20.32	-1.05
1244.00	60.00	20.73	20.31	-1.06
1250.00	66.00	18.94	20.31	-1.06
1264.00	80.00	15.80	20.30	-1.07
1286.00	102.00	12.61	20.28	-1.09
1309.00	125.00	10.47	20.27	-1.10
1610.00	426.00	3.78	20.10	-1.27
2431.00	1247.00	1.95	19.87	-1.50

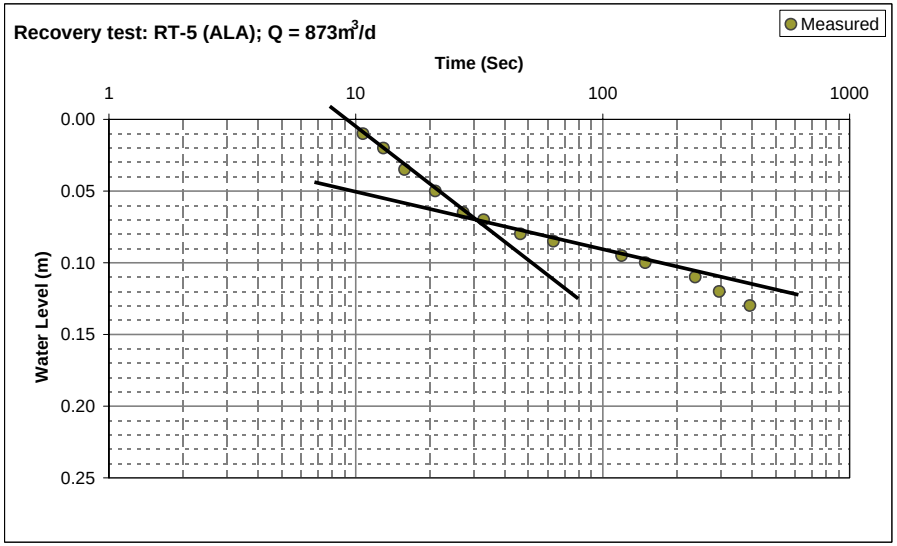
RT-5c (monitored well)

time (min)	Water level (mTOC)	Drawdown (m)
0.00	21.61	0.00
28.00	21.64	0.03
40.00	21.64	0.03
52.00	21.64	0.03
66.00	21.65	0.04
71.00	21.65	0.04
81.00	21.65	0.04
109.00	21.66	0.05
124.00	21.66	0.05
394.00	21.73	0.12
978.00	21.72	0.11
1117.00	21.73	0.12
1178.00	21.74	0.13

RT-5c (monitored well)

t (min)	t' (min)	t/t'	Waterlevel (mTOC)	Drawdown (m)
1182.00	-2.00		21.74	0.13
1197.00	13.00	92.08	21.72	0.11
1215.00	31.00	39.19	21.73	0.12
1230.00	46.00	26.74	21.72	0.11
1247.00	63.00	19.79	21.70	0.09
1266.00	82.00	15.44	21.69	0.08
1289.00	105.00	12.28	21.67	0.06
1306.00	122.00	10.70	21.67	0.06
1612.00	428.00	3.77	21.63	0.02
2427.00	1243.00	1.95	21.64	0.03





All time

Q = 873 kL/day r = 0 m

δs = 0.03 m t = 0.000231 days

$KD = \frac{2.3Q}{4\pi\delta s}$ = 5326 m^2/day

$S = \frac{2.25KDt}{r^2}$ = n/a

Mid-time

Q = 873 kL/day r = 0 m

δs' = 0.04 m t = 0.000231 days

$KD = \frac{2.3Q}{4\pi\delta s'}$ = 3995 m^2/day

$S = \frac{2.25KDt}{r^2}$ = n/a

Late-time

Q = 873 kL/day r = 0 m

δs' = 0.13 m t = 0.000231 days

$KD = \frac{2.3Q}{4\pi\delta s'}$ = 1229 m^2/day

$S = \frac{2.25KDt}{r^2}$ = n/a

Groundwater Monitoring Well Survey Data Summary WITH SALINITY CORRECTION

Client : BHP Billiton
Job Name : EIS Report Waterlevels
Job No : EV-02

Date : 1-Oct-07
Levels by : REM from 6/9/7-19/9/7

Density of FRESH Water (Pf) : 1
Conversion factor (EC to TDS) : 0.65

	Survey			Field Gauging from surveyed standpipe						Relative Levels		Water Column Thickness	Salinity		Density Calcs.	Salinity	Correction (m)	Interpreted log	Conversion (EC to TDS)
Bore Location	RP (mAHD)	Type of Standpipe (P or S)	Ground Level (mAHD)	SWL (m bRP)	Bore Depth (m)	Screen Length (m)	Top of Screen (mAHD)	Base of Screen (mAHD)	Measured rSWL (Hs) (mAHD)	Bore Depth (mAHD)	Slotted Interval Midpoint (Hp) (mAHD)	(m)	EC* (mS/cm)	TDS (mg/L)	Ps	Corrected rSWL (mAHD)			
RT1	50.08	S	49.78	11.48	474.0	30	-387.92	-417.92	38.60	-423.92	-402.92	462.52	341.0	193000	1.145	102.51	**63.91**	Pwc	0.57
RT2a	95.58	S	95.28	55.15	119.5	6	-17.92	-23.92	40.43	-23.92	-20.92	64.35	55.0	43400	1.033	42.43	**2.00**	€a	0.79
RT2b	95.56	S	95.26	69.30	342.0	12	62.56	-246.44	26.26	-246.44	-110.09	272.70	328.0	203000	1.152	47.02	**20.76**	Pws	0.62
RT3	100.82	S	100.52	59.92	142.0	115	66.82	-48.18	40.90	-41.18	-3.64	82.08	30.0	19500	1.015	41.55	**0.65**	€a	0.65
RT4a	72.16	S	71.86	32.15	58.0	16	30.16	14.16	40.01	14.16	22.16	25.85	49.0	31700	1.024	40.44	**0.42**	€a	0.65
RT4b	72.22	S	71.92	55.08	522.0	36	-413.78	-449.78	17.14	-449.78	-431.78	466.92	327.0	191000	1.143	81.45	**64.31**	Pwx	0.58
RT5a	48.82	S	48.52	9.45	66.0	30	12.82	-17.18	39.37	-17.18	-2.18	56.55	99.6	62200	1.047	41.31	**1.94**	€a	0.62
RT5b	48.48	S	48.18	21.58	200.0	12	-106.52	-118.52	26.90	-151.52	-112.52	178.42	404.0	261000	1.196	54.19	**27.29**	€a	0.65
RT5c	48.48	S	48.18	16.59	634.0	134	-451.52	-585.52	31.89	-585.52	-518.52	617.41	430.0	257000	1.193	137.98	**106.09**	Pwr/Pwa	0.60
RT7a	65.01	S	64.71	12.96	36.0	12	41.01	29.01	52.05	29.01	35.01	23.04	88.3	60200	1.045	52.82	**0.77**	Pfa	0.68
RT7b	65.01	S	64.71	18.39	96.0	6	-24.99	-30.99	46.62	-30.99	-27.99	77.61	90.7	62400	1.047	50.11	**3.49**	Pfa	0.69
RT9	59.29	S	58.99	16.30	71.0	12	12.29	0.29	42.99	-11.71	6.29	54.70	54.3	31000	1.023	43.85	**0.85**	Pwr	0.57
RT16a	102.42	S	102.12	59.07	68.0	6	40.42	34.42	43.35	34.42	37.42	8.93	34.5	22100	1.017	43.45	**0.10**	€a	0.64
RT16b	102.45	S	102.15	71.51	216.0	12	-95.55	-107.55	30.94	-113.55	-101.55	144.49	84.5	56700	1.043	36.58	**5.63**	Pwc	0.67
RT17a	101.56	S	101.26	52.73	84.0	12	35.56	23.56	48.83	17.56	29.56	31.27	29.0	18850	1.014	49.10	**0.27**	€a	0.65
RT17b	101.94	S	101.64	72.24	264.0	12	-134.06	-146.06	29.70	-162.06	-140.06	191.76	75.0	48750	1.037	35.90	**6.21**	Pwc	0.65
PT-24a	105.87	S	105.17	-154.17	86.0	12	31.87	19.87	48.29	19.87	25.87	240.17	50.0	32500	1.024	48.84	**0.55**	€a	0.65
LR1	102.91	S	102.41	55.96	68.0	18	52.91	34.91	46.95	34.91	40.93	12.04	50.0	32500	1.024	47.10	**0.15**	€a	0.65
LR2	101.19	S	100.69	56.28	70.0	24	55.19	31.19	44.91	31.19	38.05	13.72	50.0	32500	1.024	45.08	**0.17**	€a	0.65
LR3	101.50	S	101.00	32.23	58.0	14	57.50	43.50	69.27	43.50	50.50	25.77	50.0	32500	1.024	69.73	**0.46**	€a	0.65
LR4	103.40	S	102.90	62.41	78.8	12	36.60	24.60	40.99	24.60	30.60	16.39	50.0	32500	1.024	41.24	**0.25**	€a	0.65
LR5	104.80	S	104.30	52.77	66.8	6	44.00	38.00	52.03	38.00	41.00	14.03	50.0	32500	1.024	52.30	**0.27**	€a	0.65
LR6	102.09	S	101.59	50.16	72.8	6	35.29	29.29	51.93	29.29	32.29	22.64	50.0	32500	1.024	52.41	**0.48**	€a	0.65
LR7	105.59	S	105.09	53.12	66.8	6	44.79	38.79	52.47	38.79	41.79	13.68	50.0	32500	1.024	52.73	**0.26**	€a	0.65
LR8	97.09	S	96.59	54.63	66.8	6	36.29	30.29	42.46	30.29	33.29	12.17	50.0	32500	1.024	42.68	**0.22**	€a	0.65
LR9	87.40	S	86.90	39.19	49.8	6	43.60	37.60	48.21	37.60	40.60	10.61	50.0	32500	1.024	48.40	**0.19**	€a	0.65
LR10	49.82	S	49.38	12.58	40.0	15	24.82	9.82	38.00	9.82	17.32	27.42	50.0	32500	1.024	38.50	**0.50**	€a	0.65
LR11	55.24	S	54.82	15.48	40.0	15	30.24	15.24	40.00	15.24	22.74	24.52	50.0	32500	1.024	40.42	**0.42**	€a	0.65
LR12	99.96	S	99.58	54.57	92.0	15	22.96	7.96		7.96	3.98	37.43	50.0	32500	1.024	-0.10	**-0.10**	€a	0.65
LT41	98.19	S	97.69	49.19	66.0	6	38.19	32.19	49.00	32.19	35.19	16.81	50.0	32500	1.024	49.34	**0.34**	€a	0.65
LT19	102.40	S	101.90	51.87	67.0	17	52.40	35.40	50.53	35.40	42.97	15.13	50.0	32500	1.024	50.71	**0.18**	€a	0.65

Note:

$Hf = Hs + ((Ps-Pf)/ Pf)(Hs-Hp)$ where

Hf = Equivalent freshwater head (mAHD)
Hs = Level of saline groundwater measured in peizometer (mAHD)
Hp = if RSWL > Top of Screen (mAHD, Screen is fully Saturated): Relative Level of the Midpoint of the Screen (mAHD)
if RSWL < Top of Screen (mAHD, screen intersects SWL): mid-point between the SWL and the base of the screen (m AHD)
Pf = Density of fresh water (=1, kg/L)
Ps = density of saline groundwater (as a rule of thumb: TDS (mg/L) * $7.5x10^{-7}$ + 1)

mAHD = metres relative to Australian Height Datum
SWL = Standing Water Level
P = Standpipe PVC
S = Standpipe Steel

RT Correction Range (m)

	Max	Min	GeoMean Conv^{n}
€a	27.29	0.10	0.66
Pwc	63.91	5.634	0.63
Pws	106.09	20.759	0.61
Shales	64.31	26.372	0.63

BHP Bore Locations: Andamooka Limestone

Target ID	Easting	Northing	Depth (m)	Waterlevel (mAHD)	Date of WL Measurement
LR1	675630.8	6636423	68.5	46.94	1/03/2007
LR2	685786.8	6637306	70	45.59	1/03/2007
LR4	691262.7	6628950	79	41.05	1/03/2007
LR8	678842.9	6641779	67	42.43	1/03/2007
LR9	668483.9	6624888	50	48.23	26/02/2007
LM25	681879.2	6628459		53.54	1/03/2007
LT19	672990.8	6630471	67	49.21	26/02/2007
LT41	674401.5	6631671	66	50.63	19/03/2007
PT24a	676815.5	6627754		48.294	20/06/2007
LR10	705533	6652117		38	
LR11	701711.7	6651124		40	

Table E.1 Groundwater chemistry

	Well Number		RT-1	LR-10	RT-2a	RT-2a	RT-2b	RT-3	RT-4a	RT-4b	RT-5a	RT-5b	RT-5c	RT-7a	RT-7b	RT-9	RT-16a	RT-16b	RT-17a	RT-17b
	Target Aquifer		Pwc	€a	€a (after completion)	€a/Pws (red) (before completion)	Pws (red)	€a	€a	Pwx	€a	€a (lower)	Pwa	Pfa (upper)	Pfa (lower)	Pwm	€a	Pwc	€a	Pwc
Date Sampled			24/07/2007	23/07/2007	29/06/2007	11/12/2006	12/07/2007	1/12/2006	22/08/2007	22/08/2007	7/08/2007	9/08/2007	9/08/2007	24/08/2007	24/08/2007	11/01/2007	18/06/2007	18/06/2007	18/06/2007	18/06/2007
General Laboratory Analysis	pH		7.55	7.58	7.69	7.54	7.46	7.48	7.61	7.52	7.61	7.66	7.6	7.51	7.71	7.1	7.21	7.51	---	---
	Electrical Conductivity	µS/cm	341000	56700	55000	66700	328000	30000	49000	327000	99600	404000	43000	88300	90700	54300	34500	84500	---	---
	Total Dissolved Solids @180°C	mg/L	193000	38000	36100	43400	203000	- - -	31700	191000	62200	261000	257000	60200	62400	31000	22100	56700	---	---
	Suspended Solids (SS)	mg/L	200	98	52	77	596	- - -	200	536	160	458	1150	608	296	3160	3420	84	---	---
	Turbidity	NTU	218	100	4.3	19.1	1540	22.1	190	282	42.2	185	492	349	165	6570	2620	48.5	---	---
	Total Alkalinity as CaCO3	mg/L	85	252	213	254	84	243	233	55	248	63	56	<1	<10	216	236	203	---	---
Dissolved Anions	Sulphate as SO4 2-	mg/L	10300	4430	4540	5630	12900	5700	3610	4880	5810	13500	12500	4420	5000	4880	4310	7440	---	---
	Chloride	mg/L	114000	20400	17300	22800	136000	6960	15400	108000	44600	146000	143000	31900	31500	17500	9510	30800		
Dissolved Cations	Calcium	mg/L	835	1030	945	1000	983	554	753	1560	959	983	952	520	1930	1010	832	1040	---	---
	Magnesium	mg/L	3990	1030	965	1370	5170	358	615	1280	1630	5880	5510	330	1390	913	754	1620	---	---
	Sodium	mg/L	73500	11900	10900	14400	86800	6460	8720	69400	25100	94200	94200	21400	20400	12200	6610	20200	---	---
	Potassium	mg/L	501	61	92	208	368	63	115	83	135	347	379	136	98	225	42	104	---	---
	Iron	mg/L				- - -		<0.01								0.1			---	---
	Iron	mg/L				3.58		1.05								241				
Dissolved Metals	Aluminium	mg/L	<0.10	<0.01	<0.01		<0.10		0.04	<0.10	<0.01	<0.10	<0.10	<0.01	0.12		<0.01	<0.01	0.37	0.04
	Arsenic	mg/L	0.028	0.006	0.004		0.034		0.002	1.06	0.011	0.017	0.021	0.004	0.004		0.004	0.006	0.002	0.003
	Barium	mg/L				- - -		0.085								0.037				
	Cobalt	mg/L	0.055	0.003	0.011		0.014		0.008	<0.010	0.006	<0.010	0.032	0.007	0.007		0.004	0.01	0.002	0.003
	Copper	mg/L	0.073	0.008	0.008		0.04		0.013	<0.010	0.015	0.036	0.035	0.015	0.02		0.007	0.015	0.008	0.017
	Lead	mg/L	<0.010	<0.001	<0.001		<0.010		<0.001	<0.010	<0.001	<0.010	<0.010	<0.001	0.002		<0.001	<0.001	<0.001	<0.001
	Manganese	mg/L	3.86	0.61	0.235	0.412	0.982	0.366	0.444	<0.010	0.256	0.708	1.64	3.13	3.28	5.44	0.171	1.39	0.036	0.858
	Molybdenum	mg/L																		
	Strontium	mg/L	13.9	18.1	14.4	- - -	15.6	5.3	14.2	0.851	14.8	12.9	15.3	36.3	37.1	13.8	12.9	19.1	13.3	18.2
	Uranium	mg/L	<0.010	0.026	0.051		<0.010		0.003	<0.010	0.009	<0.010	<0.010	0.01	0.001		0.076	0.017	0.024	0.029
	Zinc	mg/L	0.172	0.011	0.009		0.119		0.173	<0.050	0.064	0.053	1.21	0.175	1.4		0.049	0.023	0.009	0.005
	Boron (Dissolved)	mg/L	4.11	5.34	5.2	- - -	2.66	5.78	4.99	114	4.31	1.22	2.06	4.47	4.36	5.61	5.29	6.47	3.47	5.94
	Boron (Total)	mg/L				6.3		7.54								6.86				
	Silica	mg/L	105	81	114	11.9	151	14.3	48.2	120	126	214	0.4	100	93.4	10.4	104	140	---	---
	Fluoride	mg/L	0.4	1.4	1.1	1.5	0.4	<0.1	1	0.3	1	0.1	0.3	0.9	1.1	0.3	1.6	0.8	---	---
	Nitrite as N	mg/L	0.029	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	0.015	0.573	0.349	<0.010	<0.010	<0.010	0.011	---	---
	Nitrate as N	mg/L	0.665	0.837	0.031	<0.010	0.08	<0.010	0.152	0.188	0.139	0.101	3.11	2.11	0.096	<0.010	0.222	9.8	---	---
	Nitrite + Nitrate as N	mg/L	0.694	0.837	0.031	<0.010	0.08	0.015	0.152	0.188	0.139	0.116	3.68	2.46	0.096	<0.010	0.222	9.81	---	---
Ionic Balance	Total Anions	meq/L	3440	673	587	766	4100	320	515	3160	1380	4410	4290	992	1000	601	362	1030	---	---
	Total Cations	meq/L	3580	656	603	795	4260	340	470	3200	1280	4640	4610	988	1100	660	392	1070	---	---
	Ionic Balance	%	1.88	1.26	1.32	1.9	1.83	2.98	4.54	0.7	4.12	2.55	3.56	0.19	4.83	4.74	3.93	1.84	---	---

CERTIFICATE OF ANALYSIS

Work Order	: **EM0706659**	Page	: 1 of 12
Client	: **RESOURCE & ENVIRON MANGMNT P/L**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: UNIT 9, 15 FULLARTON RD KENT TOWN SA AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: paulhowe@rem.net.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8363 1777	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8363 1477	Facsimile	: +61-3-8549 9601
Project	: EV02&EV03	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 05-SEP-2007
Sampler	: ----	Issue Date	: 12-SEP-2007
Site	: ----		
		No. of samples received	: 22
Quote number	: ME/122/06	No. of samples analysed	: 22

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

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

Key : CAS Number = Chemistry Abstract Services number
LOR = Limit of reporting
^ = Result(s) reported is calculated using analyte detections at or above the LOR. (eg. <5 + 5 + 7 = 12).

- **ED037-P: EM0706659 #017, #018, #020, #021, #022. Insufficient sample has been provided for Alkalinity. Where applicable LOR values have been adjusted accordingly.**
- **EGO20: EMO706659 #002, 005, 009, 011, 016, 017, 018, 019 and 020 have been diluted for ICP-MS analysis due to internal standard failier and LORs have been raised accordingly.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RT4A	RT4B	PB3	LR-10	RT1
				Client sampling date / time: 22-AUG-2007 15:00	22-AUG-2007 15:00	11-JUN-2007 15:00	23-JUL-2007 15:00	24-JUL-2007 15:00
				EM0706659-001	EM0706659-002	EM0706659-003	EM0706659-004	EM0706659-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.61**	**7.52**	**7.68**	**7.58**	**7.55**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**49000**	**327000**	**42300**	**56700**	**341000**
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**31700**	**191000**	**27200**	**38000**	**193000**
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**200**	**536**	**122**	**98**	**200**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**190**	**282**	**115**	**100**	**218**
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	**233**	**55**	**330**	**252**	**85**
Total Alkalinity as CaCO3	----	1	mg/L	**233**	**55**	**330**	**252**	**85**
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**3610**	**4880**	**5330**	**4430**	**10300**
^ Silica	7631-86-9	0.1	mg/L	**48.2**	**120**	**86.2**	**81.0**	**105**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**15400**	**108000**	**12800**	**20400**	**114000**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**753**	**1560**	**906**	**1030**	**835**
Magnesium	7439-95-4	1	mg/L	**615**	**1280**	**904**	**1030**	**3990**
Sodium	7440-23-5	1	mg/L	**8720**	**69400**	**8010**	**11900**	**73500**
Potassium	7440-09-7	1	mg/L	**115**	**83**	**51**	**61**	**501**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	<0.10	<0.01	<0.01	<0.10
Arsenic	7440-38-2	0.001	mg/L	**0.002**	**1.06**	**0.007**	**0.006**	**0.028**
Cobalt	7440-48-4	0.001	mg/L	**0.008**	<0.010	**0.001**	**0.003**	**0.055**
Copper	7440-50-8	0.001	mg/L	**0.013**	<0.010	**0.008**	**0.008**	**0.073**
Lead	7439-92-1	0.001	mg/L	<0.001	<0.010	<0.001	<0.001	<0.010
Manganese	7439-96-5	0.001	mg/L	**0.444**	<0.010	**0.043**	**0.610**	**3.86**
Strontium	7440-24-6	0.001	mg/L	**14.2**	**0.851**	**15.6**	**18.1**	**13.9**
Uranium	7440-61-1	0.001	mg/L	**0.003**	<0.010	**0.070**	**0.026**	<0.010
Zinc	7440-66-6	0.005	mg/L	**0.173**	<0.050	**0.007**	**0.011**	**0.172**
Boron	7440-42-8	0.05	mg/L	**4.99**	**114**	**7.68**	**5.34**	**4.11**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RT4A	RT4B	PB3	LR-10	RT1
				Client sampling date / time: 22-AUG-2007 15:00	22-AUG-2007 15:00	11-JUN-2007 15:00	23-JUL-2007 15:00	24-JUL-2007 15:00
				EM0706659-001	EM0706659-002	EM0706659-003	EM0706659-004	EM0706659-005
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.0**	**0.3**	**2.0**	**1.4**	**0.4**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	**0.029**
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	**0.152**	**0.188**	**0.383**	**0.837**	**0.665**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	**0.152**	**0.188**	**0.383**	**0.837**	**0.694**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**515**	**3160**	**479**	**673**	**3440**
^ Total Cations	----	0.01	meq/L	**470**	**3200**	**469**	**656**	**3580**
^ Ionic Balance	----	0.01	%	**4.54**	**0.70**	**0.98**	**1.26**	**1.88**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RT16	RT16A	RT2	RT5C	RT5A (66M)
				Client sampling date / time: 18-JUN-2007 15:00	18-JUN-2007 15:00	29-JUN-2007 15:00	09-AUG-2007 15:00	07-AUG-2007 15:00
				EM0706659-006	EM0706659-007	EM0706659-008	EM0706659-009	EM0706659-010
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.51**	**7.21**	**7.69**	**7.60**	**7.61**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**84500**	**34500**	**55000**	**43000**	**99600**
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**56700**	**22100**	**36100**	**257000**	**62200**
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**84**	**3420**	**52**	**1150**	**160**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**48.5**	**2620**	**4.3**	**492**	**42.2**
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	**203**	**236**	**213**	**56**	**248**
Total Alkalinity as CaCO3	----	1	mg/L	**203**	**236**	**213**	**56**	**248**
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**7440**	**4310**	**4540**	**12500**	**5810**
^ Silica	7631-86-9	0.1	mg/L	**140**	**104**	**114**	**0.4**	**126**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**30800**	**9510**	**17300**	**143000**	**44600**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1040**	**832**	**945**	**952**	**959**
Magnesium	7439-95-4	1	mg/L	**1620**	**754**	**965**	**5510**	**1630**
Sodium	7440-23-5	1	mg/L	**20200**	**6610**	**10900**	**94200**	**25100**
Potassium	7440-09-7	1	mg/L	**104**	**42**	**92**	**379**	**135**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.10	<0.01
Arsenic	7440-38-2	0.001	mg/L	**0.006**	**0.004**	**0.004**	**0.021**	**0.011**
Cobalt	7440-48-4	0.001	mg/L	**0.010**	**0.004**	**0.011**	**0.032**	**0.006**
Copper	7440-50-8	0.001	mg/L	**0.015**	**0.007**	**0.008**	**0.035**	**0.015**
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001
Manganese	7439-96-5	0.001	mg/L	**1.39**	**0.171**	**0.235**	**1.64**	**0.256**
Strontium	7440-24-6	0.001	mg/L	**19.1**	**12.9**	**14.4**	**15.3**	**14.8**
Uranium	7440-61-1	0.001	mg/L	**0.017**	**0.076**	**0.051**	<0.010	**0.009**
Zinc	7440-66-6	0.005	mg/L	**0.023**	**0.049**	**0.009**	**1.21**	**0.064**
Boron	7440-42-8	0.05	mg/L	**6.47**	**5.29**	**5.20**	**2.06**	**4.31**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RT16	RT16A	RT2	RT5C	RT5A (66M)
				Client sampling date / time: 18-JUN-2007 15:00	18-JUN-2007 15:00	29-JUN-2007 15:00	09-AUG-2007 15:00	07-AUG-2007 15:00
				EM0706659-006	EM0706659-007	EM0706659-008	EM0706659-009	EM0706659-010
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.8**	**1.6**	**1.1**	**0.3**	**1.0**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	**0.011**	<0.010	<0.010	**0.573**	<0.010
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	**9.80**	**0.222**	**0.031**	**3.11**	**0.139**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	**9.81**	**0.222**	**0.031**	**3.68**	**0.139**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1030**	**362**	**587**	**4290**	**1380**
^ Total Cations	----	0.01	meq/L	**1070**	**392**	**603**	**4610**	**1280**
^ Ionic Balance	----	0.01	%	**1.84**	**3.93**	**1.32**	**3.56**	**4.12**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RT5A(BOTTOM LMST)	PB1(1)	PB1(2)	RT17	RT17A
				Client sampling date / time: 09-AUG-2007 15:00	11-JUN-2007 15:00	11-JUN-2007 15:00	18-JUN-2007 15:00	18-JUN-2007 15:00
				EM0706659-011	EM0706659-012	EM0706659-013	EM0706659-014	EM0706659-015
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.66**	**7.76**	**7.61**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**404000**	**42500**	**42500**	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**261000**	**29200**	**28300**	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**458**	**94**	**48**	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**185**	**98.0**	**29.0**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**63**	**231**	**238**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**63**	**231**	**238**	----	----
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**13500**	**4810**	**4880**	----	----
^ Silica	7631-86-9	0.1	mg/L	**214**	**122**	**98.4**	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**146000**	**12200**	**12800**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**983**	**892**	**897**	----	----
Magnesium	7439-95-4	1	mg/L	**5880**	**892**	**902**	----	----
Sodium	7440-23-5	1	mg/L	**94200**	**7860**	**8010**	----	----
Potassium	7440-09-7	1	mg/L	**347**	**66**	**54**	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.01	<0.01	**0.04**	**0.37**
Arsenic	7440-38-2	0.001	mg/L	**0.017**	**0.002**	**0.002**	**0.003**	**0.002**
Cobalt	7440-48-4	0.001	mg/L	<0.010	**0.020**	**0.028**	**0.003**	**0.002**
Copper	7440-50-8	0.001	mg/L	**0.036**	**0.008**	**0.008**	**0.017**	**0.008**
Lead	7439-92-1	0.001	mg/L	<0.010	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.708**	**0.468**	**0.515**	**0.858**	**0.036**
Strontium	7440-24-6	0.001	mg/L	**12.9**	**15.3**	**15.2**	**18.2**	**13.3**
Uranium	7440-61-1	0.001	mg/L	<0.010	**0.034**	**0.035**	**0.029**	**0.024**
Zinc	7440-66-6	0.005	mg/L	**0.053**	<0.005	<0.005	**0.005**	**0.009**
Boron	7440-42-8	0.05	mg/L	**1.22**	**5.97**	**6.01**	**5.94**	**3.47**

Analytical Results

Sub-Matrix: **WATER**

				Client sample ID :	RT5A(BOTTOM LMST)	PB1(1)	PB1(2)	RT17	RT17A
				Client sampling date / time :	09-AUG-2007 15:00	11-JUN-2007 15:00	11-JUN-2007 15:00	18-JUN-2007 15:00	18-JUN-2007 15:00
Compound	CAS Number	LOR	Unit		EM0706659-011	EM0706659-012	EM0706659-013	EM0706659-014	EM0706659-015
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.1**	**2.1**	**2.1**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.010	mg/L		**0.015**	<0.010	<0.010	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.010	mg/L		**0.101**	**0.036**	**0.029**	----	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.010	mg/L		**0.116**	**0.036**	**0.029**	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**4410**	**450**	**467**	----	----
^ Total Cations	----	0.01	meq/L		**4640**	**462**	**469**	----	----
^ Ionic Balance	----	0.01	%		**2.55**	**1.20**	**0.16**	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RT2B BLAST6	RT2B BLAST2	RT2B BLAST3	RT2B BLAST4	RT2B BLAST4 PIPE
				Client sampling date / time: 12-JUL-2007 15:00	12-JUL-2007 15:00	12-JUL-2007 15:00	12-JUL-2007 15:00	12-JUL-2007 15:00
				EM0706659-016	EM0706659-017	EM0706659-018	EM0706659-019	EM0706659-020
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.46	7.48	7.34	7.37	7.31
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	328000	192000	183000	191000	191000
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	203000	121000	125000	130000	110000
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	596	2810	4310	568	2560
EA045: Turbidity								
Turbidity	----	0.1	NTU	1540	2470	3980	1950	3060
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<10	<10	<1	<10
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<10	<10	<1	<10
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	84	81	84	113	<10
Total Alkalinity as CaCO3	----	1	mg/L	84	81	84	113	<10
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	12900	8980	8470	9620	10400
^ Silica	7631-86-9	0.1	mg/L	151	158	116	153	195
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	136000	87300	86200	84800	78100
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	983	857	820	929	1250
Magnesium	7439-95-4	1	mg/L	5170	3260	3090	3540	3640
Sodium	7440-23-5	1	mg/L	86800	55100	54000	52500	48400
Potassium	7440-09-7	1	mg/L	368	286	243	269	302
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	<0.10	<0.10	0.14
Arsenic	7440-38-2	0.001	mg/L	0.034	0.015	0.022	0.015	0.016
Cobalt	7440-48-4	0.001	mg/L	0.014	<0.010	0.013	0.014	<0.010
Copper	7440-50-8	0.001	mg/L	0.040	0.030	0.033	0.030	0.046
Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	0.117
Manganese	7439-96-5	0.001	mg/L	0.982	1.06	1.89	1.46	0.746
Strontium	7440-24-6	0.001	mg/L	15.6	13.7	14.2	14.8	14.2
Uranium	7440-61-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L	0.119	<0.050	0.060	<0.050	0.327
Boron	7440-42-8	0.05	mg/L	2.66	3.00	3.71	3.57	2.55

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RT2B BLAST6	RT2B BLAST2	RT2B BLAST3	RT2B BLAST4	RT2B BLAST4 PIPE
				Client sampling date / time: 12-JUL-2007 15:00	12-JUL-2007 15:00	12-JUL-2007 15:00	12-JUL-2007 15:00	12-JUL-2007 15:00
				EM0706659-016	EM0706659-017	EM0706659-018	EM0706659-019	EM0706659-020
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.4**	**2.0**	**2.1**	**0.7**	**1.4**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	**0.022**
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	**0.080**	**0.045**	**0.068**	**0.084**	**0.076**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	**0.080**	**0.045**	**0.068**	**0.084**	**0.099**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**4100**	**2650**	**2610**	**2600**	**2420**
^ Total Cations	----	0.01	meq/L	**4260**	**2720**	**2650**	**2630**	**2480**
^ Ionic Balance	----	0.01	%	**1.83**	**1.19**	**0.71**	**0.62**	**1.12**

Analytical Results

Sub-Matrix: **WATER**

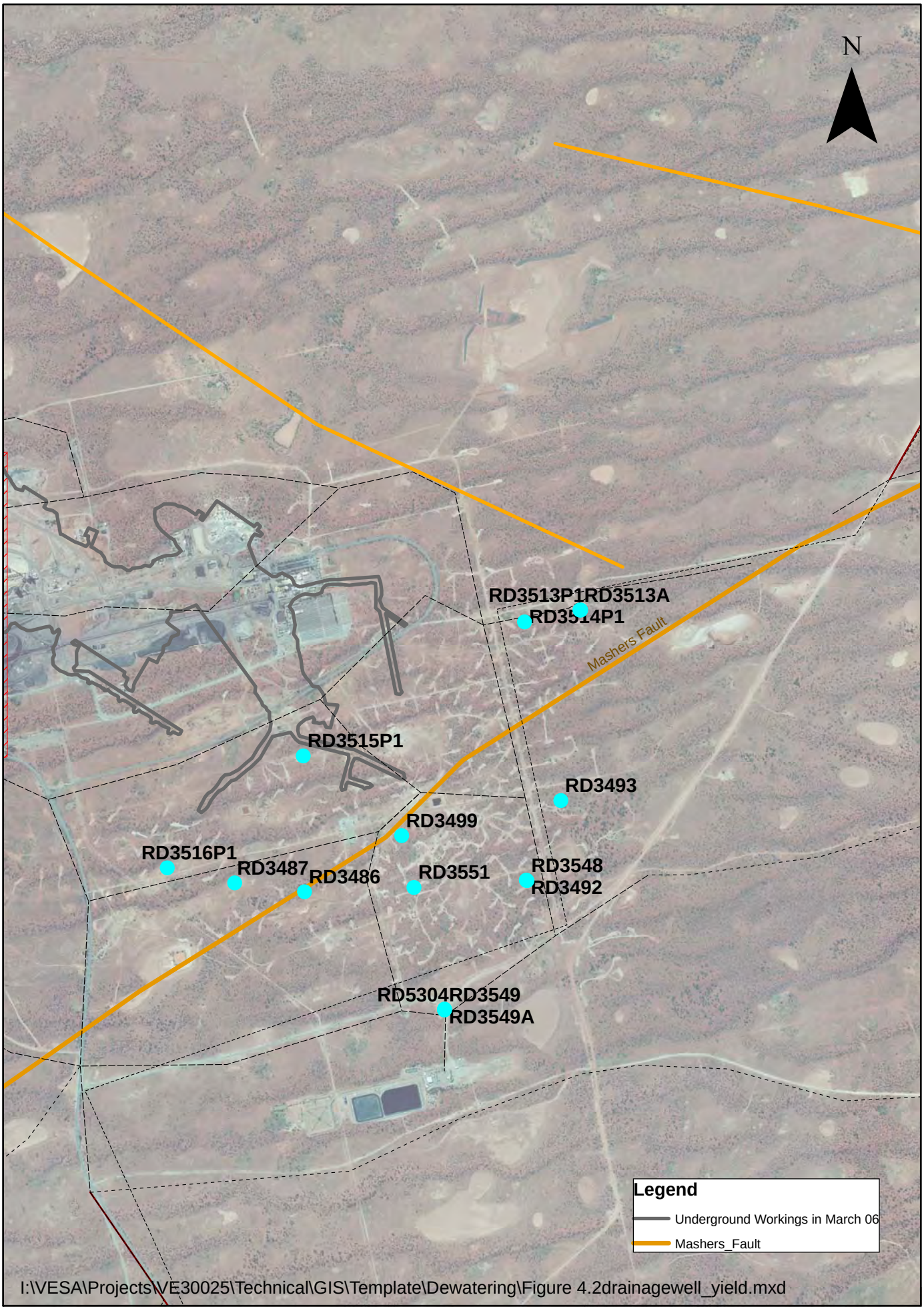
Compound	CAS Number	LOR	Unit	Client sample ID: RT7B	RT7A			
				Client sampling date / time: 24-AUG-2007 15:00	24-AUG-2007 15:00			
				EM0706659-021	EM0706659-022			
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.71**	**7.51**			
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**90700**	**88300**			
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**62400**	**60200**			
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**296**	**608**			
EA045: Turbidity								
Turbidity	----	0.1	NTU	**165**	**349**			
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<10	<1			
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<10	<1			
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<10	<1			
Total Alkalinity as CaCO3	----	1	mg/L	<10	<1			
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**5000**	**4420**			
^ Silica	7631-86-9	0.1	mg/L	**93.4**	**100**			
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**31500**	**31900**			
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1930**	**520**			
Magnesium	7439-95-4	1	mg/L	**1390**	**330**			
Sodium	7440-23-5	1	mg/L	**20400**	**21400**			
Potassium	7440-09-7	1	mg/L	**98**	**136**			
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.12**	<0.01			
Arsenic	7440-38-2	0.001	mg/L	**0.004**	**0.004**			
Cobalt	7440-48-4	0.001	mg/L	**0.007**	**0.007**			
Copper	7440-50-8	0.001	mg/L	**0.020**	**0.015**			
Lead	7439-92-1	0.001	mg/L	**0.002**	<0.001			
Manganese	7439-96-5	0.001	mg/L	**3.28**	**3.13**			
Strontium	7440-24-6	0.001	mg/L	**37.1**	**36.3**			
Uranium	7440-61-1	0.001	mg/L	**0.001**	**0.010**			
Zinc	7440-66-6	0.005	mg/L	**1.40**	**0.175**			
Boron	7440-42-8	0.05	mg/L	**4.36**	**4.47**			

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RT7B	RT7A			
				Client sampling date / time: 24-AUG-2007 15:00	24-AUG-2007 15:00			
				EM0706659-021	EM0706659-022			
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.1**	**0.9**			
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	**0.349**			
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	**0.096**	**2.11**			
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	**0.096**	**2.46**			
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1000**	**992**			
^ Total Cations	----	0.01	meq/L	**1100**	**988**			
^ Ionic Balance	----	0.01	%	**4.83**	**0.19**			

Attachment B
Mine pit dewatering and depressurisation trial drilling, construction and testing completion report



ODX mine pit dewatering & depressurisation trials

Drilling locality plan

Dewatering drilling investigation program

Well no.	Completion [3]	Depth (m bgl)	Objective	Outcome
RD3486 [1]	Pwt / BC	546	Drill into the basement rock to 600 m to determine the effect of dewatering on the basement rocks and to perform constant head tests on the isolated lower basement rock	The hole was terminated in Volcanic basement rock. The aquifer was pressure cemented to isolate the basement rocks.
RD3487 [1]	Pwt / BC	600	Drill into the basement rock to 600 m to determine the effect of dewatering on the basement rocks and to perform constant head tests on the isolated lower basement rock	The hole was terminated in Volcanic basement rock. The aquifer was pressure cemented to isolate the basement rocks.
RD3492 [2]	Pws/Pwc	234	Dewatering production well to be will be used as a pumping well for the dewatering trial	Due to the low yield the well was completed as an observation well with 50 mm PVC with a 6 m screen at the base
RD3493 [2]	Pws/Pwc	228	Dewatering production well to be will be used as a pumping well for the dewatering trial	Due to the low yield the well was left open
RD3499 [2]	Pwc	240	Dewatering production well to be will be used as a pumping well for the dewatering trial	Due to the low yield the well was left open
RD3504 [2]	Pwc	228	Dewatering production well to be will be used as a pumping well for the dewatering trial	Due to the low yield the well was completed as an observation well with 50 mm PVC and a 6 m screen at the base
RD3513A-P1 [2]	Pws/Pwc/Pwt	270	Dewatering production well to be will be used as a pumping well for the dewatering trial	The hole was terminated in the Tregolana Shale, 8" slotted production steel casing form the first water cut to EOH with 2 blanks within screened zone for placement of pump
RD3514-P1 [2]	Pws/Pwc	256	Dewatering production well to be will be used as a pumping well for the dewatering trial	The hole was terminated in the Tregolana Shale, 8" slotted production steel casing form the first water cut to EOH with 2 blanks within screened zone for placement of pump
RD3515-P1 [2]	Pws	192	Dewatering production well to be will be used as a pumping well for the dewatering trial	The hole was terminated in the Arcoona Quarzite White, 8" slotted production steel casing form the first water cut to EOH with 2 blanks within screened zone for placement of pump. Hole collapsed from 172-192 m

Dewatering drilling investigation program (cont.)

Well no.	Completion [3]	Depth (m bgl)	Objective	Outcome
RD3516-P1 [2]	Pws/Pwc	216	Dewatering production well to be used as a pumping well for the dewatering trial	The hole was terminated in the Tregolana Shale, 8" slotted production steel casing form the first water cut to EOH with 2 blanks within screened zone for placement of pump. Hole collapsed from 204-222 m
RD3548 [2]	Pws/Pwc	234	Dewatering production well to be used as a pumping well for the dewatering trial	The hole was terminated in the Tregolana Shale, 8" slotted production steel casing form the first water cut to EOH with 2 blanks within screened zone for placement of pump
RD3549 [2]	Pws/Pwc	194	Dewatering production well to be used as a pumping well for the dewatering trial	Hole was terminated due to shanked bit at 194 m. Completed as a 50 mm DN observation well with 6 m screen at base.
RD3549A [2]	Pws/Pwc	228	Dewatering production well to be used as a pumping well for the dewatering trial	The hole was terminated in the Tregolana Shale, 8" slotted production steel casing form the first water cut to EOH with 2 blanks within screened zone for placement of pump
RD3551 [2]	€a/Pws/Pwc	250	Dewatering production well to be used as a pumping well for the dewatering trial	Due to the low yield the well was left open

Notes:
1. Depressurisation / drainage well
2. Dewatering well
3. €a; Andamooka Limestone Pws; Arcoona Quartzite Pwc; Corraberra Sandstone Pwt; Tregolana Shale BC; Breccia Complex

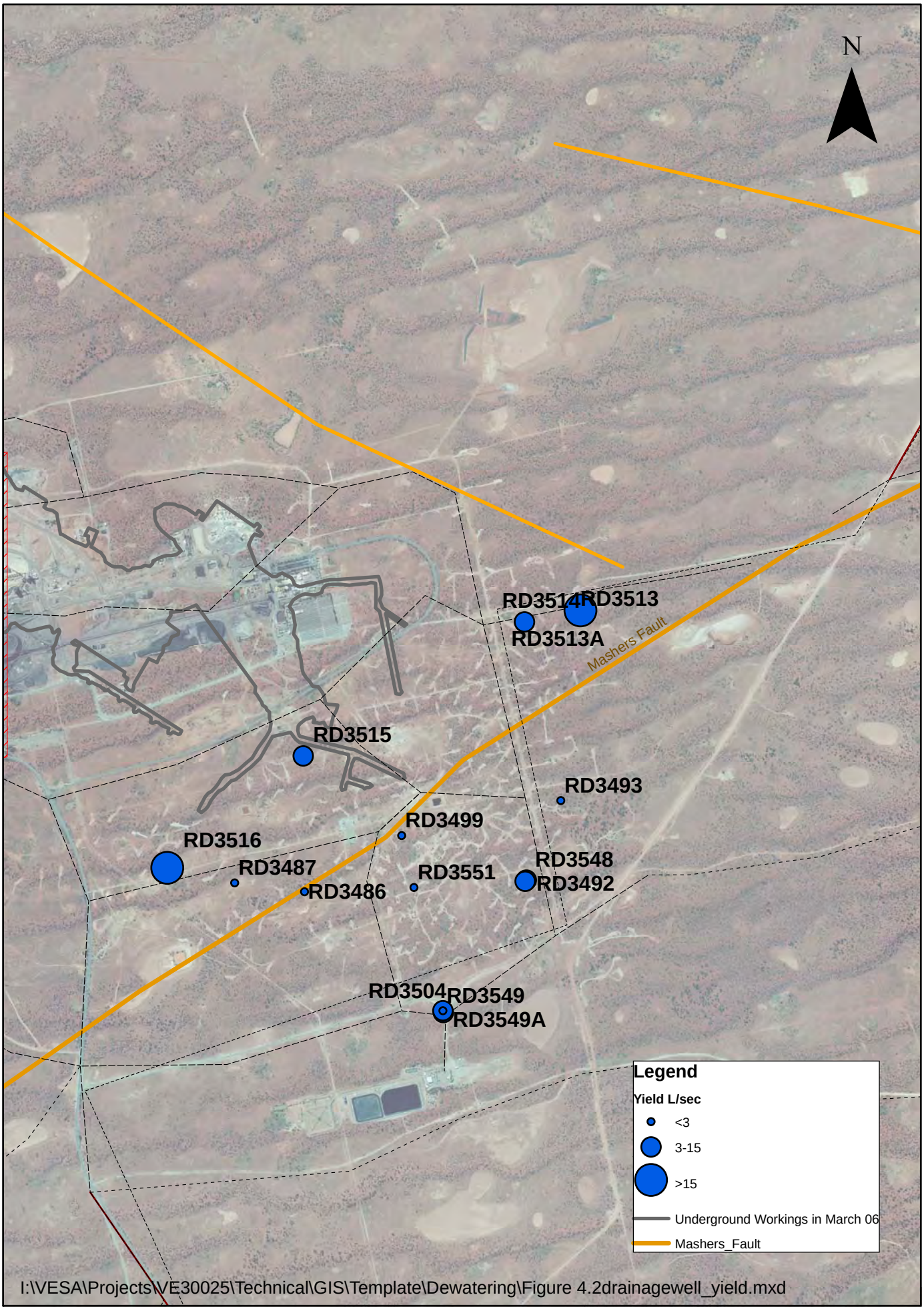
Well details

Well no. (BHP no.)	Purpose.	Location (MGA94 Zone 53) [1]		DWLBC permit no.	Date		Method
		Easting	Northing		Commenced	Completed	
RD3486	Drainage	682975	6630860	129168	20/7/08	4/8/08	air hammer
RD3487	Drainage	681255	6629495	129167	12/6/08	1/7/08	air hammer
RD3492	Monitoring	682705	6629510	145091	17/5/08	20/5/08	air hammer
RD3493	Dewatering	682875	6629905	145089	5/5/08	10/5/08	air hammer
RD3499	Dewatering	684085	6629730	145090	11/5/08	16/5/08	air hammer
RD3504	Monitoring	682290	6628850	145093	27/5/08	30/5/08	air hammer
RD3513A-P1	Dewatering	682975	6630850	127949	2/7/08	11/7/08	air hammer
RD3514-P1	Dewatering	682695	6630795	127951	24/4/08	4/4/08	air hammer
RD3515-P1	Dewatering	681595	6630125	127952	14/4/08	22/4/08	air hammer
RD3516-P1	Dewatering	680920	6629570	145086	22/4/08	4/5/08	air hammer
RD3548	Dewatering	682300	6629505	145092	31/5/08	26/5/08	air hammer
RD3549	Monitoring	682290	6628865	145088	31/5/08	5/6/08	air hammer
RD3549A	Dewatering	682290	6628860	129163	5/6/08	10/6/08	air hammer
RD3551	Dewatering	681245	6629475	145087	11/7/08	19/7/08	air hammer

Notes: 1. Rounded to nearest 5 m

Well construction data

Well no. (BHP no.)	Production casing / pre-collar / surface casing			Screened interval		
	setting [1]	completion	materials	setting [1]	diameter (mm)	material
RD3486	0-240	cemented	ERW steel	240-546	150	open hole
RD3487	0-252	cemented	ERW steel	252-600	150	open hole
RD3492	0-216	cemented	ERW steel	216-234	50	PVC
RD3493	0-186	cemented	ERW steel	186-228	200	open hole
RD3499	0-204	cemented	ERW steel	204-240	200	open hole
RD3504	0-210	cemented	ERW steel	210-228	50	PVC
RD3513A-P1	0-174	cemented	ERW steel	174-270	200	ERW steel
RD3514-P1	0-118	cemented	ERW steel	118-256	200	ERW steel
RD3515-P1	0-130	cemented	ERW steel	130-168	200	ERW steel
RD3516-P1	0-90	cemented	ERW steel	90-216	200	ERW steel
RD3548	0-132	cemented	ERW steel	132-234	200	ERW steel
RD3549	0-174	cemented	ERW steel	174-194	50	PVC
RD3549A	0-168	cemented	ERW steel	168-228	200	ERW steel
RD3551	0-70	cemented	ERW steel	70-250	300	open hole



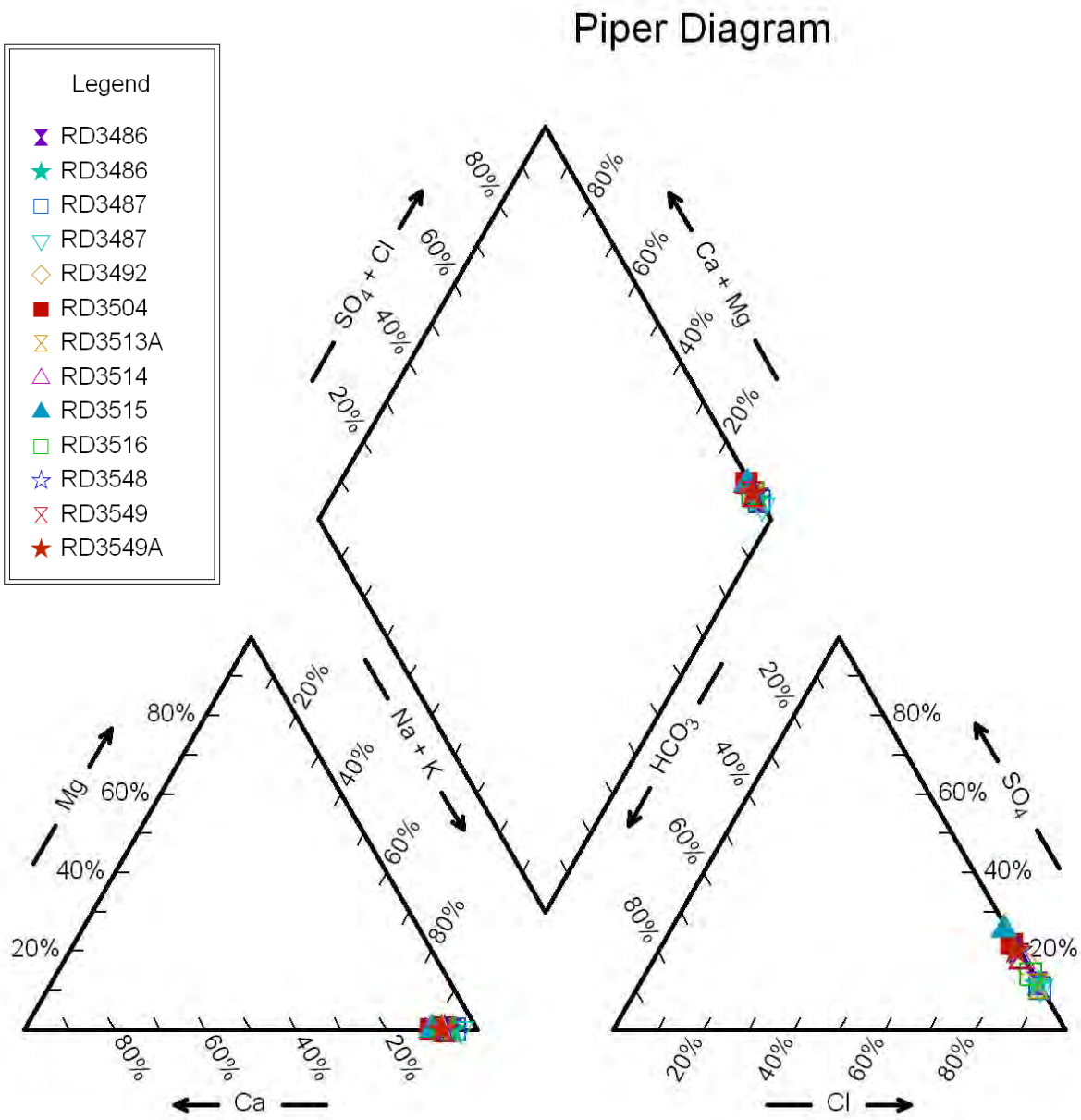
ODX mine pit dewatering & depressurisation trials

Airlift yield distribution

Field measured groundwater parameters

Well no.	pH	EC (mS/cm)	Temperature (^{o}C)	Airlift yield (L/s)	Standing water Depth (m bTOC)	Standing water Date gauged
RD3486	10.68	101	31.6	3.0	106.08	4/9/08
RD3487	-	162	32.3	2.0	100.23	29/6/08
RD3492	-	56	-	3.5	104.92	23/6/08
RD3493	-	57	-	2.6	105.83	23/6/08
RD3499	-	58	-	0.7	144.9	23/6/08
RD3504	-	38	-	3.7	93.23	23/6/08
RD3513A	-	80	29.7	38.0	117.65	12/7/08
RD3514	-	41	30.2	7.0	99.96	6/4/08
RD3515	-	49	-	15.0	106.63	23/6/08
RD3516	-	70	-	42.0	96.94	23/6/08
RD3528	-	55	-	4.0	102.32	23/6/08
RD3549A	-	29	28.4	3.2	93.14	20/6/08
RD3549	-	28.6	22.2	3.0	93.14	20/6/08
RD3551	-	75.6	-	3.0	-	-

Notes: EC; electrical conductivity
m bTOC; metres below top of casing
-; not available



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Laboratory analytical water quality data

	Sample	RD3486	RD3486	RD3487	RD3487	RD3492	RD3504	RD3513A	RD3514	RD3515	RD3516	RD3548	RD3549	RD3549A
	Date	5/08/2008	5/08/2008	29/06/2008	30/06/2008	20/05/2008	26/05/2008	12/07/2008	4/04/2008	7/05/2008	16/07/2008	26/05/2008	11/06/2008	10/06/2008
	Lab Report	EM0806545	EM0806545	EM0805232	EM0805232	EM0804153	EM0804444	EM0805832	EM0802617	EM0803494	EM0805832	EM0804153	EM0804594	EM0804594
Analyte	**Units**	**ALS LOR**												
pH Value and Total Dissolved Solids														
pH	pH Unit	0.1	7.82	7.93	8.02	7.9	7.79	7.78	7.56	7.73	7.61	7.39	8.17	7.93	7.82
EC	µS/cm		120000	106000	136000	138000	54200	42600	90400	45100	50600	64100	56300	40400	42000
TDS	mg/L	1	93300	91000	94800	99100	35600	30300	63400	27800	30200	44700	38100	28800	29700
Alkalinity															
Hydroxide as CaCO3	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbonate as CACO3	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate as CACO3	mg/L	1	155	168	118	122	265	249	268	276	254	268	177	256	252
Total Alkalinity as CACO	mg/L	1	155	168	118	122	265	249	268	276	254	268	177	256	252
Dissolved Major Cations															
Calcium	mg/L	1	1510	1540	1530	1230	979	707	1280	894	1270	913	940	670	749
Magnesium	mg/L	1	2230	2290	2660	2450	1090	874	1410	812	1280	1080	1080	844	914
Sodium	mg/L	1	32100	32700	35000	38100	13200	7280	21200	9480	13500	13600	14500	9860	10500
Potassium	mg/L	1	283	276	340	505	131	116	166	80	102	95	121	80	89
Dissolved Metals															
Aluminium	mg/L	0.01	0.04	0.02	<0.10	<0.10	-	<0.01	<0.01	0.02	0.01	<0.01	-	<0.01	0.01
Arsenic	mg/L	0.001	0.009	0.011	<0.010	0.017	0.003	<0.01	0.009	0.003	0.006	0.006	0.004	0.014	0.014
Beryllium	mg/L	0.001	-	-	-	-	-	-		-	-	-	-	-	-
Barium	mg/L	0.001	0.056	0.05	0.04	0.042	-	0.031	0.037	-	0.035	0.039	-	0.03	0.027
Boron	mg/L	0.05	5.03	4.94	7.8	7.96	-	6.24	5.99	6.56	7.3	6.27	-	5.72	5.71
Cadmium	mg/L	0.0001	-	-	-	-	0.0001	-	-	-	-	-	0.0001	-	-
Chromium	mg/L	0.001	-	-	-	-	<0.001	-	-	-	-	-	<0.001	-	-
Cobalt	mg/L	0.001	0.004	0.003	<0.010	<0.010	-	0.001	0.003	0.002	0.006	0.001	-	<0.001	0.001
Copper	mg/L	0.001	0.02	0.023	0.022	0.024	0.01	0.016	0.026	0.009	0.013	0.02	0.013	0.012	0.013
Iron	mg/L	0.01	<0.5	<0.5	1.15	0.7	<0.5	<0.1	2.14	-	<0.5	<0.50	<0.5	0.83	0.96
Lead	mg/L	0.001	<0.001	<0.001	<0.010	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	1.28	1.21	2.49	2.54	-	0.75	1.37	1.04	1.69	0.975	-	0.716	-
Mercury	mg/L	0.0001	-	-	-	-	<0.0001	-	-	-	-	-	<0.0001	-	-
Nickel	mg/L	0.001	-	-	-	-	<0.007	-	-	-	-	-	<0.008	-	-
Nitrite as N	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.010	<0.01	-	<0.010	-	0.012	0.013
Nitrate as N	mg/L	0.01	<0.01	0.22	0.012	0.012	-	0.013	<0.010	<0.01	-	<0.010	-	<0.01	<0.01
Nitrite + Nitrate as N	mg/L	0.01	<0.01	0.22	0.012	0.066	-	0.013	<0.010	<0.01	-	<0.010	-	0.019	0.014
Strontium	mg/L	0.001	26.4	26.2	26.4	26.7	-	-	20.4	14	<0.01	14.2	-	0.005	0.005
Uranium	mg/L	0.001	0.005	0.004	<0.01	<0.01	-	-	0.002	0.002	0.008	<0.001	-	0.001	<0.001
Vanadium	mg/L	0.01	-	-	-	-	-	0.03	-	-	-	-	-	-	-
Zinc	mg/L	0.005	0.094	0.043	<0.050	<0.050	0.144	0.027	0.024	0.02	0.037	46.3	0.011	0.13	0.016

Laboratory analytical water quality data (cont.)

	Sample	RD3486	RD3486	RD3487	RD3487	RD3492	RD3504	RD3513A	RD3514	RD3515	RD3516	RD3548	RD3549	RD3549A
	Date	5/08/2008	5/08/2008	29/06/2008	30/06/2008	20/05/2008	26/05/2008	12/07/2008	4/04/2008	7/05/2008	16/07/2008	26/05/2008	11/06/2008	10/06/2008
	Lab Report	EM0806545	EM0806545	EM0805232	EM0805232	EM0804153	EM0804444	EM0805832	EM0802617	EM0803494	EM0805832	EM0804153	EM0804594	EM0804594
Analyte	**Units**	**ALS LOR**												
Sulphate														
Sulphate	mg/L	1	8600	8820	9050	10800	5460	4950	6430	4010	7270	5310	6210	4290	4670
Chloride														
Chloride	mg/L	1	47700	50600	56700	66000	19100	13000	38000	14000	15500	24000	18400	13700	13500
Fluoride														
Fluoride	mg/L	0.1	0.6	0.6	0.9	0.9		0.9	0.7	0.8	-	0.9	-	1.2	1.3
Ionic Balance														
Total Anions	meq/L	0.1	1530	1610	1790	2090	659	475	1210	484	-	794	652	-	-
Total Cations	meq/L	0.1	1660	1690	1830	1930	718	427	1110	526	-	728	768	-	-
Ionic Balance	%	0.1	4.21	2.4	1.01	3.96	4.27	5.35	4.53	4.14	-	4.31	8.16	-	-

Notes: LOR laboratory limit of reporting

\- not analysed

Pumping tests were not conducted as part of the program of works associated with the installation of the dewatering and drainage wells. However, constant head discharge tests conducted on the Tregolana Shale and basement drainage wells (Appendix D) indicate that low long-term drainage rates can be expected from the overburden beneath the THA. The highest drainage rates (averaging around 3.5 L/s) were observed in well RD3486.

FIELD BOREHOLE / WELL LOG

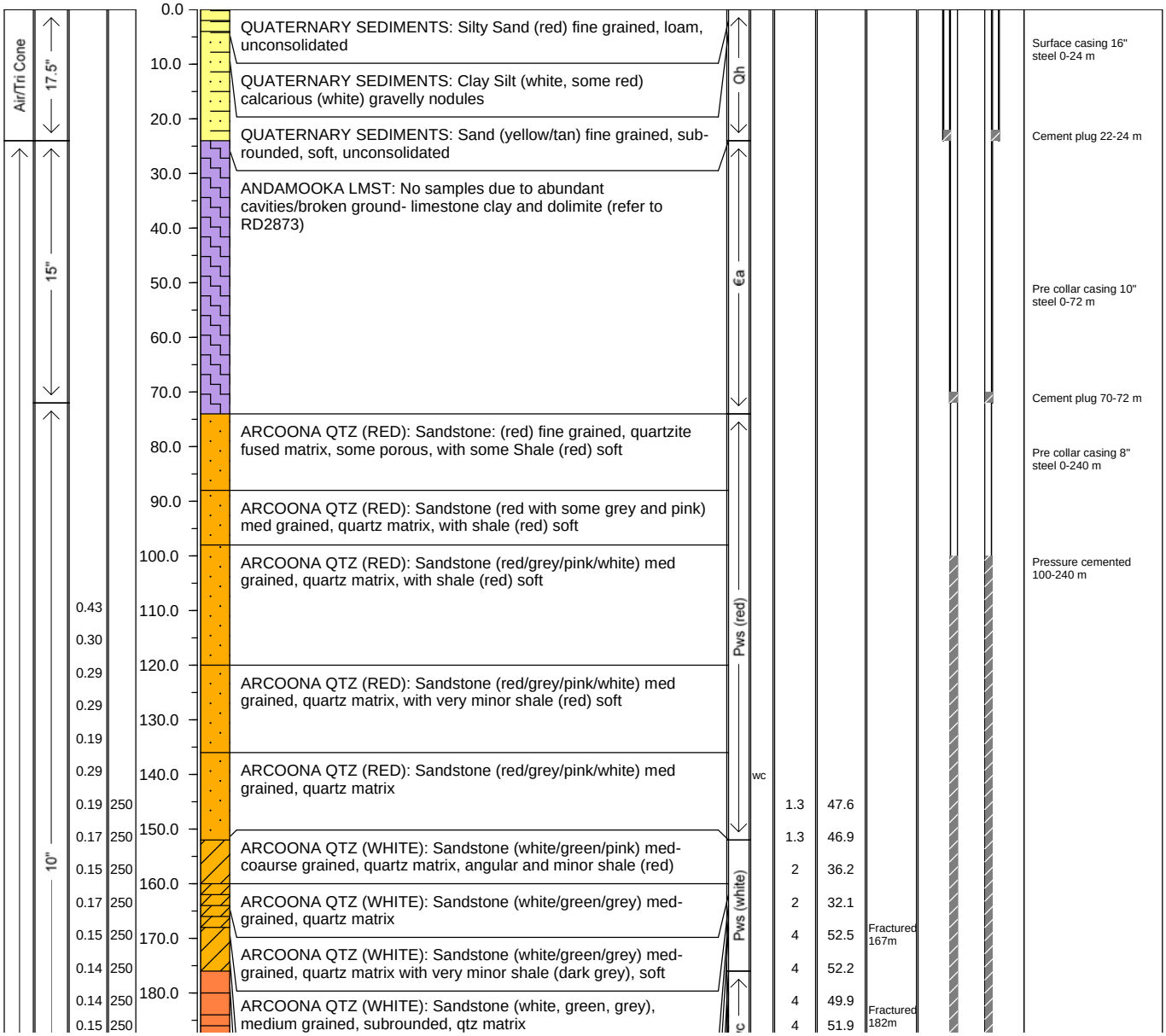
BOREHOLE / WELL NUMBER

RD3486

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **20/07/2008** DATE COMPLETED: **09/08/08**

WELL PERMIT NUMBER: **129168**
TOTAL DEPTH (m bgl): **546**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **4/09/08** Depth (m TOC) **106.08**
PROJECTION: **GDA94 Zone 53**
EASTING: **681601** NORTHING: **6629452**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Hyland DATE: 09/08/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

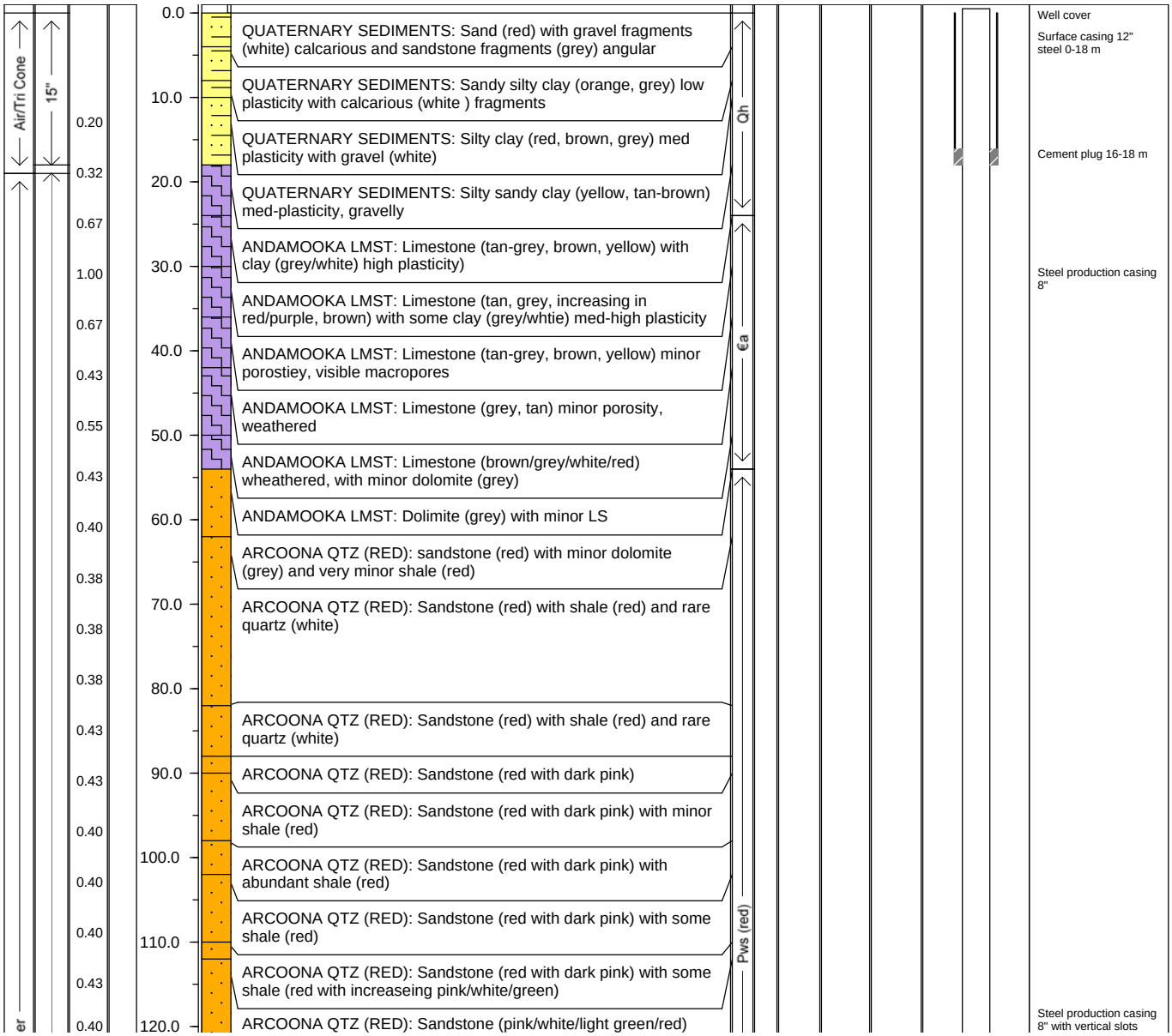
BOREHOLE / WELL NUMBER

RD3549A

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **5/06/2008** DATE COMPLETED: **10/06/2008**

WELL PERMIT NUMBER: **129163**
TOTAL DEPTH (m bgl): **228**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **20/06/2008** Depth (m TOC) **93.14**
PROJECTION: **GDA94 Zone 53**
EASTING: **682289** NORTHING: **6628861**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 10/06/2008

CHECKED: D Pierce DATE: 05/09/2008

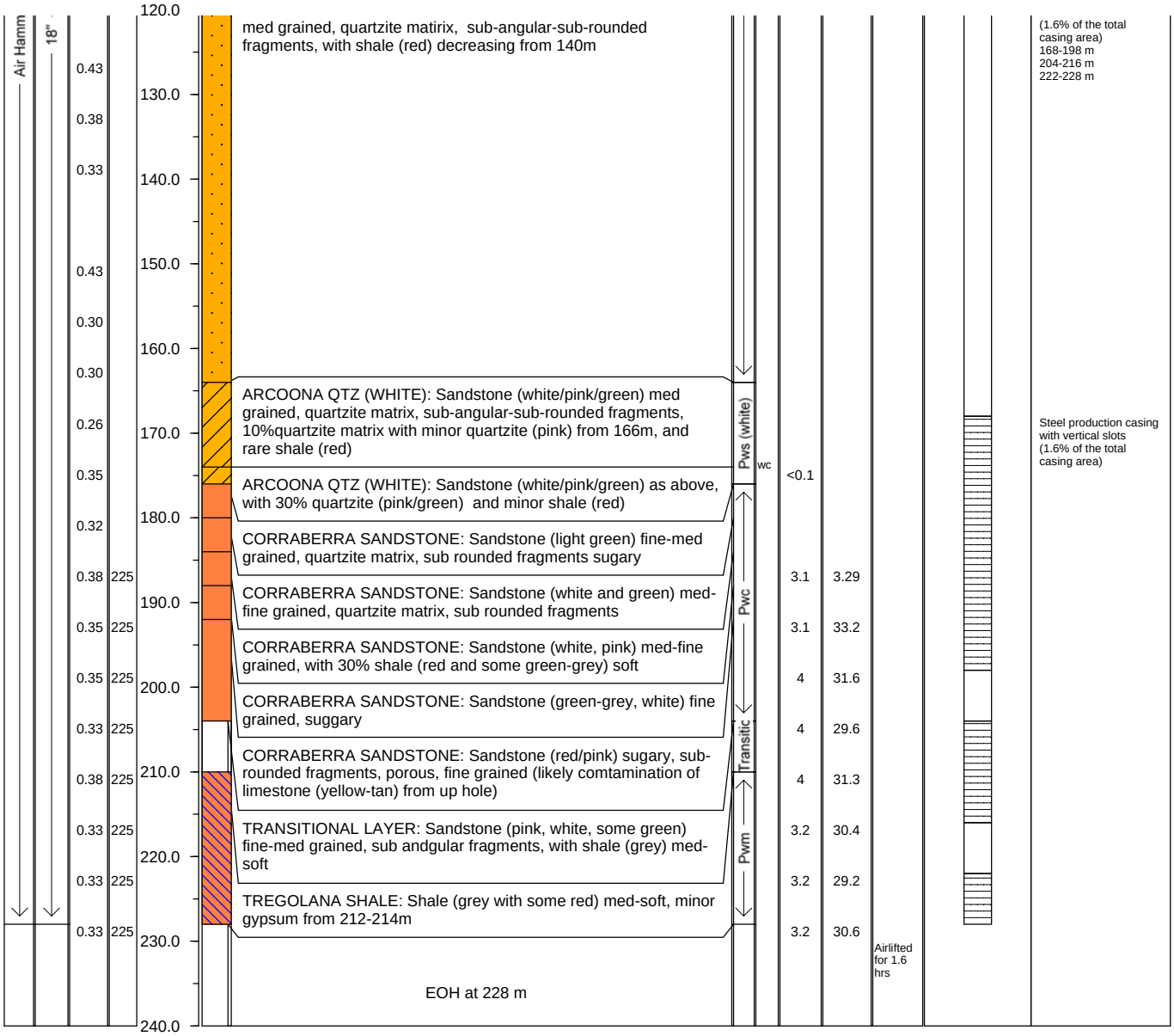
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3549A

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **5/06/2008** DATE COMPLETED: **10/06/2008**

WELL PERMIT NUMBER: **129163**
TOTAL DEPTH (m bgl): **228**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **20/06/2008** Depth (m TOC) **93.14**
PROJECTION: **GDA94 Zone 53**
EASTING: **682289** NORTHING: **6628861**



LOGGED: K Furness DATE: 10/06/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

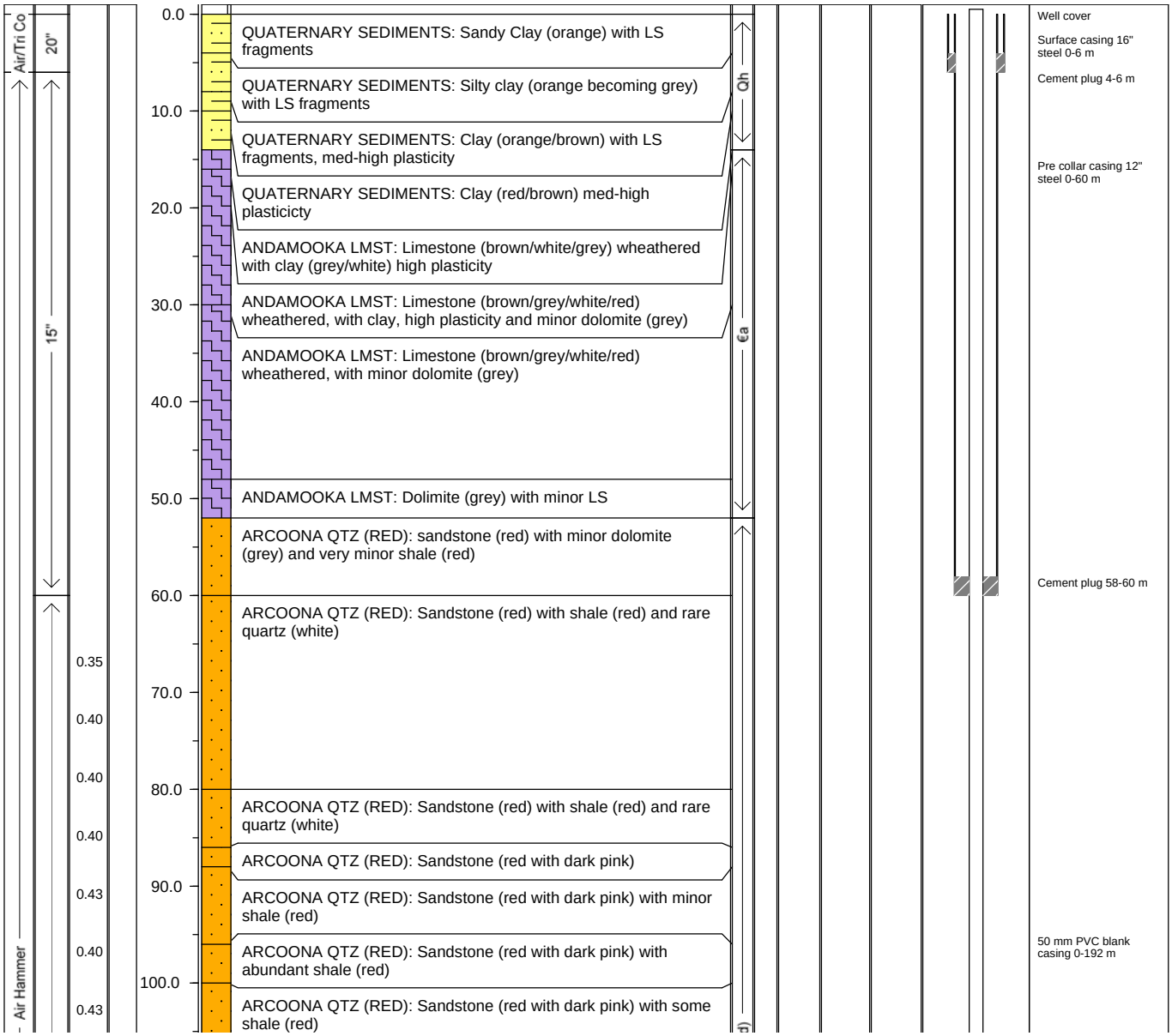
BOREHOLE / WELL NUMBER

RD3549

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **31/05/2008** DATE COMPLETED: **05/06/2008**

WELL PERMIT NUMBER: **145088**
TOTAL DEPTH (m bgl): **194**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **20/6/2008** Depth (m TOC): **93.14**
PROJECTION: **GDA94 Zone 53**
EASTING: **682289** NORTHING: **6628861**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness and K Hyland DATE: 5/06/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3549

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **31/05/2008** DATE COMPLETED: **05/06/2008**

WELL PERMIT NUMBER: **145088**
TOTAL DEPTH (m bgl): **194**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **20/6/2008** Depth (m TOC) **93.14**
PROJECTION: **GDA94 Zone 53**
EASTING: **682289** NORTHING: **6628861**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	12"	0.43		110.0		ARCOONA QTZ (RED): Sandstone (red with dark pink) with some shale (red with increaseing pink/white/green)	Pws (re						
		0.50				ARCOONA QTZ (RED): Sandstone (pink/white/light green/red) med grained, quartzite matirix, sub-angular-sub-rounded fragments, with shale (red) decreasing from 140m							
		0.40		120.0									
				130.0									
				140.0									
		0.40											
		0.30		150.0									
		0.29											
		0.22		160.0									
						ARCOONA QTZ (WHITE): Sandstone (white/pink/green) med grained, quartzite matrix, sub-angular-sub-rounded fragments, 10%quartzite matrix with minor quartzite (pink) from 166m, and rare shale (red)	Pws (white)						
				170.0		ARCOONA QTZ (WHITE): Sandstone (white/pink/green) as above, with 30% quartzite (pink/green) and minor shale (red)							50 mm PVC slotted casing 174-186 m
		0.30	220	180.0		CORRABERRA SANDSTONE: Sandstone (light green) fine-med grained, quartzite matrix, sub rounded fragments sugary			3	36			
		0.32	225			CORRABERRA SANDSTONE: Sandstone (white (and green from 186-188)) med-fine grained, quartzite matrix, sub rounded fragments	Pwc		3	37.1	Suspected yield increase from 186-190m		
		0.22		190.0		CORRABERRA SANDSTONE: Sandstone/Quartzite (dark-med green with some red) med grained/crystals, sub angular fragments with minor shale (green)					Bit Shanked at 194m		
				200.0		CORRABERRA SANDSTONE: Sandstone/Quartzite (red) med grained/crystals, sub angular fragments							
				210.0		EOH at 200m							

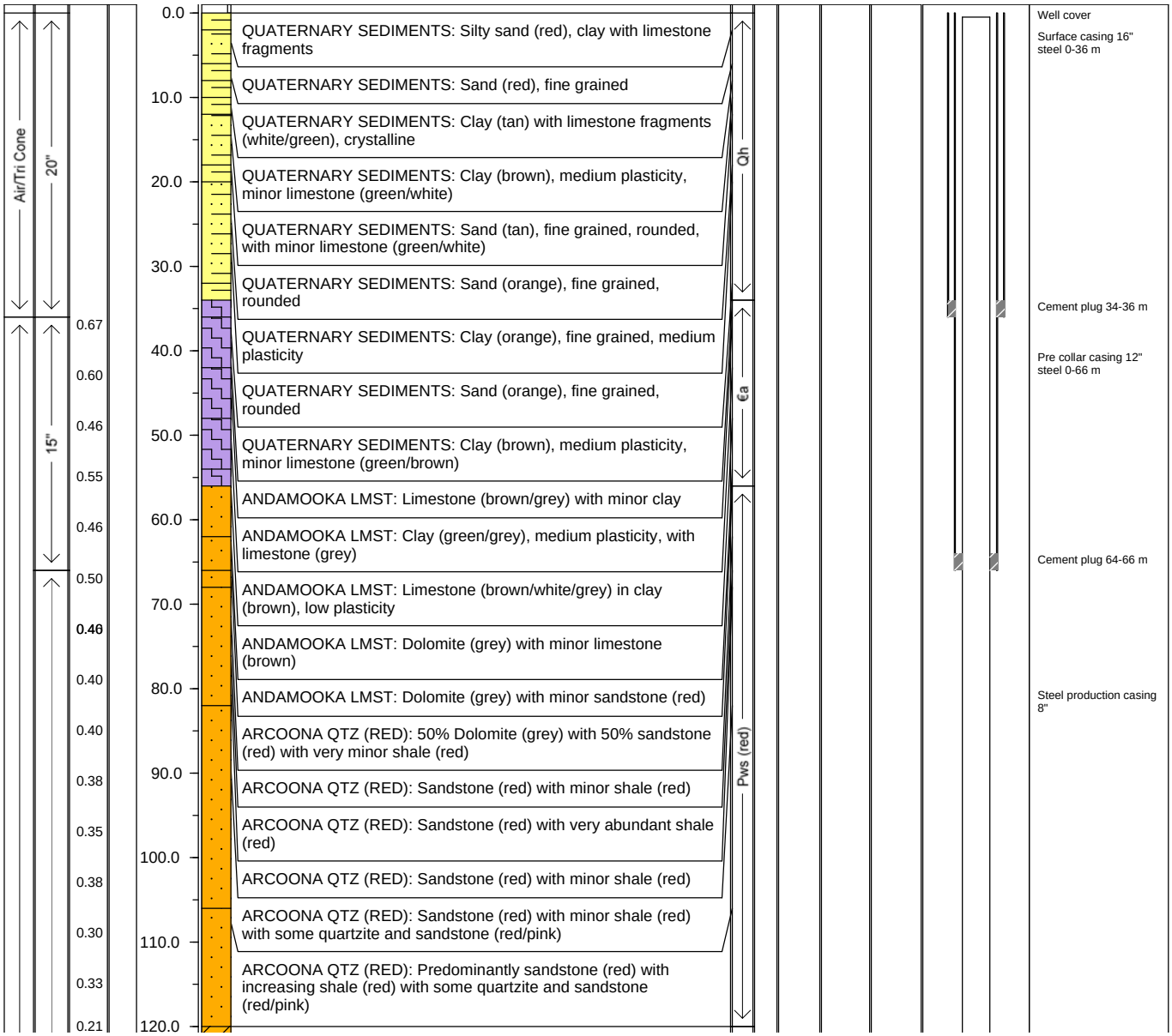
LOGGED: K Furness and K Hyland DATE: 5/06/2008
CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3548

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**145092**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**234**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **23/06/08** Depth (m TOC):	**102.32**
BOREHOLE DIAMETER:	**7 7/8"**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED:	**20/05/08** DATE COMPLETED: **26/05/08**	EASTING: **682698**	NORTHING: **6629504**



LOGGED: K. Hyland DATE: 26/05/08

CHECKED: D Pierce DATE: 05/09/2008

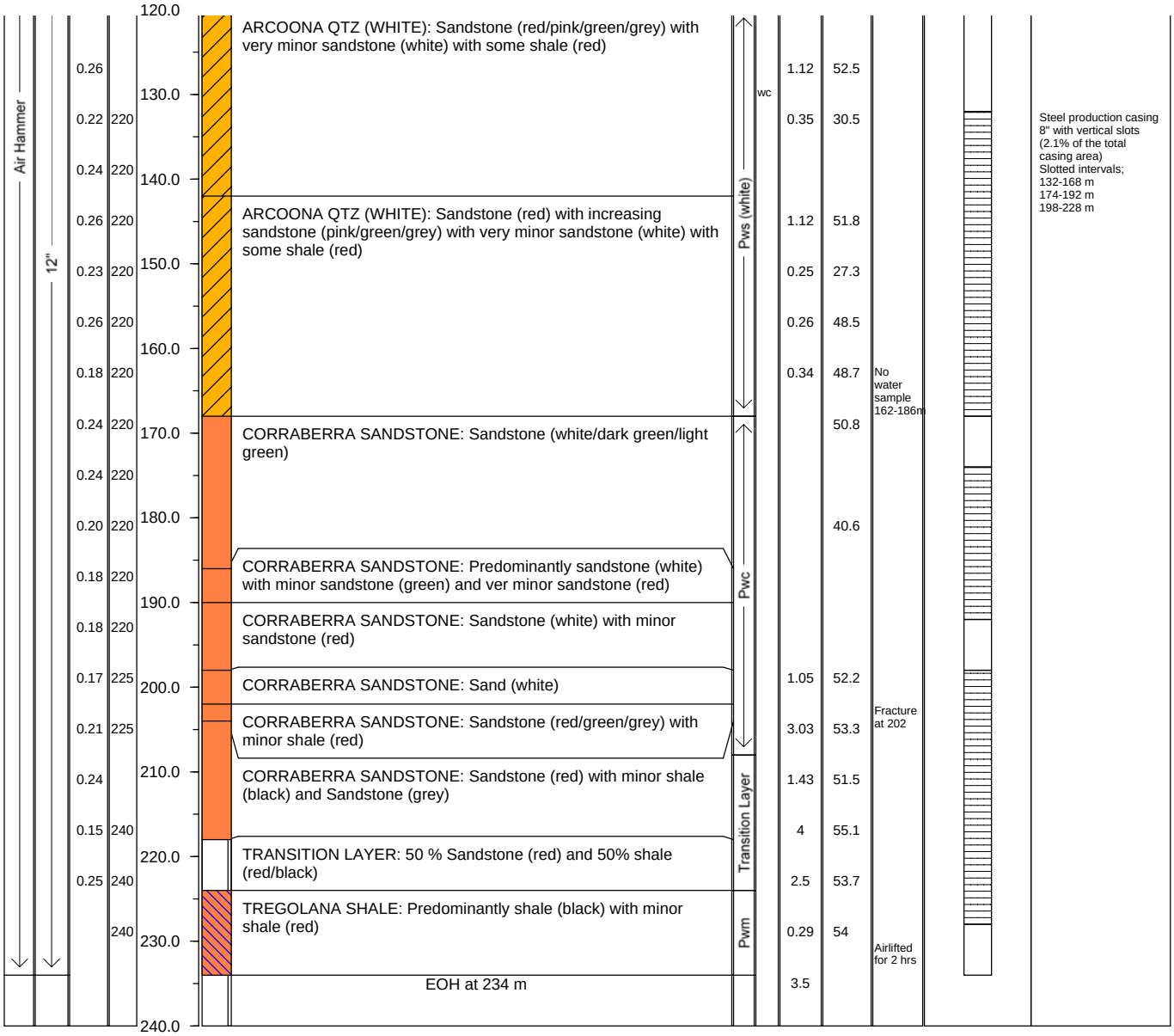
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3548

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **7 7/8"**
DATE STARTED: **20/05/08** DATE COMPLETED: **26/05/08**

WELL PERMIT NUMBER: **145092**
TOTAL DEPTH (m bgl): **234**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **23/06/08** Depth (m TOC): **102.32**
PROJECTION: **GDA94 Zone 53**
EASTING: **682698** NORTHING: **6629504**



LOGGED: K. Hyland DATE: 26/05/08

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3516- P1

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **22/04/2008** DATE COMPLETED: **04/05/2008**

WELL PERMIT NUMBER: **145086**
TOTAL DEPTH (m bgl): **216**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **23/6/2008** Depth (m TOC): **96.94**
PROJECTION: **GDA94 Zone 53**
EASTING: **680919** NORTHING: **6629571**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air/Tri C	17.5"	0.30		0.0		ANDAMOOKA LMST: Limestone (grey/brown) with fine grained sands (red)						Well cover	
		0.38		10.0		ANDAMOOKA LMST: Limestone (grey/brown) with fine grained sands (brown)						Surface casing 16" steel 0-6 m	
		0.30		20.0		ANDAMOOKA LMST: Limestone (grey/brown) in a fine grained sand (grey/brown)						Cement plug 4-6 m	
	15"	0.50		30.0		ANDAMOOKA LMST: Limestone (brown)	Ea					Pre collar casing 12" steel 0-66 m	
		0.50		40.0		ANDAMOOKA LMST: Limestone (brown) with crystalline dolomite (grey/pink/red)							
		0.55		50.0		ANDAMOOKA LMST: Predominantly crystalline dolomite (grey) with some limestone (brown)							
		0.60		60.0		ANDAMOOKA LMST: Crystalline dolomite (grey) with sandstone (tan and grey)							
		0.50		70.0		ARCOONA QTZ (RED): Sandstone (pink and grey) with minor crystalline dolomite (grey)						Cement plug 64-66 m	
	17.5"	0.60		80.0		ARCOONA QTZ (RED): Predominantly sandstone (grey) with sandstone (pink/red)						Steel production casing 8"	
		0.55		90.0		ARCOONA QTZ (RED): Sandstone (pink/tan/grey)							
		0.67		100.0		ARCOONA QTZ (RED): Sandstone (red/pink/grey) with minor pyrite						Steel production casing 8" with vertical slots (1.6% of the total casing area) Slotted intervals; 90-162 m 186-192 m	
		0.32		110.0		ARCOONA QTZ (RED): Sandstone (red/pink/grey) with minor pyrite with minor shale (red)	Pws (red) wc						
Air Hammer		0.35											
		0.60											
		0.38											
		0.33	190						0.7	25.74			

LOGGED: K Hyland DATE: 04/05/2008

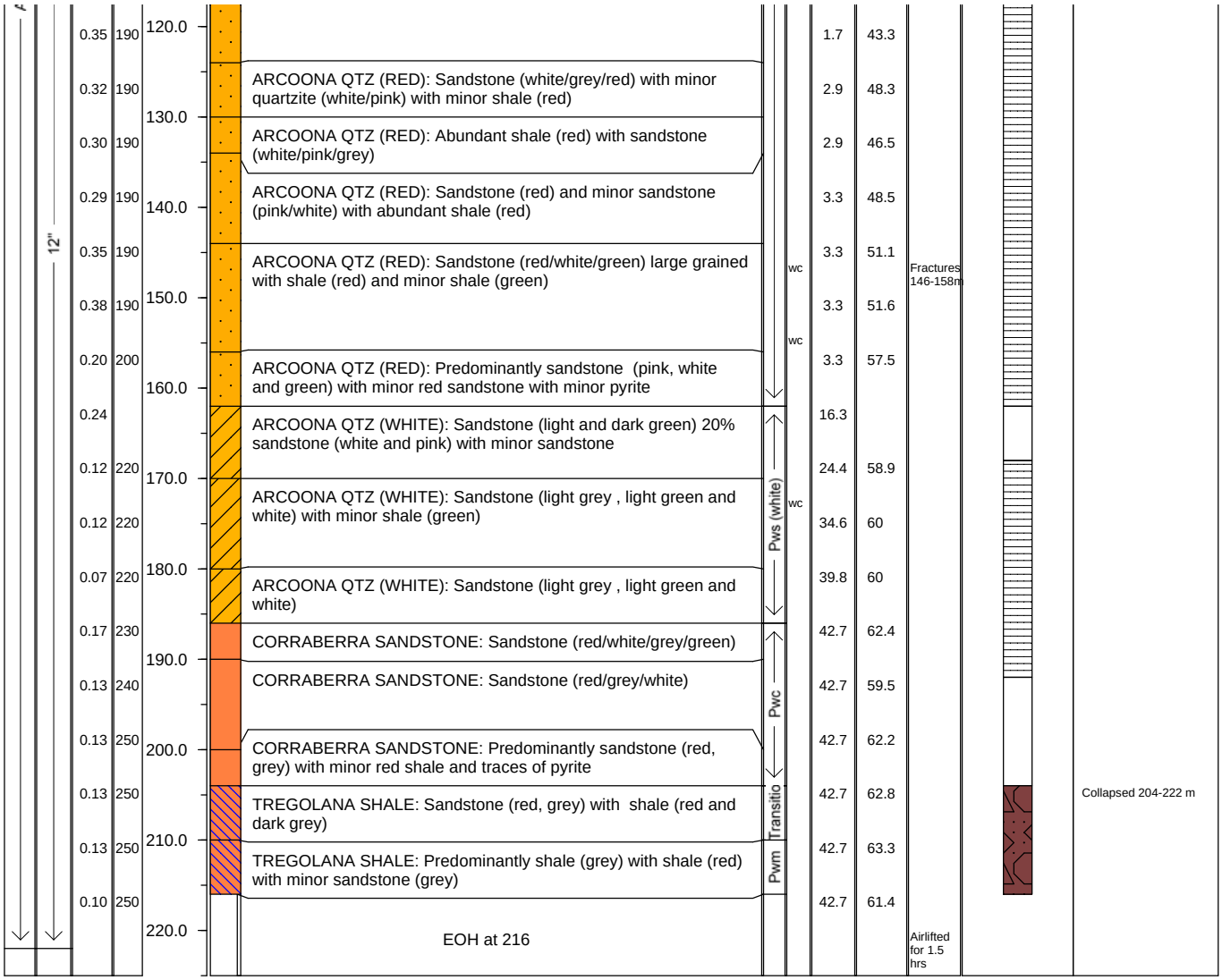
CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3516- P1

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**145086**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**216**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **23/6/2008** Depth (m TOC):	**96.94**
BOREHOLE DIAMETER:	**8 inches**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED: **22/04/2008**	DATE COMPLETED: **04/05/2008**	EASTING: **680919**	NORTHING: **6629571**



LOGGED: K Hyland DATE: 04/05/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

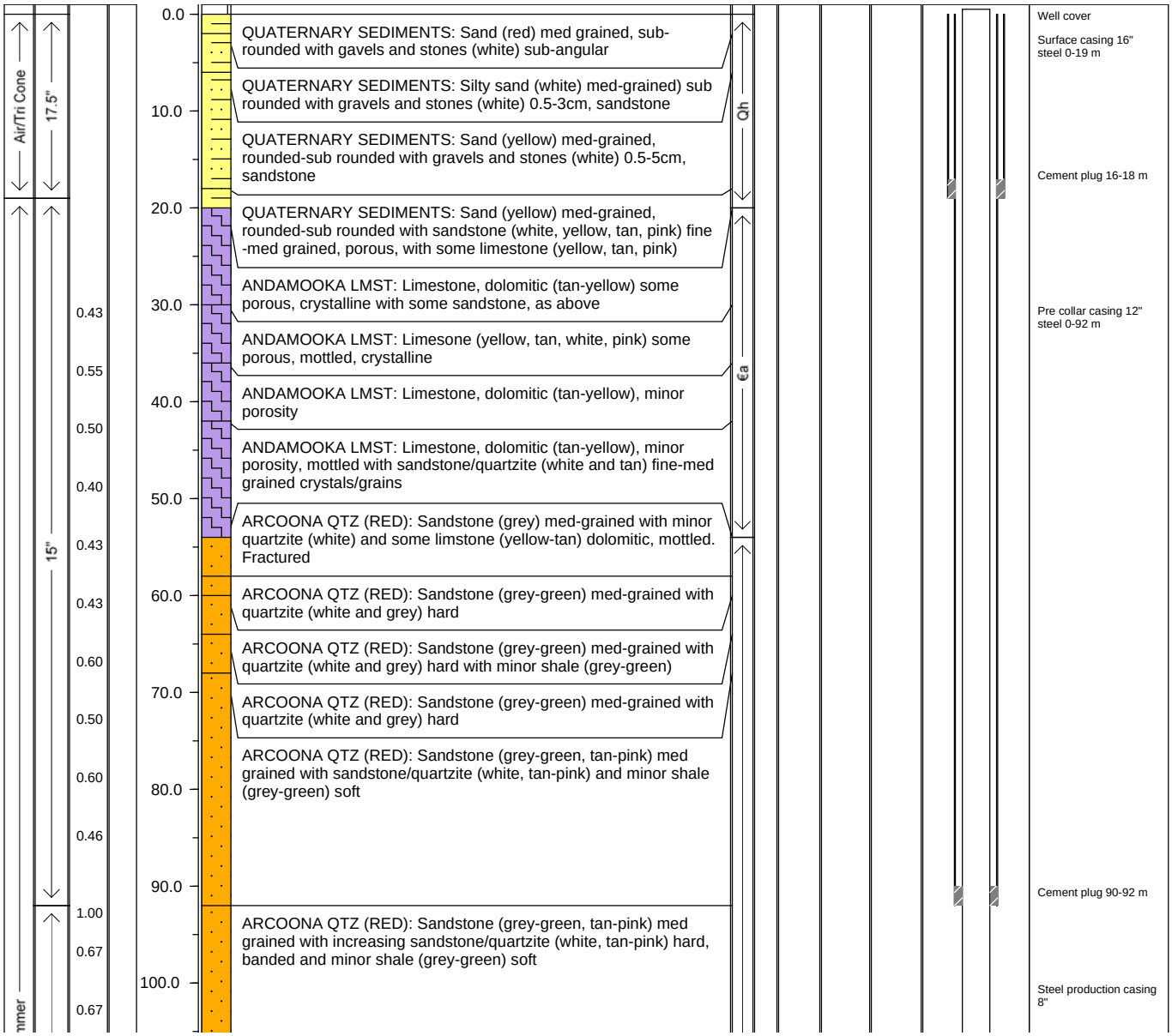
BOREHOLE / WELL NUMBER

RD3515- P1

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **14/04/2008** DATE COMPLETED: **22/04/2008**

WELL PERMIT NUMBER: **127952**
TOTAL DEPTH (m bgl): **192**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **23/06/2008** Depth (m TOC) **106.63**
PROJECTION: **GDA94 Zone 53**
EASTING: **681595** NORTHING: **6630127**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 14/04/2008

CHECKED: D Pierce DATE: 05/09/2008

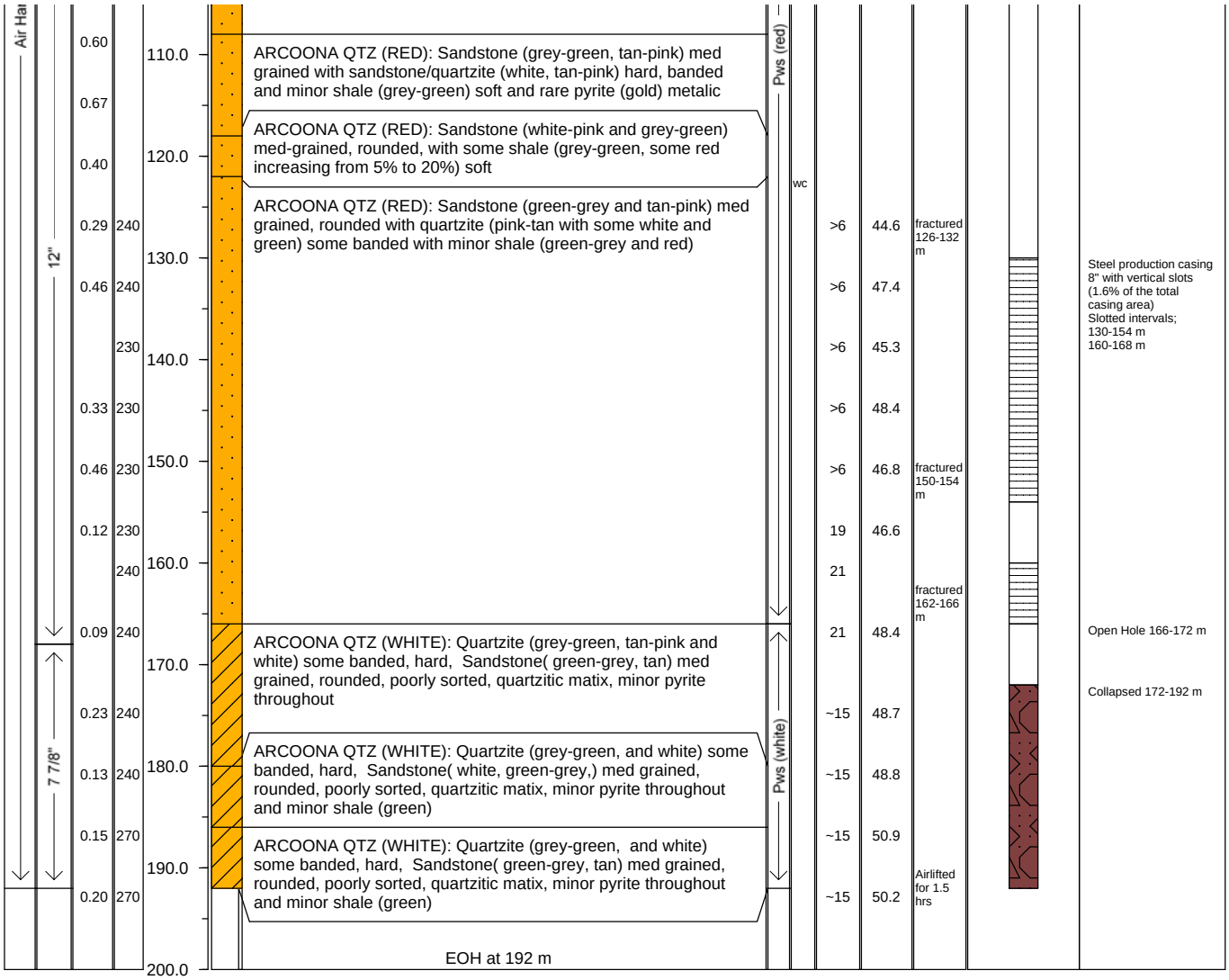
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3515- P1

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **14/04/2008** DATE COMPLETED: **22/04/2008**

WELL PERMIT NUMBER: **127952**
TOTAL DEPTH (m bgl): **192**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **23/06/2008** Depth (m TOC) **106.63**
PROJECTION: **GDA94 Zone 53**
EASTING: **681595** NORTHING: **6630127**



LOGGED: K Furness DATE: 14/04/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

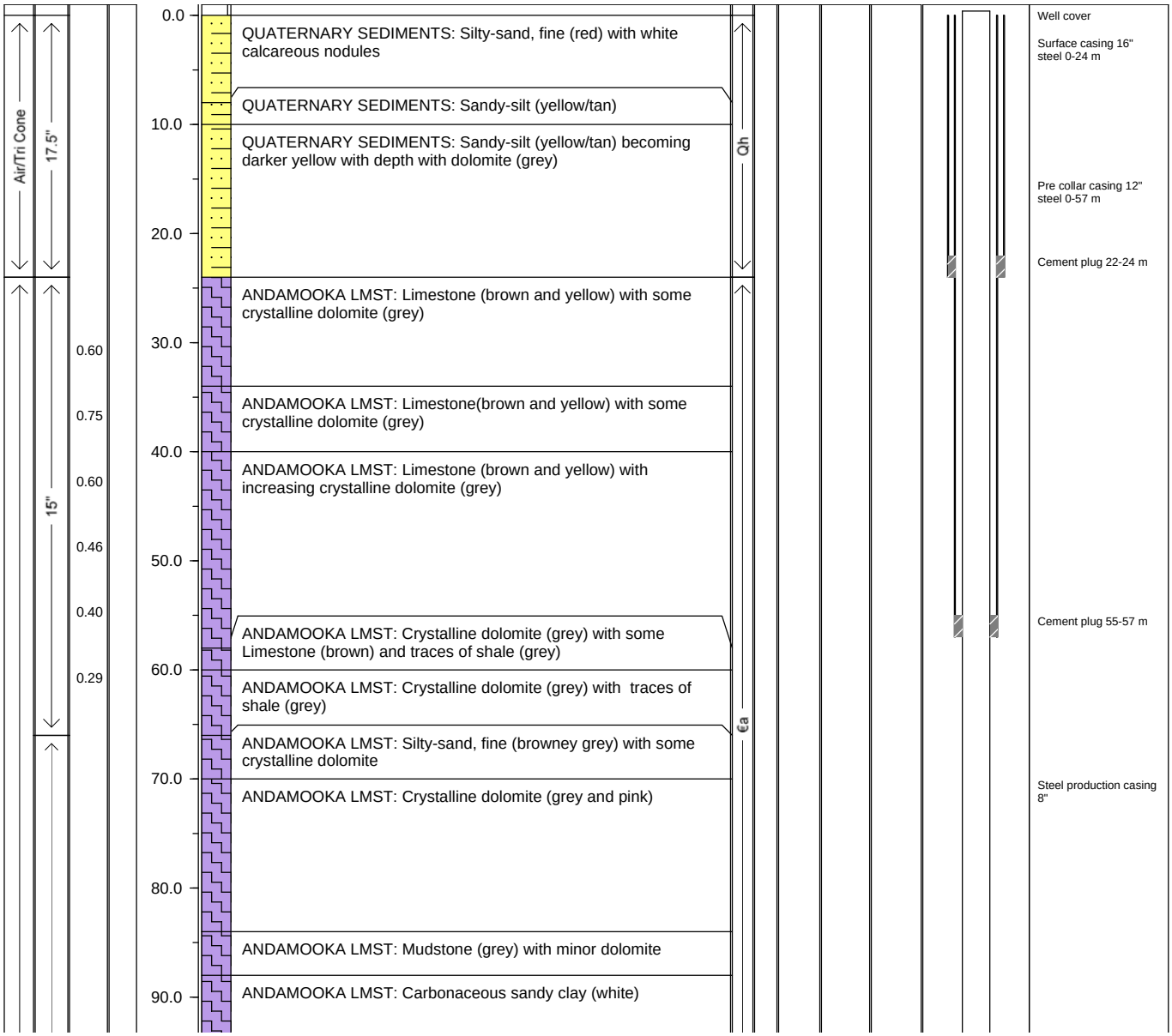
BOREHOLE / WELL NUMBER

RD3514- P1

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **24/03/2008** DATE COMPLETED: **04/04/2008**

WELL PERMIT NUMBER: **127951**
TOTAL DEPTH (m bgl): **256**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **6/04/2008** Depth (m TOC): **99.96**
PROJECTION: **GDA94 Zone 53**
EASTING: **682695** NORTHING: **6630793**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Hyland DATE: 04/04/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3514- P1

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **24/03/2008** DATE COMPLETED: **04/04/2008**

WELL PERMIT NUMBER: **127951**
TOTAL DEPTH (m bgl): **256**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **6/04/2008** Depth (m TOC): **99.96**
PROJECTION: **GDA94 Zone 53**
EASTING: **682695** NORTHING: **6630793**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	8"	0.50		100.0		ANDAMOOKA LMST: Quartzite (grey and red) with crystalline dolomite							
		0.40											
		0.30		110.0		ARCOONA QTZ (RED): Quartzite (grey and pink) with Shale (red)		wc					
		0.50				ARCOONA QTZ (RED): Quartzite (grey and pink) with abundant red sandstone							
		0.40	180	120.0					1.5.	23.3			Steel production casing 8" with vertical slots (1.6% of the total casing area) Slotted intervals; 118-178 m 184-214 m 220-238 m
		0.35	180			ARCOONA QTZ (RED): Quartzite (grey and pink) with some red sandstone			2	26.6			
		0.33	180	130.0		ARCOONA QTZ (RED): Quartzite (grey and pink) with sandstone (red and green)			2.5	36.3			
		0.60	180				Pws (red)		2.5	35.9			
		0.60	180	140.0		ARCOONA QTZ (RED): Quartzite (grey and pink) with sandstone (red and green) and red shale			2.9	39.0			
		0.46	180	150.0					4	38.2			
		0.33	180			ARCOONA QTZ (RED): Quartzite (grey and pink) with sandstone (red and green) and minor green shale			4	36.2			
		0.40	180	160.0		ARCOONA QTZ (RED): Quartzite becoming lighter pinks and greys and some quartzite (red)			4	38.2			
		0.60	180						4	34.8			
		0.40	180	170.0		ARCOONA QTZ (WHITE): Quartzite (pink and grey) with minor shale (green) and sandstone (white)			4	39.6			
		0.43	180	180.0					2	39.6	Low yield from 178-202 m due to lost circulation		
		0.27	190			ARCOONA QTZ (WHITE): Quartzite sandstone (white and green) and minor shale (green)	Pws (white)		1.67	41.3			

LOGGED: K Hyland DATE: 04/04/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3514- P1

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **24/03/2008** DATE COMPLETED: **04/04/2008**

WELL PERMIT NUMBER: **127951**
TOTAL DEPTH (m bgl): **256**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **6/04/2008** Depth (m TOC) **99.96**
PROJECTION: **GDA94 Zone 53**
EASTING: **682695** NORTHING: **6630793**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION

PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	LITHOLOGY	INTERPRETIVE LOG	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS
	190	190.0	ARCOONA QTZ (WHITE): Increasing sandstone (white), abundant quartzite (green and white) and minor green shale interface	P		40.7	
0.23	190		ARCOONA QTZ (WHITE): Quartzite (white and green), sandstone (white).		2.8	40.1	
	200	200.0					
0.18	195		ARCOONA QTZ (WHITE): Quartzite (white and green), sandstone (white) with minor shale (green)		1.18	40.1	
0.22	200	210.0	CORRABERRA SANDSTONE: Quartzite (white and green) with increasing sandstone (white)		4	40.4	
0.21	200		CORRABERRA SANDSTONE: Abundant sandstone (white) with quartzite (white and green)	Pwc	4	40.2	
0.30	200	220.0	CORRABERRA SANDSTONE: Predominantly sandstone (red) with quartzite (white and green and pink)		5.7	39.5	
0.32	200		CORRABERRA SANDSTONE: Sandstone (red) with quartzite (white and green and pink)		4.4	40.4	
0.29	200	230.0	CORRABERRA SANDSTONE: Quartzite (white, pink and green) with green shale and sandstone (red)	Transitional	4	40.7	
0.29	200		CORRABERRA SANDSTONE: Quartzite (white, pink and green) with grey shale and some sandstone (red)		4	43.5	
0.38	200	240.0	TRANSITIONAL LAYER: Predominantly shale (dark grey) with some red sandstone and quartzite		5.7	40.2	
0.40	200	250.0	TREGOLANA SHALE: Shale (dark grey)	Pwm	5.7	40.7	
	200				5.7	43.8	Airlifted for 3 hrs Final yield 7 L/s
		260.0					
		270.0					
		280.0	EOH at 256 m				

LOGGED: K Hyland DATE: 04/04/2008

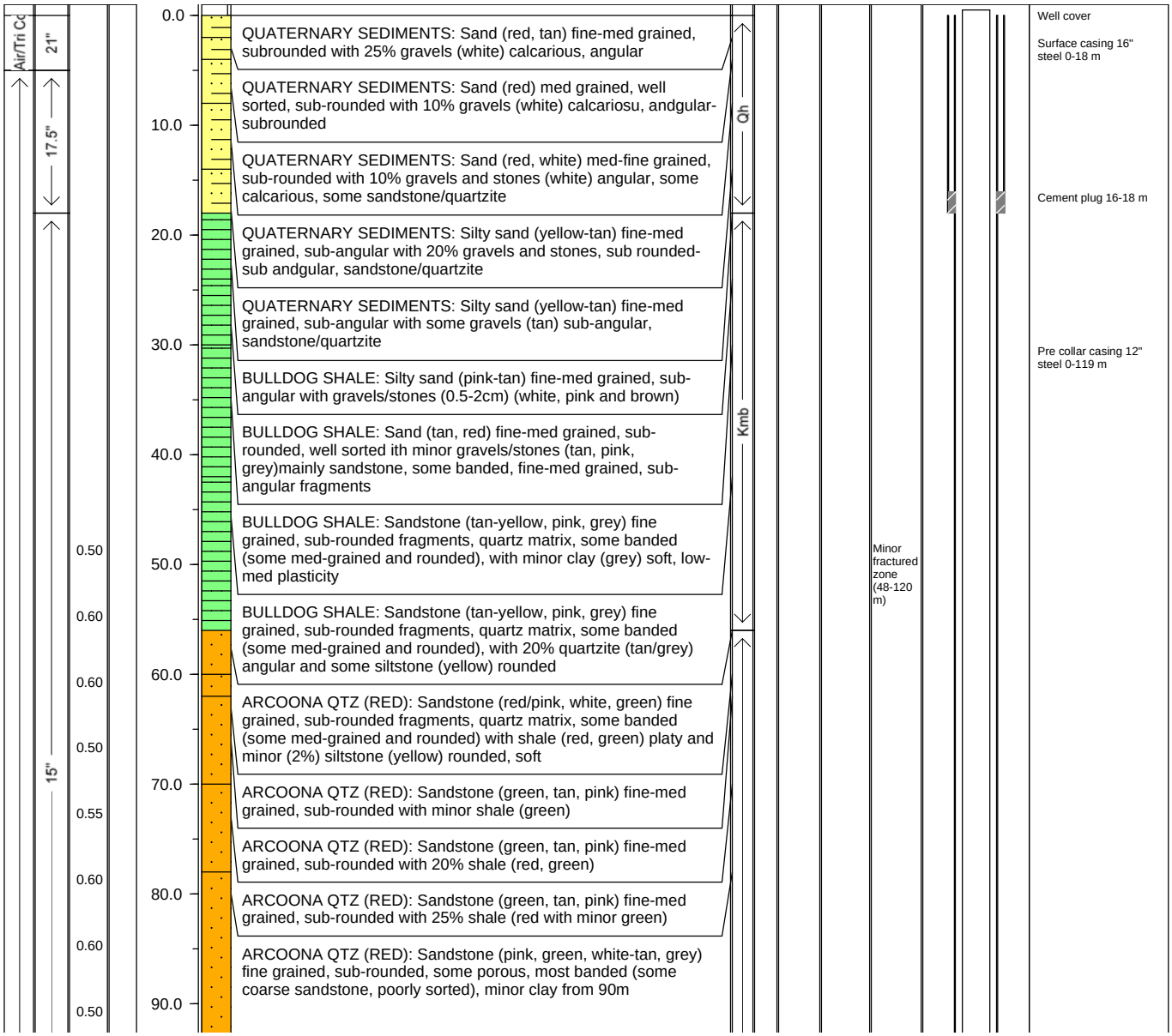
CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3513A-P1

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**127949**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**270**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **12/07/08** Depth (m TOC):	**117.65**
BOREHOLE DIAMETER:	**8 inch**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED: **2/07/2008**	DATE COMPLETED: **11/07/2008**	EASTING: **682970**	NORTHING: **6630860**



LOGGED: K Furness DATE: 11/07/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3513A-P1

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inch**
DATE STARTED: **2/07/2008** DATE COMPLETED: **11/07/2008**

WELL PERMIT NUMBER: **127949**
TOTAL DEPTH (m bgl): **270**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **12/07/08** Depth (m TOC): **117.65**
PROJECTION: **GDA94 Zone 53**
EASTING: **682970** NORTHING: **6630860**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer		0.75		100.0		ARCOONA QTZ (RED): Sandstone (pink, green, white-tan, grey) fine grained, sub-rounded, some porous, most banded (some coarse sandstone, poorly sorted) with 2% shale (red)							
		0.67											
		0.60	240	110.0		ARCOONA QTZ (RED): Sandstone (pink, green, white-tan, grey) fine grained, sub-rounded, some porous, most banded (some coarse sandstone, poorly sorted) with 30% shale (red with minor green-grey)	Pws (red)						
		0.55	250										
		0.43	250	120.0		ARCOONA QTZ (RED): Sandstone (pink, green, tan)med grained, sub-rounded (minor coarse) with 35% shale (red) soft						Cement plug 117-119 m	
		0.43	250						0.50	28.29			
				130.0									Steel production casing 8"
		0.38	250						0.19	36.4			
		0.35	210	140.0		ARCOONA QTZ (RED): Sandstone (green, white with minor pink) med grained, sub-rounded (minor coarse) with 35% shale (red) soft			0.25	20.31			
		0.35	210			ARCOONA QTZ (RED): Sandstone (white and green) med grained, quiartzite matrix, sub-angular with rare shale (red)			0.17				
		0.35	210	150.0		ARCOONA QTZ (RED): Sandstone (white and green) med grained, quiartzite matrix, sub-angular (with 10% (pink) coarse rounded sandstone) with rare shale (red)			0.59	18.49			
		0.30	240						0.14	22.41			
				160.0									
		0.30	220			ARCOONA QTZ (RED): Sandstone (white, pink, tan, green) med grained, sub-angular, quartzite matrix, with sand (pink/white), med grainded, sub-angular				41.5			
			160	170.0		ARCOONA QTZ (WHITE): Sandstone/quartzite (pink, green, white) med-grained/minerals, angilar fragments, some porous with minor shale bands (red)	wc		1.43	40.2			
		0.24							2.00	39.5			Steel production casing 8" with vertical slots (1.6% of the total casing area) Slotted intervals; 174-192 m 198-222 m 228-270 m
		0.21	160	180.0		ARCOONA QTZ (WHITE): Sandstone/quartzite (white, green with grey and tan at 178m) med grained/minerals, angular	Pws (white)		4.00	38.2			
		0.21	26.9						5.00	35.8			

LOGGED: K Furness DATE: 11/07/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3513A-P1

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**127949**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**270**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **12/07/08** Depth (m TOC):	**117.65**
BOREHOLE DIAMETER:	**8 inch**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED: **2/07/2008**	DATE COMPLETED: **11/07/2008**	EASTING: **682970**	NORTHING: **6630860**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	12"	0.25	160	190.0		ARCOONA QTZ (WHITE): Sandstone (white, green) hard, angular, minor shale (green) band at 188m and sandstone (white, green) from 194-196m			>3.33	39.4			
			140	200.0		CORRABERRA SANDSTONE: Sandstone (pink, white) fine grained, sub-rounded fragments, porous			>3.33	40.2			
		0.26	200			CORRABERRA SANDSTONE: Sandstone (white) fine grained, rounded, minor pyrite			>2.5	43.9			
						CORRABERRA SANDSTONE: Sandstone (pink, white, green) fine grained, sub-rounded fragments, porous, quartzite matrix		wc					
		0.25	200	210.0		CORRABERRA SANDSTONE: Sandstone (white) fine grained, rounded	Pwc		>2	41.8			
		0.29	200			CORRABERRA SANDSTONE: Sandstone (tan-pink, green, med-fine grained, quartzite matrix with shale (green-grey) hard (tan-grey sandstone from 222-224m)			>2.86	42.2			
		0.38	200	220.0						44.2			
		0.43	200	230.0		TRANSITIONAL LAYER: Shale (green-grey and grey-purple) hard with 50% Sandstone (dark red) fine grained, angular fragments, hard			10.2	66.6			
		0.38	220						12.1	64.3			
		0.26	220	240.0		TRANSITIONAL LAYER: Shale (grey-purple) angular, hard			14.2	84.0			
						TRANSITIONAL LAYER: Sandstone (dark red) fine grained, angular fragments, hard							
		0.21	220			TRANSITIONAL LAYER: 60% shale (grey-purple) angular, hard with 40% sandstone (dark red) fine grained, angular fragments, hard	Transition Layer		21.7				
		0.22	220	250.0		TRANSITIONAL LAYER: 60-80% sandstone (dark red) fine grained, angular fragments, hard with 20-40% shale (grey-purple) angular, hard			31.3	101.0			
		0.20		260.0		TRANSITIONAL LAYER: 50-60% shale (grey-purple) angular, hard with 40-50% sandstone (dark red) fine grained, angular fragments, hard			38.9	111.1			
		0.19							35	92.4			
		0.13	310	270.0		EOH at 270m			38.9	88.9	Airlifted for 1.25 hrs		

LOGGED: K Furness DATE: 11/07/2008

CHECKED: D Pierce DATE: 05/09/2008

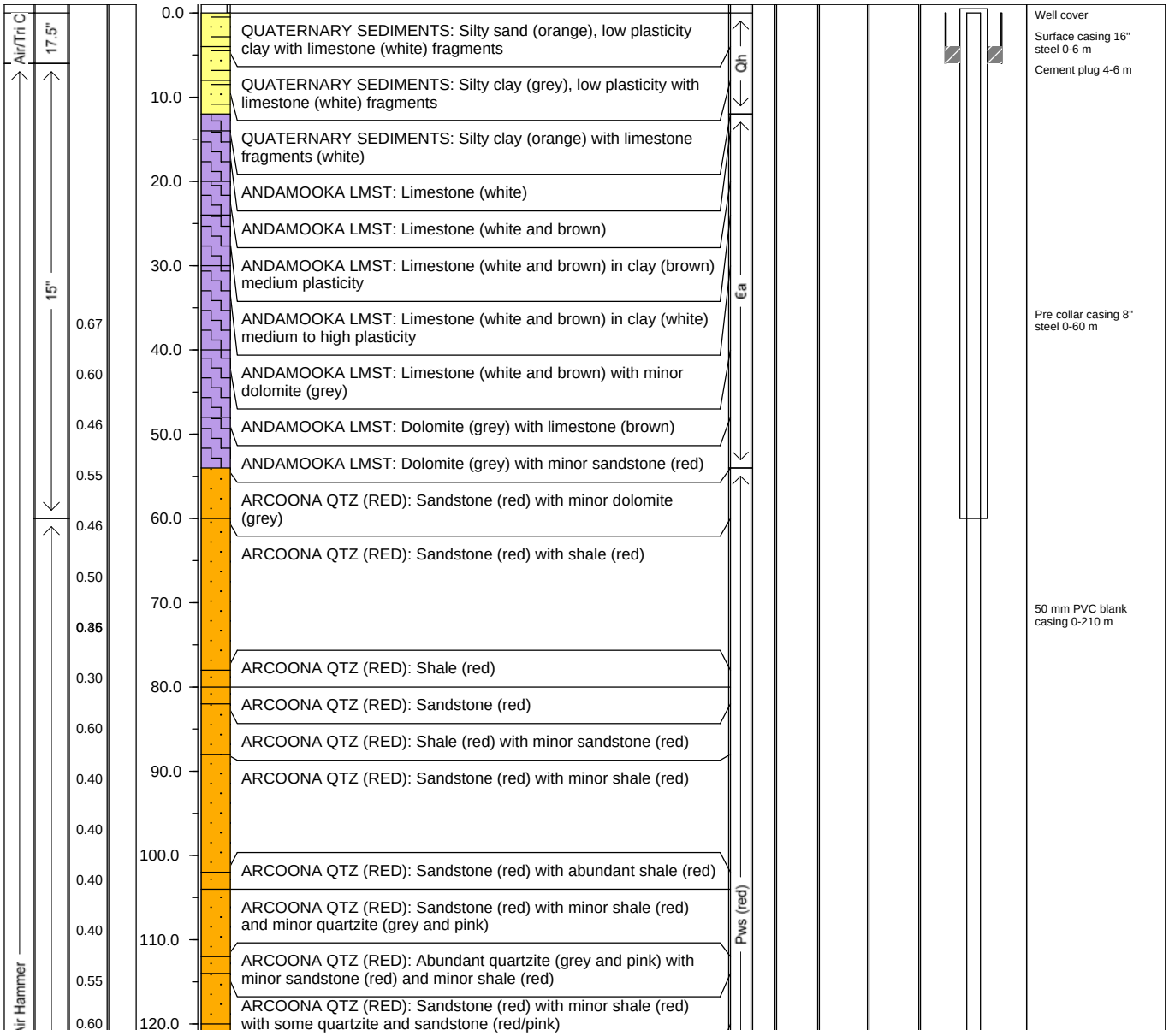
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3504

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**145093**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**222**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **23/06/08** Depth (m TOC):	**93.23**
BOREHOLE DIAMETER:	**7 7/8"**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED: **27/05/08**	DATE COMPLETED: **30/05/08**	EASTING: **682291**	NORTHING: **6628852**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K. Hyland DATE: 30/05/08

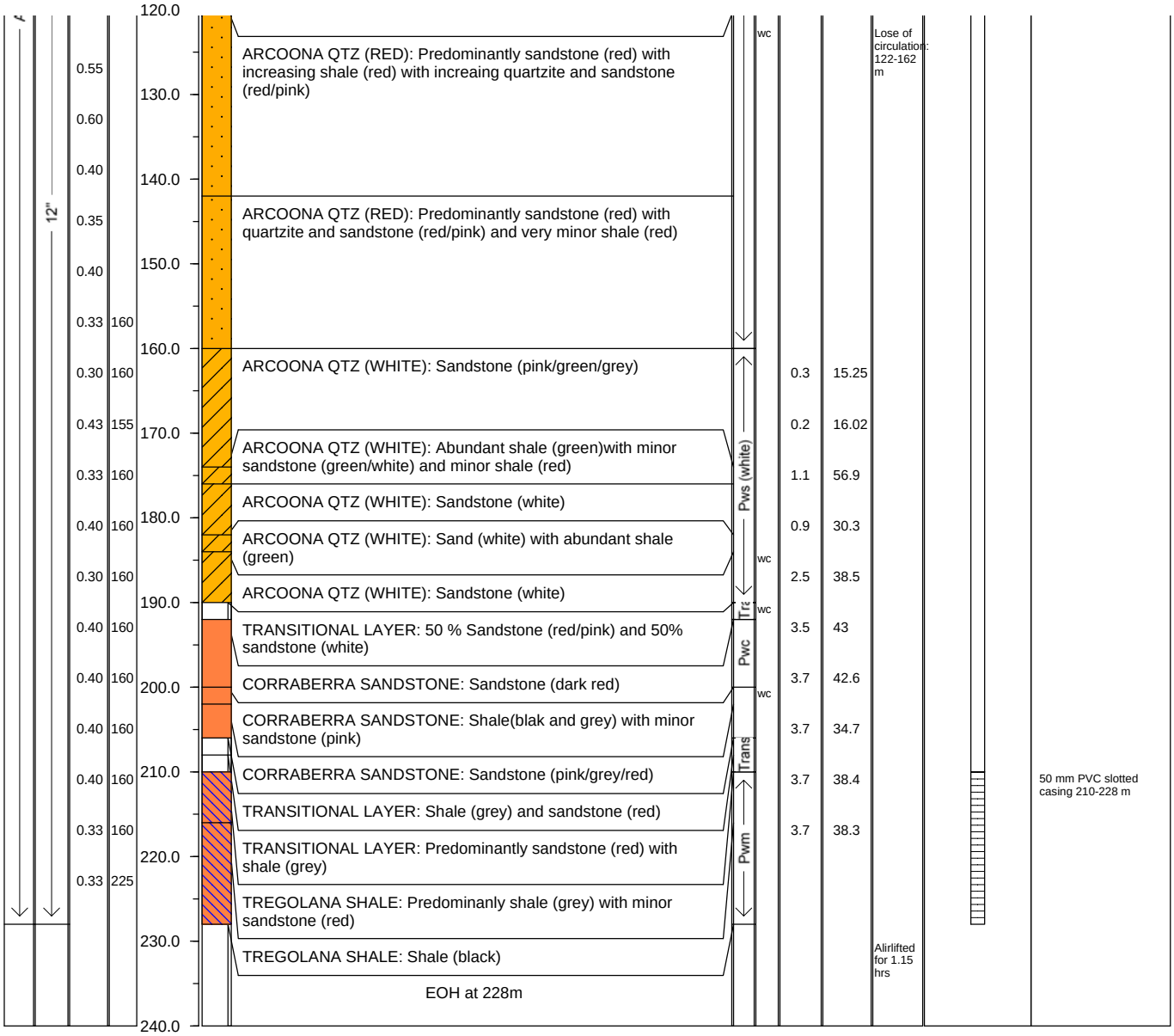
CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3504

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**145093**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**222**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **23/06/08** Depth (m TOC):	**93.23**
BOREHOLE DIAMETER:	**7 7/8"**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED: **27/05/08**	DATE COMPLETED: **30/05/08**	EASTING: **682291**	NORTHING: **6628852**



LOGGED: K. Hyland DATE: 30/05/08

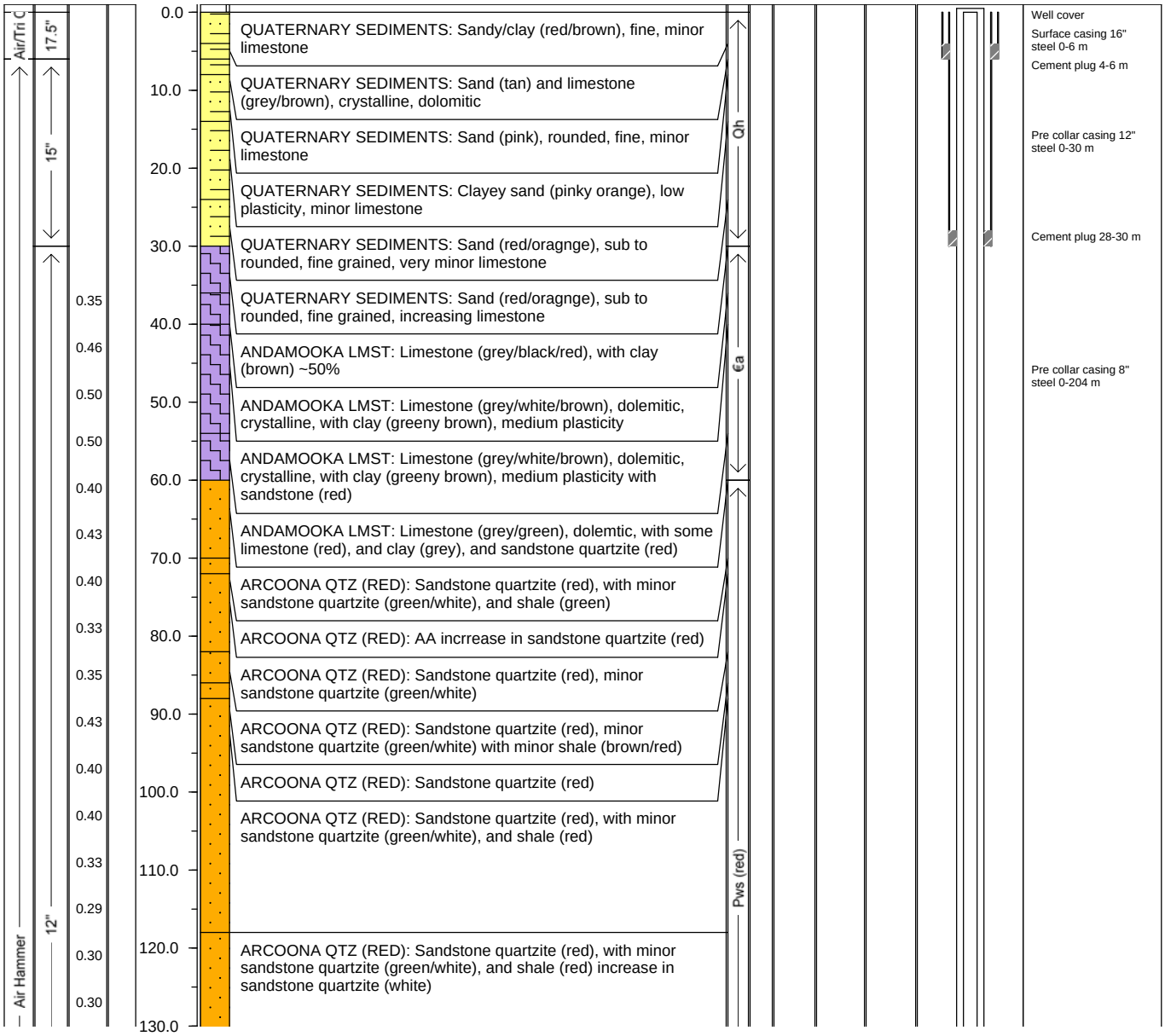
CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3499

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**145090**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**240**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **23/06/08** Depth (m TOC):	**114.9**
BOREHOLE DIAMETER:	**7 7/8"**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED: **11/05/08**	DATE COMPLETED: **16/05/08**	EASTING: **682084**	NORTHING: **6629731**



LOGGED: J. Richards DATE: 16/05/08

CHECKED: D Pierce DATE: 05/09/2008

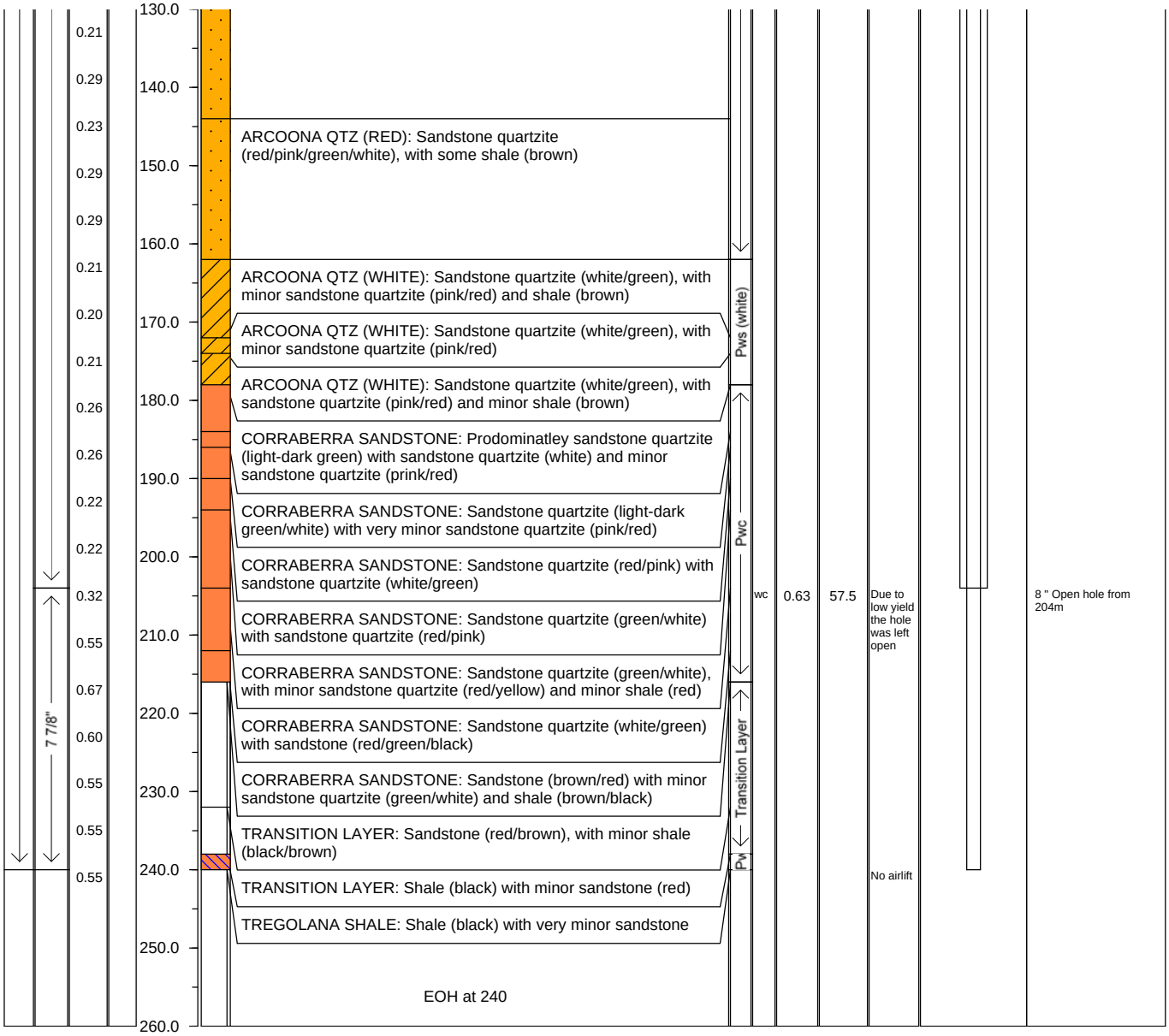
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3499

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **7 7/8"**
DATE STARTED: **11/05/08** DATE COMPLETED: **16/05/08**

WELL PERMIT NUMBER: **145090**
TOTAL DEPTH (m bgl): **240**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **23/06/08** Depth (m TOC): **114.9**
PROJECTION: **GDA94 Zone 53**
EASTING: **682084** NORTHING: **6629731**



LOGGED: J. Richards DATE: 16/05/08

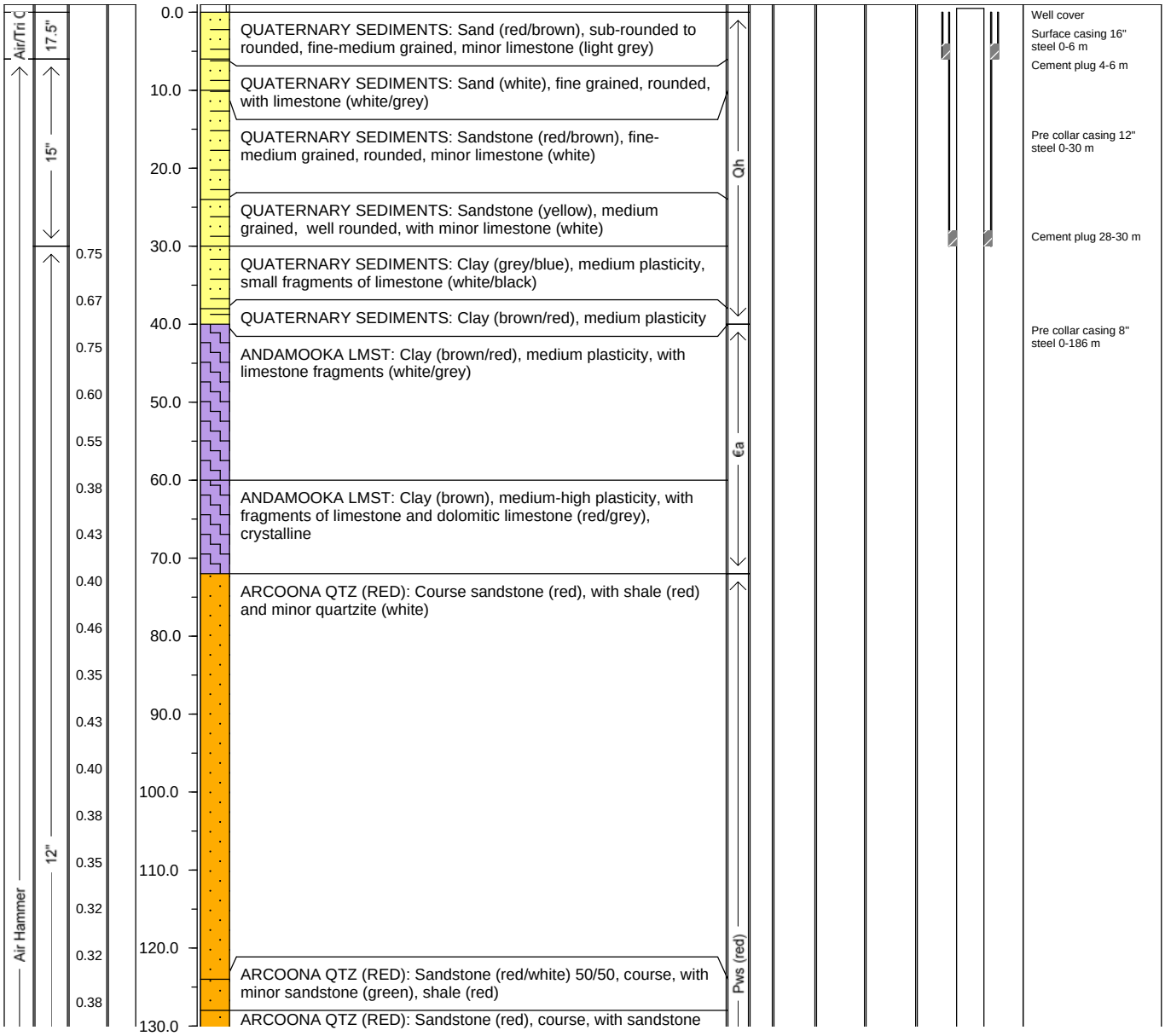
CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3493

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**145089**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**228**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **23/06/08** Depth (m TOC):	**105.83**
BOREHOLE DIAMETER:	**8"**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED: **05/05/2008**	DATE COMPLETED: **10/05/2008**	EASTING: **682875**	NORTHING: **6629905**



LOGGED: J Richards DATE: 10/05/2008

CHECKED: D Pierce DATE: 05/09/2008

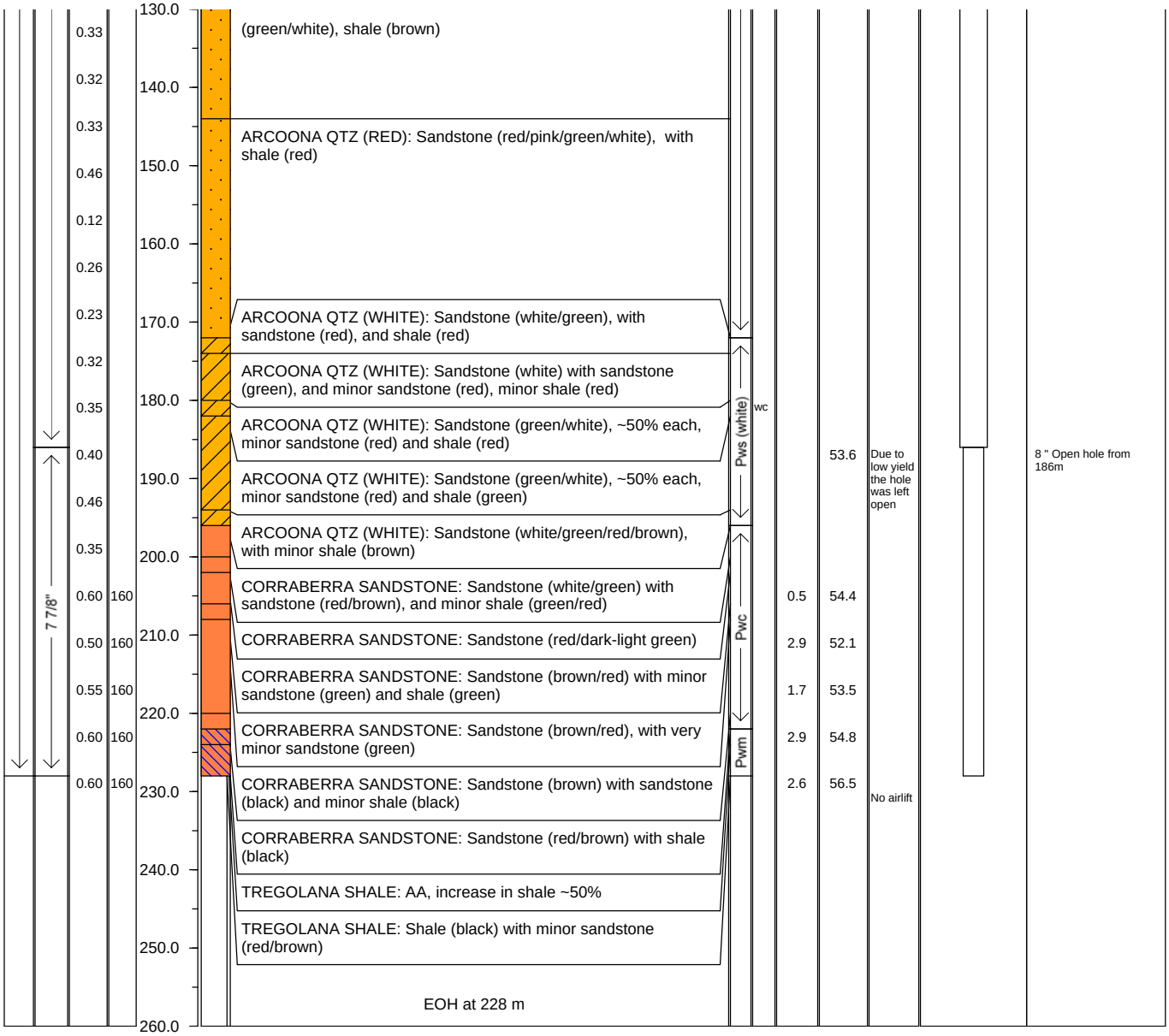
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3493

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **05/05/2008** DATE COMPLETED: **10/05/2008**

WELL PERMIT NUMBER: **145089**
TOTAL DEPTH (m bgl): **228**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **23/06/08** Depth (m TOC) **105.83**
PROJECTION: **GDA94 Zone 53**
EASTING: **682875** NORTHING: **6629905**



LOGGED: J Richards DATE: 10/05/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

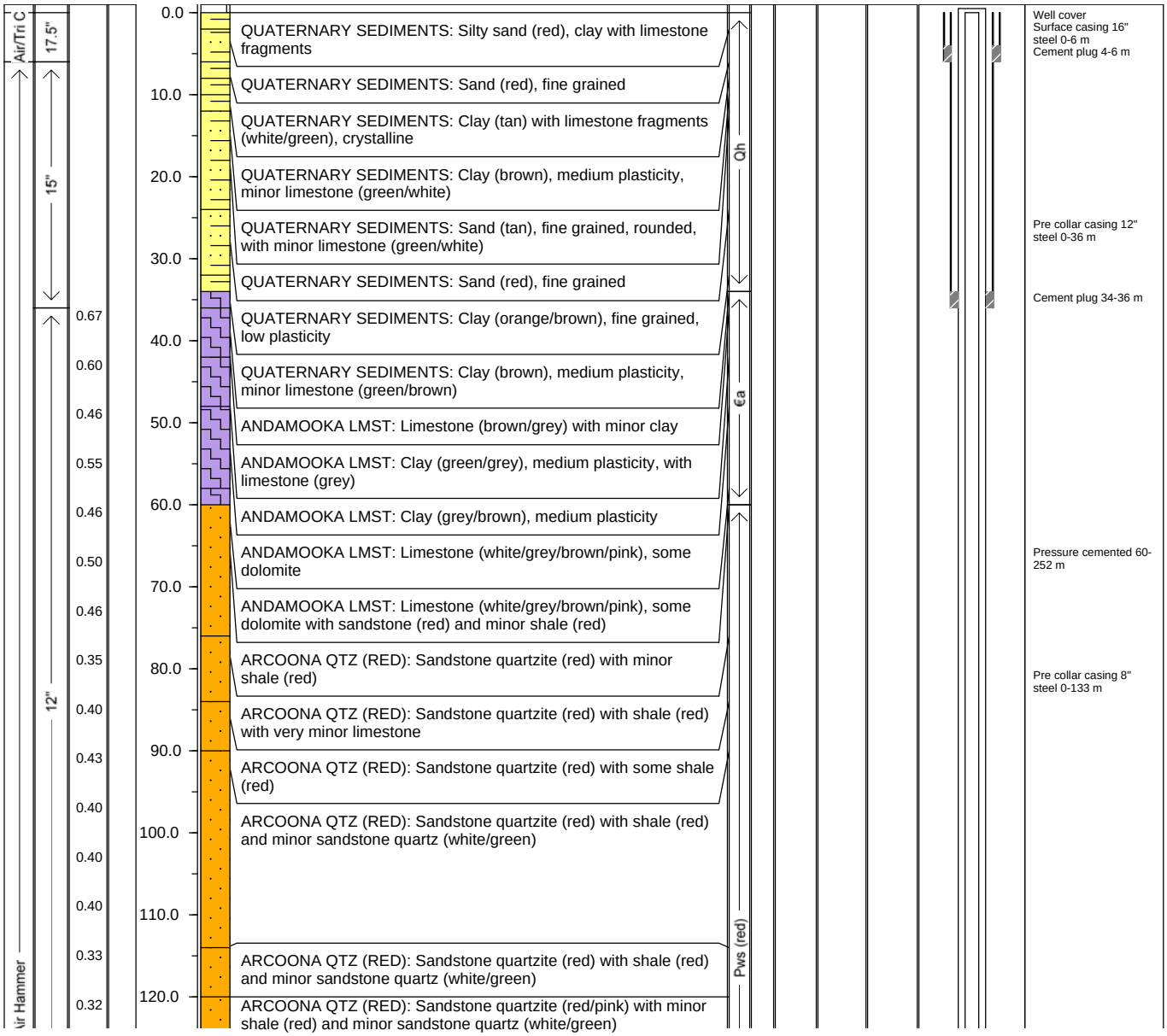
BOREHOLE / WELL NUMBER

RD3492

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **7 7/8"**
DATE STARTED: **17/05/2008** DATE COMPLETED: **20/05/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **232**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **23/06/08** Depth (m TOC): **104.92**
PROJECTION: **GDA94 Zone 53**
EASTING: **682704** NORTHING: **6629510**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K. Hyland DATE: 20/05/2008

CHECKED: D Pierce DATE: 05/09/2008

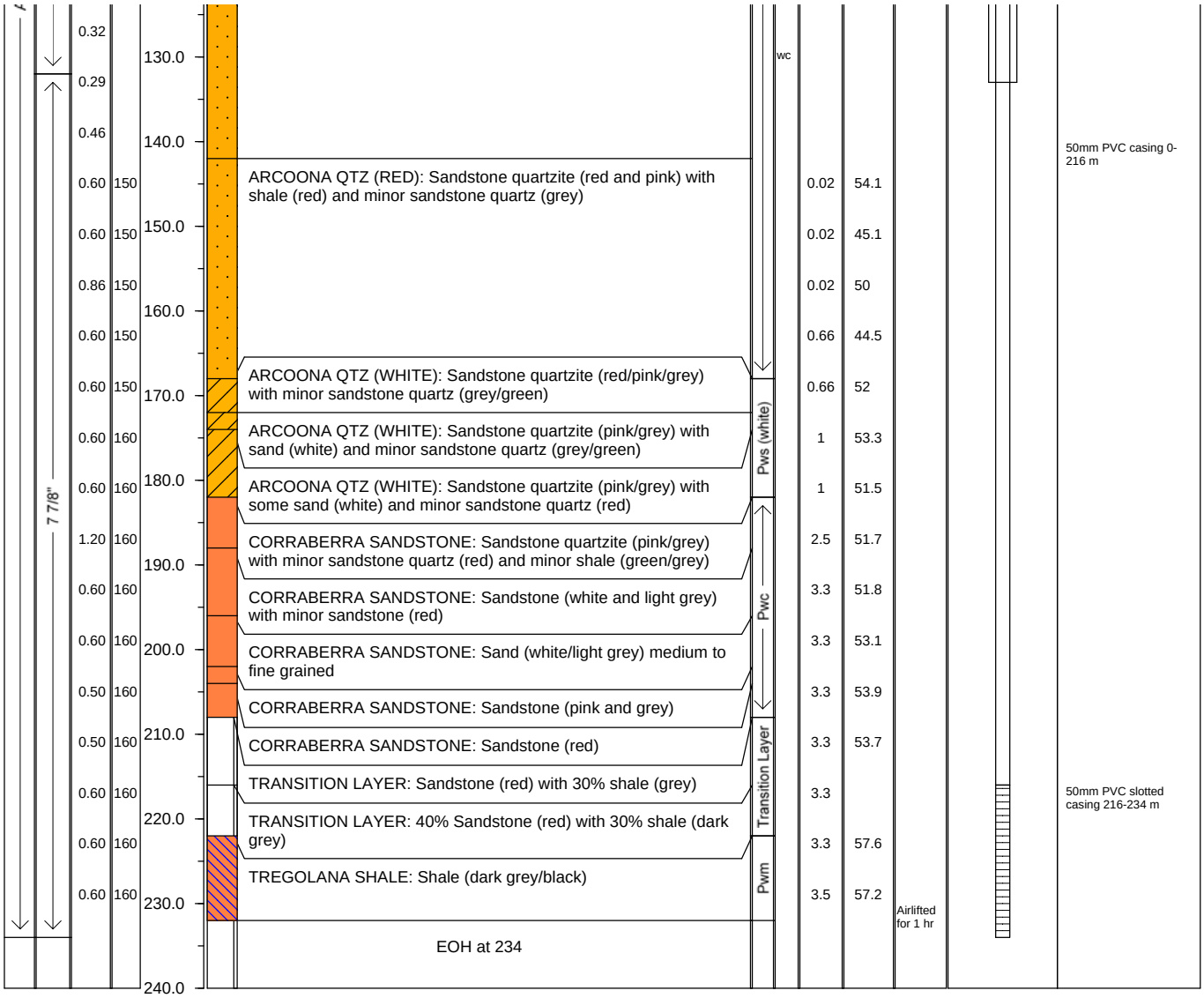
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3492

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**n/a**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**232**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **23/06/08** Depth (m TOC):	**104.92**
BOREHOLE DIAMETER:	**7 7/8"**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED:	**17/05/2008** DATE COMPLETED: **20/05/2008**	EASTING: **682704**	NORTHING: **6629510**

DRILLING INFO. | MATERIAL PROPERTIES | FIELD RECORDS / CONSTRUCTION INFO.



LOGGED: K. Hyland DATE: 20/05/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

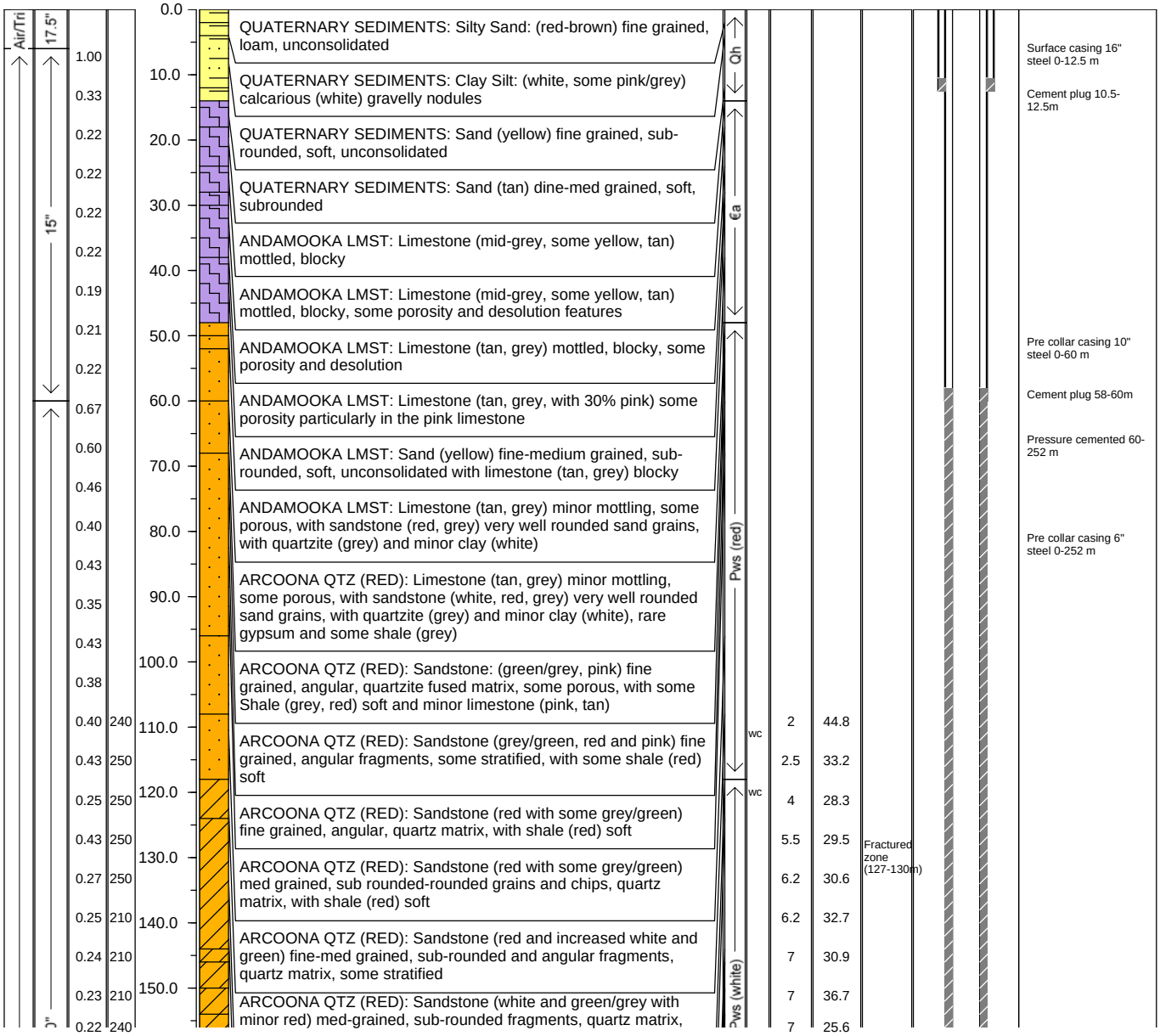
BOREHOLE / WELL NUMBER

RD3487

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **12/06/2008** DATE COMPLETED: **1/07/2008**

WELL PERMIT NUMBER: **129167**
TOTAL DEPTH (m bgl): **600**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **29/6/2008** Depth (m TOC) **100.23**
PROJECTION: **GDA94 Zone 53**
EASTING: **681254** NORTHING: **6629496**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness & J Richards DATE: 1/07/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3487

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **12/06/2008** DATE COMPLETED: **1/07/2008**

WELL PERMIT NUMBER: **129167**
TOTAL DEPTH (m bgl): **600**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **29/6/2008** Depth (m TOC): **100.23**
PROJECTION: **GDA94 Zone 53**
EASTING: **681254** NORTHING: **6629496**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	11	0.13	220	160.0		with some quartzite (white) stratified, and minor shale (red, grey/green)			7	31.2			
		0.15	160	170.0		ARCOONA QTZ (WHITE): Sandstone (white, green) med-grained, sub-rounded fragments, quartz matrix, with some quartzite (white-tan, green) stratified, hard, angular and minor shale (red)			7	35			
		0.24											
		0.35	160	180.0		ARCOONA QTZ (WHITE): Sandstone (white with some green and red) med-grained, sub-rounded fragments, quartz matrix, with some quartzite (white, green) stratified, hard, angular and minor shale (red). Three minor fractures from 127-130m			7	33.9			
		0.30	26.9						7	38.5			
		0.26	160	190.0		ARCOONA QTZ (WHITE): Sandstone (white-pale green, black/dark grey, red, pink) med grained, sub-rounded, quartz matrix with quartzite (pink-tan, pale gren/white) stratified	Pwc		7	29.5			
		0.40	140	200.0					7	28.4			
		0.40	200			ARCOONA QTZ (WHITE): Sandstone (white, pale green, pink) med grained, sub-rounded-sub-angular fragments, quartz matrix, with Quartzite(sandstone?) (pale green, white, tan) stratified, hard, with minorshale (red) well laminated, firm			7	31.8			
		0.43	200	210.0					7	32.5			
		0.35	200			ARCOONA QTZ (WHITE): Sandstone (pink-brown, light green) med-coarse grained, subrounded, fragments, rounded grains, quartz matrix			7	33.6			
		0.38	200	220.0					7	33.0			
		0.32	200			ARCOONA QTZ (WHITE): Sandstone (white, pale green, pink) med grained, sub-rounded-sub-angular fragments, quartz matrix, with Quartzite (pale green, white, tan) stratified, hard, with minor shale (red) well laminated, firm	Transitional Layer		7	36.1			
		0.30	220	230.0					7	36.0			
		0.40	220			ARCOONA QTZ (WHITE): Sandstone (white, green, grey), fine-medium grained, subrounded, qtz matrix, with rare pyrite			7	36.6			
		0.33	220	240.0					7	39.8			
		0.46	220			CORRABERRA SANDSTONE: Sandstone (pink,red), medium-grained, sub-rounded, with minor sandstone (white, green)			7	40.4			6 " Open hole from 252m
		0.33		250.0		CORRABERRA SANDSTONE: Sandstone (red, brown), medium-coarse grained, sub-rounded, with minor shale (brown, green)							
		0.40											
		0.50	310	260.0		CORRABERRA SANDSTONE: Sandstone (red, brown), medium-coarse grained, sub-rounded, with very minor shale (green), and sandstone (white)			3.0	107.3			
		0.23	310			CORRABERRA SANDSTONE: Sandstone (red, brown), medium-coarse grained, sub-angular to sub-rounded, minor shale (brown)	Pwm		3.0	115.6			
		0.27		270.0									
		0.40				TRANSITION LAYER: Shale (black, brown), with minor sandstone (red, brown) ~10%							
		0.24	240	280.0		TRANSITION LAYER: AA with an increase in sandstone ~35%			1.8	123.0			
		0.67	220			TRANSITION LAYER: AA with an increase in sandstone ~10%			1.1	115.2			
		0.50	220	290.0		TREGOLANA SHALE: Shale (brown) with minor sandstone (red)			2.5	123.3			
		0.55	220	300.0		TREGOLANA SHALE: Shale (brown) with minor shale (green)			1.7	120.1			
				310.0									

LOGGED: K Furness & J Richards DATE: 1/07/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3487

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **12/06/2008** DATE COMPLETED: **1/07/2008**

WELL PERMIT NUMBER: **129167**
TOTAL DEPTH (m bgl): **600**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **29/6/2008** Depth (m TOC) **100.23**
PROJECTION: **GDA94 Zone 53**
EASTING: **681254** NORTHING: **6629496**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	6"	0.67	230	320.0		TREGOLANA SHALE: Shale (brown) with shale (green) and sandstone (red), coarse	KHEMQ		2.0	112.9			
		0.43	250			TREGOLANA SHALE: Shale (brown) with some shale (green)			2.5	111.2			
		0.29	230	330.0		TREGOLANA SHALE: AA with minor quartzite (green)			2.5	112.2			
		0.17	260			TREGOLANA SHALE: Shale (rbown) with shale (green)			1.4	124.3			
		0.27	260	340.0		TREGOLANA SHALE: Shale (brown) with clay (brown), low plasticity, and shale (green)			1.7	115.8			
		0.24	230	350.0		TREGOLANA SHALE: AA with a decrease in shale (green) <10%			2.0	128.4			
		0.27	240			TREGOLANA SHALE: AA with an increase in shale (green) ~15-20%			2.0	133.6			
		0.20	260	360.0		TREGOLANA SHALE: Shale (brown) with very minor shale (green)			1.3	135.3			
		0.23	250			Unconformity			2.0	148.5			
		0.29	200	370.0		HEMATITE GRANITE BRECCIA: Granite breccia (pink) med sized crystals (relative), quartz rich, 30% hematite, with some interbedded? Shale (red) and minor volcaniclastics (dark grey) stratified	HEMV		1.4	150.8			
		0.23	220	380.0					1.4	148.3			
		0.24	250			HEMATITE GRANITE BRECCIA: Granite breccia (pink) med sized crystals (relative), quartz rich, increasing to 60% hematite, with some interbedded? Shale (red) and increasing (40% from 328-330) volcaniclastics (dark grey) stratified			2.0	151.6			
		0.25		390.0						163.3			
		0.19	270						1.7	173.6			
		0.22	280	400.0		HEMATITE GRANITE BRECCIA: Granite breccia (pink) fine sized crystals, 30% hematite, with some interbedded Shale (red) and abundant interbedded volcaniclastics (dark grey) stratified	VHEM		2.2	171.5			
		0.23	260	410.0		HEMATITE GRANITE BRECCIA: Granite breccia (pink) med sized crystals, 30% hematite, with some interbedded Shale (red) and minor volcaniclastics (dark grey) stratified			2.0	160.0			
		0.21	260						2.0	148.7			
		0.22	220	420.0		HEMATIITE VOLCANIC CLASTS: Hematite (red) with 20% ultramafic-mafic volcanic clasts (pink, white, grey, black, green) with some interbedded shale (red) laminated			2.5	144.5			
		0.22	220	430.0					1.7	160.3			
		0.24	260			HEMATIITE VOLCANIC CLASTS: Shale (red) with 10% hematie-volcanic clasts (aa)			2.5	151.0			
		0.21	260	440.0		VOLCANIC CLASTS-HEMATITE: Volcanic clasts (aa) increasing from 10-30% hematite with minor shale (red)			2.0	167.6			
		0.20	250						1.7	161.8			
		0.26	260	450.0		VOLCANIC CLASTS-HEMATITE: Volcanic clasts (aa), 40% hematite with minor shale (red)			1.7	168.7			
		0.25	310	460.0					1.3	178.7			
		0.27	310						1.7	182.1			
		0.26	320						1.3	172.8			

LOGGED: K Furness & J Richards DATE: 1/07/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3487

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **12/06/2008** DATE COMPLETED: **1/07/2008**

WELL PERMIT NUMBER: **129167**
TOTAL DEPTH (m bgl): **600**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **29/6/2008** Depth (m TOC) **100.23**
PROJECTION: **GDA94 Zone 53**
EASTING: **681254** NORTHING: **6629496**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
		0.23	320	470.0			HEMV		1.3	211.2			
		0.16	330	480.0		VOLCANIC CLASTS-HEMATITE: Volcanic clasts, ultramafic-mafic (pink, white, grey, black, with increasing light green and white) with 30% Hematite (red) with some interbedded shale (red) laminated			1.4	206.0			
		0.16	340						1.4	203.4			
		0.16	300	490.0					1.4	163.6			
		0.16	320	500.0					1.7	168.8			
		0.21	320						1.7	172.5			
		0.29	310	510.0		VOLCANIC CLASTS-HEMATITE: Volcanic clasts (aa), 30% hematite with cloritised mixed volcanic ash (grey-green) increasing from 10 to 80%			1.4	102.5			
		0.30	310						1.4	182.8			
		0.32	310	520.0		VOLCANIC ASH EPICLASTS: Mixed ash epiclasts (grey-green) relatively soft, low hemitisation, fine grained, with shale (red) lamintated from 528-542m and 588-596m			1.1	170.4			
		0.30	310	530.0					1.4	171.4			
		0.23	310						1.4	217.8			
		0.40	310	540.0					1.7	224.0			
		0.33	310						1.7	210.3			
		0.25	320	550.0					2.5	197.4			
		0.29	320				KASH		1.7	184.1			
		0.38	320	560.0					2.0	185.0			
		0.38	320						2.5	183.3			
		0.26	320	570.0					2.0	180.0			
		0.15	320	580.0					1.7	129.5			
		0.16	320						2.0	176.6			
		0.14	320	590.0					2.0	168			
		0.19	320	600.0					2.0	153.3			
				610.0							Airlifted for 11 hrs		
				620.0		EOH at 600 m							

LOGGED: K Furness & J Richards DATE: 1/07/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3551

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **11/07/2008** DATE COMPLETED: **19/07/2008**

WELL PERMIT NUMBER: **145087**
TOTAL DEPTH (m bgl): **250**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **12/09/2008** Depth (m TOC) **118.96**
PROJECTION: **GDA94 Zone 53**
EASTING: **682145** NORTHING: **6629473**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air/Tri Cone	17.5"			0.0		QUATERNARY SEDIMENTS: Sand (red, white) fine grained, sub-angular with 30% gravels and stone (white, grey, tan) some calcarious, some sandstone	Qh					Well cover
				10.0		QUATERNARY SEDIMENTS: Silty Sand (tan-yellow) med grained, sub-angular with 15% gravels and stones (white, grey, tan) angular, some calcarious, some sandstone						Surface casing 15" steel 0-15 m
				20.0		QUATERNARY SEDIMENTS: Sand (yellow) fine-med grained, sub rounded with minor stones and gravels (white)						Cement plug 13-15m
				30.0		QUATERNARY SEDIMENTS: Silt (white, tan) calcarious with gypsum minerals and nodules (white, tan)						
				40.0		QUATERNARY SEDIMENTS: Silty Sand (tan) fine grained, with 40% gravels and nodules (white, tan), soft	Ea					
				50.0		QUATERNARY SEDIMENTS: Silt (white, tan) calcarious with gypsum minerals and nodules (white, tan)						Pre collar steel casing 0-72 m
	15"			60.0		QUATERNARY SEDIMENTS: Clayey silt (tan-grey) soft with minor (20%) Limestone fagments (tan) soft						
				70.0		ANDAMOOKA LMST: Sandy clayey silt (tan-grey) soft, fine grained						Cement plug 70-72m 12 " Open hole 72-250 m
				80.0		ANDAMOOKA LMST: Clayey sandy silt (tan-grey) soft, fine grained						
				90.0		ANDAMOOKA LMST: Clayey silt (tan-grey) soft with (40%) Limestone fagments (tan) soft						
		0.14				ANDAMOOKA LMST: Clayey silt (tan-grey) soft with (70%) Limestone fagments (tan) soft and (10%) Dolomite (grey)						
		0.16				ANDAMOOKA LMST: Clayey silt (tan-grey) soft with (60%) Limestone fagments (tan) soft and (30%) Dolomite (grey)						
		0.15		100.0		ANDAMOOKA LMST: Crystaline dolomite (grey) with (20%) Limestone (tan/white)						
		0.15				ANDAMOOKA LMST: Crystaline dolomite (grey) with (50%) Sandstone (red)	Pws (red)					
		0.14	215	110.0		ARCOONA QTZ (RED): Sandstone (red) med grained, sub rounded-rounded grains, quartz matrix, with with minior dolomite (grey) and limestone (white/tan)		wc	2.8	33.4	Fractures 112-114 m		
		0.13	215	120.0		ARCOONA QTZ (RED): Sandstone (red) med grained, sub rounded-rounded grains, quartz matrix, with with minior shale (red) soft			2.8	37.5			
		0.11	215						1.2	38.2			
ammer		0.13	215	130.0		ARCOONA QTZ (RED): Sandstone (red/pink) med grained, sub rounded-rounded grains, quartz matrix with minor sandstone (grey and pink)			1.2				
		0.13	220			ARCOONA QTZ (RED): Sandstone (red/pink) fine-med grained,			1	43.8			

LOGGED: K Hyland DATE: 19/07/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3551

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **11/07/2008** DATE COMPLETED: **19/07/2008**

WELL PERMIT NUMBER: **145087**
TOTAL DEPTH (m bgl): **250**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **12/09/2008** Depth (m TOC) **118.96**
PROJECTION: **GDA94 Zone 53**
EASTING: **682145** NORTHING: **6629473**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air H	12"	0.11	220	140.0		sub-rounded and angular fragments, quartz matrix, some stratified, with some shale (red)			0.2	53.8			
		0.10	220	150.0		ARCOONA QTZ (RED): Sandstone (red) fine-med grained, sub-rounded and angular fragments, quartz matrix, some stratified			0.2	54.6			
		0.08	220			ARCOONA QTZ (RED): Sandstone (red/pink/grey) fine-med grained, sub-rounded and angular fragments, quartz matrix			0.2	52.3			
		0.33	220	160.0		ARCOONA QTZ (WHITE): Sandstone (white and green/grey with minor pink) med-grained, sub-rounded fragments, quartz matrix, with some quartzite (white) stratified with very minot shale (red)			-		Fracture 157 m		
		0.25	220			ARCOONA QTZ (WHITE): Sandstone (white, light green/grey), fine-medium grained, subrounded, qtz matrix, with shale (green)	Pws (white)		0.2	55.6	Fracture 168 m		
		0.40	220	170.0		ARCOONA QTZ (WHITE): Sandstone (white, light green/grey), fine-medium grained, subrounded, qtz matrix			3	43.6	Fractures 176-178 m		
		0.30	220			ARCOONA QTZ (WHITE): Sandstone (white, pink, light and dark grey), fine-medium grained, subrounded, qtz matrix with minor sandstone (red)			3	45.5			
		0.29	220	180.0		CORRABERRA SANDSTONE: Sandstone (red, brown), medium-coarse grained, sub-rounded, with minor shale (brown)			3	49.5			
		0.30	220			CORRABERRA SANDSTONE: Sandstone (white, green/grey), fine-medium grained, subrounded, qtz matrix			3	52.5			
		0.32	220	190.0		CORRABERRA SANDSTONE: Sandstone (red, brown), medium-coarse grained, sub-rounded, with shale (brown/grey)	Pwc		3	53.1			
		0.26	220			CORRABERRA SANDSTONE: Sandstone (pink, grey ans red) fine-medium grained, subrounded, qtz matrix with (20%) shale (dark grey)			3	56.3			
		0.30	220	200.0		CORRABERRA SANDSTONE: Sandstone (red, brown), medium-coarse grained, sub-angular to sub-rounded, minor shale (red, dark grey)			3	57.1			
		0.22	220			TRANSITIONAL LAYER: Shale (brown/dark grey) with minor sandstone (red)	Transiti		3	61			
		0.17	220	210.0		TREGOLANA SHALE: Shale (brown/dark grey)			3	64.2	Not airlifted		
		0.30	225						3	70			
		0.22	220	220.0			Pwm		3	77.1			
		0.21	220						3	68.1			
		0.17	220	230.0					3	75.6			
				240.0									
				250.0		EOH at 250							
				260.0									

LOGGED: K Hyland DATE: 19/07/2008

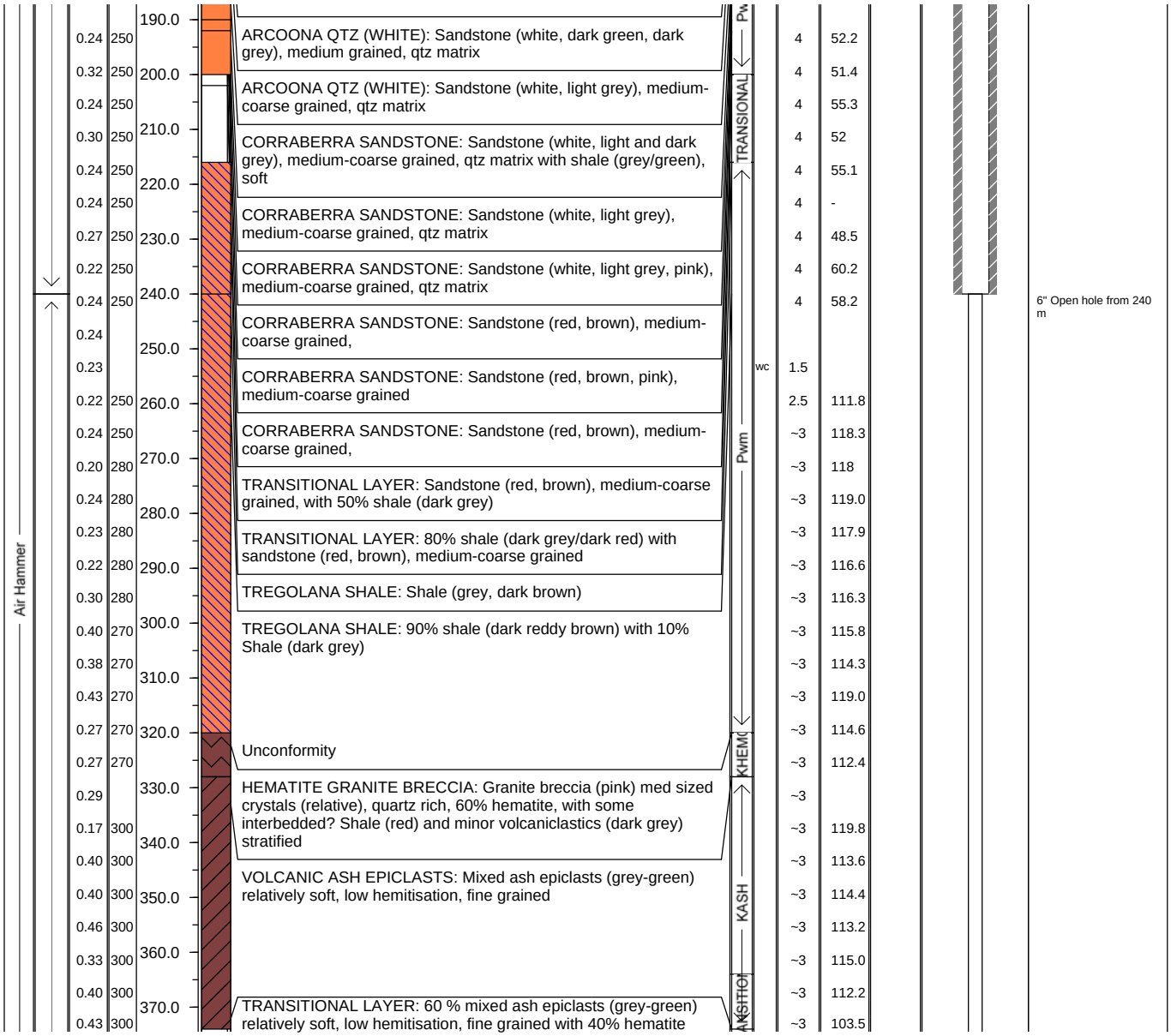
CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3486

PROJECT NUMBER:	**EV- 10**	WELL PERMIT NUMBER:	**129168**
PROJECT NAME:	**BHPB Dewatering Trial**	TOTAL DEPTH (m bgl):	**546**
LOCATION:	**Olympic Dam, South Australia**	REFERENCE POINT (m AHD):	
DRILLING CO:	**Gorey & Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**Air Hammer**	Date: **4/09/08** Depth (m TOC):	**106.08**
BOREHOLE DIAMETER:	**6 inches**	PROJECTION:	**GDA94 Zone 53**
DATE STARTED:	**20/07/2008** DATE COMPLETED: **09/08/08**	EASTING: **681601**	NORTHING: **6629452**



DEPTH (m)	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	BIT LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)
190.0	0.24	250			4	52.2
200.0	0.32	250			4	51.4
	0.24	250			4	55.3
210.0	0.30	250			4	52
	0.24	250			4	55.1
220.0	0.24	250			4	-
	0.27	250			4	48.5
230.0	0.22	250			4	60.2
	0.24	250			4	58.2
240.0	0.24					
	0.23			wc	1.5	
250.0	0.22	250			2.5	111.8
260.0	0.24	250			~3	118.3
	0.20	280			~3	118
270.0	0.24	280			~3	119.0
	0.23	280			~3	117.9
280.0	0.22	280			~3	116.6
290.0	0.30	280			~3	116.3
	0.40	270			~3	115.8
300.0	0.38	270			~3	114.3
	0.43	270			~3	119.0
310.0	0.27	270			~3	114.6
320.0	0.27	270			~3	112.4
	0.29				~3	
330.0	0.17	300			~3	119.8
	0.40	300			~3	113.6
340.0	0.40	300			~3	114.4
350.0	0.46	300			~3	113.2
	0.33	300			~3	115.0
360.0	0.40	300			~3	112.2
370.0	0.43	300			~3	103.5

LOGGED: K Hyland DATE: 09/08/2008

CHECKED: D Pierce DATE: 05/09/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

RD3486

PROJECT NUMBER: **EV- 10**
PROJECT NAME: **BHPB Dewatering Trial**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **20/07/2008** DATE COMPLETED: **09/08/08**

WELL PERMIT NUMBER: **129168**
TOTAL DEPTH (m bgl): **546**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **4/09/08** Depth (m TOC): **106.08**
PROJECTION: **GDA94 Zone 53**
EASTING: **681601** NORTHING: **6629452**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	6"	0.60	300	380.0		HEMATITE GRANITE BRECCIA: 80% hematite with minor mixed ash epiclasts (grey-green) relatively soft, low hemitisation, fine grained	TR		~3	109.6			
		0.27	300						~3	100.4			
		0.40	300	390.0			KHEMQ		~3	101.0			
		0.24	300						~3	114.2			
		0.24	300	400.0					~3	114.6			
		0.19	300						~3	117.1			
		0.22	300	410.0					~3	118.5			
		0.21	300						~3	117.8			
		0.20	300	420.0		VOLCANIC CLASTS-HEMATITE: Volcanic clasts, ultramafic-mafic (pink, white, grey, black, with increasing light green and white) with 40% Hematite (red) with some interbedded shale (red) laminated			~3	109.0			
		0.19	300						~3	107.3			
		0.21	300	430.0					~3	107.4			
		0.18	300						~3	104.4			
		0.17	300	440.0					~3	105.5			
		0.18	300						~3	105.3			
		0.15	300	450.0					~3	103.8			
		0.18	300						~3	106.6			
		0.13	300	460.0					~3				
		0.13	300				HEMV		~2.5	104.7			
		0.13	300	470.0					~2.5	105.5			
		0.13	300						~2.5	103.6			
		0.13	300	480.0					~2.5	103.2			
		0.11	300						~2.5	102.6			
		0.11	300	490.0		VOLCANIC CLASTS-HEMATITE: Volcanic clasts, ultramafic-mafic (pink, white, grey, black, with increasing light green and white) with 40% Hematite (red) with increasing interbedded shale (red) laminated			~2.5	103.2			
		0.11	300						~2.5	103.6			
		0.22	300	500.0					~2.5	105.7			
		0.22	300						~2.5	101.2			
		0.30	300	510.0					~2.5	101.6			
		0.26	300						~2.5	86.8			
		0.20	300	520.0					~2.5	95.7			
						EOH at 546 m					Airllifted for 9 hrs		
				530.0									
				540.0									
				550.0									
				560.0									

LOGGED: K Hyland DATE: 09/08/2008

CHECKED: D Pierce DATE: 05/09/2008

Drilling summary report

Hole: RD3486

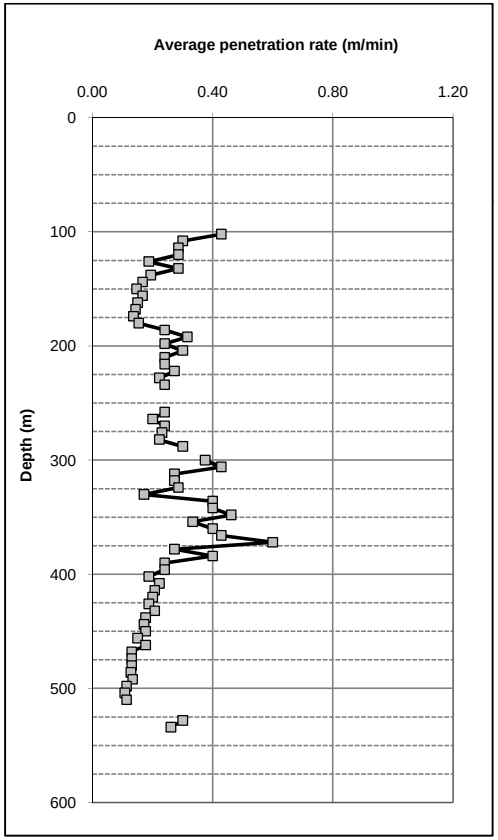
Date started: 20/07/2008

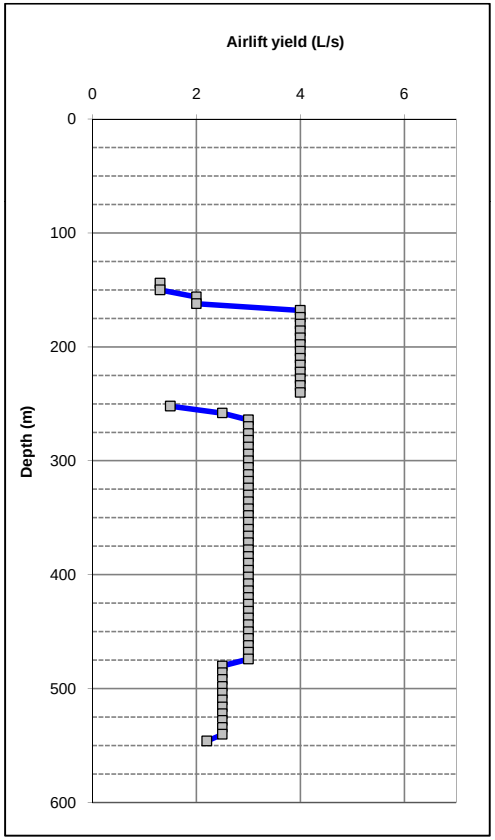
Date completed:

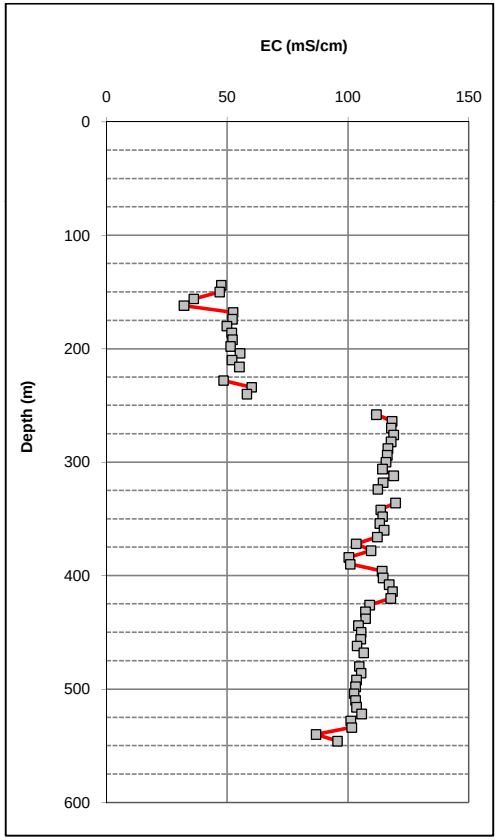
BHP Number:	**RD3486**
DWLBC Permit no.:	**129168**
Drilling Co./Rig:	**Gorey and Cole,**
Driller:	**4951**
EIHCP:	**877**
ECC:	**4951**

Co-ordinates (GDA94, Z54):	E	6630860
	N	682976
Natural surface elevation. (mAHD)		0

Graphical Log







Drilling summary report

Hole: RD3549

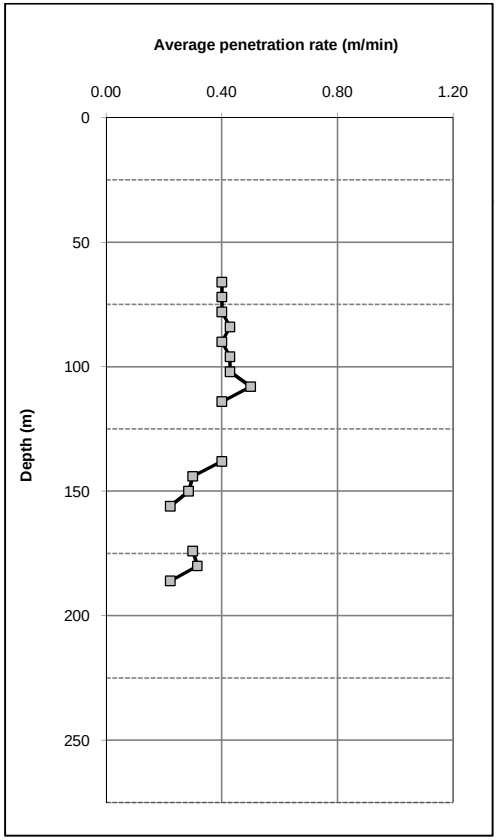
Date started: 31/05/2008

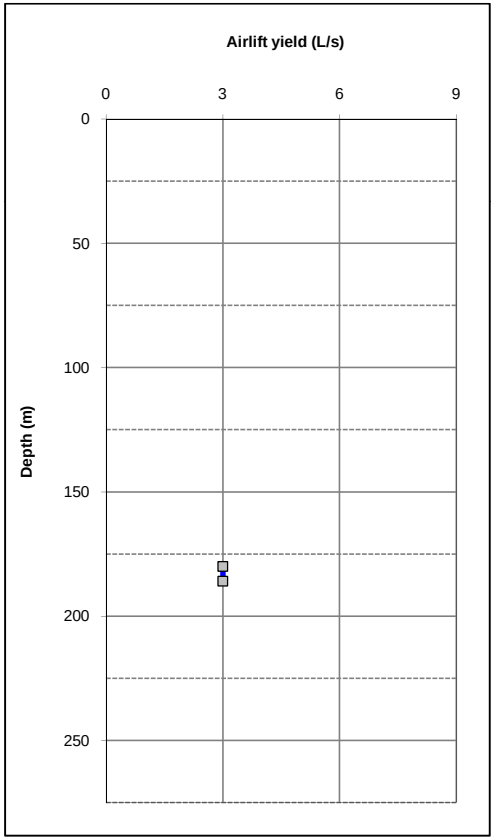
Date completed: 5/06/2008

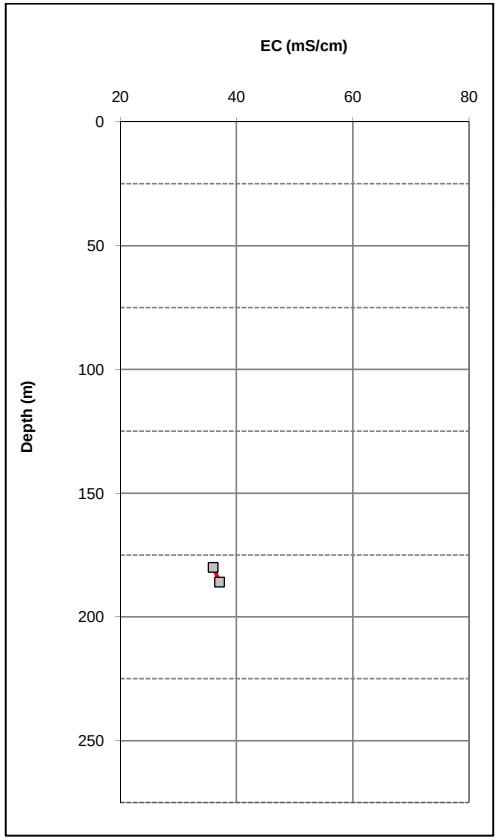
BHP Number:	RD3549
DWLBC Permit no.:	145088
Drilling Co./Rig:	Gorey and Cole,
Driller:	M Tyler
EIHCP:	922
ECC:	3815

Co-ordinates (GDA94, Z54):	E	682289
	N	6628861
Natural surface elevation. (mAHD)		0

Graphical Log







Drilling summary report

Hole: RD3548

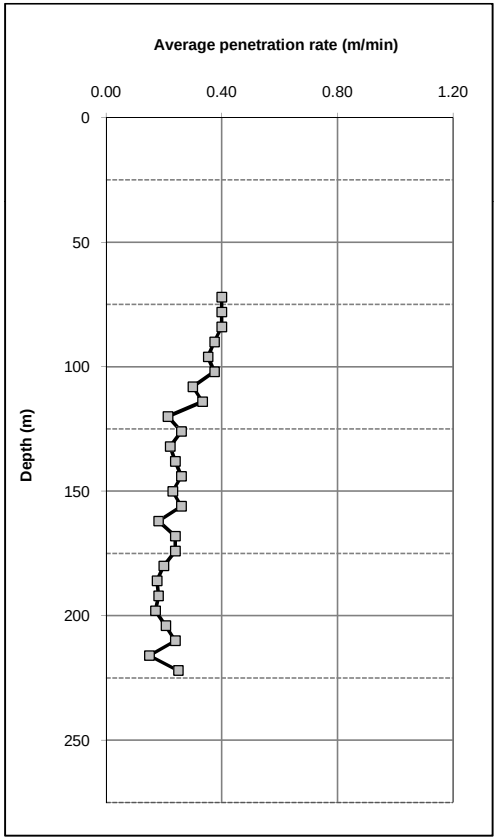
Date started: 20/05/2008

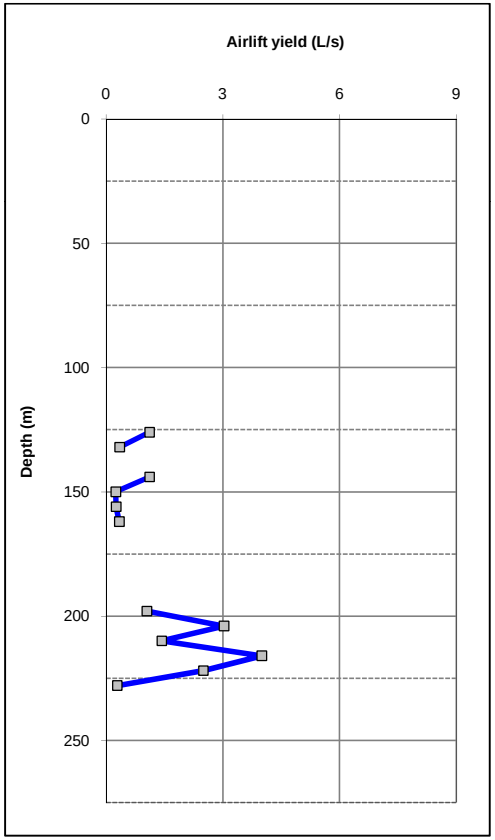
Date completed: 26/05/2008

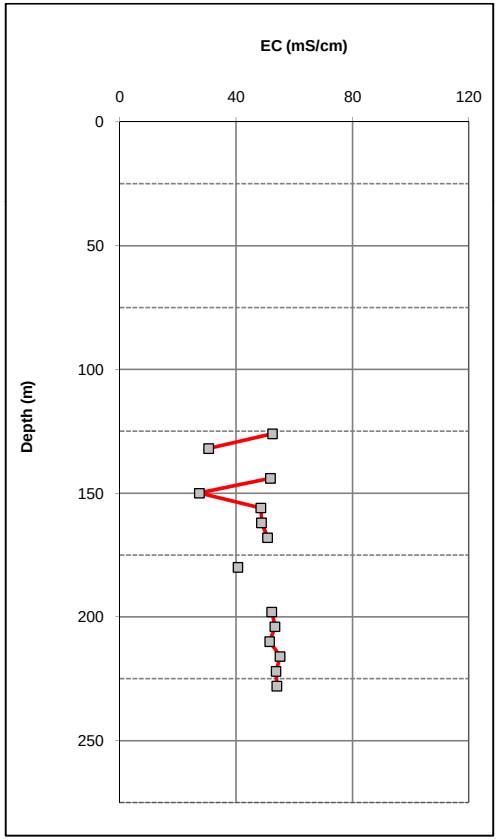
BHP Number: RD3548
DWLBC Permit no.: 145092
Drilling Co./Rig: Gorey and Cole,
Driller:
EIHCP: 922
ECC:

Co-ordinates (GDA94, Z54): E 682298
N 6629504
Natural surface elevation. (mAHD) 0

Graphical Log







Drilling summary report

Hole: RD3516 P1

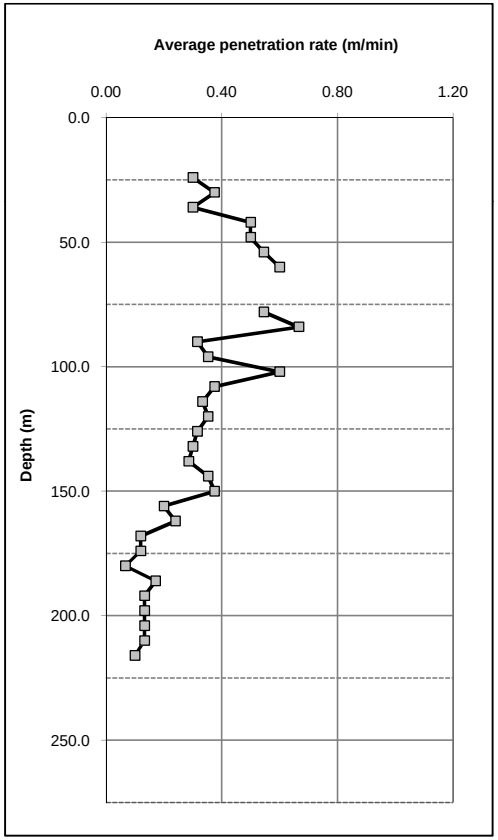
Date started: 24/03/2008

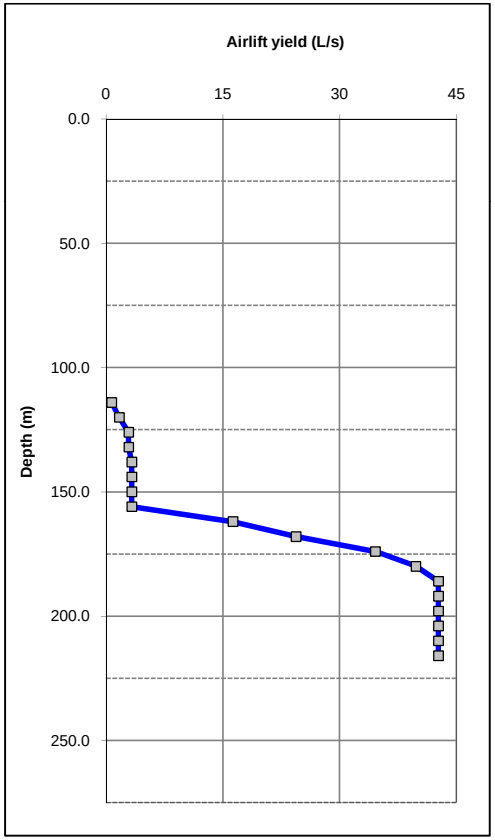
Date completed: 4/04/2008

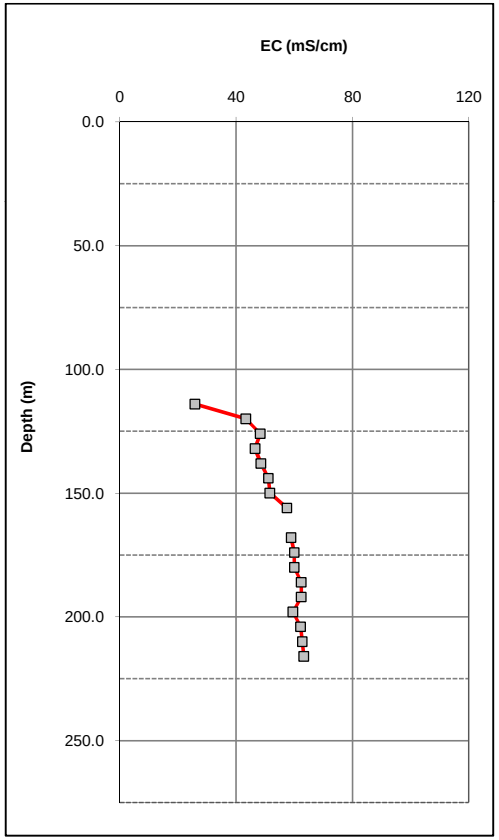
BHP Number: RD75
DWLBC Permit no.: 145086
Drilling Co./Rig: Gorey and Cole,
Driller:
EIHCP: 922
ECC:

Co-ordinates (GDA94, Z54): E 680919
N 6629571
Natural surface elevation. (mAHD) 0

Graphical Log







Drilling summary report

Hole: RD3515P1

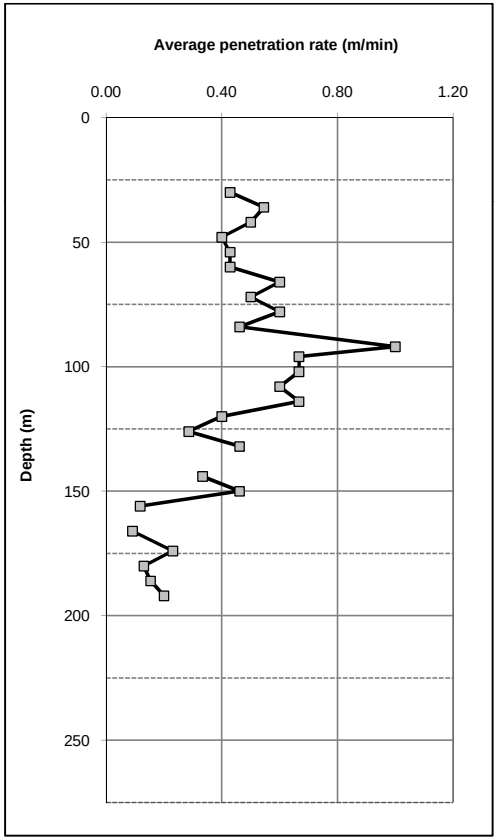
Date started: 24/03/2008

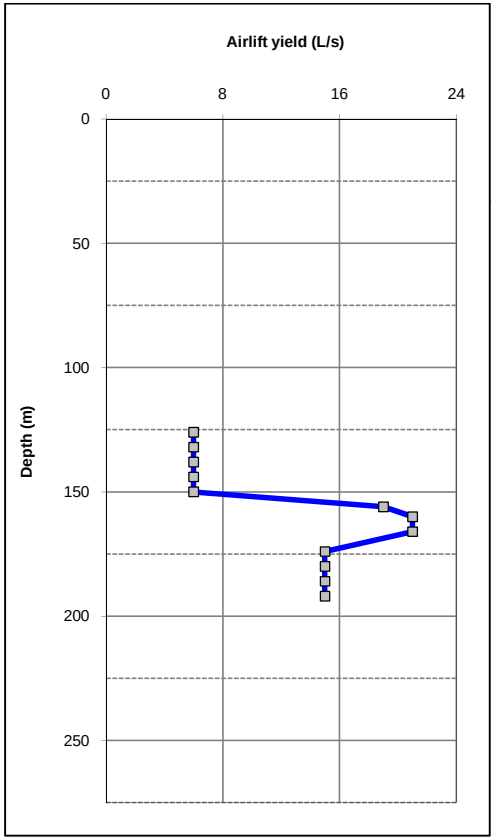
Date completed: 4/04/2008

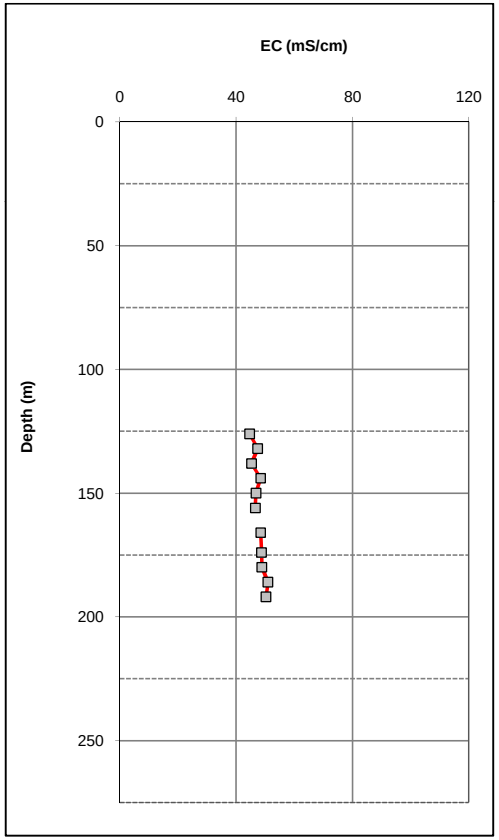
BHP Number: RD3515P1
DWLBC Permit no.: 127952
Drilling Co./Rig: Gorey and Cole,
Driller:
EIHCP: 922
ECC:

Co-ordinates (GDA94, Z54): E 681595
N 6630127
Natural surface elevation. (mAHD) 0

Graphical Log







Drilling summary report

Hole: RD3514- P1

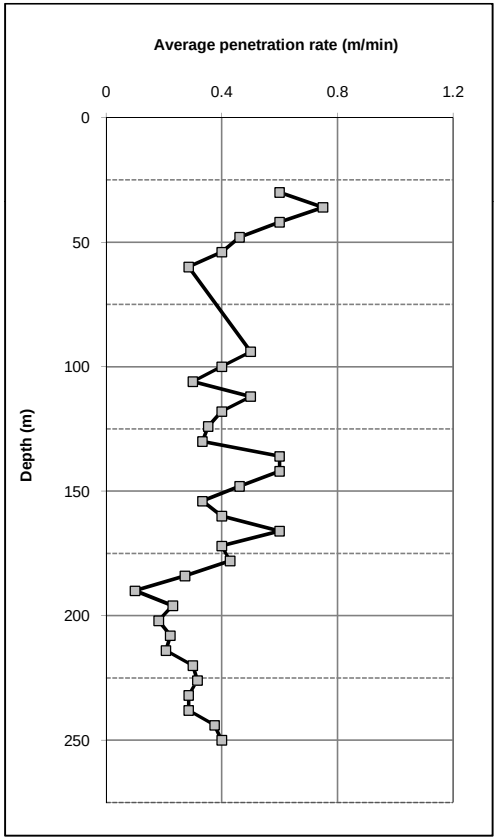
Date started: 24/03/2008

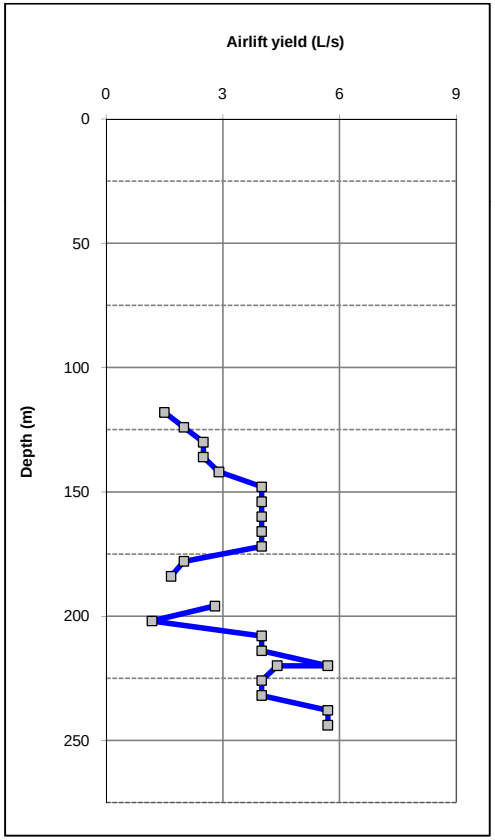
Date completed: 4/04/2008

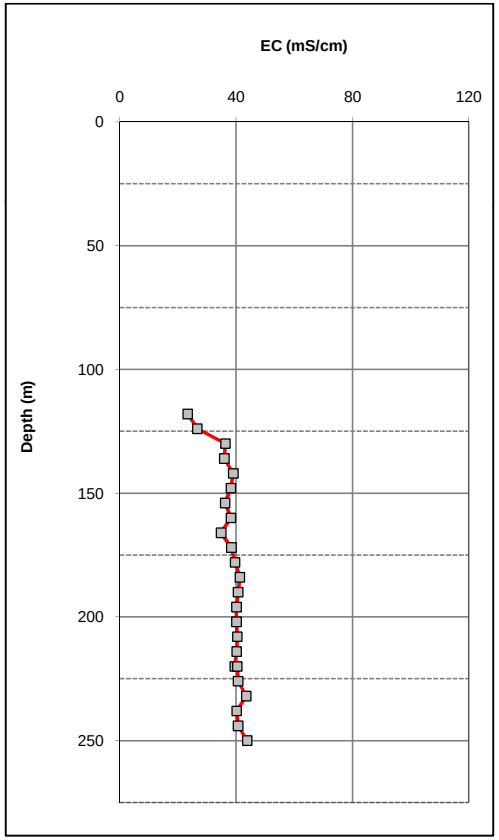
BHP Number: RD3514- P1
DWLBC Permit no.: 127951
Drilling Co./Rig: Gorey and Cole,
Driller:
EIHCP: 922
ECC:

Co-ordinates (GDA94, Z54): E 682695
N 6630793
Natural surface elevation. (mAHD) 0

Graphical Log







Drilling summary report

Hole: RD3513A

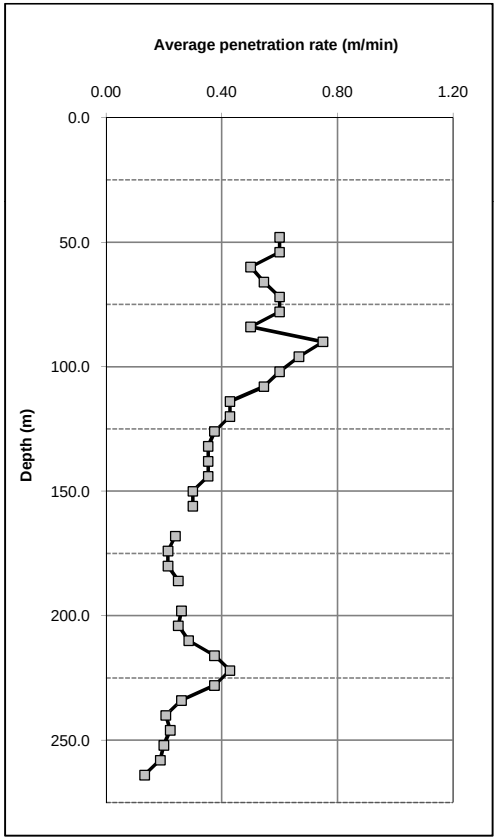
Date started: 2/07/2008

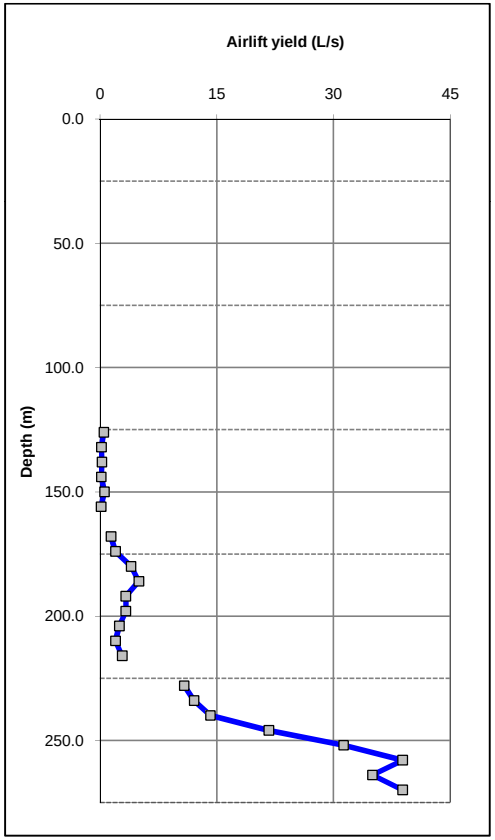
Date completed: 11/07/2008

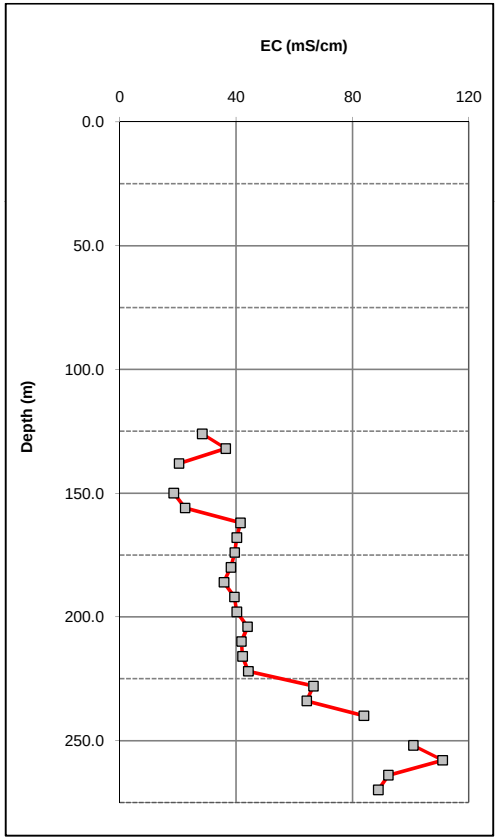
BHP Number:	RD3513A
DWLBC Permit no.:	127949
Drilling Co./Rig:	Gorey and Cole,
Driller:	5250
EIHCP:	922
ECC:	5250

Co-ordinates (GDA94, Z54):	E	682970
	N	6630860
Natural surface elevation. (mAHD)		0

Graphical Log







Drilling summary report

Hole: RD3504

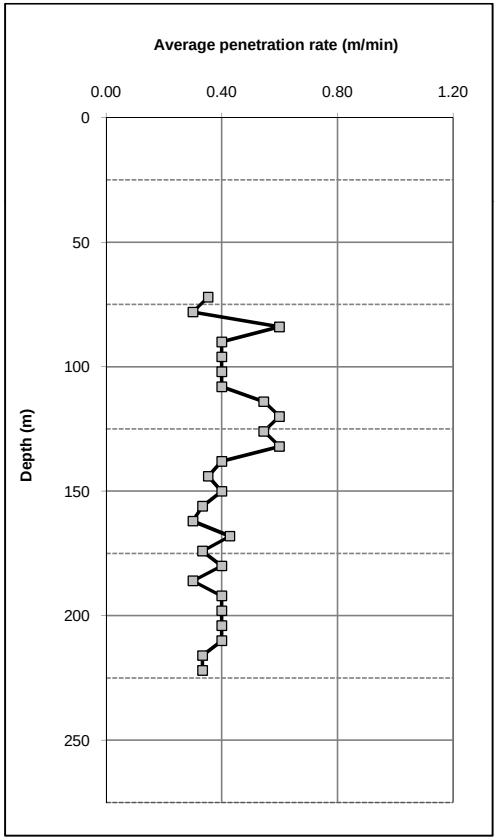
Date started: 27/05/2008

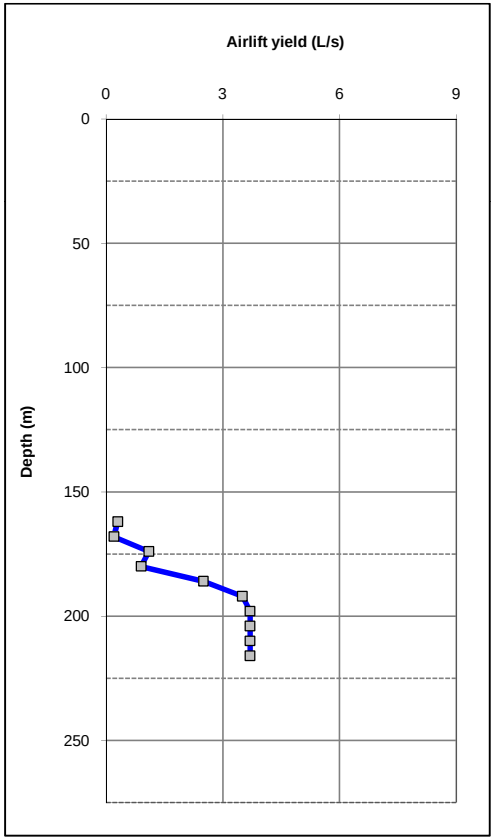
Date completed: 30/05/2008

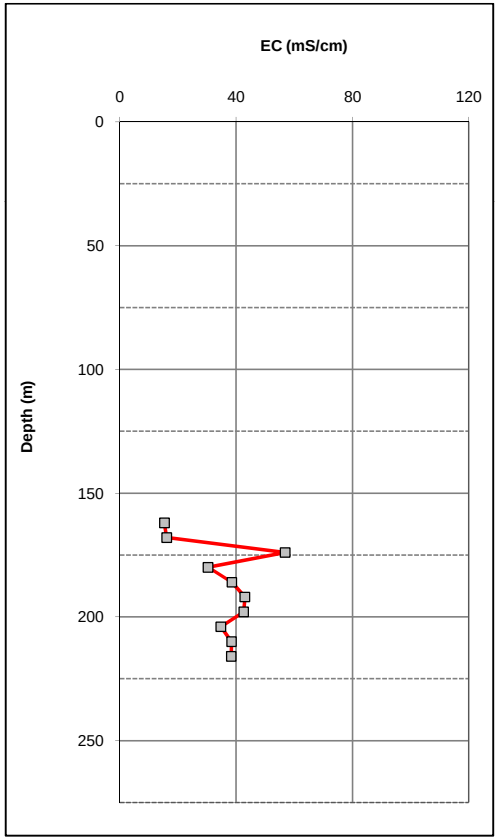
BHP Number: RD3504
DWLBC Permit no.: 145092
Drilling Co./Rig: Gorey and Cole,
Driller:
EIHCP: 922
ECC:

Co-ordinates (GDA94, Z54): E 682291
N 6628852
Natural surface elevation. (mAHD) 0

Graphical Log







Drilling summary report

Hole: RD3499

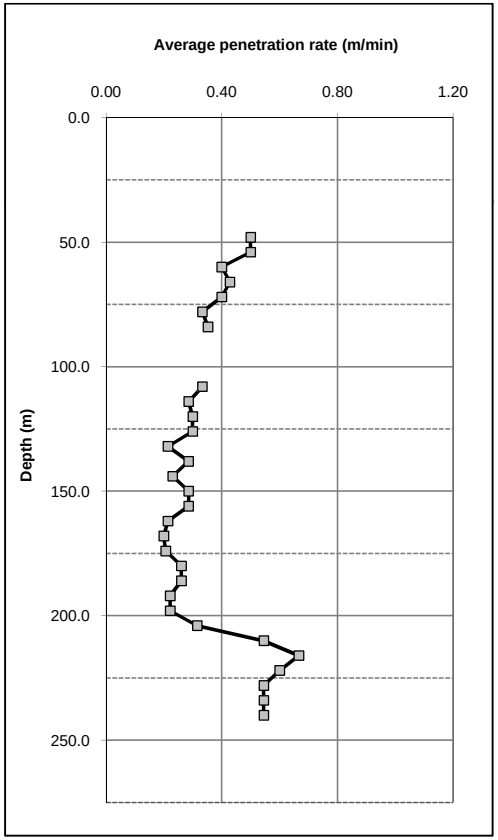
Date started: 11/05/2008

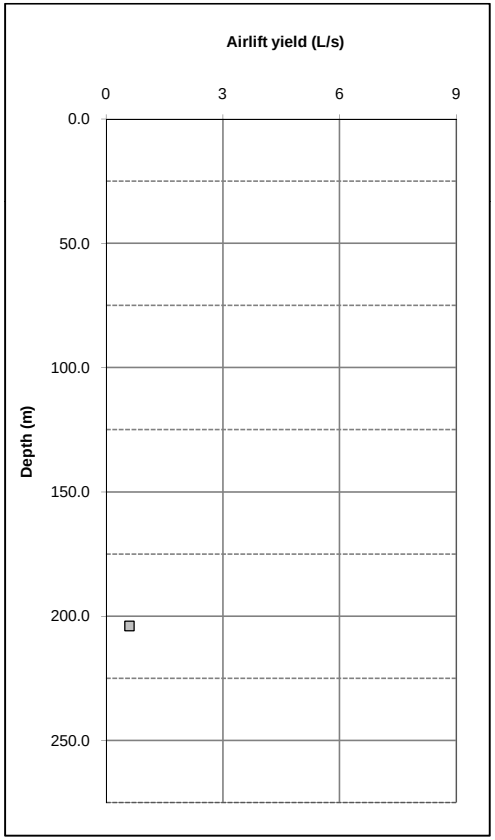
Date completed: 16/05/2008

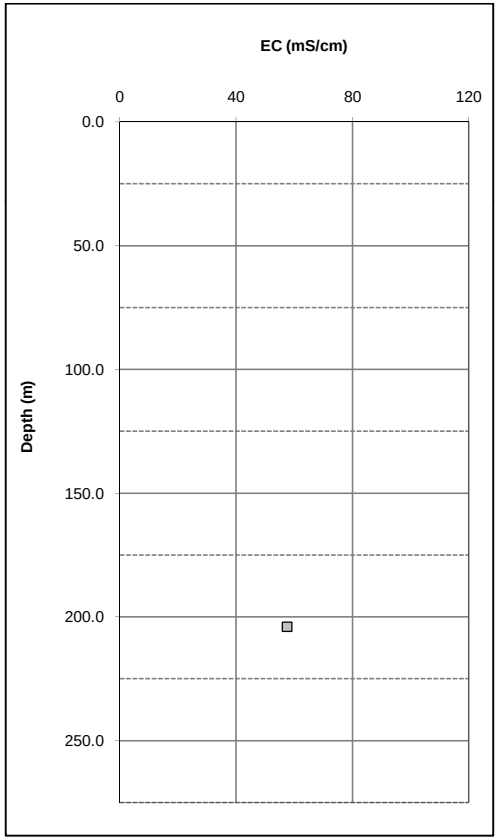
BHP Number: RD3499
DWLBC Permit no.: 145090
Drilling Co./Rig: Gorey and Cole,
Driller:
EIHCP: 922
ECC:

Co-ordinates (GDA94, Z54): E 682084
N 6629731
Natural surface elevation. (mAHD) 0

Graphical Log







Drilling summary report

Hole: RD3493

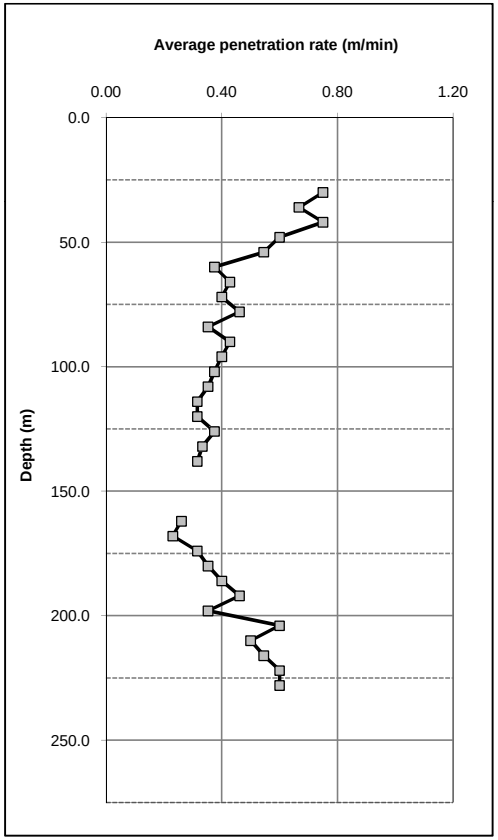
Date started: 5/05/2008

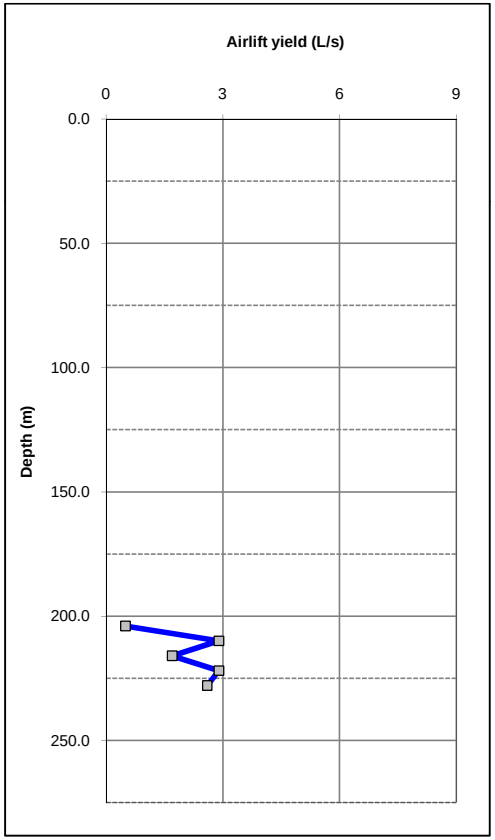
Date completed: 0/01/1900

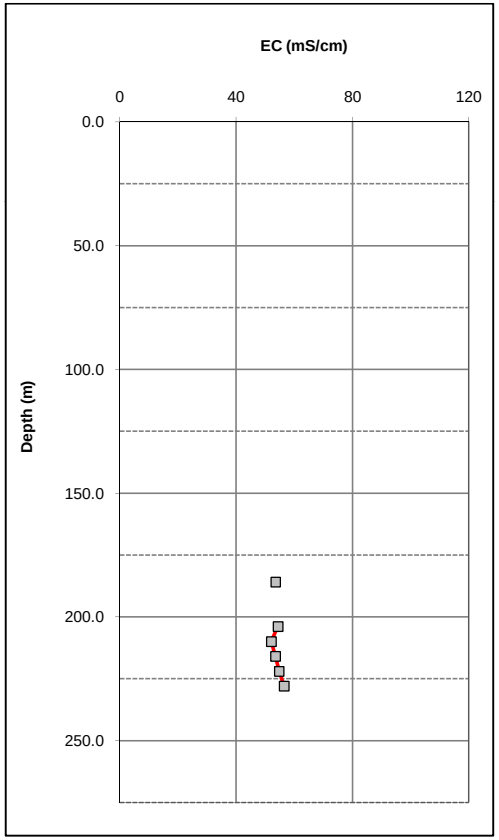
BHP Number: RD3493
DWLBC Permit no.: 145089
Drilling Co./Rig: Gorey and Cole,
Driller:
EIHCP: 922
ECC:

Co-ordinates (GDA94, Z54): E 682695
N 6630793
Natural surface elevation. (mAHD) 0

Graphical Log







Drilling summary report

Hole: RD3492

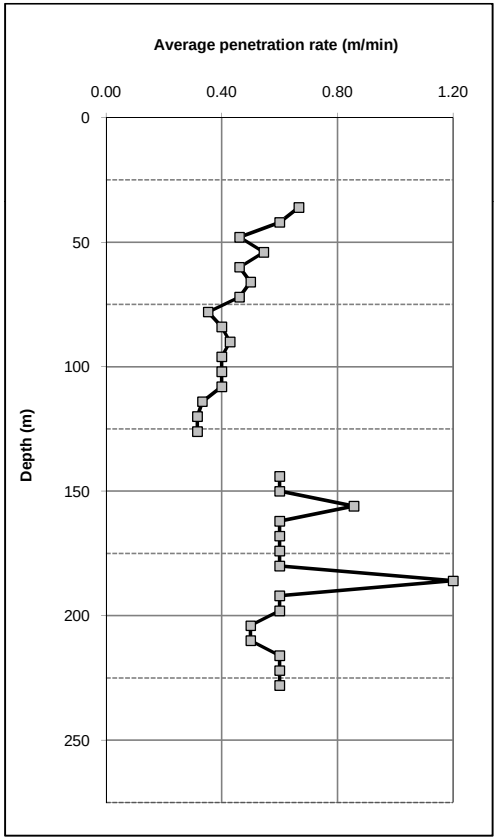
Date started: 17/05/2008

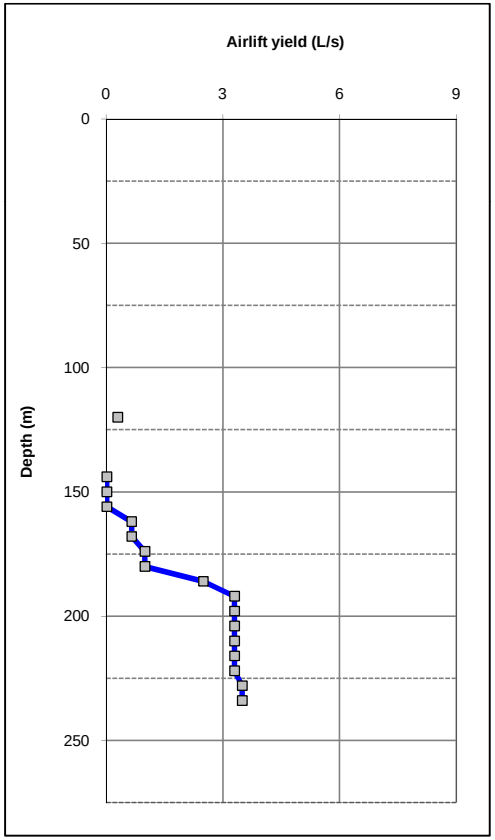
Date completed: 20/05/2008

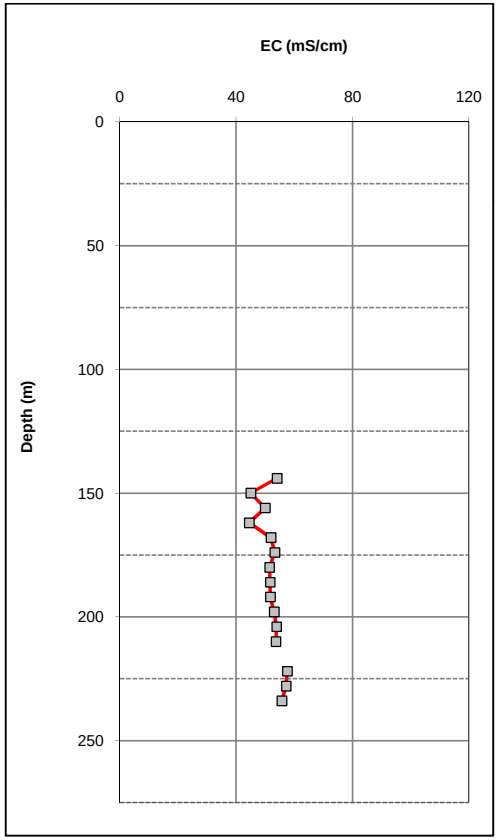
BHP Number: RD3492
DWLBC Permit no.: 145091
Drilling Co./Rig: Gorey and Cole,
Driller:
EIHCP: 922
ECC:

Co-ordinates (GDA94, Z54): E 682695
N 6630793
Natural surface elevation. (mAHD) 0

Graphical Log







Drilling summary report

Hole: RD3551

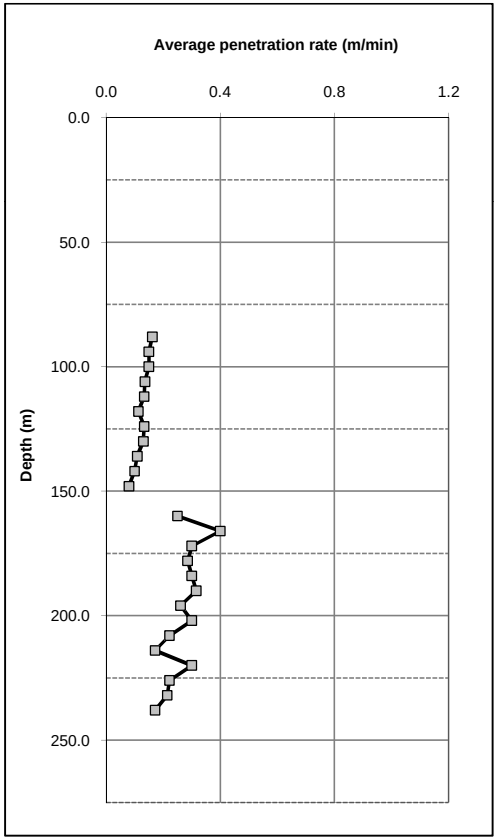
Date started: 11/07/2008

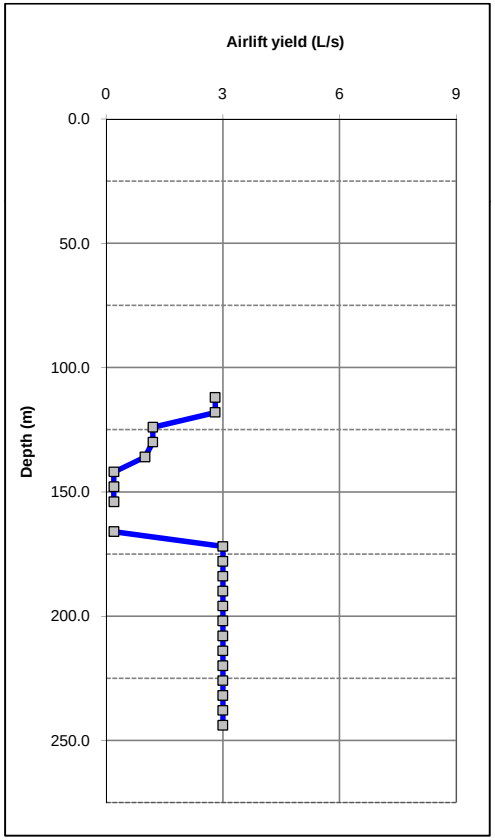
Date completed: 19/07/2008

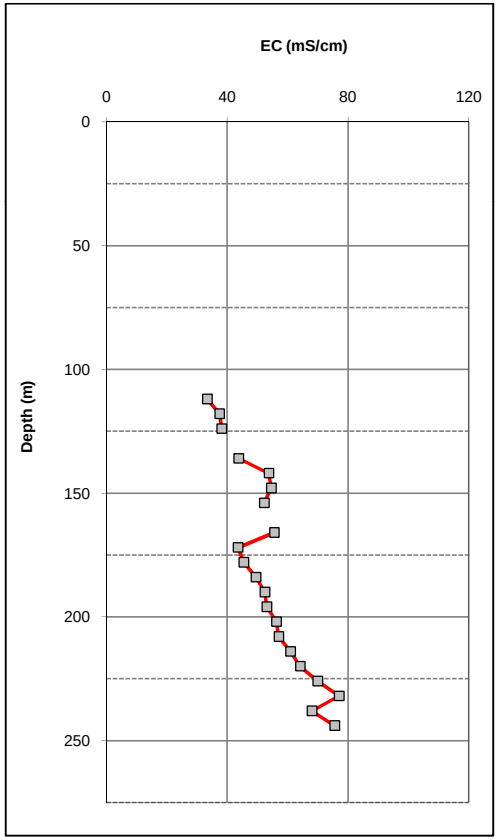
BHP Number:	RD3551
DWLBC Permit no.:	145087
Drilling Co./Rig:	Gorey and Cole,
Driller:	M Tyler
EIHCP:	922
ECC:	0

Co-ordinates (GDA94, Z54):	E	682145
	N	6629473
Natural surface elevation. (mAHD)		0

Graphical Log







CERTIFICATE OF ANALYSIS

Work Order	: **EM0802617**	Page	: 1 of 4
Client	: **RESOURCE & ENVIRON MANGMNT P/L**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: UNIT 9, 15 FULLARTON RD KENT TOWN SA, AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: paulhowe@rem.net.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8363 1777	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8363 1477	Facsimile	: +61-3-8549 9601
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 10-APR-2008
Sampler	: KH	Issue Date	: 16-APR-2008
Site	: OLYMPIC DAM DE-WATERING TRIAL		
		No. of samples received	: 1
Quote number	: ME/122/06	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

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

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

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3514	----	----	----	----
				Client sampling date / time: 04-APR-2008 15:00	----	----	----	----
				EM0802617-001	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.73**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**45100**	----	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**27800**	----	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**286**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**163**	----	----	----	----
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	**276**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**276**	----	----	----	----
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**4010**	----	----	----	----
Silicon	7440-21-3	0.05	mg/L	**14.3**	----	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**14000**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**894**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**812**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**9480**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**80**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.02**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.003**	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.002**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.009**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**1.04**	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**14.0**	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.002**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.022**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**6.56**	----	----	----	----
EG052F: Silica by ICPAES								

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	Client sampling date / time	EM0802617-001				
						RD3514	----	----	----	----
						04-APR-2008 15:00	----	----	----	----
EG052F: Silica by ICPAES - Continued										
^ Silica	7631-86-9	0.1	mg/L			**0.6**	----	----	----	----
EK040P: Fluoride by PC Titrator										
Fluoride	16984-48-8	0.1	mg/L			**0.8**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser										
Nitrite as N	----	0.010	mg/L			<0.010	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser										
^ Nitrate as N	14797-55-8	0.010	mg/L			<0.010	----	----	----	----
EK059G: NOX as N by Discrete Analyser										
Nitrite + Nitrate as N	----	0.010	mg/L			<0.010	----	----	----	----
EN055: Ionic Balance										
^ Total Anions	----	0.01	meq/L			**484**	----	----	----	----
^ Total Cations	----	0.01	meq/L			**526**	----	----	----	----
^ Ionic Balance	----	0.01	%			**4.14**	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0806545**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: phowe@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 12-AUG-2008
Sampler	: KF, KH	Issue Date	: 19-AUG-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EG005T: Iron LOR has been raised.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	RD3486	RD3486	----	----	----
				Client sampling date / time	05-AUG-2008 09:45	05-AUG-2008 16:43	----	----	----
					EM0806545-001	EM0806545-002	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.82**	**7.93**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**120000**	**106000**	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		**93300**	**91000**	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**56**	**48**	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**20.6**	**7.8**	----	----	----
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		**155**	**168**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**155**	**168**	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**8600**	**8820**	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		**47700**	**50600**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**1510**	**1540**	----	----	----
Magnesium	7439-95-4	1	mg/L		**2230**	**2290**	----	----	----
Sodium	7440-23-5	1	mg/L		**32100**	**32700**	----	----	----
Potassium	7440-09-7	1	mg/L		**283**	**276**	----	----	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		<0.50	<0.50	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**3.20**	**5.73**	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	**0.02**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		**0.009**	**0.011**	----	----	----
Barium	7440-39-3	0.001	mg/L		**0.056**	**0.050**	----	----	----
Cobalt	7440-48-4	0.001	mg/L		**0.004**	**0.003**	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.020**	**0.023**	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**1.28**	**1.21**	----	----	----
Strontium	7440-24-6	0.001	mg/L		**26.4**	**26.2**	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3486	RD3486	----	----	----
				Client sampling date / time: 05-AUG-2008 09:45	05-AUG-2008 16:43	----	----	----
				EM0806545-001	EM0806545-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Uranium	7440-61-1	0.001	mg/L	**0.005**	**0.004**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.094**	**0.043**	----	----	----
Boron	7440-42-8	0.05	mg/L	**5.03**	**4.94**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.6**	**0.6**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.22**	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.22**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1530**	**1610**	----	----	----
^ Total Cations	----	0.01	meq/L	**1660**	**1690**	----	----	----
^ Ionic Balance	----	0.01	%	**4.21**	**2.40**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0805832**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: phowe@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 21-JUL-2008
Sampler	: KF, KH	Issue Date	: 24-JUL-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

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Signatories

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Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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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

- **EG005T: Iron LOR has been raised.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3513A	RD3516	----	----	----
				Client sampling date / time: 12-JUL-2008 08:30	16-JUL-2008 17:00	----	----	----
				EM0805832-001	EM0805832-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.56**	**7.39**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**90400**	**64100**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**63400**	**44700**	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**61**	**54**	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**59.0**	**60.0**	----	----	----
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	**268**	**291**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**268**	**291**	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**6430**	**5310**	----	----	----
Silicon	7440-21-3	0.05	mg/L	**48.0**	**19.6**	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**38000**	**24000**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1280**	**913**	----	----	----
Magnesium	7439-95-4	1	mg/L	**1410**	**1080**	----	----	----
Sodium	7440-23-5	1	mg/L	**21200**	**13600**	----	----	----
Potassium	7440-09-7	1	mg/L	**166**	**95**	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**2.14**	<0.50	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**9.38**	**5.07**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.009**	**0.006**	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.037**	**0.039**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.003**	**0.001**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.026**	**0.020**	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	**1.37**	**0.975**	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3513A	RD3516	----	----	----
				Client sampling date / time: 12-JUL-2008 08:30	16-JUL-2008 17:00	----	----	----
				EM0805832-001	EM0805832-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Strontium	7440-24-6	0.001	mg/L	**20.4**	**14.2**	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.002**	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.024**	**46.3**	----	----	----
Boron	7440-42-8	0.05	mg/L	**5.99**	**6.27**	----	----	----
Iron	7439-89-6	0.05	mg/L	**3.96**	**0.53**	----	----	----
EG052F: Silica by ICPAES								
^ Silica	7631-86-9	0.1	mg/L	**103**	**42.0**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.7**	**0.9**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	<0.010	<0.010	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	<0.010	<0.010	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1210**	**794**	----	----	----
^ Total Cations	----	0.01	meq/L	**1110**	**728**	----	----	----
^ Ionic Balance	----	0.01	%	**4.53**	**4.31**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0805425**	Page	: 1 of 3
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: phowe@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: R003001.74	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 08-JUL-2008
Sampler	: TW	Issue Date	: 11-JUL-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: ME/122/06	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics

General Comments

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

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

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

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

Analytical Results

Sub-Matrix: SOIL			Client sample ID	DUP01	DUP02	----	----	----
			Client sampling date / time	02-JUL-2008 15:00	02-JUL-2008 15:00	----	----	----
Compound	CAS Number	LOR	Unit	EM0805425-001	EM0805425-002	----	----	----
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**21.8**	**12.8**	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**88**	**44**	----	----	----
Copper	7440-50-8	5	mg/kg	<5	**12**	----	----	----
Lead	7439-92-1	5	mg/kg	**11**	**73**	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	**6**	----	----	----
Zinc	7440-66-6	5	mg/kg	<5	**90**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0805232**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: phowe@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 02-JUL-2008
Sampler	: JR, KF	Issue Date	: 09-JUL-2008
Site	: ----		
		No. of samples received	: 4
Quote number	: EN/003/08	No. of samples analysed	: 4

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- Analytical Results

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Signatories

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Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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- **EG020-F: EM0805232-001-005 have been diluted prior to analysis for ICP-MS and LORs have been raised accordingly.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	29/06/2008, 1420PM	29/06/2008, 1720PM	RD3487_0915AM	RD3487_1705PM	----
				Client sampling date / time	29-JUN-2008 14:20	29-JUN-2008 17:20	30-JUN-2008 15:00	30-JUN-2008 15:00	----
					EM0805232-001	EM0805232-002	EM0805232-003	EM0805232-004	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**8.00**	**8.02**	**7.90**	**8.03**	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**137000**	**136000**	**138000**	**137000**	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		**96200**	**94800**	**99100**	**94600**	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**586**	**294**	**322**	**292**	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**102**	**69.0**	**60.0**	**31.7**	----
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		**2**	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**120**	**118**	**122**	**122**	----
Total Alkalinity as CaCO3	----	1	mg/L		**120**	**118**	**122**	**122**	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**9120**	**9050**	**10800**	**11100**	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		**60200**	**56700**	**66000**	**56800**	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**1560**	**1530**	**1230**	**1220**	----
Magnesium	7439-95-4	1	mg/L		**2710**	**2660**	**2450**	**2360**	----
Sodium	7440-23-5	1	mg/L		**40600**	**35000**	**38100**	**37700**	----
Potassium	7440-09-7	1	mg/L		**349**	**340**	**505**	**467**	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		<0.50	**1.15**	**0.70**	**0.48**	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**17.3**	**11.9**	**8.59**	**5.49**	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.10	<0.10	<0.10	<0.10	----
Arsenic	7440-38-2	0.001	mg/L		**0.017**	<0.010	**0.017**	<0.010	----
Barium	7440-39-3	0.001	mg/L		**0.044**	**0.040**	**0.042**	**0.039**	----
Cobalt	7440-48-4	0.001	mg/L		**0.011**	<0.010	<0.010	<0.010	----
Copper	7440-50-8	0.001	mg/L		**0.024**	**0.022**	**0.024**	**0.023**	----
Lead	7439-92-1	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	----
Manganese	7439-96-5	0.001	mg/L		**2.78**	**2.49**	**2.54**	**2.42**	----
Strontium	7440-24-6	0.001	mg/L		**28.7**	**26.4**	**26.7**	**26.5**	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	29/06/2008, 1420PM	29/06/2008, 1720PM	RD3487_0915AM	RD3487_1705PM	----
				Client sampling date / time	29-JUN-2008 14:20	29-JUN-2008 17:20	30-JUN-2008 15:00	30-JUN-2008 15:00	----
					EM0805232-001	EM0805232-002	EM0805232-003	EM0805232-004	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Uranium	7440-61-1	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	----
Zinc	7440-66-6	0.005	mg/L		<0.050	<0.050	<0.050	<0.050	----
Boron	7440-42-8	0.05	mg/L		**8.24**	**7.80**	**7.96**	**8.06**	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**1.1**	**0.9**	**0.9**	**0.8**	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.010	mg/L		**0.018**	**0.012**	**0.012**	<0.010	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.010	mg/L		**0.018**	**0.012**	**0.066**	**0.067**	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**1890**	**1790**	**2090**	**1840**	----
^ Total Cations	----	0.01	meq/L		**2080**	**1830**	**1930**	**1900**	----
^ Ionic Balance	----	0.01	%		**4.71**	**1.01**	**3.96**	**1.84**	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0804594**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: UNIT 9, 15 FULLARTON RD KENT TOWN SA, AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: paulhowe@rem.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 83631777	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 83631477	Facsimile	: +61-3-8549 9601
Project	: EV-07	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 12-JUN-2008
Sampler	: ----	Issue Date	: 18-JUN-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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Signatories

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

Signatories	*Position*	*Accreditation Category*
Herman Lin	Senior Inorganic Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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- **ED045-P: LOR has been raised for Chloride.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3549	RD3549A	----	----	----
				Client sampling date / time: 11-JUN-2008 15:00	10-JUN-2008 15:00	----	----	----
				EM0804594-001	EM0804594-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.93**	**7.82**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**40400**	**42000**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**28800**	**29700**	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**84**	**92**	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**40.0**	**44.3**	----	----	----
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	**256**	**252**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**256**	**252**	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**4290**	**4670**	----	----	----
Silicon	7440-21-3	0.05	mg/L	**11.2**	**13.9**	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**13700**	**13500**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**670**	**749**	----	----	----
Magnesium	7439-95-4	1	mg/L	**844**	**914**	----	----	----
Sodium	7440-23-5	1	mg/L	**9860**	**10500**	----	----	----
Potassium	7440-09-7	1	mg/L	**80**	**89**	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**0.83**	**0.96**	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**3.12**	**3.15**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	**0.01**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.014**	**0.014**	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.030**	**0.027**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	**0.001**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.012**	**0.013**	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.716**	**0.769**	----	----	----

Analytical Results

Sub-Matrix: WATER				Client sample ID	RD3549	RD3549A	----	----	----
				Client sampling date / time	11-JUN-2008 15:00	10-JUN-2008 15:00	----	----	----
Compound	CAS Number	LOR	Unit		EM0804594-001	EM0804594-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Strontium	7440-24-6	0.001	mg/L		**0.005**	**0.005**	----	----	----
Uranium	7440-61-1	0.001	mg/L		**0.001**	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.130**	**0.016**	----	----	----
Boron	7440-42-8	0.05	mg/L		**5.72**	**5.71**	----	----	----
EG052F: Silica by ICPAES									
^ Silica	7631-86-9	0.1	mg/L		**24.0**	**29.8**	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**1.2**	**1.3**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.010	mg/L		**0.012**	**0.013**	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.010	mg/L		<0.010	<0.010	----	----	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.010	mg/L		**0.019**	**0.014**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0804444**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: UNIT 9, 15 FULLARTON RD KENT TOWN SA, AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: paulhowe@rem.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 83631777	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 83631477	Facsimile	: +61-3-8549 9601
Project	: EV-07	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 06-JUN-2008
Sampler	: KF/KH	Issue Date	: 16-JUN-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

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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

- **ED045-P: LOR has been raised for chloride analysis.**
- **Ionic Balance out of acceptable limits due to analytes not quantified in this report.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3504	----	----	----	----
				Client sampling date / time: 26-MAY-2008 15:00	----	----	----	----
				EM0804444-001	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.78**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**42600**	----	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**30300**	----	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**103**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**51.0**	----	----	----	----
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	**249**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**249**	----	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**4950**	----	----	----	----
Silicon	7440-21-3	0.10	mg/L	**6.00**	----	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**13000**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**707**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**874**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**7280**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**116**	----	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	<0.10	----	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**5.06**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.031**	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.001**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.016**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.750**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3504	----	----	----	----
				Client sampling date / time: 26-MAY-2008 15:00	----	----	----	----
				EM0804444-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Tin	7440-31-5	0.001	mg/L	**0.002**	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	**0.03**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.027**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**6.24**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.9**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	**0.013**	----	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	**0.013**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**475**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**427**	----	----	----	----
^ Ionic Balance	----	0.01	%	**5.35**	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0803494**	Page	: 1 of 4
Client	: **RESOURCE & ENVIRON MANGMNT P/L**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: UNIT 9, 15 FULLARTON RD KENT TOWN SA, AUSTRALIA 5067	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: paulhowe@rem.net.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8363 1777	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8363 1477	Facsimile	: +61-3-8549 9601
Project	: EV-10	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 07-MAY-2008
Sampler	: KH	Issue Date	: 14-MAY-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: ME/122/06	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Herman Lin	Senior Inorganic Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EG020-F: LCS recovery for Zinc fall outside ALS dynamic control limits, However they are within the acceptance criteria based on ALS DQO.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3515	----	----	----	----
				Client sampling date / time: [07-MAY-2008]	----	----	----	----
				EM0803494-001	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.61**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**50600**	----	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**30200**	----	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**90**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**24.0**	----	----	----	----
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	**254**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**254**	----	----	----	----
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**7270**	----	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**15500**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1270**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**1280**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**13500**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**102**	----	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	<0.50	----	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.05	mg/L	**2.64**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.01**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.006**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.035**	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.006**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.013**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**1.69**	----	----	----	----
Selenium	7782-49-2	0.010	mg/L	<0.010	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: RD3515	----	----	----	----
				Client sampling date / time: [07-MAY-2008]	----	----	----	----
				EM0803494-001	**----**	**----**	**----**	**----**
EG020F: Dissolved Metals by ICP-MS - Continued								
Strontium	7440-24-6	0.001	mg/L	**14.5**	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.008**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.037**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**7.30**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Barium	7440-39-3	0.001	mg/L	**0.039**	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0807100**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: phowe@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 28-AUG-2008
Sampler	: KF, KH	Issue Date	: 03-SEP-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Herman Lin	Senior Inorganic Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EDO93F: Sodium LOR has been raised.**
- **EG005T: Iron LOR has been raised.**
- **EG020-F: EM0807100-001 have been diluted prior to analysis and LORs have been raised accordingly.**

Analytical Results

Sub-Matrix: WATER				Client sample ID	PT63	----	----	----	----
				Client sampling date / time	23-AUG-2008 09:30	----	----	----	----
Compound	CAS Number	LOR	Unit	EM0807100-001	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	**7.31**	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	**100000**	----	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**72300**	----	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L	**62**	----	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU	**23.9**	----	----	----	----
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	**236**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**236**	----	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L	**14400**	----	----	----	----
Sulfur as S	----	1	mg/L	**4790**	----	----	----	----
^ Silica	7631-86-9	0.1	mg/L	**104**	----	----	----	----
Silicon	7440-21-3	0.10	mg/L	**48.7**	----	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L	**48100**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	**1260**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**2580**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**33800**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**208**	----	----	----	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L	<0.50	----	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L	<0.10	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.10	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.010	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.036**	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.010	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.020**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PT63	----	----	----	----
				Client sampling date / time: 23-AUG-2008 09:30	----	----	----	----
				EM0807100-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	**0.054**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**2.66**	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**15.4**	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.010	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.050	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**8.85**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	**0.01**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.45**	----	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.46**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**1660**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**1750**	----	----	----	----
^ Ionic Balance	----	0.01	%	**2.65**	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0806986**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: phowe@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 25-AUG-2008
Sampler	: KF, KH	Issue Date	: 01-SEP-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
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Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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.

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

- **ED040F: Sulfate LOR has been raised.**
- **EG005T: Aluminium, Fe, Mo, Se and Sn LORs have been raised.**
- **EK040P: EM0806990 #1 spike failed due to sample matrix. This was confirmed by further analysis.**
- **Ionic Balance out of acceptable limits for EM0806986 #1 due to analytes not quantified in this report.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PT-62	----	----	----	----
				Client sampling date / time: 19-AUG-2008 10:00	----	----	----	----
				EM0806986-001	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.16**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**37100**	----	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**23800**	----	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**38**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**22.6**	----	----	----	----
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	**273**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**273**	----	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**4880**	----	----	----	----
Sulfur as S	----	1	mg/L	**1620**	----	----	----	----
Silica	7631-86-9	0.1	mg/L	**29.8**	----	----	----	----
Silicon	7440-21-3	0.10	mg/L	**13.9**	----	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**11100**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1000**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**760**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**9260**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**130**	----	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**0.29**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**1.42**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.14**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.008**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.044**	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.038**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.033**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PT-62	----	----	----	----
				Client sampling date / time: 19-AUG-2008 10:00	----	----	----	----
				EM0806986-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	**0.002**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.790**	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**13.0**	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.057**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.059**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**5.36**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.3**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	**0.01**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.02**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**421**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**519**	----	----	----	----
^ Ionic Balance	----	0.01	%	**10.4**	----	----	----	----

DATA QUALITY SUMMARY REPORT - GROUNDWATER

Project No:	VE30063
Site:	BHP Billiton
Matrix:	GROUNDWATER
Primary Laboratory:	ALS (Batch No EM0805232, EM0804153, EM0804444, EM0805832, EM0802617, EM0803494, EM0804594, EM0804594)
No. of Tests Requested/ Reported:	17 for pH and TDS, 17 for Major Cations and Major Anions, 17 for TKN, 17 Acidity and Alkalinity, 17 for Metals and 13 and Uranium
Frequency of QA/QC undertaken:	Approximately 1 in 8 samples duplicated (intra laboratory
Frequency of QA/QC Required:	1 in 10 samples are required to be duplicated

Data Quality Issue Assessed	Issue Reviewed	Results Acceptable	Comments
Sample Holding Times			See Note 1
Analytical Procedures	✓	✓	
Laboratory Limits of Reporting (below relevant guideline value)	✓	✓	See Note 2
Field Duplicate Agreement (RPD%)	N/A	N/A	
Blank Sample Analysis			
Method Blank	✓	✓	
Rinsate Blank	✓	✓	
Equipment Blank	NA	NA	
Laboratory Duplicate Agreement (RPD%)	✓	✓	
Matrix Spikes/Matrix Spike Duplicates			
Recovery Percentages	✓	✓	
Duplicate Agreement (RPD%)	✓	✓	
Surrogate Recoveries	✓	✓	
Other Issues (i.e Trip Blank)	NA	NA	

Other Observations:

Note 1: Sample holding times were exceeded, hence the results unreliable for ph, TDS and nutrients for the following batch numbers

Note 2:

Summary Comments:

Groundwater analytical data can be used as a basis of interpretation, subject to the limitations outlined above

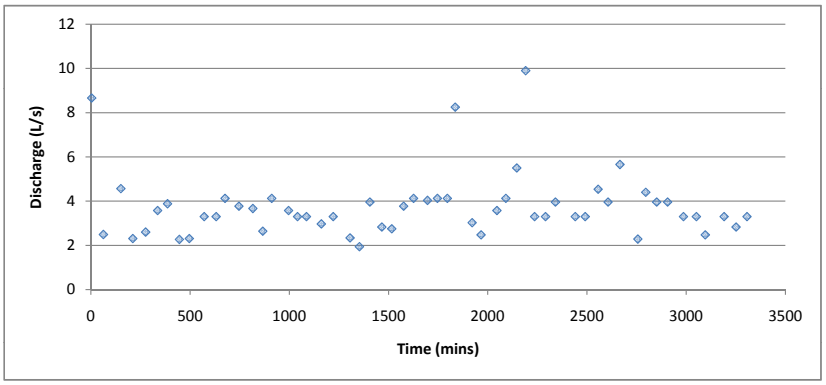
Recommended Corrective Action:

None

Checked By: JF

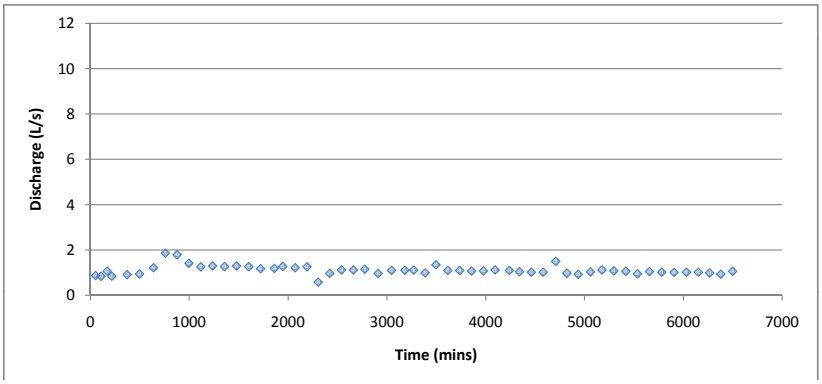
DRAINAGE WELL RD3486

Time (mins)	Flow (L/s)	Cum flow (kL)
0	0	
4.00	8.661	0.00
63.00	2.492	8.82
151.00	4.564	24.10
211.00	2.310	8.31
276.00	2.599	10.14
336.00	3.574	12.87
386.00	3.882	11.64
446.00	2.268	8.17
496.00	2.310	6.93
571.00	3.299	14.85
631.00	3.299	11.88
676.00	4.124	11.14
746.00	3.771	15.84
816.00	3.666	15.40
866.00	2.639	7.92
911.00	4.124	11.14
996.00	3.574	18.23
1041.00	3.299	8.91
1086.00	3.299	8.91
1161.00	2.969	13.36
1221.00	3.299	11.88
1306.00	2.337	11.92
1353.00	1.941	5.47
1406.00	3.959	12.59
1466.00	2.828	10.18
1516.00	2.749	8.25
1576.00	3.771	13.57
1626.00	4.124	12.37
1696.00	4.033	16.94
1746.00	4.124	12.37
1796.00	4.124	12.37
1836.00	8.248	19.80
1921.00	3.024	15.42
1966.00	2.474	6.68
2046.00	3.574	17.16
2091.00	4.124	11.14
2146.00	5.499	18.15
2191.00	9.898	26.72
2236.00	3.299	8.91
2291.00	3.299	10.89
2341.00	3.959	11.88
2441.00	3.299	19.80
2491.00	3.299	9.90
2556.00	4.537	17.69
2606.00	3.959	11.88
2666.00	5.656	20.36
2756.00	2.284	12.33
2796.00	4.399	10.56
2851.00	3.959	13.07
2906.00	3.959	13.07
2986.00	3.299	15.84
3051.00	3.299	12.87
3096.00	2.474	6.68
3191.00	3.299	18.81
3251.00	2.828	10.18
3306.00	3.299	10.89
Total (kL)		707.10
Average (kL/min)		0.21
Average (L/s)		3.56



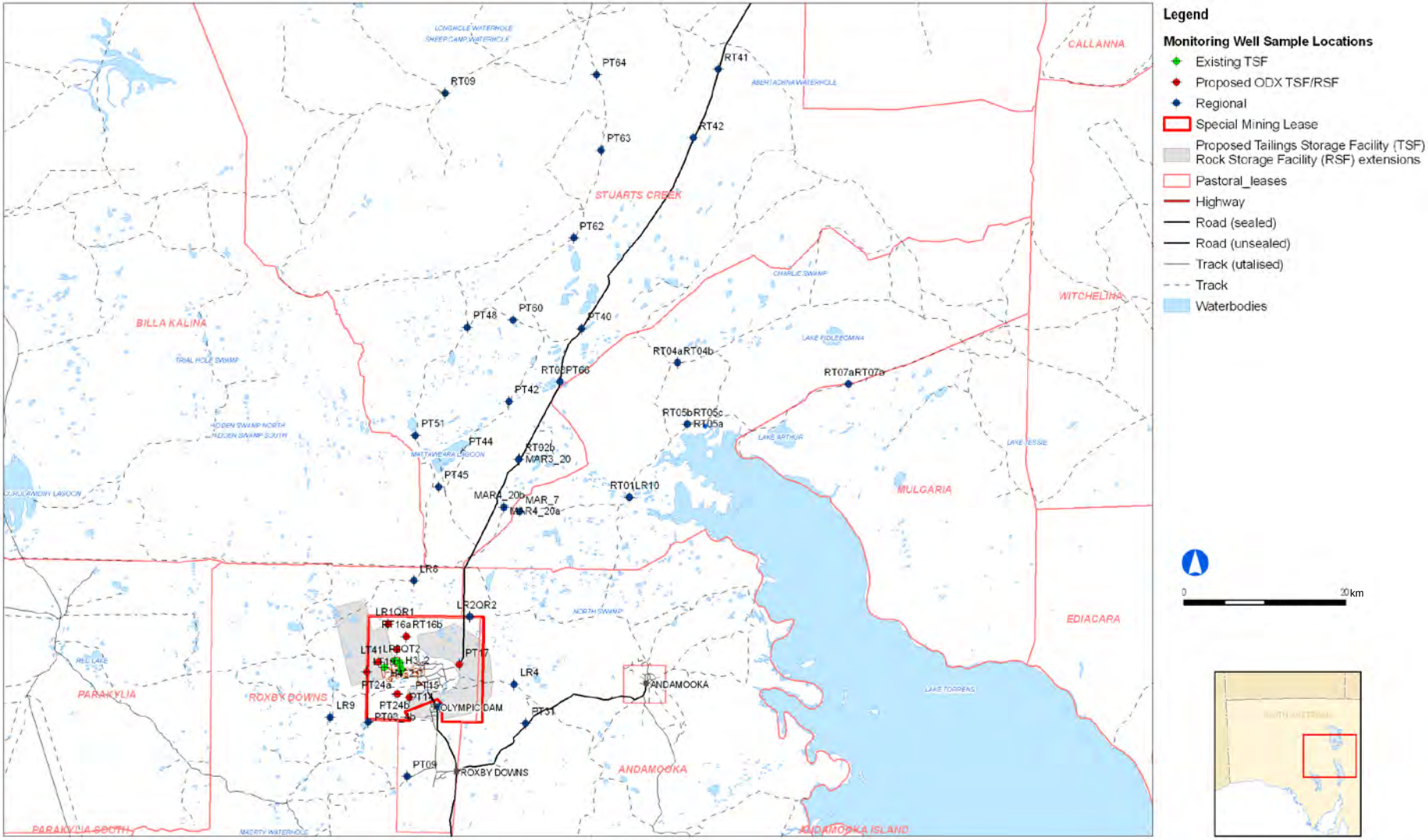
DRAINAGE WELL RD3487

Time (mins)	Flow (L/s)	Cum flow (kL)
0	0	
53.00	0.872	0.00
107.00	0.840	2.72
170.00	1.065	4.03
217.00	0.842	2.38
372.00	0.910	8.46
497.00	0.945	7.09
639.00	1.217	10.37
759.00	1.859	13.38
877.00	1.793	12.70
997.00	1.414	10.18
1117.00	1.257	9.05
1237.00	1.294	9.32
1357.00	1.269	9.14
1479.00	1.294	9.47
1602.00	1.264	9.33
1722.00	1.178	8.48
1862.00	1.188	9.98
1947.00	1.269	6.47
2072.00	1.219	9.14
2192.00	1.257	9.05
2305.00	0.583	3.95
2422.00	0.970	6.81
2542.00	1.121	8.07
2662.00	1.121	8.07
2777.00	1.155	7.97
2912.00	0.962	7.79
3047.00	1.100	8.91
3182.00	1.109	8.98
3272.00	1.115	6.02
3387.00	0.993	6.85
3497.00	1.347	8.89
3617.00	1.100	7.92
3737.00	1.100	7.92
3857.00	1.069	7.70
3977.00	1.079	7.77
4095.00	1.121	7.94
4240.00	1.100	9.57
4342.00	1.043	6.38
4462.00	1.020	7.34
4582.00	1.021	7.35
4709.00	1.500	11.43
4822.00	0.974	6.60
4937.00	0.929	6.41
5061.00	1.031	7.67
5177.00	1.121	7.80
5297.00	1.079	7.77
5418.00	1.059	7.69
5535.00	0.952	6.68
5657.00	1.050	7.68
5782.00	1.020	7.65
5907.00	1.013	7.60
6032.00	1.020	7.65
6152.00	1.021	7.35
6267.00	0.987	6.81
6379.00	0.933	6.27
6499.00	1.059	7.63
6608.00	1.031	6.74
6732.00	1.022	7.60
6842.00	1.031	6.80
6957.00	0.952	6.57
7107.00	0.963	8.67
7222.00	1.020	7.04
7342.00	0.943	6.79
7462.00	1.042	7.50
7577.00	1.010	6.97
7697.00	0.943	6.79
7807.00	0.868	5.73
7902.00	0.970	5.53
8007.00	0.970	6.11
8147.00	0.888	7.46
8282.00	0.962	7.79
8417.00	1.100	8.91
8537.00	1.100	7.92
8657.00	0.961	6.92
8777.00	0.943	6.79
8897.00	0.943	6.79
9017.00	0.943	6.79
9137.00	0.943	6.79
9257.00	0.786	5.66
9367.00	0.990	6.53
9557.00	1.237	14.10
9707.00	0.978	8.80
9842.00	0.687	5.57
9977.00	0.924	7.48
10117.00	0.924	7.76
10217.00	0.994	5.96
10337.00	0.916	6.60
10457.00	0.943	6.79
10577.00	0.943	6.79
10707.00	0.861	6.71
10817.00	0.825	5.44
10937.00	0.900	6.48
11057.00	0.943	6.79
11187.00	0.900	7.02
11297.00	0.825	5.44
11417.00	0.900	6.48
11537.00	0.943	6.79
11657.00	0.943	6.79
11777.00	0.943	6.79
11942.00	0.770	7.62
12017.00	0.825	3.71
12147.00	0.825	6.43
12267.00	0.750	5.40
12377.00	0.825	5.44
12512.00	0.924	7.48
12632.00	0.786	5.66
12732.00	0.873	5.24
12907.00	0.850	8.92
13012.00	0.733	4.62
13117.00	0.877	5.53
13237.00	0.764	5.50
13352.00	0.943	6.50
13457.00	1.100	6.93
13582.00	0.900	6.75
13732.00	0.855	7.70
13897.00	0.825	8.17
14027.00	0.717	5.59
14132.00	0.695	4.38
14237.00	1.042	6.56
14387.00	0.012	0.10
14557.00	0.745	7.60
14762.00	0.695	8.54
14882.00	0.801	5.77
14997.00	0.641	4.42
15147.00	0.770	6.93
15302.00	0.619	5.75
15457.00	0.825	7.67
15602.00	0.733	6.38
15737.00	0.825	6.68
15902.00	0.770	7.62
16037.00	0.699	5.66
16167.00	0.979	7.63
16322.00	0.602	5.60
16462.00	0.773	6.50
16577.00	0.786	5.42
16697.00	0.750	5.40
16792.00	0.776	4.42
16922.00	0.687	5.36
17037.00	0.786	5.42
17147.00	0.825	5.44
17267.00	0.628	4.52
17387.00	0.786	5.66
17597.00	0.761	9.59
17777.00	0.700	7.56
17897.00	0.786	5.66
17987.00	0.634	3.43
18077.00	0.805	4.35
18207.00	0.541	4.22
18367.00	0.770	7.39
18497.00	1.004	7.83
18602.00	0.733	4.62
18745.00	0.709	6.08
18865.00	0.757	5.45
18995.00	0.671	5.23
19117.00	0.669	4.90
19219.00	0.717	4.39
19337.00	0.786	5.56
19467.00	0.717	5.59
19617.00	0.733	6.60
19712.00	0.825	4.70
19832.00	0.786	5.66
19917.00	0.943	4.81
20077.00	0.740	7.10
20245.00	0.687	6.93
20399.00	0.750	6.93
20602.00	0.391	4.76
20912.00	0.503	9.36
21032.00	0.628	4.52
21272.00	0.587	8.45
21352.00	0.761	3.65
Total:		1,159.362
Average (kL/min)		0.05
Average (L/s)		0.90

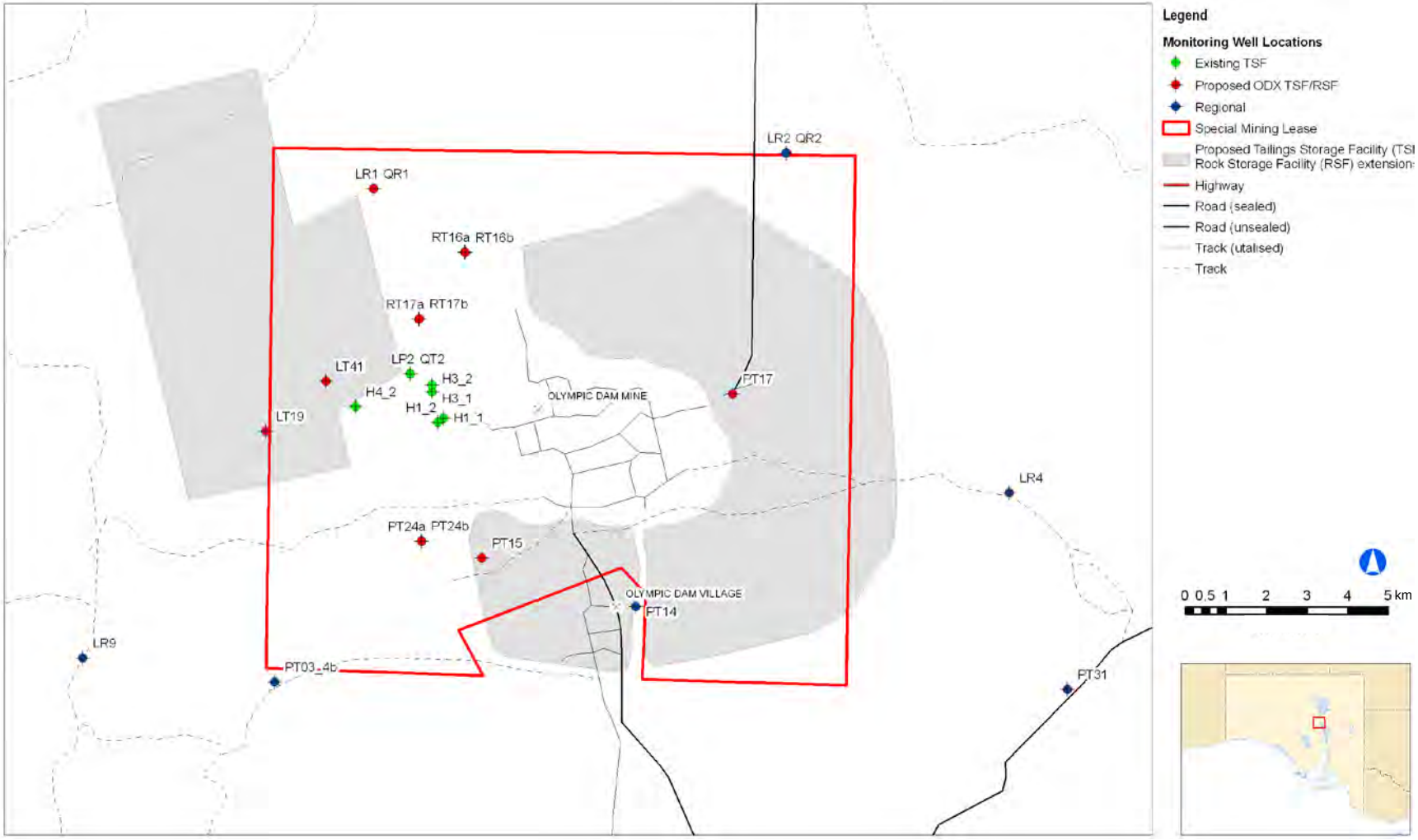


Attachment C
Baseline groundwater sampling and analytical program

Site Location



Site Location (SML)



List of Monitoring Wells

Program (1)	Well ID	mE	mN	Geological Unit	Hydrostrati-graphic unit (2)	Sample Collected	Date sampled	Sample method	Comments (3)
1	H1-1	677 352	6 630 789	TAILS	TAILS	Yes	21/07/2008	Disposable Bailer	Complete analysis
1	H1-2	677 215	6 630 678	TAILS	TAILS	Yes	21/07/2008	Disposable Bailer	Complete analysis
1	H3-1	677 067	6 631 427	QT SANDS & top ZAL	QT SANDS / ALA	Yes	21/07/2008	Disposable Bailer	Complete analysis
1	H3-2	677 066	6 631 608	TAILS	TAILS	Yes	21/07/2008	Disposable Bailer	Complete analysis
1	H4-2	675 197	6 631 063	TAILS	TAILS	Yes	21/07/2008	Disposable Bailer	Complete analysis
1	LP2	676 529	6 631 873	Andamooka Lst	ALA	Yes	4/09/2008	Headworks tap	Complete analysis
1	QT2	676 529	6 631 873	Arcoona Qtz	Arcoona Aquitard	Yes	4/09/2008	Disposable Bailer	Complete analysis
2	LT19	672 990	6 630 470	Andamooka Lst	ALA	Yes	28/07/2008	Micro-purge	Complete analysis
2	LT41	674 459	6 631 692	Andamooka Lst	ALA	Yes	28/07/2008	Micro-purge	Complete analysis
2	LR1	675 631	6 636 423	Andamooka Lst	ALA	Yes	27/07/2008	Micro-purge	Complete analysis
2	LR2	685 787	6 637 306	Andamooka Lst	ALA	Yes	30/07/2008	Micro-purge	Complete analysis
2	PT17	684 464	6 631 390	Corraberra Sst	THA	Yes	17/08/2008	Disposable Bailer	Complete analysis
2	PT24a	676 816	6 627 754	Andamooka Lst	ALA	Yes	28/07/2008	Micro-purge	Complete analysis
2	PT24b	676 805	6 627 765	Corraberra Sst	THA	Yes	12/08/2008	Micro-purge	Complete analysis
2	QR1	675 631	6 636 423	Arcoona Qtz	Arcoona Aquitard	Yes	13/08/2008	Micro-purge	Complete analysis
2	QR2	685 765	6 637 300	Arcoona Qtz	Arcoona Aquitard	No	-	Well complications	No analysis conducted
2	RT16a	677 879	6 634 872	Andamooka Lst	ALA	Yes	27/07/2008	Micro-purge	Complete analysis
2	RT16b	677 884	6 634 860	Corraberra Sst	THA	Yes	17/08/2008	Disposable Bailer	Complete analysis
2	RT17a	676 746	6 633 220	Andamooka Lst	ALA	Yes	27/07/2008	Micro-purge	Complete analysis
2	RT17b	676 759	6 633 225	Corraberra Sst	THA	Yes	17/08/2008	Disposable Bailer	Complete analysis
3	LR4	691 263	6 628 950	Arcoona Qtz	Arcoona Aquitard	Yes	-	Disposable Bailer - DRY	Partial analysis conducted
3	LR8	678 843	6 641 779	Andamooka Lst	ALA	Yes	30/07/2008	Micro-purge	Complete analysis
3	LR9	668 484	6 624 888	Andamooka Lst	ALA	Yes	31/07/2008	Micro-purge	Complete analysis
3	LR10	705 533	6 652 117	Andamooka Lst	ALA	Yes	20/08/2008	Micro-purge	Complete analysis

Program (1)	Well ID	mE	mN	Geological Unit	Hydrostrati-graphic unit (2)	Sample Collected	Date sampled	Sample method	Comments (3)
3	MAR3-20	691 910	6 656 810	Andamooka Lst	ALA	Yes	17/08/2008	Disposable Bailer	Complete analysis
3	MAR4-20a	689 985	6 650 885	Andamooka Lst	ALA	Yes	17/08/2008	Disposable Bailer	Complete analysis
3	MAR4-20b	689 985	6 650 885	Andamooka Lst	ALA	Yes	17/08/2008	Disposable Bailer	Complete analysis
3	MAR7	691 930	6 650 334	Andamooka Lst	ALA	Yes	8/09/2008	Disposable Bailer	Complete analysis
3	PT03-4b	673 204	6 624 297	Arcoona Qtz	Arcoona Aquitard	Yes	10/08/2008	Micro-purge	Complete analysis
3	PT09	677 991	6 617 546	Corraberra Sst	THA	Yes	14/08/2008	Micro-purge	Complete analysis
3	PT14	682 089	6 626 155	Corraberra Sst	THA	Yes	11/08/2008	Micro-purge	Complete analysis
3	PT15	678 297	6 627 345	Corraberra Sst	THA	Yes	12/08/2008	Micro-purge	Complete analysis
3	PT31	692 701	6 624 120	Corraberra Sst	THA	Yes	17/08/2008	Disposable Bailer	Complete analysis
3	PT40	699 616	6 672 964	Andamooka Lst	ALA	Yes	17/08/2008	Disposable Bailer	Complete analysis
3	PT42	690 623	6 663 940	Andamooka Lst	ALA	Yes	19/08/2008	Micro-purge	Complete analysis
3	PT44	684 970	6 657 514	Andamooka Lst	ALA	Yes	19/08/2008	Micro-purge	Complete analysis
3	PT45	681 923	6 653 391	Andamooka Lst	ALA	Yes	18/08/2008	Micro-purge	Complete analysis
3	PT48	685 489	6 673 125	Andamooka Lst	ALA	Yes	18/08/2008	Micro-purge	Complete analysis
3	PT51	679 062	6 659 765	Andamooka Lst	ALA	Yes	18/08/2008	Micro-purge	Complete analysis
3	PT60	691 117	6 674 056	Andamooka Lst	ALA	Yes	17/08/2008	Disposable Bailer	Complete analysis
3	PT62	698 652	6 684 173	Cadna-owie	Eromanga	Yes	9/09/2008	Micro-purge	Complete analysis
3	PT63	702 071	6 695 060	BRACHINA Fmt	Adelaide	Yes	9/09/2008	Micro-purge	Complete analysis
3	PT64	701 463	6 704 421	BRACHINA Fmt	Adelaide	No	-	Dry	No analysis conducted
3	PT66	696 949	6 666 399	Andamooka Lst	ALA	Yes	19/08/2008	Disposable Bailer	Complete analysis
3	RT01	705 545	6 652 083	Corraberra Sst	THA	Yes	1/09/2008	Micro-purge	Complete analysis
3	RT02b	691 849	6 656 795	Arcoona Qtz	Arcoona Aquitard	Yes	17/08/2008	Disposable Bailer	Complete analysis
3	RT03	696 949	6 666 399	Andamooka Lst	ALA	Yes	19/08/2008	Micro-purge	Complete analysis
3	RT04a	711 500	6 668 735	Andamooka Lst	ALA	Yes	2/09/2008	Micro-purge	Complete analysis
3	RT04b	711 497	6 668 746	Yarloo Sh.	Yarloo Aquitard	Yes	3/09/2008	Micro-purge	Complete analysis

Program [1]	Well ID	mE	mN	Geological Unit	Hydrostrati-graphic unit [2]	Sample Collected	Date sampled	Sample method	Comments [3]
3	RT05a	712 726	6 661 145	Andamooka Lst	ALA	Yes	20/08/2008	Micro-purge	Complete analysis
3	RT05b	712 714	6 661 127	Andamooka Lst	ALA	Yes	20/08/2008	Micro-purge	Complete analysis
3	RT05c	712 714	6 661 127	ABCQTZ+BRACHINA	Adelaide	Yes	1/09/2008	Micro-purge	Complete analysis
3	RT07a	732 710	6 666 105	AMBEROONA Fmt	Adelaide	Yes	21/08/2008	Micro-purge	Complete analysis
3	RT07b	732 710	6 666 105	AMBEROONA Fmt	Adelaide	Yes	2/09/2008	Micro-purge	Complete analysis
3	RT09	682 697	6 702 115	BRACHINA Fmt	Adelaide	Yes	3/09/2008	Micro-purge	Complete analysis
3	RT41	716 560	6 705 063	BRACHINA Fmt	Adelaide	Yes	10/09/2008	Micro-purge	Complete analysis
3	RT42	713 445	6 696 563	BRACHINA Fmt	Adelaide	Yes	10/09/2008	Micro-purge	Complete analysis

Notes :

[1] Baseline sampling program :

1 - Existing ODO TSF

2 - Proposed ODX TSF/RSF (sub-regional)

3 - Regional hydrogeology

[2] Screened hydrogeology:

ALA = Andamooka Limestone Aquifer

Yarloo Aquitard = Yarloo Shale

Arcoona Aquitard = Upper Arcoona Quartzite Aquitard

THA = Tent Hill Aquifer

Adelaide = Adelaide Geosyncline aquifers

Eromanga = Cadna-owie Fm & Algebuckna Sst

[3] Refer to Table 2

Summary of entrained tails water chemistry

Analyte	Units	Primary Lab LOR	Minimum	Maximum	Geometric mean
pH Value and Total Dissolved Solids					
pH	pH Unit	0.1	3.16	4.23	3.50
TDS	mg/L	1	73100	99300	85118
Electrical conductivity	uS/cm	1	22700	34900	35962
Alkalinity					
Hydroxide as CaCO3	mg/L	5	<5	<5	<5
Carbonate as CACO3	mg/L	5	<5	<5	<5
Bicarbonate as CACO3	mg/L	5	<5	<5	<5
Total Alkalinity as CACO3	mg/L	5	<5	<5	<5
Dissolved Major Cations					
Calcium	mg/L	0.1	627	894	714
Iron	mg/L	0.1	-	-	-
Magnesium	mg/L	0.1	492	1590	834
Sodium	mg/L	0.1	3100	3810	4084
Potassium	mg/L	0.1	200	800	558
Total Metals					
Iron	mg/L	0.1	327	8020	4375
Dissolved Metals					
Arsenic	mg/L	0.001	<0.005	0.05	0.021
Barium	mg/L	0.001	0.023	0.07	0.042
Boron	mg/L	0.001	1.4	6.1	2.40
Cobalt	mg/L	0.001	27	75	50
Copper	mg/L	0.001	4.3	500	49.8
Lead	mg/L	0.001	0.029	0.99	0.087
Manganese	mg/L	0.001	94	240	159
Nickel	mg/L	0.001	3.5	9.7	6.5
Selenium	mg/L	0.001	3.5	6.7	5.0
Strontium	mg/L	0.001	3.9	8.7	5.0
Thallium	mg/L	0.001	0.0039	4.5	0.017
Thorium	mg/L	0.001	-	-	-
Uranium	mg/L	0.001	200	400	297
Zinc	mg/L	0.001	0.047	50	10.4
Dissolved Anions					
Sulphate	mg/L	2	26100	49300	38097
Chloride	mg/L	1	2690	4370	3745
Fluoride	mg/L	0.1	5010	13400	9414
NO2-N	mg/L	0.5	<0.01	0.04	0.02
NO3-N	mg/L	0.5	<0.01	0.02	0.02
Other parameters					
TKN as N	mg/L	1	2.1	182	61.4
Total Nitrogen (as N)	mg/L	2	2.2	182	61.9
Silica	mg/L	1	7.5	87	25.5
Total Organic Carbon	mg/L	1	24	30	26.3

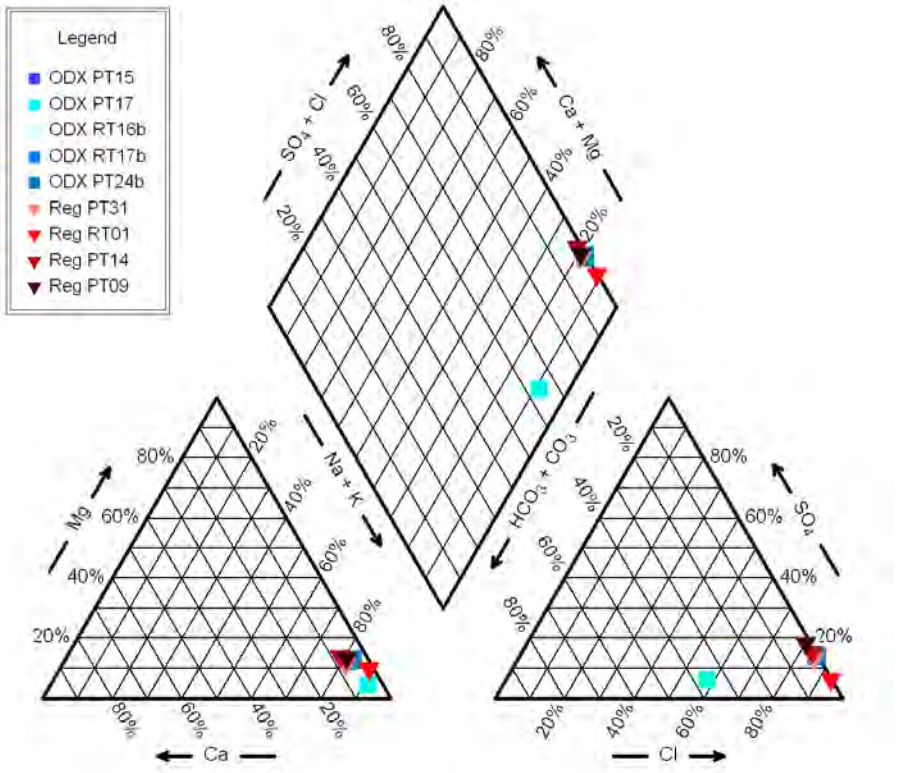
Note : where values were less than the Limit of Reporting (LOR), the geomean has been calculated setting values at the LOR (ie. the geomean is possibly slightly overestimated).

Summary of ALA aquifer groundwater chemistry for the proposed TSF

Analyte	Units	Primary Lab LOR	Minimum	Maximum	Geometric mean
pH Value and Total Dissolved Solids					
pH	pH Unit	0.1	7.12	11.1	7.7
TDS	mg/L	1	18000	28800	24064
Electrical conductivity	uS/cm	1	22600	39000	32430
Alkalinity					
Hydroxide as CaCO3	mg/L	5	<1	<1	<1
Carbonate as CACO3	mg/L	5	<1	31	1.7
Bicarbonate as CACO3	mg/L	5	4	359	137
Total Alkalinity as CACO3	mg/L	5	35	359	197
Dissolved Major Cations					
Calcium	mg/L	0.1	777	1360	965
Iron	mg/L	0.1	0.114	0.114	0.114
Magnesium	mg/L	0.1	93	1050	569
Sodium	mg/L	0.1	7120	9360	7981
Potassium	mg/L	0.1	56	217	90
Total Metals					
Iron	mg/L	0.1	0.34	1.76	0.71
Dissolved Metals					
Arsenic	mg/L	0.001	<0.001	<0.005	<0.005
Barium	mg/L	0.001	0.011	0.15	0.022
Boron	mg/L	0.001	0.57	10.8	5.68
Cobalt	mg/L	0.001	0.001	0.004	0.002
Copper	mg/L	0.001	0.008	0.363	0.030
Lead	mg/L	0.001	<0.005	0.029	0.008
Manganese	mg/L	0.001	<0.001	0.91	0.159
Nickel	mg/L	0.001	<0.001	0.38	0.015
Selenium	mg/L	0.001	<0.010	0.028	0.012
Strontium	mg/L	0.001	12	19.6	16.3
Thallium	mg/L	0.001	<0.001	<0.005	0.001
Thorium	mg/L	0.001	<0.001	<0.005	0.001
Uranium	mg/L	0.001	<0.001	0.064	0.034
Zinc	mg/L	0.001	0.033	0.231	0.071
Dissolved Anions					
Sulphate	mg/L	2	2300	5680	3869
Chloride	mg/L	1	8200	11000	9860
Fluoride	mg/L	0.1	0.2	3.2	1.25
NO2-N	mg/L	0.5	<0.010	0.298	0.034
NO3-N	mg/L	0.5	<0.010	<0.5	0.044
Other parameters					
TKN as N	mg/L	1	-	-	-
Total Nitrogen (as N)	mg/L	2	0.013	1.3	0.179
Silica	mg/L	1	9.41	17.8	14.5
Total Organic Carbon	mg/L	1	<1	12	2.6

Note : where values were less than the Limit Of Reporting (LOR), the geomean has been calculated setting values at the LOR (ie. the geomean is slightly overestimated).

Piper plot for wells installed in the Tent Hill Aquifer



Summary of THA aquifer groundwater chemistry for the proposed TSF/RSF

Analyte	Units	Primary Lab LOR	Minimum	Maximum	Geometric mean
pH Value and Total Dissolved Solids					
pH	pH Unit	0.1	7.1	7.9	7.41
TDS	mg/L	1	2800	65000	30367
Electrical conductivity	uS/cm	1	3470	67900	35630
Alkalinity					
Hydroxide as CaCO3	mg/L	5	-	-	-
Carbonate as CACO3	mg/L	5	1	1	1
Bicarbonate as CACO3	mg/L	5	219.9	720	319
Total Alkalinity as CACO3	mg/L	5	219.95	719.97	319
Dissolved Major Cations					
Calcium	mg/L	0.1	34.5	1520	578
Iron	mg/L	0.1	0.1	15	1.8
Magnesium	mg/L	0.1	22.1	2610	766
Sodium	mg/L	0.1	875	30200	11697
Potassium	mg/L	0.1	6.1	320	93.2
Total Metals					
Iron	mg/L	0.1	-	-	-

Analyte	Units	Primary Lab LOR	Minimum	Maximum	Geometric mean
Dissolved Metals					
Arsenic	mg/L	0.001	0.005	0.007	0.005
Barium	mg/L	0.001	0.047	0.37	0.123
Boron	mg/L	0.001	1.7	11	6.1
Cobalt	mg/L	0.001	0.005	0.009	0.006
Copper	mg/L	0.001	0.005	0.026	0.014
Lead	mg/L	0.001	0.005	0.005	0.005
Manganese	mg/L	0.001	0.13	2.1	0.70
Nickel	mg/L	0.001	0.005	0.029	0.013
Selenium	mg/L	0.001	0.009	0.013	0.066
Strontium	mg/L	0.001	0.81	26	9.93
Thallium	mg/L	0.001	0.005	0.005	0.005
Thorium	mg/L	0.001	0.005	0.005	0.005
Uranium	mg/L	0.001	0.005	0.029	0.009
Zinc	mg/L	0.001	0.051	0.15	0.085
Dissolved Anions					
Sulphate	mg/L	2	96	6100	2378
Chloride	mg/L	1	680	28000	11164
Fluoride	mg/L	0.1	0.5	5.6	1.175
NO2-N	mg/L	0.5	0.5	0.5	0.500
NO3-N	mg/L	0.5	0.5	0.5	0.500
Other parameters					
TKN as N	mg/L	1	1	3	1.9
Total Nitrogen (as N)	mg/L	2	2	3	2.1
Silica	mg/L	1	13.3	34	18.0
Total Organic Carbon	mg/L	1	1	4.5	1.8

Note : where values were less than the Limit Of Reporting (LOR), the geomean has been calculated setting values at the LOR (ie. the geomean is slightly overestimated).

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Summary of regional ALA aquifer groundwater chemistry

Analyte	Units	Primary Lab LOR	Minimum	Maximum	Geometric mean
pH Value and Total Dissolved Solids					
pH	pH Unit	0.1	6.56	8.1	7.04
TDS	mg/L	1	19000	59000	43628
Electrical conductivity	uS/cm	1	20100	135000	39118
Alkalinity					
Hydroxide as CaCO3	mg/L	5	-	-	-
Carbonate as CACO3	mg/L	5	0	<1	-
Bicarbonate as CACO3	mg/L	5	96	1260	235
Total Alkalinity as CACO3	mg/L	5	96	1260	235
Dissolved Major Cations					
Calcium	mg/L	0.1	603	1280	956
Iron	mg/L	0.1	<0.1	63.4	2.6
Magnesium	mg/L	0.1	342	5200	1075
Sodium	mg/L	0.1	6030	88900	13926
Potassium	mg/L	0.1	64	800	151
Total Metals					
Iron	mg/L	0.1	5.72	51.4	20.0
Dissolved Metals					
Arsenic	mg/L	0.001	0.001	0.018	0.003
Barium	mg/L	0.001	0.018	0.82	0.055
Boron	mg/L	0.001	0.001	12	3.10
Cobalt	mg/L	0.001	0.001	0.017	0.004
Copper	mg/L	0.001	0.001	0.032	0.007
Lead	mg/L	0.001	0.001	1.5	0.005
Manganese	mg/L	0.001	0.029	2.2	0.39
Nickel	mg/L	0.001	0.001	0.043	0.012
Selenium	mg/L	0.001	0.01	0.1	0.043
Strontium	mg/L	0.001	6.3	20	14.0
Thallium	mg/L	0.001	0.001	0.074	0.002
Thorium	mg/L	0.001	0.001	0.01	0.004
Uranium	mg/L	0.001	0.0014	0.067	0.01
Zinc	mg/L	0.001	0.001	0.24	0.038
Dissolved Anions					
Sulphate	mg/L	2	2500	10000	4184
Chloride	mg/L	1	4900	150000	17586
Fluoride	mg/L	0.1	0.5	3.8	0.70
NO2-N	mg/L	0.5	0.01	0.5	0.32
NO3-N	mg/L	0.5	0.02	18	0.75
Other parameters					
TKN as N	mg/L	1	0.1	34.7	1.69
Total Nitrogen (as N)	mg/L	2	2	34.7	3.41
Silica	mg/L	1	7.96	38	16.5
Total Organic Carbon	mg/L	1	1	25	2.1

Note : where values were less than the Limit Of Reporting (LOR), the geomean has been calculated setting values at the LOR (ie. the geomean is slightly overestimated).

Summary of THA aquifer groundwater chemistry for the regional wells

Analyte	Units	Primary Lab LOR	Minimum	Maximum	Geometric mean
pH Value and Total Dissolved Solids					
pH	pH Unit	0.1	6.9	7.2	7.05
TDS	mg/L	1	4000	200000	25823
Electrical conductivity	uS/cm	1	6520	132000	28966
Alkalinity					
Hydroxide as CaCO3	mg/L	5	-	-	-
Carbonate as CACO3	mg/L	5	0	1	-
Bicarbonate as CACO3	mg/L	5	130	380	223
Total Alkalinity as CACO3	mg/L	5	130	380	223
Dissolved Major Cations					
Calcium	mg/L	0.1	98.2	802	388
Iron	mg/L	0.1	0.282	8.7	3.5
Magnesium	mg/L	0.1	83.1	4160	567
Sodium	mg/L	0.1	1190	71400	7537
Potassium	mg/L	0.1	1	1000	46.5
Total Metals					
Iron	mg/L	0.1	-	-	-

Analyte	Units	Primary Lab LOR	Minimum	Maximum	Geometric mean
Dissolved Metals					
Arsenic	mg/L	0.001	0.005	0.08	0.008
Barium	mg/L	0.001	0.086	0.13	0.101
Boron	mg/L	0.001	2	12	4.85
Cobalt	mg/L	0.001	0.005	0.073	0.009
Copper	mg/L	0.001	0.005	0.14	0.012
Lead	mg/L	0.001	0.005	0.019	0.006
Manganese	mg/L	0.001	0.29	6.2	0.97
Nickel	mg/L	0.001	0.005	0.084	0.011
Selenium	mg/L	0.001	0.015	0.2	0.052
Strontium	mg/L	0.001	1.6	18	6.4
Thallium	mg/L	0.001	0.005	0.025	0.006
Thorium	mg/L	0.001	0.005	0.005	0.005
Uranium	mg/L	0.001	0.005	0.0085	0.005
Zinc	mg/L	0.001	0.05	0.59	0.09
Dissolved Anions					
Sulphate	mg/L	2	170	9200	1917
Chloride	mg/L	1	720	100000	9419
Fluoride	mg/L	0.1	0.5	0.5	0.5
NO2-N	mg/L	0.5	0.5	0.5	0.5
NO3-N	mg/L	0.5	0.5	2.1	0.67
Other parameters					
TKN as N	mg/L	1	1	8.4	1.7
Total Nitrogen (as N)	mg/L	2	2	8	2.63
Silica	mg/L	1	5.5	19	9.48
Total Organic Carbon	mg/L	1	1	46	5.99

Note : where values were less than the Limit Of Reporting (LOR), the geomean has been calculated setting values at the LOR (ie. the geomean is slightly overestimated).

Summary of Brachina Formation groundwater chemistry

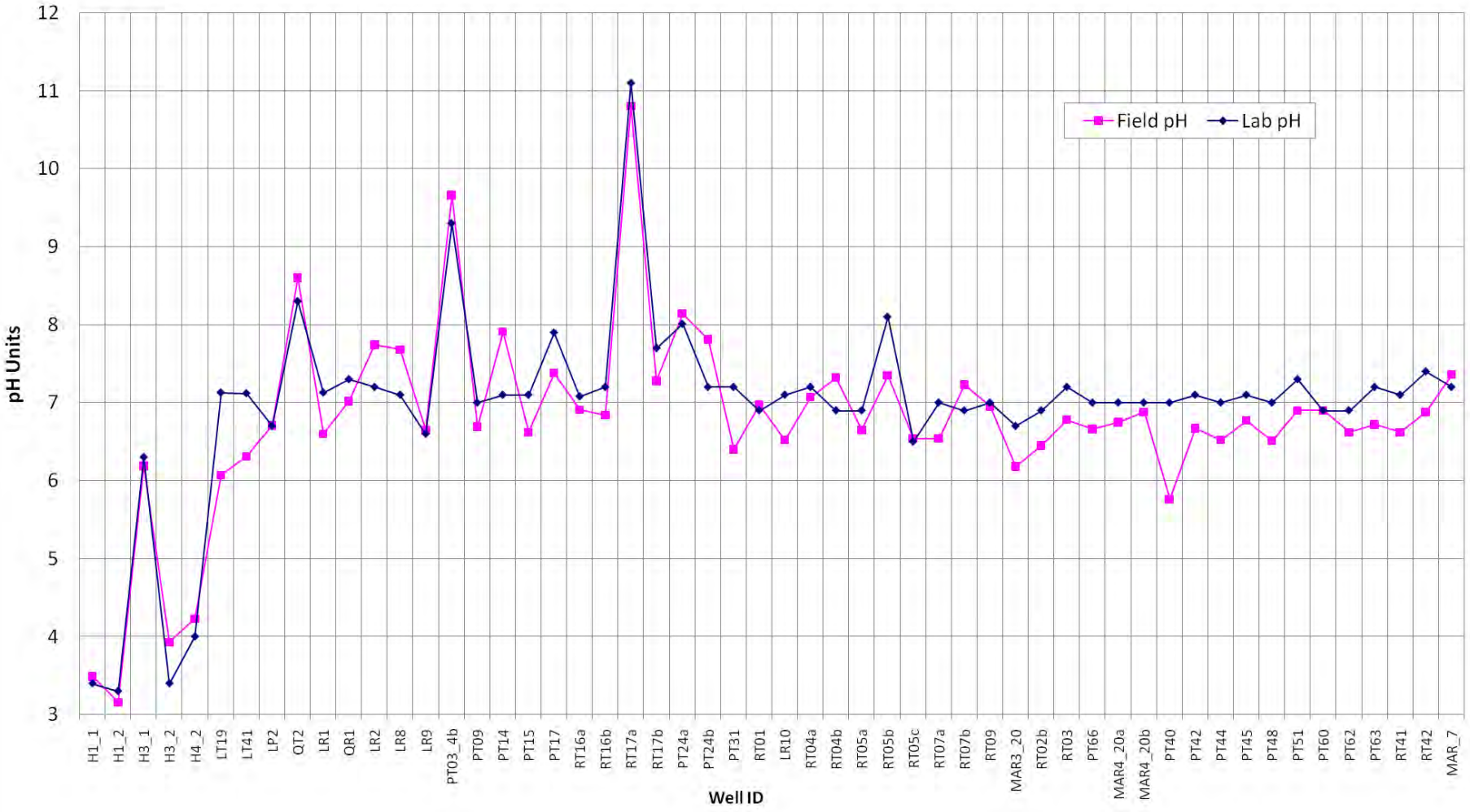
Analyte	Units	Primary Lab LOR	Minimum	Maximum	Geometric mean
pH Value and Total Dissolved Solids					
pH	pH Unit	0.1	7	7.4	7.17
TDS	mg/L	1	26000	77000	41745
Electrical conductivity	uS/cm	1	30500	77000	49501
Alkalinity					
Hydroxide as CaCO3	mg/L	5	0	0	0
Carbonate as CACO3	mg/L	5	1	1	1
Bicarbonate as CACO3	mg/L	5	120	380	199
Total Alkalinity as CACO3	mg/L	5	120	380	199
Dissolved Major Cations					
Calcium	mg/L	0.1	829	1250	1044
Iron	mg/L	0.1	0.759	9.39	2.81
Magnesium	mg/L	0.1	653	1940	891
Sodium	mg/L	0.1	10100	24500	14133
Potassium	mg/L	0.1	85	230	139
Total Metals					
Iron	mg/L	0.1	-	-	-
Dissolved Metals					
Arsenic	mg/L	0.001	0.001	0.100	0.010
Barium	mg/L	0.001	0.032	0.12	0.056
Boron	mg/L	0.001	7.8	11	8.8
Cobalt	mg/L	0.001	0.001	0.0054	0.002
Copper	mg/L	0.001	0.005	0.014	0.008
Lead	mg/L	0.001	0.001	0.001	0.001
Manganese	mg/L	0.001	0.49	3.6	0.95
Nickel	mg/L	0.001	0.01	0.017	0.013
Selenium	mg/L	0.001	0.026	0.062	0.032
Strontium	mg/L	0.001	12	34	19.8
Thallium	mg/L	0.001	0.001	0.001	0.001
Thorium	mg/L	0.001	0	0	0
Uranium	mg/L	0.001	0.001	0.0087	0.003
Zinc	mg/L	0.001	0.015	0.063	0.025
Dissolved Anions					
Sulphate	mg/L	2	1500	6700	3177
Chloride	mg/L	1	9400	27000	13695
Fluoride	mg/L	0.1	0.5	0.5	0.5
NO2-N	mg/L	0.5	0.5	0.5	0.5
NO3-N	mg/L	0.5	0.5	19	1.24
Other parameters					
TKN as N	mg/L	1	1	3.6	1.6
Total Nitrogen (as N)	mg/L	2	2	21	4.3
Silica	mg/L	1	14.4	25	17.0
Total Organic Carbon	mg/L	1	1.6	15	5.7

Note : where values were less than the Limit Of Reporting (LOR), the geomean has been calculated setting values at the LOR (ie. the geomean is slightly overestimated).

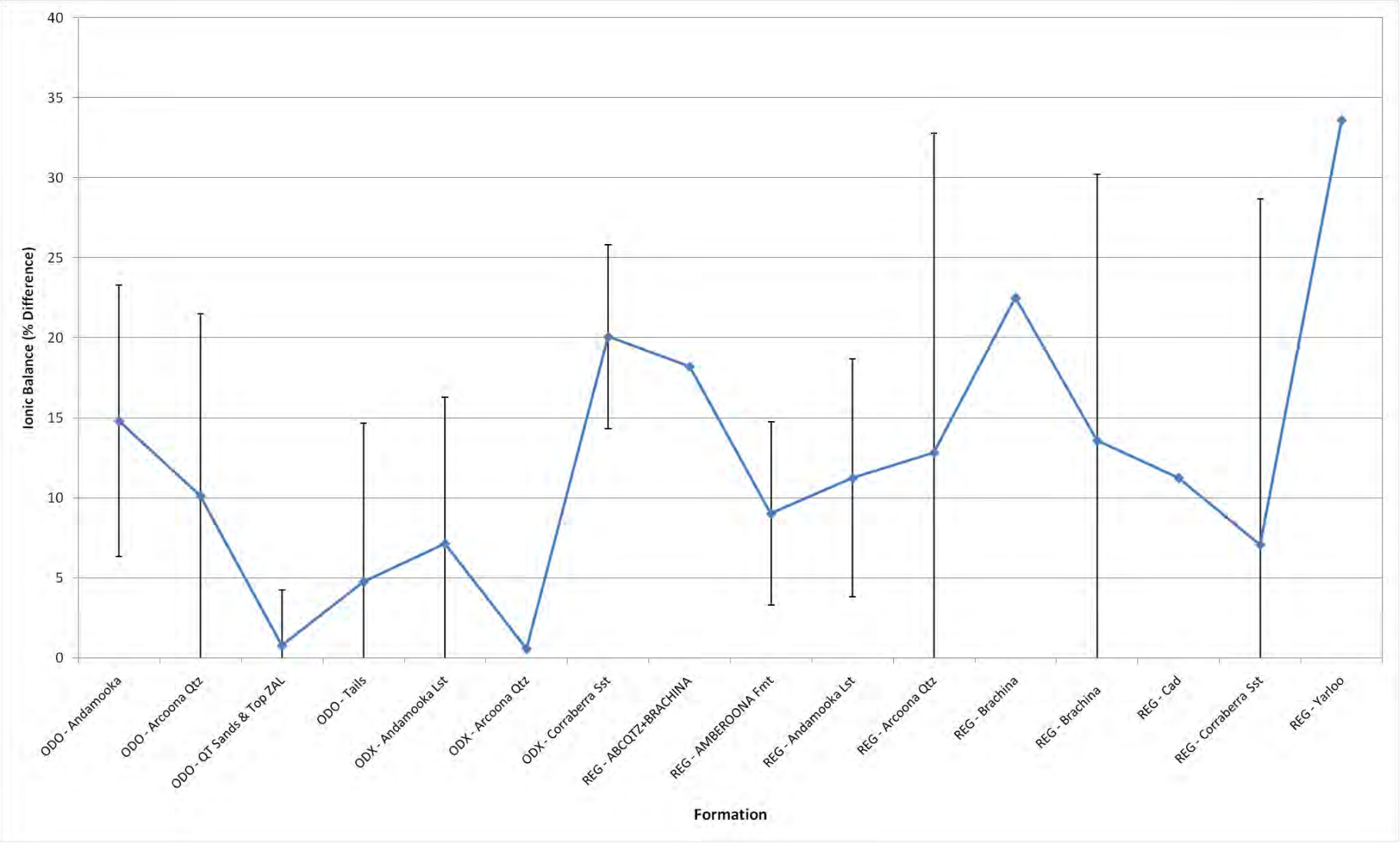
Summary of Amberoona Formation groundwater chemistry

Analyte	Units	Primary Lab LOR	Minimum	Maximum
pH Value and Total Dissolved Solids				
pH	pH Unit	0.1	6.9	7
TDS	mg/L	1	55000	150000
Electrical conductivity	uS/cm	1	56900	120000
Alkalinity				
Hydroxide as CaCO3	mg/L	5	-	-
Carbonate as CACO3	mg/L	5	0	0
Bicarbonate as CACO3	mg/L	5	91	150
Total Alkalinity as CACO3	mg/L	5	91	150
Dissolved Major Cations				
Calcium	mg/L	0.1	1650	2040
Iron	mg/L	0.1	3.19	3.71
Magnesium	mg/L	0.1	1180	2040
Sodium	mg/L	0.1	17800	57900
Potassium	mg/L	0.1	120	630
Total Metals				
Iron	mg/L	0.1	-	-
Dissolved Metals				
Arsenic	mg/L	0.001	<0.001	<0.07
Barium	mg/L	0.001	0.045	0.1
Boron	mg/L	0.001	3.1	7.1
Cobalt	mg/L	0.001	0.0016	0.0027
Copper	mg/L	0.001	0.021	0.046
Lead	mg/L	0.001	<0.001	0.0011
Manganese	mg/L	0.001	3.7	5.3
Nickel	mg/L	0.001	0.018	0.027
Selenium	mg/L	0.001	0.039	0.083
Strontium	mg/L	0.001	34	44
Thallium	mg/L	0.001	<0.001	<0.001
Thorium	mg/L	0.001	-	-
Uranium	mg/L	0.001	<0.001	0.005
Zinc	mg/L	0.001	0.094	0.13
Dissolved Anions				
Sulphate	mg/L	2	3600	5300
Chloride	mg/L	1	21000	78000
Fluoride	mg/L	0.5	<0.5	<0.5
NO2-N	mg/L	0.5	<0.5	<0.5
NO3-N	mg/L	0.5	<0.5	<0.5
Other parameters				
TKN as N	mg/L	1	<1	6.5
Total Nitrogen (as N)	mg/L	2	<2	6
Silica	mg/L	1	6.5	13.3
Total Organic Carbon	mg/L	1	<1	6.1

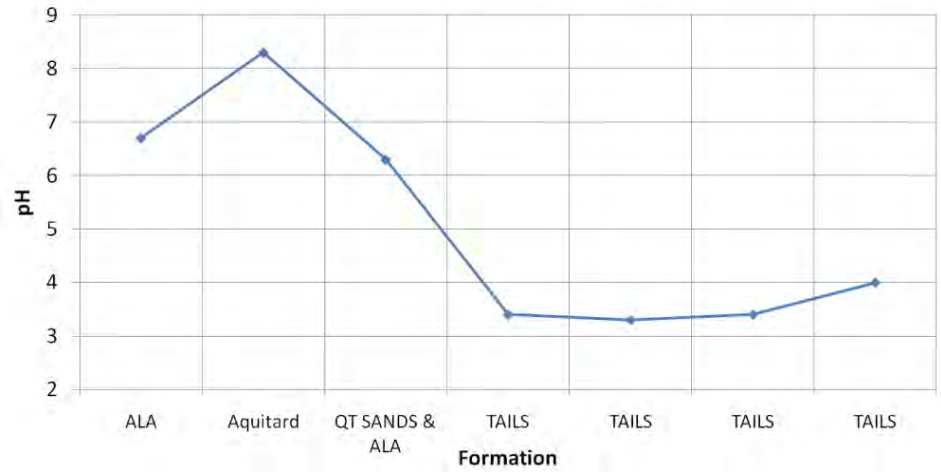
Lab vs Field pH measurements



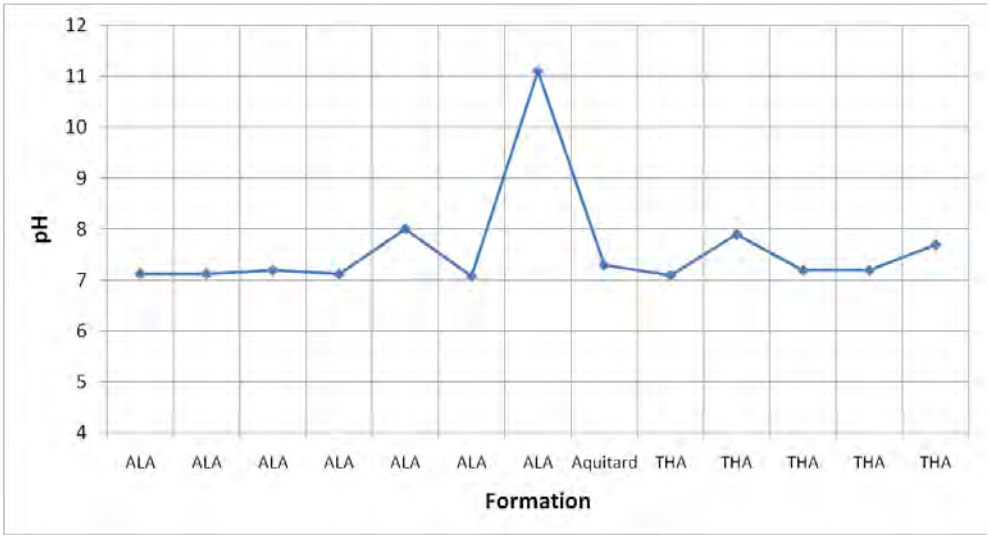
Ionic Balance



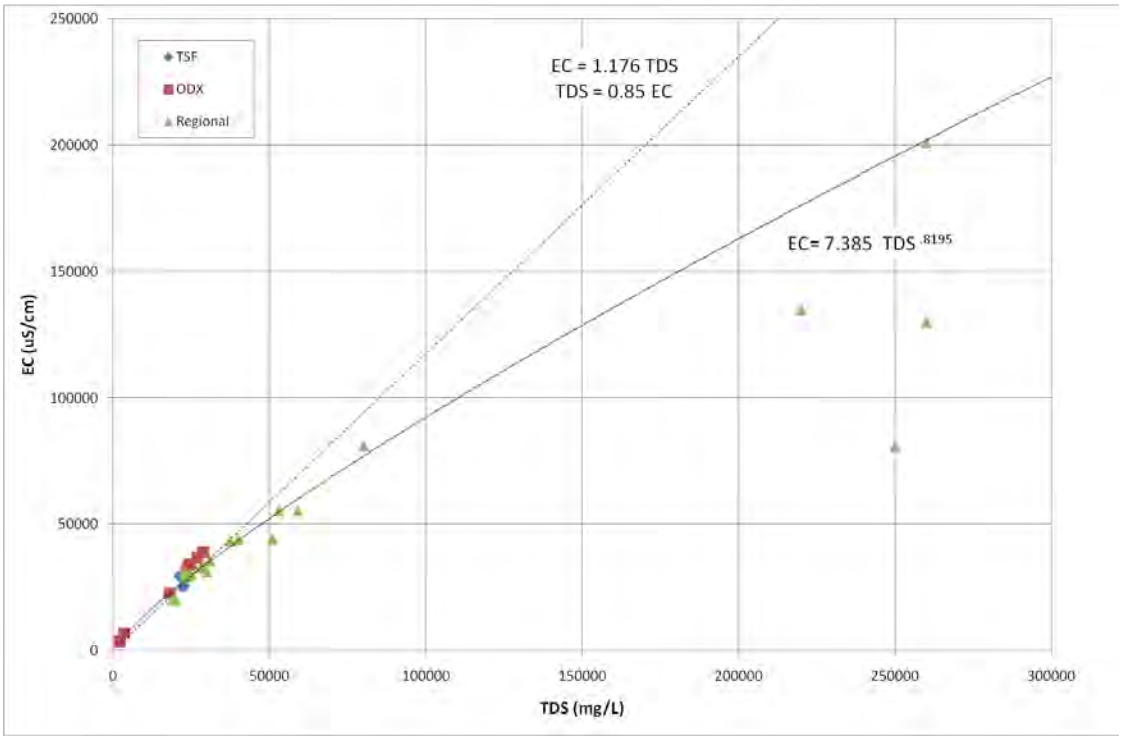
pH of groundwater in the ODO TSF area



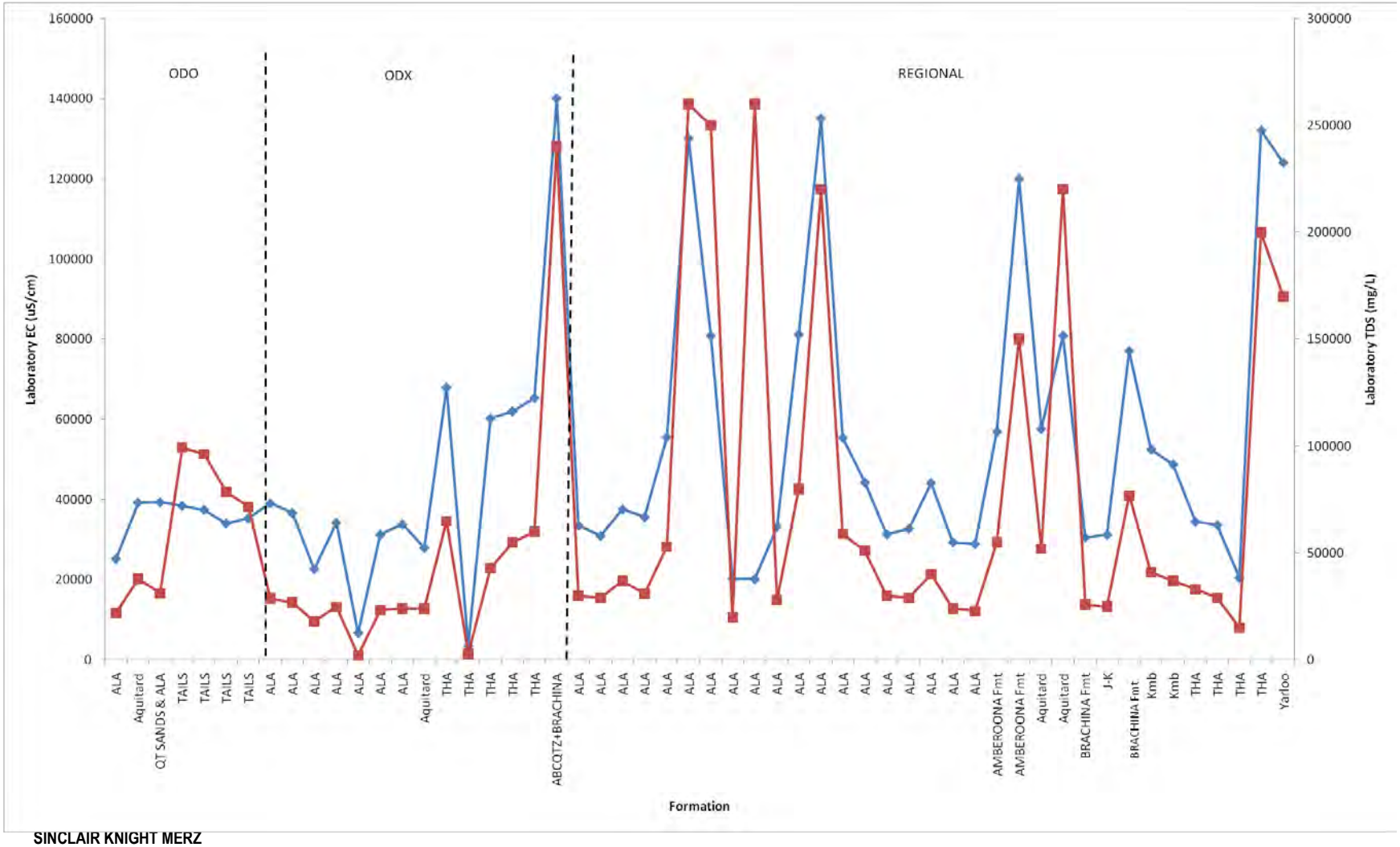
pH of sub-regional groundwaters (ODX proposed TSF/RSF)



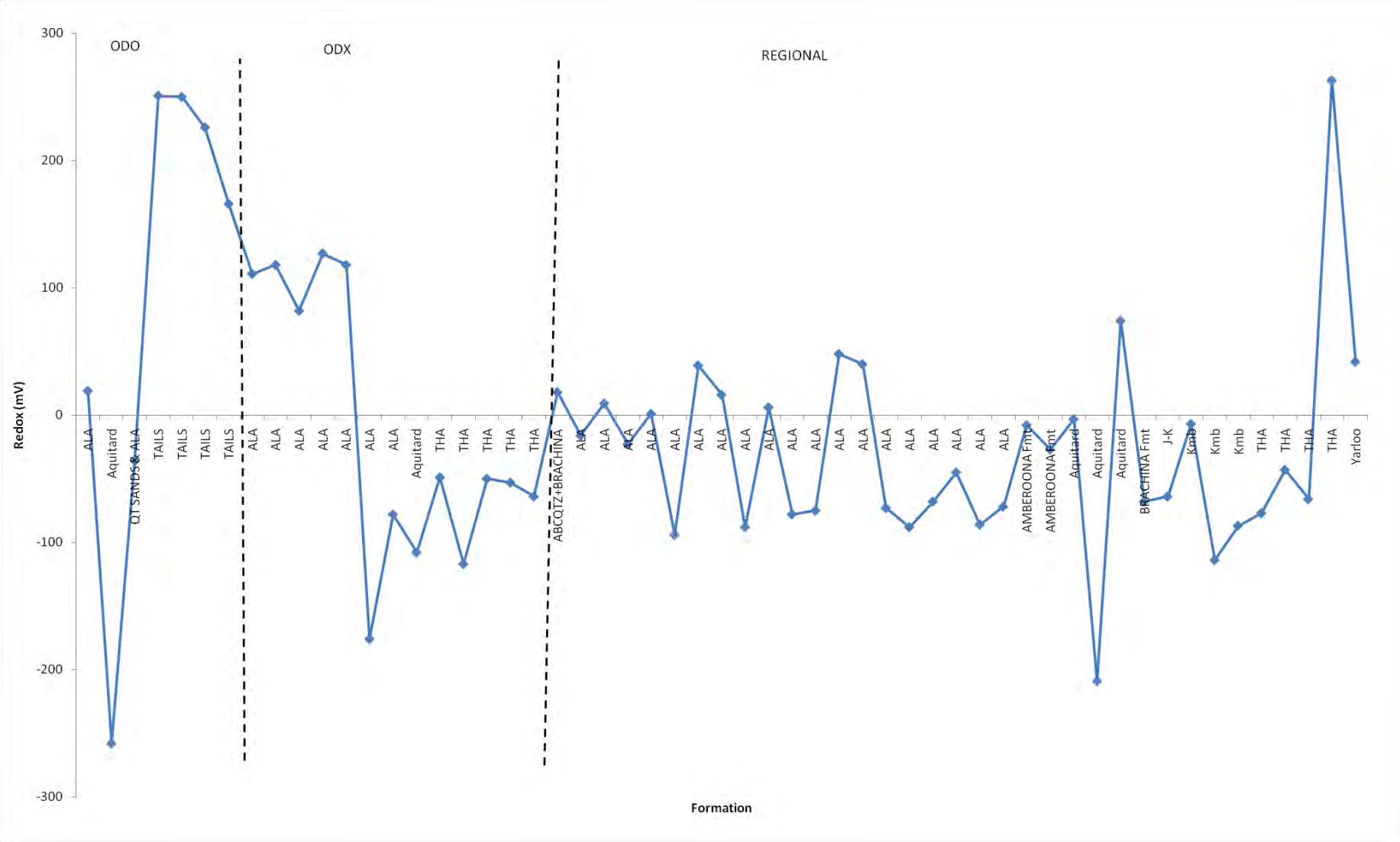
Relationship of Lab EC to TDS in the ALA



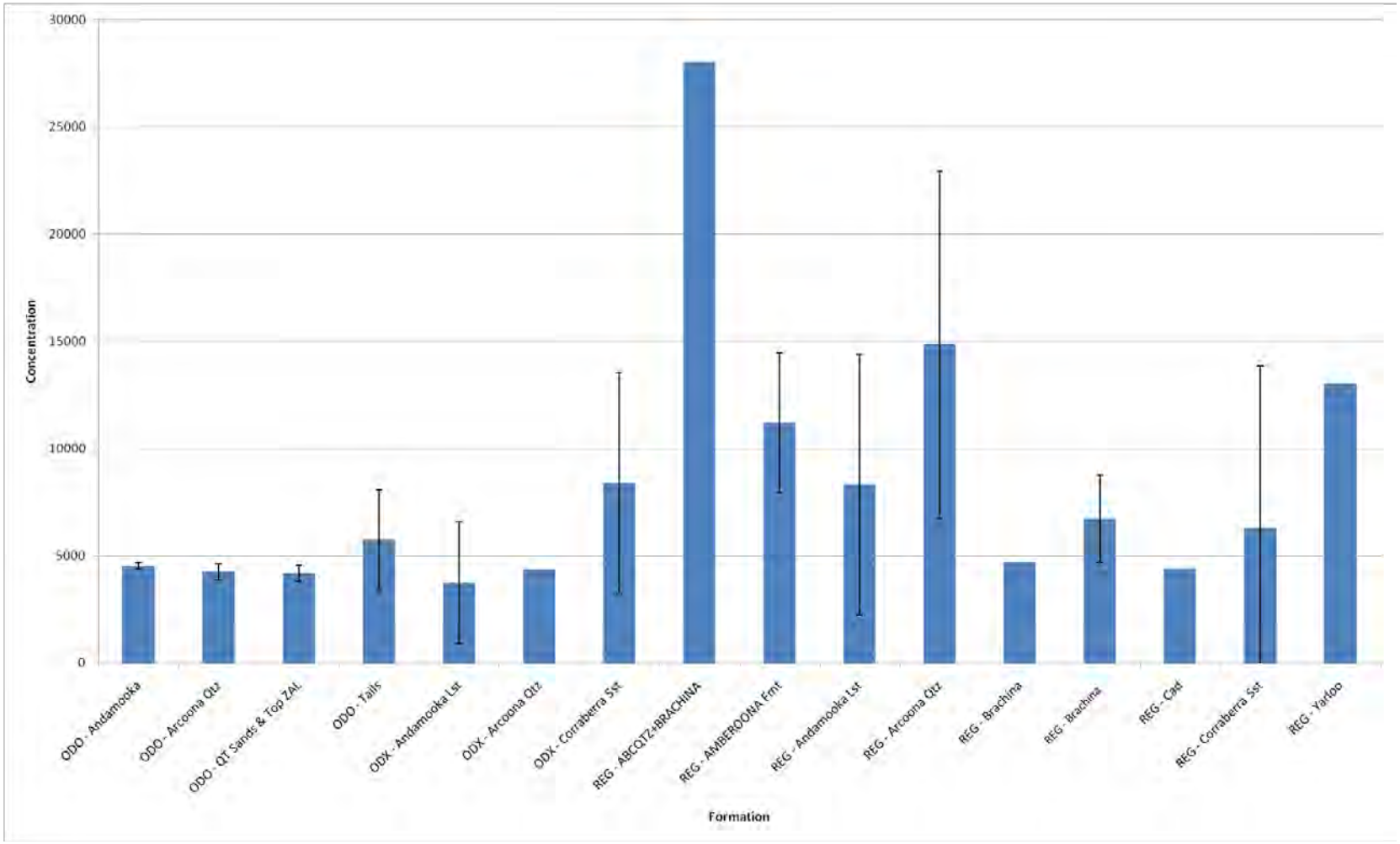
Laboratory measurements of EC and TDS



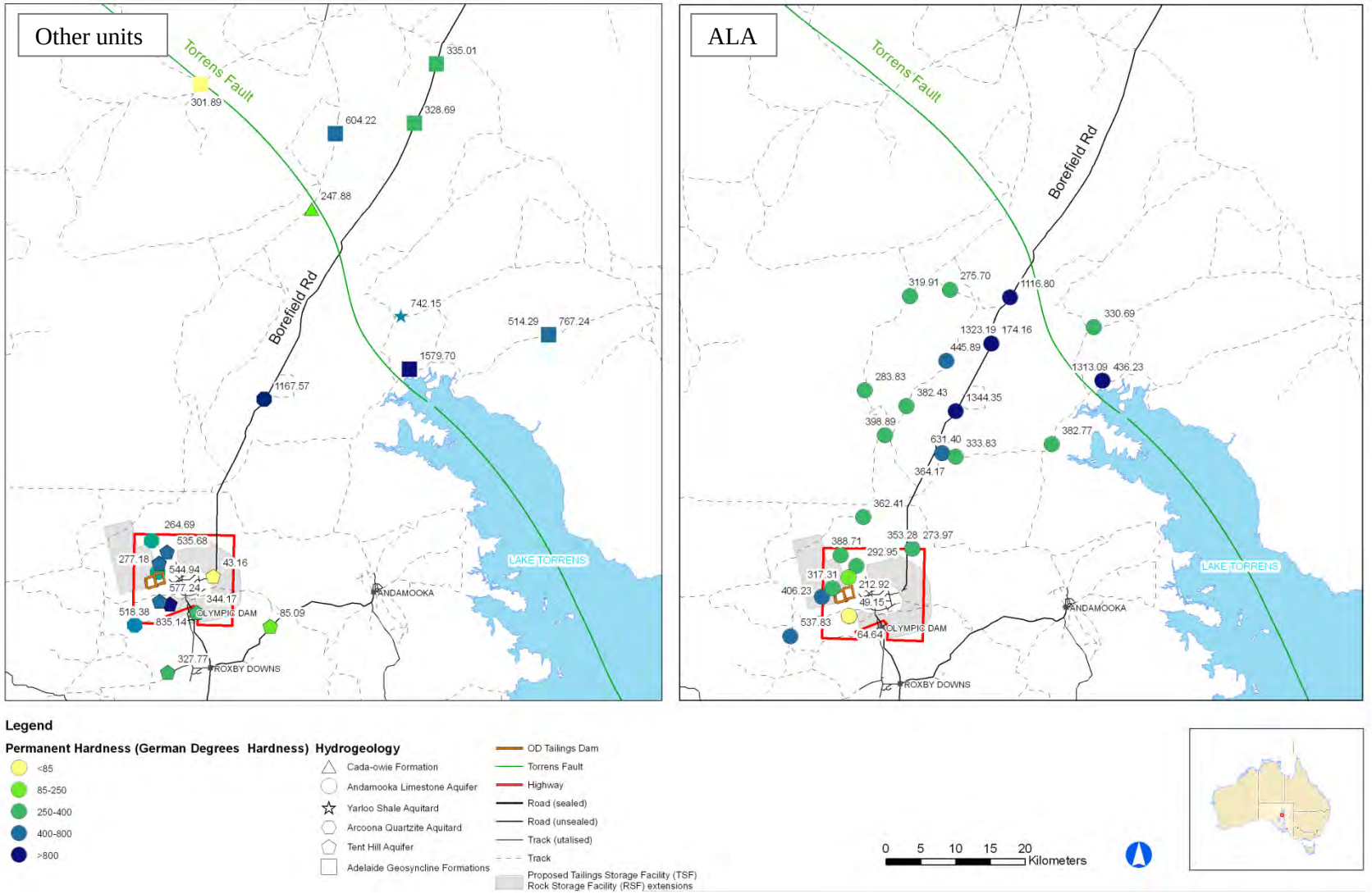
Field redox readings



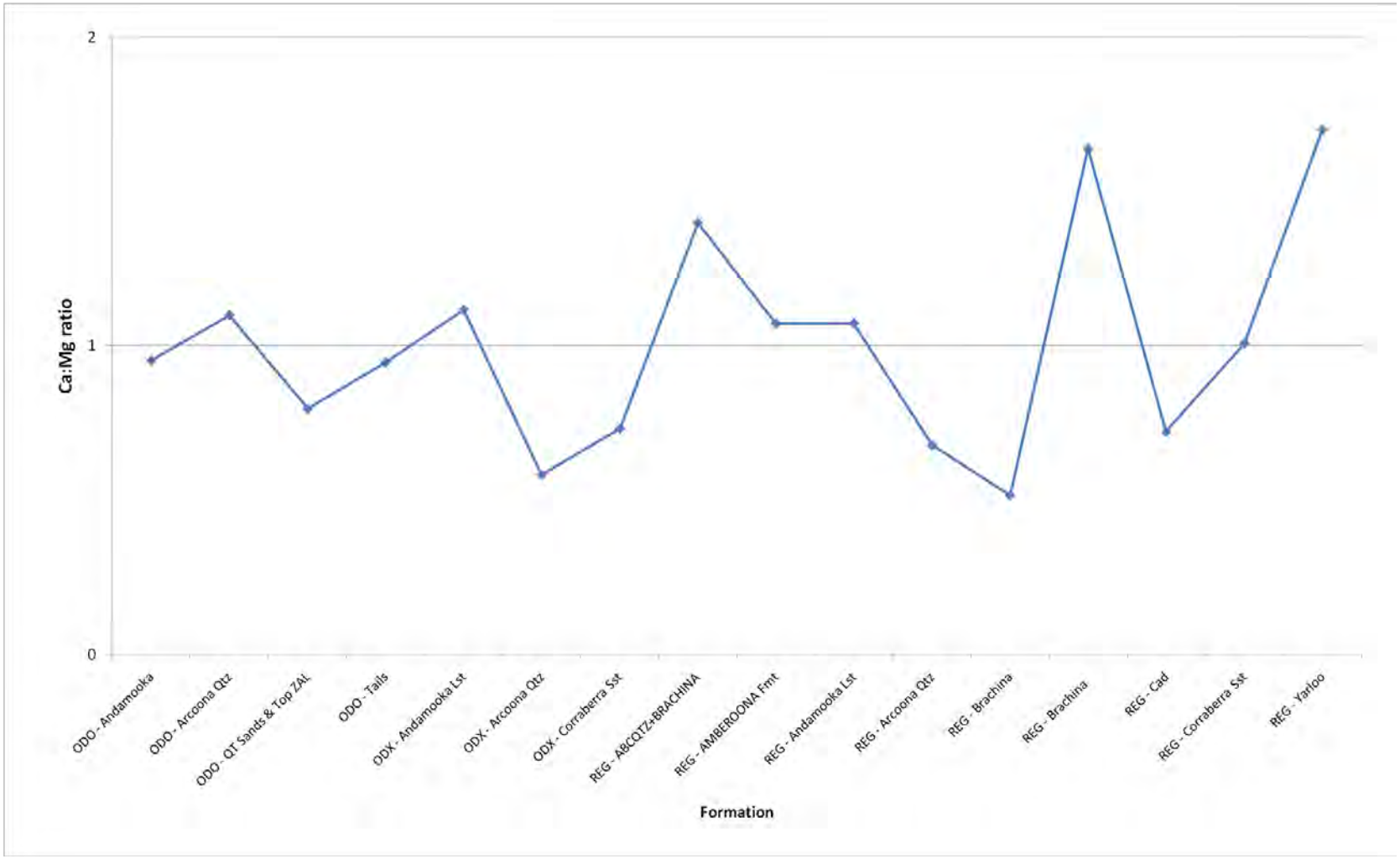
. Concentrations of Permanent Hardness



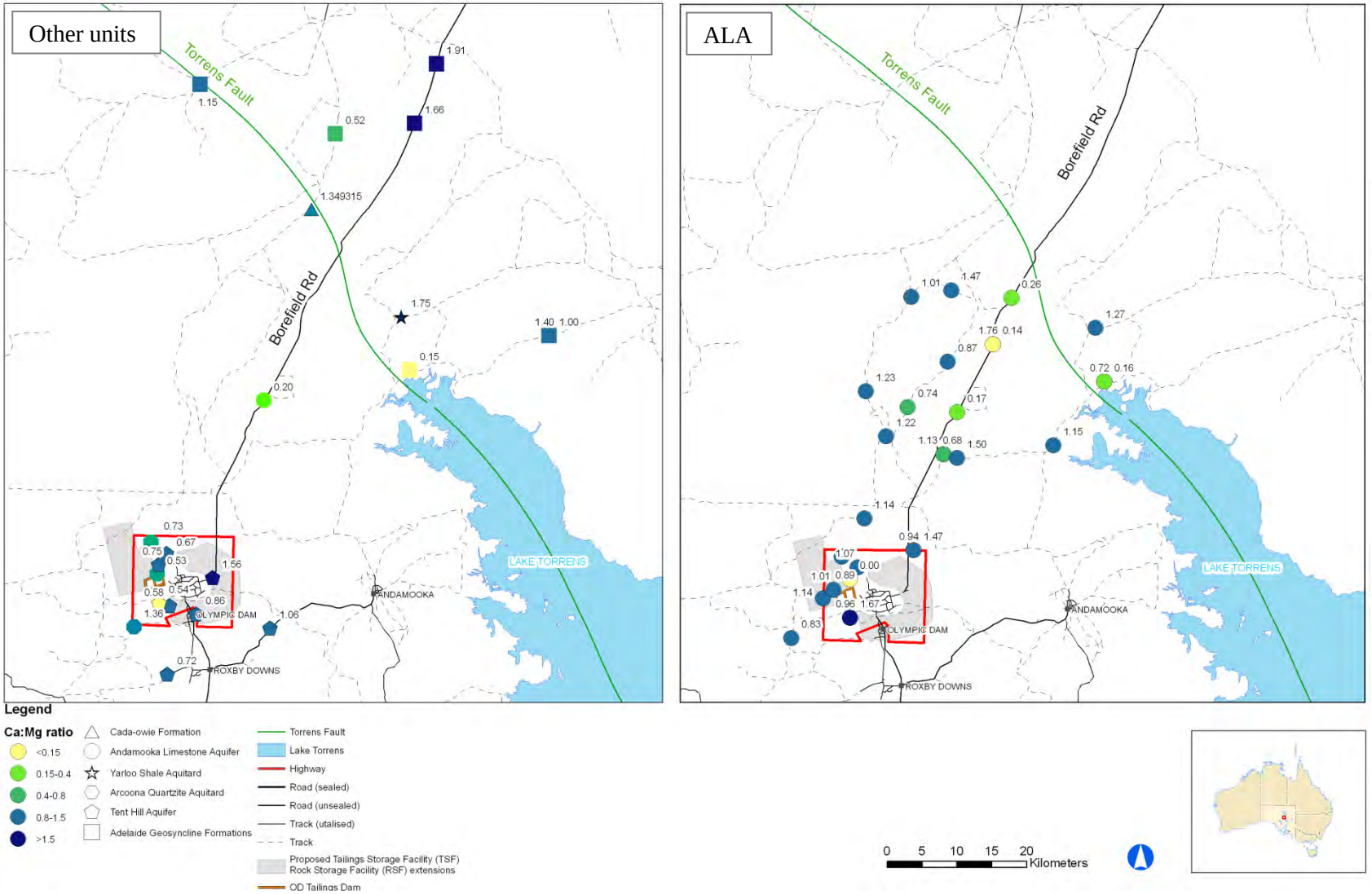
Geographic distribution of groundwater permanent hardness



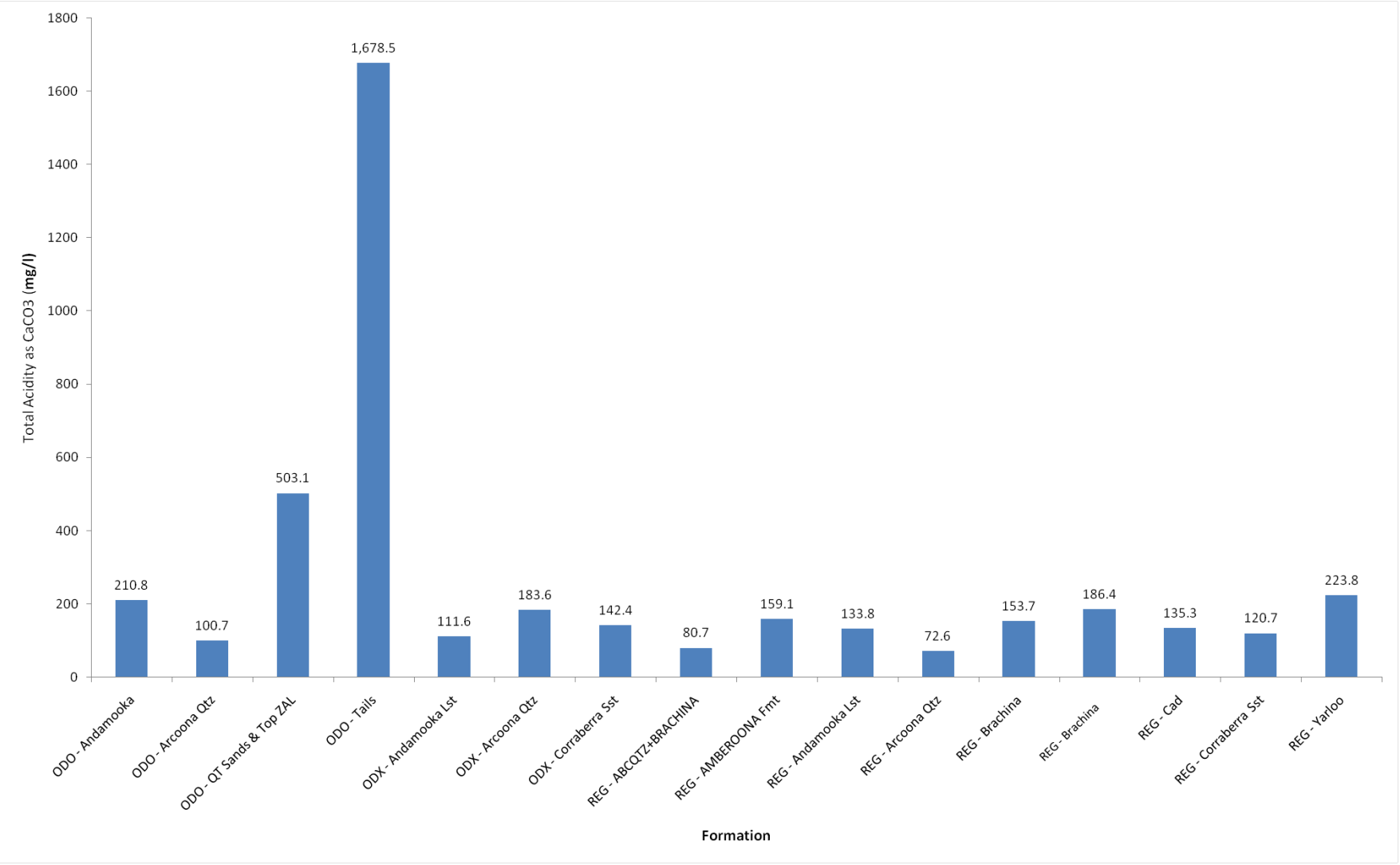
Ca:Mg ratios


2
1
0
Ca:Mg ratio
ODO - Andamooka
ODO - Arcoona Qtz
ODO - QT Sands & Top ZAL
ODO - Tails
ODX - Andamooka Lst
ODX - Arcoona Qtz
ODX - Corraberra Sst
REG - ABCQTZ+BRACHINA
REG - AMBEROONA Fmt
REG - Andamooka Lst
REG - Arcoona Qtz
REG - Brachina
REG - Brachina
REG - Cad
REG - Corraberra Sst
REG - Yarloo
Formation

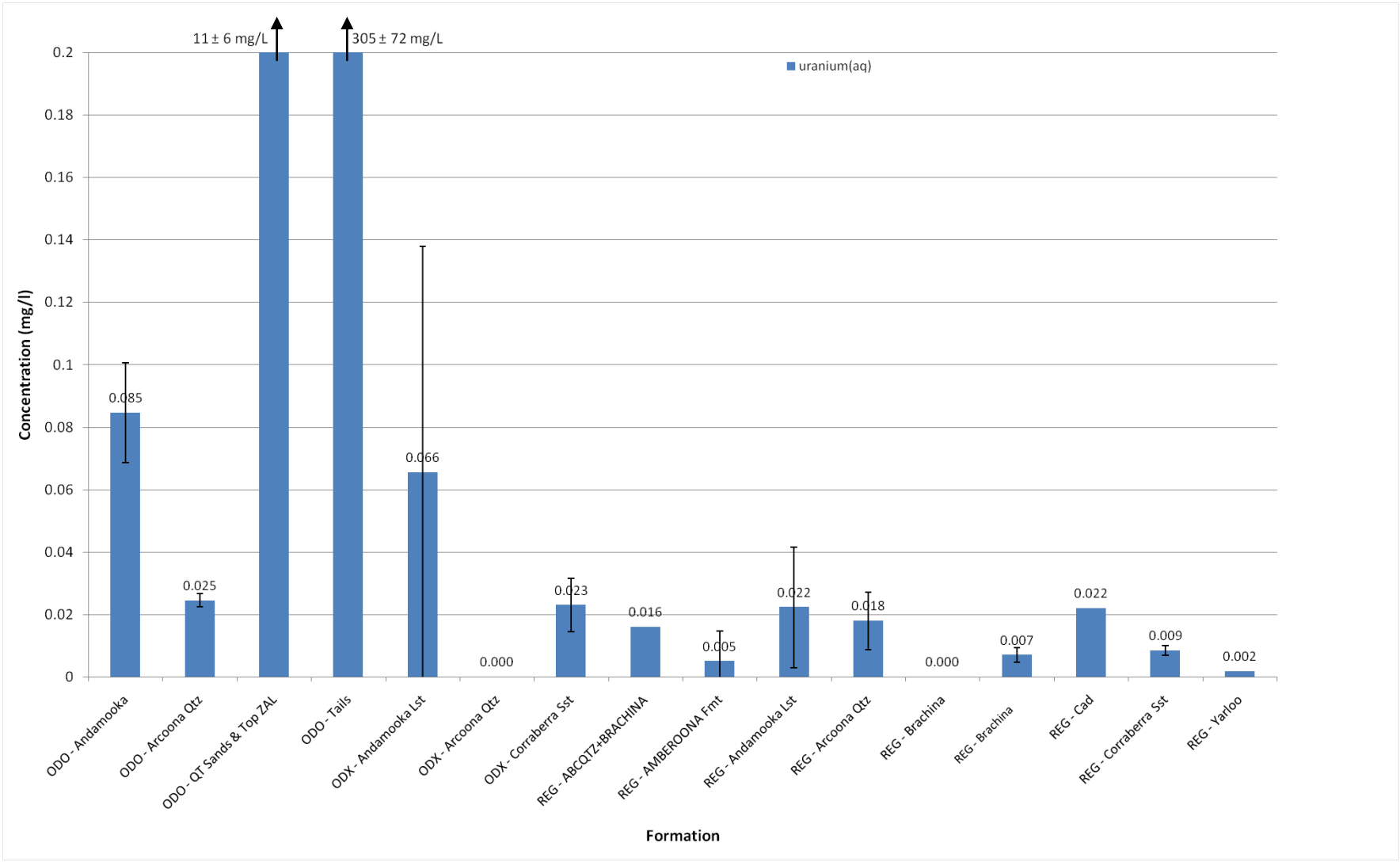
Geographic distribution of groundwater Ca:Mg ratios



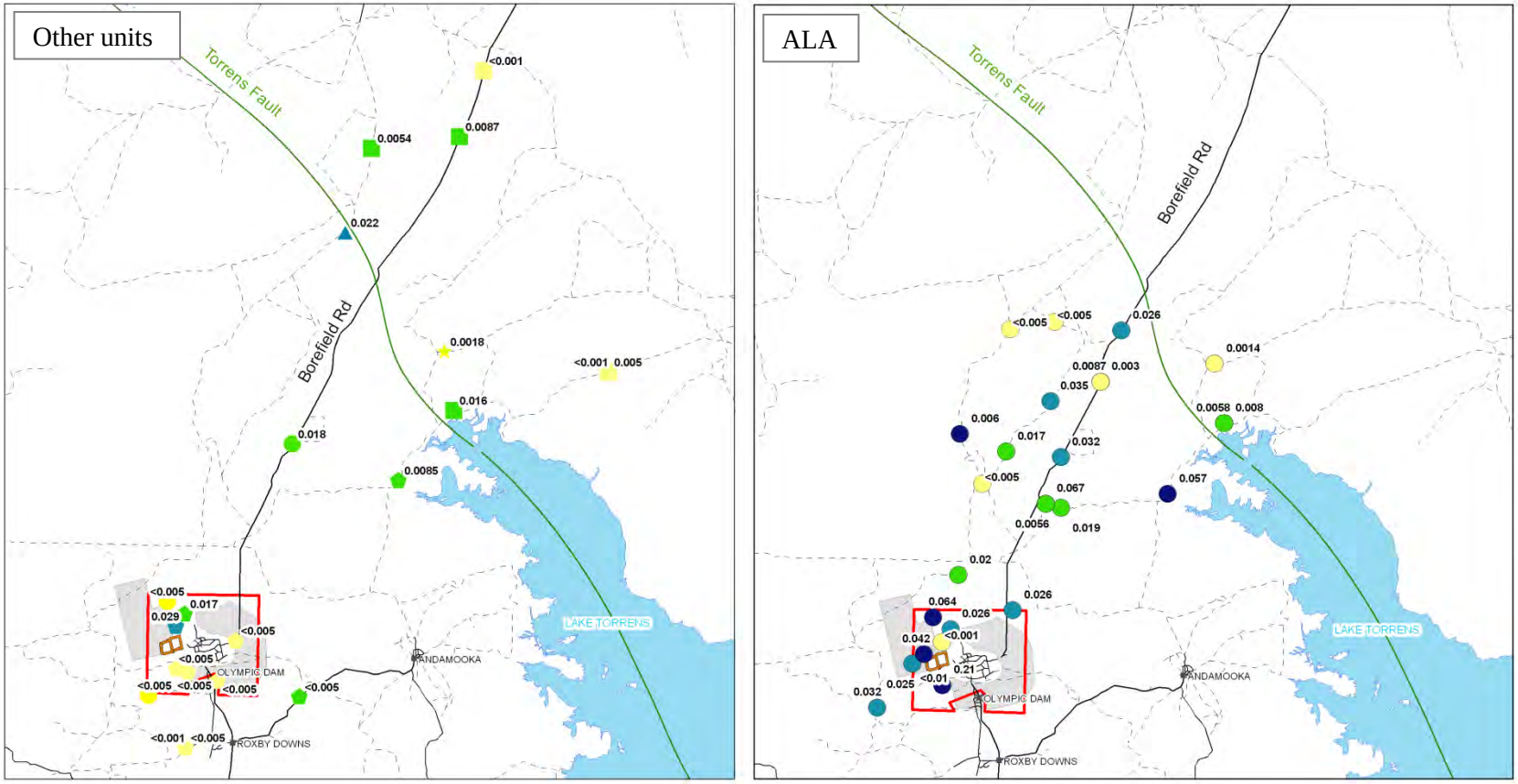
Total Acidity



Average uranium (aqueous) concentrations in key hydrogeological units



Geographical distribution of uranium (aq) concentrations in groundwater



Client: BHP-Billiton
Job Name: BHP-B Baseline GW Survey
Project No: VE30064

Date: July - Sep 2008
Levels by: SKM

Monitoring Well	Program	Screened Lithology	Date sampled	SWL (m)	pH	Laboratory pH	Electrical Conductivity (uS/cm)	Laboratory EC (uS/cm)	TDS (mg/L)	Laboratory TDS (mg/L)	TDS/EC	Redox (mV)	Temperature (°C)	Appearance
H1_1	Existing TSF	TAILS	21/07/2008	11.92	3.49	3.40	34900	38400	22685	99300	2.85	251	12.9	Dark red, turbid
H1_2	Existing TSF	TAILS	21/07/2008	11.46	3.16	3.30	32300	37400	20995	96200	2.98	250	15.8	Dark red/maroon
H3_1	Existing TSF	QT SANDS & ALA	21/07/2008	3.86	6.19	6.30	42800	39300	27820	31100	0.73	-36	16.1	Pale brown/orange, turbid
H3_2	Existing TSF	TAILS	21/07/2008	10.02	3.93	3.40	31300	34000	20345	78500	2.51	226	14.4	Dark red/maroon
H4_2	**Existing TSF**	**TAILS**	**21/07/2008**	**1.43**	**4.23**	**4.00**	**22700**	**35300**	**14755**	**71600**	**3.15**	**166**	**12.1**	**Dark red, thick slurry**
LP2	Existing TSF	ALA	4/09/2008	N/A	6.71	6.70	29400	25200	19110	22000	0.75	19	19.4	Clear, no odour
QT2	Existing TSF	Arcoona	4/09/2008	83.17	8.60	8.30	50900	39200	33085	38000	0.75	-258	21.7	Clear, dark grey tinge, H_2S odour
LR1	Proposed ODX TSF/RSF	ALA	27/07/2008	55.32	6.60	7.13	34900	36600	22685	26900	0.77	118	10.6	Clear
LR2	Proposed ODX TSF/RSF	ALA	30/07/2008	55.58	7.74	7.20	30300	22600	19695	18000	0.59	82	20.0	Clear, no odour
LT19	Proposed ODX TSF/RSF	ALA	28/07/2008	48.96	6.07	7.13	37500	39000	24375	28800	0.77	111	9.5	Slightly cloudy/clear
LT41	Proposed ODX TSF/RSF	ALA	28/07/2008	51.69	6.31	7.12	32300	34200	20995	24800	0.77	127	9.7	Clear
PT15	Proposed ODX TSF/RSF	THA	12/08/2008	50.20	6.62	7.10	89200	67900	57980	65000	0.73	-49	19.6	Clear with fine black particles
PT17	Proposed ODX TSF/RSF	THA	17/08/2008	93.01	7.38	7.90	3710	3470	2412	2800	0.75	-117	23.5	Clear with grey tinge, strong hydrocarbon odour
PT24a	Proposed ODX TSF/RSF	ALA	28/07/2008	57.38	8.14	8.01	3570	6690	2321	2190	0.61	118	11.7	Clear, no odour
PT24b	Proposed ODX TSF/RSF	THA	12/08/2008	57.52	7.81	7.20	N/A*	60200	-	43000	-	-50	17.7	Clear with fine black particles
QR1	Proposed ODX TSF/RSF	Arcoona	13/08/2008	56.48	7.02	7.30	31600	27900	20540	24000	0.76	-108	22.8	Clear, no odour
QR2	Proposed ODX TSF/RSF	Arcoona	-	-	-	-	-	-	-	-	-	-	-	NOT SAMPLED
RT16a	Proposed ODX TSF/RSF	ALA	27/07/2008	59.33	6.91	7.08	30600	31200	19890	23300	0.76	-176	9.5	Clear
RT16b	Proposed ODX TSF/RSF	THA	17/08/2008	70.23	6.84	7.20	71800	62000	46670	55000	0.77	-53	22.9	Pale orange, slightly turbid
RT17a	Proposed ODX TSF/RSF	ALA	27/07/2008	52.84	10.80	11.10	32500	33800	21125	24100	0.74	-78	12.1	Clear, no odour
RT17b	Proposed ODX TSF/RSF	THA	17/08/2008	70.24	7.28	7.70	85500	65300	55575	60000	0.70	-64	19.8	Clear, slight H_2S
LR10	Regional hydrogeology	ALA	20/08/2008	12.59	6.52	7.10	14480	37500	9412	37000	2.56	-23	23.7	Clear, slightly cloudy, no odour
LR4	Regional hydrogeology	Arcoona	-	62.82	7.52	-	14600	-	9490	-	-	-3	22.4	Partially DRY, enough to sample field parameters, clear, slightly cloudy - pale orange
LR8	Regional hydrogeology	ALA	30/07/2008	54.66	7.68	7.10	47900	33500	31135	30000	0.63	-16	18.4	Slightly cloudy - clear
LR9	Regional hydrogeology	ALA	31/07/2008	39.16	6.65	6.60	39200	30900	25480	29000	0.74	9	21.5	Clear, no odour
MAR_7	Regional hydrogeology	ALA	8/09/2008	69.14	7.36	7.20	30200	28900	19630	23000	0.76	-72	24.3	Clear, moderate H_2S odour
MAR3_20	Regional hydrogeology	ALA	17/08/2008	69.81	6.18	6.70	250000	80800	162500	250000	1.00	16	25.4	Pale orange/brown, turbid
MAR4_20a	Regional hydrogeology	ALA	17/08/2008	69.72	6.75	7.00	39000	33200	25350	28000	0.72	-78	24.8	Turbid, pale grey, moderate H_2S odour
MAR4_20b	Regional hydrogeology	ALA	17/08/2008	71.86	6.88	7.00	105400	81100	68510	80000	0.76	-75	26.5	Grey/black, turbid, slight H_2S odour
PT03_4b	Regional hydrogeology	Arcoona	10/08/2008	50.00	9.66	9.30	64100	57600	41665	52000	0.81	-209	20.2	Clear with fine black particles
PT09	Regional hydrogeology	THA	14/08/2008	47.16	6.69	7.00	47800	34400	31070	33000	0.69	-77	18.9	Clear with fine black particles, hydrocarbon odour
PT14	Regional hydrogeology	THA	11/08/2008	63.02	7.91	7.10	35900	33600	23335	29000	0.81	-43	18.6	Clear with fine black particles
PT31	Regional hydrogeology	THA	17/08/2008	66.05	6.40	7.20	N/A	20500	-	15000	-	-66	23.1	Clear with grey tinge, strong hydrocarbon odour
PT40	Regional hydrogeology	ALA	17/08/2008	67.82	5.76	7.00	236000	135000	153400	220000	0.93	48	22.9	Cloudy white/pale brown, no odour
PT42	Regional hydrogeology	ALA	19/08/2008	57.86	6.67	7.10	31700	55400	20605	59000	1.86	40	21.0	Pale orange/brown, no odour
PT44	Regional hydrogeology	ALA	19/08/2008	35.17	6.52	7.00	69800	44200	45370	51000	0.73	-73	21.4	Clear, H_2S odour
PT45	**Regional hydrogeology**	**ALA**	**18/08/2008**	**36.57**	**6.77**	**7.10**	**33000**	**31300**	**21450**	**30000**	**0.91**	**-88**	**23.5**	**Cloudy grey, H_2S odour**
PT48	Regional hydrogeology	ALA	18/08/2008	52.76	6.51	7.00	38700	32700	25155	29000	0.75	-68	20.8	Clear, no odour
PT51	Regional hydrogeology	ALA	18/08/2008	40.07	6.90	7.30	52200	44100	33930	40000	0.77	-45	24.2	Clear, no odour
PT60	Regional hydrogeology	ALA	17/08/2008	75.83	6.90	6.90	33700	29300	21905	24000	0.71	-86	21.6	Clear, moderate H_2S odour
PT62	Regional hydrogeology	Cadnowie	9/09/2008	50.05	6.62	6.90	35400	31200	23010	25000	0.71	-64	19.3	Clear, no odour
PT63	Regional hydrogeology	BRACHINA Fmt	9/09/2008	8.09	6.72	7.20	91900	77000	59735	77000	0.84	-7	24.0	Clear, no odour
PT64	Regional hydrogeology	BRACHINA Fmt	-	N/A	-	-	-	-	-	-	-	-	-	DRY - Not Sampled
PT66	Regional hydrogeology	ALA	19/08/2008	75.61	6.66	7.00	184900	20100	120185	260000	1.41	6	26.5	Pale brown, no odour
RT01	Regional hydrogeology	THA	1/09/2008	10.47	6.97	6.90	179000	132000	116350	200000	1.12	263	24.3	Clear, no odour
RT02b	Regional hydrogeology	Arcoona	17/08/2008	62.00	6.45	6.90	249000	80800	161850	220000	0.88	74	24.4	Pale brown, frothy, drilling fluid odour
RT03	Regional hydrogeology	ALA	19/08/2008	59.86	6.78	7.20	22800	20200	14820	20000	0.88	-88	21.7	Pale grey/clear, hydrocarbon odour
RT04a	**Regional hydrogeology**	**ALA**	**2/09/2008**	**32.32**	**7.07**	**7.20**	**41600**	**35600**	**27040**	**31000**	**0.75**	**1**	**23.7**	**Clear, minoir drilling fluid odour**
RT04b	Regional hydrogeology	Yarloo	3/09/2008	36.13	7.32	6.90	168800	124000	109720	170000	1.01	42	24.1	Yellowish discolouration. No odour
RT05a	Regional hydrogeology	ALA	20/08/2008	9.63	6.65	6.90	34000	55500	22100	53000	1.56	-94	22.4	Clear, no odour
RT05b	Regional hydrogeology	ALA	20/08/2008	21.58	7.35	8.10	N/A*	130000	-	260000	-	39	23.2	Clear no odour, very salty
RT05c	Regional hydrogeology	ABCQTZ+BRACHINA	1/09/2008	18.61	6.54	6.50	199000	140000	129350	240000	1.21	18	22.9	Clear, slightly cloudy, no odour
RT07a	Regional hydrogeology	AMBEROONA Fmt	21/08/2008	12.93	6.54	7.00	N/A*	56900	-	55000	-	-8	16.3	Clear, no odour
RT07b	Regional hydrogeology	AMBEROONA Fmt	2/09/2008	16.00	7.23	6.90	154700	120000	100555	150000	0.97	-27	18.4	Dark grey, strong drilling fluid odour
RT09	Regional hydrogeology	BRACHINA Fmt	3/09/2008	16.49	6.95	7.00	37200	30500	24180	26000	0.70	-68	22.8	Clear, H_2S odour
RT41	Regional hydrogeology	BRACHINA Fmt	10/09/2008	19.55	6.62	7.10	57600	52500	37440	41000	0.71	-114	24.5	Clear, strong H_2S odour
RT42	Regional hydrogeology	BRACHINA Fmt	10/09/2008	6.46	6.88	7.40	53300	48700	34645	37000	0.69	-87	26.1	Clear, strong H_2S odour

Notes:
* EC probe malfunction, no EC recorded for monitoring well
ALA - Andamooka Limestone Aquifer
Arcoona - Arcoona Quartzite Aquitard
THA - Tent Hill Aquifer
Yarloo - Yarloo Shale
J-K - Cadna-owie/Algebuckina
Kmb - Bulldog Shale
SWL - Standing Water Level

								Existing TSF											
								Andamooka Lst			Arcoona Qtz			QT SANDS & top ZAL		TAILS			
							Sample	LP2	DUP 6	TRIPLICATE 3	QT2	DUP 8	TRIPLICATE 5	H3-1	H3-1	H1-1	H3-2	H1-1	H3-2	H4-2	H1-2
							Date	4/09/2008	4/09/2008	4/09/2008	4/09/2008	9/09/2008	10/09/2008	17/06/2008	23/07/2008	17/06/2008	17/06/2008	23/07/2008	23/07/2008	23/07/2008	23/07/2008
							Lab Report	08ENME0023714	08ENME0023714	ES0813041	08ENME0023714	08ENME0024196	ES0813178001	E038205	E038811	E038205	E038205	E038811	E038811	E038811	E038811
							Laboratory	Labmark	Labmark	ALS	Labmark	Labmark	ALS	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark
							Duplication		Intra-lab	Inter-lab		Intra-lab	Inter-lab								
Analyte	Units	Labmark LOR	ALS LOR	SA EPA (2003) Environmental Protection Policy - Marine Waters 95% Species Protection	SA EPA (2003) Environmental Protection Policy - Potable Water	ANZECC (2000) Aquatic Ecosystems - Marine Waters 95% Species Protection	ANZECC (2000) Aquatic Ecosystems - Marine Waters 90% Species Protection												
pH Value and Total Dissolved Solids																			
pH	pH Unit	0.1	0.01		6.5-8.5			6.7	6.8	6.74	8.3	7	6.77	6.3	6.3	3.5	3.5	3.4	3.4	4	3.3
TDS	mg/L	1	1					22000	23000	21000	38000	25000	23600	33700	31100	96900	73100	99300	78500	71600	96200
Electrical conductivity	uS/cm	1	1					25200	25400	29400	39200	31200	33000	41700	39300	37800	33200	38400	34000	35300	37400
Alkalinity																			
Hydroxide as CaCO3	mg/L	5	1					-	-	<1	-	-	<1	<5	<5	<5	<5	<5	<5	<5	<5
Carbonate as CACO3	mg/L	5	1					<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5
Bicarbonate as CACO3	mg/L	5	1					920	940	949	140	340	258	1780	1920	<5	<5	<5	<5	<5	<5
Total Alkalinity as CACO3	mg/L	5	1					920	940	949	140	260	258	1780	1920	<5	<5	<5	<5	<5	<5
Dissolved Major Cations																			
Calcium	mg/L	0.1	1					800	799	785	469	791	769	807	755	894	697	738	669	627	690
Iron	mg/L	0.1	0.05					15.6	15.6	14.2	0.115	5.12	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	0.1	1					850	852	801	877	577	552	1010	948	1590	518	839	492	1660	597
Sodium	mg/L	0.1	1					6510	6330	6610	14400	7620	7620	3720	9330	8370	3100	3810	3330	3700	3810
Potassium	mg/L	0.1	1					61	62	63	86	110	98	780	26.6	200	800	655	730	527	752
Total Metals																			
Iron	mg/L	0.1	0.01										5.69	7690	117	327	7420	7380	6550	8020	7460
Dissolved Metals																			
Aluminium	mg/L	0.001	0.01					0.024	0.018	0.02	0.039	0.0034	<0.01	9.6	0.39	13000	8200	10000	6600	3900	8200
Antimony	mg/L	0.001	0.001	0.5	0.003			<0.001	<0.001	<0.001	<0.001	<0.001	0.004	0.0034	<0.001	<0.001	0.0012	<0.001	0.0013	0.0013	<0.001
Arsenic	mg/L	0.001	0.001	0.05	0.007			<0.001	<0.001	<0.001	<0.001	0.024	0.016	<0.001	<0.005	0.026	0.0082	0.05	0.0091	0.047	<0.005
Barium	mg/L	0.001	0.001		0.7			0.018	0.019	0.016	0.029	0.048	0.043	0.02	0.019	0.07	0.045	0.062	0.033	0.023	0.038
Beryllium	mg/L	0.001	0.001					<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.001	<0.005	0.25	0.34	0.56	0.47	0.31	0.54
Boron	mg/L	0.001	0.05		0.3			12	12	6.47	6	7.1	3.92	23	33	1.9	3.3	1.4	6.1	1.8	2
Cadmium	mg/L	0.0002	0.0001	0.002	0.002			<0.0002	<0.0002	0.0009	<0.0002	<0.0002	<0.0001	0.0004	<0.002	0.018	0.015	0.27	0.2	0.14	0.24
Chromium	mg/L	0.001	0.001	0.0044^	0.05^			0.0068	0.0087	<0.001	0.0027	0.0016	<0.001	0.06	-	0.87	0.32	-	-	-	-
Cobalt	mg/L	0.001	0.001			0.001	0.014	0.067	0.066	0.054	<0.001	0.0047	0.004	1.6	1.8	48	27	75	43	56	69
Copper	mg/L	0.001	0.001	0.01	2			0.084	0.093	0.088	0.0067	0.0053	0.006	1	0.84	450	5.8	500	9.7	4.3	280
Lead	mg/L	0.001	0.001	0.005	0.01			<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	0.013	0.086	0.031	0.99	0.029	0.2	0.029
Lithium	mg/L	0.001	0.001					0.88	0.87	0.856	0.91	0.56	0.484	0.95	0.62	13	9.7	21	16	1.4	20
Manganese	mg/L	0.001	0.001		0.5			2.8	2.7	2.2	1.6	0.86	0.818	8.9	16	160	94	200	140	240	160
Molybdenum	mg/L	0.001	0.001		0.05			<0.001	<0.001	<0.001	0.0024	0.0019	0.006	0.0072	<0.005	0.0057	0.004	<0.005	<0.005	0.047	<0.005
Nickel	mg/L	0.001	0.001	0.015	0.02			0.031	0.029	0.015	0.0059	0.02	0.01	0.3	0.32	6.1	3.5	9.7	5.7	7.7	8.6
Selenium	mg/L	0.001	0.01	0.07	0.01			0.038	0.036	<0.010	0.07	0.044	0.01	0.065	0.12	5.6	3.5	6.7	5.5	3.5	6.3
Strontium	mg/L	0.001	0.001					14	13	13.2	9.4	15	13	23	24	4	3.9	4.9	4.5	8.7	4.9
Thallium	mg/L	0.001	0.001	0.02				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	0.0076	0.0039	0.0077	4.5	<0.005	<0.005
Thorium	mg/L	0.001	0.001					-	-	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-
Tin	mg/L	0.001	0.001					<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.0044	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005
Titanium	mg/L	0.001	0.01					0.0038	0.0029	<0.01	0.0068	0.0025	<0.01	0.0067	0.021	0.026	0.037	0.022	0.049	0.02	0.054
Uranium	mg/L	0.001	0.001		0.02			0.074	0.077	0.103	<0.001	0.023	0.026	1.9	11	330	200	320	250	400	330
Vanadium	mg/L	0.001	0.01			0.1	0.16	0.0014	0.0017	<0.01	<0.001	<0.001	<0.01	0.019	0.018	0.64	0.34	0.88	0.42	0.52	0.82
Zinc	mg/L	0.001	0.005	0.05				0.079	0.076	0.046	0.019	0.024	0.018	0.15	0.38	28	19	50	32	31	0.047
Gold	mg/L	0.01	0.001					-	-	0.001	-	-	<0.001	<0.01	-	<0.01	<0.01	-	-	-	-
Silica																			
Silica	mg/L	1	0.1					29.5	29.3	29.8	6.9	18.6	15.2	74	-	7.5	87	-	-	-	-
Sulphate																			
Sulphate	mg/L	2	1		500			4300	4100	4020	4500	2600	4420	12200	9900	32200	26100	49300	39100	39900	47300
Chloride																			
Chloride	mg/L	1	1					5700	5500	9020	13000	10000	11600	12500	9040	3180	2690	4370	4050	4200	4340
Fluoride																			
Fluoride	mg/L	0.1	0.1		1.5			1.5	1.5	2.2	<0.5	<0.5	1	10.9	10.4	11700	9480	13400	8990	5010	10400
Total Kjeldahl Nitrogen as N																			
TKN as N	mg/L	1	0.1	5				9.4	11	4.4	2.9	<1	1.2	32.7	15.6	168	182	98.6	70.3	2.1	120
Ionic Balance																			
Total Anions	meq/L		0.01					-268	-258	-357	-467	-345	-428	-640	-496	-1377	-1120	-1857	-1403	-1215	-1657
Total Cations	meq/L		0.01					395	388	395	725	422	418	718	529	2017	1547	1804	1328	1217	1588
Ionic Balance	%		0.01					19.3	20.1	5.1	21.6	9.9	-1.1	5.7	3.3	18.8	16.0	-1.5	-2.7	0.1	-2.1
Total Organic Carbon (TOC)																			
Total Organic Carbon	mg/L	1	1	10				3.4	3.4	4	2.7	3.4	4	57	65	28	26	30	26	24	24
Nitrite as N																			
NO2-N	mg/L	0.5	0.01		1			<0.5	<0.5	<0.01	<0.5	<0.5	<0.01	-	0.04	-	-	0.02	<0.01	0.04	0.01
Nitrate as N																			
NO3-N	mg/L	0.5	0.01		10			<0.5	<0.5	<0.01	<0.5	<0.5	<0.01	10.4	10.2	0.02	0.02	0.01	<0.01	0.01	0.02
Total Nitrogen (as N)																			
Total Nitrogen (as N)	mg/L	2	0.1	5				9	11	4.4	3	<2	1.3	43.1	25.8	168	182	98.6	70.3	2.2	121

Notes
LOR - Limit of reporting
- Not Analysed
* Raised LOR
^ Guideline is for Hexavalent Chromium (Cr VI)
^^ Guideline is for 90% Protection

Sample in excess of the adopted guideline - (SA EPA 2003) - Marine Waters 95% Level Species Protection
Sample in excess of the adopted guideline - (SA EPA 2003) - Potable Water
Sample in excess of the adopted guideline - (ANZECC 2000) - Marine Waters 95% Level Species Protection
Sample in excess of the adopted guideline - (ANZECC 2000) - Marine Waters 90% Level Species Protection

Proposed ODX TSF/RSF

Analyte	Units	Labmark LOR	ALS LOR	SA EPA (2003) Environmental Protection Policy - Marine Waters 95% Species Protection	SA EPA (2003) Environmental Protection Policy - Potable Water	ANZECC (2000) Aquatic Ecosystems - Marine Waters 95% Species Protection	ANZECC (2000) Aquatic Ecosystems - Marine Waters 90% Species Protection
pH Value and Total Dissolved Solids							
pH	pH Unit	0.1	0.01		6.5-8.5		
TDS	mg/L	1	1				
Electrical conductivity	uS/cm	1	1				
Alkalinity							
Hydroxide as CaCO3	mg/L	5	1				
Carbonate as CACO3	mg/L	5	1				
Bicarbonate as CACO3	mg/L	5	1				
Total Alkalinity as CACO3	mg/L	5	1				
Dissolved Major Cations							
Calcium	mg/L	0.1	1				
Iron	mg/L	0.1	0.05				
Magnesium	mg/L	0.1	1				
Sodium	mg/L	0.1	1				
Potassium	mg/L	0.1	1				
Total Metals							
Iron	mg/L	0.1	0.01				
Dissolved Metals							
Aluminium	mg/L	0.001	0.01				
Antimony	mg/L	0.001	0.001	0.5	0.003		
Arsenic	mg/L	0.001	0.001	0.05	0.007		
Barium	mg/L	0.001	0.001		0.7		
Beryllium	mg/L	0.001	0.001				
Boron	mg/L	0.001	0.05		0.3		
Cadmium	mg/L	0.0002	0.0001	0.002	0.002		
Chromium	mg/L	0.001	0.001	0.0044^	0.05^		
Cobalt	mg/L	0.001	0.001			0.001	0.014
Copper	mg/L	0.001	0.001	0.01	2		
Lead	mg/L	0.001	0.001	0.005	0.01		
Lithium	mg/L	0.001	0.001				
Manganese	mg/L	0.001	0.001		0.5		
Molybdenum	mg/L	0.001	0.001		0.05		
Nickel	mg/L	0.001	0.001	0.015	0.02		
Selenium	mg/L	0.001	0.01	0.07	0.01		
Strontium	mg/L	0.001	0.001				
Thallium	mg/L	0.001	0.001	0.02			
Thorium	mg/L	0.001	0.001				
Tin	mg/L	0.001	0.001				
Titanium	mg/L	0.001	0.01				
Uranium	mg/L	0.001	0.001		0.02		
Vanadium	mg/L	0.001	0.01			0.1	0.16
Zinc	mg/L	0.001	0.005	0.05			
Gold	mg/L	0.01	0.001				
Silica							
Silica	mg/L	1	0.1				
Sulphate							
Sulphate	mg/L	2	1		500		
Chloride							
Chloride	mg/L	1	1				
Fluoride							
Fluoride	mg/L	0.1	0.1		1.5		
Total Kjeldahl Nitrogen as N							
TKN as N	mg/L	1	0.1	5			
Ionic Balance							
Total Anions	meq/L		0.01				
Total Cations	meq/L		0.01				
Ionic Balance	%		0.01				
Total Organic Carbon (TOC)							
Total Organic Carbon	mg/L	1	1	10			
Nitrite as N							
NO2-N	mg/L	0.5	0.01		1		
Nitrate as N							
NO3-N	mg/L	0.5	0.01		10		
Total Nitrogen (as N)							
Total Nitrogen (as N)	mg/L	2	0.1	5			

	Andamooka Lst								Arcoona Qtz	Corraberra Sst					ABCQTZ+BRACHINA	AMBEROONA Fmt						
Sample	LT19	LT41	LR1	LR 2	RT16a	RT17a	PT24a	PT24A	QR1	PT15	PT17	RT16B	RT17B	PT24b	RT05C	RTO7A	RT07B	LR 8	DUP1	LR 9	LR10	DUP 5
Date	27/07/2008	27/07/2008	27/07/2008	30/07/2008	27/07/2008	27/07/2008	17/06/2008	28/07/2008	13/08/2008	12/08/2008	17/08/2008	17/08/2008	17/08/2008	12/08/2008	1/09/2008	21/08/2008	2/09/2008	30/07/2008	30/07/2008	31/07/2008	20/08/2008	20/08/2008
Lab Report	EM0806112	EM0806112	EM0806112	08ENME0020073	EM0806112	EM0806112	E038205	ES0810866001	08ENME0021450	08ENME0021450	08ENME0021863	08ENME0021863	08ENME0021863	08ENME0021268	08ENME0023416	08ENME0022255	08ENME0023416	08ENME0020073	08ENME0020073	08ENME0020073	08ENME0022255	08ENME0022255
Laboratory	ALS	ALS	ALS	Labmark	ALS	ALS	Labmark	ALS	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark
Duplication																			Intra lab			Intra-lab
pH Value and Total Dissolved Solids																						
pH	7.13	7.12	7.13	7.2	7.08	11.1	8.2	8.01	7.3	7.1	7.9	7.2	7.7	7.2	6.5	7	6.9	7.1	7.1	6.6	7.1	7.1
TDS	28800	24800	26900	18000	23300	24100	3580	2190	24000	65000	2800	55000	60000	43000	240000	55000	150000	30000	31000	29000	37000	37000
Electrical conductivity	39000	34200	36600	22600	31200	33800	6690	3500	27900	67900	3470	62000	65300	60200	140000	56900	120000	33500	33900	30900	37500	37200
Alkalinity																						
Hydroxide as CaCO3	<1	<1	<1	-	<1	<1	<5	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonate as CACO3	<1	<1	<1	<1	<1	31	<5	<1	<1	<1	<1	<1	<1	<1	0	0	0	<1	<1	<1	0	0
Bicarbonate as CACO3	348	359	263	161	314	4	878	915	200	260	720	253	219.9	320	75	150	91	163	166	339	260	250
Total Alkalinity as CACO3	348	359	263	161	314	35	878	915	200	260	719.97	252.99	219.95	320	75	150	91	163	166	339	260	250
Dissolved Major Cations																						
Calcium	1130	811	935	890	777	1360	62.9	25	555	1520	34.5	1070	1180	978	911	1650	2040	1030	1120	1240	1080	1130
Iron				0.114				-	13.2	15	0.307	7.1	<0.1	5.73	0.555	3.71	3.19	1.28	1.31	5.8	3.23	3.41
Magnesium	991	800	1050	606	725	93	65.8	15	760	2610	22.1	1600	1580	1820	6200	1180	2040	900	982	1490	938	992
Sodium	9210	7380	8670	7120	6580	9360	1390	848	6950	30200	875	18400	20200	22300	117000	17800	57900	10200	11100	9840	11100	11600
Potassium	105	68	83	74	56	217	73	20	290	320	6.1	150	150	160	890	120	630	140	150	120	100	100
Total Metals																						
Iron	1.76	0.52	0.34	-	0.4	1.42	1.21	0.11	-	-	-	-	-	-		-		-	-	-	-	-
Dissolved Metals																						
Aluminium	0.02	0.02	0.06	0.0076	0.02	0.16	7.8	-	<0.005	<0.005	0.041	0.031	0.013	<0.005	0.017	<0.001	0.022	0.0072	0.0079	0.0095	0.0028	<0.001
Antimony	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0018	<0.001	<0.001	<0.001	0.0016	0.0023	0.0014	0.0014	<0.001	<0.001	0.0012	<0.001	<0.001
Arsenic	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	0.0016	0.001	<0.005	<0.005	0.0078	<0.005	<0.005	<0.005	<0.09	<0.001	<0.07	<0.005	<0.005	<0.005	<0.001	<0.001
Barium	0.027	0.012	0.016	0.013	0.011	0.15	0.24	0.228	0.025	0.047	0.37	0.087	0.22	0.083	0.076	0.045	0.1	0.027	0.029	0.018	0.034	0.035
Beryllium	0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Boron	10.8	10.4	8.47	7.1	8.74	0.57	1.5	1.1	9.3	11	1.7	8.4	6.9	7.9	2.8	7.1	3.1	7	6.7	7.6	6.7	6.9
Cadmium	0.0001	<0.0001	0.0003	<0.002	<0.0001	<0.0001	<0.0002	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0002	<0.0002	<0.0002	<0.002	<0.002	<0.002	<0.0002	<0.0002
Chromium	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	0.0086	<0.005	0.0056	0.0058	0.02	<0.005	<0.005	<0.005	0.0028	<0.001	0.002	<0.005	<0.005	<0.005	<0.001	<0.001
Cobalt	0.004	0.001	0.003	<0.005	<0.001	0.001	0.03	<0.001	<0.005	<0.005	<0.005	0.0097	0.0068	<0.005	0.028	0.0016	0.0027	0.0051	0.0052	<0.005	0.0055	0.005
Copper	0.363	0.019	0.068	0.026	0.008	0.008	0.058	0.006	0.0091	0.026	<0.005	0.016	0.015	0.017	0.092	0.021	0.046	0.031	0.032	0.0076	0.01	0.011
Lead	0.006	0.006	0.029	<0.005	0.012	0.006	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.028	0.0011	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Lithium	0.493	0.443	0.32	0.17	0.272	0.9	0.17	0.146	0.27	0.6	0.17	0.59	0.66	0.52	1.6	0.4	4.9	0.23	0.24	0.3	0.37	0.34
Manganese	0.91	0.288	0.542	0.3	0.38	<0.001	0.11	0.002	0.91	0.95	0.13	2.1	1	0.65	2.2	3.7	5.3	0.89	0.91	2.2	0.55	0.53
Molybdenum	0.002	0.001	0.004	<0.005	0.001	0.021	<0.001	0.001	<0.005	<0.005	<0.005	0.0068	0.0054	<0.005	0.012	<0.001	0.0075	<0.005	<0.005	<0.005	<0.001	<0.001
Nickel	0.38	0.007	0.109	0.01	0.004	<0.001	<0.001	0.026	0.0058	0.012	<0.005	0.029	0.018	0.012	0.048	0.018	0.027	0.017	0.017	0.011	0.012	0.014
Selenium	<0.010	<0.010	<0.010	0.028	<0.010	<0.010	<0.001	<0.010	0.038	0.094	0.0093	0.12	0.13	0.091	0.11	0.039	0.083	0.046	0.046	0.051	0.052	0.053
Strontium	17.9	15.4	19.6	12	16.7	17.3	1.3	0.001	14	26	0.81	18	17	15	17	34	44	15	16	16	20	19
Thallium	<0.001	<0.001	<0.001	<0.005	0.001	<0.001	<0.001	0.668	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Thorium	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	-	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	<0.005	-	-
Tin	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0021	<0.001	0.0012	<0.005	<0.005	<0.005	<0.001	<0.001
Titanium	1.19	<0.01	1.2	0.0067	<0.01	1.19	0.0038	<0.001	0.03	0.044	0.0058	0.031	0.024	0.044	0.078	0.02	0.048	0.019	0.019	0.018	0.024	0.025
Uranium	0.025	0.042	0.064	0.026	0.026	<0.001	0.21	<0.01	<0.005	<0.005	<0.005	0.017	0.029	<0.005	0.016	<0.001	0.005	0.02	0.021	0.032	0.057	0.058
Vanadium	<0.01	<0.01	<0.01	<0.005	<0.01	0.02	0.0042	<0.001	<0.005	<0.005	0.012	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Zinc	0.231	0.069	0.104	0.036	0.033	0.067	0.057	<0.01	0.046	0.051	0.15	0.12	0.075	0.065	0.76	0.13	0.094	0.035	0.042	0.046	0.096	0.11
Gold	<0.001	<0.001	<0.001	0.02	<0.001	<0.001	<0.01	<0.001	-	-	-	-	-	<0.001	-	-	-	0.0036	0.0026	0.0066	-	-
Silica																						
Silica	14.6	17.8	15	14	17.7	9.41	30.4	33.5	10.5	13.5	34	15.3	13.3	20	6.4	13.3	6.5	16.5	16.4	16	15	14.9
Sulphate																						
Sulphate	5680	4430	4440	2300	4160	3140	441	82	3500	6100	96	5000	5100	5100	10000	3600	5300	3800	3700	4700	3000	2900
Chloride																						
Chloride	10600	11000	10700	8200	8720	10300	2210	778	9900	28000	680	18000	22000	23000	130000	21000	78000	15000	14000	12000	13000	12000
Fluoride																						
Fluoride	1.6	1.6	1.4	3.2	1.7	0.2	4	3.6	<0.5	5.6	3.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.8	1.7	1.8	<0.5	<0.5
Total Kjeldahl Nitrogen as N																						
TKN as N	-	-	-	<1	-	-	0.1	<0.1	<1	1.9	3	2.5	1.6	<1	<1	<1	6.5	<1	<1	<1	<1	<1
Ionic Balance																						
Total Anions	-421	-407	-403	-285	-341	-360	-87	-39	-359	-931	-33	-623	-738	-769	-3924	-677	-2340	-510	-480	-446	-438	-407
Total Cations	542	430	513	406	387	488	71	40	401	1615	42	991	1073	1174	5672	958	2806	574	624	617	617	646
Ionic Balance	12.6	2.8	12.1	17.6	6.3	15.2	-10.1	1.0	5.5	26.8	11.4	22.8	18.5	20.9	18.2	17.1	9.0	5.8	13.1	16.1	17.0	22.7
Total Organic Carbon (TOC)																						
Total Organic Carbon	3	4	<1	<1	2	12	<1	4	<1	<1	4.5	<1	3.3	1.1	8.9	<1	6.1	<1	<1	2.8	<1	<1
Nitrite as N																						
NO2-N	<0.010	<0.010	<0.010	<0.5	<0.010	0.298	-	<0.010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrate as N																						
NO3-N	0.017	0.013	<0.010	<0.5	0.029	0.215	0.94	0.011	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	18	<0.5	<0.5	2.5	2
Total Nitrogen (as N)																						
Total Nitrogen (as N)	<0.1	0.013	<0.1	<2	<0.1	1.3	1.1	<0.1	<2	<2	3	2	<2	<2	<2	<2	6	18	<2	<2	3	2

Notes
LOR - Limit of reporting
- Not Analysed
* Raised LOR
^ Guideline is for Hexavalent Chromium (Cr VI)
^^ Guideline is for 90% Protection

Sample in excess of the adopted guideline - (SA EPA 2003) - Marine Waters 95% Level Species Protection
Sample in excess of the adopted guideline - (SA EPA 2003) - Potable Water
Sample in excess of the adopted guideline - (ANZECC 2000) - Marine Waters 95% Level Species Protection
Sample in excess of the adopted guideline - (ANZECC 2000) - Marine Waters 90% Level Species Protection

Regional Hydrogeology

Andamooka Lst

Analyte	Units	Labmark LOR	ALS LOR	SA EPA (2003) Environmental Protection Policy - Marine Waters 95% Species Protection	SA EPA (2003) Environmental Protection Policy - Potable Water	ANZECC (2000) Aquatic Ecosystems - Marine Waters 95% Species Protection	ANZECC (2000) Aquatic Ecosystems - Marine Waters 90% Species Protection
Sample							
Date							
Lab Report							
Laboratory							
Duplication							
pH Value and Total Dissolved Solids							
pH	pH Unit	0.1	0.01		6.5-8.5		
TDS	mg/L	1	1				
Electrical conductivity	uS/cm	1	1				
Alkalinity							
Hydroxide as CaCO3	mg/L	5	1				
Carbonate as CACO3	mg/L	5	1				
Bicarbonate as CACO3	mg/L	5	1				
Total Alkalinity as CACO3	mg/L	5	1				
Dissolved Major Cations							
Calcium	mg/L	0.1	1				
Iron	mg/L	0.1	0.05				
Magnesium	mg/L	0.1	1				
Sodium	mg/L	0.1	1				
Potassium	mg/L	0.1	1				
Total Metals							
Iron	mg/L	0.1	0.01				
Dissolved Metals							
Aluminium	mg/L	0.001	0.01				
Antimony	mg/L	0.001	0.001	0.5	0.003		
Arsenic	mg/L	0.001	0.001	0.05	0.007		
Barium	mg/L	0.001	0.001		0.7		
Beryllium	mg/L	0.001	0.001				
Boron	mg/L	0.001	0.05		0.3		
Cadmium	mg/L	0.0002	0.0001	0.002	0.002		
Chromium	mg/L	0.001	0.001	0.0044^	0.05^		
Cobalt	mg/L	0.001	0.001			0.001	0.014
Copper	mg/L	0.001	0.001	0.01	2		
Lead	mg/L	0.001	0.001	0.005	0.01		
Lithium	mg/L	0.001	0.001				
Manganese	mg/L	0.001	0.001		0.5		
Molybdenum	mg/L	0.001	0.001		0.05		
Nickel	mg/L	0.001	0.001	0.015	0.02		
Selenium	mg/L	0.001	0.01	0.07	0.01		
Strontium	mg/L	0.001	0.001				
Thallium	mg/L	0.001	0.001	0.02			
Thorium	mg/L	0.001	0.001				
Tin	mg/L	0.001	0.001				
Titanium	mg/L	0.001	0.01				
Uranium	mg/L	0.001	0.001		0.02		
Vanadium	mg/L	0.001	0.01			0.1	0.16
Zinc	mg/L	0.001	0.005	0.05			
Gold	mg/L	0.01	0.001				
Silica							
Silica	mg/L	1	0.1				
Sulphate							
Sulphate	mg/L	2	1		500		
Chloride							
Chloride	mg/L	1	1				
Fluoride							
Fluoride	mg/L	0.1	0.1		1.5		
Total Kjeldahl Nitrogen as N							
TKN as N	mg/L	1	0.1	5			
Ionic Balance							
Total Anions	meq/L		0.01				
Total Cations	meq/L		0.01				
Ionic Balance	%		0.01				
Total Organic Carbon (TOC)							
Total Organic Carbon	mg/L	1	1	10			
Nitrite as N							
NO2-N	mg/L	0.5	0.01		1		
Nitrate as N							
NO3-N	mg/L	0.5	0.01		10		
Total Nitrogen (as N)							
Total Nitrogen (as N)	mg/L	2	0.1	5			

Sample	DUP 5	RT04A	RTO5A	RTO5B	MAR3_20	RT03	DUP4	PT66	MAR4_20A	MAR4_20B	PT40	PT42	PT44	PT45	PT48	PT51	PT60	DUP2	DUP2	MAR 7	DUP 7	TRIPLICATE 4
Date	20/08/2008	2/09/2008	20/08/2008	20/08/2008	17/08/2008	19/08/2008	19/08/2008	19/08/2008	17/08/2008	17/08/2008	17/08/2008	19/08/2008	19/08/2008	18/08/2008	18/08/2008	18/08/2008	17/08/2008	17/08/2008	17/08/2008	8/09/2008	8/09/2008	10/09/2008
Lab Report	ES0812254	08ENME0023416	08ENME0022255	08ENME0022255	08ENME0021863	08ENME0022217	08ENME0022217	08ENME0022217	08ENME0021863	08ENME0021863	08ENME0021863	08ENME0022217	08ENME0022217	08ENME0021986	08ENME0021986	08ENME0021986	08ENME0021863	08ENME0021863	ES0811987	08ENME0024196	08ENME0024196	ES0813178001
Laboratory	ALS	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	ALS	Labmark	Labmark	ALS
Duplication	Inter-lab						Intra-lab											Intra-lab	Inter-lab		Intra-lab	Inter-lab
pH Value and Total Dissolved Solids																						
pH	6.56	7.2	6.9	8.1	6.7	7.2	7.3	7	7	7	7	7.1	7	7.1	7	7.3	6.9	6.9	6.64	7.2	7.2	6.91
TDS	37500	31000	53000	260000	250000	20000	19000	260000	28000	80000	220000	59000	51000	30000	29000	40000	24000	24000	25100	23000	23000	22700
Electrical conductivity	43400	35600	55500	130000	80800	20200	20300	20100	33200	81100	135000	55400	44200	31300	32700	44100	29300	29500	30200	28900	29000	30900
Alkalinity																						
Hydroxide as CaCO3	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	<1
Carbonate as CACO3	<1	0	0	0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate as CACO3	248	270	240	1260	131.6	200	200	96	287.7	270.6	119.7	180	230	300	250	210	259.4	280.1	337	100	342	320
Total Alkalinity as CACO3	248	270	240	1260	131.61	200	200	96	287.72	270.65	119.69	180	230	300	250	210	259.39	280.08	337	100	340	320
Dissolved Major Cations																						
Calcium	1080	982	915	803	880	604	603	741	1010	1280	1060	1070	818	1160	832	831	880	900	877	1110	1120	1110
Iron	-	2.45	28.6	0.175	0.565	3.12	2.74	0.239	17.2	7.23	0.22	<0.1	8.25	5.47	17.9	2.25	63.4	50.8	-	0.621	0.589	-
Magnesium	922	772	1270	4890	5200	343	342	5200	895	1880	4120	1230	1100	951	820	674	600	595	585	742	736	721
Sodium	10900	9490	17700	88900	85000	6070	6030	87700	8650	28400	78000	20900	18200	8900	10200	15900	7600	7600	7630	6230	6260	6640
Potassium	71	160	170	800	610	64	78	800	73	230	460	220	200	150	250	210	96	82	95	77	78	67
Total Metals																						
Iron	5.72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51.4			27.5
Dissolved Metals																						
Aluminium	<0.10	0.12	<0.001	<0.001	<5	<0.001	<0.001	<0.001	0.02	0.022	<5	<0.001	0.027	0.033	0.033	0.023	0.019	0.036	0.02	0.018	0.016	<0.01
Antimony	<0.010	<0.001	0.0011	0.0029	0.0037	<0.001	<0.001	0.006	<0.001	<0.001	0.0091	0.0015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.006
Arsenic	<0.010	<0.02	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	0.013	0.017	0.018	0.009
Barium	0.022	0.029	0.047	0.2	0.26	0.019	0.019	0.55	0.05	0.11	0.82	0.059	0.045	0.062	0.036	0.02	0.044	0.04	0.036	0.078	0.077	0.072
Beryllium	<0.010	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001
Boron	5.66	7.3	6	<0.001	2.4	6.9	7	<0.001	6.1	5.4	2.5	4.8	5.9	8.1	6.1	12	6	6.6	5.02	6.3	6.2	3.64
Cadmium	<0.0010	<0.0002	<0.0002	<0.0002	<0.002	<0.0002	<0.0002	0.0005	<0.002	<0.002	<0.002	<0.0002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0002	<0.0002	<0.0001
Chromium	<0.010	0.0054	<0.001	<0.001	<0.005	0.003	0.0032	<0.001	<0.005	<0.005	<0.005	0.0023	0.0029	0.0072	0.0061	<0.005	0.0063	0.0072	<0.001	0.0042	0.002	<0.001
Cobalt	<0.010	<0.001	0.0011	<0.001	0.017	<0.001	<0.001	0.0022	<0.005	<0.005	0.013	0.003	0.0036	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	0.011	0.0093	0.008
Copper	<0.020	0.0046	0.011	<0.001	<0.005	0.0044	0.0047	0.0032	0.0059	0.01	<0.005	0.018	0.013	0.011	0.0096	0.011	0.008	0.0072	0.004	0.0064	0.0061	0.005
Lead	<0.010	<0.001	<0.001	0.02	0.89	<0.001	<0.001	1.5	<0.005	<0.005	0.63	0.0023	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	<0.001	<0.001	<0.001
Lithium	0.325	0.61	0.42	0.0066	0.012	0.62	0.63	0.018	0.42	2.1	0.016	0.45	0.37	0.35	0.34	0.17	0.66	0.69	0.484	0.37	0.36	0.306
Manganese	0.59	0.41	0.23	0.029	0.099	0.53	0.52	0.08	0.83	0.51	0.077	0.066	0.27	0.9	0.29	0.11	1.4	1.4	1.13	0.5	0.46	0.433
Molybdenum	<0.010	0.0034	<0.001	0.0015	0.006	0.0056	0.005	0.017	0.012	0.015	0.0081	0.011	0.1	<0.005	<0.005	0.027	<0.005	<0.005	0.004	0.085	0.085	0.118
Nickel	<0.010	0.011	0.0087	<0.001	<0.005	0.011	0.012	0.0067	0.013	0.012	0.021	0.043	0.026	0.018	0.013	0.0098	0.013	0.013	<0.005	0.03	0.027	0.012
Selenium	<0.100	0.036	0.053	0.03	0.041	0.019	0.022	0.065	0.046	0.087	0.056	0.057	0.054	0.069	0.063	0.044	0.048	0.046	<0.010	0.042	0.041	<0.010
Strontium	16.8	15	15	16	15	6.5	6.3	16	14	20	16	17	14	17	12	8.6	11	11	11.2	17	17	14.5
Thallium	<0.010	<0.001	<0.001	0.0038	0.074	<0.001	<0.001	0.022	<0.005	<0.005	0.0058	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	0.001
Thorium	<0.010	-	-	-	<0.005	-	-	-	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001
Tin	<0.010	<0.001	<0.001	0.0019	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001
Titanium	<0.10	0.018	0.02	0.0043	<0.005	0.01	0.017	0.0062	0.011	0.019	<0.005	0.029	0.029	0.0082	0.0098	0.0075	0.013	0.0093	<0.01	0.0023	0.0031	<0.01
Uranium	0.045	0.0014	0.008	0.0058	0.032	0.003	0.003	0.0087	0.067	0.0056	0.026	0.035	0.017	<0.005	<0.005	0.006	<0.005	<0.005	0.002	0.019	0.019	0.022
Vanadium	<0.10	<0.001	<0.001	<0.001	<0.005	0.0016	0.0019	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	0.003	0.002	<0.01
Zinc	0.078	0.04	0.027	0.019	0.075	<0.001	<0.001	0.17	0.032	0.059	0.061	0.088	0.04	0.24	0.045	0.039	0.11	0.096	0.047	0.019	0.022	0.01
Gold	<0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	0.001
Silica																						
Silica	14.2	11.4	13.6	34.7	38	12.7	13	30	16.9	22	34.5	7.96	13.9	14.8	13.8	14.1	15.2	15.5	9.8	18	18.3	16.1
Sulphate																						
Sulphate	5190	3100	3600	10000	9100	3800	3500	9600	3400	5100	9200	3500	2900	3500	3200	8300	3000	3000	3860	2700	2500	4460
Chloride																						
Chloride	15500	12000	22000	130000	87000	4900	4900	150000	13000	34000	120000	21000	18000	11000	15000	16000	11000	11000	11000	9000	9200	10900
Fluoride																						
Fluoride	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	1	1	1.5
Total Kjeldahl Nitrogen as N																						
TKN as N	<0.1	<1	<1	2.4	4.4	<1	<1	4	<1	3.2	3	<1	<1	<1	<1	<1	<1	<1	2	24	22	34.7
Ionic Balance																						
Total Anions	-555	-412	-708	-3943	-2677	-222	-216	-4487	-447	-1082	-3622	-676	-578	-392	-499	-634	-381	-381	-400	-315	-321	-410
Total Cations	607	530	926	4333	4189	324	323	4304	503	1461	3799	1070	929	528	560	794	427	427	427	390	392	406
Ionic Balance	4.4	12.6	13.3	4.7	22.0	18.6	19.8	-2.1	5.9	14.9	2.4	22.6	23.3	14.8	5.7	11.3	5.7	5.7	3.2	10.7	10.0	-0.4
Total Organic Carbon (TOC)																						
Total Organic Carbon	<1	1	<1	<1	7.3	<1	<1	11	<1	25	4.3	<1	1.1	2.2	<1	<1	2.9	<1	8	6.7	5.8	9
Nitrite as N																						
NO2-N	<0.01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.5	<0.5	<0.01
Nitrate as N																						
NO3-N	2.94	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.6	3.9	2.7	2.4	2.4	0.02	<0.5	<0.5	0.03
Total Nitrogen (as N)																						
Total Nitrogen (as N)	2.9	<2	<2	2	4	<2	<2	4	<2	3	3	<2	<2	3	4	3	2	2	2	24	22	34.7

Notes
LOR - Limit of reporting
- Not Analysed
* Raised LOR
^ Guideline is for Hexavalent Chromium (Cr VI)
^^ Guideline is for 90% Protection

Sample in excess of the adopted guideline - (SA EPA 2003) - Marine Waters 95% Level Species Protection
Sample in excess of the adopted guideline - (SA EPA 2003) - Potable Water
Sample in excess of the adopted guideline - (ANZECC 2000) - Marine Waters 95% Level Species Protection
Sample in excess of the adopted guideline - (ANZECC 2000) - Marine Waters 90% Level Species Protection

								Arcoona Qtz		BRACHINA Fmt						Cadna-owie/Algebuckina	Corraberra Sst					Yarloo Sh.	
								Sample	PT03_4b	RT02B	RT09	PT63	RT41	DUP 9	TRIPLICATE 6	RT42	PT62	PT09	PT14	PT31	DUP3	RT01	RT04b	LT02
								Date	11/08/2008	17/08/2008	3/09/2008	9/09/2008	10/09/2008	10/09/2008	10/09/2008	10/09/2008	9/09/2008	14/08/2008	11/08/2008	17/08/2008	17/08/2008	1/09/2008	3/09/2008	20/06/2008
								Lab Report	08ENME0021268	08ENME0021863	08ENME0023714	08ENME0024196	08ENME0024479	08ENME0024479	ES0813421001	08ENME0024479	08ENME0024196	08ENME0021703	08ENME0021268	08ENME0021863	08ENME0021863	08ENME0023416	08ENME0023714	E0388250
								Laboratory	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	ALS	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark	Labmark
								Duplication						Intra-lab	Inter-lab						Intra-lab			
Analyte	Units	Labmark LOR	ALS LOR	SA EPA (2003) Environmental Protection Policy - Marine Waters 95% Species Protection	SA EPA (2003) Environmental Protection Policy - Potable Water	ANZECC (2000) Aquatic Ecosystems - Marine Waters 95% Species Protection	ANZECC (2000) Aquatic Ecosystems - Marine Waters 90% Species Protection																		
pH Value and Total Dissolved Solids																								
pH	pH Unit	0.1	0.01		6.5-8.5			9.3	6.9	7	7.2	7.1	7.1	6.19	7.4	6.9	7	7.1	7.2	7.1	6.9	6.9	6.2
TDS	mg/L	1	1					52000	220000	26000	77000	41000	41000	41000	37000	25000	33000	29000	15000	4000	200000	170000	27500
Electrical conductivity	uS/cm	1	1					57600	80800	30500	77000	52500	52600	54000	48700	31200	34400	33600	20500	6520	132000	124000	38700
Alkalinity																								
Hydroxide as CaCO3	mg/L	5	1					-	-	-	-	-	-	<1		-	-	-	-	-	-	-	<5
Carbonate as CACO3	mg/L	5	1					76	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	<1	<5
Bicarbonate as CACO3	mg/L	5	1					5.4	137.5	380	230	150	150	185	120	17	380	300	203	183.2	130	100	698
Total Alkalinity as CACO3	mg/L	5	1					81	137.45	380	230	150	150	185	120	17	380	300	202.98	183.196	130	100	698
Dissolved Major Cations																								
Calcium	mg/L	0.1	1					1660	900	829	1000	1250	1260	1150	1150	788	669	802	210	98.2	796	2690	1080
Iron	mg/L	0.1	0.05					<0.1	0.107	9.39	0.759	6.65	6.95		1.31	4.65	7.32	3.8	7.94	8.7	0.282	0.276	
Magnesium	mg/L	0.1	1					1220	4430	719	1940	653	657	851	692	584	926	932	198	83.1	4160	1540	985
Sodium	mg/L	0.1	1					23200	74000	10100	24500	12900	13400	14000	12500	7720	10500	9950	2740	1190	71400	83000	7580
Potassium	mg/L	0.1	1					180	660	85	230	210	220	201	91	110	300	110	6.6	<1	1000	790	220
Total Metals																								
Iron	mg/L	0.1	0.01					-	-					7.35			-	-	-	-			<0.1
Dissolved Metals																								
Aluminium	mg/L	0.001	0.01					<0.005	<5	0.02	0.0076	0.0036	<0.001	<0.10	<0.001	0.0043	0.0079	0.0053	0.015	0.013	0.018	0.018	0.033
Antimony	mg/L	0.001	0.001	0.5	0.003			0.0025	0.004	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	0.0011	<0.001	<0.001	0.0033	<0.001	<0.001
Arsenic	mg/L	0.001	0.001	0.05	0.007			<0.005	<0.005	<0.001	<0.05	<0.1	<0.1	0.053	<0.05	0.023	<0.005	<0.005	<0.005	<0.005	<0.08	<0.1	<0.001
Barium	mg/L	0.001	0.001		0.7			0.11	0.41	0.032	0.07	0.12	0.12	0.086	0.036	0.048	0.086	0.088	0.13	0.096	0.11	0.15	0.097
Beryllium	mg/L	0.001	0.001					<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
Boron	mg/L	0.001	0.05		0.3			4.6	2.9	7.8	11	9	9	7.42	7.9	7.2	12	8.2	2.4	2	5.7	5.6	14
Cadmium	mg/L	0.0002	0.0001	0.002	0.002			<0.002	0.0059	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.0002	<0.0002	<0.0002
Chromium	mg/L	0.001	0.001	0.0044^	0.05^			<0.005	<0.005	0.0026	0.0038	0.0033	0.0032	<0.010	0.0023	0.0018	0.0075	<0.005	0.0055	0.0055	0.0046	0.0075	0.0034
Cobalt	mg/L	0.001	0.001			0.001	0.014	<0.005	<0.005	<0.001	0.0051	<0.001	<0.001	<0.010	0.0054	0.0045	<0.005	<0.005	0.0069	0.0059	0.073	0.0038	0.0055
Copper	mg/L	0.001	0.001	0.01	2			0.017	0.0051	0.0066	0.014	0.008	0.0075	<0.010	0.0059	0.0051	0.013	0.007	<0.005	<0.005	0.14	0.032	0.36
Lead	mg/L	0.001	0.001	0.005	0.01			<0.005	0.075	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	0.019	0.0018	<0.001
Lithium	mg/L	0.001	0.001					0.43	0.02	0.88	3.4	3.6	3.6	3.4	0.37	0.57	0.26	0.22	0.08	0.051	3.1	11	0.5
Manganese	mg/L	0.001	0.001		0.5			0.081	0.16	0.51	3.6	0.49	0.5	0.504	0.92	0.86	1.7	0.69	0.4	0.29	6.2	2.8	1.7
Molybdenum	mg/L	0.001	0.001		0.05			<0.005	0.029	<0.001	<0.001	<0.001	<0.001	<0.010	0.004	0.0028	<0.005	<0.005	<0.005	<0.005	0.027	0.0089	<0.001
Nickel	mg/L	0.001	0.001	0.015	0.02			0.013	0.0073	0.01	0.017	0.013	0.013	<0.010	0.015	0.02	0.01	0.0085	0.0063	<0.005	0.084	0.029	0.0092
Selenium	mg/L	0.001	0.01	0.07	0.01			0.089	0.067	0.026	0.062	0.026	0.025	<0.050	0.026	0.041	0.2	0.043	0.021	0.015	0.15	0.16	0.027
Strontium	mg/L	0.001	0.001					13	19	12	19	34	32	-	20	15	9.3	12	3.4	1.6	18	50	17
Thallium	mg/L	0.001	0.001	0.02				<0.005	0.019	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	0.025	<0.001	<0.001
Thorium	mg/L	0.001	0.001					<0.005	<0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-
Tin	mg/L	0.001	0.001					<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	0.0033	<0.001	<0.001
Titanium	mg/L	0.001	0.01					0.026	0.0076	0.049	0.0075	0.012	0.013	-	0.0064	0.0019	0.011	0.02	<0.005	<0.005	0.071	0.0019	0.0083
Uranium	mg/L	0.001	0.001		0.02			<0.005	0.018	<0.001	0.0054	<0.001	<0.001	-	0.0087	0.022	<0.005	<0.005	<0.005	<0.005	0.0085	0.0018	0.027
Vanadium	mg/L	0.001	0.01			0.1	0.16	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.10	0.0016	<0.001	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
Zinc	mg/L	0.001	0.005	0.05				0.028	0.16	0.028	0.063	0.015	0.017	<0.050	0.015	0.023	0.05	0.076	0.058	0.05	0.59	0.042	0.036
Gold	mg/L	0.01	0.001					0.0018	-	-	-	-	-	-	-	-	-	0.0035	-	-	-	-	<0.01
Silica																								
Silica	mg/L	1	0.1					<1	31	15	15.6	25	25	19.7	14.4	19	-	19	9.3	8.34	5.5	10	32
Sulphate																								
Sulphate	mg/L	2	1		500			4300	1200	2600	6700	1500	3400	3790	3900	2600	3700	3200	1400	170	9200	3600	5890
Chloride																								
Chloride	mg/L	1	1					21000	130000	9900	27000	9400	24000	22800	14000	10000	12000	13000	6600	720	100000	65000	13700
Fluoride																								
Fluoride	mg/L	0.1	0.1		1.5			5.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9
Total Kjeldahl Nitrogen as N																								
TKN as N	mg/L	1	0.1	5				2.6	36	<1	1.7	3.6	<1	5.8	<1	<1	<1	<1	<1	1.7	8.4	7.9	6.4
Ionic Balance																								
Total Anions	meq/L		0.01					-690	-3742	-343	-915	-302	-759	-733	-483	-340	-426	-443	-221	-27	-3051	-1934	-
Total Cations	meq/L		0.01					1198	3648	543	1283	683	706	742	661	427	575	553	146	64	3516	3892	-
Ionic Balance	%		0.01					26.9	-1.3	22.5	16.7	38.7	-3.6	0.6	15.5	11.3	14.9	11.1	-20.4	40.2	7.1	33.6	-
Total Organic Carbon (TOC)																								
Total Organic Carbon	mg/L	1	1	10				1.5	57	1.6	6.7	15	14	15	6.6	2.7	pending	<1	46	<1	28	33	6
Nitrite as N																								
NO2-N	mg/L	0.5	0.01		1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.02
Nitrate as N																								
NO3-N	mg/L	0.5	0.01		10			<0.5	<0.5	<0.5	19	<0.5	<0.5	<0.01	<0.5	3	<0.5	<0.5	2.1	<0.5	<0.5	<0.5	0.13
Total Nitrogen (as N)																								
Total Nitrogen (as N)	mg/L	2	0.1	5				3	36	<2	21	4	<2	5.8	<2	3	<2	<2	2	2	8	8	6.5

Notes
LOR - Limit of reporting
- Not Analysed
* Raised LOR
^ Guideline is for Hexavalent Chromium (Cr VI)
^^ Guideline is for 90% Protection

Sample in excess of the adopted guideline - (SA EPA 2003) - Marine Waters 95% Level Species Protection
Sample in excess of the adopted guideline - (SA EPA 2003) - Potable Water
Sample in excess of the adopted guideline - (ANZECC 2000) - Marine Waters 95% Level Species Protection
Sample in excess of the adopted guideline - (ANZECC 2000) - Marine Waters 90% Level Species Protection

LabMark
ENVIRONMENTAL LABORATORIES

ilac-MRA NATA Accreditation No. 13542

Accredited for compliance with ISO/IEC 17025. The results of tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the APLAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

AQIS
AUSTRALIAN QUARANTINE AND INSPECTION SERVICE

SYDNEY License No. N0356.

Quarantine Approved Premises criteria 5.1 for quarantine containment level 1 (QCI) facilities. Class five criteria cover premises utilised for research, analysis and testing of biological material, soil, animal, plant and human products.

CUSTOMER CENTRIC - ANALYTICAL CHEMISTS

FINAL CERTIFICATE OF ANALYSIS - ENVIRONMENTAL DIVISION

Laboratory Report No:	E038205	Cover Page 1 of 4 plus Sample Results
Client Name:	Sinclair Knight Merz Pty Ltd	
Client Reference:	VE30064	
Contact Name:	Russel Martin	
Chain of Custody No:	na	Date Received: 17/06/2008
Sample Matrix:	WATER	Date Reported: 27/06/2008

This Final Certificate of Analysis consists of sample results, DQI's, method descriptions, laboratory definitions, and internationally recognised NATA accreditation and endorsement. The DQO compliance relates specifically to QA/QC results as performed as part of the sample analysis, and may provide an indication of sample result quality. Transfer of report ownership from Labmark to the client shall only occur once full & final payment has been settled and verified. All report copies may be retracted where full payment has not occured within the agreed settlement period.

QUALITY ASSURANCE CRITERIA

Accuracy:	matrix spike:	1 in first 5-20, then 1 every 20 samples
	lcs, crm, method:	1 per analytical batch
	surrogate spike:	addition per target organic method
Precision:	laboratory duplicate:	1 in first 5-10, then 1 every 10 samples
	laboratory triplicate:	re-extracted & reported when duplicate RPD values exceed acceptance criteria
Holding Times:	soils, waters:	Refer to LabMark Preservation & THT table VOC's 14 days water / soil VAC's 7 days water or 14 days acidified VAC's 14 days soil SVOC's 7 days water, 14 days soil Pesticides 7 days water, 14 days soil Metals 6 months general elements Mercury 28 days
Confirmation:	target organic analysis:	GC/MS, or confirmatory column
Sensitivity:	EQL:	Typically 2-5 x Method Detection Limit (MDL)

QUALITY CONTROL GLOBAL ACCEPTANCE CRITERIA (GAC)

Accuracy:	spike, lcs, crm surrogate:	general analytes 70% - 130% recovery phenol analytes 50% - 130% recovery organophosphorous pesticide analytes 60% - 130% recovery phenoxy acid herbicides, organotin 50% - 130% recovery
	anion/cation bal:	+/- 10% (0-3 meq/l), +/- 5% (>3 meq/l)
Precision:	method blank:	not detected >95% of the reported EQL
	duplicate lab RPD (metals):	0-30% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)
	duplicate lab RPD:	0-50% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)

QUALITY CONTROL ANALYTE SPECIFIC ACCEPTANCE CRITERIA (ASAC)

Accuracy:	spike, lcs, crm surrogate:	analyte specific recovery data <3xsd of historical mean
Uncertainty:	spike, lcs:	measurement calculated from historical analyte specific control charts

RESULT ANNOTATION

Data Quality Objective	s:	matrix spike recovery	p:	pending	bcs: batch specific lcs
Data Quality Indicator	d:	laboratory duplicate	lcs:	laboratory control sample	bmb: batch specific mb
Estimated Quantitation Limit	t:	laboratory triplicate	crm:	certified reference material	
not applicable	r:	RPD relative % difference	mb:	method blank	

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Geoff Weir
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Laboratory Report: E038205

NEPC GUIDELINE COMPLIANCE - DQO

1. GENERAL

A. Results relate specifically to samples as received. Sample results are not corrected for matrix spike, lcs, or surrogate recovery data.

B. EQL's are matrix dependant and may be increased due to sample dilution or matrix interference.

C. Laboratory QA/QC samples are specific to this project.

D. Inter-laboratory proficiency results are available upon request. NATA accreditation details available at www.nata.asn.au.

E. VOC spikes & surrogates added to samples during extraction, SVOC spikes & surrogates added prior to extraction.

F. Recovery data outside GAC limits shall be investigated and compared to ASAC (historical mean +/- 3sd). If recovery data <20%, then the relevant results for that compound are considered not reliable.

G. Recovery data (ms, surrogate, crm, lcs) outside ASAC limits shall initiate an investigative action. Anomolous QC data is examined in conjunction with other QC samples and a final decision whether to accept or reject results is provided by the professional judgement of the senior analyst. The USEPA-CLP National Functional Guidelines are referred to for specific recommendations.

H. Extraction (preparation) date refers to the date that sample preparation was initiated. Note that certain methods not requiring sample preparation (eg. VOCs in water, etc) may report a common extraction and analysis date.

I. LabMark shall maintain an official copy of this Certificate of Analysis for all tracable reference purposes.

2. CHAIN OF CUSTODY (COC) & SAMPLE RECEIPT NOTICE (SRN) REQUIREMENTS

A. SRN issued to client upon sample receipt & login verification.

B. Preservation & sampling date details specified on COC and SRN, unless noted.

C. Sample Integrity & Validated Time of Sample Receipt (VTSR) Holding Times verified (preservation may extend holding time, refer to preservation chart).

3. NATA ACCREDITED METHODS

A. NATA accreditation held for each in-house method and sample matrix type reported, unless noted below (Refer to subcontracted test reports for NATA accreditation status).

B. NATA accredited in-house laboratory methods are referenced from NEPC, ASTM, modified USEPA / APHA documents. Corporate Accreditation No. 13542.

C. Subcontracted analyses: Refer to Sample Receipt Notice and additional DQO comments.

Reported by Amdel Limited, NATA accreditation No.1526.

Reported by Sydney Analytical Laboratories, NATA accreditation No.1884.

Environmental Laboratory Industry Group
Foundation Member

Laboratory Report: E038205

4. QA/QC FREQUENCY COMPLIANCE TABLE SPECIFIC TO THIS REPORT

Matrix: **WATER**

Page:	Method:	Totals:	#d	%d-ratio	#t	#s	%s-ratio
1	pH in water	4	0	0%	0	0	0%
2	Electrical conductivity (EC)	4	0	0%	0	0	0%
3	Total alkalinity	4	0	0%	0	0	0%
4	Chloride	4	0	0%	0	0	0%
5	Fluoride	4	0	0%	0	0	0%
6	Sulphate	4	0	0%	0	0	0%
7	Nitrate as N	4	0	0%	0	0	0%
8	TKN (as N)	4	0	0%	0	0	0%
9	Total Nitrogen (as N)	4	0	0%	0	0	0%
10	Alkalinity (CO3, HCO3, OH)	4	0	0%	0	0	0%
11	Total Organic Carbon (TOC)	4	1	25%	0	0	0%
12	Total Dissolved Solids (TDS)	4	1	25%	0	0	0%

GLOSSARY:

#d number of discrete duplicate extractions/analyses performed.
%d-ratio NEPC guideline for laboratory duplicates is 1 in 10 samples (min 10%).
#t number of triplicate extractions/analyses performed.
#s number of spiked samples analysed.
%s-ratio USEPA guideline for laboratory matrix spikes is 1 in 20 samples (min 5%).

Environmental Laboratory Industry Group
Foundation Member

Laboratory Report: E038205

5. ADDITIONAL COMMENTS SPECIFIC TO THIS REPORT

A. All tests were conducted by LabMark Environmental Sydney, NATA accreditation No. 13542, Corporate Site No. 13535, unless indicated below.
B. The following test was conducted by Amdel Limited, NATA accreditation No.1526. :- Metals analysis.
C. The following tests were conducted by Sydney Analytical Laboratories, NATA accreditation No.1884. :- TDS and TOC.SAL reference SAL20847 report issued on 27/6/2008.
D.Samples received and analysed outside technical holding time for pH. Please refer to sample receipt notice.

Laboratory QA/QC data shall relate specifically to this report, and may provide an indication of site specific sample result quality. LabMark DOES NOT report NON-RELEVANT BATCH QA/QC data. Acceptance of this self assessment certificate does not preclude any requirement for a QA/QC review by a accredited contaminated site EPA auditor, when and wherever necessary. Laboratory QA/QC self assessment references available upon request.

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E038205
Client Name: Sinclair Knight Merz Pty Ltd
Contact Name: Russel Martin
Client Reference: VE30064

Date: 27/06/08
This report supercedes reports issued on: 24/06/08

Final
Certificate
of Analysis

Laboratory Identification		**162172**	**162228**	**162229**	**162230**						
Sample Identification		H1-1	H3-1	H3-2	PT24a						
Depth (m)		--	--	--	--						
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08						
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08						
Laboratory Analysis Date		17/6/08	17/6/08	17/6/08	17/6/08						
Method : E018.1											
pH in water	**EQL**										
pH (pH units)	0.1	3.5	6.3	3.5	8.2						

Results expressed in pH units unless otherwise specified

Comments:

E018.1: Direct measurement by pH ion selective electrode.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**mb**					
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC					
Depth (m)		--	--	--	--	--					
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--					
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08					
Laboratory Analysis Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08					
Method : E032.1											
Electrical conductivity (EC)	**EQL**										
Electric conductivity (uS/cm)	1	37800	41700	33200	6690	1					

Results expressed in uS/cm unless otherwise specified

Comments:

E032.1: Measurement by EC probe. Results expressed in uS/cm.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**lcs**	**mb**				
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC				
Depth (m)		--	--	--	--	--	--				
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--				
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08	17/6/08				
Laboratory Analysis Date		18/6/08	17/6/08	18/6/08	19/6/08	17/6/08	17/6/08				
Method : E035.1											
Total alkalinity	**EQL**										
Alkalinity	5	<5	1780	<5	878	103%	<5				

Results expressed in mg/l unless otherwise specified

Comments:

E035.1: Determination by colour and/or by titration. Results expressed as CaCO3.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**lcs**	**mb**				
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC				
Depth (m)		--	--	--	--	--	--				
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--				
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08	17/6/08				
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08	20/6/08	17/6/08	17/6/08				
Method : E033.1/E045.1/E047.1 **Chloride**	**EQL**										
Chloride	1	3180	12500	2690	2210	103%	<1				

Results expressed in mg/l unless otherwise specified

Comments:

E033.1/E045.1/E047.1: Determination by colour and/or by Ion Chromatography. Sample filtered through a 0.45um filter prior to analysis.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**lcs**	**mb**				
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC				
Depth (m)		--	--	--	--	--	--				
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--				
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08	17/6/08				
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08	20/6/08	17/6/08	17/6/08				
Method : E034.1/E045.1											
Fluoride	**EQL**										
Fluoride	0.1	11700	10.9	9480	4.0	106%	<0.1				

Results expressed in mg/l unless otherwise specified

Comments: -

E034.1/E045.1: Determined by FIA-Ion Selective Electrode and/or by Ion Chromatography. Samples filtered through a 0.45um filter prior to analysis.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**lcs**	**mb**				
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC				
Depth (m)		--	--	--	--	--	--				
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--				
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08	17/6/08				
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08	20/6/08	17/6/08	17/6/08				
Method : E042.1/E045.1/E056.1 **Sulphate**	**EQL**										
Sulphate	2	32200	12200	26100	441	104%	<2				

Results expressed in mg/l unless otherwise specified

Comments:

E042.1/E045.1/E056.1: Determination by colour and/or by Ion Chromatography. Sample filtered through 0.45um prior to analysis.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**lcs**	**mb**				
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC				
Depth (m)		--	--	--	--	--	--				
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--				
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08	17/6/08				
Laboratory Analysis Date		17/6/08	17/6/08	17/6/08	19/6/08	17/6/08	17/6/08				
Method : E037.1/E051.1											
Nitrate as N	**EQL**										
NO3-N	0.01	0.02	10.4	0.02	0.94	91%	<0.01				

Results expressed in mg/l unless otherwise specified

Comments:

E037.1/E051.1: Nitrate determined by colour. Sample filtered through 0.45um prior to analysis.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**lcs**	**mb**				
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC				
Depth (m)		--	--	--	--	--	--				
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--				
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08	17/6/08				
Laboratory Analysis Date		24/6/08	24/6/08	24/6/08	24/6/08	19/6/08	19/6/08				
Method : E039.1											
TKN (as N)	**EQL**										
Total Kjeldahl Nitrogen	0.1	168	32.7	182	0.1	102%	<0.1				

Results expressed in mg/l unless otherwise specified

Comments:

E039.1: Sample filtered through 0.45um filter prior to analysis. Acidic digestion followed by determination by colour.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**lcs**	**mb**				
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC				
Depth (m)		--	--	--	--	--	--				
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--				
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08	17/6/08				
Laboratory Analysis Date		24/6/08	24/6/08	24/6/08	24/6/08	19/6/08	19/6/08				
Method : E038.1											
Total Nitrogen (as N)	**EQL**										
Total Nitrogen (as N)	0.1	168	43.1	182	1.1	99%	<0.1				

Results expressed in mg/l unless otherwise specified

Comments:

E038.1: Total Nitrogen by calculation.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**lcs**	**mb**				
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC				
Depth (m)		--	--	--	--	--	--				
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--				
Laboratory Extraction (Preparation) Date		17/6/08	17/6/08	17/6/08	17/6/08	17/6/08	17/6/08				
Laboratory Analysis Date		18/6/08	17/6/08	18/6/08	19/6/08	17/6/08	17/6/08				
Method : E035.1											
Alkalinity (CO3, HCO3, OH)	**EQL**										
Carbonate	5	<5	<5	<5	<5	--	<5				
Bicarbonate	5	<5	1780	<5	878	93%	<5				
Hydroxide	5	<5	<5	<5	<5	--	<5				

Results expressed in mg/l unless otherwise specified

Comments:

E035.1: Determination by colour and/or by titration, followed by calculation. Results expressed as CaCO3.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**162172d**	**162172r**	**mb**			
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC	QC			
Depth (m)		--	--	--	--	--	--	--			
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--	--			
Laboratory Extraction (Preparation) Date		25/6/08	25/6/08	25/6/08	25/6/08	25/6/08	--	25/6/08			
Laboratory Analysis Date		26/6/08	26/6/08	26/6/08	26/6/08	26/6/08	--	26/6/08			
Method : E2580											
Total Organic Carbon (TOC)	**EQL**										
Total Organic Carbon	1	28	57	26	<1	26	7%	<1			

Results expressed in mg/l unless otherwise specified

Comments:

E2580: TOC analyser.

Laboratory Identification		**162172**	**162228**	**162229**	**162230**	**162172d**	**162172r**	**mb**			
Sample Identification		H1-1	H3-1	H3-2	PT24a	QC	QC	QC			
Depth (m)		--	--	--	--	--	--	--			
Sampling Date recorded on COC		16/6/08	15/6/08	15/6/08	15/6/08	--	--	--			
Laboratory Extraction (Preparation) Date		25/6/08	25/6/08	25/6/08	25/6/08	25/6/08	--	25/6/08			
Laboratory Analysis Date		26/6/08	26/6/08	26/6/08	26/6/08	26/6/08	--	26/6/08			
Method : APHA 2540C **Total Dissolved Solids (TDS)**	**EQL**										
TDS	1	96900	33700	73100	3580	63000	42%	<1			

Results expressed in mg/l unless otherwise specified

Comments:

APHA 2540C: Determined gravimetrically.

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Report Date : 18/06/2008
Report Time : 2:16:13PM

Sample **Receipt** Notice (SRN) for **E038205**

Quality, Service, Support

Client Details		Laboratory Reference Information	
Client Name:	Sinclair Knight Merz Pty Ltd	**Please have this information ready when contacting Labmark.**	
Client Phone:	08 8424 3800		
Client Fax:	08 8424 3810	**Laboratory Report:**	**E038205**
Contact Name:	Russel Martin	**Quotation Number:**	- Not provided, standard prices apply
Contact Email:	rmartin@skm.com.au	**Laboratory Address:**	Unit 1, 8 Leighton Pl. Asquith NSW 2077
Client Address:	33 King William St Adelaide SA 5000	**Phone:**	61 2 9476 6533
		Fax:	61 2 9476 8219
Project Name:	VE30064	**Sample Receipt Contact:**	Ros Schacht
Project Number:	- Not provided -	**Email:**	Ros.Schacht@labmark.com.au
CoC Serial Number:	- Not provided -	**Reporting Contact:**	Geoff Weir
Purchase Order:	- Not provided -	**Email:**	geoff.weir@labmark.com.au
Surcharge:	No surcharge applied (results by 6:30pm on due date)		
Sample Matrix:	WATER		
Date Sampled (earliest date):	15/06/2008	**NATA Accreditation:**	13542
Date Samples Received:	17/06/2008	**TGA GMP License:**	185-336 (Sydney)
Date Sample Receipt Notice issued:	18/06/2008	**APVMA License:**	6105 (Sydney)
Date Preliminary Report Due:	24/06/2008	**AQIS Approval:**	NO356 (Sydney)
		AQIS Entry Permit:	200521534 (Sydney)

Reporting Requirements: Electronic Data Download required: Yes

Invoice Number: 32480

Sample Condition: COC received with samples. Report number and lab ID's defined on COC.
Samples received in good order .
Samples received with cooling media: Ice bricks .
Samples received chilled.
Security seals not used .
Sample container & chemical preservation suitable .

Comments: Sample PT24a was not received initally, sample was received 19/6/08, these samples are out of THT for Anions, NO3 and pH. Samples sent to SAL for analysis of TDS and TOC. Samples sent to Labmark Vic for metals analysis.

Holding Times: Date received allows for insufficient time to meet Technical Holding Times.
Note: There are Samples within this batch that have been received by the laboratory 1 day(s) after Technical Holding Times expire. LabMark cannot guarantee THT compliance, refer to the extraction dates detailed in the sample grid for confirmation.

Preservation: Chemical preservation of samples satisfactory for requested analytes.

Important Notes:

LabMark shall responsibly dispose of spent customer soil and water samples which includes the disintegration of the sample label. A sample disposal fee of $1.00 is applicable on all samples received by the laboratory regardless of whether they have undergone analytical testing. Sample disposal of environmental samples shall be 31 days (water) and 3 months (soil, HN03 preserved samples) after laboratory receipt, unless otherwise requested in writing by the client. Samples requested to be held in non-refrigerated storage shall incur $5.00/ sample/ 3 months. Additional refrigerated storage shall incur $30/ sample/ 3 months. Combination prices apply only if requested. Transfer of report ownership from LabMark to the client shall occur once full and final payment has been settled and verified. All report copies may be retracted where full payment does not occur within the agreed settlement period.

Analysis comments:

Subcontracted Analyses:

Reported by Amdel Limited, NATA accreditation No.1526.
Reported by Sydney Analytical Laboratories, NATA accreditation No.1884.

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

LabMark
ENVIRONMENTAL LABORATORIES

Report Date : 18/06/2008
Report Time : 2:16:13PM

Sample **Receipt** Notice (SRN) for **E038205**

Quality, Service, Support

The table below represents LabMark's understanding and interpretation of the customer supplied sample COC request (refer to SRN comments section on first page for external subcontracting method details). Please confirm that your COC request has been entered correctly. Due to THT and TAT requirements, testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

GRID REVIEW TABLE

No.	Date	Depth	Client Sample ID	Requested Analysis: Major cations	Alkalinity (CO_3, HCO_3, OH)	Chloride	Electrical conductivity (EC)	Fluoride	Nitrite as N	Nitrate as N	NOx (as N)	pH in water	PREP Not Reported	Sulphate	TKN (as N)	Total alkalinity	Total Nitrogen (as N)	External Analysis by Amdel	External Total Dissolved Solids (TDS)	External Total Organic Carbon (TOC)			
162172	16/06		H1-1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
162228	15/06		H3-1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
162229	15/06		H3-2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
162230	15/06		PT24a	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
			Totals:	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			

'PREP Not Reported' refers to an internal laboratory instruction - client confirmation of this parameter is not required.

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

Container Identification	500ml	125ml	43ml				
Size	500ml	125ml	43ml				
Type	plastic	plastic	vile				
Preserv	no	yes	yes				
Analytes	See Attached	See Attached	See Attached				

LAB USE ONLY	
QUOTE NUMBER	Project No: VE30064
Job Code:	Project Manager: Russell Martin
Due Date:	
Custody seal intact?	Sampler(s): Alistair Walsh
Sample cold?	
Received for Laboratory by:	Checked:
Date:	Date:
Time:	16/06/2008

Lab id	Date	Time	Matrix	Sample Identification LAB#	Comments		Tick required analyses
	16/06/2008		H2O	H1-1 - 500ml } 162172			See attached analysis spreadsheet
	16/06/2008		H2O	H1-1 - 125ml }			
	16/06/2008		H2O	H1-1 - 43ml }			
	15/06/2008		H2O	H3-1 - 500ml } 162228			
	15/06/2008		H2O	H3-1 - 125ml }			
	15/06/2008		H2O	H3-1 - 43ml }			
	15/06/2008		H2O	H3-2 - 500ml } 162229			
	15/06/2008		H2O	H3-2 - 125ml }			
	15/06/2008		H2O	H3-2 - 43ml }			
	~~15/06/2008~~		~~H2O~~	~~PT24a - 500ml~~ } 162230			
	~~15/06/2008~~		~~H2O~~	~~PT24a - 125ml~~ } not received	dg	18/6/08	
	~~15/06/2008~~		~~H2O~~	~~PT24a - 43ml~~ }			
				PT24a			
				TOTAL			

Notes:

Please email awalsh@skm.com.au and rmartin@skm.com.au upon receival of samples. Thanks

See attached spreadsheet for analysis required, any questions please call 0430288222

received dg 17/6/08 Job # E038205

Sheet 1 OF 1

ytee List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
	Sample Batch fee			
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
removed 98.	~~Iron~~ (Fe2+)	5 µg/L	24 hrs	Separate
	~~Iron~~ (Fe3+)	5 µg/L	24 hrs	Separate
[redacted]	[redacted]	0.01 mg/L	48 hrs	measured together
	[redacted]	0.01 mg/L	48 hrs	
	[redacted]	0.01 mg/L	28 days	
	[redacted]	1 mg/L	28 days	
	[redacted]	0.1 mg/L	28 days	
	[redacted]	[redacted]	[redacted]	
	~~total CO_2~~			measure in field by titration
	~~Free CO_2~~			measure in field by titration
	Cost/sample			

Total Cost

Job#E0358205

Health, Safety, Environment & Community

File: 6.1- Radiation and Hygiene\6.1.2-Management\KT\Transport\Correspondence_Reports Exemption.doc

bhpbilliton

BHP Billiton Limited
Olympic Way
Olympic Dam, South Australia, 5725
Australia

PO Box 150
Olympic Dam, South Australia, 5725
Australia

Tel +61 (08) 8671 8468 Fax +61 (08) 8671 2493
david.kruss@bhpbilliton.com

16 June 2008

To Whom it May Concern

Dear Sir/Madam

Re: Transportation of materials below Exemption Levels

The bearers of the attached groundwater samples are transporting them at levels below the level of concern for radiological purposes. In particular, the levels are below 10,000Bq of Uranium-238, Lead-210 and Polonium-210. These levels are the exemption levels provided in the IAEA Code of Practice for Safe Transport of Radioactive Substances 1990 as adopted by all States and the Commonwealth within Australia and also by relevant international bodies including IATA and IMO. The ground water is acidic; however the volume is below 5 litres and is therefore an exempted corrosive substance under the Australian Dangerous Goods code.

At these very low levels the material is not considered corrosive or radioactive for transport or licencing purposes and poses minimal health or safety risk.

There is some acidity and radioactive content in the groundwater samples and safety precautions should be taken during handling. Gloves should be worn when handling the samples and if any activity is conducted which may give rise to airborne dust, then a dust mask should be worn. Processes which create dust should be avoided.

The samples should be analysed in work area be covered to prevent loss of any spill and any material removed from the groundwater samples should be collected, sealed in an approved dangerous goods container suitable for liquids and returned to Olympic Dam with the groundwater samples in a similar manner to which the groundwater samples was supplied. Any personal protective equipment used in the handling of these groundwater samples should also be collected, sealed in a plastic bag and returned to Olympic Dam.

If you have any further queries on the transport of these samples, please contact me on +61 8 8671 8468, my mobile +61 417 814 359, or my e-mail address at david.kruss@bhpbilliton.com.

Yours sincerely,

D Kruss

David Kruss
Radiation Safety Officer - Process

CHEMWATCH

OLYMPIC DAM EVAPORATION POND LIQUOR

Hazard Alert Code: EXTREME

Chemwatch Material Safety Data Sheet (REVIEW) Revision No: 2.0 Chemwatch 5501-93

Issue Date: 28-Sep-2003 CD 2008/2

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: OLYMPIC DAM EVAPORATION POND LIQUOR

SYNONYMS

"evaporation pond liquid", "pond liquors"

PROPER SHIPPING NAME

CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (contains sulfuric acid)

PRODUCT USE

Process liquors as held in Evaporating Ponds at Olympic Dam operations.

SUPPLIER

Company: BHP Billiton - Olympic Dam

Address:

PO Box 150

Roxby Downs

SA, 5725

AUS

Telephone: +61 8 8671 8888

Fax: +61 8 8671 8807

HAZARD RATINGS

		Min	Max
Flammability:	0		
Toxicity:	0		
Body Contact:	4		
Reactivity:	0		
Chronic:	0		

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

S6

RISK

Irritating to eyes respiratory system and skin.

Harmful to aquatic organisms may cause long-term adverse effects in the aquatic environment.

Cumulative effects may result following exposure*.

* (limited evidence).

SAFETY

Do not breathe gas/ fumes/ vapour/ spray.

Avoid contact with skin.

Wear eye/ face protection.

To clean the floor and all objects contaminated by this material use water.

In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.

If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

This material and its container must be disposed of as hazardous waste.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
sulfuric acid	7664-93-9	<10
Cu 2.5-7.0 g/L as copper sulfate	7758-98-7	<1
Fe 30-87 g/L as ferrous sulfate anhydrous	7720-78-7	1-10
Ca 0.85-1.49 g/L as calcium sulfate	7778-18-9	<0.5

Uranium mixed oxides max		0.04
dissolved SiO2 as alkali silicate max		0.87
Cl- max		0.9
Radionuclides: Po210 max 0.2 Bq/g		
Pb210 max 1.8 Bq/g		
water	7732-18-5	>60

Section 4 - FIRST AID MEASURES

SWALLOWED

For advice, contact a Poisons Information Centre or a doctor.

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

EYE

If this product comes in contact with the eyes:

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.

INHALED

- If inhaled, remove quickly from contaminated area.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

NOTES TO PHYSICIAN

For acute or short term repeated exposures to strong acids:

- Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
- Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling
- Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
- Strong acids produce a coagulation necrosis characterised by formation of a coagulum (eschar) as a result of the dessicating action of the acid on proteins in specific tissues.

INGESTION:

- Immediate dilution (milk or water) within 30 minutes post ingestion is recommended.
- DO NOT attempt to neutralise the acid since exothermic reaction may extend the corrosive injury.
- Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
- Charcoal has no place in acid management.
- Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:

- Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
- Deep second-degree burns may benefit from topical silver sulfadiazine.

EYE:

- Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjuctival cul-de-sacs. Irrigation should last at least 20-30 minutes. DO NOT use neutralising agents or any other additives. Several litres of saline are required.
- Cycloplegic drops, (1% cyclopentolate for short-term use or 5% homatropine for longer term use) antibiotic drops, vasoconstrictive agents or artificial tears may be indicated dependent on the severity of the injury.
- Steroid eye drops should only be administered with the approval of a consulting ophthalmologist).

[Ellenhorn and Barceloux: Medical Toxicology].

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.

- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

Non combustible liquid.
Will not burn, but heat produces highly toxic fumes/vapours.
Reacts with metals producing flammable / explosive hydrogen gas.
If involved in fire emits toxic fumes of: sulfur oxides (SOx).

FIRE INCOMPATIBILITY

Avoid contact with. strong alkalis, strong oxidisers and cyanides.

HAZCHEM

2X

Personal Protective Equipment

Gas tight chemical resistant suit.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

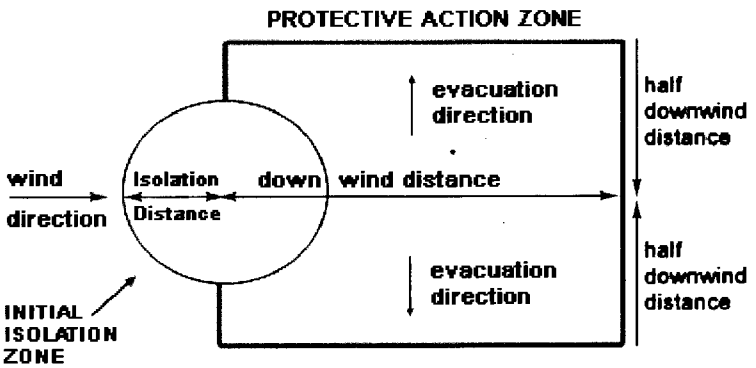
Carefully, contain and neutralise with slaked lime.

- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labelled container for waste disposal.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Neutralise/decontaminate residue.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)	
Isolation Distance	25 metres
Downwind Protection Distance	250 metres
IERG Number	37

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
5 Guide 154 is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

OLYMPIC DAM EVAPORATION POND LIQUOR

Hazard Alert Code: EXTREME

Chemwatch Material Safety Data Sheet (REVIEW) Revision No: 2.0 Chemwatch 5501-93

Issue Date: 28-Sep-2003 CD 2008/2

+	X	+	X	0	+

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

- Check that containers are clearly labelled

Bulk, open pondage

STORAGE INCOMPATIBILITY

Segregate quantities of liquor outside the Evaporation Pond from strong alkalies and cyanides

STORAGE REQUIREMENTS

Prevent contact with corrodible materials.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC
Australia Exposure Standards	sulfuric acid (Sulphuric acid)		1		3			
Australia Exposure Standards	copper sulfate (Copper, dusts & mists (as Cu))		1					
Australia Exposure Standards	copper sulfate (Copper (fume))		0.2					
Australia Exposure Standards	ferrous sulfate anhydrous (Iron salts, soluble (as Fe))		1					
Australia Exposure Standards	calcium sulfate (Calcium sulphate (a))		10					

The following materials had no OELs on our records

- water: CAS:7732-18-5

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
sulfuric acid	15	

MATERIAL DATA

None assigned. Refer to individual constituents.

INGREDIENT DATA

FERROUS SULFATE ANHYDROUS:

SULFURIC ACID:

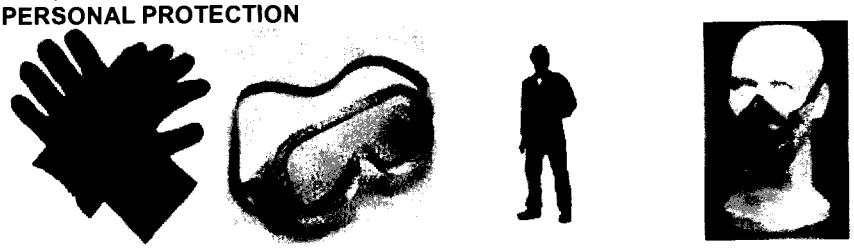
Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling

values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.
OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

FERROUS SULFATE ANHYDROUS:
The recommended TLV is thought to reduce the likelihood of respiratory irritation and skin irritation from exposure to aerosols and mists of soluble iron salts.
CALCIUM SULFATE:
The TLV-TWA is thought to be protective against the significant risks of
eye, skin and other physical irritation.
WATER:
No exposure limits set by NOHSC or ACGIH.

PERSONAL PROTECTION



EYE

- Chemical goggles
- Full face shield
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

HANDS/FEET

PVC gloves.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

RESPIRATOR

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	E-AUS P	-
1000	50	-	E-AUS P
5000	50	Airline *	-
5000	100	-	E-2 P
10000	100	-	E-3 P
	100+		Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand.
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

If risk of inhalation or overexposure exists, wear SAA approved respirator or work in fume hood.
Correct respirator fit is essential to obtain adequate protection.
Provide adequate ventilation in warehouse or closed storage areas.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Opaque, greyish blue-green liquid. Characteristic odour. Miscible with water. Corrosive to metals, 241.5mm per year on aluminium (7075 T6 non-clad) when tested in accordance with NACE Method TM 0169-76.

PHYSICAL PROPERTIES

Liquid.
Mixes with water.
Corrosive.
Acid.

Molecular Weight: Not applicable.	Boiling Range (°C): >100
Melting Range (°C): Not available.	Specific Gravity (water=1): 1.1 estd.
Solubility in water (g/L): Miscible	pH (as supplied): 1.1-1.6
pH (1% solution): Not available	Vapour Pressure (kPa): Not available
Volatile Component (%vol): Not available	Evaporation Rate: Not available
Relative Vapour Density (air=1): Not available.	Flash Point (°C): Not applicable
Lower Explosive Limit (%): Not applicable	Upper Explosive Limit (%): Not applicable
Autoignition Temp (°C): Not available.	Decomposition Temp (°C): Not available
State: Liquid	

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

The liquid is. highly corrosive to the gastro-intestinal tract and capable of causing severe burns if swallowed.
Considered an unlikely route of entry in commercial/industrial environments.

EYE

The vapour/liquid is. extremely corrosive to the eyes and is capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.
The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

SKIN

The vapour/liquid is. corrosive to the skin and is capable of causing burns.
The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

INHALED

Not normally a hazard due to non-volatile nature of product.
The vapour/mist is. highly discomforting to the upper respiratory tract and lungs.
The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.

CHRONIC HEALTH EFFECTS

Primary route of exposure is usually by skin contact/eye contact.

TOXICITY AND IRRITATION

Not available. Refer to individual constituents.
SULFURIC ACID:
unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 2140 mg/kg	Eye (rabbit): 1.38 mg SEVERE
Inhalation (rat) LC50: 510 mg/m³/2h	Eye (rabbit): 5 mg/30sec SEVERE
Inhalation (human) TCLo: 3 mg/m³/24w	

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.
WARNING: For inhalation exposure ONLY: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS.

Occupational exposures to strong inorganic acid mists of sulfuric acid:

COPPER SULFATE:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (human) LDLo: 50 mg/kg	Nil Reported
Oral (man) LDLo: 857 mg/kg	
Oral (human) TDLo: 11 mg/kg	
Oral (rat) LD50: 300 mg/kg	

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

FERROUS SULFATE ANHYDROUS:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

Oral (woman) LDLo: 60 mg/kg Nil Reported
Oral (woman) TDLo: 600 mg/kg
Oral (woman) TDLo: 10.56 mg/kg
Oral (rat) LD50: 319 mg/kg
Oral (Human) TDLo: 68640 mg/kg
Oral (Human) TDLo: 960 mg/kg
Oral (Mouse) LD50: 680 mg/kg
Intraperitoneal (Mouse) LD50: 106 mg/kg
Intravenous (Mouse) LD50: 112 mg/kg
Intravenous (Dog) LD50: 79 mg/kg
Oral (Human) LD: 60 mg/kg
Oral (Human) LD: 699 mg/kg
Subcutaneous (Rat) LD50: 155 mg/kg
Oral (Guinea) pig: LD50 1200 mg/kg

CALCIUM SULFATE:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
for dihydrate
[RTEC NO.: EW 4150000]
Inhalation (human) TCLo: 194000 mg/m³/10Y Nil reported
-Intermittent

WATER:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

Marine Pollutant:Not Determined

DO NOT discharge into sewer or waterways.
Refer to data for ingredients, which follows:
SULFURIC ACID:
Prevent, by any means available, spillage from entering drains or water courses.
DO NOT discharge into sewer or waterways.
Data from tap water studies with human volunteers indicate that sulfates produce a laxative effect at concentrations of 1000 - 1200 mg/litre, but no increase in diarrhoea, dehydration or weight loss. The presence of sulfate in drinking-water can also result in a noticeable taste; the lowest taste threshold concentration for sulfate is approximately 250 mg/litre as the sodium salt. Sulfate may also contribute to the corrosion of distribution systems. No health-based guideline value for sulfate in drinking water is proposed. However, there is an increasing likelihood of complaints arising from a noticeable taste as concentrations in water increase above 500 mg/litre.
Sulfuric acid is soluble in water and remains indefinitely in the environment as sulfate.
Large discharges may contribute to the acidification of water and be fatal to aquatic life and soil micro-organisms.
Large discharges may contribute to the acidification of effluent treatment systems and injure sewage treatment organisms. [ICI UK]
COPPER SULFATE:
Fish LC50 (96hr.) (mg/l): 3.20- 7.4
Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
Copper is unlikely to accumulate in the atmosphere due to a short residence time for airborne copper aerosols. Airborne coppers, however, may be transported over large distances. Copper accumulates significantly in the food chain.
Drinking Water Standards:
3000 ug/l (UK max)
2000 ug/l (WHO provisional Guideline)
1000 ug/l (WHO level where individuals complain)
Soil Guidelines: Dutch Criteria
36 mg/kg (target)
190 mg/kg (intervention)
Air Quality Standards: no data available.
The toxic effect of copper in the aquatic biota depends on the bio-availability of copper in water which, in turn, depends on its physico-chemical form (ie.speciation). Bioavailability is decreased by complexation and adsorption of copper by natural organic matter, iron and manganese hydrated oxides, and chelating agents excreted by algae and other aquatic organisms. Toxicity is also affected by pH and hardness. Total copper is rarely useful as a predictor of toxicity. In natural sea water, more than 98% of copper is organically bound and in river waters a high percentage is often organically bound, but the actual percentage depends on the river water and its pH.

Copper exhibits significant toxicity in some aquatic organisms. Some algal species are very sensitive to copper with EC50 (96 hour) values as low as 47 ug/litre dissolved copper whilst for other algal species EC50 values of up to 481 ug/litre have been reported. However many of the reportedly high EC50 values may arise in experiments conducted with a culture media containing copper-complexing agents such as silicate, iron, manganese and EDTA which reduce bioavailability.
Toxic effects arising following exposure by aquatic species to copper are typically:

Algae EC50 (96 h)	Daphnia magna LC50 (48-96 h)	Amphipods LC50 (48-96 h)	Gastropods LC50 (48-96 h).	Crab larvae LC50 (48-96 h)
47-481 *	7-54 *	37-183 *	58-112 *	50-100 *

* ug/litre
Exposure to concentrations ranging from one to a few hundred micrograms per litre has led to sublethal effects and effects on long-term survival. For high bioavailability waters, effect concentrations for several sensitive species may be below 10 ug Cu/litre.
In fish, the acute lethal concentration of copper ranges from a few ug/litre to several mg/litre, depending both on test species and exposure conditions. Where the value is less than 50 ug Cu/litre, test waters generally have a low dissolved organic carbon (DOC) level, low hardness and neutral to slightly acidic pH. Exposure to concentrations ranging from one to a few hundred micrograms per litre has led to sublethal effects and effects on long-term survival. Lower effect concentrations are generally associated with test waters of high bioavailability.
In summary:
Responses expected for high concentration ranges of copper *

Total dissolved Cu concentration range (ug/litre)	Effects of high availability in water
1-10	Significant effects are expected for diatoms and sensitive invertebrates, notably cladocerans. Effects on fish could be significant in freshwaters with low pH and hardness.
10-100	Significant effects are expected on various species of microalgae, some species of macroalgae, and a range of invertebrates, including crustaceans, gastropods and sea urchins. Survival of sensitive fish will be affected and a variety of fish show sublethal effects.
100-1000	Most taxonomic groups of macroalgae and invertebrates will be severely affected. Lethal levels for most fish species will be reached.
>1000	Lethal concentrations for most tolerant organisms are reached.

* Sites chosen have moderate to high bioavailability similar to water used in most toxicity tests.
In soil, copper levels are raised by application of fertiliser, fungicides, from deposition of highway dusts and from urban, mining and industrial sources. Generally, vegetation rooted in soils reflects the soil copper levels in its foliage. This is dependent upon the bioavailability of copper and the physiological requirements of species concerned.
Typical foliar levels of copper are:

Uncontaminated soils (0.3-250 mg/kg)	Contaminated soils (150-450 mg/kg)	Mining/smelting soils
6.1-25 mg/kg	80 mg/kg	300 mg/kg

Plants rarely show symptoms of toxicity or of adverse growth effects at normal soil concentrations of copper. Crops are often more sensitive to copper than the native flora, so protection levels for agricultural crops range from 25 mg Cu/kg to several hundred mg/kg, depending on country. Chronic and or acute effects on sensitive species occur at copper levels occurring in some soils as a result of human activities such as copper fertiliser addition, and addition of sludge.
When soil levels exceed 150 mg Cu/kg, native and agricultural species show chronic effects. Soils in the range 500-1000 mg Cu/kg act in a strongly selective fashion allowing the survival of only copper-tolerant species and strains. At 2000 Cu mg/kg most species cannot survive. By 3500 mg Cu/kg areas are largely devoid of vegetation cover. The organic content of the soil appears to be a key factor affecting the bioavailability of copper.
On normal forest soils, non-rooted plants such as mosses and lichens show higher copper concentrations. The fruiting bodies and mycorrhizal sheaths of soil fungi associated with higher plants in forests often accumulate copper to much higher levels than plants at the same site. International Programme on Chemical Safety (IPCS): Environmental Health Criteria 200.
Data from tap water studies with human volunteers indicate that sulfates produce a laxative effect at concentrations of 1000 - 1200 mg/litre, but no increase in diarrhoea, dehydration or weight loss. The presence of sulfate in drinking-water can also result in a noticeable taste; the lowest taste threshold concentration for sulfate is approximately 250 mg/litre as the sodium salt. Sulfate may also contribute to the corrosion of distribution systems. No health-based guideline value for sulfate in drinking water is proposed. However, there is an increasing likelihood of complaints arising from a noticeable taste as concentrations in water increase above 500 mg/litre.
DO NOT discharge into sewer or waterways.
The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l
* Classification of Substances as Ecotoxic (Dangerous to the Environment)
Appendix 8, Table 1
Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.
FERROUS SULFATE ANHYDROUS:
Data from tap water studies with human volunteers indicate that sulfates produce a laxative effect at concentrations of 1000 - 1200 mg/litre, but no increase in diarrhoea, dehydration or weight loss. The presence of sulfate in drinking-water can also result in a noticeable taste; the lowest taste threshold concentration for sulfate is approximately 250 mg/litre as the sodium salt. Sulfate may also contribute to the corrosion of distribution systems. No health-based guideline value for sulfate in drinking water is proposed. However, there is an increasing likelihood of complaints arising from a noticeable taste as concentrations in water increase above 500 mg/litre.
DO NOT discharge into sewer or waterways.

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Treat and neutralise at an effluent treatment plant.
- Use soda ash or slaked lime to neutralise.
- Recycle containers, otherwise dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

Labels Required: CORROSIVE
HAZCHEM: 2X

UNDG:

Dangerous Goods Class:	8	Subrisk:	None
UN Number:	3264	Packing Group:	III

Shipping Name:CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.
(contains sulfuric acid)

Air Transport IATA:

ICAO/IATA Class:	8	ICAO/IATA Subrisk:	None
UN/ID Number:	3264	Packing Group:	III
Special provisions:	A3		

Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. *

Maritime Transport IMDG:

IMDG Class:	8	IMDG Subrisk:	None
UN Number:	3264	Packing Group:	III
EMS Number:	F-A,S-B	Special provisions:	223 274 944
Limited Quantities:	5 L	Marine Pollutant:	Not Determined

Shipping Name: CORROSIVE LIQUID, ACIDIC,INORGANIC, N.O.S.

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE

S6

REGULATIONS

Olympic Dam Evaporation Pond Liquor (CAS: None):
No regulations applicable
sulfuric acid (CAS: 7664- 93- 9) is found on the following regulatory lists;
Australia Exposure Standards
Australia Hazardous Substances
Australia High Volume Industrial Chemical List (HVICL)
Australia Illicit Drug Reagents/Essential Chemicals - Category III
Australia Inventory of Chemical Substances (AICS)
Australia National Pollutant Inventory
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix E (Part 2)
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix F (Part 3)
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 6
China (Hong Kong) Control of Chemicals Ordinance
China (Hong Kong) Fire Service Department - List of Dangerous Goods
China (Hong Kong) Occupational Exposure Limits
China (Hong Kong) Pharmacy and Poisons Regulations - Poisons Exempted from Labelling Provisions
China (Hong Kong) Pharmacy and Poisons Regulations - Special Exemptions
China (Hong Kong) Poisons List Regulations - Poisons List
China Classification and Labelling of Dangerous Chemical Substances
China Dangerous Chemicals Names List
China Inventory of Existing Chemical Substances
China National Dangerous Wastes Name List (Chinese)
China Occupational Exposure Limits for Hazardous Agents in the Workplace
IMO IBC Code Chapter 17: Summary of minimum requirements
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
India Chemical Accidents Rules - Schedule 1: List of Hazardous Chemicals
India Hazardous Wastes Rules - Schedule 2: List of Wastes Constituents with Concentration Limits
India Manufacture, Storage and Import of Hazardous Chemical Rules - Schedule 1: List of Hazardous and Toxic Chemicals
India Permissible Levels of Certain Chemical Substances in Work Environment
International Air Transport Association (IATA) Dangerous Goods Regulations
International Council of Chemical Associations (ICCA) - High Production Volume List
Japan Air Pollution Prevention
Japan Chemical Substances Control Law - Existing/New Chemical Substances
Japan Civil Aeronautics Law
Japan Drug Enforcement Legislation
Japan Fire Service Law - Obstacle Substances to Fire Fighting
Japan Food Sanitation Law - Designated Additives
Japan Food Sanitation Law - Designated Additives (Japanese)
Japan GHS Classifications (Japanese)
Japan Industrial Safety and Health Law (ISHL) - Chemicals Requiring Eye Protection
Japan Industrial Safety and Health Law (ISHL) - Corrosive Liquid (English)

OLYMPIC DAM EVAPORATION POND LIQUOR

Hazard Alert Code: EXTREME

Chemwatch Material Safety Data Sheet (REVIEW) Revision No: 2.0 Chemwatch 5501-93

Issue Date: 28-Sep-2003 CD 2008/2

Japan Industrial Safety and Health Law (ISHL) - Corrosive Liquid (Japanese)
Japan Industrial Safety and Health Law (ISHL) - Notifiable Substances
Japan Industrial Safety and Health Law (ISHL) - Specified Chemical Substances
Japan Marine Pollution and Disasters
Japan Occupational Exposure Limits
Japan Occupational Exposure Limits (Japanese)
Japan Poisonous and Deleterious Substances Control Law
Japan Poisonous and Deleterious Substances Control Law - Deleterious Substances
Japan Road Law
Japan Shipping Legislation
Korea (South) Existing Chemicals List (KECL)
Korea (South) Occupational Exposure Standards (Korean)
Korea (South) Toxic Chemicals Control Act - Toxic Chemicals
Korea (South) Toxic Release Inventory (TRI) Chemicals
Korea GHS Classifications (Korean)
Malaysia Permissible Exposure Limits
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Hazardous Substances Register
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Scheduled Toxic Substances
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Poisons Schedule [NLV]
New Zealand Transferred List of Single Component Substances
New Zealand Workplace Exposure Standards (WES)
OECD Representative List of High Production Volume (HPV) Chemicals
Philippines Inventory of Chemicals and Chemical Substances (PICCS)
Philippines Occupational Exposure Limits
Philippines Regulatory Guidelines Concerning Food Additives - Permitted Food Additives
Philippines Regulatory Guidelines Concerning Food Additives - Recommended Levels of Use for some Food Additives
Singapore Environmental Pollution Control (Hazardous Substances) Regulations
Singapore Environmental Pollution Control Act (EPCA) - List of Controlled Hazardous Substances
Singapore Food Regulations - Food Addititves - Permitted General Purpose Food Additives
Singapore Odour Thresholds and Irritation Concentration of Chemicals
Singapore Permissible Exposure Limits of Toxic Substances
Taiwan Hazard Prevention Standard for Specified Chemical Substances - Specified Chemical Substances (Category A - D) & Specified Controlled Substances
Taiwan Permissible Concentration of Airborne Harmful Substances
Taiwan Rules for Hazard Communication for Dangerous and Harmful Materials - Harmful Materials (Chinese)
Taiwan Scope and Application Standards of Food Additives - Chemicals for Food Industry
Thailand Harmful Chemicals - List I
Thailand List of Precursor and Chemical Control (Watch List)
Thailand Occupational Exposure Limits - Working Safety and Environmental Condition (Chemical) Table 1
United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances - Table II
United Nations List of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances Under International Control - Table II
Vietnam Air Quality Hazardous Substances Standards
copper sulfate (CAS: 7758- 98- 7) is found on the following regulatory lists;
Australia Dangerous Goods Code Draft 7th Edition - List of Common Pesticides with Corresponding UN Numbers
Australia Exposure Standards
Australia Hazardous Substances
Australia High Volume Industrial Chemical List (HVICL)
Australia Inventory of Chemical Substances (AICS)
Australia National Pollutant Inventory
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix A
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 4
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 5
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 6
Australia Therapeutic Goods Administration (TGA) Substances that may be used as active ingredients in Listed medicines
Cambodia Water Pollution Control - Annex 1 Type of the hazardous substances
China Dangerous Chemicals Names List
China Inventory of Existing Chemical Substances
China National Dangerous Wastes Name List (Chinese)
India Chemical Accidents Rules - Schedule 1: List of Hazardous Chemicals
India Hazardous Wastes Rules - Schedule 2: List of Wastes Constituents with Concentration Limits
India Manufacture, Storage and Import of Hazardous Chemical Rules - Schedule 1: List of Hazardous and Toxic Chemicals
India Permissible Levels of Certain Chemical Substances in Work Environment
International Council of Chemical Associations (ICCA) - High Production Volume List
Japan Chemical Substances Control Law - Existing/New Chemical Substances
Japan Food Sanitation Law - Designated Additives
Japan Food Sanitation Law - Designated Additives (Japanese)
Japan GHS Classifications (Japanese)
Japan Industrial Safety and Health Law (ISHL) - Notifiable Substances
Japan Poisonous and Deleterious Substances Control Law
Japan Poisonous and Deleterious Substances Control Law - Deleterious Substances
Japan PRTR Law
Japan Water Pollution Control Law - National Effluent Standards
Korea (South) Existing Chemicals List (KECL)
Korea (South) Occupational Exposure Standards (Korean)
Korea (South) Toxic Chemicals Control Act - Chemicals not Relevant to Toxic
Korea (South) Toxic Release Inventory (TRI) Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Hazardous Substances Register
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Pesticides

Malaysia Food Regulations - Permitted Food Conditioners
Malaysia Permissible Exposure Limits
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Transferred List of Single Component Substances
New Zealand Workplace Exposure Standards (WES)
OECD Representative List of High Production Volume (HPV) Chemicals
Philippines Inventory of Chemicals and Chemical Substances (PICCS)
Philippines Regulatory Guidelines Concerning Food Additives - Permitted Food Additives
Singapore Food Regulations - Food Addititves - Permitted Nutrient Supplement
Singapore Permissible Exposure Limits of Toxic Substances
Taiwan Scope and Application Standards of Food Additives - Food quality improvement, fermentation and food processing agents
Thailand Food Act - Bottled Drinking Water Quality Standard
Thailand Ground Water Act - Ground Water Quality Standards for Drinking Purposes
Thailand Industrial Products Standards Act - Drinking Water Quality Standards
Thailand Notification No 84 (B.E. 2527) Food Additives - Section 4: Salts
calcium sulfate (CAS: 10101- 41- 4) is found on the following regulatory lists;
Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (Domestic water supply - inorganic chemicals)
Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Agricultural uses (Stock)
Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Domestic water quality
Cambodia Water Pollution Control - Annex 2 Effluent standard for pollution sources discharging wastewater to public water areas or sewer
Thailand Food Act - Bottled Drinking Water Quality Standard
Thailand Ground Water Act - Ground Water Quality Standards for Drinking Purposes
Thailand Industrial Products Standards Act - Drinking Water Quality Standards
water (CAS: 7732- 18- 5) is found on the following regulatory lists;
Australia Inventory of Chemical Substances (AICS)
China Inventory of Existing Chemical Substances
IMO IBC Code Chapter 18: List of products to which the Code does not apply
India Hazardous Wastes Rules - Schedule 2: List of Wastes Constituents with Concentration Limits
Korea (South) Existing Chemicals List (KECL)
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Transferred List of Single Component Substances
OECD Representative List of High Production Volume (HPV) Chemicals
Philippines Inventory of Chemicals and Chemical Substances (PICCS)
Thailand Harmful Chemicals - List I

Section 16 - OTHER INFORMATION

Ingredients with multiple CAS Nos

Ingredient Name	CAS
ferrous sulfate anhydrous	7720-78-7, 13463-43-9
calcium sulfate	7778-18-9, 10101-41-4

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.
The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Issue Date: 28-Sep-2003
Print Date: 16-Jun-2008

LabMark
ENVIRONMENTAL LABORATORIES

ilac-MRA NATA Accreditation No. 13542

Accredited for compliance with ISO/IEC 17025. The results of tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the APLAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

AQIS
AUSTRALIAN QUARANTINE AND INSPECTION SERVICE

SYDNEY License No. N0356.

Quarantine Approved Premises criteria 5.1 for quarantine containment level 1 (QCI) facilities. Class five criteria cover premises utilised for research, analysis and testing of biological material, soil, animal, plant and human products.

CUSTOMER CENTRIC - ANALYTICAL CHEMISTS

FINAL CERTIFICATE OF ANALYSIS - ENVIRONMENTAL DIVISION

Laboratory Report No:	E038250	Cover Page 1 of 4 plus Sample Results
Client Name:	Sinclair Knight Merz Pty Ltd	
Client Reference:	VE30064	
Contact Name:	Russel Martin	
Chain of Custody No:	na	Date Received: 20/05/2008
Sample Matrix:	WATER	Date Reported: 27/06/2008

This Final Certificate of Analysis consists of sample results, DQI's, method descriptions, laboratory definitions, and internationally recognised NATA accreditation and endorsement. The DQO compliance relates specifically to QA/QC results as performed as part of the sample analysis, and may provide an indication of sample result quality. Transfer of report ownership from Labmark to the client shall only occur once full & final payment has been settled and verified. All report copies may be retracted where full payment has not occured within the agreed settlement period.

QUALITY ASSURANCE CRITERIA

Accuracy:	matrix spike:	1 in first 5-20, then 1 every 20 samples
	lcs, crm, method:	1 per analytical batch
	surrogate spike:	addition per target organic method
Precision:	laboratory duplicate:	1 in first 5-10, then 1 every 10 samples
	laboratory triplicate:	re-extracted & reported when duplicate RPD values exceed acceptance criteria
Holding Times:	soils, waters:	Refer to LabMark Preservation & THT table VOC's 14 days water / soil VAC's 7 days water or 14 days acidified VAC's 14 days soil SVOC's 7 days water, 14 days soil Pesticides 7 days water, 14 days soil Metals 6 months general elements Mercury 28 days
Confirmation:	target organic analysis:	GC/MS, or confirmatory column
Sensitivity:	EQL:	Typically 2-5 x Method Detection Limit (MDL)

QUALITY CONTROL GLOBAL ACCEPTANCE CRITERIA (GAC)

Accuracy:	spike, lcs, crm surrogate:	general analytes 70% - 130% recovery phenol analytes 50% - 130% recovery organophosphorous pesticide analytes 60% - 130% recovery phenoxy acid herbicides, organotin 50% - 130% recovery
	anion/cation bal:	+/- 10% (0-3 meq/l), +/- 5% (>3 meq/l)
Precision:	method blank:	not detected >95% of the reported EQL
	duplicate lab RPD (metals):	0-30% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)
	duplicate lab RPD:	0-50% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)

QUALITY CONTROL ANALYTE SPECIFIC ACCEPTANCE CRITERIA (ASAC)

Accuracy:	spike, lcs, crm surrogate:	analyte specific recovery data <3xsd of historical mean
Uncertainty:	spike, lcs:	measurement calculated from historical analyte specific control charts

RESULT ANNOTATION

Data Quality Objective	s:	matrix spike recovery	p:	pending	bcs: batch specific lcs
Data Quality Indicator	d:	laboratory duplicate	lcs:	laboratory control sample	bmb: batch specific mb
Estimated Quantitation Limit	t:	laboratory triplicate	crm:	certified reference material	
not applicable	r:	RPD relative % difference	mb:	method blank	

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This document is issued in accordance with NATA's accreditation requirements.

NEPC GUIDELINE COMPLIANCE - DQO

1. GENERAL

A. Results relate specifically to samples as received. Sample results are not corrected for matrix spike, lcs, or surrogate recovery data.

B. EQL's are matrix dependant and may be increased due to sample dilution or matrix interference.

C. Laboratory QA/QC samples are specific to this project.

D. Inter-laboratory proficiency results are available upon request. NATA accreditation details available at www.nata.asn.au.

E. VOC spikes & surrogates added to samples during extraction, SVOC spikes & surrogates added prior to extraction.

F. Recovery data outside GAC limits shall be investigated and compared to ASAC (historical mean +/- 3sd). If recovery data <20%, then the relevant results for that compound are considered not reliable.

G. Recovery data (ms, surrogate, crm, lcs) outside ASAC limits shall initiate an investigative action. Anomolous QC data is examined in conjunction with other QC samples and a final decision whether to accept or reject results is provided by the professional judgement of the senior analyst. The USEPA-CLP National Functional Guidelines are referred to for specific recommendations.

H. Extraction (preparation) date refers to the date that sample preparation was initiated. Note that certain methods not requiring sample preparation (eg. VOCs in water, etc) may report a common extraction and analysis date.

I. LabMark shall maintain an official copy of this Certificate of Analysis for all tracable reference purposes.

2. CHAIN OF CUSTODY (COC) & SAMPLE RECEIPT NOTICE (SRN) REQUIREMENTS

A. SRN issued to client upon sample receipt & login verification.

B. Preservation & sampling date details specified on COC and SRN, unless noted.

C. Sample Integrity & Validated Time of Sample Receipt (VTSR) Holding Times verified (preservation may extend holding time, refer to preservation chart).

3. NATA ACCREDITED METHODS

A. NATA accreditation held for each in-house method and sample matrix type reported, unless noted below (Refer to subcontracted test reports for NATA accreditation status).

B. NATA accredited in-house laboratory methods are referenced from NEPC, ASTM, modified USEPA / APHA documents. Corporate Accreditation No. 13542.

C. Subcontracted analyses: Refer to Sample Receipt Notice and additional DQO comments.

Reported by Amdel Limited, NATA accreditation No.1526.

Reported by Sydney Analytical Laboratories, NATA accreditation No.1884.

4. QA/QC FREQUENCY COMPLIANCE TABLE SPECIFIC TO THIS REPORT

Matrix: **WATER**

Page:	Method:	Totals:	#d	%d-ratio	#t	#s	%s-ratio
1	pH in water	1	0	0%	0	0	0%
2	Electrical conductivity (EC)	1	0	0%	0	0	0%
3	Total alkalinity	1	0	0%	0	0	0%
4	Chloride	1	0	0%	0	0	0%
5	Fluoride	1	0	0%	0	0	0%
6	Sulphate	1	0	0%	0	0	0%
7	Nitrate as N	1	0	0%	0	0	0%
7	Nitrite as N	1	0	0%	0	0	0%
8	TKN (as N)	1	0	0%	0	0	0%
9	Total Nitrogen (as N)	1	0	0%	0	0	0%
10	Alkalinity (CO3, HCO3, OH)	1	0	0%	0	0	0%
11	Total Organic Carbon (TOC)	1	1	100%	0	0	0%
12	Total Dissolved Solids (TDS)	1	1	100%	0	0	0%

GLOSSARY:

#d	number of discrete duplicate extractions/analyses performed.
%d-ratio	NEPC guideline for laboratory duplicates is 1 in 10 samples (min 10%).
#t	number of triplicate extractions/analyses performed.
#s	number of spiked samples analysed.
%s-ratio	USEPA guideline for laboratory matrix spikes is 1 in 20 samples (min 5%).

Environmental Laboratory Industry Group
Foundation Member

Laboratory Report: E038250

5. ADDITIONAL COMMENTS SPECIFIC TO THIS REPORT

A. All tests were conducted by LabMark Environmental Sydney, NATA accreditation No. 13542, Corporate Site No. 13535, unless indicated below.
B. The following tests were conducted by Sydney Analytical Laboratories, NATA accreditation No.1884. :- TDS and TOC. SAL reference SAL20854 report issued on 27/6/2008
C. The following test was conducted by Amdel Limited, NATA accreditation No.1526. :- Metals analysis.

Laboratory QA/QC data shall relate specifically to this report, and may provide an indication of site specific sample result quality. LabMark DOES NOT report NON-RELEVANT BATCH QA/QC data. Acceptance of this self assessment certificate does not preclude any requirement for a QA/QC review by a accredited contaminated site EPA auditor, when and wherever necessary. Laboratory QA/QC self assessment references available upon request.

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E038250
Client Name: Sinclair Knight Merz Pty Ltd
Contact Name: Russel Martin
Client Reference: VE30064

Page: 1 of 12
plus cover page
Date: 27/06/08
This report supercedes reports issued on: 26/06/08

Final
Certificate
of Analysis

Laboratory Identification		**162565**									
Sample Identification		LT02/LP2									
Depth (m)		--									
Sampling Date recorded on COC		18/6/08									
Laboratory Extraction (Preparation) Date		20/6/08									
Laboratory Analysis Date		20/6/08									
Method : E018.1											
pH in water	**EQL**										
pH (pH units)	0.1	6.2									

Results expressed in pH units unless otherwise specified

Comments:

E018.1: Direct measurement by pH ion selective electrode.

Laboratory Identification		**162565**	**mb**								
Sample Identification		LT02/LP2	QC								
Depth (m)		--	--								
Sampling Date recorded on COC		18/6/08	--								
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08								
Laboratory Analysis Date		20/6/08	20/6/08								
Method : E032.1											
Electrical conductivity (EC)	**EQL**										
Electric conductivity (uS/cm)	1	38700	1								

Results expressed in uS/cm unless otherwise specified

Comments:

E032.1: Measurement by EC probe. Results expressed in uS/cm.

Laboratory Identification		**162565**	**lcs**	**mb**							
Sample Identification		LT02/LP2	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/6/08	--	--							
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08	20/6/08							
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08							
Method : E035.1											
Total alkalinity	**EQL**										
Alkalinity	5	698	90%	<5							

Results expressed in mg/l unless otherwise specified

Comments:

E035.1: Determination by colour and/or by titration. Results expressed as CaCO3.

Laboratory Identification		**162565**	**lcs**	**mb**							
Sample Identification		LT02/LP2	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/6/08	--	--							
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08	20/6/08							
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08							
Method : E033.1/E045.1/E047.1											
Chloride	**EQL**										
Chloride	1	13700	103%	<1							

Results expressed in mg/l unless otherwise specified

Comments:

E033.1/E045.1/E047.1: Determination by colour and/or by Ion Chromatography. Sample filtered through a 0.45um filter prior to analysis.

Laboratory Identification		**162565**	**lcs**	**mb**							
Sample Identification		LT02/LP2	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/6/08	--	--							
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08	20/6/08							
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08							
Method : E034.1/E045.1											
Fluoride	**EQL**										
Fluoride	0.1	1.9	106%	<0.1							

Results expressed in mg/l unless otherwise specified

Comments:

E034.1/E045.1: Determined by FIA-Ion Selective Electrode and/or by Ion Chromatography. Samples filtered through a 0.45um filter prior to analysis.

Laboratory Identification		**162565**	**lcs**	**mb**							
Sample Identification		LT02/LP2	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/6/08	--	--							
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08	20/6/08							
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08							
Method : E042.1/E045.1/E056.1											
Sulphate	**EQL**										
Sulphate	2	5890	103%	<2							

Results expressed in mg/l unless otherwise specified

Comments:

E042.1/E045.1/E056.1: Determination by colour and/or by Ion Chromatography. Sample filtered through 0.45um prior to analysis.

Laboratory Identification		**162565**	**lcs**	**mb**							
Sample Identification		LT02/LP2	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/6/08	--	--							
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08	20/6/08							
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08							
Method : E037.1/E051.1											
Nitrite as N	**EQL**										
NO2-N	0.01	0.02	102%	<0.01							
Method : E037.1/E051.1											
Nitrate as N	**EQL**										
NO3-N	0.01	0.13	97%	<0.01							

Results expressed in mg/l unless otherwise specified

Comments:

E037.1/E051.1: Nitrate determined by colour. Sample filtered through 0.45um prior to analysis.
E037.1/E051.1: Nitrite determined by colour. Sample filtered through 0.45um prior to analysis.

Laboratory Identification		**162565**	**lcs**	**mb**							
Sample Identification		LT02/LP2	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/6/08	--	--							
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08	20/6/08							
Laboratory Analysis Date		25/6/08	25/6/08	25/6/08							
Method : E039.1											
TKN (as N)	**EQL**										
Total Kjeldahl Nitrogen	0.1	6.4	85%	<0.1							

Results expressed in mg/l unless otherwise specified

Comments:

E039.1: Sample filtered through 0.45um filter prior to analysis. Acidic digestion followed by determination by colour.

Laboratory Identification		**162565**	**lcs**	**mb**							
Sample Identification		LT02/LP2	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/6/08	--	--							
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08	20/6/08							
Laboratory Analysis Date		25/6/08	25/6/08	25/6/08							
Method : E038.1											
Total Nitrogen (as N)	**EQL**										
Total Nitrogen (as N)	0.1	6.5	92%	<0.1							

Results expressed in mg/l unless otherwise specified

Comments:

E038.1: Total Nitrogen by calculation.

Laboratory Identification		**162565**	**lcs**	**mb**							
Sample Identification		LT02/LP2	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/6/08	--	--							
Laboratory Extraction (Preparation) Date		20/6/08	20/6/08	20/6/08							
Laboratory Analysis Date		20/6/08	20/6/08	20/6/08							
Method : E035.1											
Alkalinity (CO3, HCO3, OH)	**EQL**										
Carbonate	5	<5	--	<5							
Bicarbonate	5	698	90%	<5							
Hydroxide	5	<5	--	<5							

Results expressed in mg/l unless otherwise specified

Comments:

E035.1: Determination by colour and/or by titration, followed by calculation. Results expressed as CaCO3.

Laboratory Identification		**162565**	**162565d**	**162565r**	**mb**						
Sample Identification		LT02/LP2	QC	QC	QC						
Depth (m)		--	--	--	--						
Sampling Date recorded on COC		18/6/08	--	--	--						
Laboratory Extraction (Preparation) Date		25/6/08	25/6/08	--	25/6/08						
Laboratory Analysis Date		26/6/08	26/6/08	--	26/6/08						
Method : E2580											
Total Organic Carbon (TOC)	**EQL**										
Total Organic Carbon	1	6	5	18%	<1						

Results expressed in mg/l unless otherwise specified

Comments:

E2580: TOC analyser.

Laboratory Identification		**162565**	**162565d**	**162565r**	**mb**						
Sample Identification		LT02/LP2	QC	QC	QC						
Depth (m)		--	--	--	--						
Sampling Date recorded on COC		18/6/08	--	--	--						
Laboratory Extraction (Preparation) Date		25/6/08	25/6/08	--	25/6/08						
Laboratory Analysis Date		25/6/08	25/6/08	--	26/6/08						
Method : APHA 2540C **Total Dissolved Solids (TDS)**	**EQL**										
TDS	1	27500	28000	2%	<1						

Results expressed in mg/l unless otherwise specified

Comments:

APHA 2540C: Determined gravimetrically.

LabMark
ENVIRONMENTAL LABORATORIES

Report Date : 20/06/2008
Report Time : 2:18:38PM

Sample **Receipt** Notice (SRN) for **E038250**

Quality, Service, Support

Client Details		Laboratory Reference Information	
Client Name:	Sinclair Knight Merz Pty Ltd	**Please have this information ready when contacting Labmark.**	
Client Phone:	08 8424 3800		
Client Fax:	08 8424 3810	**Laboratory Report:**	**E038250**
Contact Name:	Russel Martin	**Quotation Number:**	- Not provided, standard prices apply
Contact Email:	rmartin@skm.com.au	**Laboratory Address:**	Unit 1, 8 Leighton Pl. Asquith NSW 2077
Client Address:	33 King William St Adelaide SA 5000	**Phone:**	61 2 9476 6533
		Fax:	61 2 9476 8219
Project Name:	VE30064	**Sample Receipt Contact:**	Ros Schacht
Project Number:	- Not provided -	**Email:**	Ros.Schacht@labmark.com.au
CoC Serial Number:	- Not provided -	**Reporting Contact:**	Geoff Weir
Purchase Order:	- Not provided -	**Email:**	geoff.weir@labmark.com.au
Surcharge:	No surcharge applied (results by 6:30pm on due date)		
Sample Matrix:	WATER		
Date Sampled (earliest date):	18/06/2008	**NATA Accreditation:**	13542
Date Samples Received:	20/05/2008	**TGA GMP License:**	185-336 (Sydney)
Date Sample Receipt Notice issued:	20/06/2008	**APVMA License:**	6105 (Sydney)
Date Preliminary Report Due:	26/06/2008	**AQIS Approval:**	NO356 (Sydney)
		AQIS Entry Permit:	200521534 (Sydney)

Reporting Requirements: Electronic Data Download required: Yes

Invoice Number: 32528

Sample Condition: COC received with samples. Report number and lab ID's defined on COC.
Samples received in good order .
Samples received with cooling media: Ice bricks .
Samples received chilled.
Security seals not used .
Sample container & chemical preservation suitable .

Comments: TDS and TOC subcontracted to SAL | Metals analysis subcontracted to LabMark Melbourne

Holding Times: Date received allows for sufficient time to meet Technical Holding Times.

Preservation: Chemical preservation of samples unsatisfactory for requested analytes.

Important Notes:

LabMark shall responsibly dispose of spent customer soil and water samples which includes the disintegration of the sample label. A sample disposal fee of $1.00 is applicable on all samples received by the laboratory regardless of whether they have undergone analytical testing. Sample disposal of environmental samples shall be 31 days (water) and 3 months (soil, HN03 preserved samples) after laboratory receipt, unless otherwise requested in writing by the client. Samples requested to be held in non-refrigerated storage shall incur $5.00/ sample/ 3 months. Additional refrigerated storage shall incur $30/ sample/ 3 months. Combination prices apply only if requested. Transfer of report ownership from LabMark to the client shall occur once full and final payment has been settled and verified. All report copies may be retracted where full payment does not occur within the agreed settlement period.

Analysis comments:

Subcontracted Analyses:

Reported by Amdel Limited, NATA accreditation No.1526.
Reported by Sydney Analytical Laboratories, NATA accreditation No.1884.

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

LabMark
ENVIRONMENTAL LABORATORIES

Report Date : 20/06/2008
Report Time : 2:18:38PM

Sample **Receipt** Notice (SRN) for **E038250**

Quality, Service, Support

The table below represents LabMark's understanding and interpretation of the customer supplied sample COC request (refer to SRN comments section on first page for external subcontracting method details). Please confirm that your COC request has been entered correctly. Due to THT and TAT requirements, testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

GRID REVIEW TABLE

				Requested Analysis																		
No.	**Date**	**Depth**	**Client Sample ID**	Alkalinity (CO3, HCO3, OH)	Chloride	Electrical conductivity (EC)	Fluoride	Nitrite as N	Nitrate as N	NOx (as N)	pH in water	PREP Not Reported	Sulphate	TKN (as N)	Total alkalinity	Total Nitrogen (as N)	External Analysis by Amdel	External Total Dissolved Solids (TDS)	External Total Organic Carbon (TOC)				
162565	18/06		LT02/LP2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
			Totals:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				

'PREP Not Reported' refers to an internal laboratory instruction - client confirmation of this parameter is not required.

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

			Container Identification						
		Size	500ml	125ml	43ml				
LAB USE ONLY	Project No:	Type	plastic	plastic	vile				
QUOTE NUMBER	VE30064	Preserv	no	yes	yes				
Job Code:	**Project Manager:**								
Due Date:	Russell Martin								
Custody seal intact?	**Sampler(s):**	Analytes							
Sample cold?	Alistair Walsh (0430 288 222)								
Received for Laboratory by:	**Checked:**								
Date:	**Date:**								
Time:	~~18/06/2008~~ 19/05/08								

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
162565	18/06/2008		H2O	LT02 / LP2 - groundwater	See attached list for analysis full suite								
					TOTAL								

Notes:

Please email awalsh@skm.com.au and rmartin@skm.com.au upon receival of samples. Thanks

20/6/08 800. E038250

Sheet 1 OF 1

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	~~pH (units)~~	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
	~~total CO_2~~			measure in field by titration
	~~Free CO_2~~			measure in field by titration
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 time:
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

E038250

20/6 800

Health, Safety, Environment & Community

File: 6.1- Radiation and Hygiene\6.1.2-Management\KT\Transport\Correspondence_Reports Exemption.doc

bhpbilliton

BHP Billiton Limited
Olympic Way
Olympic Dam, South Australia, 5725
Australia

PO Box 150
Olympic Dam, South Australia, 5725
Australia

Tel +61 (08) 8671 8468 Fax +61 (08) 8671 2493
david.kruss@bhpbilliton.com

16 June 2008

To Whom it May Concern

Dear Sir/Madam

Re: Transportation of materials below Exemption Levels

The bearers of the attached groundwater samples are transporting them at levels below the level of concern for radiological purposes. In particular, the levels are below 10,000Bq of Uranium-238, Lead-210 and Polonium-210. These levels are the exemption levels provided in the IAEA Code of Practice for Safe Transport of Radioactive Substances 1990 as adopted by all States and the Commonwealth within Australia and also by relevant international bodies including IATA and IMO. The ground water is acidic; however the volume is below 5 litres and is therefore an exempted corrosive substance under the Australian Dangerous Goods code.

At these very low levels the material is not considered corrosive or radioactive for transport or licencing purposes and poses minimal health or safety risk.

There is some acidity and radioactive content in the groundwater samples and safety precautions should be taken during handling. Gloves should be worn when handling the samples and if any activity is conducted which may give rise to airborne dust, then a dust mask should be worn. Processes which create dust should be avoided.

The samples should be analysed in work area be covered to prevent loss of any spill and any material removed from the groundwater samples should be collected, sealed in an approved dangerous goods container suitable for liquids and returned to Olympic Dam with the groundwater samples in a similar manner to which the groundwater samples was supplied. Any personal protective equipment used in the handling of these groundwater samples should also be collected, sealed in a plastic bag and returned to Olympic Dam.

If you have any further queries on the transport of these samples, please contact me on +61 8 8671 8468, my mobile +61 417 814 359, or my e-mail address at david.kruss@bhpbilliton.com.

Yours sincerely,

D Kruss

David Kruss
Radiation Safety Officer - Process

CHEMWATCH

OLYMPIC DAM EVAPORATION POND LIQUOR

Hazard Alert Code: EXTREME

Chemwatch Material Safety Data Sheet (REVIEW) Revision No: 2.0 Chemwatch 5501-93

Issue Date: 28-Sep-2003 CD 2008/2

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: OLYMPIC DAM EVAPORATION POND LIQUOR

SYNONYMS

"evaporation pond liquid", "pond liquors"

PROPER SHIPPING NAME

CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (contains sulfuric acid)

PRODUCT USE

Process liquors as held in Evaporating Ponds at Olympic Dam operations.

SUPPLIER

Company: BHP Billiton - Olympic Dam

Address:

PO Box 150

Roxby Downs

SA, 5725

AUS

Telephone: +61 8 8671 8888

Fax: +61 8 8671 8807

HAZARD RATINGS

		Min	Max
Flammability:	0		
Toxicity:	0		
Body Contact:	4		
Reactivity:	0		
Chronic:	0		

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

S6

RISK

Irritating to eyes respiratory system and skin.

Harmful to aquatic organisms may cause long-term adverse effects in the aquatic environment.

Cumulative effects may result following exposure*.

* (limited evidence).

SAFETY

Do not breathe gas/ fumes/ vapour/ spray.

Avoid contact with skin.

Wear eye/ face protection.

To clean the floor and all objects contaminated by this material use water.

In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.

If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

This material and its container must be disposed of as hazardous waste.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
sulfuric acid	7664-93-9	<10
Cu 2.5-7.0 g/L as copper sulfate	7758-98-7	<1
Fe 30-87 g/L as ferrous sulfate anhydrous	7720-78-7	1-10
Ca 0.85-1.49 g/L as calcium sulfate	7778-18-9	<0.5

Uranium mixed oxides max		0.04
dissolved SiO2 as alkali silicate max		0.87
Cl- max		0.9
Radionuclides: Po210 max 0.2 Bq/g		
Pb210 max 1.8 Bq/g		
water	7732-18-5	>60

Section 4 - FIRST AID MEASURES

SWALLOWED

For advice, contact a Poisons Information Centre or a doctor.

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

EYE

If this product comes in contact with the eyes:

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.

INHALED

- If inhaled, remove quickly from contaminated area.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

NOTES TO PHYSICIAN

For acute or short term repeated exposures to strong acids:

- Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
- Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling
- Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
- Strong acids produce a coagulation necrosis characterised by formation of a coagulum (eschar) as a result of the dessicating action of the acid on proteins in specific tissues.

INGESTION:

- Immediate dilution (milk or water) within 30 minutes post ingestion is recommended.
- DO NOT attempt to neutralise the acid since exothermic reaction may extend the corrosive injury.
- Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
- Charcoal has no place in acid management.
- Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:

- Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
- Deep second-degree burns may benefit from topical silver sulfadiazine.

EYE:

- Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjuctival cul-de-sacs. Irrigation should last at least 20-30 minutes. DO NOT use neutralising agents or any other additives. Several litres of saline are required.
- Cycloplegic drops, (1% cyclopentolate for short-term use or 5% homatropine for longer term use) antibiotic drops, vasoconstrictive agents or artificial tears may be indicated dependent on the severity of the injury.
- Steroid eye drops should only be administered with the approval of a consulting ophthalmologist).

[Ellenhorn and Barceloux: Medical Toxicology].

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.

- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

Non combustible liquid.
Will not burn, but heat produces highly toxic fumes/vapours.
Reacts with metals producing flammable / explosive hydrogen gas.
If involved in fire emits toxic fumes of: sulfur oxides (SOx).

FIRE INCOMPATIBILITY

Avoid contact with. strong alkalis, strong oxidisers and cyanides.

HAZCHEM

2X

Personal Protective Equipment

Gas tight chemical resistant suit.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

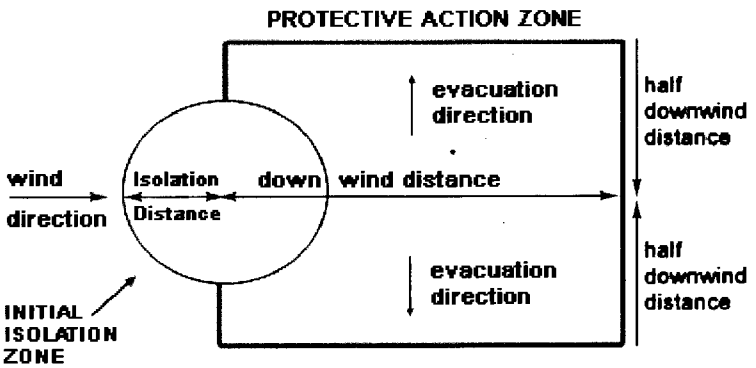
Carefully, contain and neutralise with slaked lime.

- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labelled container for waste disposal.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Neutralise/decontaminate residue.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)	
Isolation Distance	25 metres
Downwind Protection Distance	250 metres
IERG Number	37

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
5 Guide 154 is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

OLYMPIC DAM EVAPORATION POND LIQUOR

Hazard Alert Code: EXTREME

Chemwatch Material Safety Data Sheet (REVIEW) Revision No: 2.0 Chemwatch 5501-93

Issue Date: 28-Sep-2003 CD 2008/2

+	X	+	X	0	+

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

- Check that containers are clearly labelled

Bulk, open pondage

STORAGE INCOMPATIBILITY

Segregate quantities of liquor outside the Evaporation Pond from strong alkalies and cyanides

STORAGE REQUIREMENTS

Prevent contact with corrodible materials.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC
Australia Exposure Standards	sulfuric acid (Sulphuric acid)		1		3			
Australia Exposure Standards	copper sulfate (Copper, dusts & mists (as Cu))		1					
Australia Exposure Standards	copper sulfate (Copper (fume))		0.2					
Australia Exposure Standards	ferrous sulfate anhydrous (Iron salts, soluble (as Fe))		1					
Australia Exposure Standards	calcium sulfate (Calcium sulphate (a))		10					

The following materials had no OELs on our records

- water: CAS:7732-18-5

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
sulfuric acid	15	

MATERIAL DATA

None assigned. Refer to individual constituents.

INGREDIENT DATA

FERROUS SULFATE ANHYDROUS:

SULFURIC ACID:

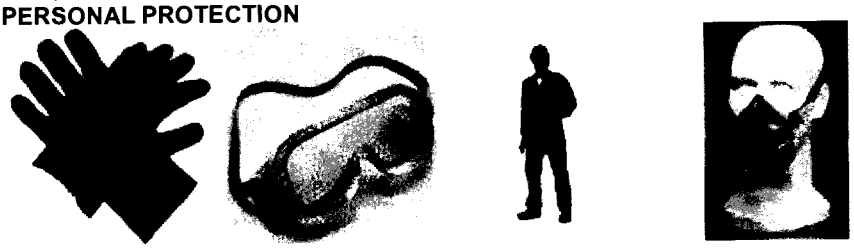
Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling

values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.
OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

FERROUS SULFATE ANHYDROUS:
The recommended TLV is thought to reduce the likelihood of respiratory irritation and skin irritation from exposure to aerosols and mists of soluble iron salts.
CALCIUM SULFATE:
The TLV-TWA is thought to be protective against the significant risks of
eye, skin and other physical irritation.
WATER:
No exposure limits set by NOHSC or ACGIH.

PERSONAL PROTECTION



EYE

- Chemical goggles
- Full face shield
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

HANDS/FEET

PVC gloves.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

RESPIRATOR

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	E-AUS P	-
1000	50	-	E-AUS P
5000	50	Airline *	-
5000	100	-	E-2 P
10000	100	-	E-3 P
	100+		Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand.
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

If risk of inhalation or overexposure exists, wear SAA approved respirator or work in fume hood.
Correct respirator fit is essential to obtain adequate protection.
Provide adequate ventilation in warehouse or closed storage areas.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Opaque, greyish blue-green liquid. Characteristic odour. Miscible with water. Corrosive to metals, 241.5mm per year on aluminium (7075 T6 non-clad) when tested in accordance with NACE Method TM 0169-76.

PHYSICAL PROPERTIES

Liquid.
Mixes with water.
Corrosive.
Acid.

Molecular Weight: Not applicable.	Boiling Range (°C): >100
Melting Range (°C): Not available.	Specific Gravity (water=1): 1.1 estd.
Solubility in water (g/L): Miscible	pH (as supplied): 1.1-1.6
pH (1% solution): Not available	Vapour Pressure (kPa): Not available
Volatile Component (%vol): Not available	Evaporation Rate: Not available
Relative Vapour Density (air=1): Not available.	Flash Point (°C): Not applicable
Lower Explosive Limit (%): Not applicable	Upper Explosive Limit (%): Not applicable
Autoignition Temp (°C): Not available.	Decomposition Temp (°C): Not available
State: Liquid	

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

The liquid is. highly corrosive to the gastro-intestinal tract and capable of causing severe burns if swallowed.
Considered an unlikely route of entry in commercial/industrial environments.

EYE

The vapour/liquid is. extremely corrosive to the eyes and is capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.
The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

SKIN

The vapour/liquid is. corrosive to the skin and is capable of causing burns.
The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

INHALED

Not normally a hazard due to non-volatile nature of product.
The vapour/mist is. highly discomforting to the upper respiratory tract and lungs.
The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.

CHRONIC HEALTH EFFECTS

Primary route of exposure is usually by skin contact/eye contact.

TOXICITY AND IRRITATION

Not available. Refer to individual constituents.
SULFURIC ACID:
unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 2140 mg/kg	Eye (rabbit): 1.38 mg SEVERE
Inhalation (rat) LC50: 510 mg/m³/2h	Eye (rabbit): 5 mg/30sec SEVERE
Inhalation (human) TCLo: 3 mg/m³/24w	

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.
WARNING: For inhalation exposure ONLY: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS.

Occupational exposures to strong inorganic acid mists of sulfuric acid:

COPPER SULFATE:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (human) LDLo: 50 mg/kg	Nil Reported
Oral (man) LDLo: 857 mg/kg	
Oral (human) TDLo: 11 mg/kg	
Oral (rat) LD50: 300 mg/kg	

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

FERROUS SULFATE ANHYDROUS:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

Oral (woman) LDLo: 60 mg/kg Nil Reported
Oral (woman) TDLo: 600 mg/kg
Oral (woman) TDLo: 10.56 mg/kg
Oral (rat) LD50: 319 mg/kg
Oral (Human) TDLo: 68640 mg/kg
Oral (Human) TDLo: 960 mg/kg
Oral (Mouse) LD50: 680 mg/kg
Intraperitoneal (Mouse) LD50: 106 mg/kg
Intravenous (Mouse) LD50: 112 mg/kg
Intravenous (Dog) LD50: 79 mg/kg
Oral (Human) LD: 60 mg/kg
Oral (Human) LD: 699 mg/kg
Subcutaneous (Rat) LD50: 155 mg/kg
Oral (Guinea) pig: LD50 1200 mg/kg

CALCIUM SULFATE:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
for dihydrate
[RTEC NO.: EW 4150000]
Inhalation (human) TCLo: 194000 mg/m³/10Y Nil reported
-Intermittent

WATER:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

Marine Pollutant:Not Determined

DO NOT discharge into sewer or waterways.
Refer to data for ingredients, which follows:
SULFURIC ACID:
Prevent, by any means available, spillage from entering drains or water courses.
DO NOT discharge into sewer or waterways.
Data from tap water studies with human volunteers indicate that sulfates produce a laxative effect at concentrations of 1000 - 1200 mg/litre, but no increase in diarrhoea, dehydration or weight loss. The presence of sulfate in drinking-water can also result in a noticeable taste; the lowest taste threshold concentration for sulfate is approximately 250 mg/litre as the sodium salt. Sulfate may also contribute to the corrosion of distribution systems. No health-based guideline value for sulfate in drinking water is proposed. However, there is an increasing likelihood of complaints arising from a noticeable taste as concentrations in water increase above 500 mg/litre.
Sulfuric acid is soluble in water and remains indefinitely in the environment as sulfate.
Large discharges may contribute to the acidification of water and be fatal to aquatic life and soil micro-organisms.
Large discharges may contribute to the acidification of effluent treatment systems and injure sewage treatment organisms. [ICI UK]
COPPER SULFATE:
Fish LC50 (96hr.) (mg/l): 3.20- 7.4
Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
Copper is unlikely to accumulate in the atmosphere due to a short residence time for airborne copper aerosols. Airborne coppers, however, may be transported over large distances. Copper accumulates significantly in the food chain.
Drinking Water Standards:
3000 ug/l (UK max)
2000 ug/l (WHO provisional Guideline)
1000 ug/l (WHO level where individuals complain)
Soil Guidelines: Dutch Criteria
36 mg/kg (target)
190 mg/kg (intervention)
Air Quality Standards: no data available.
The toxic effect of copper in the aquatic biota depends on the bio-availability of copper in water which, in turn, depends on its physico-chemical form (ie.speciation). Bioavailability is decreased by complexation and adsorption of copper by natural organic matter, iron and manganese hydrated oxides, and chelating agents excreted by algae and other aquatic organisms. Toxicity is also affected by pH and hardness. Total copper is rarely useful as a predictor of toxicity. In natural sea water, more than 98% of copper is organically bound and in river waters a high percentage is often organically bound, but the actual percentage depends on the river water and its pH.

Copper exhibits significant toxicity in some aquatic organisms. Some algal species are very sensitive to copper with EC50 (96 hour) values as low as 47 ug/litre dissolved copper whilst for other algal species EC50 values of up to 481 ug/litre have been reported. However many of the reportedly high EC50 values may arise in experiments conducted with a culture media containing copper-complexing agents such as silicate, iron, manganese and EDTA which reduce bioavailability.
Toxic effects arising following exposure by aquatic species to copper are typically:

Algae EC50 (96 h)	Daphnia magna LC50 (48-96 h)	Amphipods LC50 (48-96 h)	Gastropods LC50 (48-96 h).	Crab larvae LC50 (48-96 h)
47-481 *	7-54 *	37-183 *	58-112 *	50-100 *

* ug/litre
Exposure to concentrations ranging from one to a few hundred micrograms per litre has led to sublethal effects and effects on long-term survival. For high bioavailability waters, effect concentrations for several sensitive species may be below 10 ug Cu/litre.
In fish, the acute lethal concentration of copper ranges from a few ug/litre to several mg/litre, depending both on test species and exposure conditions. Where the value is less than 50 ug Cu/litre, test waters generally have a low dissolved organic carbon (DOC) level, low hardness and neutral to slightly acidic pH. Exposure to concentrations ranging from one to a few hundred micrograms per litre has led to sublethal effects and effects on long-term survival. Lower effect concentrations are generally associated with test waters of high bioavailability.
In summary:
Responses expected for high concentration ranges of copper *

Total dissolved Cu concentration range (ug/litre)	Effects of high availability in water
1-10	Significant effects are expected for diatoms and sensitive invertebrates, notably cladocerans. Effects on fish could be significant in freshwaters with low pH and hardness.
10-100	Significant effects are expected on various species of microalgae, some species of macroalgae, and a range of invertebrates, including crustaceans, gastropods and sea urchins. Survival of sensitive fish will be affected and a variety of fish show sublethal effects.
100-1000	Most taxonomic groups of macroalgae and invertebrates will be severely affected. Lethal levels for most fish species will be reached.
>1000	Lethal concentrations for most tolerant organisms are reached.

* Sites chosen have moderate to high bioavailability similar to water used in most toxicity tests.
In soil, copper levels are raised by application of fertiliser, fungicides, from deposition of highway dusts and from urban, mining and industrial sources. Generally, vegetation rooted in soils reflects the soil copper levels in its foliage. This is dependent upon the bioavailability of copper and the physiological requirements of species concerned.
Typical foliar levels of copper are:

Uncontaminated soils (0.3-250 mg/kg)	Contaminated soils (150-450 mg/kg)	Mining/smelting soils
6.1-25 mg/kg	80 mg/kg	300 mg/kg

Plants rarely show symptoms of toxicity or of adverse growth effects at normal soil concentrations of copper. Crops are often more sensitive to copper than the native flora, so protection levels for agricultural crops range from 25 mg Cu/kg to several hundred mg/kg, depending on country. Chronic and or acute effects on sensitive species occur at copper levels occurring in some soils as a result of human activities such as copper fertiliser addition, and addition of sludge.
When soil levels exceed 150 mg Cu/kg, native and agricultural species show chronic effects. Soils in the range 500-1000 mg Cu/kg act in a strongly selective fashion allowing the survival of only copper-tolerant species and strains. At 2000 Cu mg/kg most species cannot survive. By 3500 mg Cu/kg areas are largely devoid of vegetation cover. The organic content of the soil appears to be a key factor affecting the bioavailability of copper.
On normal forest soils, non-rooted plants such as mosses and lichens show higher copper concentrations. The fruiting bodies and mycorrhizal sheaths of soil fungi associated with higher plants in forests often accumulate copper to much higher levels than plants at the same site. International Programme on Chemical Safety (IPCS): Environmental Health Criteria 200.
Data from tap water studies with human volunteers indicate that sulfates produce a laxative effect at concentrations of 1000 - 1200 mg/litre, but no increase in diarrhoea, dehydration or weight loss. The presence of sulfate in drinking-water can also result in a noticeable taste; the lowest taste threshold concentration for sulfate is approximately 250 mg/litre as the sodium salt. Sulfate may also contribute to the corrosion of distribution systems. No health-based guideline value for sulfate in drinking water is proposed. However, there is an increasing likelihood of complaints arising from a noticeable taste as concentrations in water increase above 500 mg/litre.
DO NOT discharge into sewer or waterways.
The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l
* Classification of Substances as Ecotoxic (Dangerous to the Environment)
Appendix 8, Table 1
Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.
FERROUS SULFATE ANHYDROUS:
Data from tap water studies with human volunteers indicate that sulfates produce a laxative effect at concentrations of 1000 - 1200 mg/litre, but no increase in diarrhoea, dehydration or weight loss. The presence of sulfate in drinking-water can also result in a noticeable taste; the lowest taste threshold concentration for sulfate is approximately 250 mg/litre as the sodium salt. Sulfate may also contribute to the corrosion of distribution systems. No health-based guideline value for sulfate in drinking water is proposed. However, there is an increasing likelihood of complaints arising from a noticeable taste as concentrations in water increase above 500 mg/litre.
DO NOT discharge into sewer or waterways.

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Treat and neutralise at an effluent treatment plant.
- Use soda ash or slaked lime to neutralise.
- Recycle containers, otherwise dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

Labels Required: CORROSIVE
HAZCHEM: 2X

UNDG:

Dangerous Goods Class:	8	Subrisk:	None
UN Number:	3264	Packing Group:	III

Shipping Name:CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.
(contains sulfuric acid)

Air Transport IATA:

ICAO/IATA Class:	8	ICAO/IATA Subrisk:	None
UN/ID Number:	3264	Packing Group:	III
Special provisions:	A3		

Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. *

Maritime Transport IMDG:

IMDG Class:	8	IMDG Subrisk:	None
UN Number:	3264	Packing Group:	III
EMS Number:	F-A,S-B	Special provisions:	223 274 944
Limited Quantities:	5 L	Marine Pollutant:	Not Determined

Shipping Name: CORROSIVE LIQUID, ACIDIC,INORGANIC, N.O.S.

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE

S6

REGULATIONS

Olympic Dam Evaporation Pond Liquor (CAS: None):
No regulations applicable
sulfuric acid (CAS: 7664- 93- 9) is found on the following regulatory lists;
Australia Exposure Standards
Australia Hazardous Substances
Australia High Volume Industrial Chemical List (HVICL)
Australia Illicit Drug Reagents/Essential Chemicals - Category III
Australia Inventory of Chemical Substances (AICS)
Australia National Pollutant Inventory
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix E (Part 2)
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix F (Part 3)
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 6
China (Hong Kong) Control of Chemicals Ordinance
China (Hong Kong) Fire Service Department - List of Dangerous Goods
China (Hong Kong) Occupational Exposure Limits
China (Hong Kong) Pharmacy and Poisons Regulations - Poisons Exempted from Labelling Provisions
China (Hong Kong) Pharmacy and Poisons Regulations - Special Exemptions
China (Hong Kong) Poisons List Regulations - Poisons List
China Classification and Labelling of Dangerous Chemical Substances
China Dangerous Chemicals Names List
China Inventory of Existing Chemical Substances
China National Dangerous Wastes Name List (Chinese)
China Occupational Exposure Limits for Hazardous Agents in the Workplace
IMO IBC Code Chapter 17: Summary of minimum requirements
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
India Chemical Accidents Rules - Schedule 1: List of Hazardous Chemicals
India Hazardous Wastes Rules - Schedule 2: List of Wastes Constituents with Concentration Limits
India Manufacture, Storage and Import of Hazardous Chemical Rules - Schedule 1: List of Hazardous and Toxic Chemicals
India Permissible Levels of Certain Chemical Substances in Work Environment
International Air Transport Association (IATA) Dangerous Goods Regulations
International Council of Chemical Associations (ICCA) - High Production Volume List
Japan Air Pollution Prevention
Japan Chemical Substances Control Law - Existing/New Chemical Substances
Japan Civil Aeronautics Law
Japan Drug Enforcement Legislation
Japan Fire Service Law - Obstacle Substances to Fire Fighting
Japan Food Sanitation Law - Designated Additives
Japan Food Sanitation Law - Designated Additives (Japanese)
Japan GHS Classifications (Japanese)
Japan Industrial Safety and Health Law (ISHL) - Chemicals Requiring Eye Protection
Japan Industrial Safety and Health Law (ISHL) - Corrosive Liquid (English)

OLYMPIC DAM EVAPORATION POND LIQUOR

Hazard Alert Code: EXTREME

Chemwatch Material Safety Data Sheet (REVIEW) Revision No: 2.0 Chemwatch 5501-93

Issue Date: 28-Sep-2003 CD 2008/2

Japan Industrial Safety and Health Law (ISHL) - Corrosive Liquid (Japanese)
Japan Industrial Safety and Health Law (ISHL) - Notifiable Substances
Japan Industrial Safety and Health Law (ISHL) - Specified Chemical Substances
Japan Marine Pollution and Disasters
Japan Occupational Exposure Limits
Japan Occupational Exposure Limits (Japanese)
Japan Poisonous and Deleterious Substances Control Law
Japan Poisonous and Deleterious Substances Control Law - Deleterious Substances
Japan Road Law
Japan Shipping Legislation
Korea (South) Existing Chemicals List (KECL)
Korea (South) Occupational Exposure Standards (Korean)
Korea (South) Toxic Chemicals Control Act - Toxic Chemicals
Korea (South) Toxic Release Inventory (TRI) Chemicals
Korea GHS Classifications (Korean)
Malaysia Permissible Exposure Limits
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Hazardous Substances Register
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Scheduled Toxic Substances
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Poisons Schedule [NLV]
New Zealand Transferred List of Single Component Substances
New Zealand Workplace Exposure Standards (WES)
OECD Representative List of High Production Volume (HPV) Chemicals
Philippines Inventory of Chemicals and Chemical Substances (PICCS)
Philippines Occupational Exposure Limits
Philippines Regulatory Guidelines Concerning Food Additives - Permitted Food Additives
Philippines Regulatory Guidelines Concerning Food Additives - Recommended Levels of Use for some Food Additives
Singapore Environmental Pollution Control (Hazardous Substances) Regulations
Singapore Environmental Pollution Control Act (EPCA) - List of Controlled Hazardous Substances
Singapore Food Regulations - Food Addititves - Permitted General Purpose Food Additives
Singapore Odour Thresholds and Irritation Concentration of Chemicals
Singapore Permissible Exposure Limits of Toxic Substances
Taiwan Hazard Prevention Standard for Specified Chemical Substances - Specified Chemical Substances (Category A - D) & Specified Controlled Substances
Taiwan Permissible Concentration of Airborne Harmful Substances
Taiwan Rules for Hazard Communication for Dangerous and Harmful Materials - Harmful Materials (Chinese)
Taiwan Scope and Application Standards of Food Additives - Chemicals for Food Industry
Thailand Harmful Chemicals - List I
Thailand List of Precursor and Chemical Control (Watch List)
Thailand Occupational Exposure Limits - Working Safety and Environmental Condition (Chemical) Table 1
United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances - Table II
United Nations List of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances Under International Control - Table II
Vietnam Air Quality Hazardous Substances Standards
copper sulfate (CAS: 7758- 98- 7) is found on the following regulatory lists;
Australia Dangerous Goods Code Draft 7th Edition - List of Common Pesticides with Corresponding UN Numbers
Australia Exposure Standards
Australia Hazardous Substances
Australia High Volume Industrial Chemical List (HVICL)
Australia Inventory of Chemical Substances (AICS)
Australia National Pollutant Inventory
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix A
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 4
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 5
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 6
Australia Therapeutic Goods Administration (TGA) Substances that may be used as active ingredients in Listed medicines
Cambodia Water Pollution Control - Annex 1 Type of the hazardous substances
China Dangerous Chemicals Names List
China Inventory of Existing Chemical Substances
China National Dangerous Wastes Name List (Chinese)
India Chemical Accidents Rules - Schedule 1: List of Hazardous Chemicals
India Hazardous Wastes Rules - Schedule 2: List of Wastes Constituents with Concentration Limits
India Manufacture, Storage and Import of Hazardous Chemical Rules - Schedule 1: List of Hazardous and Toxic Chemicals
India Permissible Levels of Certain Chemical Substances in Work Environment
International Council of Chemical Associations (ICCA) - High Production Volume List
Japan Chemical Substances Control Law - Existing/New Chemical Substances
Japan Food Sanitation Law - Designated Additives
Japan Food Sanitation Law - Designated Additives (Japanese)
Japan GHS Classifications (Japanese)
Japan Industrial Safety and Health Law (ISHL) - Notifiable Substances
Japan Poisonous and Deleterious Substances Control Law
Japan Poisonous and Deleterious Substances Control Law - Deleterious Substances
Japan PRTR Law
Japan Water Pollution Control Law - National Effluent Standards
Korea (South) Existing Chemicals List (KECL)
Korea (South) Occupational Exposure Standards (Korean)
Korea (South) Toxic Chemicals Control Act - Chemicals not Relevant to Toxic
Korea (South) Toxic Release Inventory (TRI) Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Hazardous Substances Register
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Pesticides

Malaysia Food Regulations - Permitted Food Conditioners
Malaysia Permissible Exposure Limits
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Transferred List of Single Component Substances
New Zealand Workplace Exposure Standards (WES)
OECD Representative List of High Production Volume (HPV) Chemicals
Philippines Inventory of Chemicals and Chemical Substances (PICCS)
Philippines Regulatory Guidelines Concerning Food Additives - Permitted Food Additives
Singapore Food Regulations - Food Addititves - Permitted Nutrient Supplement
Singapore Permissible Exposure Limits of Toxic Substances
Taiwan Scope and Application Standards of Food Additives - Food quality improvement, fermentation and food processing agents
Thailand Food Act - Bottled Drinking Water Quality Standard
Thailand Ground Water Act - Ground Water Quality Standards for Drinking Purposes
Thailand Industrial Products Standards Act - Drinking Water Quality Standards
Thailand Notification No 84 (B.E. 2527) Food Additives - Section 4: Salts
calcium sulfate (CAS: 10101- 41- 4) is found on the following regulatory lists;
Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (Domestic water supply - inorganic chemicals)
Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Agricultural uses (Stock)
Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Domestic water quality
Cambodia Water Pollution Control - Annex 2 Effluent standard for pollution sources discharging wastewater to public water areas or sewer
Thailand Food Act - Bottled Drinking Water Quality Standard
Thailand Ground Water Act - Ground Water Quality Standards for Drinking Purposes
Thailand Industrial Products Standards Act - Drinking Water Quality Standards
water (CAS: 7732- 18- 5) is found on the following regulatory lists;
Australia Inventory of Chemical Substances (AICS)
China Inventory of Existing Chemical Substances
IMO IBC Code Chapter 18: List of products to which the Code does not apply
India Hazardous Wastes Rules - Schedule 2: List of Wastes Constituents with Concentration Limits
Korea (South) Existing Chemicals List (KECL)
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Transferred List of Single Component Substances
OECD Representative List of High Production Volume (HPV) Chemicals
Philippines Inventory of Chemicals and Chemical Substances (PICCS)
Thailand Harmful Chemicals - List I

Section 16 - OTHER INFORMATION

Ingredients with multiple CAS Nos

Ingredient Name	CAS
ferrous sulfate anhydrous	7720-78-7, 13463-43-9
calcium sulfate	7778-18-9, 10101-41-4

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.
The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Issue Date: 28-Sep-2003
Print Date: 16-Jun-2008

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0020073**
Client Reference	VE30064
Received Date	01/08/2008 02:39:00 PM

Customer Sample ID			**LR 9**	**LR 2**	**LR 8**	**Duplicate**
Amdel Sample Number			**1111342**	**1111343**	**1111344**	**1111345**
Date Sampled			**31/07/2008**	**31/07/2008**	**31/07/2008**	**31/07/2008**
Test/Reference	PQL	Unit				
0000 Gold (Au)						
Gold (Au)*	-	µg/L	6.6	20	3.6	2.6
Metals						
Test/Reference	PQL	Unit				
3100 Dissolved Metals in Water By ICP/MS						
Aluminium	5	µg/L	9.5	7.6	7.2	7.9
Antimony	1	µg/L	1.2	<1	<1	<1
Arsenic	5	µg/L	<5	<5	<5	<5
Barium	5	µg/L	18	13	27	29
Beryllium	5	µg/L	<5	<5	<5	<5
Boron	5	µg/L	7600	7100	7000	6700
Cadmium	2	µg/L	<2	<2	<2	<2
Chromium	5	µg/L	<5	<5	<5	<5
Cobalt	5	µg/L	<5	<5	5.1	5.2
Copper	5	µg/L	7.6	26	31	32
Lead	5	µg/L	<5	<5	<5	<5
Lithium	5	µg/L	300	170	230	240
Manganese	5	µg/L	2200	300	890	910
Molybdenum	5	µg/L	<5	<5	<5	<5
Nickel	5	µg/L	11	10	17	17
Selenium	5	µg/L	51	28	46	46
Strontium	5	µg/L	16000	12000	15000	16000
Thallium	5	µg/L	<5	<5	<5	<5
Thorium	5	µg/L	<5	<5	<5	<5
Tin	5	µg/L	<5	<5	<5	<5
Titanium	5	µg/L	18	6.7	19	19
Uranium	5	µg/L	32	26	20	21
Vanadium	5	µg/L	<5	<5	<5	<5
Zinc	5	µg/L	46	36	35	42
3200 Dissolved Metals in Water - ICP/AES						
Calcium	100	µg/L	1240000	890000	1030000	1120000
Iron	100	µg/L	5800	114	1280	1310
Magnesium	100	µg/L	1490000	606000	900000	982000
Potassium	1000	µg/L	120000	74000	140000	150000
Sodium	100	µg/L	9840000	7120000	10200000	11100000
Inorganics						
Test/Reference	PQL	Unit				
4010 Conductivity in Water						
Electrical Conductivity	20	µS/cm	30900	22600	33500	33900

Customer Sample ID			LR 9	LR 2	LR 8	Duplicate
Amdel Sample Number			1111342	1111343	1111344	1111345
Date Sampled			31/07/2008	31/07/2008	31/07/2008	31/07/2008
Inorganics						
Test/Reference	PQL	Unit				
4000 pH in Water						
pH	0.1	pH	6.6	7.2	7.1	7.1
4110 Dissolved Solids in Water						
Total Dissolved Solids	20	mg/L	29000	18000	30000	31000
4540 TKN in Water by Titration						
TKN	1	mg/L	<1	<1	<1	<1
4410 TOC in Water By Analyser						
Total Organic Carbon	1	mg/L	2.8	<1	<1	<1
4941 Total Nitrogen in Water by Calc						
Total Nitrogen	2	mg N/L	<2	<2	18	<2
4300 Anions in Water by IC						
Chloride	0.5	mg/L	12000	8200	15000	14000
Fluoride	0.5	mg/L	1.8	3.2	3.8	1.7
Nitrate as N	0.5	mg N/L	<0.5	<0.5	18	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	4700	2300	3800	3700
Miscellaneous						
Test/Reference	PQL	Unit				
Total Alkalinity as CaCo3*	-	mg/L	339	161	163	166
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	339	161	163	166
Silica*	-	mg/L	16	14	16.5	16.4

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
0000 Gold (Au)		14/08/2008
3100 Dissolved Metals in Water By ICP/MS	04/08/2008	11/08/2008
3200 Dissolved Metals in Water - ICP/AES	04/08/2008	06/08/2008
4000 pH in Water		04/08/2008
4010 Conductivity in Water		05/08/2008
4110 Dissolved Solids in Water		06/08/2008
4300 Anions in Water by IC	04/08/2008	08/08/2008
4410 TOC in Water By Analyser	04/08/2008	06/08/2008
4540 TKN in Water by Titration	04/08/2008	05/08/2008
4941 Total Nitrogen in Water by Calc		05/08/2008
NEW_TEST01		11/08/2008

Test Description

4000 pH in Water

As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

LR 9

All the TDS results have been performed in duplicate, with the duplicate results all demonstration RPD's <5%.

LR 2

All the TDS results have been performed in duplicate, with the duplicate results all demonstration RPD's <5%.

LR 8

All the TDS results have been performed in duplicate, with the duplicate results all demonstration RPD's <5%.

Duplicate

All the TDS results have been performed in duplicate, with the duplicate results all demonstration RPD's <5%.

Amdel Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Amdel QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (Form LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE**: pH duplicates are reported as a range NOT an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1113311 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Phosphorus	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	
1113391 [Method Blank]							
3100 Dissolved Metals in Water By ICP/MS							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<5			< 5	T	
Barium	µg/L	<5			< 5	T	
Beryllium	µg/L	<5			< 5	T	
Boron	µg/L	<5			< 5	T	
Cadmium	µg/L	<2			< 2	T	
Chromium	µg/L	<5			< 5	T	
Cobalt	µg/L	<5			< 5	T	
Copper	µg/L	<5			< 5	T	
Lead	µg/L	<5			< 5	T	
Manganese	µg/L	<5			< 5	T	
Molybdenum	µg/L	<5			< 5	T	
Nickel	µg/L	<5			< 5	T	
Selenium	µg/L	<5			< 5	T	
Tin	µg/L	<5			< 5	T	
Vanadium	µg/L	<5			< 5	T	
Zinc	µg/L	<5			< 5	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1113392 [Laboratory Control Sample]							
3100 Dissolved Metals in Water By ICP/MS			Expected Value	Percent Recovery			
Antimony	µg/L	92	100.0	92	80-120 %	T	
Arsenic	µg/L	100	100.0	102	80-120 %	T	
Barium	µg/L	97	100.0	97	80-120 %	T	
Beryllium	µg/L	100	100.0	101	80-120 %	T	
Cadmium	µg/L	97	100.0	97	80-120 %	T	
Chromium	µg/L	96	100.0	96	80-120 %	T	
Cobalt	µg/L	97	100.0	97	80-120 %	T	
Copper	µg/L	99	100.0	99	80-120 %	T	
Lead	µg/L	92	100.0	92	80-120 %	T	
Manganese	µg/L	99	100.0	99	80-120 %	T	
Molybdenum	µg/L	120	100.0	119	80-120 %	T	
Nickel	µg/L	98	100.0	98	80-120 %	T	
Selenium	µg/L	110	100.0	108	80-120 %	T	
Tin	µg/L	97	100.0	97	80-120 %	T	
Vanadium	µg/L	98	100.0	98	80-120 %	T	
Zinc	µg/L	100	100.0	100	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1112787 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1112926 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1113566 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1113990 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<5			< 5	T	
1112789 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	95	100.0	95	80-120 %	T	
Chloride	mg/L	95	100.0	95	80-120 %	T	
Fluoride	mg/L	94	100.0	94	80-120 %	T	
Nitrate	mg/L	110	100.0	109	80-120 %	T	
Nitrite	mg/L	85	100.0	85	80-120 %	T	
Orthophosphate as P	mg/L	92	100.0	92	80-120 %	T	
Sulphate	mg/L	93	100.0	93	80-120 %	T	
1112928 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	9.2	10.0	92	80-120 %	T	
1113158 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1420	N/A	N/A	N/A	N/A	
1113568 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	96	100.0	96	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1113991 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	950	1000.0	95	90-110 %	T	

Report Results Information

Gold (Au)	Amdel Melbourne

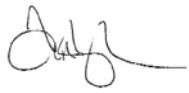
Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	Yes

Authorised By

Carol Cawrse	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane	Operations Manager	

Final Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

ALK as new test

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

			Container Identification						
LAB USE ONLY	Project No:	Size	1000ml	43ml	125ml	100ml			
QUOTE NUMBER	VE30064	Type	plastic	glass	plastic	plastic			
Job Code:	Project Manager:	Preserv	NO	YES	YES	NO			
Due Date:	Daniel Pierce	Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace Hold			
Custody seal intact?	Sampler(s):								
Sample cold?	Alistair Walsh / Tom Kelly								
Received for Laboratory by:	Checked:								
Date:	Date:								
Time:	31/07/2008								

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
	31/07/2008		H20	LR9			X						
	31/07/2008		H20	LR9				X					
	31/07/2008		H20	LR9	Field Filtered				X				
	31/07/2008		H20	LR9	Field Filtered					X			
	30/07/2008		H20	LR2			X						
	30/07/2008		H20	LR2				X					
	30/07/2008		H20	LR2	Field Filtered				X				
	30/07/2008		H20	LR2	Field Filtered					X			
	30/07/2008		H20	LR8			X						
	30/07/2008		H20	LR8				X					
	30/07/2008		H20	LR8	Field Filtered				X				
	30/07/2008		H20	LR8	Field Filtered					X			
	30/07/2008		H20	Duplicate			X						
	30/07/2008		H20	Duplicate				X					
	30/07/2008		H20	Duplicate	Field Filtered				X				
	30/07/2008		H20	Duplicate	Field Filtered					X			
					TOTAL								

1111342/08ENME0020073-1
SKM_ADEL-LR 9-01/08

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

Rec: DEH Labmark 1/8/08 2-39pm

COC-RevA

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times

Rec'd DHL LABmark 1/18/05 2:39pm

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	1 August 2008
Attention:	MR Daniel Pierce	**Due Date:**	8 August 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number:	08ENME0020073	**Your Amdel Contact:**	Vanda Dabkowski 0395382267

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity	
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	Yes
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	4
Conductivity in Water	4010	4
Gold (Au)	0000	4
Dissolved Metals in Water - ICP/AES	3200	4
Dissolved Metals in Water By ICP/MS	3100	4
	NEW_TEST01	4
pH in Water	4000	4
Dissolved Solids in Water	4110	4
TKN in Water by Titration	4540	4
TOC in Water By Analyser	4410	4
Total Nitrogen in Water by Calc	4941	4

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details
  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Duncan Harrison

Date : Fri 1 August 2008

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark
ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Labmark P/L
Unit 1 / 8 Leighton Plc
Asquith NSW 2077
Australia

Attention: Poonam Raj

Project	**08ENME0019303**
Client Reference	E038811
Received Date	24/07/2008 11:36:00 AM

Customer Sample ID			**168101**	**168102**	**168103**	**168104**	**168105**
Amdel Sample Number			**1098391**	**1098392**	**1098393**	**1098394**	**1098395**
Date Sampled			**21/07/2008**	**21/07/2008**	**21/07/2008**	**21/07/2008**	**21/07/2008**
Metals							
Test/Reference	PQL	Unit					
3200 Total Metals in Water by ICP/AES							
Iron	100	µg/L	7380000	117000	6550000	8020000	7460000
3100 Dissolved Metals in Water By ICP/MS							
Aluminium	5	µg/L	10000000	390	6600000	3900000	8200000
Antimony	1	µg/L	<1	<1	1.3	1.3	<1
Arsenic	5	µg/L	50	<5	9.1	47	<5
Barium	5	µg/L	62	19	33	23	38
Beryllium	5	µg/L	560	<5	470	310	540
Boron	5	µg/L	1400	33000	6100	1800	2000
Cadmium	2	µg/L	270	<2	200	140	240
Cobalt	5	µg/L	75000	1800	43000	56000	69000
Copper	5	µg/L	500000	840	9700	4300	280000
Lead	5	µg/L	99	13	29	200	29
Lithium	5	µg/L	21000	620	16000	14000	20000
Manganese	5	µg/L	200000	16000	140000	240000	160000
Molybdenum	5	µg/L	<5	<5	<5	47	<5
Nickel	5	µg/L	9700	320	5700	7700	8600
Selenium	5	µg/L	6700	120	5500	3500	6300
Silver	5	µg/L	8.2	7.4	6.9	6.7	6.8
Strontium	5	µg/L	4900	24000	4500	8700	4900
Thallium	5	µg/L	7.7	<5	<5	<5	<5
Tin	5	µg/L	<5	<5	<5	<5	<5
Titanium	5	µg/L	22	21	49	20	54
Uranium	5	µg/L	320000	11000	250000	400000	330000
Vanadium	5	µg/L	880	18	420	520	820
Zinc	5	µg/L	50000	380	32000	31000	47000
3200 Dissolved Metals in Water - ICP/AES							
Silicon	100	µg/L	35800	7130	38200	28900	40800

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	**Extracted**	**Analysed**
3100 Dissolved Metals in Water By ICP/MS	25/07/2008	30/07/2008
3200 Dissolved Metals in Water - ICP/AES	28/07/2008	30/07/2008
3200 Total Metals in Water by ICP/AES	28/07/2008	30/07/2008

Amdel Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Amdel QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (Form LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE**: pH duplicates are reported as a range NOT an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1102581 [Method Blank]							
3100 Dissolved Metals in Water By ICP/MS							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<5			< 5	T	
Barium	µg/L	<5			< 5	T	
Beryllium	µg/L	<5			< 5	T	
Boron	µg/L	<5			< 5	T	
Cadmium	µg/L	<2			< 2	T	
Chromium	µg/L	<5			< 5	T	
Cobalt	µg/L	<5			< 5	T	
Copper	µg/L	<5			< 5	T	
Lead	µg/L	<5			< 5	T	
Manganese	µg/L	<5			< 5	T	
Molybdenum	µg/L	<5			< 5	T	
Nickel	µg/L	<5			< 5	T	
Selenium	µg/L	<5			< 5	T	
Tin	µg/L	<5			< 5	T	
Vanadium	µg/L	<5			< 5	T	
Zinc	µg/L	7.7			< 5	F	
1102641 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Iron	µg/L	<100			< 100	T	
1102651 [Method Blank]							
3200 Total Metals in Water by ICP/AES							
Iron	µg/L	<100			< 100	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1102582 [Laboratory Control Sample]							
3100 Dissolved Metals in Water By ICP/MS			Expected Value	Percent Recovery			
Antimony	µg/L	99	100.0	99	80-120 %	T	
Arsenic	µg/L	100	100.0	100	80-120 %	T	
Barium	µg/L	99	100.0	99	80-120 %	T	
Beryllium	µg/L	100	100.0	100	80-120 %	T	
Boron	µg/L	110	100.0	105	80-120 %	T	
Cadmium	µg/L	100	100.0	102	80-120 %	T	
Chromium	µg/L	97	100.0	97	80-120 %	T	
Cobalt	µg/L	99	100.0	99	80-120 %	T	
Copper	µg/L	100	100.0	100	80-120 %	T	
Lead	µg/L	98	100.0	98	80-120 %	T	
Manganese	µg/L	98	100.0	98	80-120 %	T	
Molybdenum	µg/L	120	100.0	115	80-120 %	T	
Nickel	µg/L	100	100.0	100	80-120 %	T	
Selenium	µg/L	96	100.0	96	80-120 %	T	
Tin	µg/L	100	100.0	101	80-120 %	T	
Vanadium	µg/L	97	100.0	97	80-120 %	T	
Zinc	µg/L	100	100.0	101	80-120 %	T	
1098411 [Duplicate of 1098391]							
3200 Dissolved Metals in Water - ICP/AES			Result 2	RPD			
Silicon	µg/L	35600	35800	N/A	N/A	N/A	
1098412 [Duplicate of 1098391]							
3200 Total Metals in Water by ICP/AES			Result 2	RPD			
Iron	µg/L	7310000	7380000	1	0-30 %	T	
1098413 [Duplicate of 1098391]							
3100 Dissolved Metals in Water By ICP/MS			Result 2	RPD			
Aluminium	µg/L	8900000	10000000	17	0-10 %	F	
Antimony	µg/L	<1	<1	<1	0-10 %	T	
Arsenic	µg/L	38	50	26	0-10 %	F	
Barium	µg/L	60	62	2	0-10 %	T	
Beryllium	µg/L	640	560	14	0-10 %	F	
Boron	µg/L	1800	1400	20	0-10 %	F	
Cadmium	µg/L	280	270	5	0-10 %	T	
Cobalt	µg/L	71000	75000	5	0-10 %	T	
Copper	µg/L	540000	500000	8	0-10 %	T	
Lead	µg/L	99	99	<1	0-10 %	T	
Lithium	µg/L	21000	21000	1	0-10 %	T	
Manganese	µg/L	210000	200000	5	0-10 %	T	
Molybdenum	µg/L	<5	<5	<1	0-10 %	T	
Nickel	µg/L	9200	9700	5	0-10 %	T	
Selenium	µg/L	6500	6700	3	0-10 %	T	
Silver	µg/L	7.0	8.2	16	0-10 %	F	
Strontium	µg/L	5000	4900	<1	0-10 %	T	
Thallium	µg/L	7.6	7.7	1	0-10 %	T	
Tin	µg/L	<5	<5	<1	0-10 %	T	
Titanium	µg/L	25	22	13	0-10 %	F	
Uranium	µg/L	340000	320000	7	0-10 %	T	
Vanadium	µg/L	980	880	11	0-10 %	F	
Zinc	µg/L	47000	50000	6	0-10 %	T	

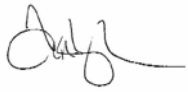
Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645

Laboratory Manager

Anthony Crane	Operations Manager	

Final Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		24/7/08	24/7/08	24/7/08	24/7/08	24/7/08	24/7/08	--	24/7/08	24/7/08	24/7/08
Method : E035.1											
Total alkalinity	**EQL**										
Alkalinity	5	<5	1920	<5	<5	<5	<5	--	#	92%	<5

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E035.1: Determination by colour and/or by titration. Results expressed as CaCO3.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Method : E033.1/E045.1/E047.1											
Chloride	**EQL**										
Chloride	1	4370	9040	4050	4200	4340	4600	5%	#	105%	<1

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E033.1/E045.1/E047.1: Determination by colour and/or by Ion Chromatography. Sample filtered through a 0.45um filter prior to analysis.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Method : E034.1/E045.1											
Fluoride	**EQL**										
Fluoride	0.1	13400	10.4	8990	5010	10400	13800	3%	#	103%	<0.1

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E034.1/E045.1: Determined by FIA-Ion Selective Electrode and/or by Ion Chromatography. Samples filtered through a 0.45um filter prior to analysis.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Method : E042.1/E045.1/E056.1											
Sulphate	**EQL**										
Sulphate	2	49300	9900	39100	39900	47300	49000	1%	#	105%	<2

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E042.1/E045.1/E056.1: Determination by colour and/or by Ion Chromatography. Sample filtered through 0.45um prior to analysis.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Method : E037.1/E051.1											
Nitrite as N	**EQL**										
NO2-N	0.01	0.02	0.04	<0.01	0.04	0.01	0.02	0%	111%	90%	<0.01
Method : E037.1/E051.1											
Nitrate as N	**EQL**										
NO3-N	0.01	0.01	10.2	<0.01	0.01	0.02	0.01	0%	#	103%	<0.01

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E037.1/E051.1: Nitrate determined by colour. Sample filtered through 0.45um prior to analysis.
E037.1/E051.1: Nitrite determined by colour. Sample filtered through 0.45um prior to analysis.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		25/7/08	25/7/08	25/7/08	25/7/08	25/7/08	25/7/08	--	25/7/08	24/7/08	24/7/08
Method : E039.1											
TKN (as N)	**EQL**										
Total Kjeldahl Nitrogen	0.1	98.6	15.6	70.3	2.1	120	82.6	18%	#	92%	<0.1

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E039.1: Acidic digestion followed by determination by colour.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		25/7/08	25/7/08	25/7/08	25/7/08	25/7/08	25/7/08	--	25/7/08	24/7/08	24/7/08
Method : E038.1											
Total Nitrogen (as N)	**EQL**										
Total Nitrogen (as N)	0.1	98.6	25.8	70.3	2.2	121	82.6	18%	#	95%	<0.1

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E038.1: Total Nitrogen by calculation.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		25/7/08	25/7/08	25/7/08	25/7/08	25/7/08	31/7/08	--	31/7/08	25/7/08	25/7/08
Method : E020.1/E030.1											
Major cations	**EQL**										
Calcium	0.1	738	755	669	627	690	725	2%	#	109%	<0.1
Magnesium	0.1	839	948	492	1660	597	808	4%	#	112%	<0.1
Sodium	0.1	3810	9330	3330	3700	3810	3740	2%	#	109%	<0.1
Potassium	0.1	655	26.6	730	527	752	633	3%	#	100%	<0.1

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E020.1/E030.1: Sample directly analysed by Flame AAS and/or ICP-OES.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**168102s**	**lcs**	**mb**
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC	QC	QC
Depth (m)		--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--	--	--
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08	23/7/08	23/7/08
Laboratory Analysis Date		24/7/08	24/7/08	24/7/08	24/7/08	24/7/08	24/7/08	--	24/7/08	24/7/08	24/7/08
Method : E035.1											
Alkalinity (CO3, HCO3, OH)	**EQL**										
Carbonate	5	<5	<5	<5	<5	<5	<5	--	--	--	<5
Bicarbonate	5	<5	1920	<5	<5	<5	<5	--	#	92%	<5
Hydroxide	5	<5	<5	<5	<5	<5	<5	--	--	--	<5

Results expressed in mg/l unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E035.1: Determination by colour and/or by titration, followed by calculation. Results expressed as CaCO3.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168105d**	**168105r**	**mb**		
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC		
Depth (m)		--	--	--	--	--	--	--	--		
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--		
Laboratory Extraction (Preparation) Date		28/7/08	28/7/08	28/7/08	28/7/08	28/7/08	28/7/08	--	28/7/08		
Laboratory Analysis Date		31/7/08	31/7/08	31/7/08	31/7/08	31/7/08	31/7/08	--	29/7/08		
Method : E2580 **Total Organic Carbon (TOC)**	**EQL**										
Total Organic Carbon	1	30	65	26	24	24	27	12%	<1		

Results expressed in mg/l unless otherwise specified

Comments:

E2580: TOC analyser.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168105d**	**168105r**	**mb**		
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC		
Depth (m)		--	--	--	--	--	--	--	--		
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--		
Laboratory Extraction (Preparation) Date		28/7/08	28/7/08	28/7/08	28/7/08	28/7/08	28/7/08	--	28/7/08		
Laboratory Analysis Date		29/7/08	29/7/08	29/7/08	29/7/08	29/7/08	29/7/08	--	29/7/08		
Method : APHA 2540C **Total Dissolved Solids (TDS)**	**EQL**										
TDS	1	99300	31100	78500	71600	96200	98800	3%	<1		

Results expressed in mg/l unless otherwise specified

Comments:

APHA 2540C: Determined gravimetrically.

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark
ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Labmark P/L
Unit 1 / 8 Leighton Plc
Asquith NSW 2077
Australia

Attention: Poonam Raj

Project	**08ENME0019303**
Client Reference	E038811
Received Date	24/07/2008 11:36:00 AM

Customer Sample ID			**168101**	**168102**	**168103**	**168104**	**168105**
Amdel Sample Number			**1098391**	**1098392**	**1098393**	**1098394**	**1098395**
Date Sampled			**21/07/2008**	**21/07/2008**	**21/07/2008**	**21/07/2008**	**21/07/2008**
Metals							
Test/Reference	PQL	Unit					
3200 Total Metals in Water by ICP/AES							
Iron	100	µg/L	7380000	117000	6550000	8020000	7460000
3100 Dissolved Metals in Water By ICP/MS							
Aluminium	5	µg/L	10000000	390	6600000	3900000	8200000
Antimony	1	µg/L	<1	<1	1.3	1.3	<1
Arsenic	5	µg/L	50	<5	9.1	47	<5
Barium	5	µg/L	62	19	33	23	38
Beryllium	5	µg/L	560	<5	470	310	540
Boron	5	µg/L	1400	33000	6100	1800	2000
Cadmium	2	µg/L	270	<2	200	140	240
Cobalt	5	µg/L	75000	1800	43000	56000	69000
Copper	5	µg/L	500000	840	9700	4300	280000
Lead	5	µg/L	99	13	29	200	29
Lithium	5	µg/L	21000	620	16000	14000	20000
Manganese	5	µg/L	200000	16000	140000	240000	160000
Molybdenum	5	µg/L	<5	<5	<5	47	<5
Nickel	5	µg/L	9700	320	5700	7700	8600
Selenium	5	µg/L	6700	120	5500	3500	6300
Silver	5	µg/L	8.2	7.4	6.9	6.7	6.8
Strontium	5	µg/L	4900	24000	4500	8700	4900
Thallium	5	µg/L	7.7	<5	<5	<5	<5
Tin	5	µg/L	<5	<5	<5	<5	<5
Titanium	5	µg/L	22	21	49	20	54
Uranium	5	µg/L	320000	11000	250000	400000	330000
Vanadium	5	µg/L	880	18	420	520	820
Zinc	5	µg/L	50000	380	32000	31000	47000
3200 Dissolved Metals in Water - ICP/AES							
Silicon	100	µg/L	35800	7130	38200	28900	40800

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	**Extracted**	**Analysed**
3100 Dissolved Metals in Water By ICP/MS	25/07/2008	30/07/2008
3200 Dissolved Metals in Water - ICP/AES	28/07/2008	30/07/2008
3200 Total Metals in Water by ICP/AES	28/07/2008	30/07/2008

Amdel Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Amdel QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (Form LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE**: pH duplicates are reported as a range NOT an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1102581 [Method Blank]							
3100 Dissolved Metals in Water By ICP/MS							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<5			< 5	T	
Barium	µg/L	<5			< 5	T	
Beryllium	µg/L	<5			< 5	T	
Boron	µg/L	<5			< 5	T	
Cadmium	µg/L	<2			< 2	T	
Chromium	µg/L	<5			< 5	T	
Cobalt	µg/L	<5			< 5	T	
Copper	µg/L	<5			< 5	T	
Lead	µg/L	<5			< 5	T	
Manganese	µg/L	<5			< 5	T	
Molybdenum	µg/L	<5			< 5	T	
Nickel	µg/L	<5			< 5	T	
Selenium	µg/L	<5			< 5	T	
Tin	µg/L	<5			< 5	T	
Vanadium	µg/L	<5			< 5	T	
Zinc	µg/L	7.7			< 5	F	
1102641 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Iron	µg/L	<100			< 100	T	
1102651 [Method Blank]							
3200 Total Metals in Water by ICP/AES							
Iron	µg/L	<100			< 100	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1102582 [Laboratory Control Sample]							
3100 Dissolved Metals in Water By ICP/MS			Expected Value	Percent Recovery			
Antimony	µg/L	99	100.0	99	80-120 %	T	
Arsenic	µg/L	100	100.0	100	80-120 %	T	
Barium	µg/L	99	100.0	99	80-120 %	T	
Beryllium	µg/L	100	100.0	100	80-120 %	T	
Boron	µg/L	110	100.0	105	80-120 %	T	
Cadmium	µg/L	100	100.0	102	80-120 %	T	
Chromium	µg/L	97	100.0	97	80-120 %	T	
Cobalt	µg/L	99	100.0	99	80-120 %	T	
Copper	µg/L	100	100.0	100	80-120 %	T	
Lead	µg/L	98	100.0	98	80-120 %	T	
Manganese	µg/L	98	100.0	98	80-120 %	T	
Molybdenum	µg/L	120	100.0	115	80-120 %	T	
Nickel	µg/L	100	100.0	100	80-120 %	T	
Selenium	µg/L	96	100.0	96	80-120 %	T	
Tin	µg/L	100	100.0	101	80-120 %	T	
Vanadium	µg/L	97	100.0	97	80-120 %	T	
Zinc	µg/L	100	100.0	101	80-120 %	T	
1098411 [Duplicate of 1098391]							
3200 Dissolved Metals in Water - ICP/AES			Result 2	RPD			
Silicon	µg/L	35600	35800	N/A	N/A	N/A	
1098412 [Duplicate of 1098391]							
3200 Total Metals in Water by ICP/AES			Result 2	RPD			
Iron	µg/L	7310000	7380000	1	0-30 %	T	
1098413 [Duplicate of 1098391]							
3100 Dissolved Metals in Water By ICP/MS			Result 2	RPD			
Aluminium	µg/L	8900000	10000000	17	0-10 %	F	
Antimony	µg/L	<1	<1	<1	0-10 %	T	
Arsenic	µg/L	38	50	26	0-10 %	F	
Barium	µg/L	60	62	2	0-10 %	T	
Beryllium	µg/L	640	560	14	0-10 %	F	
Boron	µg/L	1800	1400	20	0-10 %	F	
Cadmium	µg/L	280	270	5	0-10 %	T	
Cobalt	µg/L	71000	75000	5	0-10 %	T	
Copper	µg/L	540000	500000	8	0-10 %	T	
Lead	µg/L	99	99	<1	0-10 %	T	
Lithium	µg/L	21000	21000	1	0-10 %	T	
Manganese	µg/L	210000	200000	5	0-10 %	T	
Molybdenum	µg/L	<5	<5	<1	0-10 %	T	
Nickel	µg/L	9200	9700	5	0-10 %	T	
Selenium	µg/L	6500	6700	3	0-10 %	T	
Silver	µg/L	7.0	8.2	16	0-10 %	F	
Strontium	µg/L	5000	4900	<1	0-10 %	T	
Thallium	µg/L	7.6	7.7	1	0-10 %	T	
Tin	µg/L	<5	<5	<1	0-10 %	T	
Titanium	µg/L	25	22	13	0-10 %	F	
Uranium	µg/L	340000	320000	7	0-10 %	T	
Vanadium	µg/L	980	880	11	0-10 %	F	
Zinc	µg/L	47000	50000	6	0-10 %	T	

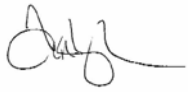
Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645

Laboratory Manager

Anthony Crane	Operations Manager	

Final Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

LabMark
ENVIRONMENTAL LABORATORIES

Report Date : 23/07/2008
Report Time : 12:37:37PM

Sample **Receipt** Notice (SRN) for **E038811**

Quality, Service, Support

Client Details		Laboratory Reference Information	
Client Name:	Sinclair Knight Merz Pty Ltd	**Please have this information ready when contacting Labmark.**	
Client Phone:	08 8424 3800		
Client Fax:	08 8424 3810	**Laboratory Report:**	**E038811**
Contact Name:	Daniel Pierce	**Quotation Number:**	- Not provided, standard prices apply
Contact Email:	dpierce@skm.com.au	**Laboratory Address:**	Unit 1, 8 Leighton Pl. Asquith NSW 2077
Client Address:	Level 5, 33 King William St Adelaide SA 5000	**Phone:**	61 2 9476 6533
		Fax:	61 2 9476 8219
Project Name:	VE30064	**Sample Receipt Contact:**	Ros Schacht
Project Number:	- Not provided -	**Email:**	Ros.Schacht@labmark.com.au
CoC Serial Number:	- Not provided -	**Reporting Contact:**	Geoff Weir
Purchase Order:	- Not provided -	**Email:**	geoff.weir@labmark.com.au
Surcharge:	No surcharge applied (results by 6:30pm on due date)		
Sample Matrix:	WATER		
Date Sampled (earliest date):	21/07/2008	**NATA Accreditation:**	13542
Date Samples Received:	23/07/2008	**TGA GMP License:**	185-336 (Sydney)
Date Sample Receipt Notice issued:	23/07/2008	**APVMA License:**	6105 (Sydney)
Date Preliminary Report Due:	31/07/2008	**AQIS Approval:**	NO356 (Sydney)
		AQIS Entry Permit:	200521534 (Sydney)

Reporting Requirements: Electronic Data Download required: Yes

Invoice Number: 33156

Sample Condition: COC received with samples. Report number and lab ID's defined on COC.
Samples received in good order .
Samples received with cooling media: Ice bricks .
Samples received chilled.
Security seals not used .
Sample container & chemical preservation suitable .

Comments: Metals subcontracted to LabMark Melbourne | TOC, TDS subconcracted to SAL

Holding Times: Date received allows for insufficient time to meet Technical Holding Times.
Note: There are Samples within this batch that have been received by the laboratory 1 day(s) after Technical Holding Times expire. LabMark cannot guarantee THT compliance, refer to the extraction dates detailed in the sample grid for confirmation.

Preservation: Chemical preservation of samples satisfactory for requested analytes.

Important Notes:

LabMark shall responsibly dispose of spent customer soil and water samples which includes the disintegration of the sample label. A sample disposal fee of $1.00 is applicable on all samples received by the laboratory regardless of whether they have undergone analytical testing. Sample disposal of environmental samples shall be 31 days (water) and 3 months (soil, HN03 preserved samples) after laboratory receipt, unless otherwise requested in writing by the client. Samples requested to be held in non-refrigerated storage shall incur $5.00/ sample/ 3 months. Additional refrigerated storage shall incur $30/ sample/ 3 months. Combination prices apply only if requested. Transfer of report ownership from LabMark to the client shall occur once full and final payment has been settled and verified. All report copies may be retracted where full payment does not occur within the agreed settlement period.

Analysis comments:

Subcontracted Analyses:

Reported by Amdel Limited, NATA accreditation No.1526.
Reported by Sydney Analytical Laboratories, NATA accreditation No.1884.

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

LabMark
ENVIRONMENTAL LABORATORIES

Report Date : 23/07/2008
Report Time : 12:37:37PM

Sample **Receipt** Notice (SRN) for **E038811**

Quality, Service, Support

The table below represents LabMark's understanding and interpretation of the customer supplied sample COC request (refer to SRN comments section on first page for external subcontracting method details). Please confirm that your COC request has been entered correctly. Due to THT and TAT requirements, testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

GRID REVIEW TABLE

No.	Date	Depth	Client Sample ID	Requested Analysis: Major cations	Alkalinity (CO3, HCO3, OH)	Chloride	Electrical conductivity (EC)	Fluoride	Nitrite as N	Nitrate as N	NOx (as N)	pH in water	PREP Not Reported	Sulphate	TKN (as N)	Total alkalinity	Total Nitrogen (as N)	External Analysis by Amdel	External Total Dissolved Solids (TDS)	External Total Organic Carbon (TOC)			
168101	21/07		H1-1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
168102	21/07		H3-1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
168103	21/07		H3-2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
168104	21/07		H4-2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
168105	21/07		H1-2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
			Totals:	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			

'PREP Not Reported' refers to an internal laboratory instruction - client confirmation of this parameter is not required.

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

			Container Identification							
		Size	1000ml	125ml	43ml					
LAB USE ONLY QUOTE NUMBER Job Code: Due Date: Custody seal intact? Sample cold? Received for Laboratory by: Date: Time:	Project No: VE30064 Project Manager: Daniel Pierce Sampler(s): Alistair Walsh E038811 Checked: Michael Cowin Date: 22/07/2008	Type	plastic	plastic	vile					
		Preserv	no	yes	yes					
		Analytes	See Attached	See Attached	See Attached					

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
168101	21/07/2008		H2O	H1-1 -1000ml			✓						
	21/07/2008		H2O	H1-1 - 125ml				✓					
	21/07/2008		H2O	H1-1 - 43ml					✓				
168102	21/07/2008		H2O	H3-1 - 1000ml			✓						
	21/07/2008		H2O	H3-1 - 125ml				✓					
	21/07/2008		H2O	H3-1 - 43ml					✓				
168103	21/07/2008		H2O	H3-2 - 1000ml			✓						
	21/07/2008		H2O	H3-2 - 125ml				✓					
	21/07/2008		H2O	H3-2 - 43ml					✓				
168104	21/07/2008		H2O	H4-2 - 1000ml			✓						
	21/07/2008		H2O	H4-2 - 125ml				✓					
	21/07/2008		H2O	H4-2 - 43ml					✓				
168105	21/07/2008		H2O	H1-2 - 1000ml			✓						
	21/07/2008		H2O	H1-2 - 125ml				✓					
	21/07/2008		H2O	H1-2 - 43ml					✓				
				TOTAL									

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au upon receival of samples. Thanks

See attached spreadsheet for analysis required, any questions please call 0430288222

Rec'd SS 23/7/08 10:00am

Sheet 1 OF 1

COC-RevA

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times

Rec'd · BS 23/7/08 · 10.00am

LabMark
ENVIRONMENTAL LABORATORIES

ilac-MRA NATA Accreditation No. 13542

Accredited for compliance with ISO/IEC 17025. The results of tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the APLAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

AQIS
AUSTRALIAN QUARANTINE AND INSPECTION SERVICE

SYDNEY License No. N0356.

Quarantine Approved Premises criteria 5.1 for quarantine containment level 1 (QCI) facilities. Class five criteria cover premises utilised for research, analysis and testing of biological material, soil, animal, plant and human products.

CUSTOMER CENTRIC - ANALYTICAL CHEMISTS

FINAL CERTIFICATE OF ANALYSIS - ENVIRONMENTAL DIVISION

Laboratory Report No:	E038811	Cover Page 1 of 4 plus Sample Results
Client Name:	Sinclair Knight Merz Pty Ltd	
Client Reference:	VE30064	
Contact Name:	Daniel Pierce	
Chain of Custody No:	na	Date Received: 23/07/2008
Sample Matrix:	WATER	Date Reported: 08/08/2008

This Final Certificate of Analysis consists of sample results, DQI's, method descriptions, laboratory definitions, and internationally recognised NATA accreditation and endorsement. The DQO compliance relates specifically to QA/QC results as performed as part of the sample analysis, and may provide an indication of sample result quality. Transfer of report ownership from Labmark to the client shall only occur once full & final payment has been settled and verified. All report copies may be retracted where full payment has not occured within the agreed settlement period.

QUALITY ASSURANCE CRITERIA

Accuracy:	matrix spike:	1 in first 5-20, then 1 every 20 samples
	lcs, crm, method:	1 per analytical batch
	surrogate spike:	addition per target organic method
Precision:	laboratory duplicate:	1 in first 5-10, then 1 every 10 samples
	laboratory triplicate:	re-extracted & reported when duplicate RPD values exceed acceptance criteria
Holding Times:	soils, waters:	Refer to LabMark Preservation & THT table VOC's 14 days water / soil VAC's 7 days water or 14 days acidified VAC's 14 days soil SVOC's 7 days water, 14 days soil Pesticides 7 days water, 14 days soil Metals 6 months general elements Mercury 28 days
Confirmation:	target organic analysis:	GC/MS, or confirmatory column
Sensitivity:	EQL:	Typically 2-5 x Method Detection Limit (MDL)

QUALITY CONTROL GLOBAL ACCEPTANCE CRITERIA (GAC)

Accuracy:	spike, lcs, crm surrogate:	general analytes 70% - 130% recovery phenol analytes 50% - 130% recovery organophosphorous pesticide analytes 60% - 130% recovery phenoxy acid herbicides, organotin 50% - 130% recovery
	anion/cation bal:	+/- 10% (0-3 meq/l), +/- 5% (>3 meq/l)
Precision:	method blank:	not detected >95% of the reported EQL
	duplicate lab RPD (metals):	0-30% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)
	duplicate lab RPD:	0-50% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)

QUALITY CONTROL ANALYTE SPECIFIC ACCEPTANCE CRITERIA (ASAC)

Accuracy:	spike, lcs, crm surrogate:	analyte specific recovery data <3xsd of historical mean
Uncertainty:	spike, lcs:	measurement calculated from historical analyte specific control charts

RESULT ANNOTATION

Data Quality Objective	s:	matrix spike recovery	p:	pending	bcs: batch specific lcs
Data Quality Indicator	d:	laboratory duplicate	lcs:	laboratory control sample	bmb: batch specific mb
Estimated Quantitation Limit	t:	laboratory triplicate	crm:	certified reference material	
not applicable	r:	RPD relative % difference	mb:	method blank	

David Burns
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Geoff Weir
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Simon Mills
Authorising Chemist (NATA signatory)
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Laboratory Report: E038811

NEPC GUIDELINE COMPLIANCE - DQO

1. GENERAL

A. Results relate specifically to samples as received. Sample results are not corrected for matrix spike, lcs, or surrogate recovery data.

B. EQL's are matrix dependant and may be increased due to sample dilution or matrix interference.

C. Laboratory QA/QC samples are specific to this project.

D. Inter-laboratory proficiency results are available upon request. NATA accreditation details available at www.nata.asn.au.

E. VOC spikes & surrogates added to samples during extraction, SVOC spikes & surrogates added prior to extraction.

F. Recovery data outside GAC limits shall be investigated and compared to ASAC (historical mean +/- 3sd). If recovery data <20%, then the relevant results for that compound are considered not reliable.

G. Recovery data (ms, surrogate, crm, lcs) outside ASAC limits shall initiate an investigative action. Anomolous QC data is examined in conjunction with other QC samples and a final decision whether to accept or reject results is provided by the professional judgement of the senior analyst. The USEPA-CLP National Functional Guidelines are referred to for specific recommendations.

H. Extraction (preparation) date refers to the date that sample preparation was initiated. Note that certain methods not requiring sample preparation (eg. VOCs in water, etc) may report a common extraction and analysis date.

I. LabMark shall maintain an official copy of this Certificate of Analysis for all tracable reference purposes.

2. CHAIN OF CUSTODY (COC) & SAMPLE RECEIPT NOTICE (SRN) REQUIREMENTS

A. SRN issued to client upon sample receipt & login verification.

B. Preservation & sampling date details specified on COC and SRN, unless noted.

C. Sample Integrity & Validated Time of Sample Receipt (VTSR) Holding Times verified (preservation may extend holding time, refer to preservation chart).

3. NATA ACCREDITED METHODS

A. NATA accreditation held for each in-house method and sample matrix type reported, unless noted below (Refer to subcontracted test reports for NATA accreditation status).

B. NATA accredited in-house laboratory methods are referenced from NEPC, ASTM, modified USEPA / APHA documents. Corporate Accreditation No. 13542.

C. Subcontracted analyses: Refer to Sample Receipt Notice and additional DQO comments.

Reported by Amdel Limited, NATA accreditation No.1526.

Reported by Sydney Analytical Laboratories, NATA accreditation No.1884.

4. QA/QC FREQUENCY COMPLIANCE TABLE SPECIFIC TO THIS REPORT

Matrix: **WATER**

Page:	Method:	Totals:	#d	%d-ratio	#t	#s	%s-ratio
1	pH in water	5	1	20%	0	0	0%
2	Electrical conductivity (EC)	5	1	20%	0	0	0%
3	Total alkalinity	5	1	20%	0	1	20%
4	Chloride	5	1	20%	0	1	20%
5	Fluoride	5	1	20%	0	1	20%
6	Sulphate	5	1	20%	0	1	20%
7	Nitrate as N	5	1	20%	0	1	20%
7	Nitrite as N	5	1	20%	0	1	20%
8	TKN (as N)	5	1	20%	0	1	20%
9	Total Nitrogen (as N)	5	1	20%	0	1	20%
10	Major cations	5	1	20%	0	1	20%
11	Alkalinity (CO3, HCO3, OH)	5	1	20%	0	1	20%
12	Total Organic Carbon (TOC)	5	1	20%	0	0	0%
13	Total Dissolved Solids (TDS)	5	1	20%	0	0	0%

GLOSSARY:

#d	number of discrete duplicate extractions/analyses performed.
%d-ratio	NEPC guideline for laboratory duplicates is 1 in 10 samples (min 10%).
#t	number of triplicate extractions/analyses performed.
#s	number of spiked samples analysed.
%s-ratio	USEPA guideline for laboratory matrix spikes is 1 in 20 samples (min 5%).

5. ADDITIONAL COMMENTS SPECIFIC TO THIS REPORT

A. All tests were conducted by LabMark Environmental Sydney, NATA accreditation No. 13542, Corporate Site No. 13535, unless indicated below.
B. The following test was conducted by Amdel Limited, NATA accreditation No.1526. :Metals, see attached report.
C. The following tests were conducted by Sydney Analytical Laboratories, NATA accreditation No.1884. :- TDS and TOC SAL reference SAL21040 report issued on 04/08/2008.
D.Samples received and measured for pH outside technical holding times.

Laboratory QA/QC data shall relate specifically to this report, and may provide an indication of site specific sample result quality. LabMark DOES NOT report NON-RELEVANT BATCH QA/QC data. Acceptance of this self assessment certificate does not preclude any requirement for a QA/QC review by a accredited contaminated site EPA auditor, when and wherever necessary. Laboratory QA/QC self assessment references available upon request.

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E038811
Client Name: Sinclair Knight Merz Pty Ltd
Contact Name: Daniel Pierce
Client Reference: VE30064

Page: 1 of 13
plus cover page
Date: 08/08/08
This report supercedes reports issued on: 31/07/08

Final
Certificate
of Analysis

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**			
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC			
Depth (m)		--	--	--	--	--	--	--			
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--			
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--			
Laboratory Analysis Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--			
Method : E018.1											
pH in water	**EQL**										
pH (pH units)	0.1	3.4	6.3	3.4	4.0	3.3	3.4	0%			

Results expressed in pH units unless otherwise specified

Comments:

E018.1: Direct measurement by pH ion selective electrode.

Laboratory Identification		**168101**	**168102**	**168103**	**168104**	**168105**	**168101d**	**168101r**	**mb**		
Sample Identification		H1-1	H3-1	H3-2	H4-2	H1-2	QC	QC	QC		
Depth (m)		--	--	--	--	--	--	--	--		
Sampling Date recorded on COC		21/7/08	21/7/08	21/7/08	21/7/08	21/7/08	--	--	--		
Laboratory Extraction (Preparation) Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08		
Laboratory Analysis Date		23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	23/7/08	--	23/7/08		
Method : E032.1											
Electrical conductivity (EC)	**EQL**										
Electric conductivity (uS/cm)	1	38400	39300	34000	35300	37400	38400	0%	1		

Results expressed in uS/cm unless otherwise specified

Comments:

E032.1: Measurement by EC probe. Results expressed in uS/cm.

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0021268**
Client Reference	VE30064
Received Date	13/08/2008 09:32:00 AM

Customer Sample ID			**PT03_4b**	**PT14**	**PT24b**
Amdel Sample Number			**1126323**	**1126324**	**1126325**
Date Sampled			**11/08/2008**	**11/08/2008**	**12/08/2008**
Test/Reference	PQL	Unit			
0000 Gold (Au)					
Gold (Au)*	-	µg/L	1.8	3.5	<1
Metals					
Test/Reference	PQL	Unit			
3100 Dissolved Metals in Water By ICP/MS					
Aluminium	5	µg/L	<5	5.3	<5
Antimony	1	µg/L	2.5	1.1	1.6
Arsenic	5	µg/L	<5	<5	<5
Barium	5	µg/L	110	88	83
Beryllium	5	µg/L	<5	<5	<5
Boron	5	µg/L	4600	8200	7900
Cadmium	2	µg/L	<2	<2	<2
Chromium	5	µg/L	<5	<5	<5
Cobalt	5	µg/L	<5	<5	<5
Copper	5	µg/L	17	7.0	17
Lead	5	µg/L	<5	<5	<5
Lithium	5	µg/L	430	220	520
Manganese	5	µg/L	81	690	650
Molybdenum	5	µg/L	<5	<5	<5
Nickel	5	µg/L	13	8.5	12
Selenium	5	µg/L	89	43	91
Strontium	5	µg/L	13000	12000	15000
Thallium	5	µg/L	<5	<5	<5
Thorium	5	µg/L	<5	<5	<5
Tin	5	µg/L	<5	<5	<5
Titanium	5	µg/L	26	20	44
Uranium	5	µg/L	<5	<5	<5
Vanadium	5	µg/L	<5	<5	<5
Zinc	5	µg/L	28	76	65
3200 Dissolved Metals in Water - ICP/AES					
Calcium	100	µg/L	1660000	802000	978000
Iron	100	µg/L	<100	3800	5730
Magnesium	100	µg/L	1220000	932000	1820000
Potassium	1000	µg/L	180000	110000	160000
Sodium	100	µg/L	23200000	9950000	22300000
Inorganics					
Test/Reference	PQL	Unit			
4010 Conductivity in Water					
Electrical Conductivity	20	µS/cm	57600	33600	60200

Customer Sample ID			PT03_4b	PT14	PT24b
Amdel Sample Number			1126323	1126324	1126325
Date Sampled			11/08/2008	11/08/2008	12/08/2008
Inorganics					
Test/Reference	PQL	Unit			
4000 pH in Water					
pH	0.1	pH	9.3	7.1	7.2
4110 Dissolved Solids in Water					
Total Dissolved Solids	20	mg/L	52000	29000	43000
4540 TKN in Water by Titration					
TKN	1	mg/L	2.6	<1	<1
4410 TOC in Water By Analyser					
Total Organic Carbon	1	mg/L	1.5	<1	1.1
4941 Total Nitrogen in Water by Calc					
Total Nitrogen	2	mg N/L	3	<2	<2
4300 Anions in Water by IC					
Chloride	0.5	mg/L	21000	13000	23000
Fluoride	0.5	mg/L	5.2	<0.5	<0.5
Nitrate as N	0.5	mg N/L	<0.5	<0.5	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	4300	3200	5100
Miscellaneous					
Test/Reference	PQL	Unit			
Total Alkalinity as CaCo3*	-	mg/L	81	300	320
Carbonate Alkalinity as CaCo3*	-	mg/L	76	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	5.4	300	320
Silica*	-	mg/L	<1	19	20

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
0000 Gold (Au)		14/08/2008
3100 Dissolved Metals in Water By ICP/MS	14/08/2008	15/08/2008
3200 Dissolved Metals in Water - ICP/AES	14/08/2008	14/08/2008
4000 pH in Water		14/08/2008
4010 Conductivity in Water		19/08/2008
4110 Dissolved Solids in Water		18/08/2008
4300 Anions in Water by IC	14/08/2008	15/08/2008
4410 TOC in Water By Analyser	20/08/2008	21/08/2008
4540 TKN in Water by Titration	14/08/2008	15/08/2008
4941 Total Nitrogen in Water by Calc		15/08/2008
NEW_TEST01		14/08/2008

Test Description

4000 pH in Water

As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Amdel Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Amdel QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (Form LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE**: pH duplicates are reported as a range NOT an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1127454 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	
1127537 [Method Blank]							
3100 Dissolved Metals in Water By ICP/MS							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<5			< 5	T	
Barium	µg/L	<5			< 5	T	
Beryllium	µg/L	<5			< 5	T	
Boron	µg/L	<5			< 5	T	
Cadmium	µg/L	<2			< 2	T	
Chromium	µg/L	<5			< 5	T	
Cobalt	µg/L	<5			< 5	T	
Copper	µg/L	<5			< 5	T	
Lead	µg/L	<5			< 5	T	
Manganese	µg/L	<5			< 5	T	
Molybdenum	µg/L	<5			< 5	T	
Nickel	µg/L	<5			< 5	T	
Selenium	µg/L	<5			< 5	T	
Tin	µg/L	<5			< 5	T	
Vanadium	µg/L	<5			< 5	T	
Zinc	µg/L	<5			< 5	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1127538 [Laboratory Control Sample]							
3100 Dissolved Metals in Water By ICP/MS			Expected Value	Percent Recovery			
Antimony	µg/L	100	100.0	101	80-120 %	T	
Arsenic	µg/L	99	100.0	99	80-120 %	T	
Barium	µg/L	100	100.0	102	80-120 %	T	
Beryllium	µg/L	100	100.0	100	80-120 %	T	
Boron	µg/L	100	100.0	103	80-120 %	T	
Cadmium	µg/L	100	100.0	100	80-120 %	T	
Chromium	µg/L	97	100.0	97	80-120 %	T	
Cobalt	µg/L	99	100.0	99	80-120 %	T	
Copper	µg/L	96	100.0	96	80-120 %	T	
Lead	µg/L	100	100.0	101	80-120 %	T	
Manganese	µg/L	98	100.0	98	80-120 %	T	
Molybdenum	µg/L	110	100.0	112	80-120 %	T	
Nickel	µg/L	99	100.0	99	80-120 %	T	
Selenium	µg/L	100	100.0	100	80-120 %	T	
Tin	µg/L	99	100.0	99	80-120 %	T	
Vanadium	µg/L	97	100.0	97	80-120 %	T	
Zinc	µg/L	100	100.0	101	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1127241 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1129009 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1130108 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1135708 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1135709 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1127243 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	95	100.0	95	80-120 %	T	
1127309 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1360	N/A	N/A	N/A	N/A	
1129010 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	950	1000.0	95	90-110 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1130109 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	97	100.0	97	80-120 %	T	
Chloride	mg/L	96	100.0	96	80-120 %	T	
Fluoride	mg/L	94	100.0	94	80-120 %	T	
Nitrate	mg/L	110	100.0	114	80-120 %	T	
Nitrite	mg/L	86	100.0	86	80-120 %	T	
Orthophosphate as P	mg/L	110	100.0	107	80-120 %	T	
Sulphate	mg/L	99	100.0	99	80-120 %	T	
1135710 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	9.2	10.0	92	80-120 %	T	
1135711 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	9.2	10.0	92	80-120 %	T	

Report Results Information

Gold (Au) Amdel Mineral Chemistry, Accreditation: 1526

Sample Integrity

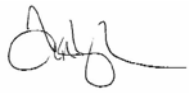
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	Yes

Authorised By

Carol Cawrse	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645
Jian Zhou	Lab Officer	Accreditation Number: 1645

Laboratory Manager

Anthony Crane Operations Manager



Final Report

- Indicates Not Requested * Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY
QUOTE NUMBER
Job Code:
Due Date:
Custody seal intact?
Sample cold?
Received for Laboratory by:
Date: 13/8/08
Time: 9.32am

Project No: VE30064
Project Manager: Daniel Pierce
Sampler(s): Alistair Walsh / Michael Cowin
Checked:
Date: 12/08/2008

	Container Identification							
Size	1000ml	43ml	125ml	125ml				
Type	plastic	glass	plastic	plastic				
Preserv	NO	YES	YES	NO				
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	~~ORC Ultra-trace~~				

Lab Id	Date	Time	Matrix	Sample Identification	Comments	Tick required analytes						
	11/08/2008		H20	PT03_4b		X						
	11/08/2008		H20	PT03_4b	X 2 Viles		X					
	11/08/2008		H20	PT03_4b	Field Filtered			X				
	11/08/2008		H20	PT03_4b	Field Filtered - HOLD SAMPLE				X			
	11/08/2008		H20	PT14		X						
	11/08/2008		H20	PT14	X 2 Viles		X					
	11/08/2008		H20	PT14	Field Filtered			X				
	11/08/2008		H20	PT14	Field Filtered - HOLD SAMPLE				X			
	12/08/2008		H20	PT24b		X						
	12/08/2008		H20	PT24b	X 2 Viles		X					
	12/08/2008		H20	PT24b	Field Filtered			X				
	12/08/2008		H20	PT24b	Field Filtered - HOLD SAMPLE				X			
					TOTAL							

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

COC-RevA

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	13 August 2008
Attention:	MR Daniel Pierce	**Due Date:**	20 August 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number:	08ENME0021268	**Your Amdel Contact:**	Vanda Dabkowski 0395382267

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity	
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	Yes
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	3
Conductivity in Water	4010	3
Gold (Au)	0000	3
Dissolved Metals in Water - ICP/AES	3200	3
Dissolved Metals in Water By ICP/MS	3100	3
	NEW_TEST01	3
pH in Water	4000	3
Dissolved Solids in Water	4110	3
TKN in Water by Titration	4540	3
TOC in Water By Analyser	4410	3
Total Nitrogen in Water by Calc	4941	3

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details
  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Duncan Harrison

Date : Wed 13 August 2008

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0021450**
Client Reference	VE30064
Received Date	14/08/2008 09:55:00 AM

Customer Sample ID			**PT15**	**QR1**
Amdel Sample Number			**1128571**	**1128572**
Date Sampled			**12/08/2008**	**13/08/2008**
Metals				
Test/Reference	PQL	Unit		
3100 Dissolved Metals in Water By ICP/MS				
Aluminium	5	µg/L	<5	<5
Antimony	1	µg/L	1.8	<1
Arsenic	5	µg/L	<5	<5
Barium	5	µg/L	47	25
Beryllium	5	µg/L	<5	<5
Boron	5	µg/L	11000	9300
Cadmium	2	µg/L	<2	<2
Chromium	5	µg/L	5.8	5.6
Cobalt	5	µg/L	<5	<5
Copper	5	µg/L	26	9.1
Lead	5	µg/L	<5	<5
Lithium	5	µg/L	600	270
Manganese	5	µg/L	950	910
Molybdenum	5	µg/L	<5	<5
Nickel	5	µg/L	12	5.8
Selenium	5	µg/L	94	38
Strontium	5	µg/L	26000	14000
Thallium	5	µg/L	<5	<5
Thorium	5	µg/L	<5	<5
Tin	5	µg/L	<5	<5
Titanium	5	µg/L	44	30
Uranium	5	µg/L	<5	<5
Vanadium	5	µg/L	<5	<5
Zinc	5	µg/L	51	46
3200 Dissolved Metals in Water - ICP/AES				
Calcium	100	µg/L	1520000	555000
Iron	100	µg/L	15000	-
Magnesium	100	µg/L	2610000	-
Iron	100	µg/L	-	13200
Potassium	1000	µg/L	320000	-
Magnesium	100	µg/L	-	760000
Potassium	1000	µg/L	-	290000
Sodium	100	µg/L	30200000	6950000
Inorganics				
Test/Reference	PQL	Unit		
4010 Conductivity in Water				
Electrical Conductivity	20	µS/cm	67900	27900

Customer Sample ID			PT15	QR1
Amdel Sample Number			1128571	1128572
Date Sampled			12/08/2008	13/08/2008
Inorganics				
Test/Reference	PQL	Unit		
4000 pH in Water				
pH	0.1	pH	7.1	7.3
4110 Dissolved Solids in Water				
Total Dissolved Solids	20	mg/L	65000	24000
4540 TKN in Water by Titration				
TKN	1	mg/L	1.9	<1
4410 TOC in Water By Analyser				
Total Organic Carbon	1	mg/L	<1	<1
4941 Total Nitrogen in Water by Calc				
Total Nitrogen	2	mg N/L	<2	<2
4300 Anions in Water by IC				
Chloride	0.5	mg/L	28000	9900
Fluoride	0.5	mg/L	5.6	<0.5
Nitrate as N	0.5	mg N/L	<0.5	0.7
Nitrite as N	0.5	mg N/L	<0.5	<0.5
Sulphate	0.5	mg/L	6100	3500
Miscellaneous				
Test/Reference	PQL	Unit		
Total Alkalinity as CaCo3*	-	mg/L	260	200
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	260	200
Silica*	-	mg/L	13.5	10.5

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Dissolved Metals in Water By ICP/MS	15/08/2008	19/08/2008
3200 Dissolved Metals in Water - ICP/AES	18/08/2008	21/08/2008
4000 pH in Water		19/08/2008
4010 Conductivity in Water		19/08/2008
4110 Dissolved Solids in Water		20/08/2008
4300 Anions in Water by IC	15/08/2008	19/08/2008
4410 TOC in Water By Analyser	20/08/2008	21/08/2008
4540 TKN in Water by Titration	18/08/2008	19/08/2008
4941 Total Nitrogen in Water by Calc		19/08/2008
NEW_TEST01		22/08/2008

Test Description

4000 pH in Water — As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Amdel Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Amdel QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (Form LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE**: pH duplicates are reported as a range NOT an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1130342 [Method Blank]							
3100 Dissolved Metals in Water By ICP/MS							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<5			< 5	T	
Barium	µg/L	<5			< 5	T	
Beryllium	µg/L	<5			< 5	T	
Boron	µg/L	<5			< 5	T	
Cadmium	µg/L	<2			< 2	T	
Chromium	µg/L	<5			< 5	T	
Cobalt	µg/L	<5			< 5	T	
Copper	µg/L	<5			< 5	T	
Lead	µg/L	<5			< 5	T	
Manganese	µg/L	<5			< 5	T	
Molybdenum	µg/L	<5			< 5	T	
Nickel	µg/L	<5			< 5	T	
Selenium	µg/L	<5			< 5	T	
Tin	µg/L	<5			< 5	T	
Vanadium	µg/L	<5			< 5	T	
Zinc	µg/L	<5			< 5	T	
1132018 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1130343 [Laboratory Control Sample]							
3100 Dissolved Metals in Water By ICP/MS			Expected Value	Percent Recovery			
Antimony	µg/L	100	100.0	102	80-120 %	T	
Arsenic	µg/L	100	100.0	101	80-120 %	T	
Barium	µg/L	110	100.0	106	80-120 %	T	
Beryllium	µg/L	110	100.0	106	80-120 %	T	
Boron	µg/L	110	100.0	107	80-120 %	T	
Cadmium	µg/L	110	100.0	105	80-120 %	T	
Chromium	µg/L	100	100.0	101	80-120 %	T	
Cobalt	µg/L	99	100.0	99	80-120 %	T	
Copper	µg/L	99	100.0	99	80-120 %	T	
Lead	µg/L	100	100.0	101	80-120 %	T	
Manganese	µg/L	100	100.0	101	80-120 %	T	
Molybdenum	µg/L	110	100.0	112	80-120 %	T	
Nickel	µg/L	99	100.0	99	80-120 %	T	
Selenium	µg/L	100	100.0	104	80-120 %	T	
Tin	µg/L	100	100.0	103	80-120 %	T	
Vanadium	µg/L	100	100.0	101	80-120 %	T	
Zinc	µg/L	100	100.0	102	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1129009 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1129281 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1131315 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1135708 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1135709 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1128943 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1410	N/A	N/A	N/A	N/A	
1129010 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	950	1000.0	95	90-110 %	T	
1129283 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	89	100.0	89	80-120 %	T	
Chloride	mg/L	91	100.0	91	80-120 %	T	
Fluoride	mg/L	90	100.0	90	80-120 %	T	
Nitrate	mg/L	110	100.0	106	80-120 %	T	
Nitrite	mg/L	89	100.0	89	80-120 %	T	
Orthophosphate as P	mg/L	88	100.0	88	80-120 %	T	
Sulphate	mg/L	90	100.0	90	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1131317 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	88	100.0	88	80-120 %	T	
1135710 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	9.2	10.0	92	80-120 %	T	
1135711 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	9.2	10.0	92	80-120 %	T	

Sample Integrity

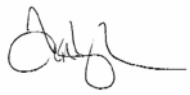
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Carol Cawrse	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645
Jian Zhou	Lab Officer	Accreditation Number: 1645

Laboratory Manager

Anthony Crane — Operations Manager



Final Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

		Container Identification						
Size	1000ml	43ml	125ml	125ml				
Type	plastic	glass	plastic	plastic				
Preserv	NO	YES	YES	NO				
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace				

LAB USE ONLY	Project No: VE30064
QUOTE NUMBER	Project Manager: Daniel Pierce
Job Code:	Sampler(s): Alistair Walsh / Michael Cowin
Due Date:	Checked:
Custody seal intact?	Date: 13/08/2008
Sample cold?	
Received for Laboratory by:	
Date:	
Time:	

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
	12/08/2008		H20	PT15			X						
	12/08/2008		H20	PT15	X 2 Viles			X					
	12/08/2008		H20	PT15	Field Filtered				X				
	12/08/2008		H20	PT15	Field Filtered - HOLD SAMPLE					X			
	13/08/2008		H20	QR1			X						
	13/08/2008		H20	QR1	X 2 Vilas			X					
	13/08/2008		H20	QR1	Field Filtered				X				
	13/08/2008		H20	QR1	Field Filtered - HOLD SAMPLE					X			
					TOTAL								

08ENME0021450-1(1128571)
SKM_ADEL(PT15)

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

Rec: DH Labmark 14/8/08 9.55Am

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

Sheet 1 of 2

COC-Rev4

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	14 August 2008
Attention:	MR Daniel Pierce	**Due Date:**	21 August 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number:	08ENME0021450	**Your Amdel Contact:**	Vanda Dabkowski 0395382267

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	2
Conductivity in Water	4010	2
Gold (Au)	0000	2
Dissolved Metals in Water - ICP/AES	3200	2
Dissolved Metals in Water By ICP/MS	3100	2
	NEW_TEST01	2
pH in Water	4000	2
Dissolved Solids in Water	4110	2
TKN in Water by Titration	4540	2
TOC in Water By Analyser	4410	2
Total Nitrogen in Water by Calc	4941	2

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details
  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Duncan Harrison

Date : Thu 14 August 2008

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark
ENVIRONMENTAL LABORATORIES

Interim Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Alistair Walsh

Project	**08ENME0021703**
Client Reference	VE30064
Received Date	15/08/2008 10:00:00 AM

Customer Sample ID			**PT09**
Amdel Sample Number			**1131895**
Date Sampled			**14/08/2008**
Metals			
Test/Reference	PQL	Unit	
3100 Dissolved Metals in Water By ICP/MS			
Aluminium	5	µg/L	7.9
Antimony	1	µg/L	<1
Arsenic	5	µg/L	<5
Barium	5	µg/L	86
Beryllium	5	µg/L	<5
Boron	5	µg/L	12000
Cadmium	2	µg/L	<2
Chromium	5	µg/L	7.5
Cobalt	5	µg/L	<5
Copper	5	µg/L	13
Lead	5	µg/L	<5
Lithium	5	µg/L	260
Manganese	5	µg/L	1700
Molybdenum	5	µg/L	<5
Nickel	5	µg/L	10
Selenium	5	µg/L	200
Strontium	5	µg/L	9300
Thallium	5	µg/L	<5
Thorium	5	µg/L	<5
Tin	5	µg/L	<5
Titanium	5	µg/L	11
Uranium	5	µg/L	<5
Vanadium	5	µg/L	<5
Zinc	5	µg/L	50
3200 Dissolved Metals in Water - ICP/AES			
Calcium	100	µg/L	669000
Iron	100	µg/L	7320
Magnesium	100	µg/L	926000
Potassium	1000	µg/L	300000
Sodium	100	µg/L	10500000
Inorganics			
Test/Reference	PQL	Unit	
4010 Conductivity in Water			
Electrical Conductivity	20	µS/cm	34400
4000 pH in Water			
pH	0.1	pH	7.0
4110 Dissolved Solids in Water			
Total Dissolved Solids	20	mg/L	33000

LabMark
ENVIRONMENTAL LABORATORIES

Customer Sample ID			**PT09**
Amdel Sample Number			**1131895**
Date Sampled			**14/08/2008**

Inorganics

Test/Reference	PQL	Unit	
4540 TKN in Water by Titration			
TKN	1	mg/L	<1
4410 TOC in Water By Analyser			
Total Organic Carbon	1	mg/L	Pending
4941 Total Nitrogen in Water by Calc			
Total Nitrogen	2	mg N/L	<2
4300 Anions in Water by IC			
Chloride	0.5	mg/L	12000
Fluoride	0.5	mg/L	<0.5
Nitrate as N	0.5	mg N/L	<0.5
Nitrite as N	0.5	mg N/L	<0.5
Sulphate	0.5	mg/L	3700

Miscellaneous

Test/Reference	PQL	Unit	
Total Alkalinity as CaCo3*	-	mg/L	380
Carbonate Alkalinity as CaCo3*	-	mg/L	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	380

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Dissolved Metals in Water By ICP/MS	19/08/2008	21/08/2008
3200 Dissolved Metals in Water - ICP/AES	19/08/2008	21/08/2008
4000 pH in Water	19/08/2008	19/08/2008
4010 Conductivity in Water	19/08/2008	19/08/2008
4110 Dissolved Solids in Water		22/08/2008
4300 Anions in Water by IC	19/08/2008	21/08/2008
4410 TOC in Water By Analyser	N/A20/08/2008	
4540 TKN in Water by Titration	20/08/2008	22/08/2008
4941 Total Nitrogen in Water by Calc		22/08/2008
NEW_TEST01		19/08/2008

Test Description

4000 pH in Water	As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Sample Integrity

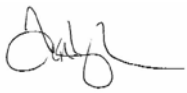
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645
Jian Zhou	Lab Officer	Accreditation Number: 1645

Laboratory Manager

Anthony Crane Operations Manager



Interim Report. A final report will be issued once all testing is complete

- Indicates Not Requested * Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY	Project No: VE30064		Container Identification			
QUOTE NUMBER	Project Manager: Daniel Pierce	Size	1000ml	43ml	125ml	125ml
Job Code:	Sampler(s): Alistair Walsh / Michael Cowin	Type	plastic	glass	plastic	plastic
Due Date:	Checked:	Preserv	NO	YES	YES	NO
Custody seal intact?	Date: 14/08/2008	Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace
Sample cold?						
Received for Laboratory by:						
Date:						
Time:						

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes					
	14/8/08		H20	PT09			x					
	14/8/08		H20	PT09	X 2 Viles			x				
	14/8/08		H20	PT09	Field Filtered				x			
	14/8/08		H20	PT09	Field Filtered - HOLD SAMPLE					x		
			~~H20~~									
			~~H20~~		~~X2 Viles~~							
			~~H20~~		~~Field Filtered~~							
			~~H20~~		~~Field Filtered - HOLD SAMPLE~~							
					TOTAL							

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

DF Labmark
15/8 10:00

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

COC-Resit

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	15 August 2008
Attention:	MR Alistair Walsh	**Due Date:**	22 August 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number:	08ENME0021703	**Your Amdel Contact:**	Vanda Dabkowski 0395382267

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	1
Conductivity in Water	4010	1
Gold (Au)	0000	1
Dissolved Metals in Water - ICP/AES	3200	1
Dissolved Metals in Water By ICP/MS	3100	1
	NEW_TEST01	1
pH in Water	4000	1
Dissolved Solids in Water	4110	1
TKN in Water by Titration	4540	1
TOC in Water By Analyser	4410	1
Total Nitrogen in Water by Calc	4941	1

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details
  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Damien Battaglia

Date : Mon 18 August 2008

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Amended Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0021863**
Client Reference	VE30064
Order Number	VE30064
Received Date	19/08/2008 09:00:00 AM

Customer Sample ID			**MAR4_20A**	**MAR4_20B**	**MAR3_20**	**RT02B**	**RT16B**
Labmark Sample No.			**1134842**	**1134843**	**1134844**	**1134845**	**1134846**
Date Sampled			**17/08/2008**	**17/08/2008**	**17/08/2008**	**17/08/2008**	**17/08/2008**
Metals							
Test/Reference	PQL	Unit					
3100 Dissolved Metals in Water By ICP/MS							
Aluminium	5	µg/L	20	22	<5	<5	31
Antimony	1	µg/L	<1	<1	3.7	4.0	<1
Arsenic	5	µg/L	<5	<5	<5	<5	<5
Barium	5	µg/L	50	110	260	410	87
Beryllium	5	µg/L	<5	<5	<5	<5	<5
Boron	5	µg/L	6100	5400	2400	2900	8400
Cadmium	2	µg/L	<2	<2	<2	5.9	<2
Chromium	5	µg/L	<5	<5	<5	<5	<5
Cobalt	5	µg/L	<5	<5	17	<5	9.7
Copper	5	µg/L	5.9	10	<5	5.1	16
Lead	5	µg/L	<5	<5	890	75	<5
Lithium	5	µg/L	420	2100	12	20	590
Manganese	5	µg/L	830	510	99	160	2100
Molybdenum	5	µg/L	12	15	6.0	29	6.8
Nickel	5	µg/L	13	12	<5	7.3	29
Selenium	5	µg/L	46	87	41	67	120
Strontium	5	µg/L	14000	20000	15000	19000	18000
Thallium	5	µg/L	<5	<5	74	19	<5
Thorium	5	µg/L	<5	<5	<5	<5	<5
Tin	5	µg/L	<5	<5	<5	<5	<5
Titanium	5	µg/L	11	19	<5	7.6	31
Uranium	5	µg/L	67	5.6	32	18	17
Vanadium	5	µg/L	<5	<5	<5	<5	<5
Zinc	5	µg/L	32	59	75	160	120
3200 Dissolved Metals in Water - ICP/AES							
Calcium	100	µg/L	1010000	1280000	880000	900000	1070000
Iron	100	µg/L	17200	7230	565	107	7100
Magnesium	100	µg/L	895000	1880000	5200000	4430000	1600000
Potassium	1000	µg/L	73000	230000	610000	660000	150000
Sodium	100	µg/L	8650000	28400000	85000000	74000000	18400000
Inorganics							
Test/Reference	PQL	Unit					
4010 Conductivity in Water							
Electrical Conductivity	20	µS/cm	33200	93600	165000	163000	62000
4000 pH in Water							
pH	0.1	pH	7.0	7.0	6.7	6.9	7.2
4110 Dissolved Solids in Water							

Customer Sample ID			MAR4_20A	MAR4_20B	MAR3_20	RT02B	RT16B
Labmark Sample No.			**1134842**	**1134843**	**1134844**	**1134845**	**1134846**
Date Sampled			**17/08/2008**	**17/08/2008**	**17/08/2008**	**17/08/2008**	**17/08/2008**
Inorganics							
Test/Reference	PQL	Unit					
Total Dissolved Solids	20	mg/L	28000	80000	250000	220000	55000
4540 TKN in Water by Titration							
TKN	1	mg/L	<1	3.2	4.4	36	2.5
4410 TOC in Water By Analyser							
Total Organic Carbon	1	mg/L	<1	25	7.3	57	<1
4941 Total Nitrogen in Water by Calc							
Total Nitrogen	2	mg N/L	<2	3	4	36	2
4300 Anions in Water by IC							
Chloride	0.5	mg/L	13000	34000	87000	130000	18000
Fluoride	0.5	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrate as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	3400	5100	9100	1200	5000
Miscellaneous							
Test/Reference	PQL	Unit					
Total Alkalinity as CaCo3*	-	mg/L	287.72	270.65	131.61	137.45	252.99
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	287.7	270.6	131.6	137.5	253
Silica*	-	mg/L	16.9	22	38	31	15.3

Customer Sample ID			RT17B	PT17	PT40	PT60	PT31
Labmark Sample No.			**1134847**	**1134848**	**1134849**	**1134850**	**1134851**
Date Sampled			**17/08/2008**	**17/08/2008**	**17/08/2008**	**17/08/2008**	**17/08/2008**
Metals							
Test/Reference	PQL	Unit					
3100 Dissolved Metals in Water By ICP/MS							
Aluminium	5	µg/L	13	41	<5	19	15
Antimony	1	µg/L	<1	<1	9.1	<1	<1
Arsenic	5	µg/L	<5	7.8	<5	<5	<5
Barium	5	µg/L	220	370	820	44	130
Beryllium	5	µg/L	<5	<5	<5	<5	<5
Boron	5	µg/L	6900	1700	2500	6000	2400
Cadmium	2	µg/L	<2	<2	<2	<2	<2
Chromium	5	µg/L	<5	20	<5	6.3	5.5
Cobalt	5	µg/L	6.8	<5	13	<5	6.9
Copper	5	µg/L	15	<5	<5	8.0	<5
Lead	5	µg/L	<5	<5	630	<5	<5
Lithium	5	µg/L	660	170	16	660	80
Manganese	5	µg/L	1000	130	77	1400	400
Molybdenum	5	µg/L	5.4	<5	8.1	<5	<5
Nickel	5	µg/L	18	<5	21	13	6.3
Selenium	5	µg/L	130	9.3	56	48	21
Strontium	5	µg/L	17000	810	16000	11000	3400
Thallium	5	µg/L	<5	<5	5.8	<5	<5
Thorium	5	µg/L	<5	<5	<5	<5	<5
Tin	5	µg/L	<5	<5	<5	<5	<5
Titanium	5	µg/L	24	5.8	<5	13	<5

Customer Sample ID			RT17B	PT17	PT40	PT60	PT31
Labmark Sample No.			**1134847**	**1134848**	**1134849**	**1134850**	**1134851**
Date Sampled			**17/08/2008**	**17/08/2008**	**17/08/2008**	**17/08/2008**	**17/08/2008**
Metals							
Test/Reference	PQL	Unit					
Uranium	5	µg/L	29	<5	26	<5	<5
Vanadium	5	µg/L	<5	12	<5	<5	<5
Zinc	5	µg/L	75	150	61	110	58
3200 Dissolved Metals in Water - ICP/AES							
Calcium	100	µg/L	1180000	34500	1060000	-	210000
Iron	100	µg/L	<100	307	220	-	7940
Calcium	100	µg/L	-	-	-	880000	-
Magnesium	100	µg/L	1580000	22100	4120000	-	198000
Iron	100	µg/L	-	-	-	63400	-
Magnesium	100	µg/L	-	-	-	600000	-
Potassium	1000	µg/L	150000	6100	460000	96000	6600
Sodium	100	µg/L	20200000	875000	78000000	7600000	2740000
Inorganics							
Test/Reference	PQL	Unit					
4010 Conductivity in Water							
Electrical Conductivity	20	µS/cm	65300	3470	135000	29300	20500
4000 pH in Water							
pH	0.1	pH	7.7	7.9	7.0	6.9	7.2
4110 Dissolved Solids in Water							
Total Dissolved Solids	20	mg/L	60000	2800	220000	24000	15000
4540 TKN in Water by Titration							
TKN	1	mg/L	1.6	3.0	3.0	<1	<1
4410 TOC in Water By Analyser							
Total Organic Carbon	1	mg/L	3.3	4.5	4.3	2.9	46
4941 Total Nitrogen in Water by Calc							
Total Nitrogen	2	mg N/L	<2	3	3	2	2
4300 Anions in Water by IC							
Chloride	0.5	mg/L	22000	680	120000	11000	6600
Fluoride	0.5	mg/L	<0.5	3.2	<0.5	<0.5	<0.5
Nitrate as N	0.5	mg N/L	<0.5	<0.5	<0.5	2.4	2.1
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	5100	96	9200	3000	1400
Miscellaneous							
Test/Reference	PQL	Unit					
Total Alkalinity as CaCo3*	-	mg/L	219.95	719.97	119.69	259.39	202.98
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	219.9	720	119.7	259.4	203
Silica*	-	mg/L	13.3	34	34.5	15.2	9.3

Customer Sample ID			DUP2	DUP3
Labmark Sample No.			**1134852**	**1134853**
Date Sampled			**17/08/2008**	**17/08/2008**
Metals				
Test/Reference	PQL	Unit		
3100 Dissolved Metals in Water By ICP/MS				
Aluminium	5	µg/L	36	13
Antimony	1	µg/L	<1	<1

Customer Sample ID			**DUP2**	**DUP3**
Labmark Sample No.			**1134852**	**1134853**
Date Sampled			**17/08/2008**	**17/08/2008**
Metals				
Test/Reference	PQL	Unit		
Arsenic	5	µg/L	<5	<5
Barium	5	µg/L	40	96
Beryllium	5	µg/L	<5	<5
Boron	5	µg/L	6600	2000
Cadmium	2	µg/L	<2	<2
Chromium	5	µg/L	7.2	5.5
Cobalt	5	µg/L	<5	5.9
Copper	5	µg/L	7.2	<5
Lead	5	µg/L	<5	<5
Lithium	5	µg/L	690	51
Manganese	5	µg/L	1400	290
Molybdenum	5	µg/L	<5	<5
Nickel	5	µg/L	13	<5
Selenium	5	µg/L	46	15
Strontium	5	µg/L	11000	1600
Thallium	5	µg/L	<5	<5
Thorium	5	µg/L	<5	<5
Tin	5	µg/L	<5	<5
Titanium	5	µg/L	9.3	<5
Uranium	5	µg/L	<5	<5
Vanadium	5	µg/L	<5	<5
Zinc	5	µg/L	96	50
3200 Dissolved Metals in Water - ICP/AES				
Calcium	100	µg/L	900000	98200
Iron	100	µg/L	50800	8700
Magnesium	100	µg/L	595000	83100
Potassium	1000	µg/L	82000	<1000
Sodium	100	µg/L	7600000	1190000
Inorganics				
Test/Reference	PQL	Unit		
4010 Conductivity in Water				
Electrical Conductivity	20	µS/cm	29500	6520
4000 pH in Water				
pH	0.1	pH	6.9	7.1
4110 Dissolved Solids in Water				
Total Dissolved Solids	20	mg/L	24000	4000
4540 TKN in Water by Titration				
TKN	1	mg/L	<1	1.7
4410 TOC in Water By Analyser				
Total Organic Carbon	1	mg/L	<1	<1
4941 Total Nitrogen in Water by Calc				
Total Nitrogen	2	mg N/L	2	2
4300 Anions in Water by IC				
Chloride	0.5	mg/L	11000	720
Fluoride	0.5	mg/L	<0.5	<0.5
Nitrate as N	0.5	mg N/L	2.4	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5
Sulphate	0.5	mg/L	3000	170
Miscellaneous				
Test/Reference	PQL	Unit		

Customer Sample ID			DUP2	DUP3
Labmark Sample No.			1134852	1134853
Date Sampled			17/08/2008	17/08/2008
Miscellaneous				
Test/Reference	PQL	Unit		
Total Alkalinity as CaCo3*	-	mg/L	280.08	183.196
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	280.1	183.2
Silica*	-	mg/L	15.5	8.34

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Dissolved Metals in Water By ICP/MS	21/08/2008	25/08/2008
3200 Dissolved Metals in Water - ICP/AES	21/08/2008	26/08/2008
4000 pH in Water	21/08/2008	22/08/2008
4010 Conductivity in Water	21/08/2008	22/08/2008
4110 Dissolved Solids in Water		26/08/2008
4300 Anions in Water by IC	21/08/2008	01/09/2008
4410 TOC in Water By Analyser	26/08/2008	28/08/2008
4540 TKN in Water by Titration	22/08/2008	25/08/2008
4941 Total Nitrogen in Water by Calc		01/09/2008
NEW_TEST01		27/08/2008

Test Description

4000 pH in Water	As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Labmark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Labmark QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1138606 [Method Blank]							
3100 Dissolved Metals in Water By ICP/MS							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<5			< 5	T	
Barium	µg/L	<5			< 5	T	
Beryllium	µg/L	<5			< 5	T	
Boron	µg/L	<5			< 5	T	
Cadmium	µg/L	<2			< 2	T	
Chromium	µg/L	<5			< 5	T	
Cobalt	µg/L	<5			< 5	T	
Copper	µg/L	<5			< 5	T	
Lead	µg/L	<5			< 5	T	
Manganese	µg/L	<5			< 5	T	
Molybdenum	µg/L	<5			< 5	T	
Nickel	µg/L	<5			< 5	T	
Selenium	µg/L	<5			< 5	T	
Tin	µg/L	<5			< 5	T	
Vanadium	µg/L	<5			< 5	T	
Zinc	µg/L	<5			< 5	T	
1138815 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1138607 [Laboratory Control Sample]							
3100 Dissolved Metals in Water By ICP/MS			Expected Value	Percent Recovery			
Antimony	µg/L	98	N/A	N/A	N/A	N/A	
Arsenic	µg/L	100	N/A	N/A	N/A	N/A	
Barium	µg/L	100	N/A	N/A	N/A	N/A	
Beryllium	µg/L	99	N/A	N/A	N/A	N/A	
Boron	µg/L	100	N/A	N/A	N/A	N/A	
Cadmium	µg/L	100	N/A	N/A	N/A	N/A	
Chromium	µg/L	100	N/A	N/A	N/A	N/A	
Cobalt	µg/L	99	N/A	N/A	N/A	N/A	
Copper	µg/L	100	N/A	N/A	N/A	N/A	
Lead	µg/L	100	N/A	N/A	N/A	N/A	
Manganese	µg/L	99	N/A	N/A	N/A	N/A	
Molybdenum	µg/L	110	N/A	N/A	N/A	N/A	
Nickel	µg/L	100	N/A	N/A	N/A	N/A	
Selenium	µg/L	100	N/A	N/A	N/A	N/A	
Tin	µg/L	99	N/A	N/A	N/A	N/A	
Vanadium	µg/L	99	N/A	N/A	N/A	N/A	
Zinc	µg/L	98	N/A	N/A	N/A	N/A	
1134950 [Duplicate of 1134842]							
3200 Dissolved Metals in Water - ICP/AES			Result 2	RPD			
Calcium	µg/L	1020000	1010000	1	0-10 %	T	
Iron	µg/L	17200	17200	<1	0-10 %	T	
Magnesium	µg/L	905000	895000	1	0-10 %	T	
Potassium	µg/L	79000	73000	8	0-10 %	T	
Sodium	µg/L	8800000	8650000	2	0-10 %	T	
1134951 [Duplicate of 1134843]							
3200 Dissolved Metals in Water - ICP/AES			Result 2	RPD			
Calcium	µg/L	1260000	1280000	1	0-10 %	T	
Iron	µg/L	6640	7230	9	0-10 %	T	
Magnesium	µg/L	1840000	1880000	2	0-10 %	T	
Potassium	µg/L	220000	230000	5	0-10 %	T	
Sodium	µg/L	27800000	28400000	2	0-10 %	T	
1134953 [Duplicate of 1134842]							
3100 Dissolved Metals in Water By ICP/MS			Result 2	RPD			
Antimony	µg/L	<1	<1	<1	0-10 %	T	
Arsenic	µg/L	<5	<5	<1	0-10 %	T	
Barium	µg/L	47	50	6	0-10 %	T	
Beryllium	µg/L	<5	<5	<1	0-10 %	T	
Boron	µg/L	6400	6100	4	0-10 %	T	
Cadmium	µg/L	<2	<2	<1	0-10 %	T	
Cobalt	µg/L	<5	<5	<1	0-10 %	T	
Lead	µg/L	<5	<5	<1	0-10 %	T	
Molybdenum	µg/L	12	12	4	0-10 %	T	
Strontium	µg/L	15000	14000	4	0-10 %	T	
Thallium	µg/L	<5	<5	<1	0-10 %	T	
Thorium	µg/L	<5	<5	<5	0-10 %	T	
Tin	µg/L	<5	<5	<1	0-10 %	T	
Titanium	µg/L	12	11	8	0-10 %	T	
Uranium	µg/L	63	67	6	0-10 %	T	
Vanadium	µg/L	<5	<5	<1	0-10 %	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1134954 [Duplicate of 1134843]							
3100 Dissolved Metals in Water By ICP/MS			Result 2	RPD			
Antimony	µg/L	<1	<1	<1	0-10 %	T	
Arsenic	µg/L	<5	<5	<1	0-10 %	T	
Barium	µg/L	120	110	10	0-10 %	T	
Beryllium	µg/L	<5	<5	<1	0-10 %	T	
Boron	µg/L	5400	5400	<1	0-10 %	T	
Cadmium	µg/L	<2	<2	<1	0-10 %	T	
Chromium	µg/L	<5	<5	<1	0-10 %	T	
Cobalt	µg/L	5.4	<5	7	0-10 %	T	
Lead	µg/L	<5	<5	<1	0-10 %	T	
Lithium	µg/L	2100	2100	3	0-10 %	T	
Molybdenum	µg/L	15	15	1	0-10 %	T	
Strontium	µg/L	19000	20000	1	0-10 %	T	
Thallium	µg/L	<5	<5	<1	0-10 %	T	
Thorium	µg/L	<5	<5	<5	0-10 %	T	
Tin	µg/L	<5	<5	<1	0-10 %	T	
Uranium	µg/L	5.9	5.6	5	0-10 %	T	
Vanadium	µg/L	<5	<5	<1	0-10 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1137589 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1139123 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1141307 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1143278 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1143279 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1137330 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1420	N/A	N/A	N/A	N/A	
1137331 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1390	N/A	N/A	N/A	N/A	
1137591 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	99	100.0	99	80-120 %	T	
Chloride	mg/L	100	100.0	101	80-120 %	T	
Fluoride	mg/L	100	100.0	102	80-120 %	T	
Nitrate	mg/L	120	100.0	120	80-120 %	T	
Nitrite	mg/L	90	100.0	90	80-120 %	T	
Orthophosphate as P	mg/L	100	100.0	101	80-120 %	T	
Sulphate	mg/L	100	100.0	105	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1139125 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	86	100.0	86	80-120 %	T	
1141308 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	990	1000.0	99	90-110 %	T	
1143280 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	9.2	10.0	92	80-120 %	T	
1143281 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	9.5	10.0	95	80-120 %	T	
1134944 [Duplicate of 1134842]							
4300 Anions in Water by IC			Result 2	RPD			
Chloride	mg/L	13000	13000	<1	0-10 %	T	
Fluoride	mg/L	<0.5	<0.5	<1	0-10 %	T	
Nitrate as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Nitrite as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Sulphate	mg/L	3400	3400	<1	0-10 %	T	
1134946 [Duplicate of 1134843]							
4300 Anions in Water by IC			Result 2	RPD			
Chloride	mg/L	34000	34000	<1	0-10 %	T	
Fluoride	mg/L	<0.5	<0.5	<1	0-10 %	T	
Nitrate as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Nitrite as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Sulphate	mg/L	5100	5100	1	0-10 %	T	
1134947 [Duplicate of 1134842]							
4010 Conductivity in Water			Result 2	RPD			
Electrical Conductivity	µS/cm	33500	33200	1	0-10 %	T	
1134948 [Duplicate of 1134843]							
4010 Conductivity in Water			Result 2	RPD			
Electrical Conductivity	µS/cm	80800	93600	<1	0-10 %	T	
1134955 [Duplicate of 1134842]							
4000 pH in Water			Result 2	RPD			
pH	pH	7.0	7.0	0.0	0-0.2 pH	T	
1134956 [Duplicate of 1134843]							
4000 pH in Water			Result 2	RPD			
pH	pH	7.1	7.0	0.0	0-0.2 pH	T	
1134957 [Duplicate of 1134842]							
4110 Dissolved Solids in Water			Result 2	RPD			
Total Dissolved Solids	mg/L	29000	28000	3	0-10 %	T	
1134958 [Duplicate of 1134843]							
4110 Dissolved Solids in Water			Result 2	RPD			
Total Dissolved Solids	mg/L	79000	80000	1	0-10 %	T	
1134959 [Duplicate of 1134842]							
4540 TKN in Water by Titration			Result 2	RPD			
TKN	mg/L	<1	<1	<1	0-20 %	T	
1134960 [Duplicate of 1134843]							
4540 TKN in Water by Titration			Result 2	RPD			
TKN	mg/L	3.2	3.2	3	0-20 %	T	
1134961 [Spike of 1134844]							
4300 Anions in Water by IC			Spike Value	Percent Recovery			
Nitrate as N	mg N/L	27	N/A	N/A	N/A	N/A	
Nitrite as N	mg N/L	33	N/A	N/A	N/A	N/A	
1134963 [Spike of 1134844]							
4540 TKN in Water by Titration			Spike Value	Percent Recovery			
TKN	mg/L	87	100.0	82	80-120 -	T	

Project Comments

Comments	Note TOC machine down. May have sub-contract.

Sample Integrity

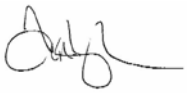
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Carol Cawrse	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane	Operations Manager



Amended Report: This report replaces report # 327584

- Indicates Not Requested * Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

LABMARK

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY	
QUOTE NUMBER	
Job Code:	
Due Date:	
Custody seal intact?	
Sample cold?	
Received for Laboratory by:	
Date:	
Time:	

Project No:	VE30064
Project Manager:	Daniel Pierce
Sampler(s):	Alistair Walsh / Michael Cowin
Checked:	ALISTAIR WALSH
Date:	18-Aug-08

	Container Identification							
Size	500ml	43ml	125ml	125ml				
Type	plastic	glass	plastic	plastic				
Preserv	NO	YES	YES	NO				
Analytes	Major anions, TDS, pH, EC, FI, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, SI and Dissolved Metals	ORC Ultra Trace				

Lab Id	Date	Time	Matrix	Sample Identification	Comments	Tick required analytes						
MAR4_20a			H20			X						
MAR4_20a			H20		X 2 Viles		X					
MAR4_20a			H20		Field Filtered			X				
MAR4_20a			H20		Field Filtered - HOLD SAMPLE				X			
MAR4_20b			H20			X						
MAR4_20b			H20		X 2 Viles		X					
MAR4_20b			H20		Field Filtered			X				
MAR4_20b			H20		Field Filtered - HOLD SAMPLE				X			
MAR3_20			H20			X						
MAR3_20			H20		X 2 Viles		X					
MAR3_20			H20		Field Filtered			X				
MAR3_20			H20		Field Filtered - HOLD SAMPLE				X			
RT02b			H20			X						
RT02b			H20		X 2 Viles		X					
RT02b			H20		Field Filtered			X				
RT02b			H20		Field Filtered - HOLD SAMPLE				X			
RT16b			H20			X						
RT16b			H20		X 2 Viles		X					
RT16b			H20		Field Filtered			X				
RT16b			H20		Field Filtered - HOLD SAMPLE				X			
RT17b			H20			X						
RT17b			H20		X 2 Viles		X					
RT17b			H20		Field Filtered			X				
RT17b			H20		Field Filtered - HOLD SAMPLE				X			
PT17			H20			X						
PT17			H20		X 2 Viles		X					
PT17			H20		Field Filtered			X				
PT17			H20		Field Filtered - HOLD SAMPLE				X			
					TOTAL							

Notes: Rec : labmark @ 9.00 19/8/08

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

08ENME0021863-1(1134842)
SKM_ADEL(MAR4_20A)

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY		Project No:	VE30064
QUOTE NUMBER		Project Manager:	Daniel Pierce
Job Code:		Sampler(s):	Alistair Walsh / Michael Cowin
Due Date:		Checked:	
Custody seal intact?		Date:	18-Aug-08
Sample cold?			
Received for Laboratory by:			
Date:			
Time:			

Container Identification

Size	1000ml	43ml	125ml	125ml			
Type	plastic	glass	plastic	plastic			
Preserv	NO	YES	YES	NO			
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace			

Tick required analytes

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace			
PT40			H20				X						
PT40			H20		X 2 Viles			X					
PT40			H20		Field Filtered				X				
PT40			H20		Field Filtered - HOLD SAMPLE					X			
PT60			H20				X						
PT60			H20		X 2 Viles			X					
PT60			H20		Field Filtered				X				
PT60			H20		Field Filtered - HOLD SAMPLE					X			
PT31			H20				X						
PT31			H20		X 2 Viles			X					
PT31			H20		Field Filtered				X				
PT31			H20		Field Filtered - HOLD SAMPLE					X			
DUP2			H20				X						
DUP2			H20		X 2 Viles			X					
DUP2			H20		Field Filtered				X				
DUP2			H20		Field Filtered - HOLD SAMPLE					X			
DUP3			H20				X						
DUP3			H20		X 2 Viles			X					
DUP3			H20		Field Filtered				X				
DUP3			H20		Field Filtered - HOLD SAMPLE					X			
					TOTAL								

Notes: Rec: labmark [illegible] 19/8/08 @ 9:00

08ENME0021863-1(1134842)
SKM_ADEL(MAR4_20A)

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
	Sample Batch fee			
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	19 August 2008
Attention:	MR Daniel Pierce	**Due Date:**	26 August 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number:	08ENME0021863	**Your Amdel Contact:**	Vanda Dabkowski 0395382267

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Project Comments

Comments	Note TOC machine down. May have sub-contract.

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	12
Conductivity in Water	4010	12
Gold (Au)	0000	12
Dissolved Metals in Water - ICP/AES	3200	12
Dissolved Metals in Water By ICP/MS	3100	12
	NEW_TEST01	12
pH in Water	4000	12
Dissolved Solids in Water	4110	12
TKN in Water by Titration	4540	12
Total Nitrogen in Water by Calc	4941	12

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details
  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Chris Slevison

Date : Tue 19 August 2008

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0021986**
Client Reference	VE30064
Received Date	20/08/2008 09:00:00 AM

Customer Sample ID			**PT45**	**PT48**	**PT51**
Labmark Sample No.			**1136477**	**1136478**	**1136479**
Date Sampled			**19/08/2008**	**19/08/2008**	**19/08/2008**
Metals					
Test/Reference	PQL	Unit			
3100 Dissolved Metals in Water By ICP/MS					
Aluminium	5	µg/L	33	33	23
Antimony	1	µg/L	<1	<1	<1
Arsenic	5	µg/L	<5	<5	<5
Barium	5	µg/L	62	36	20
Beryllium	5	µg/L	<5	<5	<5
Boron	5	µg/L	8100	6100	12000
Cadmium	2	µg/L	<2	<2	<2
Chromium	5	µg/L	7.2	6.1	<5
Cobalt	5	µg/L	<5	<5	<5
Copper	5	µg/L	11	9.6	11
Lead	5	µg/L	<5	<5	<5
Lithium	5	µg/L	350	340	170
Manganese	5	µg/L	900	290	110
Molybdenum	5	µg/L	<5	<5	27
Nickel	5	µg/L	18	13	9.8
Selenium	5	µg/L	69	63	44
Strontium	5	µg/L	17000	12000	8600
Thallium	5	µg/L	<5	<5	<5
Thorium	5	µg/L	<5	<5	<5
Tin	5	µg/L	<5	<5	<5
Titanium	5	µg/L	8.2	9.8	7.5
Uranium	5	µg/L	<5	<5	6.0
Vanadium	5	µg/L	<5	<5	<5
Zinc	5	µg/L	240	45	39
3200 Dissolved Metals in Water - ICP/AES					
Calcium	100	µg/L	1160000	832000	831000
Iron	100	µg/L	5470	17900	2250
Magnesium	100	µg/L	951000	820000	674000
Potassium	1000	µg/L	150000	250000	210000
Sodium	100	µg/L	8900000	10200000	15900000
Inorganics					
Test/Reference	PQL	Unit			
4010 Conductivity in Water					
Electrical Conductivity	20	µS/cm	31300	32700	44100
4000 pH in Water					
pH	0.1	pH	7.1	7.0	7.3
4110 Dissolved Solids in Water					
Total Dissolved Solids	20	mg/L	30000	29000	40000

Customer Sample ID			PT45	PT48	PT51
Labmark Sample No.			1136477	1136478	1136479
Date Sampled			19/08/2008	19/08/2008	19/08/2008
Inorganics					
Test/Reference	PQL	Unit			
4540 TKN in Water by Titration					
TKN	1	mg/L	<1	<1	<1
4410 TOC in Water By Analyser					
Total Organic Carbon	1	mg/L	2.2	<1	<1
4941 Total Nitrogen in Water by Calc					
Total Nitrogen	2	mg N/L	3	4	3
4300 Anions in Water by IC					
Chloride	0.5	mg/L	11000	15000	16000
Fluoride	0.5	mg/L	<0.5	<0.5	<0.5
Nitrate as N	0.5	mg N/L	2.6	3.9	2.7
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	3500	3200	8300
Miscellaneous					
Test/Reference	PQL	Unit			
Total Alkalinity as CaCo3*	-	mg/L	300	250	210
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	300	250	210
Silica*	-	mg/L	14.8	13.8	14.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Dissolved Metals in Water By ICP/MS	21/08/2008	25/08/2008
3200 Dissolved Metals in Water - ICP/AES	21/08/2008	27/08/2008
4000 pH in Water	21/08/2008	21/08/2008
4010 Conductivity in Water	21/08/2008	22/08/2008
4110 Dissolved Solids in Water		27/08/2008
4300 Anions in Water by IC	21/08/2008	28/08/2008
4410 TOC in Water By Analyser	26/08/2008	27/08/2008
4540 TKN in Water by Titration	25/08/2008	26/08/2008
4941 Total Nitrogen in Water by Calc		26/08/2008
NEW_TEST01		27/08/2008

Test Description

4000 pH in Water — As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Labmark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Labmark QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1138639 [Method Blank]							
3100 Dissolved Metals in Water By ICP/MS							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<5			< 5	T	
Barium	µg/L	<5			< 5	T	
Beryllium	µg/L	<5			< 5	T	
Boron	µg/L	<5			< 5	T	
Cadmium	µg/L	<2			< 2	T	
Chromium	µg/L	<5			< 5	T	
Cobalt	µg/L	<5			< 5	T	
Copper	µg/L	<5			< 5	T	
Lead	µg/L	<5			< 5	T	
Manganese	µg/L	<5			< 5	T	
Molybdenum	µg/L	<5			< 5	T	
Nickel	µg/L	<5			< 5	T	
Selenium	µg/L	<5			< 5	T	
Tin	µg/L	<5			< 5	T	
Vanadium	µg/L	<5			< 5	T	
Zinc	µg/L	<5			< 5	T	
1138792 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Phosphorus	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1138640 [Laboratory Control Sample]							
3100 Dissolved Metals in Water By ICP/MS			Expected Value	Percent Recovery			
Antimony	µg/L	92	100.0	92	80-120 %	T	
Arsenic	µg/L	110	100.0	108	80-120 %	T	
Barium	µg/L	100	100.0	100	80-120 %	T	
Beryllium	µg/L	110	100.0	112	80-120 %	T	
Cadmium	µg/L	100	100.0	100	80-120 %	T	
Chromium	µg/L	100	100.0	102	80-120 %	T	
Cobalt	µg/L	100	100.0	102	80-120 %	T	
Copper	µg/L	100	100.0	102	80-120 %	T	
Lead	µg/L	93	100.0	93	80-120 %	T	
Manganese	µg/L	100	100.0	104	80-120 %	T	
Nickel	µg/L	100	100.0	103	80-120 %	T	
Selenium	µg/L	110	100.0	108	80-120 %	T	
Tin	µg/L	96	100.0	96	80-120 %	T	
Vanadium	µg/L	100	100.0	104	80-120 %	T	
Zinc	µg/L	98	100.0	98	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1137589 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1141307 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1141436 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1143278 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1143279 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1137332 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1360	N/A	N/A	N/A	N/A	
1137591 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	99	100.0	99	80-120 %	T	
Chloride	mg/L	100	100.0	101	80-120 %	T	
Fluoride	mg/L	100	100.0	102	80-120 %	T	
Nitrate	mg/L	120	100.0	120	80-120 %	T	
Nitrite	mg/L	90	100.0	90	80-120 %	T	
Orthophosphate as P	mg/L	100	100.0	101	80-120 %	T	
Sulphate	mg/L	100	100.0	105	80-120 %	T	
1141308 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	990	1000.0	99	90-110 %	T	
1141438 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	92	100.0	92	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1143280 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	9.2	10.0	92	80-120 %	T	
1143281 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	9.5	10.0	95	80-120 %	T	

Sample Integrity

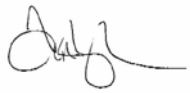
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	N/A
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Carol Cawrse	Client Services Officer	
Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane — Operations Manager



Final Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

	Container Identification						
Size	500ml	43ml	125ml	125ml			
Type	plastic	glass	plastic	plastic			
Preserv	NO	YES	YES	NO			
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace			

LAB USE ONLY	
QUOTE NUMBER	**Project No:** VE30084
Job Code:	**Project Manager:** Daniel Pierce
Due Date:	**Sampler(s):** Alistair Walsh / Michael Cowin
Custody seal intact?	**Checked:**
Sample cold?	
Received for Laboratory by:	
Date:	**Date:** 19-Aug-08
Time:	

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace			
							Tick required analytes						
PT45	18/08/2008		H20				x						
PT45	18/08/2008		H20		X 2 Viles			x					
PT45	18/08/2008		H20		Field Filtered				x				
PT45	18/08/2008		H20		Field Filtered - HOLD SAMPLE					x			
PT48	18/08/2008		H20				x						
PT48	18/08/2008		H20		X 2 Viles			x					
PT48	18/08/2008		H20		Field Filtered				x				
PT48	18/08/2008		H20		Field Filtered - HOLD SAMPLE					x			
PT51	18/08/2008		H20				x						
PT51	18/08/2008		H20		X 2 Viles			x					
PT51	18/08/2008		H20		Field Filtered				x				
PT51	18/08/2008		H20		Field Filtered - HOLD SAMPLE					x			
					TOTAL								

Notes: [initials] Labmark 20/8 9:00

08ENME0021986-1(1136477)
SKM_ADEL(PT45)

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	20 August 2008
Attention:	MR Daniel Pierce	**Due Date:**	27 August 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number:	08ENME0021986	**Your Amdel Contact:**	Vanda Dabkowski 0395382267

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	N/A
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	3
Conductivity in Water	4010	3
Gold (Au)	0000	3
Dissolved Metals in Water - ICP/AES	3200	3
Dissolved Metals in Water By ICP/MS	3100	3
	NEW_TEST01	3
pH in Water	4000	3
Dissolved Solids in Water	4110	3
TKN in Water by Titration	4540	3
TOC in Water By Analyser	4410	3
Total Nitrogen in Water by Calc	4941	3

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details
  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Duncan Harrison

Date : Wed 20 August 2008

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0022255**
Client Reference	VE30064
Received Date	22/08/2008 12:00:00 AM

Customer Sample ID			**LR10**	**RTO5A**	**RTO5B**	**RTO7A**	**DUP 5**
Labmark Sample No.			**1140189**	**1140190**	**1140191**	**1140192**	**1140193**
Date Sampled			**20/08/2008**	**20/08/2008**	**20/08/2008**	**20/08/2008**	**20/08/2008**
Metals							
Test/Reference	PQL	Unit					
3100 Low Level Dissolved Metals in Water							
Aluminium	1	µg/L	2.8	<1	<1	<1	<1
Antimony	1	µg/L	<1	1.1	2.9	1.4	<1
Arsenic	1	µg/L	<1	<1	<1	<1	<1
Barium	1	µg/L	34	47	200	45	35
Beryllium	1	µg/L	<1	<1	<1	<1	<1
Boron	1	µg/L	6700	6000	<1	7100	6900
Cadmium	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	1	µg/L	<1	<1	<1	<1	<1
Cobalt	1	µg/L	5.5	1.1	<1	1.6	5.0
Copper	1	µg/L	10	11	<1	21	11
Lead	1	µg/L	<1	<1	20	1.1	<1
Lithium	1	µg/L	370	420	6.6	400	340
Manganese	1	µg/L	550	230	29	3700	530
Molybdenum	1	µg/L	<1	<1	1.5	<1	<1
Nickel	1	µg/L	12	8.7	<1	18	14
Selenium	1	µg/L	52	53	30	39	53
Strontium	1	µg/L	20000	15000	16000	34000	19000
Thallium	1	µg/L	<1	<1	3.8	<1	<1
Tin	1	µg/L	<1	<1	1.9	<1	<1
Titanium	1	µg/L	24	20	4.3	20	25
Uranium	1	µg/L	57	8.0	5.8	<1	58
Vanadium	1	µg/L	<1	<1	<1	<1	<1
Zinc	1	µg/L	96	27	19	130	110
3200 Dissolved Metals in Water - ICP/AES							
Calcium	100	µg/L	1080000	915000	803000	1650000	1130000
Iron	100	µg/L	3230	28600	175	3710	3410
Magnesium	100	µg/L	938000	1270000	4890000	1180000	992000
Potassium	1000	µg/L	100000	170000	800000	120000	100000
Sodium	100	µg/L	11100000	17700000	88900000	17800000	11600000
Inorganics							
Test/Reference	PQL	Unit					
4010 Conductivity in Water							
Electrical Conductivity	20	µS/cm	37500	55500	130000	56900	37200
4000 pH in Water							
pH	0.1	pH	7.1	6.9	8.1	7.0	7.1
4110 Dissolved Solids in Water							
Total Dissolved Solids	20	mg/L	37000	53000	260000	55000	37000
4540 TKN in Water by Titration							

Customer Sample ID			LR10	RTO5A	RTO5B	RTO7A	DUP 5
Labmark Sample No.			1140189	1140190	1140191	1140192	1140193
Date Sampled			20/08/2008	20/08/2008	20/08/2008	20/08/2008	20/08/2008
Inorganics							
Test/Reference	PQL	Unit					
TKN	1	mg/L	<1	<1	2.4	<1	<1
4410 TOC in Water By Analyser							
Total Organic Carbon	1	mg/L	<1	<1	<1	<1	<1
4941 Total Nitrogen in Water by Calc							
Total Nitrogen	2	mg N/L	3	<2	2	<2	2
4300 Anions in Water by IC							
Chloride	0.5	mg/L	13000	22000	130000	21000	12000
Fluoride	0.5	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrate as N	0.5	mg N/L	2.5	<0.5	<0.5	<0.5	2.0
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	3000	3600	10000	3600	2900
Miscellaneous							
Test/Reference	PQL	Unit					
Total Alkalinity as CaCo3*	-	mg/L	260	240	1260	150	250
Carbonate Alkalinity as CaCo3*	-	mg/L	0	0	0	0	0
Bicarbonate Alkalinity as CaCo3*	-	mg/L	260	240	1260	150	250
Silica*	-	mg/L	15	13.6	34.7	13.3	14.9

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Low Level Dissolved Metals in Water	26/08/2008	28/08/2008
3200 Dissolved Metals in Water - ICP/AES	26/08/2008	28/08/2008
4000 pH in Water		26/08/2008
4010 Conductivity in Water		26/08/2008
4110 Dissolved Solids in Water		28/08/2008
4300 Anions in Water by IC		30/08/2008
4410 TOC in Water By Analyser	27/08/2008	03/09/2008
4540 TKN in Water by Titration	27/08/2008	28/08/2008
4941 Total Nitrogen in Water by Calc		30/08/2008
NEW_TEST01		28/08/2008

Test Description

4000 pH in Water — As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Labmark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Labmark QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1144534 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	
1148996 [Method Blank]							
3100 Low Level Dissolved Metals in Water							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<1			< 1	T	
Barium	µg/L	<1			< 1	T	
Beryllium	µg/L	<1			< 1	T	
Boron	µg/L	<1			< 1	T	
Cadmium	µg/L	<0.2			< 0.2	T	
Chromium	µg/L	<1			< 1	T	
Cobalt	µg/L	<1			< 1	T	
Copper	µg/L	<1			< 1	T	
Lead	µg/L	<1			< 1	T	
Manganese	µg/L	<1			< 1	T	
Molybdenum	µg/L	<1			< 1	T	
Nickel	µg/L	<1			< 1	T	
Selenium	µg/L	<1			< 1	T	
Tin	µg/L	<1			< 1	T	
Vanadium	µg/L	<1			< 1	T	
Zinc	µg/L	<1			< 1	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1141365 [Duplicate of 1140189]							
3200 Dissolved Metals in Water - ICP/AES			Result 2	RPD			
Calcium	µg/L	1120000	1080000	4	0-10 %	T	
Iron	µg/L	3410	3230	5	0-10 %	T	
Magnesium	µg/L	973000	938000	4	0-10 %	T	
Sodium	µg/L	11200000	11100000	1	0-10 %	T	
1141366 [Duplicate of 1140189]							
3100 Low Level Dissolved Metals in Water			Result 2	RPD			
Antimony	µg/L	<1	<1	N/A	N/A	N/A	
Arsenic	µg/L	<1	<1	<1	0-10 %	T	
Barium	µg/L	35	34	1	0-10 %	T	
Beryllium	µg/L	<1	<1	<1	0-10 %	T	
Boron	µg/L	7000	6700	4	0-10 %	T	
Cadmium	µg/L	<0.2	<0.2	<1	0-10 %	T	
Chromium	µg/L	<1	<1	<1	0-10 %	T	
Cobalt	µg/L	5.1	5.5	8	0-10 %	T	
Copper	µg/L	10	10	<1	0-10 %	T	
Lead	µg/L	<1	<1	N/A	N/A	N/A	
Lithium	µg/L	350	370	4	0-10 %	T	
Manganese	µg/L	540	550	1	0-10 %	T	
Molybdenum	µg/L	<1	<1	<1	0-10 %	T	
Nickel	µg/L	14	12	9	0-10 %	T	
Selenium	µg/L	54	52	3	0-10 %	T	
Strontium	µg/L	20000	20000	<1	0-10 %	T	
Thallium	µg/L	<1	<1	<1	0-10 %	T	
Tin	µg/L	<1	<1	N/A	N/A	N/A	
Titanium	µg/L	24	24	N/A	N/A	N/A	
Uranium	µg/L	58	57	2	0-10 %	T	
Vanadium	µg/L	<1	<1	<1	0-10 %	T	
Zinc	µg/L	96	96	N/A	N/A	N/A	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1141307 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1141796 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1144255 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1145150 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1145151 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1145194 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1141308 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	990	1000.0	99	90-110 %	T	
1141798 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	99	100.0	99	80-120 %	T	
Chloride	mg/L	100	100.0	101	80-120 %	T	
Fluoride	mg/L	100	100.0	103	80-120 %	T	
Nitrate	mg/L	120	100.0	120	80-120 %	T	
Nitrite	mg/L	90	100.0	90	80-120 %	T	
Orthophosphate as P	mg/L	100	100.0	101	80-120 %	T	
Sulphate	mg/L	100	100.0	104	80-120 %	T	
1141889 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1430	N/A	N/A	N/A	N/A	
1144256 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	990	1000.0	99	90-110 %	T	
1145152 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	11	10.0	109	80-120 %	T	
1145153 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	9.8	10.0	98	80-120 %	T	
1145196 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	100	100.0	102	80-120 %	T	
1141363 [Duplicate of 1140189]							
4300 Anions in Water by IC			Result 2	RPD			
Chloride	mg/L	13000	13000	1	0-10 %	T	
Fluoride	mg/L	<0.5	<0.5	<1	0-10 %	T	
Nitrate as N	mg N/L	2.3	2.5	8	0-10 %	T	
Nitrite as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Sulphate	mg/L	3000	3000	<1	0-10 %	T	
1141364 [Duplicate of 1140189]							
4010 Conductivity in Water			Result 2	RPD			
Electrical Conductivity	µS/cm	37500	37500	<1	0-10 %	T	
1141367 [Duplicate of 1140189]							
4000 pH in Water			Result 2	RPD			
pH	pH	7.1	7.1	0.0	0-0.2 pH	T	
1141368 [Duplicate of 1140189]							
4110 Dissolved Solids in Water			Result 2	RPD			
Total Dissolved Solids	mg/L	38000	37000	1	0-10 %	T	
1141369 [Duplicate of 1140189]							
4540 TKN in Water by Titration			Result 2	RPD			
TKN	mg/L	<1	<1	<1	0-20 %	T	
1141370 [Duplicate of 1140189]							
4410 TOC in Water By Analyser			Result 2	RPD			
Total Organic Carbon	mg/L	<1	<1	<1	0-10 %	T	
1141371 [Spike of 1140190]							
4300 Anions in Water by IC			Spike Value	Percent Recovery			
Nitrate as N	mg N/L	27	N/A	N/A	N/A	N/A	
Nitrite as N	mg N/L	33	N/A	N/A	N/A	N/A	
1141373 [Spike of 1140190]							
4540 TKN in Water by Titration			Spike Value	Percent Recovery			
TKN	mg/L	88	100.0	88	80-120 -	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1141374 [Spike of 1140190]							
4410 TOC in Water By Analyser			Spike Value	Percent Recovery			
Total Organic Carbon	mg/L	12	10.0	115	80-120 %	T	

Sample Integrity

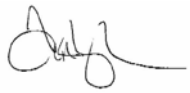
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Carol Cawrse	Client Services Officer	
Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane — Operations Manager



Final Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LABMARK

LAB USE ONLY			Container Identification			
QUOTE NUMBER	Project No: VE30064	Size	~~1000ml~~ 500	43ml	125ml	~~500ml~~ 125
Job Code:	Project Manager: Daniel Pierce	Type	plastic	glass	plastic	plastic
Due Date:	Sampler(s): Alistair Walsh / Michael Cowin	Preserv	NO	YES	YES	NO
Custody seal intact?	Checked:	Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace
Sample cold?	Date: 21/08/08					
Received for Laboratory by:						
Date:						
Time:						

Lab Id	Date	Time	Matrix	Sample Identification	Comments	Major anions (Tick required analytes)	TOC	Major Cations	ORC Ultra Trace
	20/8/08		H20	LR10		✓			
	↓		H20	" "	x2 viles		✓		
	↓		H20	" "	Field filtered			✓	
	↓		H20	" "	Field filtered - Hold Sample				
	20/8/08		H20	RT05a		✓			
	↓		H20	" "	x2 viles		✓		
	↓		H20	" "	Field filtered			✓	
[redacted]									
	20/8/08		H20	RT05b		✓			
	↓		H20	" "	x2 viles		✓		
	↓		H20	" "	Field filtered			✓	
[redacted]									
	21/8/08		H20	RT07a		✓			
	↓		H20	" "	x2 viles		✓		
	↓		H20	" "	field filtered			✓	
[redacted]									
	20/8/08		H20	Duplicate 5		✓			
	↓		H20	" "	x2 viles		✓		
	↓		H20	" "	field filtered			✓	
	↓		H20	" "	Field filtered - HOLD				
					TOTAL				

08ENME0022255-1(1140189)
SKM_ADEL(LR10)

Notes:

Rec: DEH LABMARK 22/8/08 9am

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

COC-RevA

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	22 August 2008
Attention:	MR Daniel Pierce	**Due Date:**	29 August 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number:	08ENME0022255	**Your Amdel Contact:**	Vanda Dabkowski 0395382267

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity	
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	5
Conductivity in Water	4010	5
Dissolved Metals in Water - ICP/AES	3200	5
Low Level Dissolved Metals in Water	3100	5
	NEW_TEST01	5
pH in Water	4000	5
Dissolved Solids in Water	4110	5
TKN in Water by Titration	4540	5
TOC in Water By Analyser	4410	5
Total Nitrogen in Water by Calc	4941	5

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details

  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Kim Jolly

Date : Fri 22 August 2008

Labmark 1868 Dandenong Rd Clayton VIC Australia 3168
ABN: 30 008 127 802 Telephone: (03) 9538 2277 Facsimile: (03) 9538 2278

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0022217**
Client Reference	VE30064
Received Date	22/08/2008 12:00:00 AM

Customer Sample ID			**RT03**	**PT66**	**PT42**	**PT44**	**DUP4**
Labmark Sample No.			**1139820**	**1139821**	**1139822**	**1139823**	**1139824**
Date Sampled			**20/08/2008**	**20/08/2008**	**20/08/2008**	**20/08/2008**	**20/08/2008**
Metals							
Test/Reference	PQL	Unit					
3100 Low Level Dissolved Metals in Water							
Aluminium	1	µg/L	<1	<1	<1	27	<1
Antimony	1	µg/L	<1	6.0	1.5	<1	<1
Arsenic	1	µg/L	<1	<1	<1	<1	<1
Barium	1	µg/L	19	550	59	45	19
Beryllium	1	µg/L	<1	<1	<1	<1	<1
Boron	1	µg/L	6900	<1	4800	5900	7000
Cadmium	0.2	µg/L	<0.2	0.5	<0.2	<0.2	<0.2
Chromium	1	µg/L	3.0	<1	2.3	2.9	3.2
Cobalt	1	µg/L	<1	2.2	3.0	3.6	<1
Copper	1	µg/L	4.4	3.2	18	13	4.7
Lead	1	µg/L	<1	1500	2.3	<1	<1
Lithium	1	µg/L	620	18	450	370	630
Manganese	1	µg/L	530	80	66	270	520
Molybdenum	1	µg/L	5.6	17	11	100	5.0
Nickel	1	µg/L	11	6.7	43	26	12
Selenium	1	µg/L	19	65	57	54	22
Strontium	1	µg/L	6500	16000	17000	14000	6300
Thallium	1	µg/L	<1	22	<1	<1	<1
Tin	1	µg/L	<1	<1	<1	<1	<1
Titanium	1	µg/L	10	6.2	29	29	17
Uranium	1	µg/L	3.0	8.7	35	17	3.0
Vanadium	1	µg/L	1.6	<1	<1	<1	1.9
Zinc	1	µg/L	<1	170	88	40	<1
3200 Dissolved Metals in Water - ICP/AES							
Calcium	100	µg/L	604000	741000	1070000	818000	603000
Iron	100	µg/L	3120	239	<100	8250	2740
Magnesium	100	µg/L	343000	5200000	1230000	1100000	342000
Potassium	1000	µg/L	64000	800000	220000	200000	78000
Sodium	100	µg/L	6070000	87700000	20900000	18200000	6030000
Inorganics							
Test/Reference	PQL	Unit					
4010 Conductivity in Water							
Electrical Conductivity	20	µS/cm	20200	20100	55400	44200	20300
4000 pH in Water							
pH	0.1	pH	7.2	7.0	7.1	7.0	7.3
4110 Dissolved Solids in Water							
Total Dissolved Solids	20	mg/L	20000	260000	59000	51000	19000
4540 TKN in Water by Titration							

Customer Sample ID			RT03	PT66	PT42	PT44	DUP4
Labmark Sample No.			1139820	1139821	1139822	1139823	1139824
Date Sampled			20/08/2008	20/08/2008	20/08/2008	20/08/2008	20/08/2008
Inorganics							
Test/Reference	PQL	Unit					
TKN	1	mg/L	<1	4.0	<1	<1	<1
4410 TOC in Water By Analyser							
Total Organic Carbon	1	mg/L	<1	11	<1	1.1	<1
4941 Total Nitrogen in Water by Calc							
Total Nitrogen	2	mg N/L	<2	4	<2	<2	<2
4300 Anions in Water by IC							
Chloride	0.5	mg/L	4900	150000	21000	18000	4900
Fluoride	0.5	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrate as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	3800	9600	3500	2900	3500
Miscellaneous							
Test/Reference	PQL	Unit					
Total Alkalinity as CaCo3*	-	mg/L	200	96	180	230	200
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	200	96	180	230	200
Silica*	-	mg/L	12.7	30	7.96	13.9	13

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Low Level Dissolved Metals in Water	27/08/2008	28/08/2008
3200 Dissolved Metals in Water - ICP/AES	26/08/2008	28/08/2008
4000 pH in Water		26/08/2008
4010 Conductivity in Water		26/08/2008
4110 Dissolved Solids in Water		28/08/2008
4300 Anions in Water by IC		02/09/2008
4410 TOC in Water By Analyser	26/08/2008	28/08/2008
4540 TKN in Water by Titration	26/08/2008	27/08/2008
4941 Total Nitrogen in Water by Calc		02/09/2008
NEW_TEST01		03/09/2008

Test Description

4000 pH in Water	As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Labmark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Labmark QC Acceptance/Rejection criteria are available on request.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quotes PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1144546 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	
1146517 [Method Blank]							
3100 Low Level Dissolved Metals in Water							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<1			< 1	T	
Barium	µg/L	<1			< 1	T	
Beryllium	µg/L	<1			< 1	T	
Boron	µg/L	<1			< 1	T	
Cadmium	µg/L	<0.2			< 0.2	T	
Chromium	µg/L	<1			< 1	T	
Cobalt	µg/L	<1			< 1	T	
Copper	µg/L	<1			< 1	T	
Lead	µg/L	<1			< 1	T	
Manganese	µg/L	<1			< 1	T	
Molybdenum	µg/L	<1			< 1	T	
Nickel	µg/L	<1			< 1	T	
Selenium	µg/L	<1			< 1	T	
Tin	µg/L	<1			< 1	T	
Vanadium	µg/L	<1			< 1	T	
Zinc	µg/L	<1			< 1	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1140216 [Duplicate of 1139820]							
3200 Dissolved Metals in Water - ICP/AES			Result 2	RPD			
Calcium	µg/L	617000	604000	2	0-10 %	T	
Iron	µg/L	3110	3120	<1	0-10 %	T	
Magnesium	µg/L	349000	343000	2	0-10 %	T	
Potassium	µg/L	75000	64000	N/A	N/A	N/A	
Sodium	µg/L	6030000	6070000	1	0-10 %	T	
1140217 [Duplicate of 1139820]							
3100 Low Level Dissolved Metals in Water			Result 2	RPD			
Aluminium	µg/L	<1	<1	<1	0-10 %	T	
Antimony	µg/L	<1	<1	<1	0-10 %	T	
Arsenic	µg/L	<1	<1	<1	0-10 %	T	
Barium	µg/L	18	19	6	0-10 %	T	
Beryllium	µg/L	<1	<1	<1	0-10 %	T	
Boron	µg/L	7000	6900	1	0-10 %	T	
Cadmium	µg/L	<0.2	<0.2	<1	0-10 %	T	
Chromium	µg/L	3.1	3.0	6	0-10 %	T	
Cobalt	µg/L	<1	<1	<1	0-10 %	T	
Copper	µg/L	4.4	4.4	N/A	N/A	N/A	
Lead	µg/L	<1	<1	<1	0-10 %	T	
Lithium	µg/L	640	620	3	0-10 %	T	
Manganese	µg/L	530	530	<1	0-10 %	T	
Molybdenum	µg/L	5.6	5.6	N/A	N/A	N/A	
Nickel	µg/L	11	11	N/A	N/A	N/A	
Selenium	µg/L	23	19	N/A	N/A	N/A	
Strontium	µg/L	6100	6500	6	0-10 %	T	
Thallium	µg/L	<1	<1	<1	0-10 %	T	
Tin	µg/L	<1	<1	<1	0-10 %	T	
Titanium	µg/L	14	10	N/A	N/A	N/A	
Uranium	µg/L	3.0	3.0	2	0-10 %	T	
Vanadium	µg/L	1.8	1.6	8	0-10 %	T	
Zinc	µg/L	<1	<1	<1	0-10 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1141307 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1141796 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1143092 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1143282 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1143283 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1141308 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	990	1000.0	99	90-110 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1141798 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	99	100.0	99	80-120 %	T	
Chloride	mg/L	100	100.0	101	80-120 %	T	
Fluoride	mg/L	100	100.0	103	80-120 %	T	
Nitrate	mg/L	120	100.0	120	80-120 %	T	
Nitrite	mg/L	90	100.0	90	80-120 %	T	
Orthophosphate as P	mg/L	100	100.0	101	80-120 %	T	
Sulphate	mg/L	100	100.0	104	80-120 %	T	
1141889 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1430	N/A	N/A	N/A	N/A	
1143094 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	96	100.0	96	80-120 %	T	
1143284 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	11	10.0	106	80-120 %	T	
1143285 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	11	10.0	107	80-120 %	T	
1140214 [Duplicate of 1139820]							
4300 Anions in Water by IC			Result 2	RPD			
Chloride	mg/L	4900	4900	<1	0-10 %	T	
Fluoride	mg/L	<0.5	<0.5	<1	0-10 %	T	
Nitrate as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Nitrite as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Sulphate	mg/L	3500	3800	9	0-10 %	T	
1140215 [Duplicate of 1139820]							
4010 Conductivity in Water			Result 2	RPD			
Electrical Conductivity	µS/cm	20100	20200	<1	0-10 %	T	
1140219 [Duplicate of 1139820]							
4000 pH in Water			Result 2	RPD			
pH	pH	7.4	7.2	0.2	0-0.2 pH	T	
1140220 [Duplicate of 1139820]							
4110 Dissolved Solids in Water			Result 2	RPD			
Total Dissolved Solids	mg/L	19000	20000	4	0-10 %	T	
1140221 [Duplicate of 1139820]							
4540 TKN in Water by Titration			Result 2	RPD			
TKN	mg/L	<1	<1	<1	0-20 %	T	
1140235 [Duplicate of 1139820]							
4410 TOC in Water By Analyser			Result 2	RPD			
Total Organic Carbon	mg/L	<1	<1	<1	0-10 %	T	
1140241 [Spike of 1139821]							
4300 Anions in Water by IC			Spike Value	Percent Recovery			
Nitrate as N	mg N/L	23	N/A	N/A	N/A	N/A	
Nitrite as N	mg N/L	30	N/A	N/A	N/A	N/A	
1140243 [Spike of 1139821]							
4540 TKN in Water by Titration			Spike Value	Percent Recovery			
TKN	mg/L	110	100.0	104	80-120 -	T	
1140244 [Spike of 1139821]							
4410 TOC in Water By Analyser			Spike Value	Percent Recovery			
Total Organic Carbon	mg/L	21	10.0	105	80-120 %	T	

Sample Integrity

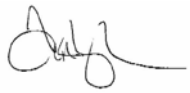
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane	Operations Manager



Final Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0023416**
Client Reference	VE30064
Order Number	VE30064
Received Date	03/09/2008 09:00:00 AM

Customer Sample ID			**RT01**	**RT05C**	**RT07B**	**RT04A**
Sample Matrix			**WATER**	**WATER**	**WATER**	**WATER**
Labmark Sample No.			**1156682**	**1156683**	**1156684**	**1156685**
Date Sampled			**01/09/2008**	**01/09/2008**	**02/09/2008**	**02/09/2008**
Metals						
Test/Reference	PQL	Unit				
3100 Low Level Dissolved Metals in Water						
Aluminium	1	µg/L	18	17	22	120
Antimony	1	µg/L	3.3	2.3	1.4	<1
Arsenic	1	µg/L	G01 <80	G01 <90	<70	<20
Barium	1	µg/L	110	76	100	29
Beryllium	1	µg/L	<1	<1	<1	<1
Boron	1	µg/L	5700	2800	3100	7300
Cadmium	0.2	µg/L	<0.2	<0.2	<0.2	<0.2
Chromium	1	µg/L	4.6	2.8	2.0	5.4
Cobalt	1	µg/L	73	28	2.7	<1
Copper	1	µg/L	140	92	46	4.6
Lead	1	µg/L	19	28	<1	<1
Lithium	1	µg/L	3100	1600	4900	610
Manganese	1	µg/L	6200	2200	5300	410
Molybdenum	1	µg/L	27	12	7.5	3.4
Nickel	1	µg/L	84	48	27	11
Selenium	1	µg/L	150	110	83	36
Strontium	1	µg/L	18000	17000	44000	15000
Thallium	1	µg/L	25	10	<1	<1
Tin	1	µg/L	3.3	2.1	1.2	<1
Titanium	1	µg/L	71	78	48	18
Uranium	1	µg/L	8.5	16	5.0	1.4
Vanadium	1	µg/L	<1	<1	<1	<1
Zinc	1	µg/L	590	760	94	40
3200 Dissolved Metals in Water - ICP/AES						
Calcium	100	µg/L	796000	911000	2040000	982000
Iron	100	µg/L	282	555	3190	2450
Magnesium	100	µg/L	4160000	6200000	2040000	772000
Potassium	1000	µg/L	1000000	890000	630000	160000
Sodium	100	µg/L	71400000	117000000	57900000	9490000
Inorganics						
Test/Reference	PQL	Unit				
4010 Conductivity in Water						
Electrical Conductivity	20	µS/cm	132000	140000	120000	35600
4000 pH in Water						
pH	0.1	pH	6.9	6.5	6.9	7.2
4110 Dissolved Solids in Water						

Customer Sample ID			RT01	RT05C	RT07B	RT04A
Sample Matrix			WATER	WATER	WATER	WATER
Labmark Sample No.			1156682	1156683	1156684	1156685
Date Sampled			01/09/2008	01/09/2008	02/09/2008	02/09/2008
Inorganics						
Test/Reference	PQL	Unit				
Total Dissolved Solids	20	mg/L	200000	240000	150000	31000
4540 TKN in Water by Titration						
TKN	1	mg/L	8.4	<1	6.5	<1
4410 TOC in Water By Analyser						
Total Organic Carbon	1	mg/L	28	8.9	6.1	1.0
4941 Total Nitrogen in Water by Calc						
Total Nitrogen	2	mg N/L	8	<2	6	<2
4300 Anions in Water by IC						
Chloride	0.5	mg/L	100000	130000	78000	12000
Fluoride	0.5	mg/L	<0.5	<0.5	<0.5	<0.5
Nitrate as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	9200	10000	5300	3100
Miscellaneous						
Test/Reference	PQL	Unit				
Total Alkalinity as CaCo3*	-	mg/L	130	75	91	270
Carbonate Alkalinity as CaCo3*	-	mg/L	0	0	0	0
Bicarbonate Alkalinity as CaCo3*	-	mg/L	130	75	91	270
Silica*	-	mg/L	5.5	6.4	6.5	11.4

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Low Level Dissolved Metals in Water	03/09/2008	08/09/2008
3200 Dissolved Metals in Water - ICP/AES	03/09/2008	04/09/2008
4000 pH in Water		05/09/2008
4010 Conductivity in Water		05/09/2008
4110 Dissolved Solids in Water		05/09/2008
4300 Anions in Water by IC	04/09/2008	10/09/2008
4410 TOC in Water By Analyser		17/09/2008
4540 TKN in Water by Titration	04/09/2008	05/09/2008
4941 Total Nitrogen in Water by Calc		05/09/2008
NEW_TEST01		04/09/2008

Test Description

4000 pH in Water

As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Labmark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Matrix spike recoveries are calculated on an 'As Received' basis; the parent sample result is moisture corrected after the % recovery is determined.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1157162 [Method Blank]							
3100 Low Level Dissolved Metals in Water							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<1			< 1	T	
Barium	µg/L	<1			< 1	T	
Beryllium	µg/L	<1			< 1	T	
Boron	µg/L	<1			< 1	T	
Cadmium	µg/L	<0.2			< 0.2	T	
Chromium	µg/L	<1			< 1	T	
Cobalt	µg/L	<1			< 1	T	
Copper	µg/L	<1			< 1	T	
Lead	µg/L	<1			< 1	T	
Manganese	µg/L	<1			< 1	T	
Molybdenum	µg/L	<1			< 1	T	
Nickel	µg/L	<1			< 1	T	
Selenium	µg/L	<1			< 1	T	
Tin	µg/L	<1			< 1	T	
Vanadium	µg/L	<1			< 1	T	
Zinc	µg/L	1.5			< 1	F	
1157834 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1157163 [Laboratory Control Sample]							
3100 Low Level Dissolved Metals in Water			Expected Value	Percent Recovery			
Antimony	µg/L	100	100.0	101	80-120 %	T	
Arsenic	µg/L	100	100.0	104	80-120 %	T	
Barium	µg/L	100	100.0	100	80-120 %	T	
Beryllium	µg/L	110	100.0	106	80-120 %	T	
Cadmium	µg/L	100	100.0	105	80-120 %	T	
Chromium	µg/L	100	100.0	101	80-120 %	T	
Cobalt	µg/L	100	100.0	103	80-120 %	T	
Copper	µg/L	100	100.0	101	80-120 %	T	
Lead	µg/L	100	100.0	100	80-120 %	T	
Manganese	µg/L	100	100.0	103	80-120 %	T	
Molybdenum	µg/L	110	100.0	105	80-120 %	T	
Nickel	µg/L	100	100.0	103	80-120 %	T	
Selenium	µg/L	100	100.0	103	80-120 %	T	
Tin	µg/L	110	100.0	110	80-120 %	T	
Vanadium	µg/L	100	100.0	100	80-120 %	T	
Zinc	µg/L	100	100.0	102	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1157225 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1158081 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1158263 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1158477 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1157227 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	8.6	10.0	86	80-120 %	T	
1158083 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	88	100.0	88	80-120 %	T	
1158170 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1420	N/A	N/A	N/A	N/A	
1158264 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	970	1000.0	97	90-110 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1158480 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	96	100.0	96	80-120 %	T	
Chloride	mg/L	98	100.0	98	80-120 %	T	
Fluoride	mg/L	96	100.0	96	80-120 %	T	
Nitrate	mg/L	120	100.0	118	80-120 %	T	
Nitrite	mg/L	80	100.0	80	80-120 %	T	
Orthophosphate as P	mg/L	100	100.0	101	80-120 %	T	
Sulphate	mg/L	100	100.0	101	80-120 %	T	

Report Results Information

TOC EML - accreditation # 2731 - report # N005887

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

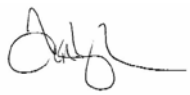
Code	Description
G01	The PQLs have been raised due to Matrix Interference

Authorised By

Carol Cawrse	Client Services Officer	
Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane Operations Manager



Final Report

- Indicates Not Requested * Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

LABMARK

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY
QUOTE NUMBER
Job Code:
Due Date:
Custody seal intact?
Sample cold?
Received for Laboratory by:
Date:
Time:

Project No: VE30064
Project Manager: Daniel Pierce
Sampler(s): Alistair Walsh / ~~Michael Smith~~ T. KELLY
Checked:
Date: 02/09/08

	Container Identification							
Size	500 ~~1000ml~~	43ml	125ml	125ml				
Type	plastic	glass	plastic	plastic				
Preserv	NO	YES	YES	NO				
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace				

Lab Id	Date	Time	Matrix	Sample Identification	Comments	Tick required analytes						
	01/09/08		H20	RT01		X						
	" "		H20	RT01	X 2 Vils		X					
	" "		H20	RT01	Field Filtered			X				
	" "		H20	RT01	Field Filtered - HOLD SAMPLE				X	(HOLD)		
	01/09/08		H20	RT05c		X						
	" "		H20	RT05c	X 2 Vils		X					
	" "		H20	RT05c	Field Filtered			X				
	" "		H20	RT05c	Field Filtered - HOLD SAMPLE				X	(HOLD)		
	02/09/08			RT07b		X						
	" "			RT07b	x 2 vials		X					
	" "			RT07b	Field filtered			X				
	" "			RT07b	Field filtered				X	(HOLD)		
	02/09/08			RT04a		X						
	" "			RT04a	x 2 vials		X					
	" "			RT04a	Field filtered			X				
	" "			RT04a	Field Filtered				X	(HOLD		
					TOTAL							

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

08ENME0023416-1(1156682)
SKM_ADEL(RT01)

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

COC-RevA

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	3 September 2008
Attention:	MR Daniel Pierce	**Due Date:**	10 September 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number: 08ENME0023416

Your Amdel Contact: Carol Cawrse
+61 3 9538 2277

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	4
Conductivity in Water	4010	4
Dissolved Metals in Water - ICP/AES	3200	4
Low Level Dissolved Metals in Water	3100	4
	NEW_TEST01	4
pH in Water	4000	4
Dissolved Solids in Water	4110	4
TKN in Water by Titration	4540	4
TOC in Water By Analyser	4410	4
Total Nitrogen in Water by Calc	4941	4

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details

  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : James Taylor

Date : Wed 3 September 2008

Labmark 1868 Dandenong Rd Clayton VIC Australia 3168
ABN: 30 008 127 802 Telephone: (03) 9538 2277 Facsimile: (03) 9538 2278

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0023714**
Client Reference	VE30064
Received Date	05/09/2008 09:00:00 AM

Customer Sample ID			**RT04b**	**RT09**	**QT2**	**LP2**	**Duplicate 6**
Sample Matrix			**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Labmark Sample No.			**1160528**	**1160529**	**1160530**	**1160531**	**1160532**
Date Sampled			**03/09/2008**	**03/09/2008**	**04/09/2008**	**04/09/2008**	**04/09/2008**
Metals							
Test/Reference	PQL	Unit					
3100 Low Level Dissolved Metals in Water							
Aluminium	1	µg/L	18	20	39	24	18
Antimony	1	µg/L	<1	<1	<1	<1	<1
Arsenic	1	µg/L	G01 <100	<1	<1	<1	<1
Barium	1	µg/L	150	32	29	18	19
Beryllium	1	µg/L	<1	<1	<1	<1	<1
Boron	1	µg/L	5600	7800	6000	12000	12000
Cadmium	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	1	µg/L	7.5	2.6	2.7	6.8	8.7
Cobalt	1	µg/L	3.8	<1	<1	67	66
Copper	1	µg/L	32	6.6	6.7	84	93
Lead	1	µg/L	1.8	<1	<1	<1	<1
Lithium	1	µg/L	11000	880	910	880	870
Manganese	1	µg/L	2800	510	1600	2800	2700
Molybdenum	1	µg/L	8.9	<1	2.4	<1	<1
Nickel	1	µg/L	29	10	5.9	31	29
Selenium	1	µg/L	160	26	70	38	36
Strontium	1	µg/L	50000	12000	9400	14000	13000
Thallium	1	µg/L	<1	<1	<1	<1	<1
Tin	1	µg/L	<1	<1	<1	<1	<1
Titanium	1	µg/L	1.9	49	6.8	3.8	2.9
Uranium	1	µg/L	1.8	<1	<1	74	77
Vanadium	1	µg/L	<1	<1	<1	1.4	1.7
Zinc	1	µg/L	42	28	19	79	76
3200 Dissolved Metals in Water - ICP/AES							
Calcium	100	µg/L	2690000	829000	469000	800000	799000
Iron	100	µg/L	276	9390	115	15600	15600
Magnesium	100	µg/L	1540000	719000	877000	850000	852000
Potassium	1000	µg/L	790000	85000	86000	61000	62000
Sodium	100	µg/L	83000000	10100000	14400000	6510000	6330000
Inorganics							
Test/Reference	PQL	Unit					
4010 Conductivity in Water							
Electrical Conductivity	20	µS/cm	124000	30500	39200	25200	25400
4000 pH in Water							
pH	0.1	pH	6.9	7.0	8.3	6.7	6.8
4110 Dissolved Solids in Water							
Total Dissolved Solids	20	mg/L	170000	26000	38000	22000	23000

Customer Sample ID			RT04b	RT09	QT2	LP2	Duplicate 6
Sample Matrix			WATER	WATER	WATER	WATER	WATER
Labmark Sample No.			1160528	1160529	1160530	1160531	1160532
Date Sampled			03/09/2008	03/09/2008	04/09/2008	04/09/2008	04/09/2008
Inorganics							
Test/Reference	PQL	Unit					
4540 TKN in Water by Titration							
TKN	1	mg/L	7.9	<1	2.9	9.4	11
4410 TOC in Water By Analyser							
Total Organic Carbon*	1	mg/L	33	1.6	2.7	3.4	3.4
4941 Total Nitrogen in Water by Calc							
Total Nitrogen	2	mg N/L	8	<2	3	9	11
4300 Anions in Water by IC							
Chloride	0.5	mg/L	65000	9900	13000	5700	5500
Fluoride	0.5	mg/L	<0.5	<0.5	<0.5	1.5	1.5
Nitrate as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	3600	2600	4500	4300	4100
Miscellaneous							
Test/Reference	PQL	Unit					
Total Alkalinity as CaCo3*	-	mg/L	100	380	140	920	940
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	100	380	140	920	940
Silica*	-	mg/L	10	15	6.9	29.5	29.3

Customer Sample ID			RB2	RB1
Sample Matrix			WATER	WATER
Labmark Sample No.			1160533	1160534
Date Sampled			04/09/2008	04/09/2008
Metals				
Test/Reference	PQL	Unit		
3100 Low Level Dissolved Metals in Water				
Aluminium	1	µg/L	20	9.5
Antimony	1	µg/L	<1	<1
Arsenic	1	µg/L	<1	<1
Barium	1	µg/L	<1	<1
Beryllium	1	µg/L	<1	<1
Boron	1	µg/L	<1	<1
Cadmium	0.2	µg/L	<0.2	<0.2
Chromium	1	µg/L	<1	<1
Cobalt	1	µg/L	<1	<1
Copper	1	µg/L	1.4	2.3
Lead	1	µg/L	<1	<1
Lithium	1	µg/L	<1	<1
Manganese	1	µg/L	<1	<1
Molybdenum	1	µg/L	<1	<1
Nickel	1	µg/L	<1	<1
Selenium	1	µg/L	<1	<1
Strontium	1	µg/L	<1	<1
Thallium	1	µg/L	<1	<1
Tin	1	µg/L	<1	<1
Titanium	1	µg/L	<1	<1
Uranium	1	µg/L	<1	<1

Customer Sample ID			**RB2**	**RB1**
Sample Matrix			**WATER**	**WATER**
Labmark Sample No.			**1160533**	**1160534**
Date Sampled			**04/09/2008**	**04/09/2008**
Metals				
Test/Reference	PQL	Unit		
Vanadium	1	µg/L	<1	<1
Zinc	1	µg/L	29	55
3200 Dissolved Metals in Water - ICP/AES				
Calcium	100	µg/L	201	225
Iron	100	µg/L	<100	<100
Magnesium	100	µg/L	<100	<100
Potassium	1000	µg/L	<1000	<1000
Sodium	100	µg/L	<100	<100
Inorganics				
Test/Reference	PQL	Unit		
4410 TOC in Water By Analyser				
Total Organic Carbon*	1	mg/L	1.2	1.4
Miscellaneous				
Test/Reference	PQL	Unit		
Silica*	-	mg/L	<1	<1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Low Level Dissolved Metals in Water	05/09/2008	10/09/2008
3200 Dissolved Metals in Water - ICP/AES	05/09/2008	08/09/2008
4000 pH in Water		09/09/2008
4010 Conductivity in Water		09/09/2008
4110 Dissolved Solids in Water		10/09/2008
4300 Anions in Water by IC	08/09/2008	10/09/2008
4410 TOC in Water By Analyser		16/09/2008
4540 TKN in Water by Titration	08/09/2008	11/09/2008
4941 Total Nitrogen in Water by Calc		11/09/2008
NEW_TEST01		09/09/2008

Test Description

4000 pH in Water

As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Labmark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Matrix spike recoveries are calculated on an 'As Received' basis; the parent sample result is moisture corrected after the % recovery is determined.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1160795 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	
1161775 [Method Blank]							
3100 Low Level Dissolved Metals in Water							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<1			< 1	T	
Barium	µg/L	<1			< 1	T	
Beryllium	µg/L	<1			< 1	T	
Boron	µg/L	<1			< 1	T	
Cadmium	µg/L	<0.2			< 0.2	T	
Chromium	µg/L	<1			< 1	T	
Cobalt	µg/L	<1			< 1	T	
Copper	µg/L	<1			< 1	T	
Lead	µg/L	<1			< 1	T	
Manganese	µg/L	<1			< 1	T	
Molybdenum	µg/L	<1			< 1	T	
Nickel	µg/L	<1			< 1	T	
Selenium	µg/L	<1			< 1	T	
Tin	µg/L	<1			< 1	T	
Vanadium	µg/L	<1			< 1	T	
Zinc	µg/L	<1			< 1	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1161776 [Laboratory Control Sample]							
3100 Low Level Dissolved Metals in Water			Expected Value	Percent Recovery			
Antimony	µg/L	100	100.0	101	80-120 %	T	
Arsenic	µg/L	99	100.0	99	80-120 %	T	
Barium	µg/L	97	100.0	97	80-120 %	T	
Beryllium	µg/L	100	100.0	101	80-120 %	T	
Boron	µg/L	110	100.0	111	80-120 %	T	
Cadmium	µg/L	100	100.0	103	80-120 %	T	
Chromium	µg/L	96	100.0	96	80-120 %	T	
Cobalt	µg/L	95	100.0	95	80-120 %	T	
Copper	µg/L	97	100.0	97	80-120 %	T	
Lead	µg/L	98	100.0	98	80-120 %	T	
Manganese	µg/L	96	100.0	96	80-120 %	T	
Molybdenum	µg/L	94	100.0	94	80-120 %	T	
Nickel	µg/L	96	100.0	96	80-120 %	T	
Selenium	µg/L	110	100.0	108	80-120 %	T	
Tin	µg/L	100	100.0	104	80-120 %	T	
Vanadium	µg/L	98	100.0	98	80-120 %	T	
Zinc	µg/L	100	100.0	104	80-120 %	T	
1160602 [Duplicate of 1160528]							
3200 Dissolved Metals in Water - ICP/AES			Result 2	RPD			
Calcium	µg/L	2680000	2690000	<1	0-10 %	T	
Iron	µg/L	276	276	<1	0-10 %	T	
Magnesium	µg/L	1530000	1540000	1	0-10 %	T	
Potassium	µg/L	800000	790000	2	0-10 %	T	
1160603 [Duplicate of 1160528]							
3100 Low Level Dissolved Metals in Water			Result 2	RPD			
Aluminium	µg/L	19	18	2	0-10 %	T	
Antimony	µg/L	<1	<1	<1	0-10 %	T	
Arsenic	µg/L	<100	<100	<1	0-10 %	T	
Barium	µg/L	150	150	1	0-10 %	T	
Beryllium	µg/L	<1	<1	<1	0-10 %	T	
Boron	µg/L	5600	5600	<1	0-10 %	T	
Cadmium	µg/L	<0.2	<0.2	<1	0-10 %	T	
Chromium	µg/L	7.3	7.5	3	0-10 %	T	
Cobalt	µg/L	3.5	3.8	9	0-10 %	T	
Lithium	µg/L	11000	11000	2	0-10 %	T	
Manganese	µg/L	2800	2800	1	0-10 %	T	
Selenium	µg/L	170	160	9	0-10 %	T	
Strontium	µg/L	50000	50000	1	0-10 %	T	
Thallium	µg/L	<1	<1	<1	0-10 %	T	
Tin	µg/L	<1	<1	<1	0-10 %	T	
Titanium	µg/L	46	1.9	N/A	N/A	N/A	
Vanadium	µg/L	<1	<1	<1	0-10 %	T	
Zinc	µg/L	43	42	4	0-10 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1162613 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1162919 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1164257 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1169680 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1169681 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1169684 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1169685 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1162615 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	97	100.0	97	80-120 %	T	
1162921 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	94	100.0	94	80-120 %	T	
Chloride	mg/L	95	100.0	95	80-120 %	T	
Fluoride	mg/L	93	100.0	93	80-120 %	T	
Nitrate	mg/L	120	100.0	120	80-120 %	T	
Nitrite	mg/L	80	100.0	80	80-120 %	T	
Orthophosphate as P	mg/L	98	100.0	98	80-120 %	T	
Sulphate	mg/L	97	100.0	97	80-120 %	T	
1163049 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1420	N/A	N/A	N/A	N/A	
1164258 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	1000	1000.0	100	90-110 %	T	
1169682 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	8.0	10.0	80	80-120 %	T	
1169683 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	8.0	10.0	80	80-120 %	T	
1169686 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	8.0	10.0	80	80-120 %	T	
1169687 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	8.0	10.0	80	80-120 %	T	
1160600 [Duplicate of 1160528]							
4300 Anions in Water by IC			Result 2	RPD			
Chloride	mg/L	66000	65000	1	0-10 %	T	
Fluoride	mg/L	<0.5	<0.5	<1	0-10 %	T	
Nitrate as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Nitrite as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Sulphate	mg/L	3700	3600	4	0-10 %	T	
1160601 [Duplicate of 1160528]							
4010 Conductivity in Water			Result 2	RPD			
Electrical Conductivity	µS/cm	124000	124000	<1	0-10 %	T	
1160604 [Duplicate of 1160528]							
4000 pH in Water			Result 2	RPD			
pH	pH	7.0	6.9	0.1	0-0.2 pH	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1160605 [Duplicate of 1160528]							
4110 Dissolved Solids in Water			Result 2	RPD			
Total Dissolved Solids	mg/L	170000	170000	2	0-10 %	T	
1160606 [Duplicate of 1160528]							
4540 TKN in Water by Titration			Result 2	RPD			
TKN	mg/L	6.8	7.9	15	0-20 %	T	
1160608 [Spike of 1160529]							
4300 Anions in Water by IC			Spike Value	Percent Recovery			
Nitrate as N	mg N/L	26	N/A	N/A	N/A	N/A	
Nitrite as N	mg N/L	<0.5	N/A	N/A	N/A	N/A	
1160610 [Spike of 1160529]							
4540 TKN in Water by Titration			Spike Value	Percent Recovery			
TKN	mg/L	83	100.0	83	80-120 -	T	

Report Results Information

TOC EML - accreditation # 2731 - report # N005887

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	N/A
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

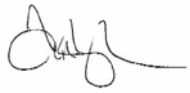
Code	Description
G01	The PQLs have been raised due to Matrix Interference

Authorised By

Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane Operations Manager



Final Report

- Indicates Not Requested * Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

LABMARK

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY	
QUOTE NUMBER	
Job Code:	
Due Date:	
Custody seal intact?	
Sample cold?	
Received for Laboratory by:	
Date:	
Time:	

Project No:	VE30064
Project Manager:	Daniel Pierce
Sampler(s):	Alistair Walsh
Checked:	
Date:	4/09/2008

ASHBY

Container Identification							
Size	1000ml	43ml	125ml	125ml			
Type	plastic	glass	plastic	plastic			
Preserv	NO	YES	YES	NO			
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace			

Lab Id	Date	Time	Matrix	Sample Identification	Comments	Tick required analytes						
	3/09/2008		H20	RT04b		X						
	3/09/2008		H20	RT04b	X 2 Vils		X					
	3/09/2008		H20	RT04b	Field Filtered			X				
	3/09/2008		H20	RT04b	Field Filtered - HOLD SAMPLE				X			
	3/09/2008		H20	RT09		X						
	3/09/2008		H20	RT09	X 2 Vils		X					
	3/09/2008		H20	RT09	Field Filtered			X				
	3/09/2008		H20	RT09	Field Filtered - HOLD SAMPLE				X			
	4/09/2008		H20	QT2		X						
	4/09/2008		H20	QT2	X 2 Vils		X					
	4/09/2008		H20	QT2	Field Filtered			X				
	[redacted]											
	4/09/2008		H20	LP2		X						
	4/09/2008		H20	LP2	X 2 Vils		X					
	4/09/2008		H20	LP2	Field Filtered			X				
	4/09/2008		H20	LP2	Field Filtered - HOLD SAMPLE				X			
	4/09/2008		H20	Duplicate 6		X						
	4/09/2008		H20	Duplicate 6	X 2 Vils		X					
	4/09/2008		H20	Duplicate 6	Field Filtered			X				
	[redacted]											
	4/9/08		H20	RB2								
	" "		H20	RB2	X 2 vils		X					
	" "		H20	RB2	Field filtered			X				
	4/9/08		H20	RB1								
	" "		H20	RB1	X 2 vials		X					
	" "		H20	RB1	Field Filtered			X				
					TOTAL							

08ENME0023714-1(1160528)
SKM_ADEL(RT04b)

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

Labmark
5/9 9:00

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	5 September 2008
Attention:	MR Daniel Pierce	**Due Date:**	12 September 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number: 08ENME0023714

Your Amdel Contact: Carol Cawrse
+61 3 9538 2277

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	N/A
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	5
Conductivity in Water	4010	5
Dissolved Metals in Water - ICP/AES	3200	7
Low Level Dissolved Metals in Water	3100	7
	NEW_TEST01	7
pH in Water	4000	5
Dissolved Solids in Water	4110	5
TKN in Water by Titration	4540	5
TOC in Water By Analyser	4410	7
Total Nitrogen in Water by Calc	4941	5

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details

  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Damien Battaglia

Date : Fri 5 September 2008

Labmark 1868 Dandenong Rd Clayton VIC Australia 3168
ABN: 30 008 127 802 Telephone: (03) 9538 2277 Facsimile: (03) 9538 2278

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Daniel Pierce

Project	**08ENME0024196**
Client Reference	VE30064
Received Date	10/09/2008 10:06:00 AM

Customer Sample ID			**M.A.R 7**	**PT62**	**PT63**	**RB3**	**Duplicate 7**
Sample Matrix			**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Labmark Sample No.			**1167583**	**1167584**	**1167585**	**1167586**	**1167587**
Date Sampled			**09/09/2008**	**09/09/2008**	**09/09/2008**	**09/09/2008**	**09/09/2008**
Metals							
Test/Reference	PQL	Unit					
3100 Low Level Dissolved Metals in Water							
Aluminium	1	µg/L	18	4.3	7.6	6.7	16
Antimony	1	µg/L	<1	<1	<1	<1	<1
Arsenic	1	µg/L	17	23	G01 <50	<1	18
Barium	1	µg/L	78	48	70	<1	77
Beryllium	1	µg/L	<1	<1	<1	<1	<1
Boron	1	µg/L	6300	7200	11000	6.4	6200
Cadmium	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	1	µg/L	4.2	1.8	3.8	<1	2.0
Cobalt	1	µg/L	11	4.5	5.1	<1	9.3
Copper	1	µg/L	6.4	5.1	14	1.6	6.1
Lead	1	µg/L	<1	<1	<1	<1	<1
Lithium	1	µg/L	370	570	3400	<1	360
Manganese	1	µg/L	500	860	3600	<1	460
Molybdenum	1	µg/L	85	2.8	<1	<1	85
Nickel	1	µg/L	30	20	17	<1	27
Selenium	1	µg/L	42	41	62	<1	41
Strontium	1	µg/L	17000	15000	19000	1.1	17000
Thallium	1	µg/L	<1	<1	<1	<1	<1
Tin	1	µg/L	<1	<1	<1	<1	<1
Titanium	1	µg/L	2.3	1.9	7.5	<1	3.1
Uranium	1	µg/L	19	22	5.4	<1	19
Vanadium	1	µg/L	3.0	<1	<1	<1	2.0
Zinc	1	µg/L	19	23	63	12	22
3200 Dissolved Metals in Water - ICP/AES							
Calcium	100	µg/L	1110000	788000	1000000	167	1120000
Iron	100	µg/L	621	-	759	<100	589
Magnesium	100	µg/L	742000	-	1940000	-	736000
Iron	100	µg/L	-	4650	-	-	-
Magnesium	100	µg/L	-	-	-	<100	-
Potassium	1000	µg/L	77000	-	230000	-	78000
Magnesium	100	µg/L	-	584000	-	-	-
Potassium	1000	µg/L	-	-	-	<1000	-
Sodium	100	µg/L	6230000	-	24500000	-	6260000
Potassium	1000	µg/L	-	110000	-	-	-
Sodium	100	µg/L	-	7720000	-	330	-
Inorganics							
Test/Reference	PQL	Unit					

LabMark
ENVIRONMENTAL LABORATORIES

Customer Sample ID			M.A.R 7	PT62	PT63	RB3	Duplicate 7
Sample Matrix			WATER	WATER	WATER	WATER	WATER
Labmark Sample No.			1167583	1167584	1167585	1167586	1167587
Date Sampled			09/09/2008	09/09/2008	09/09/2008	09/09/2008	09/09/2008
Inorganics							
Test/Reference	PQL	Unit					
4010 Conductivity in Water							
Electrical Conductivity	20	µS/cm	28900	31200	77000	<20	29000
4000 pH in Water							
pH	0.1	pH	7.2	6.9	7.2	8.0	7.2
4110 Dissolved Solids in Water							
Total Dissolved Solids	20	mg/L	23000	25000	77000	<20	23000
4540 TKN in Water by Titration							
TKN	1	mg/L	24	<1	1.7	<1	22
4410 TOC in Water By Analyser							
Total Organic Carbon	1	mg/L	6.7	2.7	6.7	<1	5.8
4941 Total Nitrogen in Water by Calc							
Total Nitrogen	2	mg N/L	24	3	21	<2	22
4300 Anions in Water by IC							
Chloride	0.5	mg/L	9000	10000	27000	1.3	9200
Fluoride	0.5	mg/L	1.0	<0.5	<0.5	<0.5	1.0
Nitrate as N	0.5	mg N/L	<0.5	3.0	19	<0.5	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	2700	2600	6700	0.9	2500
Miscellaneous							
Test/Reference	PQL	Unit					
Total Alkalinity as CaCo3*	-	mg/L	100	17	230	20	340
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	100	17	230	20	342
Silica*	-	mg/L	18	19	15.6	<1	18.3

Customer Sample ID			Duplicate 8
Sample Matrix			WATER
Labmark Sample No.			1167588
Date Sampled			09/09/2008
Metals			
Test/Reference	PQL	Unit	
3100 Low Level Dissolved Metals in Water			
Aluminium	1	µg/L	3.4
Antimony	1	µg/L	<1
Arsenic	1	µg/L	24
Barium	1	µg/L	48
Beryllium	1	µg/L	<1
Boron	1	µg/L	7100
Cadmium	0.2	µg/L	<0.2
Chromium	1	µg/L	1.6
Cobalt	1	µg/L	4.7
Copper	1	µg/L	5.3
Lead	1	µg/L	<1
Lithium	1	µg/L	560
Manganese	1	µg/L	860
Molybdenum	1	µg/L	1.9
Nickel	1	µg/L	20

Customer Sample ID			**Duplicate 8**
Sample Matrix			**WATER**
Labmark Sample No.			**1167588**
Date Sampled			**09/09/2008**

Metals

Test/Reference	PQL	Unit	
Selenium	1	µg/L	44
Strontium	1	µg/L	15000
Thallium	1	µg/L	<1
Tin	1	µg/L	<1
Titanium	1	µg/L	2.5
Uranium	1	µg/L	23
Vanadium	1	µg/L	<1
Zinc	1	µg/L	24
3200 Dissolved Metals in Water - ICP/AES			
Calcium	100	µg/L	791000
Iron	100	µg/L	5120
Magnesium	100	µg/L	577000
Potassium	1000	µg/L	110000
Sodium	100	µg/L	7620000

Inorganics

Test/Reference	PQL	Unit	
4010 Conductivity in Water			
Electrical Conductivity	20	µS/cm	31200
4000 pH in Water			
pH	0.1	pH	7.0
4110 Dissolved Solids in Water			
Total Dissolved Solids	20	mg/L	25000
4540 TKN in Water by Titration			
TKN	1	mg/L	<1
4410 TOC in Water By Analyser			
Total Organic Carbon	1	mg/L	3.4
4941 Total Nitrogen in Water by Calc			
Total Nitrogen	2	mg N/L	<2
4300 Anions in Water by IC			
Chloride	0.5	mg/L	10000
Fluoride	0.5	mg/L	<0.5
Nitrate as N	0.5	mg N/L	<0.5
Nitrite as N	0.5	mg N/L	<0.5
Sulphate	0.5	mg/L	2600

Miscellaneous

Test/Reference	PQL	Unit	
Total Alkalinity as CaCo3*	-	mg/L	260
Carbonate Alkalinity as CaCo3*	-	mg/L	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	340
Silica*	-	mg/L	18.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3100 Low Level Dissolved Metals in Water	10/09/2008	12/09/2008
3200 Dissolved Metals in Water - ICP/AES	11/09/2008	15/09/2008
4000 pH in Water		11/09/2008
4010 Conductivity in Water		11/09/2008
4110 Dissolved Solids in Water		16/09/2008
4300 Anions in Water by IC	11/09/2008	16/09/2008
4410 TOC in Water By Analyser		15/09/2008
4540 TKN in Water by Titration	11/09/2008	12/09/2008
4941 Total Nitrogen in Water by Calc		15/09/2008
NEW_TEST01		12/09/2008

Test Description

4000 pH in Water	As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Labmark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Matrix spike recoveries are calculated on an 'As Received' basis; the parent sample result is moisture corrected after the % recovery is determined.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1168029 [Method Blank]							
3100 Low Level Dissolved Metals in Water							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<1			< 1	T	
Barium	µg/L	<1			< 1	T	
Beryllium	µg/L	<1			< 1	T	
Boron	µg/L	<1			< 1	T	
Cadmium	µg/L	<0.2			< 0.2	T	
Chromium	µg/L	<1			< 1	T	
Cobalt	µg/L	<1			< 1	T	
Copper	µg/L	<1			< 1	T	
Lead	µg/L	<1			< 1	T	
Molybdenum	µg/L	<1			< 1	T	
Nickel	µg/L	<1			< 1	T	
Selenium	µg/L	<1			< 1	T	
Tin	µg/L	<1			< 1	T	
Vanadium	µg/L	<1			< 1	T	
1169643 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1168030 [Laboratory Control Sample]							
3100 Low Level Dissolved Metals in Water			Expected Value	Percent Recovery			
Antimony	µg/L	96	100.0	96	80-120 %	T	
Arsenic	µg/L	100	100.0	102	80-120 %	T	
Barium	µg/L	100	100.0	100	80-120 %	T	
Beryllium	µg/L	87	100.0	87	80-120 %	T	
Boron	µg/L	99	100.0	99	80-120 %	T	
Cadmium	µg/L	100	100.0	100	80-120 %	T	
Chromium	µg/L	94	100.0	94	80-120 %	T	
Cobalt	µg/L	97	100.0	97	80-120 %	T	
Copper	µg/L	98	100.0	98	80-120 %	T	
Lead	µg/L	94	100.0	94	80-120 %	T	
Manganese	µg/L	97	100.0	97	80-120 %	T	
Molybdenum	µg/L	95	100.0	95	80-120 %	T	
Nickel	µg/L	99	100.0	99	80-120 %	T	
Selenium	µg/L	100	100.0	103	80-120 %	T	
Tin	µg/L	82	100.0	82	80-120 %	T	
Vanadium	µg/L	97	100.0	97	80-120 %	T	
Zinc	µg/L	110	100.0	106	80-120 %	T	
1167779 [Duplicate of 1167583]							
3200 Dissolved Metals in Water - ICP/AES			Result 2	RPD			
Calcium	µg/L	1120000	1110000	1	0-10 %	T	
Iron	µg/L	682	621	9	0-10 %	T	
Magnesium	µg/L	737000	742000	1	0-10 %	T	
Potassium	µg/L	77000	77000	<1	0-10 %	T	
Sodium	µg/L	6290000	6230000	1	0-10 %	T	
1167780 [Duplicate of 1167583]							
3100 Low Level Dissolved Metals in Water			Result 2	RPD			
Antimony	µg/L	<1	<1	<1	0-10 %	T	
Arsenic	µg/L	17	17	<1	0-10 %	T	
Barium	µg/L	78	78	<1	0-10 %	T	
Beryllium	µg/L	<1	<1	<1	0-10 %	T	
Boron	µg/L	6700	6300	6	0-10 %	T	
Cadmium	µg/L	<0.2	<0.2	<1	0-10 %	T	
Chromium	µg/L	4.4	4.2	7	0-10 %	T	
Cobalt	µg/L	11	11	2	0-10 %	T	
Copper	µg/L	5.9	6.4	7	0-10 %	T	
Lead	µg/L	<1	<1	<1	0-10 %	T	
Lithium	µg/L	370	370	<1	0-10 %	T	
Manganese	µg/L	490	500	1	0-10 %	T	
Nickel	µg/L	30	30	<1	0-10 %	T	
Selenium	µg/L	46	42	9	0-10 %	T	
Strontium	µg/L	16000	17000	<1	0-10 %	T	
Thallium	µg/L	<1	<1	<1	0-10 %	T	
Tin	µg/L	<1	<1	<1	0-10 %	T	
Titanium	µg/L	2.2	2.3	2	0-10 %	T	
Uranium	µg/L	19	19	<1	0-10 %	T	
Vanadium	µg/L	2.7	3.0	10	0-10 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1168689 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1169100 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1169684 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1169685 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1172295 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1168691 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	100	100.0	104	80-120 %	T	
1168811 [Laboratory Control Sample]							
4010 Conductivity in Water			Expected Value	Percent Recovery			
Electrical Conductivity	µS/cm	1440	N/A	N/A	N/A	N/A	
1169102 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	95	100.0	95	80-120 %	T	
Chloride	mg/L	96	100.0	96	80-120 %	T	
Fluoride	mg/L	93	100.0	93	80-120 %	T	
Nitrate	mg/L	120	100.0	120	80-120 %	T	
Nitrite	mg/L	81	100.0	81	80-120 %	T	
Orthophosphate as P	mg/L	83	100.0	83	80-120 %	T	
Sulphate	mg/L	97	100.0	97	80-120 %	T	
1169686 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	8.0	10.0	80	80-120 %	T	
1169687 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	8.0	10.0	80	80-120 %	T	
1172296 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	1000	1000.0	101	90-110 %	T	
1167776 [Duplicate of 1167583]							
4300 Anions in Water by IC			Result 2	RPD			
Chloride	mg/L	9000	9000	<1	0-10 %	T	
Fluoride	mg/L	1.0	1.0	1	0-10 %	T	
Nitrate as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Nitrite as N	mg N/L	<0.5	<0.5	<1	0-10 %	T	
Sulphate	mg/L	2800	2700	3	0-10 %	T	
1167777 [Duplicate of 1167583]							
4010 Conductivity in Water			Result 2	RPD			
Electrical Conductivity	µS/cm	29000	28900	<1	0-10 %	T	
1167785 [Duplicate of 1167583]							
4000 pH in Water			Result 2	RPD			
pH	pH	7.2	7.2	0.0	0-0.2 pH	T	
1167786 [Duplicate of 1167583]							
4110 Dissolved Solids in Water			Result 2	RPD			
Total Dissolved Solids	mg/L	24000	23000	2	0-10 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1167787 [Duplicate of 1167583]							
4540 TKN in Water by Titration			Result 2	RPD			
TKN	mg/L	22	24	9	0-20 %	T	
1167788 [Duplicate of 1167583]							
4410 TOC in Water By Analyser			Result 2	RPD			
Total Organic Carbon	mg/L	6.8	6.7	2	0-10 %	T	
1167790 [Spike of 1167584]							
4300 Anions in Water by IC			Spike Value	Percent Recovery			
Nitrate as N	mg N/L	28	N/A	N/A	N/A	N/A	
Nitrite as N	mg N/L	30	N/A	N/A	N/A	N/A	
1167792 [Spike of 1167584]							
4540 TKN in Water by Titration			Spike Value	Percent Recovery			
TKN	mg/L	81	100.0	81	80-120 -	T	
1167793 [Spike of 1167584]							
4410 TOC in Water By Analyser			Spike Value	Percent Recovery			
Total Organic Carbon	mg/L	11	10.0	82	80-120 %	T	

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

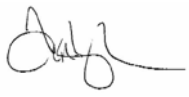
Code	Description
G01	The PQLs have been raised due to Matrix Interference

Authorised By

Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane	Operations Manager



Final Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

LAB MARK

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY
QUOTE NUMBER
Job Code:
Due Date:
Custody seal intact?
Sample cold?
Received for Laboratory by:
Date:
Time:

Project No: VE30064
Project Manager: Daniel Pierce
Sampler(s): Alistair Walsh Jack Ashby
Checked:
Date: 9/09/2008

	Container Identification								
Size	1000ml	43ml	125ml						
Type	plastic	glass	plastic						
Preserv	NO	YES	YES						
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals						

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
	8/09/2008		H20	M.A.R 7			X						
	8/09/2008		H20	M.A.R 7	X 2 Viles			X					
	8/09/2008		H20	M.A.R 7	Field Filtered				X				
	9/09/2008		H20	PT62			X						
	9/09/2008		H20	PT62	X 2 Viles			X					
	9/09/2008		H20	PT62	Field Filtered				X				
	9/09/2008		H20	PT63			X						
	9/09/2008		H20	PT63	X 2 Viles			X					
	9/09/2008		H20	PT63	Field Filtered				X				
	9/09/2008		H20	RB3			X						
	9/09/2008		H20	RB3	X 2 Viles			X					
	9/09/2008		H20	RB3	Field Filtered				X				
	8/09/2008		H20	Duplicate 7			X						
	8/09/2008		H20	Duplicate 7	X 2 Viles			X					
	8/09/2008		H20	Duplicate 7	Field Filtered				X				
	9/09/2008		H20	Duplicate 8			X						
	9/09/2008		H20	Duplicate 8	X 2 Viles			X					
	9/09/2008		H20	Duplicate 8	Field Filtered				X				
					TOTAL								

08ENME0024196-1(1167583)
SKM_ADEL(M.A.R 7)

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

Rec: DEH Lab mark 10/9/08 10 am

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS.
Any questions please call Alistair Walsh on 0430288222

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Per: DCH LABmark 10/2/15 10AM

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	10 September 2008
Attention:	MR Daniel Pierce	**Due Date:**	17 September 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number: 08ENME0024196

Your Amdel Contact: Carol Cawrse
+61 3 9538 2277

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity	
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	6
Conductivity in Water	4010	6
Dissolved Metals in Water - ICP/AES	3200	6
Low Level Dissolved Metals in Water	3100	6
	NEW_TEST01	6
pH in Water	4000	6
Dissolved Solids in Water	4110	6
TKN in Water by Titration	4540	6
TOC in Water By Analyser	4410	6
Total Nitrogen in Water by Calc	4941	6

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details

  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Duncan Harrison

Date : Wed 10 September 2008

Labmark 1868 Dandenong Rd Clayton VIC Australia 3168
ABN: 30 008 127 802 Telephone: (03) 9538 2277 Facsimile: (03) 9538 2278

This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025

Accreditation Number: 1645

LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Sinclair Knight Mertz
Level 5, 33 King William Street
Adelaide SA 5000

Attention: Alistair Walsh

Project	**08ENME0024479**
Client Reference	VE30064
Received Date	12/09/2008 10:07:00 AM

Customer Sample ID			**RT41**	**RT42**	**DUP 9**	**RB4**
Sample Matrix			**WATER**	**WATER**	**WATER**	**WATER**
Labmark Sample No.			**1170666**	**1170667**	**1170668**	**1170669**
Date Sampled			**10/09/2008**	**10/09/2008**	**10/09/2008**	**10/09/2008**
Metals						
Test/Reference	PQL	Unit				
3100 Low Level Dissolved Metals in Water						
Comments			G01			
Aluminium	1	µg/L	3.6	<1	<1	<1
Antimony	1	µg/L	<1	<1	<1	<1
Arsenic	1	µg/L	<100	<50	<100	<1
Barium	1	µg/L	120	36	120	<1
Beryllium	1	µg/L	<1	<1	<1	<1
Boron	1	µg/L	9000	7900	9000	1.2
Cadmium	0.2	µg/L	<0.2	<0.2	<0.2	<0.2
Chromium	1	µg/L	3.3	2.3	3.2	<1
Cobalt	1	µg/L	<1	5.4	<1	<1
Copper	1	µg/L	8.0	5.9	7.5	2.5
Lead	1	µg/L	<1	<1	<1	<1
Lithium	1	µg/L	3600	370	3600	<1
Manganese	1	µg/L	490	920	500	1.1
Molybdenum	1	µg/L	<1	4.0	<1	<1
Nickel	1	µg/L	13	15	13	3.2
Selenium	1	µg/L	26	26	25	<1
Strontium	1	µg/L	34000	20000	32000	11
Thallium	1	µg/L	<1	<1	<1	<1
Tin	1	µg/L	<1	<1	<1	<1
Titanium	1	µg/L	12	6.4	13	<1
Uranium	1	µg/L	<1	8.7	<1	<1
Vanadium	1	µg/L	<1	1.6	<1	<1
Zinc	1	µg/L	15	15	17	R14 140
3200 Dissolved Metals in Water - ICP/AES						
Calcium	100	µg/L	1250000	1150000	1260000	535
Iron	100	µg/L	6650	1310	6950	264
Magnesium	100	µg/L	653000	692000	657000	171
Potassium	1000	µg/L	210000	91000	220000	<1000
Sodium	100	µg/L	12900000	12500000	13400000	1790
Inorganics						
Test/Reference	PQL	Unit				
4010 Conductivity in Water						
Electrical Conductivity	20	µS/cm	52500	48700	52600	<20
4000 pH in Water						
pH	0.1	pH	7.1	7.4	7.1	6.3
4110 Dissolved Solids in Water						

Customer Sample ID			**RT41**	**RT42**	**DUP 9**	**RB4**
Sample Matrix			**WATER**	**WATER**	**WATER**	**WATER**
Labmark Sample No.			**1170666**	**1170667**	**1170668**	**1170669**
Date Sampled			**10/09/2008**	**10/09/2008**	**10/09/2008**	**10/09/2008**
Inorganics						
Test/Reference	PQL	Unit				
Total Dissolved Solids	20	mg/L	41000	37000	41000	<20
4540 TKN in Water by Titration						
TKN	1	mg/L	3.6	<1	<1	<1
4410 TOC in Water By Analyser						
Total Organic Carbon	1	mg/L	15	6.6	14	2.1
4941 Total Nitrogen in Water by Calc						
Total Nitrogen	2	mg N/L	4	<2	<2	<2
4300 Anions in Water by IC						
Chloride	0.5	mg/L	9400	14000	24000	2.2
Fluoride	0.5	mg/L	<0.5	<0.5	<0.5	<0.5
Nitrate as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5
Nitrite as N	0.5	mg N/L	<0.5	<0.5	<0.5	<0.5
Sulphate	0.5	mg/L	1500	3900	3400	1.1
Miscellaneous						
Test/Reference	PQL	Unit				
Total Alkalinity as CaCo3*	-	mg/L	150	120	150	10
Carbonate Alkalinity as CaCo3*	-	mg/L	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCo3*	-	mg/L	150	120	150	10
Silica*	-	mg/L	25	14.4	25	<1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	**Extracted**	**Analysed**
3100 Low Level Dissolved Metals in Water	12/09/2008	15/09/2008
3200 Dissolved Metals in Water - ICP/AES	12/09/2008	15/09/2008
4000 pH in Water	15/09/2008	17/09/2008
4010 Conductivity in Water	15/09/2008	17/09/2008
4110 Dissolved Solids in Water		16/09/2008
4300 Anions in Water by IC	15/09/2008	19/09/2008
4410 TOC in Water By Analyser	16/09/2008	17/09/2008
4540 TKN in Water by Titration	15/09/2008	16/09/2008
4941 Total Nitrogen in Water by Calc		18/09/2008
NEW_TEST01		17/09/2008

Test Description

4000 pH in Water

As noted in LM-FOR-ADM-020 pH should be tested in the field, therefore this test has been analysed in the laboratory outside Holding Times

Labmark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Matrix spike recoveries are calculated on an 'As Received' basis; the parent sample result is moisture corrected after the % recovery is determined.
3. Proficiency trial results are available on request.
4. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spike or surrogate recoveries.
6. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
8. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
9. Samples were analysed on an as received basis.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (LM-FOR-ADM-020)

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgement.
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitablity qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

Quality Control Results

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1171225 [Method Blank]							
3100 Low Level Dissolved Metals in Water							
Antimony	µg/L	<1			< 1	T	
Arsenic	µg/L	<1			< 1	T	
Barium	µg/L	<1			< 1	T	
Beryllium	µg/L	<1			< 1	T	
Boron	µg/L	<1			< 1	T	
Cadmium	µg/L	<0.2			< 0.2	T	
Chromium	µg/L	<1			< 1	T	
Cobalt	µg/L	<1			< 1	T	
Copper	µg/L	<1			< 1	T	
Lead	µg/L	<1			< 1	T	
Manganese	µg/L	<1			< 1	T	
Molybdenum	µg/L	<1			< 1	T	
Nickel	µg/L	<1			< 1	T	
Selenium	µg/L	<1			< 1	T	
Tin	µg/L	<1			< 1	T	
Vanadium	µg/L	<1			< 1	T	
Zinc	µg/L	<1			< 1	T	
1171389 [Method Blank]							
3200 Dissolved Metals in Water - ICP/AES							
Calcium	µg/L	<100			< 100	T	
Iron	µg/L	<100			< 100	T	
Magnesium	µg/L	<100			< 100	T	
Potassium	µg/L	<1000			< 1000	T	
Sodium	µg/L	<100			< 100	T	

Laboratory: **EN_METALS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1171226 [Laboratory Control Sample]							
3100 Low Level Dissolved Metals in Water			Expected Value	Percent Recovery			
Antimony	µg/L	100	100.0	103	80-120 %	T	
Arsenic	µg/L	100	100.0	100	80-120 %	T	
Barium	µg/L	110	100.0	108	80-120 %	T	
Beryllium	µg/L	93	100.0	93	80-120 %	T	
Boron	µg/L	110	100.0	108	80-120 %	T	
Cadmium	µg/L	110	100.0	107	80-120 %	T	
Chromium	µg/L	100	100.0	100	80-120 %	T	
Cobalt	µg/L	96	100.0	96	80-120 %	T	
Copper	µg/L	99	100.0	99	80-120 %	T	
Lead	µg/L	100	100.0	101	80-120 %	T	
Manganese	µg/L	99	100.0	99	80-120 %	T	
Molybdenum	µg/L	110	100.0	107	80-120 %	T	
Nickel	µg/L	98	100.0	98	80-120 %	T	
Selenium	µg/L	100	100.0	104	80-120 %	T	
Tin	µg/L	96	100.0	96	80-120 %	T	
Vanadium	µg/L	100	100.0	100	80-120 %	T	
Zinc	µg/L	100	100.0	104	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1172295 [Method Blank]							
4110 Dissolved Solids in Water							
Total Dissolved Solids	mg/L	<20			< 20	T	
1172322 [Method Blank]							
4540 TKN in Water by Titration							
TKN	mg/L	<1			< 1	T	
1172600 [Method Blank]							
4300 Anions in Water by IC							
Bromide	mg/L	<0.5			< 0.5	T	
Chloride	mg/L	<0.5			< 0.5	T	
Fluoride	mg/L	<0.5			< 0.5	T	
Nitrate	mg/L	<0.5			< 0.5	T	
Nitrite	mg/L	<0.5			< 0.5	T	
Orthophosphate as P	mg/L	<0.5			< 0.5	T	
Sulphate	mg/L	<0.5			< 0.5	T	
1175726 [Method Blank]							
4410 TOC in Water By Analyser							
Total Organic Carbon	mg/L	<1			< 1	T	
1175727 [Method Blank]							
4410 TOC in Water By Analyser							
Dissolved Organic Carbon	mg/L	<1			< 1	T	
1172296 [Laboratory Control Sample]							
4110 Dissolved Solids in Water			Expected Value	Percent Recovery			
Total Dissolved Solids	mg/L	1000	1000.0	101	90-110 %	T	
1172324 [Laboratory Control Sample]							
4540 TKN in Water by Titration			Expected Value	Percent Recovery			
TKN	mg/L	96	100.0	96	80-120 %	T	
1172602 [Laboratory Control Sample]							
4300 Anions in Water by IC			Expected Value	Percent Recovery			
Bromide	mg/L	92	100.0	92	80-120 %	T	
Chloride	mg/L	95	100.0	95	80-120 %	T	
Fluoride	mg/L	89	100.0	89	80-120 %	T	
Nitrate	mg/L	95	100.0	95	80-120 %	T	
Nitrite	mg/L	92	100.0	92	80-120 %	T	
Orthophosphate as P	mg/L	90	100.0	90	80-120 %	T	
Sulphate	mg/L	89	100.0	89	80-120 %	T	

Laboratory: **EN_WATERS**

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
1173644 [Laboratory Control Sample]							
4000 pH in Water			Expected Value	Percent Recovery			
pH	pH	7.4	7.4	100	95-105 %	T	
1175728 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Total Organic Carbon	mg/L	8.6	10.0	86	80-120 %	T	
1175729 [Laboratory Control Sample]							
4410 TOC in Water By Analyser			Expected Value	Percent Recovery			
Dissolved Organic Carbon	mg/L	8.6	10.0	86	80-120 %	T	

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

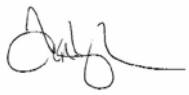
Code	Description
G01	The PQLs have been raised due to Matrix Interference
R14	These results have been confirmed by repeat analysis.

Authorised By

Ruth Callander	Client Services Officer	
Mark Herbstreit	Senior Analyst - Metals	Accreditation Number: 1645
Helen Lei	Senior Analyst - Waters	Accreditation Number: 1645

Laboratory Manager

Anthony Crane	Operations Manager



Final Report

- Indicates Not Requested * Indicates NATA accreditation does not cover the performance of this service

The samples were not collected by Amdel staff.

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY	Project No:
QUOTE NUMBER	VE30064
Job Code:	Project Manager:
Due Date:	Daniel Pierce
Custody seal intact?	Sampler(s):
Sample cold?	Alistair Walsh / Tom Kelly
Received for Laboratory by:	Checked:
Date:	Date:
Time:	11/09/2008

	Container Identification						
Size	1000ml	43ml	125ml				
Type	plastic	glass	plastic				
Preserv	NO	YES	YES				
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals				

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
	10/09/2008		H20	RT41			x						
	10/09/2008		H20	RT41	X 2 Viles			x					
	10/09/2008		H20	RT41	Field Filtered				x				
	10/09/2008		H20	RT42			x						
	10/09/2008		H20	RT42	X 2 Viles			x					
	10/09/2008		H20	RT42	Field Filtered				x				
	10/09/2008		H20	Duplicate 9			x						
	10/09/2008		H20	Duplicate 9	X 2 Viles			x					
	10/09/2008		H20	Duplicate 9	Field Filtered				x				
	10/09/2008		H20	RB4			x						
	10/09/2008		H20	RB4	X 2 Viles			x					
	10/09/2008		H20	RB4	Field Filtered				x				
					TOTAL								

08ENME0024479-1(1170666)
SKM_ADEL(RT41)

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS. Any questions please call Alistair Walsh on 0430288222

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
	Cost/sample			

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Sample Receipt Advice

LabMark
ENVIRONMENTAL LABORATORIES
Customer Service - 1300 552 389

Client Name:	Sinclair Knight Mertz	**Date Received:**	12 September 2008
Attention:	MR Alistair Walsh	**Due Date:**	19 September 2008
Client Reference number:	VE30064	**Turnaround:**	Standard

Amdel Reference number: 08ENME0024479

Your Amdel Contact: Carol Cawrse
+61 3 9538 2277

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	N/A

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Anions in Water by IC	4300	4
Conductivity in Water	4010	4
Dissolved Metals in Water - ICP/AES	3200	4
Low Level Dissolved Metals in Water	3100	4
	NEW_TEST01	4
pH in Water	4000	4
Dissolved Solids in Water	4110	4
TKN in Water by Titration	4540	4
TOC in Water By Analyser	4410	4
Total Nitrogen in Water by Calc	4941	4

Note

- Turn Around Time starts when samples are received at the Laboratory
- For samples received after 4pm, Turn Around Time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 6 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- Samples submitted for Micro analysis on a Friday may incur a $150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).
- The Quoted Due Date does not apply to sub-contracted tests or some in-house tests. Contact your Customer Support Officer for details

  NOTE: Unless advised otherwise - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.

Logged in by : Kim Jolly

Date : Fri 12 September 2008

Labmark 1868 Dandenong Rd Clayton VIC Australia 3168
ABN: 30 008 127 802 Telephone: (03) 9538 2277 Facsimile: (03) 9538 2278

CERTIFICATE OF ANALYSIS

Work Order	: **EM0806112**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR DANIEL PIERCE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: dpierce@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 29-JUL-2008
Sampler	: AW, MC	Issue Date	: 07-AUG-2008
Site	: ----		
		No. of samples received	: 5
Quote number	: EN/003/08	No. of samples analysed	: 5

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **LOR 's for Iron for method EG020F raised due to matrix interference.**
- **Poor matrix spike recovery was obtained for Zinc, Beriyllium, Copper, Nickel and Cadmium for method EG020F due to matrix interference.Results have been confirmed by re-spiking and reanalysis.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	LR1	RT16a	RT17a	LT19	LT41
Client sample ID								
Client sampling date / time				27-JUL-2008 15:00	27-JUL-2008 15:00	27-JUL-2008 15:00	27-JUL-2008 15:00	27-JUL-2008 15:00
				EM0806112-001	EM0806112-002	EM0806112-003	EM0806112-004	EM0806112-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.13	7.08	11.1	7.13	7.12
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	36600	31200	33800	39000	34200
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	26900	23300	24100	28800	24800
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	31	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	263	314	4	348	359
Total Alkalinity as CaCO3	----	1	mg/L	263	314	35	348	359
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	4440	4160	3140	5680	4430
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	10700	8720	10300	10600	11000
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	935	777	1360	1130	811
Magnesium	7439-95-4	1	mg/L	1050	725	93	991	800
Sodium	7440-23-5	1	mg/L	8670	6580	9360	9210	7380
Potassium	7440-09-7	1	mg/L	83	56	217	105	68
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	0.34	0.40	1.42	1.76	0.52
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.06	0.02	0.16	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	<0.001	<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	0.016	0.011	0.150	0.027	0.012
Cadmium	7440-43-9	0.0001	mg/L	0.0003	<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	0.003	<0.001	0.001	0.004	0.001
Copper	7440-50-8	0.001	mg/L	0.068	0.008	0.008	0.363	0.019
Lead	7439-92-1	0.001	mg/L	0.029	0.012	0.006	0.006	0.006
Lithium	7439-93-2	0.001	mg/L	0.320	0.272	0.900	0.493	0.443
Manganese	7439-96-5	0.001	mg/L	0.542	0.380	<0.001	0.910	0.288
Molybdenum	7439-98-7	0.001	mg/L	0.004	0.001	0.021	0.002	0.001
Nickel	7440-02-0	0.001	mg/L	0.109	0.004	<0.001	0.380	0.007
Selenium	7782-49-2	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: LR1	RT16a	RT17a	LT19	LT41
				Client sampling date / time: 27-JUL-2008 15:00	27-JUL-2008 15:00	27-JUL-2008 15:00	27-JUL-2008 15:00	27-JUL-2008 15:00
				EM0806112-001	EM0806112-002	EM0806112-003	EM0806112-004	EM0806112-005
EG020F: Dissolved Metals by ICP-MS - Continued								
Strontium	7440-24-6	0.001	mg/L	**19.6**	**16.7**	**17.3**	**17.9**	**15.4**
Thallium	7440-28-0	0.001	mg/L	<0.001	**0.001**	<0.001	<0.001	<0.001
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L	**1.20**	<0.01	**1.19**	**1.19**	<0.01
Uranium	7440-61-1	0.001	mg/L	**0.064**	**0.026**	<0.001	**0.025**	**0.042**
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	**0.02**	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	**0.104**	**0.033**	**0.067**	**0.231**	**0.069**
Boron	7440-42-8	0.05	mg/L	**8.47**	**8.74**	**0.57**	**10.8**	**10.4**
Gold	7440-57-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EG052G: Silica by Discete Analyser								
Silica	7631-86-9	0.10	mg/L	**15.0**	**17.7**	**9.41**	**14.6**	**17.8**
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.4**	**1.7**	**0.2**	**1.6**	**1.6**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	**0.298**	<0.010	<0.010
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	<0.010	**0.029**	**0.215**	**0.017**	**0.013**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	<0.010	**0.029**	**0.513**	**0.017**	**0.013**
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	**0.8**	<0.1	<0.1
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	**1.3**	<0.1	<0.1
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	**2**	**12**	**3**	**4**

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EM0806112**		
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: ALISTAIR WALSH	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: awalsh@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30064	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008SINKNI0045 (EN/003/08)
Site	: ----		
Sampler	: AW, MC	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 29-JUL-2008	Issue Date	: 30-JUL-2008 13:08
Client Requested Due Date	: 05-AUG-2008	Scheduled Reporting Date	: **05-AUG-2008**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 5.4 - Ice bricks present
No. of coolers/boxes	: 1	No. of samples received	: 5
Sercurity Seal	: Intact.	No. of samples analysed	: 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Sample(s) have been received within recommended holding times**
- **Please direct any queries related to sample condition / numbering / breakages to Peter Ravlic.**
- **Analytical work for this work order will be conducted at ALS Melbourne.**
- 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.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG005T : Total Recoverable Metals by ICP-AES		
LR1	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
RT16a	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
RT17a	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
LT19	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
LT41	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
EP005 : Total Organic Carbon		
LR1	- Clear Plastic Bottle - Natural	- Amber TOC Vial- Sulphuric Acid
RT16a	- Clear Plastic Bottle - Natural	- Amber TOC Vial- Sulphuric Acid
RT17a	- Clear Plastic Bottle - Natural	- Amber TOC Vial- Sulphuric Acid
LT19	- Clear Plastic Bottle - Natural	- Amber TOC Vial- Sulphuric Acid
LT41	- Clear Plastic Bottle - Natural	- Amber TOC Vial- Sulphuric Acid

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PC)	WATER - EA010P Conductivity (PC)	WATER - EA015 Total Dissolved Solids	WATER - EG005T-EM Total Metals by ICP-AES (Melbourne)	WATER - EG020A-F Dissolved Metals by ICPMS - Suite A	WATER - EG020B-F Dissolved Metals by ICPMS - Suite B	WATER - EG052G Silica by Discrete Analyser	WATER - EK040-P Fluoride(PC)
EM0806112-001	27-JUL-2008 15:00	LR1	✓	✓	✓	✓	✓	✓	✓	✓
EM0806112-002	27-JUL-2008 15:00	RT16a	✓	✓	✓	✓	✓	✓	✓	✓
EM0806112-003	27-JUL-2008 15:00	RT17a	✓	✓	✓	✓	✓	✓	✓	✓
EM0806112-004	27-JUL-2008 15:00	LT19	✓	✓	✓	✓	✓	✓	✓	✓
EM0806112-005	27-JUL-2008 15:00	LT41	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EK057G Nitrite as N by Discrete Analyser	WATER - EK058G Nitrate as N by Discrete Analyser	WATER - EK061G Total Kjeldahl Nitrogen as N (TKN) By Discrete Analyser	WATER - EK062G Total Nitrogen as N (TKN + NOx) By Discrete Analyser	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 (EB/PCT) Major Anions (Cl, SO4, Alkalinity)	WATER - W-01 7 Metals
EM0806112-001	27-JUL-2008 15:00	LR1	✓	✓	✓	✓	✓	✓	✓	✓
EM0806112-002	27-JUL-2008 15:00	RT16a	✓	✓	✓	✓	✓	✓	✓	✓
EM0806112-003	27-JUL-2008 15:00	RT17a	✓	✓	✓	✓	✓	✓	✓	✓
EM0806112-004	27-JUL-2008 15:00	LT19	✓	✓	✓	✓	✓	✓	✓	✓
EM0806112-005	27-JUL-2008 15:00	LT41	✓	✓	✓	✓	✓	✓	✓	✓

Requested Deliverables

ALISTAIR WALSH

- *AU Certificate of Analysis - NATA	Email	awalsh@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	awalsh@skm.com.au
- *AU QC Report ¿ DEFAULT (Anon QC Rep) - NATA	Email	awalsh@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	awalsh@skm.com.au
- Default - Chain of Custody	Email	awalsh@skm.com.au
- EDI Format - ENMRG	Email	awalsh@skm.com.au
- EDI Format - ESDAT	Email	awalsh@skm.com.au

MR DANIEL PIERCE

- *AU Certificate of Analysis - NATA	Email	dpierce@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	dpierce@skm.com.au
- *AU QC Report ¿ DEFAULT (Anon QC Rep) - NATA	Email	dpierce@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	dpierce@skm.com.au
- A4 - AU Tax Invoice	Email	dpierce@skm.com.au
- Default - Chain of Custody	Email	dpierce@skm.com.au
- EDI Format - ENMRG	Email	dpierce@skm.com.au
- EDI Format - ESDAT	Email	dpierce@skm.com.au

QUALITY CONTROL REPORT

Work Order	: **EM0806112**	Page	: 1 of 8
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR DANIEL PIERCE	Contact	: Paul Loewy
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Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 29-JUL-2008
Sampler	: AW, MC	Issue Date	: 07-AUG-2008
Order number	: ----		
		No. of samples received	: 5
Quote number	: EN/003/08	No. of samples analysed	: 5

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 720462)									
EM0806112-001	LR1	EA005-P: pH Value	----	0.01	pH Unit	7.13	7.13	0.0	0% - 20%
EM0806112-005	LT41	EA005-P: pH Value	----	0.01	pH Unit	7.12	7.14	0.3	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 720465)									
EM0806112-001	LR1	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	36600	36600	0.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 719135)									
EM0806064-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	530	510	3.8	0% - 20%
EM0806111-002	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	2600	2600	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 720461)									
EM0806112-001	LR1	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	263	262	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	263	262	0.0	0% - 20%
EM0806112-005	LT41	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	359	357	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	359	357	0.6	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 719740)									
EM0806095-001	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	565	628	10.6	0% - 20%
EM0806112-002	RT16a	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	4160	4530	8.5	0% - 20%
ED045P: Chloride by PC Titrator (QC Lot: 720463)									
EM0806112-001	LR1	ED045-P: Chloride	16887-00-6	1	mg/L	10700	10400	2.6	0% - 20%
EM0806112-005	LT41	ED045-P: Chloride	16887-00-6	1	mg/L	11000	11000	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 719741)									
EM0806095-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	391	362	7.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2380	2900	19.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	20100	23600	16.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	608	730	18.3	0% - 20%
EM0806112-002	RT16a	ED093F: Calcium	7440-70-2	1	mg/L	777	878	12.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	725	802	10.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	6580	7100	7.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	56	58	2.8	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 718728)									
EM0806070-018	Anonymous	EG005T: Iron	7439-89-6	0.01	mg/L	0.05	0.07	28.6	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 720374)									

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 720374) - continued									
EM0806112-001	LR1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0003	0.0004	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	0.016	0.016	0.0	0% - 50%
		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	0.003	0.003	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.068	0.068	0.0	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.029	0.030	5.6	0% - 20%
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	0.320	0.287	11.0	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.542	0.535	1.2	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.004	0.003	33.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.109	0.111	1.9	0% - 20%
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.104	0.107	3.0	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.06	0.02	76.2	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	<0.010	<0.010	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	8.47	8.72	2.9	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 720375)									
EM0806112-001	LR1	EG020B-F: Strontium	7440-24-6	0.001	mg/L	19.6	19.1	2.7	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	0.064	0.063	0.0	0% - 20%
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	1.20	1.22	1.3	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 720376)									
EM0806112-001	LR1	EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG052G: Silica by Discete Analyser (QC Lot: 720309)									
EM0806112-001	LR1	EG052G: Silica	7631-86-9	0.10	mg/L	15.0	14.5	3.5	0% - 20%
ES0810946-007	Anonymous	EG052G: Silica	7631-86-9	0.10	mg/L	3.57	3.53	1.1	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 720464)									
EM0806112-001	LR1	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.4	1.4	0.0	0% - 50%
EM0806112-005	LT41	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.6	1.7	0.0	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 719107)									
EM0806064-001	Anonymous	EK057G: Nitrite as N	----	0.010	mg/L	0.205	0.205	0.0	0% - 20%
EM0806111-003	Anonymous	EK057G: Nitrite as N	----	0.010	mg/L	<0.010	<0.010	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 719109)									
EM0806064-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.010	mg/L	18.6	18.9	1.2	0% - 20%
EM0806109-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.010	mg/L	1.20	1.19	0.8	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK059G: NOX as N by Discrete Analyser (QC Lot: 719110)									
EM0806112-005	LT41	EK059G: Nitrite + Nitrate as N	----	0.010	mg/L	0.013	0.013	0.0	No Limit
EM0806131-010	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.010	mg/L	<0.010	<0.010	0.0	No Limit
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 719169)									
EM0805994-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EM0806109-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	0.8	13.2	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 719761)									
EM0805997-007	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit
EM0806103-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.0	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 720465)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
EA015: Total Dissolved Solids (QCLot: 719135)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	2000 mg/L	101	93.7	106
ED037P: Alkalinity by PC Titrator (QCLot: 720461)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	108	80	120
ED040F: Dissolved Major Anions (QCLot: 719740)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	300 mg/L	106	86.4	118
ED045P: Chloride by PC Titrator (QCLot: 720463)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	89.6	81.7	120
ED093F: Dissolved Major Cations (QCLot: 719741)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	114	91.4	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	117	86.9	121
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	112	85.2	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	117	82.1	118
EG005T: Total Metals by ICP-AES (QCLot: 718728)								
EG005T: Iron	7439-89-6	0.01	mg/L	<0.01	1.00 mg/L	95.1	80	120
EG020F: Dissolved Metals by ICP-MS (QCLot: 720374)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	88.1	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.7	79.2	117
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.3	79.2	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	101	82	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.5	85.1	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	87	117
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.6	80.6	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	84.1	114
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	105	78.1	118
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	103	84	116
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	100	79.7	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	83	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	----	0.1 mg/L	98.9	73.5	124
		0.010	mg/L	<0.010	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 720374) - continued								
EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	0.1 mg/L	96.2	82.5	118
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	99.7	77.7	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	104	86.2	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	86.9	81.1	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	74.8	74.7	119
EG020F: Dissolved Metals by ICP-MS (QCLot: 720375)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	101	85.3	110
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	102	87.8	109
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 720376)								
EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.001	----	----	----	----
EG052G: Silica by Discete Analyser (QCLot: 720309)								
EG052G: Silica	7631-86-9	0.1	mg/L	----	21.4 mg/L	97.8	70	130
		0.10	mg/L	<0.10	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 720464)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	84.2	79.4	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 719107)								
EK057G: Nitrite as N	----	0.01	mg/L	----	0.5 mg/L	96.2	89.9	105
		0.010	mg/L	<0.010	----	----	----	----
EK059G: NOX as N by Discrete Analyser (QCLot: 719109)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	----	0.5 mg/L	106	76.5	120
		0.010	mg/L	<0.010	----	----	----	----
EK059G: NOX as N by Discrete Analyser (QCLot: 719110)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	----	0.5 mg/L	100	76.5	120
		0.010	mg/L	<0.010	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 719169)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	98.6	71.4	111
EP005: Total Organic Carbon (TOC) (QCLot: 719761)								
EP005: Total Organic Carbon	----	1	mg/L	<1	100 mg/L	87.1	80.5	115

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045P: Chloride by PC Titrator (QCLot: 720463)							
EM0806104-001	Anonymous	ED045-P: Chloride	16887-00-6	4900 mg/L	81.1	70	130
EG005T: Total Metals by ICP-AES (QCLot: 718728)							
EM0806070-025	Anonymous	EG005T: Iron	7439-89-6	1.00 mg/L	94.2	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 720374)							
EM0806112-001	LR1	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	80.0	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	# 49.9	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	86.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	# 64.4	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	87.6	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	82.2	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	# 61.2	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	73.0	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	98.3	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	# 64.8	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	86.4	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	# 54.7	70	130
EG052G: Silica by Discete Analyser (QCLot: 720309)							
EM0806112-001	LR1	EG052G: Silica	7631-86-9	5.0 mg/L	107	70	130
EK040P: Fluoride by PC Titrator (QCLot: 720464)							
EM0806104-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	82.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 719107)							
EM0806103-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	98.8	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 719109)							
EM0806103-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	120	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 719110)							
EM0806131-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	105	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 719169)							
EM0805994-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	4 mg/L	87.2	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 719761)							
EM0806047-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	91.6	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EM0806112**	Page	: 1 of 10
Client	: SINCLAIR KNIGHT MERZ	Laboratory	: Environmental Division Melbourne
Contact	: MR DANIEL PIERCE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
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Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 29-JUL-2008
Sampler	: AW, MC	Issue Date	: 07-AUG-2008
Order number	: ----		
		No. of samples received	: 5
Quote number	: EN/003/08	No. of samples analysed	: 5

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**---**	---	----	**01-AUG-2008**	27-JUL-2008	✗
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**---**	---	----	**01-AUG-2008**	24-AUG-2008	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**----**	----	----	**31-JUL-2008**	03-AUG-2008	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**---**	---	----	**01-AUG-2008**	10-AUG-2008	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**---**	---	----	**31-JUL-2008**	24-AUG-2008	✓
ED045P: Chloride by PC Titrator							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**---**	---	----	**01-AUG-2008**	24-AUG-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**---**	---	----	**31-JUL-2008**	24-AUG-2008	✓
EG005T: Total Metals by ICP-AES							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**30-JUL-2008**	23-JAN-2009	✓	**30-JUL-2008**	23-JAN-2009	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**---**	---	----	**04-AUG-2008**	23-JAN-2009	✓
EG052G: Silica by Discete Analyser							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**----**	----	----	**01-AUG-2008**	24-AUG-2008	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**---**	---	----	**01-AUG-2008**	24-AUG-2008	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**----**	----	----	**30-JUL-2008**	29-JUL-2008	×
EK059G: NOX as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**----**	----	----	**30-JUL-2008**	29-JUL-2008	×
EK061: Total Kjeldahl Nitrogen (TKN)							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**01-AUG-2008**	28-JUL-2008	×	**01-AUG-2008**	29-AUG-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Clear Plastic Bottle - Natural							
LR1, RT16a, RT17a, LT19, LT41	**27-JUL-2008**	**----**	----	----	**01-AUG-2008**	24-AUG-2008	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	15	**13.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	2	15	**13.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	8	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	5	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	5	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	14	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	31	**12.9**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Recoverable Metals by ICP-AES	EG005T	1	7	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	**6.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Recoverable Metals by ICP-AES	EG005T	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by PC Titrator	ED045-P	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Conductivity by PC Titrator	EA010-P	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	**6.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Recoverable Metals by ICP-AES	EG005T	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by PC Titrator	ED045-P	1	15	**6.7**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	**20.0**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	14	**7.1**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	**6.5**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement
Total Recoverable Metals by ICP-AES	EG005T	1	7	**14.3**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids	EA015	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by both manual measurement and automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Filtered	ED040F	WATER	APHA 21st ed., 3120 Sulfur and/or Silcon content is determined by ICP/AES and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Chloride by PC Titrator	ED045-P	WATER	APHA 21st ed., 4500 Cl - B. Automated Silver Nitrate titration.
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Recoverable Metals by ICP-AES	EG005T	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 Samples are digested by USEPA 3005 prior to analysis. The ICPAES technique ionises the 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.
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.
Dissolved Metals by ICP-MS - Suite E	EG020E-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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by seal at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO3- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3--F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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							
EG020F: Dissolved Metals by ICP-MS	EM0806112-001	LR1	**Beryllium**	7440-41-7	49.9 %	70-130%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM0806112-001	LR1	**Cadmium**	7440-43-9	64.4 %	70-130%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM0806112-001	LR1	**Copper**	7440-50-8	61.2 %	70-130%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM0806112-001	LR1	**Nickel**	7440-02-0	64.8 %	70-130%	**Recovery less than lower data quality objective**
EG020F: Dissolved Metals by ICP-MS	EM0806112-001	LR1	**Zinc**	7440-66-6	54.7 %	70-130%	**Recovery less than lower data quality objective**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
LR1, RT16a, RT17a, LT19, LT41	----	----	----	01-AUG-2008	27-JUL-2008	**5**
EK057G: Nitrite as N by Discrete Analyser						

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural						
LR1, RT16a, RT17a, LT19, LT41	----	----	----	30-JUL-2008	29-JUL-2008	**1**
EK059G: NOX as N by Discrete Analyser						
Clear Plastic Bottle - Natural						
LR1, RT16a, RT17a, LT19, LT41	----	----	----	30-JUL-2008	29-JUL-2008	**1**
EK061: Total Kjeldahl Nitrogen (TKN)						
Clear Plastic Bottle - Natural						
LR1, RT16a, RT17a, LT19, LT41	01-AUG-2008	28-JUL-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.**

CERTIFICATE OF ANALYSIS

Work Order	: **ES0810866**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 30-JUL-2008
Sampler	: A.W	Issue Date	: 08-AUG-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PT24A	----	----	----	----
				Client sampling date / time: 28-JUL-2008 15:00	----	----	----	----
				ES0810866-001	----	----	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**8.01**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3500**	----	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**2190**	----	----	----	----
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	**915**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**915**	----	----	----	----
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**82**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1.0	mg/L	**778**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**25**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**15**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**848**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**20**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
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	**0.228**	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.005	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.006**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Lithium	7439-93-2	0.001	mg/L	**0.146**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.002**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	**0.001**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.026**	----	----	----	----
Selenium	7782-49-2	0.010	mg/L	<0.010	----	----	----	----
Silver	7440-22-4	0.001	mg/L	**0.001**	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**0.668**	----	----	----	----
Thallium	7440-28-0	0.001	mg/L	<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER				Client sample ID	PT24A	----	----	----	----
				Client sampling date / time	28-JUL-2008 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES0810866-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Thorium	7440-29-1	0.001	mg/L		<0.001	----	----	----	----
Tin	7440-31-5	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	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**1.10**	----	----	----	----
Gold	7440-57-5	0.001	mg/L		<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS									
Iron	7439-89-6	0.05	mg/L		**0.11**	----	----	----	----
EG052F: Silica by ICPAES									
^ Silica	7631-86-9	0.1	mg/L		**33.5**	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**3.6**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.010	mg/L		<0.010	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.010	mg/L		**0.011**	----	----	----	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.010	mg/L		**0.011**	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	----	----	----	----
EK062: Total Nitrogen as N									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	----	----	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**41.9**	----	----	----	----
^ Total Cations	----	0.01	meq/L		**39.9**	----	----	----	----
^ Ionic Balance	----	0.01	%		**2.52**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**4**	----	----	----	----

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **ES0810866**

Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: ALISTAIR WALSH	Contact	: Victor Kedicioglu
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: victor.kedicioglu@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008SINKNI0045 (EN/003/08)
Site	: ----		
Sampler	: A.W	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 30-JUL-2008	Issue Date	: 30-JUL-2008 16:56
Client Requested Due Date	: 08-AUG-2008	Scheduled Reporting Date	: **08-AUG-2008**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: CHILLED - Ice bricks present
No. of coolers/boxes	: 1 HARD	No. of samples received	: 1
Sercurity Seal	: Intact.	No. of samples analysed	: 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Breaches in recommended extraction / analysis holding times may occur. Please contact ALS for further information (Nanthini Coilparampil).**
- **Appropriately preserved bottle not supplied for total metal analyis, lab will sub sample from natural bottle provided**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Nanthini Coilparampil
- Analytical work for this work order will be conducted at ALS Sydney.
- 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.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG020A-T : Total Metals by ICP-MS - Suite A		
PT24A	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA005: pH pH	WATER - EA010P Conductivity (PC)	WATER - EA015 Total Dissolved Solids	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 - EG020E-F Dissolved Metals by ICPMS - Suite E	WATER - EG052 Silica (Total Dissolved) by ICPAES
ES0810866-001	28-JUL-2008 15:00	PT24A	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EK040-P Fluoride(PC)	WATER - EN055 - TS Ionic Balance (TS)	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Cl, SO4, Alkalinity)	WATER - NT-06 Total Nitrogen + NO2 + NO3
ES0810866-001	28-JUL-2008 15:00	PT24A	✓	✓	✓	✓	✓	✓

Requested Deliverables

ALISTAIR WALSH

- *AU Certificate of Analysis - NATA	Email	awalsh@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	awalsh@skm.com.au
- *AU QC Report ¿ DEFAULT (Anon QC Rep) - NATA	Email	awalsh@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	awalsh@skm.com.au
- Default - Chain of Custody	Email	awalsh@skm.com.au
- EDI Format - ENMRG	Email	awalsh@skm.com.au

MR DANIEL PIERCE

- *AU Certificate of Analysis - NATA	Email	dpierce@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	dpierce@skm.com.au
- *AU QC Report ¿ DEFAULT (Anon QC Rep) - NATA	Email	dpierce@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	dpierce@skm.com.au
- A4 - AU Tax Invoice	Email	dpierce@skm.com.au
- Default - Chain of Custody	Email	dpierce@skm.com.au
- EDI Format - ENMRG	Email	dpierce@skm.com.au

QUALITY CONTROL REPORT

Work Order	: **ES0810866**	Page	: 1 of 7
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 30-JUL-2008
Sampler	: A.W	Issue Date	: 08-AUG-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 719067)									
ES0810896-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.23	7.25	0.3	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 720779)									
ES0810866-001	PT24A	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3500	3490	0.3	0% - 20%
ES0810888-008	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1240	1230	0.4	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 719811)									
ES0810853-002	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	9320	9330	0.1	0% - 20%
ES0810961-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	20200	19300	4.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 720781)									
ES0810866-001	PT24A	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	915	908	0.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	915	908	0.8	0% - 20%
ES0810888-008	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	49	52	5.1	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	397	398	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	446	450	0.7	0% - 20%
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 723604)									
ES0810789-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	648	639	1.4	0% - 20%
ES0810845-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	2	mg/L	1840	1610	13.7	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 719476)									
ES0810839-002	Anonymous	ED045G: Chloride	16887-00-6	1.0	mg/L	48700	48500	0.4	0% - 20%
ES0810853-001	Anonymous	ED045G: Chloride	16887-00-6	1.0	mg/L	20.6	20.2	2.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 720414)									
ES0810866-001	PT24A	ED093F: Calcium	7440-70-2	1	mg/L	25	25	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	15	15	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	848	853	0.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 20%
ES0810921-008	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	104	105	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	136	137	0.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	706	712	0.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.0	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 719496)									
ES0810584-001	Anonymous	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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 719496) - continued									
ES0810584-001	Anonymous	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	0.066	0.066	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	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	0.023	0.024	0.0	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.106	0.102	3.9	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	0.020	0.019	0.0	0% - 50%
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	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	<0.010	<0.010	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 719497)									
ES0810584-001	Anonymous	EG020E-F: Gold	7440-57-5	0.001	mg/L	0.003	<0.001	110	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 719181)									
ES0810855-001	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	3.86	3.64	5.9	0% - 20%
ES0810862-001	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	0.13	0.12	12.3	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 720780)									
ES0810866-001	PT24A	EK040P: Fluoride	16984-48-8	0.1	mg/L	3.6	3.4	5.1	0% - 20%
ES0810941-008	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.5	0.5	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 719048)									
ES0810856-001	Anonymous	EK057G: Nitrite as N	----	0.010	mg/L	<0.010	<0.010	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 719059)									
ES0810866-001	PT24A	EK059G: Nitrite + Nitrate as N	----	0.010	mg/L	0.011	0.020	58.1	No Limit
ES0810888-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.010	mg/L	0.307	0.308	0.3	0% - 20%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 723597)									
ES0810962-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.5	32.9	No Limit
ES0810888-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 722701)									
EP0804201-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	5	17.8	No Limit
ES0810960-008	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.0	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 720779)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	99.8	86.3	112
EA015: Total Dissolved Solids (QCLot: 719811)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	100	77.9	122
ED037P: Alkalinity by PC Titrator (QCLot: 720781)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	98.0	80.2	108
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 723604)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	20 mg/L	97.0	76.1	126
ED045G: Chloride Discrete analyser (QCLot: 719476)								
ED045G: Chloride	16887-00-6	1	mg/L	----	50 mg/L	98.6	83.7	124
		1.0	mg/L	<1.0	----	----	----	----
ED093F: Dissolved Major Cations (QCLot: 720414)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.9	82.9	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.4	82.7	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.3	77.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	100	84.3	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 719496)								
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	79.2	117
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	97.0	79.2	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.0	82	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.4	85.1	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.6	87	117
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	106	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.0	80.6	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.7	84.1	114
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	101	78.1	118
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.6	84	116
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	98.6	79.7	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	83	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	----	0.1 mg/L	101	73.5	124
		0.010	mg/L	<0.010	----	----	----	----
EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	0.1 mg/L	92.7	82.5	118
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	96.9	77.7	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	101	86.2	112

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 719496) - continued								
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	95.0	74.7	119
EG020F: Dissolved Metals by ICP-MS (QCLot: 719497)								
EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 719498)								
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	104	85.3	110
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	102	87.8	109
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 719181)								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.3	75.3	113
EK040P: Fluoride by PC Titrator (QCLot: 720780)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	96.2	64.8	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 719048)								
EK057G: Nitrite as N	----	0.01	mg/L	----	0.96 mg/L	97.4	65.1	129
		0.010	mg/L	<0.010	----	----	----	----
EK059G: NOX as N by Discrete Analyser (QCLot: 719059)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	----	0.96 mg/L	104	76.9	122
		0.010	mg/L	<0.010	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 723597)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	89.5	62.4	140
EP005: Total Organic Carbon (TOC) (QCLot: 722701)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	96.6	86.9	125

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 719476)							
ES0810839-002	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 719496)							
ES0810584-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	121	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	115	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	109	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	115	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	112	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	124	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	111	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	109	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	105	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	113	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	115	70	130
EK040P: Fluoride by PC Titrator (QCLot: 720780)							
ES0810941-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	98.6	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 719048)							
ES0810856-001	Anonymous	EK057G: Nitrite as N	----	0.60 mg/L	91.2	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 719059)							
ES0810866-001	PT24A	EK059G: Nitrite + Nitrate as N	----	0.60 mg/L	93.3	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 723597)							
ES0810962-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	79.0	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 722701)							
EP0804201-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	110	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0810866**	Page	: 1 of 8
Client	: SINCLAIR KNIGHT MERZ	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 30-JUL-2008
Sampler	: A.W	Issue Date	: 08-AUG-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**----**	----	----	**30-JUL-2008**	28-JUL-2008	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**---**	---	----	**01-AUG-2008**	25-AUG-2008	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**----**	----	----	**31-JUL-2008**	04-AUG-2008	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**---**	---	----	**01-AUG-2008**	11-AUG-2008	✓
ED041: Sulfate (Turbidimetric) as SO4 2-							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**----**	----	----	**06-AUG-2008**	25-AUG-2008	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**----**	----	----	**31-JUL-2008**	25-AUG-2008	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**---**	---	----	**01-AUG-2008**	25-AUG-2008	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered							
PT24A	**28-JUL-2008**	**---**	---	----	**01-AUG-2008**	24-JAN-2009	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**31-JUL-2008**	24-JAN-2009	✓	**31-JUL-2008**	24-JAN-2009	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**---**	---	----	**01-AUG-2008**	25-AUG-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
PT24A	**28-JUL-2008**	**----**	----	----	**30-JUL-2008**	30-JUL-2008	✓
EK059G: NOX as N by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid							
PT24A	**28-JUL-2008**	**----**	----	----	**30-JUL-2008**	25-AUG-2008	✓
EK061: Total Kjeldahl Nitrogen (TKN)							
Clear Plastic Bottle - Sulphuric Acid							
PT24A	**28-JUL-2008**	**06-AUG-2008**	25-AUG-2008	✓	**06-AUG-2008**	25-AUG-2008	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulphuric Acid							
PT24A	**28-JUL-2008**	**----**	----	----	**05-AUG-2008**	25-AUG-2008	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	9	**22.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	12	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	17	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	1	9	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	2	10	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	14	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	12	**8.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	17	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.3**	**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
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	12	**8.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	17	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.3**	**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
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.1**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.3**	**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	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	14	**7.1**	**5.0**	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH	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)
Total Dissolved Solids	EA015	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by 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.
Sulfate (Turbidimetric) as SO4 2-	ED041	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are precipitated in an acetic acid medium with barium chloride to form barium sulfate crystals. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite E	EG020E-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.
Silica (Total Dissolved) by ICPAES	EG052	WATER	APHA 21st ed., 4500-SiO2. Silica (Total) determined by calculation from Silicon by ICPAES.
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO3- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3--F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA Turbidimetric and ICPAES	EN055 - TS	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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							
ED045G: Chloride Discrete analyser	ES0810839-002	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005: pH						
Clear Plastic Bottle - Natural						
PT24A	----	----	----	30-JUL-2008	28-JUL-2008	**2**

Outliers : Frequency of Quality Control Samples

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

- **No Quality Control Sample Frequency Outliers exist.**

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY
QUOTE NUMBER
Job Code:
Due Date:
Custody seal intact?
Sample cold?
Received for Laboratory by: Ben
Date: 30/7
Time: 9:00

Project No: VE30064
Project Manager: Daniel Pierce
Sampler(s): Alistair Walsh
Checked:
Date: 28/07/2008

Container Identification							
Size	1000ml	250ml	43ml				
Type	plastic	plastic	vile				
Preserv	no	yes	yes				
Analytes	See Attached	See Attached	See Attached				

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes
(1)	28/07/2008		H2O	PT24a -1000ml			
	28/07/2008		H2O	PT24a - 250ml			
	28/07/2008		H2O	PT24a - 43ml (x2)			
	29/07/2008		H20	PT24a - 125ml	Metals → ICPMS (no ultra trace ORC)		
	An extra sample bottle is STILL to be sent						
	100ml unpreserved ORC metals. However Mus is						
	to be kept but NOT tested until we notify						

Environmental Division
Sydney
Work Order
ES0810866

Telephone : +61-2-8784 8555

TOTAL

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au upon receival of samples. Please also email results to these email addresses too.Thanks

See attached spreadsheet for analysis required, any questions please call 0430288222

COC-RevA

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times

CERTIFICATE OF ANALYSIS

Work Order	: **ES0811987**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 19-AUG-2008
Sampler	: AW & MC	Issue Date	: 27-AUG-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **LOR 's for Nickel for method EGO20A-F raised due to matrix interference.**
- **TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**

Analytical Results

Sub-Matrix: WATER				Client sample ID	DUP2	----	----	----	----
				Client sampling date / time	[19-AUG-2008]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES0811987-001	----	----	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		6.64	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		30200	----	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		25100	----	----	----	----
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		337	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		337	----	----	----	----
ED040F: Dissolved Major Anions									
Silicon	7440-21-3	0.05	mg/L		4.60	----	----	----	----
ED041: Sulfate (Turbidimetric) as SO4 2-									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3860	----	----	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		11000	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		877	----	----	----	----
Magnesium	7439-95-4	1	mg/L		585	----	----	----	----
Sodium	7440-23-5	1	mg/L		7630	----	----	----	----
Potassium	7440-09-7	1	mg/L		95	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		0.02	----	----	----	----
Antimony	7440-36-0	0.001	mg/L		<0.001	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L		0.013	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Barium	7440-39-3	0.001	mg/L		0.036	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		0.002	----	----	----	----
Copper	7440-50-8	0.001	mg/L		0.004	----	----	----	----
Lead	7439-92-1	0.001	mg/L		0.002	----	----	----	----
Lithium	7439-93-2	0.001	mg/L		0.484	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		1.13	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		0.004	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.005	----	----	----	----
Selenium	7782-49-2	0.010	mg/L		<0.010	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: DUP2	----	----	----	----
				Client sampling date / time: [19-AUG-2008]	----	----	----	----
				ES0811987-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Strontium	7440-24-6	0.001	mg/L	**11.2**	----	----	----	----
Thallium	7440-28-0	0.001	mg/L	<0.001	----	----	----	----
Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.001	----	----	----	----
Titanium	7440-32-6	0.01	mg/L	<0.01	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.002**	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.047**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**5.02**	----	----	----	----
Gold	7440-57-5	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**51.4**	----	----	----	----
EG052F: Silica by ICPAES								
^ Silica	7631-86-9	0.1	mg/L	**9.8**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.4**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.02**	----	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.02**	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**2.0**	----	----	----	----
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**2.0**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**396**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**426**	----	----	----	----
^ Ionic Balance	----	0.01	%	**3.64**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**8**	----	----	----	----

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **ES0811987**

Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008SINKNI0045 (EN/003/08)
Site	: ----		
Sampler	: AW & MC	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 19-AUG-2008	Issue Date	: 19-AUG-2008 13:39
Client Requested Due Date	: 27-AUG-2008	Scheduled Reporting Date	: **27-AUG-2008**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: CHILLED - Ice bricks present
No. of coolers/boxes	: 1 HARD	No. of samples received	: 1
Sercurity Seal	: Intact.	No. of samples analysed	: 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Sample(s) have been received within recommended holding times.**
- **Appropriately preserved bottle not supplied for TOC. lab will sub sample from Purple plastci bottle supplied**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Nanthini Coilparampil
- Analytical work for this work order will be conducted at ALS Sydney.
- 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.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG020A-T : Total Metals by ICP-MS - Suite A		
DUP2	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005: pH pH	WATER - EA010P Conductivity (PC)	WATER - EA015 Total Dissolved Solids	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 - EG020E-F Dissolved Metals by ICPMS - Suite E	WATER - EG052 Silica (Total Dissolved) by ICPAES
ES0811987-001	[19-AUG-2008]	DUP2	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EK040-P Fluoride(PC)	WATER - EN055 - TS Ionic Balance (TS)	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Cl, SO4, Alkalinity)	WATER - NT-06 Total Nitrogen + NO2 + NO3
ES0811987-001	[19-AUG-2008]	DUP2	✓	✓	✓	✓	✓	✓

Requested Deliverables

MR DANIEL PIERCE

- *AU Certificate of Analysis - NATA	Email	dpierce@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	dpierce@skm.com.au
- *AU QC Report ¿ DEFAULT (Anon QC Rep) - NATA	Email	dpierce@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	dpierce@skm.com.au
- A4 - AU Tax Invoice	Email	dpierce@skm.com.au
- Default - Chain of Custody	Email	dpierce@skm.com.au
- EDI Format - ENMRG	Email	dpierce@skm.com.au

QUALITY CONTROL REPORT

Work Order	: **ES0811987**	Page	: 1 of 8
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 19-AUG-2008
Sampler	: AW & MC	Issue Date	: 27-AUG-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 734235)									
ES0811732-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	12.3	12.3	0.0	0% - 20%
ES0811987-001	DUP2	EA005: pH Value	----	0.01	pH Unit	6.64		0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 734743)									
ES0811988-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2210		0.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 735074)									
ES0811985-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	735	700	4.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 734741)									
ES0811925-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	284	281	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	284		1.4	0% - 20%
ES0811988-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1		0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	86	93	7.8	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1250		0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1340	1350	0.8	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 735787)									
ES0811987-001	DUP2	ED040F: Silicon	7440-21-3	0.05	mg/L	4.60		0.0	0% - 20%
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 739819)									
ES0811973-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	36	38	5.9	0% - 20%
ES0812002-008	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	489		0.6	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 734636)									
EN0801505-027	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.0	No Limit
ES0811973-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	8120		0.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 735786)									
ES0811987-001	DUP2	ED093F: Calcium	7440-70-2	1	mg/L	877		0.9	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	585	584	0.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7630		0.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	95		0.0	0% - 20%
ES0812002-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	597	611	2.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	44	45	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	61		0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	14		0.0	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 738488)									
ES0811987-001	DUP2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 738488) - continued									
ES0811987-001	DUP2	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	0.013	0.011	17.9	0% - 50%
		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	0.036		5.8	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001		0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.003	52.3	No Limit
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	0.484	0.502	3.5	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.13	1.14	1.4	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.004		0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.005		0.0	No Limit
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001		0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.047	0.076	46.7	0% - 50%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01		0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.010	mg/L	<0.010		0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	5.02	5.05	0.5	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 738489)									
ES0811987-001	DUP2	EG020B-F: Strontium	7440-24-6	0.001	mg/L	11.2	11.1	0.7	0% - 20%
		EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001		0.0	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.002	0.001	0.0	No Limit
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01		0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 738490)									
ES0811987-001	DUP2	EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.001		0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 734557)									
ES0811918-004	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	14.5	14.1	2.9	0% - 20%
ES0811974-007	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	0.86		4.9	0% - 50%
EK040P: Fluoride by PC Titrator (QC Lot: 734742)									
ES0811988-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.6	0.6	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 734396)									
ES0811950-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.10		11.8	0% - 50%
EK059G: NOX as N by Discrete Analyser (QC Lot: 733972)									
ES0811973-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.06	1.00	5.9	0% - 20%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 737488)									
ES0811918-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.5		7.5	0% - 20%
ES0811930-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.1	2.8	9.7	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 738688)									

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 (%)*
EP005: Total Organic Carbon (TOC) (QC Lot: 738688) - continued									
ES0811985-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	76		12.0	0% - 20%
ES0812052-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5		0.0	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 734743)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	99.5	86.3	112
EA015: Total Dissolved Solids (QCLot: 735074)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	104	77.9	122
ED037P: Alkalinity by PC Titrator (QCLot: 734741)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	92.2	80.2	108
ED040F: Dissolved Major Anions (QCLot: 735787)								
ED040F: Silicon	7440-21-3	0.05	mg/L	<0.05	5 mg/L	96.5	85	121
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 739819)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	20 mg/L	97.9	76.1	126
ED045G: Chloride Discrete analyser (QCLot: 734636)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	96.2	83.7	124
ED093F: Dissolved Major Cations (QCLot: 735786)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	82.9	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.7	82.7	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	77.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	84.3	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 738488)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.8	88.1	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.6	79.2	117
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.7	79.2	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.8	82	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.2	85.1	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	87	117
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	80.6	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	84.1	114
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	98.1	78.1	118
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	103	84	116
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	102	79.7	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	83	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	----	0.1 mg/L	99.8	73.5	124
		0.010	mg/L	<0.010	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 738488) - continued								
EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	0.1 mg/L	100	82.5	118
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	93.4	77.7	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.6	86.2	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	81.1	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	87.3	74.7	119
EG020F: Dissolved Metals by ICP-MS (QCLot: 738489)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	98.3	85.3	110
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	98.9	87.8	109
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 738490)								
EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 734557)								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	110	75.3	113
EK040P: Fluoride by PC Titrator (QCLot: 734742)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	98.8	64.8	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 734396)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.96 mg/L	107	65.1	129
EK059G: NOX as N by Discrete Analyser (QCLot: 733972)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.96 mg/L	108	76.9	122
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 737488)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1.0 mg/L	118	62.4	140
EP005: Total Organic Carbon (TOC) (QCLot: 738688)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.1	86.9	125

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 734636)							
EN0801505-027	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	95.9	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 738488)							
ES0811987-001	DUP2	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	98.4	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	83.6	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	112	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	90.4	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	101	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	101	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	84.0	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	96.3	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	87.8	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	108	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	71.5	70	130
EK040P: Fluoride by PC Titrator (QCLot: 734742)							
ES0811988-006	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	100	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 734396)							
ES0811950-001	Anonymous	EK057G: Nitrite as N	----	0.60 mg/L	108	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 733972)							
ES0811973-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.60 mg/L	115	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 737488)							
ES0811918-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	82.8	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 738688)							
ES0811987-001	DUP2	EP005: Total Organic Carbon	----	100 mg/L	105	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0811987**	Page	: 1 of 8
Client	: SINCLAIR KNIGHT MERZ	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
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Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 19-AUG-2008
Sampler	: AW & MC	Issue Date	: 27-AUG-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**----**	----	----	**19-AUG-2008**	19-AUG-2008	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**---**	---	----	**20-AUG-2008**	16-SEP-2008	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**----**	----	----	**20-AUG-2008**	26-AUG-2008	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**---**	---	----	**20-AUG-2008**	02-SEP-2008	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**---**	---	----	**21-AUG-2008**	16-SEP-2008	✓
ED041: Sulfate (Turbidimetric) as SO4 2-							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**----**	----	----	**26-AUG-2008**	16-SEP-2008	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**----**	----	----	**20-AUG-2008**	16-SEP-2008	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**---**	---	----	**21-AUG-2008**	16-SEP-2008	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered							
DUP2	**19-AUG-2008**	**---**	---	----	**25-AUG-2008**	15-FEB-2009	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**21-AUG-2008**	15-FEB-2009	✓	**21-AUG-2008**	15-FEB-2009	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**---**	---	----	**20-AUG-2008**	16-SEP-2008	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
DUP2	**19-AUG-2008**	**----**	----	----	**19-AUG-2008**	21-AUG-2008	✓
EK059G: NOX as N by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid							
DUP2	**19-AUG-2008**	**----**	----	----	**19-AUG-2008**	16-SEP-2008	✓
EK061: Total Kjeldahl Nitrogen (TKN)							
Clear Plastic Bottle - Sulphuric Acid							
DUP2	**19-AUG-2008**	**25-AUG-2008**	16-SEP-2008	✓	**25-AUG-2008**	16-SEP-2008	✓
EP005: Total Organic Carbon (TOC)							
Clear Plastic Bottle - Sulphuric Acid							
DUP2	**19-AUG-2008**	**----**	----	----	**25-AUG-2008**	16-SEP-2008	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	17	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	8	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	7	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	9	**22.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	7	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	17	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	17	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Conductivity by PC Titrator	EA010-P	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	17	**5.9**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	**11.1**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	7	**14.3**	**5.0**	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH	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)
Total Dissolved Solids	EA015	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by 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.
Sulfate (Turbidimetric) as SO4 2-	ED041	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are precipitated in an acetic acid medium with barium chloride to form barium sulfate crystals. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite E	EG020E-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.
Silica (Total Dissolved) by ICPAES	EG052	WATER	APHA 21st ed., 4500-SiO2. Silica (Total) determined by calculation from Silicon by ICPAES.
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO3- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3--F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA Turbidimetric and ICPAES	EN055 - TS	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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							
EG020F: Dissolved Metals by ICP-MS	ES0811987-001	DUP2	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

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

- **No Quality Control Sample Frequency Outliers exist.**

ALS

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

		Container Identification			
	Size	~~1000ml~~ 500ml	~~40ml~~ 250	125ml	125ml
	Type	plastic	glass	plastic	plastic
	Preserv	NO	YES	YES	NO
	Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace

LAB USE ONLY
QUOTE NUMBER
Job Code:
Due Date:
Custody seal intact?
Sample cold?
Received for Laboratory by:
Date:
Time:

Project No: VE30084
Project Manager: Daniel Pierce
Sampler(s): Alistair Walsh / Michael Cowin
Checked: ALISTAIR WALSH
Date: 18-Aug-08

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes			
DUP2			H20				x			
DUP2			H20		X 2 Viles			x		
DUP2			H20		Field Filtered				x	
DUP2			H20		Field Filtered - HOLD SAMPLE					x
					TOTAL					

①

Frank
19/08/08
0845

Environmental Division
Sydney
Work Order
ES0811987
Telephone : +61-2-8784 8555

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

Sheet 1 **of** 2

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
	Sample Batch fee			
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Costusample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

CERTIFICATE OF ANALYSIS

Work Order	: **ES0812254**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 25-AUG-2008
Sampler	: A.W. & M.C.	Issue Date	: 02-SEP-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EA-015 TDS result has been confirmed by re-analysis.**
- **ED045G: LCS recovery for Chloride fall outside ALS dynamic control limits, However they are within the acceptance criteria based on ALS DQO. No further action is required.**
- **Samples required dilution for method EG020A-T due to matrix interference and LOR's have been raised accordingly.**

Analytical Results

Sub-Matrix: WATER				Client sample ID	DUP 5	----	----	----	----
				Client sampling date / time	20-AUG-2008 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES0812254-001	----	----	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		6.56	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		43400	----	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		37500	----	----	----	----
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		248	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		248	----	----	----	----
ED040F: Dissolved Major Anions									
Silicon	7440-21-3	0.05	mg/L		6.64	----	----	----	----
ED041: Sulfate (Turbidimetric) as SO4 2-									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		5190	----	----	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		15500	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		1080	----	----	----	----
Magnesium	7439-95-4	1	mg/L		922	----	----	----	----
Sodium	7440-23-5	1	mg/L		10900	----	----	----	----
Potassium	7440-09-7	1	mg/L		71	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.10	----	----	----	----
Antimony	7440-36-0	0.001	mg/L		<0.010	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.010	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.010	----	----	----	----
Barium	7440-39-3	0.001	mg/L		0.022	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0010	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.010	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.010	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.020	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.010	----	----	----	----
Lithium	7439-93-2	0.001	mg/L		0.325	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.590	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		<0.010	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.010	----	----	----	----
Selenium	7782-49-2	0.010	mg/L		<0.100	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: DUP 5	----	----	----	----
				Client sampling date / time: 20-AUG-2008 15:00	----	----	----	----
				ES0812254-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Strontium	7440-24-6	0.001	mg/L	**16.8**	----	----	----	----
Thallium	7440-28-0	0.001	mg/L	<0.010	----	----	----	----
Thorium	7440-29-1	0.001	mg/L	<0.010	----	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.010	----	----	----	----
Titanium	7440-32-6	0.01	mg/L	<0.10	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.045**	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.10	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.078**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**5.66**	----	----	----	----
Gold	7440-57-5	0.001	mg/L	<0.010	----	----	----	----
EG020T: Total Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**5.72**	----	----	----	----
EG052F: Silica by ICPAES								
^ Silica	7631-86-9	0.1	mg/L	**14.2**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.4**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**2.94**	----	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**2.94**	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	----	----	----	----
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**2.9**	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**550**	----	----	----	----
Total Cations	----	0.01	meq/L	**604**	----	----	----	----
Ionic Balance	----	0.01	%	**4.67**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	----	----	----	----

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **ES0812254**		
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008SINKNI0045 (EN/003/08)
Site	: ----		
Sampler	: A.W. & M.C.	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 25-AUG-2008	Issue Date	: 25-AUG-2008 16:23
Client Requested Due Date	: 01-SEP-2008	Scheduled Reporting Date	: **01-SEP-2008**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: CHILLED - Ice bricks present
No. of coolers/boxes	: 1 FOAM	No. of samples received	: 1
Sercurity Seal	: Intact.	No. of samples analysed	: 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Breaches in recommended extraction / analysis holding times may occur. Please contact ALS for further information (Nanthini Coilparampil).**
- **pH analysis should be conducted within 6 hours of sampling.**
- **NO2 and NO3 should be analysed within 48 hours of sampling.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Nanthini Coilparampil
- Analytical work for this work order will be conducted at ALS Sydney.
- 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.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG020A-T : Total Metals by ICP-MS - Suite A		
DUP 5	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005: pH pH	WATER - EA010P Conductivity (PC)	WATER - EA015 Total Dissolved Solids	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 - EG020E-F Dissolved Metals by ICPMS - Suite E	WATER - EG052 Silica (Total Dissolved) by ICPAES
ES0812254-001	20-AUG-2008 15:00	DUP 5	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EK040-P Fluoride(PC)	WATER - EN055 - TS Ionic Balance (TS)	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Cl, SO4, Alkalinity)	WATER - NT-06 Total Nitrogen + NO2 + NO3
ES0812254-001	20-AUG-2008 15:00	DUP 5	✓	✓	✓	✓	✓	✓

Requested Deliverables

MR DANIEL PIERCE

- *AU Certificate of Analysis - NATA	Email	dpierce@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	dpierce@skm.com.au
- *AU QC Report ¿ DEFAULT (Anon QC Rep) - NATA	Email	dpierce@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	dpierce@skm.com.au
- A4 - AU Tax Invoice	Email	dpierce@skm.com.au
- Default - Chain of Custody	Email	dpierce@skm.com.au
- EDI Format - ENMRG	Email	dpierce@skm.com.au

QUALITY CONTROL REPORT

Work Order	: **ES0812254**	Page	: 1 of 8
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 25-AUG-2008
Sampler	: A.W. & M.C.	Issue Date	: 02-SEP-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 739390)									
ES0812254-001	DUP 5	EA005: pH Value	----	0.01	pH Unit	6.56	6.55	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 740075)									
ES0812254-001	DUP 5	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	43400	43200	0.5	0% - 20%
ES0812269-009	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2080	2070	0.2	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 739212)									
ES0812226-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	1560	1480	5.5	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 740074)									
ES0812254-001	DUP 5	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	248	252	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	248	252	1.6	0% - 20%
ES0812269-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	144	139	3.5	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	292	295	1.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	436	434	0.4	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 739631)									
ES0812254-001	DUP 5	ED040F: Silicon	7440-21-3	0.05	mg/L	6.64	6.09	8.6	0% - 20%
ES0812259-001	Anonymous	ED040F: Silicon	7440-21-3	0.10	mg/L	8.75	8.62	1.5	0% - 20%
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 744662)									
ES0812180-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	24	24	0.0	0% - 20%
ES0812310-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	2	mg/L	320	316	1.1	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 739782)									
ES0812254-001	DUP 5	ED045G: Chloride	16887-00-6	1	mg/L	15500	15500	0.02	0% - 20%
ES0812269-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	70	70	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 739630)									
ES0812108-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	59	60	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	17	17	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	62	62	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	238	236	1.0	0% - 20%
ES0812254-001	DUP 5	ED093F: Calcium	7440-70-2	1	mg/L	1080	1110	2.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	922	946	2.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11200	11300	0.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	71	72	0.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 740924)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 740924) - continued									
ES0812254-001	DUP 5	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.0	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.022	0.024	10.4	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.020	<0.020	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	0.325	0.318	2.1	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.590	0.572	2.9	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.078	<0.050	43.1	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.010	mg/L	<0.100	<0.100	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	5.66	5.39	4.8	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 740925)									
ES0812254-001	DUP 5	EG020B-F: Strontium	7440-24-6	0.001	mg/L	16.8	16.7	0.5	0% - 20%
		EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.045	0.047	4.4	0% - 20%
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.10	<0.10	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 740926)									
ES0812254-001	DUP 5	EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.010	<0.010	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 739616)									
ES0812254-001	DUP 5	EG020A-T: Iron	7439-89-6	0.05	mg/L	5.72	5.61	2.0	0% - 20%
ES0812269-009	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	0.14	0.18	21.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 740076)									
ES0812254-001	DUP 5	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.4	1.4	0.0	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 739377)									
ES0812254-001	DUP 5	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 739741)									
ES0812254-001	DUP 5	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.94	2.93	0.4	0% - 20%
ES0812269-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	11.5	11.7	1.8	0% - 20%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 741021)									
ES0812217-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP005: Total Organic Carbon (TOC) (QC Lot: 739702)									
ES0812213-009	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	3	3	0.0	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 740075)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	99.4	86.3	112
EA015: Total Dissolved Solids (QCLot: 739212)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	106	77.9	122
ED037P: Alkalinity by PC Titrator (QCLot: 740074)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	91.5	80.2	108
ED040F: Dissolved Major Anions (QCLot: 739631)								
ED040F: Silicon	7440-21-3	0.05	mg/L	<0.05	5 mg/L	102	85	121
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 744662)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	20 mg/L	98.2	76.1	126
ED045G: Chloride Discrete analyser (QCLot: 739782)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	83.2	83.7	124
ED093F: Dissolved Major Cations (QCLot: 739630)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	103	82.9	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	82.7	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	92.2	77.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.2	84.3	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 740924)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.6	88.1	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.6	79.2	117
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.8	79.2	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.2	82	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.2	85.1	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	87	117
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.4	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.8	80.6	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.2	84.1	114
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	87.6	78.1	118
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	84	116
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	101	79.7	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.8	83	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	----	0.1 mg/L	100	73.5	124
		0.010	mg/L	<0.010	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 740924) - continued								
EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	0.1 mg/L	105	82.5	118
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	90.1	77.7	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	100	86.2	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.6	81.1	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	76.0	74.7	119
EG020F: Dissolved Metals by ICP-MS (QCLot: 740925)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	96.0	85.3	110
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	98.0	87.8	109
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 740926)								
EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 739616)								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.8	75.3	113
EK040P: Fluoride by PC Titrator (QCLot: 740076)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	99.0	64.8	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 739377)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.96 mg/L	98.0	65.1	129
EK059G: NOX as N by Discrete Analyser (QCLot: 739741)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.96 mg/L	107	76.9	122
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 741021)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.8	62.4	140
EP005: Total Organic Carbon (TOC) (QCLot: 739702)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	97.5	86.9	125

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 739782)							
ES0812254-001	DUP 5	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 740924)							
ES0812254-001	DUP 5	EG020A-F: Arsenic	7440-38-2	2 mg/L	102	70	130
		EG020A-F: Beryllium	7440-41-7	2 mg/L	96.3	70	130
		EG020A-F: Barium	7440-39-3	2 mg/L	107	70	130
		EG020A-F: Cadmium	7440-43-9	0.5 mg/L	94.7	70	130
		EG020A-F: Chromium	7440-47-3	2 mg/L	105	70	130
		EG020A-F: Cobalt	7440-48-4	2 mg/L	102	70	130
		EG020A-F: Copper	7440-50-8	2 mg/L	91.8	70	130
		EG020A-F: Lead	7439-92-1	2 mg/L	100	70	130
		EG020A-F: Manganese	7439-96-5	2 mg/L	92.0	70	130
		EG020A-F: Nickel	7440-02-0	2 mg/L	99.7	70	130
		EG020A-F: Vanadium	7440-62-2	2 mg/L	106	70	130
		EG020A-F: Zinc	7440-66-6	2 mg/L	89.6	70	130
EK040P: Fluoride by PC Titrator (QCLot: 740076)							
ES0812254-001	DUP 5	EK040P: Fluoride	16984-48-8	5.0 mg/L	70.8	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 739377)							
ES0812254-001	DUP 5	EK057G: Nitrite as N	----	0.60 mg/L	107	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 739741)							
ES0812254-001	DUP 5	EK059G: Nitrite + Nitrate as N	----	0.60 mg/L	# Not Determined	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 741021)							
ES0812217-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	94.0	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 739702)							
ES0812213-010	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	104	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0812254**	Page	: 1 of 8
Client	: SINCLAIR KNIGHT MERZ	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 25-AUG-2008
Sampler	: A.W. & M.C.	Issue Date	: 02-SEP-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**----**	----	----	**25-AUG-2008**	20-AUG-2008	✗
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**---**	---	----	**26-AUG-2008**	17-SEP-2008	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**----**	----	----	**25-AUG-2008**	27-AUG-2008	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**---**	---	----	**26-AUG-2008**	03-SEP-2008	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**---**	---	----	**26-AUG-2008**	17-SEP-2008	✓
ED041: Sulfate (Turbidimetric) as SO4 2-							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**----**	----	----	**01-SEP-2008**	17-SEP-2008	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**----**	----	----	**26-AUG-2008**	17-SEP-2008	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**---**	---	----	**26-AUG-2008**	17-SEP-2008	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered							
DUP 5	**20-AUG-2008**	**---**	---	----	**27-AUG-2008**	16-FEB-2009	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**26-AUG-2008**	16-FEB-2009	✓	**26-AUG-2008**	16-FEB-2009	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**---**	---	----	**26-AUG-2008**	17-SEP-2008	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
DUP 5	**20-AUG-2008**	**----**	----	----	**25-AUG-2008**	22-AUG-2008	×
EK059G: NOX as N by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid							
DUP 5	**20-AUG-2008**	**----**	----	----	**26-AUG-2008**	17-SEP-2008	✓
EK061: Total Kjeldahl Nitrogen (TKN)							
Clear Plastic Bottle - Sulphuric Acid							
DUP 5	**20-AUG-2008**	**27-AUG-2008**	17-SEP-2008	✓	**27-AUG-2008**	17-SEP-2008	✓
EP005: Total Organic Carbon (TOC)							
Clear Plastic Bottle - Sulphuric Acid							
DUP 5	**20-AUG-2008**	**----**	----	----	**26-AUG-2008**	17-SEP-2008	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	6	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	14	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	4	**25.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	1	5	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	3	**33.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	3	**33.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	19	**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	1	4	**25.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	3	**33.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	3	**33.3**	**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 Organic Carbon	EP005	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Conductivity by PC Titrator	EA010-P	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	19	**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	1	4	**25.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	3	**33.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	3	**33.3**	**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 Organic Carbon	EP005	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	**5.6**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	6	**16.7**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	4	**25.0**	**5.0**	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	3	**33.3**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	13	**7.7**	**5.0**	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	**10.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	APHA 21st ed. 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids	EA015	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by 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.
Sulfate (Turbidimetric) as SO4 2-	ED041	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are precipitated in an acetic acid medium with barium chloride to form barium sulfate crystals. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite E	EG020E-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.
Silica (Total Dissolved) by ICPAES	EG052	WATER	APHA 21st ed., 4500-SiO2. Silica (Total) determined by calculation from Silicon by ICPAES.
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO3- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3--F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA Turbidimetric and ICPAES	EN055 - TS	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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							
ED045G: Chloride Discrete analyser	834007-003	----	**Chloride**	16887-00-6	83.2 %	83.7-124%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
ED045G: Chloride Discrete analyser	ES0812254-001	DUP 5	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK059G: NOX as N by Discrete Analyser	ES0812254-001	DUP 5	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005: pH						
Clear Plastic Bottle - Natural						
DUP 5	----	----	----	25-AUG-2008	20-AUG-2008	**5**
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural						
DUP 5	----	----	----	25-AUG-2008	22-AUG-2008	**3**

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.**

ALS.

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

	Container Identification			
		250		125
Size	1000ml	~~40ml~~	125ml	~~100ml~~
Type	plastic	plastic ~~glass~~	plastic	plastic
Preserv	NO	YES	YES	NO
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC	Major Cations, Si and Dissolved Metals	ORC Ultra Trace

LAB USE ONLY	
QUOTE NUMBER	Project No: VE30064
Job Code:	Project Manager: Daniel Pierce
Due Date:	Sampler(s): Alistair Walsh / Michael Cowin
Custody seal intact?	Checked:
Sample cold?	
Received for Laboratory by:	
Date:	Date: 21/8/08
Time:	

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Major anions…	TOC	Major Cations…	ORC Ultra Trace			
	20/8		H20	DUP S			X						
(1)	↓		H20	DUP S				X					
			H20	DUPS	Field Filtered				X				
			H20	DUPS	Field Filtered - Hold Sample					X			
			~~H20~~										
			~~H20~~										
			~~H20~~										
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			~~H20~~										
			~~H20~~										
			~~H20~~										
					TOTAL								

Environmental Division
Sydney
Work Order
ES0812254

Telephone : + 61-2-8784 8555

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS and HOLD on analysis of ORC Ultra-trace metals. Any questions please call Alistair Walsh on 0430288222

Frank 25/08/08 0745

Sheet 1 of 2

COC-RevA

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

CERTIFICATE OF ANALYSIS

Work Order	: **ES0813041**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 08-SEP-2008
Sampler	: AW	Issue Date	: 17-SEP-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **Poor matrix spike recovery was obtained for Zinc for method EG020A-F due to matrix interference. Results have been confirmed by reanalysis**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: TRIPLICATE 3	----	----	----	----
				Client sampling date / time: 04-SEP-2008 15:00	----	----	----	----
				ES0813041-001	----	----	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**6.74**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**29400**	----	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**21000**	----	----	----	----
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	**949**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**949**	----	----	----	----
ED040F: Dissolved Major Anions								
Silicon	7440-21-3	0.05	mg/L	**13.9**	----	----	----	----
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**4020**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**9020**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**785**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**801**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**6610**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**63**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.02**	----	----	----	----
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	**0.002**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.016**	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	**0.0009**	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.054**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.088**	----	----	----	----
Lead	7439-92-1	0.001	mg/L	**0.005**	----	----	----	----
Lithium	7439-93-2	0.001	mg/L	**0.856**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**2.20**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.015**	----	----	----	----
Selenium	7782-49-2	0.010	mg/L	<0.010	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: TRIPLICATE 3	----	----	----	----
				Client sampling date / time: 04-SEP-2008 15:00	----	----	----	----
				ES0813041-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Strontium	7440-24-6	0.001	mg/L	**13.2**	----	----	----	----
Thallium	7440-28-0	0.001	mg/L	<0.001	----	----	----	----
Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
Tin	7440-31-5	0.001	mg/L	**0.001**	----	----	----	----
Titanium	7440-32-6	0.01	mg/L	<0.01	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.103**	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.046**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**6.47**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**14.2**	----	----	----	----
Gold	7440-57-5	0.001	mg/L	**0.001**	----	----	----	----
EG052F: Silica by ICPAES								
^ Silica	7631-86-9	0.1	mg/L	**29.8**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**2.2**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**4.4**	----	----	----	----
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**4.4**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**357**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**394**	----	----	----	----
^ Ionic Balance	----	0.01	%	**4.92**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**4**	----	----	----	----

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **ES0813041**

Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008SINKNI0045 (EN/003/08)
Site	: ----		
Sampler	: AW	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 08-SEP-2008	Issue Date	: 09-SEP-2008 09:35
Client Requested Due Date	: 15-SEP-2008	Scheduled Reporting Date	: **15-SEP-2008**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 8.1'C - Ice bricks present
No. of coolers/boxes	: 1 FOAM	No. of samples received	: 1
Sercurity Seal	: Intact.	No. of samples analysed	: 1

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. Please contact ALS for further information (Nanthini Coilparampil).**
- **Appropriately preserved bottle not supplied for TOC analysis, Lab will sub sample from purple bottle provided.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **NO2, NO3, should be analysed within 48 hours of sampling.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Nanthini Coilparampil
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

- **No sample container / preservation non-compliance exist.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA005: pH pH	WATER - EA010P Conductivity (PC)	WATER - EA015 Total Dissolved Solids	WATER - EG020A-F Dissolved Metals by ICPMS - Suite A	WATER - EG020B-F Dissolved Metals by ICPMS - Suite B	WATER - EG020E-F Dissolved Metals by ICPMS - Suite E	WATER - EG052 Silica (Total Dissolved) by ICPAES	WATER - EK040-P Fluoride(PC)
ES0813041-001	04-SEP-2008 15:00	TRIPLICATE 3	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EK057G Nitrite as N by Discrete Analyser	WATER - EK058G Nitrate as N by Discrete Analyser	WATER - EK061G Total Kjeldahl Nitrogen as N (TKN) By Discrete Analyser	WATER - EK062G Total Nitrogen as N (TKN + NOx) By Discrete Analyser	WATER - EN055 - TS Ionic Balance (TS)	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Cl, SO4, Alkalinity)
ES0813041-001	04-SEP-2008 15:00	TRIPLICATE 3	✓	✓	✓	✓	✓	✓	✓	✓

Requested Deliverables

mr ALISTAIR WALSH

- *AU Certificate of Analysis - NATA	Email	awalsh@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	awalsh@skm.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	awalsh@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	awalsh@skm.com.au
- Default - Chain of Custody	Email	awalsh@skm.com.au
- EDI Format - ENMRG	Email	awalsh@skm.com.au

MR DANIEL PIERCE

- *AU Certificate of Analysis - NATA	Email	dpierce@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	dpierce@skm.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	dpierce@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	dpierce@skm.com.au
- A4 - AU Tax Invoice	Email	dpierce@skm.com.au
- Default - Chain of Custody	Email	dpierce@skm.com.au
- EDI Format - ENMRG	Email	dpierce@skm.com.au

QUALITY CONTROL REPORT

Work Order	: **ES0813041**	Page	: 1 of 8
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 08-SEP-2008
Sampler	: AW	Issue Date	: 17-SEP-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 751860)									
ES0813018-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.97	7.96	0.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 754078)									
ES0813057-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	20200	20200	0.0	0% - 20%
ES0813089-007	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1870	1880	1.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 751800)									
ES0812841-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	4180	4460	6.5	0% - 20%
ES0813049-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	6460	6390	1.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 754076)									
ES0813057-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	9	10	11.2	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	9	10	11.2	0% - 50%
ES0813089-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1020	1020	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1020	1020	0.6	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 752533)									
EB0812124-001	Anonymous	ED040F: Silicon	7440-21-3	0.05	mg/L	9.58	9.63	0.5	0% - 20%
EB0812127-001	Anonymous	ED040F: Silicon	7440-21-3	0.05	mg/L	6.14	6.41	4.3	0% - 20%
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 755489)									
ES0812910-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	2	mg/L	142	144	1.6	0% - 20%
ES0813018-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	2	mg/L	164	175	6.5	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 752964)									
ES0813041-001	TRIPLICATE 3	ED045G: Chloride	16887-00-6	1	mg/L	8510	8530	0.2	0% - 20%
ES0813089-008	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	41	40	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 752534)									
EB0812124-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	581	583	0.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	158	159	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	263	264	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	119	120	0.0	0% - 20%
EB0812127-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	37	38	3.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	3	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 755234)									
ES0813041-001	TRIPLICATE 3	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0009	0.0002	141	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	0.002	0.002	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.016	0.016	0.0	0% - 50%
		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	0.054	0.054	0.0	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.088	0.088	0.0	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	0.856	0.900	5.1	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	2.20	2.08	5.3	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.016	9.0	0% - 50%
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.048	0.048	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	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	<0.010	<0.010	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	6.47	6.45	0.3	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	14.2	13.2	6.8	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 755237)									
ES0813041-001	TRIPLICATE 3	EG020B-F: Strontium	7440-24-6	0.001	mg/L	13.2	13.3	0.8	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	0.103	0.102	0.0	0% - 20%
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 755239)									
ES0813041-001	TRIPLICATE 3	EG020E-F: Gold	7440-57-5	0.001	mg/L	0.001	<0.001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 754077)									
ES0813057-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.5	0.5	0.0	No Limit
ES0813089-007	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 752327)									
ES0813041-001	TRIPLICATE 3	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.01	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 751775)									
EB0812108-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.0	No Limit
EB0812108-010	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	3.41	3.46	1.6	0% - 20%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 753855)									
EB0812062-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.2	1.1	0.0	0% - 50%
EB0812108-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.9	3.8	2.6	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP005: Total Organic Carbon (TOC) (QC Lot: 753931)									
ES0813041-001	TRIPLICATE 3	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.0	No Limit
ES0813119-004	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	1	<1	0.0	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 754078)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	102	86.3	112
EA015: Total Dissolved Solids (QCLot: 751800)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	119	77.9	122
ED037P: Alkalinity by PC Titrator (QCLot: 754076)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	91.6	80.2	108
ED040F: Dissolved Major Anions (QCLot: 752533)								
ED040F: Silicon	7440-21-3	0.05	mg/L	<0.05	5 mg/L	101	85	121
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 755489)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	20 mg/L	93.6	76.1	126
ED045G: Chloride Discrete analyser (QCLot: 752964)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	98.5	83.7	124
ED093F: Dissolved Major Cations (QCLot: 752534)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	82.9	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	82.7	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.0	77.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.2	84.3	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 755234)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	88.1	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.4	79.2	117
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	98.7	79.2	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.0	82	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.0	85.1	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	104	87	117
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.6	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.9	80.6	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.9	84.1	114
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	87.8	78.1	118
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	106	84	116
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	94.3	79.7	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.7	83	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	----	0.1 mg/L	89.6	73.5	124
		0.010	mg/L	<0.010	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 755234) - continued								
EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	0.1 mg/L	103	82.5	118
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	89.9	77.7	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	103	86.2	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.7	81.1	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	78.7	74.7	119
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	107	79.2	116
EG020F: Dissolved Metals by ICP-MS (QCLot: 755237)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	94.4	85.3	110
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	102	87.8	109
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 755239)								
EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.001	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 754077)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	96.8	64.8	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 752327)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.96 mg/L	94.2	65.1	129
EK059G: NOX as N by Discrete Analyser (QCLot: 751775)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.96 mg/L	108	76.9	122
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 753855)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	78.5	62.4	140
EP005: Total Organic Carbon (TOC) (QCLot: 753931)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	89.9	86.9	125

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 752964)							
ES0813041-001	TRIPLICATE 3	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 755234)							
ES0813041-001	TRIPLICATE 3	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	92.3	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	87.2	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	114	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	88.9	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	94.0	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	88.6	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	75.5	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	91.5	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	82.4	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	99.0	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	# 68.4	70	130
EK040P: Fluoride by PC Titrator (QCLot: 754077)							
ES0813057-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	79.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 752327)							
ES0813041-001	TRIPLICATE 3	EK057G: Nitrite as N	----	0.60 mg/L	94.2	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 751775)							
EB0812108-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.60 mg/L	70.8	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 753855)							
EB0812062-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	93.6	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 753931)							
ES0813071-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	95.0	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0813041**	Page	: 1 of 8
Client	: SINCLAIR KNIGHT MERZ	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 08-SEP-2008
Sampler	: AW	Issue Date	: 17-SEP-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**----**	----	----	**08-SEP-2008**	04-SEP-2008	✗
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**---**	---	----	**11-SEP-2008**	02-OCT-2008	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**----**	----	----	**09-SEP-2008**	11-SEP-2008	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**---**	---	----	**11-SEP-2008**	18-SEP-2008	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**---**	---	----	**10-SEP-2008**	02-OCT-2008	✓
ED041: Sulfate (Turbidimetric) as SO4 2-							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**----**	----	----	**12-SEP-2008**	02-OCT-2008	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**----**	----	----	**10-SEP-2008**	02-OCT-2008	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**---**	---	----	**10-SEP-2008**	02-OCT-2008	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered							
TRIPLICATE 3	**04-SEP-2008**	**---**	---	----	**12-SEP-2008**	03-MAR-2009	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**---**	---	----	**11-SEP-2008**	02-OCT-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
TRIPLICATE 3	**04-SEP-2008**	**----**	----	----	**09-SEP-2008**	06-SEP-2008	×
EK059G: NOX as N by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid							
TRIPLICATE 3	**04-SEP-2008**	**----**	----	----	**09-SEP-2008**	02-OCT-2008	✓
EK061: Total Kjeldahl Nitrogen (TKN)							
Clear Plastic Bottle - Sulphuric Acid							
TRIPLICATE 3	**04-SEP-2008**	**11-SEP-2008**	02-OCT-2008	✓	**11-SEP-2008**	02-OCT-2008	✓
EP005: Total Organic Carbon (TOC)							
Clear Plastic Bottle - Sulphuric Acid							
TRIPLICATE 3	**04-SEP-2008**	**----**	----	----	**11-SEP-2008**	02-OCT-2008	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	1	**100.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	2	9	**22.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.3**	**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
Sulfate (Turbidimetric) as SO4 2-	ED041	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	1	**100.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.3**	**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
Sulfate (Turbidimetric) as SO4 2-	ED041	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	1	**100.0**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.1**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.3**	**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	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH	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)
Total Dissolved Solids	EA015	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by 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.
Sulfate (Turbidimetric) as SO4 2-	ED041	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are precipitated in an acetic acid medium with barium chloride to form barium sulfate crystals. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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.
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.
Dissolved Metals by ICP-MS - Suite E	EG020E-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.
Silica (Total Dissolved) by ICPAES	EG052	WATER	APHA 21st ed., 4500-SiO2. Silica (Total) determined by calculation from Silicon by ICPAES.

Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO3- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3--F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA Turbidimetric and ICPAES	EN055 - TS	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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)

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							
ED045G: Chloride Discrete analyser	ES0813041-001	TRIPLICATE 3	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES0813041-001	TRIPLICATE 3	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES0813041-001	TRIPLICATE 3	**Zinc**	7440-66-6	68.4 %	70-130%	**Recovery less than lower data quality objective**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005: pH						
Clear Plastic Bottle - Natural						
TRIPLICATE 3	----	----	----	08-SEP-2008	04-SEP-2008	**4**
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural						
TRIPLICATE 3	----	----	----	09-SEP-2008	06-SEP-2008	**3**

Outliers : Frequency of Quality Control Samples

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

- **No Quality Control Sample Frequency Outliers exist.**

CHAIN OF CUSTODY FORM

SKM

From : SKM Pty Ltd
ABN: 37 001 024 085
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

			Container Identification							
		Size	1000ml	250ml	125ml					
		Type	plastic	plastic	plastic					
		Preserv	NO	YES	YES					
LAB USE ONLY	Project No: VE30064	Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC, Sec Acidified	Major Cations, Si and Dissolved Metals					
QUOTE NUMBER	Project Manager: Daniel Pierce									
Job Code:	Sampler(s): Alistair Walsh									
Due Date:	Checked:									
Custody seal intact?	Date: 4/09/2008									
Sample cold?										
Received for Laboratory by:										
Date:										
Time:										

Lab Id	Date	Time	Matrix	Sample Identification	Comments	Tick required analytes						
1	4/09/2008		H20	Triplicate 3		X						
	4/09/2008		H20	Triplicate 3			X					
	4/09/2008		H20	Triplicate 3	Field Filtered			X				
					TOTAL							

Environmental Division
Sydney
Work Order
ES0813041

Telephone : +61-2-8784 8555

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

8/9
8:45

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS. Any questions please call Alistair Walsh on 0430288222

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
	Sample Batch fee			
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	[redacted]
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

CERTIFICATE OF ANALYSIS

Work Order	: **ES0813178**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 10-SEP-2008
Sampler	: AW	Issue Date	: 23-SEP-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EA010-P: Electrical Conductivity may bias low due to matrix interference.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: TRIPLICATE4	TRIPLICATE5	----	----	----
				Client sampling date / time: 10-SEP-2008 09:00	10-SEP-2008 09:00	----	----	----
				ES0813178-001	ES0813178-002	----	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**6.91**	**6.77**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**30900**	**33000**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**22700**	**23600**	----	----	----
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	**320**	**258**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**320**	**258**	----	----	----
ED040F: Dissolved Major Anions								
Silicon	7440-21-3	0.05	mg/L	**7.52**	**7.10**	----	----	----
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**4460**	**4420**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**10900**	**11600**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1110**	**769**	----	----	----
Magnesium	7439-95-4	1	mg/L	**721**	**552**	----	----	----
Sodium	7440-23-5	1	mg/L	**6640**	**7620**	----	----	----
Potassium	7440-09-7	1	mg/L	**67**	**98**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----
Antimony	7440-36-0	0.001	mg/L	**0.006**	**0.004**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.009**	**0.016**	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.072**	**0.043**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.008**	**0.004**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.005**	**0.006**	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Lithium	7439-93-2	0.001	mg/L	**0.306**	**0.484**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.433**	**0.818**	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	**0.118**	**0.006**	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.012**	**0.010**	----	----	----
Selenium	7782-49-2	0.010	mg/L	<0.010	**0.010**	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: TRIPLICATE4	TRIPLICATE5	----	----	----
				Client sampling date / time: 10-SEP-2008 09:00	10-SEP-2008 09:00	----	----	----
				ES0813178-001	ES0813178-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	----	----	----
Strontium	7440-24-6	0.001	mg/L	**14.5**	**13.0**	----	----	----
Thallium	7440-28-0	0.001	mg/L	**0.001**	<0.001	----	----	----
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	----	----	----
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.022**	**0.026**	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.010**	**0.018**	----	----	----
Boron	7440-42-8	0.05	mg/L	**3.64**	**3.92**	----	----	----
Gold	7440-57-5	0.001	mg/L	**0.001**	<0.001	----	----	----
EG020T: Total Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**27.5**	**5.69**	----	----	----
EG052F: Silica by ICPAES								
^ Silica	7631-86-9	0.1	mg/L	**16.1**	**15.2**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.5**	**1.0**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.03**	**0.01**	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.03**	**0.01**	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**34.7**	**1.2**	----	----	----
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**34.7**	**1.3**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**407**	**424**	----	----	----
^ Total Cations	----	0.01	meq/L	**406**	**418**	----	----	----
^ Ionic Balance	----	0.01	%	**0.21**	**0.81**	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**9**	**4**	----	----	----

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **ES0813178**

Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: MR DANIEL PIERCE	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dpierce@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008SINKNI0045 (EN/003/08)
Site	: ----		
Sampler	: AW	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 10-SEP-2008	Issue Date	: 10-SEP-2008 16:56
Client Requested Due Date	: 17-SEP-2008	Scheduled Reporting Date	: **17-SEP-2008**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 4.1'C - Ice present
No. of coolers/boxes	: 1 HARD	No. of samples received	: 2
Sercurity Seal	: Intact.	No. of samples analysed	: 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Breaches in recommended extraction / analysis holding times may occur. Please contact ALS for further information (Nanthini Coilparampil).**
- **Incorrect sampling container has been supplied for TOC analysis therefore sample will be subsampled into the correct 40mL vial from the unpreserved container provided. Please contact a member of our client services team if information is required on the correct containers to use.**
- **Incorrect sampling container has been supplied for Total Fe nalysis therefore sample will be subsampled from the unpreserved container provided. Please contact a member of our client services team if information is required on the correct containers to use.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Nanthini Coilparampil
- Analytical work for this work order will be conducted at ALS Sydney.
- 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.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG020A-T : Total Metals by ICP-MS - Suite A		
TRIPLICATE4	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
TRIPLICATE5	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005: pH pH	WATER - EA010P Conductivity (PC)	WATER - EA015 Total Dissolved Solids	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 - EG020E-F Dissolved Metals by ICPMS - Suite E	WATER - EG052 Silica (Total Dissolved) by ICPAES
ES0813178-001	10-SEP-2008 09:00	TRIPLICATE4	✓	✓	✓	✓	✓	✓	✓	✓
ES0813178-002	10-SEP-2008 09:00	TRIPLICATE5	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EK040-P Fluoride(PC)	WATER - EK057G Nitrite as N by Discrete Analyser	WATER - EK058G Nitrate as N by Discrete Analyser	WATER - EK061G Total Kjeldahl Nitrogen as N (TKN) By Discrete Analyser	WATER - EK062G Total Nitrogen as N (TKN + NOx) By Discrete Analyser	WATER - EN055 - TS Ionic Balance (TS)	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)
ES0813178-001	10-SEP-2008 09:00	TRIPLICATE4	✓	✓	✓	✓	✓	✓	✓	✓
ES0813178-002	10-SEP-2008 09:00	TRIPLICATE5	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - NT-02 Major Anions (Cl, SO4, Alkalinity)
ES0813178-001	10-SEP-2008 09:00	TRIPLICATE4	✓
ES0813178-002	10-SEP-2008 09:00	TRIPLICATE5	✓

Requested Deliverables

MR DANIEL PIERCE

- *AU Certificate of Analysis - NATA	Email	dpierce@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	dpierce@skm.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	dpierce@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	dpierce@skm.com.au
- A4 - AU Tax Invoice	Email	dpierce@skm.com.au
- Default - Chain of Custody	Email	dpierce@skm.com.au
- EDI Format - ENMRG	Email	dpierce@skm.com.au

QUALITY CONTROL REPORT

Work Order	: **ES0813178**	Page	: 1 of 8
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 10-SEP-2008
Sampler	: AW	Issue Date	: 23-SEP-2008
Order number	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 753475)									
ES0813152-014	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.77	7.78	0.1	0% - 20%
ES0813152-023	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.43	7.42	0.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 755582)									
ES0813178-001	TRIPLICATE4	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	30900	30800	0.3	0% - 20%
ES0813306-008	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	417	421	1.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 756728)									
ES0813178-001	TRIPLICATE4	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	22700	21700	4.6	0% - 20%
ES0813231-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	256	260	1.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 755581)									
ES0813178-001	TRIPLICATE4	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	320	319	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	320	319	0.0	0% - 20%
ES0813293-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	26	24	7.6	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	213	216	1.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	239	240	0.6	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 758301)									
ES0813178-001	TRIPLICATE4	ED040F: Silicon	7440-21-3	0.05	mg/L	7.52	7.59	1.0	0% - 20%
ES0813249-010	Anonymous	ED040F: Silicon	7440-21-3	0.05	mg/L	6.21	6.31	1.6	0% - 20%
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 758270)									
ES0813147-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	2	mg/L	2800	2420	14.3	0% - 20%
ES0813201-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	2	mg/L	102	99	3.0	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 754005)									
ES0813116-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1820	1840	0.9	0% - 20%
ES0813162-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	7	7	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 758302)									
ES0813178-001	TRIPLICATE4	ED093F: Calcium	7440-70-2	1	mg/L	1110	1110	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	721	710	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	6640	6730	1.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	67	68	2.0	0% - 20%
ES0813249-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	1	1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	690	688	0.3	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 758302) - continued									
ES0813249-010	Anonymous	ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 757095)									
ES0813178-001	TRIPLICATE4	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	0.006	0.006	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.009	0.007	23.0	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	0.072	0.070	2.2	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	0.008	0.008	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	0.006	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	0.306	0.326	6.3	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.433	0.447	3.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.118	0.118	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.012	0.013	12.9	0% - 50%
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.010	0.011	15.5	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	<0.010	<0.010	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	3.64	3.67	0.6	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 757096)									
ES0813178-001	TRIPLICATE4	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-F: Strontium	7440-24-6	0.001	mg/L	14.5	14.5	0.5	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	0.022	0.022	0.0	0% - 20%
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 757097)									
ES0813178-001	TRIPLICATE4	EG020E-F: Gold	7440-57-5	0.001	mg/L	0.001	<0.001	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 755204)									
ES0813165-009	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
ES0813213-001	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	12.6	12.0	4.6	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 755583)									
ES0813178-001	TRIPLICATE4	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.5	1.5	0.0	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 753625)									
ES0813211-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES0813140-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.08	0.11	25.6	0% - 50%
EK059G: NOX as N by Discrete Analyser (QC Lot: 754010)									

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 (%)*
EK059G: NOX as N by Discrete Analyser (QC Lot: 754010) - continued									
ES0813140-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.89	1.88	0.6	0% - 20%
ES0813211-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.12	0.13	0.0	0% - 50%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 758527)									
ES0813193-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	99.1	98.2	0.9	0% - 20%
ES0813219-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 758607)									
ES0813173-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.0	No Limit
ES0813178-002	TRIPLICATE5	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.0	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 755582)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	99.5	86.3	112
EA015: Total Dissolved Solids (QCLot: 756728)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	105	77.9	122
ED037P: Alkalinity by PC Titrator (QCLot: 755581)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	92.7	80.2	108
ED040F: Dissolved Major Anions (QCLot: 758301)								
ED040F: Silicon	7440-21-3	0.05	mg/L	<0.05	5 mg/L	95.8	85	121
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 758270)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	20 mg/L	105	76.1	126
ED045G: Chloride Discrete analyser (QCLot: 754005)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	99.2	83.7	124
ED093F: Dissolved Major Cations (QCLot: 758302)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.1	82.9	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.9	82.7	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.3	77.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	84.3	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 757095)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	88.1	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.9	79.2	117
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.6	79.2	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	91.7	82	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.4	85.1	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.1	87	117
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.1	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.0	80.6	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.4	84.1	114
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	88.3	78.1	118
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	84	116
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	95.0	79.7	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.7	83	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	----	0.1 mg/L	100	73.5	124
		0.010	mg/L	<0.010	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 757095) - continued								
EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	0.1 mg/L	111	82.5	118
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	99.1	77.7	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	97.0	86.2	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.7	81.1	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	95.6	74.7	119
EG020F: Dissolved Metals by ICP-MS (QCLot: 757096)								
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	98.1	85.3	110
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	97.2	87.8	109
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 757097)								
EG020E-F: Gold	7440-57-5	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 755204)								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	75.3	113
EK040P: Fluoride by PC Titrator (QCLot: 755583)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	97.2	64.8	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 753625)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.96 mg/L	94.2	65.1	129
EK059G: NOX as N by Discrete Analyser (QCLot: 754010)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.96 mg/L	111	76.9	122
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 758527)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	85.0	62.4	140
EP005: Total Organic Carbon (TOC) (QCLot: 758607)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	93.2	86.9	125

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 754005)							
ES0813116-003	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 757095)							
ES0813178-001	TRIPLICATE4	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	94.3	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	74.3	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	106	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	87.5	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	96.2	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	94.1	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	81.0	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	98.6	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	85.8	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	87.1	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	98.9	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	70.0	70	130
EK040P: Fluoride by PC Titrator (QCLot: 755583)							
ES0813293-002	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	99.0	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 753625)							
ES0813211-001	Anonymous	EK057G: Nitrite as N	----	0.60 mg/L	89.0	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 754010)							
ES0813140-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	6 mg/L	75.7	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 758527)							
ES0813193-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 758607)							
ES0813173-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	100	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0813178**	Page	: 1 of 8
Client	: SINCLAIR KNIGHT MERZ	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 10-SEP-2008
Sampler	: AW	Issue Date	: 23-SEP-2008
Order number	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**----**	----	----	**10-SEP-2008**	10-SEP-2008	✓
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**---**	---	----	**12-SEP-2008**	08-OCT-2008	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**----**	----	----	**14-SEP-2008**	17-SEP-2008	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**---**	---	----	**12-SEP-2008**	24-SEP-2008	✓
ED040F: Dissolved Major Anions								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**---**	---	----	**16-SEP-2008**	08-OCT-2008	✓
ED041: Sulfate (Turbidimetric) as SO4 2-								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**----**	----	----	**17-SEP-2008**	08-OCT-2008	✓
ED045G: Chloride Discrete analyser								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**----**	----	----	**11-SEP-2008**	08-OCT-2008	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**---**	---	----	**16-SEP-2008**	08-OCT-2008	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**---**	---	----	**15-SEP-2008**	09-MAR-2009	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**12-SEP-2008**	09-MAR-2009	✓	**12-SEP-2008**	09-MAR-2009	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**---**	---	----	**12-SEP-2008**	08-OCT-2008	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**----**	----	----	**10-SEP-2008**	12-SEP-2008	✓
EK059G: NOX as N by Discrete Analyser								
Clear Plastic Bottle - Sulphuric Acid								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**----**	----	----	**11-SEP-2008**	08-OCT-2008	✓
EK061: Total Kjeldahl Nitrogen (TKN)								
Clear Plastic Bottle - Sulphuric Acid								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**16-SEP-2008**	08-OCT-2008	✓	**16-SEP-2008**	08-OCT-2008	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulphuric Acid								
TRIPLICATE4,	TRIPLICATE5	**10-SEP-2008**	**----**	----	----	**16-SEP-2008**	08-OCT-2008	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	3	**33.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	8	**25.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	17	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	15	**13.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	3	**33.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	17	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Conductivity by PC Titrator	EA010-P	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	3	**33.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	8	**12.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	17	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	3	**33.3**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	**20.0**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	**7.7**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH	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)
Total Dissolved Solids	EA015	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by 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.
Sulfate (Turbidimetric) as SO4 2-	ED041	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are precipitated in an acetic acid medium with barium chloride to form barium sulfate crystals. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite E	EG020E-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.
Silica (Total Dissolved) by ICPAES	EG052	WATER	APHA 21st ed., 4500-SiO2. Silica (Total) determined by calculation from Silicon by ICPAES.
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO3- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3--F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA Turbidimetric and ICPAES	EN055 - TS	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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							
ED045G: Chloride Discrete analyser	ES0813116-003	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK061: Total Kjeldahl Nitrogen (TKN)	ES0813193-001	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

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

- **No Quality Control Sample Frequency Outliers exist.**

CHAIN OF CUSTODY FORM

ALS

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY
QUOTE NUMBER
Job Code:
Due Date:
Custody seal intact?
Sample cold? 4 + 1 C
Received for Laboratory by: BM
Date: 10/9
Time: 9:00

Project No: VE30064
Project Manager: Daniel Pierce
Sampler(s): Alistair Walsh Jack Ashby
Checked:
Date: 9/09/2008

						Container Identification						
					Size	1000ml	250ml	125ml				
					Type	plastic	plastic	plastic				
					Preserv	NO	YES	YES				
					Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC + see attached	Major Cations, Si and Dissolved Metals				
Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
1	8/09/2008		H20	Triplicate 4			X						
	8/09/2008		H20	Triplicate 4				X					
	8/09/2008		H20	Triplicate 4	Field Filtered				X				
2	9/09/2008		H20	Triplicate 5			X						
	9/09/2008		H20	Triplicate 5				X					
	9/09/2008		H20	Triplicate 5	Field Filtered				X				
						TOTAL							

Environmental Division
Sydney
Work Order
ES0813178

Telephone : +61-2-8784 8555

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS. Any questions please call Alistair Walsh on 0430288222

CHAIN OF CUSTODY FORM

ALS

SKM

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY
QUOTE NUMBER
Job Code:
Due Date:
Custody seal intact?
Sample cold? 4 1°C
Received for Laboratory by:
Date: 10/9
Time: 9:00

Project No: VE30064
Project Manager: Daniel Pierce
Sampler(s): Alistair Walsh Jack Ashby
Checked:
Date: 9/09/2008

	Container Identification						
Size	1000ml	250ml	125ml				
Type	plastic	plastic	plastic				
Preserv	NO	YES	YES				
Analytes	Major anions, TDS, pH, EC, Fl, NO3, NO2, Total Nitrogen and TKN	TOC + see attached	Major Cations, Si and Dissolved Metals				

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
(1)	8/09/2008		H20	Triplicate 4			X						
	8/09/2008		H20	Triplicate 4				X					
	8/09/2008		H20	Triplicate 4	Field Filtered				X				
(2)	9/09/2008		H20	Triplicate 5			X						
	9/09/2008		H20	Triplicate 5				X					
	9/09/2008		H20	Triplicate 5	Field Filtered				X				
						TOTAL							

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Sydney
Work Order
ES0813178

Telephone : +61-2-8784 8555

Notes:

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS. Any questions please call Alistair Walsh on 0430288222

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

CERTIFICATE OF ANALYSIS

Work Order	: **ES0813421**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 12-SEP-2008
Sampler	: ----	Issue Date	: 23-SEP-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics
Victor Kedicioglu	Business Manager - NSW	Inorganics

General Comments

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

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

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

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

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

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

- **EG020A-F & T: LOR's have been raised due to saline sample.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: TRIPLICATE 6	----	----	----	----
				Client sampling date / time: 10-SEP-2008 15:00	----	----	----	----
				ES0813421-001	----	----	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**6.19**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**54000**	----	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**41000**	----	----	----	----
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	**185**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**185**	----	----	----	----
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**3790**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**22800**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1150**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**851**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**14000**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**201**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.10	----	----	----	----
Antimony	7440-36-0	0.001	mg/L	<0.010	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.053**	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.010	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.086**	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0010	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.010	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.010	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.010	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.010	----	----	----	----
Lithium	7439-93-2	0.001	mg/L	**3.40**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.504**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.010	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.010	----	----	----	----
Selenium	7782-49-2	0.010	mg/L	<0.050	----	----	----	----
Thallium	7440-28-0	0.001	mg/L	<0.010	----	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.010	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: TRIPLICATE 6	----	----	----	----
				Client sampling date / time: 10-SEP-2008 15:00	----	----	----	----
				ES0813421-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Vanadium	7440-62-2	0.01	mg/L	<0.10	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.050	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**7.42**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Iron	7439-89-6	0.05	mg/L	**7.35**	----	----	----	----
EG052G: Silica by Discete Analyser								
Silica	7631-86-9	0.10	mg/L	**19.7**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.6**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**5.8**	----	----	----	----
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**5.8**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**725**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**744**	----	----	----	----
^ Ionic Balance	----	0.01	%	**1.25**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**15**	----	----	----	----

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **ES0813421**

Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008SINKNI0045 (EN/003/08)
Site	: ----		
Sampler	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 12-SEP-2008	Issue Date	: 15-SEP-2008 08:30
Client Requested Due Date	: 22-SEP-2008	Scheduled Reporting Date	: **22-SEP-2008**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 19.1' C - Ice bricks present
No. of coolers/boxes	: 1 FOAM	No. of samples received	: 1
Sercurity Seal	: Intact.	No. of samples analysed	: 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Breaches in recommended extraction / analysis holding times may occur. Please contact ALS for further information (Nanthini Coilparampil).**
- **Due to inappropriate preseved container supplied for total Iron, the analysis to be conducted from the natural bottle.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Nanthini Coilparampil
- Analytical work for this work order will be conducted at ALS Sydney.
- 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.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG020A-T : Total Metals by ICP-MS - Suite A		
TRIPLICATE 6	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA005: pH pH	WATER - EA010P Conductivity (PC)	WATER - EA015 Total Dissolved Solids	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 - EG020E-F Dissolved Metals by ICPMS - Suite E	WATER - EG052G Silica by Discrete Analyser
ES0813421-001	10-SEP-2008 15:00	TRIPLICATE 6	✓	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EK040-P Fluoride(PC)	WATER - EN055 - TS Ionic Balance (TS)	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Cl, SO4, Alkalinity)	WATER - NT-06 Total Nitrogen + NO2 + NO3
ES0813421-001	10-SEP-2008 15:00	TRIPLICATE 6	✓	✓	✓	✓	✓	✓

Requested Deliverables

mr ALISTAIR WALSH

- *AU Certificate of Analysis - NATA	Email	awalsh@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	awalsh@skm.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	awalsh@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	awalsh@skm.com.au
- Default - Chain of Custody	Email	awalsh@skm.com.au
- EDI Format - ENMRG	Email	awalsh@skm.com.au

MR DANIEL PIERCE

- *AU Certificate of Analysis - NATA	Email	dpierce@skm.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep)	Email	dpierce@skm.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA	Email	dpierce@skm.com.au
- A4 - AU Sample Receipt Notification - Environmental	Email	dpierce@skm.com.au
- A4 - AU Tax Invoice	Email	dpierce@skm.com.au
- Default - Chain of Custody	Email	dpierce@skm.com.au
- EDI Format - ENMRG	Email	dpierce@skm.com.au

QUALITY CONTROL REPORT

Work Order	: **ES0813421**	Page	: 1 of 7
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 12-SEP-2008
Sampler	: ----	Issue Date	: 23-SEP-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics
Victor Kedicioglu	Business Manager - NSW	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 757637)									
ES0813248-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	6.66	6.69	0.4	0% - 20%
ES0813435-006	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.45	7.49	0.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 758653)									
ES0813408-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	232	233	0.4	0% - 20%
ES0813408-010	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	432	435	0.7	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 758479)									
ES0813262-023	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	6440	6820	5.7	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 758655)									
ES0813408-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	111	110	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	111	110	0.0	0% - 20%
ES0813408-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	174	171	1.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	174	171	1.7	0% - 20%
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 760763)									
ES0813408-007	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	85	87	2.3	0% - 20%
ES0813446-003	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12	12	0.0	0% - 50%
ED045G: Chloride Discrete analyser (QC Lot: 757295)									
ES0813319-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	69	68	0.0	0% - 20%
ES0813408-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	5	5	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 759608)									
ES0813408-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	182	181	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	101	102	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	81	80	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	7	7	0.0	No Limit
ES0813419-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	6	6	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 757095)									
ES0813178-001	Anonymous	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	0.006	0.006	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 757095) - continued									
ES0813178-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.009	0.007	23.0	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	0.072	0.070	2.2	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	0.008	0.008	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	0.006	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	0.306	0.326	6.3	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.433	0.447	3.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.118	0.118	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.012	0.013	12.9	0% - 50%
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.010	0.011	15.5	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	<0.010	<0.010	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	3.64	3.67	0.6	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 759601)									
ES0813319-001	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	0.20	0.19	6.1	No Limit
ES0813396-001	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	3.13	3.17	1.2	0% - 20%
EG052G: Silica by Discete Analyser (QC Lot: 758062)									
EM0807542-001	Anonymous	EG052G: Silica	7631-86-9	0.10	mg/L	<0.10	0.13	26.1	No Limit
ES0813374-011	Anonymous	EG052G: Silica	7631-86-9	0.10	mg/L	1.05	1.05	0.0	0% - 50%
EK040P: Fluoride by PC Titrator (QC Lot: 758654)									
ES0813408-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.0	No Limit
ES0813408-010	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 757936)									
ES0813421-001	TRIPLICATE 6	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES0813446-018	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.01	<0.01	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 757291)									
ES0813338-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.0	No Limit
ES0813408-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.0	No Limit
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 762131)									
ES0813399-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.4	2.8	15.4	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 762202)									
ES0813408-008	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	36	35	3.0	0% - 20%

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 758653)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	100	86.3	112
EA015: Total Dissolved Solids (QCLot: 758479)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	100	77.9	122
ED037P: Alkalinity by PC Titrator (QCLot: 758655)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	95.8	80.2	108
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 760763)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	20 mg/L	99.3	76.1	126
ED045G: Chloride Discrete analyser (QCLot: 757295)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	94.8	83.7	124
ED093F: Dissolved Major Cations (QCLot: 759608)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.5	82.9	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.6	82.7	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	92.4	77.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.5	84.3	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 757095)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	88.1	116
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.9	79.2	117
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.6	79.2	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	91.7	82	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.4	85.1	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.1	87	117
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.1	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.0	80.6	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.4	84.1	114
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	88.3	78.1	118
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	84	116
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	95.0	79.7	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.7	83	115
EG020A-F: Selenium	7782-49-2	0.01	mg/L	----	0.1 mg/L	100	73.5	124
		0.010	mg/L	<0.010	----	----	----	----
EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	0.1 mg/L	111	82.5	118
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	99.1	77.7	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	97.0	86.2	112

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 757095) - continued								
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.7	81.1	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	95.6	74.7	119
EG020T: Total Metals by ICP-MS (QCLot: 759601)								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.0	75.3	113
EG052G: Silica by Discete Analyser (QCLot: 758062)								
EG052G: Silica	7631-86-9	0.1	mg/L	----	21.4 mg/L	76.4	70	130
		0.10	mg/L	<0.10	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 758654)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	99.4	64.8	115
EK057G: Nitrite as N by Discrete Analyser (QCLot: 757936)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.96 mg/L	101	65.1	129
EK059G: NOX as N by Discrete Analyser (QCLot: 757291)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.96 mg/L	107	76.9	122
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 762131)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	101	62.4	140
EP005: Total Organic Carbon (TOC) (QCLot: 762202)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	91.4	86.9	125

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 757295)							
ES0813319-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	91.0	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 757095)							
ES0813178-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	94.3	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	74.3	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	106	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	87.5	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	96.2	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	94.1	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	81.0	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	98.6	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	85.8	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	87.1	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	98.9	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	70.0	70	130
EG052G: Silica by Discete Analyser (QCLot: 758062)							
EM0807542-001	Anonymous	EG052G: Silica	7631-86-9	5.0 mg/L	79.4	70	130
EK040P: Fluoride by PC Titrator (QCLot: 758654)							
ES0813408-006	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	104	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 757936)							
ES0813421-001	TRIPLICATE 6	EK057G: Nitrite as N	----	0.60 mg/L	116	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 757291)							
ES0813338-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.60 mg/L	94.5	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 762131)							
ES0813399-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	98.0	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 762202)							
ES0813408-009	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	95.0	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0813421**	Page	: 1 of 8
Client	: SINCLAIR KNIGHT MERZ	Laboratory	: Environmental Division Sydney
Contact	: mr ALISTAIR WALSH	Contact	: Charlie Pierce
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: awalsh@skm.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 8424 3810	Facsimile	: +61-2-8784 8500
Project	: VE30064	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 12-SEP-2008
Sampler	: ----	Issue Date	: 23-SEP-2008
Order number	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**----**	----	----	**15-SEP-2008**	10-SEP-2008	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**---**	---	----	**16-SEP-2008**	08-OCT-2008	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**----**	----	----	**16-SEP-2008**	17-SEP-2008	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**---**	---	----	**16-SEP-2008**	24-SEP-2008	✓
ED041: Sulfate (Turbidimetric) as SO4 2-							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**----**	----	----	**18-SEP-2008**	08-OCT-2008	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**----**	----	----	**15-SEP-2008**	08-OCT-2008	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**---**	---	----	**17-SEP-2008**	08-OCT-2008	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered							
TRIPLICATE 6	**10-SEP-2008**	**---**	---	----	**15-SEP-2008**	09-MAR-2009	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**17-SEP-2008**	09-MAR-2009	✓	**18-SEP-2008**	09-MAR-2009	✓
EG052G: Silica by Discete Analyser							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**----**	----	----	**15-SEP-2008**	08-OCT-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**---**	---	----	**16-SEP-2008**	08-OCT-2008	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
TRIPLICATE 6	**10-SEP-2008**	**----**	----	----	**15-SEP-2008**	12-SEP-2008	×
EK059G: NOX as N by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid							
TRIPLICATE 6	**10-SEP-2008**	**----**	----	----	**15-SEP-2008**	08-OCT-2008	✓
EK061: Total Kjeldahl Nitrogen (TKN)							
Clear Plastic Bottle - Sulphuric Acid							
TRIPLICATE 6	**10-SEP-2008**	**19-SEP-2008**	08-OCT-2008	✓	**19-SEP-2008**	08-OCT-2008	✓
EP005: Total Organic Carbon (TOC)							
Clear Plastic Bottle - Sulphuric Acid							
TRIPLICATE 6	**10-SEP-2008**	**----**	----	----	**19-SEP-2008**	08-OCT-2008	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	10	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	3	**33.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	10	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	5	**20.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	4	**25.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	4	**25.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	3	**33.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	4	**25.0**	**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 Organic Carbon	EP005	1	4	**25.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Conductivity by PC Titrator	EA010-P	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	3	**33.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite E	EG020E-F	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	4	**25.0**	**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 Organic Carbon	EP005	1	4	**25.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	3	**33.3**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	11	**9.1**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	10	**10.0**	**5.0**	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	4	**25.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	4	**25.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	APHA 21st ed. 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids	EA015	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by 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)
Sulfate (Turbidimetric) as SO4 2-	ED041	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are precipitated in an acetic acid medium with barium chloride to form barium sulfate crystals. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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.
Dissolved Metals by ICP-MS - Suite E	EG020E-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.

Analytical Methods	Method	Matrix	Method Descriptions
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acdic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by seal at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO3- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3--F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA Turbidimetric and ICPAES	EN055 - TS	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005: pH						
Clear Plastic Bottle - Natural						
TRIPLICATE 6	----	----	----	15-SEP-2008	10-SEP-2008	**5**
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural						
TRIPLICATE 6	----	----	----	15-SEP-2008	12-SEP-2008	**3**

Outliers : Frequency of Quality Control Samples

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

- **No Quality Control Sample Frequency Outliers exist.**

CHAIN OF CUSTODY FORM

SKM

1/2

From : SKM Pty Ltd
ABN: 37 001 024 095
Level 5, 33 King William St, Adelaide, SA 5000
ph: (08) 8424 3800 fax: (08) 8424 3810

LAB USE ONLY
QUOTE NUMBER
Job Code:
Due Date:
Custody seal intact?
Sample cold?
Received for Laboratory by:
Date:
Time:

Project No: VE30064
Project Manager: Daniel Pierce
Sampler(s): Allstair Walsh / Tom Kelly
Checked:
Date: 11/09/2008

	Container Identification						
Size	1000ml	250ml	125ml				
Type	plastic	plastic	plastic				
Preserv	NO	YES	YES				
Analytes	Major anions, TDS, pH, EC, Fl, NO_3, NO_2, Total Nitrogen and TKN	TOC + see attached	Major Cations, Si and Dissolved Metals				

Lab Id	Date	Time	Matrix	Sample Identification	Comments		Tick required analytes						
1	10/09/2008		H20	Triplicate 6			X						
	10/09/2008		H20	Triplicate 6				X					
	10/09/2008		H20	Triplicate 6	Field Filtered				X				
					TOTAL								

Environmental Division
Sydney
Work Order
ES0813421

Telephone : +61-2-8784 8555

Notes:

Received by: Tom 12/9/08 11:20am

Please email awalsh@skm.com.au and dpierce@skm.com.au reults and upon receival of samples

See attached spreadsheet for full breakdown of analytes required. Please analyse all dissolved metals using ICP-MS. Any questions please call Alistair Walsh on 0430288222

Sample Analytes List

	Analytes	Limits of Reporting (LOR)	Maximum holding time	Comments
Sample Batch fee				
Major Cations (mg/L)	Calcium (Ca)	1 mg/L	7 days	
	Magnesium (Mg)			
	Sodium (Na)			
	Potassium (K)			
Major Anions (mg/L)	Calcium Carbonate ($CaCO_3$)	1 mg/L	48 Hrs	
	Sulphate (SO_4)			
	Chloride (Cl)			
	Carbonate (CO_3)	1 mg/L		
	Bicarbonate (HCO_3)	1 mg/L		
	TDS (mg/L)	1 mg/L	28 days	
	EC (uS/cm)		28 days	
	pH (units)	0.01 pH unit	6-12 hrs	Measure+G39 in field
	Fluoride			
	Silica (Si)			
Dissolved Metals (mg/L)	Aluminum (Al)	10 µg/L	6 months	Ultra trace metals dissolved in saline water by ORC/ICP/MS
	Antimony (Sb)	0.5 µg/L	6 months	
	Arsenic (As)	0.5 µg/L	6 months	
	Barium (Ba)	5 µg/L	6 months	
	Beryllium (Be)	0.1 µg/L	6 months	
	Boron (B)	100 µg/L	6 months	
	Cadmium (Cd)	0.2 µg/L	6 months	
	Chromium (Cr)	0.5 µg/L	6 months	
	Cobalt (Co)	0.2 µg/L	6 months	
	Copper (Cu)	5 µg/L	6 months	
	Gold (Ag)	0.1 µg/L	6 months	
	Lead (Pb)	0.2 µg/L	6 months	
	Lithium (Li)	5 µg/L	6 months	
	Manganese (Mn)	0.5 µg/L	6 months	
	Molybdenum (Mo)	0.1 µg/L	6 months	
	Nickel (Ni)	0.5 µg/L	6 months	
	Selenium (Se)	5 µg/L	6 months	
	Strontium (Sr)	10 µg/L	6 months	
	Thallium (Tl)	0.1 µg/L	6 months	
	Thorium (Th)	0.1 µg/L	6 months	
	Tin (Sn)	5 µg/L	6 months	
	Titanium (Ti)	5 µg/L	6 months	
	Uranium (U)	0.1 µg/L	6 months	
	Vanadium (V)	0.5 µg/L	6 months	
	Zinc (Zn)	5 µg/L	6 months	
	Iron - total (Fe)	5 µg/L	6 months	ICP OES
Nutrients (mg/L)	Nitrite as N (NO_2)	0.01 mg/L	48 hrs	measured together
	Nitrate as N (NO_3)	0.01 mg/L	48 hrs	
	Total Nitrogen	0.01 mg/L	28 days	
	Total Organic Carbon (TOC)	1 mg/L	28 days	
	Total Kjeldahl Nitrogen (TKN)	0.1 mg/L	28 days	
		Cost/sample		

Total Cost

Note: If highly saline, samples may require a 1:5 x dilution therfore LORs raised by a factor of 5 times
1 in every 10 sample required for laboratory duplicate to comply with QA/QC
1 in every 20 samples required for inter laboratory testing for QA/QC

Australian Radiation Services Pty Ltd
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Email: info@australian-radiation-services.com.au
Web Site: www.australian-radiation-services.com.au
ABN 66 006 528 267

Keeping people safe.

Radioactivity Analysis Report

To: Sinclair Knight Merz
Level 6/ 33 King William Street
Adelaide SA 5000

Report No.: 08-7079-R1
Date: 8th August 2008

Contact: Mr. Daniel Pierce

Sample description: Liquid

Number of samples: Five

Submission date: 17th June 2008

Analysis required: Determination of the activity of radium-226 (Ra-226) by liquid scintillation counting.

Analytical method: Filtration of heavy sediments followed by determination of radium-226 carried out by liquid scintillation counting after preliminary radiochemical separation to isolate radium isotopes.

Analysis performed by: Ms. Genelle Jones

Results:

Client Sample ID (ARS ID)	Radium-226 Activity Concentration ($Bq \cdot L^{-1}$)[a,b,c]
H1-1 (08-7079-01)	0.44 ± 0.05
H3-1 (08-7079-02)	0.03 ± 0.02
H3-2 (08-7079-03)	0.35 ± 0.04
Duplicate (08-7079-04)	0.36 ± 0.04
LT02/ LP2 (08-7079-05)	0.71 ± 0.08

NB:
a. Activities are in becquerel (Bq) per Litre. One becquerel equals one nuclear transformation per second.
b. Less than (<) values indicate the limit of detection for each isotope for the measurement system.
c. The reported uncertainty in each result is the expanded uncertainty calculated using a coverage factor of 2.

Australian Radiation Services Pty Ltd
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Email: info@australian-radiation-services.com.au
Web Site: www.australian-radiation-services.com.au
ABN 66 006 528 267

Keeping people safe.

Radioactivity Analysis Report

To: Sinclair Knight Merz
Level 6/ 33 King William Street
Adelaide SA 5000

Report No.: 09-1-069-R1
Date: 18th September 2008

Contact: Mr. Daniel Pierce

Sample description: Liquid

Number of samples: Ten

Submission date: 1st August 2008

Analysis required: Determination of the activity of radium-226 (Ra-226) by liquid scintillation counting.

Analytical method: Filtration of heavy sediments followed by determination of radium-226 carried out by liquid scintillation counting after preliminary radiochemical separation to isolate radium isotopes.

Analysis performed by: Ms. Genelle Jones

Results:

Client Sample ID (ARS ID)	Radium-226 Activity Concentration ($Bq \cdot L^{-1}$)[a,b,c]
LR1 Monitoring Well (09-1-069-01)	0.21 ± 0.03
LR2 Monitoring Well (09-1-069-02)	0.08 ± 0.01
LR8 Monitoring Well (09-1-069-03)	0.22 ± 0.03
LR9 Monitoring Well (09-1-069-04)	0.21 ± 0.03
LT19 Monitoring Well (09-1-069-05)	0.50 ± 0.05
LT41 Monitoring Well (09-1-069-06)	0.75 ± 0.08
PT24a Monitoring Well (09-1-069-07)	< 0.02
RT16a Monitoring Well (09-1-069-08)	0.66 ± 0.07
RT17a Monitoring Well (09-1-069-09)	0.03 ± 0.01
Duplicate Monitoring Well (09-1-069-10)	0.64 ± 0.07

NB: a. Activities are in becquerel (Bq) per Litre. One becquerel equals one nuclear transformation per second.
b. Less than (<) values indicate the limit of detection for each isotope for the measurement system.
c. The reported uncertainty in each result is the expanded uncertainty calculated using a coverage factor of 2.

AUSTRALIAN RADIATION SERVICES PTY. LTD.

Report prepared by:	Ms. Genelle Jones Radiochemist	**Signed:**
Reviewed by:	Dr. Malcolm Cooper Consultant Environmental Scientist	**Signed:**
Date:	18th September 2008	

Project No:	VE30064
Site:	BHP-B Olympic Dam
Matrix:	GROUNDWATER
Primary Laboratory:	Labmark (Batch No's. E0388250, E038205, E038811, 08ENME0020073, 08ENME0021986, 08ENME0021703, 08ENME0021863, 08ENME0022217, 08ENME0022255, 08ENME0021268, 08ENME0021450, 08ENME0023416, 08ENME0023714, 08ENME0024196 & 08ENME0024479)
Secondary Laboratory:	ALS (Batch No's. EM0806112, ES0810866001, ES0811987, ES0812254, ES0813041,)
No. of Tests Requested/ Reported:	54 for Dissolved metals, pH, EC, TDS, Silica, Major Cations (Ca, Mg, Na, K), Major Anions (Cl, SO4, HCO3, CO3), Nutrients (NO2, NO3, Total Nitrogen, TOC, TKN), Acidity (as CaCO3), and Alkalinity (OH, HCO3, CO3).
Frequency of QA/QC undertaken:	6 in 54 samples duplicated (inter and intra laboratory)
Frequency of QA/QC Required:	1 in 10 samples are required to be duplicated

Data Quality Issue Assessed	Issue Reviewed	Results Acceptable	Comments
Sampling Technique	✓	✓	
Sample Holding Times	✓	✓	
Analytical Procedures	✓	✓	
Laboratory Limits of Reporting (below relevant guideline value)	✓	✓	See Note 1
Field Duplicate Agreement (RPD%)	✓	✓	See Note 2
Blank Sample Analysis			
Method Blank	✓	✓	
Rinsate Blank	✓	✓	
Equipment Blank	NA	NA	
Laboratory Duplicate Agreement (RPD%)	✓	✓	
Matrix Spikes/Matrix Spike Duplicates			
Recovery Percentages	✓	✓	
Duplicate Agreement (RPD%)	✓	✓	
Surrogate Recoveries	✓	✓	
Other Issues (i.e Trip Blank)	✓	✓	

Other Observations:

Note:1 LOR for certain metal species were not low enough to encompass guideline value, particularly chromium, but also arsenic however it is unlikely that this signficantly affects the outcome of the investigation due to the exceedances noted elsewhere.

Note 2: Field duplicate agreement was generally sound although the cation / anion equilibria may have caused some differences within individual samples.

Summary Comments:

Groundwater analytical data can be used as a basis of interpretation subject to the limitations outlined above.

Recommended Corrective Action:

None

				Sample	PT60	DUP2	RPD%	DUP2	RPD%	LR10	DUP 5	RPD%	DUP 5	RPD%	LP2	DUP 6	RPD%	TRIPLICATE 3	RPD%
				Date	17/08/2008	17/08/2008		17/08/2008		20/08/2008	20/08/2008		20/08/2008		4/09/2008	4/09/2008		4/09/2008	
				Lab Report	08ENME0021863	08ENME0021863		ES0811987		08ENME0022255	08ENME0022255		ES0812254		08ENME0023714	08ENME0023714		ES0813041	
				Laboratory	Labmark	Labmark		ALS		Labmark	Labmark		ALS		Labmark	Labmark		ALS	
Analyte	Units	Labmark LOR	ALS LOR																
pH Value and Total Dissolved Solids																			
pH	pH Unit	0.1	0.01	6.9	6.9	0	6.64	3.84	7.1	7.1	0	6.56	7.91	6.7	6.8	1.48	6.74	0.60	
TDS	mg/L	1	1	24000	24000	0	25100	4.48	37000	37000	0	37500	1.34	22000	23000	4.44	21000	4.65	
Electrical conductivity	uS/cm	20	1	29300	29500	0.68	30200	3.03	37500	37200	0.80	43400	14.59	25200	25400	0.79	29400	15.38	
Alkalinity																			
Hydroxide as CaCO3	mg/L	5	1	-	-	-	<1	-	-	-	-	<1	-	-	-	-	<1	-	
Carbonate as CACO3	mg/L	5	1	<1	<1	-	<1	-	0	0	-	<1	-	<1	<1	-	<1	-	
Bicarbonate as CACO3	mg/L	5	1	259.4	280.1	7.67	337	26.02	260	250	3.92	248	4.72	920	940	2.15	949	3.10	
Total Alkalinity as CACO3	mg/L	5	1	259.39	280.08	7.67	337	26.03	260	250	3.92	248	4.72	920	940	2.15	949	3.10	
Acidity																			
Calcium	mg/L	0.1	1	880	900	2.25	877	0.34	1080	1130	4.52	1080	0	800	799	0.13	785	1.89	
Iron	mg/L	0.1		63.4	50.8	22.07	-	-	3.23	3.41	5.42	-	-	15.6	15.6	0	14.2	9.40	
Magnesium	mg/L	0.1	1	600	595	0.84	585	2.53	938	992	5.60	922	1.72	850	852	0.24	801	5.94	
Sodium	mg/L	0.1	1	7600	7600	0	7630	0.39	11100	11600	4.41	10900	1.82	6510	6330	2.80	6610	1.52	
Potassium	mg/L	0.1	1	96	82	15.73	95	1.05	100	100	0	71	33.92	61	62	1.63	63	3.23	
Total Metals																			
Iron	mg/L	0.1	0.01	-	-	-	51.4	-	-	-	-	5.72	-			-		-	
Dissolved Metals																			
Aluminium	mg/L	0.001	0.01	0.019	0.036	**61.82**	0.02	5.13	0.0028	<0.001	-	<0.10	-	0.024	0.018	28.57	0.02	18.18	
Antimony	mg/L	0.001	0.001	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.010	-	<0.001	<0.001	-	<0.001	-	
Arsenic	mg/L	0.001	0.001	<0.005	<0.005	-	0.013	-	<0.001	<0.001	-	<0.010	-	<0.001	<0.001	-	<0.001	-	
Barium	mg/L	0.001	0.001	0.044	0.04	9.52	0.036	20	0.034	0.035	2.90	0.022	42.86	0.018	0.019	5.41	0.016	11.76	
Beryllium	mg/L	0.001	0.001	<0.005	<0.005	-	<0.001	-	<0.001	<0.001	-	<0.010	-	<0.001	<0.001	-	0.002	-	
Boron	mg/L	0.001	0.05	6	6.6	9.52	5.02	17.79	6.7	6.9	2.94	5.66	16.83	12	12	0	6.47	**59.88**	
Cadmium	mg/L	0.0002	0.0001	<0.002	<0.002	-	<0.0001	-	<0.0002	<0.0002	-	<0.0010	-	<0.0002	<0.0002	-	0.0009	-	
Chromium	mg/L	0.001	0.001	0.0063	0.0072	13.33	<0.001	-	<0.001	<0.001	-	<0.010	-	0.0068	0.0087	24.52	<0.001	-	
Cobalt	mg/L	0.001	0.001	<0.005	<0.005	-	0.002	-	0.0055	0.005	9.52	<0.010	-	0.067	0.066	1.50	0.054	21.49	
Copper	mg/L	0.001	0.001	0.008	0.0072	10.53	0.004	**66.67**	0.01	0.011	9.52	<0.020	-	0.084	0.093	10.17	0.088	4.65	
Lead	mg/L	0.001	0.001	<0.005	<0.005	-	0.002	-	<0.001	<0.001	-	<0.010	-	<0.001	<0.001	-	0.005	-	
Lithium	mg/L	0.001	0.001	0.66	0.69	4.44	0.484	30.77	0.37	0.34	8.45	0.325	12.95	0.88	0.87	1.14	0.856	2.76	
Manganese	mg/L	0.001	0.001	1.4	1.4	0	1.13	21.34	0.55	0.53	3.70	0.59	7.02	2.8	2.7	3.64	2.2	24.00	
Molybdenum	mg/L	0.001	0.001	<0.005	<0.005	-	0.004	-	<0.001	<0.001	-	<0.010	-	<0.001	<0.001	-	<0.001	-	
Nickel	mg/L	0.001	0.001	0.013	0.013	0	<0.005	-	0.012	0.014	15.38	<0.010	-	0.031	0.029	6.67	0.015	**69.57**	
Selenium	mg/L	0.001	0.01	0.048	0.046	4.26	<0.010	-	0.052	0.053	1.90	<0.100	-	0.038	0.036	5.41	<0.010	-	
Strontium	mg/L	0.001	0.001	11	11	0	11.2	1.80	20	19	5.13	16.8	17.39	14	13	7.41	13.2	5.88	
Thallium	mg/L	0.001	0.001	<0.005	<0.005	-	<0.001	-	<0.001	<0.001	-	<0.010	-	<0.001	<0.001	-	<0.001	-	
Thorium	mg/L	0.001	0.001	<0.005	<0.005	-	<0.001	-	-	-	-	<0.010	-	-	-	-	<0.001	-	
Tin	mg/L	0.001	0.001	<0.005	<0.005	-	<0.001	-	<0.001	<0.001	-	<0.010	-	<0.001	<0.001	-	0.001	-	
Titanium	mg/L	0.001	0.01	0.013	0.0093	33.18	<0.01	-	0.024	0.025	-	<0.10	-	0.0038	0.0029	26.87	<0.01	-	
Uranium	mg/L	0.001	0.001	<0.005	<0.005	-	0.002	-	0.057	0.058	1.74	0.045	23.53	0.074	0.077	3.97	0.103	32.77	
Vanadium	mg/L	0.001	0.01	<0.005	<0.005	-	<0.01	-	<0.001	<0.001	-	<0.10	-	0.0014	0.0017	19.35	<0.01	-	
Zinc	mg/L	0.001	0.005	0.11	0.096	13.59	0.047	**80.25**	0.096	0.11	13.59	0.078	20.69	0.079	0.076	3.87	0.046	**52.80**	
Gold	mg/L	0.01	0.001	-	-	-	<0.001	-	-	-	-	<0.010	-	-	-	-	0.001	-	
Silica																			
Silica	mg/L	1		15.2	15.5	1.95	9.8	43.20	15	14.9	0.67	14.2	5.48	29.5	29.3	0.68	29.8	1.01	
Sulphate																			
Sulphate	mg/L	2		3000	3000	0	3860	25.07	3000	2900	3.39	5190	**53.48**	4300	4100	4.76	4020	6.73	
Chloride																			
Chloride	mg/L	1		11000	11000	0	11000	0	13000	12000	8.00	15500	17.54	5700	5500	3.57	9020	45.11	
Fluoride																			
Fluoride	mg/L	0.1		<0.5	<0.5	-	1.4	-	<0.5	<0.5	-	1.4	-	1.5	1.5	0	2.2	37.84	
Total Kjeldahl Nitrogen as N																			
TKN as N	mg/L	1	0.1	<1	<1	-	2	-	<1	<1	-	<0.1	-	9.4	11	15.69	4.4	**72.46**	
Ionic Balance																			
Total Anions	meq/L		0.01	-	-	-	396	-	-	-	-	550	-	-	-	-	357	-	
Total Cations	meq/L		0.01	-	-	-	426	-	-	-	-	604	-	-	-	-	394	-	
Ionic Balance	%		0.01	-	-	-	3.64	-	-	-	-	4.67	-	-	-	-	4.92	-	
Total Organic Carbon (TOC)																			
Total Organic Carbon	mg/L	1	1	2.9	<1	-	8	**93.58**	<1	<1	-	<1	-	3.4	3.4	0	4	16.22	
Nitrite as N																			
NO2-N	mg/L	0.5	0.01	<0.5	<0.5	-	<0.01	-	<0.5	<0.5	-	<0.01	-	<0.5	<0.5	-	<0.01	-	
Nitrate as N																			
NO3-N	mg/L	0.5	0.01	2.4	2.4	0	0.02	**196.69**	2.5	2	22.22	2.94	16.18	<0.5	<0.5	-	<0.01	-	
Total Nitrogen (as N)																			
Total Nitrogen (as N)	mg/L	2	0.1	2	2	0	2	0	3	2	40.00	2.9	3.39	9	11	20.00	4.4	**68.66**	

Notes:

RPD exceeds allowable duplicate difference (50%)

If the primary and duplicate samples were report <LOR (identical LOR), then RPD is assumed to be 0.

				Sample	MAR 7	DUP 7	RPD%	TRIPLICATE 4	RPD%	QT2	DUP 8	RPD%	TRIPLICATE 5	RPD%	RT41	DUP 9	RPD%	TRIPLICATE 6	RPD%
				Date	8/09/2008	8/09/2008		10/09/2008		4/09/2008	9/09/2008		10/09/2008		10/09/2008	10/09/2008		10/09/2008	
				Lab Report	08ENME0024196	08ENME0024196		ES0813178001		08ENME0023714	08ENME0024196		ES0813178001		08ENME0024479	08ENME0024479		ES0813421001	
				Laboratory	Labmark	Labmark		ALS		Labmark	Labmark		ALS		Labmark	Labmark		ALS	
Analyte	Units	Labmark LOR	ALS LOR																
pH Value and Total Dissolved Solids																			
pH	pH Unit	0.1	0.01	7.2	7.2	0	6.91	4.11	8.3	7	16.99	6.77	20.31	7.1	7.1	0	6.19	13.69	
TDS	mg/L	1	1	23000	23000	0	22700	1.31	38000	25000	41.27	23600	46.75	41000	41000	0	41000	0	
Electrical conductivity	uS/cm	20	1	28900	29000	0.35	30900	6.69	39200	31200	22.73	33000	17.17	52500	52600	0.19	54000	2.82	
Alkalinity																			
Hydroxide as CaCO3	mg/L	5	1	-	-	-	<1	-	-	-	-	<1	-	-	-	-	<1	-	
Carbonate as CACO3	mg/L	5	1	<1	<1	-	<1	-	<1	<1	-	<1	-	<1	<1	-	<1	-	
Bicarbonate as CACO3	mg/L	5	1	100	342	**109.50**	320	**104.76**	140	340	**83.33**	258	**59.30**	150	150	0	185	20.90	
Total Alkalinity as CACO3	mg/L	5	1	100	340	**109.09**	320	**104.76**	140	260	60	258	**59.30**	150	150	0	185	20.90	
Acidity																			
Calcium	mg/L	0.1	1	1110	1120	0.90	1110	0	469	791	**51.11**	769	48.47	1250	1260	0.80	1150	8.33	
Iron	mg/L	0.1		0.621	0.589	5.29	-	-	0.115	5.12	**191.21**	-	-	6.65	6.95	4.41		200	
Magnesium	mg/L	0.1	1	742	736	0.81	721	2.87	877	577	41.27	552	45.49	653	657	0.61	851	26.33	
Sodium	mg/L	0.1	1	6230	6260	0.48	6640	6.37	14400	7620	**61.58**	7620	**61.58**	12900	13400	3.80	14000	8.18	
Potassium	mg/L	0.1	1	77	78	1.29	67	13.89	86	110	24.49	98	**13.04**	210	220	4.65	201	4.38	
Total Metals																			
Iron	mg/L	0.1	0.01			-	27.5	-			-	5.69	-			-	7.35	-	
Dissolved Metals																			
Aluminium	mg/L	0.001	0.01	0.018	0.016	11.76	<0.01	-	0.039	0.0034	**167.92**	<0.01	-	0.0036	<0.001	-	<0.10	-	
Antimony	mg/L	0.001	0.001	<0.001	<0.001	-	0.006	-	<0.001	<0.001	-	0.004	-	<0.001	<0.001	-	<0.010	-	
Arsenic	mg/L	0.001	0.001	0.017	0.018	5.71	0.009	**61.54**	<0.001	0.024	-	0.016	-	<0.1	<0.1	-	0.053	-	
Barium	mg/L	0.001	0.001	0.078	0.077	1.29	0.072	8	0.029	0.048	49.35	0.043	38.89	0.12	0.12	0	0.086	33.01	
Beryllium	mg/L	0.001	0.001	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.010	-	
Boron	mg/L	0.001	0.05	6.3	6.2	1.6	3.64	**53.52**	6	7.1	16.79	3.92	41.94	9	9	0	7.42	19.24	
Cadmium	mg/L	0.0002	0.0001	<0.0002	<0.0002	-	<0.0001	-	<0.0002	<0.0002	-	<0.0001	-	<0.0002	<0.0002	-	<0.0010	-	
Chromium	mg/L	0.001	0.001	0.0042	0.002	**70.97**	<0.001	-	0.0027	0.0016	**51.16**	<0.001	-	0.0033	0.0032	3.08	<0.010	-	
Cobalt	mg/L	0.001	0.001	0.011	0.0093	16.75	0.008	31.58	<0.001	0.0047	-	0.004	-	<0.001	<0.001	-	<0.010	-	
Copper	mg/L	0.001	0.001	0.0064	0.0061	4.8	0.005	24.56	0.0067	0.0053	23.33	0.006	11.02	0.008	0.0075	6.45	<0.010	-	
Lead	mg/L	0.001	0.001	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.010	-	
Lithium	mg/L	0.001	0.001	0.37	0.36	2.74	0.306	18.93	0.91	0.56	47.62	0.484	**61.12**	3.6	3.6	0	3.4	5.71	
Manganese	mg/L	0.001	0.001	0.5	0.46	8.33	0.433	14.36	1.6	0.86	**60.16**	0.818	**64.68**	0.49	0.5	2.02	0.504	2.82	
Molybdenum	mg/L	0.001	0.001	0.085	0.085	0	0.118	32.51	0.0024	0.0019	23.26	0.006	**85.71**	<0.001	<0.001	-	<0.010	-	
Nickel	mg/L	0.001	0.001	0.03	0.027	10.53	0.012	**85.71**	0.0059	0.02	**108.88**	0.01	**51.57**	0.013	0.013	0	<0.010	-	
Selenium	mg/L	0.001	0.01	0.042	0.041	2.41	<0.010	-	0.07	0.044	45.61	0.01	150	0.026	0.025	3.92	<0.050	-	
Strontium	mg/L	0.001	0.001	17	17	0	14.5	15.87	9.4	15	45.90	13	32.14	34	32	6.060606061	-	-	
Thallium	mg/L	0.001	0.001	<0.001	<0.001	-	0.001	-	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.010	-	
Thorium	mg/L	0.001	0.001	-	-	-	<0.001	-	-	-	-	<0.001	-	-	-	-	-	-	
Tin	mg/L	0.001	0.001	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.010	-	
Titanium	mg/L	0.001	0.01	0.0023	0.0031	29.63	<0.01	-	0.0068	0.0025	**92.47**	<0.01	-	0.012	0.013	8	-	-	
Uranium	mg/L	0.001	0.001	0.019	0.019	0	0.022	14.63	<0.001	0.023	-	0.026	-	<0.001	<0.001	-	-	-	
Vanadium	mg/L	0.001	0.01	0.003	0.002	40	<0.01	-	<0.001	<0.001	-	<0.01	-	<0.001	<0.001	-	<0.10	-	
Zinc	mg/L	0.001	0.005	0.019	0.022	14.63	0.01	**62.07**	0.019	0.024	23.26	0.018	5.41	0.015	0.017	12.5	<0.050	-	
Gold	mg/L	0.01	0.001	-	-	-	0.001	-	-	-	-	<0.001	-	-	-	-	-	-	
Silica																			
Silica	mg/L	1		18	18.3	1.65	16.1	11.14	6.9	18.6	**91.76**	15.2	**75.11**	25	25	0	19.7	23.71	
Sulphate																			
Sulphate	mg/L	2		2700	2500	7.69	4460	49.16	4500	2600	**53.52**	4420	1.79	1500	3400	**77.55**	3790	**86.58**	
Chloride																			
Chloride	mg/L	1		9000	9200	2.20	10900	19.10	13000	10000	26.09	11600	11.38	9400	24000	**87.43**	22800	**83.23**	
Fluoride																			
Fluoride	mg/L	0.1		1	1	0	1.5	40	<0.5	<0.5	-	1	-	<0.5	<0.5	-	0.6	-	
Total Kjeldahl Nitrogen as N																			
TKN as N	mg/L	1	0.1	24	22	8.70	34.7	36.46	2.9	<1	-	1.2	**82.93**	3.6	<1	-	5.8	-	
Ionic Balance																			
Total Anions	meq/L		0.01	-	-	-	407	-	-	-	-	424	-			-	725	-	
Total Cations	meq/L		0.01	-	-	-	406	-	-	-	-	418	-			-	744	-	
Ionic Balance	%		0.01	-	-	-	0.21	-	-	-	-	0.81	-			-	1.25	-	
Total Organic Carbon (TOC)																			
Total Organic Carbon	mg/L	1	1	6.7	5.8	14.4	9	29.30	2.7	3.4	22.95	4	38.81	15	14	6.90	15	0	
Nitrite as N																			
NO2-N	mg/L	0.5	0.01	<0.5	<0.5	-	<0.01	-	<0.5	<0.5	-	<0.01	-	<0.5	<0.5	-	<0.01	-	
Nitrate as N																			
NO3-N	mg/L	0.5	0.01	<0.5	<0.5	-	0.03	-	<0.5	<0.5	-	<0.01	-	<0.5	<0.5	-	<0.01	-	
Total Nitrogen (as N)																			
Total Nitrogen (as N)	mg/L	2	0.1	24	22	8.70	34.7	36.46	3	<2	-	1.3	**79.07**	4	<2	-	5.8	-	

Notes:

RPD exceeds allowable duplicate difference (50%)

If the primary and duplicate samples were report <LOR (identical LOR

Sample	RB1	RB2	RB3	RB4
Date	4/09/2008	4/09/2008	9/09/2008	10/09/2008
Lab Report	08ENME0023714	08ENME0023714	08ENME0024196	08ENME0024479
Laboratory	Labmark	Labmark	Labmark	Labmark

Analyte	Units	Labmark LOR	ALS LOR				
pH Value and Total Dissolved Solids							
pH	pH Unit	0.1	0.01	-	-	8	6.3
TDS	mg/L	1	1	-	-	<20	<20
Electrical conductivity	uS/cm	20	1	-	-	<20	<20
Alkalinity							
Hydroxide as CaCO3	mg/L	5	1	-	-	-	
Carbonate as CACO3	mg/L	5	1	-	-	<1	<1
Bicarbonate as CACO3	mg/L	5	1	-	-	20	10
Total Alkalinity as CACO3	mg/L	5	1	-	-	20	10
Acidity							
Acidity as CACO3	mg/L			-	-	-	
Dissolved Major Cations							
Calcium	mg/L	0.1	1	0.225	0.201	0.167	0.535
Iron	mg/L	0.1		<0.1	<0.1	<0.1	0.264
Magnesium	mg/L	0.1	1	<0.1	<0.1	<0.1	0.171
Sodium	mg/L	0.1	1	<0.1	<0.1	0.33	1.79
Potassium	mg/L	0.1	1	<1	<1	<1	<1
Total Metals							
Iron	mg/L	0.1	0.01	-	-	-	
Dissolved Metals							
Aluminium	mg/L	0.001	0.01	0.0095	0.02	0.0067	<0.001
Antimony	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Beryllium	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.001	0.05	<0.001	<0.001	0.0064	0.0012
Cadmium	mg/L	0.0002	0.0001	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.001	0.001	0.0023	0.0014	0.0016	0.0025
Lead	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	0.001	<0.001	<0.001	<0.001	0.0011
Molybdenum	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.001	0.001	<0.001	<0.001	<0.001	0.0032
Selenium	mg/L	0.001	0.01	<0.001	<0.001	<0.001	<0.001
Strontium	mg/L	0.001	0.001	<0.001	<0.001	0.0011	0.011
Thallium	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Thorium	mg/L	0.001	0.001	-	-	-	-
Tin	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Titanium	mg/L	0.001	0.01	<0.001	<0.001	<0.001	<0.001
Uranium	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/L	0.001	0.01	<0.001	<0.001	<0.001	<0.001
Zinc	mg/L	0.001	0.005	0.055	0.029	0.012	0.14
Gold	mg/L	0.01	0.001	-	-	-	-
Silica							
Silica	mg/L	1		<1	<1	<1	<1
Sulphate							
Sulphate	mg/L	2		-	-	0.9	1.1
Chloride							
Chloride	mg/L	1		-	-	1.3	2.2
Fluoride							
Fluoride	mg/L	0.1		-	-	<0.5	<0.5
Total Kjeldahl Nitrogen as N							
TKN as N	mg/L	1	0.1	-	-	<1	<1
Ionic Balance							
Total Anions	meq/L		0.01	-	-	-	
Total Cations	meq/L		0.01	-	-	-	
Ionic Balance	%		0.01	-	-	-	
Total Organic Carbon (TOC)							
Total Organic Carbon	mg/L	1	1	1.4	1.2	<1	2.1
Nitrite as N							
NO2-N	mg/L	0.5	0.01	-	-	<0.5	<0.5
Nitrate as N							
NO3-N	mg/L	0.5	0.01	-	-	<0.5	<0.5
Total Nitrogen (as N)							
Total Nitrogen (as N)	mg/L	2	0.1	-	-	<2	<2

Notes

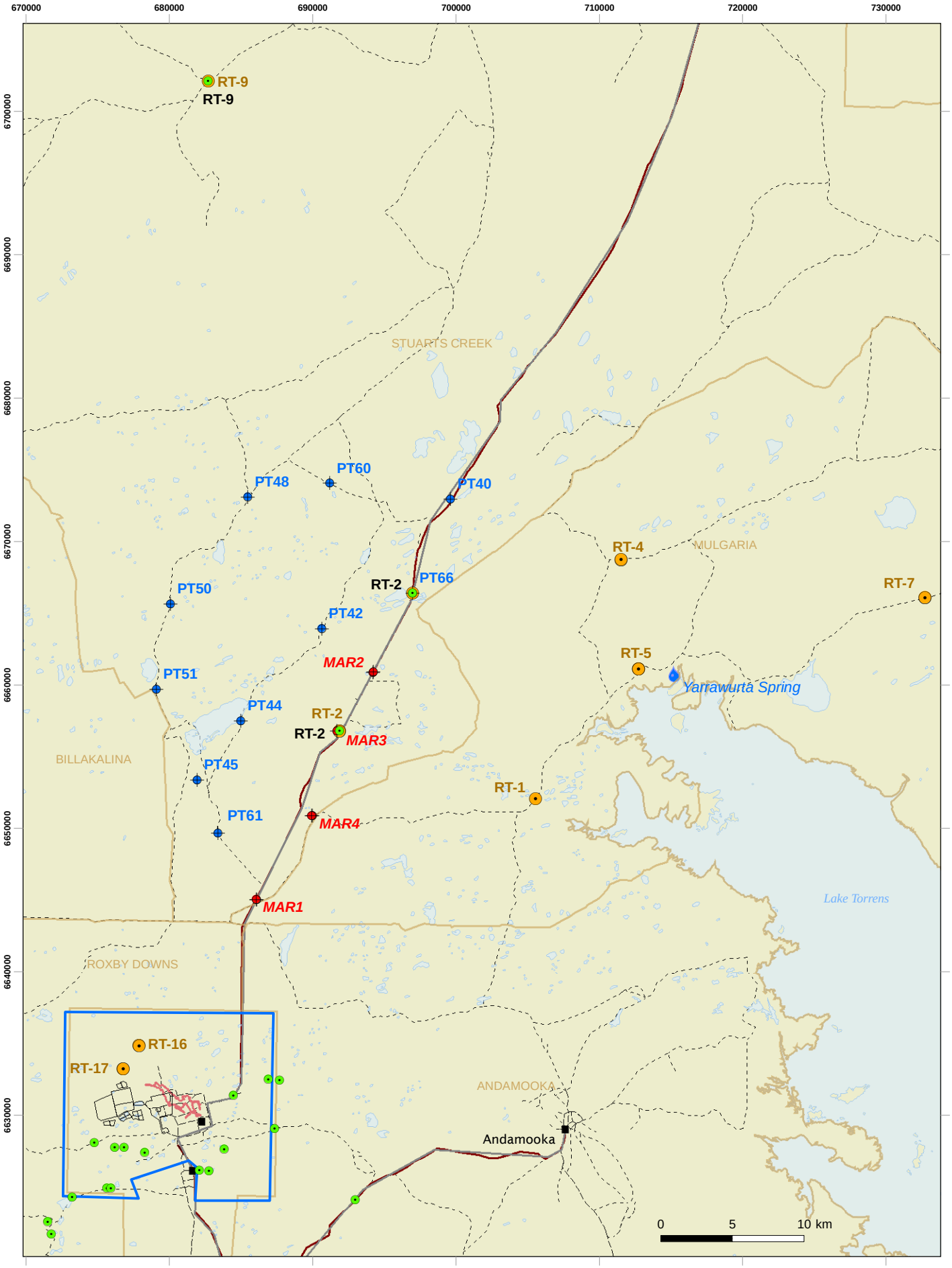
LOR - Limit of reporting

- Not Analysed

* Raised LOR

Attachment D
Hydrogeological investigations of the Andamooka Limestone aquifer

D.1 Motherwell investigations



MAR Test Sites
EIS Investigation Wells
Motherwell Investigation Sites
PFS Investigation Wells (2006-07)
Underground Workings March 06
Existing Surface Infrastructure and Tailings
SML OD
Pastoral Leases

Motherwell Salt Water Wellfield – Selection Phase Study

MOTHERWELL GROUNDWATER INVESTIGATION LOCALITY PLAN

Figure

1.2

April 2008

R:\GIS\BHP\07\04 - Maps\motherwell investigation locality.mxd

Motherwell drilling program summary

Production / injection wells		Pilot / observation wells			
Well ID	**Testing completed**	**Well ID**	**Testing completed**	**Well ID**	**Testing completed**
MAR-1	not constructed	MAR1-10	△	PT-44	△
MAR-2	△ ▲ ▼	MAR1-20	△	PT-45	△
MAR-3	△ ▲ ▼	MAR2-10a&b	△	PT-48	△
MAR-4	△ ▲ ▼	MAR2-50a&b	△	PT-50	△
		MAR3-20	△	PT-51	△
		MAR4-20	△	PT-60	△
		MAR4-50	△	PT-61	△
		PT-40	△	PT-66	△
		PT-42	△		

Notes:

△ airlift pumping test

▲ pumping test

▼ injection test

'a' top of ALA (nested)

'b' base of ALA (nested)

Drilling locality data

MAR investigations				
Production well ID	**Co-ordinates** [1]	**Observation well ID**	**Co-ordinates** [1]	**Distance from production well** (m)
MAR-1	Not constructed	MAR1-10 MAR1-20	686082E 6645060N 686050E 6645060N	- -
MAR-2	694180E 6660885N	MAR2-10 (a&b) MAR2-50 (a&b)	694195E 6660875N 694230E 6660905N	17.5 51.0
MAR-3	691905E 6656770N	MAR3-20	691880E 6656790N	
MAR-4	689955E 6650870N	MAR4-20 MAR4-50	689985E 6650885N 689910E 6650915N	35.0 65.0

Motherwell investigations			
Pilot well ID	**Co-ordinates** [1]	**Pilot well ID**	**Co-ordinates** [1])
PT-40	699595E 6672970N	PT-50	680065E 6665665N
PT-42	690625N 6663910N	PT-51	679080E 6659710N
PT-44	684970E 6657515N	PT-60	680105E 6665600N
PT-45	681920E 6653390N	PT-61	683385E 6649660N
PT-48	685470E 6673025N	PT-66	696950E 6666420N

Notes: 1. GDA 1994, Zone 53 projection

MAR investigation well completion summary[1]

Well ID	Drilled depth[1]	Pre-collar			Well casing				Annular completion	
		Depth setting	Diameter (mm)	Material	Production casing setting	Screen setting	Diameter (mm)	Material	Gravel pack	Seal[2]
MAR1-10	120.0	84.0	150	steel	-	84.0-120.0	150	open hole	-	[3]82-84
MAR1-20	120.0	84.0	150	steel	-	84.0-120.0	150	open hole	-	[3]82-84
MAR-2	204.5	124.0	250	steel	-	124.0-205.5	250	open hole	-	[3]121-124
MAR2-10a	198.0	124.0	200	steel	130.0	130.0-136.0	50	PVC	126-136	112-126
MAR2-10b	198.0	124.0	200	steel	192.0	192.0-198.0	50	PVC	182-198	180-182
MAR2-50a	198.0	124.0	200	steel	130.0	130.0-136.0	50	PVC	126-136	112-126
MAR2-50b						192.0-198.0	50	PVC	182-198	180-182
MAR-3	228.0	90.0	250	steel	-	90.0-228.0	250	open hole	-	[3]78-88
MAR3-20	228.0	88.0	200	steel	222.0	222.0-228.0	200	open hole	211-228	200-211
MAR-4	186.0	84.0	250	steel	-	84.0-186.0	250	open hole	-	[3]82-84
MAR4-20a	186.0	82.0	200	steel	100.0	100.0-106.0	50	PVC	91-106	89-91
MAR4-20b	'				180.0	180.0-186.0	50	PVC	168-186	166-168
MAR4-50a	186.0	82.0	200	steel	88.0	88.0-94.0	50	PVC	84-94	82-84
MAR4-50b					192.0	192.0-198.0	50	PVC	168-186	166-168

Notes:
1. All as metres below ground level (m bgl), except where noted
2. All wells completed with surface casing cemented into place at ground surface
3. Pre-collar seated in fresh limestone and cemented in place

Motherwell investigation well completion summary [1]

Well ID	Drilled depth [1]	Pre-collar			Well casing				Annular completion	
		Depth setting	Diameter (mm)	Material	Production casing setting	Screen setting	Diameter (mm)	Material	Gravel pack	Seal [2]
PT-40	264.0	82.0	200	steel	264.0	258.0-264.0	100	PVC	180-264	140-180
PT-42	258.0	124.0	200	steel	126.0	126.0-258.0	100	PVC	_[3]	122-126
PT-44	192.0	88.0	200	steel	88.0	88.0-192.0	100	PVC	_[3]	190-192
PT-45	168.0	52.0	200	steel	52.0	52.0-168.0	100	PVC	_[3]	_[4]
PT-48	270.0	120.0	200	steel	126.0	126.0-270.0	100	PVC	_[3]	118-120
PT-50	248.0	112.0	200	steel	114.0	114.0-246.0	100	PVC	_[3]	170-175
PT-51	192.0	64.0	200	steel	64.0	64.0-192.0	100	PVC	_[3]	62-64
PT-60	204.0	8.0	200	steel	90.0	[5]90.0-108.0	100	PVC	-	-
PT-61	138.0	70.0	200	steel	70.0	70.0-132.0	100	PVC	_[3]	68-70
PT-66	312.0	152.5	200	steel	300.0	300.0-306.0	50	PVC	_[3]	230-250

Notes:
1. All as metres below ground level (m bgl), except where noted
2. All wells completed with surface casing cemented into place at ground surface
3. Cement-bentonite slurry seal set above cement basket

MAR investigations field measured parameters

Hole ID	Airlift yield (L/s)	EC (mS/cm)	Standing water level (m bgl)
MAR1-10			
Upper Andamooka Limestone	<1	[1]	
Lower Andamooka Limestone/ Upper Arcoona Quartzite	2.4	[1]	~58
MAR1-20			
Upper Andamooka Limestone	0.2 – 0.7	12.72	
Lower Andamooka Limestone/ Upper Arcoona Quartzite	2.5 – 3.3	30.0	58.14
MAR2			
Upper Andamooka Limestone	<1	23.4	
Lower Andamooka Limestone	35	181.6	69.36
Lower Andamooka Limestone/ Upper Arcoona Quartzite	47	208.6	
MAR2-10			
Upper Andamooka Limestone	3	46.5 (MAR2-10a)	70.04 (MAR2-10a)
Lower Andamooka Limestone/ Upper Arcoona Quartzite	14	303.6 (MAR2-10b)	82.81 (MAR2-10b)
MAR2-50			
Upper Andamooka Limestone	3	36.2 (MAR2-50a)	70.43 (MAR2-50a)
Lower Andamooka Limestone/ Upper Arcoona Quartzite	15	285.4 (MAR2-50b)	83.27 (MAR2-50b)
MAR3			
Andamooka Limestone	~40	202.3	~57
MAR3-20			
Andamooka Limestone	~20	208.7	57.175
MAR4			
Upper Andamooka Limestone	<1	40.0	
Lower Andamooka Limestone/ Upper Arcoona Quartzite	17	78.3	70.26
MAR4-20			
Upper Andamooka Limestone	<1	45.0 (MAR4-20a)	69.77 (MAR4-20a)
Lower Andamooka Limestone/ Upper Arcoona Quartzite	>15	99.6 (MAR4-20b)	71.88 (MAR4-20b)
MAR4-50			
Upper Andamooka Limestone	1	44.7 (MAR4-50a)	68.93 (MAR4-50a)
Lower Andamooka Limestone/ Upper Arcoona Quartzite	7	111.6 (MAR4-50b)	69.07 (MAR4-50b)

Notes: 1. out of range for EC meter

MAR investigations field measured parameters (cont.)

Hole ID	Airlift yield (L/s)	EC (mS/cm)	Standing water level (m bgl)
PT-40 *Andamooka Limestone*	<10 above 168 m, then >25	<40 above 168 m, then >180	68.34
PT-42 *Andamooka Limestone*	at bottom >20	at bottom >300	58.96
PT-44 *Andamooka Limestone*	<20 above 144 m, then >30	<100 above 144 m, then >125	36.16
PT-45 *Andamooka Limestone*	<5 above 100 m then ~10	<50 above 100 m, then ~70	36.93
PT-48 *Andamooka Limestone*	<15 above 222 m, then >20	<100 above 216 m, then >120	55.8
PT-50 *Andamooka Limestone*	<5 above 192 m, then >10	<100 above 180 m, then >120	53.0
PT-51 *Andamooka Limestone*	<10 above 144 m, then >40	<100 above 168 m, then >100	40.5
PT-60 *Andamooka Limestone*	<10 above 102 m, then >10	<60	76.2
PT-61 *Andamooka Limestone*	<5 above 100 m, then up to 15	<30 above 100 m, then up to 44	42.42
PT66 *Andamooka Limestone*	>15	211.4	76.15

Airlift pumping test details

Production well	Observation well	r (m) [1]	Test type	Q (m^3/day) [2]
		Site MAR-1		
MAR1-10	MAR1-20	33	Constant rate / recovery	173
		Site MAR-2		
MAR-2	MAR1-10a	17	Constant rate / recovery	2,705
	MAR1-10b	17	Constant rate	2,705
	MAR2-50a	51	Constant rate / recovery	2,705
		Site MAR-4		
MAR-4	MAR4-20a	34	Constant rate / recovery	1,132
	MAR4-20b	34	Constant rate / recovery	1,132
	MAR4-50a	64	Constant rate / recovery	1,132
	MAR4-50b	64	Constant rate / recovery	1,132

Notes: 1. Distance from pumping well
2. Pumping rate

Airlift pumping tests – estimates of aquifer parameters [1]

Test site	T (m^2/day)	S	S' [2]
MAR-1	60 to 75	$5.0x10^{-5}$	$7.1x10^{-6}$

Notes:
1. Geometric means of data presented in Appendix F.1
2. Storativity during recovery

Pumping test details

Production well	Observation well	r (m) [1]	Test type	Q (m^3/day) [2]
Site MAR-2				
MAR-2	MAR-2	0	Multi-rate / constant rate / recovery	2,592
	MAR1-20a	17	Constant rate / recovery	
	MAR1-20b	17	Constant rate / recovery	
	MAR1-50a	51	Constant rate	
Site MAR-3				
MAR-3	MAR-3	0	Multi-rate / constant rate / recovery	3,024
	MAR3-20	20	Constant rate / recovery	
	RT-2a [3]	34	Constant rate / recovery	
	RT-2b [3]	34	Constant rate	
Site MAR-4				
MAR-4	MAR-4	0	Multi-rate / constant rate / recovery	2,592
	MAR4-20a	34	Constant rate / recovery	
	MAR4-20b	34	Constant rate / recovery	
	MAR4-50a	64	Constant rate / recovery	
	MAR4-50b	64	Constant rate / recovery	

Notes:
1. Distance from pumping well
2. Pumping rate
3. Reported in REM (2007b)

Pumping tests – estimates of aquifer parameters [1]

Test site	T (m^2/day)	S	S' [2]
MAR-2	440 to 4,395	$1.1x10^{-3}$	$1.1x10^{-4}$
MAR-3 [3]	3,000 to 3,870	$1.6x10^{-5}$	$1.1x10^{-5}$
MAR-4 [3]	3,320 to 4,160	$1.2x10^{-7}$	$8.0x10^{-8}$

Notes:
1. Geometric means of data presented in Appendix F.2
2. Storativity during recovery
3. Storativity data indicative only as observation wells do not all fully screen the ALA

Injection test details

Injection well	Observation well	r (m) [1]	Test type	Q (m^3/day) [2]
Site MAR-2				
MAR-2	MAR-2	0	Multi-rate / constant rate / recovery	1,941
	MAR1-20a	17	Constant rate / recovery	
	MAR1-20b	17	Constant rate / recovery	
Site MAR-3				
MAR-3	MAR-3	0	Multi-rate / constant rate / recovery	1,584
	MAR3-20	20	Constant rate / recovery	
	RT-2a [3]	34	Constant rate / recovery	
Site MAR-4				
MAR-4	MAR-4	0	Multi-rate / constant rate / recovery	1,632
	MAR4-20a	34	Constant rate / recovery	
	MAR4-20b	34	Constant rate / recovery	
	MAR4-50a	64	Constant rate / recovery	
	MAR4-50b	64	Constant rate / recovery	

Notes:
1. Distance from pumping well
2. Pumping rate
3. Reported in REM (2007b)

Water quality data for the Motherwell and MAR investigation sites

	Well Number		PT-61	PT-45	PT-44	MAR-2	PT-48	PT-42	PT-51	PT-60	MAR-4*	MAR-3
	Target Aquifer		Ea	Ea	Ea	Ea	Ea	Ea	Ea	Ea	Ea	Ea
Date Sampled			15-Feb-08	18-Feb-08	22-Feb-08	19-Feb-08	05-Mar-08	28-Feb-08	18-Mar-08	11-Mar-08	27-Jan-08	23-Jan-08
General Laboratory Analysis	pH		7.39	7.64	7.38	6.95	7	7.66	7.65	7.56	6.99	7.16
	Electrical Conductivity	µS/cm	85200	54500	96600	295000	188000	69200	93300	72200	61000	240000
	Total Dissolved Solids @180°C	mg/L	49300	37600	71400	192000	171000	48700	69400	50200	33600	179000
	Conversion factor		0.58	0.69	0.74	0.65	0.91	0.70	0.74	0.70	0.55	0.75
	Suspended Solids (SS)	mg/L	66	136	108	310	526	170	144	60	107	445
	Turbidity	NTU	6.8	12	4.7	17.4	5.3	0.7	1.1	2.4	66	32.8
	Total Alkalinity as CaCO3	mg/L	215	270	200	105	125	180	210	200	281	140
Dissolved Anions	Carbonate (as $CACO_3$)		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	Bicarbonate (as $CaCO_3$)	mg/L	215	270	200	105	125	180	210	200	281	140
	Sulfate as SO_4^{2-}	mg/L	3600	5180	2860	5380	9810	4970	5610	5060	5470	11500
	Chloride	mg/L	12100	17700	39300	104000	105000	26200	38400	32800	19500	86300
Dissolved Cations	Calcium	mg/L	912	976	408	465	959	1060	818	978	1060	1000
	Magnesium	mg/L	570	1020	694	1870	3240	898	1250	935	1110	3660
	Sodium	mg/L	7270	12100	23600	64800	64000	14700	22100	19400	12700	58600
	Potassium	mg/L	79	112	90	174	270	127	158	147	106	304
Dissolved Metals	Aluminium	mg/L	0.03	0.02	0.08	0.26	0.13	0.05	0.02	0.01	<LOR	<LOR
	Arsenic	mg/L	0.003	0.005	0.22	<LOR	<LOR	0.006	0.003	0.004	<LOR	<LOR
	Barium	mg/L	0.029	0.026	0.035	0.038	0.065	0.033	0.036	0.048	0.026	0.034
	Cobalt	mg/L	0.062	0.015	0.049	<LOR	0.11	0.015	0.011	0.01	0.001	<LOR
	Copper	mg/L	0.007	0.012	0.027	0.035	0.028	0.015	0.017	0.014	0.009	0.032
	Lead	mg/L	<LOR	<LOR	0.011	<LOR	0.251	<LOR	0.002	<LOR	<LOR	0.021
	Manganese	mg/L	1.9	0.613	0.31	0.587	0.518	0.131	0.158	0.445	0.684	0.864
	Selenium	mg/L	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	0.045	<LOR	-	-
	Strontium	mg/L	11.4	15.9	14	12	12.5	16.6	14.4	16.3	16	13.9
	Uranium	mg/L	0.03	0.015	0.008	<LOR	<LOR	0.008	0.006	0.005	0.013	0.01
	Zinc	mg/L	0.008	0.019	0.027	0.2	0.188	0.051	0.051	0.67	0.264	0.063
	Boron	mg/L	4.3	6.38	4.44	2.85	2.59	4.67	4.67	5.31	4.56	3.2
Iron	Iron (dissolved)	mg/L	<LOR	<LOR	0.44	2.89	<LOR	0.17	0.06	<LOR	1.45	2
	Iron (total)	mg/L	0.58	3.6	1.94	2.26	6.76	2.52	0.39	0.1	3.66	5.03
	Iron (ferrous)	mg/L	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	0.11	<LOR	-	-
	Iron (ferric)	mg/L	<LOR	<LOR	0.44	4.19	1.72	0.17	<LOR	<LOR	-	-
Other analytes	Silica	mg/L	106	104	61.9	63.6	57.4	6.5	87.9	58.1	9.1	I
	Fluoride	mg/L	1.2	1.5	1.1	0.4	0.5	1.8	1.3	1.3	1.6	I
Nutrients	Nitrite as N	mg/L	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	Nitrate as N	mg/L	<LOR	0.308	0.012	0.053	3.81	<LOR	<LOR	0.027	0.015	<LOR
	Nitrite + Nitrate as N	mg/L	<LOR	0.308	0.012	0.053	4.64	<LOR	<LOR	0.027	0.015	I
Ionic Balance	Total Anions	meq/L	421	612	1170	3040	3160	846	1200	1030	670	2680
	Total Cations	meq/L	411	662	1100	3000	3100	768	1110	972	699	2910
	Ionic Balance	%	1.24	3.95	2.07	0.76	0.88	4.8	4.23	3.06	2.08	4.13
			* pumped sample		- not analysed							

Water quality data for the Motherwell and MAR investigation sites (cont.)

	Well Number		MAR4	PT66	MAR2-50b	MAR2-10b	MAR2-10a	MAR2	MAR3-20	MAR2-50	MAR3*	PT40
	Target Aquifer		€a	€a	€a	€a	€a	€a	€a	€a	€a	€a
Date Sampled			12-Dec-07	31-Jan-08	05-Dec-07	06-Dec-07	06-Dec-07	07-Dec-07	22-Jan-08	05-Dec-07	05-Feb-08	07-Feb-08
General Laboratory Analysis	pH		7.81	7.67	7.36	7.31	7.53	7.31	6.94	7.69	6.57	7.82
	Electrical Conductivity	µS/cm	72000	464000	417000	431000	52000	334000	420000	53000	210000	220000
	Total Dissolved Solids @180°C	mg/L	43200	261000	237000	230000	31700	182000	221000	32100	136000	111000
	Conversion factor		0.60	0.56	0.57	0.53	0.61	0.54	0.53	0.61	0.64	0.50
	Suspended Solids (SS)	mg/L	90	420	704	563	134	379	614	90	318	4690
	Turbidity	NTU	10.3	5.8	4.7	6.6	1.3	17.1	29.2	0.5	58	1830
	Total Alkalinity as CaCO3	mg/L	259	87	79	80	202	119	62	220	151	187
Dissolved Anions	Carbonate (as $CACO_3$)		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	Bicarbonate (as $CaCO_3$)	mg/L	259	87	79	80	202	119	62	220	151	187
	Sulfate as SO_4^{2-}	mg/L	5560	16400	16300	14100	5340	13500	16000	5700	11100	8760
	Chloride	mg/L	22500	149000	139000	139000	14000	113000	142000	15200	87000	75100
Dissolved Cations	Calcium	mg/L	957	906	943	878	1140	1100	946	1170	995	1170
	Magnesium	mg/L	1110	5970	5440	5400	880	4450	5820	866	3640	2530
	Sodium	mg/L	13900	98900	87200	85000	10200	72200	93900	10500	58500	46700
	Potassium	mg/L	133	436	461	446	113	354	495	107	315	207
Dissolved Metals	Aluminium	mg/L	0.02	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	0.03	<LOR	<LOR
	Arsenic	mg/L	<LOR	0.026	<LOR	<LOR	0.01	<LOR	<LOR	0.016	0.011	0.259
	Barium	mg/L	0.029	0.043	0.033	0.035	0.043	0.035	0.039	0.03	0.032	0.069
	Cobalt	mg/L	0.006	0.021	<LOR	<LOR	0.003	<LOR	0.091	0.006	<LOR	0.584
	Copper	mg/L	0.01	0.106	0.05	0.049	0.01	0.036	0.08	0.009	0.3	0.39
	Lead	mg/L	<LOR	1.74	0.022	0.033	<LOR	<LOR	0.322	<LOR	0.028	0.037
	Manganese	mg/L	0.75	0.537	0.966	0.976	0.283	0.675	1.27	0.222	0.818	0.526
	Selenium	mg/L	-	-	-	-	-	-	-	-	-	-
	Strontium	mg/L	16.4	13.2	13.8	14	13.9	15.1	16	14.9	13.6	16.9
	Uranium	mg/L	0.015	<LOR	<LOR	<LOR	0.004	0.01	<LOR	0.004	0.01	0.03
	Zinc	mg/L	0.006	0.088	<LOR	0.052	0.01	0.071	0.113	0.01	0.504	0.24
	Boron	mg/L	4.39	1.2	1.86	1.9	4.73	2.62	2.04	5.18	3.21	5.8
Iron	Iron (dissolved)	mg/L	I	I	0.5	<LOR	<LOR	<LOR	1.9	<LOR	2.45	<LOR
	Iron (total)	mg/L	2.5	0.9	2.33	2.39	0.72	3.72	4.74	0.04	3.54	13.8
	Iron (ferrous)	mg/L	-	-	-	-	-	-	-	-	-	-
	Iron (ferric)	mg/L	-	-	-	-	-	-	-	-	-	-
Other analytes	Silica	mg/L	10.3	I	41.3	34.2	24.1	42.8	<LOR	13.4	<LOR	<LOR
	Fluoride	mg/L	12.3	I	1.7	1.8	16.9	2.5	2	17	5.2	10.8
Nutrients	Nitrite as N	mg/L	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	0.577	<LOR	0.11
	Nitrate as N	mg/L	0.018	<LOR	0.079	0.15	1.81	0.057	0.081	0.506	<LOR	0.765
	Nitrite + Nitrate as N	mg/L	0.018	<LOR	0.079	0.15	1.81	0.057	0.081	1.08	<LOR	).775
Ionic Balance	Total Anions	meq/L	755	4540	4260	4210	510	3460	4330	551	2690	2300
	Total Cations	meq/L	747	4850	4300	4200	577	3570	4620	589	2900	2300
	Ionic Balance	%	0.54	3.31	0.5	0.13	0.08	1.5	3.29	3.33	3.8	0.02
			* pumped sample		- not analysed							

Adopted aquifer parameters for analytical simulations

Site	Parameter	Pumping	Injection [1]
MAR-1	T (m^2/day)	$1.4x10^2$	$1.4x10^2$
	S (unitless)	$5.0x10^{-5}$	$5.0x10^{-6}$
MAR-2	T (m^2/day)	$4.2x10^3$	$4.2x10^3$
	S (unitless)	$1.0x10^{-4}$	$1.0x10^{-5}$
MAR-3	T (m^2/day)	$4.0x10^3$	$4.0x10^3$
	S (unitless)	$2.0x10^{-2}$	$2.0x10^{-3}$
MAR-4	T (m^2/day)	$5.0x10^3$	$5.0x10^3$
	S (unitless)	$1.0x10^{-3}$	$1.0x10^{-6}$

Notes: 1. $S_{injection}$ ranges from 1 to 3 orders of magnitude less than $S_{pumping}$ for consistency between sites and to allow for conservative modeling outcomes

Estimated sustainable injection rates for ALA (ML/day)

Site	Available	Analysis		Adopted [1]
	drawup (m)	Analytical	Multi-rate	
MAR-1	43.5	1.20	n/a	**1.20**
MAR-2	53.5	3.50	3.40	**3.40**
MAR-3	42.5	4.25	2.70	**2.70**
MAR-4	52.5	3.50	4.50	**3.50**

Notes: 1. Based on the more conservative of the analysis results presented at left

Analytical models of ALA – summary hydraulic parameters

Model	Aquifer-type	T (m^2/day)	S	D' (m) [1]	Kv (m/day) [2]
#1	Confined	1,050	$2x10^{-5}$	n/a	n/a
#2	Leaky confined	1,050	$2x10^{-5}$	30	0.001

Notes: 1. Thickness of confining layer (or distance between piezometric head and 1st water cut)
2. Vertical hydraulic conductivity of confining layer (assumes no storage in confining layer)

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR1-10 / RD3460

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **9/11/2007** DATE COMPLETED: **12/11/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **120**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **11/11/2007** Depth (m bgl): **~ 58 mbgl**
PROJECTION: **GDA94 Zone 53**
EASTING: **686082** NORTHING: **6645061**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	10"	3.00		0.0		QUATERNARY SEDIMENTS: white, yellow-tan sandy/silty clay, calcareous with gypsum	Qh					Well cover	
		0.75		10.0		QUATERNARY SEDIMENTS: red, purple and white sand, fine grained with some green and grey clay						8" STL casing 0-6m, grouted to surface	
		2.00		20.0		QUATERNARY SEDIMENTS: white and pink, fine-medium grained sands and sandstone							
		0.86		30.0		QUATERNARY SEDIMENTS: brown and grey sandy clay, very plastic, fine-grained sand							
		0.17											
	8"	0.21		40.0		QUATERNARY SEDIMENTS: brown silty clay, very plastic, increasing sandstone and consolidated limestone fragments							
				50.0		QUATERNARY SEDIMENTS: cavity							
		0.46				QUATERNARY SEDIMENTS: brown silty clay, very plastic, with consolidated limestone, minor sandstone and red shale from 60m							
		0.38		60.0		ANDAMOOKA LMST: white and yellow consolidated limestone with grey dolomite	Ea						
		0.33		70.0									
		0.38				ANDAMOOKA LMST: mainly grey dolomite with some white and tan-yellow consolidated limestone with iron stained shale, voids and precipitate from 78-80m							
		0.30		80.0									
		0.35	100										6" STL pre-collar 0-84m
		0.67	100	90.0		ANDAMOOKA LMST: mainly grey dolomite with some consolidated limestone with minor sandstone, quartz and gypsum from 92.m		WC	<0.1		no major fracturing, visible macropores		
		0.75	150						1.1				
	6"	0.50	150	100.0		ANDAMOOKA LMST: grey and pink dolomite with some limestone and increasing quartz/sandstone and minor gypsum and green shale			1.3				Open hole to 120m
		0.55	150	110.0		ANDAMOOKA LMST: pink and grey dolomite and sandstone with increasing green shale from 110m and increasing red shale from 114m			2.1				
		0.46	150						2.4				
		0.50	150	120.0		ARCOONA QTZT (RD): white and pink sandstone/quartzite with some red shale	Pwl		2.4				
						EOH at 120m							

LOGGED: K Furness DATE: 19/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR1-20 / RD3459

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **7/11/2007** DATE COMPLETED: **9/11/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **120**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **12/11/2007** Depth (m bgl): **58.14**
PROJECTION: **GDA94 Zone 53**
EASTING: **686049** NORTHING: **6645060**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer air	10"	1.00	150	0.0		QUATERNARY SEDIMENTS: red and white sandy-clay, minor gypsum minerals	Qh					Well cover	
		0.86				QUATERNARY SEDIMENTS: white silty clay							
		1.20		10.0		QUATERNARY SEDIMENTS: red purple and white sandy clay with siltstone							
		0.40				QUATERNARY SEDIMENTS: yellow-tan silty clay							
		0.29		20.0		QUATERNARY SEDIMENTS: white and tan fine grained sand							
		0.40				QUATERNARY SEDIMENTS: light grey white and brown sand with minor purple clay							
		0.50		30.0		QUATERNARY SEDIMENTS: grey sandy clay with red and yellow clay							
		0.38				QUATERNARY SEDIMENTS: brown and green clay with silt and fine sand							
		0.32		40.0		ANDAMOOKA LMST: Purple and white limestone, calcareous, vilible macropores	€a						
		0.35				ANDAMOOKA LMST: yellow and tan dolomitic limestone							
		0.32		50.0		ANDAMOOKA LMST: grey and light grey dolomite with minor yellow consolidated limestone							
		0.32	150			ANDAMOOKA LMST: dark grey dolomite with light dolomite, yellow consolidated limestone and pink porous limestone		wc	0.2		fracture 78-84m		
	8"	0.46	150	60.0		ANDAMOOKA LMST: dark brown clay-silt, black organic material			0.7			6" STL pre-collar 0-84m	
		0.67	150			ANDAMOOKA LMST: dolomite with brown siltstone,-clay			0.2				
		0.86	150	70.0		ANDAMOOKA LMST: dark grey dolomite with light dolomite, sandstone with visible macropores			1.7		fracture 93m		
		0.67	150			ANDAMOOKA LMST: light grey dolomite with pink dolomite, minor white sandstone/quartz			2.5		fracture 101m	Open hole to 120m	
		0.67	150	80.0		ANDAMOOKA LMST: light dolomite, pink dolomite wuith red and green shale bands and minor quartz.sandstone		wc	3.3		fracture 108m		
	6"	0.60	150	90.0		ARCOONA QTZT (RD): pink, white and green sandstone, quartzite fused with red and green shale	Pws		3.3				
		0.50	150	100.0		EOH at 120m			2.5				
				110.0									
				120.0									

LOGGED: K Furness DATE: 9/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

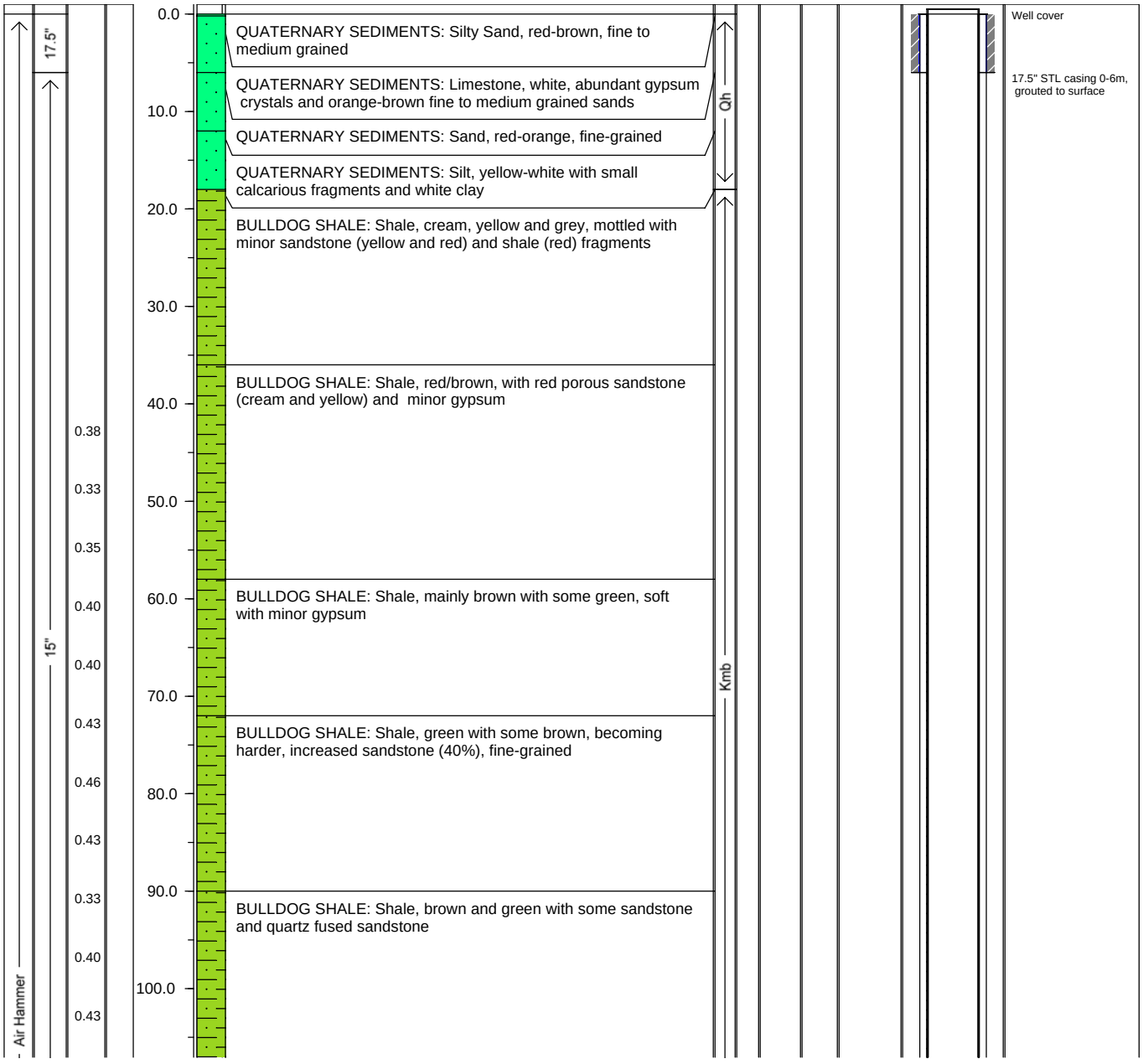
BOREHOLE / WELL NUMBER

MAR2/ RD3458

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **10 inches**
DATE STARTED: **02/12/2007** DATE COMPLETED: **07/122007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **204.5**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **08/12/2007** Depth (m bgl): **69.38**
PROJECTION: **GDA94 Zone 53**
EASTING: **694182** NORTHING: **6660886**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 07/12/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR2/ RD3458

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **10 inches**
DATE STARTED: **02/12/2007** DATE COMPLETED: **07/122007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **204.5**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **08/12/2007** Depth (m bgl): **69.38**
PROJECTION: **GDA94 Zone 53**
EASTING: **694182** NORTHING: **6660886**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
		0.40		110.0		BULLDOG SHALE: Shale, brown and green with minor limestone fragments							
		0.35				ANDAMOOKA LMST: Grey and white limestone with minor red and green shale			<0.1		minor water cut		
		0.46	110	120.0		ANDAMOOKA LMST: Grey crystalline dolomite with white quartz or limestone veins		wc	3.3	23.4	fracture and water cut		
		0.75	140						4	36.3			10" STL pre-collar 0-124m
		0.33	140	130.0		ANDAMOOKA LMST: Dolomite, (light grey and with with some pink), mottled, minor quartz			3	36.9			
		0.26	140			ANDAMOOKA LMST: Limestone (whtie with some grey and pink), visible bands with 50% shale (red/brown and some green), soft, some quartz and dark dolomite			3	37.2			
		0.46	140	140.0		ANDAMOOKA LMST: Limestone (white and pink), banded, minor shale (brown/red)			3.5	43.7			
		0.38	140	150.0		ANDAMOOKA LMST: Limestone (white, pink and green), some minor shale (brown/red)			3.5	32.8			
		0.33	140			ANDAMOOKA LMST: Limestone, mainly pink with some white, becoming darker			3.5	44.6			
10"		0.30	140	160.0		ANDAMOOKA LMST: Limestone (green, white and light brown), with shale (brown and green)		Ea	3.5	45.7			
		0.38	140			ANDAMOOKA LMST: Limestone (green, white and light brown,) with minor shale (pink and red), some sandstone (red) and quartz (light)			3.5	45.2			
		0.29	140	170.0		ANDAMOOKA LMST: Dolomite, (purple, shite and some green), mottled and crystalline, with some quartz (white and red)			3.5	44			
		0.30	140			ANDAMOOKA LMST: Dolomite/Limestone, (purple and green), some mottled and crystalline			4	45.2			
		0.25	210	180.0		ANDAMOOKA LMST: Limestone, (green) mottled and highly porous with dissolution features			9	151.1	fracture, increased water and salinity		
			210	190.0		ANDAMOOKA LMST: Limestone (green, pink, white), crystalline and porous			35	181.6			Open hole to 204.5m
		0.16	210						35	197.6	197-199m large fracture		
		0.15	210	200.0					35	220			
		0.04	210			EOH at 204.5 m			~47	208.6	very slow penetration and excessive water		
				210.0									

LOGGED: K Furness DATE: 07/12/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

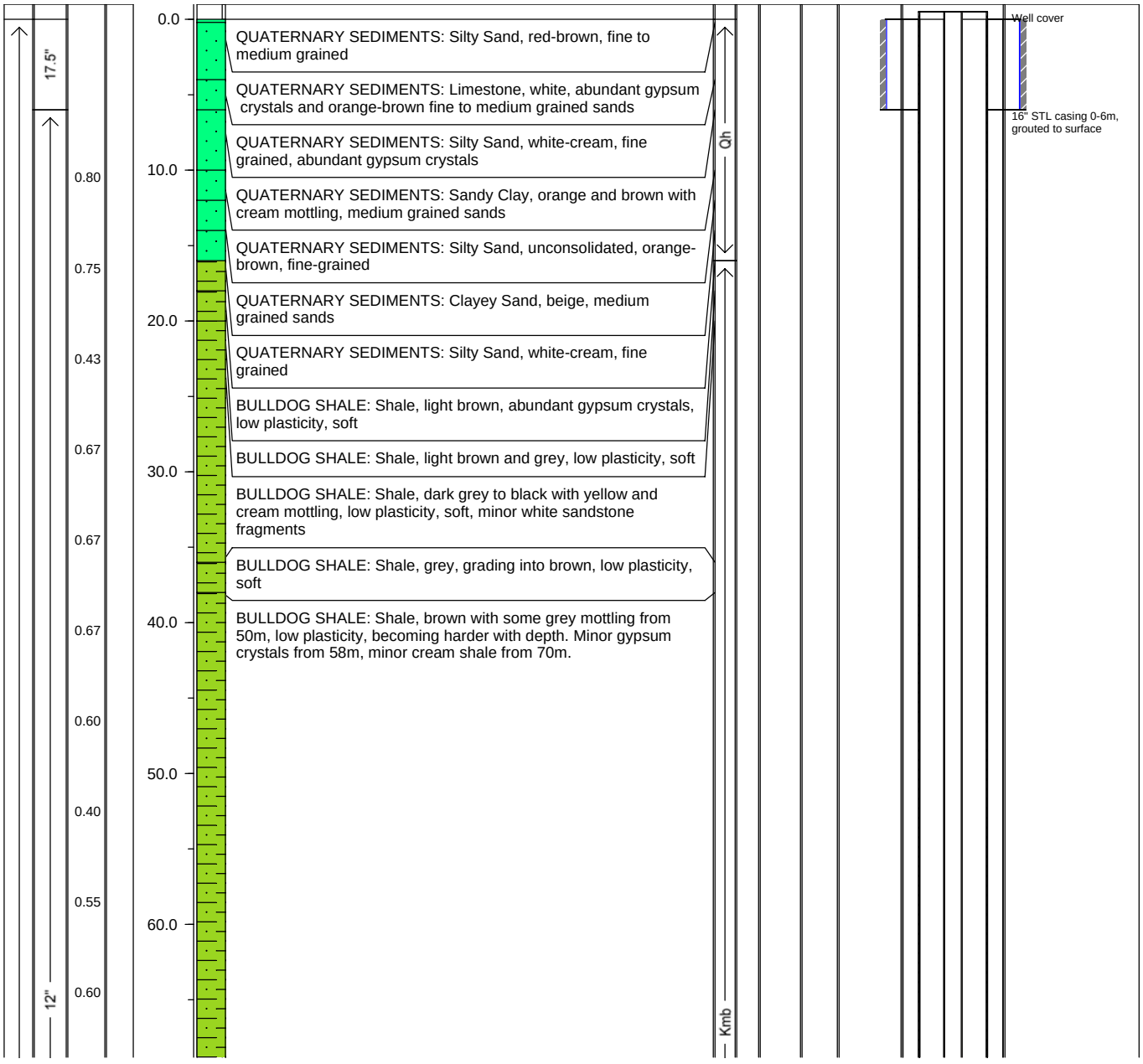
BOREHOLE / WELL NUMBER

MAR2-10 / RD3456

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **27/11/2007** DATE COMPLETED: **03/12/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **198**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **04/12/2007** Depth (m bgl): **70.04 (shallow)/82.81 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **694194** NORTHING: **6660873**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: M Ivanova DATE: 30/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR2-10 / RD3456

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **27/11/2007** DATE COMPLETED: **03/12/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **198**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **04/12/2007** Depth (m bgl): **70.04 (shallow)/82.81 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **694194** NORTHING: **6660873**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer		0.55		70.0		BULLDOG SHALE: Shale, brown and grey, hard, with minor white sandstone and gypsum crystals. Minor grey limestone fragments from 74m. Poor to no returns at 80-82 and 112-117m.					Poor to no returnsat 80-82m - foam injected to wet hole and recover cuttings		
		0.50											
				80.0									
		0.40											
		0.43		90.0									
		0.35											
		0.38		100.0									8" STL pre-collar 0-84m, grouted 122-124m
				110.0									
		0.26									Minor to no returns at 112-117m - foam injected		
		0.26				ANDAMOOKA LMST: Limestone and dolomite, grey, with visible dissolution features, ~50% brown and grey shale							Cement/bentonite seal 112-126m
				120.0		ANDAMOOKA LMST: Limestone and dolomite, grey and white, minor brown and grey shale							
		0.26						wc	3				
						ANDAMOOKA LMST: Limestone and Dolomite, white and grey, crystalline			3	38			7-15mm gravel pack 126-136m
				130.0									Shallow installation 50mm PVC monitoring casing; blank 0-130m, slotted 130-136m
		0.40	150			ANDAMOOKA LMST: Limestone, white and pink, some white fine-grained sandstone, and dark grey and white quartzite			3	37.2			
						ANDAMOOKA LMST: Dolomite, white and pink							
		0.55	150						3	38.4			

LOGGED: M Ivanova DATE: 30/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR2-10 / RD3456

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **27/11/2007** DATE COMPLETED: **03/12/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **198**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **04/12/2007** Depth (m bgl): **70.04 (shallow)/82.81 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **694194** NORTHING: **6660873**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	8"	0.55	150	140.0		ANDAMOOKA LMST: Dolomite, white and pink, interbedded with ~20% brown shale, minor white clay and pyrite			5	37.6	Fracturing/ broken ground as recorded by driller: 137-138, 139-140, 141-142, 147-148, 151-152, 155-158, 159-160, 161-162, 165-166, 167-168, 170-171, 173-174, 175-176, 179-160, 185-186, and 197-198 (the latter accompanied by noticeable increase in airlift rate).		
		0.46	150			ANDAMOOKA LMST: Dolomite, white and pink, interbedded with ~40-50% brown shale							
		0.46	150	150.0		ANDAMOOKA LMST: Dolomite, white with minor pink, minor grey limestone and pyrite fragments			6	37.8			
		0.46	150			ANDAMOOKA LMST: Dolomite and Limestone, white, grey and pink, with visible dissolution features, minor pyrite, minor white and pink fine-grained sandstone and minor grey-green shale. Interbedded brown and/ or grey shale at 160-162 (~20% brown and grey), 164-166 (~5% brown), and 166-168 (~5% grey).	€a		6	38.6			
		0.46	150	160.0					7	38.2			Cement/bentonite seal 144-182m
		0.46	150			ANDAMOOKA LMST: Limestone and Sandstone, grey, brown and minor white, interbedded with ~20% brown and green shale.			7	47.1			
		0.50	150	170.0		ANDAMOOKA LMST: Sandstone, purple-brown, calcareous, fine-grained, with ~30% grey-green and white limestone and minor green shale.			8	49.0			
		0.46	150			ANDAMOOKA LMST: Limestone, grey, white and yellow, minor purple sandstone.			9	45.6			
		0.38	150	180.0		ANDAMOOKA LMST: Dolomite, pink, with ~50% grey, white and yellow limestone, and evidence of dissolution. Minor pink and grey fine-grained sandstone from 184m.			10	51.9			7-15mm gravel pack 182-198m
		0.33	150	190.0		ANDAMOOKA LMST: Dolomite with ~50% fine-grained sandstone and quartzite, mostly pink with some grey. Minor grey and white limestone.	€a/Pws		12	103.8			Deep installation 50mm PVC monitoring casing; blank 0-192m, slotted 192-198m
						ANDAMOOKA LMST: Quartzite, pink with minor grey, ~20% pink and grey dolomite, minor grey shale.							
		0.43	150	200.0		ARCOONA QTZT (RD): Quartzite, grey and pink, with grey and pink sandstone from 196m.	Pws		14	134.4			
						EOH at 198m							

LOGGED: M Ivanova DATE: 30/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

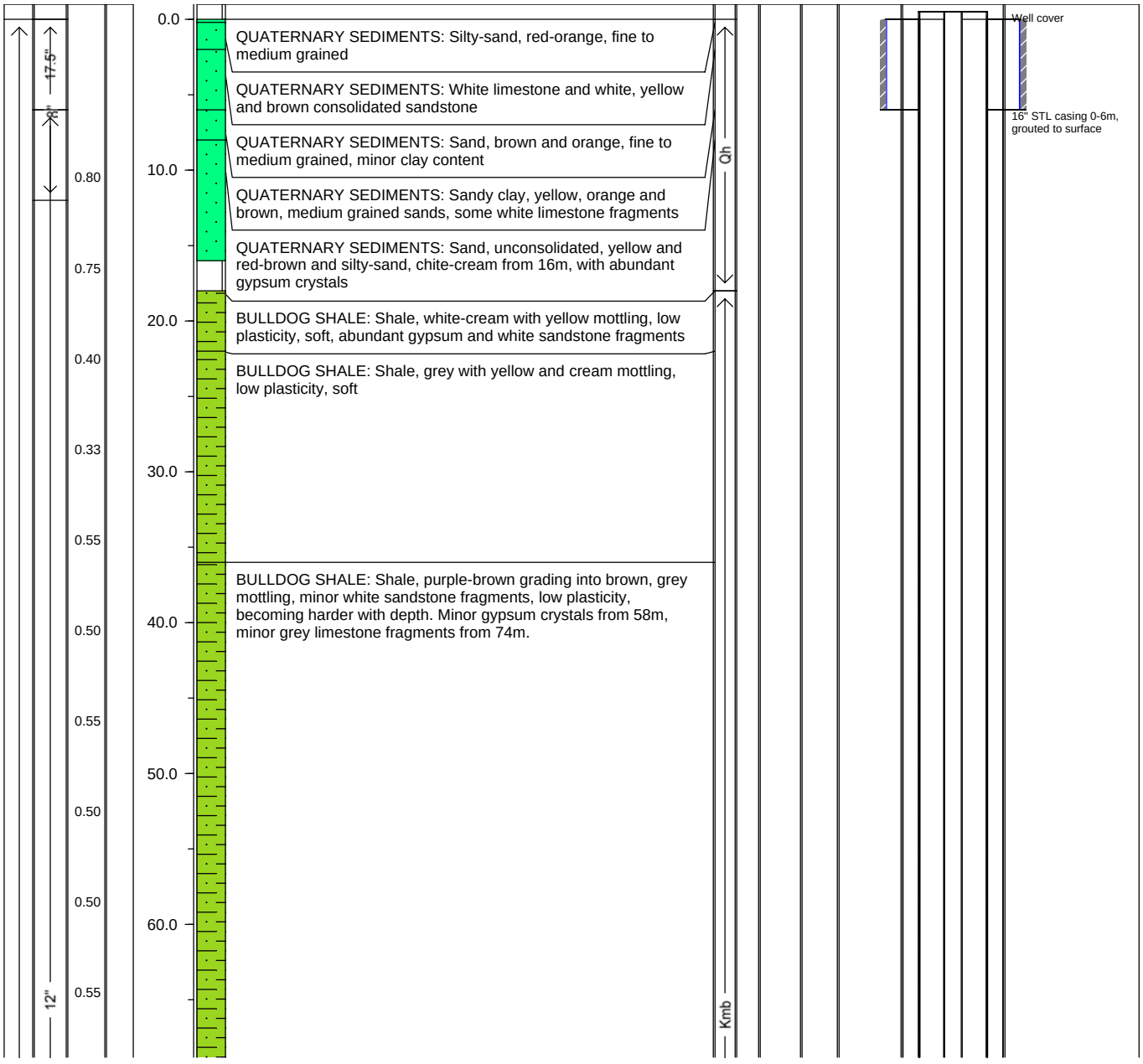
BOREHOLE / WELL NUMBER

MAR2-50 / RD3457

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **25/11/2007** DATE COMPLETED: **03/12/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **198**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **04/12/2007** Depth (m bgl): **70.43 (shallow)/83.27 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **694231** NORTHING: **6660906**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: M Ivanova DATE: 30/11/2007

CHECKED: _____ DATE: _____

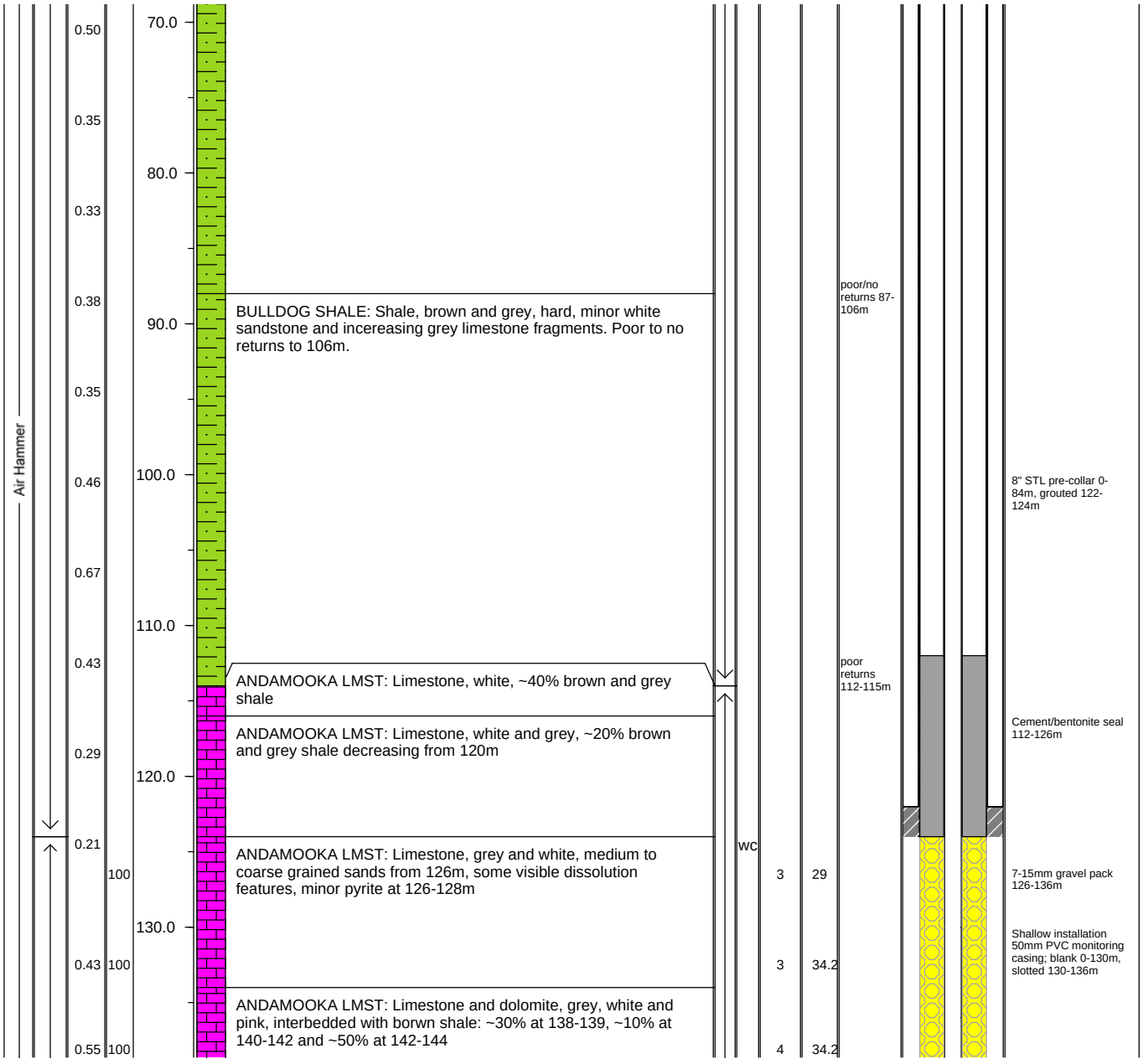
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR2-50 / RD3457

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **25/11/2007** DATE COMPLETED: **03/12/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **198**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **04/12/2007** Depth (m bgl): **70.43 (shallow)/83.27 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **694231** NORTHING: **6660906**



LOGGED: M Ivanova DATE: 30/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR2-50 / RD3457

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **25/11/2007** DATE COMPLETED: **03/12/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **198**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **04/12/2007** Depth (m bgl): **70.43 (shallow)/83.27 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **694231** NORTHING: **6660906**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	8"	0.46	100	140.0		ANDAMOOKA LMST: Dolomite, white, pink and grey, some visible dissolution features and minor pyrite, ~5% brown shale and minor grey shale at 146-148			3	35			
		0.40	100	150.0			€a		5	35.4			
		0.35	100			ANDAMOOKA LMST: Dolomite and limestone, white pink and grey, with some white, pink and grey-green sandstone and very minor green shale. Noticeable fracturing between 156 and 162m.			6	48.4	fracturing 156-162m		
		0.55	120	160.0					6	45.6			Cement/bentonite seal 144-182m
		0.50	120			ANDAMOOKA LMST: Sandstone, fine-grained, mostly pink-purple with ~40% grey and green limestone and dolomite and minor brown shale			7	51.3			
			120	170.0					9		fracture 171m		
		0.43	120			ANDAMOOKA LMST: Limestone and dolomite, grey, with some red-purple sandstone. Fracture at ~171m.			9	46.5			
						ANDAMOOKA LMST: Sandstone, red-purple, with ~5-10% grey dolomite							
		0.30	120	180.0		ANDAMOOKA LMST: Sandstone, purple, white and green, calcareous, with ~40% grey dolomite			10	59.2			
		0.38	150			ANDAMOOKA LMST: Dolomite, pink, white and grey, with pink, grey and minor purple sandstone with increasing yellow dolomite, pink and grey quartzite and disolution features from 180m			10	66.4			7-15mm gravel pack 182-198m
				190.0		ANDAMOOKA LMST: Quartzite and sandstone, pink and grey, with ~20% pink, grey and yellow dolomite	€a/Pws						
		0.32	160			ARCOONA QTZT (RD): Quartzite and sandstone, pink, with some grey-green, white and red quartzite and sandstone from 194m	Pws		12	144.0			Deep installation 50mm PVC monitoring casing; blank 0-192m, slotted 192-198m
		0.20	180	200.0		EOH at 198m			15				

LOGGED: M Ivanova DATE: 30/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR3/ RD3465

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **10 inches**
DATE STARTED: **20/01/2008** DATE COMPLETED: **24/01/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **228**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **29/01/2008** Depth (m bgl): **57**
PROJECTION: **GDA94 Zone 53**
EASTING: **691905** NORTHING: **6656771**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	17.5" / 15"	0.29 / 0.31		0.0		QUATERNARY SEDIMENTS: Sand (red), fine, clay (green), low plasticity, with small sandstone (red) and shale (dark)	Qh					Well cover	
				10.0		QUATERNARY SEDIMENTS: Clay (green) with sandstone (red), quartz, with minor shale (dark)						17.5" STL casing 0-6m, grouted to surface	
						QUATERNARY SEDIMENTS: Clay (green) medium plasticity, with increasing sandstone (red), sitly-clay (yellow) and gypsum							
				20.0		QUATERNARY SEDIMENTS: Silt/sandstone (red/brown) with gypsum, sandy-clay (yellow) and clay (green) low-plasticity							
						QUATERNARY SEDIMENTS: Clay (green, yellow and some red)							
				30.0		QUATERNARY SEDIMENTS: Clay (green, yellow and some red) with some sandstone (yellow and red) and gypsum							
						BULLDOG SHALE: Shale (red with some green ~20%), gypsum, some sandstone (red, yellow) and siltstone (grey)							
				40.0		BULLDOG SHALE: Shale (mainly red with 30% green) and gypsum							
				50.0		BULLDOG SHALE: Shale (brown/red and green/grey), occasional gypsum	Kmb						
				60.0		BULLDOG SHALE: Shale (brown/red and green/grey) with minor sandstone							
				70.0		BULLDOG SHALE: Shale (brown/red and green/grey), minor sandstone and 10% limestone (white)							
				80.0		BULLDOG SHALE: Shale (brown/red and green/grey), minor sandstone and 30% limestone (white)	hb/					10" STL pre-collar 0-88m	
				90.0		ANDAMOOKA LMST: Shale (brown/red and green/grey), with limestone (white/tan and some grey) porous		wc	0.5				
						ANDAMOOKA LMST: Limestone (grey and white) mottled, consolidated with some shale (green and red)			0.5				
				100.0		ANDAMOOKA LMST: Limestone (light grey and white) mottled, dolomitic		wc		42.2			
						ANDAMOOKA LMST: Limestone (white with increasing pink)				40			
				110.0		ANDAMOOKA LMST: Limestone (white, less pink), visible macropores		wc		44.4			
				120.0		ANDAMOOKA LMST: Limestone (white, dark pink and some			0.5	45.6			

LOGGED: K Furness DATE: 24/01/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR3/ RD3465

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **10 inches**
DATE STARTED: **20/01/2008** DATE COMPLETED: **24/01/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **228**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **29/01/2008** Depth (m bgl): **57**
PROJECTION: **GDA94 Zone 53**
EASTING: **691905** NORTHING: **6656771**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.						
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	10"	0.46		130.0		green), crystalline ANDAMOOKA LMST: Dolomitic limestone (grey, white and some pink and green), mottled			0.5	46.6			
						ANDAMOOKA LMST: Limestone (dark pink with some white), mottled			2.5	46			
		0.43		140.0		ANDAMOOKA LMST: Dolomitic limestone (grey-pink) mottled			2.5	47.1			
		0.43		150.0		ANDAMOOKA LMST: Limestone (white and pink with some green) crystalline and highty laminated			2.5	48.4			
		0.43					€a		2.5	48.3			
		0.43	220	160.0		ANDAMOOKA LMST: Limestone (white) crystalline			3	64			
		0.43	220			ANDAMOOKA LMST: Limestone (white, pink and light grey), highly porous and laminated		wc	~8	65.6			
		0.30	220	170.0		ANDAMOOKA LMST: Dolomitic limestone (dark grey) porous			~20	62.4	fracture at 170-172m		
		0.43	200	180.0					~25	78.8			Open hole to 228m
		0.43	210			ANDAMOOKA LMST: Dolomitic limestone (dark grey) porous with some sandstone			~25	81.3			
		0.44	210	190.0		ANDAMOOKA LMST: Dolomite (dark grey) porous with some limestone (light grey and pink) crystalline and 50% quartz/sandstone			~25	68.3 72.4			
		0.41	210			ANDAMOOKA LMST: Dolomite (dark grey) porous			~40				
		0.38	210	200.0		ANDAMOOKA LMST: Dolomite (dark grey) with sandstone bands (pink, yellow and grey) porous			~40				
		0.43	210			ANDAMOOKA LMST: Limestone (grey) and sandstone (grey)			~40				
		0.30	230	210.0		ANDAMOOKA LMST: Limestone (light and dark grey) some porous, platey cleavage, some sandstone			~40				
		0.35	230			ARCOONA QTZT (RD): Limestone (light and dark grey, pink) platey cleavage, some sandstone and grey and red shale	/P1		>40				
		0.40	230	220.0					>40				
		0.35	230						>40				
				230.0		EOH at 228 m							

LOGGED: K Furness DATE: 24/01/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

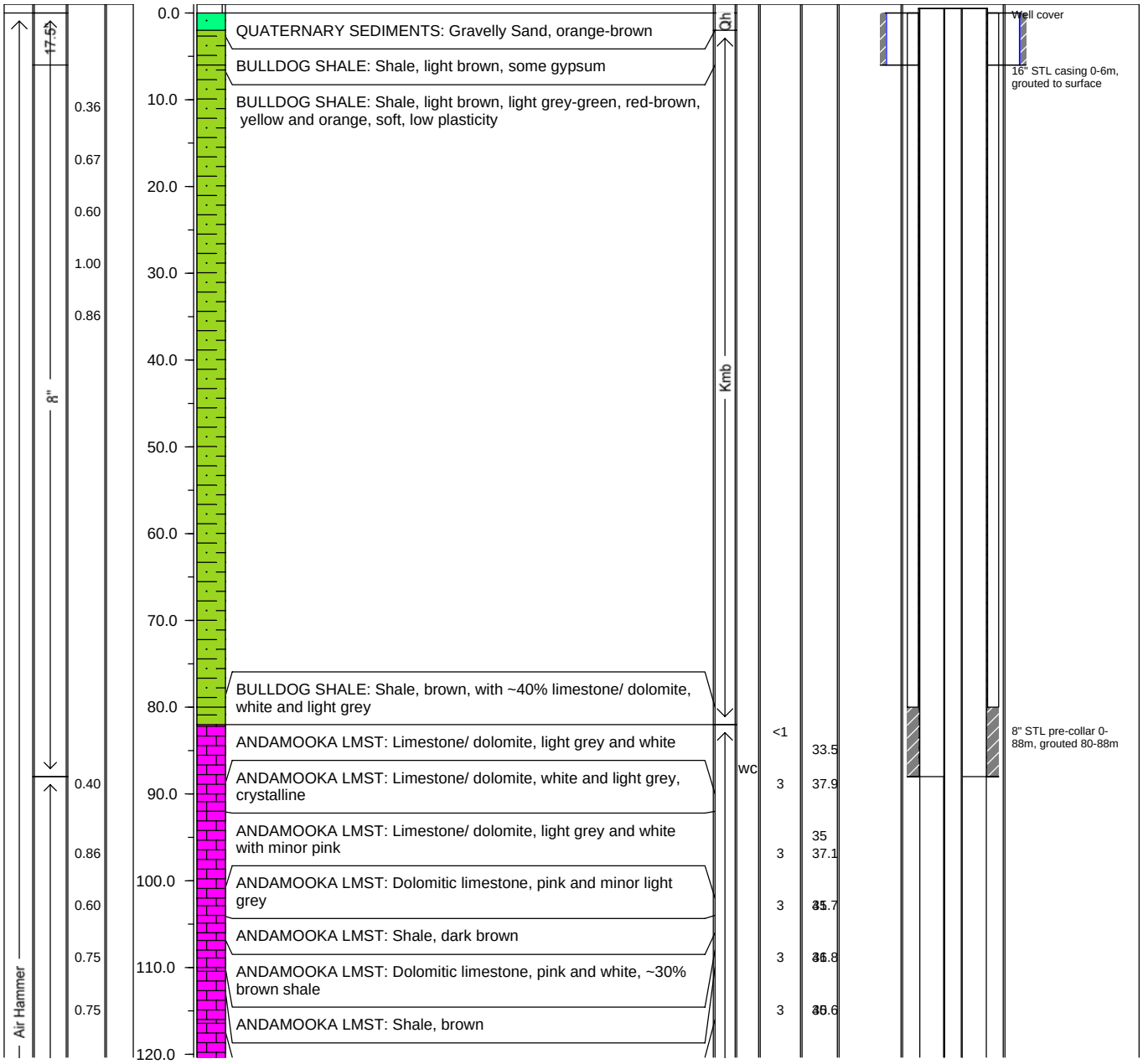
BOREHOLE / WELL NUMBER

MAR3-20 / RD3464

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **13/01/2008** DATE COMPLETED: **20/01/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **228**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **22/01/2008** Depth (m bgl): **56.175**
PROJECTION: **GDA94 Zone 53**
EASTING: **691878** NORTHING: **6656788**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: M Ivanova DATE: 20/01/2008

CHECKED: _____ DATE: _____

rem	FIELD BOREHOLE / WELL LOG	BOREHOLE / WELL NUMBER
		MAR3-20 / RD3464

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **13/01/2008** DATE COMPLETED: **20/01/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **228**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **22/01/2008** Depth (m bgl): **56.175**
PROJECTION: **GDA94 Zone 53**
EASTING: **691878** NORTHING: **6656788**

DRILLING INFO. | MATERIAL PROPERTIES | FIELD RECORDS / CONSTRUCTION INFO.

METHOD | BIT LOG | PENETRATION RATE (m/min) | UNLOAD PRESSURE (psi) | DEPTH (m) | GRAPHIC LOG | LITHOLOGY | INTERPRETIVE LOG | WATER CUTS | AIRLIFT YIELD (L/sec) | EC (mS/cm) | COMMENTS | WELL CONSTRUCTION | WELL DESCRIPTION

Bit log: 6"

Interpretive log: €a; Pws/P\

Depth scale (m): 130.0, 140.0, 150.0, 160.0, 170.0, 180.0, 190.0, 200.0, 210.0, 220.0, 230.0

LITHOLOGY
ANDAMOOKA LMST: Dolomitic limestone, pink and white with minor grey-green
ANDAMOOKA LMST: Limestone, cream-white and pink, interbedded with ~20-30% brown shale and minor grey shale
ANDAMOOKA LMST: Limestone, pink-orange
ANDAMOOKA LMST: Limestone, pink-purple and cream, minor dark purple sandstone
ANDAMOOKA LMST: Limestone and dolomite, purple-brown with minor crystalline cream, yellow and green (green becoming more abundant with depth). ~10% brown and light grey shale at 136-138m.
ANDAMOOKA LMST: Dolomite, pink and white, visible macropores, minor pyrite
ANDAMOOKA LMST: Dolomitic limestone, white and grey, visible macropores, minor mica and pyrite
ANDAMOOKA LMST: Dolomite, white and grey, ~30% light grey sandstone
ANDAMOOKA LMST: Dolomite, white and grey, numerous macropores, ~30% light grey sandstone, ~20% white and grey quartzite, minor pyrite
ANDAMOOKA LMST: Dolomite and sandstone, light grey and white, abundant macropores, minor pyrite
ANDAMOOKA LMST: Dolomite, grey, ~30% pink sandstone and quartzite
ARCOONA QTZT (RD): Quartzite, pink, with ~ 20% grey dolomite and minor grey shale
EOH at 228m

PENETRATION RATE (m/min)	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS
0.75	3	36.8	
0.75	3	39.4	
0.67	3	39.9	
0.67	3	39.5	
0.67	3	39.1	
0.86	4	60.5	
0.46	4	45.3	
0.46	4	48.5	
0.43	6	56.6 58	
0.23	8	93.1	
0.27	8	95.6	
0.30	10	96.6	
0.38	10	170.1	
0.38	12	190.4	
0.35	12	199.2	
0.23	14	197.1	
	16	198.9	fracture at 214m
0.06	16	201.0	
0.20	18	206.3	
0.20	20	208.7	

WELL DESCRIPTION:
50mm PVC monitoring casing, blank 0-222m, slotted 222-228m
Cement/bentonite seal 209-210m
7-15mm gravel pack 211-228m

LOGGED: M Ivanova DATE: 20/01/2008
CHECKED: ____________ DATE: ________

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR4/ RD3463

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **10 inches**
DATE STARTED: **08/12/2007** DATE COMPLETED: **13/122007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **186**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **14/12/2007** Depth (m bgl): **70.26**
PROJECTION: **GDA94 Zone 53**
EASTING: **689954** NORTHING: **6650868**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	17.5"	0.22		0.0		QUATERNARY SEDIMENTS: Silt (white/ tan), with limestone (white) calcareous nodules, and some dark sandstone	Qh					Well cover	
		0.32				QUATERNARY SEDIMENTS: Silty sand (white), with gypsum crystals, sandstone and some white calcareous fragments						17.5" STL casing 0-6m, grouted to surface	
		0.60		10.0		QUATERNARY SEDIMENTS: Sandy clay (red, yellow and white), coarse grained sand and med-plastic clay, some gypsum crystals and dark sandstone							
		0.60		20.0		QUATERNARY SEDIMENTS: Silt (brown) with 50% gypsum, sandstone (yellow, white, dark red)							
		0.60				BULLDOG SHALE: Shale (brown, white, yellow, grey and red) with some gypsum crystals and sandstone							
	15"	0.50		30.0		BULLDOG SHALE: Shale, green and brown, very plastic							
		0.32				BULLDOG SHALE: Shale, green/ brown, very soft	Kmb						
		0.21		40.0									
		0.35											
		0.50		50.0		BULLDOG SHALE: Shale, green-grey and red, very plastic							
		0.30		60.0		BULLDOG SHALE: Shale, green and red, with quartz/sandstone fragments							
		0.21				ANDAMOOKA LMST: Yellow, white and brown limestone with sandstone and minor clay and shale							
		0.13		70.0		ANDAMOOKA LMST: Limestone, grey, pink, white and yellow, consolidated, with minor white and black quartzite/sandstone					loss in circulation		
		0.26		80.0		ANDAMOOKA LMST: White, pink and grey dolomitic limestone with some sandstone		WC	<0.1				10" STL pre-collar 0-84m
				90.0		ANDAMOOKA LMST: Limestone, green, white and pink, visible macropores (dissolution features), with siltstone and sandstone and minor gypsum			<0.1				

LOGGED: K Furness DATE: 13/12/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR4/ RD3463

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **10 inches**
DATE STARTED: **08/12/2007** DATE COMPLETED: **13/122007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **186**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **14/12/2007** Depth (m bgl): **70.26**
PROJECTION: **GDA94 Zone 53**
EASTING: **689954** NORTHING: **6650868**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.						
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	10"	0.46	150	100.0		ANDAMOOKA LMST: Limestone, white, light green and pink, porous, with some siltstone		WC	3.3	42.2	fracture/cavity at 101-102m, slight loss in circulation, fracture at 103m		
		0.35	150			ANDAMOOKA LMST: Dolomite, grey, with white and tan consolidated limestone			2.5	40			
		0.27	150	110.0		ANDAMOOKA LMST: Dolomite, grey, porous			2.5	44.4	fracture		
		0.26	150			ANDAMOOKA LMST: Dolomite, grey-pink, hard, some porous grey dolomite		WC	4	45.6			
		0.26	150	120.0		ANDAMOOKA LMST: Dolomite, grey and white, visible macropores			5.5	46.6			
		0.32	150			ANDAMOOKA LMST: Dolomite, white and light grey			6-7	46			
		0.32	150	130.0					6-7	47.1			
		0.20	150						8	48.4			
		0.26	150	140.0		ANDAMOOKA LMST: Dolomite, grey, with minor grey sandstone			8	48.3			
		0.29	150			ANDAMOOKA LMST: Dolomite, grey, with minor green shale and sandstone			10	64			
		0.21	150	150.0		ANDAMOOKA LMST: Dolomite, grey, with some white/grey sandstone			13	65.6			
		0.27	210					WC	17	62.4	fracture		
		0.29	210	160.0		ANDAMOOKA LMST: Dolomite, pink and green, with sandstone and gypsum			17	78.8			
		0.21	210						17	81.3			
		0.17	210	170.0		ARCOONA QTZT (RD): Shale, green and red, with white and dark grey quartzite and sandstone and dark grey dolomite			17	68.3			Open hole to 186m
		0.10	210			EOH at 186 m			17	72.4			
				180.0									
				190.0									

LOGGED: K Furness DATE: 13/12/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

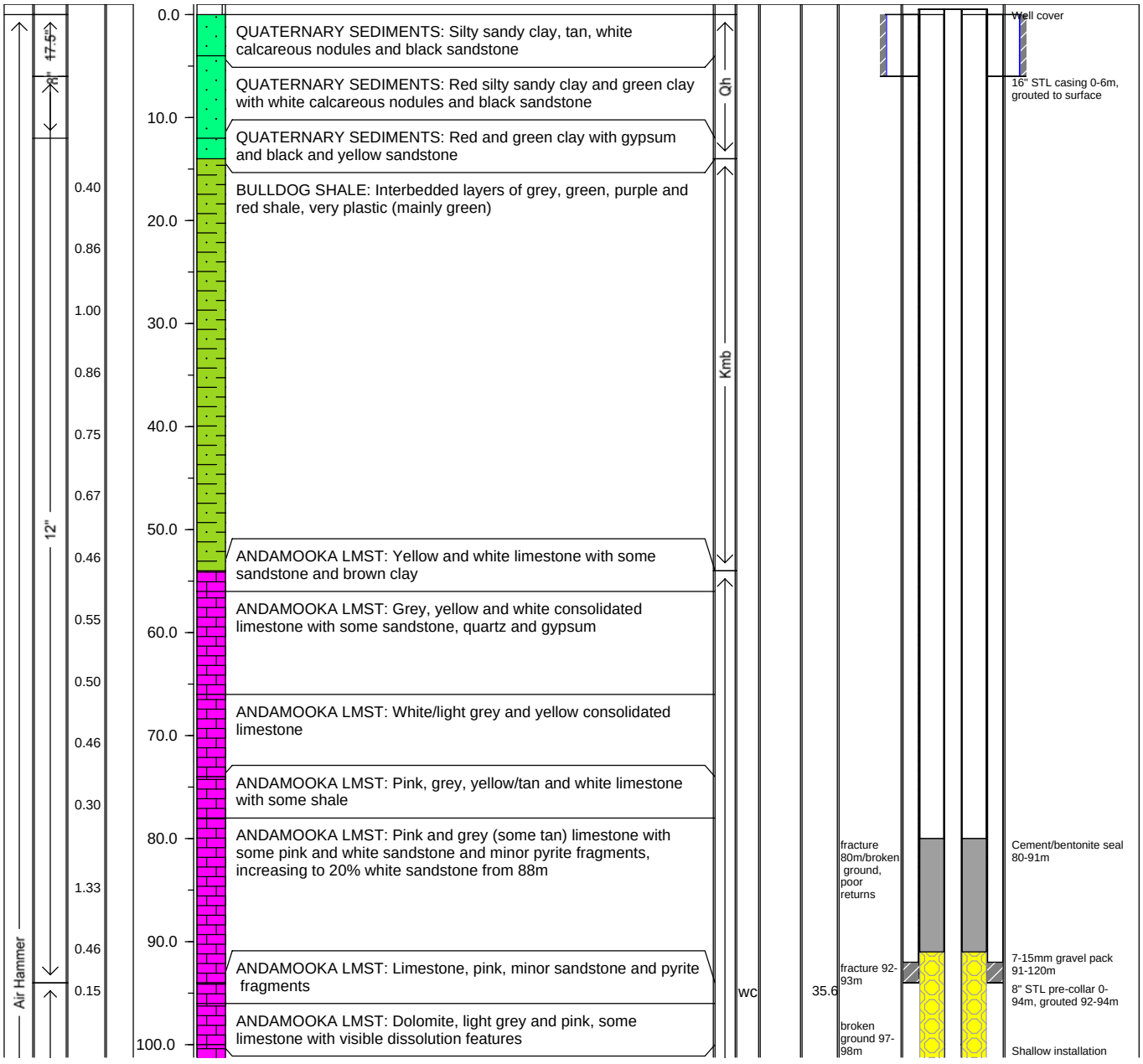
BOREHOLE / WELL NUMBER

MAR4-20 / RD3462

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **18/11/2007** DATE COMPLETED: **22/11/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **186**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **29/11/2007** Depth (m bgl): **69.77 (shallow)/71.77 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **689985** NORTHING: **6650885**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: M Ivanova DATE: 22/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR4-20 / RD3462

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **18/11/2007** DATE COMPLETED: **22/11/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **186**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **29/11/2007** Depth (m bgl): **69.77 (shallow)/71.77 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **689985** NORTHING: **6650885**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	8"	0.35	300	110.0		ANDAMOOKA LMST: Dolomite, light grey, tan, pink and white, some limestone with green tinge, minor pink sandstone and pyrite fragments. Visible dissolution features and iron oxide stained dodules 120-124m. Minor white silty clay at 148-150. Minor green shale at 154-158. Approx. 20% tan dolomite between 160 and 162m.	Ea		3	44.7			Cement/bentonite seal 120-168m
		0.35	300	130.0					3	48.3			
		0.33	300	140.0					4	45.6			
		0.30	300	150.0					3	48.6			
		0.26	300	160.0					5	46.8			
		0.26	300						6	48.9			
		0.26	300						6	48.6			
		0.19	300	170.0		ANDAMOOKA LMST: Dolomite, light grey with a green tinge and with increasing pink, increasing amount of light grey to white sandstone.			7	53.7			7-15mm gravel pack 168-186m
		0.15	300						9	56.1			
			300	180.0		ARCOONA QTZT (RD): Dolomite, light grey and pink, interbedded with ~40% red-brown shale and minor grey shale, increasing in grey white and red sandstone from 180m	Pws		10	67.2			Deep installation 50mm PVC monitoring casing; blank 0-180m, slotted 180-186m
			300			ARCOONA QTZT (RD): Sandstone, pink with some light grey, ~10% red-brown shale and minor light grey dolomite			10	70.4			
				190.0					12				

50mm PVC monitoring casing; blank 0-100m, slotted 100-106m

LOGGED: M Ivanova DATE: 22/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR4-50 / RD3461

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **13/11/2007** DATE COMPLETED: **18/11/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **186**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **21/11/2007** Depth (m bgl): **68.93 (shallow)/69.07 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **689909** NORTHING: **6650915**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	17.5" / 12"	0.43 / 0.22 / 0.21 / 0.86 / 0.50 / 1.00 / 0.60 / 0.67 / 0.33 / 0.50 / 0.46 / 0.50 / 0.38 / 0.18		0.0 / 10.0 / 20.0 / 30.0 / 40.0 / 50.0 / 60.0 / 70.0 / 80.0 / 90.0 / 100.0		QUATERNARY SEDIMENTS: Tan silty sandy clay with white calcareous nodules and black sandstone QUATERNARY SEDIMENTS: Red silty sandy clay and green clay with white calcareous nodules and black sandstone QUATERNARY SEDIMENTS: Red and green clay with gypsum and black and yellow sandstone QUATERNARY SEDIMENTS: Yellow and red clay with gypsum and black sandstone BULLDOG SHALE: Green-grey and red shale becoming yellow from 58m, very plastic BULLDOG SHALE: Green and red shale with quartz/sandstone fragments ANDAMOOKA LMST: Yellow, white and brown limestone with sandstone and minor clay and sthale ANDAMOOKA LMST: Grey, pink, white and yellow consolidated limestone with minor white and black quartzite/sandstone ANDAMOOKA LMST: White, pink and grey dolomitic limestone with some sandstone ANDAMOOKA LMST: Green, white and pink limestone, visible macropores (dissolution features), with siltstone and sandstone and minor gypsum ANDAMOOKA LMST: White, light green and pink porous limestone with some siltstone	Qh / Kmb	WC / WC	1 / 0 / >4	33.5 / 35	fracture 80m	Well cover 16" STL casing 0-6m, grouted to surface Cement/bentonite seal 70-84m 8" STL pre-collar 0-82m, grouted 80-82m 7-15mm gravel pack 84-120m Shallow installation 50mm PVC monitoring casing; blank 0-88m, slotted 88-94m	

LOGGED: K Furness DATE: 18/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MAR4-50 / RD3461

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **13/11/2007** DATE COMPLETED: **18/11/2007**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **186**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **21/11/2007** Depth (m bgl): **68.93 (shallow)/69.07 (deep)**
PROJECTION: **GDA94 Zone 53**
EASTING: **689909** NORTHING: **6650915**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	8"	0.25				ANDAMOOKA LMST: Grey dolomite with white and tan consolidated limestone, porous from 100m			>4	35			
		0.21		110.0		ANDAMOOKA LMST: Hard, grey-pink and white dolomite, some porous grey dolomite			5	36	fracture 110m, loss of circulation, poor returns		
		0.24				ANDAMOOKA LMST: White and light grey dolomite			5	35			
		0.27		120.0					6	36.5			Cement/bentonite seal 120-168m
		0.33							>6	39			
				130.0									
		0.23							>6	39			
		0.29		140.0					>6	39.5			
		0.27				ANDAMOOKA LMST: Grey dolomite with minor grey sandstone			~7	39			
		0.17		150.0		ANDAMOOKA LMST: Grey dolomite with minor green shale and standstone			7	39			
		0.27							7	42			
				160.0									
		0.25							7	45.5			
		0.24							7	50			7-15mm gravel pack 168-186m
		0.21		170.0		ANDAMOOKA LMST: Pink and green dolomite with sandstone and gypsum			7	58			
		0.15		180.0		ARCOONA QTZT (RD): Green and red shale with white and dark quartzite and sandstone. Dark grey dolomite decreasing by 184m			7	74			Deep installation 50mm PVC monitoring casing; blank 0-180m, slotted 180-186m
		0.35							7	76.0			
				190.0		EOH at 186m							

LOGGED: K Furness DATE: 18/11/2007

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 40/ RD3467

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **01/02/2008** DATE COMPLETED: **07/02/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **264**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **68.19**
PROJECTION: **GDA94 Zone 53**
EASTING: **699594** NORTHING: **6672970**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	17.5" / 12"	0.66 / 0.66 / 0.66 / 0.60 / 0.60 / 0.60 / 0.60 / 0.60 / 0.66	200	0.0 / 10.0 / 20.0 / 30.0 / 40.0 / 50.0 / 60.0 / 70.0 / 80.0 / 90.0 / 100.0 / 110.0 / 120.0 / 130.0		QUATERNARY SEDIMENTS: SAND (red), fine, minor gypsum QUATERNARY SEDIMENTS: SILTY CLAY: white, some red sands and abundant gypsum QUATERNARY SEDIMENTS: SILTY CLAY: white, minor gypsum QUATERNARY SEDIMENTS: CLAY: white/some purple, low plasticity QUATERNARY SEDIMENTS: CLAY: white/some purple, low plasticity, some silt (brown/yellow/tan) BULLDOG SHALE: SHALE/SILTSTONE: red with some green with clay (green/red/white) low plasticity BULLDOG SHALE: SHALE: red with some green BULLDOG SHALE: SHALE/SILTSTONE: red with some green with clay (green) and minor sandstone (red and green) BULLDOG SHALE: SHALE: red with some green with some sandstone ANDAMOOKA LMST: LIMESTONE: white, slightly porous with 35% shale (green) and minor sandstone ANDAMOOKA LMST: LIMESTONE : white and grey mottled ANDAMOOKA LMST: LIMESTONE: white with some green ANDAMOOKA LMST: LIMESTONE: white/tan/purple/grey, fracture, with orange and white quartz ANDAMOOKA LMST: LIMESTONE: white ANDAMOOKA LMST: LIMESTONE: yellow and red ANDAMOOKA LMST: LIMESTONE: white and minor green ANDAMOOKA LMST: LIMESTONE: white/red/pink, some porous fines	Qh / Kmb	WC	5 / 5 / 5 / 5 / 6.5 / 6.5 / 6.5 / 6.5 / 6.5	34.8 / 32.1 / 34.6 / 33.7 / 32.7 / 33.9 / 33.9 / 33.2 / 32.9		Well cover 17.5" STL casing 0-6m, grouted to surface	

LOGGED: K Furness DATE: 07/02/2008

CHECKED: _____ DATE: _____

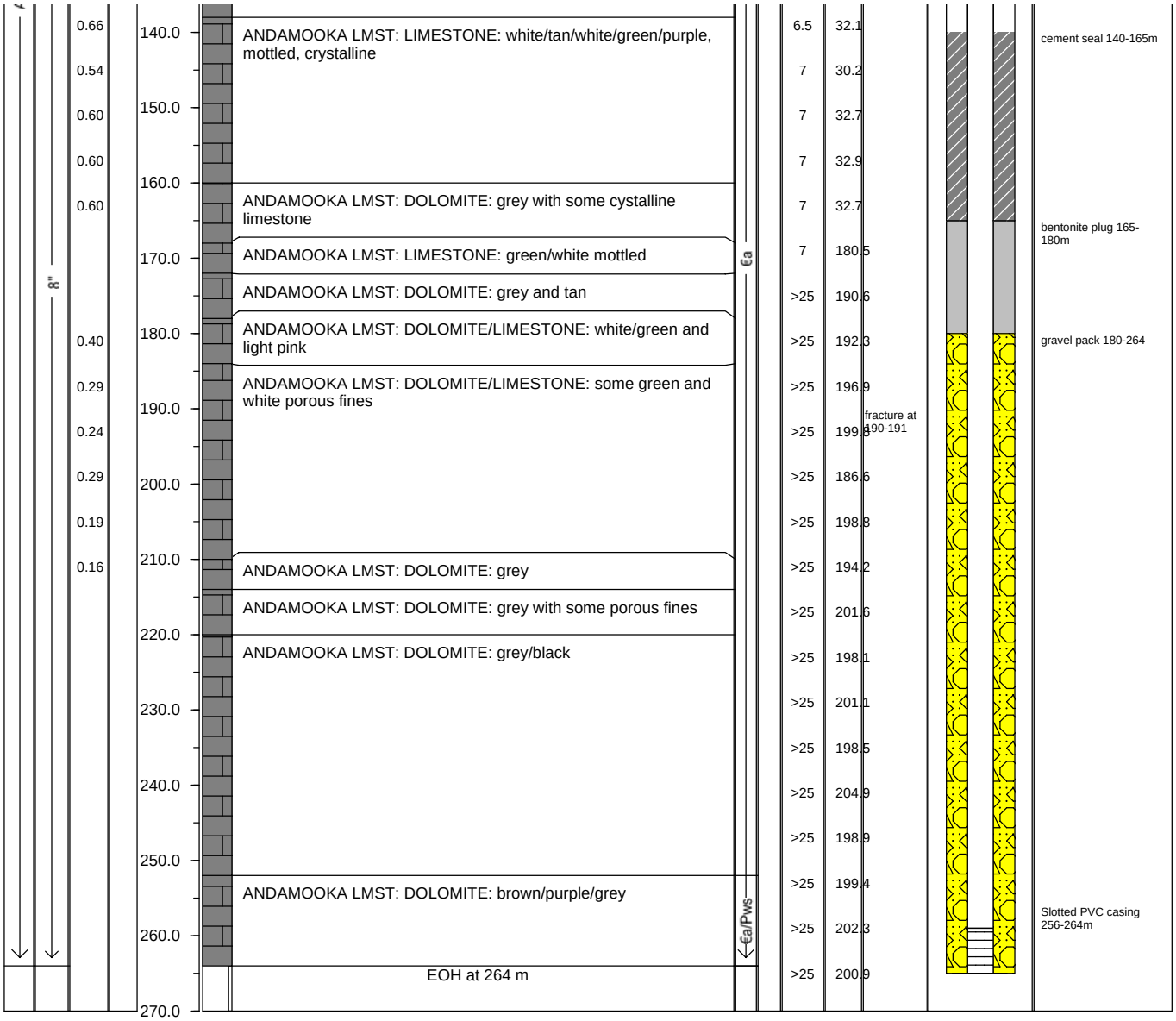
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 40/ RD3467

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **01/02/2008** DATE COMPLETED: **07/02/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **264**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **68.19**
PROJECTION: **GDA94 Zone 53**
EASTING: **699594** NORTHING: **6672970**



LOGGED: K Furness DATE: 07/02/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 42/ RD3498

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **23/03/08** DATE COMPLETED: **28/03/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **258**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **28/03/08** Depth (m bgl): **58.96**
PROJECTION: **GDA94 Zone 53**
EASTING: **690624** NORTHING: **6663910**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	7.5	1.00		0.0		QUATERNARY SEDIMENTS: Silty clay (red) low plasticity, med-fine grained	Qh					Well cover 16" STL casing 0-6m, cementing casing	
		0.67		10.0		QUATERNARY SEDIMENTS: Silty clay (green, white, red-brown, yellow) low plasticity, minor muscovite							
		0.55		20.0		QUATERNARY SEDIMENTS: Clay (red-brown and blue-green) med plasticity, minore shale (brown) from 16-20m and 52-60, occasional musovite							
		0.60		30.0									
		0.67		40.0		QUATERNARY SEDIMENTS: Shale (red-brown with some green), clay (brown)							
		0.60		50.0									
		0.67		60.0		QUATERNARY SEDIMENTS: Shale (dark brown with some green from 74m) with minor muscovite							
	12"	0.67		70.0				WC	<0.1				
		0.67	180	80.0					1.67	32.9			
		0.46	190							34.9			4" blank PVC casing 0-126m
		0.43	190	90.0					2.25	30.8			
		0.38	190						2.5	25.3			
		0.38	190	100.0					2.5	28.3			12" STL casing 0-124m, cemented in 122-126m
		0.43	190			ANDAMOOKA LMST: Limestone (grey) crystalline with shale (dark brown with minor green)			2.5	25			
		0.35	190	110.0					2.5	34.5			
		0.46	190						1.54	34.6			
		0.46	190	120.0		ANDAMOOKA LMST: Limestone (grey) crystalline with minor dolomitic limestone (grey) and shale (green)			1.82	37.8			
		0.46		130.0					1				Basket at 128m not cemented
		0.60		140.0		ANDAMOOKA LMST: Limestone (grey, pink, pale green with minor red-dark grey) and shale (green)		WC	~30				4" Slotted-blank PVC casing 126-258m
		0.67											
		0.60	195	150.0		ANDAMOOKA LMST: Limestone (red, pink, yellow and minor grey)				47.5			
		0.55	195							66.7			
		0.29	195	160.0		ANDAMOOKA LMST: Limestone (pink, grey green) dolomitic				67.2			
		0.25	195	170.0		ANDAMOOKA LMST: Limestone (pink with minor green and white)				65.7			
		0.24	190							65.5			
		0.29	190	180.0		ANDAMOOKA LMST: Limestone (grey, white and green) crystalline with minor shale (red and green) and sandstone (red) from 160m				67.7			
	8"	0.32	190	190.0			Ca			66.4			
		0.29	190							66.5			
		0.30	190	200.0		ANDAMOOKA LMST: Limestone (pink, red green) speckled with shale (purple) from 178m				76.4			
				210.0						104			
						ANDAMOOKA LMST: Limestone (pink and grey) crystalline with minor shale (green and red)				82.5			
				220.0						174			
		0.21		230.0		ANDAMOOKA LMST: Limestone (light grey) crystalline				139			
		0.20	280							205			
		0.20	300	240.0		ANDAMOOKA LMST: Limestone (grey) crystaline with minor shale (grey) banding			~30	180			
		0.20	300						~40	218			
		0.19	300	250.0		ANDAMOOKA LMST: Limestone (grey) crystalline, quartzite (white with grey) banding, hard			~40	250			
		0.15	350	260.0		EOH at 258 m			~40	298			
									~25	305			

LOGGED: K Furness DATE: 07/02/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

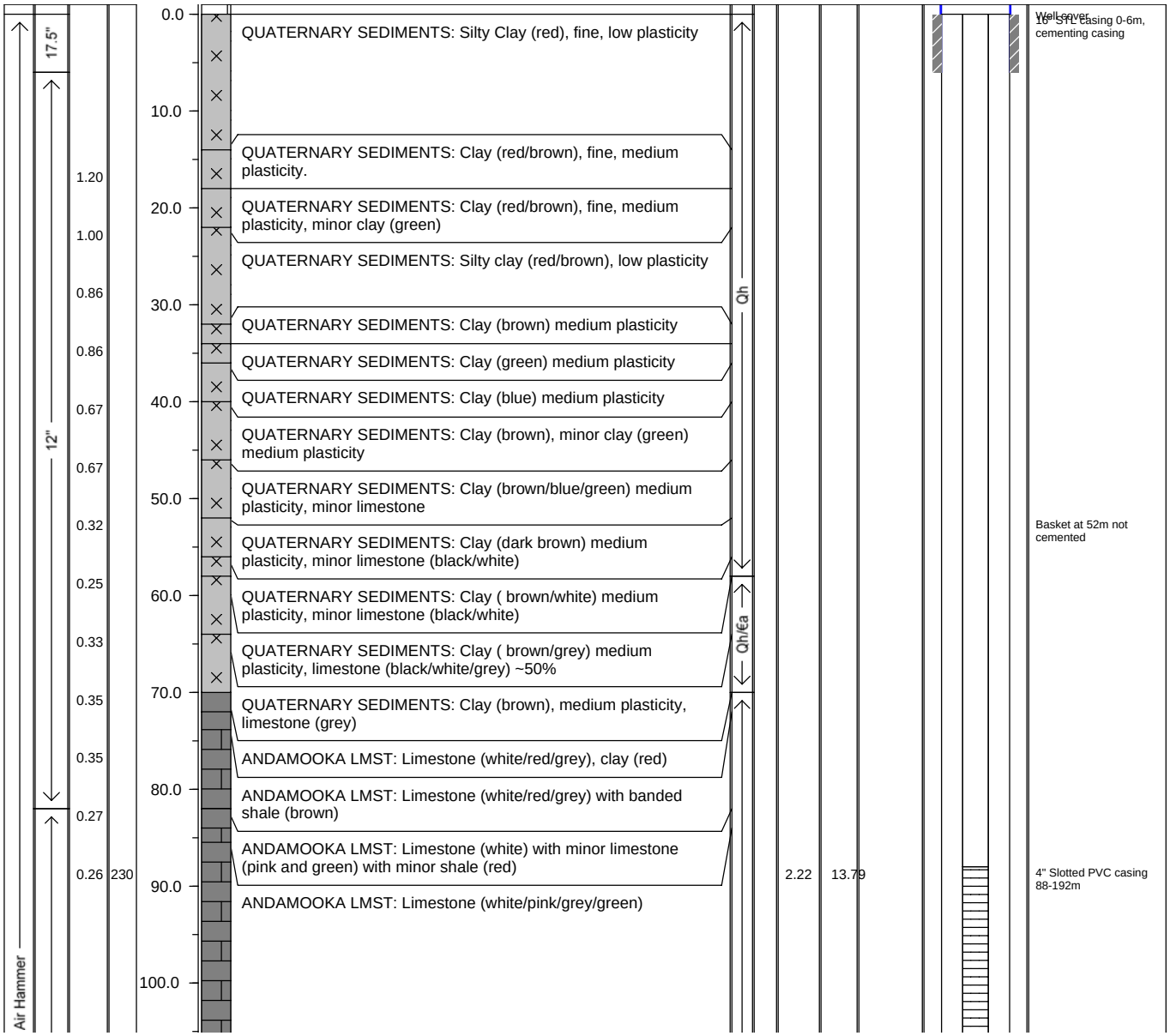
BOREHOLE / WELL NUMBER

PT- 44/RD9497

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **19/02/2008** DATE COMPLETED: **23/02/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **192**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **58.55**
PROJECTION: **GDA94 Zone 53**
EASTING: **684970** NORTHING: **6657514**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: J. Richards DATE: 23/02/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 44/RD9497

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **19/02/2008** DATE COMPLETED: **23/02/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **192**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **58.55**
PROJECTION: **GDA94 Zone 53**
EASTING: **684970** NORTHING: **6657514**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	8"	0.67	230	110.0		ANDAMOOKA LMST: Limestone (white/pink/grey/green) woth quartzite (green)	€a		0.8	46.7			
		0.60	190			ANDAMOOKA LMST: Limestone (white/pink/grey/green)			6.67	65.7			
			190	120.0					~9.1	66.4			
		0.46	190						~10.12	67.8			
		0.46	190	130.0					~15	71.2			
		0.55	190			ANDAMOOKA LMST: Limestone (grey)			~15.5	70.6			
		0.38	190	140.0		ANDAMOOKA LMST: Limestone (dark-light grey) crystalline			~15.2	87			
		0.35	195						~20	98.9			
		0.33	220	150.0					>30	126.9			
		0.30	250						>30	158.8			
		0.23	330	160.0					>40	156.7			
		0.29	330			ANDAMOOKA LMST: Limestone (grey, green, black, red) crystalline			>40	162.5			
		0.26	190	170.0					16.4	167.9			
		0.26	230			ARCOONA QTZ: Limestone (grey/green) cystalline, with shale (red), sandstone (red)	€a/Pws		>40	165.1			
		0.23	260	180.0		ARCOONA QTZ: Shale (red), sandstone (red), coarse with minor limestone (white) and shale (green)	Pws		>40	152.6			Cementing casing190-192m
						ARCOONA QTZ: Shale (red), sandstone (white, green, red) coarse with minor shale (green)							
				190.0		EOH at 192 m							
				200.0									

LOGGED: J. Richards DATE: 23/02/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

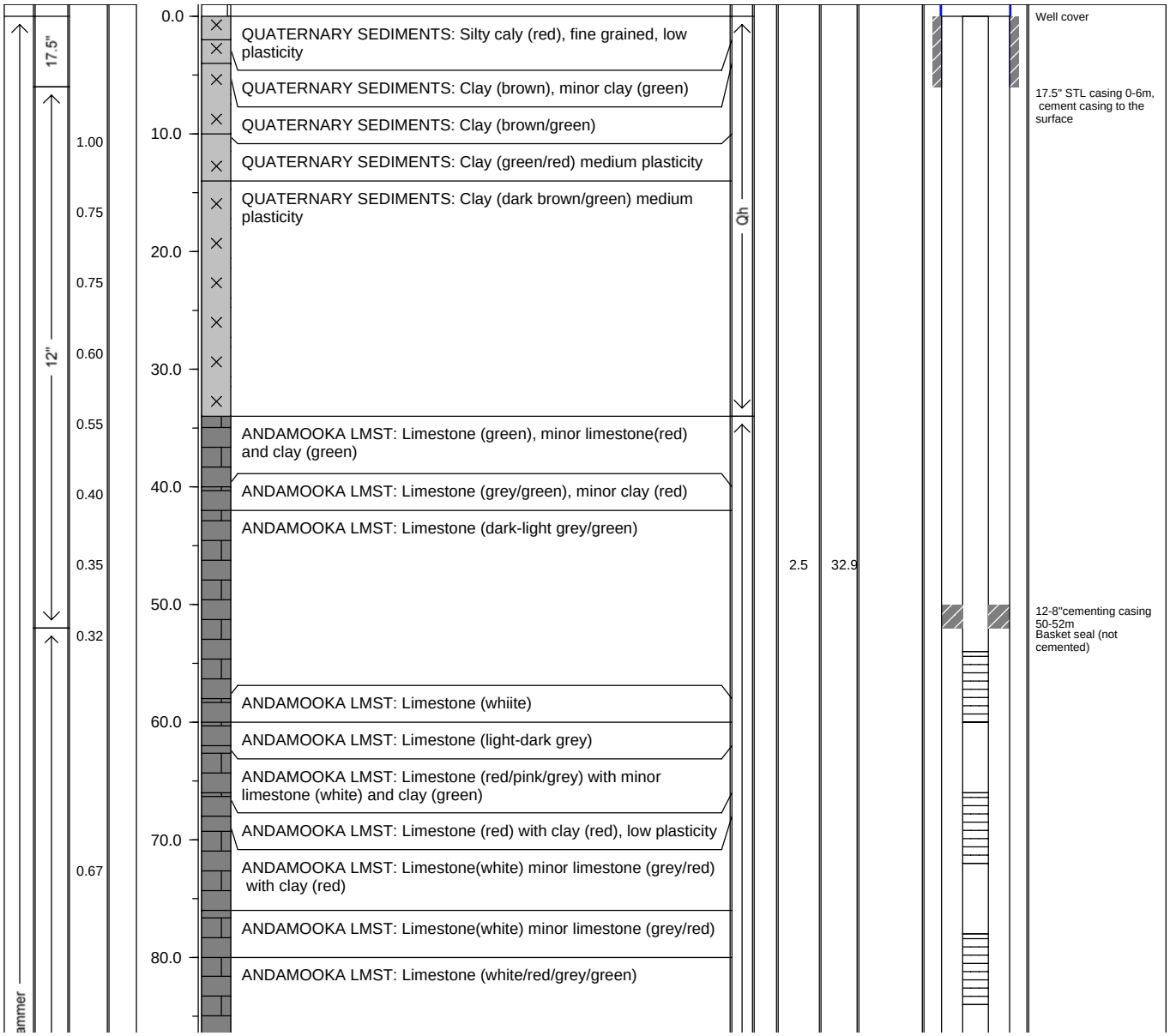
BOREHOLE / WELL NUMBER

PT- 45

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **15/02/2008** DATE COMPLETED: **17/02/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **168**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **36.83**
PROJECTION: **GDA94 Zone 53**
EASTING: **681922** NORTHING: **6653391**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: J. Richards DATE: 17/02/2008

CHECKED: _____ DATE: _____

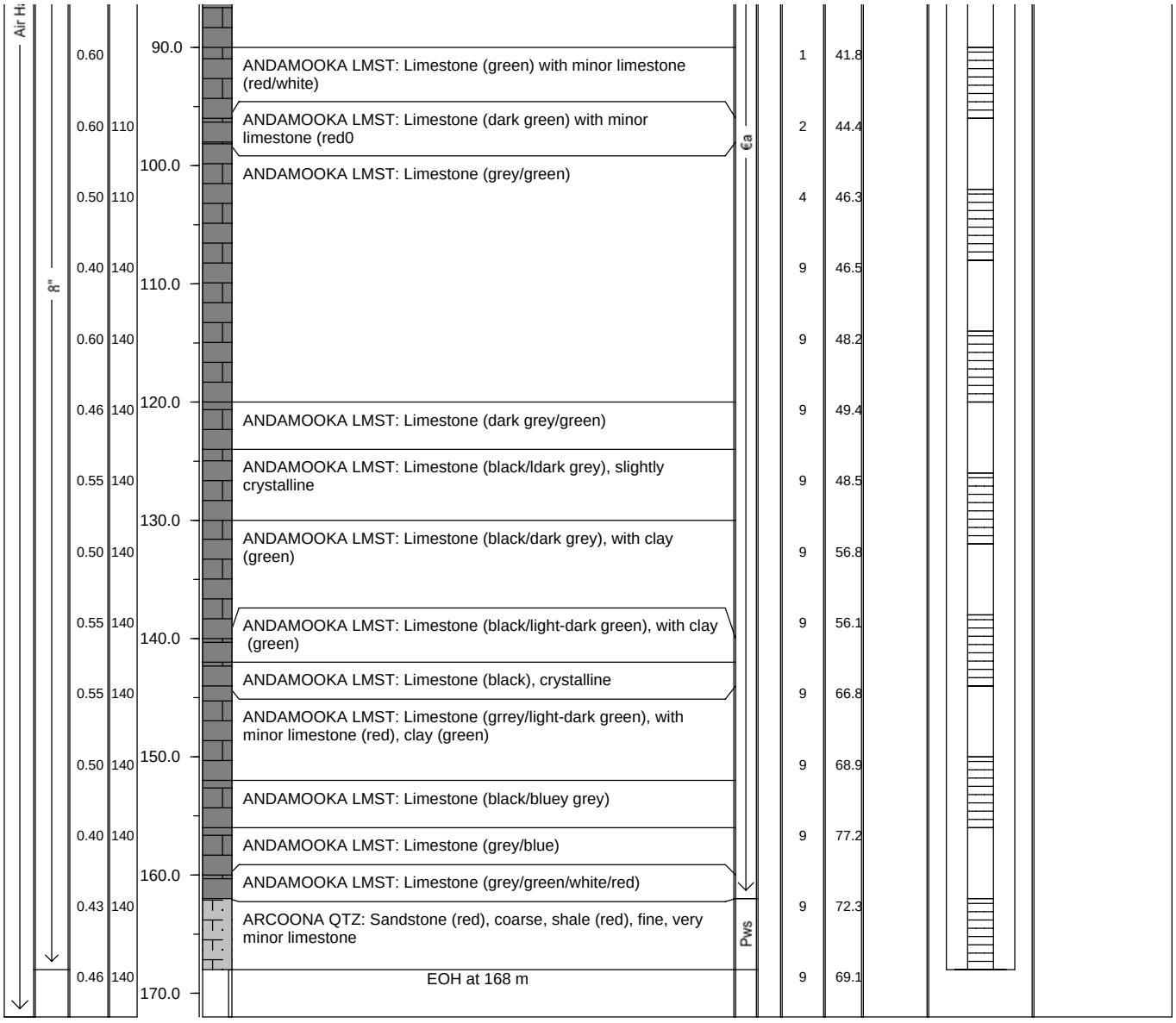
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 45

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **15/02/2008** DATE COMPLETED: **17/02/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **168**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **36.83**
PROJECTION: **GDA94 Zone 53**
EASTING: **681922** NORTHING: **6653391**



LOGGED: J. Richards DATE: 17/02/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

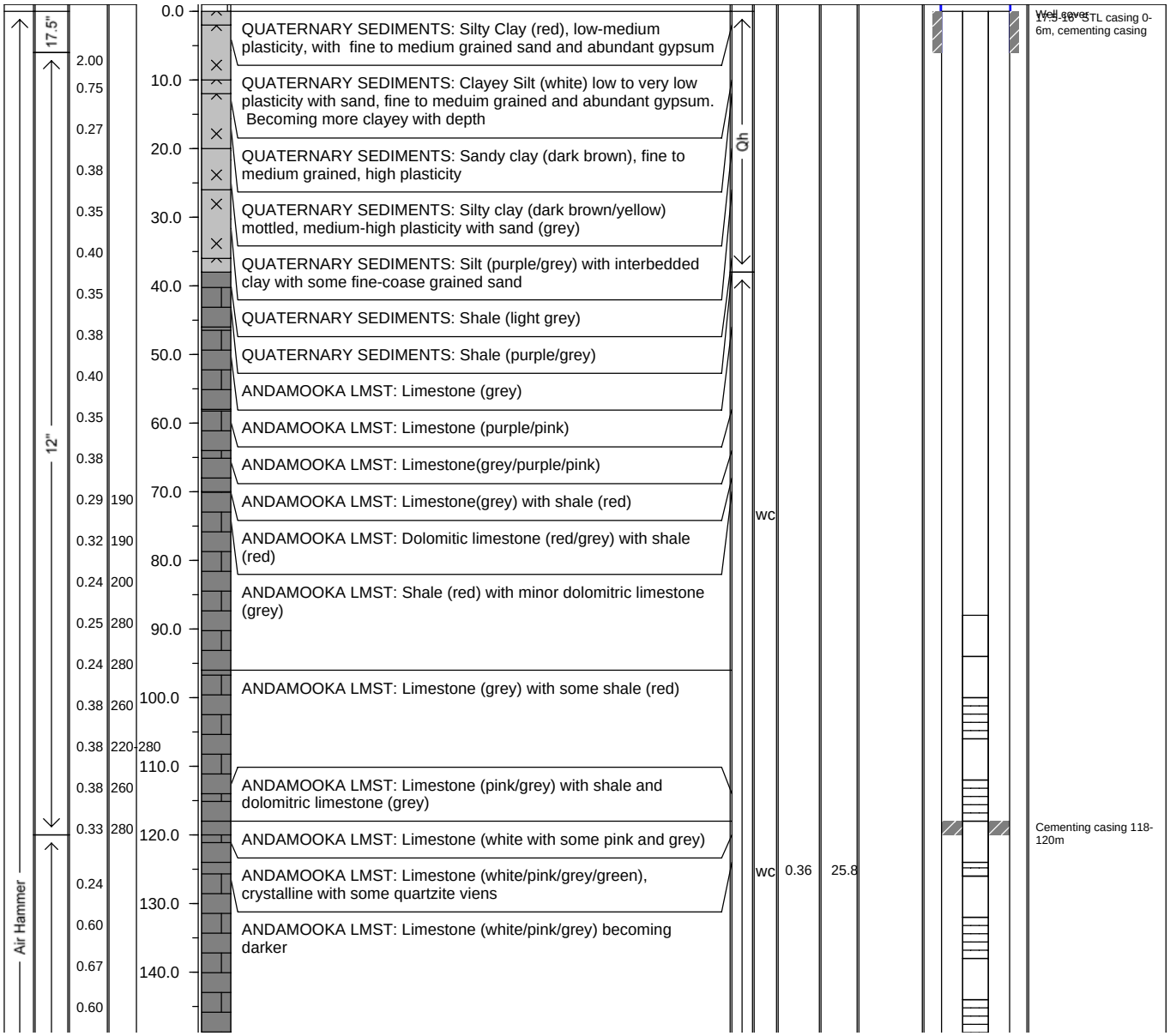
BOREHOLE / WELL NUMBER

PT- 48/RD3510

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **1/03/2008** DATE COMPLETED: **06/03/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **270**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **54.62**
PROJECTION: **GDA94 Zone 53**
EASTING: **683385** NORTHING: **6649659**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: V. Stroeher DATE: 06/03/08

CHECKED: _____ DATE: _____

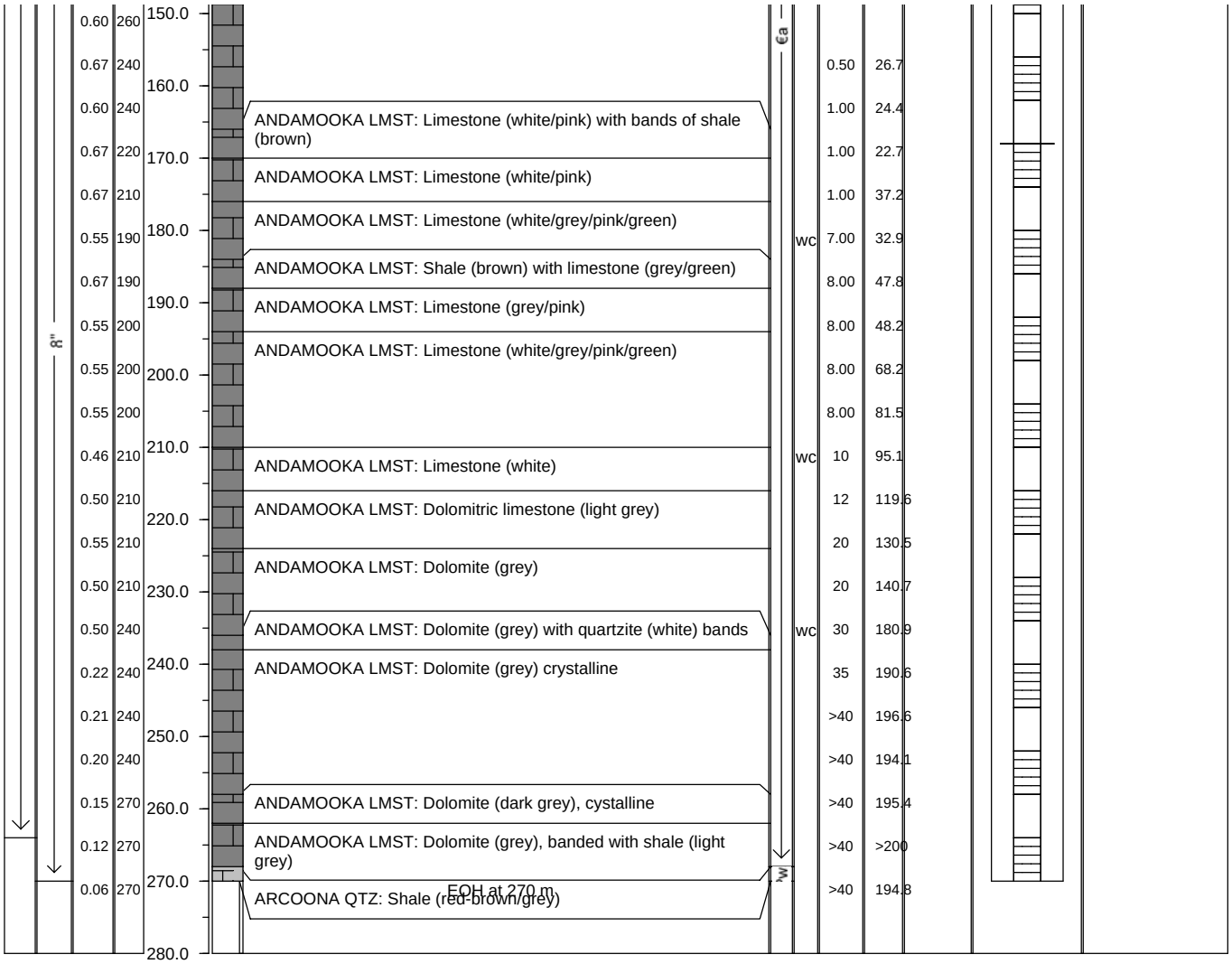
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 48/RD3510

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **1/03/2008** DATE COMPLETED: **06/03/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **270**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **54.62**
PROJECTION: **GDA94 Zone 53**
EASTING: **683385** NORTHING: **6649659**



LOGGED: V. Stroeher DATE: 06/03/08

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

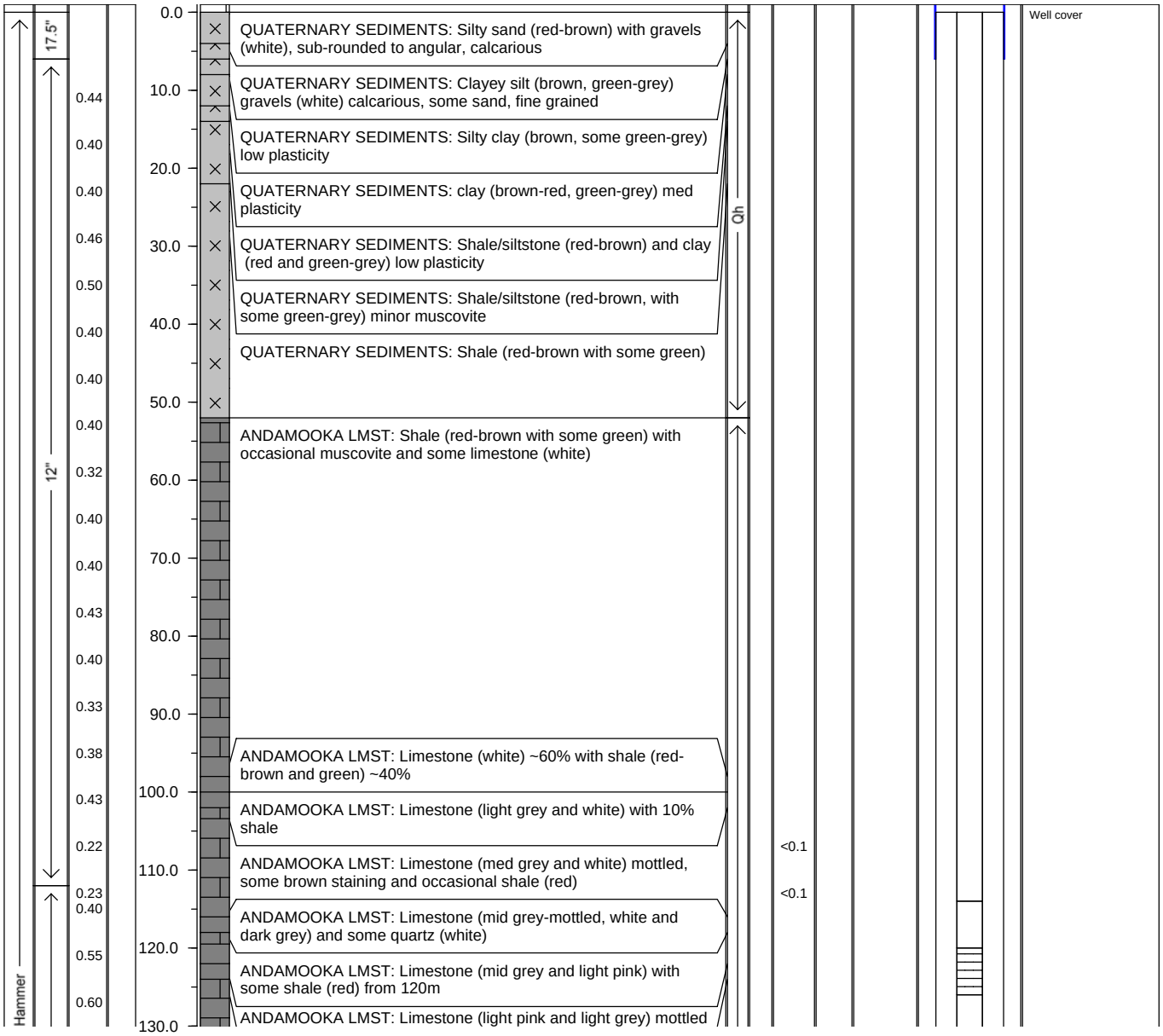
BOREHOLE / WELL NUMBER

PT- 50/RD3511

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **16/03/2008** DATE COMPLETED: **20/03/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **246**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **47.58**
PROJECTION: **GDA94 Zone 53**
EASTING: **680065** NORTHING: **6665665**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 20/03/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 50/RD3511

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **16/03/2008** DATE COMPLETED: **20/03/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **246**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **47.58**
PROJECTION: **GDA94 Zone 53**
EASTING: **680065** NORTHING: **6665665**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air	8"	0.60		140.0		ANDAMOOKA LMST: Limestone (very light pink and light grey) consolidated with shale increasing to 60% from 128-130m	Ca						
		0.50				ANDAMOOKA LMST: Limestone (pink and green-grey and white, becoming darker, crystalline with some shale (red) from 142m							
		0.55		150.0		ANDAMOOKA LMST: Limestone (dark and mid-pink with some green grey)mottled, crystalline							
		0.55											
		0.40		160.0		ANDAMOOKA LMST: Limestone (green-grey, pink, tan, and white) becoming lighter, crystalline							
		0.46	120						<0.1	7.02			
		0.46	120	170.0					1	66.6		Cementing casing 170-172m	
		0.38	130			ANDAMOOKA LMST: Limestone (light grey) crystalline			5	87.6			
		0.40	130	180.0					4	122.3			
		0.50	190			ANDAMOOKA LMST: Limestone (light grey) porous, crystalline			4	145.9			
		0.50	200	190.0					5	153.3			
		0.46	200			ANDAMOOKA LMST: Dolomitic Limestone (mid grey) crystalline			>10	153.7			
		0.32	200	200.0					>10	145.9			
		0.43	210			ANDAMOOKA LMST: Dolomite (dark grey) with decreasing dolomitic limeston (mid grey) and minor Shale (green) from 220m			>10	161.5			
		0.46	210	210.0					>10	189.6			
		0.30	210			ANDAMOOKA LMST: Dolomite (dark grey- mottled, mid-light grey, some pink from 230m) some porosity, becoming platy and lest porous from 234m			>20	185.0			
		0.22	210	220.0					>20	190.4			
		0.17	240						>30	186.5			
		0.13	240	230.0		ANDAMOOKA LMST: Dolomite (dark grey-green) platy, quartzite (white) hard and 10% shale (red)			>30	183.3			
		0.12	240	240.0		ANDAMOOKA LMST: Quartzite (white, grey-green, red) blocky, and shale (red) EOH at 246 m			>30	170.7			
				250.0									

LOGGED: K Furness DATE: 20/03/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 51/RD3512

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **12/03/2008** DATE COMPLETED: **16/03/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **192**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **40.36**
PROJECTION: **GDA94 Zone 53**
EASTING: **679082** NORTHING: **6659712**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	17.5"	0.23		0.0		QUATERNARY SEDIMENTS: Silt-fine sand (red and white) with gypsum and gravels (white), subrounded, calcarious	Qh					Well cover Cement casing 0-6m	
		0.25				QUATERNARY SEDIMENTS: Silt (grey) with abundant gypsum and some gravels (white/tan), calcarious							
				10.0		QUATERNARY SEDIMENTS: Silty clay (red-brown) with some gypsum and quartz gravels							
						QUATERNARY SEDIMENTS: Clay and Silty clay (red-brown and green) with some gypsum							
				20.0		QUATERNARY SEDIMENTS: Silty clay (grey) with gypsum		fracturing					
						BULLDOG SHALE: Shale/sitltsone (red-brown) with some gypsum and silt (green and red)							
				30.0		BULLDOG SHALE: Shale/siltsone (green and brown-red) with some gypsum and some sandstone (yellow and brown, med-grained. Mainly red shale from 20m							
		0.55				BULLDOG SHALE: Shale/siltstone (red-brown and grey green) with clay (brown and green), low plasticity	Kmb						
		0.43		40.0		BULLDOG SHALE: Shale (red with occasional green-grey bands) with some muscovite							
		0.50											
		0.55		50.0		BULLDOG SHALE: Shale (red and green) with limestone (white) ~50%							
	12"	0.22	100			ANDAMOOKA LMST: Limestone (white, grey and dark grey) some mottled with shale (red) decreasingfrom 10%			0.66	33.3		Cementing casing 62-64m Basket Seal 64m	
				60.0		ANDAMOOKA LMST: Limestone ((grey and white wth some pink) mottled, becoming lighter							
		0.67				ANDAMOOKA LMST: Limestone (light grey, dark grey, light pink) with some quartz (white)							
		0.67	130	70.0		ANDAMOOKA LMST: Limestone (white, light pink)			0.833333333	30.8			
		0.60	130			ANDAMOOKA LMST: Limestone (dark pink-red)			1.428571429	32.1			
		0.67	130	80.0		ANDAMOOKA LMST: Limestone (dark pink-red, light pink and green-grey)			2.5	50.5			
		0.60	130			ANDAMOOKA LMST: Limestone (light pink, grey, tan and white) with minore shale (red) interbeds and sandstone (red and white) from 96-88m			4	50.4			
		0.60	130	90.0		ANDAMOOKA LMST: Limestone (pink, white, light grey and tan)			1.25	51.3			
				100.0									

LOGGED: K Furness DATE: 16/03/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 51/RD3512

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **12/03/2008** DATE COMPLETED: **16/03/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **192**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **40.36**
PROJECTION: **GDA94 Zone 53**
EASTING: **679082** NORTHING: **6659712**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	8"	0.55	130	110.0		ANDAMOOKA LMST: Limestone (light pink, white, light green-grey) some porous			1.3333333335	50.7			
		0.55	130						2.857142857	47.6			
		0.60	130	120.0		ANDAMOOKA LMST: Limestone (white, light pink, light green) crystalline			3.333333333	44.9			
		0.43	130			ANDAMOOKA LMST: Limestone (light grey and some light pink) crystalline, some visivle porosity	Ca	Porosity wc	~2	54.4			
		0.46	140	130.0					6.666666667	58.3			
		0.38	140			ANDAMOOKA LMST: Limestone (mid grey) cryslalline, porous			6.666666667	59.8			
		0.21	140	140.0		ANDAMOOKA LMST: Limestone (mid grey and tan, yellow stained) dolomitic, crystalline, very porous		fracture	~10	62.3			
		0.40	250			ANDAMOOKA LMST: Dolomitic limestone (dark grey, some light-med grey from 154m) porous			~40	76.8			
		0.38	250	150.0					~40	84.1			
		0.38	250			ANDAMOOKA LMST: Dolomite (dark grey) porous			~40	88.4			
		0.40	260	160.0					>40	100.2			
		0.22	260			ANDAMOOKA LMST: Dolomite (mid grey with minor pink from 182m) porous		fracture	>40	17.2			
		0.22	260	170.0					>40	134.7			
		0.57	270			ANDAMOOKA LMST: Dolomite (mid grey) platy structure, comsolidated			>40	146.2			
		0.58	270	180.0		EOH at 192m			>40	150.6			
		0.46		190.0									
				200.0									

LOGGED: K Furness DATE: 16/03/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 60/RD3509

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **07/03/2008** DATE COMPLETED: **11/03/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **204**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **76.08**
PROJECTION: **GDA94 Zone 53**
EASTING: **680104** NORTHING: **6665601**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	17.5"	1.50		0.0		QUATERNARY SEDIMENTS: Silty Clay Orange, fine to coarse sand. Semi rounded gravels 40mm im diameter/high plasticity	Qh					Well cover	
		0.33				QUATERNARY SEDIMENTS: Clayey Silt with abundant gypsum							Cement casing 0-6m
		0.60		10.0		QUATERNARY SEDIMENTS: Clayey Silt interbedded with weathered siltstones, low plasticity							
		0.50		20.0		QUATERNARY SEDIMENTS: Grey Clayey silt with fine to medium samd, low placsticiy							
		0.46				QUATERNARY SEDIMENTS: Clayey silts, molttled grey and yellow some gypsum and fine to medium grained sand.							
		0.30		30.0		QUATERNARY SEDIMENTS: Clayey Silt, grey with fine sands, Loe plasticity							
		0.30				QUATERNARY SEDIMENTS: Clayey silt moltted grey, yellow and brown, few fine sands, low plasticity	Kmb						
		0.30		40.0		QUATERNARY SEDIMENTS: a/a slightly more yellow than grey							
	12"	0.30				QUATERNARY SEDIMENTS: a/a with some purple at the base							
		0.30		50.0		QUATERNARY SEDIMENTS: Silty Clay, brown with few fine to medium grained sand, medium plasticity. Silt brown, fine to medium sand, potentially highly weathered shale							
		0.32		60.0		BULLDOG SHALE: Shale, brown							
		0.24				ANDAMOOKA LMST: Dolimitic limestone and Shale interbedded dark grey and grey dolimite with limestone and brown shale							
		0.32		70.0		ANDAMOOKA LMST: a/a very little shale							
		0.33				ANDAMOOKA LMST: Dolimetric limestone brown, purples and grey. HCl reactive more brown with depth							
		0.40		80.0		ANDAMOOKA LMST: Limestone, brown, few grey and purple quartzite sands							
		0.25	190			ANDAMOOKA LMST: Limestone pink with minor lenses of red brown shale		wc	1	29.1			Cementing casing 86-88m
			140	90.0		ANDAMOOKA LMST: Limestone pink with minor lenses of quartzite sand							
		0.26	170	100.0		ANDAMOOKA LMST: Limestone pink and white with 20% interbedded shale			10	31.7			
		0.43	140			ANDAMOOKA LMST: Limestone pink 70% white 30%			20	32.6	Hole Callapsed from 108-216m		Dilled to 216m and hole collapsed to 108m
				110.0		EOH 108m							
		0.43	140			ANDAMOOKA LMST: Limestone pink 60% white 40%				34.1			
						ANDAMOOKA LMST: Limestone pink 70% white 30%							

LOGGED: V. Stroeher DATE: 11/03/2008

CHECKED: _____ DATE: _____

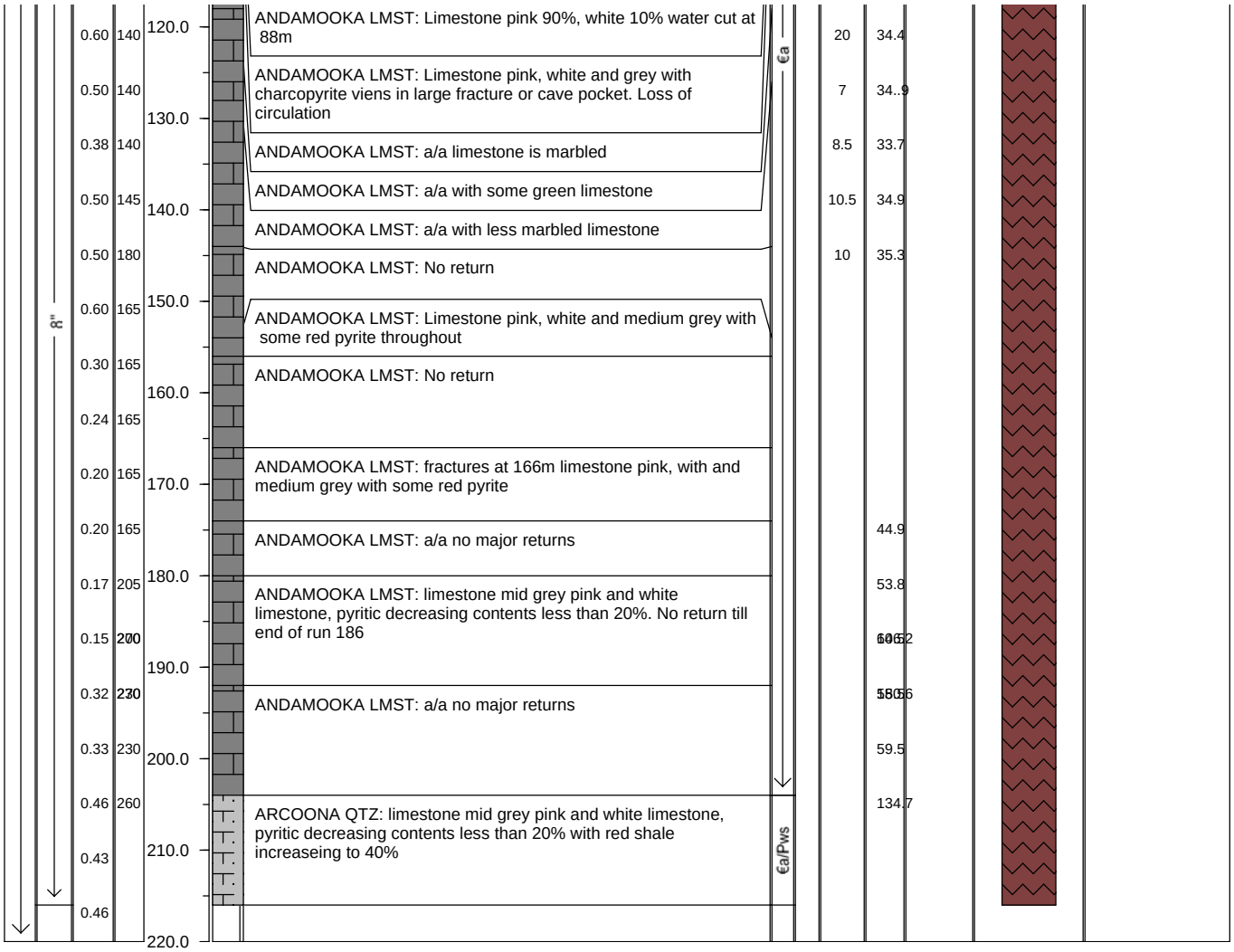
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 60/RD3509

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **07/03/2008** DATE COMPLETED: **11/03/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **204**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/04/2008** Depth (m bgl): **76.08**
PROJECTION: **GDA94 Zone 53**
EASTING: **680104** NORTHING: **6665601**



LOGGED: V. Stroeher DATE: 11/03/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT- 61/RD3468

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **09/01/08** DATE COMPLETED: **04/01/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **138**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/03/2008** Depth (m bgl): **42.29**
PROJECTION: **GDA94 Zone 53**
EASTING: **683385** NORTHING: **6649659**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Hammer	17.5"	0.50		0.0		QUATERNARY SEDIMENTS: Gravely sand (light brown), fine, gypsum gravel <20mm	Qh					Well cover Cement casing 0-6m	
						QUATERNARY SEDIMENTS: Sand (light brown), fine							
				10.0		QUATERNARY SEDIMENTS: Silt/sandy clay (light brown), low-plasticity, gypsum							
						QUATERNARY SEDIMENTS: Silty clay (purple/light brown/cream/yellow), banding							
						QUATERNARY SEDIMENTS: Sandy clay (cream/light brown), low-plasticity, banding (purple/brown)							
				20.0		QUATERNARY SEDIMENTS: Clay (brown/purple), low-plasticity							
						QUATERNARY SEDIMENTS: Clay (brown), low-plasticity							
						QUATERNARY SEDIMENTS: Clay (brown/light brown), low-plasticity							
				30.0		QUATERNARY SEDIMENTS: Clay (brown/purple), low-plasticity							
				40.0		QUATERNARY SEDIMENTS: Silty clay (light brown), low-plasticity							
						QUATERNARY SEDIMENTS: Silty clay (light brown/cream), banding (brown, low-plasticity							
				50.0		QUATERNARY SEDIMENTS: Clay (brown/purple), moderate-plasticity							
		0.50				QUATERNARY SEDIMENTS: Clay (brown/purple), bands (white/cream), moderate-plasticity							
	12"	0.60	200	60.0		BULLDOG SHALE: Shale (60% red, 40% green/grey), soft, minor sandstone, course	Kmb		3-4				
		0.86	200			ANDAMOOKA LMST: Limestone (70% white), shale (10% green, 20% red)		wc	4-6 5	26.4			
		0.27	200	70.0		ANDAMOOKA LMST: Limestone (white), porous, minor shale, pyrite, sanstone			5	27.4		Cementing casing 68-72m	
						ANDAMOOKA LMST: Limestone (white)		wc					

LOGGED: K Furness DATE: 04/01/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

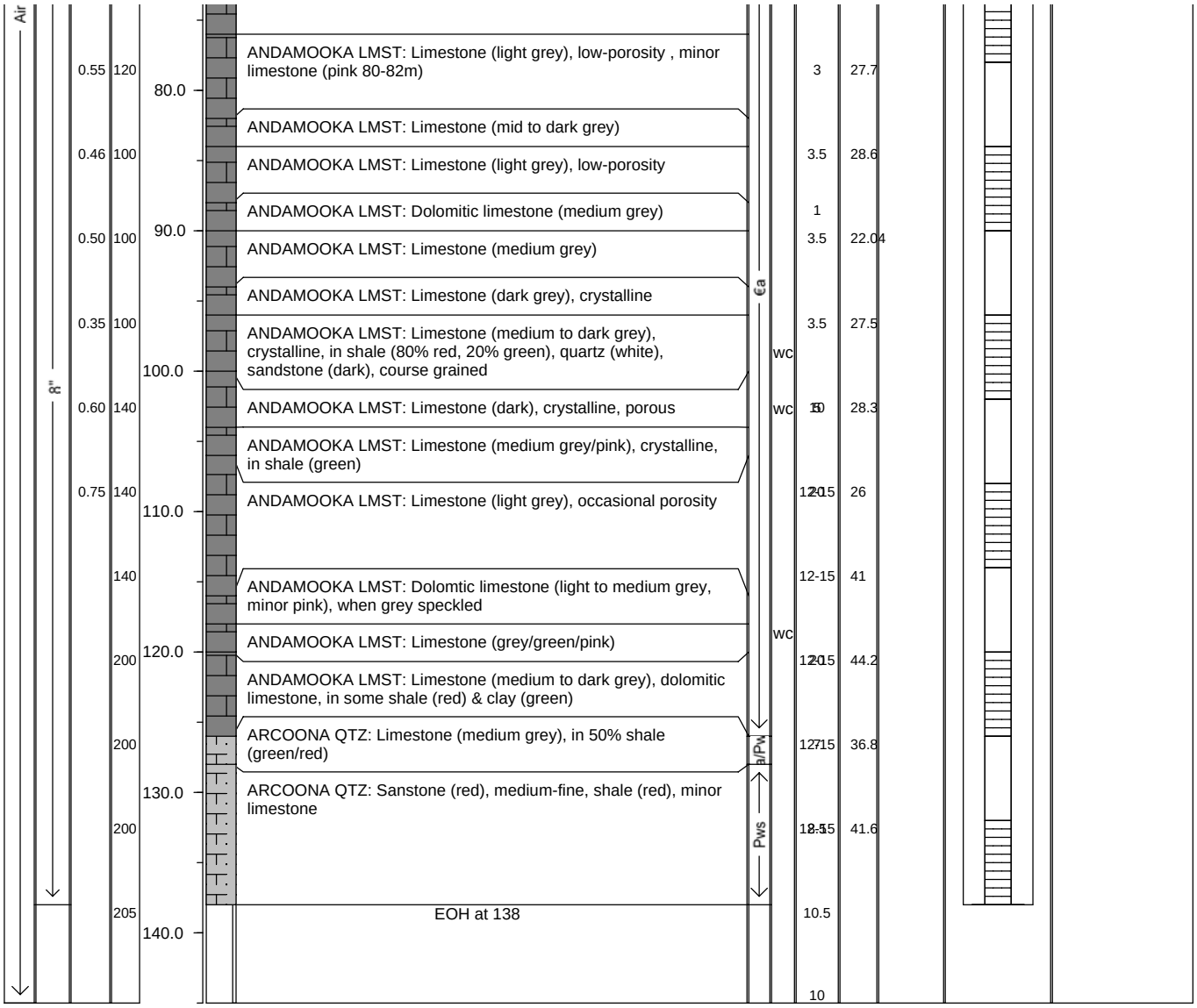
BOREHOLE / WELL NUMBER

PT- 61/RD3468

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **8 inches**
DATE STARTED: **09/01/08** DATE COMPLETED: **04/01/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **138**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: **15/03/2008** Depth (m bgl): **42.29**
PROJECTION: **GDA94 Zone 53**
EASTING: **683385** NORTHING: **6649659**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 04/01/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

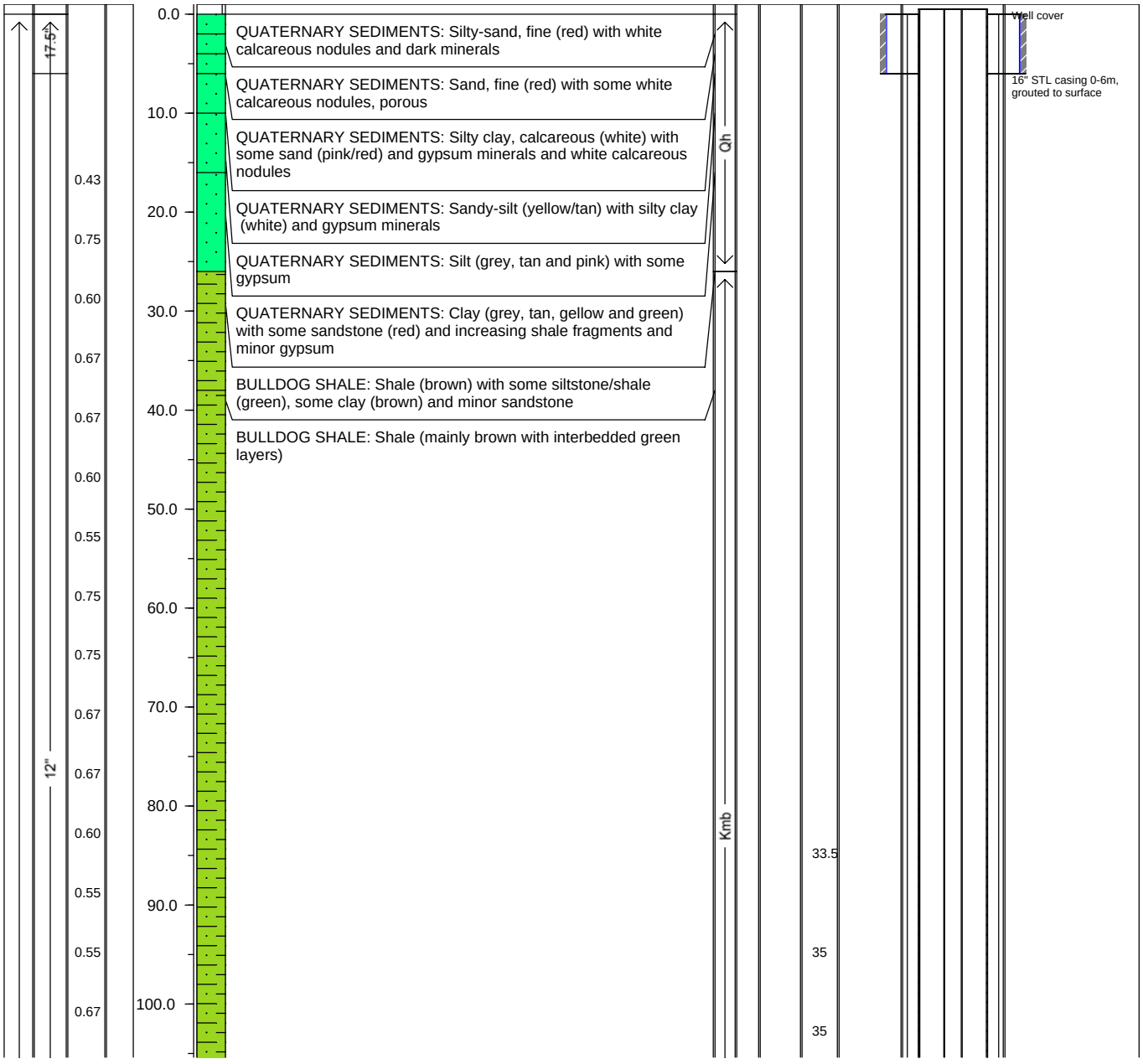
BOREHOLE / WELL NUMBER

PT66 / RD3466

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **2501/2008** DATE COMPLETED: **28/01/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **312**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: Depth (m bgl):
PROJECTION: **GDA94 Zone 53**
EASTING: **696951** NORTHING: **6666422**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 28/01/2008

CHECKED: _____ DATE: _____

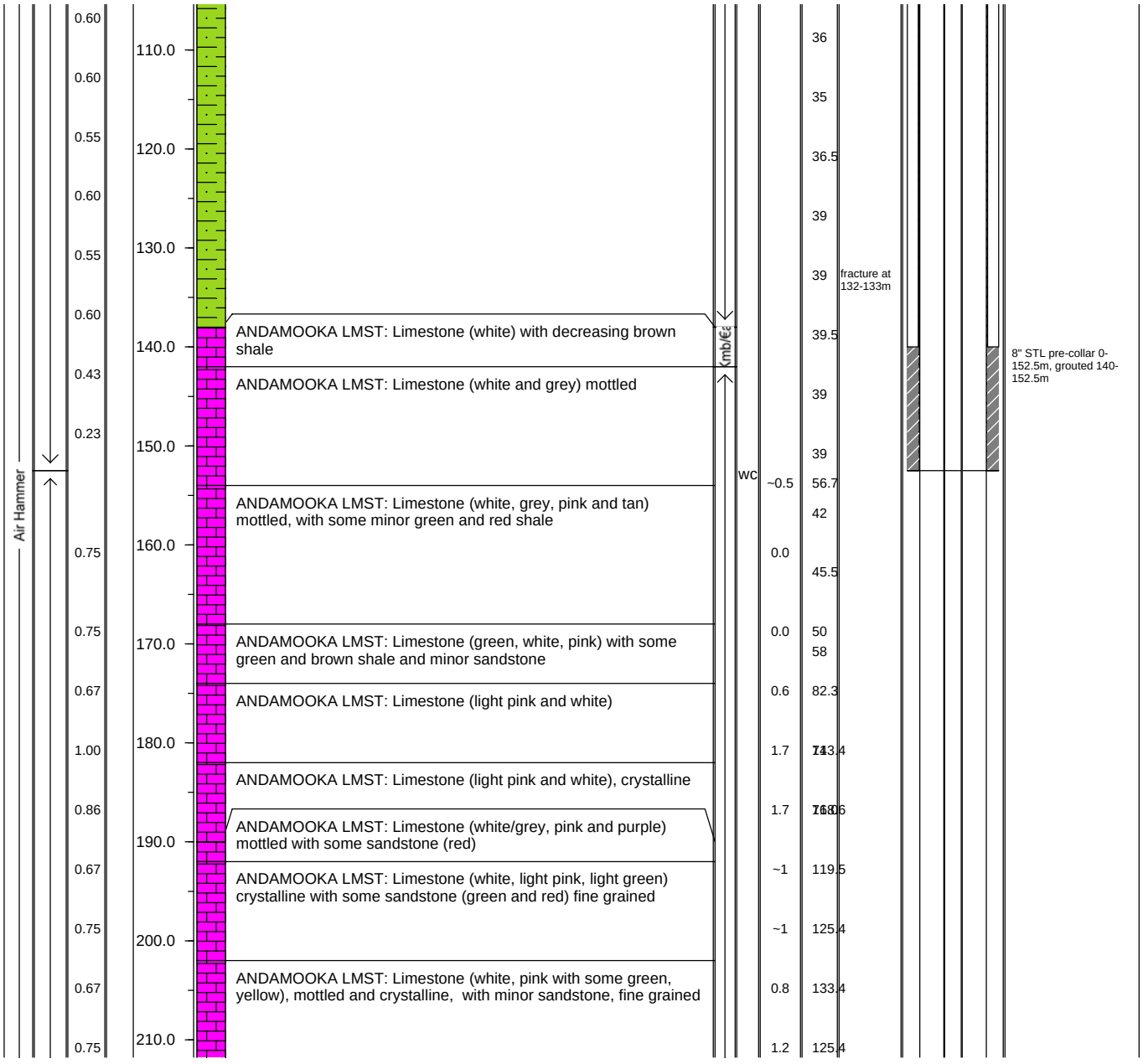
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT66 / RD3466

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **2501/2008** DATE COMPLETED: **28/01/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **312**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: Depth (m bgl):
PROJECTION: **GDA94 Zone 53**
EASTING: **696951** NORTHING: **6666422**



LOGGED: K Furness DATE: 28/01/2008

CHECKED: _____ DATE: _____

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

PT66 / RD3466

PROJECT NUMBER: **EV-07**
PROJECT NAME: **BHPB Motherwell MAR**
LOCATION: **Olympic Dam, South Australia**
DRILLING CO: **Gorey & Cole**
DRILLING METHOD: **Air Hammer**
BOREHOLE DIAMETER: **6 inches**
DATE STARTED: **2501/2008** DATE COMPLETED: **28/01/2008**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **312**
REFERENCE POINT (m AHD):
STATIC WATER LEVEL
Date: Depth (m bgl):
PROJECTION: **GDA94 Zone 53**
EASTING: **696951** NORTHING: **6666422**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
	6"	0.75		220.0		ANDAMOOKA LMST: Limestone (white and pink) motteld and crystalline, with 50% sandstone (red) fine grained	Ea		1.5	121.9			
		0.86				ANDAMOOKA LMST: Limestone (green and white with mottled pink) with 2% sandstone			1.2	109.5			
		0.67		230.0		ANDAMOOKA LMST: Limestone (green and white) crystalline			2	140.6			
		0.60				ANDAMOOKA LMST: Limestone (pink and white) crystalline and porous, with some sandstone (white)			4	206.7			
		0.40		240.0		ANDAMOOKA LMST: Limestone (white, light pink), porous and crystalline			4	211.9			Cement/bentonite seal 230-250m
		0.46							4	207.7			
		0.46		250.0		ANDAMOOKA LMST: Dolomitic limestone (light grey) crystalline			4	209.8			Basket set at 250m, open hole beneath
		0.38		260.0					5	200.9			
									15	207.8			
				270.0					>15	209.6			
		0.18				ANDAMOOKA LMST: Dolomitic limestone (dark grey) with minor limestone (white)			>15	205.6			
		0.15		280.0		ANDAMOOKA LMST: Dolomitic limestone (grey with some pink) increasing platy cleavage			>15	211.6			50mm PVC monitoring casing; blank 0-300m, slotted 300-306m
		0.11							>15	209.4			
		0.10		290.0		ANDAMOOKA LMST: Dolomite (dark grey) platy cleavage			>15				
		0.11		300.0					>15	206.0			
		0.08				ANDAMOOKA LMST: Dolomite (dark grey) platy cleavage with some grey shale			>15	209.6			
		0.05		310.0		ARCOONA QTZT (RD): Shale (red with some grey) and minor dolomite EOH at 312m	Pwt		>15	211.4			

LOGGED: K Furness DATE: 28/01/2008

CHECKED: _____ DATE: _____

MAR Pumping Test Solutions (geometric means)

Constant Rate Pumping Test

SITE	*KD (m2/day)*	*S*
MAR-1[1]	77	5.0E-05
MAR-2	4394	1.1E-03
MAR-3[1]	3870	1.6E-05
MAR-4	3322	1.2E-07

Recovery Pumping Test

SITE	*KD (m2/day)*	*S'*
MAR-1[1]	61	7.1E-06
MAR-2	438	1.1E-04
MAR-3[1]	2996	1.1E-05
MAR-4	4159	8.0E-08

* reliable data as obs. wells are fully penetrating

Stats [2]	*KD (m2/day)*	*S*	*S'*
Geomean	1048	2.E-05	5.E-06
Maximum	4394	1.14E-03	1.14E-04
Minimum	61	1.17E-07	7.97E-08

Notes:
1. reliable data as obs. wells are fully penetrating
2. for data presented on this summary sheet

MAR Pumping Test Solutions

Constant Rate Pumping Test

Production Well: MAR1-10 *not monitored*
Solution: Jacob

$KD = \frac{2.3Q}{(4\pi\delta s)}$

Solve for transmissivity
Q = 173 m^3/day
δs = m

KD = #DIV/0! m^2/day

Observation Well: MAR1-20
Solution: Jacob

$KD = \frac{2.3Q}{(4\pi\delta s)}$

Solve for transmissivity
Q = 173 m^3/day
δs = 0.41 m

KD = 77 m^2/day

$S = \frac{2.25KDt}{r^2_0}$

Solve for storativity
r = 33 m
KD = 77 m^2/day
t = 3.1E-04 days

S = 4.99E-05

$u = r^2S/4KDt$

Check for validity of solution
u = 4.2E-02

Valid ✔ if u<0.1

Constant Rate Pumping Test (RECOVERY)

Production Well: *not monitored*
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity
Q = 173 m^3/day
δs = m

KD = #DIV/0! m^2/day

Observation Well:
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity
Q = 173 m^3/day
δs = 0.52 m

KD = 61 m^2/day

$(t/t')_0 = S/S'$

Solve for storativity
S = 4.99E-05
$(t/t')_0$ = 7

S' = 7.12E-06

MAR Pumping Test Solutions

Constant Rate Pumping Test (airlift)

Production Well: RT-2b *not monitored*
Solution: Jacob

$KD = \frac{2.3Q}{(4\pi\delta s)}$

Solve for transmissivity
Q = m³/day
δs = m

KD = #DIV/0! m²/day

Observation Well: RT-2
Solution: Jacob

$KD = \frac{2.3Q}{(4\pi\delta s)}$

Solve for transmissivity
Q = 3024 m³/day
δs = 0.045 m

KD = 12298 m²/day

$S = \frac{2.25KDt}{r^2_0}$

Solve for storativity
r = 12 m
KD = 12298 m²/day
t = 2.3E-04 days

S = 4.45E-02

$u = r^2S/4KDt$

Check for validity of solution
u = 5.6E-04

Valid ✔ if u<0.1

Constant Rate Pumping Test (RECOVERY)

Production Well: RT-2b *not monitored*
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity
Q = 3024 m³/day
δs = m

KD = #DIV/0! m²/day

Observation Well: RT-2
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity
Q = 3024 m³/day
δs = 0.055 m

KD = 10062 m²/day

$(t/t')_0 = S/S'$

Solve for storativity
S = 4.45E-02
$(t/t')_0$ = 7

S' = 6.35E-03

MAR Pumping Test Solutions

Constant Rate Pumping Test

Production Well: MAR-2 *not monitored*
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity
Q = 3024 m^3/day
δs = 0.06 m

KD = 9223 m^2/day

Observation Well: MAR2-10a
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity
Q = 3024 m^3/day
δs = 0.37 m

KD = 1496 m^2/day

$$S = \frac{2.25KDt}{r_0^2}$$

Solve for storativity
r = 17.5 m
KD = 1496 m^2/day
$(t/r^2)_0$ = 1.0E-04 days

S = 1.14E-03

$$u = r^2S/4KDt$$

Check for validity of solution
u = 6.9E-04

Valid ✔ if u<0.1

Observation Well: MAR2-10b
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity
Q = 3024 m^3/day
δs = 0.09 m

KD = 6149 m^2/day

$$S = \frac{2.25KDt}{r_0^2}$$

Solve for storativity
r = 17.5 m
KD = 6149 m^2/day
$(t/r^2)_0$ = 6.9E-19 days

S = 3.14E-17

$$u = r^2S/4KDt$$

Check for validity of solution
u = 1.2E-16

Valid ✔ if u<0.1

Constant Rate Pumping Test (RECOVERY)

Production Well: MAR-2
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	3024	m^3/day
δs =	0.5	m
KD =	**1107**	m^2/day

Observation Well: MAR2-10a
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	3024	m^3/day
δs =	4.6	m
KD =	**120**	m^2/day

$(t/t')_0 = S/S'$

Solve for storativity

S =	1.14E-03	
$(t/t')_0$ =	10	
S' =	**1.14E-04**	

Observation Well: MAR2-10b
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	3024	m^3/day
δs =	0.875	m
KD =	**632**	m^2/day

$(t/t')_0 = S/S'$

Solve for storativity

S =	3.14E-17	
$(t/t')_0$ =	2	
S' =	**1.57E-17**	

MAR Pumping Test Solutions

Constant Rate Pumping Test

Production Well: MAR-3 *not monitored*
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity

Q =	3024	m^3/day
δs =	0.5	m
KD =	**1107**	m^2/day

Observation Well: MAR3-20
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity

Q =	3024	m^3/day
δs =	0.13	m
KD =	**4257**	m^2/day

$$S = \frac{2.25KDt}{r_0^2}$$

Solve for storativity

r =	25	m
KD =	4257	m^2/day
$(t/r^2)_0$ =	1.5E-06	days
S =	**2.34E-05**	

$$u = r^2S/4KDt$$

Check for validity of solution

u =	5.3E-03	
Valid	✔	if u<0.1

Observation Well: RT-2a
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity

Q =	3024	m^3/day
δs =	0.045	m
KD =	**12298**	m^2/day

$$S = \frac{2.25KDt}{r_0^2}$$

Solve for storativity

r =	36	m
KD =	12298	m^2/day
$(t/r^2)_0$ =	4.9E-07	days
S =	**1.04E-05**	

$$u = r^2S/4KDt$$

Check for validity of solution

u =	8.1E-05	
Valid	✔	if u<0.1

Constant Rate Pumping Test (RECOVERY)

Production Well: MAR-3
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	3024	m^3/day
δs =	0.3	m
KD =	**1845**	m^2/day

Observation Well: MAR3-20
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	3024	m^3/day
δs =	0.21	m
KD =	**2635**	m^2/day

$(t/t')_0 = S/S'$

Solve for storativity

S =	2.34E-05	
$(t/t')_0$ =	1.00000	
S' =	**2.34E-05**	

Observation Well: RT-2a
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	3024	m^3/day
δs =	0.1	m
KD =	**5534**	m^2/day

$(t/t')_0 = S/S'$

Solve for storativity

S =	1.04E-05	
$(t/t')_0$ =	2	
S' =	**5.19E-06**	

MAR Pumping Test Solutions

Constant Rate Pumping Test

Production Well: MAR-4
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity

Q =	2592	m^3/day
δs =	1	m
KD =	**474**	m^2/day

Observation Well: MAR4-20a
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity

Q =	2592	m^3/day
δs =	0.1	m
KD =	**4743**	m^2/day

$$S = \frac{2.25KDt}{r^2_0}$$

Solve for storativity

r =	34	m
KD =	4743	m^2/day
$(t/r^2)_0$ =	6.9E-08	days
S =	**6.41E-07**	

$$u = r^2S/4KDt$$

Check for validity of solution

u =	2.8E-05	
Valid	✔	if u<0.1

Observation Well: MAR4-20b
Solution: Jacob

$$KD = \frac{2.3Q}{(4\pi\delta s)}$$

Solve for transmissivity

Q =	2592	m^3/day
δs =	0.11	m
KD =	**4312**	m^2/day

$$S = \frac{2.25KDt}{r^2_0}$$

Solve for storativity

r =	34	m
KD =	4312	m^2/day
$(t/r^2)_0$ =	2.1E-08	days
S =	**1.75E-07**	

$$u = r^2S/4KDt$$

Check for validity of solution

u =	5.8E-06	
Valid	✔	if u<0.1

Observation Well: MAR4-50a
Solution: Jacob

$KD = \frac{2.3Q}{(4\pi\delta s)}$

Solve for transmissivity

Q =	2592	m^3/day
δs =	0.06	m
KD =	**7906**	m^2/day

$S = \frac{2.25KDt}{r^2_0}$

Solve for storativity

r =	64	m
KD =	7906	m^2/day
$(t/r^2)_0$ =	4.9E-08	days
S =	**2.11E-07**	

$u = r^2S/4KDt$

Check for validity of solution

u =	2.4E-05	
Valid	✔	if u<0.1

Observation Well: MAR4-50b
Solution: Jacob

$KD = \frac{2.3Q}{(4\pi\delta s)}$

Solve for transmissivity

Q =	2592	m^3/day
δs =	0.09	m
KD =	**5271**	m^2/day

$S = \frac{2.25KDt}{r^2_0}$

Solve for storativity

r =	64	m
KD =	5271	m^2/day
$(t/r^2)_0$ =	2.8E-09	days
S =	**8.04E-09**	

$u = r^2S/4KDt$

Check for validity of solution

u =	1.0E-07	
Valid	✔	if u<0.1

Constant Rate Pumping Test (RECOVERY)

Production Well: MAR-4
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	2506	m^3/day
δs =	0.135	m
KD =	**3397**	m^2/day

Observation Well: MAR4-20a
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	2506	m^3/day
δs =	0.12	m
KD =	**3822**	m^2/day

$(t/t')_0 = S/S'$

Solve for storativity

S =	6.41E-07	
$(t/t')_0$ =	2.00000	
S' =	**3.21E-07**	

Observation Well: MAR4-20b
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	2506	m^3/day
δs =	0.115	m
KD =	**3988**	m^2/day

$(t/t')_0 = S/S'$

Solve for storativity

S =	1.75E-07	
$(t/t')_0$ =	1.5	
S' =	**1.17E-07**	

Observation Well: MAR4-50a
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	2506	m^3/day
δs =	0.05	m
KD =	**9172**	m^2/day

$(t/t')_0 = S/S'$

Solve for storativity

S =	2.11E-07	
$(t/t')_0$ =	1.05	
S' =	**2.01E-07**	

Observation Well: MAR4-50b
Solution: Theis Recovery

$KD = \frac{2.3Q}{(4\pi\delta s')}$

Solve for transmissivity

Q =	2506	m^3/day
δs =	0.175	m
KD =	**2621**	m^2/day

$(t/t')_0 = S/S'$

Solve for storativity

S =	8.04E-09	
$(t/t')_0$ =	1.5	
S' =	**5.36E-09**	

CERTIFICATE OF ANALYSIS

Work Order	: **EM0800970**	Page	: 1 of 8
Client	: **RESOURCE & ENVIRON MANGMNT P/L**	Laboratory	: Environmental Division Melbourne
Contact	: MR PAUL HOWE	Contact	: Paul Loewy
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Project	: EV-07	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 08-FEB-2008
Sampler	: MI,KF,TM	Issue Date	: 18-FEB-2008
Site	: ----		
		No. of samples received	: 12
Quote number	: ME/122/06	No. of samples analysed	: 12

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EGO20-F: EMO800970 #002, 004, 005, 006, 008, 009, 011 and 012 have been diluted for analysis by ICP-MS and LORs have been raised accordingly.**
- **Ionic Balance out of acceptable limits for EM0800970 #7 due to analytes not quantified in this report.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MAR4_PUMPED Client sampling date / time: 27-JAN-2008 15:00 EM0800970-001	MAR3 23-JAN-2008 15:00 EM0800970-002	MAR4 12-DEC-2007 15:00 EM0800970-003	PT_66 31-JAN-2008 15:00 EM0800970-004	MAR2_50B 05-DEC-2007 15:00 EM0800970-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**69.9**	**71.6**	**78.1**	**76.7**	**73.6**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**61000**	**240000**	**72000**	**464000**	**417000**
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**33500**	**179000**	**43200**	**261000**	**237000**
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**107**	**445**	**90**	**420**	**704**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**66.0**	**32.8**	**10.3**	**5.8**	**4.7**
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	**281**	**140**	**259**	**87**	**79**
Total Alkalinity as CaCO3	----	1	mg/L	**281**	**140**	**259**	**87**	**79**
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**5470**	**11500**	**5560**	**16400**	**16300**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**19500**	**86300**	**22500**	**149000**	**139000**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**1060**	**1000**	**957**	**906**	**943**
Magnesium	7439-95-4	1	mg/L	**1110**	**3660**	**1110**	**5970**	**5440**
Sodium	7440-23-5	1	mg/L	**12700**	**58600**	**13900**	**98900**	**87200**
Potassium	7440-09-7	1	mg/L	**106**	**304**	**133**	**436**	**461**
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**1.45**	**2.00**	<0.50	<0.50	**0.50**
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**3.88**	**5.03**	**2.50**	**0.90**	**2.33**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.10	**0.02**	<0.10	<0.10
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.010	<0.001	**0.026**	<0.010
Barium	7440-39-3	0.001	mg/L	**0.026**	**0.034**	**0.029**	**0.043**	**0.033**
Cobalt	7440-48-4	0.001	mg/L	**0.001**	<0.010	**0.006**	**0.021**	<0.010
Copper	7440-50-8	0.001	mg/L	**0.009**	**0.032**	**0.010**	**0.106**	**0.050**
Lead	7439-92-1	0.001	mg/L	<0.001	**0.021**	<0.001	**1.74**	**0.022**
Manganese	7439-96-5	0.001	mg/L	**0.684**	**0.864**	**0.750**	**0.537**	**0.966**
Strontium	7440-24-6	0.001	mg/L	**16.0**	**13.9**	**16.4**	**13.2**	**13.8**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MAR4_PUMPED Client sampling date / time: 27-JAN-2008 15:00 EM0800970-001	MAR3 23-JAN-2008 15:00 EM0800970-002	MAR4 12-DEC-2007 15:00 EM0800970-003	PT_66 31-JAN-2008 15:00 EM0800970-004	MAR2_50B 05-DEC-2007 15:00 EM0800970-005
EG020F: Dissolved Metals by ICP-MS - Continued								
Uranium	7440-61-1	0.001	mg/L	**0.013**	**0.010**	**0.015**	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	**0.264**	**0.063**	**0.006**	**0.088**	<0.050
Boron	7440-42-8	0.05	mg/L	**4.56**	**3.20**	**4.39**	**1.20**	**1.86**
EG052F: Silica by ICPAES								
^ Silica	7631-86-9	0.1	mg/L	**9.1**	<0.1	**10.3**	<0.1	**41.3**
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.6**	<0.1	**12.3**	<1.0	**1.7**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	**0.015**	<0.010	**0.018**	<0.010	**0.079**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	**0.015**	<0.010	**0.018**	<0.010	**0.079**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**670**	**2680**	**755**	**4540**	**4260**
^ Total Cations	----	0.01	meq/L	**699**	**2910**	**747**	**4850**	**4300**
^ Ionic Balance	----	0.01	%	**2.08**	**4.13**	**0.54**	**3.31**	**0.50**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MAR2_10B Client sampling date / time: 06-DEC-2007 15:00 EM0800970-006	Client sample ID: MAR2_10A Client sampling date / time: 06-DEC-2007 15:00 EM0800970-007	Client sample ID: MAR2 Client sampling date / time: 07-DEC-2007 15:00 EM0800970-008	Client sample ID: MAR3_20 Client sampling date / time: 22-JAN-2008 15:00 EM0800970-009	Client sample ID: MAR2_50 Client sampling date / time: 05-DEC-2007 15:00 EM0800970-010
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**73.1**	**75.3**	**73.1**	**69.4**	**76.9**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**431000**	**52000**	**334000**	**420000**	**53000**
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**230000**	**31700**	**182000**	**221000**	**32100**
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**563**	**134**	**379**	**614**	**90**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**6.6**	**1.3**	**17.1**	**29.2**	**0.5**
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	**80**	**202**	**119**	**62**	**220**
Total Alkalinity as CaCO3	----	1	mg/L	**80**	**202**	**119**	**62**	**220**
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	**14100**	**5340**	**13500**	**16000**	**5700**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**139000**	**14000**	**113000**	**142000**	**15200**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**878**	**1140**	**1100**	**946**	**1170**
Magnesium	7439-95-4	1	mg/L	**5400**	**880**	**4450**	**5820**	**866**
Sodium	7440-23-5	1	mg/L	**85000**	**10200**	**72200**	**93900**	**10500**
Potassium	7440-09-7	1	mg/L	**446**	**113**	**354**	**495**	**107**
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	<0.50	<0.50	<0.50	**1.90**	<0.50
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**2.39**	**0.72**	**3.72**	**4.74**	**0.04**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.01	<0.10	<0.10	**0.03**
Arsenic	7440-38-2	0.001	mg/L	<0.010	**0.010**	<0.010	<0.010	**0.016**
Barium	7440-39-3	0.001	mg/L	**0.035**	**0.043**	**0.035**	**0.039**	**0.030**
Cobalt	7440-48-4	0.001	mg/L	<0.010	**0.003**	<0.010	**0.091**	**0.006**
Copper	7440-50-8	0.001	mg/L	**0.049**	**0.010**	**0.036**	**0.080**	**0.009**
Lead	7439-92-1	0.001	mg/L	**0.033**	<0.001	<0.010	**0.322**	<0.001
Manganese	7439-96-5	0.001	mg/L	**0.976**	**0.283**	**0.675**	**1.27**	**0.222**
Strontium	7440-24-6	0.001	mg/L	**14.0**	**13.9**	**15.1**	**16.0**	**14.9**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MAR2_10B Client sampling date / time: 06-DEC-2007 15:00 EM0800970-006	MAR2_10A 06-DEC-2007 15:00 EM0800970-007	MAR2 07-DEC-2007 15:00 EM0800970-008	MAR3_20 22-JAN-2008 15:00 EM0800970-009	MAR2_50 05-DEC-2007 15:00 EM0800970-010
EG020F: Dissolved Metals by ICP-MS - Continued								
Uranium	7440-61-1	0.001	mg/L	<0.001	**0.004**	**0.010**	<0.001	**0.004**
Zinc	7440-66-6	0.005	mg/L	**0.052**	**0.010**	**0.071**	**0.113**	**0.010**
Boron	7440-42-8	0.05	mg/L	**1.90**	**4.73**	**2.62**	**2.04**	**5.18**
EG052F: Silica by ICPAES								
^ Silica	7631-86-9	0.1	mg/L	**34.2**	**24.1**	**42.8**	<0.1	**13.4**
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.8**	**16.9**	**2.5**	**2.0**	**17.0**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	**0.577**
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	**0.150**	**1.81**	**0.057**	**0.081**	**0.506**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	**0.150**	**1.81**	**0.057**	**0.081**	**1.08**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**4210**	**510**	**3460**	**4330**	**551**
^ Total Cations	----	0.01	meq/L	**4200**	**577**	**3570**	**4620**	**589**
^ Ionic Balance	----	0.01	%	**0.13**	**6.08**	**1.50**	**3.29**	**3.33**

Analytical Results

Sub-Matrix: **WATER**

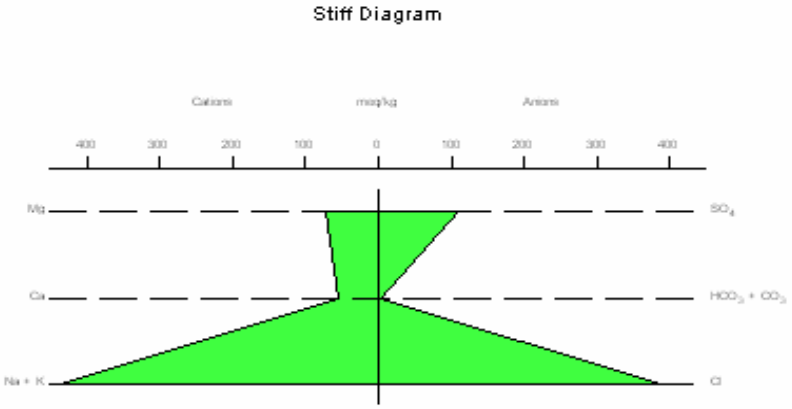
				Client sample ID	MAR3_PUMPED	PT40	----	----	----
				Client sampling date / time	05-FEB-2008 15:00	07-FEB-2008 15:00	----	----	----
Compound	CAS Number	LOR	Unit		EM0800970-011	EM0800970-012	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**65.7**	**78.2**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**210000**	**220000**	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		**135000**	**111000**	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**318**	**4690**	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**58.0**	**1830**	----	----	----
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		**151**	**187**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**151**	**187**	----	----	----
ED040F: Dissolved Major Anions									
Sulphate as SO4 2-	14808-79-8	1	mg/L		**11100**	**8760**	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		**87000**	**75100**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**995**	**1170**	----	----	----
Magnesium	7439-95-4	1	mg/L		**3640**	**2530**	----	----	----
Sodium	7440-23-5	1	mg/L		**58500**	**46700**	----	----	----
Potassium	7440-09-7	1	mg/L		**315**	**207**	----	----	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**2.45**	<0.50	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**3.54**	**13.8**	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.10	<0.10	----	----	----
Arsenic	7440-38-2	0.001	mg/L		**0.011**	**0.259**	----	----	----
Barium	7440-39-3	0.001	mg/L		**0.032**	**0.069**	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.010	**0.584**	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.030**	**0.039**	----	----	----
Lead	7439-92-1	0.001	mg/L		**0.028**	**0.037**	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.818**	**0.526**	----	----	----
Strontium	7440-24-6	0.001	mg/L		**13.6**	**16.9**	----	----	----

Analytical Results

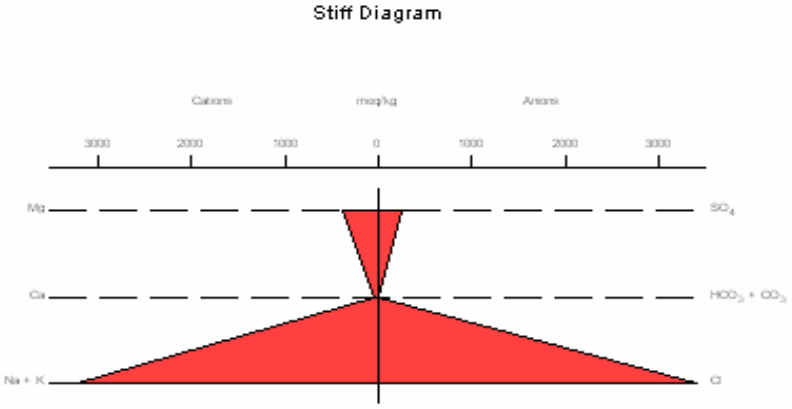
Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MAR3_PUMPED	PT40	----	----	----
				Client sampling date / time: 05-FEB-2008 15:00	07-FEB-2008 15:00	----	----	----
				EM0800970-011	EM0800970-012	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Uranium	7440-61-1	0.001	mg/L	**0.010**	**0.030**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.504**	**0.240**	----	----	----
Boron	7440-42-8	0.05	mg/L	**3.21**	**5.80**	----	----	----
EG052F: Silica by ICPAES								
^ Silica	7631-86-9	0.1	mg/L	<0.1	<0.1	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**5.2**	**10.8**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.010	mg/L	<0.010	**0.011**	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.010	mg/L	<0.010	**0.765**	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.010	mg/L	<0.010	**0.776**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**2690**	**2300**	----	----	----
^ Total Cations	----	0.01	meq/L	**2900**	**2300**	----	----	----
^ Ionic Balance	----	0.01	%	**3.80**	**0.02**	----	----	----

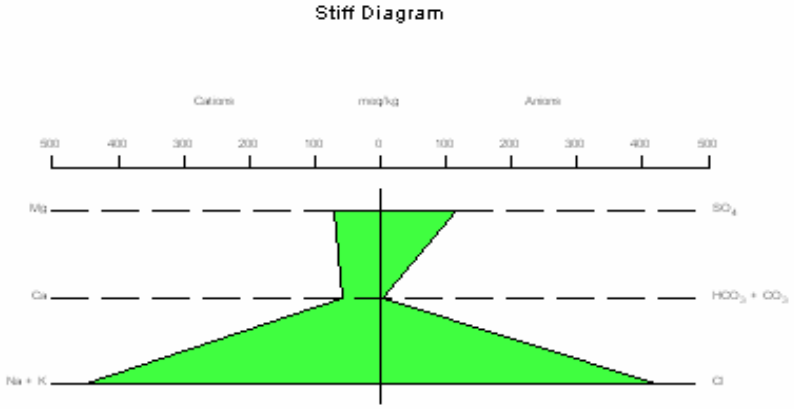
MAR2-10a - supersaturated in calcite and aragonite



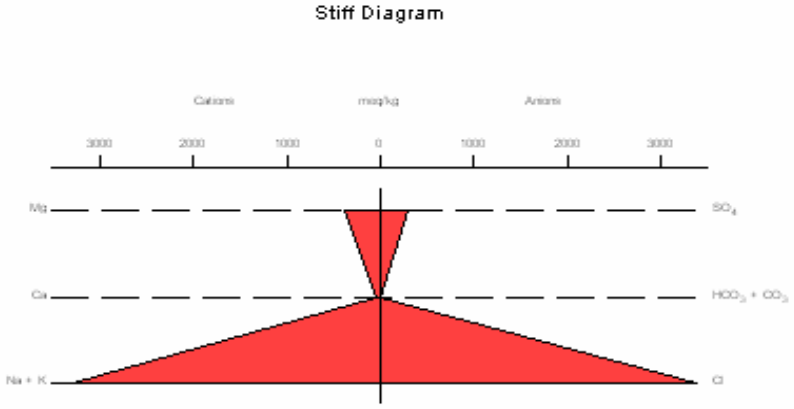
MAR2-10b - approximately saturated in calcite and undersaturated in aragonite

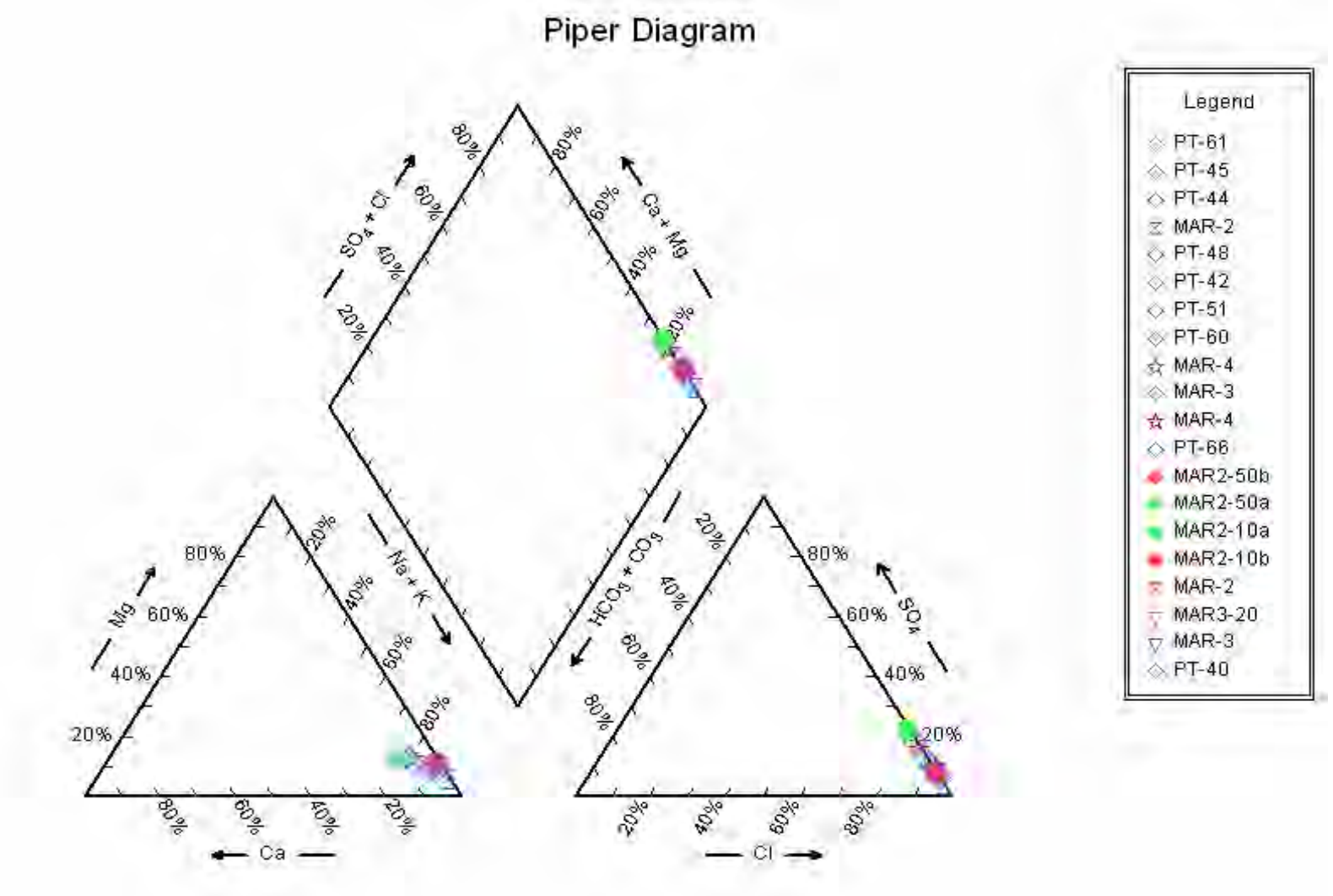


MAR2-50a - supersaturated in calcite and aragonite



MAR2-50b - approximately saturated in calcite and aragonite




Piper Diagram
Legend
PT-61
PT-45
PT-44
MAR-2
PT-48
PT-42
PT-51
PT-60
MAR-4
MAR-3
MAR-4
PT-66
MAR2-50b
MAR2-50a
MAR2-10a
MAR2-10b
MAR-2
MAR3-20
MAR-3
PT-40
SO4 + Cl
Ca + Mg
Na + K
HCO3 + CO3
Mg
Ca
Cl
SO4
20%
40%
60%
80%

Calculate Drawdown (s) for known Discharge (Q) — **THEIS Analytical Solution (Theis, 1935)**

	INPUTS
Pumping rate of well (m3/day):	2500
Storage coefficient (s) of aquifer:	2.00E-05
Transmissivity (m2/day):	1050
Time since pumping started (days):	3650

NOTE 1: Estimating 'T' from specific capacity data use: [log t = -2.31 +0.81 log (spec cap)]

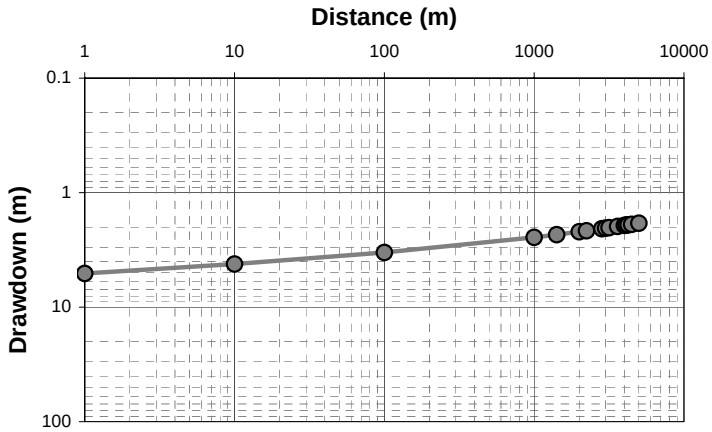
NOTE 2: If using 'T', divide by saturated thickness to give hydraulic conductivity (T=kB)

NOTE 3: Estimates of s (conservative): Unconfined=0.05, Semi=0.005, Confined=0.00005

NOTE 4: To convert Gallons/minute to litres/sec, divide by 13.2

NOTE 5: To convert litres/sec to cubic metres/day, multiply by 86.4

Distance (m)	u	W(u)	Drawdown (m)
1	1.30E-12	2.68E+01	5.07550808
10	1.30E-10	2.22E+01	4.2029657
100	1.30E-08	1.76E+01	3.33042332
1000	1.30E-06	1.30E+01	2.45788119
1414	2.61E-06	1.23E+01	2.32655072
2000	5.22E-06	1.16E+01	2.1952205
2236	6.52E-06	1.14E+01	2.1529417
2828	1.04E-05	1.09E+01	2.06389077
3000	1.17E-05	1.08E+01	2.04157465
3162	1.30E-05	1.07E+01	2.02161222
3606	1.70E-05	1.04E+01	1.97190276
4000	2.09E-05	1.02E+01	1.93256204
4123	2.22E-05	1.01E+01	1.92107573
4243	2.35E-05	1.01E+01	1.91024616
4472	2.6093E-05	9.98E+00	1.89028398
5000	3.2616E-05	9.75E+00	1.84800617



Description:
Analytical model developed to assist in assessing sustainable yields from production wells drawing water from the Andamooka Limestone aquifer north of BHP Billitons Olympic Dam mine. Total wellfield yields of up to 29 ML/day are required for up to 10 years. At an assumed 2.5 ML/day/well the adopted wellfield configuration incorporates 14 wells (including back-up supply. Model utilises the geometric mean values for T (1050m2/day) and S (2x10-5).

D.2 Motherwell extension investigation

Billa Kalina Station
WATCHIE SWAMP
DEVILS PLAYGROUND
MILLERS CREEK
MXTB-02
MXTB-01
MXTB-03
MXTB-04
MXTB05
MXTB-06
CURDLAWIDNY LAGOON
REEDY LAGOON
BILLA KALINA
TRIAL HOLE SWAMP
MXTB10
MXTB13
MXTB07
MXTB11
HIDDEN SWAMP NORTH
HIDDEN SWAMP SOUTH
MXTB08
MXTB09
MXTB12
MXTB14
MXTB-15
PARAKYLIA
ROXBY DOWNS
RED LAKE
OLYMPIC DAM MINE
STUARTS CREEK
RT-9
PT-63
RT-42
ABERTACHNA WATERHOLE
PT-62
PT-46
PT-60
PT-48
PT-40
CHARLIE SWAMP
LAKE PIDLEEOMINA
RT-4a
PT-66
PT-50
PT-42
RT-7a
MAR-9
MAR-10
RT-5a
PT-51
MAR-2
PT-44
MAR-3
MAR-8
MATTAWEARA LAGOON
LAKE ARTHUR
MULGARIA
PT-45
RT-1
MAR-4
MAR-7
PT-61
MAR-6
MAR-1
20
MAR-5
LAKE TORRENS
ANDAMOOKA
NORTH SWAMP
RT-16a
RT-17a
PT-6
PT-17

SINCLAIR KNIGHT MERZ
SKM

Motherwell Extension Drilling Investigations Area
GDA 1994 MGA Zone 53

VE23064: Motherwell Extension
I:\VESA\Projects\VE30025\Technical\GIS\Motherwell etension\Motherwell_EXT_Locallity.mxd

0 2 4 8 12 16 20
Kilometers

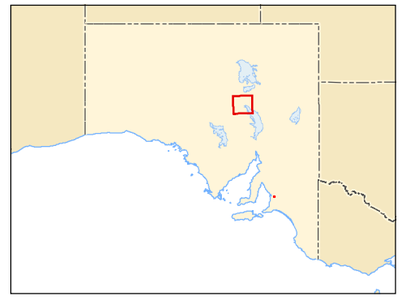
Legend

- MXTB completed wells
- Highway
- Road (sealed)
- Road (unsealed)
- Track (utalised)
- Track
- Pastoral Stations
- Special Mining Lease
- Surface water features
- Access Tracks

Wells

Program

- MAR Monitoring
- Managed Aquifer Recharge
- Motherwell
- Motherwell Extension
- Regional EIS
- Regional EIS Extension
- Saline Water Supply



Wells completed in Motherwell Extension drilling program

Well ID	Location (MGA94_Zone53)		DWLBC Permit Number	BHP Number	Dates Drilled	
	Easting	Northing			Start	Completed
MXTB05	627372	6657629	n/a	RD3581	30/09/08	2/10/08
MXTB07a/b	643063	6664649	n/a	RD3583	1/11/08	9/11/08
MXTB08	643654	6656106	n/a	RD3584	4/12/08	8/12/08
MXTB09a/b	640590	6644362	n/a	RD3585	10/11/08	17/11/08
MXTB10a/b	654543	6676749	n/a	RD3586	22/10/08	31/10/08
MXTB11a/b	653728	6659749	n/a	RD3587	26/11/08	3/12/08
MXTB12a/b	656587	6643923	n/a	RD3588	18/11/08	25/11/08
MXTB13a/b	661709	6666966	n/a	RD3589	12/10/08	21/10/08
MXTB14a/b	672164	6652846	n/a	RD3590	3/10/08	12/10/08

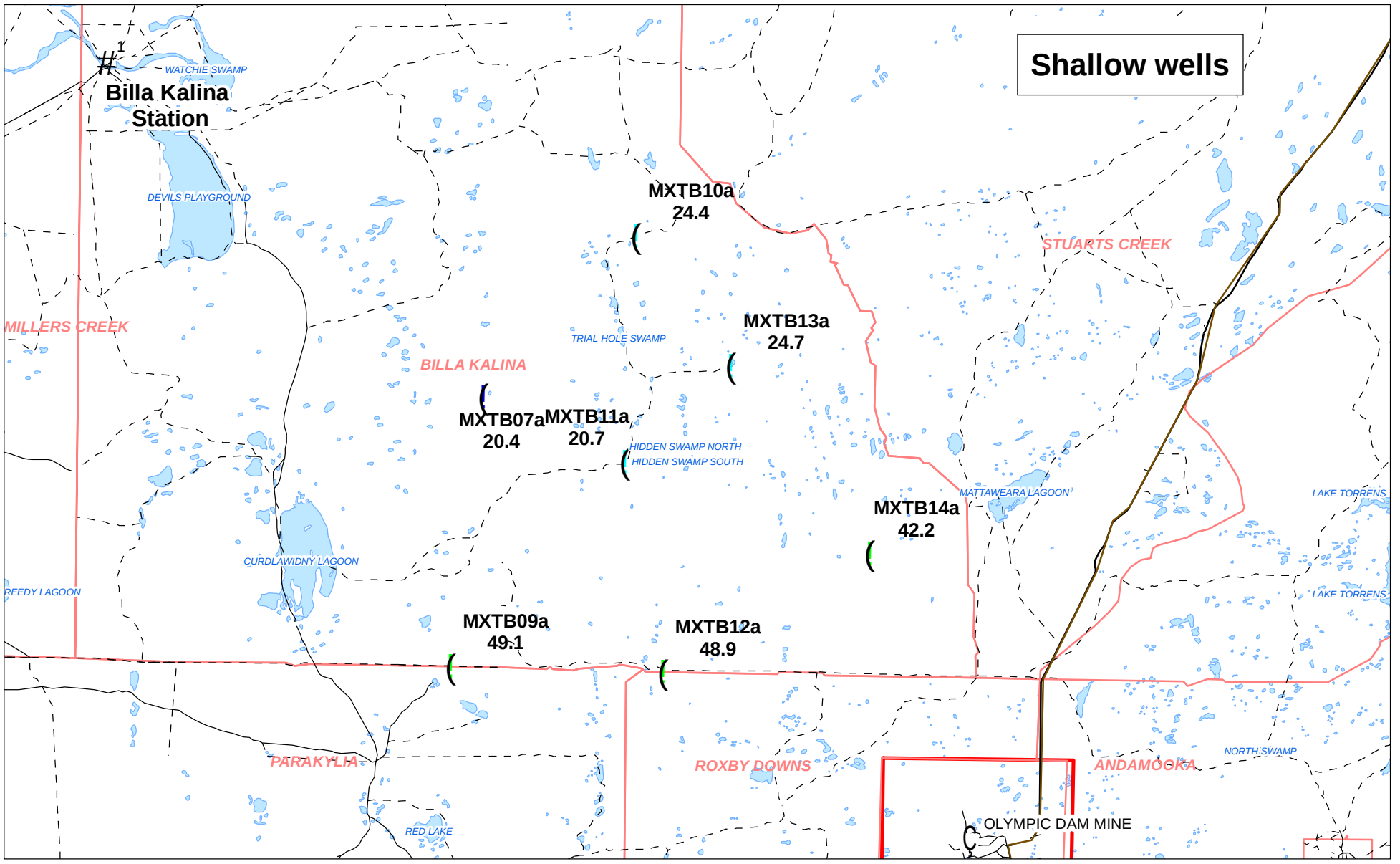
Well construction details

Well ID	Drill Method	EOH Depth (m)	Final Pre-collar Casing			Stick-up			PVC			Gravel pack Interval (m)	Seal Interval (m)	Formation EOH
			Depth Setting (m)	Diameter (mm)	Material	Steel Casing above ground (m)	PVC above ground (m)	Concrete above ground (m)	Slotted/ Production Interval (m)	Diameter (mm)	Material			
MXTB05	RC AIR HAMMER	126	42	254	Steel				-	-	-	-	-	Pws
MXTB07a/b	RC AIR HAMMER	186	66	254	Steel	0.45	**a:** 0.33 **b:** 0.36	0.15	**a:** 98-104 **b:**166-172	80	PVC	**a**: 80-110 **b**:156-186	**a**: 66-80 **b**:110-156	Pwx
MXTB08	RC AIR HAMMER	168	60	305	Steel	0.85		0.2	-	-	-	-	-	Pws
MXTB09a/b	RC AIR HAMMER	144	54	254	Steel	0.4	**a:** 0.22 **b:** 0.27	0.11	**a:** 58-64 **b:**120-126	80	PVC	**a**: 55-83 **b**:110-145	**a**: 40-54 **b**:83-111	Pwx
MXTB10a/b	RC AIR HAMMER	264	120	254	Steel	0.42	**a:** 0.26 **b:** 0.33	0.08	**a:** 136-142 **b:**240-246	80	PVC	**a**: 120-148 **b**:230-265	**a**: 110-120 **b**:148-231	Pwx
MXTB11a/b	RC AIR HAMMER	174	65	305	Steel	0.55	**a:** **b:**	0.1	**a:** 70-76 **b:**136-142	203/80	Steel/PVC	**a:** n/a **b**:126-174	**a**: n/a **b**:78-126	Pws
MXTB12a/b	RC AIR HAMMER	162	72	254	Steel	0.4	**a:**0.3 **b:** 0.34	0.11	**a:** 86-92 **b:**138-144	80	PVC	**a:** 72-100 **b**:126-162	**a**: 64-74 **b**:100-126	Pws
MXTB13a/b	RC AIR HAMMER	192	78	254	Steel	0.67	**a:**0.57 **b:** 0.61	0.18	**a:** 90-96 **b:**158-164	80	PVC	**a:** 80-108 **b**:150-192	**a**: 60-80 **b**:105-150	Pws
MXTB14a/b	RC AIR HAMMER	210	85	254	Steel	0.55	**a:**0.42 **b:** 0.44	0.11	**a:** 93-99 **b:**202-208	80	PVC	**a:** 83-100 **b**:192-210	**a**: 80-83 **b**:100-192	Pws

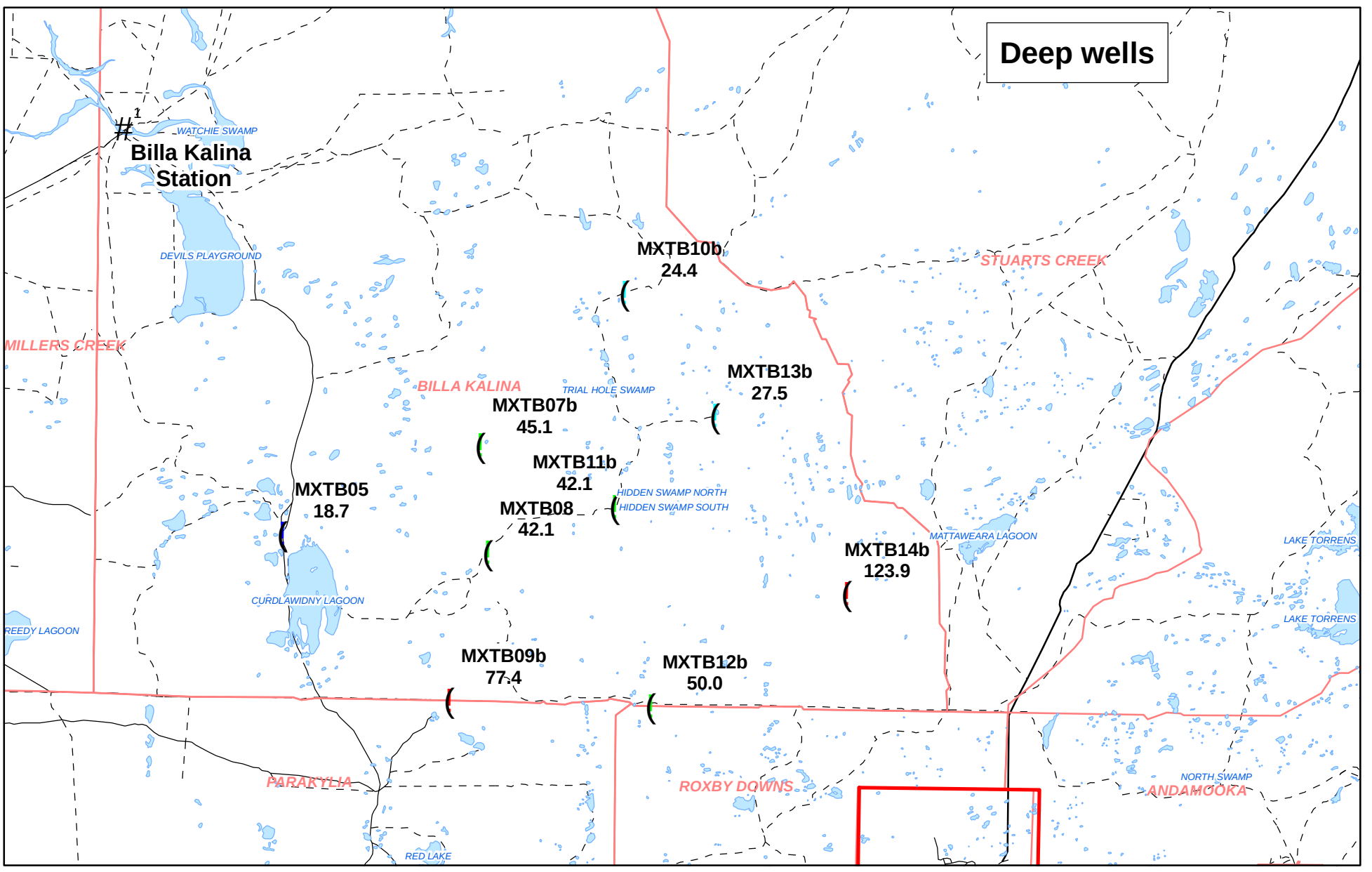
Summary of drillhole stratigraphy

Well ID	Formations Intervals and Descriptions						
	Quaternary and Tertiary Sediments	Bulldaog Shale	Yarrawarra Shale	Boorthana Shale	Andamooka Limestone	Yarloo Shale	Arcoona Quartzite
MXTB05	0-18 m Sands, clays and silts: red and brown, fine to coarse grained	18-32 m Clay: yellow and white, medium plasticity			32-122 m Limestone, moderately weathered, light coloured non-crystalline followed Dolomite, darker crystalline dolomite		122-126 m Sandstone; white and green, medium-coarse grained
MXTB07	0-22 m Sands and Silts: white, red and tan, fine-medium grained with gravels		? 22-54 m Shale and Claystone: brown, grey and purple		54- 174 m Limestone, moderately weathered, light coloured non-crystalline followed unweathered, white, crystalline Limestone, underlin by Dolomite, darker crystalline dolomite	174-186 m Shale; blue-grey and red, laminated, unweathered	
MXTB08	0-4 m Sandy Clays: Red and brown, fine to medium grained			4-48 m Shale and Claystone: grey and brown, medium plasticity becoming more laminated with depth	48-162 m Limestone, high-moderately weathered, light coloured non-crystalline followed unweathered, white, crystalline Limestone, underlin by Dolomite, darker crystalline dolomite		162-168 m Sandstone: pink and white, medium to coarse grained
MXTB09	0-2 m Sand: red, fine-coarse grained with white gravels		? 2-48 m Shale and Claystone: purple-brown, green-grey		48-136 m Limestone: moderately weathered, light coloured non-crystalline followed by unweathered, white, crystalline Limestone, underlin by Dolomite, darker crystalline dolomite	136-140 m Shale: red and pink, banded, unweathered	140-144 m Sandstone: grey and white, fine to medium grained
MXTB10	0-18 m Sands and Silts: white, red and tan, fine-medium grained with gravels			18-108 m Shale and Claystone: grey and brown, medium plasticity becoming more laminated with depth	108-241 m Limestone: moderately weathered, light coloured non-crystalline followed by unweathered, white, crystalline Limestone, underlin by Dolomite, darker crystalline dolomite	241-246 m Shale: blue-grey and red, unlaminted, unweathered	
MXTB11	0-4 m			4-58 m Shale and Claystone: grey and brown, medium plasticity becoming more laminated with depth	58-168 m Limestone: high-moderately weathered, light coloured non-crystalline followed by unweathered, white, crystalline Limestone, underlin by Dolomite, darker crystalline dolomite		168-174 m Sandstone: grey and red, coarse grained
MXTB12	0-66 m Sands and Silts: white, grey and tan, fine-medium grained with gravels				66-152 Limestone: moderately weathered, light coloured non-crystalline followed by unweathered, white, crystalline Limestone, underlin by Dolomite, darker crystalline dolomite	152-157 m Shale: red and grey, unweathered, platy	157-162 Sandstone: white, fine grained.
MXTB13	0-12 m Sand: red, fine grained		12-60 m Shale and claystone: grey and brown, slightly weathered becoming more laminated with depth		60-186 m Limestone: moderately weathered, light coloured non-crystalline followed by unweathered, white, crystalline Limestone, underlin by Dolomite, darker crystalline dolomite		186-192 Sandstone: pink and white, medium to coarse grained
MXTB14	0-24 m Silty clays: white, red and tan, fine-medium grained with gravels	26-32 m Shale and Claystone: brown and grey, medium plasticity			32-206 m Limestone: moderately weathered, light coloured non-crystalline followed by unweathered, white, crystalline Limestone, underlin by Dolomite, darker crystalline dolomite	206-210 m Shale: red and green, unweathered	

Shallow wells



Deep wells



SINCLAIR KNIGHT MERZ

EC distribution in shallow and deep wells

GDA 1994 MGA Zone 53

VE23064: Motherwell Extension

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0 2.5 5 10 15 20 25

Kilometers

Legend

EC Values mS/cm

- <20
- 20-30
- 30-50
- 50-70
- >70

- Highway
- Road (sealed)
- Road (unsealed)
- Track (utalised)
- Track
- Special Mining Lease

WATCHIE SWAMP

Billa Kalina Station

Billa Kalina

DEVILS PLAYGROUND

MILLERS CREEK

MXTB10
23.3

STUARTS CREEK

TRIAL HOLE SWAMP

MXTB13
27.6

BILLA KALINA

MXTB07
18.8

MXTB11
5.5

HIDDEN SWAMP NORTH

HIDDEN SWAMP SOUTH

MXTB05
23.1

MXTB08
3.3

MATTAWEARA LAGOON

MXTB14
31.4

CURDLAWIDNY LAGOON

MXTB09
14.0

MXTB12
24.4

PARAKYLIA

ROXBY DOWNS

ANDAMOOKA

SINCLAIR KNIGHT MERZ

SKM

EOH airlift yield distribution

GDA 1994 MGA Zone 53

VE23064: Motherwell Extension

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0 1.5 3 6 9 12 15

Kilometers

Legend

MXTB wells

Yeild L/sec

- 3.3 - 10
- 10 - 20
- 20- 30
- 30- 40

Localities

Highway

Road (sealed)

Road (unsealed)

Track (utalised)

Track

Special Mining Lease

Hydrogeological information collected during drilling

Well ID	Airlift yield (L/s)	Groundwater salinity (mS/cm)	Water level
MXTB05 *Andamooka Limestone*	Water cut at 40m with gradual increase to 10 L/s at 90m then increase to 18 L/s at 115 m with 23 L/s at EOH	14 at 40m with 16 to 18 until EoH	37.77 m BGL (15/10/2008)
MXTB08 *Andamooka Limestone*	Water cuts at 80 m, 94 m and 148m. Approximately 1 L/s at 80m and increasing to 35 L/sec at 94 m. Due to lose of circulation final yield were not able to be determined.	31 at 80 m with a gradual increase to 41 by 132 m. There were no water samples from 138-144 m. At 150 m the EC was 51 and remained so until EOH	65.12 mBGL (8/12/08)
MXTB07 *Andamooka Limestone*	Water cuts at 75 & 93 m. Steady increase to 6 L/s at 150 m and then to 19 L/s by 180 m.	<22 until 132 m, then gradual increase to 37 by 162 m	a : 64.63 mBGL b : 64.57 mBGL (9/11/08)
MXTB09 *Andamooka Limestone*	Water cut at 50 m. Increases to 8 L/s at ~70 m, 12 L/s at ~120 m, and then to 14 L/s at 186 m.	48 until 76 m, then gradual increase to 62 by 102 m and then to 70 by 132.	a : 43.05 mTOC b : 46.06 mTOC 18/11/2008
MXTB10 *Andamooka Limestone*	Water cut at 120 m. <2 L/s to 156 m with increase to 4 L/s and then to 12 L/s at 186 m. Gradual increase to 28 L/s between 222 and 252m	20 to 24 until 180, then gradual increase to ~40 at 180 m	a : 77.04 mBGL b : 77.05 mBGL (1/11/08)
MXTB11 *Andamooka Limestone*	Water cut at 65 m with a yield of 2-3 L/sec with an increase to 8-10 L/sec at 82 m. Due to lost circulation the yield could not be accurately measured past this point but water was cut again at 128 m.	20 to 22 from 76 m until 126 m. At 132 m the EC was 27 and gradually increased to 33 by EOH	a : 58.01 mTOC b : 58.09 m TOC (3/12/08)
MXTB12 *Andamooka Limestone*	Water cut at 80 m and 83 m with a yield <1L/sec. Water cut at 98 m with increase to 1.25 L/sec and gradually increased to 5.5 L/sec. Water cut at 128 m with a yield of 10 L/sec and water cut at 134 m where yield increased to 20 L/sec where it gradually increased to 25 L/sec by EOH	35 at 82 m and increased to 49 at 100 m remaining 50 until EOH	a : 67.28 m TOC b : 67.36 m TOC (25/11/08)
MXTB13 *Andamooka Limestone*	Water cuts at 66 & 92 m with <0.2 L/s to 114 m then increase to 10 L/s by 128 m and further increase to 28 L/s between 144 and 156m	<10 until 94m then between 23 and 27 until EoH	a : 62.44 mBGL b : 62.35 mBGL (9/11/08)
MXTB14 Andamooka Limestone	Water cuts at 84 & 90 m with ~2 L/s to 120 m then steady increase to 31 L/s at 168 m	42 to 50 mS/cm with increase to 85 at 180 m, then ~105 to EoH	a: 73.95 mTOC b: 78.14 mTOC (3/12/08)

Table 5. Water quality parameters measured in bailed groundwater samples

Well ID	Electrical Conductivity Bailed (uS/cm)	Electrical Conductivity Lab Results (uS/cm)	pH (pH units)	Temperature (^{o}C)
MXTB7a	20.4	20.4	8.02	29.9
MXTB7b	45.1	41.7	7.82	28.8
MXTB9a	49.1	46.3	7.94	28.9
MXTB9b	77.4	75.5	7.66	28.6
MXTB10a	24.4	24.6	8.06	26.3
MXTB10b	24.4	40.3	8.06	26.3
MXTB11b	42.1	n/a	8.04	28.6
MXTB12a	48.9	50.0	7.83	29.5
MXTB12b	50.0	52.9	7.42	30.2
MXTB13a	24.7	25.1	8.10	25.8
MXTB13b	27.5	25.2	7.70	29.5
MXTB14a	42.2	44.8	7.86	26.3
MXTB14b	123.9	139.0	7.42	28.9

Stabilised groundwater levels

Well ID	Elevation (m)	Date	Time	mTOC	mBGL	mAHD	Notes
MXTB05	85.8	15/10/2008	2:00 PM	48.03		37.77	Pre construction, hammer oil
	85.8	8/12/2008		33.875	33.075	51.925	After 1 month pumping
MXTB07a	115	9/11/2008	8:15	64.96	64.63	50.37	Before airift
	115	28/11/2008	11:30	64.88	64.4	50.6	
MXTB07b	115	9/11/2008	8:15 AM	65.08	64.57	50.43	Before airift
	115	28/11/2008	11:30 AM	65.95	65.44	49.56	
MXTB08	113	8/12/2008	11:00	65.77	65.12	47.88	
MXTB09a	100	18/11/2008	8:00 AM	43.05	42.65	57.35	Before airift
	100	30/11/2008	8:40 AM	46.06	45.66	54.34	
MXTB09b	100	18/11/2008	8:00 AM	46.04	45.59	54.41	Before airift
	100	30/11/2008	8:50 AM	46.86	46.41	53.59	
MXTB10a	126	1/11/2008	8:00 AM	77.56	77.04	48.96	Before airift
	126	9/11/2008	2:55 PM	76.3	75.78	50.22	
	126	27/11/2008	8:00 AM	77.215	76.695	49.305	
MXTB10b	126	1/11/2008	8:00 AM	77.64	77.05	48.95	Before airift
	126	9/11/2008	2:55 PM	78.55	77.96	48.04	
	126	28/11/2008	12:00	78.5	77.91	48.09	
MXTB11a	105	3/12/2008		58.01	57.56	47.44	
	105	8/12/2008		58.76	58.31	46.69	
MXTB11b	105	3/12/2008		58.09	57.64	47.36	
	105	8/12/2008		58.09	57.64	47.36	
MXTB12a	109	25/11/2008	8:20 AM	67.28	66.81	42.19	Before airift
	109	30/11/2008	9:25 AM	67.41	66.94	42.06	
MXTB12b	109	25/11/2008	8:20 AM	67.36	66.84	42.16	Before airift
	109	30/11/2008	9:25 AM	67.53	67.01	41.99	
MXTB13a	110	9/11/2008	4:30 PM	63.32	62.44	47.56	
	110	28/11/2008	12:35 PM	63.23	62.35	47.65	
MXTB13b	110	9/11/2008	4:30 PM	63.27	62.35	47.65	
	110	28/11/2008	12:35 PM	63.43	62.51	47.49	
MXTB14a	114.8	3/12/2008	4:25 PM	73.95	73.2	41.6	
MXTB14b	114.8	3/12/2008	4:25 PM	78.14	77.37	37.43	

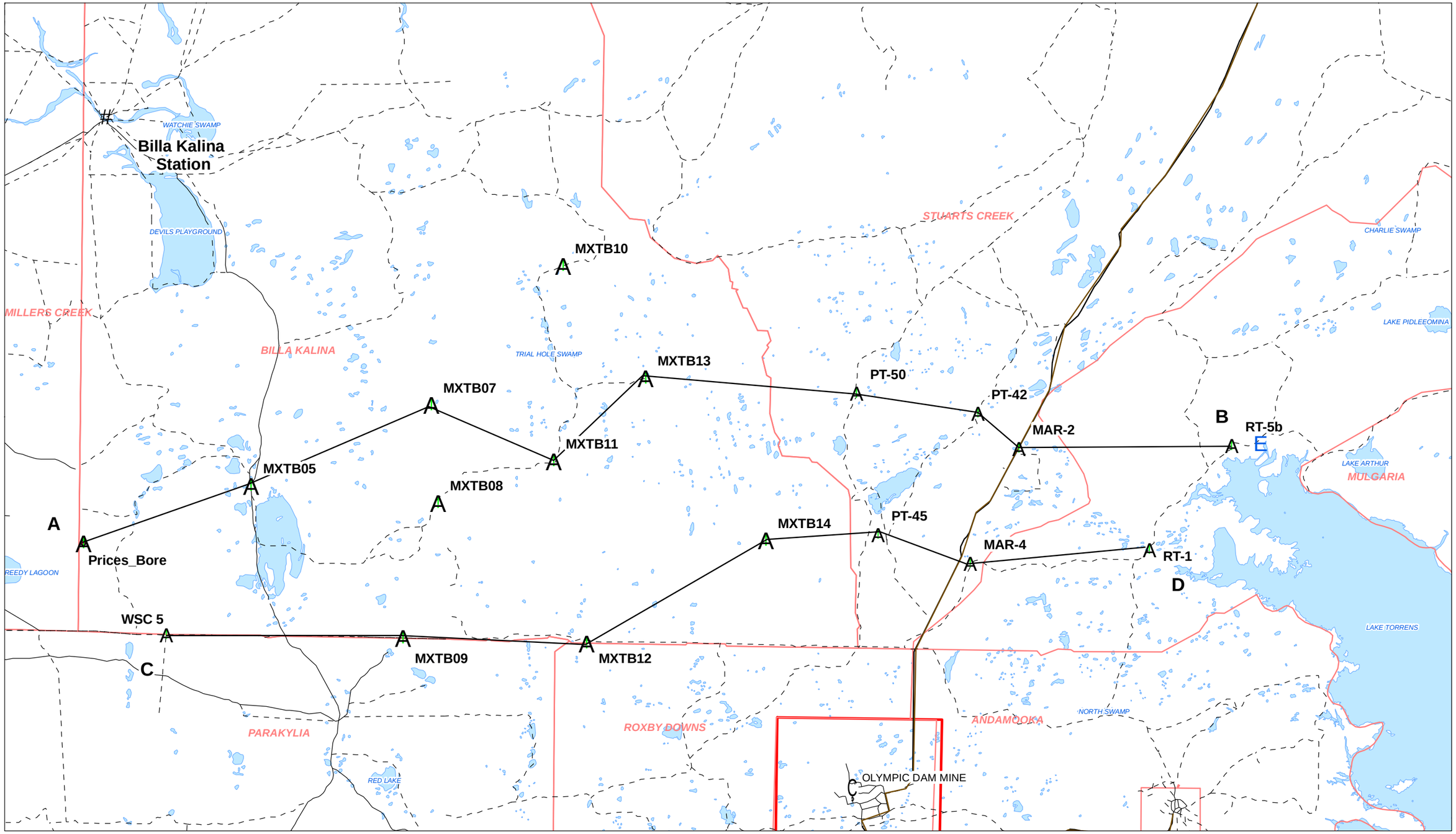
Summary of aquifer testing raw data (from airlift recovery tests)

Well ID	Total time of Airlift (mins)	Flow Rate (Q) (m3/day)	First Residual drawdown (m)	First residual drawdown time (mins)	Residual drawdown at 30 minutes (m)	Residual drawdown at 60 minutes (m)
MXTB07a	120	78.6	0.05	4	0.05	
MXTB07b	120	157.2	0.9	9	0.965	
MXTB09a	120	61.3	2.93	3	2.935	
MXTB09b	120	172.8	0.88	6	0.78	0.765
MXTB11b	120	112.3	0.77	0.775		
MXTB12a	120	14.7	0.25	5	0.065	0.04
MXTB12b	120	172.8	0.06	4	0.075	
MXTB13a	120	57.89	24.53	4	18.78	
MXTB13b	170	216	-0.33	5	0.095	
MXTB14a	60		-0.83	3	-0.54	
MXTB14b	60	216	0.17	7	0.17	

. Laboratory analytical water quality data

Sample			MXTB13	MXTB13	MXTB13A	MXTB13B	MXTB14a	MXTB14b	MXTB10	MXTB10	MXTB10a	MXTB10b	MXTB10a	MXTB10b	MXTB9a	MXTB9b	MXTB7a	MXTB7b	MXTB07a	MXTB07b	MXTB07	MXTB07	MXTB12a	MXTB12b	MXTB11b
Date			17/10/2008	18/10/2008	24/10/2008	24/10/2008	16/10/2008	16/10/2008	27/10/2008	27/10/2008	1/11/2008	1/11/2008	9/11/2008	9/11/2008	20/11/2008	20/11/2008	15/11/2008	15/11/2008	9/11/2008	9/11/2008	4/11/2008	4/11/2008	30/11/2008	30/11/2008	8/12/2008
Lab Report			EM0808905001	EM0808905002	EM0809035001	EM0809035002	EM0808812001	EM0808812002	EM0809252001	EM0809252002	EM0809556001	EM0809556002	EM0809560001	EM0809560002	EM0810011001	EM0810011002	EM0810010001	EM0810010002	EM0809540001	EM0809540002	EM0809552001	EM0809552002	EM0810344001	EM0810344002	EM0810679001
Sampling Technique			Drilling		Bailing		Bailing		Drilling		Airlifting		Bailing		Bailing		Bailing		Airlifted		Drilled		Bailing		Bailing
Depth/Screened Inverval			Drilled depth		Screened interval		Screened interval		Drilled depth		Screened interval		Screened interval		Screened interval		Screened interval		Screened interval		Drilled depth		Screened interval		Screened interval
			100m	192m	90-96m	158-164m	93-99m	202-208m	130m	264m	136-142m	240-246m	136-142m	240-246m	58-64m	120-126m	98-104m	166-172m	98-104m	166-172m	106m	186m	86-92m	138-144m	136-142
Analyte	**Units**	**ALS LOR**																							
pH Value and Total Dissolved Solids																									
pH	pH Unit	0.1	7.72	7.94	6.95	7.2	7.39	7.34	7.8	7.77	7.94	7.97	6.95	7.25	7.37	7.36	7.46	7.19	8.09	7.99			6.92	7.04	7.21
EC	µS/cm		24500	25900	25100	25200	44800	139000	33100	41700	23600	41100	24600	40300	46300	75500	20400	41700	20500	44700	10700	24200	50000	52900	43500
TDS	mg/L	1	15800	17600	16900	17300	31800	101000	20700	26700	16300	28300	17200	28800	33200	50300	12900	25300	14200	31600			30600	30800	30800
Suspended Solids	mg/L	1	1560	145	18	10	30	31	221	478	12	16	10	30	15	14	10	12	13	4	810	11	40	38	115
Turbidity	NTU	0.1	4320	225	11.9	5.2	20.3	3	102	315	5.7	1.4	9.8	12.6	16.6	8.6	21.1	7.4	17.6	4.6	442	6.2	10.2	24.7	4.5
Alkalinity																									
Hydroxide as CaCO3	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1
Carbonate as CaCO3	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1
Bicarbonate as CaCO3	mg/L	1	190	312	310	316	339	181	291	341	183	278	163	278	268	236	236	263	233	269			316	325	269
Total Alkalinity as CaCO3	mg/L	1	190	312	310	316	339	181	291	341	183	278	163	278	268	236	236	263	233	269			316	325	269
Dissolved Major Cations																									
Calcium	mg/L	1	616	672	658	719	953	1360	704	694	780	797	761	774	828	759	621	796	589	837			1020	958	681
Magnesium	mg/L	1	417	532	543	664	997	2120	643	922	394	1030	418	1020	1130	1940	358	928	374	1060			1200	1330	949
Sodium	mg/L	1	5120	5450	5280	6520	9040	32000	7350	9520	5120	10000	5250	9840	9480	14600	3810	9020	4590	11700			10400	10800	7940
Potassium	mg/L	1	87	92	98	122	132	251	100	131	71	140	71	138	156	319	65	150	70	166			138	133	118
Dissolved Major Anions																									
Sulfate as SO4 2-	mg/L	1	2680	2780	2990	3700	5150	7570	3590	4380	3670	5050	3840	4950	4740	7720	2280	4660	2510	5490			6430	6620	4180
Sulfur as S	mg/L	1	894	927	997	1230	17.5	15.7	1200	1460	1220	1680	1280	1650	1580	2570	759	1550					2140	2210	1390
Silica	mg/L	0.1	26.4	29	24.6	47.7			20.2	21.6	43.7	35.6	31.5	34.9	16.2	11.1	16.3	13.8	37.1	37.2			13.3	12.9	11.2
Silicon	mg/L	0.1	12.3	13.5	11.5	22.3			9.41	10.1	20.4	16.6	14.7	16.3	7.56	5.2	7.61	6.46	17.3	17.4			6.2	6.01	5.23
Chloride	mg/L	1	7300	8300	7980	8620	12800	45200	11700	16000	7170	15900	7580	15500	16700	25000	6750	13200	7010	16700			16900	16600	13300
Fluoride	mg/L	0.1	1.2	1.1	1.2	1	1.3	1	1.3	1.1	1.6	1.1	1.5	1.1	1.4	1.1	0.7	0.8	0.8	0.8			1.2	1.2	8.5
Ionic Balance																									
Total Anions	meq/L	0.01	266	298	294	326	475	1440	410	548	282	558	297	546	574	870	242	474	255	591			618	612	467
Total Cations	meq/L	0.01	290	317	310	377	526	1640	410	528	296	566	302	554	560	841	228	512	262	641			605	630	461
Ionic Balance	%	0.01	4.33	2.94	2.66	7.23	5.13	6.54	0.04	1.89	2.36	0.65	0.9	0.71	2.15	1.72	3.14	3.83	1.9	4.02			1.07	1.44	0.79
Dissolved Metals																									
Aluminium	mg/L	0.01	0.01	0.02	0.02	<0.01	0.01	<0.01	0.07	0.06	<0.01	0.02	0.02	0.03	0.04	0.01	0.03	0.01	<0.01	0.05			0.1	0.09	0.03
Arsenic	mg/L	0.001	<0.001	0.003	0.042	0.021	0.004	0.007	<0.001	<0.001	0.003	0.008	0.003	0.004	<0.001	<0.001	<0.001	<0.001	0.002	0.006			0.005	<0.001	0.039
Barium	mg/L	0.001	0.043	0.02	0.032	0.022	0.052	0.045	0.025	0.036	0.036	0.029	0.037	0.035	0.049	0.028	0.034	0.027	0.03	0.026			0.092	0.039	0.028
Boron	mg/L	0.05	5.42	5.38	5.33	5.49	6.31	4.85	5.53	5.34	7.82	5.51	8.14	5.27	4.12	6.47	4.08	5.38	4.27	5.85			5.95	6.26	4.46
Cobalt	mg/L	0.001	0.003	0.002	0.035	0.014	0.008	0.009	0.004	0.005	0.008	0.039	0.012	0.036	0.004	0.006	0.004	0.005	0.004	0.005			0.006	0.004	0.033
Copper	mg/L	0.001	0.006	0.004	0.007	0.006	0.012	0.017	0.007	0.009	0.006	0.009	0.006	0.014	0.012	0.018	0.005	0.011	0.004	0.01			0.011	0.014	0.012
Iron	mg/L	0.01	<0.10	<0.10	0.12	<0.10	0.1	<0.50	<0.10	<0.10	0.3	0.28	0.28	0.23	0.12	0.55	<0.10	<0.10	0.3	0.36			0.95	0.15	<0.10
Iron	mg/L	0.01	4.86	3.6	0.68	0.19	1.8	0.97	2.17	8.95	0.38	0.67	0.48	0.76	1.64	1.71	2.58	2.41	0.55	0.67	3.74	0.17	1.07	0.98	1.96
Lead	mg/L	0.001	<0.001	<0.001	0.005	0.007	0.001	0.023	<0.001	<0.001	<0.001	0.002	0.003	0.006	0.071	0.002	0.031	<0.001	<0.001	0.002			0.003	0.002	0.022
Manganese	mg/L	0.001	0.368	0.091	0.096	0.069	0.365	0.689	0.559	0.487	0.167	0.391	0.198	0.402	0.161	0.32	0.145	0.28	0.126	0.274			0.702	0.945	0.146
Strontium	mg/L	0.001	9.03	10.2	9.96	10.4	13.4	32.2	13.4	14.7	12.3	14.2	12.5	14.4	14.7	14.3	9.88	16.3	9.49	15.8			13.2	12.5	12.7
Uranium	mg/L	0.001	0.006	0.011	0.038	0.022	0.016	0.006	0.002	0.002	0.005	0.006	0.005	0.007	0.029	0.007	0.011	0.007	0.014	0.006			0.023	0.009	0.016
Zinc	mg/L	0.005	1.41	0.012	0.025	0.02	0.053	0.04	0.042	0.071	0.051	0.035	0.043	0.047	0.021	0.01	0.035	0.016	0.012	0.03			0.037	0.027	0.067
Nitrite as N	mg/L	0.01	0.03	<0.01	<0.01	0.01	0.27	<0.01	<0.01	0.08	0.16	<0.01	<0.01	<0.01	0.62	0.06	0.02	0.01	0.09	0.02	<0.01	<0.01	<0.01	<0.01	0.03
Nitrate as N	mg/L	0.01	0.09	<0.01	<0.01	<0.01	0.23	<0.01	0.01	<0.01	0.37	0.03	<0.01	<0.01	2.18	0.04	<0.01	<0.01	0.3	0.08	<0.01	0.38	<0.01	<0.01	0.08
Nitrite + Nitrate as N	mg/L	0.01	0.13	<0.01	<0.01	<0.01	0.51	<0.01	0.01	0.09	0.53	0.03	<0.01	<0.01	2.8	0.1	<0.01	<0.01	0.4	0.1	<0.01	0.38	<0.01	<0.01	0.12

Notes
LOR - Limit of reporting
- Not Analysed
* Raised LOR
^ Guideline is for Hexavalent Chromium (Cr VI)
^^ Guideline is for 90% Protection



SINCLAIR KNIGHT MERZ

SKM

Cross Sections

GDA 1994 MGA Zone 53

VE30025: Motherwell Extension

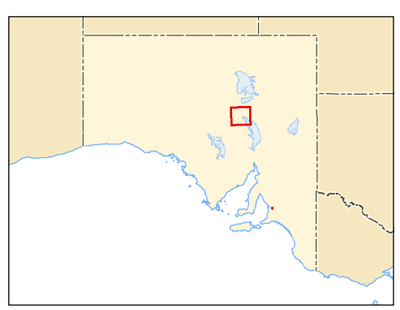
I:\VESA\Projects\VE30025\Technical\GIS\Motherwell etension\Motherwell_EXT_cross sections.mxd

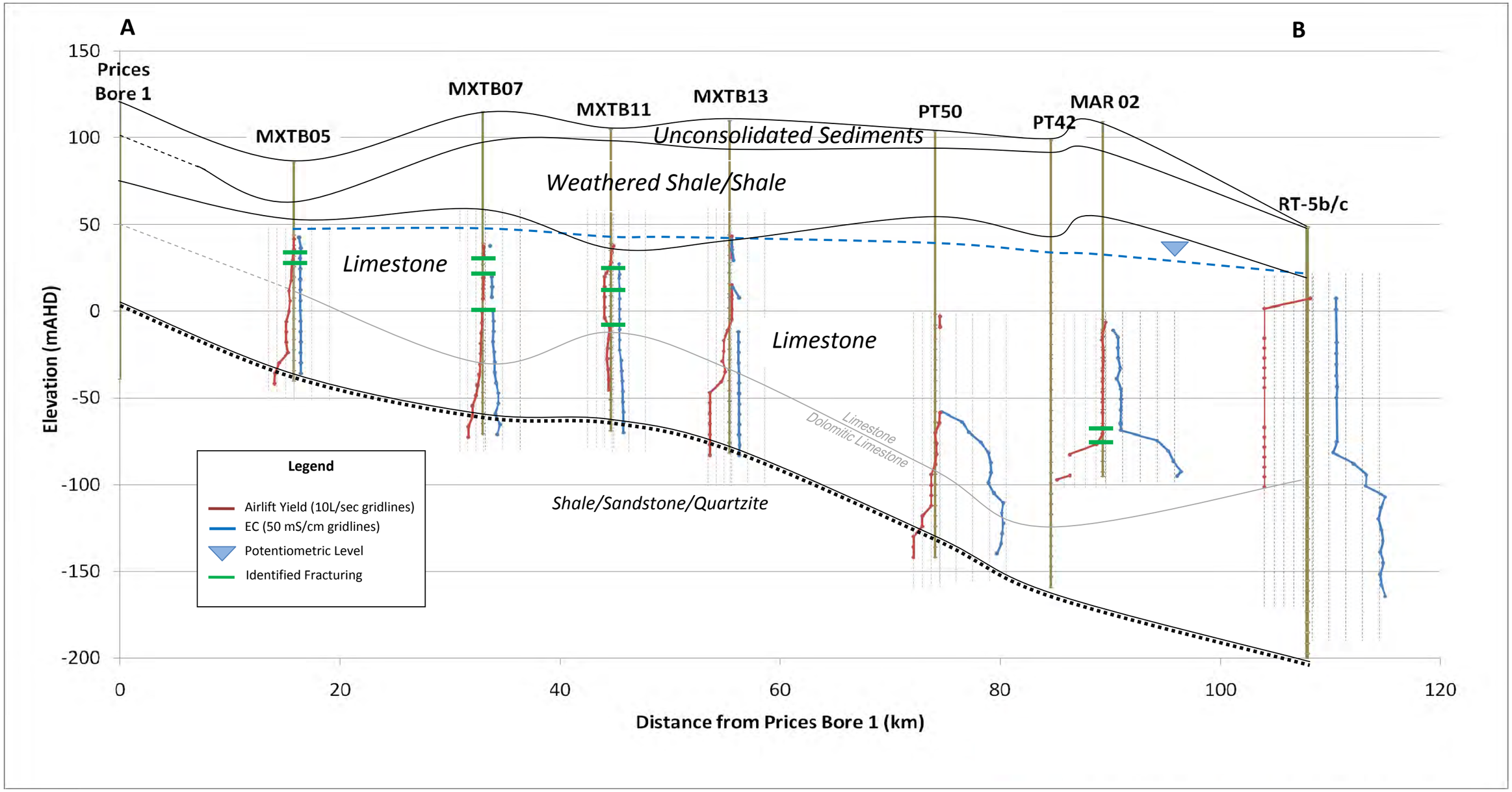
0 2.5 5 10 15 20 25

Kilometers

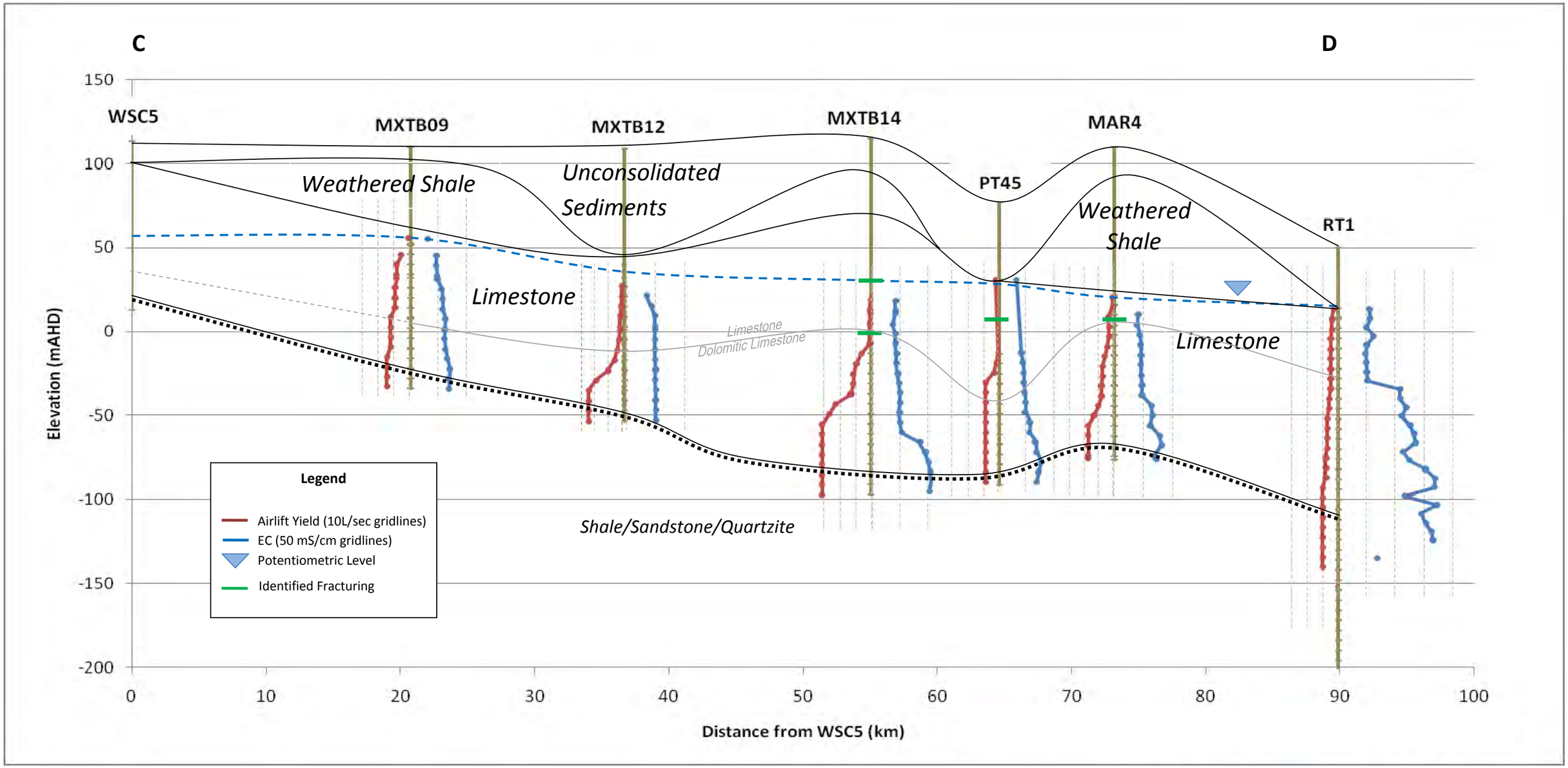
Legend

- A Wells
- Pastoral Stations
- Special Mining Lease
- Localities
- Highway
- Road (sealed)
- Road (unsealed)
- Track (utalised)
- Track

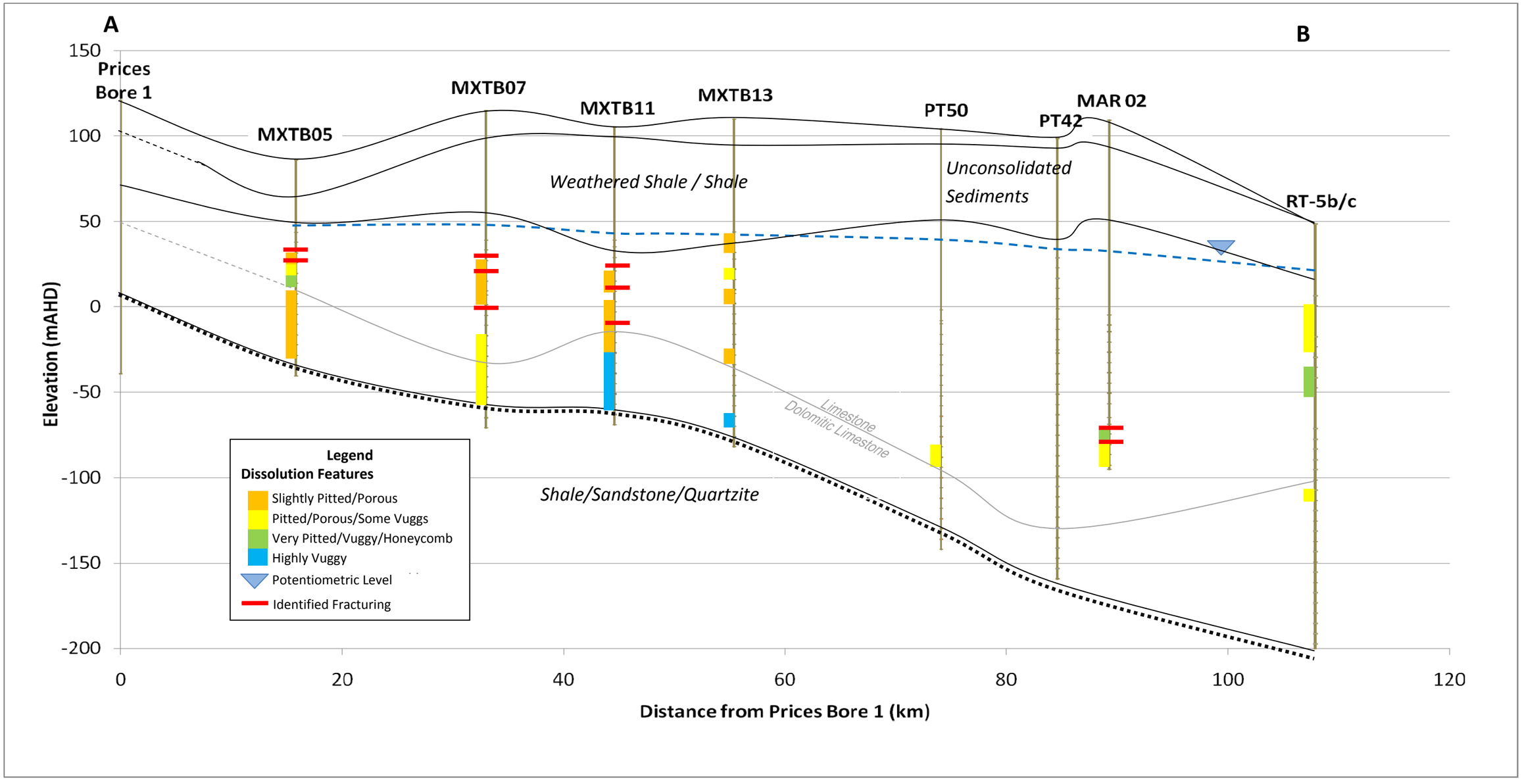




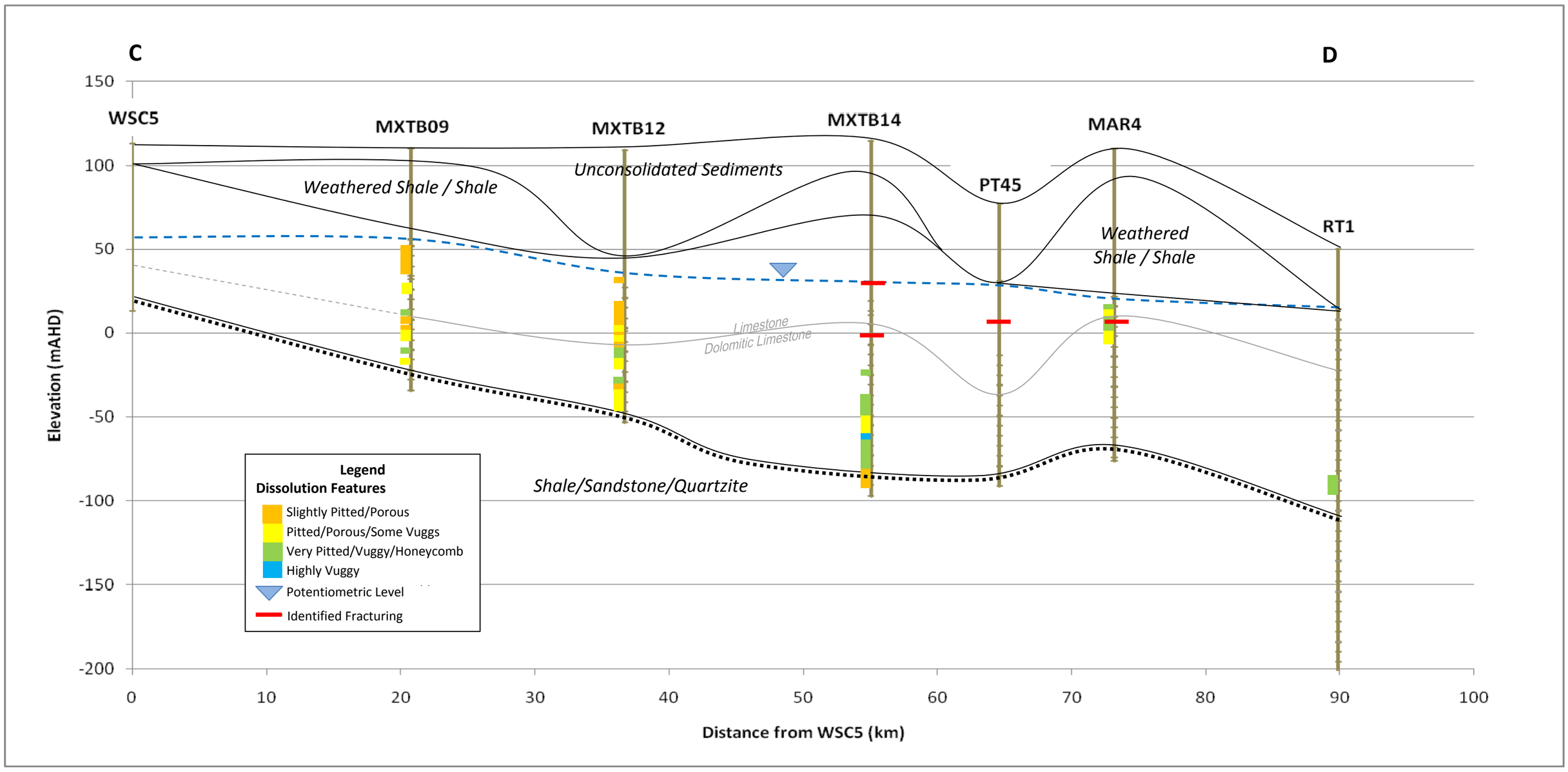
Cross section A-B -EC and airlift yield profile



Cross section C-D - EC and airlift yield profile



Cross section A-B – ALS Dissolution Features



Cross section C-D - ALS Dissolution Features

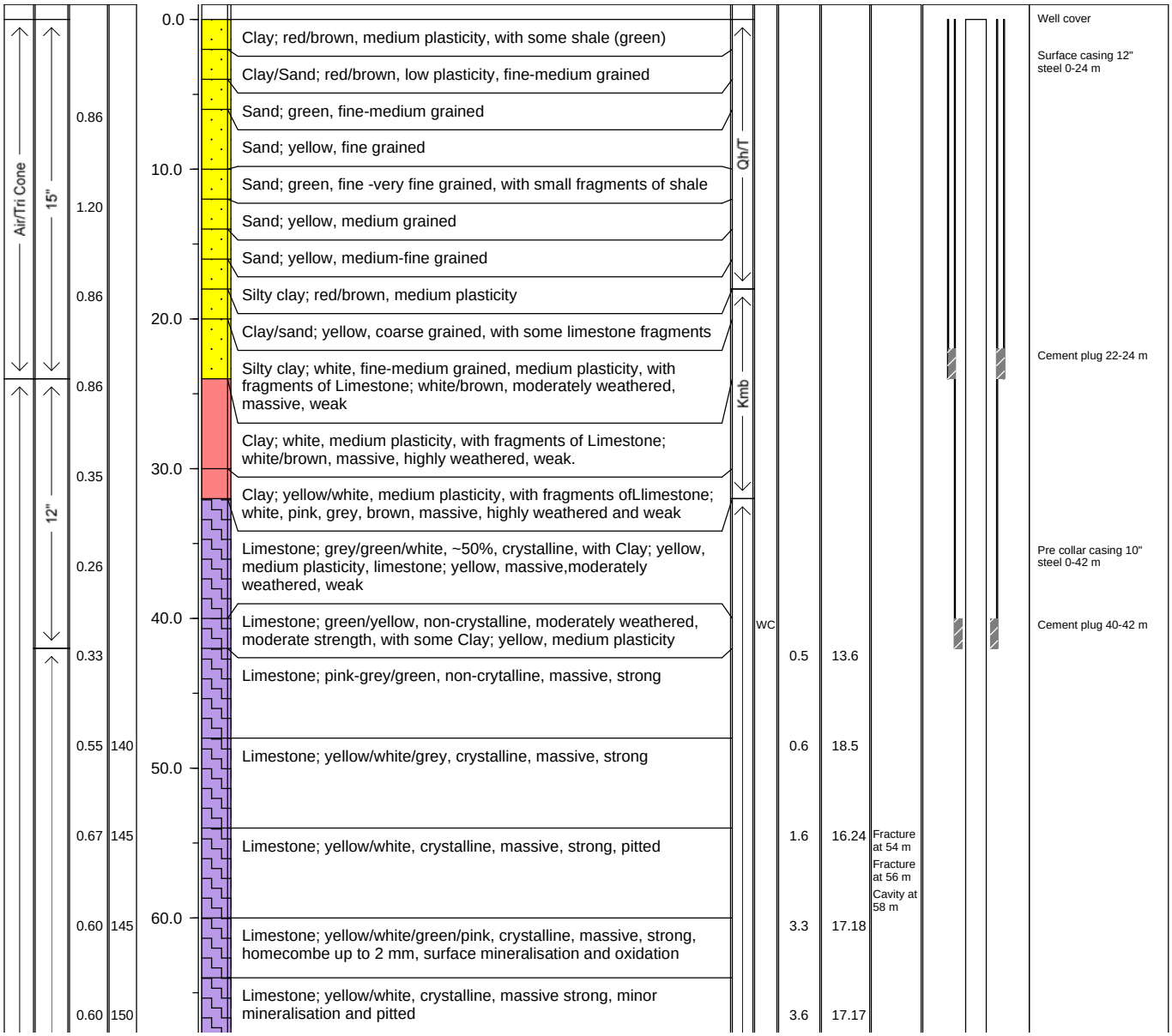
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB05

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **30/09/08** DATE COMPLETED: **02/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **126**
REFERENCE POINT (m AHD): **85.8**
STATIC WATER LEVEL
Date: **15/10/08** Depth (m TOC) **48.03 m (TOC)**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **627372** NORTHING: **6657629**



LOGGED: Jasmine Richards DATE: 2/10/08

CHECKED: K Furness DATE: 19/12/08

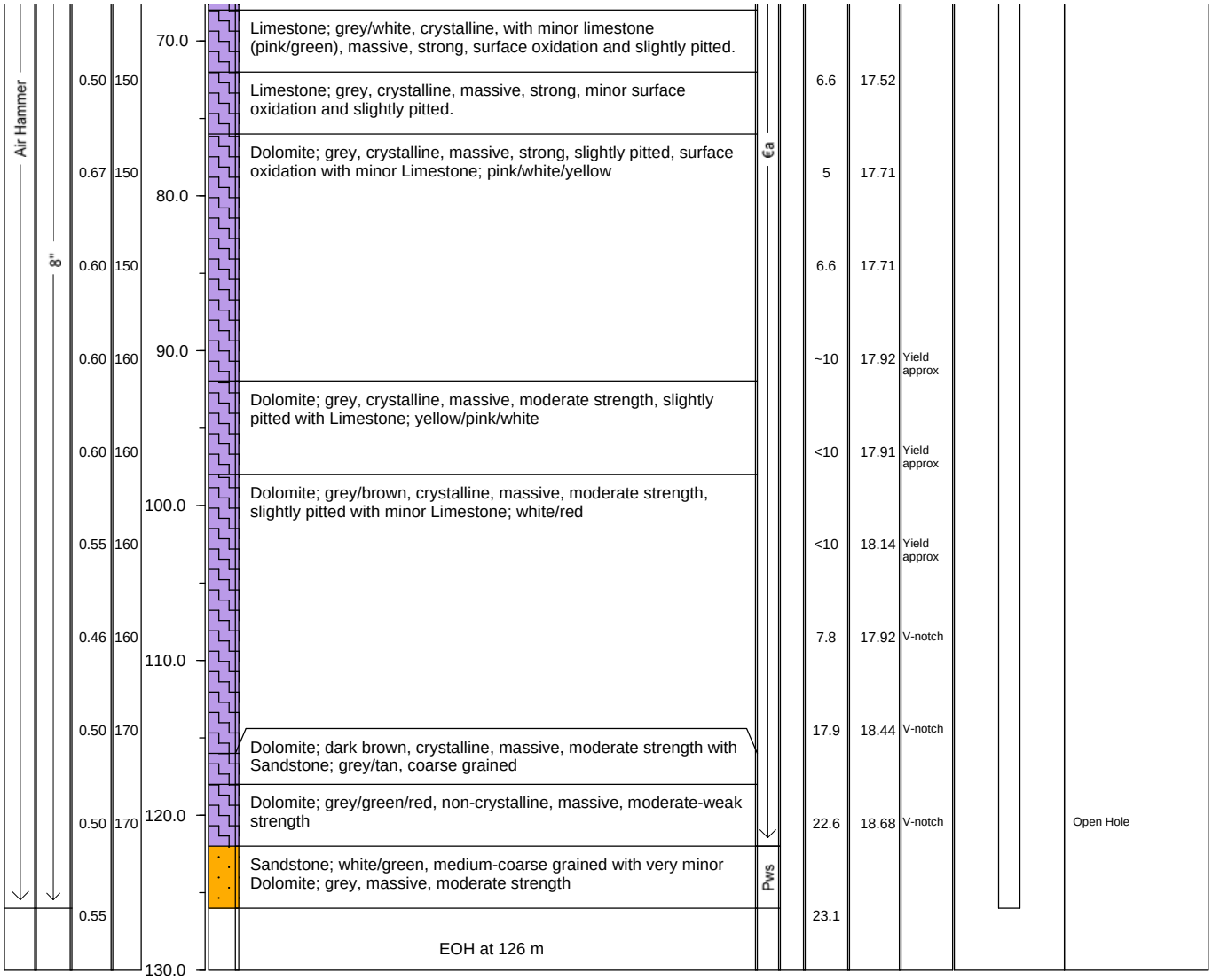
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB05

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **30/09/08** DATE COMPLETED: **02/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **126**
REFERENCE POINT (m AHD): **85.8**
STATIC WATER LEVEL
Date: **15/10/08** Depth (m TOC): **48.03 m (TOC)**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **627372** NORTHING: **6657629**



LOGGED: Jasmine Richards DATE: 2/10/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

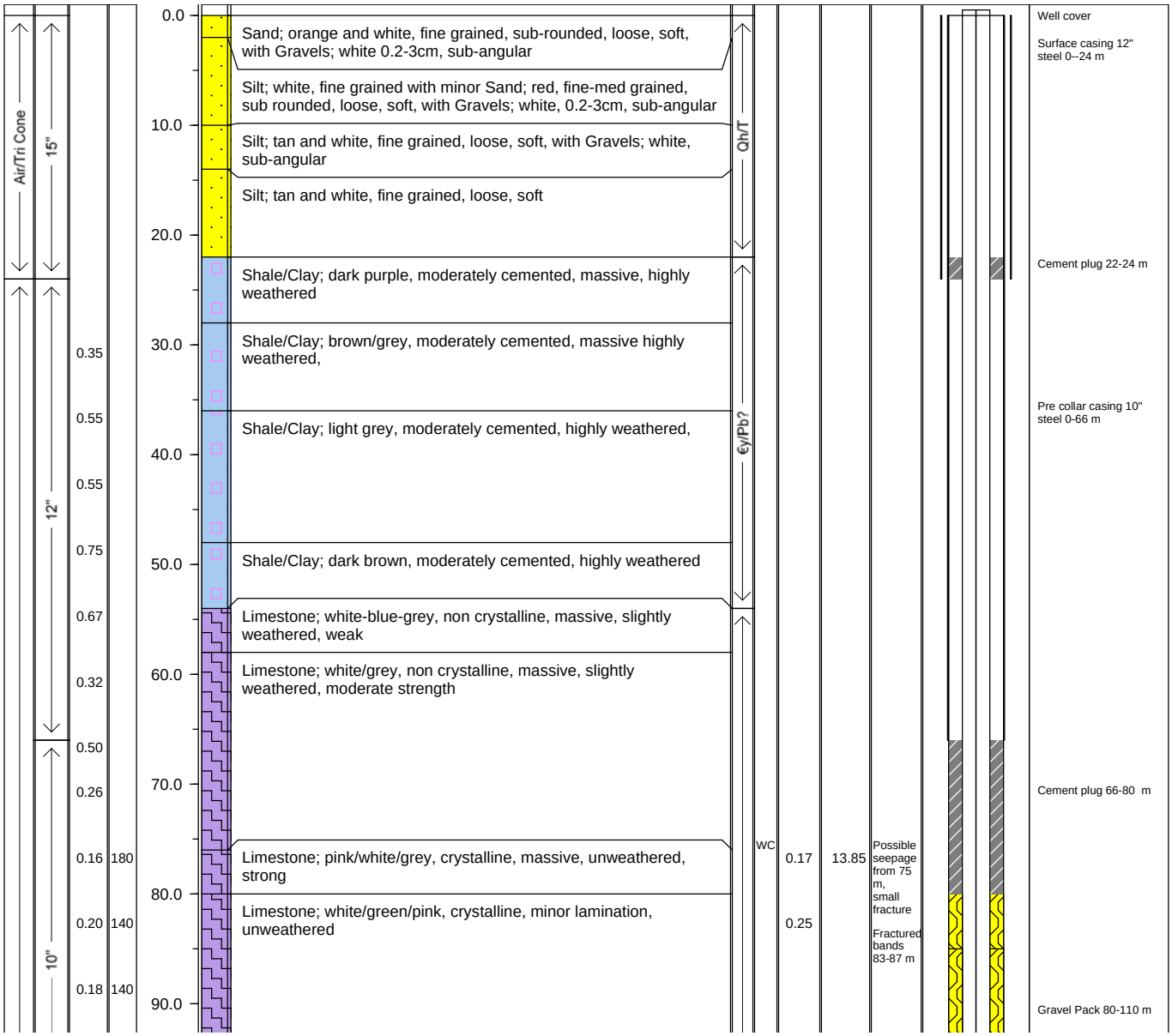
BOREHOLE / WELL NUMBER

MXTB07a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **01/11/08** DATE COMPLETED: **09/11/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **186**
REFERENCE POINT (m AHD): **115**
STATIC WATER LEVEL
Date: **9/11/08** Depth (m TOC): **a: 64.96, b:65.08**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **643063** NORTHING: **6664649**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Hyland DATE: 9/11/08

CHECKED: K Furness DATE: 19/12/08

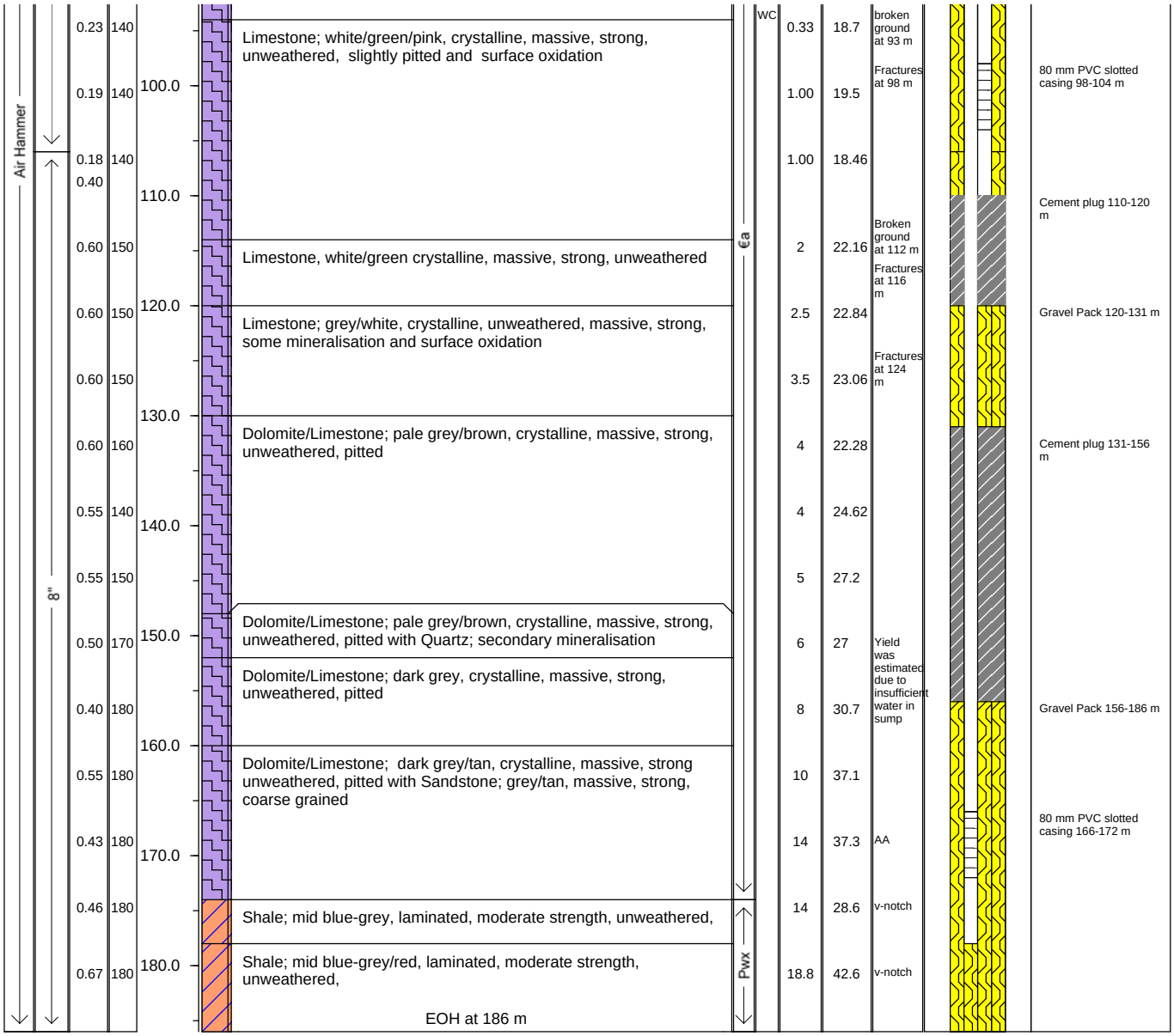
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB07a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **01/11/08** DATE COMPLETED: **09/11/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **186**
REFERENCE POINT (m AHD): **115**
STATIC WATER LEVEL
Date: **9/11/08** Depth (m TOC): **a: 64.96, b:65.08**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **643063** NORTHING: **6664649**



LOGGED: K Hyland DATE: 9/11/08

CHECKED: K Furness DATE: 19/12/08

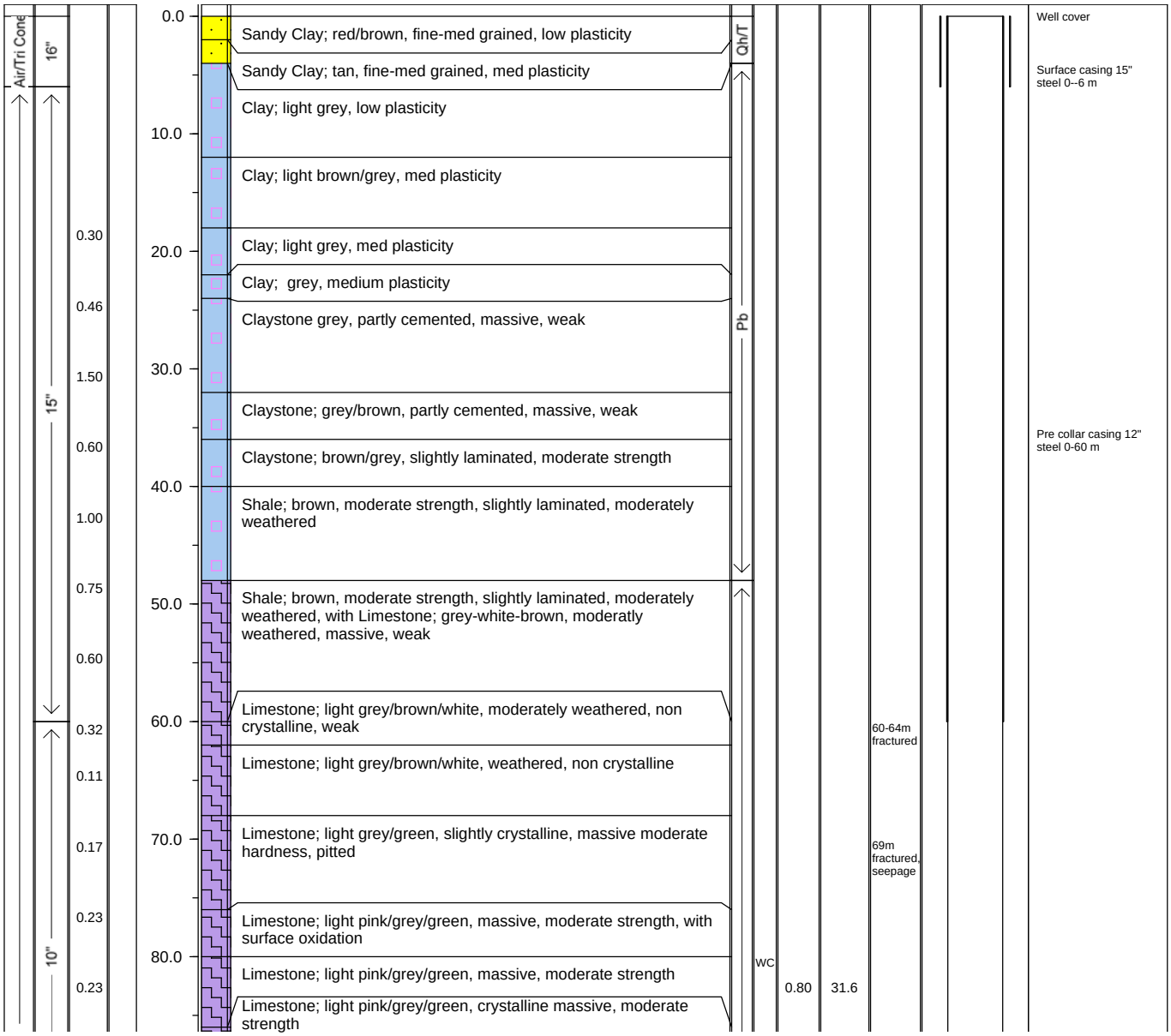
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB08

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **04/12/08** DATE COMPLETED: **8/12/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **168**
REFERENCE POINT (m AHD): **113**
STATIC WATER LEVEL
Date: **8/12/08** Depth (m TOC): **55.12**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **643654** NORTHING: **6656106**



LOGGED: K Hyland DATE: 9/11/08

CHECKED: K Furness DATE: 19/12/08

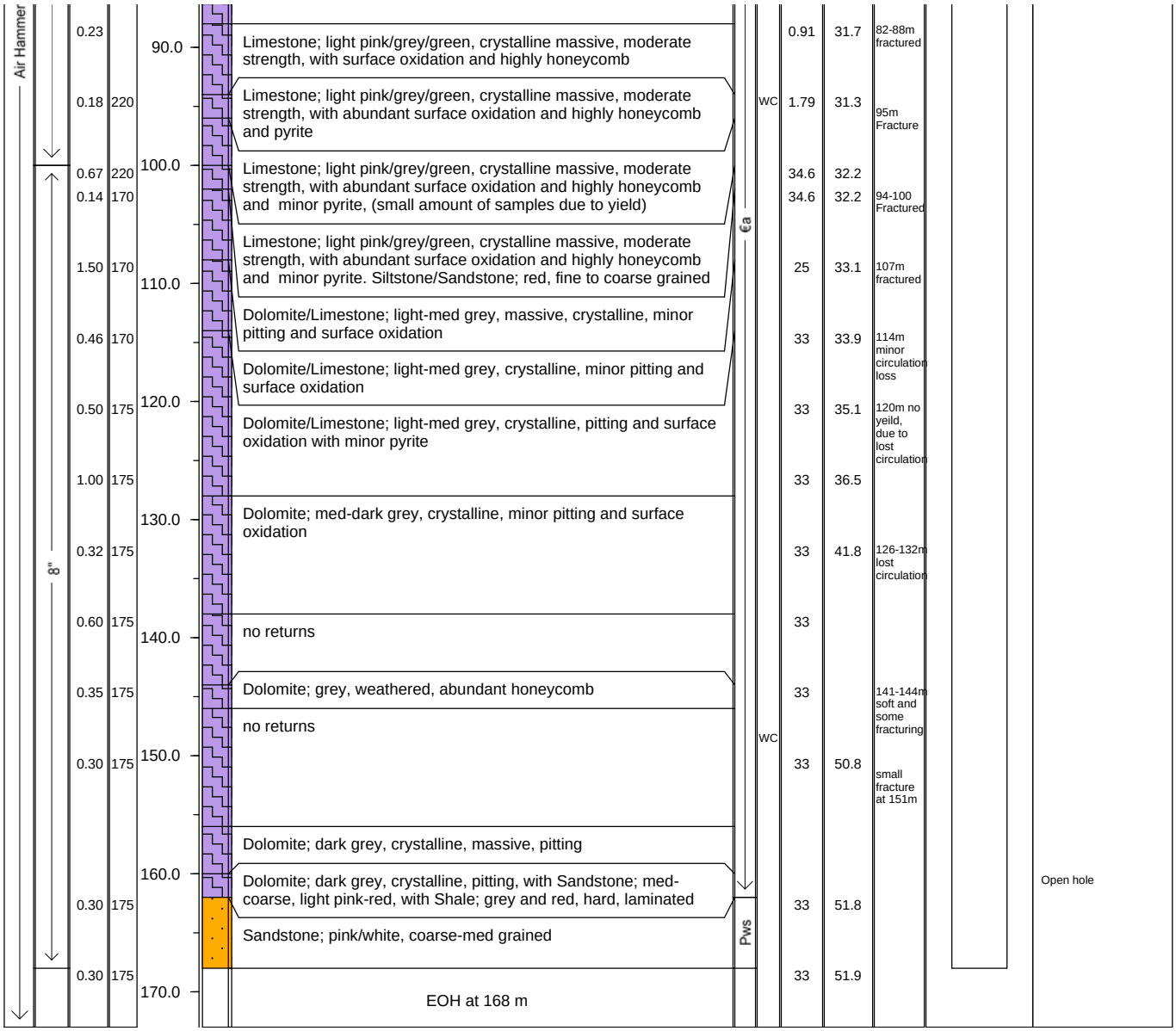
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB08

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **04/12/08** DATE COMPLETED: **8/12/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **168**
REFERENCE POINT (m AHD): **113**
STATIC WATER LEVEL
Date: **8/12/08** Depth (m TOC): **55.12**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **643654** NORTHING: **6656106**



LOGGED: K Hyland DATE: 9/11/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB09a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **10/11/08** DATE COMPLETED: **17/11/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **144**
REFERENCE POINT (m AHD): **110**
STATIC WATER LEVEL
Date: **18/11/08** Depth (m TOC) **a:43.05, b:46.04**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **640589** NORTHING: **6644364**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air/Tri Cone	15"			0.0		Sand; red, fine-coarse grained, rounded-sub angular, loose with Gravels; calcareous, white, 0.2-0.8cm	Qh/Tl					Well cover	Surface casing 12" steel 0--6m
				10.0		Shale; brown, some weathering (clays), platy, calcareous, with some Sands; quartz, and Gypsum							
						Shale; green/grey 60%, weathered, and 40%, purple-brown, platy, minor lamination							
						Shale; 80% brown, moderately weathered (clays), and 20% green-grey, soft, massive							
						Shale; 50% brown-purple and 50% green-grey, partly weathered (clays), platy, soft, massive							
		0.55		20.0		Shale; green/grey, moderately weathered (clays), platy, soft, no lamination							
		0.50				Shale; 70% green-grey and 30% purple-brown, minor weathering, platy, soft-hard, minor lamination	Ey/Pb?						
	12"	0.50		30.0		Shale; purple-brown minor weathering, platy, soft-hard, minor lamination							
		0.60				Shale; purple-brown, minor weathering, platy, soft-hard, minor lamination, with 50% Clay; red, soft, low plasticity							
		0.55				Shale; 80% purple-brown and 20% green-grey, minor weathering, stratified, platy, soft-hard, minor lamination							Pre collar casing 10" steel 0-54 m
		0.55		40.0		Limestone; 80% tan-white, 20% light grey, well cemented, minor weathering Shale; minor weathering, 80% purple-brown and 20% green-grey, stratified, platy, soft-hard, minor lamination							Cement plug 40-54 m
				50.0		Limestone; 50% tan-white (non crystalline), 50% light grey (crystalline), well cemented, minor weathering		WC					
		0.46	160			Limestone; tan, moderately cemented, minor weathering, non crystalline			0.43	32.6			
		0.21		60.0		Limestone; white/tan, moderately cemented, minor weathering, non crystalline, minor pitting							80 mm PVC slotted casing 58-64 m Gravel Pack 55-83 m
	10"	0.18	160			Limestone; grey/tan well cemented, minor weathering, with surface oxidation and purple-grey, non crystalline, minor pitting			5	47.7			
						Limestone; white/tan/grey, massive, non weathered, slightly crystalline, minor pitting							
ner		0.17	160	70.0		Sandstone; quartzitic matrix, white, purple, green, rounded and fine grains, pitting in parts			8.00	47.2			

LOGGED: K Furness DATE: 17/11/08

CHECKED: K Furness DATE: 19/12/08

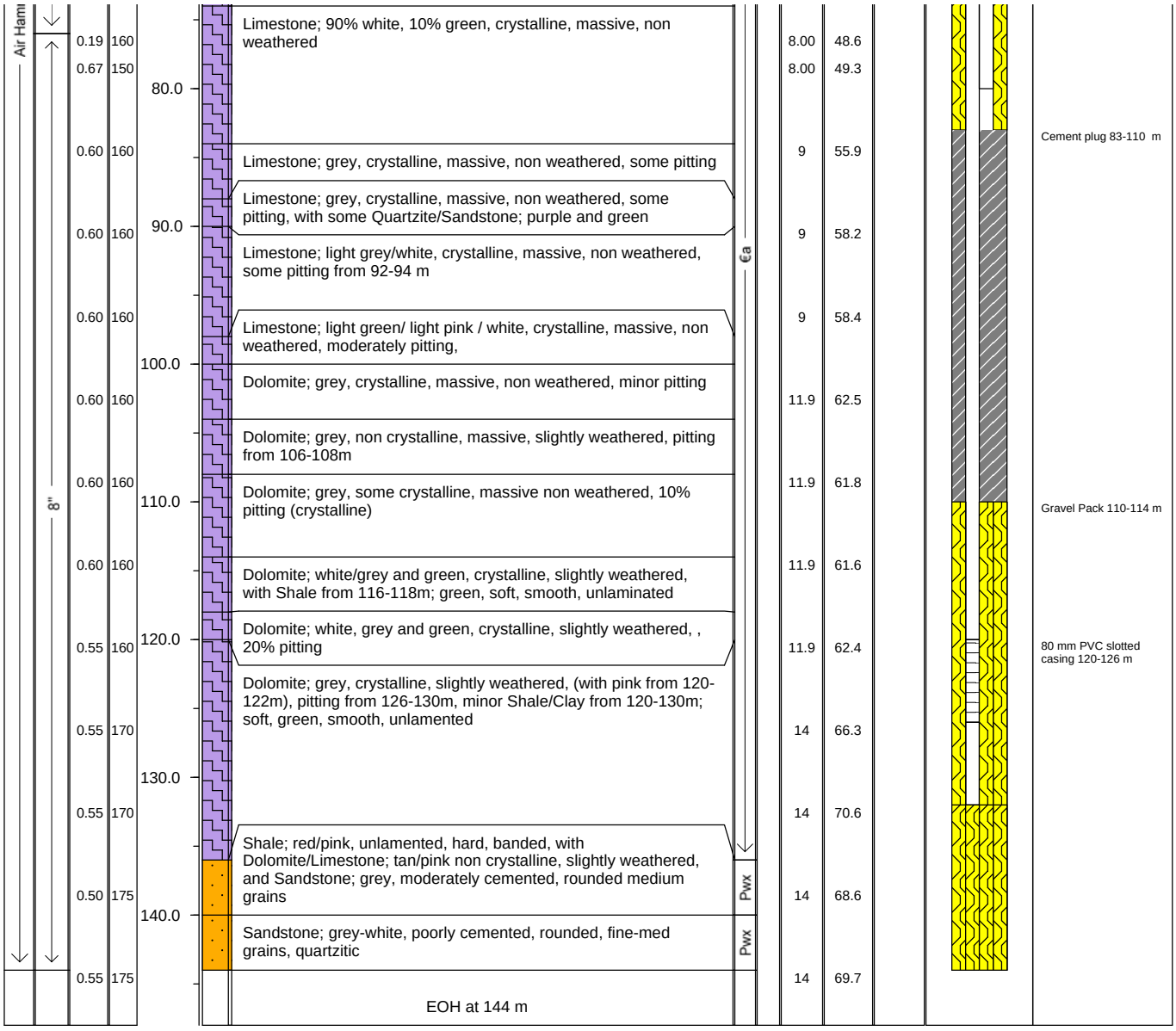
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB09a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **10/11/08** DATE COMPLETED: **17/11/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **144**
REFERENCE POINT (m AHD): **110**
STATIC WATER LEVEL
Date: **18/11/08** Depth (m TOC): **a:43.05, b:46.04**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **640589** NORTHING: **6644364**



LOGGED: K Furness DATE: 17/11/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

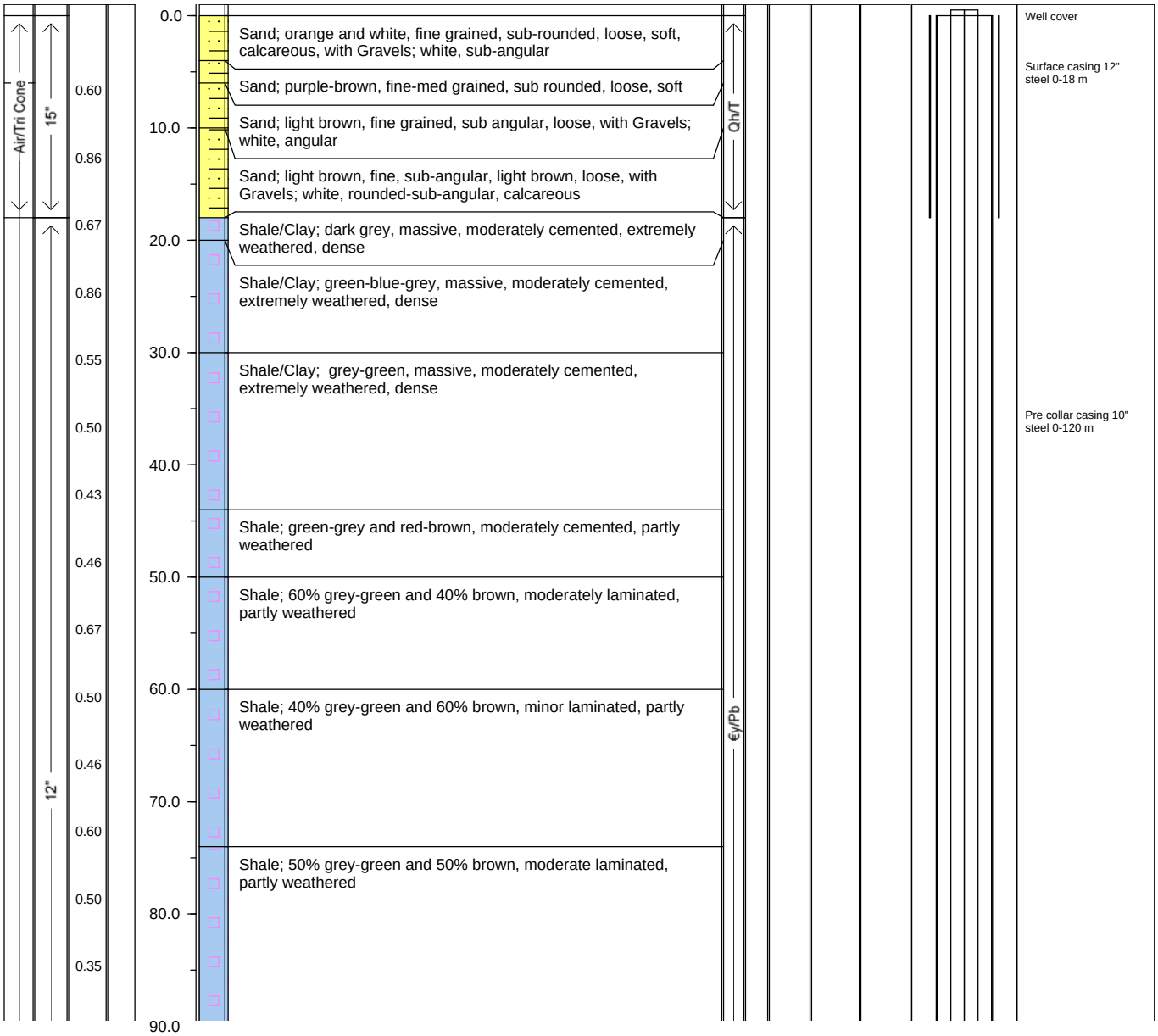
BOREHOLE / WELL NUMBER

MXTB10a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **22/01/08** DATE COMPLETED: **27/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **264**
REFERENCE POINT (m AHD): **132**
STATIC WATER LEVEL
Date: **9/11/08** Depth (m TOC): **a: 78.55, b: 76.3**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **654543** NORTHING: **6676749**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness & K Hyland DATE: 27/10/08

CHECKED: K Furness DATE: 19/12/08

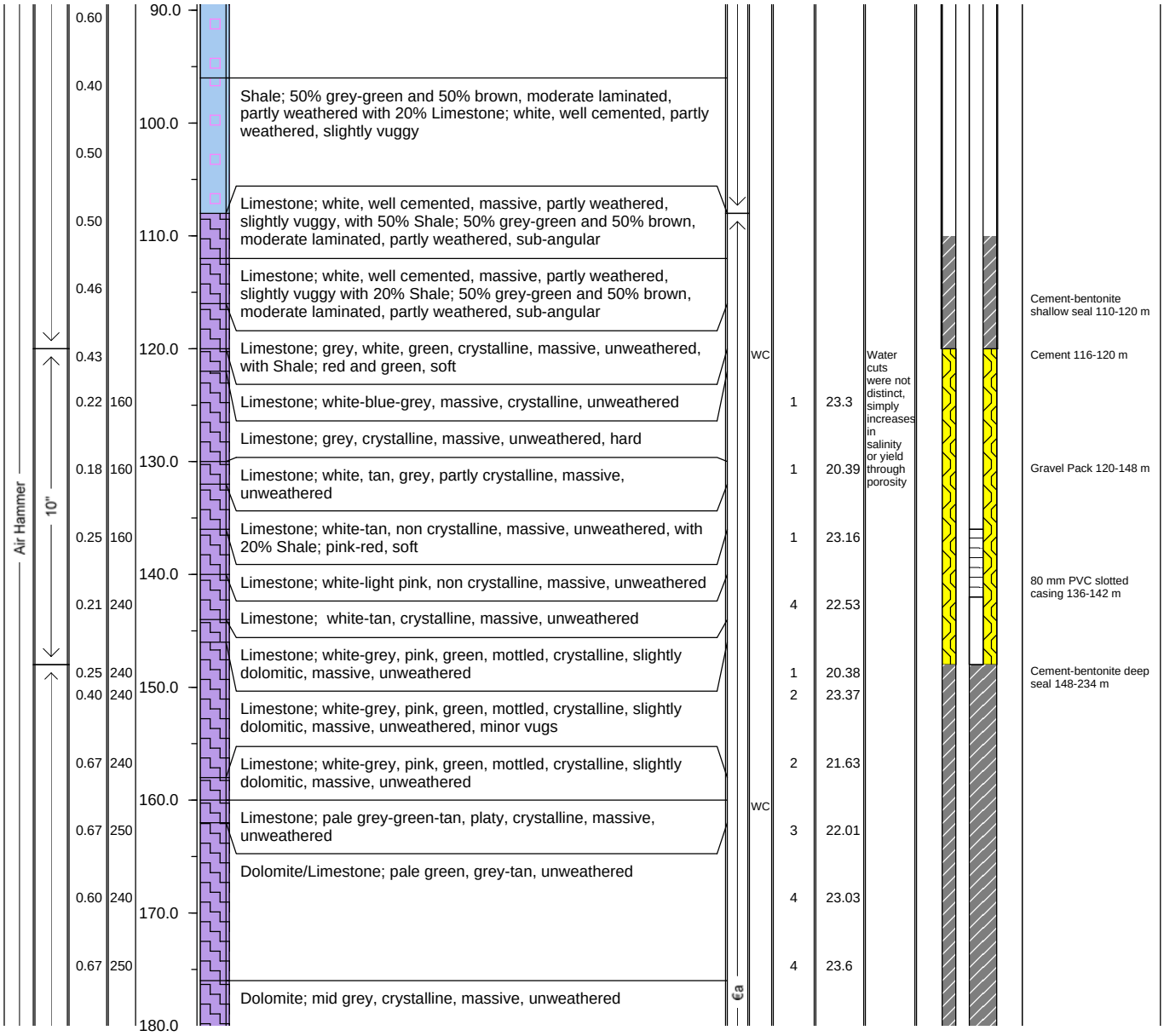
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB10a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **22/01/08** DATE COMPLETED: **27/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **264**
REFERENCE POINT (m AHD): **132**
STATIC WATER LEVEL
Date: **9/11/08** Depth (m TOC): **a: 78.55, b: 76.3**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **654543** NORTHING: **6676749**



LOGGED: K Furness & K Hyland DATE: 27/10/08

CHECKED: K Furness DATE: 19/12/08

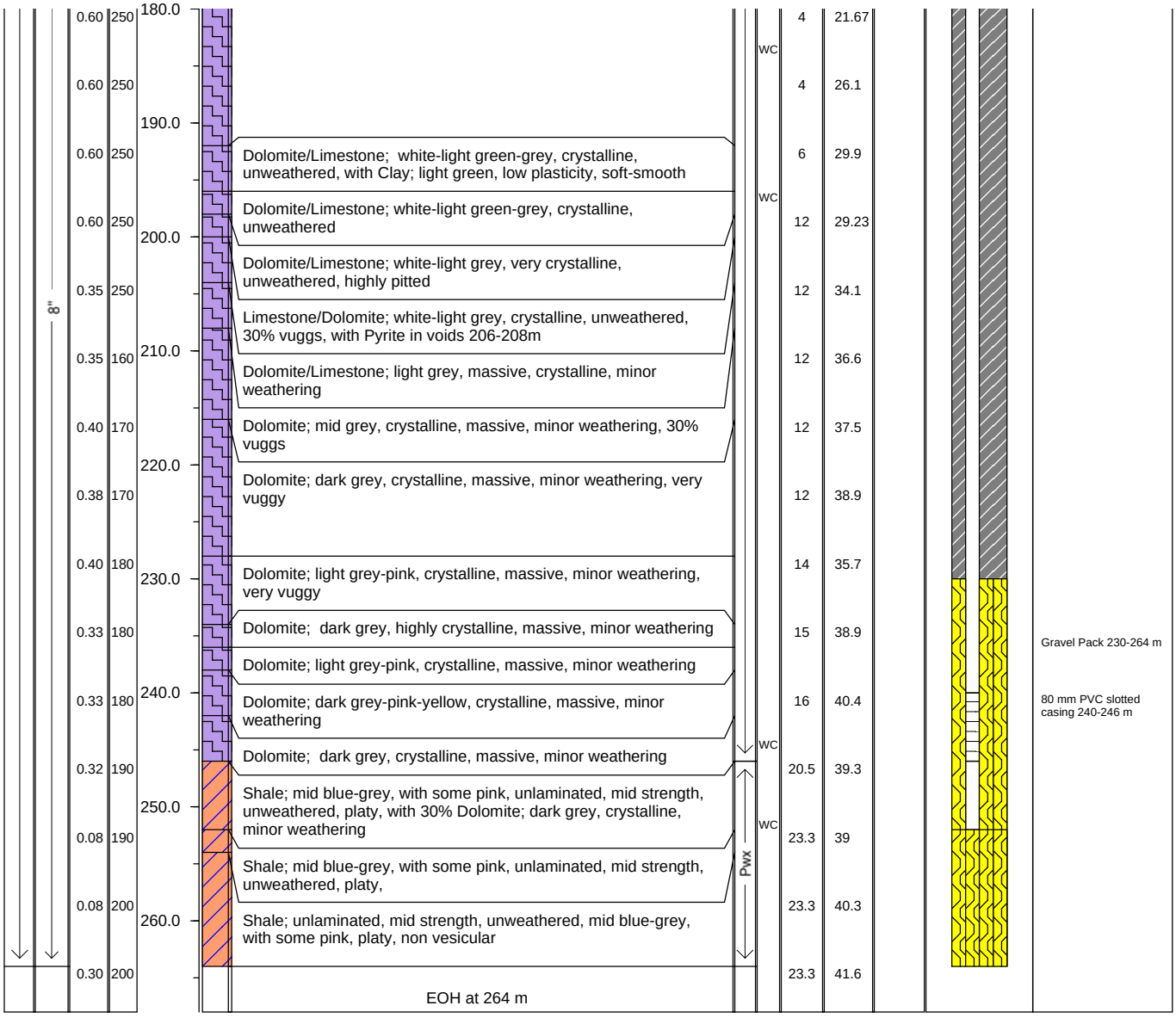
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB10a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **22/01/08** DATE COMPLETED: **27/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **264**
REFERENCE POINT (m AHD): **132**
STATIC WATER LEVEL
Date: **9/11/08** Depth (m TOC): **a: 78.55, b: 76.3**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **654543** NORTHING: **6676749**



LOGGED: K Furness & K Hyland DATE: 27/10/08
CHECKED: K Furness DATE: 19/12/08

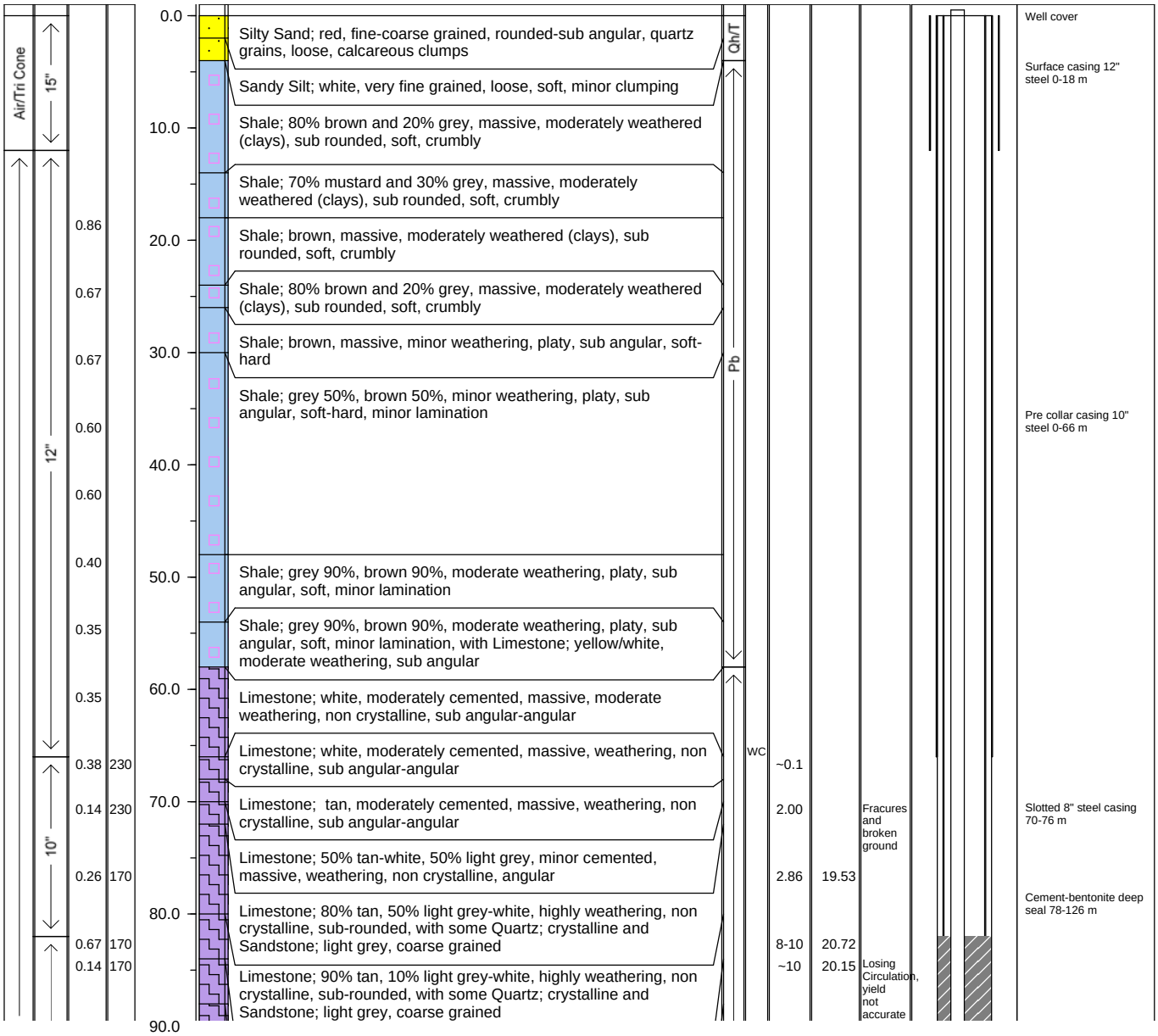
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB11a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **26/11/08** DATE COMPLETED: **3/12/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **174**
REFERENCE POINT (m AHD): **105**
STATIC WATER LEVEL
Date: **3/12/08** Depth (m TOC): **a: 58.01, b: 58.09**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **653728** NORTHING: **6659749**



LOGGED: K Hyland DATE: 4/12/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER: MXTB11a/b

PROJECT NUMBER:	**VE23064.2**	WELL PERMIT NUMBER:	**n/a**
PROJECT NAME:	**Motherwell Extention**	TOTAL DEPTH (m bgl):	**174**
LOCATION:	**Billa Kallina Station**	REFERENCE POINT (m AHD):	**105**
DRILLING CO:	**Gorey and Cole**	STATIC WATER LEVEL	
DRILLING METHOD:	**AIR ROTARY**	Date: **3/12/08**	Depth (m TOC): **a: 58.01, b: 58.09**
BOREHOLE DIAMETER:	**8"**	PROJECTION:	**GDA 1994, Zone 53**
DATE STARTED: **26/11/08**	DATE COMPLETED: **3/12/08**	EASTING: **653728**	NORTHING: **6659749**

DRILLING INFO. | MATERIAL PROPERTIES | FIELD RECORDS / CONSTRUCTION INFO.

Method: Air Hammer (to 174 m). Bit log: 8". Interpretive log: €a (to about 169 m), Pws (about 169–174 m). Water cuts: WC (at about 130 m).

PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL DESCRIPTION
0.55	170	~10	21.63	from this point	
0.46	170	~10	21.09		
0.46	170	~10	21.04		
0.50	170	~10	21.44		
0.46	170	4.3	21.47		
0.46	170	5.5	21.58		
0.40	170	6.8	20.94	Small fracture and broken ground	Gravel Pack 126-174 m
0.55	170	7.1	27.2		
0.38	170	5.8	28.6		80 mm PVC slotted casing 136-142 m
0.75	170	5.5	29.6		
0.40	170	5.5	31.8		
0.60	170	-	32		
0.50		-	33.2	Lost circulation	
0.60		-	33.8	Lost circulation	
0.55		-	33.1		

DEPTH (m)	LITHOLOGY
90.0 – ~96	Limestone; white-grey, well cemented, massive, non weathered, slightly crystalline, angular
~96 – 100.0	Limestone; white-grey, well cemented, massive, non weathered, slightly crystalline, some pitting, angular
100.0 – ~112.5	Limestone; light grey and white, crystalline, massive, non weathered, some pitting, angular, with Dolomite; grey, crystalline, non weathered, minor vuggs, angular
~112.5 – ~120	Limestone; light grey, crystalline, massive, non weathered, some pitting, angular, with Dolomite; grey, crystalline, non weathered, minor pitting angular
~120 – ~128	Dolomite; grey, some crystalline, massive, non weathered, some pitting (crystalline), angular
~128 – ~133	Dolomite; grey, some crystalline, massive, non weathered, 20% vuggs (crystalline), angular
~133 – ~138	Dolomite; grey, some crystalline, massive, non weathered, 10 % vuggs (crystalline), angular
~138 – ~144	Dolomite; grey, some crystalline, massive, non weathered, 20% vuggs (crystalline), angular
~144 – 150.0	Dolomite; grey, some crystalline, massive, non weathered, 20% vuggs (crystalline), angular
150.0 – ~169	Dolomite; grey, some crystalline, massive, non weathered, some pitting (crystalline), angular, with Shale; dark grey, hard, laminated, and Sandstone; grey, coarse grained, poorly cemented
~169 – 174	Sandstone; grey and red, coarse grained, poorly cemented with Shale; brown-red, hard, laminated
	EOH at 174 m

LOGGED: K Hyland DATE: 4/12/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

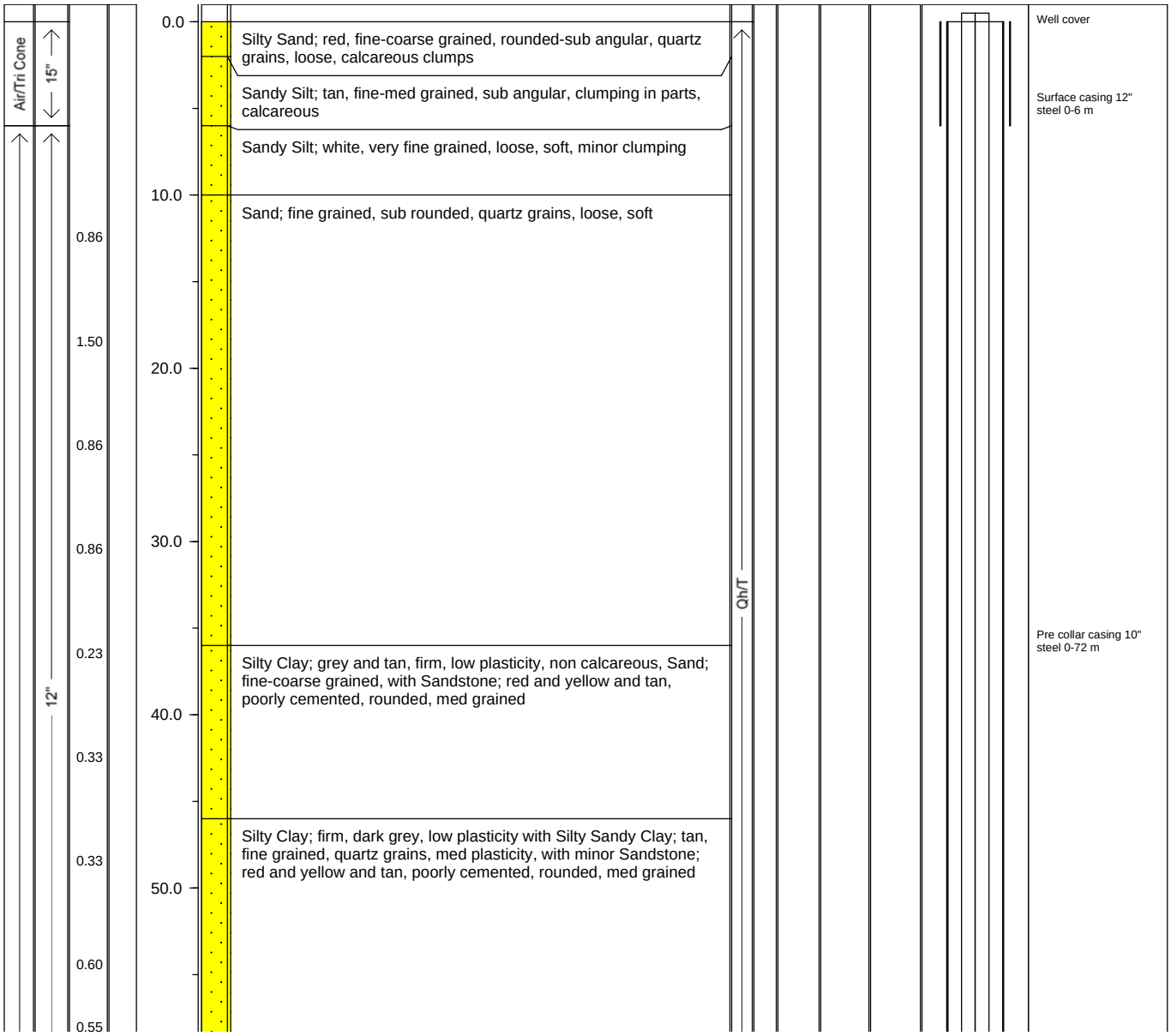
BOREHOLE / WELL NUMBER

MXTB12a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **25/11/08** DATE COMPLETED: **25/11/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **162**
REFERENCE POINT (m AHD): **109**
STATIC WATER LEVEL
Date: Depth (m TOC): **a: 67.28, b: 67.36**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **656587** NORTHING: **6643923**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 26/11/08

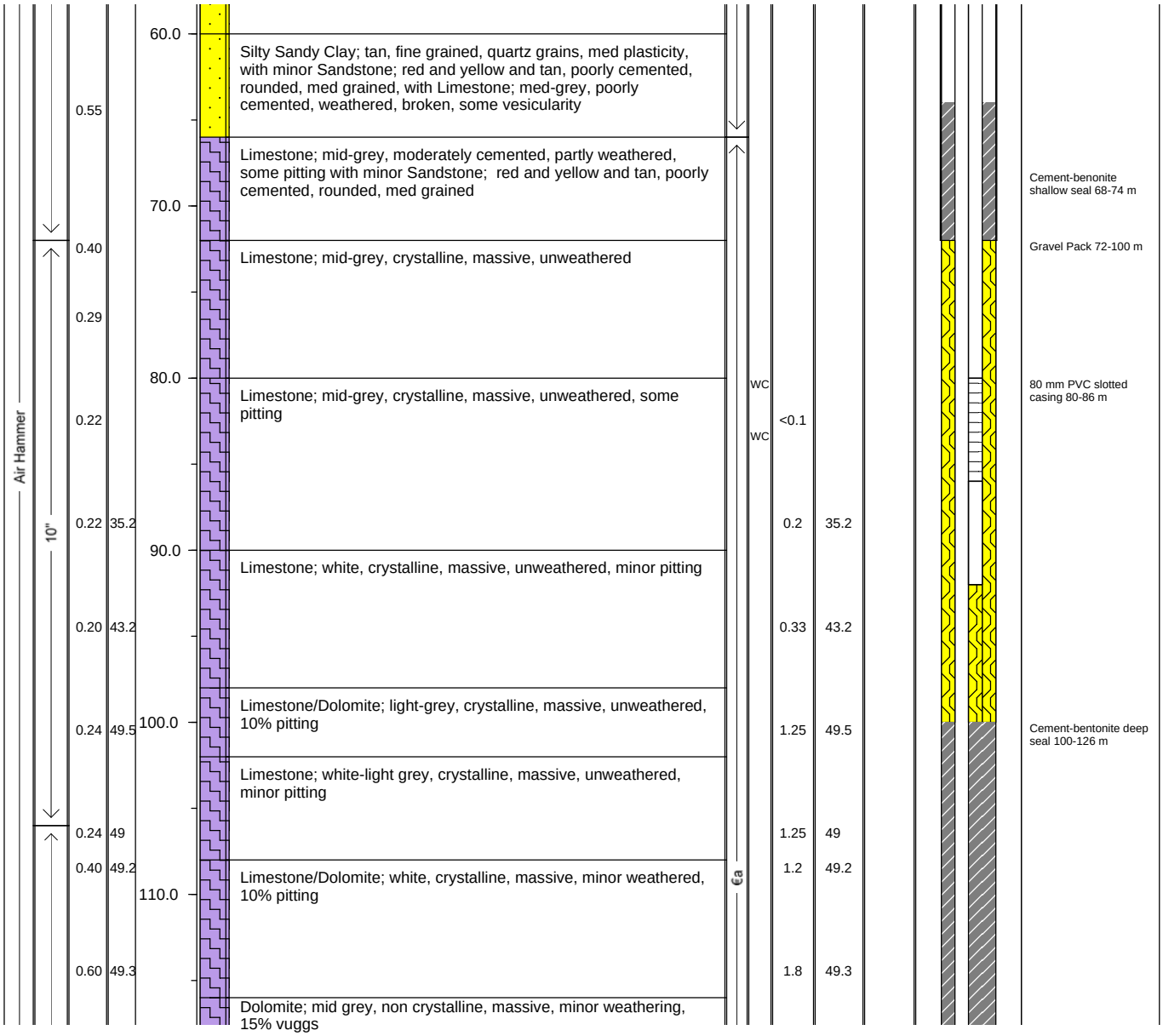
CHECKED: K Furness DATE: 19/12/2008

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB12a/b

PROJECT NUMBER:	**VE23064.2**	WELL PERMIT NUMBER:	**n/a**
PROJECT NAME:	**Motherwell Extention**	TOTAL DEPTH (m bgl):	**162**
LOCATION:	**Billa Kallina Station**	REFERENCE POINT (m AHD):	**109**
DRILLING CO:	**Gorey and Cole**	STATIC WATER LEVEL Date: Depth (m TOC)	**a: 67.28, b: 67.36**
DRILLING METHOD:	**AIR ROTARY**	PROJECTION:	**GDA 1994, Zone 53**
BOREHOLE DIAMETER:	**8"**		
DATE STARTED:	**25/11/08** DATE COMPLETED: **25/11/08**	EASTING: **656587**	NORTHING: **6643923**



LOGGED: K Furness DATE: 26/11/08

CHECKED: K Furness DATE: 19/12/2008

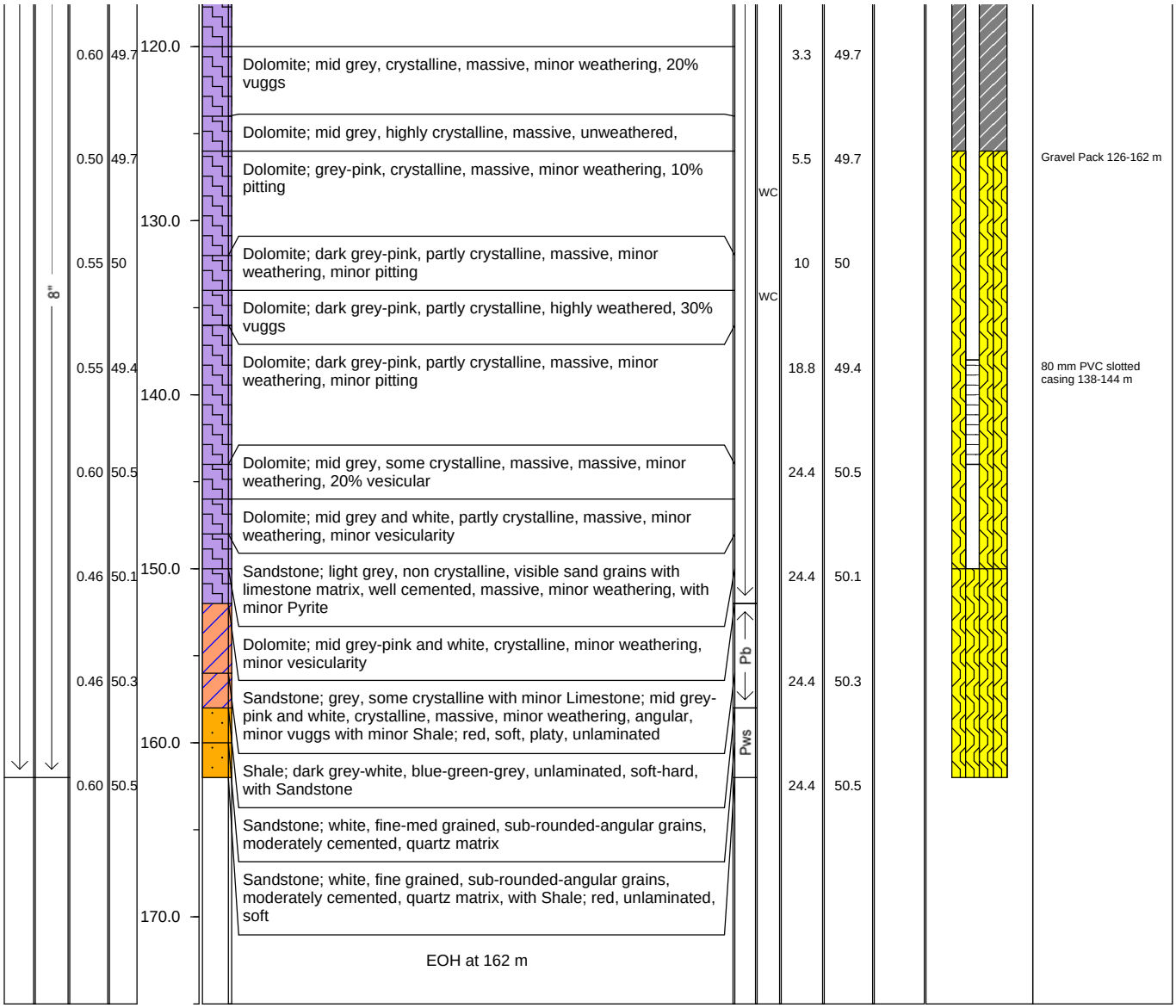
FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB12a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **25/11/08** DATE COMPLETED: **25/11/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **162**
REFERENCE POINT (m AHD): **109**
STATIC WATER LEVEL
Date: Depth (m TOC): **a: 67.28, b: 67.36**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **656587** NORTHING: **6643923**



LOGGED: K Furness DATE: 26/11/08

CHECKED: K Furness DATE: 19/12/2008

FIELD BOREHOLE / WELL LOG

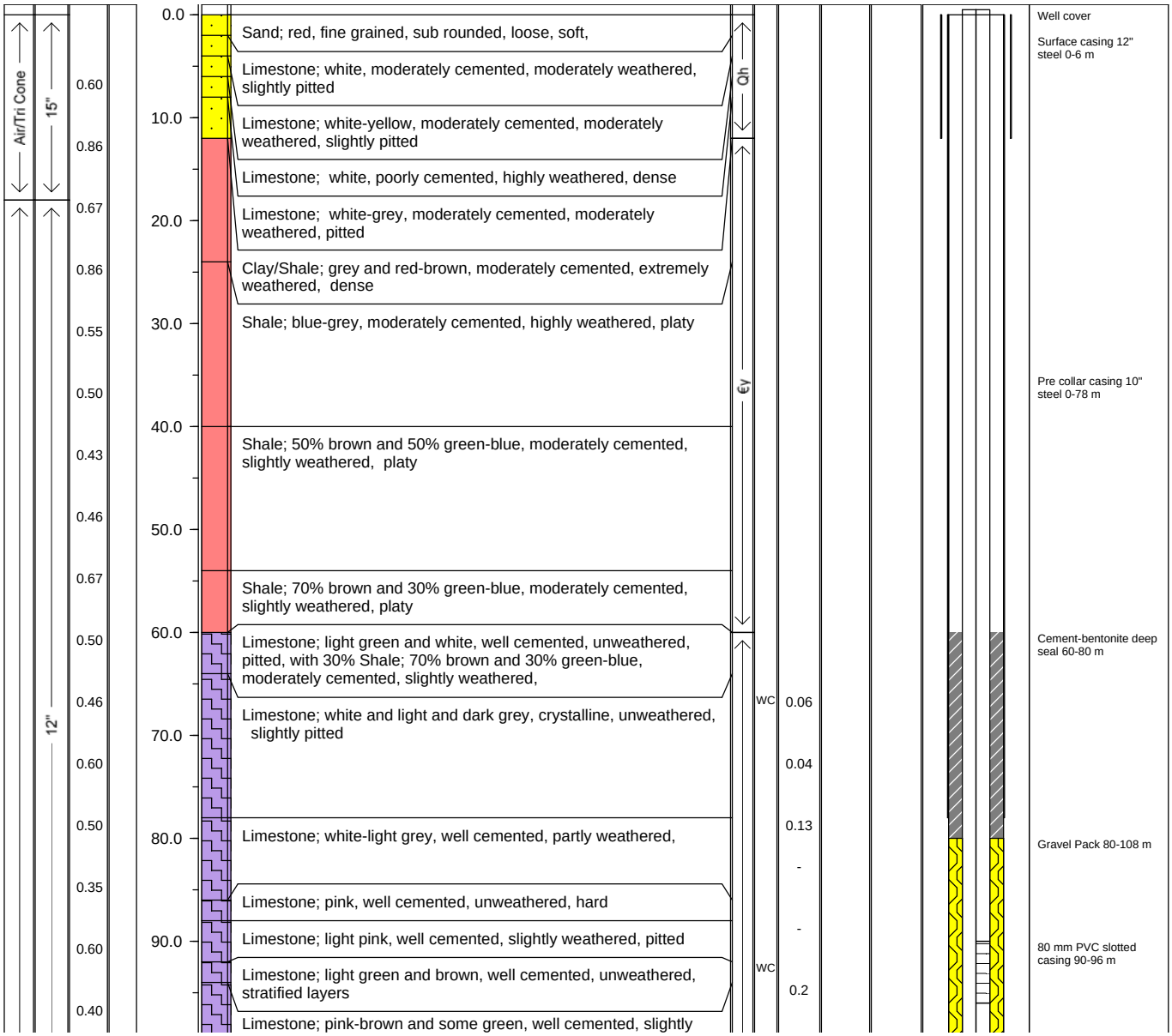
BOREHOLE / WELL NUMBER

MXTB13a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **12/10/08** DATE COMPLETED: **21/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **192**
REFERENCE POINT (m AHD): **110**
STATIC WATER LEVEL
Date: **9/11/08** Depth (m TOC): **a: 63.32, b: 63.27**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **661709** NORTHING: **6666966**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 21/10/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

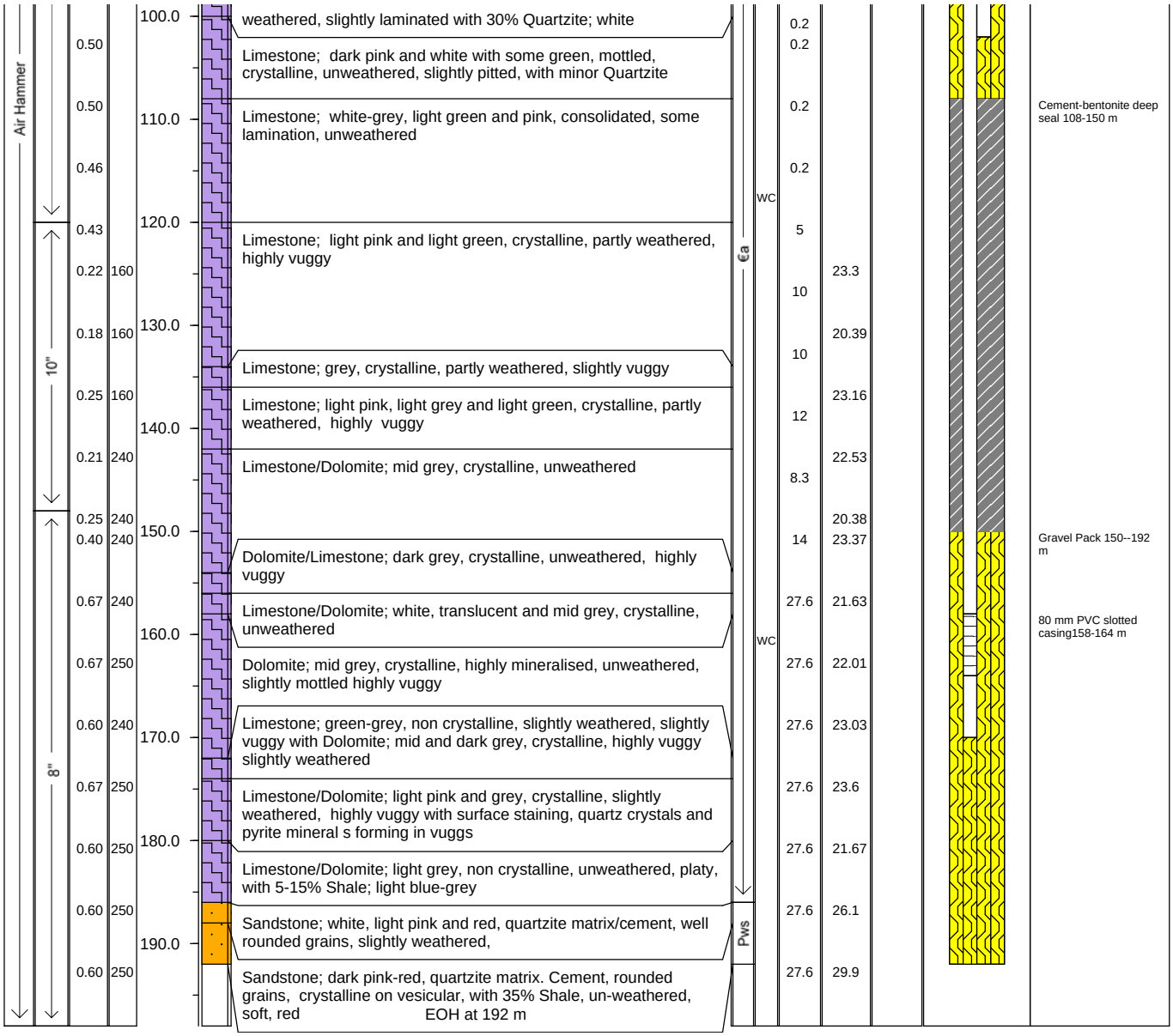
BOREHOLE / WELL NUMBER

MXTB13a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **12/10/08** DATE COMPLETED: **21/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **192**
REFERENCE POINT (m AHD): **110**
STATIC WATER LEVEL
Date: **9/11/08** Depth (m TOC): **a: 63.32, b: 63.27**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **661709** NORTHING: **6666966**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: K Furness DATE: 21/10/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

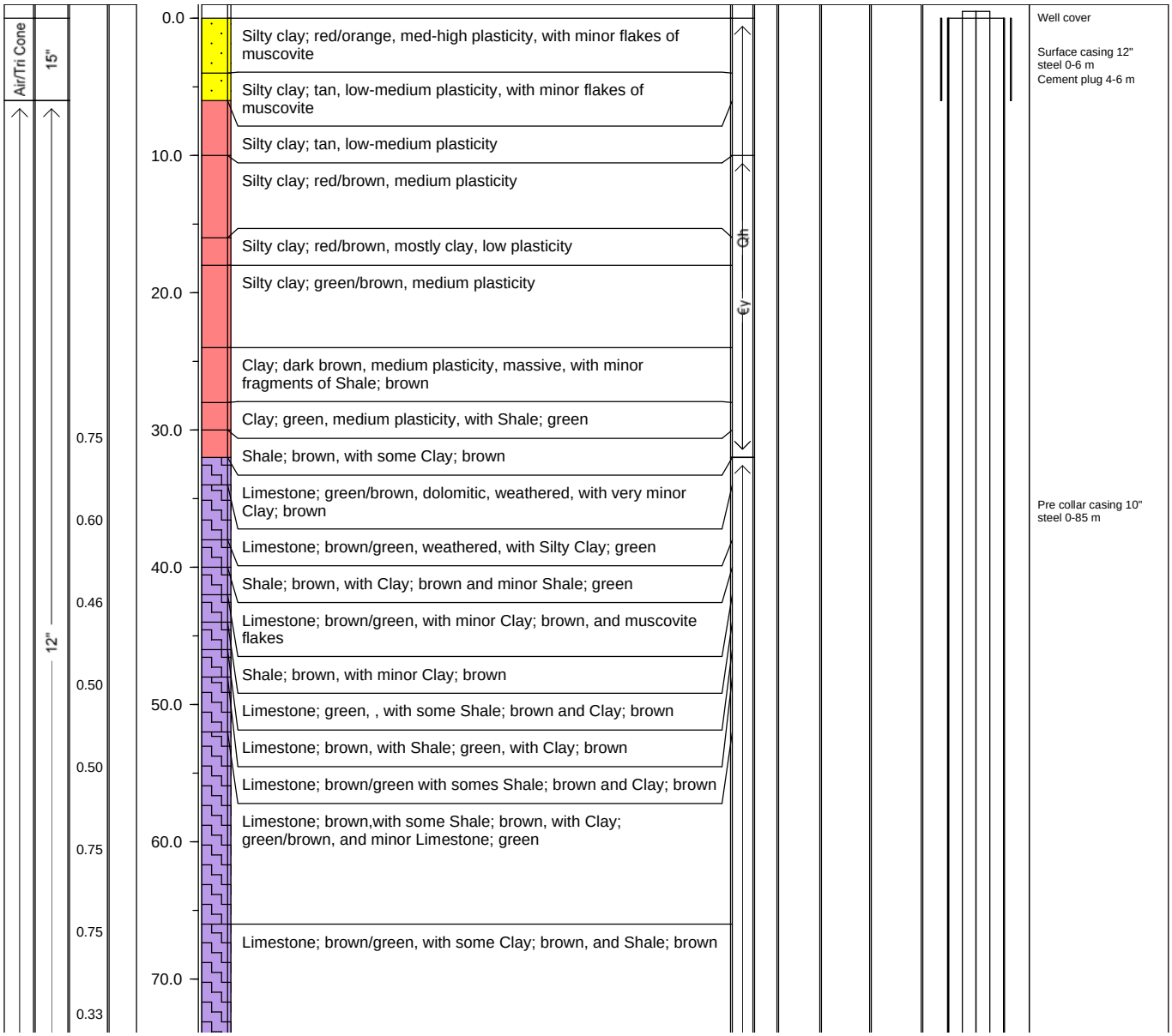
BOREHOLE / WELL NUMBER

MXTB14a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **03/10/08** DATE COMPLETED: **12/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **210**
REFERENCE POINT (m AHD): **115**
STATIC WATER LEVEL
Date: **16/10/2008** Depth (m TOC): **a: 89.34, b: 92.8**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **672164** NORTHING: **6652846**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION



LOGGED: J Richards DATE: 12/10/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB14a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **03/10/08** DATE COMPLETED: **12/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **210**
REFERENCE POINT (m AHD): **115**
STATIC WATER LEVEL
Date: **16/10/2008** Depth (m TOC): **a: 89.34, b: 92.8**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **672164** NORTHING: **6652846**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
Air Hammer	10"	0.38 0.38 0.24 0.23 0.24 0.40 0.75 0.67 0.55 0.55 0.50 0.43 0.46	150 150 150 160 150 150 160 175 175	80.0 90.0 100.0 110.0 120.0 130.0 140.0		Limestone; brown, with Clay; brown, and minor Limestone; green Limestone; white/brown/green, with minor Clay; brown Limestone; white/grey, crystalline, massive, competent limestone. Limestone; grey/black with minor brown/green, massive, crystalline, subrounded Limestone; white/light grey, crystalline, massive Limestone; grey, crystalline, massive Limestone; white, with some brown, coarse, crystalline, massive, dolomitic Limestone; pink, with minor green/brown, crystalline, massive, dolomitic Limestone; pink/green, crystalline, dolomitic, massive Limestone; red/pink with some white/green, crystalline, massive Limestone; white/grey with some brown/pink, crystalline, massive Limestone; green/brown with some pink, crystalline, dolomitic, massive, vughs <10% Limestone; white/green with minor pink/brown, crystalline, massive, dolomitic Limestone; green with minor brown, cyrstalline, massive, dolomitic Limestone; pink/grey with minor green, crystalline, dolomitic, massive Limestone; white with minor green/pink, crystalline, dolomitic, massive Limestone; grey, crystalline, dolomitic-slightly dolomitic, massive Limestone; dark grey, crystalline, massive, dolomitic-slightly dolomitic Limestone; white, crystalline, massive, dolomitic	ca	WC WC	3.6 1.3 1.9 1.4 1.6 1.8 1.8 ~7 ~8-10 ~10-15 ~10-15	42.7 42.1 41.3 37 41.9 41.7 44.3 43.8 45.8 48	Cavity at 82-84 m Fracture at 90 m Fractured 120-126 m	Cement plug 83-85 m 80 mm PVC slotted casing 93-99 m Cement bentonite seal 100-192 m	

LOGGED: J Richards DATE: 12/10/08

CHECKED: K Furness DATE: 19/12/08

FIELD BOREHOLE / WELL LOG

BOREHOLE / WELL NUMBER

MXTB14a/b

PROJECT NUMBER: **VE23064.2**
PROJECT NAME: **Motherwell Extention**
LOCATION: **Billa Kallina Station**
DRILLING CO: **Gorey and Cole**
DRILLING METHOD: **AIR ROTARY**
BOREHOLE DIAMETER: **8"**
DATE STARTED: **03/10/08** DATE COMPLETED: **12/10/08**

WELL PERMIT NUMBER: **n/a**
TOTAL DEPTH (m bgl): **210**
REFERENCE POINT (m AHD): **115**
STATIC WATER LEVEL
Date: **16/10/2008** Depth (m TOC): **a: 89.34, b: 92.8**
PROJECTION: **GDA 1994, Zone 53**
EASTING: **672164** NORTHING: **6652846**

DRILLING INFO.					MATERIAL PROPERTIES			FIELD RECORDS / CONSTRUCTION INFO.					
METHOD	BIT LOG	PENETRATION RATE (m/min)	UNLOAD PRESSURE (psi)	DEPTH (m)	GRAPHIC LOG	LITHOLOGY	INTERPRETIVE LOG	WATER CUTS	AIRLIFT YIELD (L/sec)	EC (mS/cm)	COMMENTS	WELL CONSTRUCTION	WELL DESCRIPTION
		0.35		150.0		Limestone; grey, crystalline, massive, dolomitic, vugs (~10%), ~1mm in size			13.5	49.3			
		0.35				Limestone; white, weathered, dolomitic, massive, 5-10% vugs 2mm in size			23.1	49.7			
		0.30	240	160.0		Limestone; grey, crystalline, dolomitic, vugs, <1mm in size			27	49.2			
		0.24	245						31.4	49.6			
		0.24	245	170.0		Limestone; dark grey, crystalline, weathered, 30-40% of chip with vugs up to 4mm, with some Pyrite			31.4	53.3	Fructured 174-176 m		
		0.17	245	180.0		Limestone; grey, crystalline dolomitic, 15% of chips with vugs			31.4	85			
		0.27	245						31.4	94.7			
		0.30	245	190.0		Limestone; grey with minor pink, crystalline dolomitic, 15% of chips with vugs			31.4	100.6			Gravel Pack 192-210 m
		0.30	245	200.0		Limestone; grey/light pink/white, dolomitic, massive, crystalline, very minor vughs <0.5mm			31.4	103.4			
		0.29	245			Limestone; grey/light pink/white, dolomitic, massive, crystalline, very minor vugs <0.5mm, with some minor Shale; grey			31.4	105.5			80 mm PVC slotted casing 202-208 m
		0.46	245	210.0		Limestone; grey/light pink/white, crystalline, massive, dolomitic, with 50% Shale; green/grey	Pws		31.4	101.9			
						Shale; green/red, hard							
						Shale (green/red)							
				220.0		EOH at 210 m							

LOGGED: J Richards DATE: 12/10/08

CHECKED: K Furness DATE: 19/12/08

Drilling summary report

Hole: MXTB05

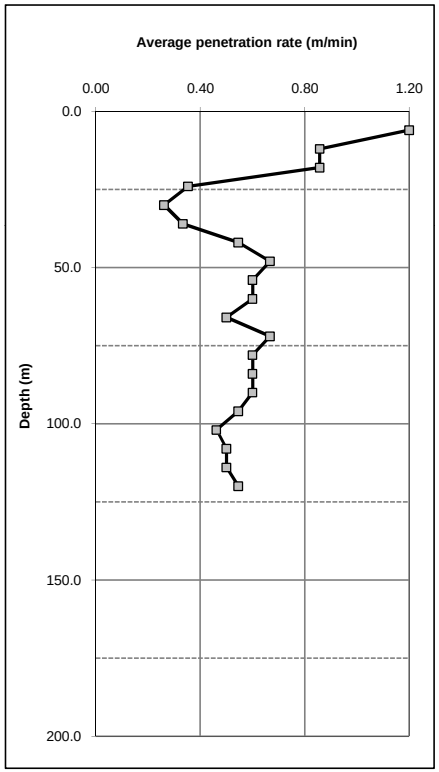
Date started: 30/09/2008

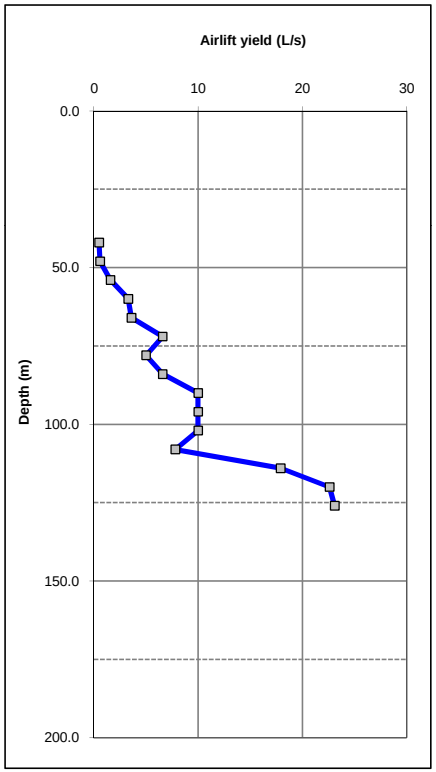
Date completed: 2/10/2008

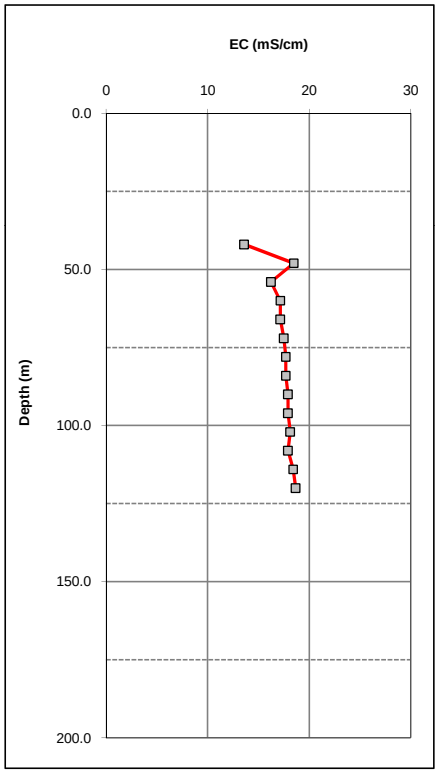
BHP Number: RD3581
DWLBC Permit no.: NA
Drilling Co./Rig: Gorey and Cole,
Driller: NA
EIHCP: 967
ECC: NA

Co-ordinates (GDA94, Z54): E 627372
N 6657629
Natural surface elevation. (mAHD)

Graphical Log







NOTES:

Drilling summary report

Hole: MXTB07

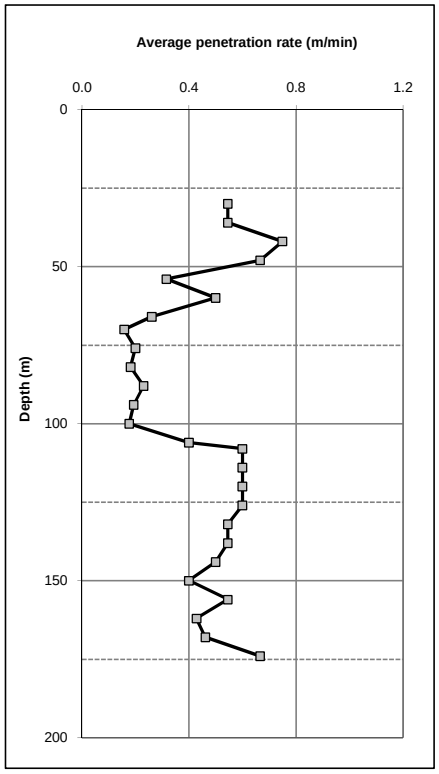
Date started: 1/11/2008

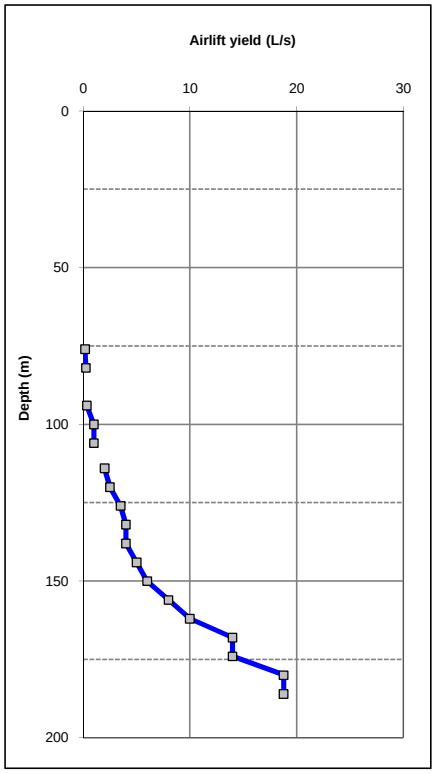
Date completed: 9/11/2008

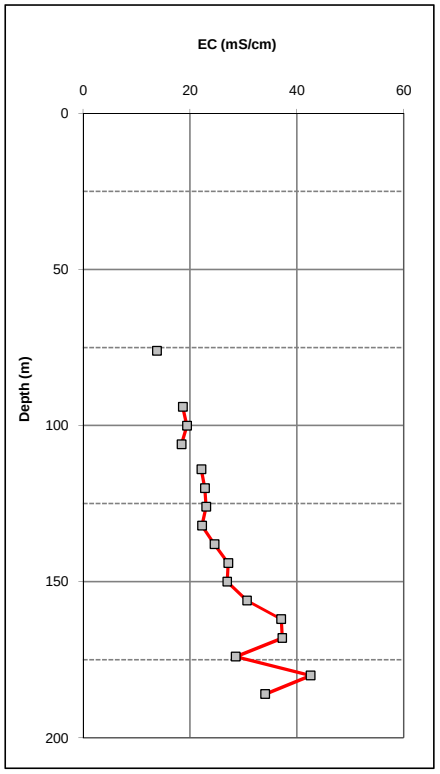
BHP Number:	RD3583
DWLBC Permit no.:	n/a
Drilling Co./Rig:	Gorey and Cole,
Driller:	n/a
EIHCP:	967
ECC:	n/a

Co-ordinates (GDA94, Z54):	E	643063
	N	6664649
Natural surface elevation. (mAHD)		115

Graphical Log







NOTES:

Drilling summary report

Hole: MXTB08

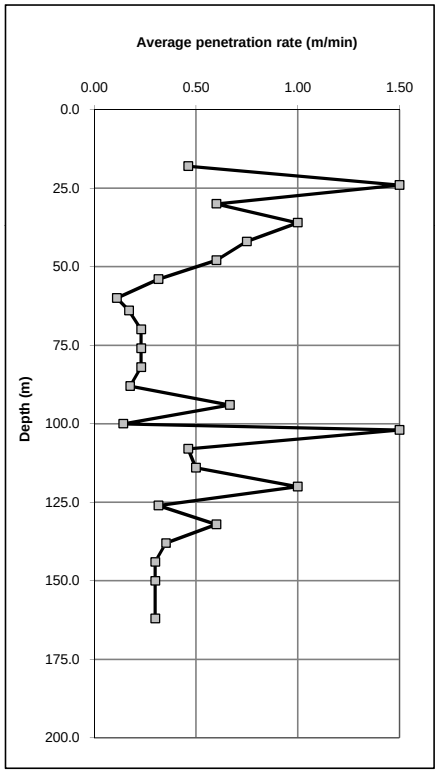
Date started: 26/11/2008

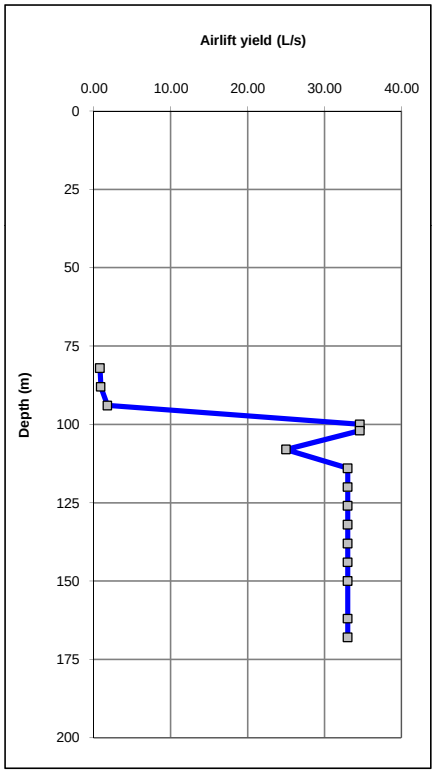
Date completed: 8/12/2008

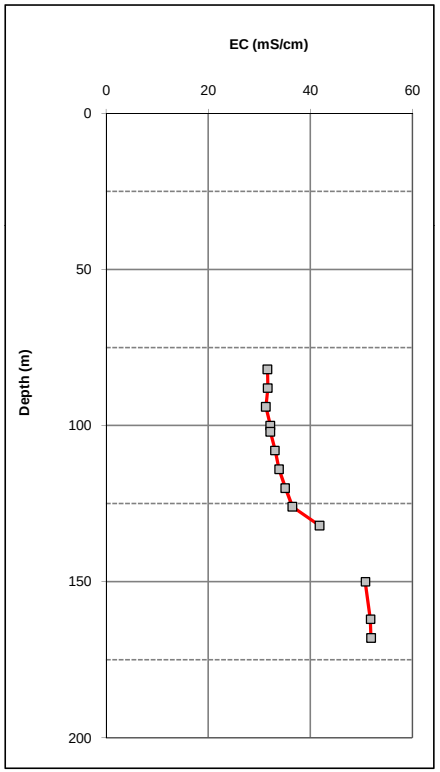
BHP Number:	RD3584
DWLBC Permit no.:	n/a
Drilling Co./Rig:	Gorey and Cole,
Driller:	Murray Tomlin
EIHCP:	967
ECC:	n/a

Co-ordinates (GDA94, Z54):	E	643654
	N	6656106
Natural surface elevation. (mAHD)		113

Graphical Log







NOTES:

Drilling summary report

Hole: MXTB09

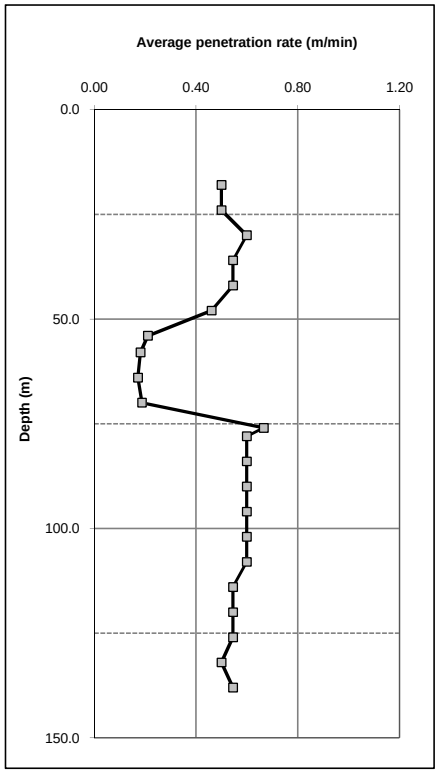
Date started: 10/11/2008

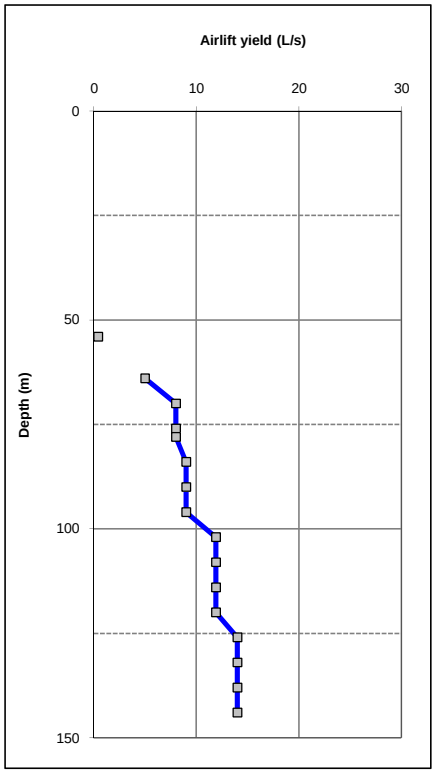
Date completed: 17/11/2008

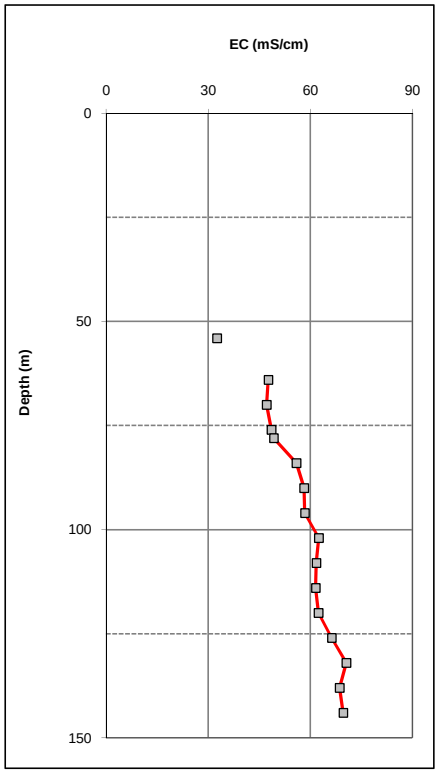
BHP Number:	RD3585
DWLBC Permit no.:	n/a
Drilling Co./Rig:	Gorey and Cole,
Driller:	n/a
EIHCP:	967
ECC:	n/a

Co-ordinates (GDA94, Z54):	E	640589
	N	6644364
Natural surface elevation. (mAHD)		100

Graphical Log







NOTES:

Drilling summary report

Hole: MXTB10

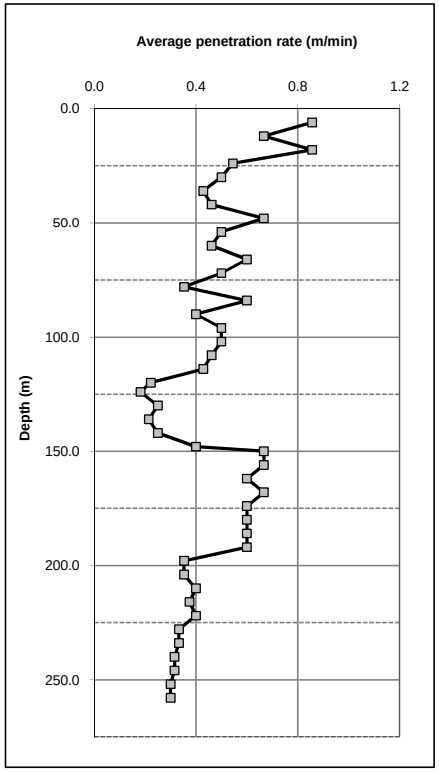
Date started: 22/010/08

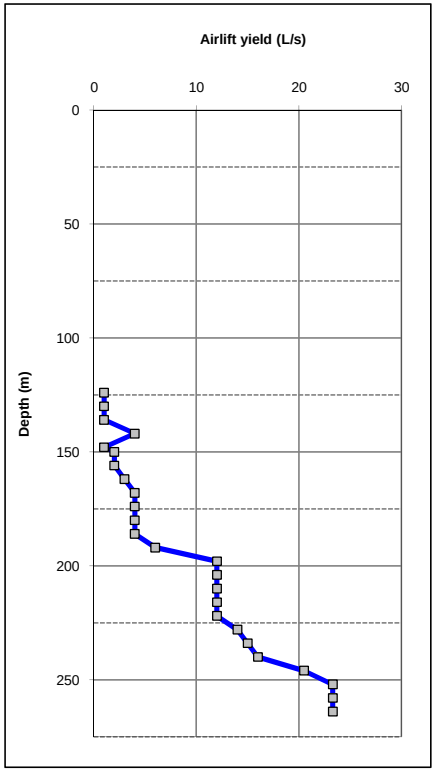
Date completed: 31/10/2008

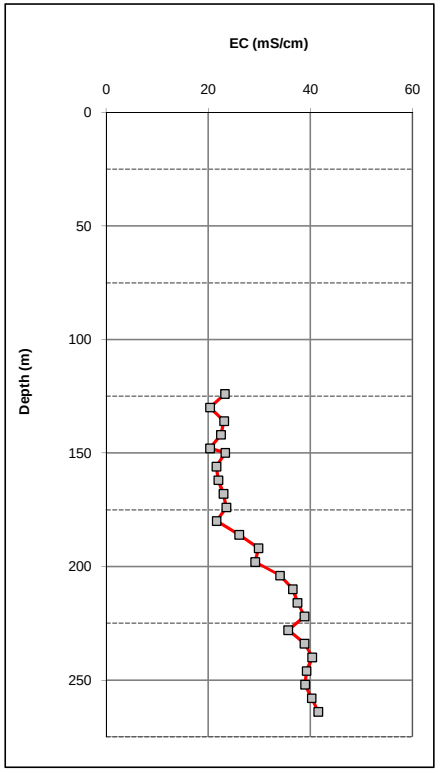
BHP Number: RD3586
DWLBC Permit no.: n/a
Drilling Co./Rig: Gorey and Cole,
Driller: Dean Johnson
EIHCP: 967
ECC: n/a

Co-ordinates (GDA94, Z54): E 654543
N 6676749
Natural surface elevation. (mAHD) 132

Graphical Log







NOTES:

Drilling summary report

Hole: MXTB11

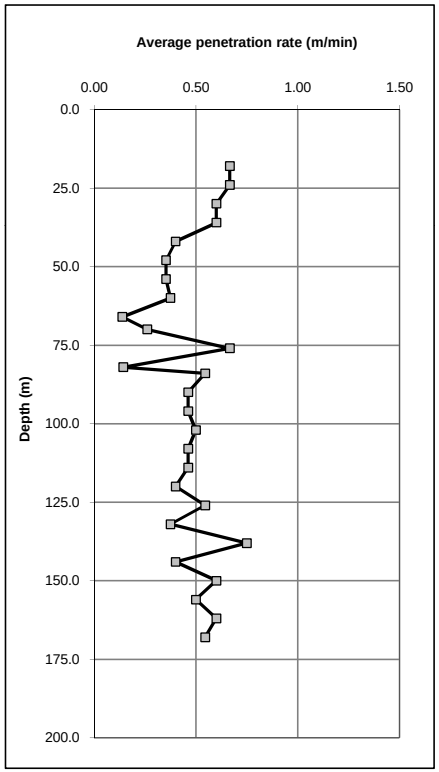
Date started: 26/11/2008

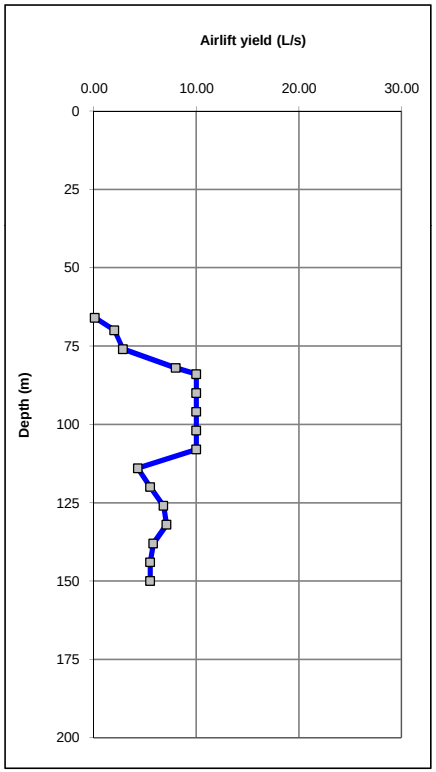
Date completed: 3/12/2008

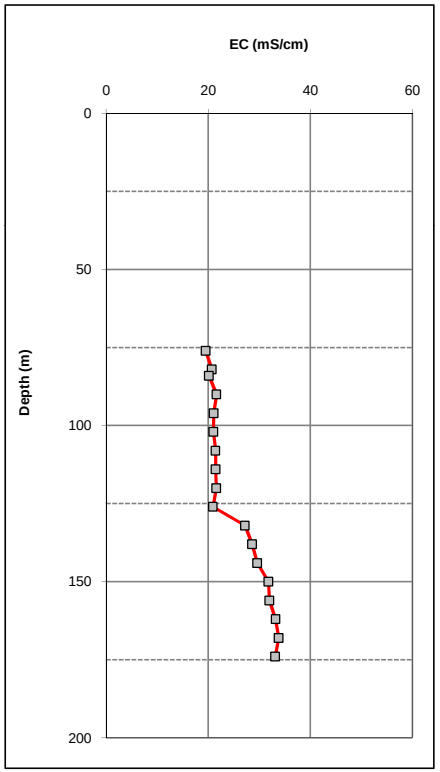
BHP Number:	RD3587
DWLBC Permit no.:	n/a
Drilling Co./Rig:	Gorey and Cole,
Driller:	Murray Tomlin
EIHCP:	967
ECC:	n/a

Co-ordinates (GDA94, Z54):	E	653728
	N	6659749
Natural surface elevation. (mAHD)		105

Graphical Log







NOTES:

Drilling summary report

Hole: MXTB12

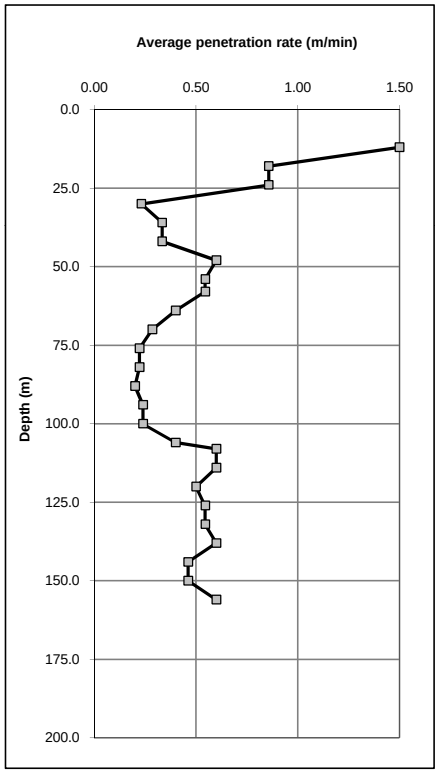
Date started: 18/11/2008

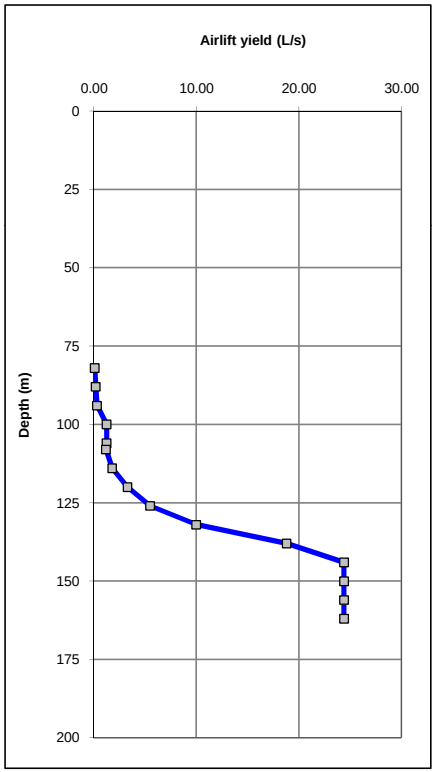
Date completed: 25/11/2008

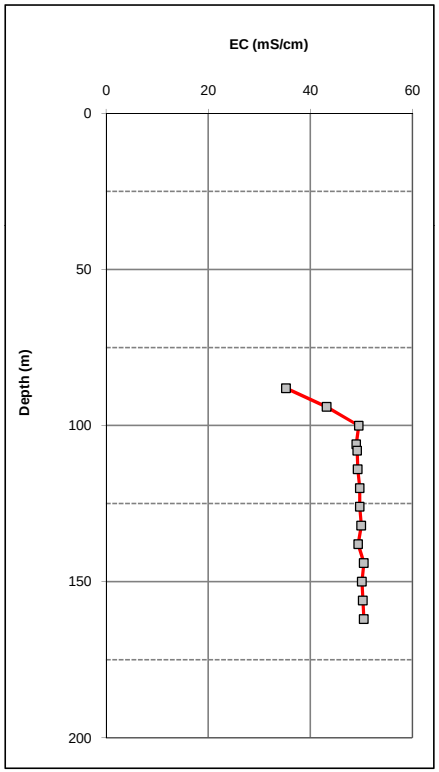
BHP Number:	RD3588
DWLBC Permit no.:	n/a
Drilling Co./Rig:	Gorey and Cole,
Driller:	n/a
EIHCP:	967
ECC:	n/a

Co-ordinates (GDA94, Z54):	E	656587
	N	6643923
Natural surface elevation. (mAHD)		109

Graphical Log







NOTES:

Drilling summary report

Hole: MXTB13

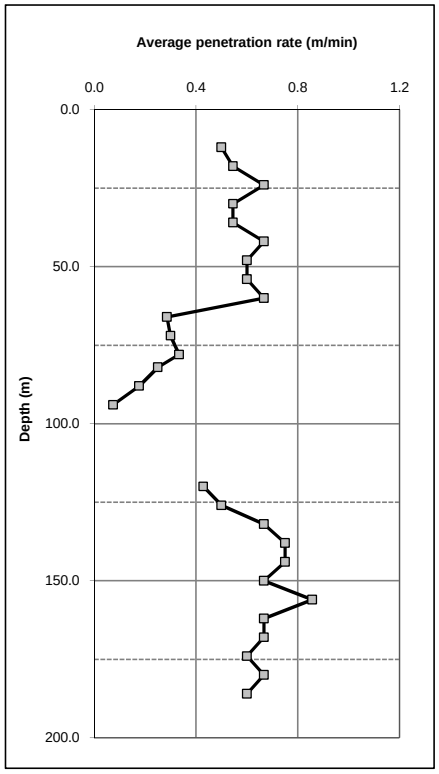
Date started: 12/10/2008

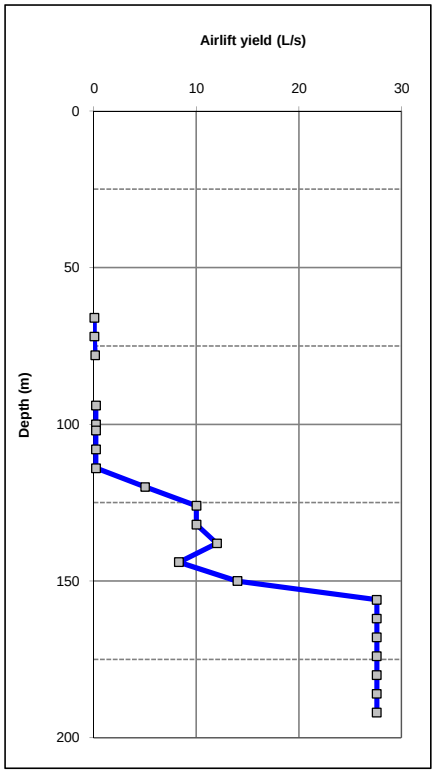
Date completed: 21/10/2008

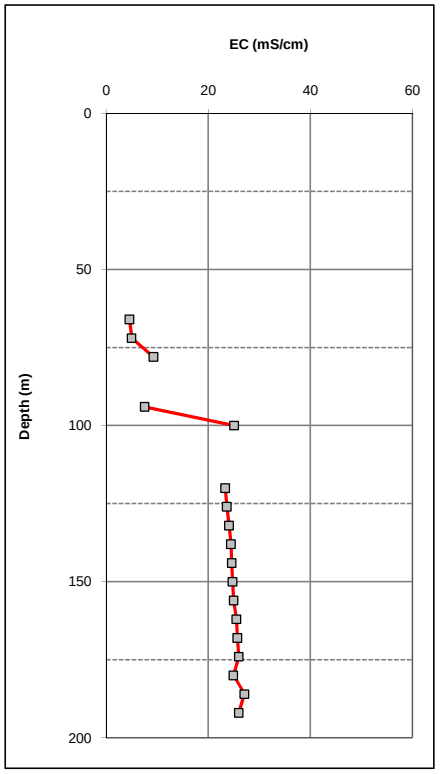
BHP Number: RD3589
DWLBC Permit no.: n/a
Drilling Co./Rig: Gorey and Cole
Driller: Dean Johnson
EIHCP: 967
ECC: n/a

Co-ordinates (GDA94, Z54): E 661709
N 6666966
Natural surface elevation. (mAHD) 110

Graphical Log







NOTES:

Drilling summary report

Hole: MXTB14

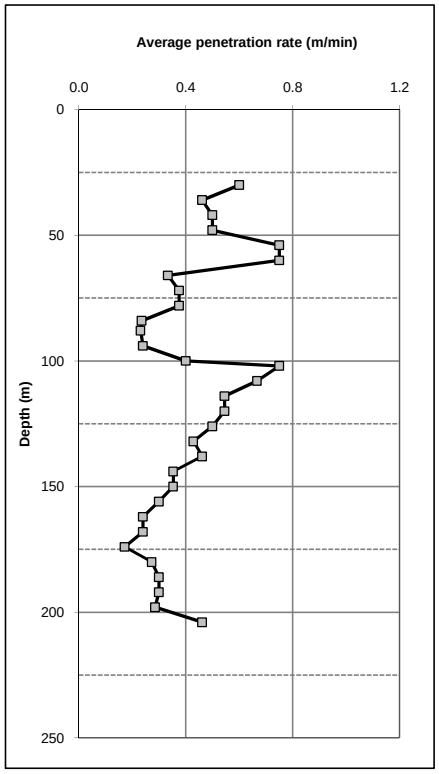
Date started: 3/10/2008

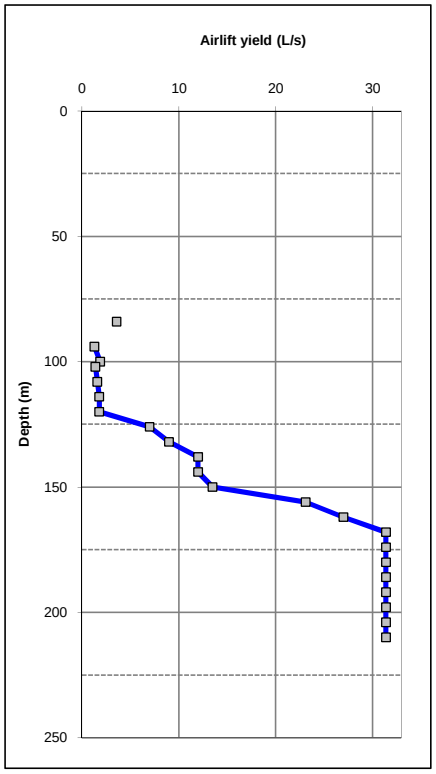
Date completed: 12/10/2008

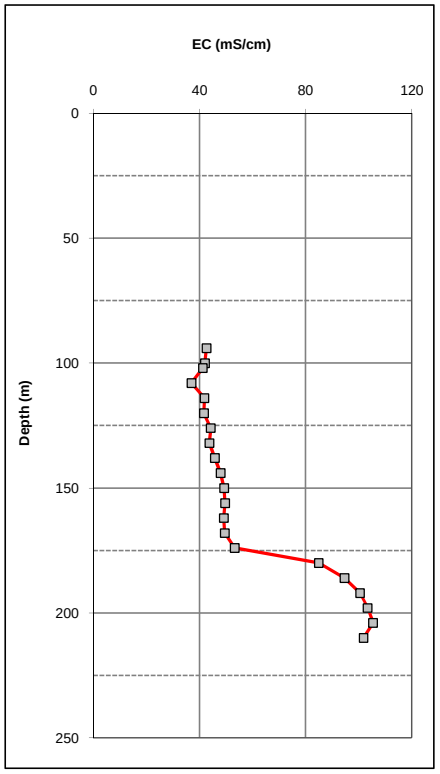
BHP Number:	RD3590
DWLBC Permit no.:	NA
Drilling Co./Rig:	Gorey and Cole,
Driller:	NA
EIHCP:	967
ECC:	NA

Co-ordinates (GDA94, Z54):	E	672164
	N	6652846
Natural surface elevation. (mAHD)		114.8

Graphical Log







NOTES:

Airlift Test MXTB07

Pumped Well:	MXTB07a	
Start Date and Time:	9/11/2008	
Finish Date and Time:	9/11/2008 13:18	
Total Time of Test:	120	min
Airlift/Pumping Rate:	78.624	m3/day
Monitored by:	Kate Hyland	
Measurement Point:	PVC	Height above GL
Initial SWL:	64.96	m(bmp)
Volume Lifted/Pumped:		m3
Depth of Airline/Pump:	94	m(bgl)

Pumped Well:	MXTB07b	
Start Date and Time:	9/11/2008 8:44	
Finish Date and Time:	10:34	
Total Time of Test:	120	min
Airlift/Pumping Rate:	157.25	m3/day
Monitored by:	Kate Hyland	
Measurement Point:	top of PVC	Height above GL
Initial SWL:	65.08	m(bmp)
Volume Lifted/Pumped:		m3
Depth of Airline/Pump:	120	m(bgl)

Pumped Well: Recovery Test Data

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)	t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
0				0			
1	121			1	121		
2	61			2	61		
3	41			3	41		
4	31	65.01	0.05	4	31		
5	25	65.015	0.055	5	25		
6	21	65.02	0.06	6	21		
7	18.14286	65.02	0.06	7	18.1429		
8	16	65.02	0.06	8	16		
9	14.33333	65.02	0.06	9	14.3333	65.98	0.9
10	13	65.015	0.55	10	13	66.01	0.93
12	11	65.015	0.055	12	11	66.055	0.975
14	9.571429	65.01	0.05	14	9.57143	66.055	0.975
16	8.5	65.01	0.05	16	8.5	66.045	0.965
18	7.666667	65.01	0.05	18	7.66667	66.045	0.965
20	7	65.01	0.05	20	7	66.045	0.965
25	5.8	65.01	0.05	25	5.8	66.045	0.965
30	5	65.01	0.05	30	5	66.045	0.965

Airlift Test MXTB09

Pumped Well:	MXTB9a	
Start Date and Time:	18/11/2008 11:30	
Finish Date and Time:	18/11/2008 13:30	
Total Time of Test:	120	min
Airlift/Pumping Rate:	61.344	m3/day
Monitored by:	K Furness	
Measurement Point:		Height above GL
Initial SWL:	43.05	m(bmp)
Volume Lifted/Pumped:	14.4	m3
Depth of Airline/Pump:	55	m(bgl)

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
0			
1	121.00		
2	61.00		
3	41.00	45.98	2.93
4	31.00	45.99	2.94
5	25.00	45.99	2.94
6	21.00	45.985	2.935
7	18.14	45.985	2.935
8	16.00	45.985	2.935
9	14.33	45.985	2.935
10	13.00	45.985	2.935
12	11.00	45.985	2.935
14	9.57	45.985	2.935
16	8.50	45.985	2.935
18	7.67	45.985	2.935
20	7.00	45.985	2.935
25	5.80	45.985	2.935
30	5.00	45.985	2.935

Pumped Well:	MXTB9b	
Start Date and Time:	18/11/2008 8:20	
Finish Date and Time:	18/11/2008 10:20	
Total Time of Test:	120	min
Airlift/Pumping Rate:	172.8	m3/day
Monitored by:	K Furness	
Measurement Point:		Height above GL
Initial SWL:	46.04	m(bmp)
Volume Lifted/Pumped:	5.112	m3
Depth of Airline/Pump:	90	m(bgl)

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
0			
1	121		
2	61		
3	41		
4	31		
5	25		
6	21	46.92	0.88
7	18.14286	46.89	0.85
8	16	46.9	0.86
9	14.33333	46.88	0.84
10	13	46.875	0.835
12	11	46.86	0.82
14	9.571429	46.86	0.82
16	8.5	46.86	0.82
18	7.666667	46.85	0.81
20	7	46.84	0.8
25	5.8	46.83	0.79
30	5	46.825	0.785
35	4.428571	46.82	0.78
40	4	46.815	0.775
45	3.666667	46.81	0.77
50	3.4	46.81	0.77
55	3.181818	46.805	0.765
60	3	46.805	0.765

AirliftTest MXTB11

Pumped Well:	MXTB11b	
Start Date and Time:	3/12/2008 10:50	
Finish Date and Time:	3/12/2008 11:30	
Total Time of Test:	120	min
Airlift/Pumping Rate:	112.32	m3/day
Monitored by:	Kate Hyland	
Measurement Point:		Height above GL
Initial SWL:	58.09	m(bmp)
Volume Lifted/Pumped:		m3
Depth of Airline/Pump:	100	m(bgl)

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
0			
1	121		
2	61		
3	41		
4	31		
5	25		
6	21		
7	18.14286		
8	16	58.86	0.77
9	14.33333	58.87	0.78
10	13	58.865	0.775
12	11	58.865	0.775
14	9.571429	58.865	0.775
16	8.5	58.865	0.775
18	7.666667	58.865	0.775
20	7	58.865	0.775
25	5.8	58.865	0.775
30	5	58.865	0.775

Airlift Test MXTB12

Pumped Well:	MXTB12a	
Start Date and Time:	25/11/2008 13:40	
Finish Date and Time:	25/11/2008 15:40	
Total Time of Test:	120	min
Airlift/Pumping Rate:	14.7	m3/day
Monitored by:	Kate Hyland	
Measurement Point:		Height above GL
Initial SWL:	67.38	m(bmp)
Volume Lifted/Pumped:	1224	m3
Depth of Airline/Pump:	74	m(bgl)

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
0			
1	121		
2	61		
3	41		
4	31		
5	25	67.53	0.25
6	21	67.48	0.2
7	18.14286	67.46	0.18
8	16	67.45	0.17
9	14.33333	67.435	0.155
10	13	67.425	0.145
12	11	67.41	0.13
14	9.571429	67.4	0.12
16	8.5	67.385	0.105
18	7.666667	67.375	0.095
20	7	67.37	0.09
25	5.8	67.35	0.07
30	5	67.345	0.065
35	4.428571	67.34	0.06
40	4	67.33	0.05
45	3.666667	67.325	0.045
50	3.4	67.32	0.04
55	3.181818	67.32	0.04
60	3	67.32	0.04
65	2.846154	67.315	0.035
70	2.714286	67.31	0.03
80	2.5	67.305	0.025
90	2.333333	67.3	0.02
100	2.2	67.295	0.015
110	2.090909	67.29	0.01
120	2	67.29	0.01

Pumped Well:	MXTB12b	
Start Date and Time:	25/11/2008 10:55	
Finish Date and Time:	25/11/2008 10:25	
Total Time of Test:	120	min
Airlift/Pumping Rate:	172.8	m3/day
Monitored by:	Kate Hyland	
Measurement Point:		Height above GL
Initial SWL:	67.36	m(bmp)
Volume Lifted/Pumped:	14400	m3
Depth of Airline/Pump:	100	m(bgl)

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
0			
1	121		
2	61		
3	41		
4	31	67.42	0.06
5	25	67.41	0.05
6	21	67.425	0.065
7	18.142857	67.425	0.065
8	16	67.435	0.075
9	14.333333	67.435	0.075
10	13	67.435	0.075
12	11	67.445	0.085
14	9.5714286	67.435	0.075
16	8.5	67.435	0.075
18	7.6666667	67.43	0.07
20	7	67.425	0.065
25	5.8	67.427	0.067
30	5	67.435	0.075

Airlift Test MXTB13

Pumped Well:	MXTB13a	
Start Date and Time:	21/10/2008	
Finish Date and Time:	21/10/2008 10:38	
Total Time of Test:	120	min
Airlift/Pumping Rate:	57.888	m3/day
Monitored by:	K Furness	
Measurement Point:	0.45	Height above GL
Initial SWL:	78.87	m(bmp)
Volume Lifted/Pumped:	4.824	m3
Depth of Airline/Pump:	89	m(bgl)

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
0			
1	121		
2	61		
3	41		
4	31	103.4	24.53
5	25	102.67	23.8
6	21	102.17	23.3
7	18.14286	101.55	22.68
8	16	100.97	22.1
9	14.33333	100.71	21.84
10	13	100.3	21.43
12	11	99.63	20.76
14	9.571429	99.03	20.16
16	8.5	98.61	19.74
18	7.666667	98.25	19.38
20	7	98.04	19.17
25	5.8	97.71	18.84
30	5	97.65	18.78
35	4.428571	97.65	18.78
40	4	97.65	18.78
45	3.666667	97.65	18.78

Pumped Well:	MXTB13b	
Start Date and Time:	21/10/2008 11:29	
Finish Date and Time:	21/10/2008 14:19	
Total Time of Test:	170	min
Airlift/Pumping Rate:	216	m3/day
Monitored by:	MXTB13a	
Measurement Point:	0.45	Height above GL
Initial SWL:	97.65	m(bmp)
Volume Lifted/Pumped:	25.5	m3
Depth of Airline/Pump:	155	m(bgl)

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
0			
1	171		
2	86		
3	57.666667		
4	43.5		
5	35	97.32	-0.33
6	29.333333	97.77	0.12
7	25.285714	97.77	0.12
8	22.25	97.75	0.1
9	19.888889	97.75	0.1
10	18	97.745	0.095
12	15.166667	97.745	0.095
14	13.142857	97.745	0.095
16	11.625	97.745	0.095
18	10.444444	97.745	0.095
20	9.5	97.745	0.095
25	7.8	97.745	0.095
30	7	97.745	0.095

Airlift Test MXTB14

Pumped Well:	MXTB14a	
Start Date and Time:	12/10/2008 8:15	
Finish Date and Time:	12/10/2008 9:15	
Total Time of Test:	60	min
Airlift/Pumping Rate:		m3/day
Monitored by:	J Richards	
Measurement Point:		Height above GL
Initial SWL:	89.34	m(bmp)
Volume Lifted/Pumped:		m3
Depth of Airline/Pump:		m(bgl)

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
1	61		
2	31		
3	21	88.51	-0.83
4	16	88.79	-0.55
5	13	88.79	-0.55
6	11	88.8	-0.54
7	9.571429	88.8	-0.54
8	8.5	88.8	-0.54
9	7.666667	88.8	-0.54
10	7	88.8	-0.54
12	6	88.8	-0.54
14	5.285714	88.8	-0.54
16	4.75	88.8	-0.54
18	4.333333	88.8	-0.54
20	4	88.8	-0.54
25	3.4	88.8	-0.54
30	3	88.8	-0.54

Pumped Well:	MXTB14b	
Start Date and Time:	12/10/2008 10:10	
Finish Date and Time:	12/10/2008 11:10	
Total Time of Test:	60	min
Airlift/Pumping Rate:	216	m3/day
Monitored by:	MXTB14a	
Monitored Well:		Height above GL
Measurement Point:		Height above GL
Initial SWL:	92.83	m(bmp)
Distance from Pumped Well:		m

t' (min)	t/t'	Waterlevel (mTOC)	Residual drawdown (m)
1	61		
2	31		
3	21		
4	16		
5	13		
6	11		
7	9.571428571	93	0.17
8	8.5	93	0.17
9	7.666666667	93	0.17
10	7	92.99	0.16
12	6	92.99	0.16
14	5.285714286	92.99	0.16
16	4.75	93.05	0.22
18	4.333333333	93	0.17
20	4	93	0.17
25	3.4	93	0.17
30	3	93	0.17
35	2.714285714	93	0.17

CERTIFICATE OF ANALYSIS

Work Order	: **EM0808905**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K HYLAND	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: khyland@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30026.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 21-OCT-2008
Sampler	: KF, KH	Issue Date	: 28-OCT-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB13 (100M) drilled 1X Red & 1X Green Bottle	Client sample ID: MXTB13 (192M) drilled 1X Red & 1X Green Bottle	----	----	----
				Client sampling date / time: 17-OCT-2008 09:00	Client sampling date / time: 18-OCT-2008 09:00	----	----	----
				EM0808905-001	EM0808905-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.72**	**7.94**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**24500**	**25900**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**15800**	**17600**	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**1560**	**145**	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**4320**	**225**	----	----	----
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	**190**	**312**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**190**	**312**	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**2680**	**2780**	----	----	----
^ Sulfur as S	----	1	mg/L	**894**	**927**	----	----	----
^ Silica	7631-86-9	0.1	mg/L	**26.4**	**29.0**	----	----	----
Silicon	7440-21-3	0.10	mg/L	**12.3**	**13.5**	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**7300**	**8300**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**616**	**672**	----	----	----
Magnesium	7439-95-4	1	mg/L	**417**	**532**	----	----	----
Sodium	7440-23-5	1	mg/L	**5120**	**5450**	----	----	----
Potassium	7440-09-7	1	mg/L	**87**	**92**	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	<0.10	<0.10	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**4.88**	**3.60**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.01**	**0.02**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.003**	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.043**	**0.020**	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB13 (100M) drilled 1X Red & 1X Green Bottle	MXTB13 (192M) drilled 1X Red & 1X Green Bottle	----	----	----
				Client sampling date / time: 17-OCT-2008 09:00	18-OCT-2008 09:00	----	----	----
				EM0808905-001	EM0808905-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Cobalt	7440-48-4	0.001	mg/L	**0.003**	**0.002**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.006**	**0.004**	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.368**	**0.091**	----	----	----
Strontium	7440-24-6	0.001	mg/L	**9.03**	**10.2**	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.006**	**0.011**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**1.41**	**0.012**	----	----	----
Boron	7440-42-8	0.05	mg/L	**5.42**	**5.38**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.2**	**1.1**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	**0.03**	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.09**	<0.01	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.13**	<0.01	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**266**	**298**	----	----	----
^ Total Cations	----	0.01	meq/L	**290**	**317**	----	----	----
^ Ionic Balance	----	0.01	%	**4.33**	**2.94**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0809035**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K HYLAND	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: khyland@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30064.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 27-OCT-2008
Sampler	: KF, KH	Issue Date	: 03-NOV-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **Ionic Balance out of acceptable limits for EM0809035 #2 due to analytes not quantified in this report.**
- **It is recognised that Nitrite +Nitrate as N is less than Nitrite as N for EM0809035 #2. However, the difference is within experimental variation of the methods.**

Analytical Results

Sub-Matrix: WATER				Client sample ID	MXTB13A	MXTB13B	----	----	----
				Client sampling date / time	24-OCT-2008 09:30	24-OCT-2008 09:30	----	----	----
Compound	CAS Number	LOR	Unit		EM0809035-001	EM0809035-002	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.95**	**7.20**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**25100**	**25200**	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		**16900**	**17300**	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**18**	**10**	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**11.9**	**5.2**	----	----	----
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		**310**	**316**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**310**	**316**	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**2990**	**3700**	----	----	----
^ Sulfur as S	----	1	mg/L		**997**	**1230**	----	----	----
^ Silica	7631-86-9	0.1	mg/L		**24.6**	**47.7**	----	----	----
Silicon	7440-21-3	0.10	mg/L		**11.5**	**22.3**	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		**7980**	**8620**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**658**	**719**	----	----	----
Magnesium	7439-95-4	1	mg/L		**543**	**664**	----	----	----
Sodium	7440-23-5	1	mg/L		**5280**	**6520**	----	----	----
Potassium	7440-09-7	1	mg/L		**98**	**122**	----	----	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**0.12**	<0.10	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**0.68**	**0.19**	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.02**	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L		**0.042**	**0.021**	----	----	----
Barium	7440-39-3	0.001	mg/L		**0.032**	**0.022**	----	----	----
Cobalt	7440-48-4	0.001	mg/L		**0.035**	**0.014**	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.007**	**0.006**	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB13A	Client sample ID: MXTB13B	----	----	----
				Client sampling date / time: 24-OCT-2008 09:30	24-OCT-2008 09:30	----	----	----
				EM0809035-001	EM0809035-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	**0.005**	**0.007**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.096**	**0.069**	----	----	----
Strontium	7440-24-6	0.001	mg/L	**9.96**	**10.4**	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.038**	**0.022**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.025**	**0.020**	----	----	----
Boron	7440-42-8	0.05	mg/L	**5.33**	**5.49**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.2**	**1.0**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	**0.01**	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**294**	**326**	----	----	----
^ Total Cations	----	0.01	meq/L	**310**	**377**	----	----	----
^ Ionic Balance	----	0.01	%	**2.68**	**7.23**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0808812**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K HYLAND	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: khyland@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE30026.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 20-OCT-2008
Sampler	: KF, KH	Issue Date	: 28-OCT-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EGO05T: Iron LOR has been raised.**
- **Ionic Balance out of acceptable limits due to analytes not quantified in this report.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB14a Client sampling date / time: 16-OCT-2008 09:00 EM0808812-001	Client sample ID: MXTB14b Client sampling date / time: 16-OCT-2008 09:00 EM0808812-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.39**	**7.34**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**44800**	**139000**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**31800**	**101000**	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**30**	**31**	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**20.3**	**3.0**	----	----	----
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	**339**	**181**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**339**	**181**	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**5150**	**7570**	----	----	----
Silicon	7440-21-3	0.10	mg/L	**17.5**	**15.7**	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**12800**	**45200**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**953**	**1360**	----	----	----
Magnesium	7439-95-4	1	mg/L	**997**	**2120**	----	----	----
Sodium	7440-23-5	1	mg/L	**9040**	**32000**	----	----	----
Potassium	7440-09-7	1	mg/L	**132**	**251**	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**0.10**	<0.50	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**1.80**	**0.97**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.01**	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.004**	**0.007**	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.052**	**0.045**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.008**	**0.009**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.012**	**0.017**	----	----	----
Lead	7439-92-1	0.001	mg/L	**0.001**	**0.023**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.365**	**0.689**	----	----	----

Analytical Results

Sub-Matrix: WATER				Client sample ID	MXTB14a	MXTB14b	----	----	----
				Client sampling date / time	16-OCT-2008 09:00	16-OCT-2008 09:00	----	----	----
Compound	CAS Number	LOR	Unit		EM0808812-001	EM0808812-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Strontium	7440-24-6	0.001	mg/L		**13.4**	**32.2**	----	----	----
Uranium	7440-61-1	0.001	mg/L		**0.016**	**0.006**	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.053**	**0.040**	----	----	----
Boron	7440-42-8	0.05	mg/L		**6.31**	**4.85**	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**1.3**	**1.0**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L		**0.27**	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.01	mg/L		**0.23**	<0.01	----	----	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.51**	<0.01	----	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**475**	**1440**	----	----	----
^ Total Cations	----	0.01	meq/L		**526**	**1640**	----	----	----
^ Ionic Balance	----	0.01	%		**5.13**	**6.54**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0809556**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K FURNESS	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: kfurness@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE23063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 11-NOV-2008
Sampler	: KF/KH	Issue Date	: 18-NOV-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EG005F: Iron LOR has been raised.**
- **EG005T: Iron LOR has been raised.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB10 Shallow Installation	MXBT10 Deep Installation	----	----	----
				Client sampling date / time: 01-NOV-2008 15:00	01-NOV-2008 15:00	----	----	----
				EM0809556-001	EM0809556-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.94**	**7.97**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**23600**	**41100**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**16300**	**28300**	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**12**	**16**	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**5.7**	**1.4**	----	----	----
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	**183**	**278**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**183**	**278**	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**3670**	**5050**	----	----	----
^ Sulfur as S	----	1	mg/L	**1220**	**1680**	----	----	----
^ Silica	7631-86-9	0.1	mg/L	**43.7**	**35.6**	----	----	----
Silicon	7440-21-3	0.10	mg/L	**20.4**	**16.6**	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**7170**	**15900**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**780**	**797**	----	----	----
Magnesium	7439-95-4	1	mg/L	**394**	**1030**	----	----	----
Sodium	7440-23-5	1	mg/L	**5120**	**10000**	----	----	----
Potassium	7440-09-7	1	mg/L	**71**	**140**	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**0.30**	**0.28**	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**0.38**	**0.67**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	**0.02**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.003**	**0.008**	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.036**	**0.029**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.008**	**0.039**	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB10 Shallow Installation	MXBT10 Deep Installation	----	----	----
				Client sampling date / time: 01-NOV-2008 15:00	01-NOV-2008 15:00	----	----	----
				EM0809556-001	EM0809556-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	**0.006**	**0.009**	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	**0.002**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.187**	**0.391**	----	----	----
Strontium	7440-24-6	0.001	mg/L	**12.3**	**14.2**	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.005**	**0.006**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.051**	**0.035**	----	----	----
Boron	7440-42-8	0.05	mg/L	**7.82**	**5.51**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.6**	**1.1**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	**0.16**	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.37**	**0.03**	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.53**	**0.03**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**282**	**558**	----	----	----
^ Total Cations	----	0.01	meq/L	**296**	**566**	----	----	----
^ Ionic Balance	----	0.01	%	**2.36**	**0.65**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0809550**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K FURNESS	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: kfurness@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE26063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 11-NOV-2008
Sampler	: KF, KH	Issue Date	: 18-NOV-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Herman Lin	Senior Inorganic Chemist	Inorganics
Nikki Stepniewski	Non-metallic Supervisor	Inorganics

General Comments

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

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

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

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

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

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

- **EG005F: Iron LOR has been raised.**
- **EG005T: Iron LOR has been raised.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB10a	MXTB10b	----	----	----
				Client sampling date / time: 09-NOV-2008 15:40	09-NOV-2008 15:30	----	----	----
				EM0809550-001	EM0809550-002	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.95**	**7.25**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**24600**	**40300**	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**17200**	**28800**	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**10**	**30**	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**9.8**	**12.6**	----	----	----
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	**163**	**278**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**163**	**278**	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**3840**	**4950**	----	----	----
^ Sulfur as S	----	1	mg/L	**1280**	**1650**	----	----	----
^ Silica	7631-86-9	0.1	mg/L	**31.5**	**34.9**	----	----	----
Silicon	7440-21-3	0.10	mg/L	**14.7**	**16.3**	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**7580**	**15500**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**761**	**774**	----	----	----
Magnesium	7439-95-4	1	mg/L	**418**	**1020**	----	----	----
Sodium	7440-23-5	1	mg/L	**5250**	**9840**	----	----	----
Potassium	7440-09-7	1	mg/L	**71**	**138**	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**0.28**	**0.23**	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**0.48**	**0.76**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.02**	**0.03**	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.003**	**0.004**	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.037**	**0.035**	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.012**	**0.036**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.006**	**0.014**	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB10a	MXTB10b	----	----	----
				Client sampling date / time: 09-NOV-2008 15:40	09-NOV-2008 15:30	----	----	----
				EM0809550-001	EM0809550-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	**0.003**	**0.006**	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.198**	**0.402**	----	----	----
Strontium	7440-24-6	0.001	mg/L	**12.5**	**14.4**	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.005**	**0.007**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.043**	**0.047**	----	----	----
Boron	7440-42-8	0.05	mg/L	**8.14**	**5.27**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.5**	**1.1**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**297**	**546**	----	----	----
^ Total Cations	----	0.01	meq/L	**302**	**554**	----	----	----
^ Ionic Balance	----	0.01	%	**0.90**	**0.71**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0810011**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR DANIEL PIERCE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: dpierce@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 24-NOV-2008
Sampler	: KF, KH	Issue Date	: 01-DEC-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below.

Signatories	*Position*	*Accreditation Category*
Herman Lin	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division Europe have been developed from established internationally recognized procedures such as those published by the USEPA, ISO and EN. 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 = Chemistry Abstract Services number
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	MXTB9a (bailed)	MXTB9b (bailed)	----	----	----
				Client sampling date / time	20-NOV-2008 08:10	20-NOV-2008 08:20	----	----	----
					EM0810011-001	EM0810011-002	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.37**	**7.36**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**46300**	**75500**	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		**33200**	**50300**	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**15**	**14**	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**16.6**	**8.6**	----	----	----
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		**268**	**236**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**268**	**236**	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**4740**	**7720**	----	----	----
^ Sulfur as S	----	1	mg/L		**1580**	**2570**	----	----	----
^ Silica	7631-86-9	0.1	mg/L		**16.2**	**11.1**	----	----	----
Silicon	7440-21-3	0.10	mg/L		**7.56**	**5.20**	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		**16700**	**25000**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**828**	**759**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1130**	**1940**	----	----	----
Sodium	7440-23-5	1	mg/L		**9480**	**14600**	----	----	----
Potassium	7440-09-7	1	mg/L		**156**	**319**	----	----	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**0.12**	**0.55**	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**1.64**	**1.71**	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.04**	**0.01**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L		**0.049**	**0.028**	----	----	----
Cobalt	7440-48-4	0.001	mg/L		**0.004**	**0.006**	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.012**	**0.018**	----	----	----

Analytical Results

Sub-Matrix: WATER				Client sample ID	MXTB9a (bailed)	MXTB9b (bailed)	----	----	----
				Client sampling date / time	20-NOV-2008 08:10	20-NOV-2008 08:20	----	----	----
Compound	CAS Number	LOR	Unit		EM0810011-001	EM0810011-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		0.071	0.002	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.161	0.320	----	----	----
Strontium	7440-24-6	0.001	mg/L		14.7	14.3	----	----	----
Uranium	7440-61-1	0.001	mg/L		0.029	0.007	----	----	----
Zinc	7440-66-6	0.005	mg/L		0.021	0.010	----	----	----
Boron	7440-42-8	0.05	mg/L		4.12	6.47	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		1.4	1.1	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L		0.62	0.06	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.01	mg/L		2.18	0.04	----	----	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		2.80	0.10	----	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		574	870	----	----	----
^ Total Cations	----	0.01	meq/L		550	841	----	----	----
^ Ionic Balance	----	0.01	%		2.15	1.72	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0810010**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: MR DANIEL PIERCE	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: dpierce@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 24-NOV-2008
Sampler	: KF, KH	Issue Date	: 01-DEC-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

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Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below.

Signatories	*Position*	*Accreditation Category*
Herman Lin	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division Europe have been developed from established internationally recognized procedures such as those published by the USEPA, ISO and EN. 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 = Chemistry Abstract Services number
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **It is recognised that NOx is less than Nitrite for sample #2. However, the difference is within experimental variation of the methods.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	MXTB7a (bailed)	MXTB7b (bailed)	----	----	----
				Client sampling date / time	15-NOV-2008 12:00	15-NOV-2008 12:30	----	----	----
					EM0810010-001	EM0810010-002	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.46**	**7.19**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**20400**	**41700**	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		**12900**	**25300**	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**10**	**12**	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**21.1**	**7.4**	----	----	----
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		**236**	**263**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**236**	**263**	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**2280**	**4660**	----	----	----
^ Sulfur as S	----	1	mg/L		**759**	**1550**	----	----	----
^ Silica	7631-86-9	0.1	mg/L		**16.3**	**13.8**	----	----	----
Silicon	7440-21-3	0.10	mg/L		**7.61**	**6.46**	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		**6750**	**13200**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**621**	**796**	----	----	----
Magnesium	7439-95-4	1	mg/L		**358**	**928**	----	----	----
Sodium	7440-23-5	1	mg/L		**3810**	**9020**	----	----	----
Potassium	7440-09-7	1	mg/L		**65**	**150**	----	----	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		<0.10	<0.10	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**2.58**	**2.41**	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.03**	**0.01**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L		**0.034**	**0.027**	----	----	----
Cobalt	7440-48-4	0.001	mg/L		**0.004**	**0.005**	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.005**	**0.011**	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB7a (bailed)	MXTB7b (bailed)	----	----	----
				Client sampling date / time: 15-NOV-2008 12:00	15-NOV-2008 12:30	----	----	----
				EM0810010-001	EM0810010-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	**0.031**	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.145**	**0.280**	----	----	----
Strontium	7440-24-6	0.001	mg/L	**9.88**	**16.3**	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.011**	**0.007**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.035**	**0.016**	----	----	----
Boron	7440-42-8	0.05	mg/L	**4.08**	**5.38**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.7**	**0.8**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	**0.02**	**0.01**	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**242**	**474**	----	----	----
^ Total Cations	----	0.01	meq/L	**228**	**512**	----	----	----
^ Ionic Balance	----	0.01	%	**3.14**	**3.83**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0809552**	Page	: 1 of 3
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K FURNESS	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: kfurness@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE23063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 11-NOV-2008
Sampler	: KF, KH	Issue Date	: 17-NOV-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

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Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Nikki Stepniewski	Non-metallic Supervisor	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EG005T: Iron LOR has been raised.**

Analytical Results

Sub-Matrix: WATER				Client sample ID	MXTB07 - 1	MXTB07 - 2	----	----	----
				Client sampling date / time	04-NOV-2008 13:00	04-NOV-2008 17:00	----	----	----
Compound	CAS Number	LOR	Unit		EM0809552-001	EM0809552-002	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		**10700**	**24200**	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**810**	**11**	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**442**	**6.2**	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		**3.74**	**0.17**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.38**	----	----	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.38**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0809540**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K FURNESS	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: kfurness@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE26063.2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 11-NOV-2008
Sampler	: KF, KH	Issue Date	: 18-NOV-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

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Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Instrument Chemist	Inorganics
Nikki Stepniewski	Non-metallic Supervisor	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

- **EG005F: Iron LOR has been raised.**
- **EG005T: Iron LOR has been raised.**

Analytical Results

Sub-Matrix: WATER				Client sample ID	MXTB07a	MXTB07b	----	----	----
				Client sampling date / time	09-NOV-2008 13:18	09-NOV-2008 10:46	----	----	----
Compound	CAS Number	LOR	Unit		EM0809540-001	EM0809540-002	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.09	7.99	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		20500	44700	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		14200	31600	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		13	4	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		17.6	4.6	----	----	----
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		233	269	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		233	269	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		2510	5490	----	----	----
^ Silica	7631-86-9	0.1	mg/L		37.1	37.2	----	----	----
Silicon	7440-21-3	0.10	mg/L		17.3	17.4	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		7010	16700	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		589	837	----	----	----
Magnesium	7439-95-4	1	mg/L		374	1060	----	----	----
Sodium	7440-23-5	1	mg/L		4590	11700	----	----	----
Potassium	7440-09-7	1	mg/L		70	166	----	----	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		0.30	0.36	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		0.55	0.67	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		<0.01	0.05	----	----	----
Arsenic	7440-38-2	0.001	mg/L		0.002	0.006	----	----	----
Barium	7440-39-3	0.001	mg/L		0.030	0.026	----	----	----
Cobalt	7440-48-4	0.001	mg/L		0.004	0.005	----	----	----
Copper	7440-50-8	0.001	mg/L		0.004	0.010	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	0.002	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MXTB07a Client sampling date / time: 09-NOV-2008 13:18 EM0809540-001	Client sample ID: MXTB07b Client sampling date / time: 09-NOV-2008 10:46 EM0809540-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Manganese	7439-96-5	0.001	mg/L	**0.126**	**0.274**	----	----	----
Strontium	7440-24-6	0.001	mg/L	**9.49**	**15.8**	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.014**	**0.006**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.012**	**0.030**	----	----	----
Boron	7440-42-8	0.05	mg/L	**4.27**	**5.85**	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.8**	**0.8**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	**0.09**	**0.02**	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.30**	**0.08**	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.40**	**0.10**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**255**	**591**	----	----	----
^ Total Cations	----	0.01	meq/L	**262**	**641**	----	----	----
^ Ionic Balance	----	0.01	%	**1.30**	**4.02**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0810344**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K FURNESS	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: kfurness@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 03-DEC-2008
Sampler	: KF, KH	Issue Date	: 11-DEC-2008
Site	: ----		
		No. of samples received	: 2
Quote number	: EN/003/08	No. of samples analysed	: 2

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

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- Analytical Results

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Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Herman Lin	Senior Inorganic Chemist	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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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

Analytical Results

Sub-Matrix: WATER				Client sample ID	MXTB12a	MXTB12b	----	----	----
				Client sampling date / time	30-NOV-2008 09:45	30-NOV-2008 10:00	----	----	----
Compound	CAS Number	LOR	Unit		EM0810344-001	EM0810344-002	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.92	7.04	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		50000	52900	----	----	----
EA015: Total Dissolved Solids									
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L		30600	30800	----	----	----
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		40	38	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		10.2	24.7	----	----	----
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		316	325	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		316	325	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		6430	6620	----	----	----
^ Sulfur as S	----	1	mg/L		2140	2210	----	----	----
^ Silica	7631-86-9	0.1	mg/L		13.3	12.9	----	----	----
Silicon	7440-21-3	0.10	mg/L		6.20	6.01	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		16900	16600	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		1020	958	----	----	----
Magnesium	7439-95-4	1	mg/L		1200	1330	----	----	----
Sodium	7440-23-5	1	mg/L		10400	10800	----	----	----
Potassium	7440-09-7	1	mg/L		138	133	----	----	----
EG005F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		0.95	0.15	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	0.01	mg/L		1.07	0.98	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		0.10	0.09	----	----	----
Arsenic	7440-38-2	0.001	mg/L		0.005	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L		0.092	0.039	----	----	----
Cobalt	7440-48-4	0.001	mg/L		0.006	0.004	----	----	----
Copper	7440-50-8	0.001	mg/L		0.011	0.014	----	----	----

Analytical Results

Sub-Matrix: WATER				Client sample ID	MXTB12a	MXTB12b	----	----	----
				Client sampling date / time	30-NOV-2008 09:45	30-NOV-2008 10:00	----	----	----
Compound	CAS Number	LOR	Unit		EM0810344-001	EM0810344-002	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		**0.003**	**0.002**	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.702**	**0.945**	----	----	----
Strontium	7440-24-6	0.001	mg/L		**13.2**	**12.5**	----	----	----
Uranium	7440-61-1	0.001	mg/L		**0.023**	**0.009**	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.037**	**0.027**	----	----	----
Boron	7440-42-8	0.05	mg/L		**5.95**	**6.26**	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**1.2**	**1.2**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	----	----	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	----	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**618**	**612**	----	----	----
^ Total Cations	----	0.01	meq/L		**605**	**630**	----	----	----
^ Ionic Balance	----	0.01	%		**1.07**	**1.44**	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: **EM0810576**	Page	: 1 of 4
Client	: **SINCLAIR KNIGHT MERZ**	Laboratory	: Environmental Division Melbourne
Contact	: K FURNESS	Contact	: Paul Loewy
Address	: LEVEL 5, 33 KING WILLIAM ST ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: kfurness@skm.com.au	E-mail	: paul.loewy@alsenviro.com
Telephone	: +61 08 8424 3800	Telephone	: +61-3-8549 9600
Facsimile	: +61 08 8424 3810	Facsimile	: +61-3-8549 9601
Project	: VE23064 2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 10-DEC-2008
Sampler	: KF, KH	Issue Date	: 17-DEC-2008
Site	: ----		
		No. of samples received	: 1
Quote number	: EN/003/08	No. of samples analysed	: 1

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

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Signatories

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

Signatories	*Position*	*Accreditation Category*
Herman Lin	Senior Inorganic Chemist	Inorganics
Nikki Stepniewski	Non-metallic Supervisor	Inorganics
Terrance Hettipathirana	Senior ICP/MS Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EG005F: LOR has been raised.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MxTB11b	----	----	----	----
				Client sampling date / time: 08-DEC-2008 16:40	----	----	----	----
				EM0810576-001	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.21**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**43500**	----	----	----	----
EA015: Total Dissolved Solids								
^ Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	**30800**	----	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**115**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**4.5**	----	----	----	----
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	**269**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**269**	----	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**4180**	----	----	----	----
^ Sulfur as S	----	1	mg/L	**1390**	----	----	----	----
^ Silica	7631-86-9	0.1	mg/L	**11.2**	----	----	----	----
Silicon	7440-21-3	0.10	mg/L	**5.23**	----	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**13300**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**681**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**949**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**7940**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**118**	----	----	----	----
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	<0.10	----	----	----	----
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	**1.96**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.03**	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.039**	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.028**	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.033**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.012**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: MxTB11b	----	----	----	----
				Client sampling date / time: 08-DEC-2008 16:40	----	----	----	----
				EM0810576-001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	**0.022**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.146**	----	----	----	----
Strontium	7440-24-6	0.001	mg/L	**12.7**	----	----	----	----
Uranium	7440-61-1	0.001	mg/L	**0.016**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.067**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	**4.46**	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**8.5**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	**0.03**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.08**	----	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.12**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**467**	----	----	----	----
^ Total Cations	----	0.01	meq/L	**461**	----	----	----	----
^ Ionic Balance	----	0.01	%	**0.73**	----	----	----	----

Attachment E
Geological log for Margaret Creek Bore #1

Feet		Meters		Description	Formation
From	To	From	To		
0	80	0	24	Shale	Bull Dog Shale
80	114	24	35	Gravel, Quartz, Sub-Angular	Cadnaowie Formation
114	149	35	45	Gravelley, Sand, white / Grey	Algebuckina Sandstone
149	168	45	51	Grey Mud / Siltstone	Stuart Range
168	200	51	61	Choc Brown Mud / Siltstone	Boorthanna Formation (Upper?)
200	276	61	84	Gravelley Mud / Siltstone, Grey	Boorthanna Formation (Lower?)
276	295	84	90	Sub-Angular Pebbles, Light / Off Grey colour	Boorthanna Formation (Lower?)
295	301	90	92	Dark Grey Mudstone	Boorthanna
301	335	92	102	Sandy, Fine Gravel, Grey / Brown, Purple mottling	Boorthanna Formation (Lower?)
335	378	102	115	Light Grey Mud / Siltstone, Fine Grains	Boorthanna Formation (Lower?)
378	391	115	119	Fine Grain, Sandy Mudstone, Light Grey / Brown	Boorthanna Formation (Lower?)
391	395	119	120	Fine sand, Light brown / Grey, Red Occurances, Grey (Sulpher?), occura	Boorthanna Formation (Lower?)
395	460	120	140	Light Grey Mudstone (Stuart Range esc)	Boorthanna
460	612	140	187	Fine Sand, quartz occurances	Arcoona Quartzite?
612	619	187	189	Fine Sand, quartz occurances, Redish Pink	Arcoona Quartzite?
619	648	189	198	Fine Sand, Quartz, Dark Grey	Arcoona Quartzite?
648	675	198	206	Fine Sand, quartz occurances, Redish Pink	Arcoona Quartzite?
675	681	206	208	Red Sandy, Fine Grain	Arcoona Quartzite?
681	685	208	209	Fine Sand, quartz occurances, Redish Pink	Arcoona Quartzite?