Rockwater
PROPRIETARY LIMITED

MULGA ROCK PROJECT

HYDROGEOLOGY, AND ASSESSMENT OF DEWATERING REQUIREMENTS AND WATER SUPPLY SOURCES

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REPORT FOR
ENERGY AND MINERALS AUSTRALIA LIMITED

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1. INTRODUCTION

The Energy and Minerals Australia Limited (EMA) Mulga Rock deposits are uranium-bearing, polymetallic deposits located 250 km east-north-east of Kalgoorlie. These include the Emperor, Shogun, Ambassador and Princess deposits. The Emperor and Shogun deposits are adjacent in the western part of the project area; Ambassador is in the east; and Princess is north of Ambassador (Fig. 1).

A Scoping Study was completed in 2010 on the Ambassador deposit, and that deposit forms the initial focus for mining. Rockwater was engaged by EMA to provide hydrogeological input to the Mulga Rock project, in particular to assess dewatering requirements and to outline sources of water.

This report presents the results to date of hydrogeological investigations on all of the deposits at Mulga Rock.

1.1 CLIMATE

Mulga Rock is in an arid area with hot summers and mild winters. Bureau of Meteorology contour maps indicate that rainfall averages about 210 mm per annum. Annual dam evaporation is about 2,100 mm (Luke, Burke and O’Brien, 1988). The nearest long-term rainfall station is at Edjudina, about 110 km to the west. Average rainfall data for the station (1900 to 2012) are given in Table 1.

Table 1: Average Monthly Rainfall (mm) Edjudina (BoM Station 012027)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
20.6	28.2	26.1	19.4	21.9	22.5	19.3	16.9	9.7	11.5	13.8	12.9	219.2

Most of the rain falls in irregular thunderstorm events or during the passage of the remnants of cyclones, with some frontal systems in winter. Daily rainfalls have been up to 98 mm (in February).

2 HYDROGEOLOGICAL SETTING

The Mulga Rock deposits lie in the Narnoo sub-basin (Fewster, 2009), a structurally controlled palaeovalley that was established during the Permian. A major phase of stream rejuvenation in the Eocene, followed by marine transgressions led to the development of the palaeodrainage which contains the mineralised sediments. The Narnoo sub-basin contains fluvial, lacustrine and marine sediments of Tertiary and Cretaceous age that include sandstone, claystone, lignite and minor conglomerate, which commonly occur in graded beds. Mineralisation typically occurs in the lignite and the underlying sandstone.

The Tertiary Minigwal palaeodrainage which includes Lake Minigwal probably flowed originally into the Narnoo sub-basin and then continued to the south along the western edge of crystalline rocks of the Albany-Fraser Orogen, before discharging into the Eucla Basin. That palaeodrainage has since been captured by another drainage system and now flows further to the north. There may still be an outlet from the Narnoo sub-basin to the south: the southerly direction of flow can be seen by groundwater levels measured in the Ambassador deposit (Fig. 1). Uranerz (1986) drilled a number of sections across the palaeodrainage which they referred to as the Ponton Channel. The channel includes a West Arm which extends south from the Emperor and Shogun deposits, and an East Arm that extends south from near the Ambassador deposit (the Palaeodrainage in Fig. 1). The nearest section to Ambassador was on Uranerz grid line 92500 N, about 23 km south of Ambassador. At that location the palaeodrainage is about six km wide and contains Tertiary sand and clay to a maximum depth of about 95 m.

The palaeodrainage contains hypersaline groundwater with salinity in the range 150,000 to 250,000 mg/L TDS. In adjacent parts of the Narnoo sub-basin, the groundwater is commonly less saline (ranging from saline to hypersaline), probably due to mixing with low-salinity water that is recharged by the infiltration of rainfall via overlying dune sands.

Salinities measured at various times are contoured in Fig. 2. They increase in the flow directions towards the centre of the palaeodrainage. Piper trilinear diagrams of major ion chemistry (Fig. 3 all data; and Figs 4 to 7 for data from each area/deposit at Mulga Rock) indicate that the portions of sodium and chloride increase, and calcium, magnesium and sulphate decrease – from the Kakarook North and BP areas, to the Ambassador/Princess, Shogun and to the Emperor deposit. This corresponds with generally increasing salinity and presumably groundwater age, and reflects the reducing geochemical conditions.

Thirty kilometres north-east of the Ambassador deposit there are Tertiary sediments that have been deposited within depressions in the Proterozoic bedrock. Mineral sand exploration holes drilled by Ramsgate Resources Ltd for the Kakarook mineral sand project intersected these sediments and where deep they extend below the water table. Water exploration holes have recently been drilled in the area by EMA to locate a source of low-salinity groundwater.

3 PREVIOUS INVESTIGATIONS

GRC (1984) reviewed all available data for PNC Exploration Pty Ltd, previous owners of the project; and carried out hydrogeological assessments for the mine water supply, dewatering of the Emperor, Shogun and Ambassador deposits, and potential environmental impacts.

Following the above study, a programme of drilling, bore construction and test-pumping was completed, and a reconnaissance was made for a source of low-salinity water (GRC, 1985). Six additional sites were drilled to explore for low-salinity water (GRC, 1986), but with little success.

Two drillholes located east of Ambassador that were reported to have abundant water (PNC, 1986) intersected schist and sediments that were reported to be of Cretaceous and Permian age. Water samples collected from the drillholes had salinities of 20,450 mg/L TDS (RC1440) and 9,150 mg/L TDS (RC1441). The drillhole locations are shown in Fig. 8. From the same report, 31 samples of peaty clay (lignite?) analysed by Amdel, had 47 percent water content.

Douglas *et. al*. (1993) completed a detailed investigation of the hydrochemistry of groundwater from the Ambassador deposit as well as the chemistry and mineralogy of the lignite.

4 HYDROGEOLOGY

4.1 GROUNDWATER LEVELS

Groundwater levels were contoured across the Mulga Rock project area by GRC (1984, Fig. 545-1-4) using approximate ground levels (+/- 3 m) and water levels measured over a three-year period in different layers. They were very irregular, but overall indicated a flat water-table that possibly sloped down from west to east from Emperor to Shogun, and north to south through Ambassador.

Water levels measured by EMA at various times are contoured in Figure 1. They indicate an east to south-easterly direction of groundwater flow at Emperor and Shogun; a south-westerly flow at Princess and Ambassador; and southerly flow at Kakarook North. There appears to be a low flat area in the water table south of Shogun and west of Ambassador that is based on few data points. This would suggest an area of groundwater discharge, however there is no known mechanism for discharge in the area. It is likely instead that the groundwater flow continues to the south-east and south down the palaeodrainage.

The water table at the Ambassador deposit is 27 to 48 m deep. The water table slopes downwards to the south-west and south at an average gradient of 0.0022. The local groundwater flow direction is almost opposite to the regional easterly or south-easterly flow towards the Eucla Basin. However, it is consistent with flow towards the East Arm of the palaeochannel mapped by Uranerz that extends south from Ambassador.

The water table at the Princess deposit ranges from 35.4 m to 48.0 m below ground level, with depths largely dependent on ground elevation. It slopes gently to the south-west, with reduced water levels between 296 m and 298 m AHD (Fig. 1).

4.2 AMBASSADOR AND PRINCESS DEPOSITS

4.2.1 Stratigraphy and Aquifer Parameters

The stratigraphy below the water table (which lies about 38 m below ground level) at the Ambassador deposit (and the adjacent Princess deposit) can be represented by the strata intersected by Bore 7 south of the deposit:

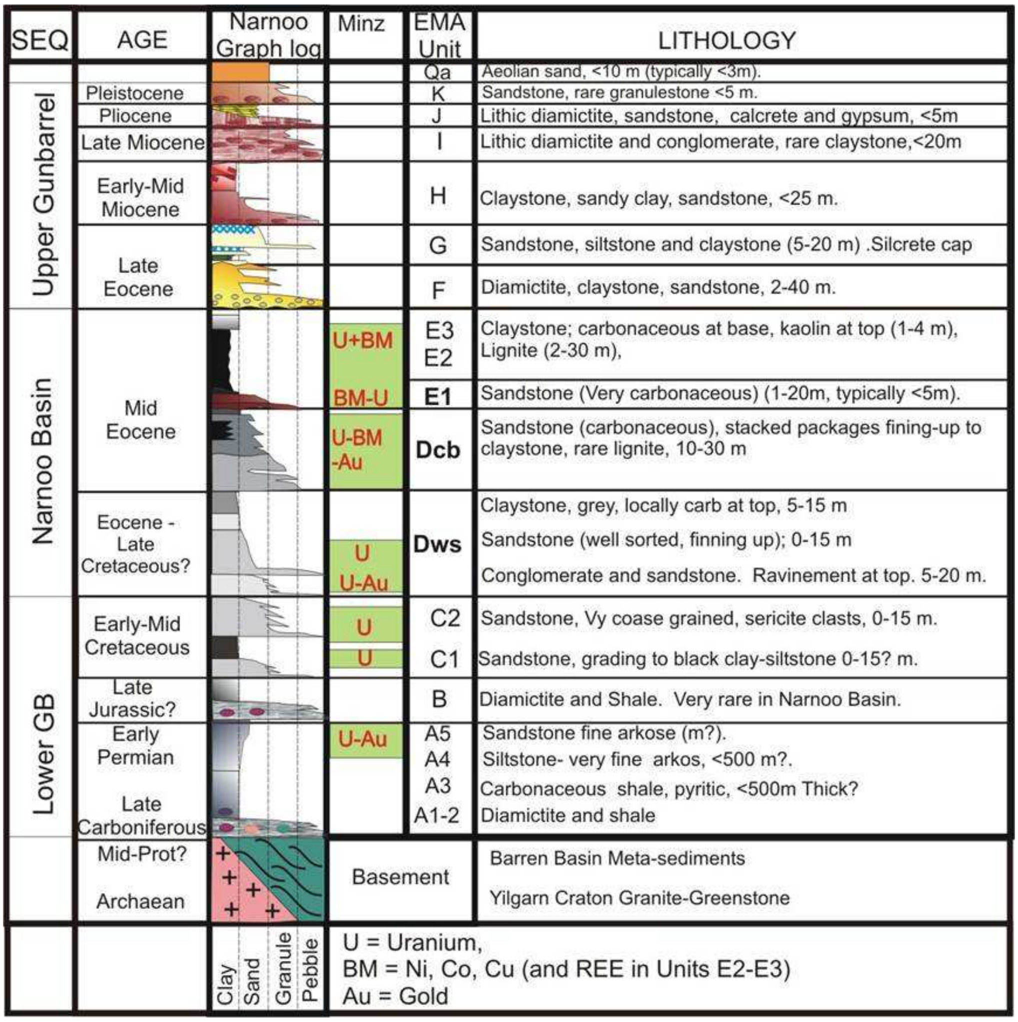
0 – 4 m	Lignite (mineralised)
4 – 9 m	Interbedded clay, lignite and sand
9 – 18 m	Coarse sand
18 – 31 m	Interbedded sand and clay
31 – 63 m	Slightly to very slightly clayey sand (Bore 7 is screened in this layer).

The deeper sand layer intersected by Bore 7 decreases in thickness to the north (M Fewster, pers. comm.).

Three geological sections through the Ambassador deposit and two through the Princess deposit that have been prepared by EMA are included as Figures 9 and 10. The section lines are shown with the geological structure in Fig. 11. They show the complex geology of these deposits. The sediments below the water table are mostly of the Upper and Lower Narnoo that have been deposited in grabens within the faulted Permian to Proterozoic basement. The lower Narnoo sediments are reduced conglomerate, sandstone and claystone of Eocene to Late Cretaceous? age; and the Upper Narnoo sediments are carbonaceous sandstone, claystone and lignite of mid Eocene age, and diamictite, claystone, sandstone and siltstone of Late Eocene age. The beds are commonly graded, fining upwards. The stratigraphy is summarised in the diagram on the following page, also prepared by EMA geologists.

The pumping test on Bore 7 (GRC, 1985) indicated an aquifer transmissivity of 210 m^2/d and a hydraulic conductivity of the deeper sand layer of 9 m/d, based on a screened interval of 24 m. A portion of the extracted water would have come from above and below the screened interval so that the average hydraulic conductivity is probably slightly less than 9 m/d. The storage coefficient (confined storativity) is calculated from the pumping test results to be 2×10^{-4}.

The specific yield (drainable porosity) of the lignite is not known, but EMA personnel report that there has been very little drainage of water from drillhole core, even though it has a high water content (see Section 3, above). A value of five percent (0.05) has been assumed for the numerical modelling.



Mulga Rock Stratigraphy and Mineralisation

4.2.2 Assessment of Dewatering Requirements

Model Description

A numerical groundwater model was constructed and run to estimate dewatering requirements of the proposed mine pits. It consists of an irregular rectangular grid of 66 rows, 72 columns, and four layers covering an area of 15.5 km east–west and 15.4 km north–south centred on the Narnoo sub-basin.

Within the confines of the sub-basin the model layers used are as follows:

Layer 1: lignite (and other fine-grained sediments where the lignite is absent)
Layer 2: the thin sand (sandstone) bed underlying the lignite
Layer 3: interbedded sand and clay
Layer 4: the deeper, thick sand layer screened in Bore 7.

The layering is generalised – in reality the sediments are quite variable and lensoid in nature, and probably displaced by faulting.

Model cells range in size from 75 m by 100 m in the area of the Ambassador deposit to 300 m by 500 m in some peripheral areas. The model utilises Processing Modflow Pro version 7.0.31 and Modflow96 (McDonald and Harbaugh, 1988).

Adopted aquifer parameters for the model are given in Table 2.

Table 2: Adopted Aquifer Parameters

Parameter	Layer 1	Layer 2	Layer 3	Layer 4
Horizontal hydraulic conductivity (m/d)	0.1	8.8	1	9
Vertical hydraulic conductivity (m/d)	0.01	0.4	0.02	1
Storage coefficient	N/A	0.0002	0.0002	0.0002
Specific Yield	0.05	0.2	0.1	0.2

N/A = Not Applicable

Modelling Results

The model was run to simulate dewatering of the planned open-cut mine to the depths shown in the drawing entitled Maximum Block Depth Mined, dated 9 June 2010; and the mining schedule shown in the drawing Annual Mining Progress Mined Pits, dated 7 June 2010, both prepared by Coffey Mining Pty Ltd.

Modflow's Drain package was used to simulate dewatering. The mining would be over a nine year period from 2014 – two model stress periods were used to represent years 2015 and 2018 when different areas would be mined. It was assumed that the mining depths would be below an average ground level of 330 m AHD.

Model-calculated average dewatering rates are given in Table 3.

Table 3: Model-Calculated Average Dewatering Rates (kL/d)

Year	Total kL	Av. kL/d
2014	1837265	5034
2015	249147	2043
2016	407429	1116
2017	932587	2555
2018	22036	287
2019	0	0
2020	1706981	4677
2021	1084396	2971
2022	58146	159
	Overall Average	**2076**

The modelling replicates dewatering using in-pit drains and sumps, and indicates that average annual pumping rates could range from 0 to 5,000 kL/d. Actual rates will depend on the area being mined, rate of mining, mine depth and dewatering method. In practice, some depressurisation of sand beds will probably be needed using dewatering bores to prevent floor heave, and this will add to the quantities being pumped.

4.2.3 Saline Water supply

The model was also used to estimate the quantity of water available from the deep sandstone beds at and south of the Ambassador deposit. The results indicate that 6,000 kL/d should be available from two widely-spaced production bores. The water would be slightly to moderately acidic (pH 4 to 6), with a salinity of around 37,000 mg/L TDS. There is more highly-saline water to the west near the Shogun and Emperor deposits, and so there could be a gradual increase in salinity with long-term pumping. The indicative quantity of water given above would include water pumped from sumps for mine dewatering.

4.2.4 Groundwater Chemistry

Water samples have been analysed at various times for different suites of parameters from 93 drillholes in total in the Ambassador and Princess deposits. The results of all the analyses are given in Appendix I, and the results from some of the separate sampling events for the Ambassador deposit are described below.

1984 to 1991 Samples

Water samples collected from Bores 1 and 7 at the end of pumping tests in 1984 were analysed for major components (GRC, 1985). Water samples airlifted from 13 drillholes in and near the Ambassador deposit in 1990 and 1991 were also analysed for major components as well as a wide range of metals and rare earth elements (Douglas *et. al*. 1993).

The results of the major component analyses and some other common elements are given in Table 4. They show that the water ranges in salinity from 7,500 to 37,600 mg/L TDS. It is moderately acidic to neutral with pH ranging from 4.3 to 7.0 (generally 5.5 to 6.6); and is of a sodium chloride type with elevated magnesium and sulphate. Metals and other elements that were analysed for (most are not shown in Table 4) were generally at low concentrations. Exceptions were moderate concentrations of iron in several holes (up to 16 mg/L); and high bromine concentrations (up to 23 mg/L). Uranium concentrations were mostly below the limit of detection (0.002 mg/L), with a maximum of 0.038 mg/L.

Oxidation potentials (Eh) range from -167 to 335 mV and are generally greater than 100 mV indicating potentially oxidising conditions. It is likely that the low pH in hole

CD1515 resulted from oxidation of sulphides, and increased rates of oxidation will almost certainly occur when the lignite is dewatered.

The areal distribution of the salinity data for all the deposits and sampling programmes is shown in Figure 2. Salinity increases to the south-west in the direction of groundwater flow, mostly from 20,000 to 40,000 mg/L TDS. Salinity also tends to increase with sample depth (Fig. 12) with moderate correlation, although the main water-bearing zones in each hole have not been identified.

Two holes, CD1366 and CD1409, had much lower salinities than in the other holes. Douglas *et. al*. (1993) consider that this resulted from contamination with rainwater in CD1366; and CD1409 has a high bicarbonate concentration and low sulphate that suggests that the water is young and that there is a high rate of recharge from rainfall/runoff.

Samples from 2010 to 2013

Water samples were airlifted from 10 holes in the Ambassador deposit in March 2010 and analysed for major components and a range of other elements and metals (Table 5). Many other holes in the area were sampled in 2012 and 2013 (Appendix I). The results are similar to the 1984 analyses, with salinity ranging from 8,000 to 80,000 mg/L TDS; pH 2.6 to 8.0; and Fe <0.1 to 56 mg/L. Salinities within the Princess and Ambassador deposits generally range from 20,000 to 30,000 mg/L TDS. Most of the higher salinities, around 60,000 mg/L TDS, are for drillholes about 5 km west of Ambassador but are included with the Ambassador data here.

Minor elements and metals other than iron that were analysed for were generally at low concentrations or below the limits of detection, including uranium. There were some elevated metal concentrations in holes that had low pH. Bromine concentrations ranged from 3 to 23 mg/L; and strontium 2 to 12 mg/L.

Water samples taken from the Princess deposit have been measured in the field in 2012 and 2013 for salinity and pH. The water is acidic, with pH generally ranging from 5.0 to 6.5. Lower pH’s of around 3 have been measured in one hole, NNA5623. Salinities are lower than most at Ambassador, ranging from 8,700 to 21,400 mg/L TDS, as the deposit is up-gradient of Ambassador.

Table 4: Results of Major Component Analyses (and Common Metals) 1984

Hole/Bore	pH	Eh (mV)	TDS (mg/L)	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	HCO3 (mg/L)	SO4 (mg/L)	NO3 (mg/L)	Fe (mg/L)	Mn (mg/L)	Br (mg/L)	Sr (mg/L)	Si (mg/L)
Bore 1	6.5	ND	37,609	11,100	260	800	1,400	19,800	89	4,150	10	12.8	ND	ND	ND	ND
RC1148	5.98	129	22,678	6,800	248	532	742	11,800	86	2,490	ND	0.4	0.2	23.1	6.9	21
Bore 7	5.8	ND	36,771	11,000	250	770	1,280	19,600	10	3,850	11	16.2	ND	ND	ND	ND
RC1213	5.46	148	12,506	3,769	138	246	350	6,730	24	1,250	ND	0.46	0.22	10.6	3.3	21
RC1152	5.91	143	19,522	5,645	231	450	700	10,400	30	2,060	ND	0.15	0.13	20.7	6.3	22
RC1151	6.36	144	14,784	4,392	169	319	467	7,810	104	1,560	ND	0.88	0.24	15	4	15.4
RC1419	6.85	173	14,535	4,185	204	300	522	7,430	283	1,730	ND	6.3	0.05	20.3	3.4	6.3
CD1500	6.01	293	18,459	5,276	207	415	651	9,820	107	2,020	ND	1.02	0.27	16.6	4.1	4
CD1498	6.58	335	32,875	9,646	383	858	1,176	16,600	303	4,040	ND	0	0.06	23.3	11.6	7.6
CD1247	7.01	213	26,887	7,939	308	626	856	14,000	382	2,950	ND	0.19	0.05	20.4	5.1	4.6
CD1515	4.27	147	35,984	11,278	250	708	1,212	19,000	0	3,520	ND	0.18	1.34	14.7	7.9	2.8
RC1216	6.45	9	25,376	7,717	249	515	681	13,400	339	2,630	ND	5.1	0.17	13	4.1	1.6
RC1177	6.58	171	27,343	8,236	263	683	754	14,200	191	3,090	ND	7.8	0.28	15.1	5.9	3.2
CD1409	6.58	-167	7,519	2,285	66	174	262	4,070	1,231	56	ND	0.22	0.6	3.3	1.7	2.9
CD1366	6.46	80	8,461	2,271	84	461	290	4,210	ND	1,140	ND	0.34	0.32	4.9	2.2	4.6

Table 5: Results of Major Component Analyses (and Other Elements and Metals) 2010

Hole/Bore Hole/Sample Depth Date Analysed	Units	NNA5027 82 26/03/2010	NNA5198 64 26/03/2010	NNA5393 73 26/03/2010	NNA5127 65 26/03/2010	NNA5140 51 26/03/2010	NNA5086 75 26/03/2010	NNA5103 66 26/03/2010	NNA5199 55 26/03/2010	NNA5155 51 26/03/2010	NNA5107 69 26/03/2010
pH	pH Units	4.1	3.5	4.2	5.5	6.4	6.8	4.3	4.2	6.7	4.8
Conductivity @25^{o}C	µS/cm	17780	23060	31200	31400	27420	47800	41700	45000	28390	44700
TDS (Calculated)	mg/L	10668	13836	18720	18840	16452	28680	25020	27000	17034	26820
Soluble Iron, Fe	mg/L	0.844	50.813	6.526	0.203	<0.2	<0.2	0.76	5.885	<0.2	<0.2
Sodium, Na	mg/L	3038	4116	5748	5710	4898	8651	7602	8197	5087	8130
Potassium, K	mg/L	101	128	185	187	171	349	257	316	180	292
Calcium, Ca	mg/L	197	274	416	463	357	604	580	614	362	620
Magnesium, Mg	mg/L	301	336	548	531	422	900	772	833	488	834
Chloride, Cl	mg/L	5311	7558	11235	10922	8689	17219	13693	16462	9677	15717
Carbonate, CO_3	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate, HCO_3	mg/L	<5	<5	<5	49	9	32	<5	<5	31	<5
Sulphate, SO_4	mg/L	1355	1633	2237	2227	1751	3317	2875	3273	1827	3553
Nitrate, NO_3	mg/L	0.35	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cation/Anion balance	%	-2.5	-5	-6.3	-5.2	-2.1	-6.3	-1.9	-6.9	-4.6	-5.8
Sum of Ions (calc.)	mg/L	10303	14045	20368	20089	16297	31071	25778	29695	17652	29147
Soluble Arsenic, As	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.01
Soluble Boron, B	mg/L	1.252	1.011	1.611	1.409	1.208	2.712	1.722	2.126	1.352	1.688
Soluble Barium, Ba	mg/L	0.038	0.052	0.035	0.055	0.07	0.051	0.066	0.094	0.053	0.067
Soluble Beryllium, Be	mg/L	<0.005	0.02	0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.01
Soluble Cadmium, Cd	mg/L	<0.0005	0.001	0.003	0.024	0.0009	0.007	0.013	<0.001	<0.0005	0.319
Soluble Chromium, Cr	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	0.013	<0.01	<0.005	<0.01
Soluble Copper, Cu	mg/L	0.032	0.021	0.018	0.013	0.024	0.018	0.628	0.016	0.005	1.904
Soluble Cobalt, Co	mg/L	0.075	0.719	1.052	0.625	0.148	0.199	3.958	0.653	0.026	2.292
Soluble Lead, Pb	mg/L	0.015	0.041	<0.005	<0.005	0.006	<0.01	0.345	<0.01	<0.005	3.077
Soluble Molybdenum, Mo	mg/L	<0.005	<0.005	<0.005	0.012	0.035	<0.01	<0.01	<0.01	0.008	<0.01
Soluble Manganese, Mn	mg/L	3.208	1.367	1.021	1.246	0.532	1.964	1.608	1.299	0.562	2.345
Soluble Nickel, Ni	mg/L	0.055	1.153	1.888	0.627	0.181	0.377	3.83	1.719	0.023	2.905
Antimony, Sb	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.01
Soluble Tin, Sn	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.005	<0.01
Soluble Selenium, Se	mg/L	<0.005	0.007	<0.005	0.009	<0.005	<0.01	0.104	<0.01	<0.005	<0.01
Soluble Zinc, Zn	mg/L	0.08	6.647	3.252	0.266	0.162	0.918	5.256	7.779	0.074	12.888
Soluble Uranium	mg/L	<0.005	<0.005	0.028	0.032	<0.005	<0.01	0.019	<0.01	<0.005	0.068
Vanadium	mg/L	<0.005	<0.005	<0.005	<0.005	0.009	<0.01	<0.01	<0.01	<0.005	<0.01
Soluble Mercury, Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

4.3 EMPEROR AND SHOGUN DEPOSITS

The hydrogeology of the Emperor and Shogun deposits was investigated by GRC (1984, 1985), and the description below is largely taken from the information presented in those reports as well as some recent data.

4.3.1 Stratigraphy and Aquifer Parameters

The stratigraphy at Emperor and Shogun is similar to that at Ambassador, with mostly clayey sand and clay overlying silcrete, carbonaceous clay and lignite; and with clayey sand and up to 10 m or more of clean sand near the base of the Tertiary sequence. The thickness of the basal clean sand was contoured by GRC (1984) and is shown in Fig. 13. The contours show that the sand extends along the section of the palaeodrainage that has been drilled for the Mulga Rock project, but that the thickness if quite variable and in some locations most or all of the sand appears be clayey.

Bores 6 (Emperor deposit) and 7 (south of Ambassador deposit) are screened in thick sections of this sand, and test-pumping results indicate that the bores are capable of pumping 2,100 and 3,400 m^3/d, respectively (GRC, 1985). Hydraulic conductivity values calculated from the pumping test results were 37.5 m/d (Bore 6) and 9 m/d (Bore 7). Bore 6 has a 12 m screened interval compared to 24 m in Bore 7 – the high hydraulic conductivity calculated for Bore 6 may have been enhanced by groundwater flow from above and below the screened interval.

Bore 5 (Shogun deposit) was screened in a clayey sand below the mineralised lignite, and so was low-yielding. It was test-pumped (GRC, 1985) to determine the vertical permeability (hydraulic conductivity) between the lignite and the underlying clay and sand beds. Values of 0.01 to 0.03 m/d were indicated, and these would probably apply to both the lignite and clayey sand.

4.3.2 Dewatering Requirements

Although the mineralised sand, carbonaceous clay and lignite at Emperor and Shogun are likely to be of low permeability, there is potential for upward leakage from the basal sands. The latter will need to be depressurised to prevent upward leakage and the possibility of heaving of the pit floor during mining.

The dewatering/depressurising requirements have yet to be quantified, but pumping of substantial volumes of water will probably be needed.

4.3.3 Groundwater Availability

GRC (1984) estimated the volume of the clean basal sand to be 3 x 10^8 m^3 in the Emperor – Shogun area where the thickness of sand was 5 m or more. Assuming a drainable porosity of 0.1, the basal sand would therefore contain 3 x 10^7 m^3 of groundwater. This represented a conservative estimate of the volume of groundwater available in the area as it didn't include some smaller areas with thick sand, the areas where the sand is less than 5 m thick and saturated sand at higher levels.

4.3.4 Groundwater Chemistry

Water samples have been collected and analysed from 155 drillholes in these deposits, mostly in 1984 and 2012.

Groundwater salinity at Emperor and Shogun ranged from 32,500 to 139,700 mg/L TDS (GRC, 1984) with the highest salinities in the south, and the lowest salinities towards the margins of the palaeochannel to the north or west (Fig. 2) suggesting possible recharge in these areas of less-saline water. The salinity increases with depth, and is generally more saline than at the Ambassador deposit.

The water from the bores at Emperor and Shogun is more acidic than at Ambassador, with pH of 3.8 to 4.1 (GRC, 1985). It is of sodium chloride type with moderately high magnesium and sulphate concentrations.

The Piper trilinear diagram indicates that the portions of the major ions are similar to seawater (Fig. 5). Of the water samples collected from drillholes in 2012 and 2013 (Appendix I) many had low pH in the range 3 to 4 (minimum 2.9 and maximum 6.2), and salinity ranging from 6,100 to 95,500 mg/L TDS. Most salinities are greater than 50,000 mg/L TDS.

Iron concentrations range from <0.05 mg/L to 55 mg/L in recent samples, and up to 190 mg/L in the 1984 samples. Bromine (four analyses) ranged from 23 to 71 mg/L; and strontium 7.7 and 8.8 mg/L (two samples). Other elements and metals that were analysed were at low levels or below levels of detection. Uranium was above the level of detection in five samples, with one high value (0.35 mg/L) from the Shogun costean in 1983. One sample from drillhole MSW002 had an anomalously high zinc concentration (26 mg/L) in May 2012, but was low (0.76 mg/L) in the October 2012 sample.

5 LOW-SALINITY WATER SOURCES

Based on the outcome of the 2010 Scoping Study, the EMA water requirements for processing ore are:

3,000 m^3/d of water with 650 mg/L chloride (1,300 mg/L TDS), plus
1,400 m^3/d of water with 3,700 mg/L chloride (7,200 mg/L TDS).

If necessary, 4,400 m^3/d of water of 7,200 mg/L TDS could be used. This could comprise a mixture of 350 m^3/d of 37,000 mg/L TDS water from Ambassador dewatering facilities with 4,050 m^3/d of water of salinity 4,500 mg/L TDS from the Kakarook North borefield.

5.1 LOCAL SOURCES

Ramsgate Resources limited carried out exploration for mineral sands in 1990 on a series of drillhole lines located to the east and north-east of the Ambassador deposit (Kakarook Project). Low-salinity water was intersected in a number of drillholes, notably in three drillholes (K104, K105 and K106) on a line 30 km north-east of Ambassador where the saturated thickness was measured at up to 21 m over a width of about 2.5 km (Fig. 8).

Recent exploration drilling in the area, referred to as Kakarook North, has delineated a south-east trending alluvial channel or basin with a saturated thickness of alluvium of up to 37 m over a length of about 6 km and width 2 to 5 km (Fig. 14). The water is contained within graded alluvial sand/sandstone beds of Eocene age that include coarse to very coarse-grained layers that are up to fine gravel in size and overlie Proterozoic bedrock.

The basin is in a low-lying area where runoff from rainfall in elevated areas to the north and north-west probably accumulates in the coarse-grained surface sand before it infiltrates to the water table. This would minimise evaporative losses and assist in maintaining the relatively low salinity of the groundwater. Also, the aquifer appears to be separate from the palaeodrainage/Narnoo sub-basin that contains the lignitic sediments and saline to hypersaline groundwater.

Water was sampled and analysed from 22 bores and drillholes in the Kakarook North area in March and April 2013. It ranges in salinity from 3,950 to 8,070 mg/L TDS, and is generally less than 5,000 mg/L TDS in the main basin/channel area (Fig. 15). The water has pH in the range 5.3 to 8.0 and is generally slightly acidic to slightly alkaline. It has elevated sulphate concentrations (550 to 1,400 mg/L), and low metal concentrations (for those metals analysed).

Salinity measurements in drillholes to the north and north-east of Ambassador and north of Shogun (GRC, 1984), and the results of the 2012/13 analyses at the Princess deposit, indicated some relatively low-salinity groundwater (9,000 to 20,000 mg/L TDS). Potential bore yields are not known, but if suitable sources can be located, the water could be mixed with the low-salinity water in the Kakarook North area to obtain the quantity and quality required for processing the ore.

5.1.1 Resource Assessment

The volume of low-salinity groundwater stored in coarse sand/sandstone in the area of Kakarook North that has been drilled to date is estimated to be at least 30 GL where the saturated thickness is 10 m or more and assuming a specific yield of 0.1.

Individual bore yields could be 200 kL/d to 500 kL/d, and the total borefield capacity could be at least 3,000 kL/d with bores spaced 500 m apart. Water salinity is expected to average about 4,500 mg/L TDS.

This assessment is based on exploration data and will be updated following a programme of test-bore construction, pumping tests and numerical modelling.

5.2 REGIONAL SOURCES

The Department of Water WIN database and a literature search were used to identify other potential sources of low-salinity water.

Shevchenko (2002) shows a regional gravity low (Fig. 16) that extends southwards to near Mulga Rock, and it seems to coincide with a deeper trough or graben within the Gunbarrel Basin. The three Rason bores (BMR, 1975) intersected Permian Paterson Formation sediments deepening to the east, but there were insufficient saturated coarse-grained sediments in the eastern bore to produce groundwater.

The Tropicana bores (Pennington Scott, 2009) intersect Neo-Proterozoic sediments in the trough that yield moderate supplies of highly saline water. Salinities are probably lower (but still high) away from the palaeodrainages.

The BMR (1975) also drilled the Neale stratigraphic holes (Fig. 16). Neale 1B intersected the Ordovician-age Lennis Sandstone from 138 m to 205.7 m (total depth). The sandstone yields large supplies of low-salinity water further north, and would probably do so at this location. Neale 2 was a shallow hole drilled to investigate Tertiary sediments of the Eucla Basin (instead it intersected fine-grained sediments of the Paterson Formation). Neale 3 was also a shallow (38 m) hole planned as a bore to supply water for drilling of the deeper holes. It intersected fine-grained Paterson Formation and failed to yield groundwater.

Anaconda Nickel drilled a series of holes in the Officer Basin to explore for large supplies of low-salinity water for the Murrin Murrin mine. The water was already known to exist from the drilling of water-supply bores for oil exploration wells and from the drilling of the wells themselves, such as Hussar 1 located 320 km north of the northern limit of Fig. 16. Test bores along the Great Central Road intersected water of 1,300 to 2,100 mg/L TDS in the Lennis Sandstone, and it was planned to install a borefield in that area. Other holes were drilled, with the OF prefix in Fig. 16, including OF3x1 to OF3x3 located about 55 km north of Ambassador. Those holes were up to 295 m deep, but only intersected fine-grained sediments and little or no water. OF3x3 had a small supply of brackish to saline water (5,300 mg/L TDS). AngloGold Ashanti has also been unsuccessful in exploring for road-construction water along the access road to Tropicana (M Fewster, pers. comm.).

Based on the above information, it would probably be necessary to install a borefield in the Lennis Sandstone about 250 km north-east of Ambassador to obtain a large supply of low-salinity water. Alternatively, desalination of saline water could be used to supplement the supply from the Kakarook North area.

There is also low-salinity water in limestone near the north-western margin of the Eucla Basin (Commander, 1990) about 200 km east of Ambassador, but there is unlikely to be sufficient water available and it is already developed for water supplies for pastoral stations and local communities.

6 CONCLUSIONS AND RECOMMENDATIONS

Groundwater Levels, Mulga Rock Deposits

The water table at the Princess and Ambassador deposits is 13 to 64 m deep; and at the Emperor and Shogun deposits, 13 to 61 m deep – the depth depending mainly on ground elevation.

Water levels reduced to AHD indicate that groundwater flows to the east and south-east at Emperor and Shogun, and to the south-west at Princess and Ambassador. The flow from both areas is inferred to continue to the south-east and south down the palaeodrainage.

Dewatering Requirements

A numerical groundwater model was run to simulate dewatering of the planned open-cut mine at the Ambassador deposit to the depths shown in the drawing entitled Maximum

Block Depth Mined, dated 9 June 2010; and to the schedule shown in the drawing Annual Mining Progress, dated 7 June 2010.

The modelling replicates dewatering using in-pit drains and sumps, and indicates that average annual pumping rates could range from 0 to 5,000 kL/d. Actual rates will depend on the area being mined, rate of mining, mine depth and dewatering method. In practice, some depressurisation of sand beds will probably be needed using dewatering bores, to prevent floor heave, and this will add to the quantities of water pumped.

Saline Water Supply

The model was also used to estimate the quantity of water available from the deep sandstone beds at and south of the Ambassador deposit. The results indicate that 6,000 kL/d should be available from two widely-spaced production bores. The water would be slightly to moderately acidic (pH 4 to 6), with salinity expected to be about 37,000 mg/L TDS. This pumping would lower groundwater levels and reduce flows to in-pit sumps.

It is unlikely that any saline water will need to be pumped, other than that required to achieve dewatering, as processing ore will need water of low salinity.

Groundwater Quality, Mulga Rock Deposits

The results of the analysis of groundwater samples for major components and a range of other elements and metals show that the water from the Mulga rock deposits is acidic to neutral, and of a sodium chloride type with moderately high concentrations of magnesium and sulphate.

Water from the Princess deposit generally has pH in the range 5 to 6.5, and salinity 9,000 to 21,000 mg/L TDS.

Water from the Ambassador deposit has pH ranging from 2.6 to 8.0, and salinity mostly in the range 20,000 to 30,000 mg/L TDS. There are some higher salinities to the south and west – around 60,000 mg/L TDS 5 km west of the deposit.

The water from the Emperor and Shogun deposits is generally more acidic and more saline than at Ambassador. The pH ranges from 2.9 to 6.2, with many values in the range 3 to 4. Salinity ranges from 6,000 to 96,000 mg/L TDS but most values are greater than 50,000 mg/L TDS.

Metals and other elements that were analysed for were generally at low concentrations or below the limits of detection. Exceptions were moderate to high concentrations of iron (up to 190 mg/L) in a number of holes; and high bromine concentrations (up to 71 mg/L) and strontium (up to 11.8 mg/L) in the few samples that were analysed. Although concentrations were generally low, there were measurements of boron (up to 2.7 mg/L); cadmium (up to 0.32 mg/L); copper (up to 9.6 mg/L); cobalt (up to 4 mg/L); lead (up to 3.1 mg/L); nickel (up to 3.8 mg/L); zinc (up to 26 mg/L); and uranium (up to 0.07 mg/L in bore samples). The elevated metal concentrations were from samples that had low pH.

Low-Salinity Water Sources

From the results of the 2010 Scoping Study, the water requirements for processing ore are:

3,000 m^3/d of water with 650 mg/L chloride (1,300 mg/L TDS), plus
1,400 m^3/d of water with 3,700 mg/L chloride (7,200 mg/L TDS).

If necessary, 4,400 m^3/d of water of 7,200 mg/L TDS could be used. This could comprise a mixture of 350 m^3/d of 37,000 mg/L TDS water from Ambassador dewatering facilities with 4,050 m^3/d of water of salinity 4,500 mg/L TDS from a borefield at Kakarook North.

Recent exploration drilling in the Kakarook North area has delineated a south-east trending alluvial channel or basin with a saturated thickness of alluvium of up to 37 m over a length of about 6 km and width 2 to 5 km. The water is contained within graded alluvial sand/sandstone beds of Eocene age, and salinity is generally less than 5,000 mg/L TDS in the main basin/channel.

The volume of low-salinity groundwater stored in coarse sand/sandstone in the area of Kakarook North that has been drilled to date is estimated to be at least 30 GL. Individual bore yields could be 200 kL/d to 500 kL/d, and the total borefield capacity could be at least 3,000 kL/d. Water salinity is expected to average about 4,500 mg/L TDS. A programme of bore construction, test-pumping and numerical modelling is required to prove-up the water supply.

Desalination could be used to supplement the water supply, if necessary.

The only other known source of large, low-salinity groundwater supplies is the Lennis Sandstone in the Officer Basin, about 250 km north-east of Ambassador.

Dated: 16 July 2013 **Rockwater Pty Ltd**

P H Wharton
Principal

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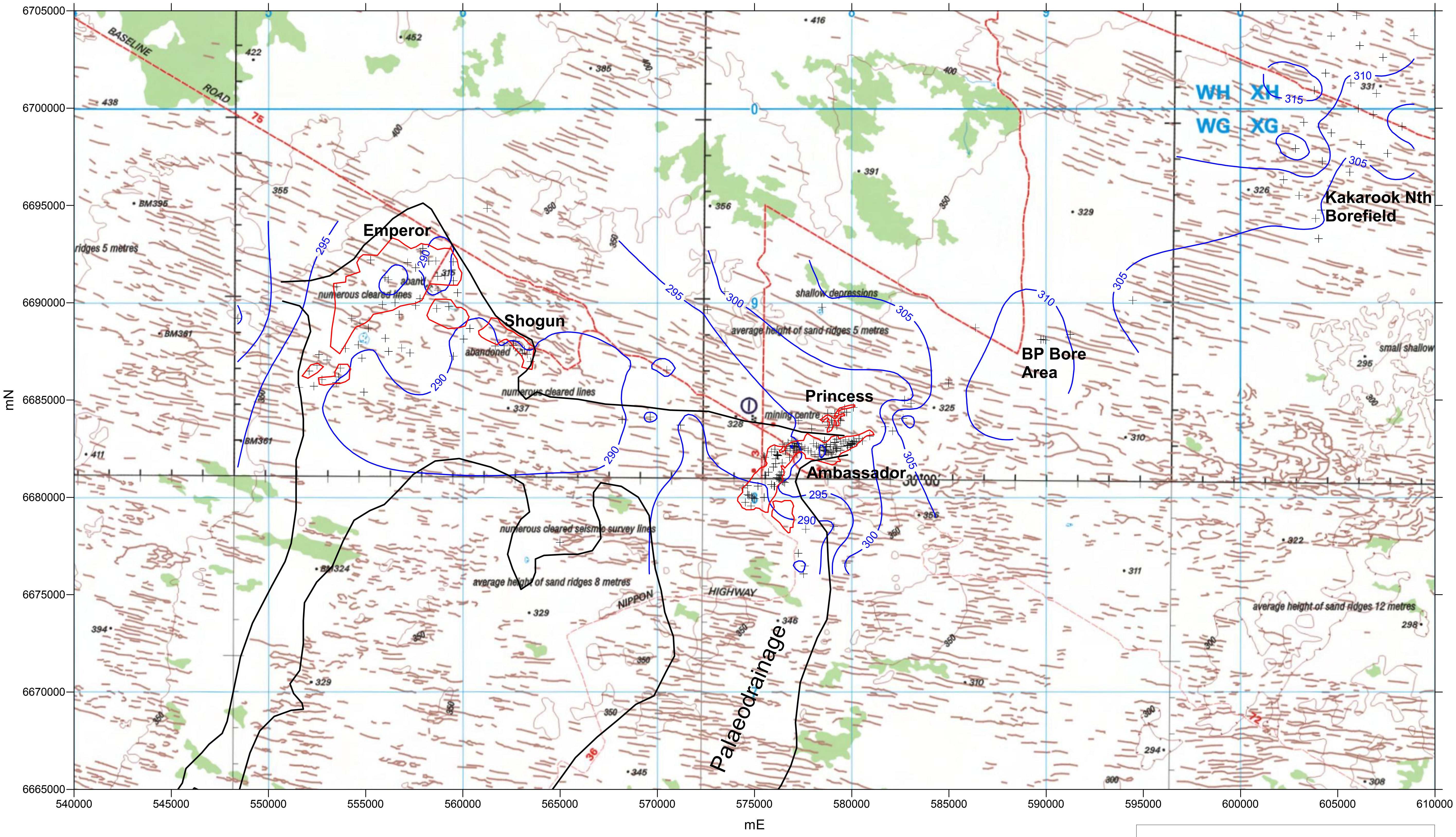
Figure 1



LOCALITY PLAN, AND REDUCED WATER LEVELS (m AHD)

MEASURED AT VARIOUS TIMES

CLIENT: Energy and Minerals Australia

PROJECT: Mulga Rock

DATE: June 2013

Dwg No.: 345-0/13/1-1

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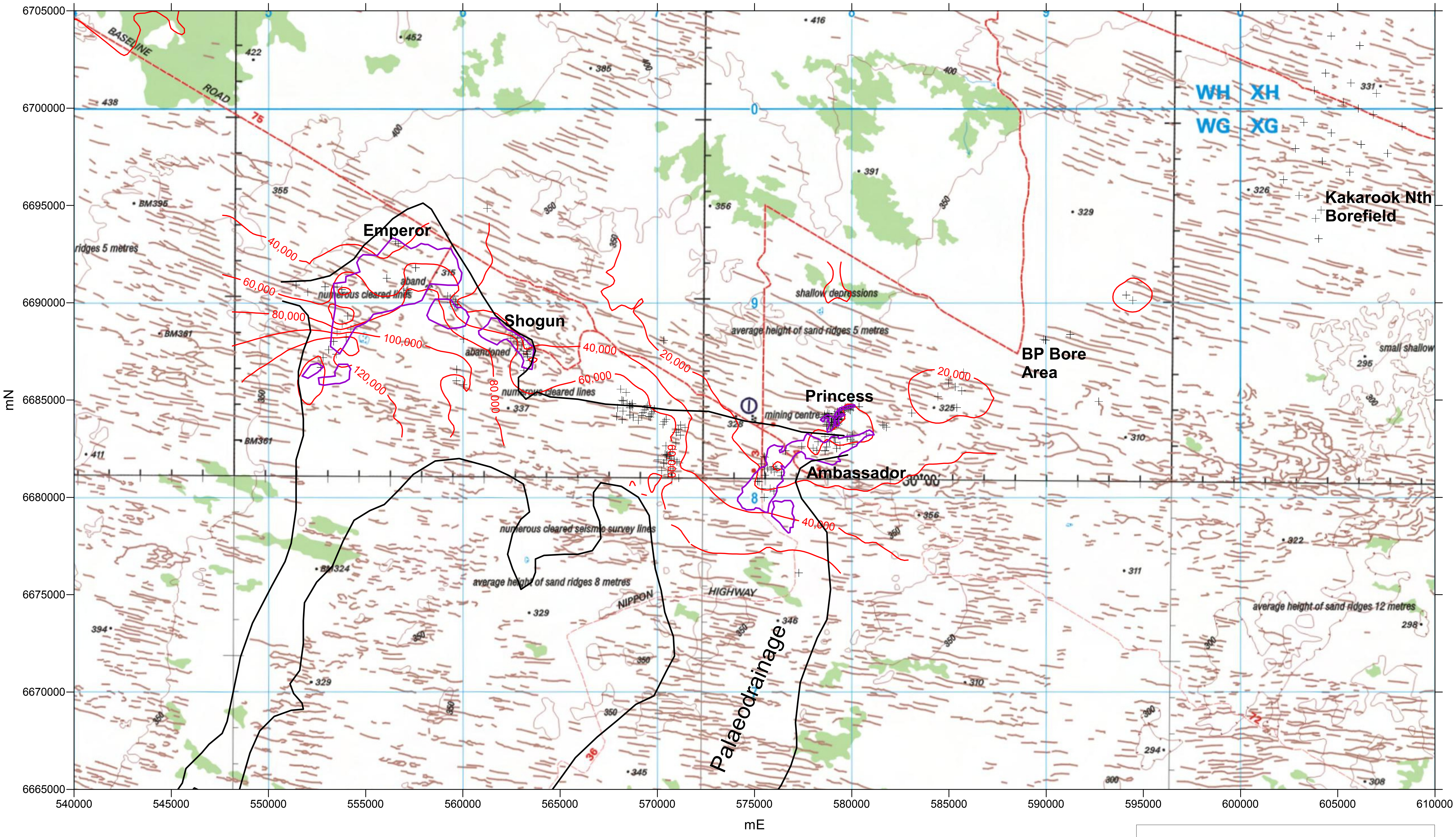
rlwls.srf

Figure 2



GROUNDWATER SALINITY (mg/L TDS)

MEASURED AT VARIOUS TIMES

CLIENT: Energy and Minerals Australia

PROJECT: Mulga Rock

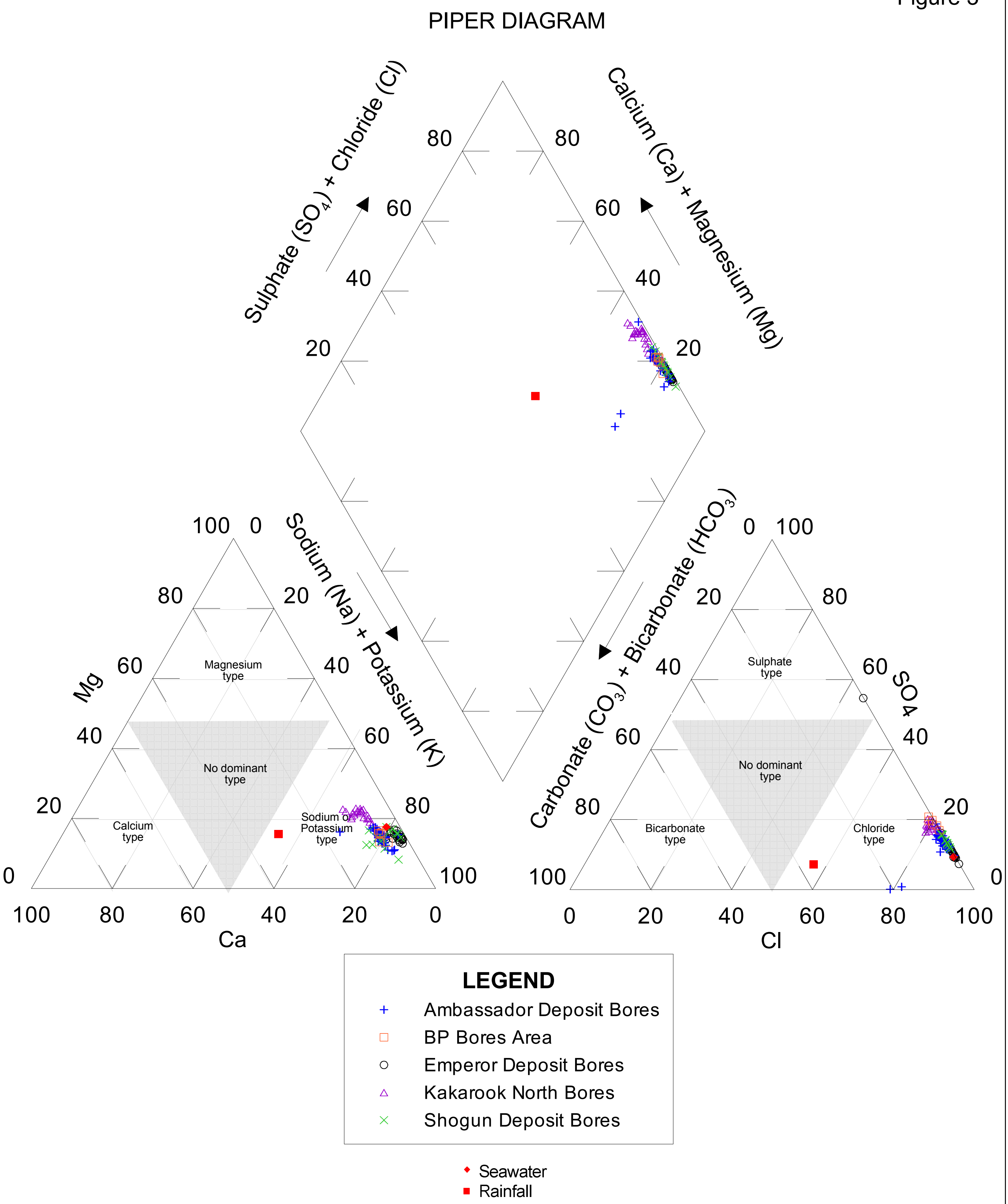
DATE: July 2013

Dwg No.: 345-0/13/1-2

Rockwater Pty Ltd

tds.srf

Figure 3



NB: Water chemistry data has been extracted from the excel file titled - 'Mulga Rock - Water Analysis - Compilation XM_May 2013_adopted.xlsx'

I:/236.19/Grapher/PIPER DIAGRAM All deposits.grf

Client: Energy and Minerals Australia

Project : Mulga Rock

Date : June 2013

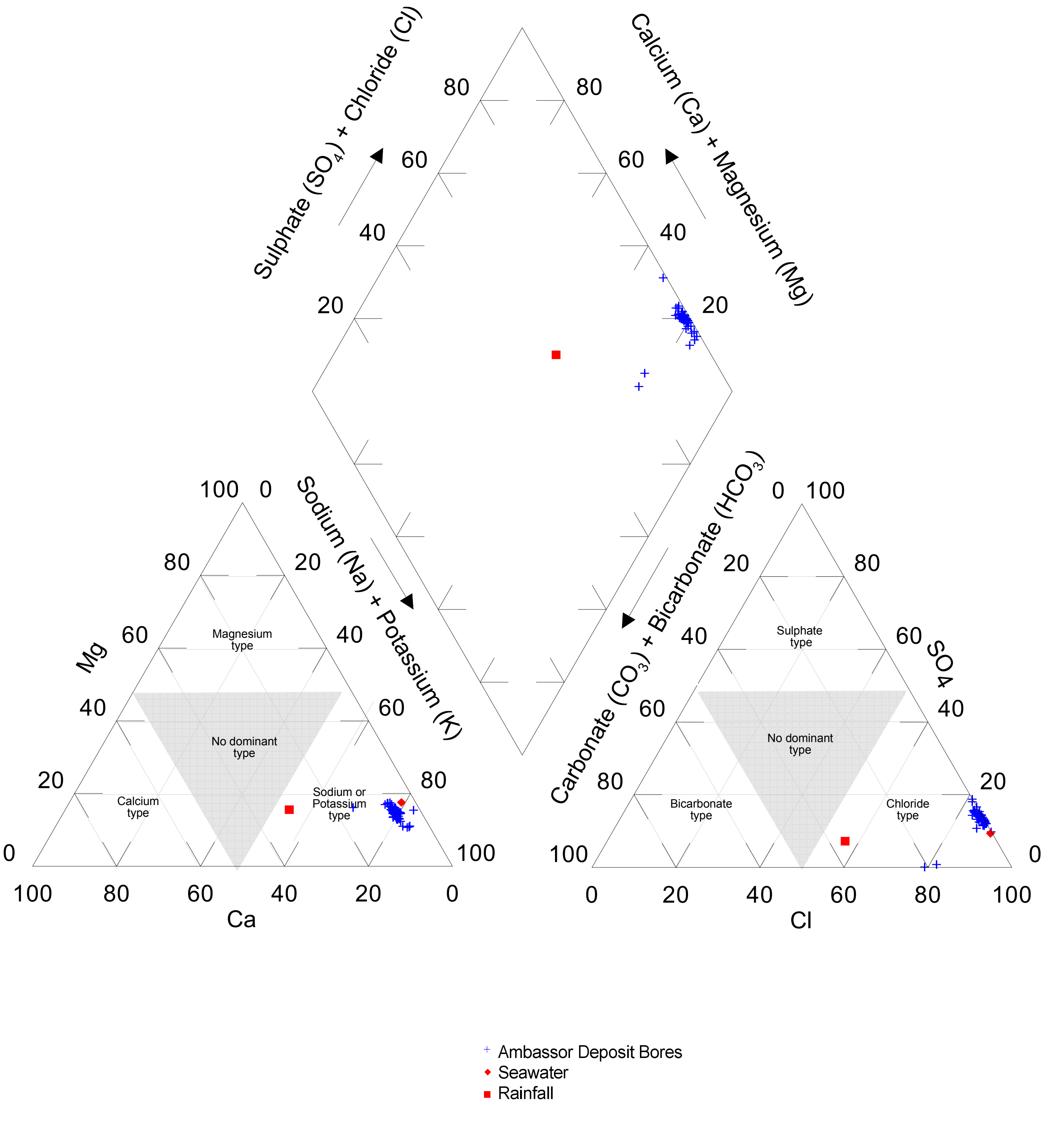
Dwg. No: 345-0/13/1-3

PIPER DIAGRAM
MULGA ROCK
WATER SAMPLES

Rockwater PROPRIETARY LIMITED

Figure 4

PIPER DIAGRAM



I:/236.19/Grapher/PIPER DIAGRAM AMB and PR deposit.grf

NB: Water chemistry data has been extracted from the excel file titled - 'Mulga Rock - Water Analysis - Compilation XM_May 2013_adopted.xlsx'

Client: Energy and Minerals Australia

Project : Mulga Rock

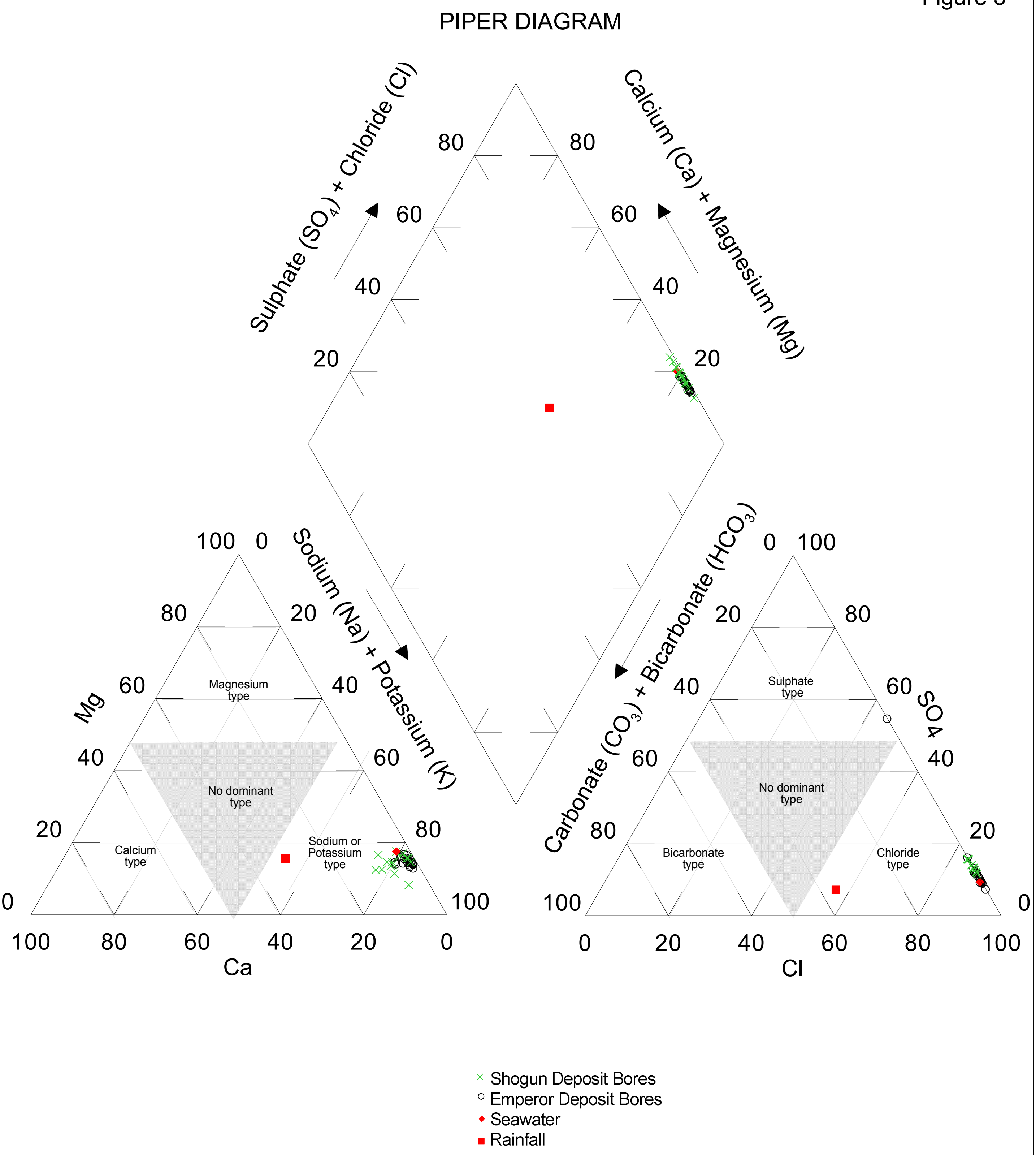
Date : June 2013

Dwg. No: 345-0/13/1-4

PIPER DIAGRAM
MULGA ROCK - WATER SAMPLES
AMBASSADOR AND PRINCESS DEPOSITS

Rockwater PROPRIETARY LIMITED

Figure 5



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NB: Water chemistry data has been extracted from the excel file titled - 'Mulga Rock - Water Analysis - Compilation XM_May 2013_adopted.xlsx'

Client: Energy and Minerals Australia

Project : Mulga Rock

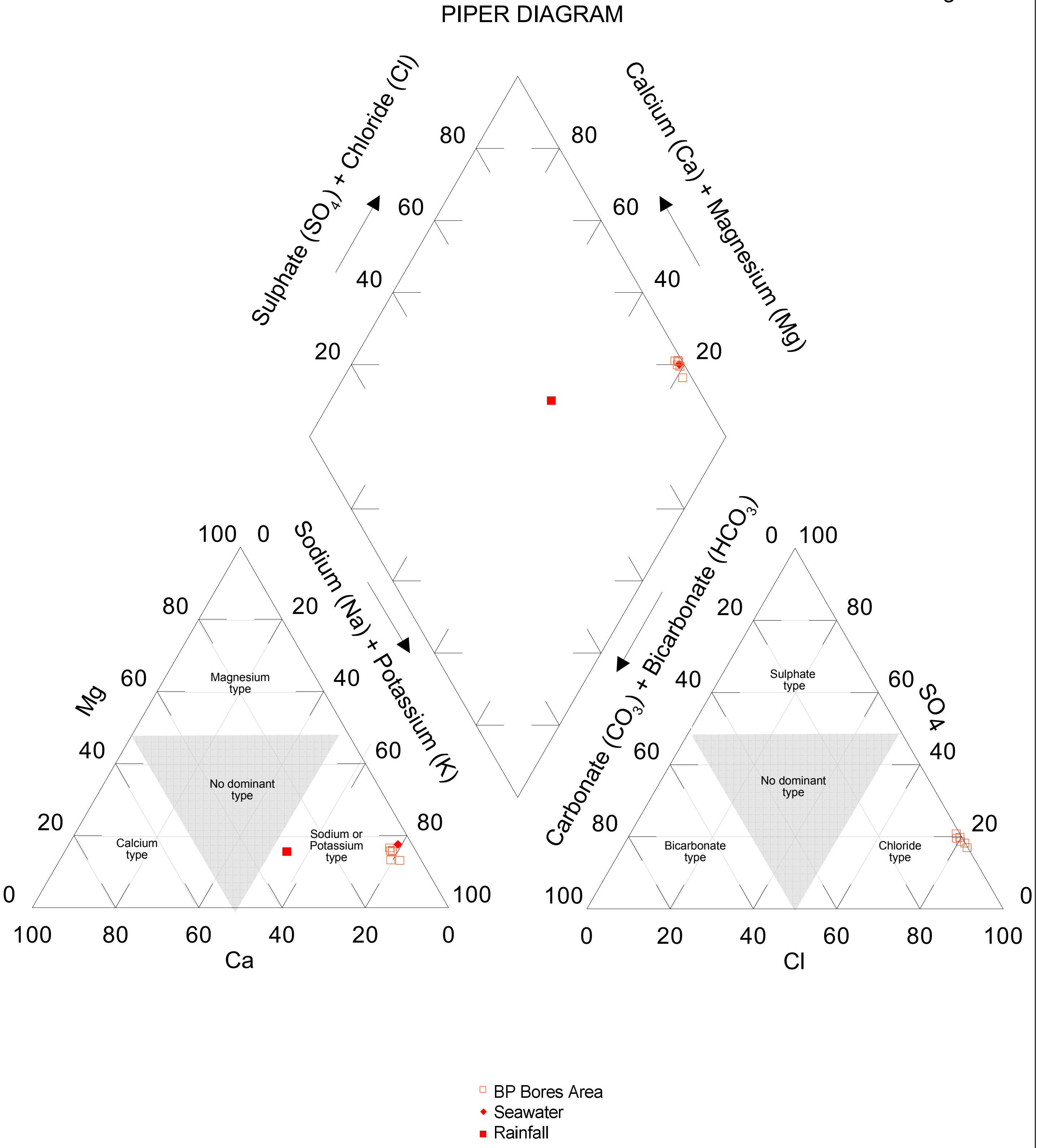
Date : June 2013

Dwg. No: 345-0/13/1-5

PIPER DIAGRAM
MULGA ROCK - WATER SAMPLES
EMPEROR AND SHOGUN DEPOSITS

Rockwater PROPRIETARY LIMITED

Figure 6



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NB: Water chemistry data has been extracted from the excel file titled - 'Mulga Rock - Water Analysis - Compilation XM_May 2013_adopted.xlsx'

Client: Energy and Minerals Australia

Project : Mulga Rock

Date : June 2013

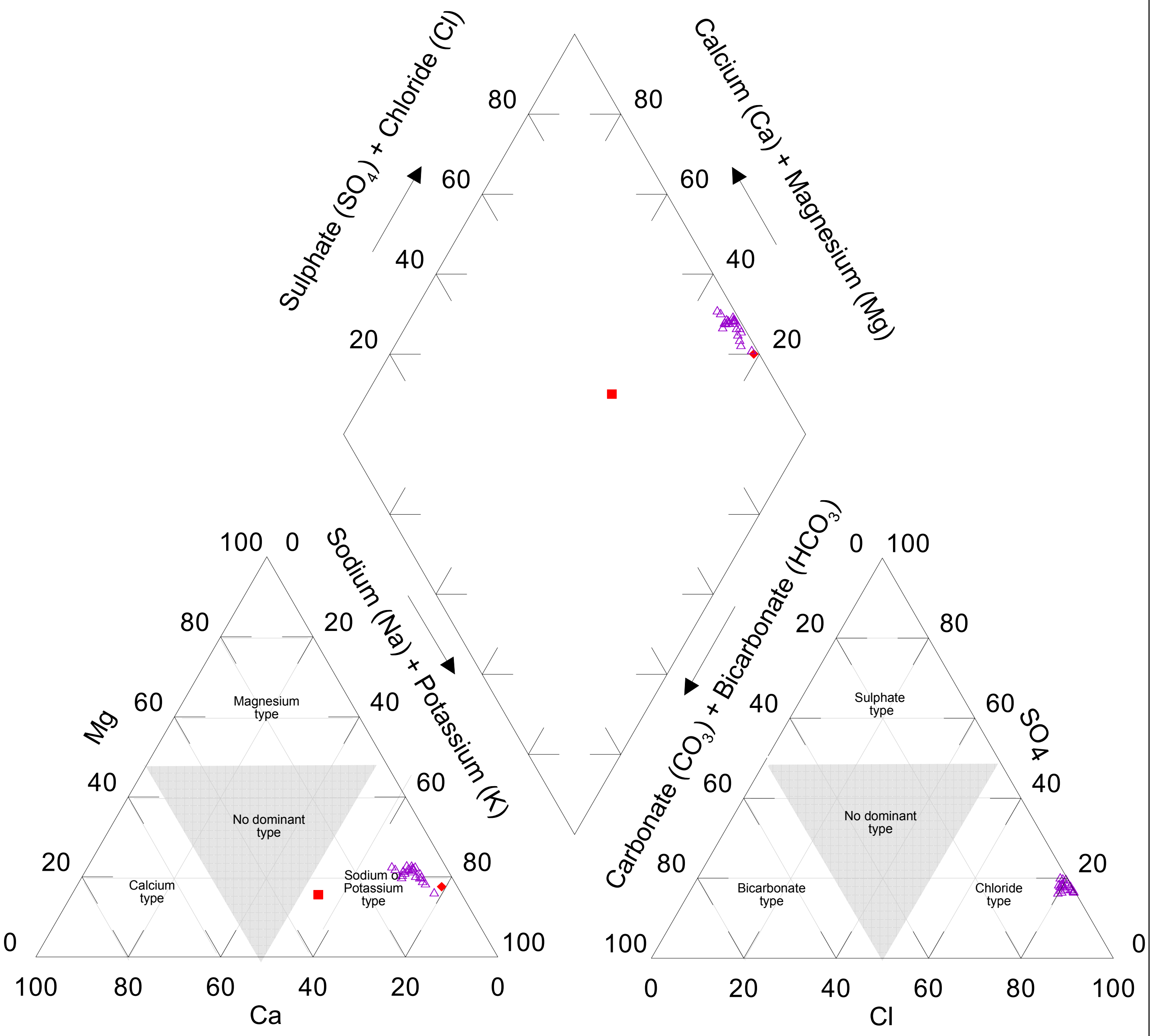
Dwg. No: 345-0/13/1-6

PIPER DIAGRAM
MULGA ROCK - WATER SAMPLES
BP BORE AREA

Rockwater PROPRIETARY LIMITED

Figure 7

PIPER DIAGRAM



I:/236.19/Grapher/PIPER DIAGRAM KAK deposit.grf

NB: Water chemistry data has been extracted from the excel file titled - 'Mulga Rock - Water Analysis - Compilation XM_May 2013_adopted.xlsx'

Client: Energy and Minerals Australia

Project : Mulga Rock

Date : June 2013

Dwg. No: 345-0/13/1-7

PIPER DIAGRAM
MULGA ROCK - WATER SAMPLES
KAKAROOK NORTH BORES

Rockwater PROPRIETARY LIMITED

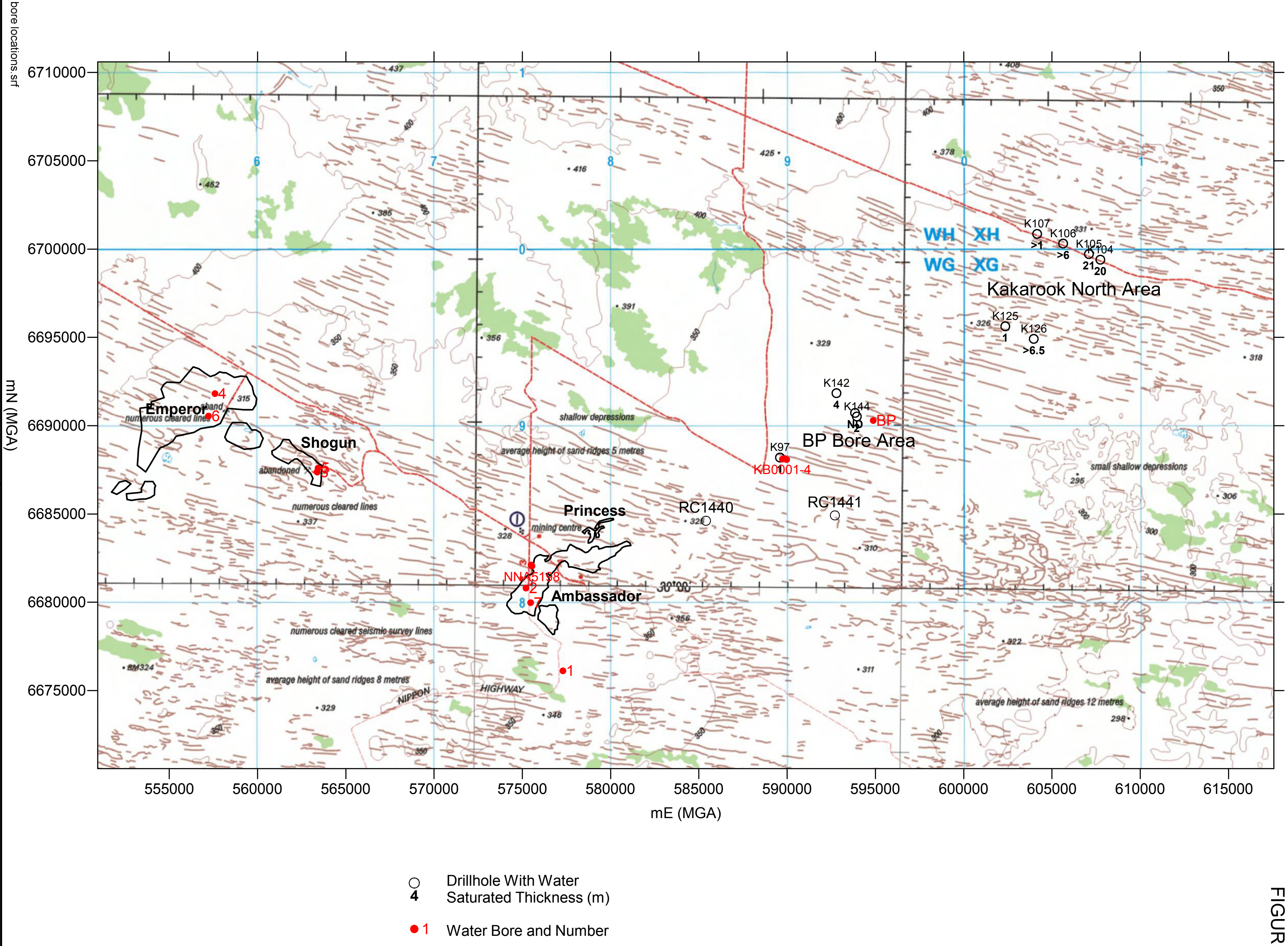


FIGURE 8

CLIENT: Energy and Minerals Australia

PROJECT: Mulga Rock Hydrogeology

DATE: July 2013

Dwg No: 345.0/13/1-8

BORE LOCATIONS, AND SATURATED AQUIFER THICKNESS

Rockwater Pty Ltd

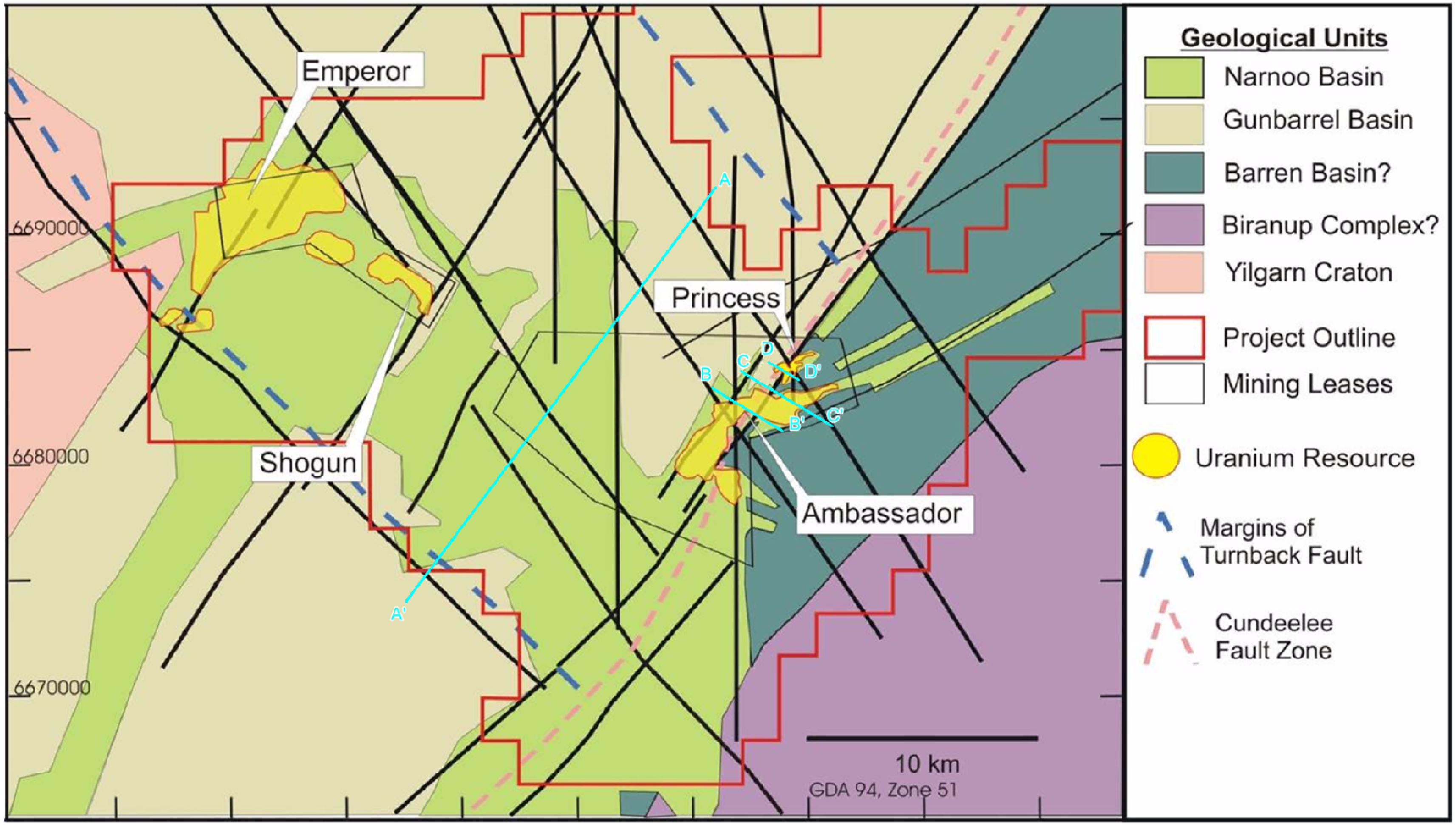
Figure 9


Princess Section 52,250N
DD
D'
NNA5597
NNA5551
NNA5550
NNA5552
NNA5549
NNA5553
NNA5546
NNA5554
NNA5547
NNA5555
NNA5548
NNA5746
NNA5747
Unit Qa
Unit J
Unit I
Unit H
Unit G1 - Possible Oxidised Upper Namoo
Oxidised Clays & Sands - Upper Namoo (formerly Unit F2)
Oxidised Clays & Sands - Upper Namoo (formerly Unit F1)
Lignitic Clay - Upper Namoo (formerly Unit E)
Reduced Clays & Sands - Upper Namoo (formerly Unit Dcb2)
Reduced Clays & Sands - Upper Namoo (formerly Unit Dcb1)
Unit C2
Blue/Grey Clay - Unit A2
Black Shale - MesoProterozoic
Reduced Sediments - Capillarity Zone
Reduced Sediments - Submerged
Drill Hole
Fault
Water Table
0
150m
Princess Section 52,250N
D
D'
NNA5597
NNA5551
NNA5550
NNA5552
NNA5549
NNA5553
NNA5546
NNA5554
NNA5547
NNA5555
NNA5548
NNA5746
NNA5747
Unit Qa
Unit J
Unit I
Unit H
Unit G1 - Possible Oxidised Upper Namoo
Oxidised Clays & Sands - Upper Namoo (formerly Unit F2)
Oxidised Clays & Sands - Upper Namoo (formerly Unit F1)
Unit C2
Blue/Grey Clay - Unit A2
Black Shale - MesoProterozoic
Reduced Sediments - Capillarity Zone
Reduced Sediments - Submerged
Drill Hole
Fault
Water Table
0
150m

Figure 10

SECTION N30
A
A'
RC0356
RC1335
RC0353
RC0106
NNA5025
NNA5511
AC1003
RC0330
RC0632
NNA5694
NNA5692
NNA5697
NNA5689
RC0652
RC0294
RC0059
RC0284
RC0274
AC0961
RC1358
RC0674
RC0097
RC0676
RC0387
Post Narnoo Sediments
Unit I
Unit G1
Upper Narnoo
Lower Narnoo
Unit A5
Reduced Sediments - Capillarity Zone
Reduced Sediments - Submerged
Drill Hole
Fault
Water Table
0
1
2
3
4 kms
Ambassador Section 50,000N
B
B'
RC1034
RC1169
RC1302
NNA5217
AC1035
NNA5766
NNA5215
NNA5214
NNA5213
NNA5209
NNA5210
NNA5211
NNA5212
RC1167
RC1037
CD1253
AC1036
CD1491
RC1166
RC1301
Unit Qa
Unit H
Unit G2
Unit G1 - Possible Oxidised Upper Narnoo
Oxidised Clays & Sands - Upper Narnoo (formerly Unit F2)
Oxidised Clays & Sands - Upper Narnoo (formerly Unit F1)
Lignitic Clay - Upper Narnoo (formerly Unit E)
Lignite - Upper Narnoo (formerly Unit E)
Reduced Clays & Sands - Upper Narnoo (formerly Unit Dcb)
Unit C2
Unit A5 - Paterson Formation
Blue/Grey Clay - Unit A2
Black Shale - MesoProterozoic
Chert - MesoProterozoic
Reduced Sediments - Capillarity Zone
Reduced Sediments - Submerged
Drill Hole
Fault
Water Table
0
500m
Ambassador Section 51,450N
C
C'
RC1293
RC1291
RC1315
RC1316
NNA5736
NNA5758
NNA5735
NNA5734
NNA5733
NNA5328
NNA5333
NNA5275
NNA5274
NNA5284
NNA5283
NNA5282
NNA5281
NNA5267
NNA5268
NNA5278
NNA5279
NNA5280
CD1496
RC1466
RC1465
Unit Qa
Unit J
Unit I
Unit H
Unit G2
Unit G1 - Possible Oxidised Upper Narnoo
Oxidised Clays & Sands - Upper Narnoo (formerly Unit F2)
Oxidised Clays & Sands - Upper Narnoo (formerly Unit F1)
Lignitic Clay - Upper Narnoo (formerly Unit E)
Lignite - Upper Narnoo (formerly Unit E)
Lignitic Sand - Upper Narnoo (formerly Unit E)
Reduced Clays & Sands - Upper Narnoo (formerly Unit Dcb)
Moderately Reduced, Non-Carbonaceous Clays - Possible Lower Narnoo (formerly Dws)
Unit C2
Unit C1
Blue/Grey Clay - Unit A2
Black Shale - MesoProterozoic
Chert - MesoProterozoic
Quartzite - MesoProterozoic
Reduced Sediments - Capillarity Zone
Reduced Sediments - Submerged
Drill Hole
Fault
Water Table
0
500m

FIGURE 11



Section Lines (Figs 9 & 10) shown in blue

(Plan provided by PMA)

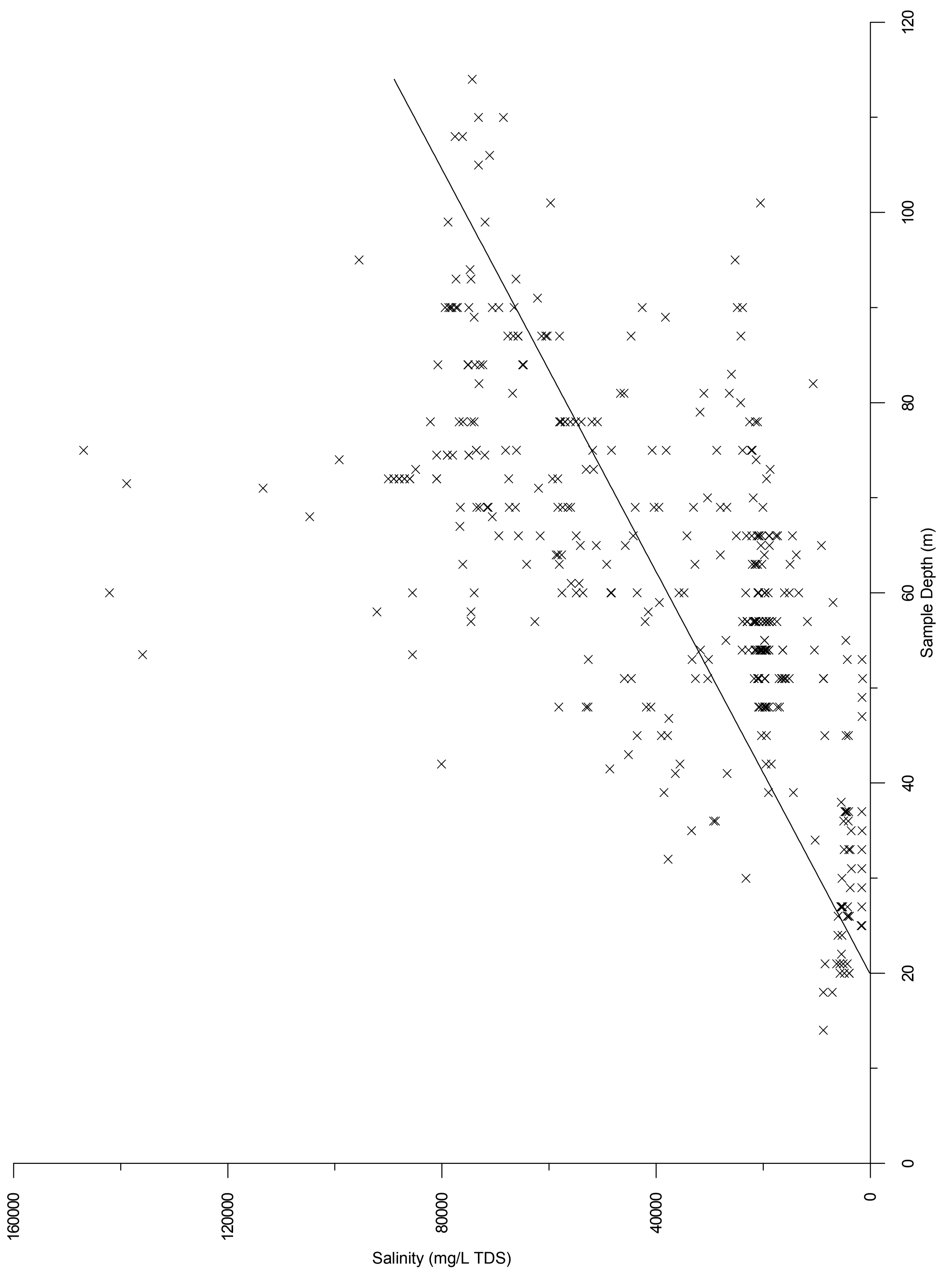
section lines & structure.srf

CLIENT: Energy and Minerals Australia
PROJECT: Mulga Rock Hydrogeology
DATE: July 2013
Dwg No: 345.0/13/1-11

SECTION LINES AND GEOLOGICAL STRUCTURE

Rockwater Pty Ltd

FIGURE 12



Client:	Energy and Minerals Australia
Project:	Mulga Rock Hydrogeology
Date:	July 2013
Dwg. No:	345-0/13/1-12

SALINITY (mg/L) VERSUS SAMPLE DEPTH (m)

MULGA ROCK DEPOSITS

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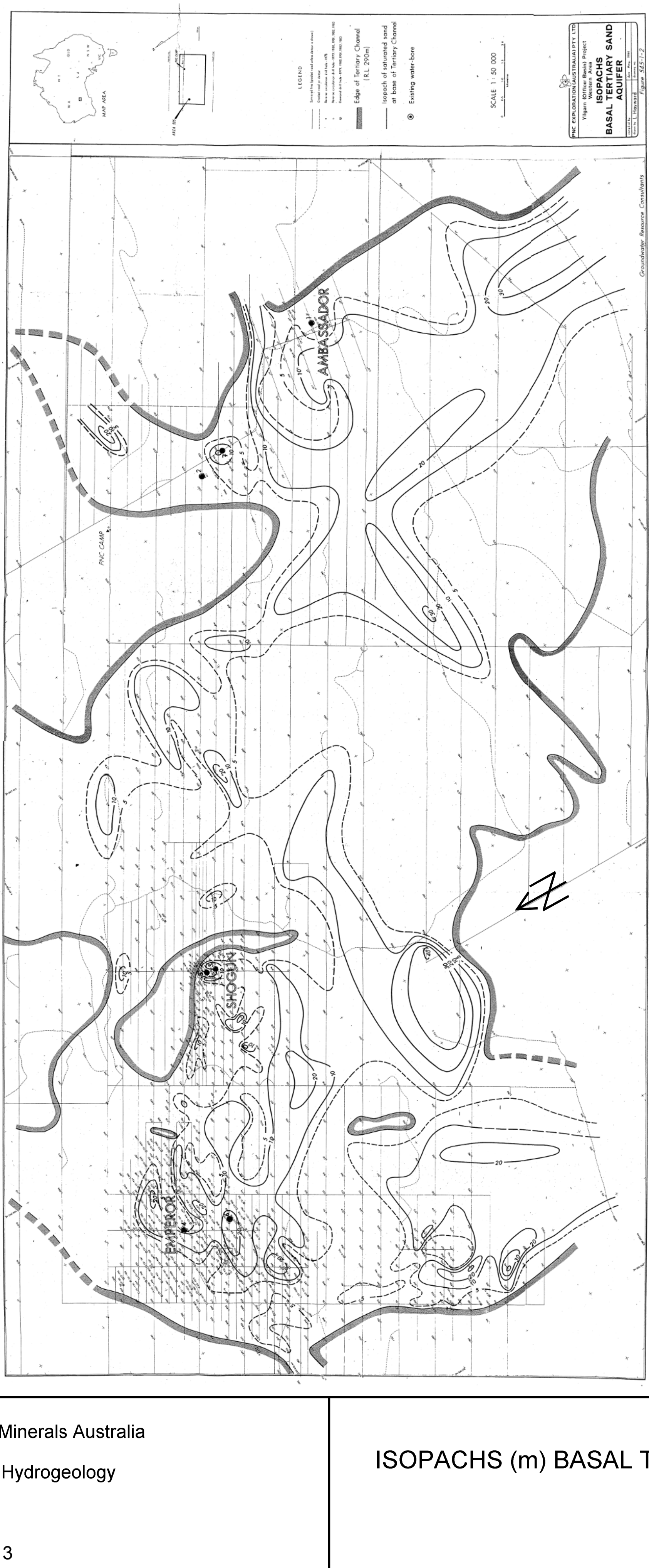
FIGURE 13



(From GRC, 1984)

sand isopach.srf

CLIENT: Energy and Minerals Australia

PROJECT: Mulga Rock Hydrogeology

DATE: July 2013

Dwg No: 345.0/13/1-13

ISOPACHS (m) BASAL TERTIARY SAND

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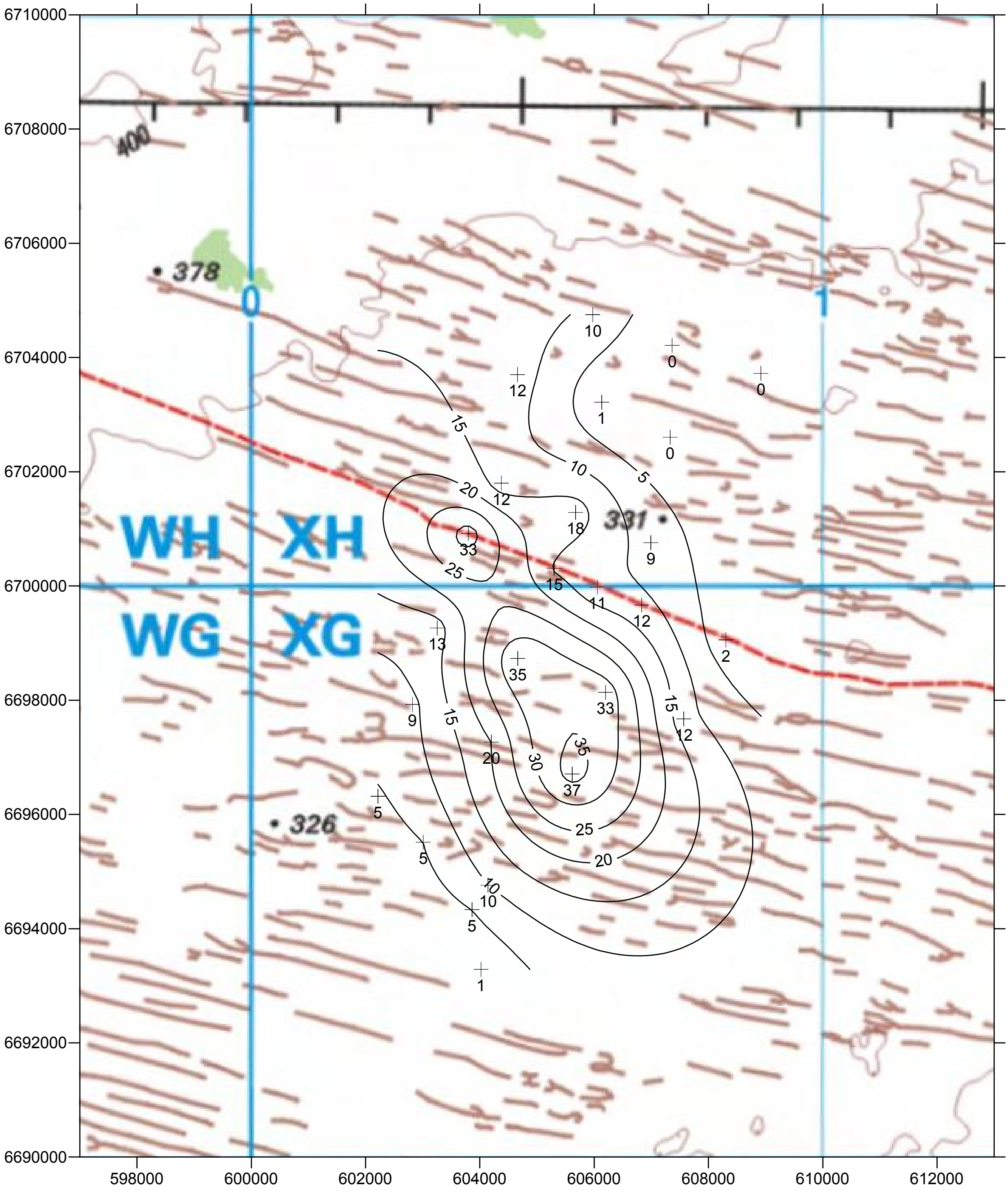
FIGURE 14



kakarook aq thick.srf

CLIENT: Energy and Minerals Australia

PROJECT: Mulga Rock

DATE: June 2013

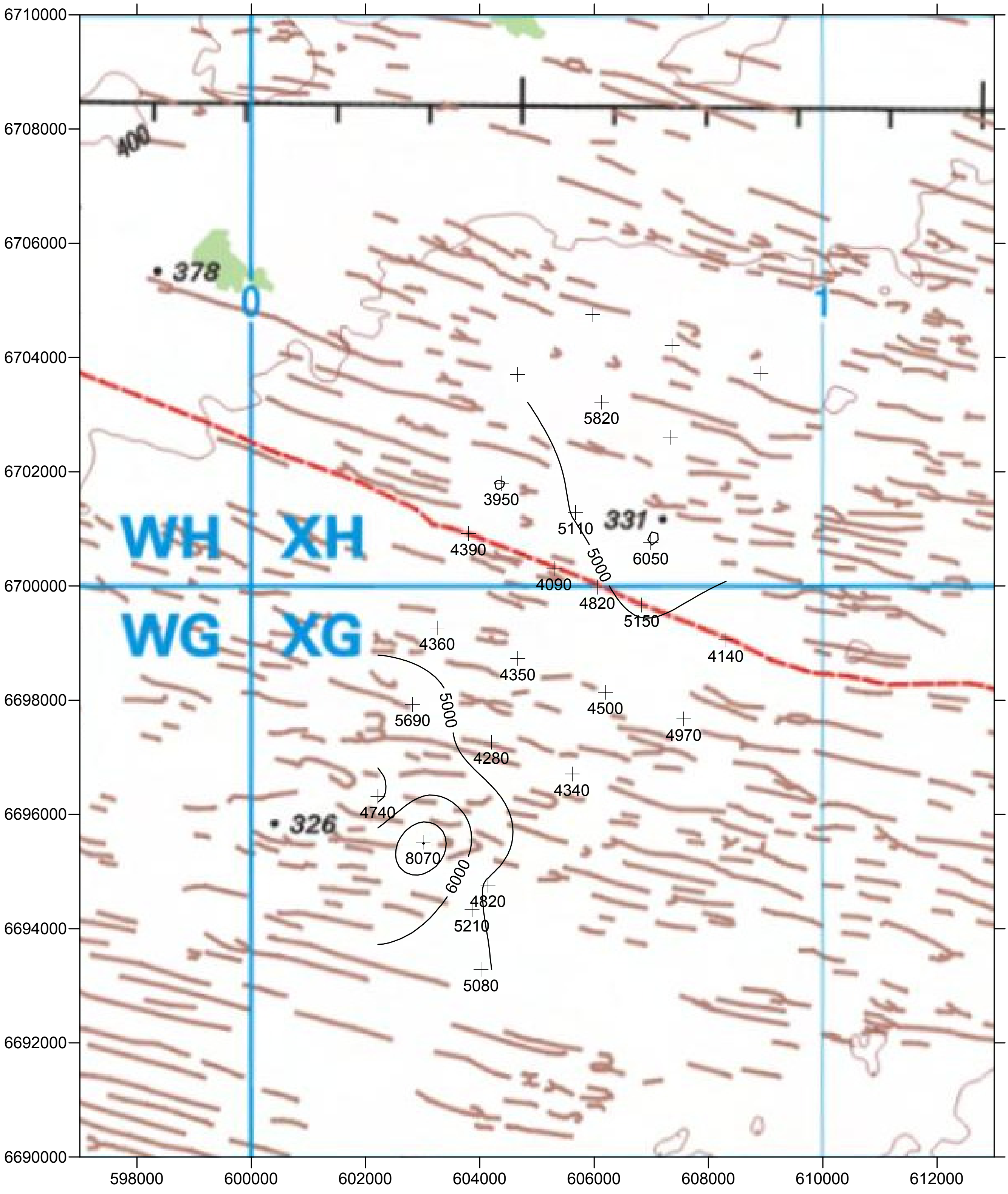
Dwg No: 345-0/13/1-14

AQUIFER THICKNESS (m)

KAKAROOK NORTH BOREFIELD

Rockwater Pty Ltd

FIGURE 15



kakarook tds.srf

CLIENT: Energy and Minerals Australia

PROJECT: Mulga Rock

DATE: June 2013

Dwg No: 345-0/13/1-15

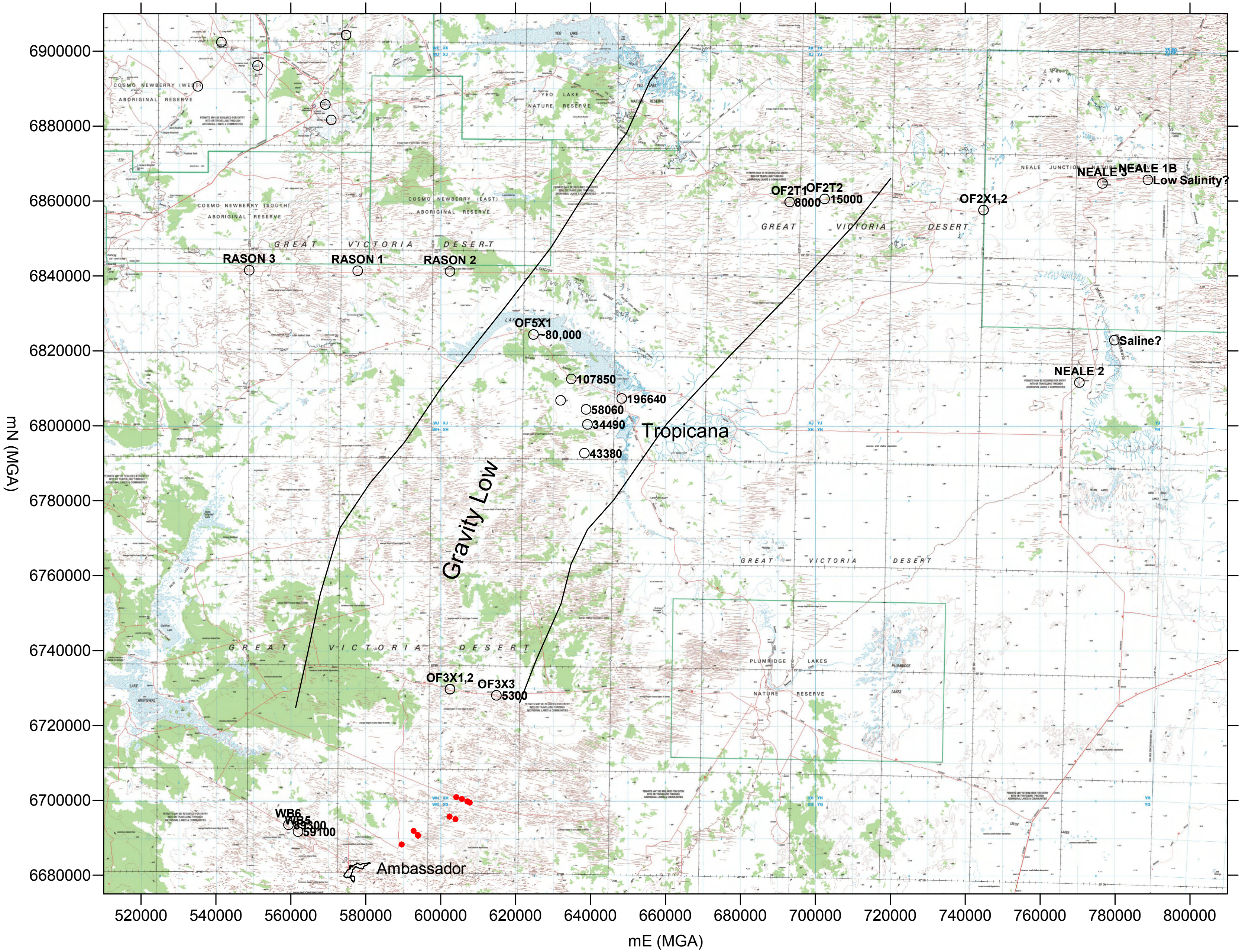
FIELD SALINITY (mg/L TDS)

KAKAROOK NORTH BOREFIELD

Rockwater Pty Ltd

CLIENT: Energy and Minerals Australia
PROJECT: Mulga Rock Hydrogeology
DATE: June 2013
Dwg No: 345.0/13/1-16

WIN TDS.srf



○ 40,000 Bore Salinity (mg/L TDS)

● Low-Salinity Drillhole

BORE SALINITY (mg/L TDS), WIN DATABASE AND OTHER SOURCES

FIGURE 16

Rockwater Pty Ltd

APPENDIX I

APPENDIX I-a
Emperor and Shogun Raw Water Chemistry Data

Hole ID	Date Sampled	GDA East	GDA North	Ca	Mg	Na	K	Cl	HCO3	SO4	NO3	RL	Sample DEPTH	Sample RL	T.F.R.	TDS	Cond	pH	ORP	Hard	Alkalinity	OH	Fe	Al	F	Si	Br	I	U	Th	Au	As_Sol	Ba_Sol	Cd_Sol	Cr_Sol	Cu_Sol	Co_Sol	Pb_Sol	Mn_Sol	Ni_Sol	Sb_Sol	Sr	Zn	V_Sol	W
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	m AHD	m	m AHD	mg/L	mg/L	µS/cm		mV	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	ug/l	ug/l	ug/L	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
AC1139	27/3/1984	550163	6690138	483	1,635	14,880	453	25,420	15	3,844	14.4	351.8					73,500	6.70					1.8																						
AC1138	27/3/1984	550748	6690109	488	1,585	14,880	448	25,210	37	3,522	16.6	346.7					73,900	7.10					2.6																						
AC1051		551420	6690908									346.2	65	281.2	45,760	45,760		7.82											<5	<5															
AC1050		552025	6690548									342.4	53	289.4	52,670	52,670		7.75											<5	6															
AC1204	8/07/1984	552690	6686672	535	3,995	45,000	935	75,620	<0.6	13,600	2.8	325.9	75	250.9	146,900	146,900	229,600	4.03					190						<5	<5															
AC1203	8/07/1984	552809	6687176	535	3,945	44,380	925	73,840	<0.6	13,480	2	328.1	?		139,500	139,500	218,000	3.27					140						<5	9															
AC0865	25/1/1984	552822	6690867	561	2,030	21,550	625	34,440	<.6	7,542	2.2	335.6	64.5	271.1			103,700	4.20					110		0.7	35			30																
AC0865	25/1/1984	552822	6690867	661	2,355	28,050	670	44,590	<.6	7,302	2	335.6	73	262.6			128,800	3.80					2.6		0.8	25			30																
NNA5707	Feb-12	552911	6690815									334.4	60	274.4		43,552	77,649	4.54																											
AC1201	8/07/1984	553097	6687579	535	3,895	44,380	925	74,550	<0.6	13,440	0.5	322.3	71.5	250.8	138,900	138,900	217,000	3.44					34.5						<5	<5															
AC1200	8/07/1984	553353	6688015	535	3,745	40,630	805	68,870	<0.6	13,090	0.7	320.9	53.5	267.4	135,900	135,900	212,400	3.57					26						<5	<5															
AC1202	8/07/1984	553492	6687354	560	2,895	28,500	540	48,990	<0.6	9,262	1.1	319.4	74	245.4	99,200	99,200	155,000	3.65					11						7	7															
NNA5708	Feb-12	553528	6690810									334.7	72	262.7		67,522	117,939	3.50																											
AC1198	8/07/1984	553529	6688496	350	2,645	27,000	535	46,150	<0.6	8,178	1	320.0	58	262.0	92,160	92,160	144,000	3.87					10						<5	<5															
NNA5709	Feb-12	553775	6690673									332.6	59	273.6		39,387	70,424	3.68																											
NNA5709	Feb-12	553775	6690673									332.6	95	237.6		95,487	164,689	3.34																											
AC1196	8/07/1984	553797	6688914	268	1,098	11,750	328	19,880	2	2,890	0.9	318.6	58	260.6	41,470	41,470	64,800	5.16					2.9						<5	<5															
AC1199	8/07/1984	553996	6688207	535	3,895	43,130	925	72,420	<0.6	13,020	0.9	312.8	60	252.8	142,100	142,100	222,000	3.20					27						<5	6															
AC1195	8/07/1984	554080	6689319	318	1,323	13,750	358	23,080	1	3,846	0.4	323.4	41.5	281.9	48,640	48,640	76,000	4.69					2.1						<5	<5															
AC1197	8/07/1984	554243	6688648	340	2,395	25,500	535	42,600	<0.6	6,467	2.1	313.9	53.5	260.4	85,500	85,500	133,600	3.65					18						<5	<5															
CD0737	27/9/1982	555622	6691014	232	947	10,800	224	17,680	121	2,460	0.1	324.6					55,600	7.60					1.2		0.3	<2																			
AC1246		556088	6691253									327.5	46.8	280.7	37,630	37,630		3.77											<5	<5															
NNA5710	Feb-12	556539	6693155									334.9	60	274.9		35,732	64,559	3.60																											
NNA5711	Feb-12	556682	6693055									335.4	60	275.4		34,797	62,434	3.48																											
MSWB003	16/02/2012	556958	6690702	340	1,800	19,000	580	31,000	4	4,000	<0.1	318.4	78	240.4		57,000	94,000	5.00		8200	4	<1	13											<0.1		<0.25		<0.01	0.67						
MSWB003	24/07/2012	556958	6690702									318.4	78	240.4		57,000	78,000	4.80																											
MSWB003	20/08/2012	556958	6690702									318.4	78	240.4		55,000	76,000	4.70																											
MSWB003	17/09/2012	556958	6690702									318.4	78	240.4		56,000	83,000	4.70																											
MSWB003	28/10/2012	556958	6690702	600	1,500	16,000	610	26,000	6	2,800		318.4	78	240.4		57,000	82,000	4.80		6800	6	<5	9.6	3.9								<0.05		<0.01		<0.01	0.05	<0.03		0.09			0.23		
MSWB003	26/11/2012	556958	6690702									318.4	78	240.4		58,000	81,000	4.50																											
MSWB003	22/01/2013	556958	6690702									318.4	78	240.4		52,000	74,000	4.50																											
CD0735	27/11/1984	557121	6690615	550	550	28,100	695	48,200	<5	8,560	20	317.5					105,000	4.10					6.8																						
CD0735	Late 1990-Mid 1991	557121	6690615	457	3,269	30,342	685	50,900	155	9,570		317.5				95,423		5.82	108				50	0.8		3.3	71.4	0.94	<2		0.004		0.025		<0.002	0.012	<0.005	0.008	1.8	0.02	<0.005	8.8	0.015	<0.002	<0.0015
MSWB001	17/02/2012	557176	6690643	480	2,500	26,000	880	40,000	<1	5,600	<1	317.3	74.5	242.8		78,000	124,900	4.40		12000	<1	<1	13											0.0033		0.006		0.85	2.8						
MSWB001	24/07/2012	557176	6690643									317.3	74.5	242.8		79,000	102,100	4.00																											
MSWB001	20/08/2012	557176	6690643									317.3	74.5	242.8		72,000	100,000	3.90																											
MSWB001	17/09/2012	557176	6690643									317.3	74.5	242.8		79,000	108,130	3.90																											
MSWB001	28/10/2012	557176	6690643	420	2,300	23,000	870	40,000	<5	5,100		317.3	74.5	242.8		75,000	108,766	4.20		11000	<5	<5	0.25	8.2								<0.05		<0.01		<0.01	0.01	0.54		0.02			0.08		
MSWB001	26/11/2012	557176	6690643									317.3	74.5	242.8		81,000	110,000	3.90																											
MSWB001	22/01/2013	557176	6690643									317.3	74.5	242.8		75,000	96,000	3.80																											
MSWB002	14/11/2011	557225	6690545									317.0	72	245.0		86,000	130,000	4.00																											
MSWB002	22/01/2012	557225	6690545	470	2,900	28,000	1,000	45,000	4	7,600	<2	317.0	72	245.0		88,000	168,000	5.20		13000		<1	10											0.002		9.6		0.56	1						
MSWB002	16/02/2012	557225	6690545	510	3,200	32,000	860	45,000	2	7,700	<0.1	317.0	72	245.0		87,000	142,200	5.80		15000	2	<1	83											<0.1		3		0.021	1.4						
MSWB002	18/03/2012	557225	6690545									317.0	72	245.0		88,000	153,600	5.70																											
MSWB002	15/04/2012	557225	6690545									317.0	72	245.0		88,000	143,000	6.00																											
MSWB002	14/05/2012	557225	6690545	470	2,500	25,000	920	4,700	5	7,700	<0.1	317.0	72	245.0		89,000	144,400	5.80		12000	5	<5	13									<0.03		0.009		2.6	0.011	0.18	0.98	0.68			26		
MSWB002	14/05/2012	557225	6690545						5			317.0	72	245.0							5	<5																							
MSWB002	28/06/2012	557225	6690545									317.0	72	245.0		87,000	146,400	6.00																											
MSWB002	24/07/2012	557225	6690545									317.0	72	245.0		90,000	108,400	6.00																											
MSWB002	20/08/2012	557225	6690545									317.0	72	245.0		86,000	108,400	5.70																											
MSWB002	17/09/2012	557225	6690545									317.0	72	245.0		89,000	117,884	6.00																											
MSWB002	28/10/2012	557225	6690545	440	2,600	25,000	930	46,000	21	6,300		317.0	72	245.0		81,000	113,272	5.70		12000	21	<5	34	1.6								<0.05		<0.01		0.14	<0.01	<0.03		<0.02			0.76		
MSWB002	22/01/2013	557225	6690545									317.0	72	245.0		81,000	103,170	6.20																											
RC0885		557572	6691797									321.4			78,000	83,600																													
RC0502		557575	6691799									321.4	67	254.4	76,670	76,670		4.15											10	<5															
RC0502	15/7/1983	557575	6691799	600	2,350	21,800	464	37,060	4	6,300	0.7	321.4					117,200	5.10					7.9		0.2	25																			
RC0502	25/11/1983	557575	6691799	504	2,150	22,900	509	39,050	<.6	6,949	2.1	321.4					120,200	3.90					22						15																
RC0502	31/10/1984	557575	6691799	620	620	21,800	515	37,400	<5	6,790	18	321.4					87,000	4.00					7																						
RC0502	Late 1990-Mid 1991	557575	6691799	511	1,930	19,066	444	32,900	24	5,920		321.4				60,854		5.11	108				39	0.7		10.7	30.9	0.63	<2		0.002		0.026		0.012	0.004	<0.005	0.017	0.95	0.07	<0.005	7.7	0.155	<0.002	<0.0015
CD0723	27/9/1982	557699	6691244	252	1,160	14,400	251	22,930	<.6	3,070	0.2	316.7					71,200	4.00					2.1		0.6	<2																			
NNA5699	Feb-12	559222	6690338									315.7	63	252.7		76,107	132,644	3.34																											
NNA5700	Feb-12	559348	6690242									314.9	42	272.9		80,102	139,359	3.51																											
NNA5700	Feb-12	559348	6690242									314.9	69	245.9		33,012	59,289	3.45																											
NNA5703	Feb-12	559383	6690004									308.0	34	274.0		10,317	19,509	2.97																											
NNA5703	Feb-12	559383	6690004									308.0	58	250.0		74,577	130,349	3.43																											
NNA5701	Feb-12	559502	6690171									312.7	24	288.7		6,067	11,689	3.95																											
NNA5701	Feb-12	559502	6690171									312.7	60	252.7		73,982	128,734	3.29																											
NNA5702	Feb-12	559580	6690341									315.8	30	285.8		23,237	42,459	3.60																											
NNA5702	Feb-12	559580	6690341									315.8	68	247.8		70,582	123,209	3.65																											
NNA5705	Feb-12	559580	6689903									308.0	36	272.0		29,272	52,829	2.89																											
NNA5705	Feb-12	559580	6689903									308.0	57	251.0		74,577	128,989	3.29																											
NNA5698	Feb-12	559640	6690073									309.0	39	270.0		38,537	68,894	3.57																											
NNA5698	Feb-12	559640	6690073									309.0	45	264.0		39,047	69,999	3.55																											
AC1192	8/07/1984	559672	6685994	475	2,545	25,000	500	41,890	1	7,399	1.4	318.0	60	258.0	85,500	85,500	133,600	3.98					22						<5	<5															
AC1191	8/07/1984	559685	6686563	485	3,195	34,500	675	56,090	1	10,330	1.2	318.5	71	247.5	113,400	113,400	177,200	3.56					19						<5	<5															
NNA5704	Feb-12	559709	6689880									308.2	36	272.2		28,932	52,404	3.50																											
AC1193	8/07/1984	560019	6685786	460	3,095	30,500	595	51,120	1	10,100	1	323.3	68	255.3	104,700	104,700	163,600	3.85					23.5						<5	5															
RC1194	8/07/1984	560043	6688135	475	2,595	23,500	445	39,050	1	8,100	1.5	312.8	?		81,280	81,280	127,000	3.70					22						<5	<5															
AC0891	25/1/1984	560339	6689173	636	1,030	11,030	292	17,470	<.6	4,562	4.6	308.2	35.5	272.7			56,400	4.00					16		0.2	40			<10																
RC1329	1985	561251	6694849	710	1,200	12,350	250	21,160	166	3,870	12.3	349.2	Composite			41,340		7.90					<0.05						<5	<5															
RC1329	28/10/1985	561251	6694849									349.2	65	284.2		51,200	80,000	6.70																											
RC1329	28/10/1985	561251	6694849									349.2	75	274.2		40,768	63,700	6.20																											
NNA5719	Feb-12	562475	6688171									317.8	48	269.8		52,732	93,374	3.22																											
NNA5719	Feb-12	562475	6688171									317.8	69	248.8		72,962	127,374	2.99																											
NNA5713	Feb-12	562564	6688343									318.4	42	276.4		35,562	64,134	3.54																											
NNA5713	Feb-12	562564	6688343									318.4	51	267.4		44,657	79,434	3.41																											
NNA5718	Feb-12	562769	6687990									323.3	69	254.3		73,472	128,394	3.17																											
NNA5718	Feb-12	562769	6687990									323.3	78	245.3		76,787	133,834	2.91																											
NNA5714	Feb-12	562817	6688183									319.2	45	274.2		43,552	77,564	3.63																											
NNA5717	Feb-12	563038	6687833									326.1	60	266.1		53,667	95,074	3.35																											
NNA5717	Feb-12	563038	6687833									326.1	60	266.1		54,942	96,604	3.45																											
Shogun Costean	13/12/1983	563112	6687494	1,020	1,275	12,750	317	22,150	<.6	4,618	1.5	292.0					69,700	3.40					1.6						350	<5															
NNA5715	Feb-12	563130	6688070									319.8	51	268.8		32,672	58,609	3.51																											
NNA5724	Feb-12	563130	6687367									318.6	45	273.6		37,872	70,207	3.46																											
NNA5731	Feb-12	563142	6686527									323.2	69	254.2		39,472	72,707	3.74																											
NNA5731	Feb-12	563142	6686527									323.2	69	254.2		40,372	74,607	3.63																											
NNA5722	Feb-12	563289	6687498									319.7	48	271.7		41,852	74,589	3.39																											
RC0472		563318	6687355									317.7	73	244.7	84,930	84,930		4.33											<5	<5															
RC0472	5/07/1982	563318	6687355	595	2,500	26,000	460	41,610	<.6	10,500	2.2	317.7					127,200	4.40					20		0.4				7																
RC0472	7/01/1982	563318	6687355	605	3,040	27,400	470	45,440	<.6	11,500	2.2	317.7					136,500	4.00					2.1		0.7	5																			
RC0472	25/11/1983	563318	6687355	578	2,600	26,600	539	44,870	<.6	9,416	2.4	317.7					140,400	3.80					36																						
RC0472	23/10/1984	563318	6687355	650	650	26,050	560	44,400	<5	9,110	11	317.7					99,000	4.10					21.4																						
RC0472	Late 1990-Mid 1991	563318	6687355	582	2,871	25,594	506	43,200	12	9,000		317.7				81,839		5.28	167				30	2		4.4	46.4	0.52	<2		0.009		0.026		0.077	0.013	0.011	0.004	1.45	0.07	<0.005	10.1	0.035	<0.002	<0.0015
NNA5725	Feb-12	563348	6687218									316.7	69	247.7		71,572	129,107	3.18																											
RC0162	18/11/1984	563414	6687607	790	790	18,200	410	31,500	<5	6,150	18	319.2					75,000	3.80					18.5																						
RC0162	Late 1990-Mid 1991	563414	6687607	697	1,640	15,653	338	27,900	15	5,410		319.2				51,725		5.47	152				55	0.1		14.7	22.5	0.3	<2		<0.001		0.032		0.002	0.007	<0.005	0.022	1.64	0.01	<0.005	9.7	0.18	<0.002	<0.0015
RC0162	28/02/2013	563414	6687607	690	840	9,200	280	19,000	<5	3,900		319.2				37,500	49,000	3.80	151													<0.1		<0.005	<0.025	<0.025		<0.1		0.05					
WB5-10S	30/11/1984	563414	6687597	850	850	16,700	370	28,800	<5	6,380	24	319.1					66,000	3.50					22.8																						
WB5-50S	30/11/1984	563414	6687557	640	640	8,550	220	15,300	<5	2,850	50	319.2					40,000	3.30					24.3																						
NNA5727	Feb-12	563439	6687019									320.5	43	277.5		45,172	82,807	3.56																											

APPENDIX I-a
Emperor and Shogun Raw Water Chemistry Data

Hole ID	Date Sampled	GDA East	GDA North	Ca	Mg	Na	K	Cl	HCO3	SO4	NO3	RL	Sample DEPTH	Sample RL	T.F.R.	TDS	Cond	pH	ORP	Hard	Alkalinity	OH	Fe	Al	F	Si	Br	I	U	Th	Au	As_Sol	Ba_Sol	Cd_Sol	Cr_Sol	Cu_Sol	Co_Sol	Pb_Sol	Mn_Sol	Ni_Sol	Sb_Sol	Sr	Zn	V_Sol	W
NNA5727	Feb-12	563439	6687019									320.5	75	245.5		66,072	119,807	3.28																											
NNA5720	Feb-12	563503	6687552									318.5	51	267.5		45,932	81,729	3.43																											
RC1343	1985	564471	6708311									407.3	75	332.3		48,330		7.00											<5	<5															
AC0987	25/11/1983	564600	6689549	294	410	4,375	120	7,313	<.6	1,826	1.3	342.0	68.5	273.5			25,400	4.20					1.8																						
RC1134	27/3/1984	566215	6686977	543	378	4,350	93	7,526	1	1,903	6.6	323.2	56.5	266.7			23,600	3.30					160																						
RC1131	27/3/1984	566569	6687057	438	358	4,150	123	7,029	1	1,570	2.7	328.2	59.5	268.7			24,900	3.80					11																						
NNA5685	Feb-12	567629	6684321									337.5	64	273.5		58,372	106,107	3.56																											
NNA5686	Feb-12	567916	6684162									339.9	69	270.9		58,372	105,807	2.84																											
NNA5686	Feb-12	567916	6684162									339.9	99	240.9		71,972	129,807	3.42																											
NNA5682	Feb-12	567959	6684595									334.5	84	250.5		64,760	117,089	3.27																											
NNA5682	Feb-12	567959	6684595									334.5	108	226.5		76,160	136,989	3.29																											
NNA5696	Feb-12	568118	6685554									325.9	66	259.9		69,380	124,776	3.51																											
NNA5696	Feb-12	568118	6685554									325.9	78	247.9		74,480	133,191	3.21																											
NNA5690	Feb-12	568179	6684995									334.0	82	252.0		73,072	131,707	4.35																											
NNA5687	Feb-12	568194	6683993									339.1	69	270.1		71,372	128,707	3.53																											
NNA5683	Feb-12	568236	6684431									334.7	69	265.7		76,572	137,907	3.32																											
NNA5683	Feb-12	568236	6684431									334.7	69	265.7		67,460	122,389	3.36																											
NNA5683	Feb-12	568236	6684431									334.7	94	240.7		74,760	134,689	3.38																											
NNA5683	Feb-12	568236	6684431									334.7	105	229.7		73,172	131,907	3.68																											
NNA5691	Feb-12	568250	6684953									332.7	66	266.7		61,672	112,007	3.40																											
NNA5695	Feb-12	568400	6685387									326.0	66	260.0		65,725	118,231	3.42																											
NNA5662	Jan-12	568448	6684831									331.4	75	256.4		73,572	132,307	3.76																											
NNA5662	Jan-12	568448	6684831									331.4	75	256.4		73,572	132,807	6.58																											
NNA5663	Jan-12	568576	6684753									332.2	78	254.2		82,172	147,507	5.87																											
NNA5663	Jan-12	568576	6684753									332.2	93	239.2		77,370	138,376	3.05																											
NNA5684	Feb-12	568591	6684228									334.8	63	271.8		58,072	105,407	3.36																											
NNA5684	Feb-12	568591	6684228									334.8	99	235.8		78,872	142,007	3.41																											
NNA5667	Jan-12	568597	6684605									330.2	78	252.2		76,072	137,007	3.27																											
NNA5664	Jan-12	568651	6684709									331.3	90	241.3		78,135	139,651	2.99																											
NNA5664	Jan-12	568651	6684709									331.3	90	241.3		77,372	139,107	2.91																											
NNA5666	Jan-12	568713	6684811									333.5	90	243.5		78,730	140,671	3.41																											
NNA5666	Jan-12	568713	6684811									333.5	90	243.5		79,410	141,521	3.28																											
NNA5665	Jan-12	568729	6684664									332.3	78	254.3		73,972	133,507	5.45																											
RC1135	25/1/1984	568749	6685177	536	1,680	15,550	342	24,990	1	5,200	1.8	330.2	59.5	270.7			76,900	4.10					8		1.5	20			35																
NNA5688	Feb-12	568760	6684118									332.0	48	284.0		40,972	75,507	3.66																											
NNA5688	Feb-12	568760	6684118									332.0	84	248.0		73,872	133,407	3.32																											
NNA5689	Feb-12	569024	6683961									337.4	57	280.4		62,672	113,807	3.56																											
NNA5689	Feb-12	569024	6683961									337.4	90	247.4		74,972	135,207	3.40																											
NNA5697	Feb-12	569206	6684206									341.1	93	248.1		74,565	133,361	3.12																											
NNA5668	Jan-12	569272	6684346									337.8	84	253.8		75,072	135,507	2.94																											
NNA5668	Jan-12	569272	6684346									337.8	84	253.8		80,772	145,107	3.05																											
NNA5692	Feb-12	569358	6684490									334.5	66	268.5		34,240	63,551	3.86																											
NNA5692	Feb-12	569358	6684490									334.5	87	247.5		66,672	120,607	3.56																											
NNA5693	Feb-12	569429	6684615									332.7	63	269.7		32,740	60,951	4.26																											
NNA5693	Feb-12	569429	6684615									332.7	84	248.7		75,160	134,381	3.50																											
NNA5694	Feb-12	569502	6684721									331.8	75	256.8		68,105	122,226	3.85																											
NNA5694	Feb-12	569502	6684721									331.8	84	247.8		72,865	130,641	3.67																											
NNA5670	Feb-12	569567	6684161									337.9	48	289.9		53,072	93,034	3.69																											
NNA5670	Feb-12	569567	6684161									337.9	90	247.9		70,582	123,549	2.83																											
NNA5671	Feb-12	569633	6684125									338.7	60	278.7		57,577	101,534	3.48																											
NNA5671	Feb-12	569633	6684125									338.7	90	248.7		77,127	134,344	2.97																											
NNA5672	Feb-12	569705	6684284									337.9	57	280.9		23,047	44,074	6.31																											
NNA5672	Feb-12	569705	6684284									337.9	69	268.9		55,962	98,389	2.86																											
NNA5672	Feb-12	569705	6684284									337.9	91	246.9		62,167	109,184	3.03																											
NNA5673	Feb-12	569777	6684402									334.8	90	244.8		78,402	136,129	2.85																											
NNA5675	Feb-12	569848	6684533									336.5	69	267.5		66,247	115,899	2.69																											
NNA5675	Feb-12	569848	6684533									336.5	90	246.5		42,617	76,034	3.67																											

APPENDIX I-b
Ambassodor and Princess Raw Water Chemistry Data

Hole ID	Date Sampled	GDA East	GDA North	Ca	Mg	Na	K	Cl	HCO3	SO4	NO3	RL	Sample DEPTH	Sample RL	T.F.R.	TDS	TSS	Co	pH	ORP	PO4	Fe	Al	F	Si	Br	I	U	Th	Au	As_Sol	B_Sol	Ba_Sol	Be_Sol	Cd_Sol	Cr_Sol	Cs	Cu_Sol	Co_Sol	Pb_Sol	Mo_Sol	Mn_Sol	Ni_Sol	Sb_Sol	Sn_Sol	Se_Sol	Sr	Ti	Y	Zn	Zr_Sol	V_Sol	W	Hg_Sol
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	m AHD	m	m AHD	mg/L	mg/L	mg/L	µS/cm		mV	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	ug/l	ug/l	ug/L	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
NNA5529	1/12/2011	570045	6681930									343.2	72	271.2		58,372		106,107	3.57																																			
NNA5529	1/12/2011	570045	6681930									343.2	93	250.2		66,172		120,007	2.57																																			
NNA5528	40878	570226	6681372									339.0	65	274.0		54,160		99,089	3.77																																			
NNA5678	40940	570296	6683748									329.3	48	281.3		58,172		105,907	3.12																																			
NNA5678	1/02/2012	570296	6683748									329.3	84	245.3		72,372		130,607	3.34																																			
AC0991	1/12/1983	570324	6688067	250	324	2,600	98	4,686	26	1,032	0.9	339.6	57.5	282.1				15,150	7.30			<.1		1.70	25.00				11.00																									
AC0991	1/12/1983	570324	6688067	270	334	2,800	100	5,055	18	1,280	0.6	339.6	82.5	257.1				16,250	7.30			<.1		1.10	####				7.00																									
NNA5027		570336	6688064	197	301	3,038	101	5,311	<5	1,355	0.4	336.5	82	254.5		10,668		17,780	4.10			0.84						<5			<0.005	1.25	0.04	<0.005	<0.0005	<0.005		0.03	0.08	0.02	<0.005	3.21	0.06	<0.005	<0.005	<0.005				0.08	0.08	<0.005		<0.0001
NNA5530	Dec-11	570341	6681754									346.2	73	273.2		51,672		94,107	3.38																																			
NNA5530	1/12/2011	570341	6681754									346.2	114	232.2		74,372		133,707	2.84																																			
NNA5677	1/02/2012	570367	6683889									334.9	71	263.9		61,972		112,307	3.31																																			
NNA5677	1/02/2012	570367	6683889									334.9	89	245.9		73,982		129,159	3.25																																			
NNA5520	Dec-11	570404	6682215									338.7	87	251.7		60,625		109,391	3.05																																			
NNA5520	1/12/2011	570404	6682215									338.7	87	251.7		60,370		109,136	4.21																																			
NNA5542	Dec-11	570452	6682644									333.7	72	261.7		59,372		107,707	2.94																																			
NNA5676	Feb-12	570458	6684009									329.3				80,102		139,444	3.03																																			
NNA5676	1/02/2012	570458	6684009									329.3	87	242.3		67,692		118,279	3.49																																			
NNA5535	1/12/2011	570464	6681915									340.5	63	277.5		49,260		90,089	4.02																																			
NNA5538	1/12/2011	570482	6682151									341.6	63	278.6		64,172		116,407	3.42																																			
NNA5538	1/12/2011	570482	6682151									341.6	90	251.6		69,372		125,407	3.04																																			
NNA5538	1/12/2011	570482	6682151									341.6	108	233.6		77,572		139,507	2.82																																			
NNA5537	40878	570510	6682197									337.4	54	283.4		31,740		59,051	4.59																																			
NNA5537	Dec-11	570510	6682197									337.4	87	250.4		65,833		119,335	2.70																																			
NNA5524	Dec-11	570554	6681178									346.9	87	259.9		61,390		110,836	3.46																																			
NNA5524	1/12/2011	570554	6681178									346.9	106	240.9		71,080		127,836	3.13																																			
NNA5519	1/12/2011	570616	6682159									335.9				64,705		116,361	3.33																																			
NNA5531	1/12/2011	570663	6682093									337.5	54	283.5		21,360		40,389	5.06																																			
NNA5531	1/12/2011	570663	6682093									337.5	54	283.5		21,560		40,489	4.42																																			
NNA5531	1/12/2011	570663	6682093									337.5	57	280.5		42,060		77,289	3.98																																			
NNA5531	1/12/2011	570663	6682093									337.5	90	247.5		66,540		120,351	3.14																																			
NNA5518	1/12/2011	570670	6682280									334.8	81	253.8		66,830		120,186	3.30																																			
NNA5522	1/12/2011	570677	6681559									343.2	110	233.2		68,530		123,246	3.40																																			
NNA5522	1/12/2011	570677	6681559									343.2	110	233.2		73,160		131,789	3.18																																			
NNA5539	1/12/2011	570716	6682008									336.2	87	249.2		65,772		119,007	3.33																																			
NNA5526	1/12/2011	570766	6681060									348.8	78	270.8		50,960		93,189	4.58																																			
NNA5526	1/12/2011	570766	6681060									348.8	87	261.8		58,060		105,489	3.18																																			
NNA5536	1/12/2011	570792	6682462									331.0	66	265.0		54,940		99,851	3.28																																			
NNA5536	1/12/2011	570792	6682462									331.0	84	247.0		64,960		117,489	3.43																																			
NNA5523	1/12/2011	570808	6681472									346.5	?			69,890		125,286	3.22																																			
NNA5532	1/12/2011	570869	6681924									336.6	60	276.6		48,460		88,689	4.29																																			
NNA5532	1/12/2011	570869	6681924									336.6	78	258.6		58,060		105,489	2.92																																			
NNA5543	1/12/2011	570953	6682801									330.8	69	261.8		56,472		102,907	3.11																																			
NNA5543	1/12/2011	570953	6682801									330.8	78	252.8		53,972		98,507	3.39																																			
NNA5679	1/02/2012	570969	6683341									325.5	61	264.5		54,372		99,107	3.01																																			
NNA5679	1/02/2012	570969	6683341									325.5	61	264.5		55,872		101,707	3.06																																			
NNA5533	1/12/2011	571012	6681831									333.9	60	273.9		48,360		88,589	3.15																																			
NNA5533	1/12/2011	571012	6681831									333.9	75	258.9		51,840		94,851	3.21																																			
NNA5680	1/02/2012	571080	6683498									325.8	64	261.8		58,660		106,589	3.25																																			
NNA5680	1/02/2012	571080	6683498									325.8	64	261.8		57,660		105,189	3.19																																			
NNA5527	1/12/2011	571110	6680995									344.7	73	271.7		53,072		96,807	3.49																																			
NNA5527	1/12/2011	571110	6680995									344.7	78	266.7		57,772		105,307	3.52																																			
NNA5534	1/12/2011	571128	6681767									336.0	51	285.0		30,360		56,689	3.63																																			
NNA5544	1/12/2011	571189	6683192									328.2	66	262.2		44,272		81,507	2.69																																			
NNA5544	1/12/2011	571189	6683192									328.2	81	247.2		46,672		85,707	3.93																																			
NNA5544	40878	571189	6683192									328.2	81	247.2		45,972		84,407	3.71																																			
NNA5681	1/02/2012	571201	6683712									329.0	51	278.0		19,760		37,789	4.54																																			
NNA5681	1/02/2012	571201	6683712									329.0	69	260.0		57,460		104,489	4.36																																			
NNA5545	1/12/2011	571431	6683581									327.2	69	258.2		43,933		80,635	5.33																																			
NNA5545	1/12/2011	571431	6683581									327.2	75	252.2		38,133		70,535	3.32																																			
RC0471B		575160	6680830									324.3	65	259.3	20,420	20,420			7.13									9.00	<5																									
RC0471B	24/11/1984	575160	6680830	490	490	5,260	170	9,220	45	1,900	8.0	324.3						29,000	6.50			20.80																																
RC0471B	30/06/1981	575160	6680830	570	409	4,725	103	7,669	61	2,333	0.1	324.3							7.10			5.50																																
RC0471B	Mar-82	575160	6680830	365	465	5,650	147	9,088	41	2,068	0.5	324.3						29,800	7.00			2.50																																
RC0471B	Jan-82	575160	6680830	415	490	5,730	154	9,621	40	2,430	<.1	324.3						31,550	7.00			2.20		0.60	22.00																													
RC0471B	25/11/1983	575160	6680830	434	500	5,800	159	9,443	45	2,176	0.7	324.3						32,300	7.40			0.50																																
RC0324		575161	6680831									324.3			13,260	18,900																																						
NNA5508	Feb-13	575239	6680797	260	310	4,500	180	7,100	340	1,200		324.3				13,700		21,000	7.60	44											<0.02				<0.001	0.01		<0.005		<0.02			0.02											
AC1226		575344	6681710									327.8	64	263.8	19,780	19,780			6.03									<5	<5																									
NNA5140		575384	6680444	357	422	4,898	171	8,689	9	1,751	<0.2	324.3	51	273.3		16,452		27,420	6.40			<0.2						<5			<0.005	1.21	0.07	<0.005	0.00	<0.005		0.02	0.15	0.01	0.04	0.53	0.18	<0.005	<0.005	<0.005				0.16	0.16	0.01		<0.0001
AC1029	25/11/1983	575486	6682117	314	380	4,225	110	7,100	5	1,453	0.6	329.0	62.5	266.5				23,300	6.40			0.50						10.00																										
NNA5099	Sep-09	575491	6682104	300	390	4,500	130	7,900	100	1,800	<0.2	329.0	63	266.0		15,000	360	23,000	6.80			0.86																																
RC1279	Jul-84	575498	6679995	770	770	11,000	250	19,600	10	3,850	11.0	322.3						49,000	5.80			16.20																																
RC1279	Late 1990-Mid 1991	575498	6679995	554	1,007	9,422	213	16,900	149	3,310		322.3				31,510			6.30	125		12.00	<0.1		12.50	18.00	0.36	<2		0.01			0.02			<0.002		<0.004	<0.005	0.00		1.20	0.01	<0.005			8.70			0.01		<0.002	<0.0015	
RC1279	Late 1990-Mid 1991	575498	6679995	704	1,248	11,202	231	20,800	71	3,880		322.3				38,144			6.22	125		23.00	<0.1		7.90	20.00	0.52	<2		<0.001			0.03			0.00		0.01	<0.005	0.00		1.36	0.01	0.01			11.80			0.01		<0.002	<0.0015	
RC1279	26/02/2013	575498	6679995									322.3	35	287.3		33,400		62,100	6.30	46																																		
RC1279		575498	6679995	651	1,171	10,813	250	21,676	9	4,106	<0.2	322.3				34,620		57,700	6.40			<0.2						<10			<0.01	0.85	0.03	<0.01	<0.001	<0.01		0.02	<0.01	<0.01	<0.01	1.57	0.03	<0.01	<0.01	<0.01				0.09	0.09	<0.01		<0.0001
RC1279	26/02/2013	575498	6679995	610	1,000	9,400	250	16,000	21	3,300		322.3				31,000		43,000	6.40	46											<0.1				<0.005	<0.025		<0.025		<0.1			0.07											
NNA5393		575508	6681421	416	548	5,748	185	11,235	<5	2,237	<0.2	327.8	73	254.8		18,720		31,200	4.20			6.53						28.00			<0.005	1.61	0.04	0.01	0.00	<0.005		0.02	1.05	<0.005	<0.005	1.02	1.89	<0.005	<0.005	<0.005				3.25	3.25	<0.005		<0.0001
NNA5127		575521	6681140	463	531	5,710	187	10,922	49	2,227	<0.2	326.0	65	261.0		18,840		31,400	5.50			0.20						32.00			<0.005	1.41	0.06	<0.005	0.02	<0.005		0.01	0.63	<0.005	0.01	1.25	0.63	<0.005	<0.005	0.01				0.27	0.27	<0.005		<0.0001
NNA5198	11/06/2010	575539	6682048									329.0						21,500																																				
NNA5198		575539	6682048	274	336	4,116	128	7,558	<5	1,633	<0.2	329.0	64	265.0		13,836		23,060	3.50			50.81						<5			<0.005	1.01	0.05	0.02	0.00	<0.005		0.02	0.72	0.04	<0.005	1.37	1.15	<0.005	<0.005	0.01				6.65	6.65	<0.005		<0.0001
N5030	26/02/2013	575544	6681137									326.2				11,600		20,600	5.62	-135																																		
N5030	Aug-10	575544	6681137									326.2	50	276.2				19,960																																				
N5030	Feb-13	575544	6681137	220	320	4,500	190	6,600	8	1,300		326.2				12,100		20,000	5.90	-135											<0.02				0.00	<0.005		<0.005		<0.02			0.01											
RC1213	Late 1990-Mid 1991	575684	6681498	246	350	3,769	138	6,730	24	1,250		328.9				12,506			5.46	148		0.46	<0.1		21.00	10.60	0.32	<2		0.01			0.03			0.00		0.03	<0.005	0.01		0.22	0.01	<0.005			3.30			0.06		<0.002	<0.0015	
NNA5155		575805	6680453	362	488	5,087	180	9,677	31	1,827	<0.2	325.5	51	274.5		17,034		28,390	6.70			<0.2						<5			<0.005	1.35	0.05	<0.005	<0.0005	<0.005		0.01	0.03	<0.005	0.01	0.56	0.02	<0.005	<0.005	<0.005				0.07	0.07	<0.005		<0.0001
NNA5097	Sep-09	575843	6681879	320	470	4,500	150	13,000		3,200	<0.2	330.0	75	255.0			1,096,240					56.00																																
NNA5107		575856	6681410	620	834	8,130	292	15,717	<5	3,553	<0.2	328.8	69	259.8		26,820		44,700	4.80			<0.2						68.00			<0.01	1.69	0.07	<0.01	0.32	<0.01		1.90	2.29	3.08	<0.01	2.35	2.91	<0.01	<0.01	<0.01				12.89	12.89	<0.01		<0.0001
NNA5100	Sep-09	575948	6681571	610	850	8,100	270	16,000	170	3,800	<0.2	329.0	69	260.0		28,000	10,000	40,000	7.10			0.42																																
N5029	Jul-10	575965	6681554									329.0	50	279.0				19,400																																				
RC1148	Late 1990-Mid 1991	576004	6680326	532	742	6,800	248	11,800	86	2,490		325.3				22,678			5.98	129		0.40	<0.1		21.00	23.10	0.64	<2		<0.001			0.03			<0.002		0.00	<0.005	0.00		0.20	0.01	<0.005			6.90			0.01		<0.002	<0.0015	
RC1152	Late 1990-Mid 1991	576022	6681299	450	700	5,645	231	10,400	30	2,060		328.2				19,522			5.91	143		0.15	<0.1		22.00	20.70	0.01	<2	0.40	<0.001			0.03			<0.002	0.01	0.00	0.01	0.05		0.13	0.02	<0.005			6.30	0.00	0.00	0.03		0.00	<0.0015	
NNA5102	Sep-09	576088	6681490	510	710	6,800	220	13,000	80	3,900	<0.2	328.9	64	264.9		28,000	930	35,000	7.00			<0.4																																
NNA5103		576153	6681450	580	772	7,602	257	13,693	<5	2,875	<0.2	328.9	66	262.9		25,020		41,700	4.30			0.76						19.00			<0.01	1.72	0.07	<0.01	0.01	0.01		0.63	3.96	0.35	<0.01	1.61	3.83	<0.01	<0.01	0.10				5.26	5.26	<0.01		<0.0001
NNA5094	Sep-09	576323	6681593	540	860	7,600	220	22,000		6,900	0.3	331.4	70	261.4			870,000					51.00																																
RC1151	Late 1990-Mid 1991	576375	6681103	319	467	4,392	169	7,810	104	1,560		326.0				14,784			6.36	144		0.88	<0.1		15.40	15.00	0.36	<2		<0.001			0.02			<0.002			0.01	0.00		0.24	0.02	0.01			4.00			0.01		0.00	<0.0015	
RC1030	25/11/1983	576390	6681554	378	530	5,225	194	9,017	76	2,087	1.0	333.2	53	280.2				23,300	6.40			0.25						<5																										
N5034	26/02/2013	576399	6681300									332.3				14,550		25,400	6.04	-205																																		
N5034	26/02/2013	576399	6681300	300	480	4,900	230	8,200	60	1,800		332.3				15,400		24,000	6.60	-205											<0.02				<0.001	<0.005		<0.005		<0.02			0.03											
N5036	27/02/2013	576591	6682391	170	230	3,300	130	5,000	83	900		332.9				9,660		16,000	6.80	-207											<0.02				<0.001	<0.005		<0.005		<0.02			0.01											
RC0065	15/05/1980	577282	6676116	980	1,400	11,250	228	19,596	154	4,144	7.1	322.8							7.30			0.25			34.00			6.00	10.00																									
RC0065	11/04/1984	577282	6676116	800	1,400	11,100	260	19,800	89	4,150	10.0	322.8						52,000	6.50			12.80																																
RC0065	Late 1990-Mid 1991	577282	6676116	316	850	7,938	177	13,800	89	2,180		322.8				25,324			7.71	78		0.00	<0.1		0.30	16.30	0.53	<2		<0.001			0.02			0.00		0.00	<0.005	0.01		3.10	<0.01	<0.005			5.80			<0.005		<0.002	<0.0015	
RC0065	Feb-13	577282	6676116	400	2,400	24,000	740	38,000	<5	5,600		322.8				75,200		91,000	4.10	251											<0.1				<0.005	<0.025		<0.025		0.65			0.07											
CD1366	Late 1990-Mid 1991	577430	6682621	461	290	2,271	84	4,210		1,140		338.3				8,461			6.46	80		0.34	<0.1		4.60	4.90	0.15						0.16			<0.002		<0.001	0.01	0.01		0.32	0.02				2.20			0.05				
AC1036	25/11/1983	578005	6682047	574	850	8,300	399	14,770	336	3,000	3.0	346.7	65	281.7				46,300	7.90			3.10						<5																										
AC1036	25/11/1983	578005	6682047	688	950	9,100	359	16,260	234	3,067	2.0	346.7	83	263.7				51,100	7.80			2.00						<5																										
AC1036	25/11/1983	578005	6682047	1,185	1,250	17,500	419	22,580	295	4,000	1.8	346.7	121	225.7				68,700	7.90			0.80						<5																										
NNA5737	1/02/2012	578015	6682529									339.0	57	282.0		23,872		45,107	5.97																																			
NNA5737	Feb-12	578015	6682529									339.0	81	258.0		31,072		57,907	5.94																																			
NNA5738	Feb-12	578209	6682413									345.1	60	285.1		23,272		43,907	5.16																																			
RC1177	Late 1990-Mid 1991	578272	6682855	683	754	8,236	263	14,200	191	3,090		333.8				27,343			6.58	171	0.00	7.80	<0.1		3.20	15.10	0.19	2.00		0.01			0.05			0.00		0.38	0.05	0.02		0.28	0.04	0.01			5.90			<0.01		<0.002	<0.0011	
NNA5556	40878	578483	6684129									340.0	51	289.0		16,572		31,607	5.24																																			
NNA5556	1/12/2011	578483	6684129									340.0	51	289.0		16,072		30,607	5.88																																			
NNA5599	1/01/2012	578560	6684084									340.3				19,260		36,689	4.78																																			
NNA5599	1/01/2012	578560	6684084									340.3				18,960		36,089	4.62																																			
NNA5551	Dec-11	578602	6684253									339.6	39	300.6		19,033		36,035	6.41																																			
NNA5551	Dec-11	578602	6684253									339.6	57	282.6		19,533		37,135	4.14																																			
NNA5551	Dec-11	578602	6684253									339.6	57	282.6		19,433		36,835	4.09																																			
NNA5609	Jan-12	578619	6684166									340.8	54	286.8		18,960		35,989	3.95																																			
NNA5609	Jan-12	578619	6684166									340.8	54	286.8		19,360		36,689	3.89																																			
NNA5755	Feb-12	578625	6683929									342.4	48	294.4		19,772		37,207	4.21																																			
RC1216	Late 1990-Mid 1991	578630	6683116	515	681	7,717	249	13,400	339	2,630		339.3				25,376			6.45	9	0.19	5.10	<0.1		1.60	13.00	0.77	<2		<0.001			0.02			0.00		<0.001	<0.005	0.01		0.17	<0.01	<0.005			4.10			<0.005		<0.002	<0.0011	
N5032	Feb-13	578632	6682382	260	450	3,700	240	6,300	150	1,600		337.6				12,700		20,000	6.90	-248											<0.02				<0.001	0.01		<0.005		<0.02			0.06											
NNA5199		578636	6682399	614	833	8,197	316	16,462	<5	3,273	<0.2	336.1	55	281.1		27,000		45,000	4.20			5.89						<10			<0.01	2.13	0.09	<0.01	<0.001	<0.01		0.02	0.65	<0.01	<0.01	1.30	1.72	<0.01	<0.01	<0.01				7.78	7.78	<0.01		<0.0001
NNA5649	Jan-12	578708	6683654									341.2	51	290.2		15,150		28,981	4.89																																			
NNA5649	Jan-12	578708	6683654									341.2	51	290.2		15,830		30,001	4.89																																			
CD1409	Late 1990-Mid 1991	578711	6682585	174	262	2,285	66	4,070	1,231	56		334.6				7,519			6.58	-167	4.89	0.22	<0.1		2.90	3.30	0.32	<2	<0.1	<0.001			0.14			0.00	0.00	<0.001	0.01	0.01		0.60	0.01	0.02			1.70	<0.000	0.00	<0.005		<0.002	0.01	
NNA5602	Jan-12	578724	6683756									342.3	54	288.3		10,460		20,289	5.83																																			
NNA5552	Dec-11	578732	6684182									340.6	57	283.6		18,833		35,635	4.27																																			
NNA5552	Dec-11	578732	6684182									340.6	57	283.6		18,933		36,035	5.21																																			
NNA5644	Jan-12	578770	6683872									343.3	54	289.3		19,572		37,207	5.39																																			
NNA5644	Jan-12	578770	6683872									343.3	54	289.3		20,272		38,507	6.50																																			
NNA5623	Jan-12	578774	6684324									340.6				64,572		117,007	2.97																																			
NNA5623	Jan-12	578774	6684324									340.6	48	292.6		16,960		32,289	5.08																																			
NNA5623	Jan-12	578774	6684324									340.6	48	292.6		17,360		32,889	5.12																																			

APPENDIX I-b

Ambassodor and Princess Raw Water Chemistry Data

Hole ID	Date Sampled	GDA East	GDA North	Ca	Mg	Na	K	Cl	HCO3	SO4	NO3	RL	Sample DEPTH	Sample RL	T.F.R.	TDS	TSS	Co	pH
NNA5549	Dec-11	578793	6684148									339.9	57	282.9		20,072		38,107	5.99
NNA5549	Dec-11	578793	6684148									339.9	57	282.9		19,472		36,907	5.48
NNA5553	Dec-11	578833	6684131									339.8	45	294.8		20,333		38,635	4.25
NNA5622	Jan-12	578834	6684277									343.7	54	289.7		20,160		38,089	3.64
NNA5757	Mar-12	578852	6682852									337.5	42	295.5		19,472		36,907	6.28
NNA5757	Mar-12	578852	6682852									337.5	78	259.5		21,472		40,407	5.69
NNA5645	Jan-12	578912	6683522									339.2	54	285.2		22,715		42,666	5.53
NNA5645	1/01/2012	578912	6683522									339.2	54	285.2		20,172		38,107	5.83
NNA5605	Jan-12	578913	6683653									340.1	54	286.1		16,360		31,389	6.02
NNA5605	Jan-12	578913	6683653									340.1	54	286.1		16,360		31,289	6.02
NNA5561	Dec-11	578951	6683851									340.2	54	286.2		19,433		36,735	5.72
NNA5561	Dec-11	578951	6683851									340.2	54	286.2		18,933		35,835	5.65
NNA5614	Jan-12	578964	6683963									339.8	55	284.8		19,760		37,689	5.03
NNA5614	Jan-12	578964	6683963									339.8	55	284.8		19,760		37,789	4.63
NNA5554	Dec-11	578979	6684070									340.5	57	283.5		18,333		34,835	6.11
NNA5554	Dec-11	578979	6684070									340.5	57	283.5		17,433		33,335	6.18
NNA5606	Jan-12	578980	6683585									338.0	54	284.0		20,660		39,089	3.91
NNA5646	Jan-12	578983	6683486									340.1	57	283.1		22,970		42,751	3.98
NNA5646	Jan-12	578983	6683486									340.1	66	274.1		21,140		40,051	4.59
NNA5646	Jan-12	578983	6683486									340.1	66	274.1		20,340		38,651	4.25
NNA5641	Jan-12	579005	6683723									342.5	57	285.5		21,865		41,051	5.83
NNA5641	Jan-12	579005	6683723									342.5	57	285.5		11,750		22,691	5.64
NNA5547	Dec-11	579046	6684026									340.4	54	286.4		20,533		38,835	4.25
NNA5642	Jan-12	579062	6683671									339.2	51	288.2		21,695		40,626	5.72
NNA5642	Jan-12	579062	6683671									339.2	51	288.2		20,772		39,207	5.50
NNA5642	Jan-12	579062	6683671									339.2	63	276.2		22,040		41,351	5.56
NNA5642	Jan-12	579062	6683671									339.2	63	276.2		21,572		40,807	5.17
NNA5734	Feb-12	579089	6683078									350.1	69	281.1		20,072		37,907	4.97
NNA5563	Dec-11	579093	6683761									340.8	60	280.8		19,733		37,735	6.07
NNA5563	Dec-11	579093	6683761									340.8	60	280.8		21,033		39,835	5.56
NNA5616	Jan-12	579105	6683886									335.6	48	287.6		20,860		39,589	5.75
NNA5616	40909	579105	6683886									335.6	48	287.567		20,660		39,089	5.75
NNA5555	40878	579115	6683986									339.6	54	285.606		20,333		38,635	5.76
NNA5555	40878	579115	6683986									339.6	60	279.606		16,033		30,535	5.98
NNA5555	40878	579115	6683986									339.6	60	279.606		15,133		29,235	4.92
NNA5634	40909	579135	6684302									342.1	51	291.105		8,775		16,996	6.29
NNA5634	40909	579135	6684302									342.1	51	291.105		8,740		17,051	6.29
NNA5733	40940	579141	6683046									350.1	90	260.07		24,872		46,707	7.10
NNA5733	40940	579141	6683046									350.1	90	260.07		23,872		45,007	6.97
NNA5086		579150	6682822	604	900	8,651	349	17,219	32	3,317	<0.2	339.8	75	264.793		28,680		47,800	6.80
NNA5748	40940	579160	6683733									340.4	57	283.358		21,372		40,107	6.08
NNA5748	40940	579160	6683733									340.4	75	265.358		22,072		42,007	6.95
NNA5617	40909	579177	6683836									333.6	51	282.591		20,960		39,589	5.88
NNA5617	40909	579177	6683836									333.6				20,760		39,289	5.94
N5038	41332	579231	6682522	250	390	3,400	200	5,700	2,100	8		338.3				10,500		17,000	8.00
NNA5749	40940	579238	6683679									334.4	42	292.387		18,472		35,207	6.22
NNA5762	40969	579245	6683797									332.8	45	287.837		19,372		36,707	7.11
NNA5625	40909	579251	6684020									340.2	54	286.231		20,260		38,389	5.66
NNA5625	40909	579251	6684020									340.2	54	286.231		20,660		39,089	5.79
NNA5746	40940	579252	6683890									333.5	51	282.457		19,672		37,307	5.90
NNA5575	40878	579273	6684398									340.8	54	286.773		19,753		37,471	5.35
NNA5575	40878	579273	6684398									340.8	54	286.773		19,653		37,271	4.77
NNA5632	40909	579278	6684251									339.7	57	282.686		19,400		36,631	6.21
NNA5632	40909	579278	6684251									339.7	57	282.686		20,845		39,096	6.17
NNA5568	40878	579285	6684138									342.7	60	282.697		20,833		39,635	4.99
NNA5568	40878	579285	6684138									342.7	66	276.697		18,933		36,035	5.33
NNA5568	40878	579285	6684138									342.7	66	276.697		18,833		35,835	5.98
NNA5760	40969	579311	6683763									333.9	48	285.943		18,972		36,107	4.68
NNA5626	40909	579317	6683995									338.1	54	284.069		19,360		36,589	5.10
NNA5577	40878	579366	6684344									341.1	57	284.143		21,672		40,507	6.05
NNA5577	40878	579366	6684344									341.1	66	275.143		23,153		43,471	6.72
NNA5577	40878	579366	6684344									341.1	66	275.143		22,153		41,971	6.40
NNA5627	40909	579383	6683961									335.3	48	287.291		20,160		38,089	6.44
NNA5627	40909	579383	6683961									335.3	48	287.291		20,160		38,489	6.20
CD1515	Late 1990-Mid 1991	579398	6682663	708	1,212	11,278	250	19,000	0	3,520		333.7				35,984			4.27
NNA5574	40878	579417	6684305									342.6	75	267.626		22,253		42,071	6.69
NNA5574	40878	579417	6684305									342.6	75	267.626		23,853		44,971	6.63
NNA5630	40909	579451	6684166									342.7	57	285.675		20,060		38,089	5.79
NNA5630	40909	579451	6684166									342.7	63	279.675		21,360		40,389	5.64
NNA5636	40909	579487	6684253									345.5	57	288.531		21,340		40,351	5.83
NNA5636	40909	579487	6684253									345.5	72	273.531		19,400		36,461	6.22
NNA5571	40878	579487	6684030									347.4	66	281.382		17,633		33,535	4.24
NNA5571	40878	579487	6684030									347.4	66	281.382		17,333		33,135	4.51
NNA5661	40909	579491	6684365									346.6	78	268.647		22,545		42,241	6.93
NNA5661	40909	579491	6684365									346.6	78	268.647		21,040		40,051	6.65
NNA5514	40878	579499	6684522									349.9	74	275.94		21,355		40,116	7.12
NNA5515	40878	579569	6684476									350.1	80	270.118		24,245		45,301	7.54
NNA5516	40878	579640	6684432									350.2	70	280.208		21,865		41,136	6.92
NNA5740	40940	579643	6684560									340.5	51	289.453		21,072		39,907	5.67
NNA5581	40878	579670	6684634									340.0	54	285.967		20,253		38,471	5.58
NNA5581	40878	579670	6684634									340.0	60	279.967		19,053		36,171	4.77
NNA5581	40878	579670	6684634									340.0	60	279.967		19,653		37,271	5.61
NNA5578	40878	579728	6684603									339.4	57	282.364		21,453		40,471	5.92
AC1232	30871	579769	6683072	618	1,048	10,000	295	17,400	210	3,566	0.2	329.0	32	297.001	37,760	37,760		59,000	7.64
AC1232		579769	6683072									329.0	53	276.001	30,210	30,210			7.54
AC1232		579769	6683072									329.0	70	259.001	30,400	30,400			8.05
NNA5580	40878	579809	6684554									339.0				20,353		38,671	6.25
NNA5580	40878	579809	6684554									339.0				21,053		40,071	5.50
NNA5591	40909	579874	6684520									339.0	54	284.996		21,060		39,889	6.49
NNA5591	40909	579874	6684520									339.0	54	284.996		19,760		37,789	6.48
NNA5592	40909	579930	6684477									339.3	48	291.305		19,553		37,171	6.97
NNA5592	40909	579930	6684477									339.3	48	291.305		19,660		37,289	7.14
CD1247	Late 1990-Mid 1991	579947	6682973	626	856	7,939	308	14,000	382	2,950		329.8				26,887			7.01
NNA5582	40878	579963	6684689									341.9	54	287.893		23,972		45,307	4.21
NNA5582	40878	579963	6684689									341.9	63	278.893		21,072		39,907	5.30
NNA5582	40878	579963	6684689									341.9	63	278.893		20,272		38,507	6.32
NNA5584	40878	580030	6684657									341.9	57	284.946		20,772		39,207	6.51
N5040	21/12/2010	580034	6682734									332.1	44	288.118				43,600	
N5040	41332	580034	6682734	15	19	190	8	330	5	74		332.1				723		1,300	6.00
CD1498	Late 1990-Mid 1991	580035	6683211	858	1,176	9,646	383	16,600	303	4,040		330.5				32,875			6.58
NNA5589	40909	580088	6684614									341.3	60	281.321		20,860		39,589	6.40
NNA5589	40909	580088	6684614									341.3	66	275.321		20,760		39,089	6.37
NNA5589	40909	580088	6684614									341.3	66	275.321		20,860		39,589	6.44
N5041	21/12/2010	580092	6682899									331.6	34	297.639				20,500	
AC1233	30871	580108	6682893	592	872	9,000	248	15,620	138	2,881	0.1	331.9	53	278.931	33,280	33,280		52,000	7.28
NNA5587	40909	580379	6684654									338.0	48	290.001		19,360		36,889	4.01
RC1040	25/11/1983	580398	6683508	494	750	6,800	259	12,000	245	3,000	1.2	335.6	64	271.647				38,600	8.00
AC1237	30871	580755	6683258	492	772	6,625	222	12,070	257	2,543	0.1	332.3	95	237.261	25,280	25,280		39,500	7.96
NNA5769	40969	581592	6683730									334.3	60	274.257		13,372		25,707	6.65
NNA5768	40969	581660	6683676									334.8	39	295.821		14,372		27,507	4.02
NNA5767	40969	581782	6683605									337.2	66	271.23		14,572		27,907	5.88
AC1048	25/11/1983	582366	6685275	414	540	5,550	209	9,514	159	2,444	1.6	341.9	56	285.903				31,600	7.70
CD1500	Late 1990-Mid 1991	583088	6684326	415	651	5,276	207	9,820	107	2,020		328.0				18,459			6.01
RC1351	1985	584431	6685188	760	1,350	13,600	245	22,440	<0.6	4,455	6.1	340.8	87	253.84		44,670			4.35
RC1351	28/10/1985	584431	6685188									340.8	79	261.84		31,808		49,700	5.10
RC1346	1985	584985	6685883	432	725	7,100	225	11,640	6	2,665	6.1	332.5	87	245.52		24,190			5.50
RC1346	28/10/1985	584985	6685883									332.5	81	251.52		26,368		41,200	6.10
RC1346	28/10/1985	584985	6685883									332.5	83	249.52		25,920		40,500	6.20
RC1330	1985	585325	6685673	985	1,700	17,600	450	30,100	32	6,285	8.6	323.3	101	222.33		59,710			7.05
RC1330	28/10/1985	585325	6685673									323.3	89	234.33		38,272		59,800	7.70
RC1440	26/8/1986	585410	6684608	399	700	6,250	235	10,150	238	2,480	4.6	330.0	101	229	20,540	20,540		32,100	7.90
RC1347	1985	585662	6685477	447	800	8,100	250	13,630	98	2,925	5.8	329.3	41	288.28		26,770			7.00
RC1347	28/10/1985	585662	6685477									329.3	41	288.28		36,416		56,900	6.70
RC1419	Late 1990-Mid 1991	585752	6686416	300	522	4,185	204	7,430	283	1,730		332.6				14,535			6.85

Hole ID	ORP	PO4	Fe	Al	F	Si	Br	I	U	Th	Au	As_Sol	B_Sol	Ba_Sol	Be_Sol	Cd_Sol	Cr_Sol	Cs	Cu_Sol	Co_Sol	Pb_Sol	Mo_Sol	Mn_Sol	Ni_Sol	Sb_Sol	Sn_Sol	Se_Sol	Sr	Ti	Y	Zn	Zr_Sol	V_Sol	W	Hg_Sol
NNA5549																																			
NNA5549																																			
NNA5553																																			
NNA5622																																			
NNA5757																																			
NNA5757																																			
NNA5645																																			
NNA5645																																			
NNA5605																																			
NNA5605																																			
NNA5561																																			
NNA5561																																			
NNA5614																																			
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NNA5554																																			
NNA5554																																			
NNA5606																																			
NNA5646																																			
NNA5646																																			
NNA5646																																			
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NNA5547																																			
NNA5642																																			
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NNA5642																																			
NNA5734																																			
NNA5563																																			
NNA5563																																			
NNA5616																																			
NNA5616																																			
NNA5555																																			
NNA5555																																			
NNA5555																																			
NNA5634																																			
NNA5634																																			
NNA5733																																			
NNA5733																																			
NNA5086			<0.2						<10			<0.01	2.71	0.05	<0.01	0.01	<0.01		0.02	0.20	<0.01	<0.01	1.96	0.38	<0.01	<0.01	<0.01				0.92	0.92	<0.01		<0.0001
NNA5748																																			
NNA5748																																			
NNA5617																																			
NNA5617																																			
N5038	-364											0.03				0.00	0.01		<0.005		<0.02			0.05											
NNA5749																																			
NNA5762																																			
NNA5625																																			
NNA5625																																			
NNA5746																																			
NNA5575																																			
NNA5575																																			
NNA5632																																			
NNA5632																																			
NNA5568																																			
NNA5568																																			
NNA5568																																			
NNA5760																																			
NNA5626																																			
NNA5577																																			
NNA5577																																			
NNA5577																																			
NNA5627																																			
NNA5627																																			
CD1515	147	0.49	0.18	<0.1		2.80	14.70	0.45						0.05			0.00		<0.001	<0.005	0.01		1.34	0.04				7.90			0.28				
NNA5574																																			
NNA5574																																			
NNA5630																																			
NNA5630																																			
NNA5636																																			
NNA5636																																			
NNA5571																																			
NNA5571																																			
NNA5661																																			
NNA5661																																			
NNA5514																																			
NNA5515																																			
NNA5516																																			
NNA5740																																			
NNA5581																																			
NNA5581																																			
NNA5581																																			
NNA5578																																			
AC1232			0.80						10.00	6.00																									
AC1232									20.00	<5																									
AC1232									<5	<5																									
NNA5580																																			
NNA5580																																			
NNA5591																																			
NNA5591																																			
NNA5592																																			
NNA5592																																			
CD1247	213	0.00	0.19	<0.1		4.60	20.40	0.04	26.00	0.40	<0.001			0.03			0.00	0.02	0.01	0.01	0.06		0.05	0.02	0.01			5.10	0.00	0.00	0.08		<0.002	0.00	
NNA5582																																			
NNA5582																																			
NNA5582																																			
NNA5584																																			
N5040																																			
N5040	-119											<0.02				<0.001	<0.005		0.01		<0.02			0.01											
CD1498	335	0.01	0.00	<0.1		7.60	23.30	0.03	38.00		0.02			0.05			<0.002		<0.001	0.02	0.01		0.06	0.04	0.02			11.60			0.06		<0.002	0.00	
NNA5589																																			
NNA5589																																			
NNA5589																																			
N5041																																			
AC1233			1.50						9.00	8.00																									
NNA5587																																			
RC1040			0.40						<5																										
AC1237			0.80						6.00	5.00																									
NNA5769																																			
NNA5768																																			
NNA5767																																			
AC1048			0.40						45.00																										
CD1500	293	0.02	1.02	<0.1		4.00	16.60	0.32	<2	0.20	0.01			0.02			<0.002	0.01	0.01	0.02	0.02		0.27	0.08	0.01			4.10	0.00	0.01	0.19		<0.002	0.00	
RC1351			<0.05						<5	<5																									
RC1351																																			
RC1346			<0.05						<5	<5																									
RC1346																																			
RC1346																																			
RC1330			<0.05						<5	<5																									
RC1330																																			
RC1440			<0.05																																
RC1347			<0.05						<5	<5																									
RC1347																																			
RC1419	173	0.10	6.30	<0.1		6.30	20.30	0.35	<2	0.80	0.01			0.04			<0.002	0.01	0.01	0.01	0.02		0.05	0.02	0.02			3.40	0.00	0.00	0.09		<0.002	0.00	

APPENDIX I-b
Ambassador and Princess Raw Water Chemistry Data

Hole ID	Date Sampled	GDA East	GDA North	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	REE (Total)	δ18O	δ2H
				mg/l	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*mg/l*	*(SMOW)*	*(SMOW)*
RC1213	Late 1990-Mid 1991	575684	6681498	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-3.18	-26.4
RC1148	Late 1990-Mid 1991	576004	6680326	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
RC1152	Late 1990-Mid 1991	576022	6681299	0.0022	0.0038	0.0006	0.0029	0.0008	0.0002	0.0008	0.0001	0.0005	0.0003	0.0005	0.0001	0.0005	0.0001	0.0134	nd	nd
CD1366	Late 1990-Mid 1991	577430	6682621	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-2.08	-14
RC1177	Late 1990-Mid 1991	578272	6682855	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-3.47	-32.6
RC1216	Late 1990-Mid 1991	578630	6683116	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-3.59	-32.2
CD1409	Late 1990-Mid 1991	578711	6682585	0.0011	0.0009	0.0002	0.0008	0.0008	0.0003	0.0007	0.0001	0.0004	0.0001	0.0004	0.0001	0.0006	0.0001	0.0066	-3.5	-24

APPENDIX I-c
BP Bores Area Raw Water Chemistry Data

Hole ID	Date Sampled	GDA East	GDA North	Ca	Mg	Na	K	Cl	HCO3	SO4	NO3	RL	Sample DEPTH	Sample RL	TDS	Cond	pH	ORP	Fe	Al	F	Si	U	Th	As_Sol	B_Sol	Ba_Sol	Be_Sol	Cd_Sol	Cr_Sol	Cu_Sol	Co_Sol	Pb_Sol	Mo_Sol	Mn_Sol	Ni_Sol	Sb_Sol	Sn_Sol	Se_Sol	Zn	Zr_Sol	V_Sol	Hg_Sol
				mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	AHD	m	mAHD	mg/L	µS/cm		mV	mg/l	mg/l	mg/l	mg/l	ug/l	ug/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
KB0001		589732	6688106									343.6	36	307.6																													
KB0004		589867	6688126									343.2	36	307.2																													
KB0004	31/10/2009	589867	6688126									343.2			6,062	10,103																								0.00			
KB0004	9/12/2009	589867	6688126	135	225	1,899	98	3,241	9	837	<0.2	343.2			5,992	9,987	6.40		<0.2				3.00		<0.002	0.99	0.03	<0.002	0.00	0.01	0.00	0.11	<0.002	<0.002	0.07	0.15	<0.002	<0.002	0.01	0.45	0.45	0.00	<0.0001
KB0004	27/02/2013	589867	6688126	140	220	2,000	110	3,100	5	860		343.2			6,480	11,000	6.00	93							<0.02				<0.001	0.02	0.01		<0.02			0.21							
KB0003		589966	6688078									341.0	36	305.5																													
KB0003	29/08/2012	589966	6688078									341.0			5,840	10,640	5.65																										
KB0003	12/04/2013	589966	6688078									341.0			5,940	10,820	5.19																										
KB0002		589978	6688075									341.0	36	305.5																													
KB0002	31/10/2009	589978	6688075									341.0			5,855	9,758																								0.00			
KB0002	9/12/2009	589978	6688075	149	266	2,301	106	3,678	26	1,084	2.7	341.0			8,232	13,720	6.60		0.39				16.00		<0.002	1.17	0.03	<0.002	0.00	0.02	0.00	0.08	0.00	<0.002	0.20	0.14	<0.002	<0.002	0.01	0.59	0.59	0.00	<0.0001
KB0002	16/04/2011	589978	6688075									341.0			5,970																												
KB0002	12/06/2011	589978	6688075									341.0			6,010																												
KB0002	25/12/2011	589978	6688075									341.0			5,210																												
KB0002	27/02/2013	589978	6688075	170	300	2,700	160	4,300	<5	1,300		341.0			8,490	14,000	5.20	171							<0.02				<0.001	0.02	0.02		<0.02			0.22							
RC1331	1985	591245	6688372	117	180	2,060	105	3,266	81	1,100	3.0	331.4	59	272.4	6,988		7.85		<0.05				<5	<5																			
RC1331	28/10/1985	591245	6688372									331.4	29	302.4	3,776	5,900	3.60																										
RC1331	28/10/1985	591245	6688372									331.4	31	300.4	3,520	5,500	3.90																										
RC1331	28/10/1985	591245	6688372									331.4	33	298.4	3,776	5,900	3.60																										
RC1331	28/10/1985	591245	6688372									331.4	35	296.4	3,584	5,600	4.90																										
RC1331	28/10/1985	591245	6688372									331.4	37	294.4	4,032	6,300	4.40																										
RC1441	26/8/1986	592707	6684921	174	300	2,575	130	4,118	61	1,300	3.8	315.0	65	250.0	9,152	14,300	7.60		<0.05																								
BP BORE		594118	6690392									329.0	25	304.0	1,542		6.18						<5	<5																			
BP BORE	20/4/1982	594118	6690392	10	14	146	11	222	31	74	20.7	329.0				880	7.20		0.75		-	-																					
BP BORE	5/07/1982	594118	6690392	30	38	380	30	628	7	245	8.1	329.0				2,310	6.30		0.10		0.20	-																					
BP BORE	Jul-82	594118	6690392	30	40	390	28	630	5	230	9.9	329.0				2,350	6.00		<0.1		0.40	34.00	8.00	8.00																			
BP BORE	25/11/1983	594118	6690392	32	35	382	26	645	5	218	1.9	329.0				2,270	6.60		<0.1		-	-	<5																				
RC1332	1985	594459	6690122	26	43	392	32	653	10	235	4.4	326.0	53	273.0	1,532		6.80		<0.05				<5	<5																			
RC1332	28/10/1985	594459	6690122									326.0	25	301.0	1,728	2,700	4.50																										
RC1332	28/10/1985	594459	6690122									326.0	27	299.0	1,600	2,500	4.40																										
RC1332	28/10/1985	594459	6690122									326.0	29	297.0	1,600	2,500	4.00																										
RC1332	28/10/1985	594459	6690122									326.0	31	295.0	1,600	2,500	4.50																										
RC1332	28/10/1985	594459	6690122									326.0	33	293.0	1,600	2,500	4.70																										
RC1332	28/10/1985	594459	6690122									326.0	35	291.0	1,536	2,400	4.70																										
RC1332	28/10/1985	594459	6690122									326.0	37	289.0	1,600	2,500	4.00																										
RC1332	28/10/1985	594459	6690122									326.0	47	279.0	1,536	2,400	4.10																										
RC1332	28/10/1985	594459	6690122									326.0	49	277.0	1,536	2,400	5.00																										
RC1332	28/10/1985	594459	6690122									326.0	51	275.0	1,472	2,300	7.20																										

APPENDIX I-d
Kakarook North Borefield Raw Water Chemistry Data

Hole ID	Date Sampled	GDA East	GDA North	Ca	Mg	Na	K	Cl	HCO3	SO4	RL	Sample DEPTH	Sample RL	TDS	Cond	pH	ORP	Alkalinity	OH	As_Sol	Cd_Sol	Cr_Sol	Cu_Sol	Pb_Sol	Ni_Sol	Zn	Hg_Sol
				mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	AHD	m	m	mg/L	µS/cm		mV	mg/L	mg/L	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
NGW25	1/04/2013	602217	6696317	92	160	1,400	100	2,400	11	810	322.0	21	301.0	5,090	8,730	6.80	240	9	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.02	0.06	<0.0001
NGW20	31/03/2013	602823	6697923	140	270	1,800	100	3,200	8	1,100	331.0	18	313.0	7,100	10,930	6.50	145	7	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.05	0.03	<0.0001
NGW20	31/03/2013	602823	6697923	140	260	1,500	86	2,800	27	800	331.0	21	310.0	6,280	10,400	7.10	146	22	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.03	0.11	<0.0001
NGW21	31/03/2013	603010	6695510	210	340	2,300	150	4,200	41	1,400	319.0	14	305.0	8,800	14,920	7.20	156	34	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.09	<0.0001
NGW21	31/03/2013	603010	6695510	210	340	2,200	140	4,000	58	1,300	319.0	18	301.0	8,790	14,520	7.50	161	48	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.07	0.04	<0.0001
NGW17	30/03/2013	603256	6699264	100	180	990	69	2,000	<5	550	326.0	20	306.0	3,930	7,880	5.50	174	<5	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.05	0.06	<0.0001
NGW17	30/03/2013	603256	6699264	93	180	1,000	67	2,100	<5	630	326.0	26	300.0	3,890	8,050	5.80	143	<5	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.05	0.06	<0.0001
NGW04	1/04/2013	603800	6700917	140	190	1,200	74	2,100	60	590	331.0	37	294.0	4,400	7,890	7.70	102	49	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.02	0.04	<0.0001
NGW04	1/04/2013	603800	6700917	170	190	1,200	75	2,200	98	700	331.0	53	278.0	4,310	8,060	7.90	140	80	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.02	0.03	<0.0001
NGW23	31/03/2013	603863	6694330	110	210	1,400	83	2,600	10	740	320.0	27	293.0	5,520	9,550	6.90	119	9	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.03	<0.0001
NGW24	31/03/2013	604021	6693287	120	230	1,400	85	2,600	<5	740	316.0	21	295.0	5,720	9,610	5.70	166	<5	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.11	<0.0001
NGW24	31/03/2013	604021	6693287	110	220	1,400	82	2,600	<5	720	316.0	27	289.0	5,440	9,580	5.30	153	<5	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.07	<0.0001
NGW22	31/03/2013	604143	6694757	110	200	1,300	75	2,400	15	750	320.0	27	293.0	5,180	9,140	7.00	117	13	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.06	0.06	<0.0001
NGW22	31/03/2013	604143	6694757	100	210	1,200	75	2,400	6	660	320.0	36	284.0	4,990	8,870	6.60	92	<5	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.04	<0.0001
NGW19	31/03/2013	604204	6697264	110	200	1,100	75	2,300	5	630	325.0	20	305.0	4,870	8,560	6.20	85	<5	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.05	0.06	<0.0001
NGW19	31/03/2013	604204	6697264	100	190	1,100	69	2,200	5	600	325.0	37	288.0	4,600	7,920	6.50	117	<5	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.05	0.06	<0.0001
NGW07	26/03/2013	604378	6701799	170	210	1,300	79	2,300	89	670	327.0	26	301.0	4,320	8,420	7.70	215	73	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.03	0.10	<0.0001
NGW07	26/03/2013	604378	6701799	150	180	1,100	69	2,000	130	560	327.0	45	282.0	4,090	7,320	8.00	214	110	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.02	0.04	<0.0001
NGW10	27/03/2013	604659	6703701	150	200	1,200	71	2,100	61	670	330.0	27	303.0	4,270		7.70		50	<5	<0.02		<0.005	<0.005	<0.02	0.05	0.02	<0.0001
NGW16	29/03/2013	604667	6698727	140	190	1,200	70	2,100	95	600	323.0	36	287.0	4,120	7,890	7.90	234	78	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.07	0.05	<0.0001
NGW16	29/03/2013	604667	6698727	160	190	1,000	68	2,100	100	590	323.0			4,210	8,000	7.60	248	84	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.02	0.04	<0.0001
NGW03	1/04/2013	605301	6700306	140	200	1,200	74	2,000	99	580	325.0	26	299.0	4,190	7,690	7.90	222	81	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.05	<0.0001
NGW03	1/04/2013	605301	6700306	140	190	1,100	73	2,100	100	610	325.0	33	292.0	4,050	7,580	7.90	224	83	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.03	0.02	<0.0001
NGW18	30/03/2013	605616	6696707	190	350	2,200	140	4,000	28	1,000	316.0	21	295.0	8,470	13,990	7.00	51	23	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.05	<0.0001
NGW18	30/03/2013	605616	6696707	150	180	990	67	2,100	89	650	316.0	55	261.0	4,590	8,000	7.60	108	73	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.02	0.13	<0.0001
NGW06	26/03/2013	605678	6701285	170	250	1,400	91	2,600	76	740	323.0	24	299.0	5,290	9,530	7.80	250	62	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.02	<0.0001
NGW06	26/03/2013	605678	6701285	150	240	1,400	87	2,500	74	780	323.0	27	296.0	5,310	9,370	7.80	220	61	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.03	0.01	<0.0001
NGW26	1/04/2013	606059	6699977	130	220	1,200	83	2,400	78	760	320.0	30	290.0	5,320	8,870	7.50	237	64	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.07	0.07	<0.0001
NGW08	27/03/2013	606132	6703215	140	240	1,700	120	2,900	81	850	328.0	20	308.0	5,680	10,630	7.80	242	66	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.02	0.04	<0.0001
NGW15	29/03/2013	606200	6698135	140	220	1,300	87	2,300	100	670	323.0	33	290.0	4,900	8,600	7.80	236	83	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.08	0.05	<0.0001
NGW15	29/03/2013	606200	6698135	130	210	1,200	87	2,300	80	700	323.0	45	278.0	4,530	8,300	7.80	97	66	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.01	0.04	<0.0001
NGW02	25/03/2013	606832	6699666	150	250	1,400	91	2,500	59	700	320.0	22	298.0	5,400	9,230	7.60	238	48	<5	<0.02		<0.005	<0.005	<0.02	0.08	0.07	<0.0001
NGW02	25/03/2013	606832	6699666	150	250	1,500	97	2,600	42	890	320.0	38	282.0	5,430	9,490	7.50	228	34	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.05	0.03	<0.0001
NGW05	26/03/2013	606994	6700758	130	220	1,200	78	2,200	24	660	321.0	21	300.0	4,320	8,300	7.40	271	20	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.03	0.03	<0.0001
NGW05	26/03/2013	606994	6700758	170	290	1,700	100	3,000	20	940	321.0	26	295.0	6,030	11,020	7.10	257	16	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.04	0.04	<0.0001
NGW14	29/03/2013	607570	6697670	120	210	1,400	100	2,400	57	840	327.0	37	290.0	4,780	9,210	7.70	230	47	<5	<0.02	<0.001	<0.005	<0.005	<0.02	0.05	0.02	<0.0001
NGW01	24/03/2013	608307	6699054	86	150	1,100	95	1,900	66	580	316.0	20	296.0	3,950	7,590	7.70	202	54	<5	<0.02	0	<0.005	<0.005	<0.02	0.03	0.05	<0.0001