PNG LNG Project: LNG Facilities

Water and Sediment Quality Baseline

January 2009

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EXECUTIVE SUMMARY

The Papua New Guinea Liquefied Natural Gas (PNG LNG) Project involves the development of a number of gas fields and facilities in a series of development phases to produce liquefied natural gas (LNG) for export. The development will also produce condensate. The development of the Hides, Angore, and Juha gas fields and blowdown of the gas caps at the existing Kutubu, Agogo and Gobe oil fields will supply the gas resources. An extensive onshore and offshore pipeline network will enable transportation of the gas to a new LNG Plant near Port Moresby and stabilised condensate to the existing oil processing and storage, and offloading facilities at the Kutubu Central Processing Facility and Kumul Marine Terminal respectively. Small amounts of condensate are also produced at the LNG Facilities site. Esso Highlands Limited (Esso), a Papua New Guinea subsidiary of the Exxon Mobil Corporation (ExxonMobil), is the operator of the PNG LNG Project. The PNG LNG Project will be developed in five phases over a period of 10 years to ensure reliability and consistent quality of supply of LNG for over the 30 year life of the project.

The 'downstream' segment of this project describes the project components from the Omati landfall in the Gulf of Papua, to the LNG Facilities in an area known as Portion 152, near Port Moresby. Portion 152 is located within the Konebada Petroleum Park, an area proposed for development of various petroleum industry infrastructure. This report deals with freshwater and estuarine environments in Portion 152 only.

The objectives of this study were to:

- Describe the background water and sediment quality conditions of watercourses in the study area; and

- Where possible, use these data to assist in the assessment of aquatic fauna and habitats (handled in separate volume Hydrobiology 2008b).

Portion 152 is a dry-tropical environment and at the time of sampling, many of the freshwater habitats were isolated pools. The estuaries are mangrove-lined and had negligible freshwater influence at the time of sampling. More detailed description of the aquatic habitats is presented in Hydrobiology (2008b).

There are two catchments represented in the Project area: Vaihua River and Karuka Creek (known locally as Kauka Ck, which itself is a tributary of Mokeke Creek) and there are estuaries at the mouths of these waterways. In addition, there is an unnamed estuary (or, more accurately, a tidal inlet) to the north of Vaihua River, referred to herein as North Vaihua Estuary.

Baseline water and sediment quality data are presented in this report. Analytical results for water samples showed that the concentrations of most potential contaminants were very low, most below detection limits. No contaminants of particular concern for ecotoxicological risk were identified as being very high in the background environment. Concentrations of some metals exceeded ANZECC/ARMCANZ (2000) trigger values for protection of aquatic life and the *PNG Environment Act 2000* water quality guidelines as follows:

- Boron at all estuary sites exceeded the *PNG Environment Act 2000* guideline;
- Copper at VAI6 exceeded ANZECC/ARMCANZ (2000) 99% and 95% trigger levels;
- Lead at VAI6 exceeded ANZECC/ARMCANZ (2000) 99% and 95% trigger levels and PNG Environment Act (2000) levels;
- Silver at VAI1 exceeded ANZECC/ARMCANZ (2000) 99% and 95% trigger levels and PNG Environment Act (2000) levels;
- Zinc at all sites exceeded ANZECC/ARMCANZ (2000) 99% and 95% trigger levels.

Nutrient concentrations exceeded trigger values for 'slightly disturbed' Australian tropical estuaries and freshwaters in the following instances:

- Total N and Total P at all estuary sites except KAR1;
- Total P at all freshwater sites except KAR5.

The LNG Facilities site area has a long history of anthropogenic disturbance, and nutrient conditions in the estuaries in particular reflect this history. These exceedences confirm the non-pristine status of the existing environment and the results of this baseline assessment should be used to develop site-specific water quality objectives and compare future monitoring.

Sediment quality results are unremarkable and probably reflect the local geology, possibly in combination with some historical anthropogenic influence. Concentrations of some metals, namely arsenic (one sample) and nickel, exceeded low-level ANZECC/ARMCANZ (2000) Interim Sediment Quality Guidelines (ISQGs) but generally were below the high-level ISQG. This is not surprising for a non-pristine environment.

PNG LNG Project: LNG Facilities

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1.1 Background

The Papua New Guinea Liquefied Natural Gas (PNG LNG) Project involves the development of a number of gas fields and facilities in a series of development phases to produce liquefied natural gas (LNG) for export. The development will also produce condensate. The development of the Hides, Angore, and Juha gas fields and blowdown of the gas caps at the existing Kutubu, Agogo and Gobe oil fields will supply the gas resources. An extensive onshore and offshore pipeline network will enable transportation of the gas to a new LNG Plant near Port Moresby and stabilised condensate to the existing oil processing and storage, and offloading facilities at the Kutubu Central Processing Facility and Kumul Marine Terminal respectively. Small amounts of condensate are also produced at the LNG Facilities site.

Esso Highlands Limited (Esso), a Papua New Guinea subsidiary of the Exxon Mobil Corporation (ExxonMobil), is the operator of the PNG LNG Project. The PNG LNG Project will be developed in five phases over a period of 10 years to ensure reliability and consistent quality of supply of LNG for over the 30 year life of the project.

A list of the proposed developments is provided below, and Figure 1-1 shows a schematic of facilities and pipelines:

Upstream Development Components

- Hides gas field development:
    - Seven wellpads with a total of eight new wells and re-completion of two existing wells;
    - Hides gathering system including gas flowlines from new and re-completed Hides wells;
    - Hides spineline and mono-ethylene glycol (MEG) Pipeline in the same right of way (ROW);
    - Hides Gas Conditioning Plant.
- Hides–Kutubu Condensate Pipeline in the same ROW as the LNG Project Gas Pipeline;
- Juha gas field development:
    - Three new wellpads with four new wells;
    - Juha gathering system including gas flowlines from new Juha wells;
    - Juha spinelines and MEG Pipeline in the same ROWs;
    - Juha Production Facility;

  - Juha–Hides pipelines right of way (ROW) containing three pipelines including Juha–Hides Rich Gas Pipeline, Juha–Hides Liquids Pipeline and Hides–Juha MEG Pipeline.

- Angore gas field development:
  - Two new wellpads with two new wells;
  - Angore gathering system including gas flowlines from new Angore wells;
  - Angore spineline and Angore MEG Pipeline to Hides Gas Conditioning Plant, both in the same ROW.

- Gas from existing fields:
  - Gas treatment at the Agogo Production Facility and a new Agogo Gas Pipeline from the Agogo Production Facility to LNG Project Gas Pipeline;
  - Gas treatment at the Gobe Production Facility and a new Gobe Gas Pipeline from the Gobe Production Facility to LNG Project Gas Pipeline;
  - Gas treatment at the Kutubu Central Processing Facility and a new Kutubu Gas Pipeline from the Kutubu Central Processing Facility to the LNG Project Gas Pipeline;
  - South East Hedinia gas field development: one new wellpad and two new wells; new gathering system including gas flow lines from the South East Hedinia new wells to the Kutubu Central Processing Facility in the same ROW as the Kutubu Gas Pipeline.

- Kopi scraper station.

- LNG Project Gas Pipeline:
  - Onshore: from Hides Gas Conditioning Plant to Omati River Landfall;
  - Offshore: Omati River Landfall to Caution Bay Landfall.

LNG Facilities Development Components

- Onshore LNG Plant including gas processing and liquefaction trains, storage tanks, flare system and utilities;

- Marine facilities including jetty, LNG and condensate export berths, materials offloading facility and tug moorage.

Supporting Facilities and Infrastructure

In addition to the principal gas production, processing and transport, and LNG production and export facilities, the project will involve the following permanent infrastructure and facilities:

- New roads and upgrade of existing roads;
- New bridges and upgrade of existing bridges;
- Upgrade of two existing airfields (upstream at Komo and Tari);
- New helipads (multiple);
- New wharf and an upgrade of the existing Kopi roll-on, roll-off facility;
- Water supply systems and pipelines, wastewater and waste management facilities;
- Operations Camps (at Hides, Juha and Tari);
- A series of temporary works and access roads will also be required during the construction phase, including:
    - Construction camps (multiple);
    - Material/pipe laydown areas.

This report deals with the LNG Facilities area only. A summary of the project components associated with the LNG Facilities area are:

- LNG Plant within an area known as Portion 152;
- Pipelaying from the ocean landfall to connect with the LNG Plant;
- LNG 'Offsite' infrastructure including LNG and condensate tanks, flare and Materials Offloading Facility;
- LNG Jetty, linking the LNG Plant with the export berths;
    - Export berth, at the terminal end of the LNG Jetty where tankers will load LNG;
    - Condensate berth, located on the LNG Jetty
- Associated infrastructure, including staff camp, offices, waste management systems and new roads.

The present report deals only with these LNG Facilities components of the project, and not the area associated with the coastal environment of the Omati landfall in the Gulf of Papua. This report is designated as Hydrobiology 2008d. The upstream water and sediment quality

report is Hydrobiology 2008c. Coffey Natural Systems contracted Hydrobiology to undertake water and sediment quality studies for the LNG Facilities segment of the project to inform an aquatic fauna impact assessment. Hydrobiology was also contracted to undertake aquatic fauna sampling in the downstream segment of the project, which will not be covered in the report, but is presented in a separate report (Hydrobiology 2008b).

1.2 Objectives

The objectives of this study were to:

- Describe the background water and sediment quality conditions of watercourses in the study area[1]; and
- Where possible, use these data to assist in the assessment of aquatic fauna and habitats (handled in separate volume Hydrobiology 2008b).

[1] This information will feed into a water and sediment quality impact assessment that is being undertaken by Coffey Natural Systems.

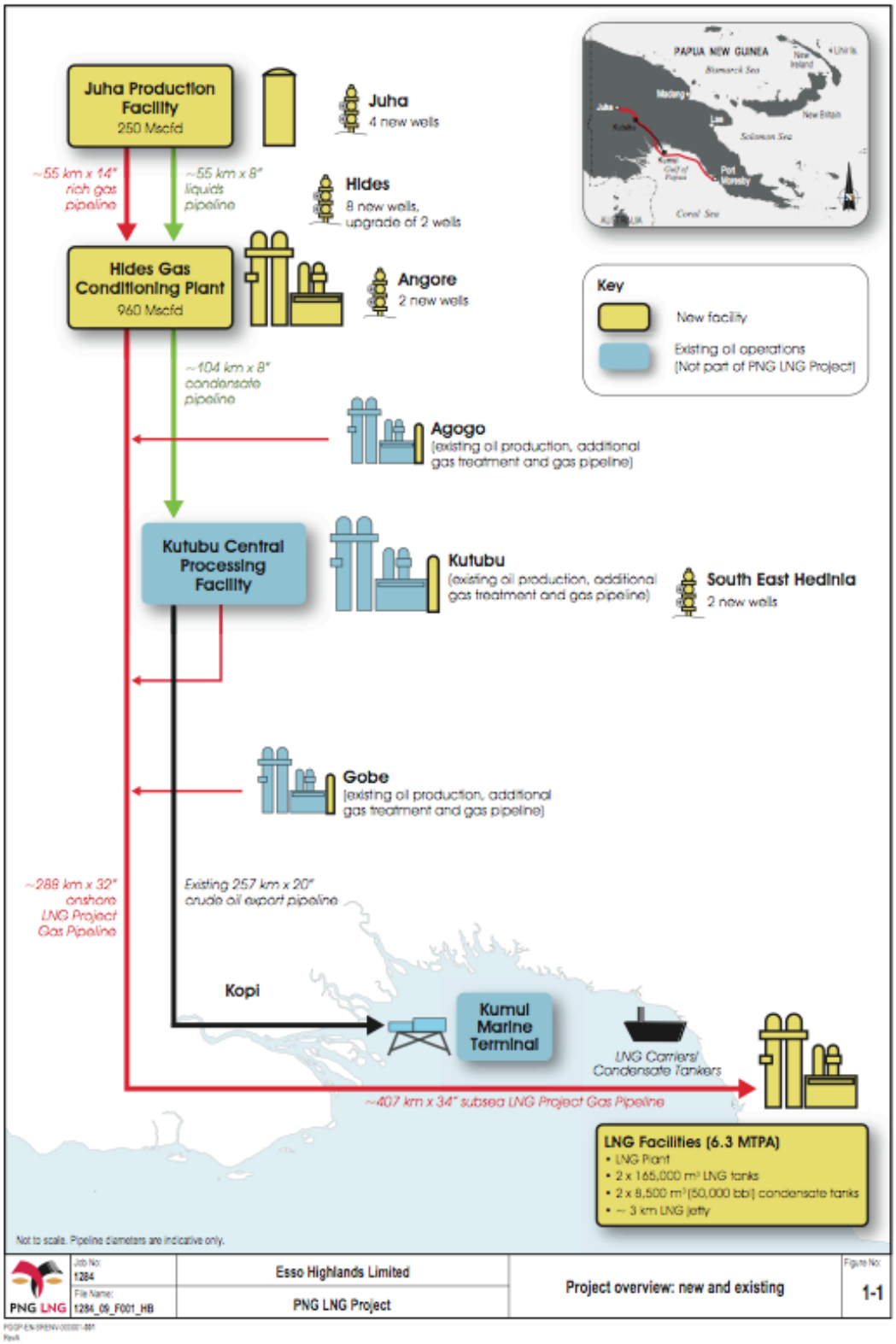

Figure 1-1 Project overview - new and existing

2 METHODS

Water and sediment sampling was carried out from 31 May to 6 June 2008. Dry conditions were experienced at the LNG Facilities site area during this time. As described in Hydrobiology (2008b), this area is understood to be a dry-tropical environment, with dry conditions predominant, interspersed with sporadic wet conditions. Most of the freshwater habitats encountered were isolated pools.

2.1 Sampling Sites

Sampling sites for the water and sediment quality baseline were linked to the sites chosen for the aquatic fauna sampling program (see Hydrobiology 2008b). The sites sampled for water and sediment quality are listed in Table 2-1 and shown in Figure 2-1. Sampling sites consisted of freshwater and estuarine sites and not all analyses were performed at every site (see Table 2-1). The aquatic habitats in each of the sampling sites are described in more detail in Hydrobiology (2008b). The two largest catchments in the Portion 152 area are the Vaihua River and Karuka Creek catchments. The majority of the LNG Facilities infrastructure is located within the catchment of a small unnamed creek to the north of the Vaihua River, named North Vaihua Creek herein. The freshwater and estuarine reaches of these three catchments were sampled. While no LNG Facility development is planned to occur within the Karuka Creek catchment, sites on this creek were sampled in order to provide freshwater and estuary control sites.

VAI2 was sampled on a low tide and a high tide to investigate the influence of tidal cycle on water and sediment quality.

Table 2-1 Sampling site coordinates and sample types

Site	Location	Location (UTM, 55L)		Water Sample	Sediment Sample	Particle Size Distribution
		East	North			
VAI1	North Vaihua Estuary	501107	8967002	YES	YES	YES
VAI2	North Vaihua Estuary	500699	8966722	YES	YES	YES
VAI3	Vaihua River Estuary	502042	8965996	YES	YES	YES
VAI4	Vaihua River Estuary	501172	8966478	YES	YES	YES
VAI5	Vaihua River (freshwater)	507069	8964504	YES	YES	YES
VAI6	Vaihua River (freshwater)	504611	8963354	YES	NO	NO
KAR1	Karuka Creek Estuary	500461	8972942	YES	YES	YES
KAR2	Karuka Creek Estuary	499910	8974226	YES	NO	NO
KAR3	Karuka Creek (freshwater)	504985	8968896	YES	YES	YES
KAR4	Karuka Creek (freshwater)	504818	8967738	YES	NO	NO
KAR5	Karuka Creek (freshwater)	502969	8971092	YES	NO	NO
	Estuarine sites					
	Freshwater sites					

Note: Orange = estuarine sites, Blue = freshwater sites

Figure 2-1 Location of water and sediment quality sampling sites

2.2 Overview of Analytes

In situ water quality measurements were taken at all water and sediment quality sites and at all aquatic biology sampling sites (see Hydrobiology 2008a).

Water quality parameters measured in water samples were:

- Dissolved (<0.45 µm) and total metals (boron, iron, selenium, aluminium, arsenic, cadmium, chromium, manganese, zinc, nickel, copper, lead, silver and mercury);
- Nutrients (total nitrogen, oxidised nitrogen (NOx), total Kjeldahl nitrogen (TKN), and total phosphorus);
- Major anions and cations (calcium, magnesium, potassium, sodium, sulphate and chloride);
- Physical parameters (total suspended solids (TSS) and total organic carbon (TOC)); and
- Alkalinity (hydroxide alkalinity, carbonate alkalinity, bicarbonate alkalinity and total alkalinity).

Where applicable, metal data in water were compared against the *PNG Environment Act 2000* criteria in order to place results into context. Data were also compared to the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)* (ANZECC/ARMCANZ, 2000) guidelines for the protection of freshwater aquatic ecosystems, where relevant. The values cited in the ANZECC/ARMCANZ (2000) document have been gathered from international ecotoxicity databases, and hence are indicative of potential ecotoxicological problems. Ecotoxicological guideline values from ANZECC/ARMCANZ (2000) for the protection of 99% and 95% of species in an aquatic ecosystem are used in this report to put results into context.

Sediment metal concentrations (boron, iron, selenium, aluminium, arsenic, cadmium, chromium, manganese, zinc, nickel, copper, lead, silver and mercury) were measured in sediment in the <2 mm size fraction. Data were compared against ANZECC/ARMCANZ (2000) interim sediment quality guidelines (ISQGs) for the protection of freshwater aquatic ecosystems.

2.3 Sample Collection

2.3.1 In situ Water Quality Parameters

In-situ water quality parameters were collected in the field using a HACH® Hydrolab DS5 water quality multiprobe. The following parameters were measured;

- pH;
- Temperature;

- Turbidity;
- Oxidation-reduction potential (ORP);
- Salinity; and
- Conductivity.

The instrument was calibrated by the manufacturer in Australia prior to departure into the field and routine daily calibrations of pH were performed in the field.

2.3.2 Water and Sediment Quality Parameters

Water sample bottles and sediment sample containers were delivered to the study site pre-treated with acid preservative where required (see Table 2-2 and Table 2-3). Water samples were collected by hand, with the sampler wearing powder-free latex gloves, collecting water from approximately 2 cm under the surface. Care was taken to avoid spillage or removal of preservative in the bottles during filling. Dissolved metals samples were collected in a stock water sample bottle, returned to Port Moresby and filtered into the appropriate bottle. Filtering was performed using sterile syringes with disposable 0.45 µm syringe-filters. Samples were refrigerated and delivered to TNT couriers in Port Moresby and consigned to ALS Brisbane, a NATA certified analytical testing laboratory.

Table 2-2 Container type, preservative and holding times for water

Analyte	Container	Preservative	Holding Times
Total Metals (Al, As, B, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Se, Ag, Zn)	Polyethylene (acid washed)	Nitric Acid to pH<2	Six Months
Total Mercury	Polyethylene (acid washed)	Nitric Acid to pH<2	28 Days
Dissolved Metals (Al, As, B, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Se, Ag, Zn)	Polyethylene (acid washed)	Nitric Acid to pH<2	Six Months
Dissolved Mercury	Polyethylene (acid washed)	Nitric Acid to pH<2	28 Days
Suspended Solids	Polyethylene	Cool to 4ºC	7 Days
Alkalinity	Polyethylene	Cool to 4ºC	14 Days
Sulphate	Polyethylene	Cool to 4ºC	28 Days
Chloride	Polyethylene	Cool to 4ºC	28 Days
Total Reactive Phosphorus	Polyethylene	Filter, cool to 4 ºC	7 Days
Dissolved Major Cations – Na, K	Polyethylene	None Required	1 Month
Dissolved Major Cations – Mg, Ca	Polyethylene	None Required	1 Week
Total Organic Carbon	Glass	Add H_2SO_4 to pH<2, cool to 4 ºC	28 days
Nitrite plus Nitrate (NOx)	Polyethylene	Add H_2SO_4 to pH<2, cool to 4 ºC	28 days
Total Phosphorus, Total Nitrogen, Kjeldahl Nitrogen	Polyethylene	Add H_2SO_4 to pH<2, cool to 4ºC	28 days

Table 2-3 Container type, preservative and holding times for sediment

Analyte	Container	Preservative	Holding Time
Metals	Plastic or glass	Cool to 4ºC	6 Months
Particle Size Distribution	Ambient	Not Specified	-

Sediment samples were collected in freshwater habitats by submerging the sample jar by hand and collecting directly into the jar. In estuaries, sediment was collected using a Van Veen grab sampler (Plate 2-1). Sediment collected in this way was emptied into a stainless steel bowl, homogenised and spooned into collection jars.

Plate 2-1 Grab sampling for sediment samples

Waters and sediments were analysed using standard laboratory methods, and these are listed in Table 2-4 and Table 2-5 respectively.

Table 2-4 Standard analytical methods for water quality

Analyte	Method
Total Metals (Al, As, Cd, Cr, Cu, Pb, Mn, Ni, Ag, Zn)	USEPA 6020 (ICP-MS)
Total Metals (B, Fe, Se)	USEPA 6010 (ICP-AES)
Total Mercury	APHA 3122 Hg-B (FIMS)
Dissolved Metals (Al, As, B, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Se, Ag, Zn)	USEPA 6020 (ICP-MS)
Dissolved Metals (B, Fe, Se)	USEPA 6010 (ICP-AES)
Dissolved Mercury	APHA 3122 Hg-B (FIMS)
Suspended Solids	APHA 2540 D
Alkalinity	APHA 2320 B
Sulphate	APHA 3120
Chloride	APHA 4500 Cl^- B
Total Reactive Phosphorus	APHA 4500 P-G
Dissolved Major Cations – Na, K	APHA 3120 (Ca, Mg, Na, K) - B
Dissolved Major Cations – Mg, Ca	APHA 3120 (Ca, Mg, Na, K) - B
Total Organic Carbon	APHA 5310 B
Nitrite plus Nitrate (NOx)	APHA 4500-NO_3^- I
Total Phosphorus, Total Nitrogen, Kjeldahl Nitrogen	APHA 4500-P H, APHA 4500-N_{org}/NH_3, APHA 4500-N_{org} D

Note: APHA (2001) 20th Ed.

Table 2-5 Standard analytical methods for sediment quality

Analyte	Method
Moisture Content	In-house
Sieving to <2000 μm	In-house
Total Metals (Al, As, Cd, Cr, Cu, Pb, Mn, Ni, Ag, Zn, B, Fe, Se)	USEPA 6020 (ICP-AES)
Total Mercury	APHA 3112 Hg-B (FIMS)
Particle Size Distribution	ASTEM 100 Hydrometer

Note: APHA (2001) 20th Ed.

2.4 Sample Processing and Quality Control

2.4.1 Total versus Dissolved Metals

In order to assess data quality of results for dissolved metal samples, the ratio of dissolved to total metals results was calculated and expressed as a percentage.

Results from this quality analysis are shown in Appendix 1 and indicated that some contamination during filtering of dissolved metal samples had occurred as follows:

- Estuarine samples: Dissolved silver concentrations higher than totals for VAI1. Dissolved zinc concentrations higher than totals for VAI1, VAI2 and, to a lesser extent, VAI3.

- Freshwater samples: Dissolved cadmium concentrations higher than totals for VAI6 and KAR4. Dissolved zinc concentrations higher than totals for VAI6 and KAR3.

2.4.2 Field Blanks

Blanks are water samples containing pure distilled water and are used to test for the possible introduction of contamination during field procedures or sample handling. Inspection of analytical results for distilled water blanks (samples W-038 to W-042) indicates that there may have been some zinc contamination of samples. The blank sample returned a total zinc concentration of 0.246 mg/L and a dissolved zinc concentration of 0.124 mg/L. This may at least partly explain the high zinc concentrations recorded. There may have also been copper contamination, with total and dissolved concentrations in blank samples of 0.098 mg/L and 0.043 mg/L respectively (see Appendix 2).

This, in combination with the inspection of dissolved versus total concentrations, suggests that the filtering process may have introduced contamination with zinc and cadmium (and silver in one sample). The commercially-supplied, reportedly sterile syringes, filters or bottles or some other contamination introduced during the filtering stage may have been responsible for the contamination.

3 WATER AND SEDIMENT QUALITY BASELINE

Laboratory reports for water and sediment analyses are given in Appendix 3.

3.1 Water

In-situ water quality measurements are given in Table 3-1. Freshwaters are clearly delineated from estuarine waters on the basis of conductivity and salinity. Estuarine surface waters were recorded to be hyper-saline (typical seawater commonly quoted at approximately 35 ppt), suggesting little freshwater input to the estuaries. Freshwater surface water had very low conductivity.

Table 3-1 In-situ water quality measurements

Date	Location	Site	pH	Temp (°C)	Turb NTU	ORP mV	Sal ppt	Cond mS/cm
31/05/08	North Vaihua Estuary	VAI1	7.2	26.51	27	287	37.9	56.8
31/05/08	North Vaihua Estuary	VAI2	7.7	28.29	-	242	37.5	56.4
3/06/08	Vaihua Estuary	VAI3	7.6	27.83	21	243	38.0	57.0
3/06/08	Vaihua Estuary	VAI4	7.9	28.34	21	205	37.3	56.0
4/06/08	Karuka Estuary	KAR1	7.0	27.40	40	222	37.5	56.4
4/06/08	Karuka Estuary	KAR2	7.6	28.40	-	205	37.0	55.7
5/06/08	Vaihua River	VAI5	7.5	25.83	-	131	0.6	1.2
6/06/08	Karuka Creek	KAR3	8.1	26.66	-	184	0.4	0.8
6/06/08	Karuka Creek	KAR4	7.7	25.70	-	186	0.5	0.9
6/06/08	Vaihua River	VAI6	8.5	29.20	-	153	0.4	0.8
6/06/08	Karuka Creek	KAR5	8.0	27.68	-	177	0.4	0.8
	Estuarine sites							
	Freshwater sites							

Temp = Temperature; Turb = Turbidity (Nephelometric turbidity units (NTU)); ORP = Oxidation-reduction potential; Sal = Salinity; Cond = Conductivity. Missing values due to unreliable probe operation in the field.

Graphs of water quality data are provided in Appendix 4. Most dissolved metal concentrations at most sites were at or below the detection limit[2]. Where values were reported above detection limits, there were no consistent between-site or between-catchment patterns and there were no consistent freshwater versus saltwater patterns. Dissolved metal concentrations exceeding water quality guidelines are indicated in Table 3-2.

[2] For the purposes of graphing, values reported to be below detection limit were assumed to be the value of the detection limit. For example, a metal concentration reported at <0.005 mg/L was reported as 0.005 mg/L. Note that detection limits achievable for freshwater samples differed from saltwater (estuarine) samples.

Table 3-2 Comparison of results against guidelines

Metal	Guideline			
	PNG Environment Act (2000)		ANZECC/ARMCANZ (2000)*	
	Saltwater	Freshwater	Saltwater	Freshwater
Dissolved boron	Exceeded at estuary sites	Not exceeded for freshwater sites	No guideline for saltwater	Not exceeded
Dissolved copper at VAI6 (saltwater site)	Not exceeded		Exceeded 99% and 95% trigger values	
Dissolved lead at VAI6 (saltwater site)	Exceeded		Exceeded 99% and 95% trigger values	
Dissolved silver at VAI1	Exceeded		Exceeded 99% and 95% trigger values	
Dissolved zinc at all sites	Not exceeded	Not exceeded	Exceeded 99% and 95% trigger values	Exceeded 99% and 95% trigger values

* Trigger values for 'slightly to moderately disturbed systems used. Exceedences highlighted in orange.

The minor exceedences of ANZECC/ARMCANZ (2000) and PNG Environment Act (2000) guidelines are not considered to be a significant issue. As described in Hydrobiology (2008b), the site has a long history of human disturbance and aquatic environmental values at some sites in Portion 152 are degraded.

The water quality results do not highlight any particularly striking water quality risks with respect to the protection of aquatic life. Some of the elevated metals, such as boron, iron and manganese do not have well-established ecotoxicological risk profiles for aquatic organisms. The metals of most concern, such as copper, chromium, nickel, selenium and mercury are generally low.

Sinclair Knight Merz (SKM) conducted sampling of groundwater in the Portion 152 area (SKM 2008). The physicochemical properties of groundwater varied markedly and there is no clear 'marker' identified in the groundwater studied that would suggest that the freshwaters sampled in this study have a groundwater origin. In the field, it was observed that some seemingly isolated pools had small flows exiting the pool, suggesting that there may be some groundwater recharge of surface water.

Suspended solids concentrations in estuaries were generally higher than those in freshwater sites (see Appendix 4). The aquatic fauna impact assessment study (Hydrobiology 2008b) discusses the potential impacts of increased sediment mobilisation to aquatic habitats and fauna.

Nutrient data collected in this study indicate some elevated concentrations of nitrogen and phosphorus in Portion 152 watercourses. Total nitrogen and total phosphorus concentrations at all estuary sites, with the exception of KAR1, exceeded the ANZECC/ARMCANZ (2000) trigger values for total nitrogen and total phosphorus in 'slightly disturbed' Australian tropical estuaries. Total nitrogen concentrations in freshwater did not exceed trigger values. Total phosphorus concentrations in freshwater were generally

lower than those in estuarine waters but still exceeded ANZECC/ARMCANZ (2000) trigger values for southeast Australian 'low-land rivers', with the exception of KAR5. The nutrient conditions in the estuaries were not observed to be linked to any obvious eutrophication impacts to fauna (Hydrobiology 2008b) and the conditions probably reflect the history of agricultural land use and settlements in the area, combined with the lack of flushing freshwater flows at the time of sampling.

3.2 Sediment

Sediment data are presented graphically in Appendix 5.

Particle size distribution analyses indicated that estuarine sediments are composed primarily of sand, silt and clay. Sediments from freshwater sites (VAI5 and KAR3) contain more gravel. Table 3-3 shows the particle size classification used for sediment samples.

Table 3-3 Classification of particle size distribution

Size Class	Grain Size (μm)
Clay	< 2
Silt	2-60
Sand	60-2000
Gravel	> 2000

Where metal concentrations were recorded above detection limits, values were compared against ANZECC/ARCMANZ (2000) Interim Sediment Quality Guidelines (ISQGs). Concentrations recorded in freshwater and estuarine sediments were below low-level ISQG values, with the following exceptions:

- Arsenic concentration at VAI1 exceeded the low-level ISQG, but was below the high-level ISQG.
- Nickel concentrations at all sites except VAI2 exceeded the low-level ISQG.
- Nickel concentrations at KAR3 and VAI5 also exceeded the high-level ISQG but other sites were below the high-level ISQG.
- Detection limits achieved for silver were too high for comparison with the low-level ISQG but all values were below the high-level ISQG.

Concentrations of aluminium, chromium, copper, zinc, manganese and nickel were higher at VAI3 and VAI4 (Vaihua River Estuary) and VAI1 (North Vaihua Estuary) than at VAI2 (North Vaihua Estuary) (see Appendix 5). Concentrations of metals in sediment did not display any consistent differences between estuaries and freshwater habitats.

4 CONCLUSIONS AND RECOMMENDATIONS

This study represents a single snap-shot baseline assessment of water and sediment quality during dry conditions. The Project area is a non-pristine environment, with a long-history of human disturbance, primarily in the form of agriculture. However, this baseline has indicated that water quality is generally good and no pre-existing contaminants of particular concern (at least among the suite of parameters tested here) were identified. With respect to dissolved metals, some exceedences of guidelines at some sites were identified as follows:

- Boron at all estuary sites exceeded the *PNG Environment Act (2000)* guideline;
- Copper at VAI6 exceeded ANZECC/ARMCANZ (2000) 99% and 95% trigger levels;
- Lead at VAI6 exceeded ANZECC/ARMCANZ (2000) 99% and 95% trigger levels and PNG Environment Act (2000) levels;
- Silver at VAI1 exceeded ANZECC/ARMCANZ (2000) 99% and 95% trigger levels and PNG Environment Act (2000) levels;
- Zinc at all sites exceeded ANZECC/ARMCANZ (2000) 99% and 95% trigger levels.

Of these exceedences, quality control analysis has indicated that there may have been data quality issues with copper, silver and zinc. The fact that exceedences for copper and silver only occurred at one site, and not at all sites, would suggest that the exceedences of these metals at VAI6 and VAI1 respectively, are not due to a common contamination source. However, the exceedence in zinc occurred at all sites, potentially indicating that sample bottle or equipment contamination may be more responsible for the exceedences.

There were no consistent between-catchment or freshwater versus saltwater trends in metal concentration. Sampling at one estuary site (VAI2) at low tide and high tide did not reveal any significant tidal variation in contaminant concentration.

Nutrient concentrations exceeded ANZECC/ARMCANZ (2000) trigger values for 'slightly disturbed' Australian tropical estuaries and freshwaters in the following instances:

- Total N and Total P at all estuary sites except KAR1;
- Total P at all freshwater sites except KAR5.

This result suggests that, by Australian standards, both estuaries are considered 'disturbed' and are not pristine. Notwithstanding this, the nutrient conditions in estuaries were not observed to cause visible signs of eutrophication. The nutrient concentrations probably reflect a history of agricultural land use and settlements in the catchment and the lack of freshwater flushing flows through the estuary.

For the purposes of this project, within the framework of the ANZECC/ARMCANZ (2000) water quality guidelines, exceedence of 99% and 95% trigger values for 'slightly to moderately disturbed systems' is not interpreted as a 'pass' or 'fail' of a standard. Rather, these findings provide evidence of pre-existing disturbance and are used for comparative purposes in future monitoring or to provide a guide for developing site-specific water quality objectives. For example, if ANZECC/ARMCANZ (2000) is adopted as a guide, 90% or 80% trigger values may be more appropriate site-specific water quality objectives.

The following recommendations are made with respect to water quality characterisation:

- Undertake baseline water quality sampling in estuaries and selected freshwater sites at a time of high rainfall, when the rivers are flowing;
- Undertake baseline sampling of hydrocarbons in estuaries and freshwater during a dry period and a wet period;
- Using dry season and wet season data, derive appropriate site-specific water quality objectives in order to test the performance of mitigation measures employed during construction and operation.

5 REFERENCES

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Appendix 1 QA/QC Results for Water Samples

Site			Dissolved Boron (mg/L)		Total Boron (mg/L)	Boron LOR	Dissolved : Total (%)		Dissolved Iron (mg/L)		Total Iron (mg/L)	Iron LOR	Dissolved : Total (%)		Dissolved Selenium (mg/L)		Total Selenium (mg/L)	Se LOR	Dissolved : Total (%)		Dissolved Aluminium (mg/L)		Total Aluminium (mg/L)	Al LOR	Dissolved : Total (%)		Dissolved Arsenic (mg/L)	
VAI5	Freshwater		0.07		0.06	0.05	116.7	<	0.05		0.27	0.05	18.5	<	0.01	<	0.01	0.01	100.0	<	0.01		0.2	0.01	5.0	<	0.001	<
VAI6	Freshwater		0.06		0.06	0.05	100.0		0.05		0.07	0.05	71.4		0.01	<	0.01	0.01	100.0		0.01		0.08	0.01	12.5		0.001	<
KAR3	Freshwater		0.06		0.06	0.05	100.0	<	0.05		0.08	0.05	62.5	<	0.01	<	0.01	0.01	100.0	<	0.01		0.06	0.01	16.7	<	0.001	<
KAR4	Freshwater		0.05		0.05	0.05	100.0		0.05		0.14	0.05	35.7		0.01	<	0.01	0.01	100.0		0.01		0.11	0.01	9.1		0.001	<
KAR5	Freshwater		0.06		0.05	0.05	120.0		0.05		0.06	0.05	83.3		0.01	<	0.01	0.01	100.0		0.01		0.05	0.01	20.0		0.001	

Site			Dissolved Cadmium (mg/L)		Total Cadmium (mg/L)	Cd LOR	Dissolved : Total (%)		Dissolved Chromium (mg/L)		Total Chromium (mg/L)	Cr LOR	Dissolved : Total (%)		Dissolved Copper (mg/L)		Total Copper (mg/L)	Cu LOR	Dissolved : Total (%)		Dissolved Lead (mg/L)		Total Lead (mg/L)	Pb LOR	Dissolved : Total (%)		Dissolved Manganese (mg/L)	
VAI5	Freshwater	<	0.0001	<	0.0001	0.0001	100.0	<	0.001	<	0.001	0.001	100.0		0.001	<	0.001	0.001	100.0	<	0.001	<	0.001	0.001	100.0	<	0.086	
VAI6	Freshwater		0.0004	<	0.0001	0.0001	400.0		0.001	<	0.001	0.001	100.0		0.002		0.002	0.001	100.0		0.007	<	0.001	0.001	700.0		0.009	
KAR3	Freshwater	<	0.0001	<	0.0001	0.0001	100.0	<	0.001	<	0.001	0.001	100.0		0.001	<	0.001	0.001	100.0	<	0.001	<	0.001	0.001	100.0	<	0.001	
KAR4	Freshwater		0.0003	<	0.0001	0.0001	300.0		0.001	<	0.001	0.001	100.0		0.001		0.001	0.001	100.0		0.001	<	0.001	0.001	100.0		0.002	
KAR5	Freshwater		0.0001	<	0.0001	0.0001	100.0		0.001	<	0.001	0.001	100.0		0.001		0.001	0.001	100.0		0.001	<	0.001	0.001	100.0		0.043	

Site			Dissolved Nickel (mg/L)		Total Nickel (mg/L)	Ni LOR	Dissolved : Total (%)		Dissolved Silver (mg/L)		Total Silver (mg/L)	Ag LOR	Dissolved : Total (%)		Dissolved Zinc (mg/L)		Total Zinc (mg/L)	Zn LOR	Dissolved : Total (%)		Dissolved Mercury (mg/L)		Total Mercury (mg/L)	Hg LOR	Dissolved : Total (%)
VAI5	Freshwater	<	0.001		0.001	0.001	100.0	<	0.001		0.001	0.001	100.0		0.025		0.041	0.005	61.0	<	0.0001	<	0.0001	0.0001	100.0
VAI6	Freshwater		0.002		0.002	0.001	100.0		0.001	<	0.001	0.001	100.0		0.304		0.053	0.005	573.6	<	0.0001	<	0.0001	0.0001	100.0
KAR3	Freshwater	<	0.001		0.001	0.001	100.0	<	0.001	<	0.001	0.001	100.0		0.097		0.036	0.005	269.4	<	0.0001	<	0.0001	0.0001	100.0
KAR4	Freshwater		0.002		0.003	0.001	66.7		0.001	<	0.001	0.001	100.0		0.069		0.061	0.005	113.1		0.0001	<	0.0001	0.0001	100.0
KAR5	Freshwater		0.001		0.001	0.001	100.0		0.001	<	0.001	0.001	100.0		0.02		0.035	0.005	57.1	<	0.0001	<	0.0001	0.0001	100.0

Site			Dissolved Boron (mg/L)		Total Boron (mg/L)	Boron LOR	Dissolved : Total (%)		Dissolved Iron (mg/L)		Total Iron (mg/L)	Iron LOR	Dissolved : Total (%)		Dissolved Selenium (mg/L)		Total Selenium (mg/L)	Se LOR	Dissolved : Total (%)		Dissolved Aluminium (mg/L)		Total Aluminium (mg/L)	Al LOR	Dissolved : Total (%)		Dissolved Arsenic (mg/L)		Total Arsenic (mg/L)
VAI1	Estuarine		5.2800		4.9900	0.0500	105.8		0.5600	<	0.5000	0.5000	112.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500		0.0700	0.0500	71.4	<	0.0500	<	0.0500
VAI2lt	Estuarine		4.7800		4.9300	0.0500	97.0	<	0.5000	<	0.5000	0.5000	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500		0.1700	0.0500	29.4	<	0.0500	<	0.0500
VAI2ht	Estuarine		4.6800		4.6100	0.0500	101.5	<	0.5000	<	0.5000	0.5000	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500	<	0.0500
VAI3	Estuarine		4.3900		4.5900	0.0500	95.6	<	0.5000	<	0.5000	0.5000	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500	<	0.0500
VAI4	Estuarine		4.3100		4.7000	0.0500	91.7	<	0.5000	<	0.5000	0.5000	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500	<	0.0500
KAR1	Estuarine		4.6400		4.5400	0.0500	102.2		0.5000	<	0.5000	0.5000	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500		0.0600	0.0500	83.3	<	0.0500	<	0.0500
KAR2	Estuarine		4.7000		4.6300	0.0500	101.5	<	0.5000	<	0.5000	0.5000	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0500		0.0600	0.0500	83.3	<	0.0500	<	0.0500

Site			Dissolved Cadmium (mg/L)		Total Cadmium (mg/L)	Cd LOR	Dissolved : Total (%)		Dissolved Chromium (mg/L)		Total Chromium (mg/L)	Cr LOR	Dissolved : Total (%)		Dissolved Copper (mg/L)		Total Copper (mg/L)	Cu LOR	Dissolved : Total (%)		Dissolved Lead (mg/L)		Total Lead (mg/L)	Pb LOR	Dissolved : Total (%)		Dissolved Manganese (mg/L)		Total Manganes (mg/L)
VAI1	Estuarine	<	0.0050	<	0.0050	0.0050	100.0	<	0.0050		0.0080	0.0050	62.5	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0230		0.0240
VAI2lt	Estuarine	<	0.0050	<	0.0050	0.0050	100.0	<	0.0050		0.0090	0.0050	55.6	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0140		0.0190
VAI2ht	Estuarine	<	0.0050	<	0.0050	0.0050	100.0	<	0.0050		0.0090	0.0050	55.6	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0120		0.0140
VAI3	Estuarine	<	0.0050	<	0.0050	0.0050	100.0		0.0060		0.0090	0.0050	66.7	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0240		0.0310
VAI4	Estuarine	<	0.0050	<	0.0050	0.0050	100.0		0.0060		0.0090	0.0050	66.7	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0090		0.0120
KAR1	Estuarine	<	0.0050	<	0.0050	0.0050	100.0		0.0050		0.0090	0.0050	55.6	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0440		0.0490
KAR2	Estuarine	<	0.0050	<	0.0050	0.0050	100.0		0.0060		0.0060	0.0050	100.0	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0060		0.0070

Site			Dissolved Nickel (mg/L)		Total Nickel (mg/L)	Ni LOR	Dissolved : Total (%)		Dissolved Silver (mg/L)		Total Silver (mg/L)	Ag LOR	Dissolved : Total (%)		Dissolved Zinc (mg/L)		Total Zinc (mg/L)	Zn LOR	Dissolved : Total (%)		Dissolved Mercury (mg/L)		Total Mercury (mg/L)	Hg LOR	Dissolved : Total (%)
VAI1	Estuarine	<	0.0500	<	0.0500	0.0500	100.0		0.0110		0.0070	0.0050	157.1		0.1350	<	0.0500	0.0050	270.0	<	0.0001	<	0.0001	0.0001	100.0
VAI2lt	Estuarine	<	0.0500	<	0.0500	0.0500	100.0		0.0050		0.0050	0.0050	100.0		0.1500	<	0.0500	0.0050	300.0	<	0.0001	<	0.0001	0.0001	100.0
VAI2ht	Estuarine	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0	<	0.0500		0.0990	0.0050	50.5	<	0.0001	<	0.0001	0.0001	100.0
VAI3	Estuarine	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0750	<	0.0500	0.0050	150.0	<	0.0001	<	0.0001	0.0001	100.0
VAI4	Estuarine	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0		0.0550		0.2780	0.0050	19.8	<	0.0001	<	0.0001	0.0001	100.0
KAR1	Estuarine	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0050	0.0050	100.0	<	0.0500		0.1530	0.0050	32.7	<	0.0001	<	0.0001	0.0001	100.0
KAR2	Estuarine	<	0.0500	<	0.0500	0.0500	100.0	<	0.0050	<	0.0210	0.0050	23.8		0.0600		0.0620	0.0050	96.8	<	0.0001	<	0.0001	0.0001	100.0

Appendix 2 QA/QC Results for Blanks

Analyte grouping/Analyte	Units	LOR	CNS0801_W_038	CNS0801_W_039	CNS0801_W_040	CNS0801_W_041	CNS0801_W_042
EA025: Suspended Solids							
Suspended Solids (SS)	mg/L	1	**1**				
EA045: Turbidity							
Turbidity	NTU	0.1	**0.1**				
ED037P: Alkalinity by PC Titrator							
Hydroxide Alkalinity as CaCO3	mg/L	1	<1				
Carbonate Alkalinity as CaCO3	mg/L	1	<1				
Bicarbonate Alkalinity as CaCO3	mg/L	1	**2**				
Total Alkalinity as CaCO3	mg/L	1	**2**				
ED040F: Dissolved Major Anions							
Sulfate as SO4 2-	mg/L	1	**2**				
ED045P: Chloride by PC Titrator							
Chloride	mg/L	1	**6**				
ED093F: Dissolved Major Cations							
Calcium	mg/L	1	<1				
Magnesium	mg/L	1	<1				
Sodium	mg/L	1	**7**				
Potassium	mg/L	1	<1				
EG020F: Dissolved Metals by ICP-MS							
Aluminium	mg/L	0.01				<0.01	
Arsenic	mg/L	0.001				<0.001	
Cadmium	mg/L	0.0001				**0.0001**	
Chromium	mg/L	0.001				<0.001	
Copper	mg/L	0.001				**0.043**	
Lead	mg/L	0.001				<0.001	
Manganese	mg/L	0.001				<0.001	
Nickel	mg/L	0.001				<0.001	
Selenium	mg/L	0.010				<0.010	
Silver	mg/L	0.001				<0.001	
Zinc	mg/L	0.005				**0.124**	
Boron	mg/L	0.05				<0.05	
Iron	mg/L	0.05				<0.05	
EG020T: Total Metals by ICP-MS							
Aluminium	mg/L	0.01			<0.01		
Arsenic	mg/L	0.001			<0.001		
Cadmium	mg/L	0.0001			<0.0001		
Chromium	mg/L	0.001			<0.001		
Copper	mg/L	0.001			**0.098**		
Lead	mg/L	0.001			<0.001		
Manganese	mg/L	0.001			<0.001		
Nickel	mg/L	0.001			<0.001		
Selenium	mg/L	0.010			<0.010		
Silver	mg/L	0.001			<0.001		
Zinc	mg/L	0.005			**0.246**		
Boron	mg/L	0.05			<0.05		
Iron	mg/L	0.05			<0.05		
EG035F: Dissolved Mercury by FIMS							
Mercury	mg/L	0.0001				<0.0001	
EG035T: Total Recoverable Mercury by FIMS							
Mercury	mg/L	0.0001			<0.0001		
EK055: Ammonia as N							
Ammonia as N	mg/L	0.010		**0.027**			
EK057: Nitrite as N							
Nitrite as N	mg/L	0.010	<0.010				
EK058: Nitrate as N							
Nitrate as N	mg/L	0.010	<0.010				
EK059: Nitrite plus Nitrate as N (NOx)							
Nitrite + Nitrate as N	mg/L	0.010	<0.010	**0.011**			
EK061: Total Kjeldahl Nitrogen (TKN)							
Total Kjeldahl Nitrogen as N	mg/L	0.1		**0.8**			
EK062: Total Nitrogen as N (TKN + NOx)							
Total Nitrogen as N	mg/L	0.1		**0.8**			
EK067: Total Phosphorus as P							
Total Phosphorus as P	mg/L	0.01		<0.05			
EK071: Reactive Phosphorus as P (Dissolved)							
Reactive Phosphorus - Filtered	mg/L	0.010	<0.010				
EN055: Ionic Balance							
Total Anions	meq/L	0.01	**0.25**				
Total Cations	meq/L	0.01	**0.32**				
Ionic Balance	%	0.01					
EP005: Total Organic Carbon (TOC)							
Total Organic Carbon	mg/L	1					<1

Appendix 3 Laboratory Reports

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB0807759**	Page	: 1 of 32
Client	: **HYDROBIOLOGY PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR ADRIAN FLYNN	Contact	: Tim Kilmister
Address	: P O BOX 2050 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: adrian.flynn@hydrobiology.biz	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 33682133	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 38763068	Facsimile	: +61-7-3243 7218
Project	: CNS0801	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 12-JUN-2008
Sampler	: ADRIAN FLYNN	Issue Date	: 18-JUL-2008
Site	: PNG		
		No. of samples received	: 88
Quote number	: ----	No. of samples analysed	: 77

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics
Peter Keyte	Lab Manager	Newcastle
Phillip Kennedy	2IC Environmental Laboratory	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics
Stephen Hislop	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **EK057 (Nitrite), EK058 (Nitrate) & EK071F (Reactive P); EB0807759-007, 014, 028, 040, 060; LOR raised due to saline sample matrix interferences**
- **Ionic balances are within acceptable limits as detailed in the 20th Ed. APHA "Standard Methods for the Examination of Water and Wastewater".**
- **LCS recovery for EG020F (Filtered Metals) & EG020T (Total Metals) analyses fall outside Dynamic Control Limits. They are however within ALS Static Control Limits and hence deemed acceptable.**
- **PSD conducted by ALS Newcastle, NATA accreditation no. 825, site no 1656**
- **Total Kjeldahl Nitrogen (EK061) and Total Phosphorus (EK067); LORs raised due to saline sample matrix interferences.**

Analytical Results

Sub-Matrix: **FRESH WATER**				Client sample ID	CNS0801_W_038	CNS0801_W_039	CNS0801_W_040	CNS0801_W_041	CNS0801_W_042
				Client sampling date / time	04-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB0807759-035	EB0807759-036	EB0807759-037	EB0807759-038	EB0807759-039
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**1**	----	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**0.1**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**2**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**2**	----	----	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**2**	----	----	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		**6**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	----	----	----	----
Sodium	7440-23-5	1	mg/L		**7**	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	----	<0.01	----
Arsenic	7440-38-2	0.001	mg/L		----	----	----	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	**0.0001**	----
Chromium	7440-47-3	0.001	mg/L		----	----	----	<0.001	----
Copper	7440-50-8	0.001	mg/L		----	----	----	**0.043**	----
Lead	7439-92-1	0.001	mg/L		----	----	----	<0.001	----
Manganese	7439-96-5	0.001	mg/L		----	----	----	<0.001	----
Nickel	7440-02-0	0.001	mg/L		----	----	----	<0.001	----
Selenium	7782-49-2	0.010	mg/L		----	----	----	<0.010	----
Silver	7440-22-4	0.001	mg/L		----	----	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		----	----	----	**0.124**	----
Boron	7440-42-8	0.05	mg/L		----	----	----	<0.05	----
Iron	7439-89-6	0.05	mg/L		----	----	----	<0.05	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	<0.01	----	----
Arsenic	7440-38-2	0.001	mg/L		----	----	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		----	----	**0.098**	----	----

Analytical Results

Sub-Matrix: **FRESH WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	CNS0801_W_038	CNS0801_W_039	CNS0801_W_040	CNS0801_W_041	CNS0801_W_042
				Client sampling date / time	04-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00
					EB0807759-035	EB0807759-036	EB0807759-037	EB0807759-038	EB0807759-039
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	----	----
Selenium	7782-49-2	0.010	mg/L		----	----	<0.010	----	----
Silver	7440-22-4	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	**0.246**	----	----
Boron	7440-42-8	0.05	mg/L		----	----	<0.05	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	<0.0001	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		----	**0.027**	----	----	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		<0.010	----	----	----	----
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		<0.010	----	----	----	----
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		<0.010	**0.011**	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	**0.8**	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		----	**0.8**	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		----	<0.05	----	----	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		<0.010	----	----	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**0.25**	----	----	----	----
^ Total Cations	----	0.01	meq/L		**0.32**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	----	----	----	<1

Analytical Results

Sub-Matrix: **FRESH WATER**				Client sample ID	CNS0801_W_050	CNS0801_W_051	CNS0801_W_052	CNS0801_W_053	CNS0801_W_057
				Client sampling date / time	05-JUN-2008 15:00	05-JUN-2008 15:00	05-JUN-2008 15:00	05-JUN-2008 15:00	06-JUN-2008 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB0807759-047	EB0807759-048	EB0807759-049	EB0807759-050	EB0807759-053
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		**4**	----	----	----	**14**
EA045: Turbidity									
Turbidity	----	0.1	NTU		**0.8**	----	----	----	**0.7**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	**12**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**593**	----	----	----	**363**
Total Alkalinity as CaCO3	----	1	mg/L		**593**	----	----	----	**375**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		**14**	----	----	----	**16**
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		**29**	----	----	----	**31**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**76**	----	----	----	**62**
Magnesium	7439-95-4	1	mg/L		**69**	----	----	----	**36**
Sodium	7440-23-5	1	mg/L		**89**	----	----	----	**68**
Potassium	7440-09-7	1	mg/L		**5**	----	----	----	**2**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	----	<0.01	----
Arsenic	7440-38-2	0.001	mg/L		----	----	----	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		----	----	----	<0.001	----
Copper	7440-50-8	0.001	mg/L		----	----	----	**0.001**	----
Lead	7439-92-1	0.001	mg/L		----	----	----	<0.001	----
Manganese	7439-96-5	0.001	mg/L		----	----	----	**0.086**	----
Nickel	7440-02-0	0.001	mg/L		----	----	----	<0.001	----
Selenium	7782-49-2	0.010	mg/L		----	----	----	<0.010	----
Silver	7440-22-4	0.001	mg/L		----	----	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		----	----	----	**0.025**	----
Boron	7440-42-8	0.05	mg/L		----	----	----	**0.07**	----
Iron	7439-89-6	0.05	mg/L		----	----	----	<0.05	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	**0.20**	----	----
Arsenic	7440-38-2	0.001	mg/L		----	----	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		----	----	<0.001	----	----

Analytical Results

Sub-Matrix: **FRESH WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	CNS0801_W_050	CNS0801_W_051	CNS0801_W_052	CNS0801_W_053	CNS0801_W_057
				Client sampling date / time	05-JUN-2008 15:00	05-JUN-2008 15:00	05-JUN-2008 15:00	05-JUN-2008 15:00	06-JUN-2008 15:00
					EB0807759-047	EB0807759-048	EB0807759-049	EB0807759-050	EB0807759-053
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	**0.135**	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	**0.001**	----	----
Selenium	7782-49-2	0.010	mg/L		----	----	<0.010	----	----
Silver	7440-22-4	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	**0.041**	----	----
Boron	7440-42-8	0.05	mg/L		----	----	**0.06**	----	----
Iron	7439-89-6	0.05	mg/L		----	----	**0.27**	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	<0.0001	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		----	**0.055**	----	----	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		<0.010	----	----	----	<0.010
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		**0.025**	----	----	----	<0.010
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		**0.025**	**0.024**	----	----	<0.010
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	**0.2**	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		----	**0.3**	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		----	**0.30**	----	----	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		**0.031**	----	----	----	**0.011**
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**13.0**	----	----	----	**8.72**
^ Total Cations	----	0.01	meq/L		**13.5**	----	----	----	**9.04**
^ Ionic Balance	----	0.01	%		**2.07**	----	----	----	**1.77**

Analytical Results

Sub-Matrix: **FRESH WATER**				Client sample ID	CNS0801_W_058	CNS0801_W_059	CNS0801_W_060	CNS0801_W_061	CNS0801_W_069
				Client sampling date / time	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB0807759-054	EB0807759-055	EB0807759-056	EB0807759-057	EB0807759-065
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		----	----	----	----	**10**
EA045: Turbidity									
Turbidity	----	0.1	NTU		----	----	----	----	**0.9**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	----	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	----	----	**436**
Total Alkalinity as CaCO3	----	1	mg/L		----	----	----	----	**436**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		----	----	----	----	**10**
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		----	----	----	----	**35**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	----	----	**76**
Magnesium	7439-95-4	1	mg/L		----	----	----	----	**42**
Sodium	7440-23-5	1	mg/L		----	----	----	----	**69**
Potassium	7440-09-7	1	mg/L		----	----	----	----	**3**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	<0.01	----	----
Arsenic	7440-38-2	0.001	mg/L		----	----	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		----	----	**0.001**	----	----
Lead	7439-92-1	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	**0.001**	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	----	----
Selenium	7782-49-2	0.010	mg/L		----	----	<0.010	----	----
Silver	7440-22-4	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	**0.097**	----	----
Boron	7440-42-8	0.05	mg/L		----	----	**0.06**	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	**0.06**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		----	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		----	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		----	<0.001	----	----	----

Analytical Results

Sub-Matrix: FRESH WATER				Client sample ID	CNS0801_W_058	CNS0801_W_059	CNS0801_W_060	CNS0801_W_061	CNS0801_W_069
				Client sampling date / time	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-054	EB0807759-055	EB0807759-056	EB0807759-057	EB0807759-065
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		----	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		----	**0.043**	----	----	----
Nickel	7440-02-0	0.001	mg/L		----	**0.001**	----	----	----
Selenium	7782-49-2	0.010	mg/L		----	<0.010	----	----	----
Silver	7440-22-4	0.001	mg/L		----	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		----	**0.036**	----	----	----
Boron	7440-42-8	0.05	mg/L		----	**0.06**	----	----	----
Iron	7439-89-6	0.05	mg/L		----	**0.08**	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	----	----
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		**0.015**	----	----	----	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		----	----	----	----	<0.010
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		----	----	----	----	<0.010
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		<0.010	----	----	----	<0.010
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		**0.21**	----	----	----	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		----	----	----	----	<0.010
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		----	----	----	----	**9.90**
^ Total Cations	----	0.01	meq/L		----	----	----	----	**10.3**
^ Ionic Balance	----	0.01	%		----	----	----	----	**1.96**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	----	----	**2**	----

Analytical Results

Sub-Matrix: **FRESH WATER**				Client sample ID	CNS0801_W_070	CNS0801_W_071	CNS0801_W_072	CNS0801_W_073	CNS0801_W_074
				Client sampling date / time	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB0807759-066	EB0807759-067	EB0807759-068	EB0807759-069	EB0807759-070
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		----	----	----	----	**4**
EA045: Turbidity									
Turbidity	----	0.1	NTU		----	----	----	----	**0.8**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	----	----	**32**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	----	----	**244**
Total Alkalinity as CaCO3	----	1	mg/L		----	----	----	----	**276**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		----	----	----	----	**7**
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		----	----	----	----	**96**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	----	----	**33**
Magnesium	7439-95-4	1	mg/L		----	----	----	----	**34**
Sodium	7440-23-5	1	mg/L		----	----	----	----	**97**
Potassium	7440-09-7	1	mg/L		----	----	----	----	**2**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	<0.01	----	----
Arsenic	7440-38-2	0.001	mg/L		----	----	**0.001**	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	**0.0003**	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		----	----	**0.001**	----	----
Lead	7439-92-1	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	**0.002**	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	**0.002**	----	----
Selenium	7782-49-2	0.010	mg/L		----	----	<0.010	----	----
Silver	7440-22-4	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	**0.069**	----	----
Boron	7440-42-8	0.05	mg/L		----	----	**0.05**	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	**0.11**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		----	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		----	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		----	**0.001**	----	----	----

Analytical Results

Sub-Matrix: FRESH WATER				Client sample ID	CNS0801_W_070	CNS0801_W_071	CNS0801_W_072	CNS0801_W_073	CNS0801_W_074
				Client sampling date / time	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-066	EB0807759-067	EB0807759-068	EB0807759-069	EB0807759-070
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		----	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		----	**0.289**	----	----	----
Nickel	7440-02-0	0.001	mg/L		----	**0.003**	----	----	----
Selenium	7782-49-2	0.010	mg/L		----	<0.010	----	----	----
Silver	7440-22-4	0.001	mg/L		----	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		----	**0.061**	----	----	----
Boron	7440-42-8	0.05	mg/L		----	**0.05**	----	----	----
Iron	7439-89-6	0.05	mg/L		----	**0.14**	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	----	----
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		**0.048**	----	----	----	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		----	----	----	----	<0.010
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		----	----	----	----	<0.010
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		<0.010	----	----	----	<0.010
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		**0.21**	----	----	----	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		----	----	----	----	<0.010
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		----	----	----	----	**8.37**
^ Total Cations	----	0.01	meq/L		----	----	----	----	**8.69**
^ Ionic Balance	----	0.01	%		----	----	----	----	**1.82**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	----	----	**3**	----

Analytical Results

Sub-Matrix: **FRESH WATER**				Client sample ID	CNS0801_W_075	CNS0801_W_076	CNS0801_W_077	CNS0801_W_078	CNS0801_W_079
				Client sampling date / time	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB0807759-071	EB0807759-072	EB0807759-073	EB0807759-074	EB0807759-075
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		----	----	----	----	**2**
EA045: Turbidity									
Turbidity	----	0.1	NTU		----	----	----	----	**2.0**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	----	----	**20**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	----	----	**379**
Total Alkalinity as CaCO3	----	1	mg/L		----	----	----	----	**399**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		----	----	----	----	**14**
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		----	----	----	----	**34**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	----	----	**52**
Magnesium	7439-95-4	1	mg/L		----	----	----	----	**38**
Sodium	7440-23-5	1	mg/L		----	----	----	----	**75**
Potassium	7440-09-7	1	mg/L		----	----	----	----	**1**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	**0.01**	----	----
Arsenic	7440-38-2	0.001	mg/L		----	----	**0.001**	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	**0.0004**	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		----	----	**0.002**	----	----
Lead	7439-92-1	0.001	mg/L		----	----	**0.007**	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	**0.009**	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	**0.002**	----	----
Selenium	7782-49-2	0.010	mg/L		----	----	<0.010	----	----
Silver	7440-22-4	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	**0.304**	----	----
Boron	7440-42-8	0.05	mg/L		----	----	**0.06**	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	**0.08**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		----	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		----	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		----	**0.002**	----	----	----

Analytical Results

Sub-Matrix: FRESH WATER				Client sample ID	CNS0801_W_075	CNS0801_W_076	CNS0801_W_077	CNS0801_W_078	CNS0801_W_079
				Client sampling date / time	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-071	EB0807759-072	EB0807759-073	EB0807759-074	EB0807759-075
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		----	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		----	**0.060**	----	----	----
Nickel	7440-02-0	0.001	mg/L		----	**0.002**	----	----	----
Selenium	7782-49-2	0.010	mg/L		----	<0.010	----	----	----
Silver	7440-22-4	0.001	mg/L		----	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		----	**0.053**	----	----	----
Boron	7440-42-8	0.05	mg/L		----	**0.06**	----	----	----
Iron	7439-89-6	0.05	mg/L		----	**0.07**	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	----	----
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		**0.017**	----	----	----	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		----	----	----	----	<0.010
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		----	----	----	----	**0.012**
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		<0.010	----	----	----	**0.012**
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		**0.06**	----	----	----	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		----	----	----	----	**0.025**
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		----	----	----	----	**9.23**
^ Total Cations	----	0.01	meq/L		----	----	----	----	**9.02**
^ Ionic Balance	----	0.01	%		----	----	----	----	**1.23**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	----	----	**4**	----

Analytical Results

Sub-Matrix: **FRESH WATER**				Client sample ID	CNS0801_W_080	CNS0801_W_081	CNS0801_W_082	CNS0801_W_083	----
				Client sampling date / time	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB0807759-076**	**EB0807759-077**	**EB0807759-078**	**EB0807759-079**	**----**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	----	<0.01	----	----
Arsenic	7440-38-2	0.001	mg/L		----	----	**0.001**	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		----	----	**0.001**	----	----
Lead	7439-92-1	0.001	mg/L		----	----	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		----	----	**0.043**	----	----
Nickel	7440-02-0	0.001	mg/L		----	----	<0.001	----	----
Selenium	7782-49-2	0.010	mg/L		----	----	<0.010	----	----
Silver	7440-22-4	0.001	mg/L		----	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		----	----	**0.020**	----	----
Boron	7440-42-8	0.05	mg/L		----	----	**0.06**	----	----
Iron	7439-89-6	0.05	mg/L		----	----	<0.05	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		----	**0.05**	----	----	----
Arsenic	7440-38-2	0.001	mg/L		----	**0.001**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		----	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		----	**0.001**	----	----	----
Lead	7439-92-1	0.001	mg/L		----	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		----	**0.072**	----	----	----
Nickel	7440-02-0	0.001	mg/L		----	**0.001**	----	----	----
Selenium	7782-49-2	0.010	mg/L		----	<0.010	----	----	----
Silver	7440-22-4	0.001	mg/L		----	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		----	**0.035**	----	----	----
Boron	7440-42-8	0.05	mg/L		----	**0.05**	----	----	----
Iron	7439-89-6	0.05	mg/L		----	**0.06**	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	----	----
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		**0.047**	----	----	----	----
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		**0.014**	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	----	----	----	----

Analytical Results

Sub-Matrix: **FRESH WATER**				Client sample ID	CNS0801_W_080	CNS0801_W_081	CNS0801_W_082	CNS0801_W_083	----
				Client sampling date / time	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	06-JUN-2008 15:00	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB0807759-076**	**EB0807759-077**	**EB0807759-078**	**EB0807759-079**	**----**
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		**0.3**	----	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		<0.01	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	----	----	**1**	----

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_001	CNS0801_W_003	CNS0801_W_004	CNS0801_W_005	CNS0801_W_009
				Client sampling date / time	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-001	EB0807759-002	EB0807759-003	EB0807759-004	EB0807759-007
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		43	----	----	----	52
EA045: Turbidity									
Turbidity	----	0.1	NTU		1.0	----	----	----	2.7
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		137	----	----	----	132
Total Alkalinity as CaCO3	----	1	mg/L		137	----	----	----	132
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		3220	----	----	----	3170
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		20700	----	----	----	20200
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		454	----	----	----	434
Magnesium	7439-95-4	1	mg/L		1520	----	----	----	1460
Sodium	7440-23-5	1	mg/L		11500	----	----	----	11000
Potassium	7440-09-7	1	mg/L		587	----	----	----	558
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	----	----	<0.05	----
Arsenic	7440-38-2	0.050	mg/L		----	----	----	<0.050	----
Cadmium	7440-43-9	0.0050	mg/L		----	----	----	<0.0050	----
Chromium	7440-47-3	0.005	mg/L		----	----	----	<0.005	----
Copper	7440-50-8	0.050	mg/L		----	----	----	<0.050	----
Lead	7439-92-1	0.005	mg/L		----	----	----	<0.005	----
Manganese	7439-96-5	0.005	mg/L		----	----	----	0.023	----
Nickel	7440-02-0	0.050	mg/L		----	----	----	<0.050	----
Selenium	7782-49-2	0.050	mg/L		----	----	----	<0.050	----
Silver	7440-22-4	0.005	mg/L		----	----	----	0.011	----
Zinc	7440-66-6	0.050	mg/L		----	----	----	0.135	----
Boron	7440-42-8	0.50	mg/L		----	----	----	5.28	----
Iron	7439-89-6	0.50	mg/L		----	----	----	0.56	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	----	0.07	----	----
Arsenic	7440-38-2	0.050	mg/L		----	----	<0.050	----	----
Cadmium	7440-43-9	0.0050	mg/L		----	----	<0.0050	----	----
Chromium	7440-47-3	0.005	mg/L		----	----	0.008	----	----
Copper	7440-50-8	0.050	mg/L		----	----	<0.050	----	----

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_001	CNS0801_W_003	CNS0801_W_004	CNS0801_W_005	CNS0801_W_009
				Client sampling date / time	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-001	EB0807759-002	EB0807759-003	EB0807759-004	EB0807759-007
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.005	mg/L		----	----	<0.005	----	----
Manganese	7439-96-5	0.005	mg/L		----	----	**0.024**	----	----
Nickel	7440-02-0	0.050	mg/L		----	----	<0.050	----	----
Selenium	7782-49-2	0.050	mg/L		----	----	<0.050	----	----
Silver	7440-22-4	0.005	mg/L		----	----	**0.007**	----	----
Zinc	7440-66-6	0.050	mg/L		----	----	<0.050	----	----
Boron	7440-42-8	0.50	mg/L		----	----	**4.99**	----	----
Iron	7439-89-6	0.50	mg/L		----	----	<0.50	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	<0.0001	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		----	**0.040**	----	----	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		<0.010	----	----	----	<0.050
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		**0.015**	----	----	----	<0.050
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		**0.015**	**0.017**	----	----	<0.010
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	<0.5	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		----	<0.5	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		----	**0.51**	----	----	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		**0.040**	----	----	----	<0.050
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**654**	----	----	----	**640**
^ Total Cations	----	0.01	meq/L		**663**	----	----	----	**637**
^ Ionic Balance	----	0.01	%		**0.73**	----	----	----	**0.22**

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_011	CNS0801_W_012	CNS0801_W_013	CNS0801_W_014	CNS0801_W_017
				Client sampling date / time	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00	03-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-008	EB0807759-009	EB0807759-010	EB0807759-011	EB0807759-014
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		----	----	----	----	**46**
EA045: Turbidity									
Turbidity	----	0.1	NTU		----	----	----	----	**0.8**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	----	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	----	----	**124**
Total Alkalinity as CaCO3	----	1	mg/L		----	----	----	----	**124**
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		----	----	----	----	**3200**
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		----	----	----	----	**20400**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	----	----	**438**
Magnesium	7439-95-4	1	mg/L		----	----	----	----	**1480**
Sodium	7440-23-5	1	mg/L		----	----	----	----	**11100**
Potassium	7440-09-7	1	mg/L		----	----	----	----	**576**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	----	<0.05	----	----
Arsenic	7440-38-2	0.050	mg/L		----	----	<0.050	----	----
Cadmium	7440-43-9	0.0050	mg/L		----	----	<0.0050	----	----
Chromium	7440-47-3	0.005	mg/L		----	----	<0.005	----	----
Copper	7440-50-8	0.050	mg/L		----	----	<0.050	----	----
Lead	7439-92-1	0.005	mg/L		----	----	<0.005	----	----
Manganese	7439-96-5	0.005	mg/L		----	----	**0.014**	----	----
Nickel	7440-02-0	0.050	mg/L		----	----	<0.050	----	----
Selenium	7782-49-2	0.050	mg/L		----	----	<0.050	----	----
Silver	7440-22-4	0.005	mg/L		----	----	<0.005	----	----
Zinc	7440-66-6	0.050	mg/L		----	----	**0.150**	----	----
Boron	7440-42-8	0.50	mg/L		----	----	**4.78**	----	----
Iron	7439-89-6	0.50	mg/L		----	----	<0.50	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	**0.17**	----	----	----
Arsenic	7440-38-2	0.050	mg/L		----	<0.050	----	----	----
Cadmium	7440-43-9	0.0050	mg/L		----	<0.0050	----	----	----
Chromium	7440-47-3	0.005	mg/L		----	**0.009**	----	----	----
Copper	7440-50-8	0.050	mg/L		----	<0.050	----	----	----

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_011	CNS0801_W_012	CNS0801_W_013	CNS0801_W_014	CNS0801_W_017
				Client sampling date / time	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00	31-MAY-2008 15:00	03-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-008	EB0807759-009	EB0807759-010	EB0807759-011	EB0807759-014
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.005	mg/L		----	<0.005	----	----	----
Manganese	7439-96-5	0.005	mg/L		----	**0.019**	----	----	----
Nickel	7440-02-0	0.050	mg/L		----	<0.050	----	----	----
Selenium	7782-49-2	0.050	mg/L		----	<0.050	----	----	----
Silver	7440-22-4	0.005	mg/L		----	**0.005**	----	----	----
Zinc	7440-66-6	0.050	mg/L		----	<0.050	----	----	----
Boron	7440-42-8	0.50	mg/L		----	**4.93**	----	----	----
Iron	7439-89-6	0.50	mg/L		----	<0.50	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	----	----
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		**0.052**	----	----	----	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		----	----	----	----	<0.050
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		----	----	----	----	<0.050
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		<0.010	----	----	----	<0.010
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.5	----	----	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		<0.5	----	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		**0.94**	----	----	----	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		----	----	----	----	<0.050
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		----	----	----	----	**646**
^ Total Cations	----	0.01	meq/L		----	----	----	----	**643**
^ Ionic Balance	----	0.01	%		----	----	----	----	**0.23**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	----	----	**3**	----

Analytical Results

Sub-Matrix: **SEAWATER**

Compound	CAS Number	LOR	Unit	Client sample ID	CNS0801_W_018	CNS0801_W_019	CNS0801_W_020	CNS0801_W_021	CNS0801_W_026
				Client sampling date / time	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00
					EB0807759-015	EB0807759-016	EB0807759-017	EB0807759-018	EB0807759-023
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	----	<0.05	----	----
Arsenic	7440-38-2	0.050	mg/L		----	----	<0.050	----	----
Cadmium	7440-43-9	0.0050	mg/L		----	----	<0.0050	----	----
Chromium	7440-47-3	0.005	mg/L		----	----	<0.005	----	----
Copper	7440-50-8	0.050	mg/L		----	----	<0.050	----	----
Lead	7439-92-1	0.005	mg/L		----	----	<0.005	----	----
Manganese	7439-96-5	0.005	mg/L		----	----	**0.012**	----	----
Nickel	7440-02-0	0.050	mg/L		----	----	<0.050	----	----
Selenium	7782-49-2	0.050	mg/L		----	----	<0.050	----	----
Silver	7440-22-4	0.005	mg/L		----	----	<0.005	----	----
Zinc	7440-66-6	0.050	mg/L		----	----	<0.050	----	----
Boron	7440-42-8	0.50	mg/L		----	----	**4.68**	----	----
Iron	7439-89-6	0.50	mg/L		----	----	<0.50	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	<0.05	----	----	<0.05
Arsenic	7440-38-2	0.050	mg/L		----	<0.050	----	----	<0.050
Cadmium	7440-43-9	0.0050	mg/L		----	<0.0050	----	----	<0.0050
Chromium	7440-47-3	0.005	mg/L		----	**0.009**	----	----	**0.009**
Copper	7440-50-8	0.050	mg/L		----	<0.050	----	----	<0.050
Lead	7439-92-1	0.005	mg/L		----	<0.005	----	----	<0.005
Manganese	7439-96-5	0.005	mg/L		----	**0.014**	----	----	**0.031**
Nickel	7440-02-0	0.050	mg/L		----	<0.050	----	----	<0.050
Selenium	7782-49-2	0.050	mg/L		----	<0.050	----	----	<0.050
Silver	7440-22-4	0.005	mg/L		----	<0.005	----	----	<0.005
Zinc	7440-66-6	0.050	mg/L		----	**0.099**	----	----	<0.050
Boron	7440-42-8	0.50	mg/L		----	**4.61**	----	----	**4.59**
Iron	7439-89-6	0.50	mg/L		----	<0.50	----	----	<0.50
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	<0.0001	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	----	<0.0001
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		**0.068**	----	----	----	----
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		**0.011**	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: **SEAWATER**				Client sample ID	CNS0801_W_018	CNS0801_W_019	CNS0801_W_020	CNS0801_W_021	CNS0801_W_026
				Client sampling date / time	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB0807759-015	EB0807759-016	EB0807759-017	EB0807759-018	EB0807759-023
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		<0.5	----	----	----	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		**1.45**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	----	----	**3**	----

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_027	CNS0801_W_028	CNS0801_W_030	CNS0801_W_031	CNS0801_W_032
				Client sampling date / time	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-024	EB0807759-025	EB0807759-028	EB0807759-029	EB0807759-030
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		----	----	**36**	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		----	----	**5.3**	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	**120**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	----	**120**	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		----	----	**3040**	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		----	----	**20200**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	**426**	----	----
Magnesium	7439-95-4	1	mg/L		----	----	**1440**	----	----
Sodium	7440-23-5	1	mg/L		----	----	**11000**	----	----
Potassium	7440-09-7	1	mg/L		----	----	**568**	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		<0.05	----	----	----	----
Arsenic	7440-38-2	0.050	mg/L		<0.050	----	----	----	----
Cadmium	7440-43-9	0.0050	mg/L		<0.0050	----	----	----	----
Chromium	7440-47-3	0.005	mg/L		**0.006**	----	----	----	----
Copper	7440-50-8	0.050	mg/L		<0.050	----	----	----	----
Lead	7439-92-1	0.005	mg/L		<0.005	----	----	----	----
Manganese	7439-96-5	0.005	mg/L		**0.024**	----	----	----	----
Nickel	7440-02-0	0.050	mg/L		<0.050	----	----	----	----
Selenium	7782-49-2	0.050	mg/L		<0.050	----	----	----	----
Silver	7440-22-4	0.005	mg/L		<0.005	----	----	----	----
Zinc	7440-66-6	0.050	mg/L		**0.075**	----	----	----	----
Boron	7440-42-8	0.50	mg/L		**4.39**	----	----	----	----
Iron	7439-89-6	0.50	mg/L		<0.50	----	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	----	----	----	<0.05
Arsenic	7440-38-2	0.050	mg/L		----	----	----	----	<0.050
Cadmium	7440-43-9	0.0050	mg/L		----	----	----	----	<0.0050
Chromium	7440-47-3	0.005	mg/L		----	----	----	----	**0.009**
Copper	7440-50-8	0.050	mg/L		----	----	----	----	<0.050

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_027	CNS0801_W_028	CNS0801_W_030	CNS0801_W_031	CNS0801_W_032
				Client sampling date / time	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-024	EB0807759-025	EB0807759-028	EB0807759-029	EB0807759-030
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.005	mg/L		----	----	----	----	<0.005
Manganese	7439-96-5	0.005	mg/L		----	----	----	----	**0.012**
Nickel	7440-02-0	0.050	mg/L		----	----	----	----	<0.050
Selenium	7782-49-2	0.050	mg/L		----	----	----	----	<0.050
Silver	7440-22-4	0.005	mg/L		----	----	----	----	<0.005
Zinc	7440-66-6	0.050	mg/L		----	----	----	----	**0.278**
Boron	7440-42-8	0.50	mg/L		----	----	----	----	**4.70**
Iron	7439-89-6	0.50	mg/L		----	----	----	----	<0.50
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	----	<0.0001
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		----	----	----	**0.084**	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		----	----	<0.050	----	----
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		----	----	<0.050	----	----
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		----	----	<0.010	**0.016**	----
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	----	----	<0.5	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		----	----	----	<0.5	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		----	----	----	**1.64**	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		----	----	<0.050	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		----	----	**637**	----	----
^ Total Cations	----	0.01	meq/L		----	----	**630**	----	----
^ Ionic Balance	----	0.01	%		----	----	**0.54**	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	**4**	----	----	----

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_033	CNS0801_W_034	CNS0801_W_043	CNS0801_W_044	CNS0801_W_045
				Client sampling date / time	03-JUN-2008 15:00	03-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-031	EB0807759-032	EB0807759-040	EB0807759-041	EB0807759-042
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		----	----	**52**	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		----	----	**0.9**	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	**122**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	----	**122**	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		----	----	**3210**	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		----	----	**20400**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	**434**	----	----
Magnesium	7439-95-4	1	mg/L		----	----	**1460**	----	----
Sodium	7440-23-5	1	mg/L		----	----	**10900**	----	----
Potassium	7440-09-7	1	mg/L		----	----	**538**	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		<0.05	----	----	----	----
Arsenic	7440-38-2	0.050	mg/L		<0.050	----	----	----	----
Cadmium	7440-43-9	0.0050	mg/L		<0.0050	----	----	----	----
Chromium	7440-47-3	0.005	mg/L		**0.006**	----	----	----	----
Copper	7440-50-8	0.050	mg/L		<0.050	----	----	----	----
Lead	7439-92-1	0.005	mg/L		<0.005	----	----	----	----
Manganese	7439-96-5	0.005	mg/L		**0.009**	----	----	----	----
Nickel	7440-02-0	0.050	mg/L		<0.050	----	----	----	----
Selenium	7782-49-2	0.050	mg/L		<0.050	----	----	----	----
Silver	7440-22-4	0.005	mg/L		<0.005	----	----	----	----
Zinc	7440-66-6	0.050	mg/L		**0.055**	----	----	----	----
Boron	7440-42-8	0.50	mg/L		**4.31**	----	----	----	----
Iron	7439-89-6	0.50	mg/L		<0.50	----	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	----	----	----	**0.06**
Arsenic	7440-38-2	0.050	mg/L		----	----	----	----	<0.050
Cadmium	7440-43-9	0.0050	mg/L		----	----	----	----	<0.0050
Chromium	7440-47-3	0.005	mg/L		----	----	----	----	**0.009**
Copper	7440-50-8	0.050	mg/L		----	----	----	----	<0.050

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_033	CNS0801_W_034	CNS0801_W_043	CNS0801_W_044	CNS0801_W_045
				Client sampling date / time	03-JUN-2008 15:00	03-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00	04-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-031	EB0807759-032	EB0807759-040	EB0807759-041	EB0807759-042
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.005	mg/L		----	----	----	----	<0.005
Manganese	7439-96-5	0.005	mg/L		----	----	----	----	**0.049**
Nickel	7440-02-0	0.050	mg/L		----	----	----	----	<0.050
Selenium	7782-49-2	0.050	mg/L		----	----	----	----	<0.050
Silver	7440-22-4	0.005	mg/L		----	----	----	----	<0.005
Zinc	7440-66-6	0.050	mg/L		----	----	----	----	**0.153**
Boron	7440-42-8	0.50	mg/L		----	----	----	----	**4.54**
Iron	7439-89-6	0.50	mg/L		----	----	----	----	<0.50
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	----	<0.0001
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		----	----	----	**0.116**	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		----	----	<0.050	----	----
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		----	----	<0.050	----	----
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		----	----	**0.017**	**0.013**	----
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	----	----	**1.0**	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		----	----	----	**1.0**	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		----	----	----	<0.05	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		----	----	<0.050	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		----	----	**645**	----	----
^ Total Cations	----	0.01	meq/L		----	----	**632**	----	----
^ Ionic Balance	----	0.01	%		----	----	**1.04**	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	**2**	----	----	----

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_046	CNS0801_W_047	CNS0801_W_064	CNS0801_W_065	CNS0801_W_066
				Client sampling date / time	04-JUN-2008 15:00	04-JUN-2008 15:00	05-JUN-2008 15:00	05-JUN-2008 15:00	05-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-043	EB0807759-044	EB0807759-060	EB0807759-061	EB0807759-062
EA025: Suspended Solids									
^ Suspended Solids (SS)	----	1	mg/L		----	----	**46**	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		----	----	**0.8**	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	**117**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	----	**117**	----	----
ED040F: Dissolved Major Anions									
Sulfate as SO4 2-	14808-79-8	1	mg/L		----	----	**3120**	----	----
ED045P: Chloride by PC Titrator									
Chloride	16887-00-6	1	mg/L		----	----	**19500**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	**424**	----	----
Magnesium	7439-95-4	1	mg/L		----	----	**1450**	----	----
Sodium	7440-23-5	1	mg/L		----	----	**10900**	----	----
Potassium	7440-09-7	1	mg/L		----	----	**547**	----	----
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		<0.05	----	----	----	----
Arsenic	7440-38-2	0.050	mg/L		<0.050	----	----	----	----
Cadmium	7440-43-9	0.0050	mg/L		<0.0050	----	----	----	----
Chromium	7440-47-3	0.005	mg/L		**0.005**	----	----	----	----
Copper	7440-50-8	0.050	mg/L		<0.050	----	----	----	----
Lead	7439-92-1	0.005	mg/L		<0.005	----	----	----	----
Manganese	7439-96-5	0.005	mg/L		**0.044**	----	----	----	----
Nickel	7440-02-0	0.050	mg/L		<0.050	----	----	----	----
Selenium	7782-49-2	0.050	mg/L		<0.050	----	----	----	----
Silver	7440-22-4	0.005	mg/L		<0.005	----	----	----	----
Zinc	7440-66-6	0.050	mg/L		<0.050	----	----	----	----
Boron	7440-42-8	0.50	mg/L		**4.64**	----	----	----	----
Iron	7439-89-6	0.50	mg/L		**0.50**	----	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		----	----	----	----	**0.06**
Arsenic	7440-38-2	0.050	mg/L		----	----	----	----	<0.050
Cadmium	7440-43-9	0.0050	mg/L		----	----	----	----	<0.0050
Chromium	7440-47-3	0.005	mg/L		----	----	----	----	**0.006**
Copper	7440-50-8	0.050	mg/L		----	----	----	----	<0.050

Analytical Results

Sub-Matrix: SEAWATER				Client sample ID	CNS0801_W_046	CNS0801_W_047	CNS0801_W_064	CNS0801_W_065	CNS0801_W_066
				Client sampling date / time	04-JUN-2008 15:00	04-JUN-2008 15:00	05-JUN-2008 15:00	05-JUN-2008 15:00	05-JUN-2008 15:00
Compound	CAS Number	LOR	Unit		EB0807759-043	EB0807759-044	EB0807759-060	EB0807759-061	EB0807759-062
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.005	mg/L		----	----	----	----	<0.005
Manganese	7439-96-5	0.005	mg/L		----	----	----	----	**0.007**
Nickel	7440-02-0	0.050	mg/L		----	----	----	----	<0.050
Selenium	7782-49-2	0.050	mg/L		----	----	----	----	<0.050
Silver	7440-22-4	0.005	mg/L		----	----	----	----	**0.021**
Zinc	7440-66-6	0.050	mg/L		----	----	----	----	**0.062**
Boron	7440-42-8	0.50	mg/L		----	----	----	----	**4.63**
Iron	7439-89-6	0.50	mg/L		----	----	----	----	<0.50
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	----	<0.0001
EK055: Ammonia as N									
Ammonia as N	7664-41-7	0.010	mg/L		----	----	----	**0.029**	----
EK057: Nitrite as N									
Nitrite as N	----	0.010	mg/L		----	----	<0.050	----	----
EK058: Nitrate as N									
^ Nitrate as N	14797-55-8	0.010	mg/L		----	----	<0.050	----	----
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		----	----	**0.013**	**0.011**	----
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	----	----	<0.5	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	0.1	mg/L		----	----	----	<0.5	----
EK067: Total Phosphorus as P									
Total Phosphorus as P	----	0.01	mg/L		----	----	----	**1.50**	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		----	----	<0.050	----	----
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		----	----	**617**	----	----
^ Total Cations	----	0.01	meq/L		----	----	**630**	----	----
^ Ionic Balance	----	0.01	%		----	----	**1.03**	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	**4**	----	----	----

Analytical Results

Sub-Matrix: **SEAWATER**				Client sample ID	**CNS0801_W-067**	**CNS0801_W_068**	----	----	----
				Client sampling date / time	05-JUN-2008 15:00	05-JUN-2008 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB0807759-063**	**EB0807759-064**	**----**	**----**	**----**
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.05	mg/L		<0.05	----	----	----	----
Arsenic	7440-38-2	0.050	mg/L		<0.050	----	----	----	----
Cadmium	7440-43-9	0.0050	mg/L		<0.0050	----	----	----	----
Chromium	7440-47-3	0.005	mg/L		**0.006**	----	----	----	----
Copper	7440-50-8	0.050	mg/L		<0.050	----	----	----	----
Lead	7439-92-1	0.005	mg/L		<0.005	----	----	----	----
Manganese	7439-96-5	0.005	mg/L		**0.006**	----	----	----	----
Nickel	7440-02-0	0.050	mg/L		<0.050	----	----	----	----
Selenium	7782-49-2	0.050	mg/L		<0.050	----	----	----	----
Silver	7440-22-4	0.005	mg/L		<0.005	----	----	----	----
Zinc	7440-66-6	0.050	mg/L		**0.060**	----	----	----	----
Boron	7440-42-8	0.50	mg/L		**4.70**	----	----	----	----
Iron	7439-89-6	0.50	mg/L		<0.50	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	**2**	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT**				Client sample ID	CNS0801_S_007	CNS0801_S_015	CNS0801_S_022	CNS0801_S_029	CNS0801_S_036
				Client sampling date / time	31-MAY-2008 15:00	31-MAY-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00	03-JUN-2008 15:00
Compound	*CAS Number*	*LOR*	*Unit*		EB0807759-005	EB0807759-012	EB0807759-019	EB0807759-027	EB0807759-034
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		**59.3**	**47.5**	**39.6**	**61.9**	**59.3**

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	CNS0801_S_049	CNS0801_S_056	CNS0801_S_063	S-007 -2mm	S-015 -2mm
				Client sampling date / time	04-JUN-2008 15:00	05-JUN-2008 15:00	06-JUN-2008 15:00	16-JUN-2008 10:00	16-JUN-2008 10:00
					EB0807759-046	EB0807759-052	EB0807759-059	EB0807759-081	EB0807759-082
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		**75.0**	**36.9**	**28.8**	----	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		----	----	----	**12700**	**3720**
Arsenic	7440-38-2	5	mg/kg		----	----	----	**22**	<5
Boron	7440-42-8	50	mg/kg		----	----	----	<50	<50
Cadmium	7440-43-9	1	mg/kg		----	----	----	<1	<1
Chromium	7440-47-3	2	mg/kg		----	----	----	**24**	**9**
Copper	7440-50-8	5	mg/kg		----	----	----	**31**	**8**
Iron	7439-89-6	50	mg/kg		----	----	----	**34300**	**7040**
Lead	7439-92-1	5	mg/kg		----	----	----	**9**	<5
Manganese	7439-96-5	5	mg/kg		----	----	----	**197**	**73**
Nickel	7440-02-0	2	mg/kg		----	----	----	**24**	**6**
Selenium	7782-49-2	5	mg/kg		----	----	----	<5	<5
Silver	7440-22-4	2	mg/kg		----	----	----	<2	<2
Zinc	7440-66-6	5	mg/kg		----	----	----	**47**	**12**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		----	----	----	<0.1	<0.1

Analytical Results

Sub-Matrix: **SEDIMENT**

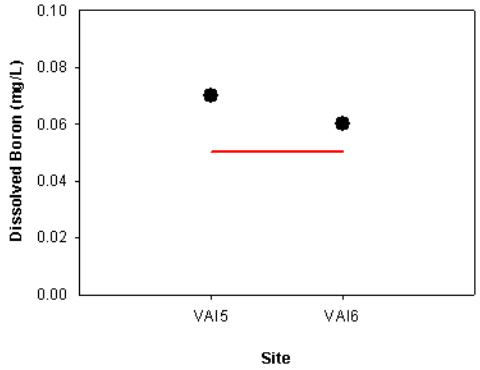
Compound	CAS Number	LOR	Unit	Client sample ID	S-022 -2mm	S-029 -2mm	S-036 -2mm	S-049 -2mm	S-056 -2mm
				Client sampling date / time	16-JUN-2008 10:00	16-JUN-2008 10:00	16-JUN-2008 10:00	16-JUN-2008 10:00	16-JUN-2008 10:00
					EB0807759-083	EB0807759-084	EB0807759-085	EB0807759-086	EB0807759-087
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**4110**	**16200**	**14100**	**11500**	**14200**
Arsenic	7440-38-2	5	mg/kg		<5	**6**	**6**	**7**	<5
Boron	7440-42-8	50	mg/kg		<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		**10**	**45**	**41**	**29**	**39**
Copper	7440-50-8	5	mg/kg		**9**	**53**	**48**	**40**	**52**
Iron	7439-89-6	50	mg/kg		**6330**	**26700**	**25600**	**21100**	**29200**
Lead	7439-92-1	5	mg/kg		<5	**8**	**7**	**8**	**9**
Manganese	7439-96-5	5	mg/kg		**69**	**315**	**297**	**169**	**1130**
Nickel	7440-02-0	2	mg/kg		**7**	**48**	**45**	**27**	**51**
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5
Silver	7440-22-4	2	mg/kg		<2	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg		**12**	**50**	**45**	**45**	**50**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1

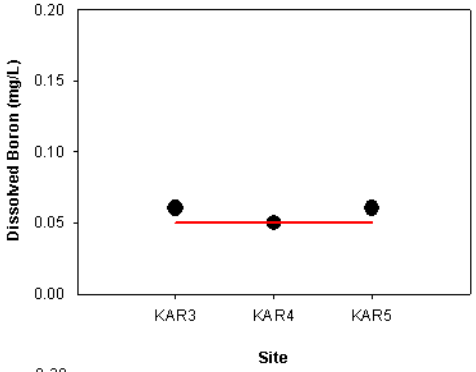
Analytical Results

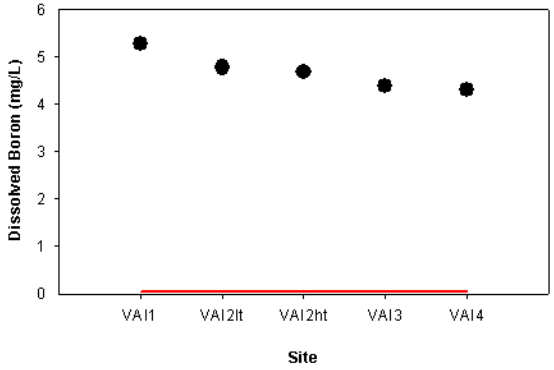
Sub-Matrix: **SEDIMENT**				Client sample ID	**S-063 -2mm**	----	----	----	----
				Client sampling date / time	16-JUN-2008 10:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EB0807759-088**	**----**	**----**	**----**	**----**
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**13000**	----	----	----	----
Arsenic	7440-38-2	5	mg/kg		<5	----	----	----	----
Boron	7440-42-8	50	mg/kg		<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		**63**	----	----	----	----
Copper	7440-50-8	5	mg/kg		**49**	----	----	----	----
Iron	7439-89-6	50	mg/kg		**32900**	----	----	----	----
Lead	7439-92-1	5	mg/kg		**10**	----	----	----	----
Manganese	7439-96-5	5	mg/kg		**2560**	----	----	----	----
Nickel	7440-02-0	2	mg/kg		**102**	----	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	----	----	----	----
Silver	7440-22-4	2	mg/kg		<2	----	----	----	----
Zinc	7440-66-6	5	mg/kg		**31**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----

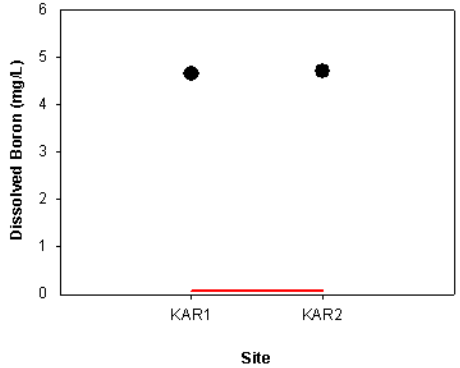
Appendix 4 Water Quality Results – Graphs

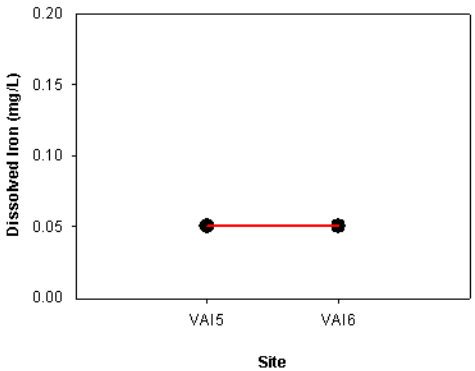
NOTE: Red line is limit of reporting, blue solid line is ANZECC/ARMCANZ (2000) 99% of species protection limit, blue dotted line is ANZECC/ARMCANZ (2000) 95% species protection limit. Green solid line is PNG Environment Act (2000) water quality guideline.

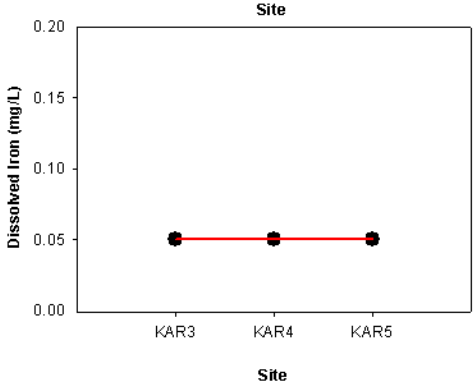

Dissolved Boron (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
VAI5
VAI6
Site

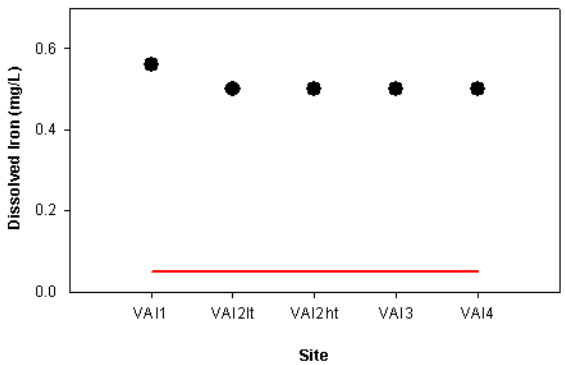

Dissolved Boron (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site


Dissolved Boron (mg/L)
6
5
4
3
2
1
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site


Dissolved Boron (mg/L)
6
5
4
3
2
1
0
KAR1
KAR2
Site


Dissolved Iron (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI5
VAI6
Site


Dissolved Iron (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site


Dissolved Iron (mg/L)
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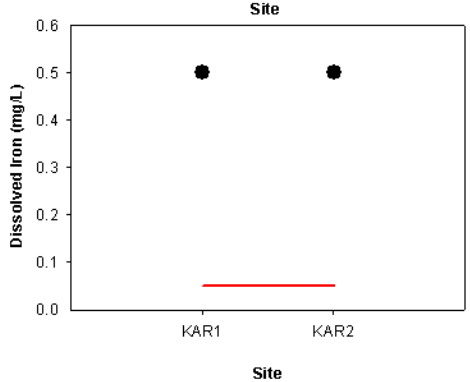
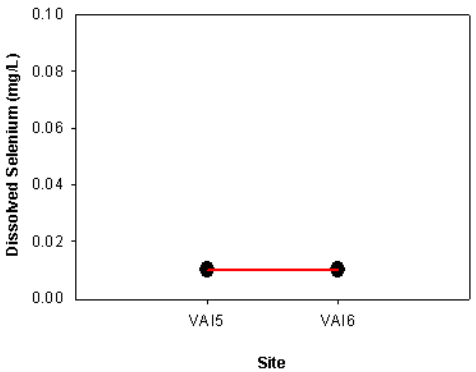
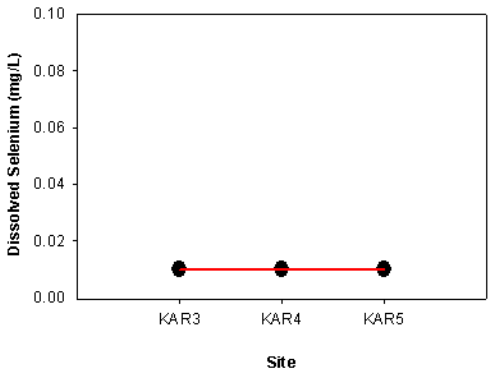
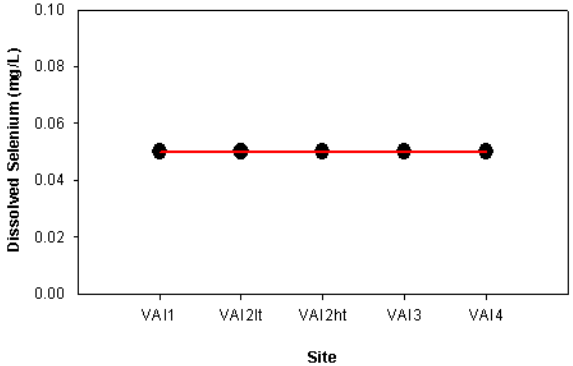
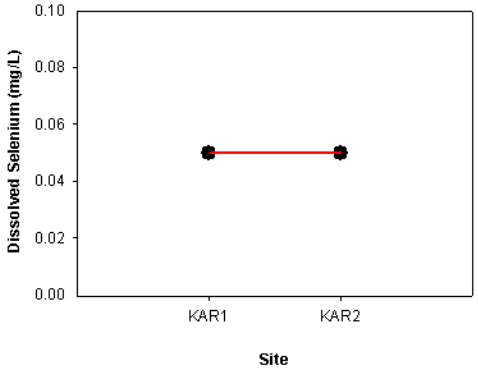
0.4
0.2
0.0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

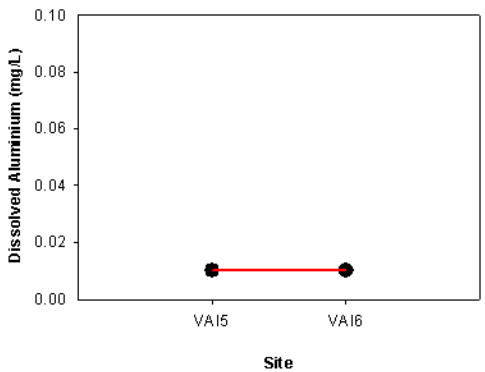

Dissolved Iron (mg/L)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
KAR1
KAR2
Site

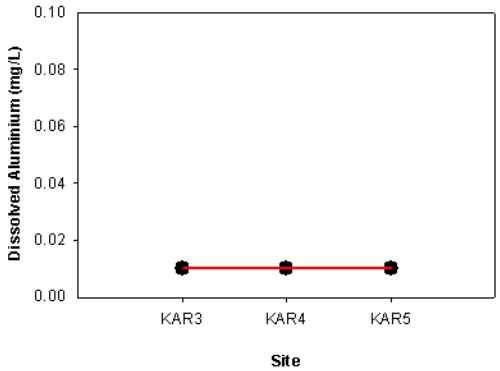

Dissolved Selenium (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
VAI5
VAI6
Site

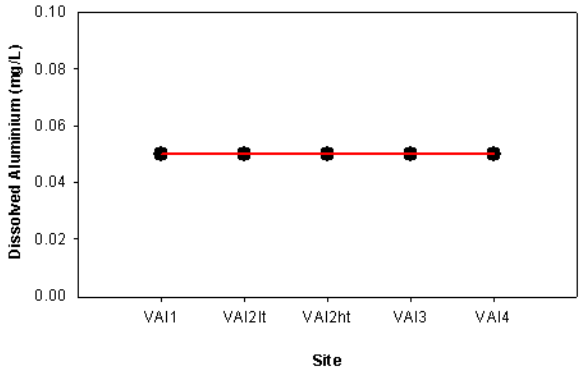

Dissolved Selenium (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
KAR3
KAR4
KAR5
Site

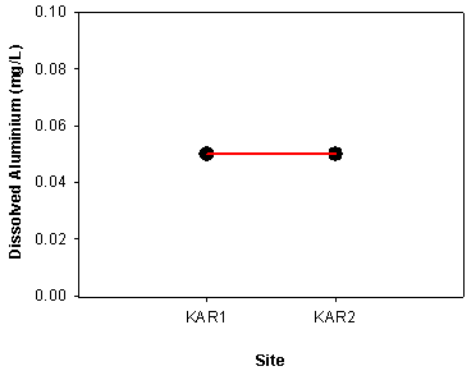

Dissolved Selenium (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

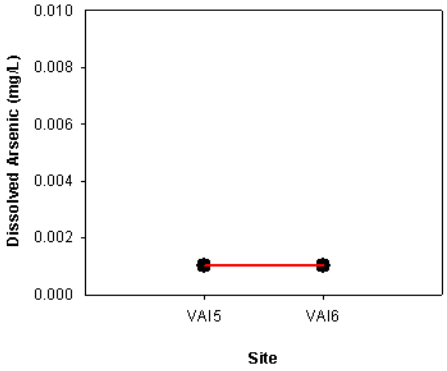

Dissolved Selenium (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
KAR1
KAR2
Site

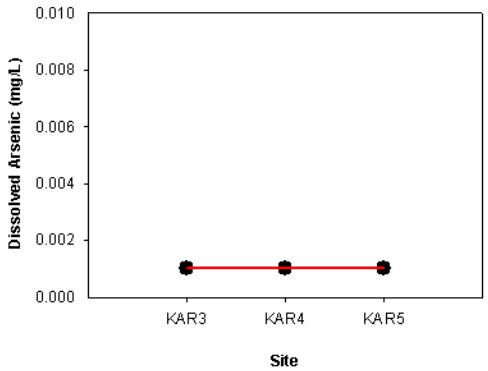

Dissolved Aluminium (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
VAI5
VAI6
Site

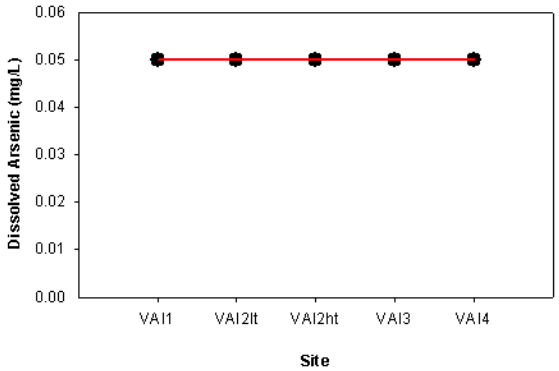

Dissolved Aluminium (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
KAR3
KAR4
KAR5
Site

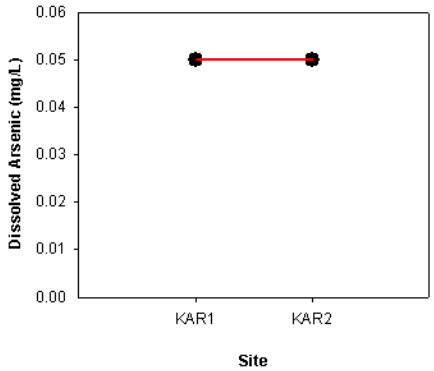

Dissolved Aluminium (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

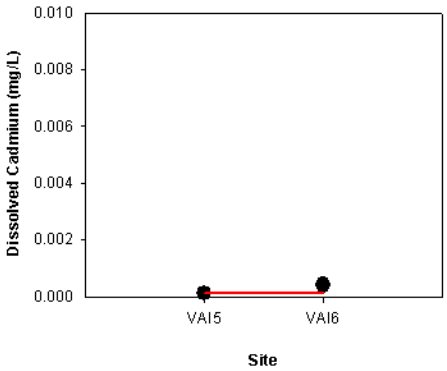

Dissolved Aluminium (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
KAR1
KAR2
Site

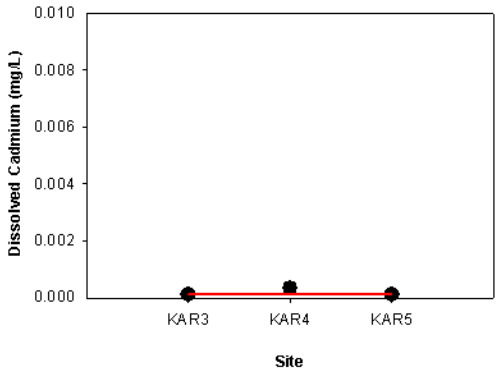

Dissolved Arsenic (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI5
VAI6
Site

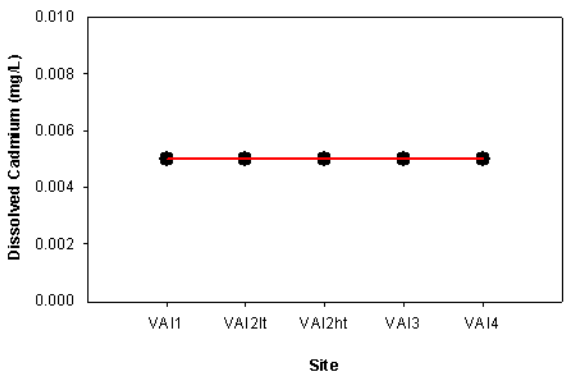

Dissolved Arsenic (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR3
KAR4
KAR5
Site

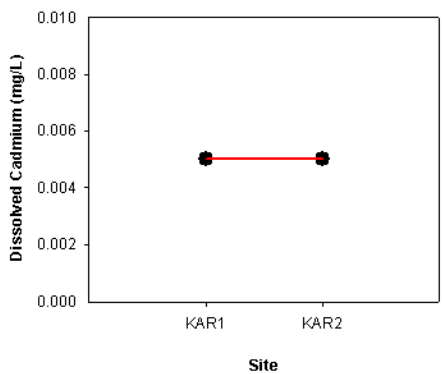

Dissolved Arsenic (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

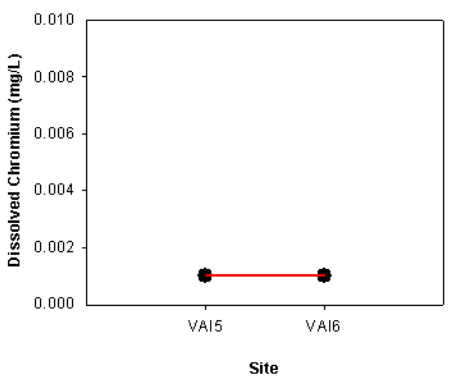

Dissolved Arsenic (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
KAR1
KAR2
Site

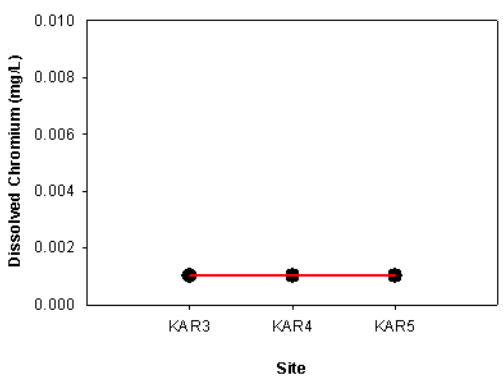

Dissolved Cadmium (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI5
VAI6
Site

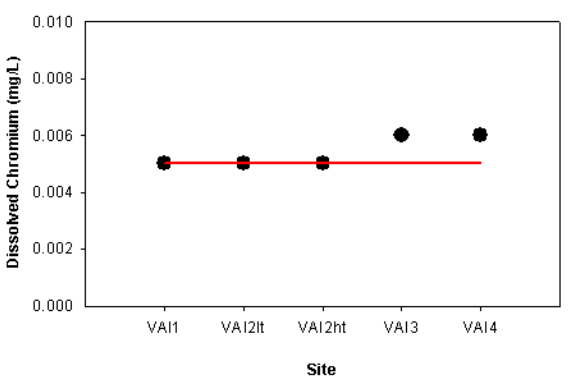

Dissolved Cadmium (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR3
KAR4
KAR5
Site

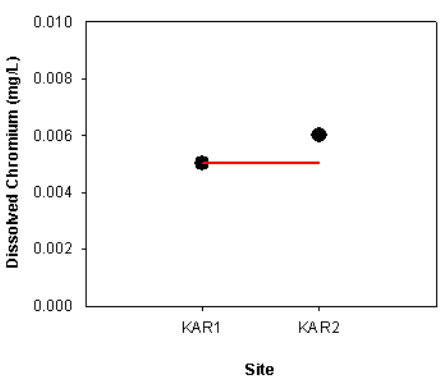

Dissolved Cadmium (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

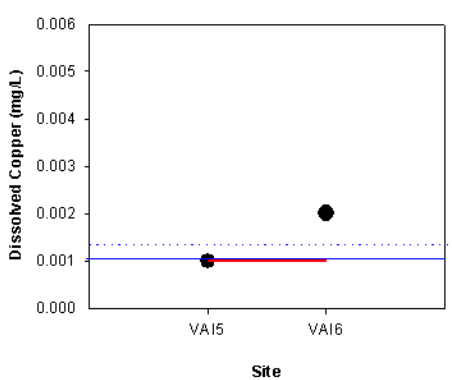

Dissolved Cadmium (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR1
KAR2
Site

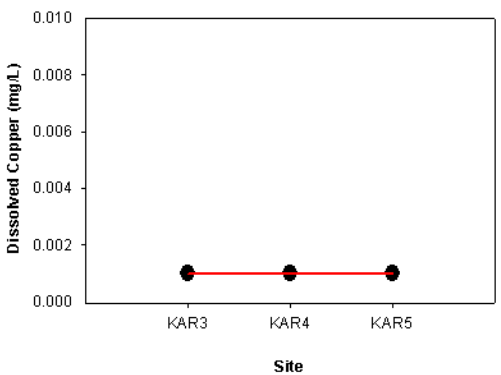

Dissolved Chromium (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI5
VAI6
Site

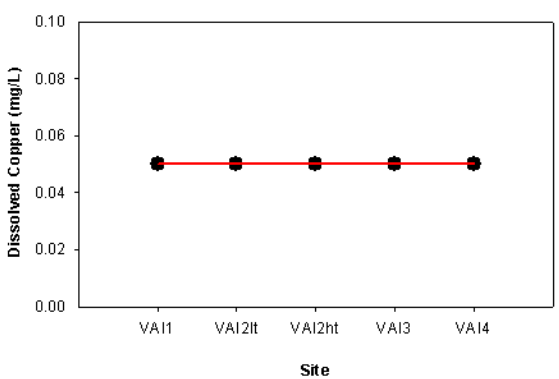

Dissolved Chromium (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR3
KAR4
KAR5
Site

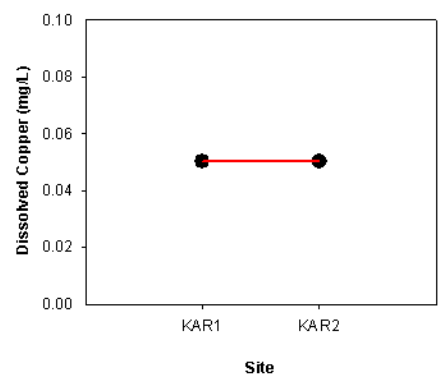

Dissolved Chromium (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

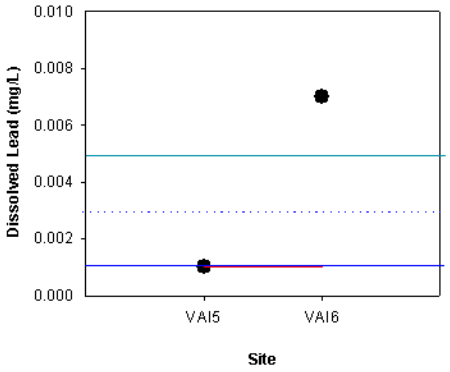

Dissolved Chromium (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR1
KAR2
Site

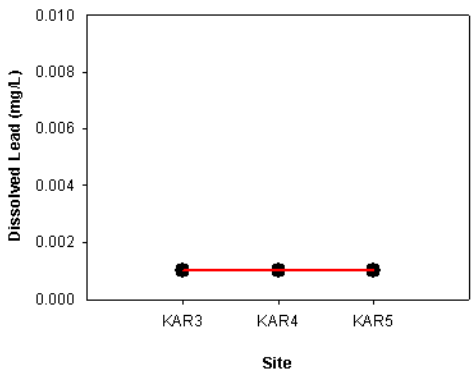

Dissolved Copper (mg/L)
0.006
0.005
0.004
0.003
0.002
0.001
0.000
VAI5
VAI6
Site

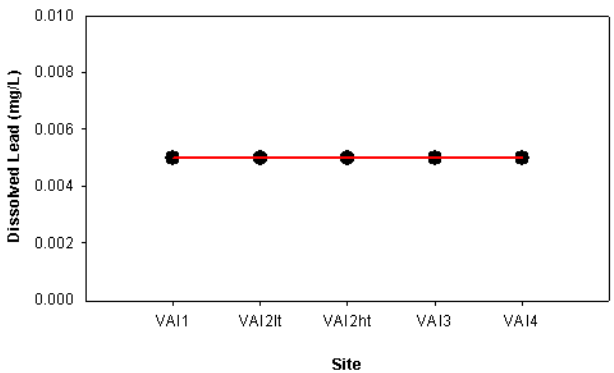

Dissolved Copper (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR3
KAR4
KAR5
Site

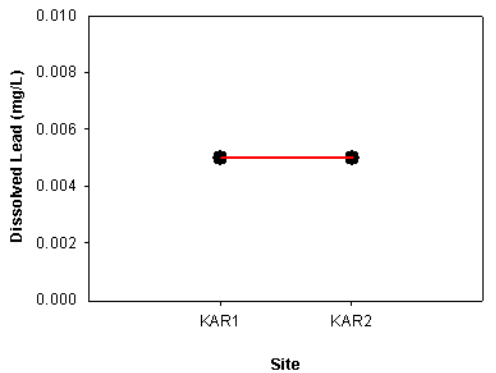

Dissolved Copper (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

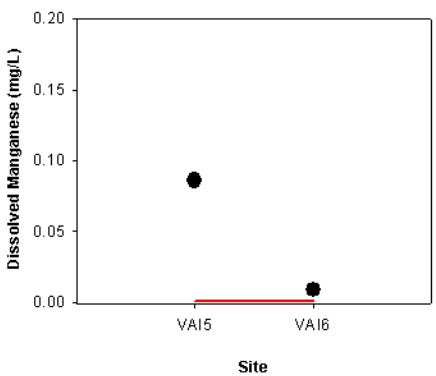

Dissolved Copper (mg/L)
0.10
0.08
0.06
0.04
0.02
0.00
KAR1
KAR2
Site

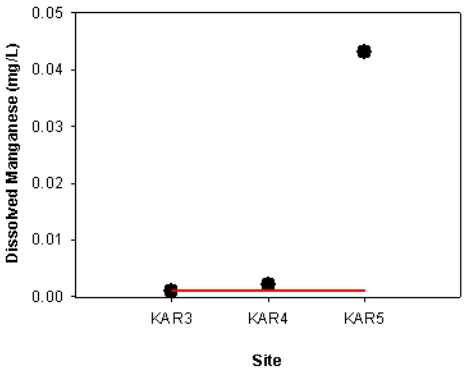

Dissolved Lead (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI5
VAI6
Site

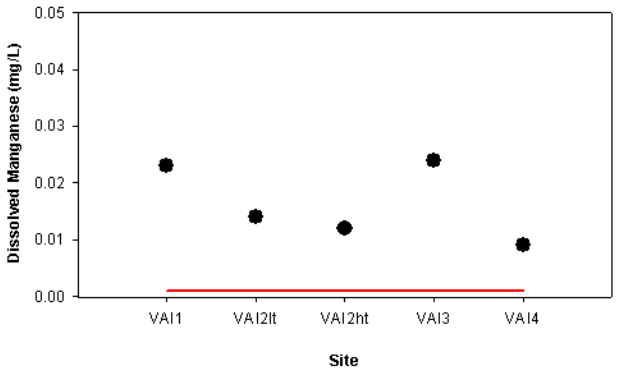

Dissolved Lead (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR3
KAR4
KAR5
Site

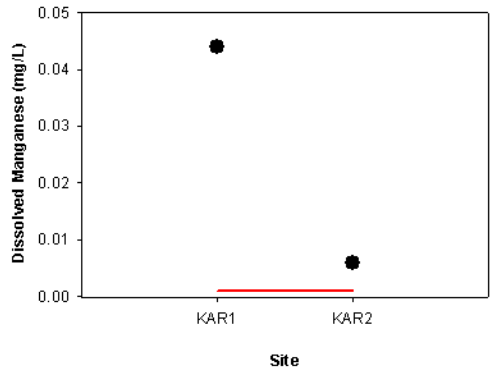

Dissolved Lead (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

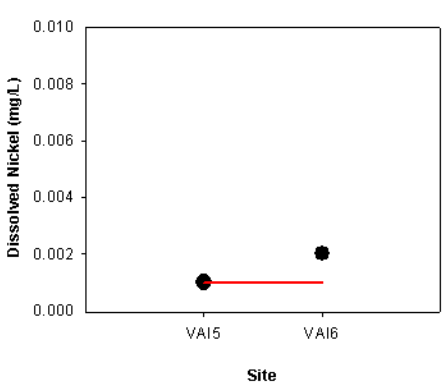

Dissolved Lead (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR1
KAR2
Site

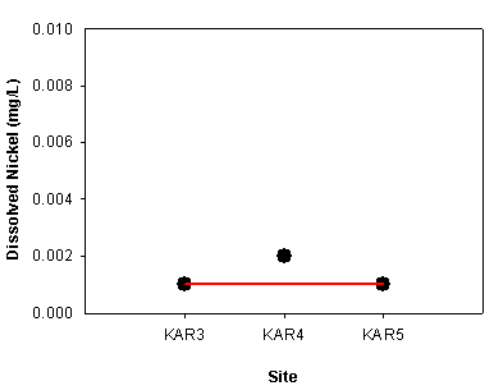

Dissolved Manganese (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI5
VAI6
Site

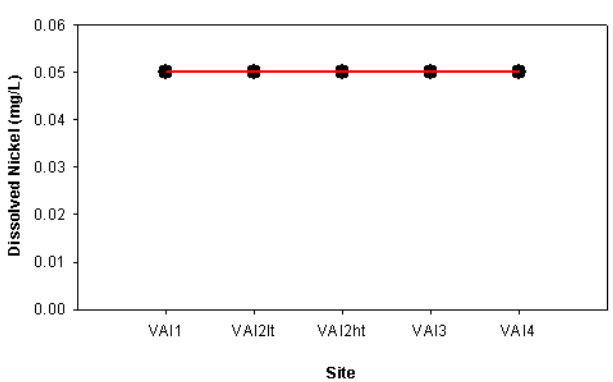

Dissolved Manganese (mg/L)
0.05
0.04
0.03
0.02
0.01
0.00
KAR3
KAR4
KAR5
Site

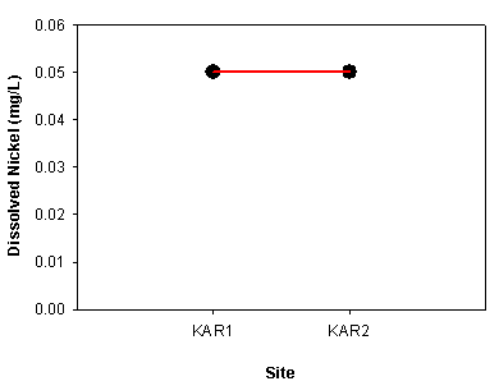

Dissolved Manganese (mg/L)
0.05
0.04
0.03
0.02
0.01
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

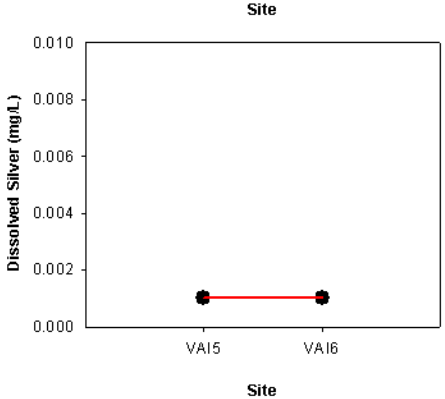

Dissolved Manganese (mg/L)
0.05
0.04
0.03
0.02
0.01
0.00
KAR1
KAR2
Site

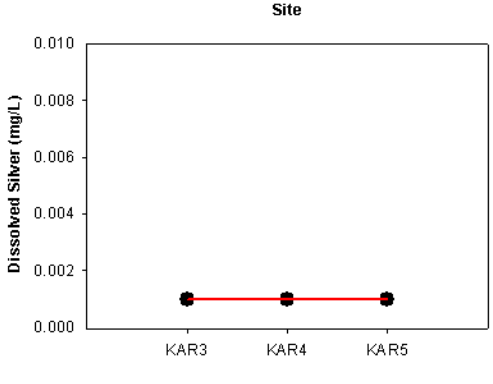

Dissolved Nickel (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI5
VAI6
Site

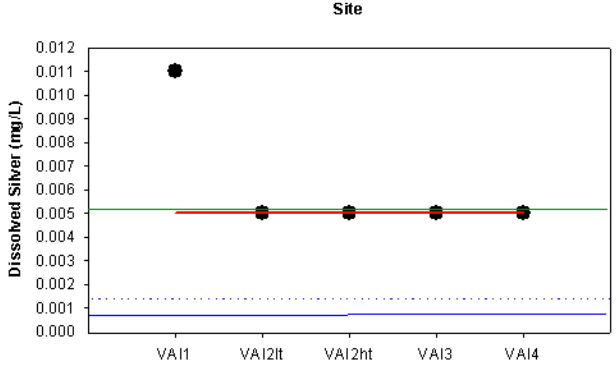

Dissolved Nickel (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR3
KAR4
KAR5
Site

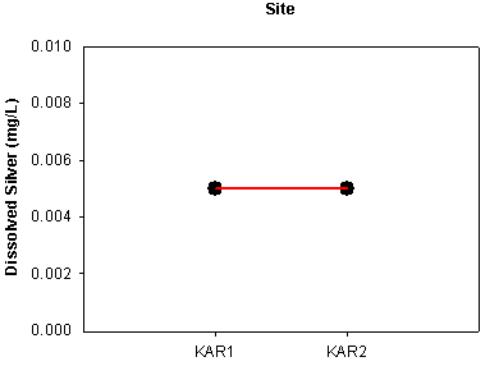

Dissolved Nickel (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

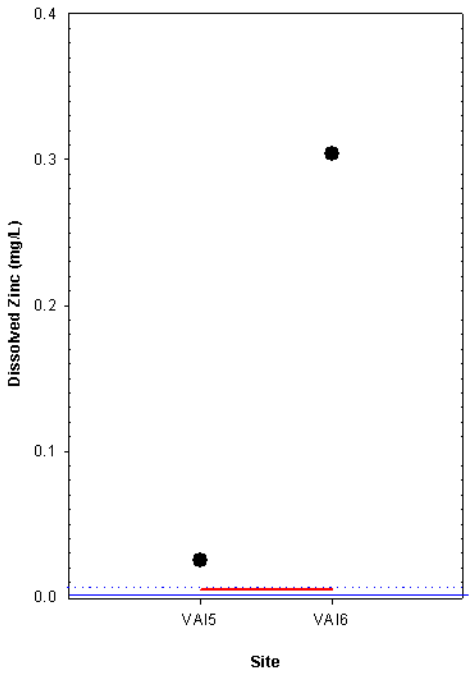

Dissolved Nickel (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
KAR1
KAR2
Site

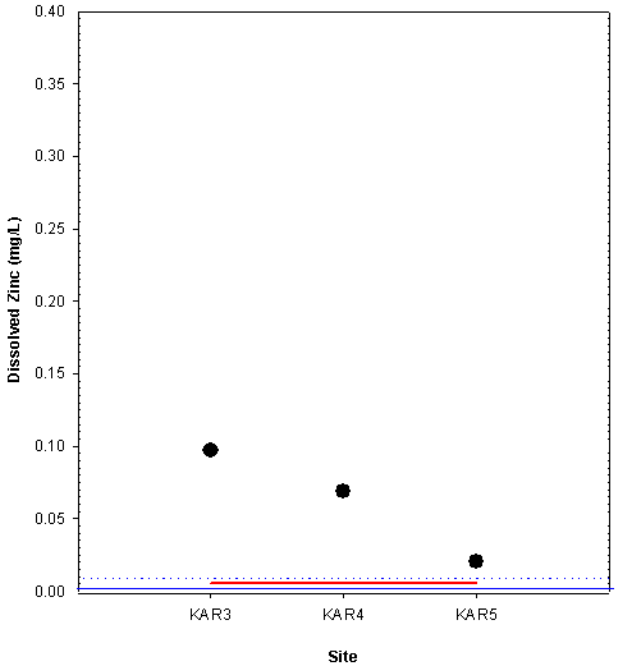

Dissolved Silver (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
VAI5
VAI6
Site

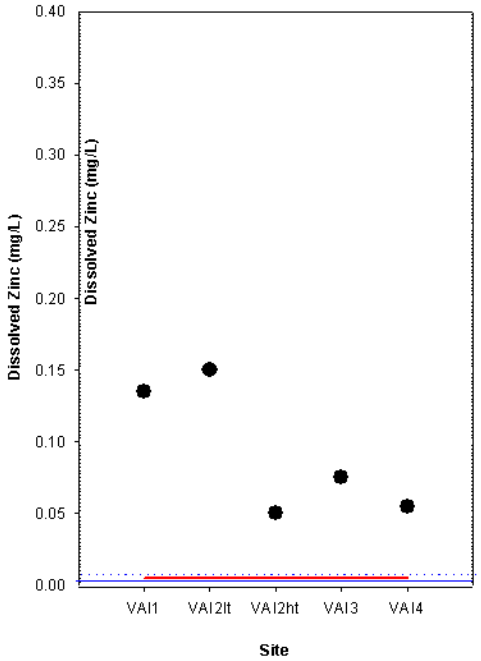

Dissolved Silver (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR3
KAR4
KAR5
Site

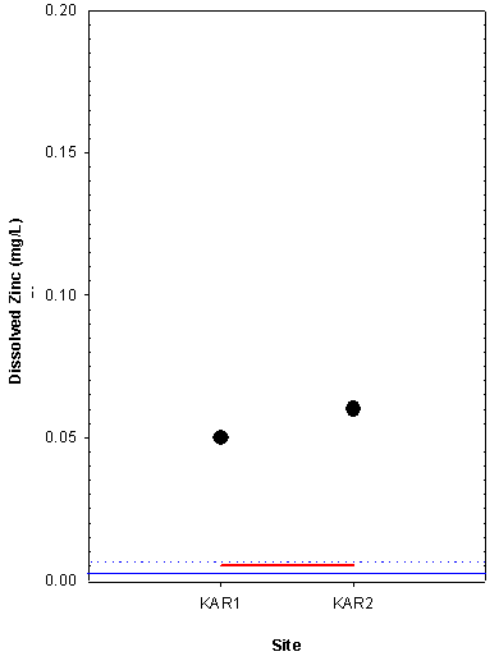

Dissolved Silver (mg/L)
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

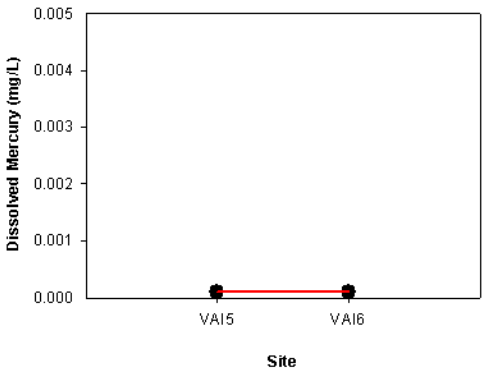

Dissolved Silver (mg/L)
0.010
0.008
0.006
0.004
0.002
0.000
KAR1
KAR2
Site

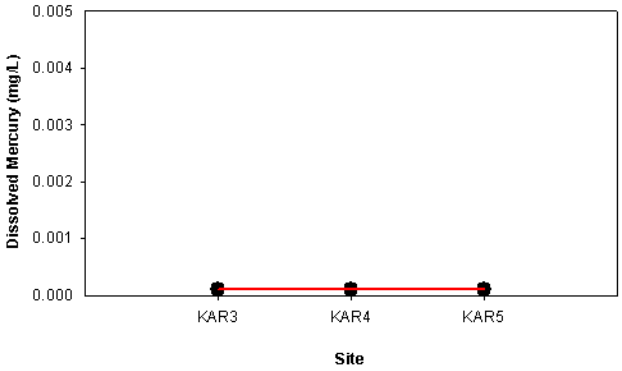

Dissolved Zinc (mg/L)
0.4
0.3
0.2
0.1
0.0
VAI5
VAI6
Site

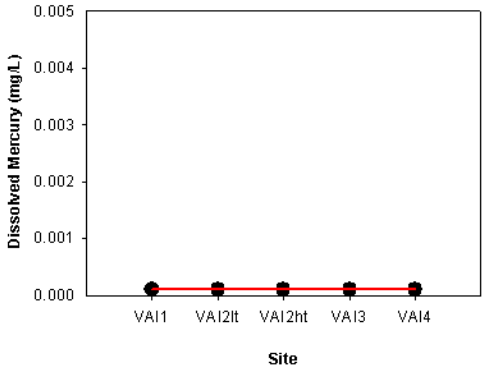

Dissolved Zinc (mg/L)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site

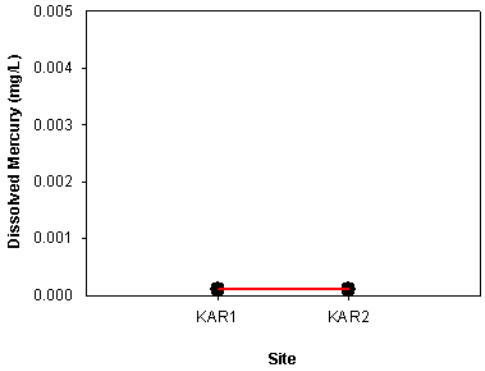

Dissolved Zinc (mg/L)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

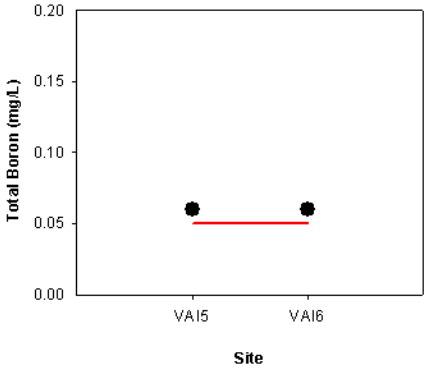

Dissolved Zinc (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR1
KAR2
Site

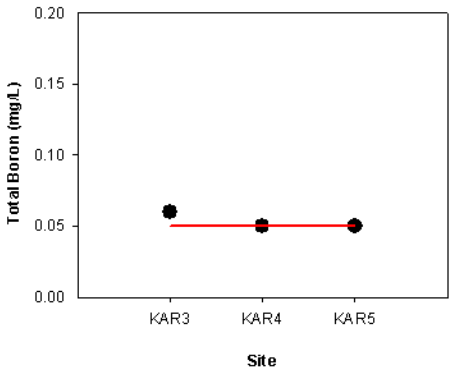

Dissolved Mercury (mg/L)
0.005
0.004
0.003
0.002
0.001
0.000
VAI5
VAI6
Site

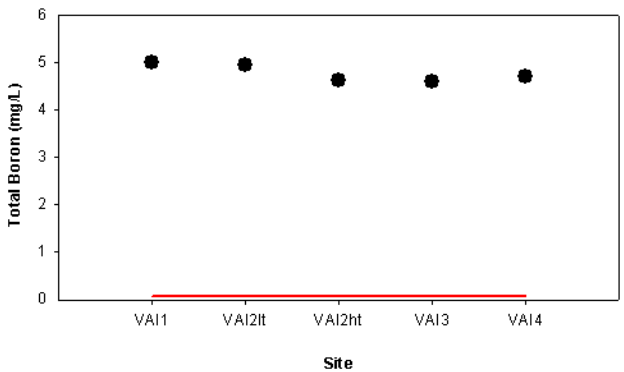

Dissolved Mercury (mg/L)
0.005
0.004
0.003
0.002
0.001
0.000
KAR3
KAR4
KAR5
Site

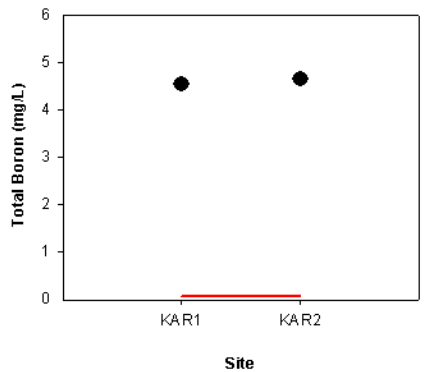

Dissolved Mercury (mg/L)
0.005
0.004
0.003
0.002
0.001
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

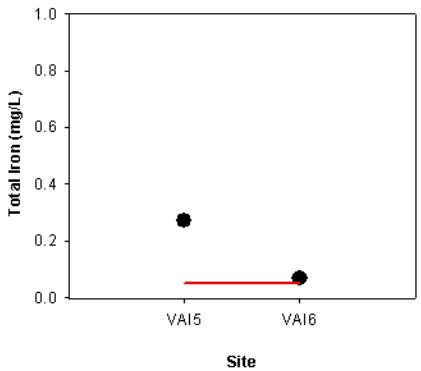

Dissolved Mercury (mg/L)
0.005
0.004
0.003
0.002
0.001
0.000
KAR1
KAR2
Site

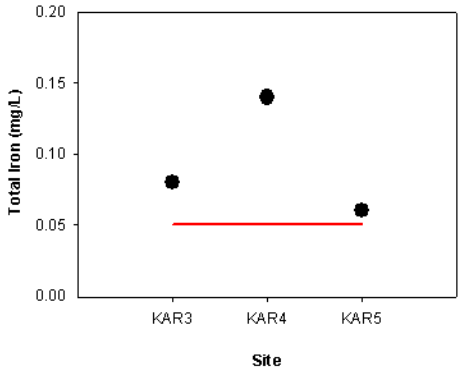

Total Boron (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI5
VAI6
Site

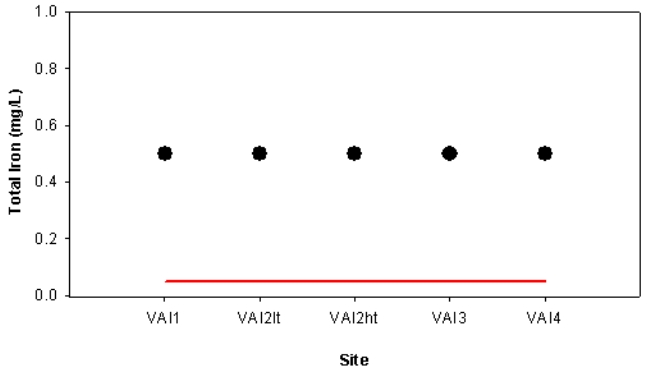

Total Boron (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site

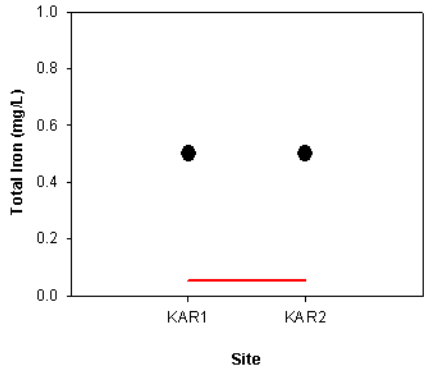

Total Boron (mg/L)
6
5
4
3
2
1
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

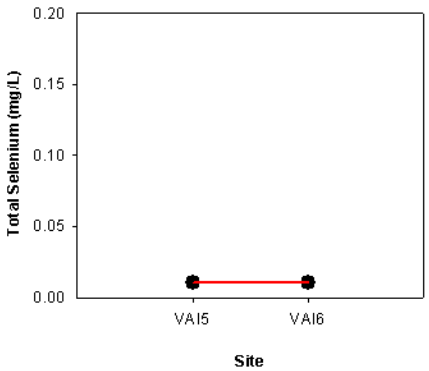

Total Boron (mg/L)
6
5
4
3
2
1
0
KAR1
KAR2
Site

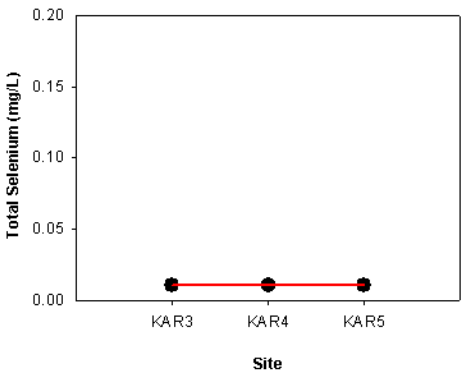

Total Iron (mg/L)
1.0
0.8
0.6
0.4
0.2
0.0
VAI5
VAI6
Site

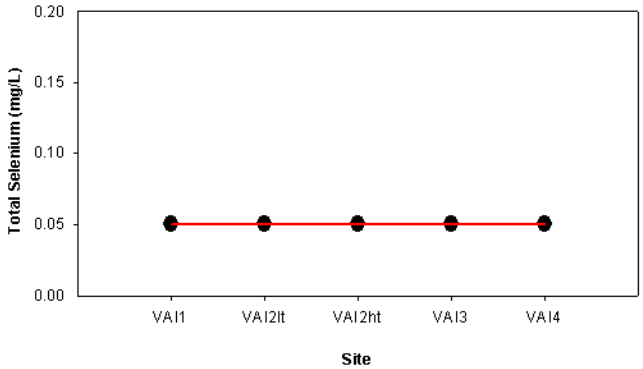

Total Iron (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site

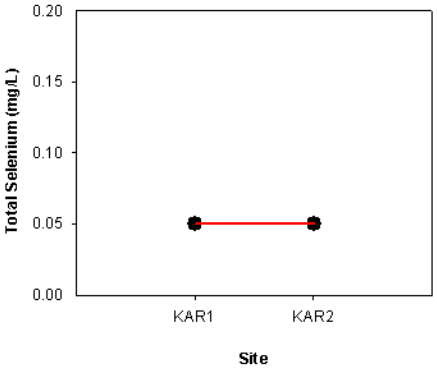

Total Iron (mg/L)
1.0
0.8
0.6
0.4
0.2
0.0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

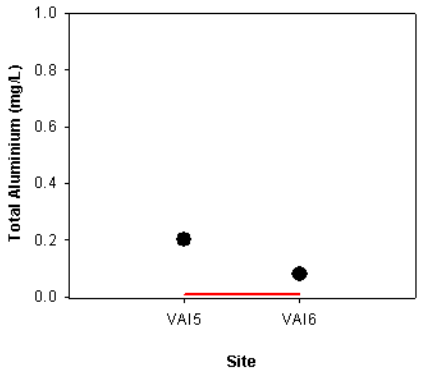

Total Iron (mg/L)
1.0
0.8
0.6
0.4
0.2
0.0
KAR1
KAR2
Site

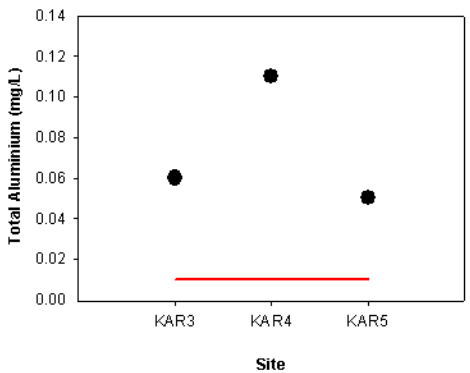

Total Selenium (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI5
VAI6
Site

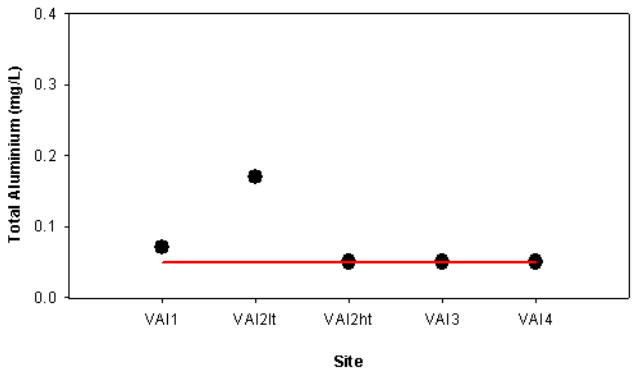

Total Selenium (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site

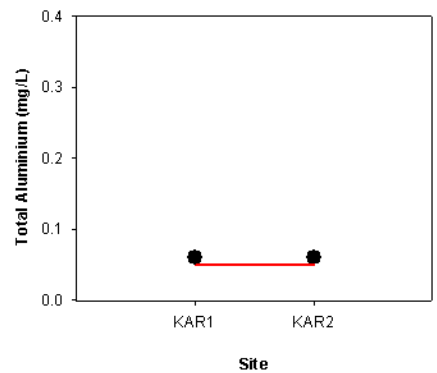

Total Selenium (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

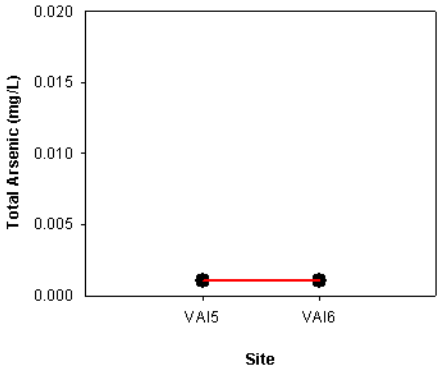

Total Selenium (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR1
KAR2
Site

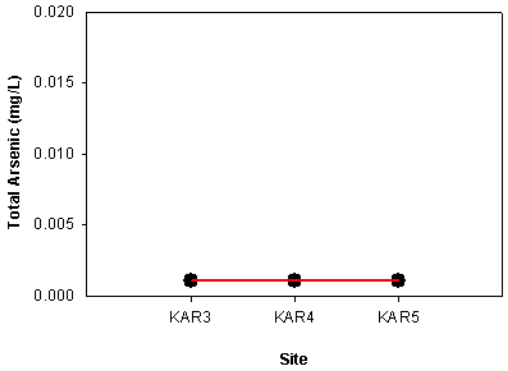

Total Aluminium (mg/L)
1.0
0.8
0.6
0.4
0.2
0.0
VAI5
VAI6
Site

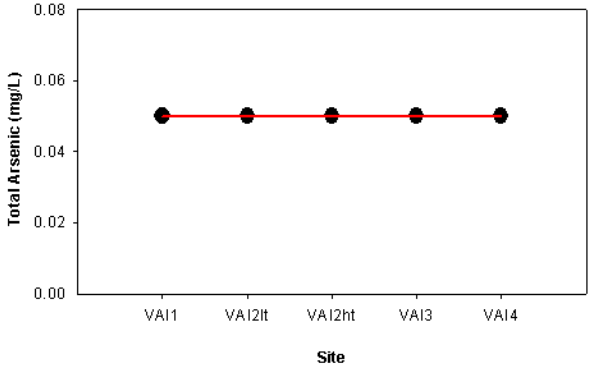

Total Aluminium (mg/L)
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
KAR3
KAR4
KAR5
Site

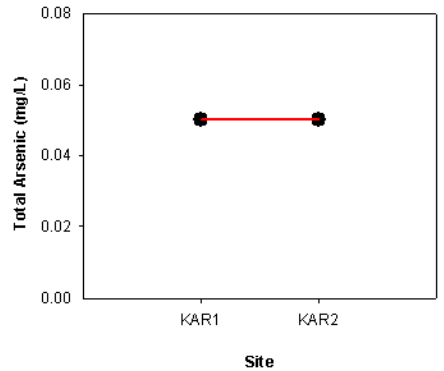

Total Aluminium (mg/L)
0.4
0.3
0.2
0.1
0.0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

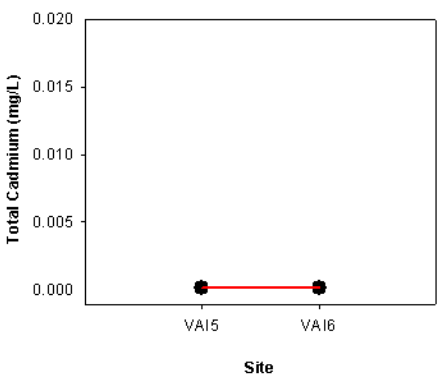

Total Aluminium (mg/L)
0.4
0.3
0.2
0.1
0.0
KAR1
KAR2
Site

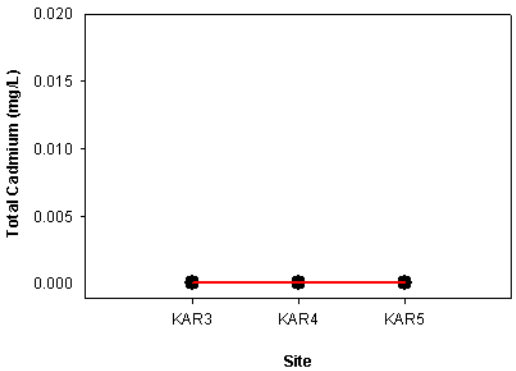

Total Arsenic (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

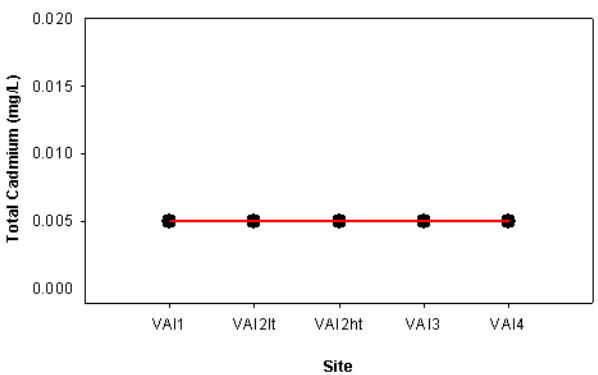

Total Arsenic (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

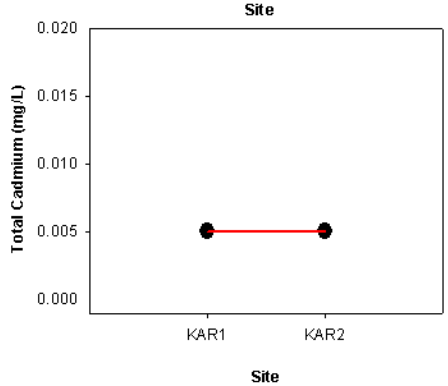

Total Arsenic (mg/L)
0.08
0.06
0.04
0.02
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

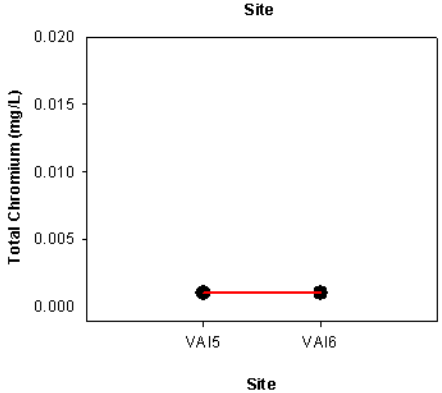

Total Arsenic (mg/L)
0.08
0.06
0.04
0.02
0.00
KAR1
KAR2
Site

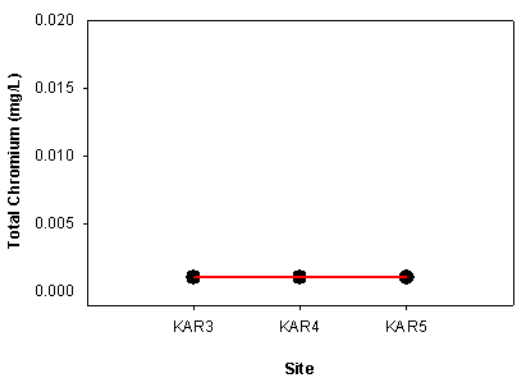

Total Cadmium (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

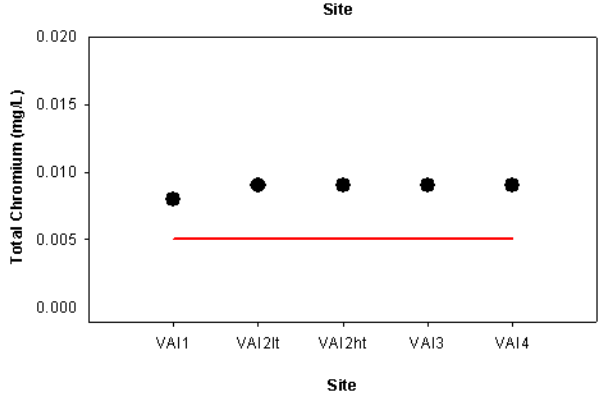

Total Cadmium (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

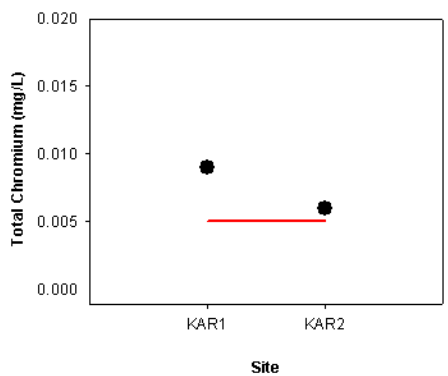

Total Cadmium (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

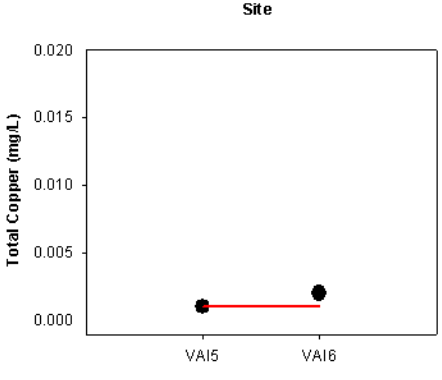

Total Cadmium (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR1
KAR2
Site

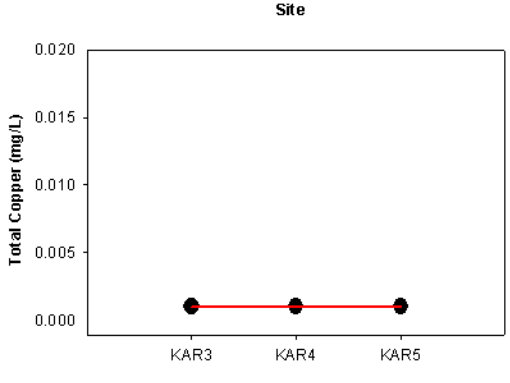

Total Chromium (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

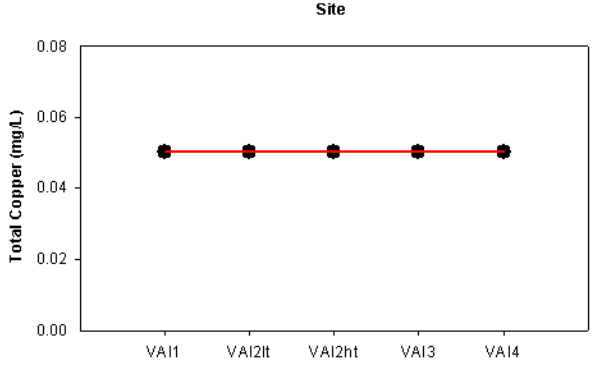

Total Chromium (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

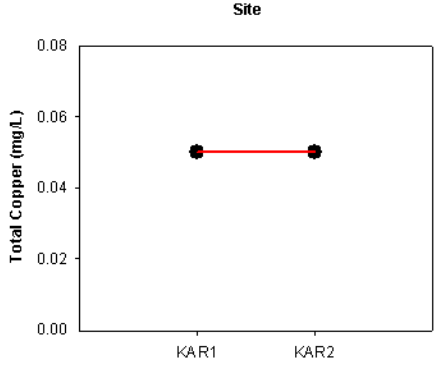

Total Chromium (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

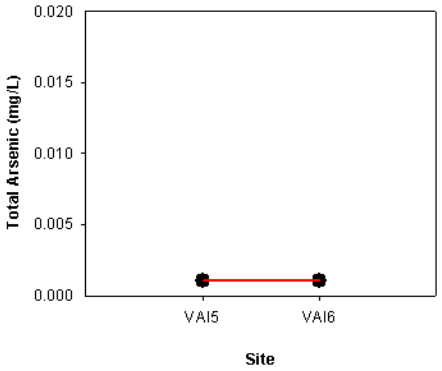

Total Chromium (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR1
KAR2
Site

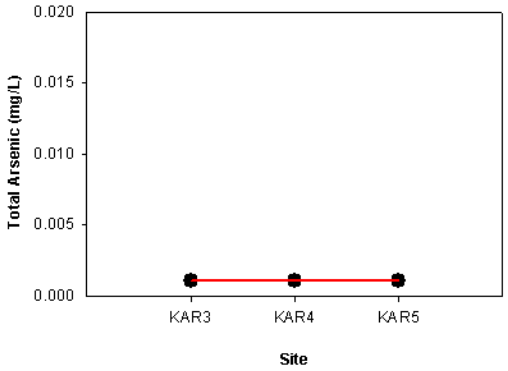

Total Copper (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

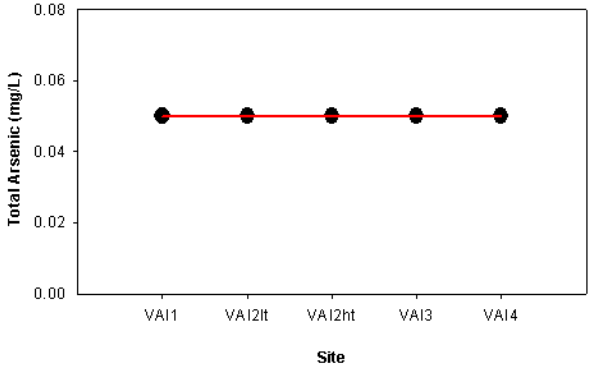

Total Copper (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

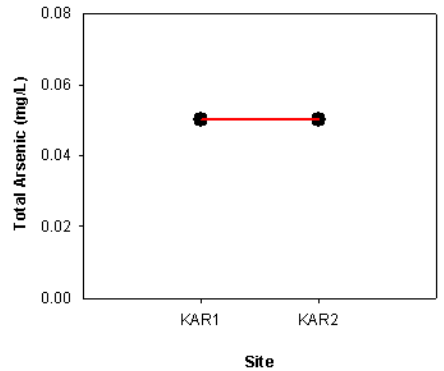

Total Copper (mg/L)
0.08
0.06
0.04
0.02
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

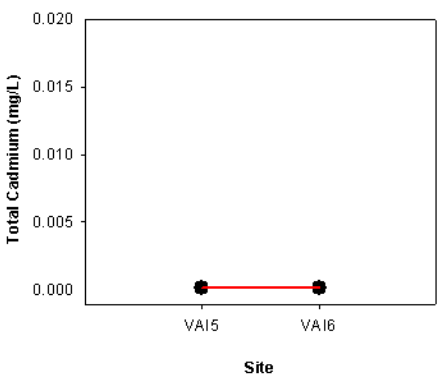

Total Copper (mg/L)
0.08
0.06
0.04
0.02
0.00
KAR1
KAR2
Site

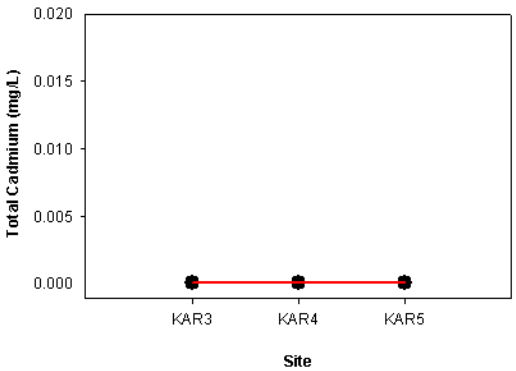

Total Arsenic (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

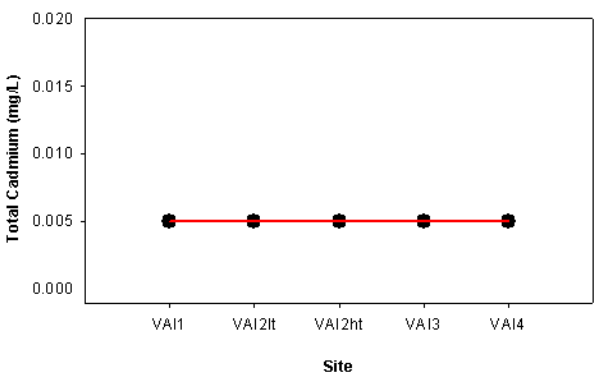

Total Arsenic (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

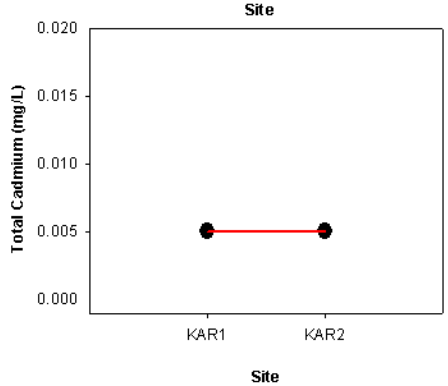

Total Arsenic (mg/L)
0.08
0.06
0.04
0.02
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

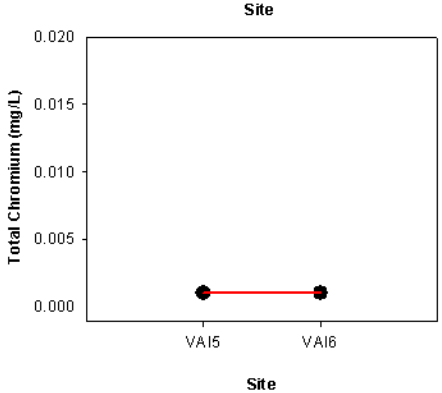

Total Arsenic (mg/L)
0.08
0.06
0.04
0.02
0.00
KAR1
KAR2
Site

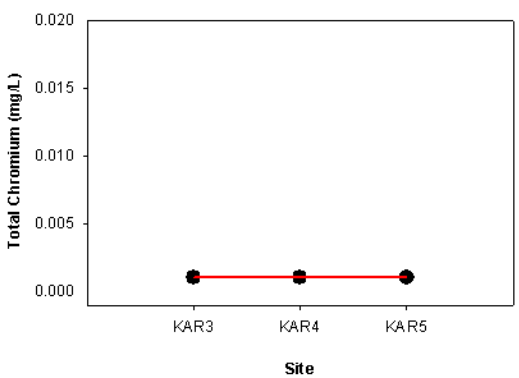

Total Cadmium (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

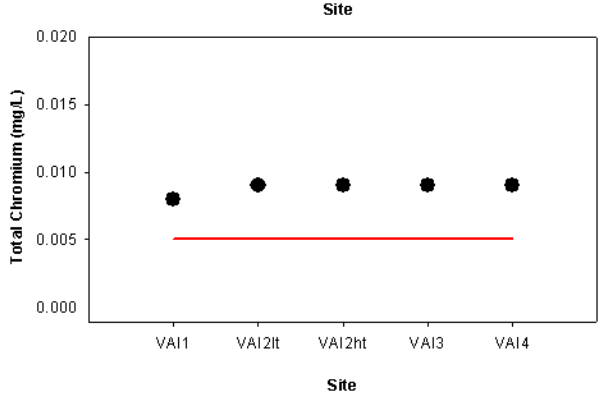

Total Cadmium (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

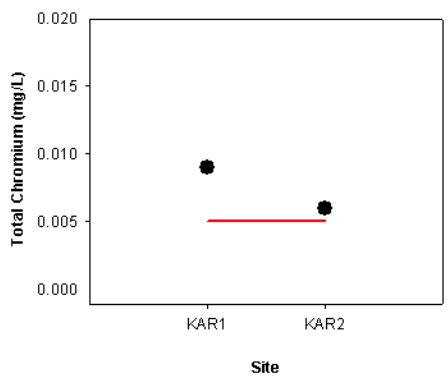

Total Cadmium (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

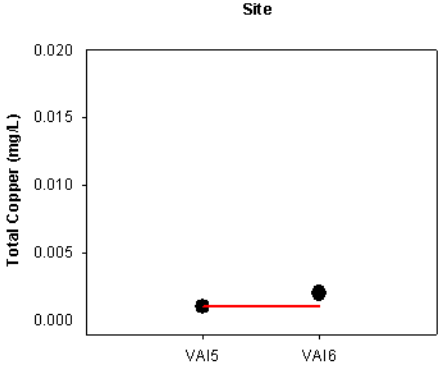

Total Cadmium (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR1
KAR2
Site

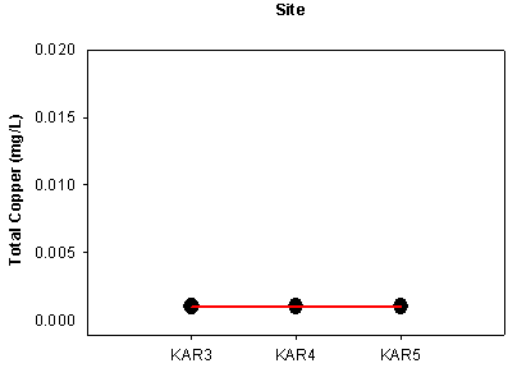

Total Chromium (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

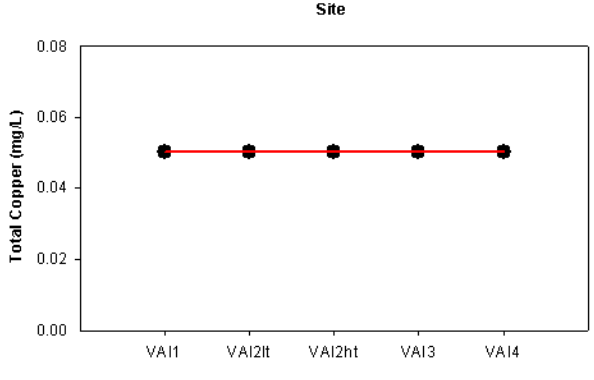

Total Chromium (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

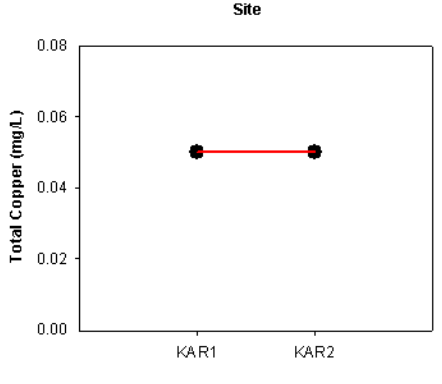

Total Chromium (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

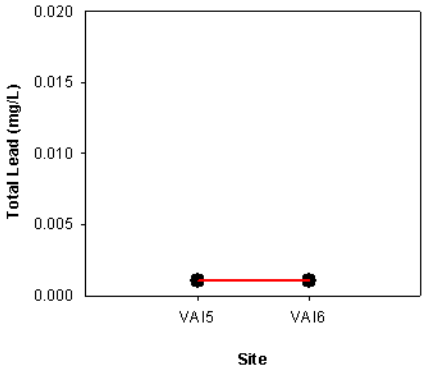

Total Chromium (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR1
KAR2
Site

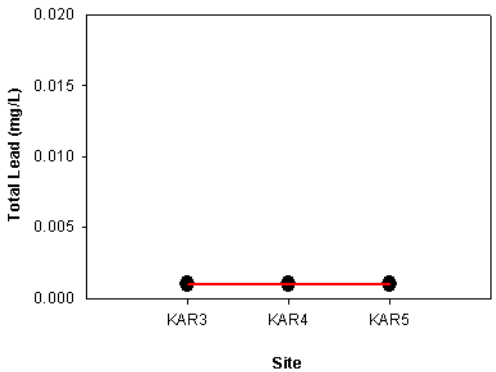

Total Copper (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

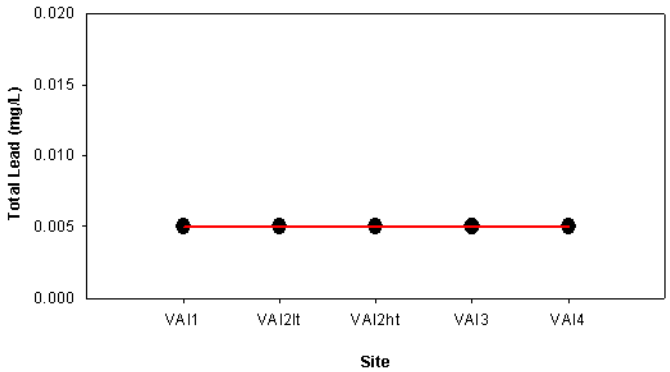

Total Copper (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

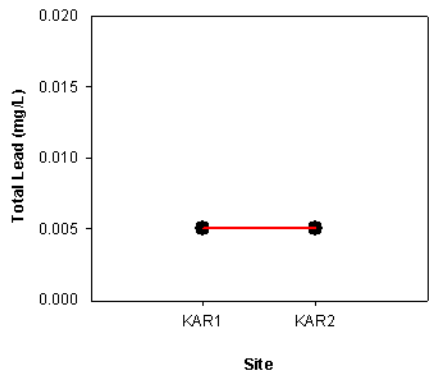

Total Copper (mg/L)
0.08
0.06
0.04
0.02
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

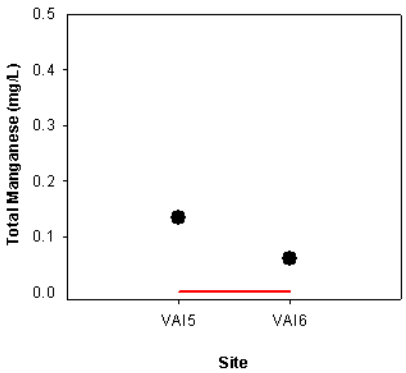

Total Copper (mg/L)
0.08
0.06
0.04
0.02
0.00
KAR1
KAR2
Site

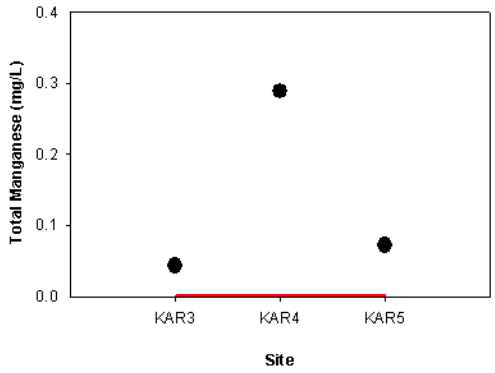

Total Lead (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI5
VAI6
Site

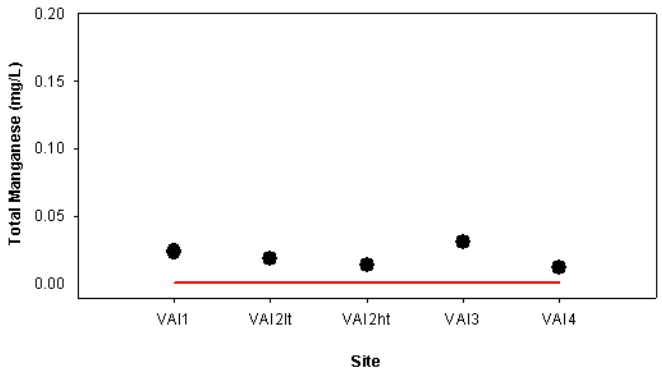

Total Lead (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR3
KAR4
KAR5
Site

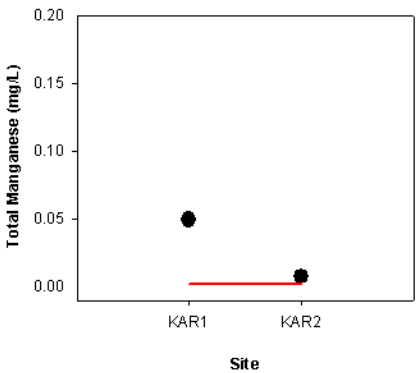

Total Lead (mg/L)
0.020
0.015
0.010
0.005
0.000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

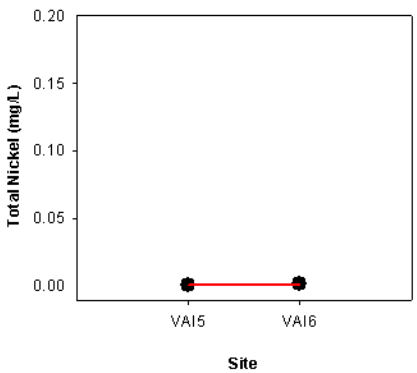

Total Lead (mg/L)
0.020
0.015
0.010
0.005
0.000
KAR1
KAR2
Site

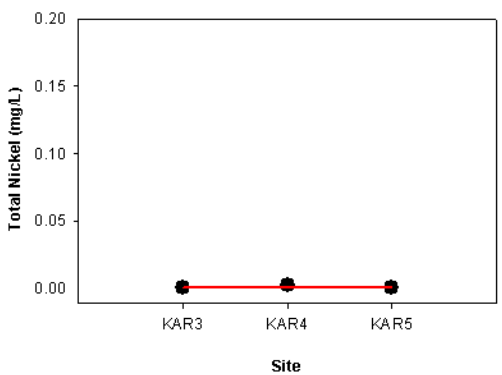

Total Manganese (mg/L)
0.5
0.4
0.3
0.2
0.1
0.0
VAI5
VAI6
Site

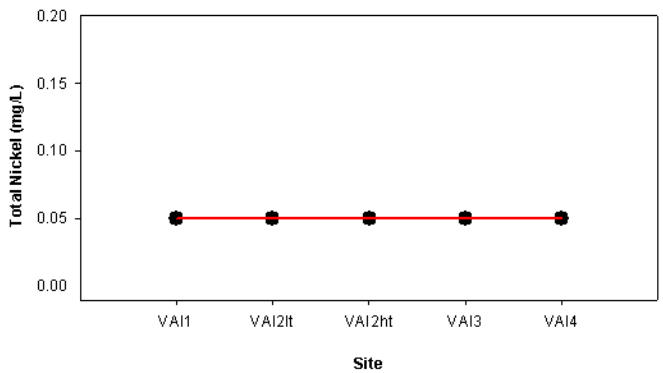

Total Manganese (mg/L)
0.4
0.3
0.2
0.1
0.0
KAR3
KAR4
KAR5
Site

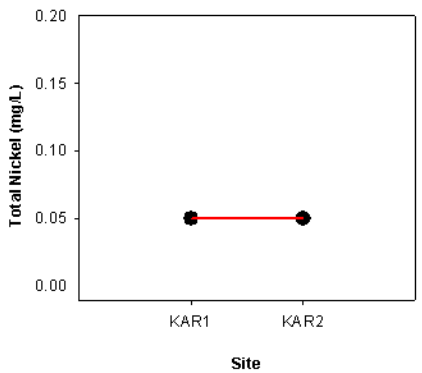

Total Manganese (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

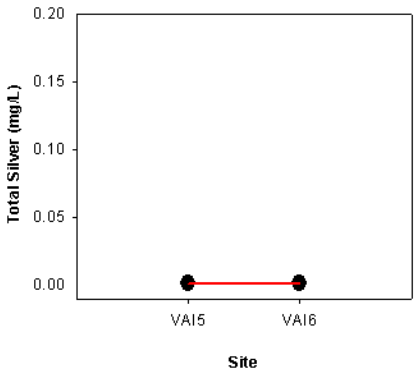

Total Manganese (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR1
KAR2
Site

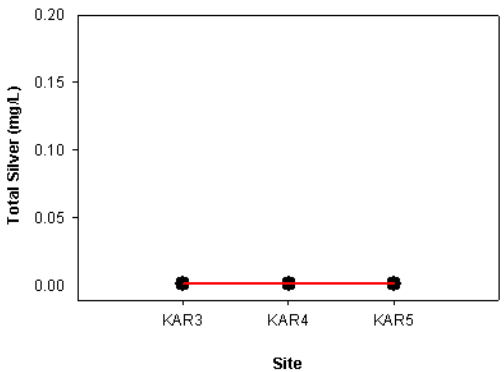

Total Nickel (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI5
VAI6
Site

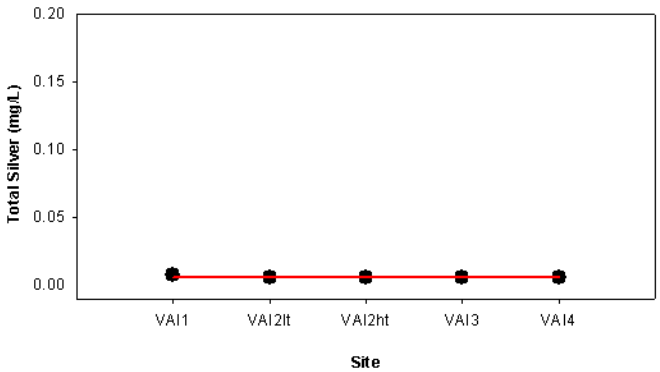

Total Nickel (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site

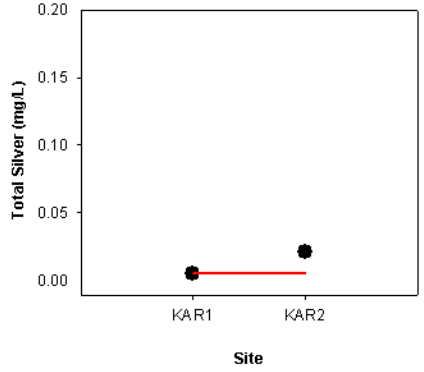

Total Nickel (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

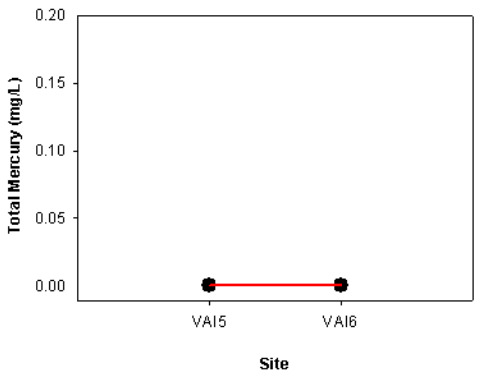

Total Nickel (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR1
KAR2
Site

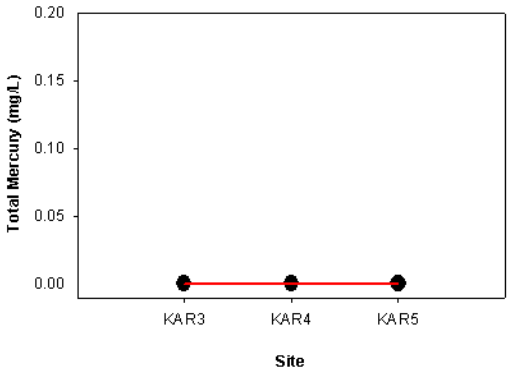

Total Silver (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI5
VAI6
Site

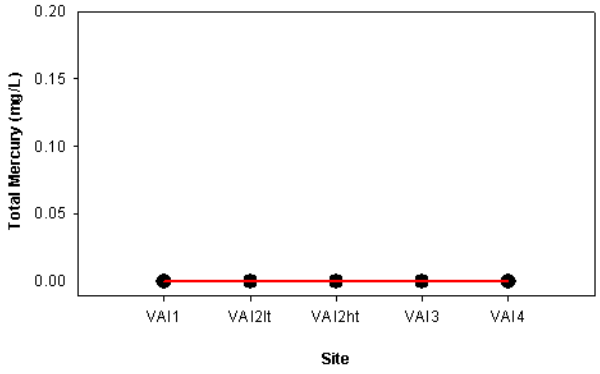

Total Silver (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site

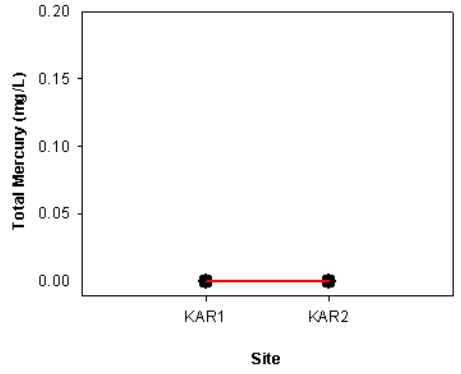

Total Silver (mg/L)
0.20
0.15
0.10
0.05
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

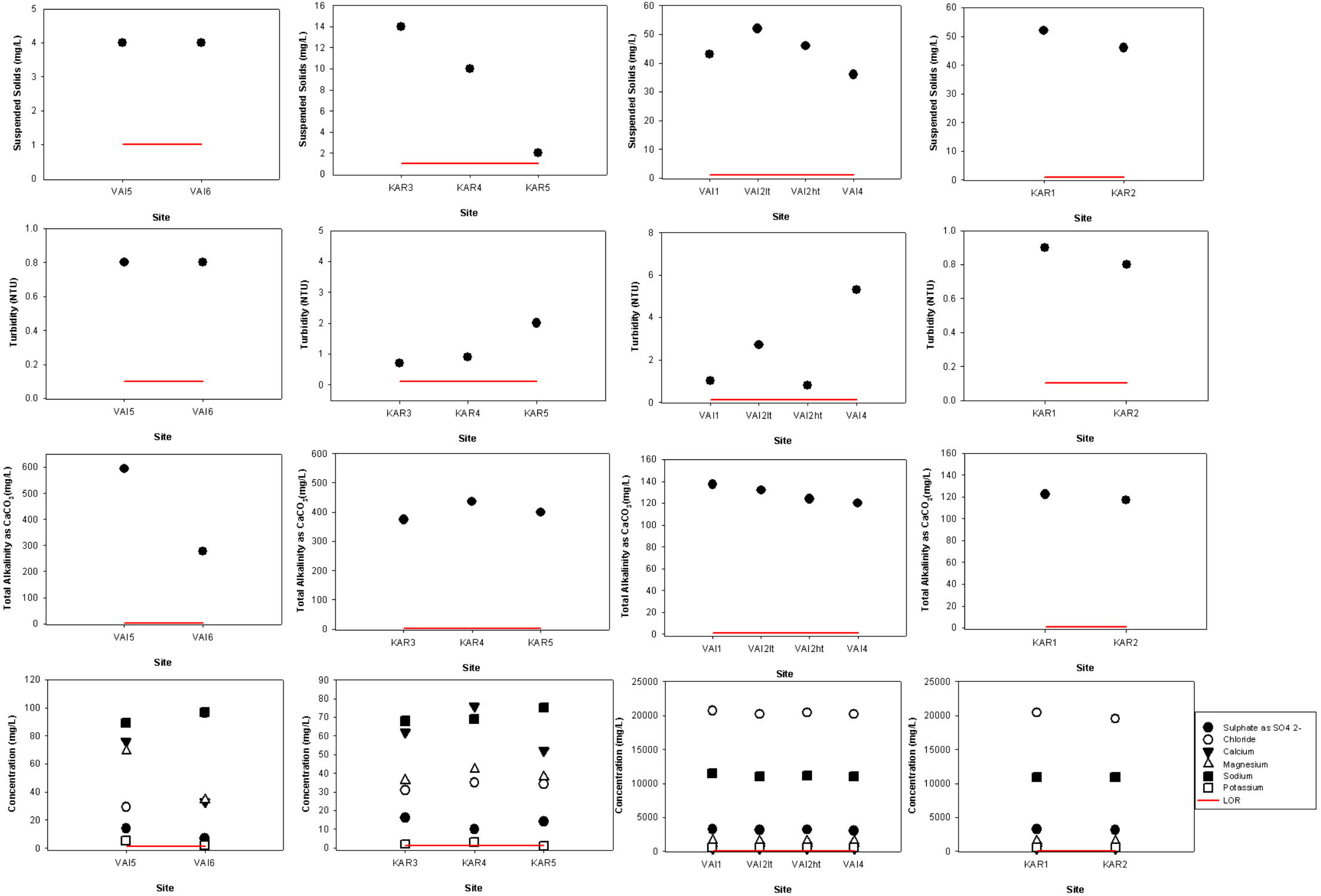

Total Silver (mg/L)
0.20
0.15
0.10
0.05
0.00
KAR1
KAR2
Site

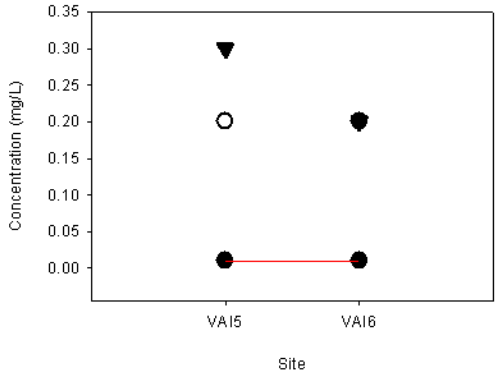

0.20
0.15
0.10
0.05
0.00
Total Mercury (mg/L)
VAI5
VAI6
Site

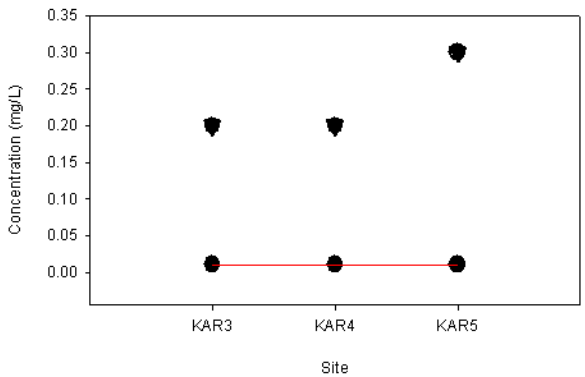

0.20
0.15
0.10
0.05
0.00
Total Mercury (mg/L)
KAR3
KAR4
KAR5
Site

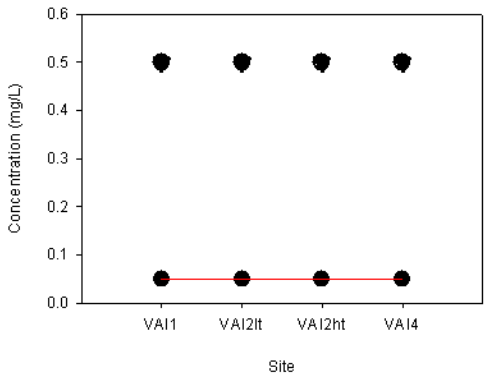

0.20
0.15
0.10
0.05
0.00
Total Mercury (mg/L)
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
Site

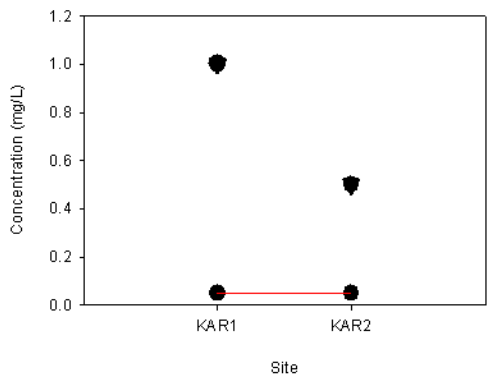

0.20
0.15
0.10
0.05
0.00
Total Mercury (mg/L)
KAR1
KAR2
Site

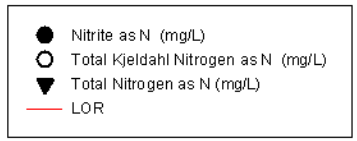

Suspended Solids (mg/L)
VAI5
VAI6
Site
KAR3
KAR4
KAR5
VAI1
VAI2lt
VAI2ht
VAI4
KAR1
KAR2
Turbidity (NTU)
Total Alkalinity as CaCO3(mg/L)
Concentration (mg/L)
Sulphate as SO4 2-
Chloride
Calcium
Magnesium
Sodium
Potassium
LOR

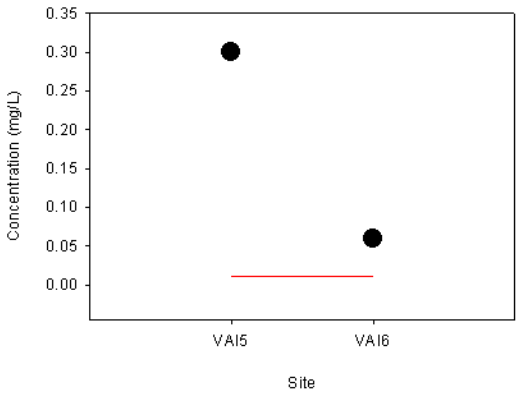

Concentration (mg/L)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
VAI5
VAI6
Site

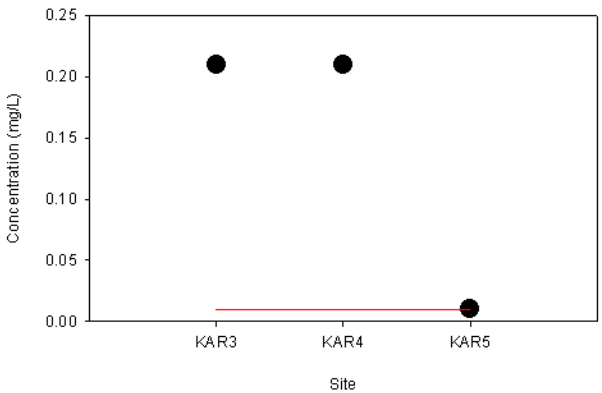

Concentration (mg/L)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site

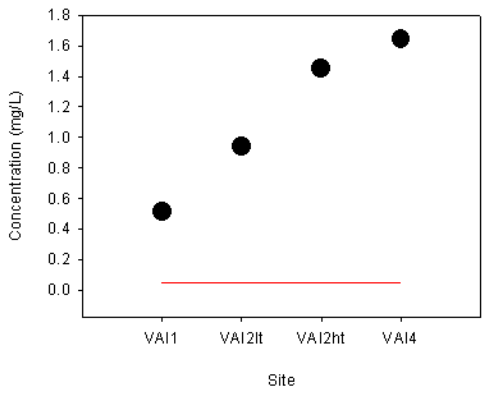

Concentration (mg/L)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
VAI1
VAI2lt
VAI2ht
VAI4
Site

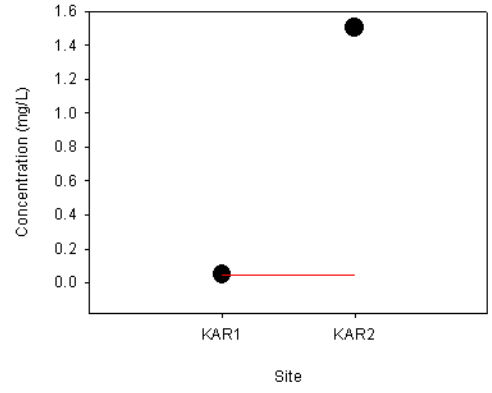

Concentration (mg/L)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
KAR1
KAR2
Site

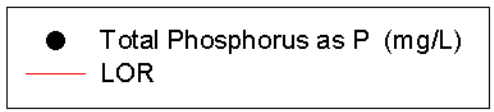

Nitrite as N (mg/L)
Total Kjeldahl Nitrogen as N (mg/L)
Total Nitrogen as N (mg/L)
LOR

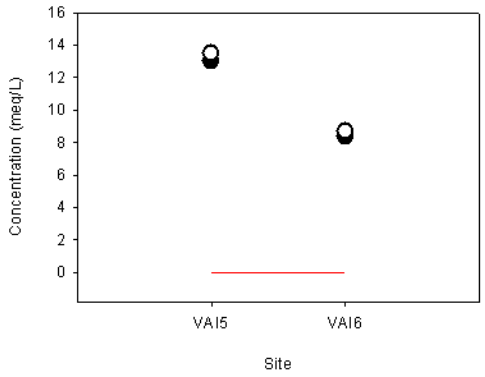

Concentration (mg/L)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
VAI5
VAI6
Site

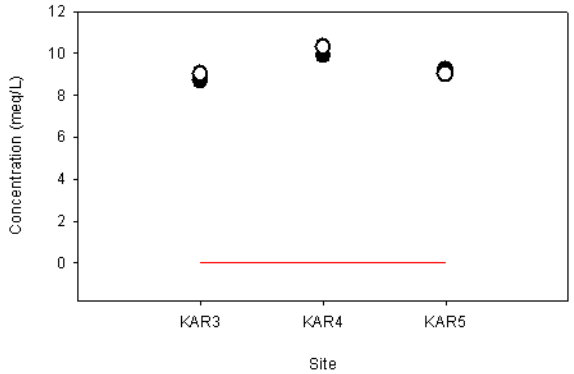

Concentration (mg/L)
0.25
0.20
0.15
0.10
0.05
0.00
KAR3
KAR4
KAR5
Site

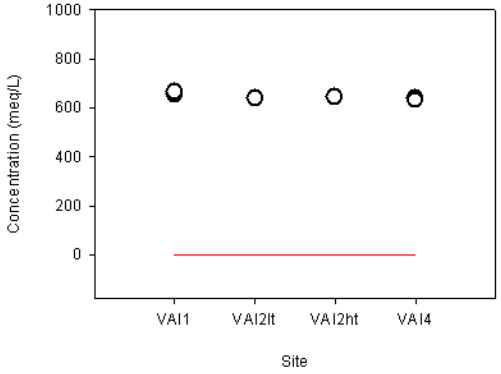

Concentration (mg/L)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
VAI1
VAI2lt
VAI2ht
VAI4
Site

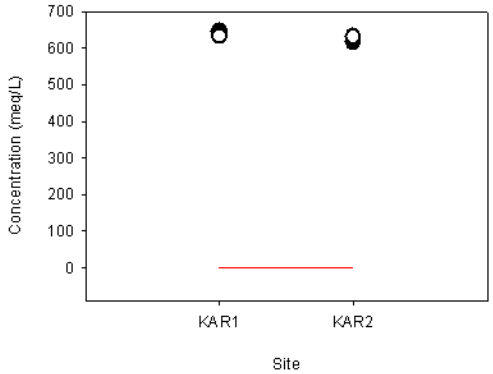

Concentration (mg/L)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
KAR1
KAR2
Site

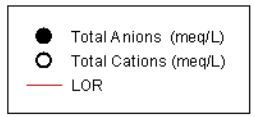

Total Phosphorus as P (mg/L)
LOR

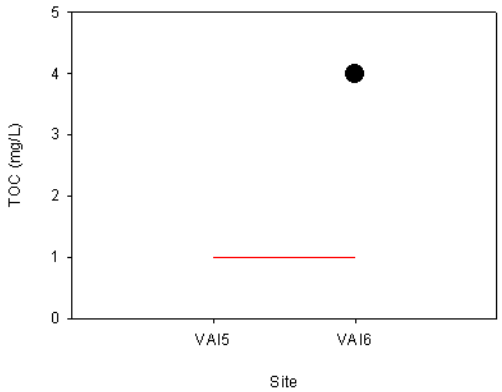


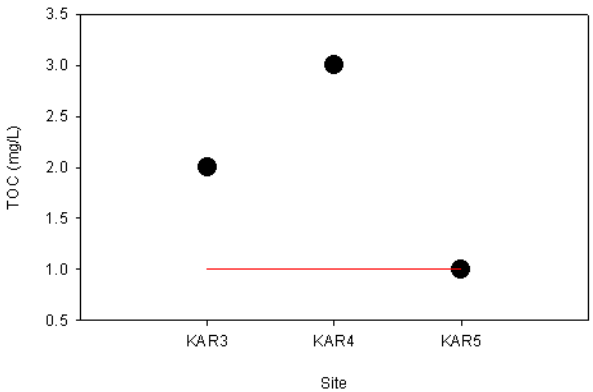


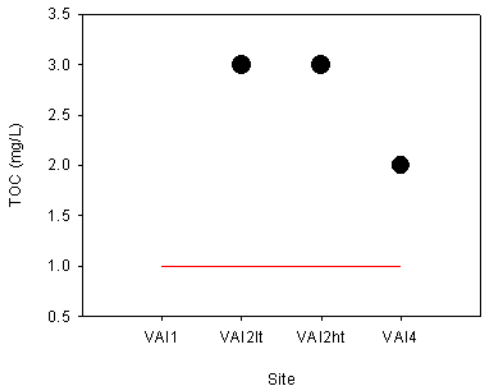


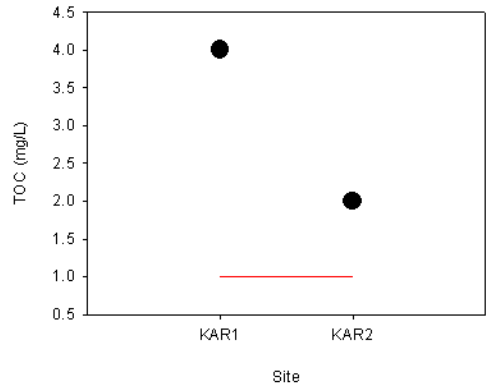








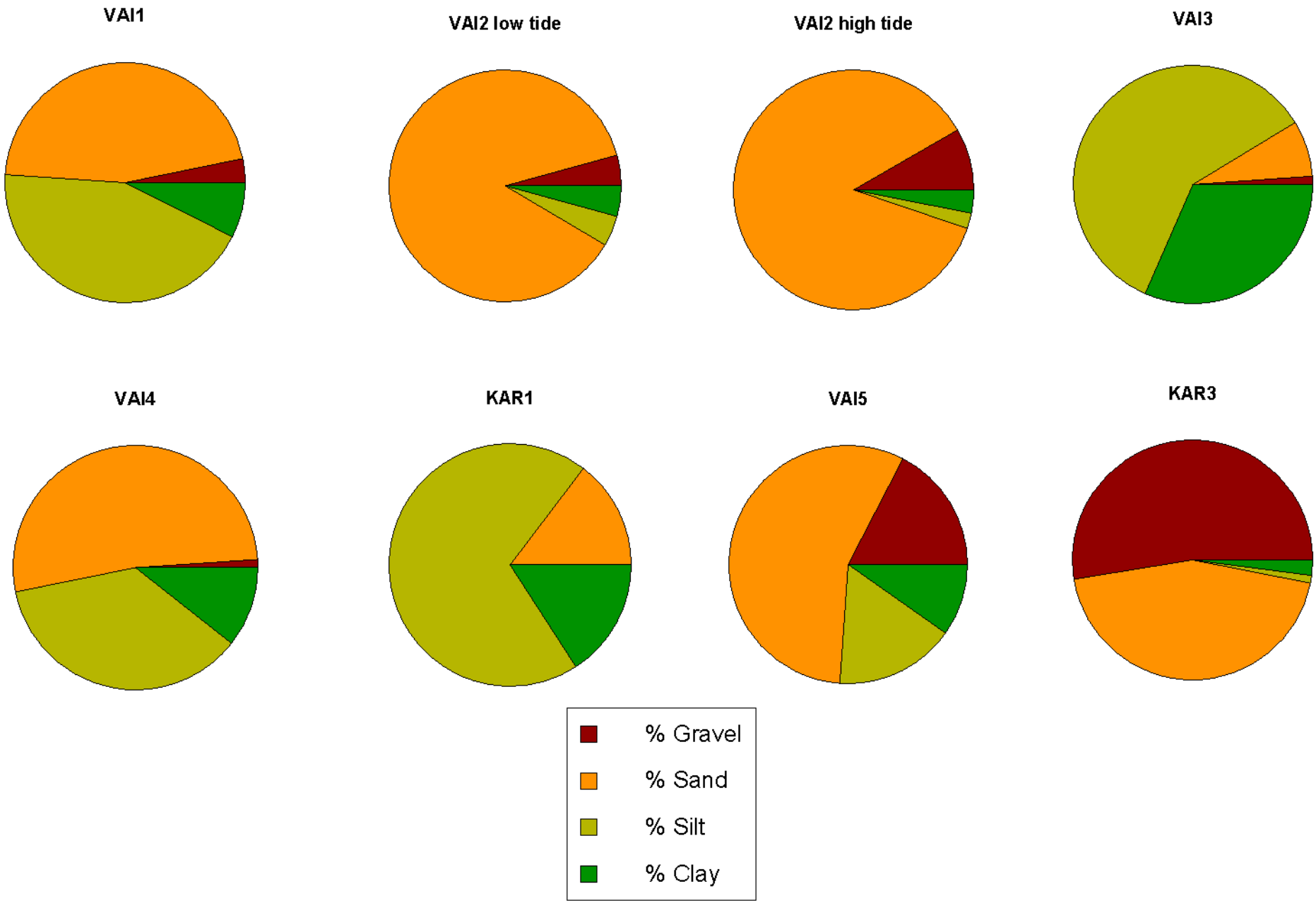


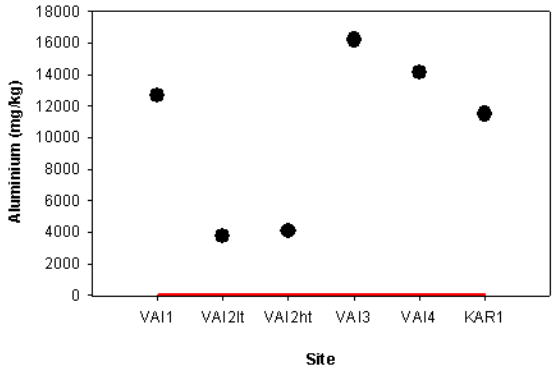


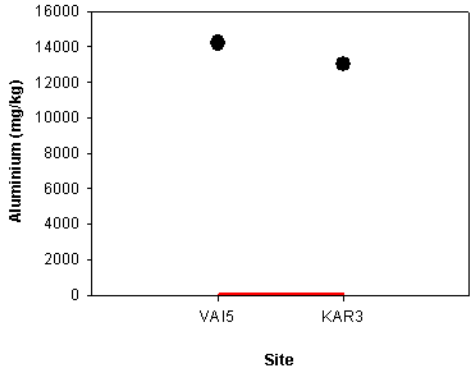
Note: Some TOC values missing as a result of bottles broken in transit

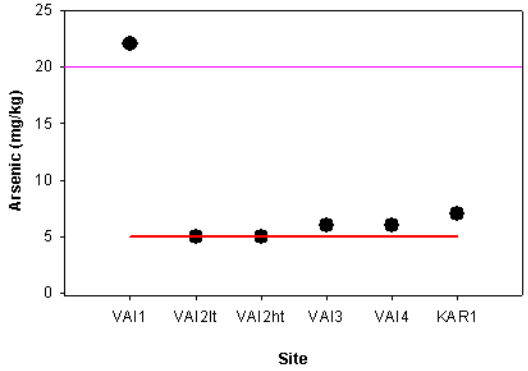
Appendix 5 Sediment Quality Results - Graphs

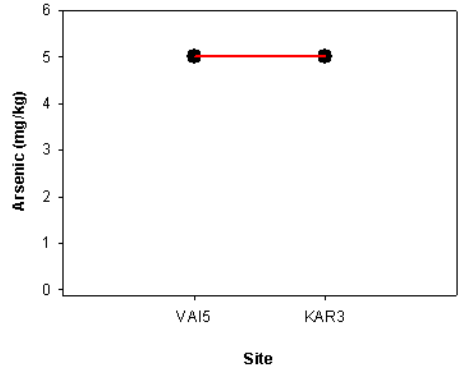
NOTE: Red line is limit of reporting, pink solid line is ANZECC/ARMCANZ (2000) low-level ISQG, pink dotted line is high-level ISQG.

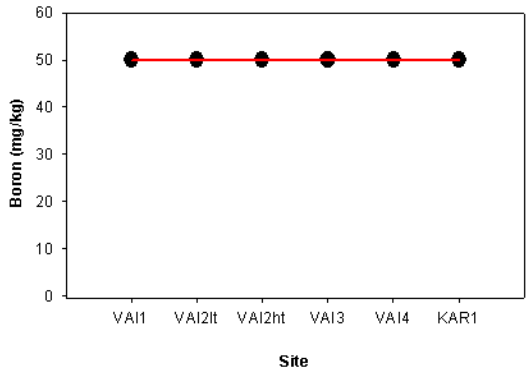

VAI1
VAI2 low tide
VAI2 high tide
VAI3
VAI4
KAR1
VAI5
KAR3
% Gravel
% Sand
% Silt
% Clay

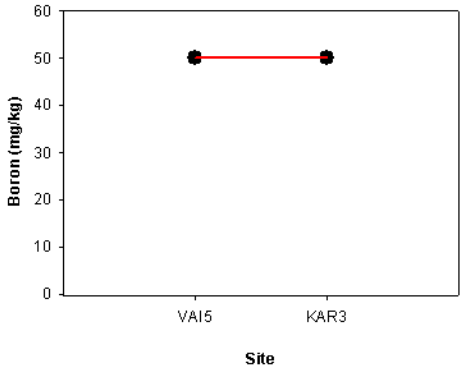

Aluminium (mg/kg)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

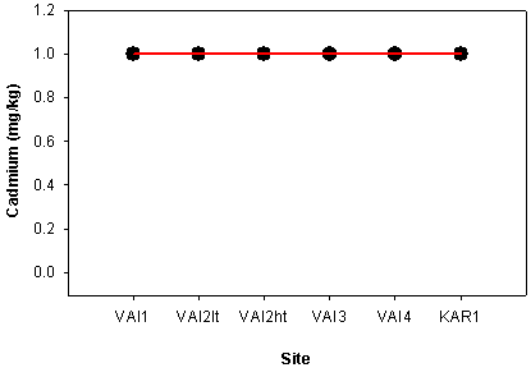

Aluminium (mg/kg)
16000
14000
12000
10000
8000
6000
4000
2000
0
VAI5
KAR3
Site

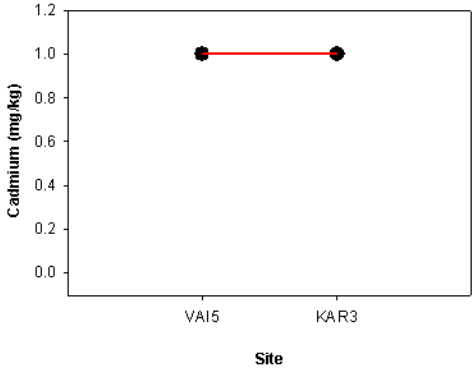

Arsenic (mg/kg)
25
20
15
10
5
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

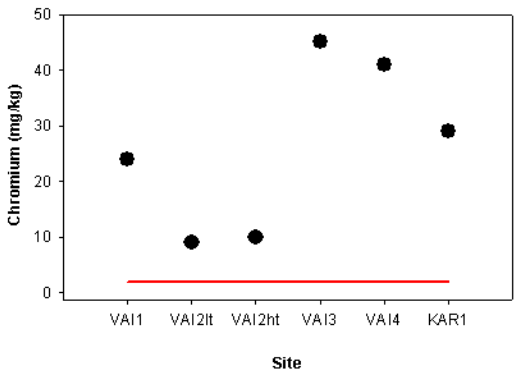

Arsenic (mg/kg)
6
5
4
3
2
1
0
VAI5
KAR3
Site

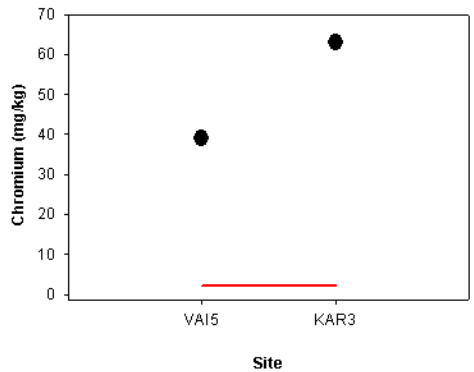

Boron (mg/kg)
60
50
40
30
20
10
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

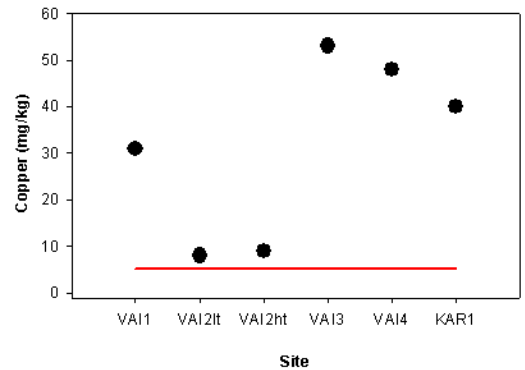

Boron (mg/kg)
60
50
40
30
20
10
0
VAI5
KAR3
Site

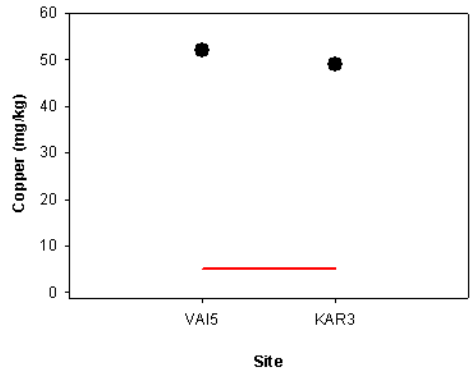

Cadmium (mg/kg)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

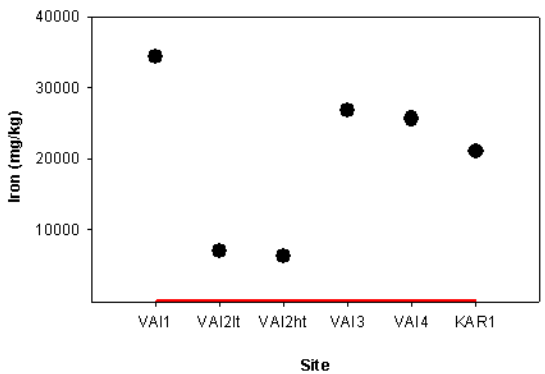

Cadmium (mg/kg)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
VAI5
KAR3
Site

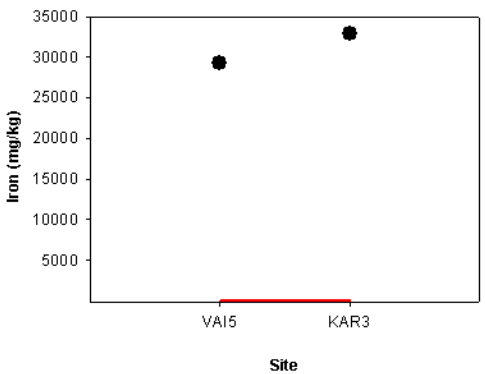

Chromium (mg/kg)
50
40
30
20
10
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

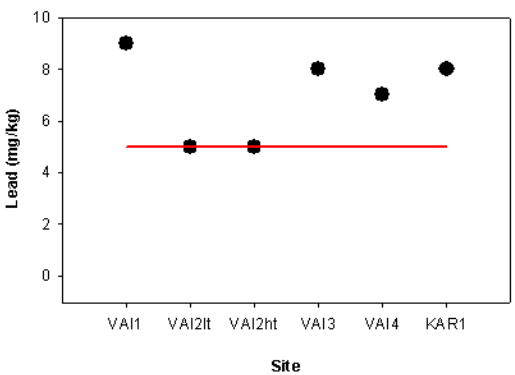

Chromium (mg/kg)
70
60
50
40
30
20
10
0
VAI5
KAR3
Site

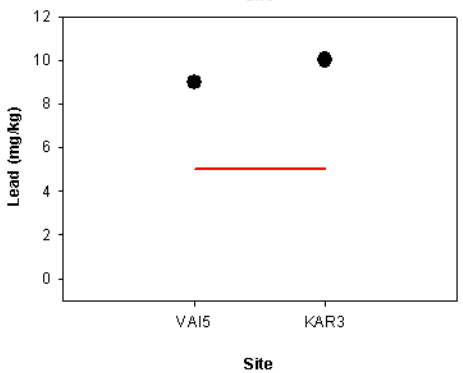

Copper (mg/kg)
60
50
40
30
20
10
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

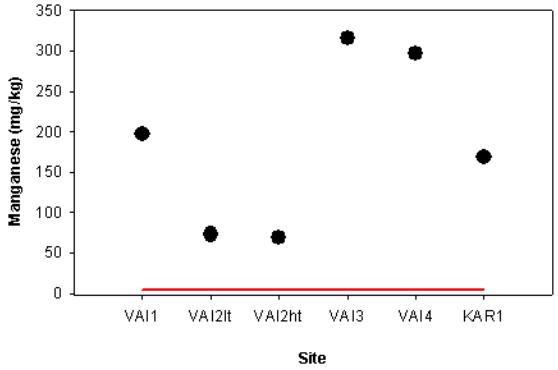

Copper (mg/kg)
60
50
40
30
20
10
0
VAI5
KAR3
Site

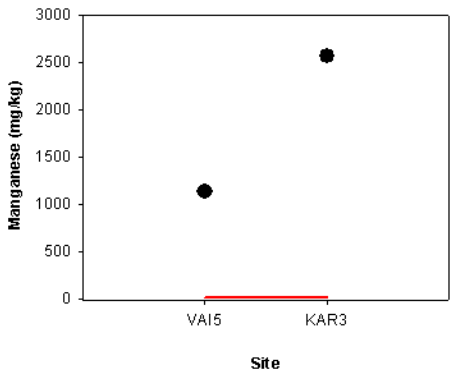

Iron (mg/kg)
40000
30000
20000
10000
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

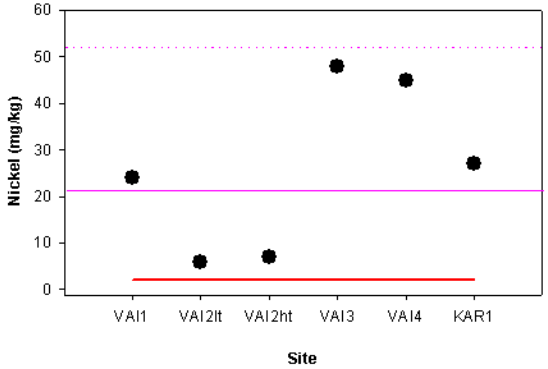

Iron (mg/kg)
35000
30000
25000
20000
15000
10000
5000
VAI5
KAR3
Site

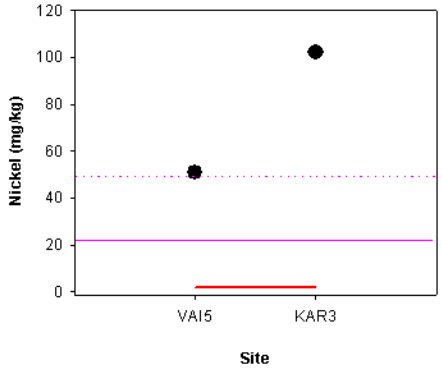

Lead (mg/kg)
10
8
6
4
2
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

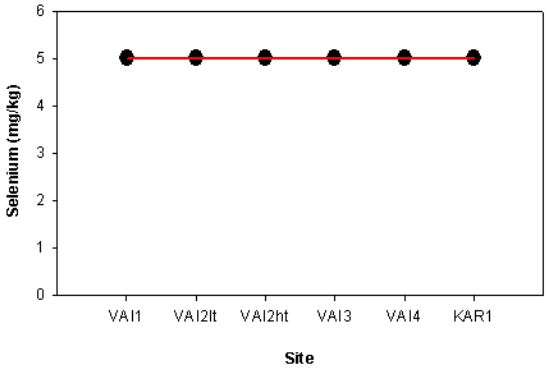

Lead (mg/kg)
12
10
8
6
4
2
0
VAI5
KAR3
Site

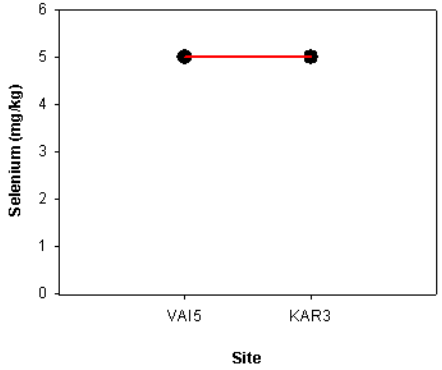

Manganese (mg/kg)
350
300
250
200
150
100
50
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

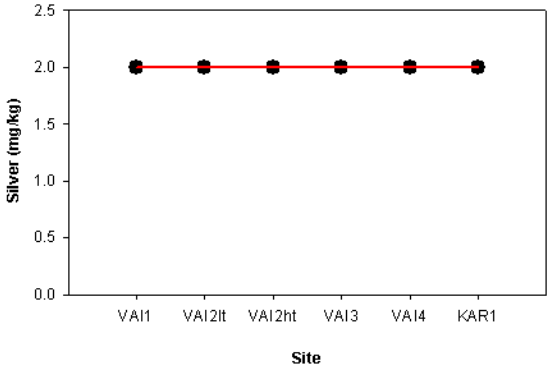

Manganese (mg/kg)
3000
2500
2000
1500
1000
500
0
VAI5
KAR3
Site

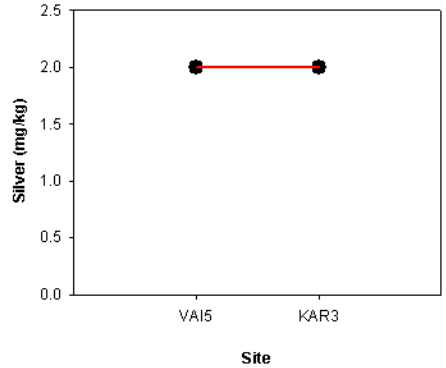

Nickel (mg/kg)
60
50
40
30
20
10
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

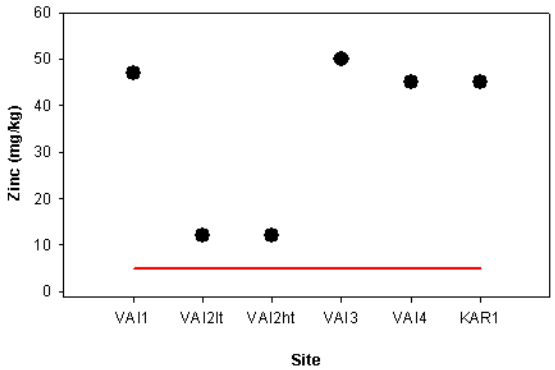

Nickel (mg/kg)
120
100
80
60
40
20
0
VAI5
KAR3
Site

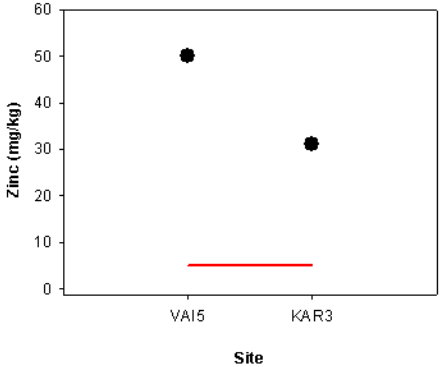

Selenium (mg/kg)
6
5
4
3
2
1
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site

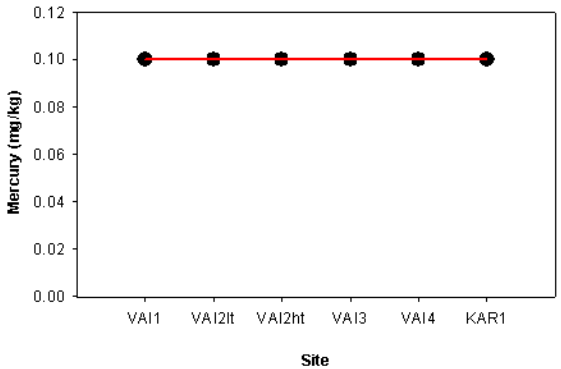

Selenium (mg/kg)
6
5
4
3
2
1
0
VAI5
KAR3
Site

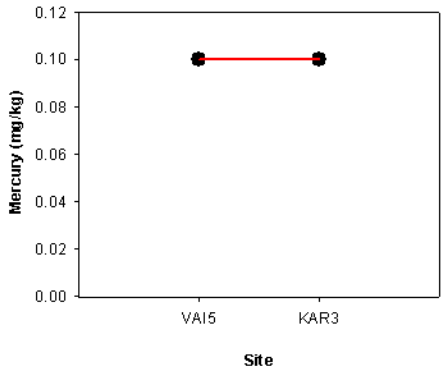

Silver (mg/kg)
2.5
2.0
1.5
1.0
0.5
0.0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site


Silver (mg/kg)
2.5
2.0
1.5
1.0
0.5
0.0
VAI5
KAR3
Site


Zinc (mg/kg)
60
50
40
30
20
10
0
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site


Zinc (mg/kg)
60
50
40
30
20
10
0
VAI5
KAR3
Site


Mercury (mg/kg)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
VAI1
VAI2lt
VAI2ht
VAI3
VAI4
KAR1
Site


Mercury (mg/kg)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
VAI5
KAR3
Site