



**NEW HOPE**  
GROUP

## G.4.3 WSAA Water Quality Monitoring Report



# ESTABLISHMENT OF GROUNDWATER QUALITY BACKGROUND LIMITS (2012)



**NEW ACLAND COAL PTY LTD**  
**RN12 / W316-14 / 01**  
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## List of Acronyms/Abbreviations

NAC	New Acland Coal Pty Ltd
BOM	Bureau of Meteorology
DERM	Department of Environment and Resource Management (formerly EPA)
DEHP	Department of Environment and Heritage Protection (formerly DERM)
EA	Environmental Authority
EC	Electrical Conductivity
LOR	Limit of Reporting
mBTOC	meters Below Top Of Casing
NATA	National Association of Testing Authorities
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percent Difference
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
WSA	Waste Solutions Australia Pty Ltd

## 1 INTRODUCTION

Waste Solutions Australia Pty Ltd (WSA) was commissioned by New Acland Coal Pty Ltd (NAC) to set background limits for monitoring bores within their compliance borefield network. This report includes background limits for monitoring bore CSMH1, with background limits for monitoring bores 2289, 2291, and BMH1 determined in the July 2012 revision of this report. It was determined following field investigations in the October 2012 routine monitoring round that bailing is the only suitable method to purge and sample CSMH1. Therefore data collected up to date from this bore can be considered acceptable and background values can be established for this bore as three years of data has been obtained (as stipulated in condition C31 in the site EA).

Setting of these background limits was conducted in accordance with sections C21 to C33 (specifically C31) of the Department of Environment and Heritage Protection (DEHP, formally DERM) Environmental Authority (EA #MIN100550507) effective 22 July 2011. It should be noted that the off-lease groundwater monitoring bores (BMH1 and CSMH1) are not required to have background limits set as stipulated in the NAC's EA (refer to C31), NAC are setting values for these bores at their own initiative.

Background limits have been set for all monitoring bores within the compliance network, with the exception of 25P (limited field data available as this bore regularly goes dry) and 26P (this bore has been historically dry during each monitoring round). Setting of these background limits was reported in *Establishment of Groundwater Quality Background Limits (WSA September 2008 and July 2012)*. This report will include the analysis and results outlined in these reports and will be a compendium of all results. The results from the WSA 2008 report were rechecked for the July 2012 revision and six errors were detected, these have now been corrected. Modification of these values has not resulted in any additional exceedances of routine monitoring results prior to and including the April 2012 monitoring round.

The location of the bores on-site is shown in Figure 1 Compliance Borefield Plan.

## 2 SCOPE OF WORK

The scope of works comprised of the following:

- Document the previous background limit determinations and historical correspondence with Department of Environment and Heritage Protection (DEHP) pertaining to these values.
- Compilation of analytical results and tabulation of new background limits for monitoring bore CSMH1. The background limits determined in WSA 2008 and those for 2289, 2291, and BMH1, determined in the July 2012 revision of this report, will remain unchanged.
- An encompassing report will be produced incorporating the data from WSA 2008 and 2012 and will include tabulation of new background limits results for monitoring bore CSMH1. This report will also be suitable for submission to DEHP. This data will be incorporated into the next round of routine groundwater monitoring at the NAC site (October 2012) for comparison with the new sampling data.

### 3 DEVELOPMENT OF BACKGROUND LIMITS

Background limits were developed for the following monitoring bores in WSA 2008: 16P (now decommissioned and replaced by 2291, with the first sampling in June 2009), 18P Coal, 27P, 28P, 81P, 82P, 83P, 84P, 843, and 848. 15P was decommissioned (due to inundation with water from the nearby environmental dam) and replaced by 2289 (with the first sampling in April 2009). The WSA 2008 derived background limits statistically analysed five years of data obtained from the compliance bores across the site. Background limits were developed for 2289, 2291, and BMH1 determined in the July 2012 revision of this report using data collected from 2008/2009 to April 2012.

This review has included the statistical assessment of information to identify trends and establish background limits for water quality parameters. The following sections describe the data used and the methodology chosen for derivation of the background limits.

#### 3.1 Data Collection and Analysis

Data for the 2008 derived background limits was obtained principally from routine (6 monthly) groundwater sampling performed by WSA. Simmonds & Bristow Pty Ltd conducted laboratory analyses over this period. Data for the 2012 derived background limits was obtained from in-house sampling by NAC up to December 2010 when WSA undertook groundwater sampling; the only exception was the April 2008 sampling of BMH1 and CSMH1, which was undertaken by WSA. BMH1 and CSMH1 were not sampled over the period sampling was undertaken by NAC. As this bore is not required to have background limits determined, the smaller sample set for statistical analysis is not considered significant. Simmonds & Bristow Pty Ltd was used for sample analysis up to December 2010, and then from June 2011, Australian Laboratory Services (ALS) was used for sample analysis. Background limit values for 2289, 2291, and BMH1 were determined following the April 2012 routine groundwater monitoring round and values for CSMH1 were determined following the October 2012 routine groundwater monitoring round.

#### 3.2 Statistical Analysis Methodology

A statistical analysis was performed using boxplots to analyse the variance of the data. Boxplots are used to highlight the centre and the symmetry of data sets as well as any outliers. Boxplots were generated from data collected at each compliance bore. The boxes shown on the plots for individual boreholes surround the area on the graph occupied by 80% of the sample results for each ion. This was done to help highlight any data points that are anomalously large or small, as they lie outside the box range. The generic boxplot is broken up into quartiles, with 50% of the data outlying the box area. With some of the sample ranges in these data sets only consisting of a small number of points then only three points would be left in the box. This small amount of data is not enough to establish a trend in the results. It was decided to select 80% as the cut-off value for the plotting of the data due to the limited size of the smaller data sets. However, the cut-off value is still high enough to highlight the extreme outliers on the graphs and remove them from the box without excluding relevant results. If values for all the data sets over time were below the laboratory limit of reporting (LOR), the LOR value has been adopted for the analyte value in absence of data.

Each background upper and lower limit nominated (refer to **Appendix A**) was determined by selecting the maximum (90<sup>th</sup> percentile) and minimum (10<sup>th</sup> percentile)



values in the box from each boxplot. These values, based on the statistical analysis, were selected as they provided the most conservative estimate of a value that is representative of the borehole location whilst not being an outlier. These are more realistic values than the mean or median value for the site. If the mean or median value had been taken as the baseline amount then there would be regular exceedances because half of the data that has been obtained at each bore location is over that value. This method discounts extreme outliers that are anomalous and are far too high to be used in generating a realistic background limit.

To produce these boxplots the median and lower and upper percentile cut-off values had to be calculated for each test parameter. As mentioned above, the majority of the lower and upper 10 percent of the data lie outside of the boxes. When the variation in data sets is very low, it is possible that the minimum and the bottom 10th percentile value are the same. The minimum and maximum 10th percentile values are used to determine the boundaries of the boxplots. The boxplots for all of the compliance bores can be seen in **Appendix B**. Individual box plots were generated for each borehole for the following parameters:

- pH<sup>1</sup>;
- Electrical conductivity (EC);
- Total Dissolved Solids (TDS);
- Major ions: calcium (Ca), sodium (Na), potassium (K), chlorine (Cl), sulphate (SO<sub>4</sub>), bicarbonate (HCO<sub>3</sub>),
- Minor ions: Total Nitrogen (Total N), fluorine (F);
- Dissolved metals: aluminium (Al), arsenic (As), copper (Cu), iron (Fe), magnesium (Mg), manganese (Mn) and selenium (Se).

All of the data contained within the boxes is considered to be representative for that analyte for that compliance bore. It can be seen in the boxplots that these values vary from bore to bore for the same analyte. Variability in each parameter was considered too high when comparing multiple bore locations and was deemed to be unusable in establishing aquifer specific values. For this reason it was decided that the establishment of borehole specific data sets would be more appropriate. The historical data tables used to generate these statistics and the boxplots data are shown in **Appendix C**.

The size of the boxes are indicative of the amount of variation in the data set, the larger the size of the box on the graph, the greater the variation in the values. The background limit ranges for each analyte in the compliance bores is determined to be between 10% less than to 10% greater than the box boundary values for the major ions. For the minor ions and metals the background limit ranges extends to 20% less than to 20% greater than the box boundary values for each analyte. These values were considered to reflect the individual hydrochemistry at each bore and provide an indicator if there is change in groundwater chemistry.

### 3.3 Correspondence with DEHP

After submission of Establishment of Groundwater Quality Background Limits (WSA

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<sup>1</sup> Note that pH, as well as standing water level, do not require baseline limit determinations as stipulated in Schedule C – Table 7 in the EA. However, for completeness baseline limits have been determined for the analytical parameter pH.

September 2008), DEHP (then the Environmental Protection Agency) responded to NAC with comments on the derivation of the background limits as stated in the WSA 2008 report. This correspondence is provided in **Appendix D**. WSA responded to these comments in two letters, dated 26<sup>th</sup> November 2008 and 8<sup>th</sup> January 2009 to NAC as provided in **Appendix E**. These letters aimed to justify the statistical methodology used and no further correspondence was received from DEHP and has therefore been considered to have provided resolution to comments offered by the DEHP (former Environmental Protection Agency).

## 4 DISCUSSION

Most of the bores show elevated levels of aluminium and iron, as compared to other dissolved metal concentrations such as arsenic, copper and selenium. Levels of these parameters can become elevated following the field filtration process as very fine clay particles carrying metal ions pass through the standard 0.45-micron filter into the sample, skewing the concentration observed. Therefore, the concentration of these two parameters is likely controlled by physical processes (i.e. the level of sediment in the sample resulting from borehole purging), it was recommended in WSA 2008 that no background limits be placed on these two parameters, however for report completeness values, they have been derived.

At the time of compiling this report, two compliance bores (25P and 26P) listed in Schedule C Table 5: On-Lease Groundwater Monitoring Locations and Frequency within Environmental Authority # MIM800317705, have not yielded sufficient data to successfully generate background limits. This was due to the limited amount of samples collected from compliance bores 25P and 26P.

## 5 CONCLUSION & RECOMMENDATIONS

WSA has reviewed the appropriate sampling data for the compliance bores at the site and implemented a statistical assessment to produce background limits for each compliance bore. The compendium of the baseline limits, including the newly derived limits for monitoring bore CSMH1, are shown in **Appendix A**. The technique of using boxplots to highlight the spread and symmetry of data sets is recognised and accepted. It is a commonly used method for statistical analysis.

The method of chemical data analysis yields both a 'lower' and 'higher' background value. With the exception of pH (which does not require determination of a background limit, however has been included for data completeness), any increase in concentration above the 'higher' value should be investigated. If concentrations decrease below the 'lower' background value, quality of water will be improving and hence should not be of concern.

After assessing the variation in the data from bore to bore, it was concluded that there was no possibility of having only one baseline limit per analyte for each aquifer across the whole site. It was decided that limits would be set for each individual bore.

## 6 LIMITATIONS

Waste Solutions Australia Pty Ltd has prepared this report for the use of New Acland Coal Pty Ltd and the Department of Environment and Heritage Protection in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report may not contain sufficient information for purposes other than for the client and its respective consulting advisers.

The accuracy of the assessment made in this report is dependent upon the accuracy and reliability of evidence drawn together from a number of sources. The field investigations on which this report is based were restricted to a level of detail appropriate for the project.

Waste Solutions Australia Pty Ltd has taken steps to ensure the accuracy and reliability of field observations and investigations. It is important, however, that the limitations of the assessment be clearly recognised when the findings of this study are being interpreted. This report is based on information derived partly from others over which Waste Solutions Australia Pty Ltd had no control.

Prepared by:



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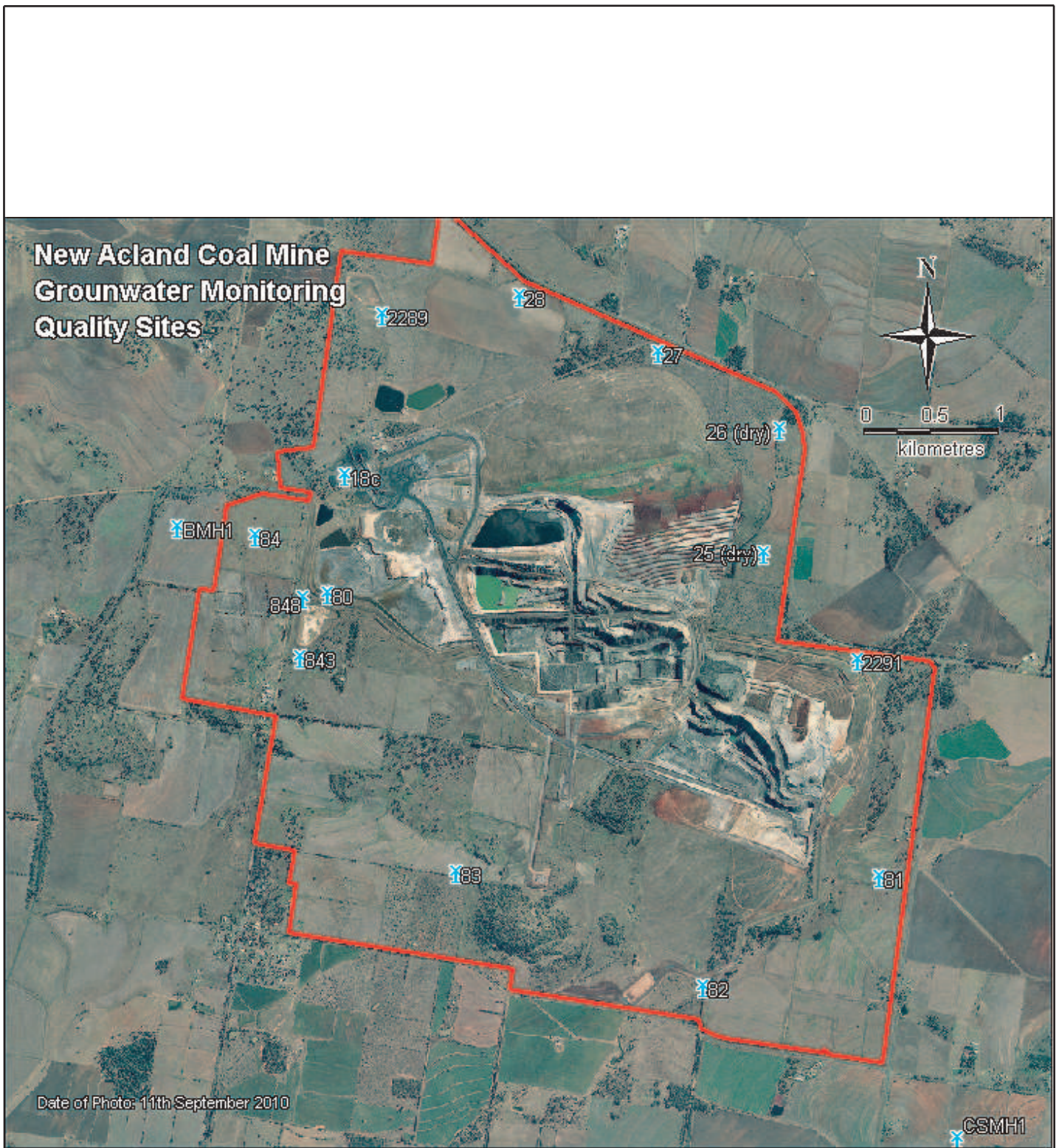
Reviewed by:




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**Legend:**

 Bore Location and name, "c" refer to coal aquifer monitoring bore

Map courtesy of New Acland Coal

	New Acland Coal Pty Ltd			
	Compliance Borefield Map			
	Establishment of Groundwater Quality Background Limits (2012)			
Drawn by: PM	Approved: PS	Date: December 2012	Job: W 316-14	Figure 1

## APPENDIX A

# GROUNDWATER QUALITY BACKGROUND LIMITS



<b>Borehole 18P (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.28 - 10% to 8.61 + 10%	6.6 – 9.5	Half Yearly
EC	µS/cm	593 - 10% to 841 + 10%	534 – 925	Half Yearly
TDS	mg/L	333.8 - 10% to 961 + 10%	300 – 1057	Half Yearly
Ca	mg/L	6.7 - 10% to 18.1 + 10%	6 – 20	Half Yearly
Mg	mg/L	1.86 - 10% to 3.22 + 10%	1.7 – 3.5	Half Yearly
Na	mg/L	90.7 - 10% to 151 + 10%	82 – 166	Half Yearly
K	mg/L	2.64 - 10% to 5.24 + 10%	2.4 – 5.8	Half Yearly
Cl	mg/L	92 - 10% to 385 + 10%	83 – 424	Half Yearly
HCO <sub>3</sub>	mg/L	64 - 10% to 152.9 + 10%	58 – 168	Half Yearly
SO <sub>4</sub>	mg/L	5.45 - 10% to 18.4 + 10%	4.9 – 20	Half Yearly
F	mg/L	0.1 - 20% to 0.42 + 20%	0.08 – 0.51	Half Yearly
Al	µg/L	18.7 - 20% to 1350 + 20%	15 – 1620	Half Yearly
As	µg/L	2.59 - 20% to 9 + 20%	2.1 – 11	Half Yearly
Cu	µg/L	1.68 - 20% to 35.2 + 20%	1.3 – 42	Half Yearly
Fe	µg/L	108.9 - 20% to 1620 + 20%	87 – 1944	Half Yearly
Mn	µg/L	4.76 - 20% to 68.6 + 20%	3.8 – 82	Half Yearly
Se	µg/L	2 - 20% to 5.9 + 20%	1.6 – 7.1	Half Yearly
Total N	mg/L	0.434 - 20% to 3.26 + 20%	0.35 – 3.9	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole 27P (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7 - 10% to 7.6 + 10%	6.3 – 8.4	Half Yearly
EC	µS/cm	9080 - 10% to 10010 + 10%	8172 – 10110	Half Yearly
TDS	mg/L	5035 - 10% to 6412.2 + 10%	4532 – 7053	Half Yearly
Ca	mg/L	388 - 10% to 507 + 10%	349 – 558	Half Yearly
Mg	mg/L	190 - 10% to 230 + 10%	171 – 257	Half Yearly
Na	mg/L	1390 - 10% to 1600 + 10%	1251 – 1760	Half Yearly
K	mg/L	19.9 - 10% to 36.8 + 10%	18 – 41	Half Yearly
Cl	mg/L	2480 - 10% to 2880 + 10%	2232 – 3168	Half Yearly
HCO <sub>3</sub>	mg/L	289 - 10% to 461 + 10%	260 – 507	Half Yearly
SO <sub>4</sub>	mg/L	578 - 10% to 713 + 10%	520 – 784	Half Yearly
F	mg/L	0.1 - 20% to 0.203 + 20%	0.08 – 0.24	Half Yearly
Al	µg/L	14.2 - 20% to 151600 + 20%	11 – 181920	Half Yearly
As	µg/L	18.2 - 20% to 129.2 + 20%	15 – 155	Half Yearly
Cu	µg/L	3.98 - 20% to 335 + 20%	3.2 – 402	Half Yearly
Fe	µg/L	1400 - 20% to 163920 + 20%	1120 – 196704	Half Yearly
Mn	µg/L	88.9 - 20% to 956 + 20%	71 – 1147	Half Yearly
Se	µg/L	7.95 - 20% to 157.7 + 20%	6.4 – 189	Half Yearly
Total N	mg/L	1.38 - 20% to 4.18 + 20%	1.1 – 5	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole 28P (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.28 - 10% to 7.9 +10%	6.6 – 8.7	Half Yearly
EC	µS/cm	8520 - 10% to 9300 + 10%	7668 – 10230	Half Yearly
TDS	mg/L	4808.8 - 10% to 6060 +10%	4327 – 6666	Half Yearly
Ca	mg/L	210 - 10% to 312 + 10%	189 – 343	Half Yearly
Mg	mg/L	204 - 10% to 278 + 10%	184 – 306	Half Yearly
Na	mg/L	1280 - 10% to 1720 + 10%	1152 – 1892	Half Yearly
K	mg/L	17.4 - 10% to 46.8 + 10%	16 – 52	Half Yearly
Cl	mg/L	2080 - 10% to 2720 + 10%	1872 – 2992	Half Yearly
HCO <sub>3</sub>	mg/L	689.6 - 10% to 992 + 10%	621 – 1091	Half Yearly
SO <sub>4</sub>	mg/L	366 - 10% to 630 + 10%	329 – 693	Half Yearly
F	mg/L	0.1 - 20% to 0.1 + 20%	0.08 – 0.12	Half Yearly
Al	µg/L	18.4 - 20% to 360576 + 20%	15 – 432691	Half Yearly
As	µg/L	16.1 - 20% to 179.7 + 20%	13 – 216	Half Yearly
Cu	µg/L	3.18 - 20% to 484.2 + 20%	2.5 – 581	Half Yearly
Fe	µg/L	952 - 20% to 306240 +20%	762 – 367488	Half Yearly
Mn	µg/L	6 - 20% to 1616 +20%	4.8 – 1939	Half Yearly
Se	µg/L	11.6 - 20% to 235 + 20%	9.3 – 282	Half Yearly
Total N	mg/L	0.93 - 20% to 2.76 + 20%	0.74 – 3.3	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole 843 (Basalt)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.29 -10% to 7.9 + 10%	6.6 – 8.6	Half Yearly
EC	µS/cm	3290 - 10% to 4210 + 10%	2961 – 4631	Half Yearly
TDS	mg/L	1799.6 - 10% to 2600 + 10%	1620 – 2860	Half Yearly
Ca	mg/L	129 - 10% to 290 +10%	116 – 319	Half Yearly
Mg	mg/L	167 - 10% to 203 + 10%	150 – 223	Half Yearly
Na	mg/L	239 - 10% to 332 + 10%	215 – 365	Half Yearly
K	mg/L	1.1 - 10% to 4.93 + 10%	0.99 – 5.4	Half Yearly
Cl	mg/L	642 - 10% to 943 + 10%	578 – 1037	Half Yearly
HCO <sub>3</sub>	mg/L	544 - 10% to 828.9 + 10%	490 – 912	Half Yearly
SO <sub>4</sub>	mg/L	100 - 10% to 151 + 10%	90 – 166	Half Yearly
F	mg/L	0.39 - 20% to 0.9 + 20%	0.31 – 1.1	Half Yearly
Al	µg/L	13.5 - 20% to 36162 + 20%	11 – 79556	Half Yearly
As	µg/L	4.96 - 20% to 46 + 20%	3.9 – 55	Half Yearly
Cu	µg/L	2.32 - 20% to 136.8 + 20%	1.9 – 164	Half Yearly
Fe	µg/L	400 - 20% to 40020 + 20%	320 – 48024	Half Yearly
Mn	µg/L	8.8 - 20% to 1772 + 20%	7 – 2126	Half Yearly
Se	µg/L	5.6 - 20% to 162.8 + 20%	4.5 – 195	Half Yearly
Total N	mg/L	4.5 - 20% to 14.1 + 20%	3.6 – 17	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole 848 (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.28 - 10% to 8.2 + 10%	6.6 – 9.1	Half Yearly
EC	µS/cm	3270 - 10% to 5330 + 10%	2943 – 5863	Half Yearly
TDS	mg/L	2060 - 10% to 3069.6 + 10%	1854 – 3377	Half Yearly
Ca	mg/L	77.4 - 10% to 173 + 10%	70 – 190	Half Yearly
Mg	mg/L	77.9 - 10% to 181 + 10%	70 – 199	Half Yearly
Na	mg/L	427 - 10% to 694 + 10%	384 – 763	Half Yearly
K	mg/L	2.18 - 10% to 7.03 + 10%	1.9 – 7.7	Half Yearly
Cl	mg/L	644 - 10% to 1210 + 10%	580 – 1331	Half Yearly
HCO <sub>3</sub>	mg/L	582.6 - 10% to 850.7 + 10%	524 – 936	Half Yearly
SO <sub>4</sub>	mg/L	69 – 10% to 148 + 10%	62 – 163	Half Yearly
F	mg/L	0.2 - 20% to 1.01 + 20%	0.16 – 1.2	Half Yearly
Al	µg/L	8.6 - 20% to 374 + 20%	6.9 – 449	Half Yearly
As	µg/L	7.02 - 20% to 29 + 20%	5.6 – 35	Half Yearly
Cu	µg/L	1.88 - 20% to 16.2 + 20%	1.5 – 19	Half Yearly
Fe	µg/L	278 - 20% to 5460 + 20%	222 – 6552	Half Yearly
Mn	µg/L	7.28 - 20% to 120 + 20%	5.8 – 144	Half Yearly
Se	µg/L	5 - 20% to 21 + 20%	4 – 25	Half Yearly
Total N	mg/L	0.99 - 20% to 8.22 + 20%	0.8 – 9.9	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.



<b>Borehole 81P (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.35 - 10% to 8.05 + 10%	6.6 – 8.9	Half Yearly
EC	µS/cm	6150 - 10% to 6800 + 10%	5535 – 7480	Half Yearly
TDS	mg/L	3145 - 10% to 3800 + 10%	2831 – 4180	Half Yearly
Ca	mg/L	200 - 10% to 235 + 10%	180 – 259	Half Yearly
Mg	mg/L	92 - 10% to 100 + 10%	83 – 110	Half Yearly
Na	mg/L	810 - 10% to 980 + 10%	729 – 1078	Half Yearly
K	mg/L	12 - 10% to 16 + 10%	11 – 18	Half Yearly
Cl	mg/L	1600 - 10% to 1800 + 10%	1440 – 1980	Half Yearly
HCO <sub>3</sub>	mg/L	312.5 - 10% to 400 + 10%	281 – 440	Half Yearly
SO <sub>4</sub>	mg/L	230 - 10% to 265 + 10%	207 – 292	Half Yearly
F	mg/L	0.11 - 20% to 0.19 + 20%	0.09 – 0.23	Half Yearly
Al	µg/L	20.4 - 20% to 58.2 + 20%	16 – 70	Half Yearly
As	µg/L	10.08 - 20% to 17.1 + 20%	8.1 – 21	Half Yearly
Cu	µg/L	2.12 - 20% to 3.8 + 20%	1.7 – 4.6	Half Yearly
Fe	µg/L	676 - 20% to 1460 + 20%	541 – 1752	Half Yearly
Mn	µg/L	142 - 20% to 442 + 20%	114 – 530	Half Yearly
Se	µg/L	6.9 - 20% to 38.4 + 20%	5.5 – 46	Half Yearly
Total N	mg/L	1.17 - 20% to 1.95 + 20%	0.94 – 2.5	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole 82P (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.65 - 10% to 7.9 + 10%	6.9 – 8.7	Half Yearly
EC	µS/cm	5350 - 10% to 5950 + 10%	4815 – 6545	Half Yearly
TDS	mg/L	3246.5 - 10% to 3550 + 10%	2921 – 3905	Half Yearly
Ca	mg/L	125 - 10% to 145 + 10%	113 – 160	Half Yearly
Mg	mg/L	130 - 10% to 140 + 10%	117 – 154	Half Yearly
Na	mg/L	755 - 10% to 880 + 10%	680 – 968	Half Yearly
K	mg/L	5.55 - 10% to 6.9 + 10%	4.9 – 7.6	Half Yearly
Cl	mg/L	1100 - 10% to 1200 + 10%	990 – 1320	Half Yearly
HCO <sub>3</sub>	mg/L	764.5 - 10% to 916.5 + 10%	688 – 1008	Half Yearly
SO <sub>4</sub>	mg/L	430 - 10% to 505 + 10%	387 – 556	Half Yearly
F	mg/L	0.22 - 20% to 0.525 + 20%	0.17 – 0.6	Half Yearly
Al	µg/L	10 - 20% to 78 +20%	8 – 94	Half Yearly
As	µg/L	6.66 - 20% to 11.6 + 20%	5.3 – 14	Half Yearly
Cu	µg/L	2.38 - 20% to 4.4 + 20%	1.9 – 5.3	Half Yearly
Fe	µg/L	740 - 20% to 2400 + 20%	592 – 2880	Half Yearly
Mn	µg/L	56.5 - 20% to 145 + 20%	45 – 174	Half Yearly
Se	µg/L	6.3 - 20% to 25.5 + 20%	5 – 31	Half Yearly
Total N	mg/L	0.74 - 20% to 1.55 + 20%	0.6 – 1.9	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole 83P (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.25 - 10% to 8.15 + 10%	6.6 – 9	Half Yearly
EC	µS/cm	1070 - 10% to 1500 + 10%	963 – 1650	Half Yearly
TDS	mg/L	652.5 - 10% to 1080 + 10%	587 – 1188	Half Yearly
Ca	mg/L	50 - 10% to 113 +10%	45 – 124	Half Yearly
Mg	mg/L	28.5 - 10% to 58.5 + 10%	26 – 64	Half Yearly
Na	mg/L	99.5 - 10% to 130 +10%	90 – 143	Half Yearly
K	mg/L	2.85 - 10% to 6 + 10%	2.6 – 6.6	Half Yearly
Cl	mg/L	115 - 10% to 160 + 10%	104 – 176	Half Yearly
HCO <sub>3</sub>	mg/L	356.5 - 10% to 644.5 + 10%	321 – 709	Half Yearly
SO <sub>4</sub>	mg/L	15.6 - 10% to 26.8 + 10%	14 – 30	Half Yearly
F	mg/L	0.15 - 20% to 0.305 + 20%	0.12 – 0.36	Half Yearly
Al	µg/L	23.5 - 20% to 308 + 20%	19 – 370	Half Yearly
As	µg/L	1.42 - 20% to 1.9 + 20%	1.1 – 2.3	Half Yearly
Cu	µg/L	1.04 - 20% to 2.64 + 20%	0.83 – 3.2	Half Yearly
Fe	µg/L	410 - 20% to 935 + 20%	328 – 1122	Half Yearly
Mn	µg/L	32 - 20% to 84.5 + 20%	26 – 101	Half Yearly
Se	µg/L	3 - 20% to 3 + 20%	2.4 – 3.6	Half Yearly
Total N	mg/L	0.405 - 20% to 11.6 + 20%	0.32 – 14	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole 84P (Basalt)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.65 - 10% to 7.9 + 10%	6.9 – 8.7	Half Yearly
EC	µS/cm	2500 - 10% to 3450 +10%	2250 – 3795	Half Yearly
TDS	mg/L	1142.5 -10% to 2100 +10%	1028 – 2310	Half Yearly
Ca	mg/L	130 -10% to 225 +10%	117 – 248	Half Yearly
Mg	mg/L	125 -10% to 195 +10%	113 – 215	Half Yearly
Na	mg/L	150 -10% to 210 +10%	135 – 231	Half Yearly
K	mg/L	2.65 - 10% to 3.6 +10%	3.2 – 3.9	Half Yearly
Cl	mg/L	420 - 10% to 765 +10%	378 – 842	Half Yearly
HCO <sub>3</sub>	mg/L	387.5 - 10% to 599 + 10%	349 – 659	Half Yearly
SO <sub>4</sub>	mg/L	88 - 10% to 220 +10%	79 – 242	Half Yearly
F	mg/L	0.16 - 20% to 0.25 + 20%	0.13 – 0.3	Half Yearly
Al	µg/L	10.85 -20% to 18.5 + 20%	8.7 – 22	Half Yearly
As	µg/L	5 - 20% to 7.9 +20%	4 – 9.5	Half Yearly
Cu	µg/L	2.08 - 20% to 3.68 + 20%	1.7 – 4.5	Half Yearly
Fe	µg/L	630 - 20% to 12000 +20%	504 – 1440	Half Yearly
Mn	µg/L	12 - 20% to 37 + 20%	9.6 – 44	Half Yearly
Se	µg/L	5.5 - 20% to 20 + 20%	4.4 – 24	Half Yearly
Total N	mg/L	2.4 - 20% to 3.25 + 20%	1.9 – 3.9	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole 2289 (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		6.424 - 10% to 7.58 + 10%	5.8 – 8.3	Half Yearly
EC	µS/cm	6120 - 10% to 17400 +10%	5508 – 19140	Half Yearly
TDS	mg/L	3500 -10% to 11960 +10%	3150 – 13156	Half Yearly
Ca	mg/L	185.6 -10% to 779.2 +10%	167 – 857	Half Yearly
Mg	mg/L	6.4 -10% to 742.6 +10%	5.8 – 817	Half Yearly
Na	mg/L	706 -10% to 2578 +10%	635 – 2836	Half Yearly
K	mg/L	11.8 - 10% to 17.4 +10%	11 – 19	Half Yearly
Cl	mg/L	1700 - 10% to 5834 +10%	1530 – 6417	Half Yearly
HCO <sub>3</sub>	mg/L	159.097 - 10% to 324 + 10%	143 – 356	Half Yearly
SO <sub>4</sub>	mg/L	350 - 10% to 2358 +10%	315 – 2594	Half Yearly
F	mg/L	0.14 - 20% to 0.42 + 20%	0.11 – 0.5	Half Yearly
Al	µg/L	10.32 -20% to 236 + 20%	8.3 – 283	Half Yearly
As	µg/L	1 - 20% to 1 +20%	0.8 – 1.2	Half Yearly
Cu	µg/L	3.5 - 20% to 13.5 + 20%	2.8 – 16.2	Half Yearly
Fe	µg/L	1182 - 20% to 3540 +20%	946 – 4248	Half Yearly
Mn	µg/L	233.2 - 20% to 1012.4 + 20%	187 – 1215	Half Yearly
Se	µg/L	22.4 - 20% to 36.4 + 20%	18 – 44	Half Yearly
Total N	mg/L	1 - 20% to 4.8 + 20%	0.8 – 5.8	Half Yearly

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.



<b>Borehole 2291 (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.2 - 10% to 7.82 + 10%	6.5 – 8.6	Half Yearly
EC	µS/cm	7360 - 10% to 7840 +10%	6624 – 8624	Half Yearly
TDS	mg/L	4380 -10% to 4900 +10%	3942 – 5390	Half Yearly
Ca	mg/L	230 -10% to 253 +10%	207 – 278	Half Yearly
Mg	mg/L	133 -10% to 145 +10%	120 – 160	Half Yearly
Na	mg/L	1130 -10% to 1400 +10%	1017 – 1540	Half Yearly
K	mg/L	13 - 10% to 17 +10%	12 – 19	Half Yearly
Cl	mg/L	2040 - 10% to 2200 +10%	1836 – 2420	Half Yearly
HCO <sub>3</sub>	mg/L	509 - 10% to 549.323 + 10%	458 – 604	Half Yearly
SO <sub>4</sub>	mg/L	290.5 - 10% to 379 +10%	261 – 417	Half Yearly
F	mg/L	0.248 - 20% to 0.472 + 20%	0.20 – 0.57	Half Yearly
Al	µg/L	9.4 -20% to 734 + 20%	7.5 – 881	Half Yearly
As	µg/L	1 - 20% to 1 +20%	0.8 – 1.2	Half Yearly
Cu	µg/L	4.23 - 20% to 5 + 20%	3.4 – 6	Half Yearly
Fe	µg/L	2435 - 20% to 5125 +20%	1948 – 6150	Half Yearly
Mn	µg/L	48.5 - 20% to 100 + 20%	39 – 120	Half Yearly
Se	µg/L	45.2 - 20% to 62.8 + 20%	36 – 75	Half Yearly
Total N	mg/L	1.05 - 20% to 6.25 + 20%	0.84 – 7.5	Half Yearly

Arsenic results were all below the LOR, therefore the LOR value has been adopted for the analyte value in absence of data.

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole BMH1 (Basalt)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.811 - 10% to 8.041 + 10%	7.0 – 8.8	Half Yearly
EC	µS/cm	1295 - 10% to 1490 +10%	1166 – 1639	Half Yearly
TDS	mg/L	803.1 -10% to 1186.9 +10%	723 – 1306	Half Yearly
Ca	mg/L	88.6 -10% to 101.4 +10%	80 – 112	Half Yearly
Mg	mg/L	64 -10% to 90.2 +10%	58 – 99	Half Yearly
Na	mg/L	86.4 -10% to 181.9 +10%	78 – 200	Half Yearly
K	mg/L	1 - 10% to 1.98 +10%	0.9 – 2.2	Half Yearly
Cl	mg/L	85.6 - 10% to 95.2 +10%	77 – 105	Half Yearly
HCO <sub>3</sub>	mg/L	698.1224 - 10% to 825.3 + 10%	628 – 908	Half Yearly
SO <sub>4</sub>	mg/L	11 - 10% to 20.7 +10%	9.9 – 23	Half Yearly
F	mg/L	0.13 - 20% to 0.27 + 20%	0.1 – 0.32	Half Yearly
Al	µg/L	13 -20% to 37 + 20%	10 – 44	Half Yearly
As	µg/L	1 - 20% to 1 +20%	0.8 – 1.2	Half Yearly
Cu	µg/L	1.1 - 20% to 1.9 + 20%	0.88 – 2.3	Half Yearly
Fe	µg/L	340 - 20% to 340 +20%	272 – 408	Half Yearly
Mn	µg/L	4.2 - 20% to 71.6 + 20%	3.4 – 86	Half Yearly
Se	µg/L	10 - 20% to 10 + 20%	8 – 12	Half Yearly
Total N	mg/L	9.75 - 20% to 17.01 + 20%	7.8 – 20	Half Yearly

Arsenic results were all below the LOR, therefore the LOR value has been adopted for the analyte value in absence of data.

\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

<b>Borehole CSMH1 (Coal)</b>				
<b>Analyte</b>	<b>Units</b>	<b>Statistically Derived Background Limits</b>	<b>Actual Background Limits*</b>	<b>Monitoring Frequency</b>
pH		7.58 - 10% to 7.80 + 10%	6.8 – 8.6	Half Yearly
EC	µS/cm	4280 - 10% to 5388 +10%	3852 – 5927	Half Yearly
TDS	mg/L	2660 -10% to 3580 +10%	2394 – 3938	Half Yearly
Ca	mg/L	176.4 -10% to 282.6 +10%	159 – 311	Half Yearly
Mg	mg/L	126.4 -10% to 223.2 +10%	114 – 246	Half Yearly
Na	mg/L	542.4 -10% to 631.8 +10%	488 – 695	Half Yearly
K	mg/L	9.1 - 10% to 11.2 +10%	8.2 – 12	Half Yearly
Cl	mg/L	916 - 10% to 1374 + 10%	824 – 1511	Half Yearly
HCO <sub>3</sub>	mg/L	467 - 10% to 658 + 10%	420 – 724	Half Yearly
SO <sub>4</sub>	mg/L	290.4 - 10% to 501.4 +10%	261 – 552	Half Yearly
F	mg/L	0.1 - 20% to 0.16 + 20%	0.08 – 0.19	Half Yearly
Al	µg/L	10 - 20% to 106 + 20%	8 – 127	Half Yearly
As	µg/L	1 - 20% to 1 + 20%	0.8 – 1.2	Half Yearly
Cu	µg/L	1 - 20% to 2.6 + 20%	0.8 – 3.1	Half Yearly
Fe	µg/L	54 - 20% to 438 + 20%	43 – 526	Half Yearly
Mn	µg/L	133 - 20% to 506.8 + 20%	106 – 608	Half Yearly
Se	µg/L	10 - 20% to 12.4 + 20%	8 – 15	Half Yearly
Total N	mg/L	3.62 - 20% to 11.18 + 20%	2.9 – 13	Half Yearly

Arsenic results were all below the LOR, therefore the LOR value has been adopted for the analyte value in absence of data.

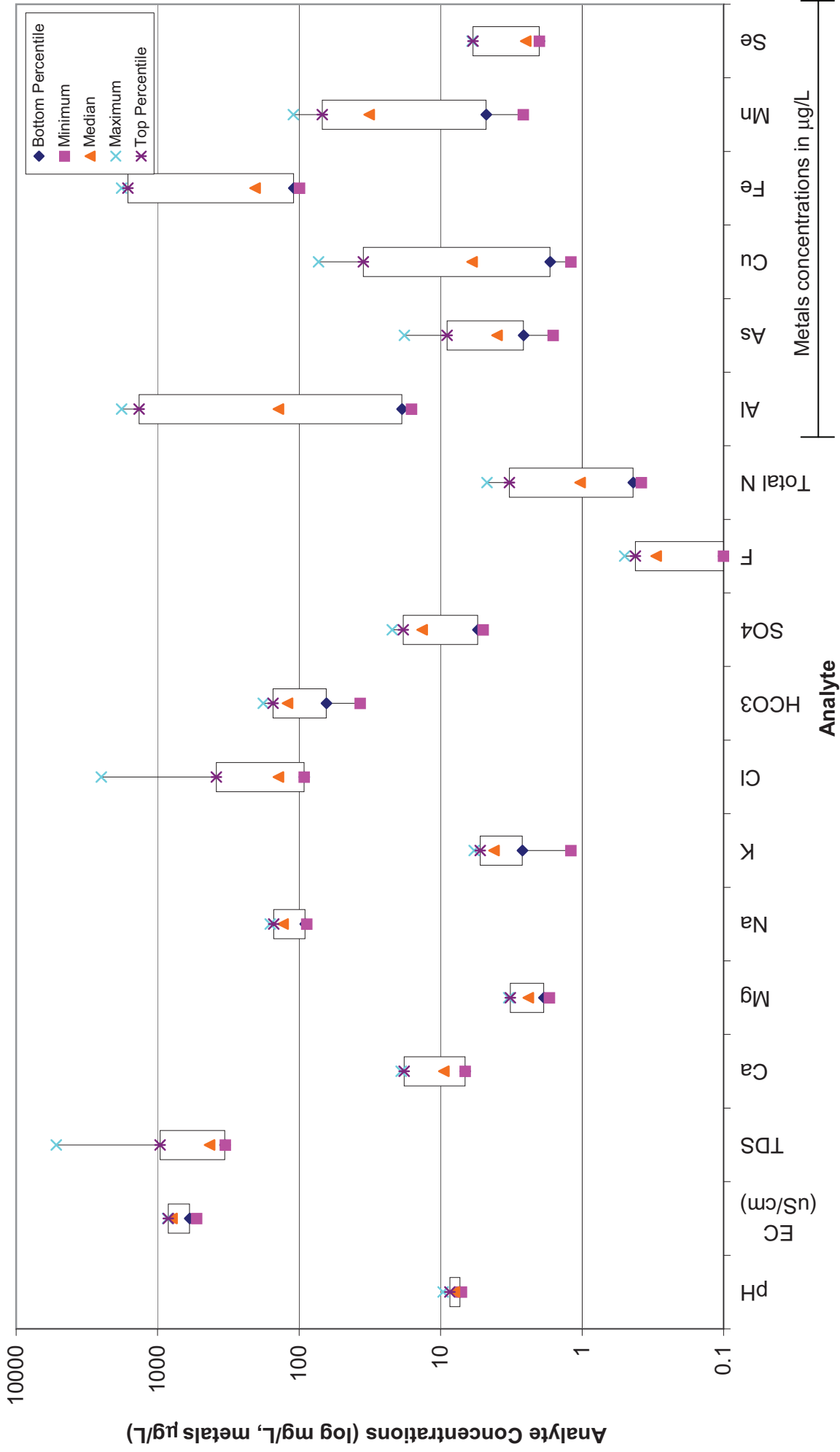
\* Please note that the Actual Background Limit values have been rounded. For values below 1 they are rounded to 2 decimal places, for values below 10 they are rounded to 1 decimal place and for values above 10 they are rounded to the nearest integer.

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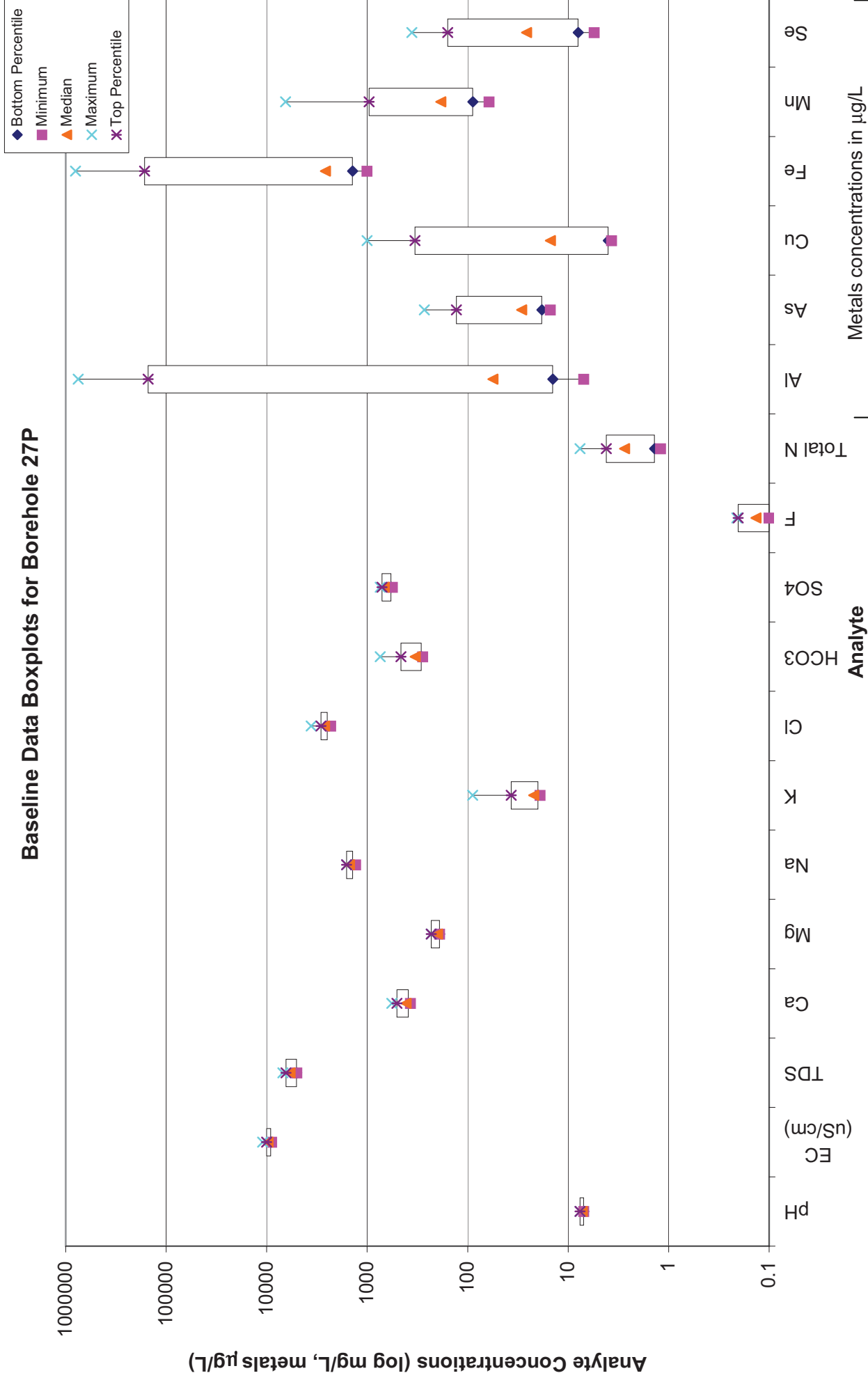
## APPENDIX B

# MONITORING BORE BOXPLOTS FOR EACH ANALYTE

### Baseline Data Boxplots for Borehole 18P (Coal)

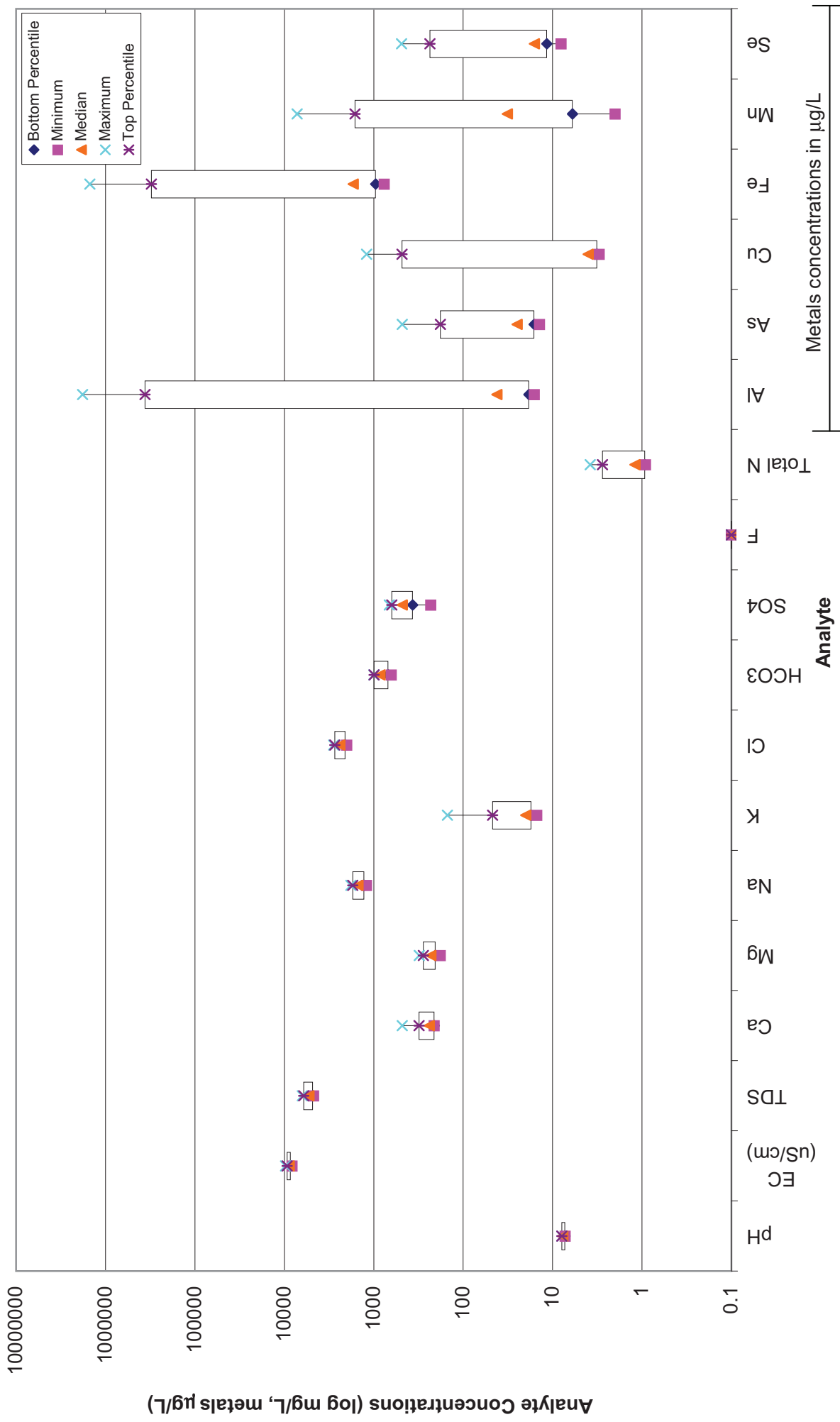


### Baseline Data Boxplots for Borehole 27P

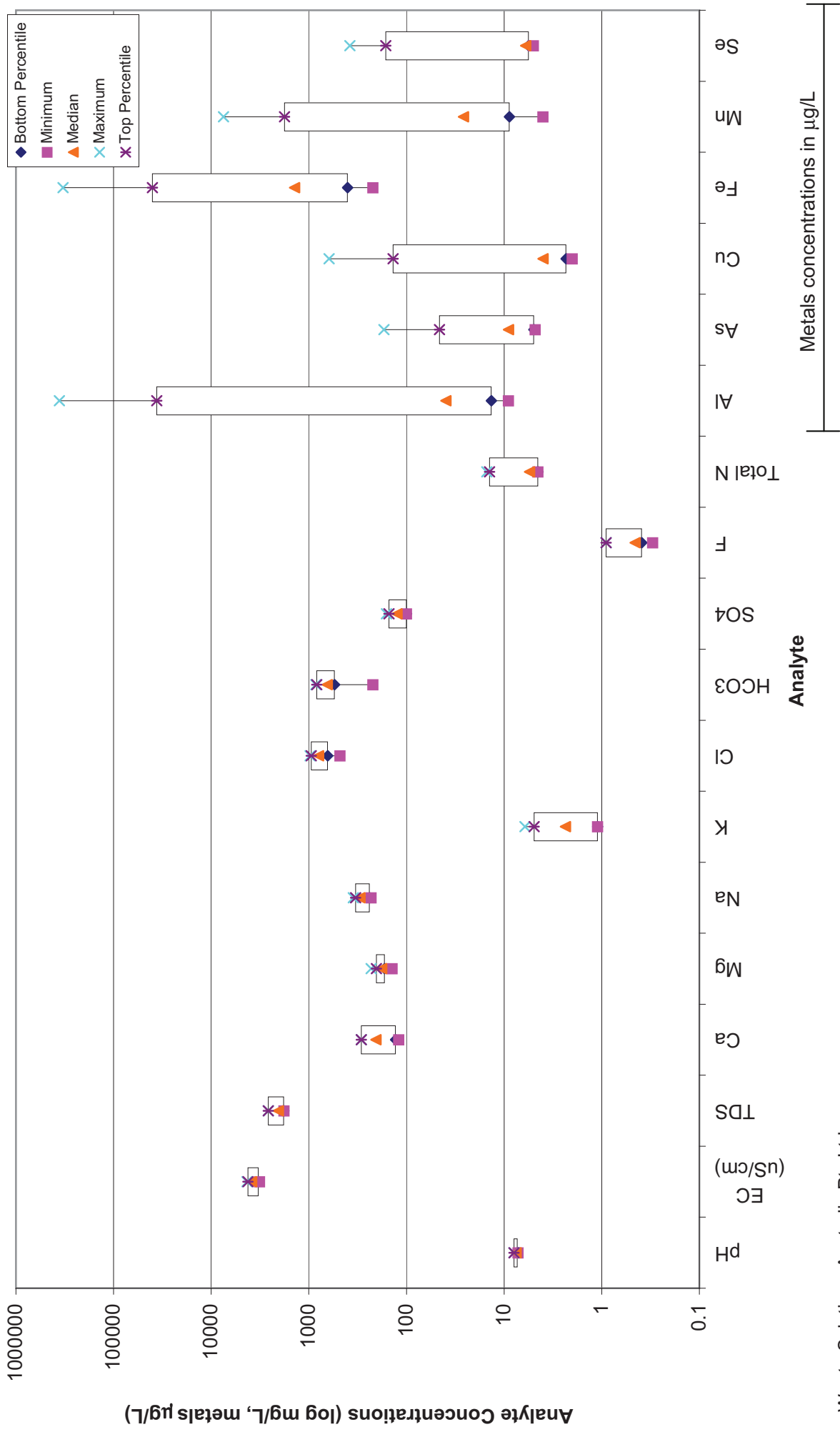




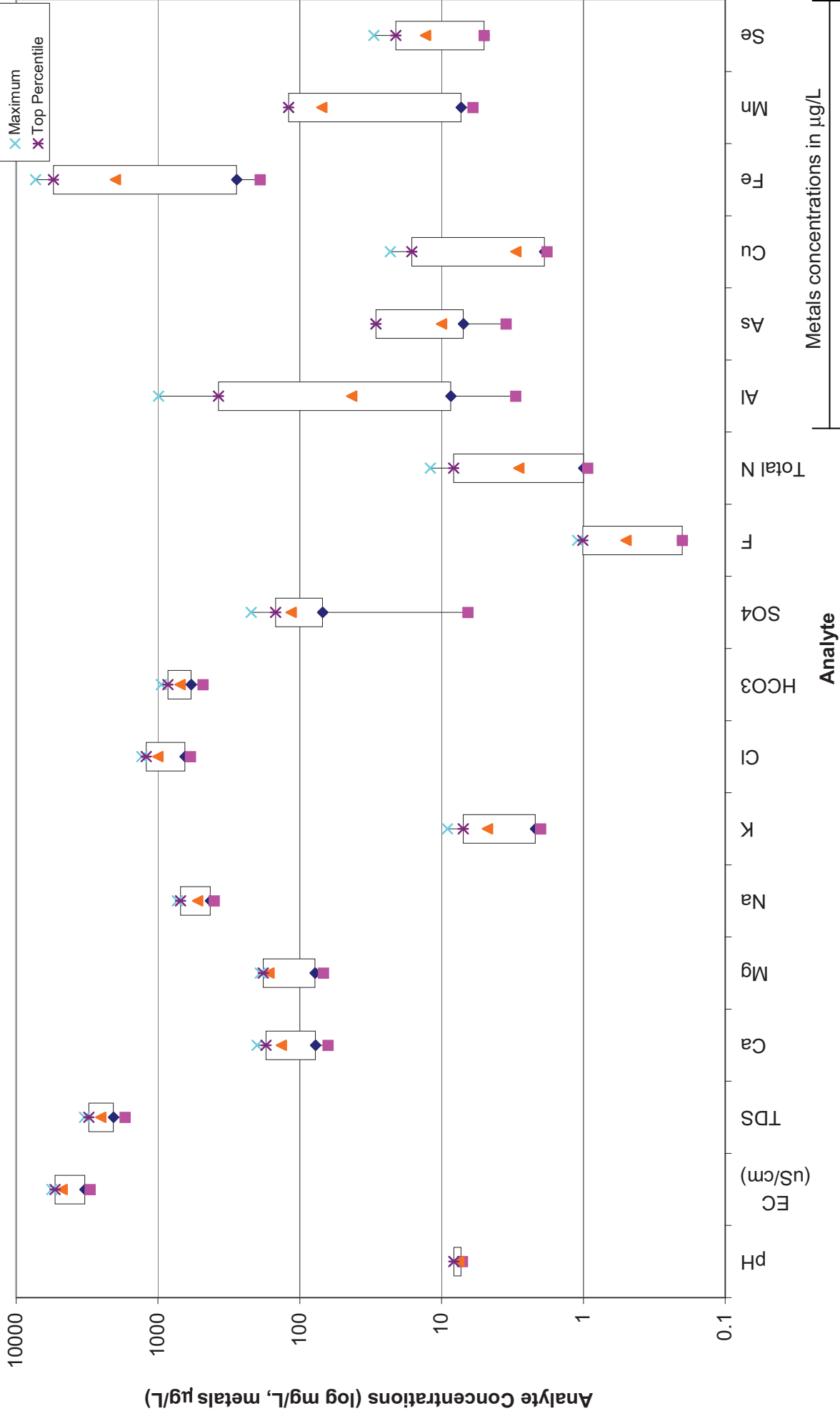
### Baseline Data Boxplots for Borehole 28P



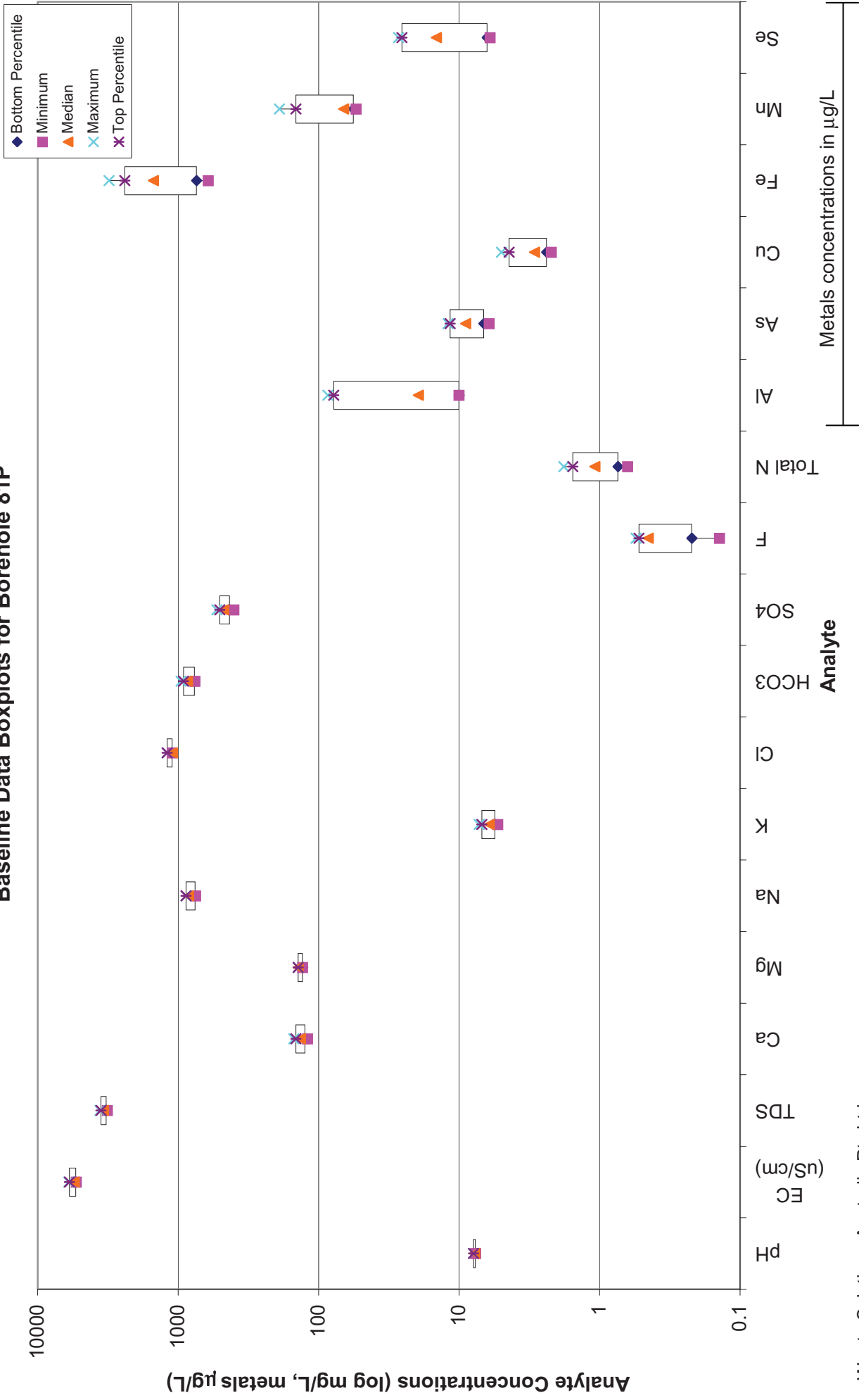
### Baseline Data Boxplots for Borehole 843



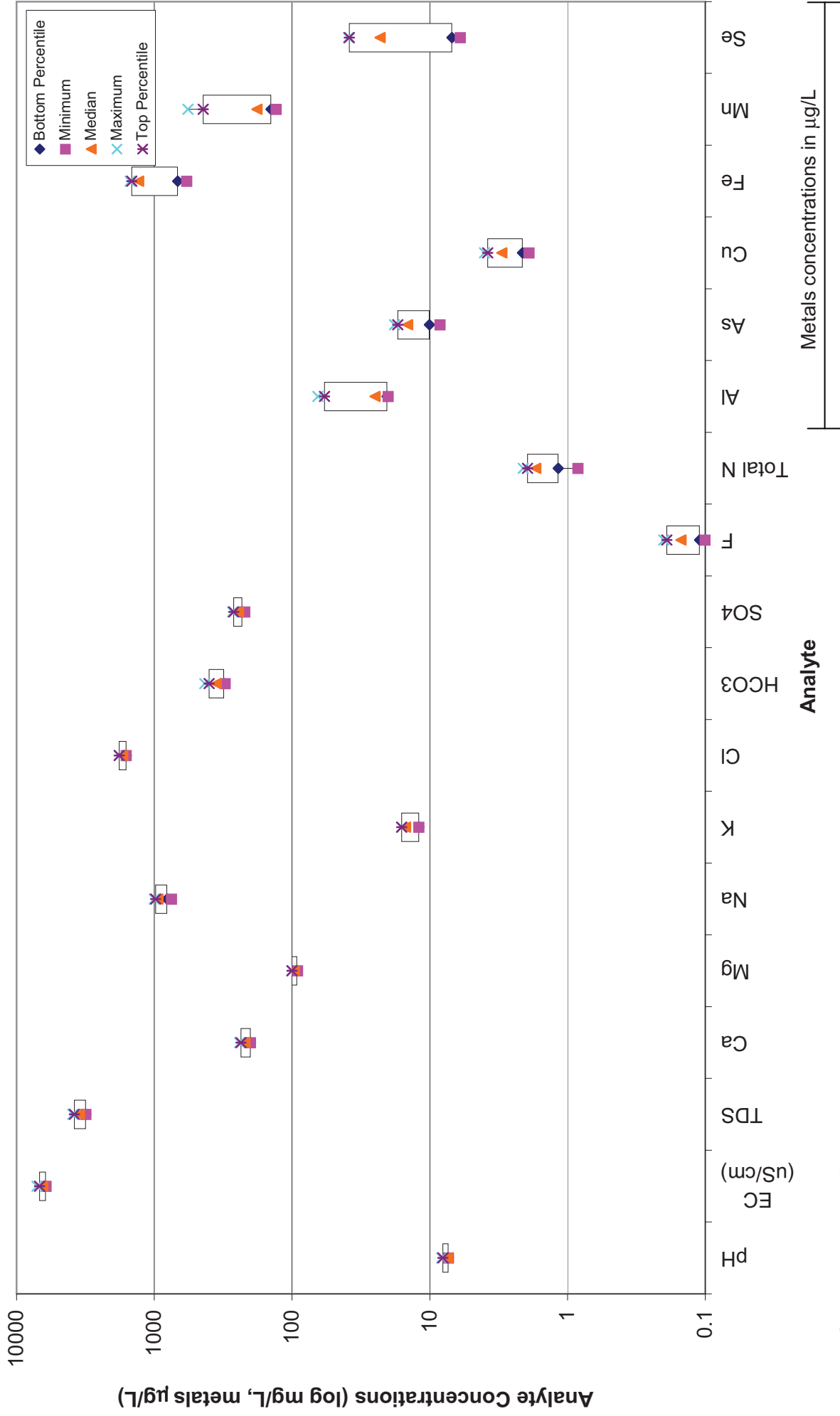
### Baseline Data Boxplots for Borehole 848



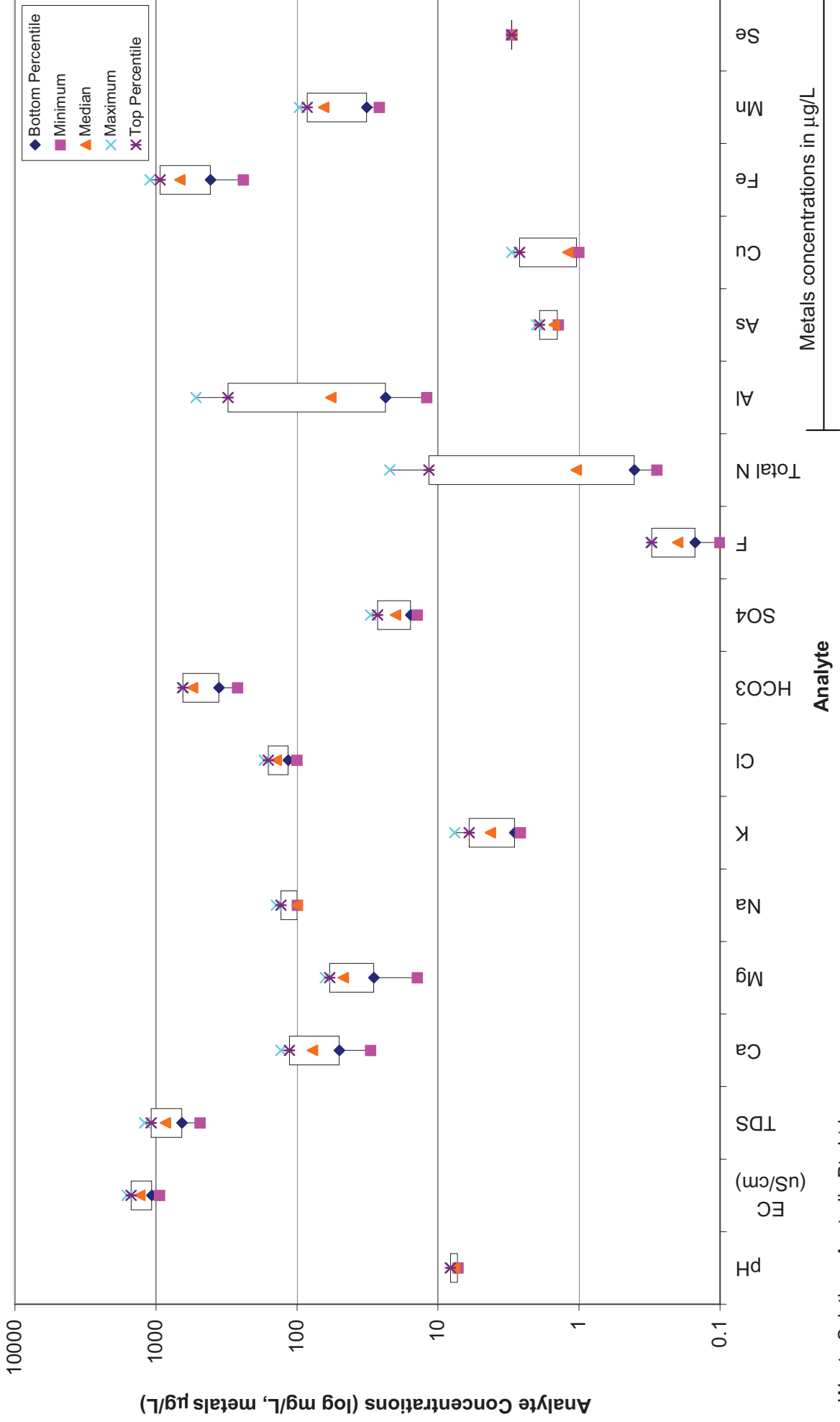
### Baseline Data Boxplots for Borehole 81P



### Baseline Data Boxplots for Borehole 82P

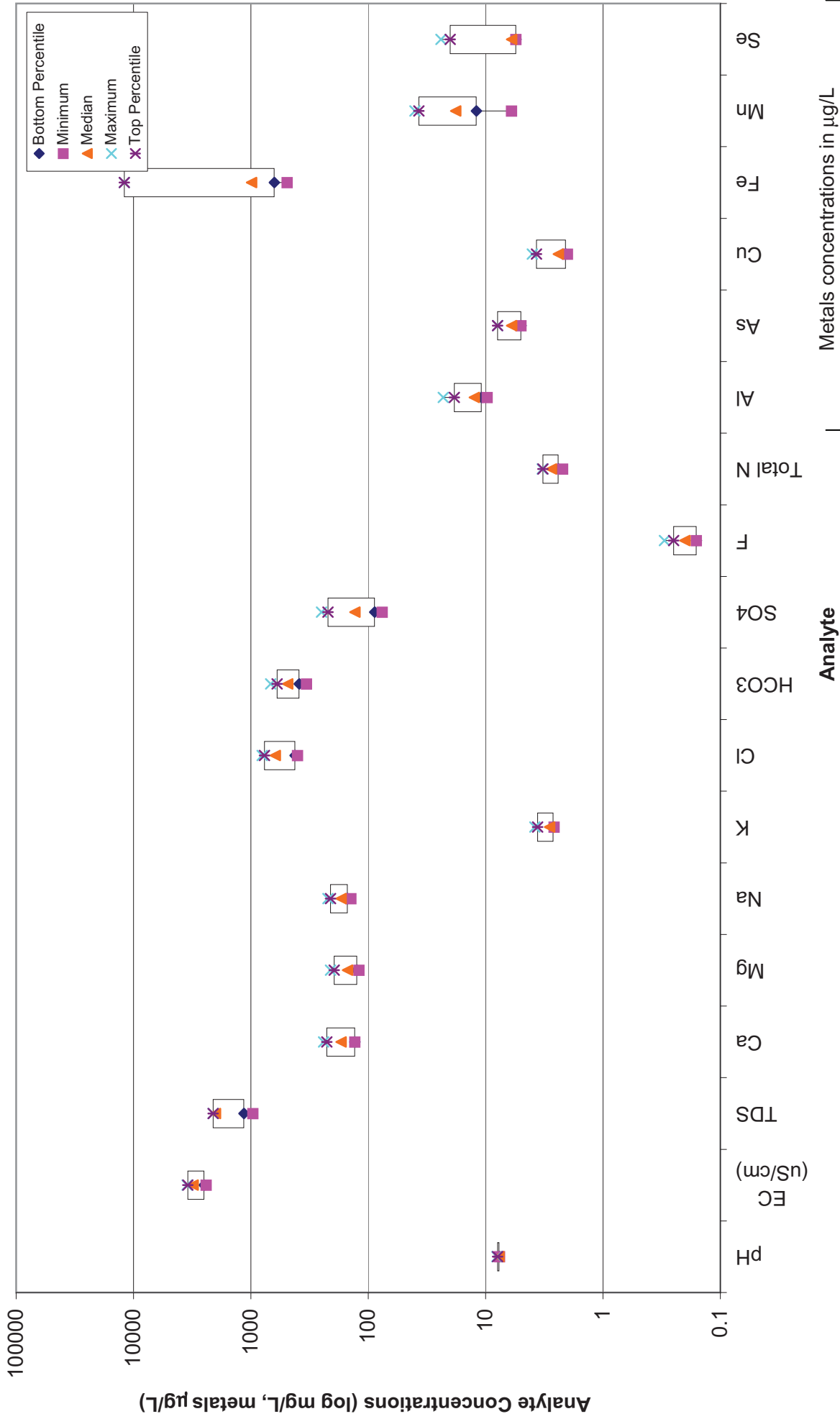


### Baseline Data Boxplots for Borehole 83P

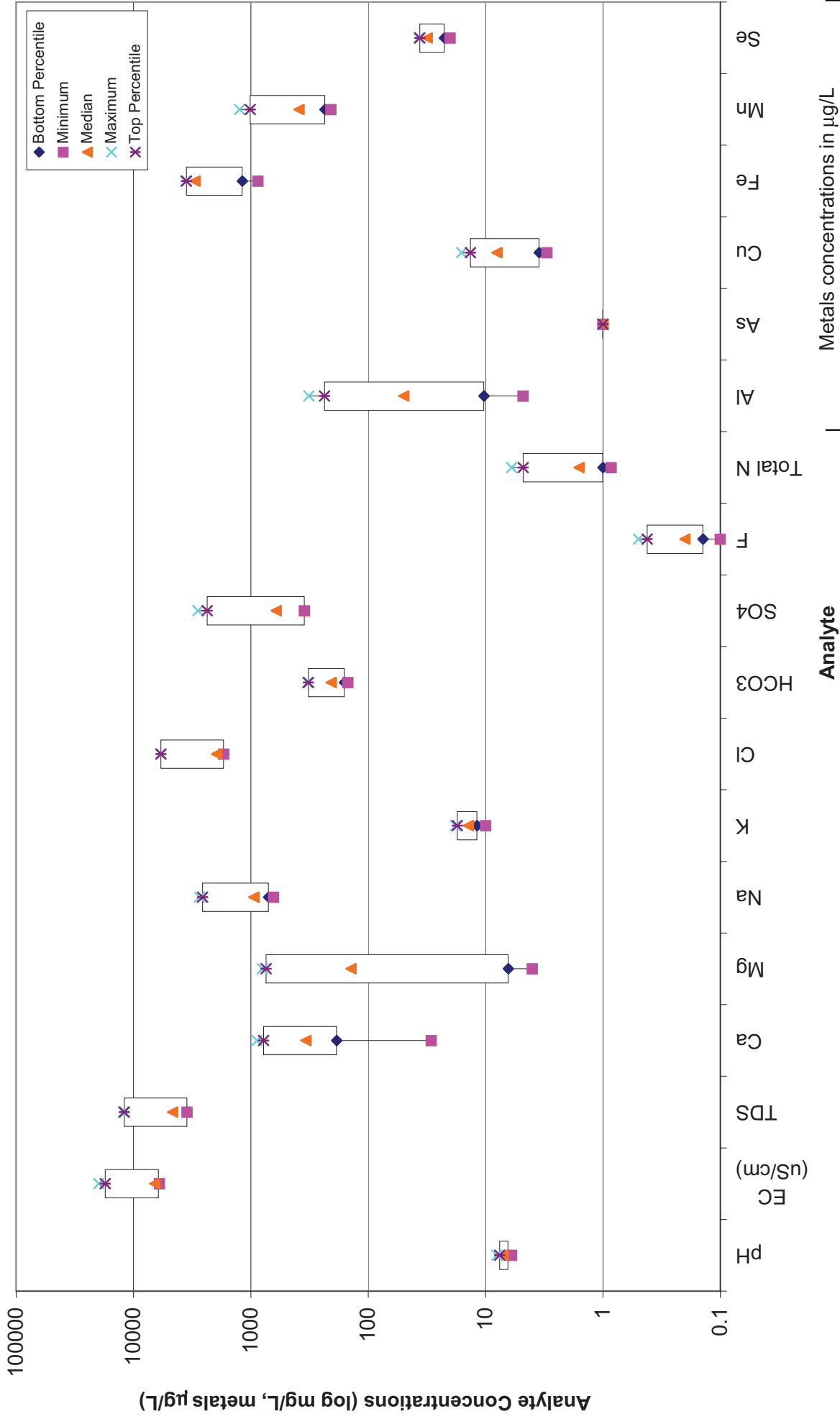




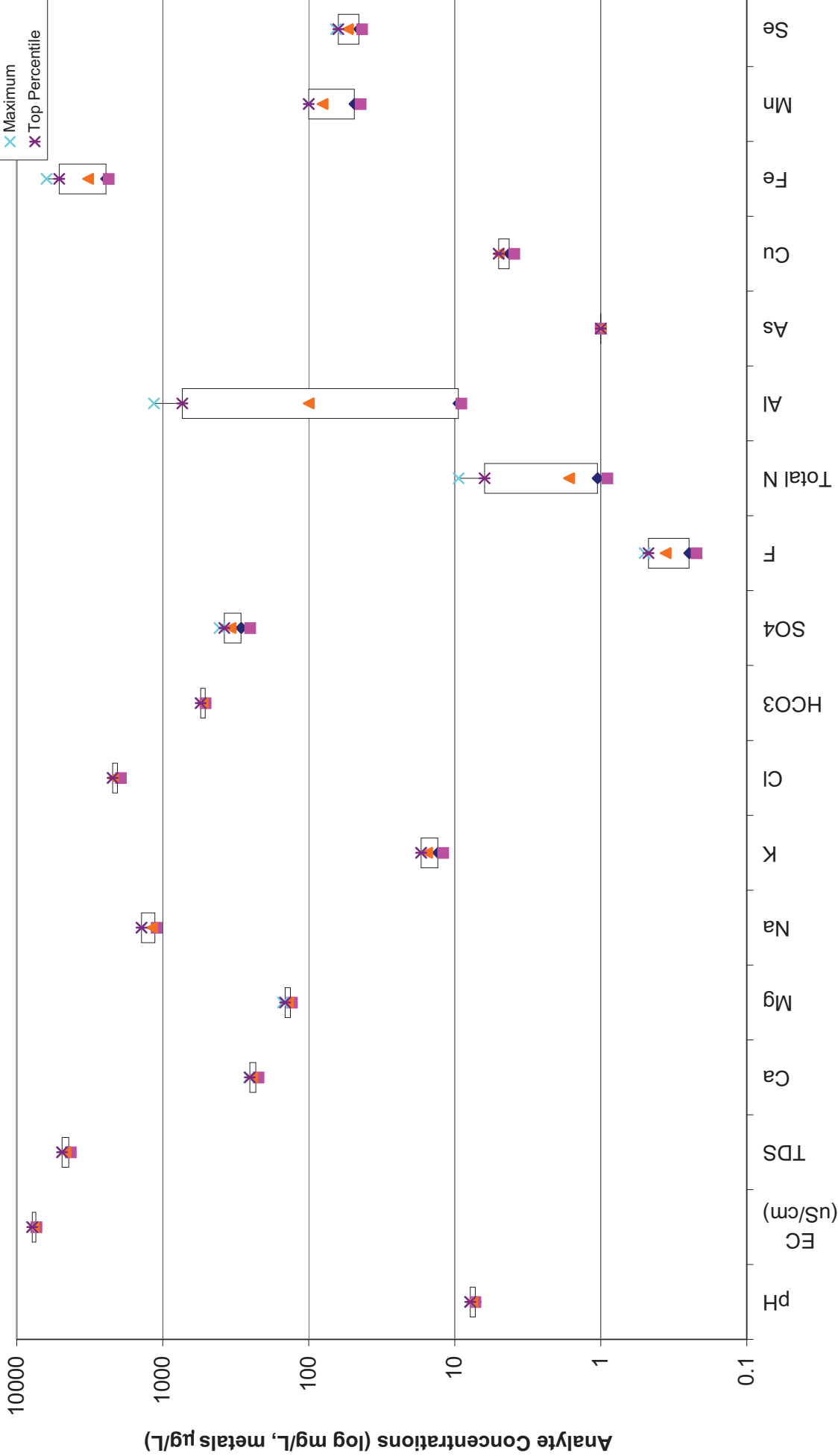
### Baseline Data Boxplots for Borehole 84P



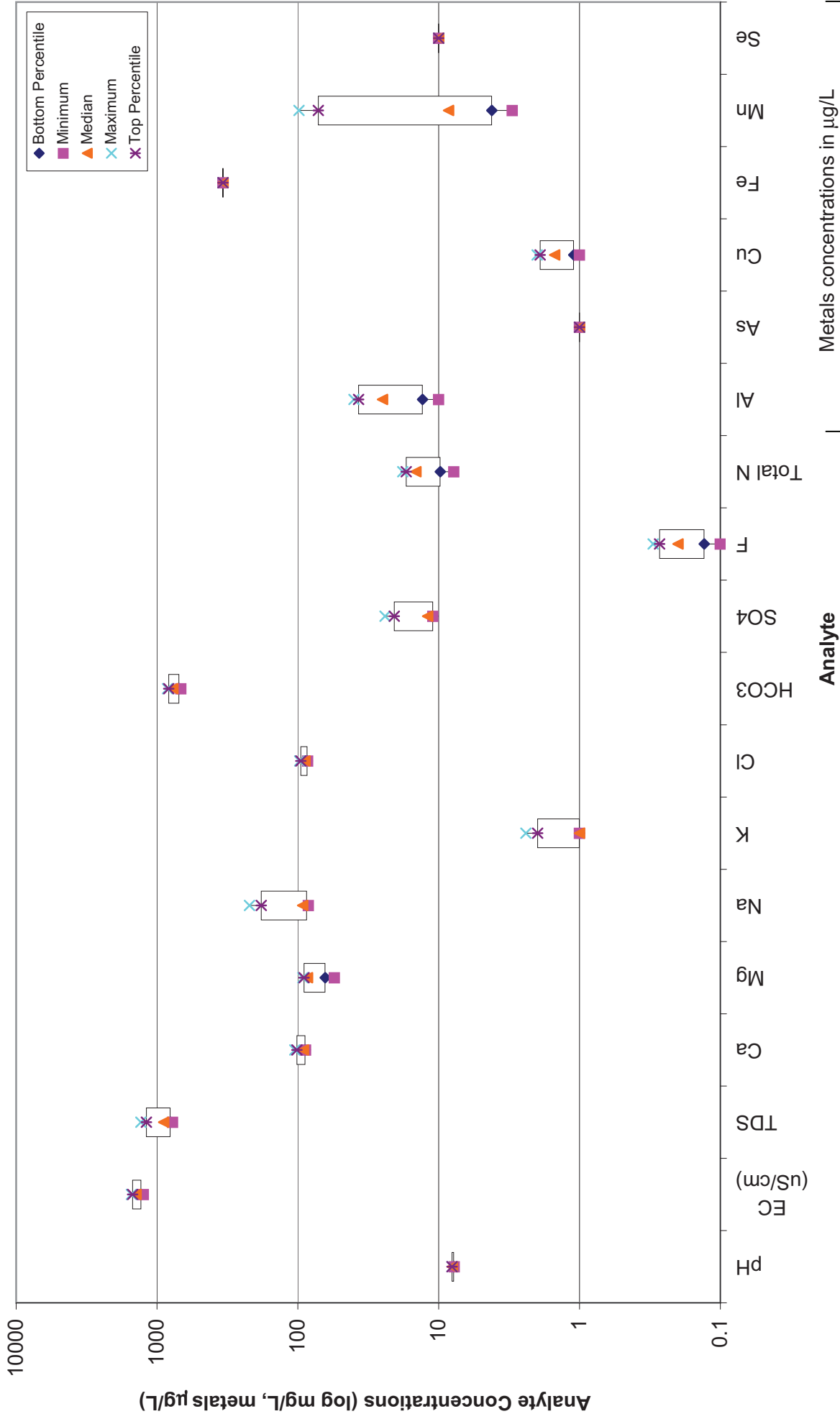
### Baseline Data Boxplots for Borehole 2289



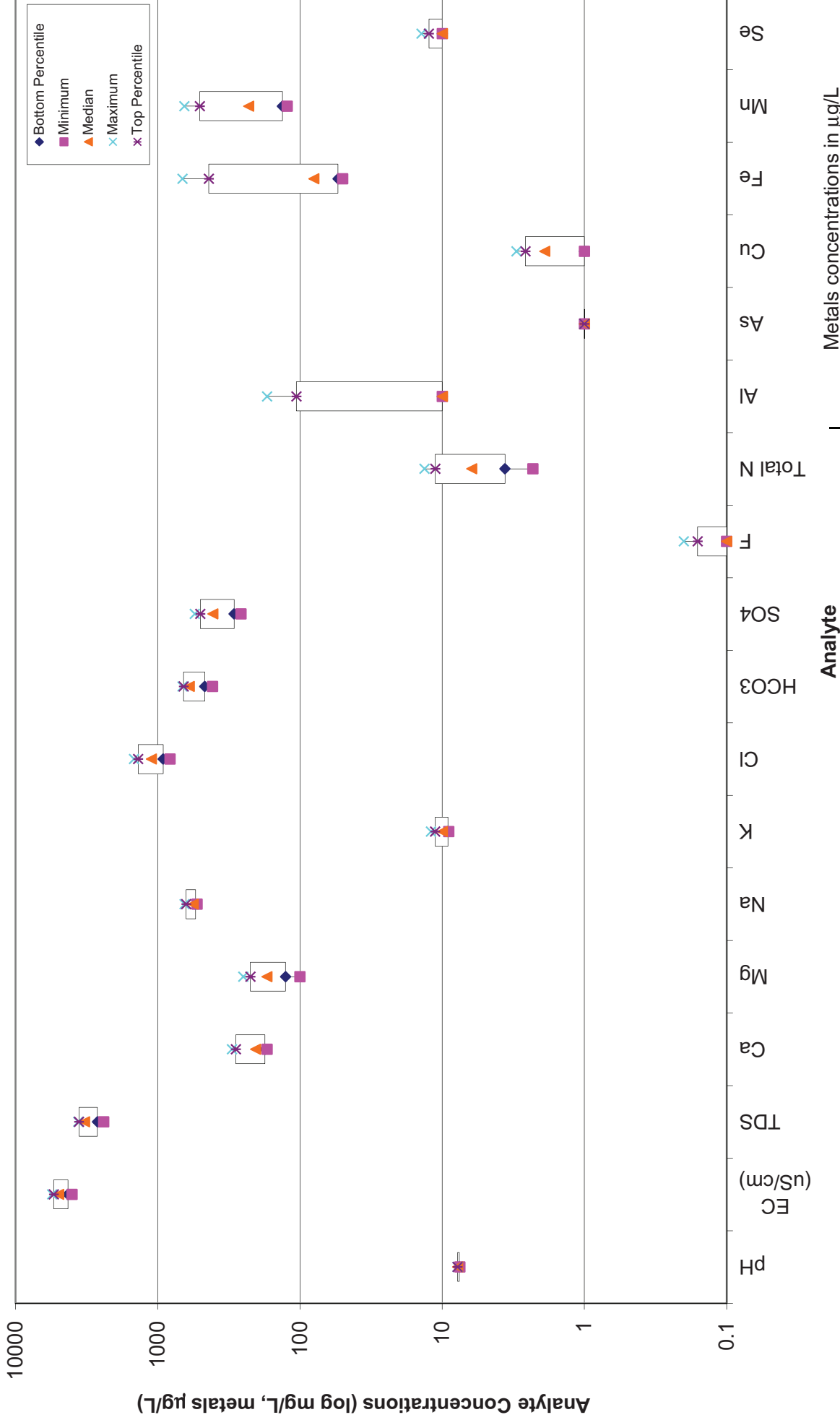
### Baseline Data Boxplots for Borehole 2291



### Baseline Data Boxplots for Borehole BMH1



### Baseline Data Boxplots for Borehole CSMH1



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# APPENDIX C

## DATA TABLES



New Acland Coal Pty Ltd  
Establishment of Groundwater Quality Background Limits (2012)

Parameter	Units	Groundwater Bore No. 18P (Coal)										Calculated Statistical Values				
		28/08/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Bottom Percentile	Minimum	Median	Maximum	Top Percentile
pH	pH units	7.1	7.3	8.2	8	8.5	7.7	8.3	9.6	8	7.7	7.28	7.1	8	9.6	8.61
EC	mS/cm	600	530	810	790	820	790	850	720	770	840	790	530	790	850	841
TDS	mg/L	332	334	474	431	403	360	430	5200	430	490	333.8	332	430	5200	961
<b>Major Ions</b>																
Ca	mg/L	19	9.2	18	9.6	6.7	6.7	11	7.4	9.4	11	6.7	6.7	9.5	19	18.1
Mg	mg/L	3	1.9	3.2	2	2	1.7	3.3	<1	2.5	2.4	1.86	1.7	2.4	3.3	3.22
Na	mg/L	88	91	130	130	130	110	130	150	150	160	90.7	88	130	160	151
K	mg/L	3	1.2	4.7	5.1	4.3	3	4.1	<1	4.3	4.2	2.64	1.2	4.2	5.8	5.24
Cl	mg/L	92	92	150	140	130	120	150	2500	140	150	92	92	140	2500	385
HCO <sub>3</sub>	mg/L	122	67	179	132	117	134	120	37	120	150	64	37	121	179	152.9
SO <sub>4</sub>	mg/L	5	11	5.5	22	16	16	17	18	5.9	6	5.45	5	13.5	22	18.4
<b>Minor Ions</b>																
F	mg/L	0.3	0.3	0.4	0.1	0.5	0.4	<0.1	0.17	0.1	0.2	0.1	0.1	0.3	0.5	0.42
Total N	mg/L	3.1	0.38	0.87	1.2	1.7	0.53	0.83	0.44	1.3	4.7	0.434	0.38	1.035	4.7	3.26
<b>Dissolved Metals</b>																
Al	mg/L	1300	19	16	1800	150	750	130	77	590	24	18.7	16	140	1800	1350
As	mg/L	5	4	18	8	3	4	3.6	4.4	2.7	1.6	2.59	1.6	4	18	9
Cu	mg/L	73	5	8	10	2	6	<2	<2	<2	1.2	1.88	1.2	6	73	35.2
Fe	mg/L	110	180	1800	1600	160	800	180	99	490	230	108.9	99	205	1800	1620
Mn	mg/L	5	39	110	37	14	27	14	2.6	56	64	4.76	2.6	32	110	68.6
Se	mg/L	2	2	<1	6	3	2	<5	<5	<5	5.8	2	2	2.5	6	5.9

N.B. Values highlighted in red indicate potentially erroneous analysis readings.

Parameter	Units	Groundwater Bore No. 27P (Coal)										Calculated Statistical Values				
		28/08/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Bottom Percentile	Minimum	Median	Maximum	Top Percentile
pH	pH units	7	7	7.4	7	7.5	7.6	7.2	7	7.6	7.3	7	7	7.25	7.6	7.6
EC	mS/cm	11000	9800	9900	9300	9700	9700	9200	9700	9100	8900	9080	8900	9700	11000	10010
TDS	mg/L	5597	6900	5040	6358	5430	4990	5900	6100	5800	5900	5035	4990	5850	6900	6412.2
<b>Major Ions</b>																
Ca	mg/L	390	400	370	500	390	420	570	430	410	410	388	370	410	570	507
Mg	mg/L	190	210	200	230	200	200	230	190	190	200	190	190	200	230	230
Na	mg/L	1400	1500	1500	1600	1600	1500	1300	1600	1500	1600	1390	1300	1500	1600	1600
K	mg/L	22	20	21	89	23	19	31	21	22	24	19.9	19	22	89	36.8
Cl	mg/L	2600	2300	2600	3600	2800	2500	2500	2700	2700	2700	2480	2300	2650	3600	2880
HCO <sub>3</sub>	mg/L	414	390	327	328	314	337	740	430	290	280	289	280	332.5	740	461
SO <sub>4</sub>	mg/L	580	580	590	740	690	690	560	670	710	680	578	560	675	740	713
<b>Minor Ions</b>																
F	mg/L	<0.1	0.1	0.2	<0.1	0.1	0.1	0.21	0.17	0.2	0.1	0.1	0.1	0.135	0.21	0.203
Total N	mg/L	1.2	1.8	2.5	7.6	3.7	3.8	3	3	1.4	2.4	1.38	1.2	2.75	7.6	4.18
<b>Dissolved Metals</b>																
Al	mg/L	640	7	7	750000	46	56	2000	140	16	25	14.2	7	56	750000	151600
As	mg/L	29	94	54	270	33	21	19	25	15	<1	18.2	15	29	270	129.2
Cu	mg/L	35	20	50	1000	10	8	<2	4.1	<2	3.7	3.98	3.7	15	1000	335
Fe	mg/L	2600	4200	4200	800000	2100	2600	2700	4900	1000	1500	1400	1000	2600	800000	163920
Mn	mg/L	160	330	200	6500	170	98	340	300	92	61	88.9	61	185	6500	956
Se	mg/L	16	36	<10	360	15	9	5.5	<5	71	58	7.95	5.5	26	360	157.7

New Acland Coal Pty Ltd  
Establishment of Groundwater Quality Background Limits (2012)

Groundwater Bore No. 28P (Coal)

Parameter	Units	15/04/2008										Calculated Statistical Values				
		28/08/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Bottom Percentile	Minimum	Median	Maximum	Top Percentile
pH	pH units	7.5	N/S	7.7	7.7	7.9	7.8	7.2	7.9	7.3	7.3	7.28	7.2	7.7	7.9	7.9
EC	mS/cm	9200	N/S	8700	9100	8800	8600	9700	8200	8700	8200	8520	8200	8800	9700	9300
TDS	mg/L	4836	N/S	5301	5836	5129	5051	5400	4700	6300	4700	4808.8	4700	5301	6300	6060
<b>Major Ions</b>																
Ca	mg/L	230	N/S	240	480	210	210	260	230	270	210	210	210	240	480	312
Mg	mg/L	180	N/S	210	230	230	230	310	230	270	230	230	230	270	310	278
Na	mg/L	1200	N/S	1400	1800	1500	1700	1300	1500	1500	1280	1280	1200	1500	1800	1720
K	mg/L	20	N/S	20	150	19	15	19	21	20	17.4	20	15	20	150	46.8
Cl	mg/L	2000	N/S	2700	2800	2400	2100	2300	2500	2500	2080	2080	2000	2400	2800	2720
HCO <sub>3</sub>	mg/L	968	N/S	769	636	703	897	850	770	1000	689.6	689.6	636	850	1000	992
SO <sub>4</sub>	mg/L	230	N/S	400	440	490	480	430	610	670	366	366	230	480	670	630
<b>Minor Ions</b>																
F	mg/L	0.1	N/S	0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total N	mg/L	2.5	N/S	1.2	3.8	1.9	1.2	1.1	0.93	1.7	0.926	0.91	0.91	1.2	3.8	2.76
<b>Dissolved Metals</b>																
Al	mg/L	400	N/S	16	1800000	23	71	720	42	42	18.4	16	16	42	1800000	360576
As	mg/L	19	N/S	51	480	27	17	26	24	<1	16.1	14	14	25	480	179.7
Cu	mg/L	<1	N/S	6	1200	4	7	<2	3.8	3	3.18	3	3	4	1200	484.2
Fe	mg/L	1500	N/S	7800	1500000	1700	1500	1000	760	4300	952	760	760	1700	1500000	306240
Mn	mg/L	140	N/S	8	7200	8	2	220	19	32	6	2	2	32	7200	1616
Se	mg/L	16	N/S	<5	490	14	8	14	<5	45	11.6	8	8	16	490	235

Groundwater Bore No. 843 (Basalt)

Parameter	Units	15/04/2008										Calculated Statistical Values				
		28/08/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Bottom Percentile	Minimum	Median	Maximum	Top Percentile
pH	pH units	7.2	7.4	7.7	7.6	7.9	7.8	7.5	7.5	7.3	7.29	7.2	7.55	7.9	7.9	
EC	mS/cm	3200	3500	3700	4000	4100	4300	4200	4200	3300	3290	3200	3200	3850	4300	4210
TDS	mg/L	1912	2205	1796	1990	2040	2070	2600	2800	1800	1799.6	1796	1796	2055	2600	2600
<b>Major Ions</b>																
Ca	mg/L	130	290	270	290	240	290	170	170	120	129	120	120	205	290	290
Mg	mg/L	140	180	180	190	180	200	170	170	180	167	140	140	180	230	203
Na	mg/L	230	270	300	300	330	300	310	310	300	239	230	230	300	350	332
K	mg/L	2	3.4	6.1	4.8	2.7	2.6	1.1	1.1	1.9	1.1	1.1	1.1	2.35	6.1	4.93
Cl	mg/L	480	660	810	940	970	910	780	780	740	642	480	480	795	970	943
HCO <sub>3</sub>	mg/L	827	691	603	580	587	846	700	700	220	544	220	220	647	846	828.9
SO <sub>4</sub>	mg/L	100	100	130	160	140	150	120	120	120	100	100	100	125	160	151
<b>Minor Ions</b>																
F	mg/L	0.6	0.9	0.8	0.3	0.4	0.9	0.41	0.41	0.4	0.39	0.3	0.3	0.455	0.9	0.9
Total N	mg/L	5.2	4.5	5.8	14	10	15	5.2	5.2	7.1	4.5	4.5	4.5	5.5	15	14.1
<b>Dissolved Metals</b>																
Al	mg/L	180	9	23	3600000	20	14	56	56	18	13.5	9	9	39.5	3600000	36162
As	mg/L	5	9	15	170	13	11	6.4	6.4	<1	4.96	4.8	4.8	9	170	46
Cu	mg/L	2	16	7	620	4	4	2.4	2.4	3.3	2.32	2	2	4	620	136.8
Fe	mg/L	790	220	7800	3300000	1900	1600	1400	1400	510	400	220	220	1400	3300000	40020
Mn	mg/L	120	340	<1	7500	4	10	26	26	17	8.8	4	4	26	7500	1772
Se	mg/L	6	5	<50	380	6	6	<5	<5	14	5.6	5	5	6	380	162.8

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Groundwater Bore No. 848 (Coal)															
Parameter	Units	28/08/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Calculated Statistical Values			
												Minimum	Median	Maximum	Top Percentile
pH	pH units	7.3	7.1	7.8	7.4	7.6	7.5	7.5	8.1	8.2	8.2	7.1	7.55	8.2	8.2
EC	mS/cm	5600	5200	5300	4700	4800	4500	5100	3300	3000	3700	3000	4750	5600	5330
TDS	mg/L	3044	3300	2802	2587	2313	2228	2600	2100	1700	2500	1700	2533.5	3300	3069.6
<b>Major Ions</b>															
Ca	mg/L	90	140	130	200	170	160	160	79	63	87	63	135	200	173
Mg	mg/L	160	170	180	170	180	170	160	160	68	120	68	165	190	181
Na	mg/L	730	670	690	540	430	510	440	450	400	600	400	525	730	694
K	mg/L	2	4.5	5	9.1	6.8	6.6	6.4	3.9	4.1	2.2	2	4.75	9.1	7.03
Cl	mg/L	1000	1100	1300	1200	1100	910	1000	650	590	790	590	1000	1300	1210
HCO <sub>3</sub>	mg/L	947	732	697	594	641	810	700	660	480	640	480	698.5	947	850.7
SO <sub>4</sub>	mg/L	110	140	6.5	220	130	130	120	77	76	84	6.5	115	220	148
<b>Minor Ions</b>															
F	mg/L	1.1	0.6	1	0.2	0.2	0.2	0.23	0.74	0.4	1	0.2	0.5	1.1	1.01
Total N	mg/L	7.8	1	3.7	2.1	1.8	0.93	1	5.6	3.6	12	0.993	2.85	12	8.22
<b>Dissolved Metals</b>															
Al	mg/L	190	29	3	990	220	54	18	43	42	10	3	43	990	374
As	mg/L	11	29	6	18	10	9	8.3	7.9	3.5	<1	3.5	10	29	29
Cu	mg/L	<1	<1	23	23	2	3	<2	<2	<2	1.8	1.8	3	23	16.2
Fe	mg/L	460	5000	5000	7300	3900	4100	1300	2000	190	300	190	2000	5460	5460
Mn	mg/L	6	70	<1	120	110	120	99	39	27	7.6	6	70	120	120
Se	mg/L	13	7	<5	30	5	5	<5	<5	15	15	5	13	30	21

Groundwater Bore No. 81P (Coal)															
Parameter	Units	28/08/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Calculated Statistical Values			
												Minimum	Median	Maximum	Top Percentile
pH	pH units	N/S	N/S	N/S	N/S	8.2	7.9	7.4	7.3	7.5	7.4	7.3	7.45	8.2	8.05
EC	mS/cm	N/S	N/S	N/S	N/S	6400	6500	7100	6200	6100	6500	6100	6450	7100	6800
TDS	mg/L	N/S	N/S	N/S	N/S	3129	3161	3400	3900	3600	3700	3129	3500	3900	3800
<b>Major Ions</b>															
Ca	mg/L	N/S	N/S	N/S	N/S	230	230	240	200	200	210	200	220	240	235
Mg	mg/L	N/S	N/S	N/S	N/S	97	91	100	93	96	100	91	96.5	100	100
Na	mg/L	N/S	N/S	N/S	N/S	750	1000	870	960	940	940	750	940	1000	980
K	mg/L	N/S	N/S	N/S	N/S	12	16	16	14	12	16	12	15	16	16
Cl	mg/L	N/S	N/S	N/S	N/S	1800	1600	1600	1800	1700	1700	1600	1700	1800	1800
HCO <sub>3</sub>	mg/L	N/S	N/S	N/S	N/S	305	361	430	320	350	370	305	355.5	430	400
SO <sub>4</sub>	mg/L	N/S	N/S	N/S	N/S	250	240	220	240	270	260	220	245	270	265
<b>Minor Ions</b>															
F	mg/L	N/S	N/S	N/S	N/S	0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.1	0.15	0.2	0.19
Total N	mg/L	N/S	N/S	N/S	N/S	1.5	1.7	1.7	2.1	0.84	1.8	0.84	1.7	2.1	1.95
<b>Dissolved Metals</b>															
Al	mg/L	N/S	N/S	N/S	N/S	20	21	<1	48	65	25	20.4	25	65	58.2
As	mg/L	N/S	N/S	N/S	N/S	18	14	<1	15	8.4	<1	10.08	14.5	18	17.1
Cu	mg/L	N/S	N/S	N/S	N/S	3	4	<2	<2	<2	1.9	1.9	3	4	3.8
Fe	mg/L	N/S	N/S	N/S	N/S	1500	1400	<5	580	820	1300	580	1300	1500	1460
Mn	mg/L	N/S	N/S	N/S	N/S	570	130	<1	250	180	160	142	130	570	442
Se	mg/L	N/S	N/S	N/S	N/S	9	6	<5	<5	37	39	6	23	39	38.4

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Groundwater Bore No. 82P (Coal)																
Parameter	Units	15/04/2008														
		28/08/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Calculated Statistical Values				
												Minimum	Median	Maximum	Top Percentile	
pH	pH units	N/S	N/S	N/S	N/S	7.7	7.6	7.7	7.7	7.9	7.9	7.6	7.75	7.9	7.9	
EC	mS/cm	N/S	N/S	N/S	N/S	5900	5600	5400	5400	5300	5400	5300	5500	6000	5950	
TDS	mg/L	N/S	N/S	N/S	N/S	3185	3308	3400	3400	3600	3500	3185	3400	3600	3550	
<b>Major Ions</b>																
Ca	mg/L	N/S	N/S	N/S	N/S	140	130	120	130	150	140	120	135	150	145	
Mg	mg/L	N/S	N/S	N/S	N/S	140	140	130	140	130	140	130	140	140	140	
Na	mg/L	N/S	N/S	N/S	N/S	750	860	850	850	840	880	750	845	880	880	
K	mg/L	N/S	N/S	N/S	N/S	6.4	5.3	5.8	5.8	7.2	6.6	5.3	6.1	7.2	6.9	
Cl	mg/L	N/S	N/S	N/S	N/S	1200	1100	1200	1100	1100	1100	1100	1100	1200	1200	
HCO <sub>3</sub>	mg/L	N/S	N/S	N/S	N/S	759	953	880	880	880	840	759	860	953	916.5	
SO <sub>4</sub>	mg/L	N/S	N/S	N/S	N/S	460	530	480	480	470	480	400	475	530	505	
<b>Minor Ions</b>																
F	mg/L	N/S	N/S	N/S	N/S	0.5	0.4	0.55	0.55	0.3	0.5	0.22	0.45	0.55	0.525	
Total N	mg/L	N/S	N/S	N/S	N/S	1.3	1.8	0.85	0.85	0.86	1.3	0.74	1.08	1.8	1.55	
<b>Dissolved Metals</b>																
Al	mg/L	N/S	N/S	N/S	N/S	10	86	15	70	10	24	10	19.5	86	78	
As	mg/L	N/S	N/S	N/S	N/S	11	9	12	7.5	6.1	<1	6.66	6.1	9	12	
Cu	mg/L	N/S	N/S	N/S	N/S	3	5	2.2	<2	<2	2.8	2.38	2.2	5	4.4	
Fe	mg/L	N/S	N/S	N/S	N/S	870	3100	1700	1600	610	1400	610	1500	3100	2400	
Mn	mg/L	N/S	N/S	N/S	N/S	54	60	73	59	190	54	56.5	66.5	190	145	
Se	mg/L	N/S	N/S	N/S	N/S	7	6	<5	<5	27	22	6	14.5	27	25.5	

Groundwater Bore No. 83P (Coal)																
Parameter	Units	15/04/2008														
		28/08/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Calculated Statistical Values				
												Minimum	Median	Maximum	Top Percentile	
pH	pH units	N/S	N/S	N/S	N/S	8.2	8.1	7.8	7.3	7.5	7.2	7.2	7.65	8.2	8.15	
EC	mS/cm	N/S	N/S	N/S	N/S	940	1200	1400	1600	1300	1300	940	1300	1600	1500	
TDS	mg/L	N/S	N/S	N/S	N/S	485	830	880	1200	820	960	485	855	1200	1080	
<b>Major Ions</b>																
Ca	mg/L	N/S	N/S	N/S	N/S	30	70	82	130	73	96	30	77.5	130	113	
Mg	mg/L	N/S	N/S	N/S	N/S	14	44	54	63	43	50	14	47	63	58.5	
Na	mg/L	N/S	N/S	N/S	N/S	100	100	140	120	99	100	99.5	100	140	130	
K	mg/L	N/S	N/S	N/S	N/S	2.6	3.1	4.4	7.6	4.2	4.3	2.6	4.25	7.6	6	
Cl	mg/L	N/S	N/S	N/S	N/S	100	140	150	170	130	140	100	140	170	160	
HCO <sub>3</sub>	mg/L	N/S	N/S	N/S	N/S	263	639	550	650	450	550	263	550	650	644.5	
SO <sub>4</sub>	mg/L	N/S	N/S	N/S	N/S	14	<50	22	30	20	18	14	20	30	26.8	
<b>Minor Ions</b>																
F	mg/L	N/S	N/S	N/S	N/S	0.2	0.1	0.31	0.2	0.2	0.3	0.1	0.2	0.31	0.305	
Total N	mg/L	N/S	N/S	N/S	N/S	1.2	1.1	22	0.53	0.28	0.99	0.28	1.045	22	11.6	
<b>Dissolved Metals</b>																
Al	mg/L	N/S	N/S	N/S	N/S	35	74	96	520	12	41	12	57.5	520	308	
As	mg/L	N/S	N/S	N/S	N/S	<1	2	1.5	1.4	1.5	<1	1.42	1.4	2	1.9	
Cu	mg/L	N/S	N/S	N/S	N/S	1	3	<2	<2	<2	1.2	1	1.2	3	2.64	
Fe	mg/L	N/S	N/S	N/S	N/S	240	560	770	1100	690	660	240	675	1100	935	
Mn	mg/L	N/S	N/S	N/S	N/S	26	38	59	96	70	73	26	64.5	96	84.5	
Se	mg/L	N/S	N/S	N/S	N/S	3	3	<5	<5	<5	<5	3	3	3	3	

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Parameter	Units	28/06/2003	3/03/2004	8/09/2004	13/04/2005	12/10/2005	28/04/2006	25/10/2006	18/04/2007	17/10/2007	15/04/2008	Calculated Statistical Values				
												Bottom Percentile	Minimum	Median	Maximum	Top Percentile
pH	pH units	N/S	N/S	N/S	N/S	8	7.6	7.7	7.7	7.8	7.7	7.65	7.6	7.7	8	7.9
EC	mS/cm	N/S	N/S	N/S	N/S	2400	2600	3100	3100	3400	3500	2500	2400	3100	3500	3450
TDS	mg/L	N/S	N/S	N/S	N/S	961	1324	2100	2100	2000	2000	1142.5	961	2000	2100	2100
<b>Major Ions</b>																
Ca	mg/L	N/S	N/S	N/S	N/S	130	130	170	170	210	240	130	130	170	240	225
Mg	mg/L	N/S	N/S	N/S	N/S	120	130	150	150	180	210	150	120	150	210	195
Na	mg/L	N/S	N/S	N/S	N/S	140	220	170	170	160	200	150	140	170	220	210
K	mg/L	N/S	N/S	N/S	N/S	3	2.6	2.7	2.7	3.4	3.8	2.65	2.6	2.85	3.8	3.6
Cl	mg/L	N/S	N/S	N/S	N/S	400	440	620	620	730	800	420	400	620	800	765
HCO <sub>3</sub>	mg/L	N/S	N/S	N/S	N/S	335	678	520	520	450	440	387.5	335	485	678	599
SO <sub>4</sub>	mg/L	N/S	N/S	N/S	N/S	76	100	130	130	190	250	88	76	130	250	220
<b>Minor Ions</b>																
F	mg/L	N/S	N/S	N/S	N/S	0.3	0.2	0.16	0.16	0.2	0.2	0.16	0.16	0.2	0.3	0.25
Total N	mg/L	N/S	N/S	N/S	N/S	3.2	2.9	2.6	2.6	2.2	3.3	2.4	2.2	2.75	3.3	3.25
<b>Dissolved Metals</b>																
Al	mg/L	N/S	N/S	N/S	N/S	23	13	12	12	14	9.7	10.85	9.7	12.5	23	18.5
As	mg/L	N/S	N/S	N/S	N/S	5	6	7.9	7.9	5	<1	5	5	6	7.9	7.9
Cu	mg/L	N/S	N/S	N/S	N/S	2	4	<2	<2	<2	2.4	2.08	2	2.4	4	3.68
Fe	mg/L	N/S	N/S	N/S	N/S	970	1000	12000	12000	490	770	630	490	985	12000	12000
Mn	mg/L	N/S	N/S	N/S	N/S	6	34	18	18	18	40	12	6	18	40	37
Se	mg/L	N/S	N/S	N/S	N/S	6	6	5.5	5.5	24	16	5.5	5.5	6	24	20

Parameter	Units	1/04/2009	1/12/2009	1/06/2010	13/12/2010	22/06/2011	14/12/2011	16/04/2012	Calculated Statistical Values					
									Bottom Percentile	Minimum	Median	Maximum	Top Percentile	
pH	pH units	8	7.3	7.1	6.7	6.01	7.01	7.2	6.424	6.01	7.1	8	7.58	
EC	mS/cm	6600	6200	6200	6200	19800	15600	7150	6120	6000	6600	19800	6000	19800
TDS	mg/L	3500	3500	3700	5700	12200	11800	4650	3500	3500	4650	12200	3500	12200
<b>Major Ions</b>														
Ca	mg/L	340	290	400	29	889	706	309	185.6	29	340	889	29	889
Mg	mg/L	140	130	8	4	799	705	182	6.4	4	140	799	4	799
Na	mg/L	640	780	750	1100	2740	2470	944	706	640	944	2740	640	2740
K	mg/L	14	17	13	17	14	10	14	11.8	10	14	18	10	18
Cl	mg/L	1700	1700	1700	2100	5630	5840	1960	1700	1700	1960	5840	1700	5840
HCO <sub>3</sub>	mg/L	290	330	320	207.3	166	172	149	159	149	207.3	330	149	324
SO <sub>4</sub>	mg/L	350	350	370	660	2820	2050	609	350	350	609	2820	350	2820
<b>Minor Ions</b>														
F	mg/L	<0.1	<0.1	0.5	0.1	0.2	0.3	0.2	0.14	0.1	0.2	0.5	0.1	0.2
Total N	mg/L	1.6	1.1	0.85	2.2	6	4	1.2	1	0.85	1.6	6	0.85	1.6
<b>Dissolved Metals</b>														
Al	mg/L	4.8	180	14	320	50	30	80	10.32	4.8	50	320	4.8	320
As	mg/L	<1	<1	3	<1	1	1	<1	1	1	1	1	1	1
Cu	mg/L	<1	7	3	11	16	9	4	3.5	3	8	16	3	16
Fe	mg/L	3000	3500	3600	3000	2250	870	1390	1182	870	3000	3600	870	3600
Mn	mg/L	390	390	390	390	250	854	208	233.2	208	390	250	208	390
Se	mg/L	28	35	37	20	<10	<10	<10	22.4	20	31.5	37	20	31.5

N.B. Values highlighted in red indicate potentially erroneous analysis readings. Values in blue indicate calculated TDS.

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Groundwater Bore No. 2291 (Coal)

Parameter	Units	9/06/2009	17/12/2009	1/07/2010	23/06/2011	13/12/2011	17/04/2012	Calculated Statistical Values				
								Bottom Percentile	Minimum	Median	Maximum	Top Percentile
pH	pH units	7.6	7.2	7.2	7.61	7.9	7.74	7.2	7.2	7.605	7.9	7.82
EC	mS/cm	7900	7400	7700	7780	7320	7630	7320	7320	7665	7900	7840
TDS	mg/L	4700	4900	4600	4250	4510	4900	4380	4250	4650	4900	4900
<b>Major Ions</b>												
Ca	mg/L	220	240	250	256	247	240	230	220	243.5	256	253
Mg	mg/L	140	150	130	136	137	140	133	130	138.5	150	145
Na	mg/L	1400	1400	1100	1200	1160	1170	1130	1100	1185	1400	1400
K	mg/L	15	14	12	17	16	17	13	12	15.5	17	17
Cl	mg/L	2200	2200	2200	1930	2150	2180	2040	1930	2190	2200	2200
HCO <sub>3</sub>	mg/L	510	540	550	508	530	549	509	508	535	550	549
SO <sub>4</sub>	mg/L	330	350	340	346	251	408	290.5	251	343	408	379
<b>Minor Ions</b>												
F	mg/L	<0.1	0.5	0.22	<0.1	<0.1	<0.1	0.248	0.22	0.36	0.5	0.472
Total N	mg/L	9.4	0.9	1.2	1.5	1.8	3.1	1.05	0.9	1.65	9.4	6.25
<b>Dissolved Metals</b>												
Al	mg/L	100	110	9	<10	1150	10	9.4	9	100	1150	734
As	mg/L	<1	<1	1	<1	<1	<1	1	1	1	1	1
Cu	mg/L	3.9	5	5	<1	5	<1	4.23	3.9	5	5	5
Fe	mg/L	3200	3300	4000	2340	6250	2530	2435	2340	3250	6250	5125
Mn	mg/L	100	76	85	44	100	53	48.5	44	80.5	100	100
Se	mg/L	43	65	54	<10	<10	<10	45.2	43	54	65	62.8

Groundwater Bore No. BMH1 (Basalt)

Parameter	Units	16/04/2008	22/06/2011	14/12/2011	17/04/2012	Calculated Statistical Values				
						Bottom Percentile	Minimum	Median	Maximum	Top Percentile
pH	pH units	8	8.02	8.05	7.73	7.811	7.73	8.01	8.05	8.041
EC	mS/cm	1400	1520	1520	1420	1295	1250	1410	1520	1490
TDS	mg/L	1300	871	774	923	803.1	774	897	1300	1186.9
<b>Major Ions</b>										
Ca	mg/L	88	105	93	90	88.6	88	91.5	105	101.4
Mg	mg/L	55	92	85	86	64	55	85.5	92	90.2
Na	mg/L	220	92	84	93	86.4	84	92.5	220	181.9
K	mg/L	2.4	1	1	1	1	1	1	2.4	1.98
Cl	mg/L	85	91	97	87	85.6	85	89	97	95.2
HCO <sub>3</sub>	mg/L	840	791	675	751	698	675	771	840	825
SO <sub>4</sub>	mg/L	11	13	11	24	11	11	12	24	20.7
<b>Minor Ions</b>										
F	mg/L	0.1	0.3	0.2	0.2	0.13	0.1	0.2	0.3	0.27
Total N	mg/L	18	14.7	7.8	14.3	9.75	7.8	14.5	18	17.01
<b>Dissolved Metals</b>										
Al	mg/L	40	<10	10	<10	13	10	25	40	37
As	mg/L	<1	<1	<1	<1	1	1	1	1	1
Cu	mg/L	1	2	<1	<1	1.1	1	1.5	2	1.9
Fe	mg/L	340	<50	<50	<50	340	340	340	340	340
Mn	mg/L	98	7	10	3	4.2	3	8.5	98	71.6
Se	mg/L	<5	<10	<10	<10	10	10	10	10	10

N.B. Values in blue indicate calculated TDS.



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Appendix C

Groundwater Bore No. CSMHT (Coal)

Parameter	Units	16/04/2008	23/06/2011	12/12/2011	18/04/2012	16/10/2012	Calculated Statistical Values				
							Bottom Percentile	Minimum	Median	Maximum	Top Percentile
pH	pH units	7.5	7.79	7.7	7.8	7.79	7.58	7.50	7.79	7.80	7.80
EC	mS/cm	4000	5190	5520	4980	4700	4280	4000	4980	5520	5388
TDS	mg/L	2400	3050	3620	3520	3270	2660	2400	3270	3620	3580
<b>Major Ions</b>											
Ca	mg/L	170	255	301	205	186	176.4	170	205	301	282.6
Mg	mg/L	100	171	250	183	166	126.4	100	171	250	223.2
Na	mg/L	530	609	647	565	561	542.4	530	565	647	631.8
K	mg/L	9.3	10	12	10	9	9.1	9.0	10.0	12.0	11.2
Cl	mg/L	820	1110	1470	1230	1060	916	820	1110	1470	1374
HCO <sub>3</sub>	mg/L	550	670	640	601	412	467	412	601	670	658
SO <sub>4</sub>	mg/L	260	410	336	430	549	290.4	260	410	549	501.4
<b>Minor Ions</b>											
F	mg/L	0.1	0.2	0.1	<0.1	<0.1	0.1	0.1	0.1	0.2	0.16
Total N	mg/L	2.3	13.3	6.2	5.6	8	3.62	2.3	6.2	13.3	11.18
<b>Dissolved Metals</b>											
Al	mg/L	170	<10	<10	<10	<10	10	10	10	170	106
As	mg/L	<1	<1	<1	<1	<1	1	1	1	1	1
Cu	mg/L	1.9	<1	<1	2	3	1	1	1.9	3	2.6
Fe	mg/L	670	<50	60	80	90	54	50	80	670	438
Mn	mg/L	650	292	230	148	123	133	123	230	650	506.8
Se	mg/L	14	<10	<10	<10	<10	10	10	10	14	12.4