BMT WBM

Port of Brisbane - Water Quality Monitoring Report 2014

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Synopsis: **A report on the 2014 water quality monitoring program at the Port of Brisbane.**

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Executive Summary

The Port of Brisbane encompasses port facilities within the lower Brisbane River area. Port of Brisbane Propriety Limited (PBPL) has initiated an environmental monitoring program to assess its potential impacts on adjacent estuarine and marine environments. Routine water quality monitoring is a component of the PBPL environmental monitoring program.

The aim of the water quality monitoring program is to assess the physico-chemical conditions of marine and estuarine waters in the Port of Brisbane area, and on the basis of this information, identify any gross impacts that may be caused by port-related activities. Sampling was carried out at 12 monitoring sites within the Brisbane River, Moreton Bay and the Mud Island Dredged Material Placement Area. The present report outlines the methodology and findings of sampling carried out in February and August 2014.

The results of the present study indicate that there were spatial gradients in the physio-chemical character of waters across the study area. Consistent with the South East Queensland Environmental Health Monitoring Program, the lower Brisbane River estuary was found to have generally poor water quality, with turbidity, dissolved oxygen, pH, total phosphorus, NO_x, copper and zinc exceeding water quality guideline values. Sites in Waterloo Bay tended to have better water quality, although some exceedances of guideline values were noted. There is no evidence to suggest that port activities were causing gross scale changes in the receiving environment water quality at the time of sampling.

The only toxicants detected in the present study were a variety of metals and metalloids. Copper had concentrations that exceeded the ANZECC water quality guideline values for the 95% protection of species at several sites in both February and August 2014, whereas zinc was recorded above the ANZECC water quality guideline in one sample in February 2014.

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1 Introduction

1.1 Background

The Port of Brisbane Propriety Limited (PBPL) is the manager and operator of the Port of Brisbane. The Port of Brisbane encompasses port facilities within the lower Brisbane River area, and is responsible for maintaining navigable depths within Moreton Bay (Figure 1-1).

Water quality is a key driver of aquatic ecosystem health. The South East Queensland Environmental Health Monitoring Program (EHMP) demonstrates that different parts of the port area and surrounds are under different levels of water quality stress. Waterloo Bay is considered to be in relatively good condition (high seagrass cover, low pollutant levels), whereas Bramble Bay to the north of the port, together with the lower Brisbane River, experiences significant water quality stress.

Water quality in western Moreton Bay and the lower Brisbane River is primarily affected by pollutants from catchment runoff and discharges of treated sewage (EHMP 2010). At a local scale, stormwater runoff from port lands also represents a potential source of pollutants in the marine environment.

PBPL has initiated an environmental monitoring program to assess its potential impacts on adjacent estuarine and marine environments. The monitoring program includes the assessment of a range of physio-chemical and biological indicators to achieve the following primary aims:

- To assess the health and long term trends in the condition of the environment to determine potential impacts of the port; and
- Provide information that supports and informs port planning and management activities.

Routine water quality monitoring is a component of the PBPL environmental monitoring program. This water quality monitoring program, which is the subject of the present report, provides local-scale data that complements broader scale, more intensive monitoring carried out under the EHMP. Together, these data provide a basis for assessing trends in water quality within the port area and the wider western Moreton Bay.

1.2 Aims and Objectives

The aim of the water quality monitoring program is to assess the physico-chemical conditions of marine and estuarine waters in the Port of Brisbane area, and on the basis of this information, identify any gross impacts that may be caused by port-related activities. The specific objectives of this monitoring program are to:

- Quantify and describe spatial trends in the physico-chemical properties of waters adjacent to port infrastructure, with a focus on potential contaminants of concern and other ecosystem stressors; and
- Determine the status of the physico-chemical properties of waters with reference to defined water quality objectives and relevant guideline values.

Title:

Locality Plan

Figure: 1-1

Rev: A

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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2 Methodology

2.1 Timing

The 2014 monitoring program included two sampling events which were conducted over one day periods on the 26th February and the 27th August. On both occasion sampling was carried out during an ebbing tide (Figure 2-1) and weather conditions were fine (e.g. light 5-10kt breeze and <0.5m swell conditions) at the time of sampling.

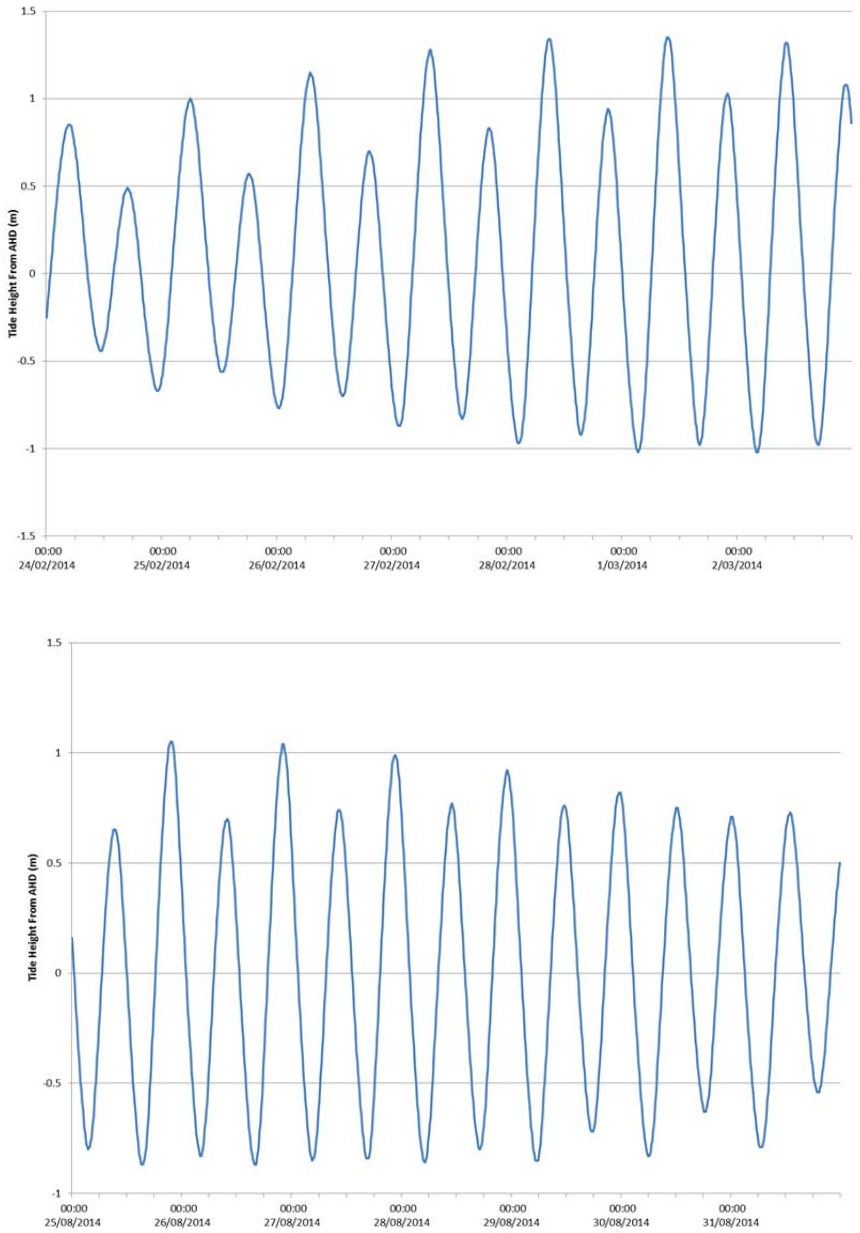

Figure 2-1 Tidal heights at Brisbane River Bar recorded during the February 2014 (upper plot) and August 2014 (lower plot) monitoring events

2.2 Survey Vessel and Positioning

All sampling was carried out from the PBPL vessel 'Port Watch' (Figure 2-2). Location and navigation to the sampling sites was undertaken using a real time differential Global Positioning System (dGPS) to provide position-fixing accuracy's of ±1m.

Figure 2-2 Photograph of 'Port Watch 1'

2.3 Monitoring Sites

The program in 2013 included sampling of 12 monitoring sites selected by PBPL within the Brisbane River, Moreton Bay and the Mud Island Dredged Material Placement Area (MIDMPA) (Table 2-1). Monitoring sites were selected on the basis of the following considerations:

- Representative examples of the range of estuarine and marine waters found in the vicinity of the port.
- Representative examples of waterbodies outside the direct zone of influence of the port, which could be used as background or control sites in future activity-based water quality monitoring programmes.

Sites were grouped into four broad areas: Brisbane River (i.e. sites downstream of river mouth), Outer Bar (i.e. sites located in the navigation channel seaward of the river mouth), Waterloo Bay and sites within the MIDMPA (Table 2-1). The position of monitoring sites is shown in Figure 2-3.

Table 2-1 Port of Brisbane water quality monitoring sites

Location	Site	EPP Schedule	Easting	Northing
Brisbane River	Site 1	Enclosed Coastal Lower Estuary (Bris R estuary) - SMD	514333.8	6967598
Brisbane River	Site 2		515105.2	6970389
Brisbane River	Site 12		515932.2	6969267
Outer Bar	Site 3	Enclosed Coastal Lower Estuary (W2) - SMD	517628.6	6974266
Outer Bar	Site 4		518335.3	6975398
Outer Bar	Site 11		516381.2	6972397
Waterloo Bay	Site 5		519992.5	6974456
Waterloo Bay	Site 6		519365.7	6972629
Waterloo Bay	Site 7		516473	6969854
Waterloo Bay	Site 8	Enclosed Coastal Lower Estuary (W1) - HEV	518754.7	6968230
DMPA	Site 9	Open Coastal (C1) - SMD	522872	6974873
DMPA	Site 10		522028	6976971

2.4 Sampling Approach

Sampling was undertaken in accordance with relevant international standards including ISO 5667-1:2006, ISO 5667-2:1991, and ISO 5667-3:2003, along with relevant Australian Standards including AS/NZS 5667.1:1998 and DEHP (2009b).

2.4.1 *In-situ* Sampling

Physical and chemical water quality parameter measurements were collected *in situ* at each station using Yellow Spring Instruments (YSI) 6600 multi-parameter automated data loggers, also known as sondes (Figure 2-4). The sondes house multiple probes that simultaneously measured temperature, electrical conductivity, dissolved oxygen (percent saturation), depth, pH and turbidity. Other parameters are not measured directly but calculated by the sonde, namely: salinity, which is calculated using specific conductivity and temperature; and dissolved oxygen which is calculated using temperature, salinity and dissolved oxygen percent saturation.

The instrument was slowly lowered through the water column and measurements were taken at one metre intervals. Data were logged by the instrument and downloaded upon return to base.

Title:

Location of water quality monitoring sites

Figure: **2-3**

Rev: **A**

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The sonde was calibrated in Brisbane prior to surveys. The sonde accuracy was checked regularly during the field program, and a final calibration was performed at the completion of the field program to check for any drift in parameters. The instrument was calibrated as recommended by the manufacturer using standard solutions prepared from National Institute of Standards and Technology (NIST) traceable reagents. Accuracy and precision checks were undertaken in accordance with manufacturer instructions. Re-calibration of instruments was undertaken if accuracy and precision tests failed to meet data quality objectives shown in Table 2-2.

Table 2-2 Water quality parameters measured *in-situ* through the water column and data quality objectives

Parameter	Resolution (and Range)	YSI Accuracy (±)	Data Quality Accuracy (±)	Precision Criteria (Relative Percent Difference)
Temperature (°C)	0.01 (-5 to 45)	0.15	0.3°C in the range of 0 to 45°C	≥95% (≤5% RPD) as determined from duplicate recordings at the same time and space
Depth (m)	0.001 (0 to 61)	0.12	0.12	
Conductivity (mS/cm)	0.001 (0 to 100)	0.5% of standard (+0.001)	2% of standard	
Dissolved oxygen (mg/l)	0.01 (0 to 50)	0.2 or 2% of standard	5% of standard	
Turbidity (NTU)	0.1 (0 to 1000)	2.0 or 5% of standard	2.0 or 5% of standard	

Figure 2-4 YSI 6600 Water Quality Instrument

2.4.2 Grab Sampling

2.4.2.1 Collection of Samples for Laboratory Analyses

Surface water samples were collected at each site from a water depth of one metre below the water surface using a spring-loaded 2L Van-Dorn water sampler. Water samples were collected from a water depth of 2 m below the water surface and at least one metre from any river bank or wharf.

Water samples collected for laboratory analyses were stored and transported in clean, sterile sample containers supplied by NATA accredited Symbio Alliance in Brisbane. Samples requiring field filtration (i.e. dissolved metals/metalloids and DOC) were filtered at each monitoring site using a syringe and 0.45µm filter cartridges.

Water samples were kept chilled (and in the dark) in the field using insulated portable containers with ice bricks, and then transported direct to the laboratory in insulated portable containers with ice bricks.

Table 2-3 provides an overview of the number of samples collected for this study. One primary sample was collected at each site. A range of additional samples were collected for QC purposes to assess the repeatability and precision of laboratory results, and consisted of the following:

- Intra-laboratory duplicates – water samples were split into two duplicate sub-samples and tested as separate (blind) samples by the primary laboratory (Symbio Alliance). Intra-laboratory duplicates were collected at 10% of monitoring sites (two sites).
- Triplicate samples – triplicate (3) samples collected at 5% of locations (one site) with one of the triplicate samples sent to a secondary reference laboratory for inter-laboratory analysis.

Table 2-3 Water Quality Sample Numbers Including QA/QC Samples

Sample type	Number of samples
Primary samples	12
Duplicates (two sites)	2
Triplicates (one site)	2
Total	16

2.4.2.2 Laboratory Analyses

The following parameters were measured in the laboratory by Symbio Alliance:

- Total and dissolved metals (aluminium, arsenic, cadmium, chromium, cobalt, copper, iron, manganese, mercury, nickel, selenium, lead, zinc).
- Total and dissolved nutrients (total nitrogen, total phosphorus, ammonia, nitrate, nitrite).
- Total suspended solids.
- Benzene, toluene, ethylbenzene and xylene (BTEX).
- Polyaromatic hydrocarbons (PAHs).
- Tributyltin (TBT).

- Organochlorine pesticides. (Only collected in August 2014).

2.4.3 Quality Assurance/Quality Control

2.4.3.1 Sample Collection, Handling, Storage and Transport

To ensure good quality data was collected during the field program, a number of quality assurance (QA) and quality control (QC) procedures were adhered to during all field work. These included the following:

- Appropriately trained field staff undertook sampling and data entry.
- Use and maintenance of appropriate sampling equipment, and implementation of appropriate calibration procedures (including use of controlled standard solution supplied by Symbio in Brisbane).
- Sampling techniques were in accordance with relevant water and sediment quality sampling guidelines and standards (e.g. AS/NZS 5667.1:1998 and AS/NZS 5667.12:1999).
- Sample containers were clearly and accurately labelled and a log of collected samples was maintained and updated.
- Chain of custody forms were maintained and included with samples.
- Data validation included cross check by a second scientist after entry into the database.
- Water sample preservation and handling procedures were followed and samples were supplied to the laboratory within nominated holding times.

2.4.3.2 Laboratory Quality Control Measures

Symbio Alliance in Brisbane was the primary laboratory used for water sample analysis. Inter-laboratory duplicates were sent to ALS. Both these laboratories are NATA accredited and as such have strict quality assurance and quality control procedures in place.

Routine laboratory control samples used at Symbio Alliance include:

- Certified reference materials;
- Laboratory duplicates;
- Laboratory control spikes;
- Matrix spikes;
- Surrogates;
- Secondary and project standards;
- Inter laboratory (proficiency) testing; and
- Client and industry managed independent audits and accreditations.

BMT WBM reviewed QA/QC documentation supplied by the primary laboratory in order to identify any potential issues.

2.5 Comparison of Data to Water Quality Objectives and Guideline Values

The results of the water quality sampling were compared against the following water quality objectives:

- ANZECC/ARMCANZ (2000) guidelines for slightly to moderately disturbed ecosystems at the 95% species protection levels for marine waters.
- Queensland Water Quality Guidelines (QWQG) for south east Queensland region enclosed coastal waters – subregion western bays and open coastal waters – subregion central Moreton Bay (DEHP 2009a).

It should be noted that the QWQG indicate that the annual median should be used in comparisons to water quality objectives. Therefore, the comparison of this snap-shot data to guideline value should be considered as indicative rather than representative of long term patterns.

3 Results

3.1 Environmental Conditions

On both sampling occasions, conditions were clear and winds were low. The two months prior to both sampling events were characterised by low rainfall that were below respective monthly long-term averages at Brisbane Airport (BoM unpublished data).

No oil slicks, algal blooms, noxious odours or other unusual water discolouration (except the typical high turbidity at the Brisbane River sites) were observed during the surveys. Ships and small craft traffic were observed near sampling sites on both occasions, and commercial prawn trawling was observed near Brisbane River in February 2014.

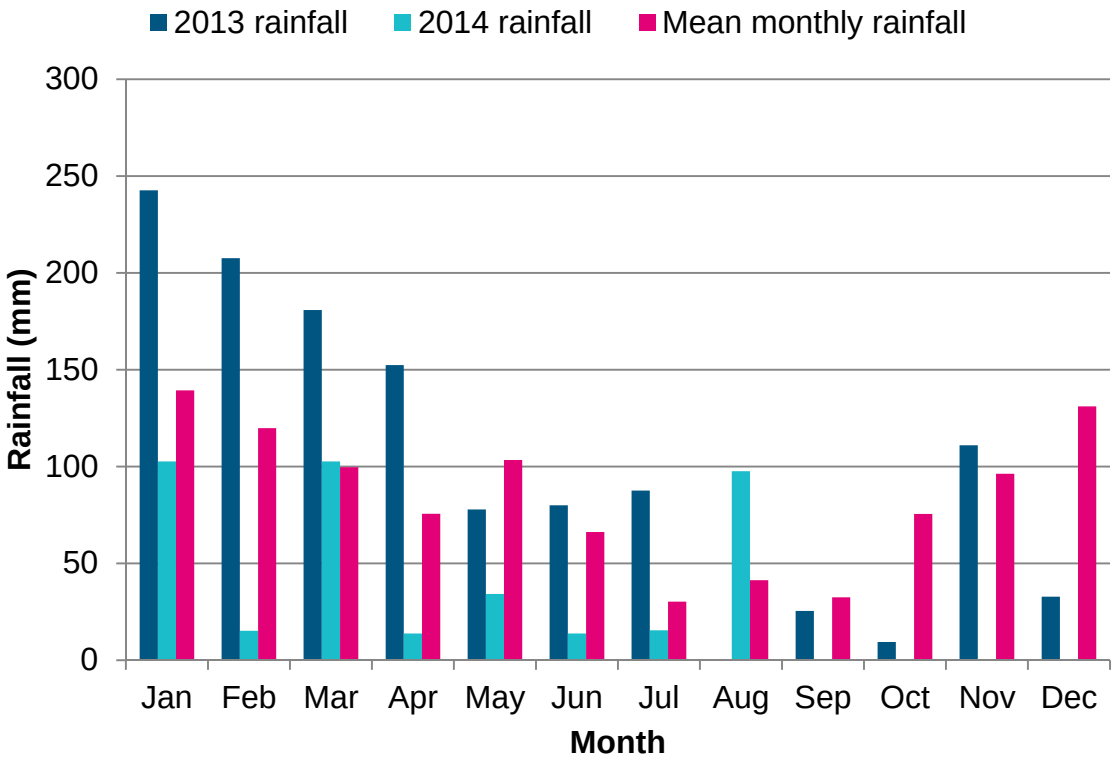

Figure 3-1 Total monthly rainfall in 2013 to present and long term average monthly rainfall for the period 1994 to present (Bureau of Meteorology Station 40842)

3.2 *In situ* Measurements

Results of physico-chemical parameters measured *in situ* are presented in Appendix A, and are displayed as box plots in Figure 3-2 to Figure 3-4. From these results, the following observations can be made:

- Water temperature was consistently higher in February than August, but there were no consistent differences among different locations across the study area (Figure 3-2) and only slight differences through the water column (Figure A-1).
- pH was within the QWQG (DEHP 2009a) acceptable range of 8.1 to 8.4 at most sites, except site 9, 10, 7, 12 and 1 (both February and August), and 2 and 11 (August) which had pH levels

slightly less than the guideline value (8 and 8.1) (Figure 3-3). pH and dissolved oxygen were positively correlated (Table 3-1).

- Electrical conductivity was only slightly lower at the Brisbane River sites than at sites in Moreton Bay (Figure 3-2). There were only slight changes in electrical conductivity through the water column, but such changes did not indicate stratification (Figure A-3).
- Turbidity - at Waterloo Bay and MIDMPA sites was generally lower than sites in the Brisbane River and the Outer Bar. Waterloo Bay sites (sites 5, 8), DMPA sites 9 and 10, and Outer Bar site 4 met QWQG values on both occasions, whereas all other sites exceeded the guideline value on one or both occasions (Figure 3-4). Little to no change was observed in the turbidity level throughout the water column at most sites in February, except site 1 in Brisbane River (increase in depth; Figure A-4). In August 2014 turbidity was higher near the bed than at the surface at most sites.
- Dissolved oxygen (DO) concentrations were slightly lower at sites 12 and 1 (Brisbane River) and Waterloo Bay site 7 than other sites (Figure 3-4). Site 2 (Brisbane River) had super-saturated dissolved oxygen concentrations in February 2014 that slightly exceeded the upper QWQG guideline value of 105 % saturation (DEHP 2009). Slight changes in DO concentrations were recorded through the water column, although there was no consistent trend suggesting a decline with increasing depth (Figure A-5).

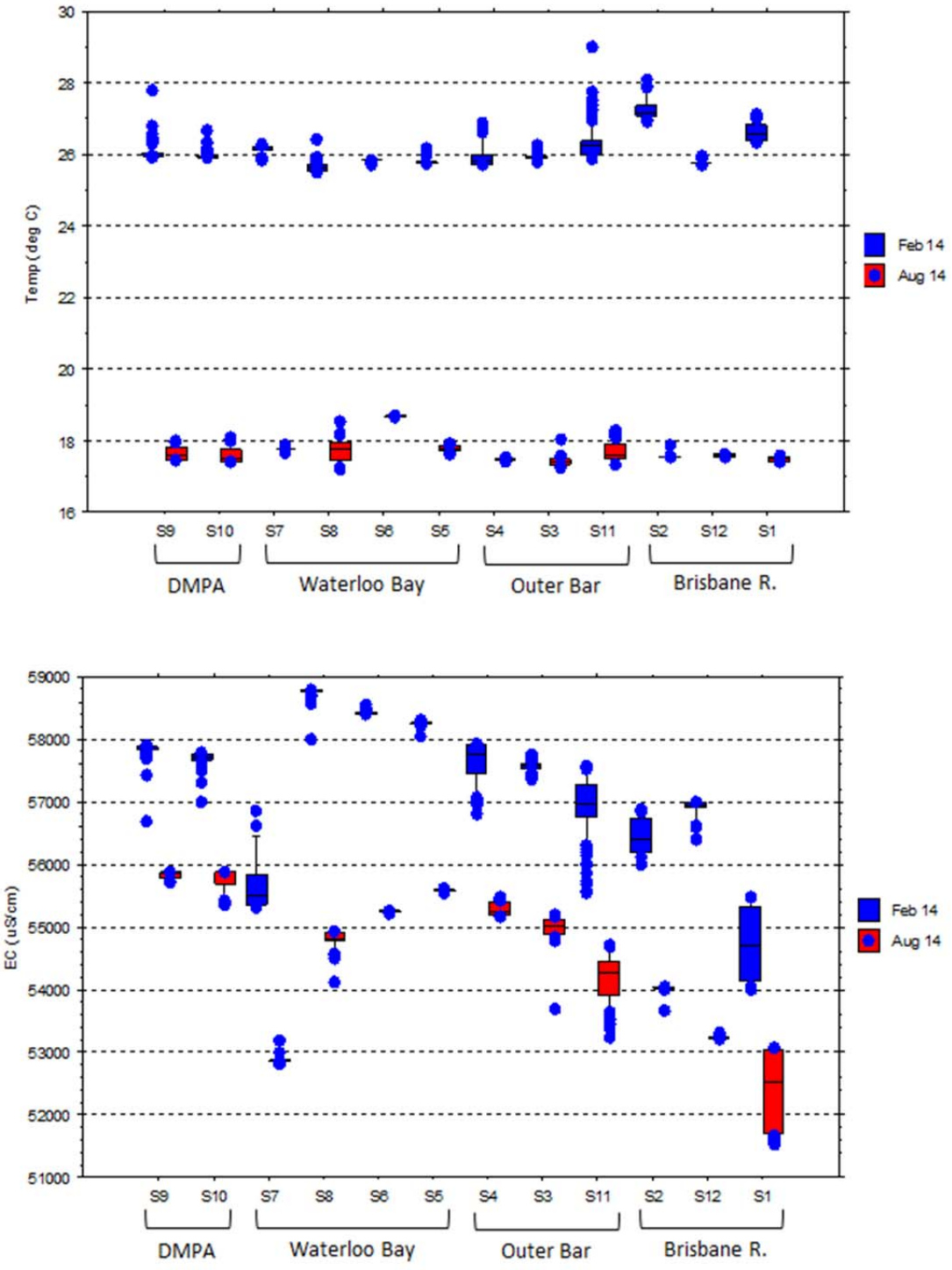

Figure 3-2 Box plot showing differences in water temperature and electrical conductivity among sites (no QWQG value for these parameters)

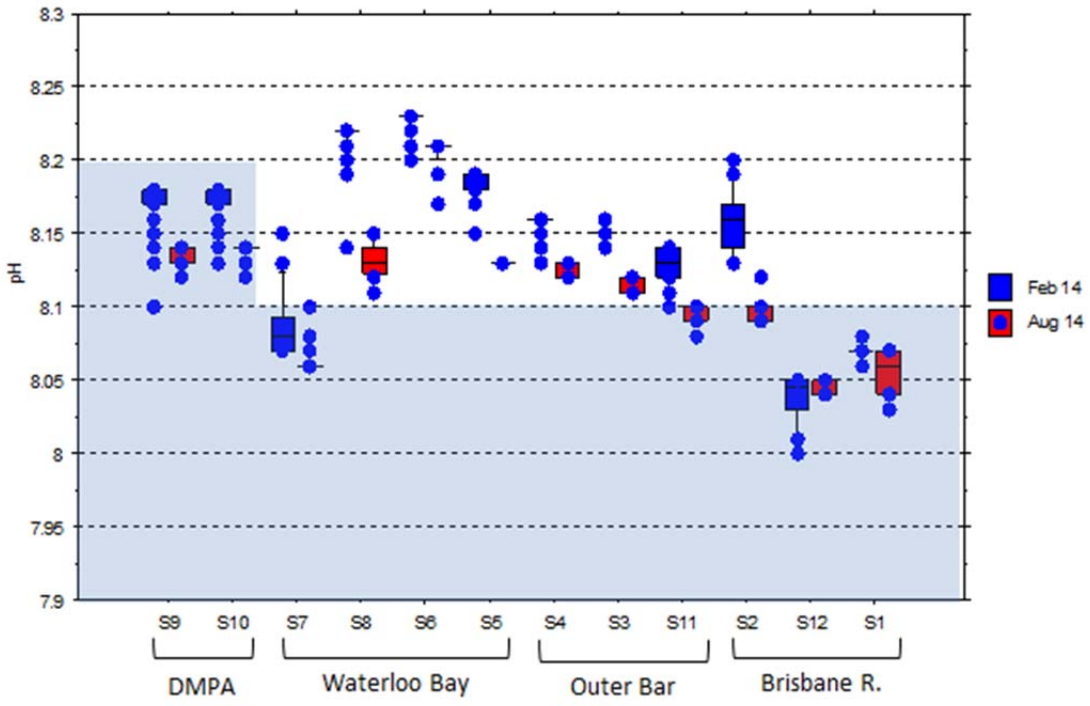

Figure 3-3 Box plot showing differences in pH among sites - Shaded – does not meet QWQG value (note QWQC value varies among locations)

Table 3-1 Pearson Product-Moment correlation coefficients for in-situ parameters

	Temperature	Conductivity	Salinity	Depth	pH	Turbidity	DO sat%
Conductivity	0.16						
Salinity	0.12	1.00					
Depth	-0.37	0.27	0.28				
pH	0.34	0.03	0.02	0.04			
Turbidity	-0.14	-0.04	-0.04	0.03	0.03		
DO sat%	0.40	0.20	0.18	0.13	0.66	-0.04	
DO mg/L	0.30	-0.17	-0.18	0.04	0.64	-0.01	0.93

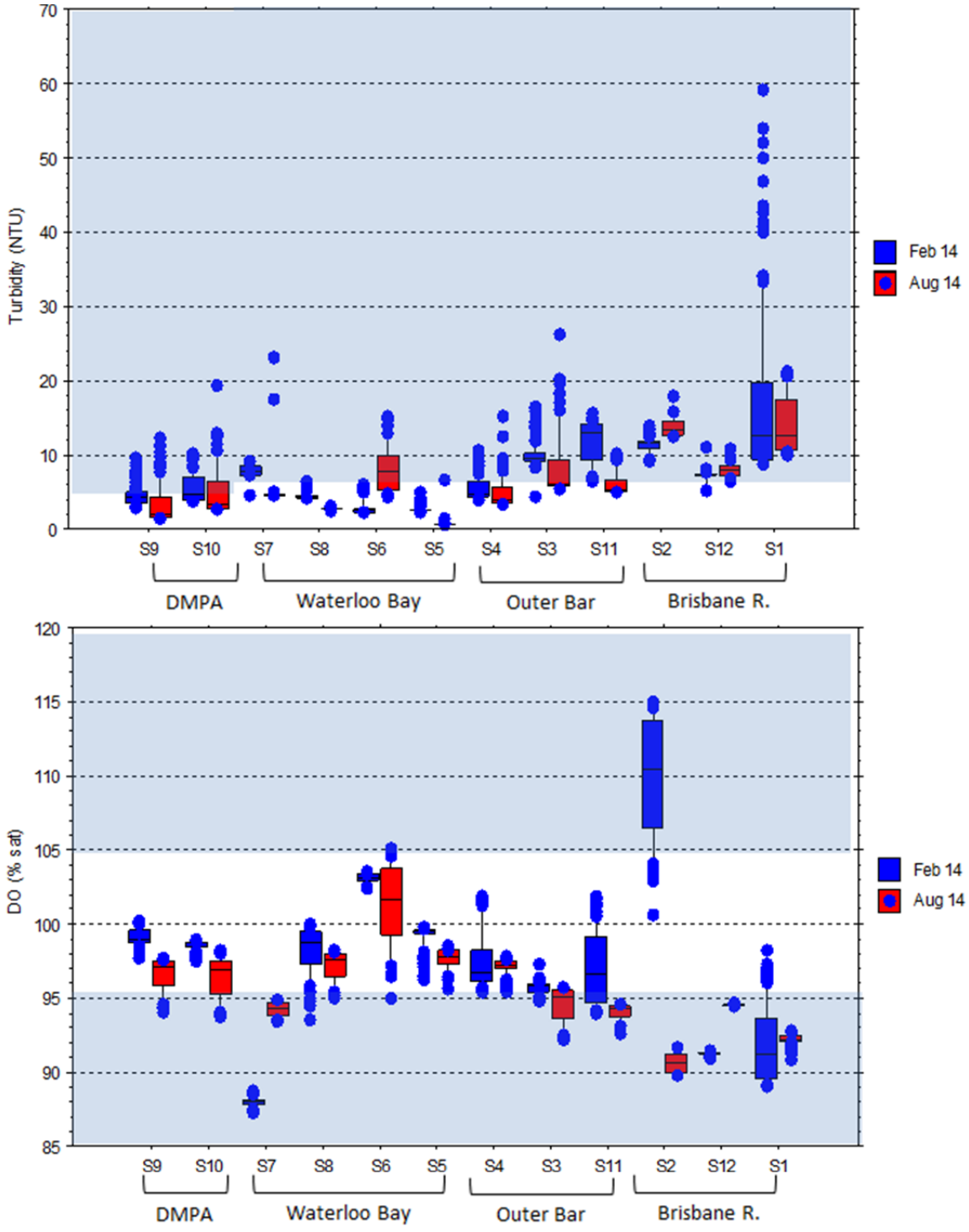

Figure 3-4 Box plot showing differences in turbidity and dissolved oxygen among sites. Shaded – does not meet QWQG value

3.3 Nutrients

Table 3-2 presents nutrient monitoring results and exceedances of relevant QWGG values. The following trends are noted:

- All Brisbane River sites had total phosphorus (TP) concentrations that exceeded the QWQG value of 0.02 mg/l. Waterloo Bay and MIDMPA sites typically had lower TP concentrations than other sites, and most of these sites met the guideline value in February but not August.
- Brisbane River site 1, outer bar site 11 and Waterloo Bay site 7 had higher total nitrogen levels than other sites, and these sites did not meet applicable QWQG values. There were no consistent temporal patterns in total nitrogen.
- Ammonia concentrations were below the levels of detection (<5 µg/l) at most sites. The exception was site 1 in August (10 µg/l) which did not meet the QWQG value of 8 µg/l.
- Nitrate was the dominant form of nitrogen within the study area. NOx (i.e. nitrate + nitrite) exceeded the water quality objectives at all sites on both occasions.

3.4 Metals/Metalloids and other Toxicants

Results for total and dissolved metals and metalloids are presented in Table 3-3 and Table 3-4, respectively. Key trends are as follows:

- With the exception of dissolved copper and zinc all other metals met the relevant ANZECC guideline values.
- Dissolved copper concentrations exceeded the ANZECC guideline value in February and August at sites 1 and 2 (Brisbane River), site 7 (Waterloo Bay) during February and site 12 (Waterloo Bay) in August.
- Dissolved zinc concentration exceeded the ANZECC guideline value at site 2 (Brisbane River) during the February monitoring event. The zinc concentration was lower at this site during the August event. All other sites had zinc concentrations below the ANZECC guideline level.
- During both sampling occasion all other measured parameters (TBT, pesticides, PAHs, BTEX etc.) had concentrations below the detection limit and relevant water quality guidelines values (refer to Appendix B).

Table 3-2 Nutrient (µg/l) and total suspended solid concentrations (mg/l) at each site

Location	Site	Rep.	Event	Total P	Ammonia	Nitrite	Nitrate	NOx	Total N	TSS
Enclosed coastal/lower estuary[1]										
QWQG				20	8			3	200	15
Brisbane River	Site 1	A	Feb	90	<5	<5	140	142.5	220	25
		A	Aug	96	10	9	140	149	220	54
		B	Aug	95	<5	9	74	83	240	34
	Site 2	A	Feb	90	<5	<5	22	24.5	170	38
		B	Feb	90	<5	<5	43	45.5	170	34
		A	Aug	69	<5	21	140	161	120	38
		B	Aug	72	<5	14	94	108	150	41
	Site 12	A	Feb	50	<5	<5	66	68.8	150	22
		A	Aug	76	<5	17	150	167	170	36
Western Bay[2]										
QWQG				30	5			2	200	15[4]
Outer Bar	Site 3	A	Feb	90	<5	<5	69	71.5	130	27
		A	Aug	68	<5	<5	13	15.5	99	26
	Site 4	A	Feb	40	<5	<5	33	33.5	90	8
		A	Aug	54	<5	<5	<5	5	60	35
	Site 11	A	Feb	80	<5	<5	81	83.5	160	19
		A	Aug	82	<5	29	130	159	150	27
		B	Aug	110	<5	29	12	41	210	21
Waterloo Bay	Site 5	A	Feb	20	<5	<5	32	34.5	<50	12
		A	Aug	41	<5	<5	<5	5	<50	47
	Site 6	A	Feb	20	<5	<5	50	52.5	90	22
		A	Aug	42	<5	<5	<5	5	62	43
	Site 7	A	Feb	80	<5	<5	120	122	250	24
		B	Feb	80	<5	<5	88	90	230	10
		A	Aug	82	<5	18	190	208	190	34
	Site 8	A	Feb	20	<5	<5	54	56	90	14
		A	Aug	42	<5	<5	<5	5	<50	31
Open Coastal[3]										
QWQG				20	5			2	160	10[4]
DMPA	Site 9	A	Feb	20	<5	<5	18	20.5	60	22
		A	Aug	42	<5	<5	<5	5	<50	32
	Site 10	A	Feb	20	<5	<5	33	35.5	<50	12
		A	Aug	45	<5	14	59	73	82	26

Note: Pink cells indicate an exceedance of QWGQ

1:Enclosed coastal within south-east Queensland

2: Area W2 – Western Bay subregional guidelines

3: Area C2 – Central Bay subregional guidelines

4: default guideline value for TSS provided in Table 3.1.1 of QWQG for south-east Queensland.

Table 3-3 Total trace metal/metalloids (µg/l) at each site for February and August monitoring events

Location	Site	Rep.	Event	Al	As	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Ni	Se	Zn
Brisbane River	Site 1	A	Feb	94	1.9	<0.1	5.2	0.38	1.9	240	0.79	19	0.12	1.4	2	12
		A	Aug	200	2	<0.1	0.74	0.37	3	370	0.31	22	<0.1	1.8	2.4	6.5
		B	Aug	190	1.8	<0.1	1.4	0.53	2.7	390	0.35	23	<0.1	0.91	1.9	7.5
	Site 2	A	Feb	110	1.8	<0.1	<0.5	0.43	1.5	290	0.59	33	<0.1	1.6	2.8	4.4
		B	Feb	130	1.8	<0.1	<0.5	0.45	1.3	320	1.1	33	<0.1	1.7	2.1	84
		A	Aug	360	2.2	<0.1	1.7	0.56	5.6	720	0.57	32	<0.1	1.6	2.3	5.7
		B	Aug	220	2	<0.1	1.1	0.4	2.3	420	0.32	21	<0.1	0.71	2.5	6.2
	Site 12	A	Feb	88	1.8	<0.1	1.2	0.29	1.3	170	0.22	23	<0.1	1.3	2.1	6.1
		A	Aug	150	1.9	<0.1	1.1	0.32	1.7	300	0.3	19	<0.1	0.87	2.2	4.8
Outer Bar	Site 3	A	Feb	50	1.8	<0.1	<0.5	0.18	0.99	100	0.33	8.8	<0.1	1.3	2.1	36
		A	Aug	160	2.1	<0.1	1.2	0.27	1.6	280	0.24	17	<0.1	1.3	2.1	4.5
	Site 4	A	Feb	42	1.6	<0.1	<0.5	0.15	0.92	92	0.78	7.9	<0.1	0.96	3.1	4.2
		A	Aug	71	1.9	<0.1	0.95	0.12	1.5	110	0.27	9.8	<0.1	0.79	2.4	4.1
	Site 11	A	Feb	99	1.9	<0.1	<0.5	0.45	8.1	180	1	16	<0.1	8.8	2	52
		A	Aug	100	1.9	<0.1	1.1	0.3	6.1	200	0.3	17	<0.1	0.59	2.3	5.6
		B	Aug	120	1.9	<0.1	0.92	0.35	1.7	230	0.23	19	<0.1	0.46	2.4	5.3
Waterloo Bay	Site 5	A	Feb	28	1.7	<0.1	<0.5	0.1	1.4	48	0.55	5.1	<0.1	0.86	2	5.2
		A	Aug	24	2	<0.1	0.71	<0.1	6.1	37	0.1	6.9	<0.1	0.83	2.3	4
	Site 6	A	Feb	29	1.8	<0.1	<0.5	0.12	<0.5	44	1.6	6	<0.1	0.86	2.1	3.8
		A	Aug	55	1.7	<0.1	0.63	0.15	0.95	99	0.13	9.4	<0.1	0.81	1.7	3.3
	Site 7	A	Feb	83	1.9	<0.1	<0.5	0.27	2.2	160	1.3	26	<0.1	1.3	2.1	11
		B	Feb	67	1.7	<0.1	<0.5	0.25	2.3	190	1.4	24	<0.1	1.3	2.4	45
		A	Aug	53	1.4	<0.1	<0.5	0.16	1.1	120	0.14	12	<0.1	0.65	2.9	2.1
	Site 8	A	Feb	39	1.8	<0.1	<0.5	0.19	1.1	92	0.77	9.4	<0.1	0.85	2.4	13

Results

Location	Site	Rep.	Event	Al	As	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Ni	Se	Zn
		A	Aug	57	1.9	<0.1	0.92	<0.1	1.2	100	0.14	9.6	<0.1	0.67	2.5	5.1
MIDMPA	Site 9	A	Feb	27	1.8	<0.1	<0.5	<0.1	1.2	51	2.5	5.9	<0.1	0.9	2	5.5
		A	Aug	25	2.1	<0.1	0.82	<0.1	1.3	46	0.38	5	<0.1	0.36	2.4	5.6
	Site 10	A	Feb	41	1.8	<0.1	<0.5	0.12	1.4	82	1.4	6.9	<0.1	0.91	2	7.4
		A	Aug	29	2	<0.1	0.52	<0.1	0.77	52	<0.1	7	<0.1	0.26	2	4.2

Table 3-4 Dissolved trace metals/metalloid concentrations (µg/l) at each site for February and August monitoring events

Location	Site	Replicate	Event	Al	As	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Ni	Se	Zn
ANZECC				ND	ND	5.5	4.4	1	1.3	ND	4.4	ND	0.4	70	ND	15
Brisbane River	Site 1	A	Feb	<2	1.6	<0.1	<0.5	<0.1	1.4	<5	<0.1	2.2	<0.1	0.76	1.6	8.2
		A	Aug	11	1.8	<0.1	<0.5	0.18	2.2	25	0.13	5.6	<0.1	1.5	1.9	5
		B	Aug	6.2	1.7	<0.1	<0.5	0.15	2.6	6	<0.1	6	<0.1	0.52	1.4	3.5
	Site 2	A	Feb	<2	1.6	<0.1	<0.5	0.2	1.4	<5	0.1	16	<0.1	0.64	2	1.2
		B	Feb	<2	1.7	<0.1	<0.5	0.2	1.2	<5	0.12	16	<0.1	0.68	2	15
		A	Aug	14	1.9	<0.1	0.71	0.2	1.5	<5	<0.1	6.8	<0.1	1.2	2.2	3.3
		B	Aug	11	1.8	<0.1	<0.5	0.17	1	<5	<0.1	6.6	<0.1	0.51	1.5	3.3
	Site 12	A	Feb	<2	1.7	<0.1	0.78	0.11	1.2	<5	<0.1	11	<0.1	0.57	2	1.1
		A	Aug	8.4	1.7	<0.1	0.52	0.14	1.3	<5	<0.1	8.1	<0.1	0.81	1.9	4.2
Outer Bar	Site 3	A	Feb	<2	1.6	<0.1	<0.5	<0.1	<0.5	<5	0.12	1.6	<0.1	0.51	2	7.3
		A	Aug	10	1.9	<0.1	<0.5	0.16	0.74	<5	<0.1	7.9	<0.1	0.76	2.1	4.1
	Site 4	A	Feb	<2	1.6	<0.1	<0.5	<0.1	<0.5	<5	0.2	1.3	<0.1	0.41	2.1	1.1
		A	Aug	13	1.9	<0.1	<0.5	<0.1	0.81	<5	<0.1	4.6	<0.1	0.18	2.1	4.1
	Site 11	A	Feb	<2	1.6	<0.1	<0.5	<0.1	0.89	<5	<0.1	3.2	<0.1	0.5	2	7.9
		A	Aug	11	1.9	<0.1	<0.5	0.13	1.3	<5	<0.1	10	<0.1	0.59	1.6	4.7
		B	Aug	11	1.9	<0.1	<0.5	0.19	1.1	<5	0.11	11	<0.1	0.27	2.3	4
Waterloo Bay	Site 5	A	Feb	<2	1.6	<0.1	<0.5	<0.1	<0.5	<5	0.32	1.6	<0.1	0.31	1.6	1.4
		A	Aug	11	2	<0.1	0.71	<0.1	0.7	7.8	0.1	5.6	<0.1	0.21	2	3.9
	Site 6	A	Feb	<2	1.7	<0.1	<0.5	<0.1	<0.5	<5	<0.1	2.9	<0.1	0.39	2	1.2
		A	Aug	8.1	1.7	<0.1	<0.5	0.1	0.91	<5	<0.1	5.2	<0.1	0.36	1.7	2.5
	Site 7	A	Feb	<2	1.7	<0.1	<0.5	0.13	1.6	<5	0.1	14	<0.1	0.59	2	11
		B	Feb	<2	1.6	<0.1	<0.5	0.1	1.8	<5	<0.1	13	<0.1	0.51	2	7.8
		A	Aug	34	1.4	<0.1	<0.5	0.16	1	72	0.13	10	<0.1	0.6	2.6	2

Results

Location	Site	Replicate	Event	Al	As	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Ni	Se	Zn
	Site 8	A	Feb	<2	1.7	<0.1	<0.5	<0.1	1	<5	0.22	3.7	<0.1	0.37	1.7	2
		A	Aug	6.8	1.9	<0.1	0.56	<0.1	1	<5	0.14	5.4	<0.1	<0.1	1.6	4.2
MIDMPA	Site 9	A	Feb	<2	1.8	<0.1	<0.5	<0.1	1	<5	0.93	1.9	<0.1	0.23	1.9	1.1
		A	Aug	8.7	1.9	<0.1	<0.5	<0.1	<0.5	<5	<0.1	3	<0.1	0.22	1.8	2.6
	Site 10	A	Feb	<2	1.7	<0.1	<0.5	<0.1	1.2	<5	0.58	1.8	<0.1	0.31	1.7	1.6
		A	Aug	8.6	2	<0.1	<0.5	<0.1	0.65	5.2	<0.1	4.1	<0.1	0.23	2	4

Note: Pink highlighted cells indicate exceedance of the Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/AMRCANZ 2000) guidelines for slightly to moderately disturbed ecosystems at the 95% species protection levels. ND indicates no data available for a guideline value. *suspect value – greater than total value

3.5 Quality Control Results and Analyses

As discussed in Section 2.4.3, QC samples were collected during the 2014 water quality monitoring program. These QC samples consisted of intra-laboratory and inter-laboratory samples. The duplicate samples were analysed for the same parameters as the primary samples.

3.5.1 Relative Percent Difference (RPD)

To assess whether laboratory results from primary and duplicate samples were within an acceptable range, the relative percent difference (RPD) between samples was determined. RPD was calculated using the following equation:

$$RPD(\%) = \frac{|X_1 - X_2|}{\overline{X}} \times 100$$

where: X1 = primary sample

X2 = duplicate sample

$\overline{X}$ = mean of results

An acceptable RPD varies depending on how close the concentration is to the laboratory limit of reporting (LOR). The closer to the LOR, the more variability is expected between results. Therefore, RPD acceptability was deemed as being:

- 0-100% when concentration is less than 5 times the LOR.
- 0-75% when concentration is 5 to 10 times the LOR.
- 0-50% when concentration is greater than 10 times the LOR.

Results of the RPD analysis on the duplicate field samples are provided in Table 3-5 and Table 3-6.

Most primary samples and duplicates were within the acceptable RPD range and there considered to be of acceptable quality. The exception to this were zinc and total suspended solids in February 2014 and nickel, copper, iron and nitrate in August 2014.

Table 3-5 Relative Percent Difference (field duplicates) for February 2014

Parameter	Site 7	Site 2
Aluminium Dissolved	0%	0%
Arsenic Dissolved	6%	6%
Cadmium Dissolved	0%	0%
Cobalt Dissolved	26%	0%
Chromium Dissolved	0%	0%
Copper Dissolved	12%	15%
Iron Dissolved	0%	0%
Manganese Dissolved	7%	0%
Lead Dissolved	0%	18%
Mercury Dissolved	0%	0%
Nickel Dissolved	15%	6%
Selenium Dissolved	0%	0%
Zinc Dissolved	34%	170%
Aluminium Total	21%	17%
Arsenic Total	11%	0%
Cadmium Total	0%	0%
Chromium Total	0%	0%
Cobalt Total	8%	5%
Copper Total	4%	14%
Iron Total	17%	10%
Manganese Total	8%	0%
Lead Total	7%	60%
Mercury Total	0%	0%
Nickel Total	0%	6%
Selenium (Total	13%	29%
Zinc Total	121%	180%
Total Nitrogen	8%	0%
Total Phosphorus	0%	0%
Ammonia-Nitrogen	0%	0%
Nitrate-Nitrogen	0%	0%
Nitrite-Nitrogen	31%	65%
Solids (Suspended)	82%	11%

Pink shading = exceedance of criteria

Table 3-6 Relative Percent Difference (field duplicates) for August 2014

Parameter	Site 1	Site 2	Site 11
Aluminium Dissolved	56%	24%	0%
Arsenic Dissolved	6%	5%	0%
Cadmium Dissolved	0%	0%	0%
Cobalt Dissolved	18%	16%	38%
Chromium Dissolved	0%	35%	0%
Copper Dissolved	17%	40%	17%
Iron Dissolved	123%	0%	0%
Manganese Dissolved	7%	3%	10%
Lead Dissolved	26%	0%	10%
Mercury Dissolved	0%	0%	0%
Nickel Dissolved	97%	81%	74%
Selenium Dissolved	30%	38%	36%
Zinc Dissolved	35%	0%	16%
Aluminium Total	5%	48%	18%
Arsenic Total	11%	10%	0%
Cadmium Total	0%	0%	0%
Chromium Total	62%	43%	18%
Cobalt Total	36%	33%	15%
Copper Total	11%	84%	113%
Iron Total	5%	53%	14%
Manganese Total	4%	42%	11%
Lead Total	12%	56%	26%
Mercury Total	0%	0%	0%
Nickel Total	66%	77%	25%
Selenium Total	23%	8%	4%
Zinc Total	14%	8%	6%
Total Nitrogen	9%	22%	33%
Total Phosphorus	1%	4%	29%
Ammonia-Nitrogen	67%	0%	0%
Nitrate-Nitrogen	62%	39%	166%
Nitrite-Nitrogen	0%	40%	47%
Solids (Suspended)	45%	8%	25%

Pink shading = exceedance of criteria

3.5.2 Holding Times

Holding times for parameters analysed by the laboratory refers to the recommended timeframe between sampling and analysis. Holding times for all parameters were met on both sampling occasions.

4 Discussion and Conclusion

4.1 Spatial Patterns in Water Quality and Drivers

As discussed in BMT WBM (2013b), aquatic ecosystems of the Brisbane River and western Moreton Bay are influenced by a range of catchment pressures. The present study found that several parameters exceeded relevant water quality objectives, including turbidity, dissolved oxygen, total phosphorus, NOx, copper and zinc. With the exception of zinc, all these parameters also exceeded water quality objectives in the 2013 survey (BMT WBM 2013b).

Consistent with the 2013 study (BMT WBM 2013b), the results of the present study indicate that there were spatial gradients in the physio-chemical character of waters across the study area. In this regard, sites in the Brisbane River were more turbid, and had higher nutrient and in most cases trace metal concentrations than sites in western Moreton Bay. There was also a tendency for some Brisbane River sites to have slightly lower electrical conductivity (salinity), and impaired dissolved oxygen concentrations, compared to sites in western Moreton Bay.

These broad-scale patterns in water quality are a consequence of several physio-chemical and biological processes (Cox 1998a, b). The lower Brisbane River estuary is the receiving waters of fluvial sediments from the wider Brisbane River catchment. Ongoing agricultural practices and land degradation from in the upper and middle Brisbane River catchment, together with urbanisation and a range of activities in the lower Brisbane River, are key sources of sediments and other pollutants in this area (Capelin *et al.* 1998; EHMP 2010). Sediments and associated pollutants are continually resuspended by tidal and to a lesser extent wave processes (Cox 1998b; Brisbane River Committee 1989).

Fluvial sediments (and associated contaminants) are flushed into western Moreton Bay by tidal processes. Tidal processes promote flushing and the exchange of riverine waters with cleaner marine waters. Some of this fluvial sediment settles out of suspension, as a result of the higher salinity of marine waters. As observed in the present study, there tends to be a spatial gradient in turbidity from the Brisbane River to the adjacent western Moreton Bay (Cox 1998a). This gradient is even more pronounced travelling further into eastern Moreton Bay (Dennison and Abal 1998).

Tidal processes also promote mixing through the water column, as evidenced by the lack of strong stratification in the present study. The present surveys were undertaken during dry conditions (including the February 2014 ‘wet season event’), and therefore was not greatly affected by fluvial flows. During wetter periods, more buoyant layers of freshwater can sit over denser saline waters, resulting in stratification of the estuary (Cox 1998b).

There are distinct differences in water quality and aquatic ecosystem health between Bramble Bay in the north and Waterloo Bay to the south of the Brisbane River. Waterloo Bay is not strongly influenced by pollutants from the Brisbane River, due to the net northward movement of river waters (EHMP 2014 Scorecard). The excellent water quality here allows the proliferation of the most extensive seagrass meadows in western Moreton Bay (Phinn *et al.* 2006; BMT WBM 2014), as well as coral communities.

Bramble Bay in contrast is considered the most degraded embayment in Moreton Bay. Bramble Bay is poor flushed, and has the longest residence time of any other embayments in Moreton Bay (59 to 62 days; EHMP 2014 Scorecard). Due to the net northward movement of waters, Bramble

Bay is also affected by inflows of pollutants (sediments and nutrients) from the adjacent Brisbane River. As a result, there are no seagrass meadows in this embayment (Phinn *et al.* 2006), and ecosystems are considered to be in an impaired condition.

Stormwater from the Port of Brisbane is discharged into both Waterloo Bay and Brisbane River, with similar volumes discharged into the two receiving environments (Craig Wilson pers. comm. January 2015). Further targeted investigations would be required to quantify the effects of the Port's stormwater discharges on receiving environments. However, given the excellent water quality conditions in Waterloo Bay, it does not appear that the stormwater discharges from the Port are causing major changes to local water quality conditions.

4.2 Ecosystem Health Ratings

BMT WBM (2013b) described the results of the PBPL monitoring program in the context of long term water quality monitoring (2000-2012) undertaken in the South-East Queensland EHMP. Results from 2013 and 2014 are now available, and are presented for the period 2009 to 2014 in Figure 4-1.

In summary, EHMP data indicated that:

- Brisbane River had limited to no compliance with water quality objectives for total nitrogen and total phosphorus, and low to moderate compliance with turbidity and dissolved oxygen water quality objectives. There has been a slight improvement in ecosystem health grades since 2012, but overall ecosystem condition in this area is considered poor (D to D+ grades).
- Waterloo Bay generally had high levels of compliance to water quality objectives for most parameters. Ecosystem health grades have remained stable and high since 2010, ranging from B to A- over this period. This indicates that aquatic ecosystem health in this embayment is generally good.
- Bramble Bay generally had high levels of compliance to water quality objectives for most parameters, except chlorophyll *a* (microalgae biomass).

It is important to note that EHMP does not report compliance for individual nitrogen species (e.g. NOx, ammonia etc.), total phosphorus or trace metals/metalloids, which, as found in the present study, exceeded water quality objectives.

As shown in Figure 4-1, ecosystem health ratings vary among years. Most of this variability occurs in response to inter-annual changes in rainfall. In general, wet years tend to have the poorest ecosystem health scores, in response to higher catchment pollutant inputs during these years. Upgrades to waste water treatment plants in the Brisbane River catchment in recent times have also significantly reduced nutrient loads in the river and Moreton Bay (BMT WBM 2013b).

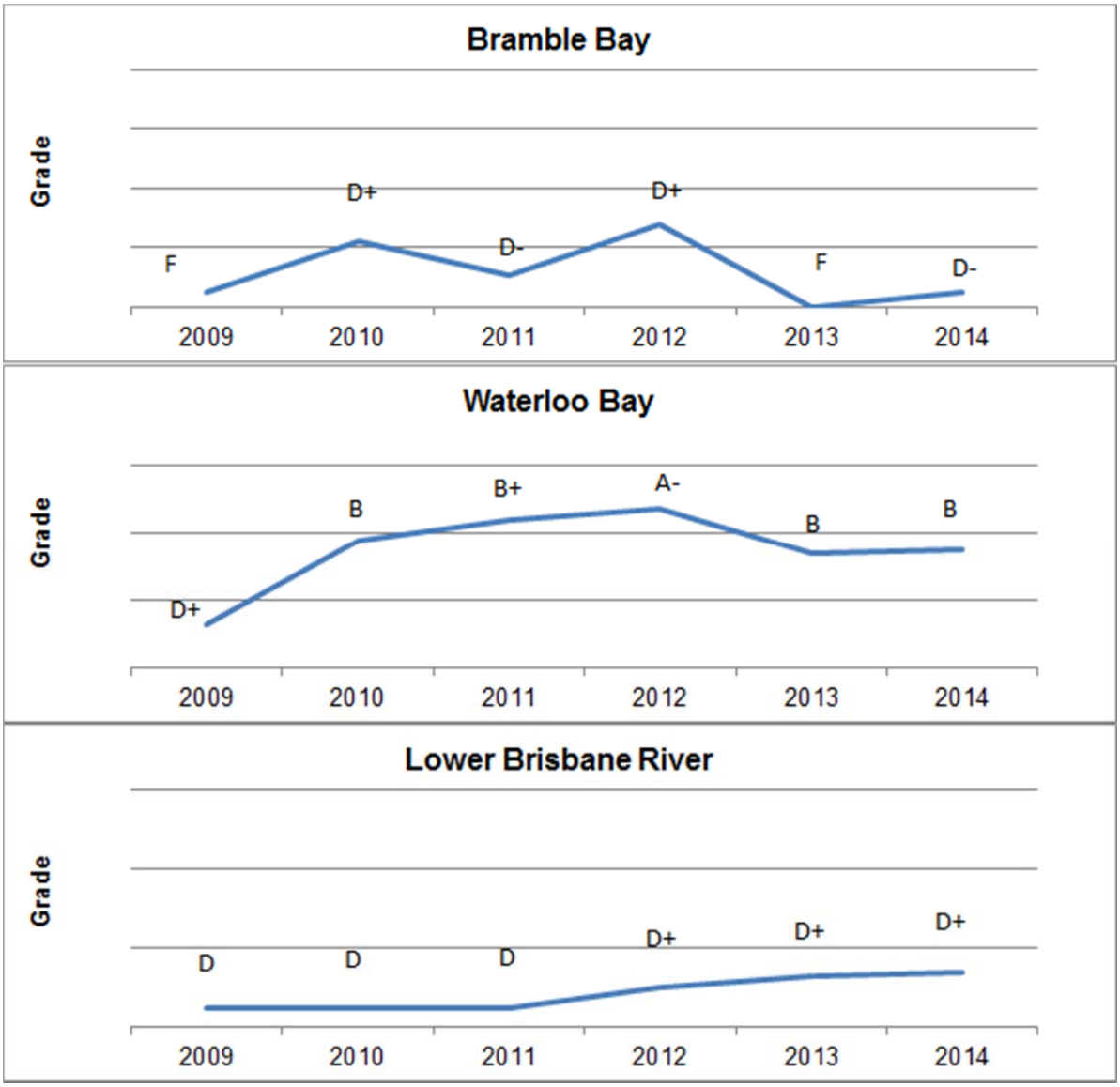

Figure 4-1 EHMP scores for the study area - 2009 - 2014

4.3 Toxicants

Consistent with the results of the 2013 sampling campaign (BMT WBM 2013b), copper was the most widespread toxicant recorded above water quality guideline levels1. The dissolved fraction is generally the most bioavailable and therefore toxic form of heavy metals, and was found to exceed the ANZECC guideline value in February and August at sites 1 and 2 (Brisbane River) and site 7 (Waterloo Bay) during February.

BMT WBM (2013b) also found that dissolved copper exceeded the ANZECC guideline, and speculated that this could be due to a sampling error. However, internal bench trials undertaken by BMT WBM did not identify sampling equipment or sample handling as a source of copper in water

[1] ANZECC/ARMCANZ water quality guideline values for the 95% protection of species.

samples. Laboratory QA/QC results also do not suggest that the laboratory caused sample cross contamination.

As discussed in BMT WBM (2013b), copper is commonly found in runoff from urbanised catchments, and also occurs at concentrations that exceed ANZECC guideline values in groundwater around the lower Brisbane River (BMT WBM 2015). It is notable that the elevated copper concentrations were recorded in the Brisbane River, and in the case of site 7, directly adjacent to discharges from the Brisbane River (*via* Aquarium Passage). Site 12, also located in Aquarium Passage, had dissolved copper concentrations (1.2-1.3 mg/l) that were also at or slightly less than the ANZECC guideline of 1.3 mg/l. This would suggest that copper originated from source/s in the Brisbane River catchment. Dissolved copper concentrations at the most upstream site (site 1) were twice that of other sites, and given that sampling was conducted on an ebbing tide, could suggest that the source/s of copper occur upstream of the Port. Further targeted sampling would be required to test this hypothesis.

Zinc was also recorded above the guideline level at site 2 during February 2014. This was an outlier, as all other sites during this period, and the same site during August 2014, had low zinc concentrations. Sediment quality sampling carried out by the PBPL did not identify zinc (or copper) as a key contaminant of concern in Brisbane River.

4.4 Conclusions

The present study demonstrated that there is great spatial variation in water quality within and adjacent to the port area. Consistent with the broader EHMP, the lower Brisbane River estuary was found to have generally poor water quality, with turbidity, dissolved oxygen, pH, total phosphorus, nitrate and copper (and in one sample zinc) all exceeding recent water quality guideline values. Sites in Waterloo Bay tended to have better water quality, although some exceedances of guideline values were noted.

Diffuse pollutant inputs from the Brisbane River catchment are known to be the main contributors to pollutant loads (sediments and nutrients) in the Brisbane River and Bramble Bay. The well-flushed Waterloo Bay, which is a receiving environment of stormwater discharges from the Port, is in excellent condition and therefore does not appear to be grossly affected by the Port. Further targeted investigations would be required to identify the source/s of elevated copper concentrations in the study area.

5 References

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Appendix A In-situ Measurement Data

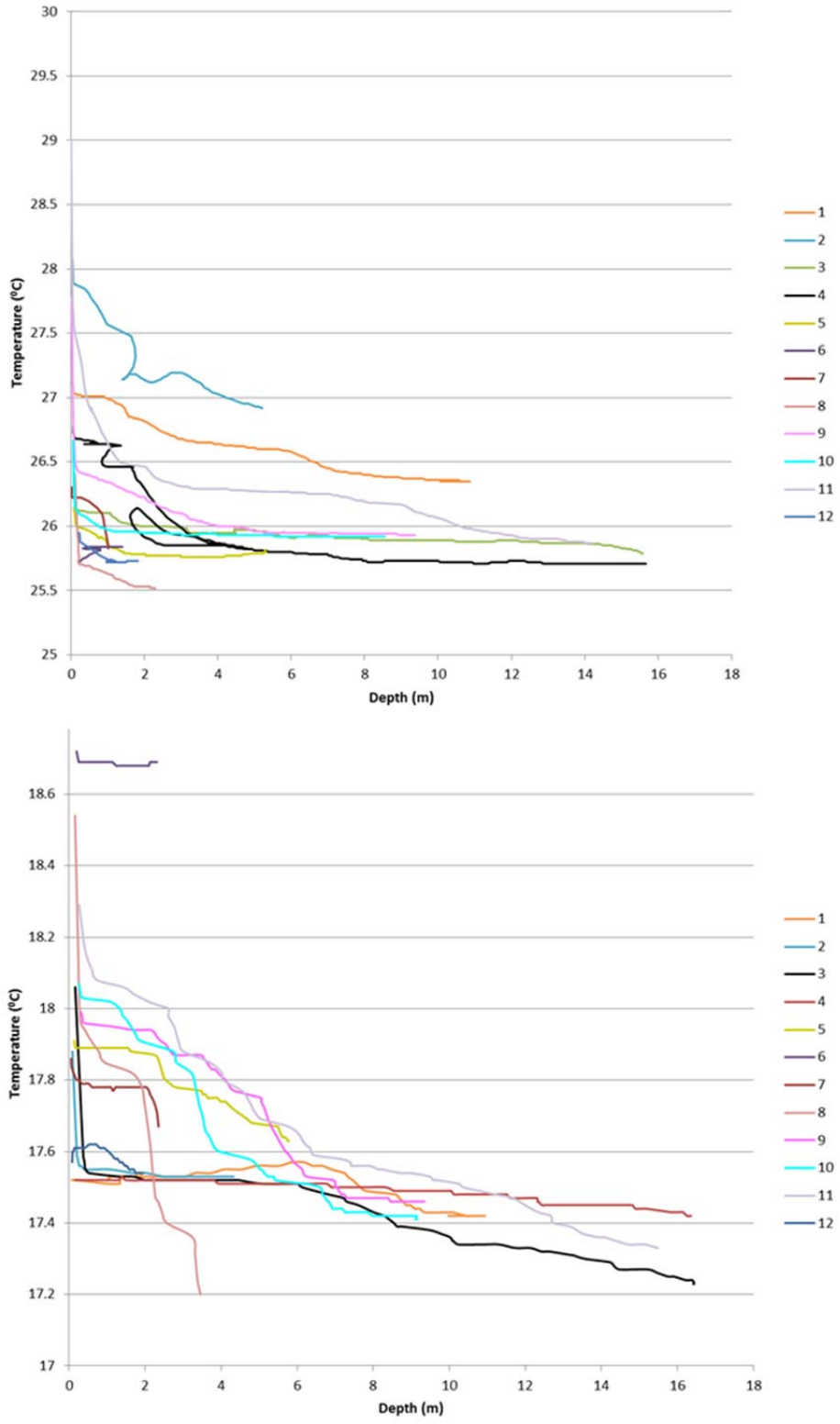

Figure A-1Changes in temperature (°C) with depth at each site during the February 2014 (upper plot) and August 2014 (lower plot) monitoring events

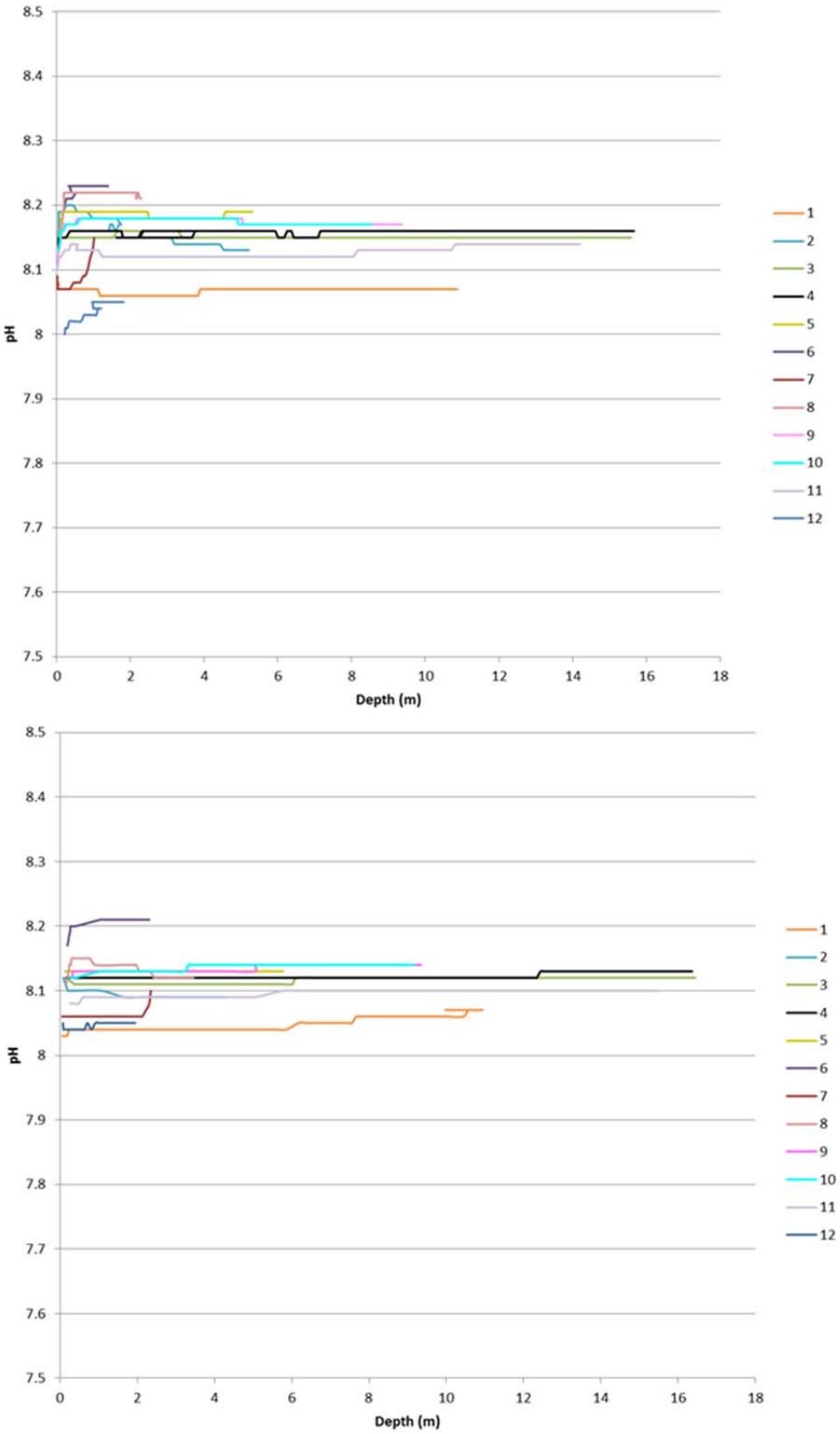

Figure A-2Change in pH with depth at each site during the February 2014 (upper plot) and August 2014 (lower plot) monitoring events

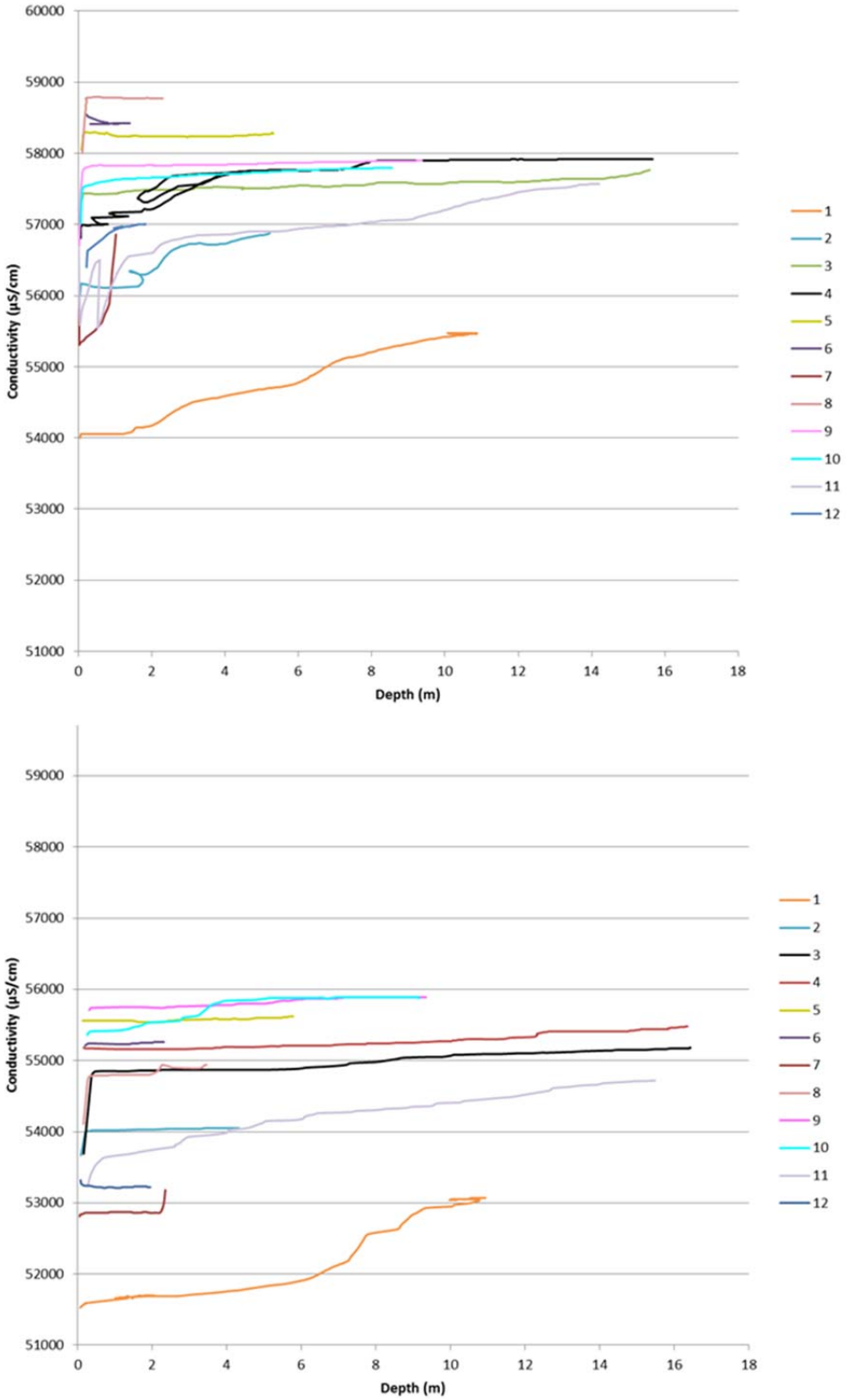

Figure A-3Changes in electrical conductivity (µS/cm) with depth at each site during the February 2014 (upper plot) and August 2014 (lower plot) monitoring events

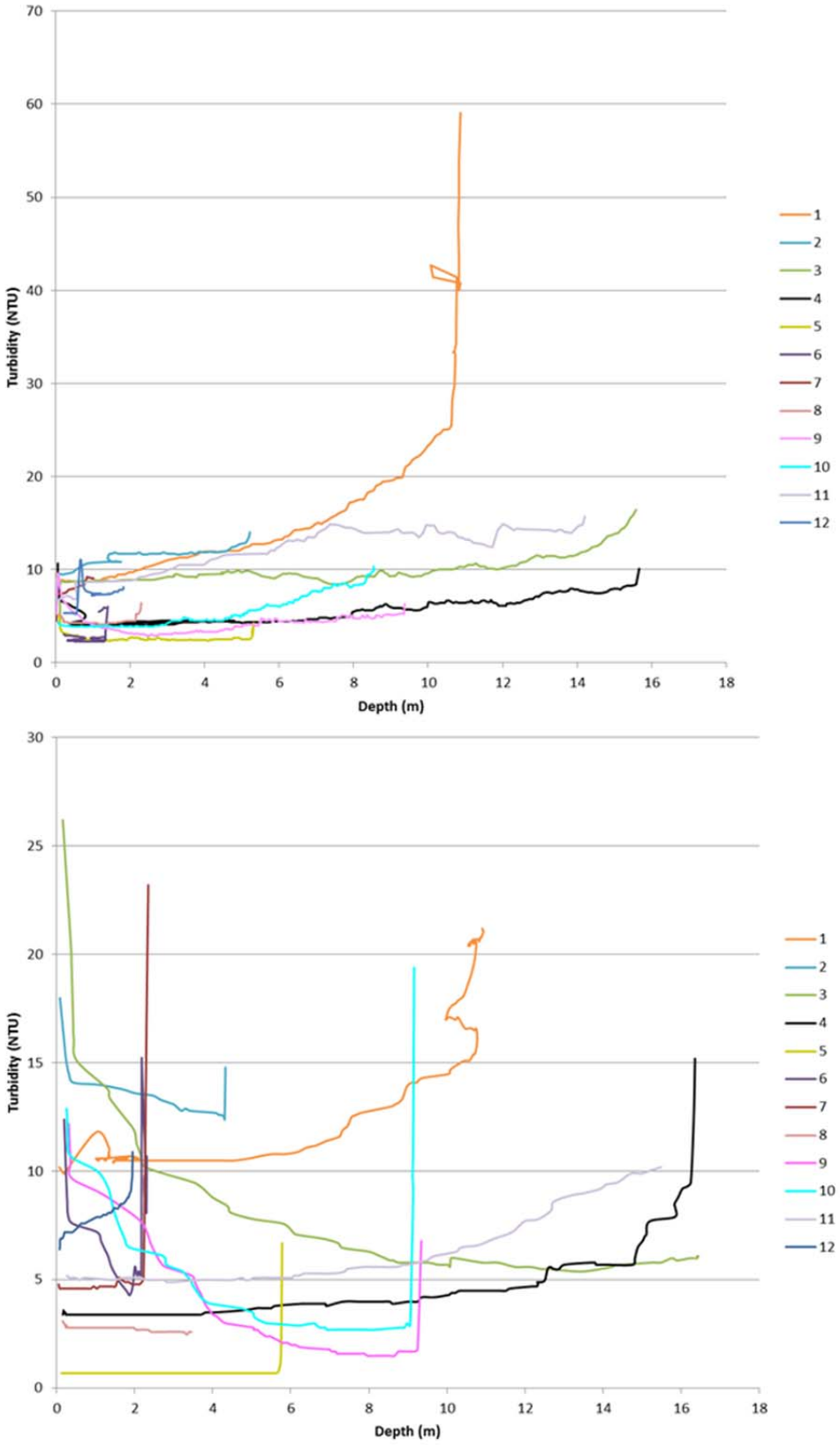

Figure A-4Changes in turbidity (NTU) with depth at each site during the February 2014 (upper plot) and August 2014 (lower plot) monitoring events

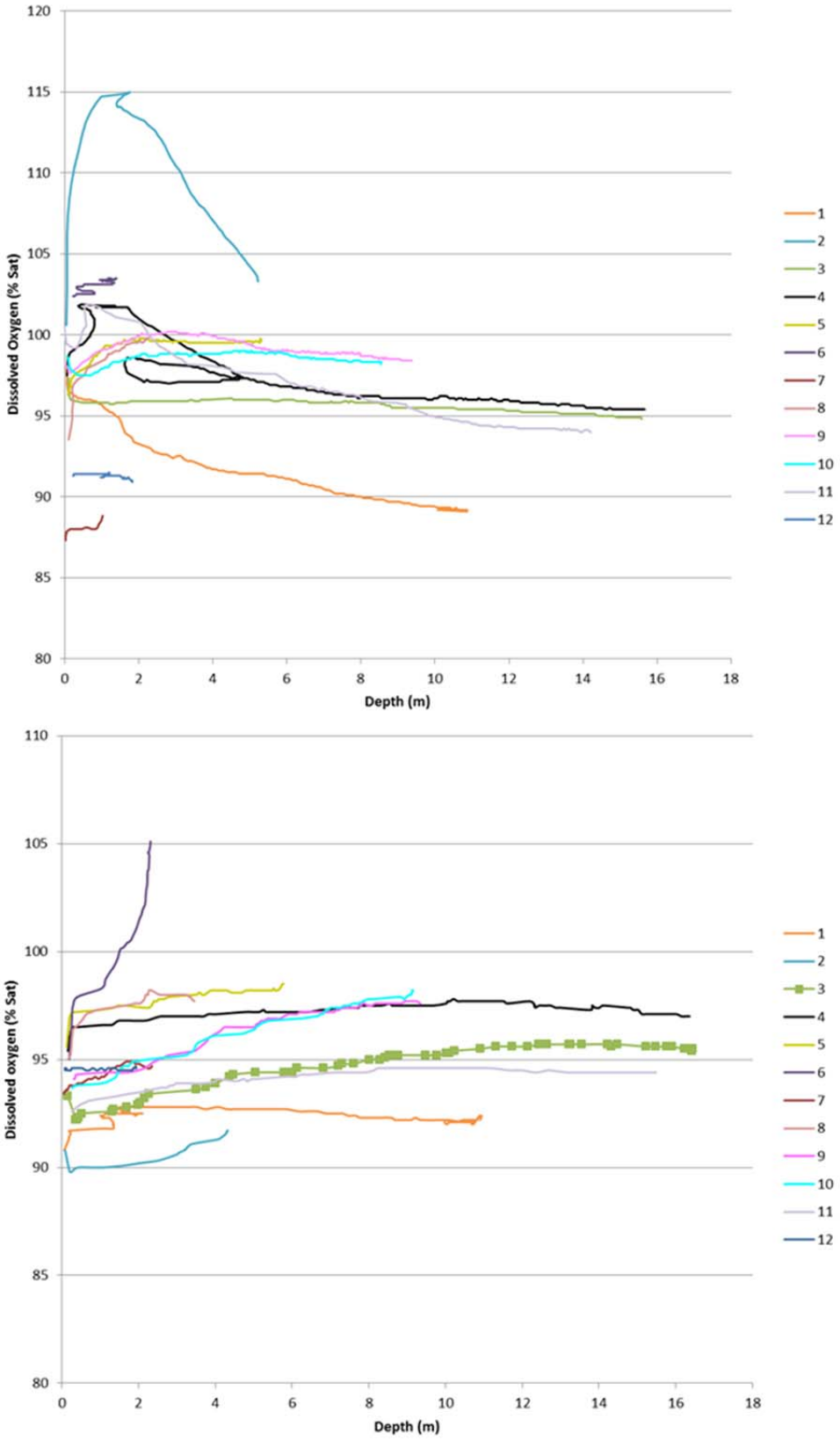

Figure A-5Changes in dissolved oxygen (% saturation) with depth at each site during the February 2014 (upper plot) and August 2014 (lower plot) monitoring events

Appendix B Laboratory Results - Primary Laboratory

CERTIFICATE NO.: 276977 **REVISION NO.:** 00
ISSUE DATE: 13/03/14 This certificate supersedes any previous revisions

CLIENT DETAILS: Markus Billerbeck
BMT WBM Pty Ltd
Level 8
200 Creek Street
Brisbane QLD 4000

DATE SAMPLED: 26/02/2014
DATE RECEIVED: 26/02/2014
CLIENT REF:
TEST DATE: Sample tested between date received and reported.

CONDITIONS OF SAMPLE: Receipt Temperature: Chilled (0 ~ 5 °C)
Storage Temperature: Refrigerated

RESULTS OF ANALYSIS:

Test	Method	Units	276977-1 Site 12	276977-2 Site 7	276977-3 Site 7D	276977-4 Site 8
Tributyltin	EFF235	ng/L	<2	<2	<2	<2
Total Phosphorus	EFF029.1	mg/L	0.05	0.08	0.08	0.02
Ammonia-Nitrogen	EFF044	mg/L	<0.005	<0.005	<0.005	<0.005
Solids (Suspended)	EFF009	mg/L	22	24	10	14
Nitrite-Nitrogen	EFF005.1	mg/L	<0.005	<0.005	<0.005	<0.005
Nitrate-Nitrogen	EFF004.1	mg/L	0.066	0.12	0.088	0.054
Total Nitrogen	EFF029.1	mg/L	0.15	0.25	0.23	0.09
Naphthalene	ENV103	µg/L	<1	<1	<1	<1
Acenaphthylene	ENV103	µg/L	<1	<1	<1	<1
Acenaphthene	ENV103	µg/L	<1	<1	<1	<1
Fluorene	ENV103	µg/L	<1	<1	<1	<1
Phenanthrene	ENV103	µg/L	<1	<1	<1	<1
Anthracene	ENV103	µg/L	<1	<1	<1	<1
Fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Pyrene	ENV103	µg/L	<1	<1	<1	<1
Benz(a)anthracene	ENV103	µg/L	<1	<1	<1	<1
Chrysene	ENV103	µg/L	<1	<1	<1	<1
Benzo(b)fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Benzo(k)fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Benzo(a)pyrene	ENV103	µg/L	<1	<1	<1	<1
Indeno(1,2,3-cd)pyrene	ENV103	µg/L	<1	<1	<1	<1
Dibenz(a,h)anthracene	ENV103	µg/L	<1	<1	<1	<1
Benzo(g,h,i)perylene	ENV103	µg/L	<1	<1	<1	<1
Surrogate Nitrobenzene-d5	ENV103	%	76.0	91.0	73.0	89.0
Surrogate 2-fluorobiphenyl	ENV103	%	90.0	103.0	71.0	75.0
Surrogate Phenanthrene-d10	ENV103	%	79.0	88.0	75.0	70.0
Surrogate 4-terphenyl-d14	ENV103	%	88.0	116.0	93.0	92.0
Benzene	ENV105	µg/L	<1	<1	<1	<1

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Test	Method	Units	276977-1 Site 12	276977-2 Site 7	276977-3 Site 7D	276977-4 Site 8
Ethylbenzene	ENV105	µg/L	<1	<1	<1	<1
Toluene	ENV105	µg/L	<1	<1	<1	<1
ortho-Xylenes	ENV105	µg/L	<1	<1	<1	<1
meta- & para-Xylenes	ENV105	µg/L	<2	<2	<2	<2
Surrogate 1,2-dichlorobenzene-d4	ENV105	%	72.0	105.0	107.0	109.0
Surrogate Chlorobenzene-d5	ENV105	%	81.0	129.0	99.0	90.0
Surrogate Fluorobenzene	ENV105	%	90.0	102.0	115.0	85.0
Aluminium (Total)*	EWM02	mg/L	0.088	0.083	0.067	0.039
Aluminium (Dissolved)*	EWM01	mg/L	<0.005	<0.005	<0.005	<0.005
Arsenic (Dissolved)	EWM01	mg/L	0.0017	0.0017	0.0016	0.0017
Arsenic (Total)	EWM02	mg/L	0.0018	0.0019	0.0017	0.0018
Cadmium (Dissolved)	EWM01	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium (Total)	EWM02	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (Dissolved)	EWM01	mg/L	0.00078	<0.0005	<0.0005	<0.0005
Chromium (Total)	EWM02	mg/L	0.0012	<0.0005	<0.0005	<0.0005
Cobalt (Total)	EWM02	mg/L	0.00029	0.00027	0.00025	0.00019
Cobalt (Dissolved)	EWM01	mg/L	0.00011	0.00013	0.0001	<0.0001
Copper (Total)	EWM02	mg/L	0.0013	0.0022	0.0023	0.0011
Copper (Dissolved)	EWM01	mg/L	0.0012	0.0016	0.0018	0.0010
Iron (Total)*	EWM02	mg/L	0.17	0.16	0.19	0.092
Iron (Dissolved)*	EWM01	mg/L	<0.005	<0.005	<0.005	<0.005
Lead (Total)	EWM02	mg/L	0.00022	0.0013	0.0014	0.00077
Lead (Dissolved)	EWM01	mg/L	<0.0001	0.0001	<0.0001	0.00022
Manganese (Total)*	EWM02	mg/L	0.023	0.026	0.024	0.0094
Manganese (Dissolved)*	EWM01	mg/L	0.011	0.014	0.013	0.0037
Mercury (Total)	EWM02	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Mercury (Dissolved)	EWM01	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Total)	EWM02	mg/L	0.0013	0.0013	0.0013	0.00085
Nickel (Dissolved)	EWM01	mg/L	0.00057	0.00059	0.00051	0.00037
Selenium (Dissolved)	EWM01	mg/L	0.0020	0.0020	0.0020	0.0017
Selenium (Total)	EWM02	mg/L	0.0021	0.0021	0.0024	0.0024
Zinc (Dissolved)	EWM01	mg/L	0.0011	0.011	0.0078	0.0020
Zinc (Total)	EWM02	mg/L	0.0061	0.011	0.045	0.013

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Test	Method	Units	276977-5 Site 6	276977-6 Site 5	276977-7 Site 9	276977-8 Site 10
Tributyltin	EFF235	ng/L	<2	<2	<2	<2
Total Phosphorus	EFF029.1	mg/L	0.02	0.02	0.02	0.02
Ammonia-Nitrogen	EFF044	mg/L	<0.005	<0.005	<0.005	<0.005
Solids (Suspended)	EFF009	mg/L	22	12	22	12
Nitrite-Nitrogen	EFF005.1	mg/L	<0.005	<0.005	<0.005	<0.005
Nitrate-Nitrogen	EFF004.1	mg/L	0.050	0.032	0.018	0.033
Total Nitrogen	EFF029.1	mg/L	0.09	<0.05	0.06	<0.05
Naphthalene	ENV103	µg/L	<1	<1	<1	<1
Acenaphthylene	ENV103	µg/L	<1	<1	<1	<1
Acenaphthene	ENV103	µg/L	<1	<1	<1	<1
Fluorene	ENV103	µg/L	<1	<1	<1	<1
Phenanthrene	ENV103	µg/L	<1	<1	<1	<1
Anthracene	ENV103	µg/L	<1	<1	<1	<1
Fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Pyrene	ENV103	µg/L	<1	<1	<1	<1
Benz(a)anthracene	ENV103	µg/L	<1	<1	<1	<1
Chrysene	ENV103	µg/L	<1	<1	<1	<1
Benzo(b)fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Benzo(k)fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Benzo(a)pyrene	ENV103	µg/L	<1	<1	<1	<1
Indeno(1,2,3-cd)pyrene	ENV103	µg/L	<1	<1	<1	<1
Dibenz(a,h)anthracene	ENV103	µg/L	<1	<1	<1	<1
Benzo(g,h,i)perylene	ENV103	µg/L	<1	<1	<1	<1
Surrogate Nitrobenzene-d5	ENV103	%	90.0	76.0	79.0	97.0
Surrogate 2-fluorobiphenyl	ENV103	%	114.0	84.0	103.0	122.0
Surrogate Phenanthrene-d10	ENV103	%	110.0	76.0	99.0	107.0
Surrogate 4-terphenyl-d14	ENV103	%	130.0	98.0	124.0	116.0
Benzene	ENV105	µg/L	<1	<1	<1	<1
Ethylbenzene	ENV105	µg/L	<1	<1	<1	<1
Toluene	ENV105	µg/L	<1	<1	<1	<1
ortho-Xylenes	ENV105	µg/L	<1	<1	<1	<1
meta- & para-Xylenes	ENV105	µg/L	<2	<2	<2	<2
Surrogate 1,2-dichlorobenzene-d4	ENV105	%	111.0	106.0	92.0	111.0
Surrogate Chlorobenzene-d5	ENV105	%	101.0	92.0	87.0	94.0
Surrogate Fluorobenzene	ENV105	%	113.0	101.0	92.0	105.0
Aluminium (Total)*	EWM02	mg/L	0.029	0.028	0.027	0.041
Aluminium (Dissolved)*	EWM01	mg/L	<0.005	<0.005	<0.005	<0.005
Arsenic (Dissolved)	EWM01	mg/L	0.0017	0.0016	0.0018	0.0017
Arsenic (Total)	EWM02	mg/L	0.0018	0.0017	0.0018	0.0018
Cadmium (Dissolved)	EWM01	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium (Total)	EWM02	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (Dissolved)	EWM01	mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Chromium (Total)	EWM02	mg/L	<0.0005	<0.0005	<0.0005	<0.0005

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Test	Method	Units	276977-5 Site 6	276977-6 Site 5	276977-7 Site 9	276977-8 Site 10
Cobalt (Total)	EWM02	mg/L	0.00012	0.0001	<0.0001	0.00012
Cobalt (Dissolved)	EWM01	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Copper (Total)	EWM02	mg/L	<0.0005	0.0014	0.0012	0.0014
Copper (Dissolved)	EWM01	mg/L	<0.0005	<0.0005	0.0010	0.0012
Iron (Total)*	EWM02	mg/L	0.044	0.048	0.051	0.082
Iron (Dissolved)*	EWM01	mg/L	<0.005	<0.005	<0.005	<0.005
Lead (Total)	EWM02	mg/L	0.0016	0.00055	0.0025	0.0014
Lead (Dissolved)	EWM01	mg/L	<0.0001	0.00032	0.00093	0.00058
Manganese (Total)*	EWM02	mg/L	0.0060	0.0051	0.0059	0.0069
Manganese (Dissolved)*	EWM01	mg/L	0.0029	0.0016	0.0019	0.0018
Mercury (Total)	EWM02	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Mercury (Dissolved)	EWM01	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Total)	EWM02	mg/L	0.00086	0.00086	0.00090	0.00091
Nickel (Dissolved)	EWM01	mg/L	0.00039	0.00031	0.00023	0.00031
Selenium (Dissolved)	EWM01	mg/L	0.0020	0.0016	0.0019	0.0017
Selenium (Total)	EWM02	mg/L	0.0021	0.0020	0.0020	0.0020
Zinc (Dissolved)	EWM01	mg/L	0.0012	0.0014	0.0011	0.0016
Zinc (Total)	EWM02	mg/L	0.0038	0.0052	0.0055	0.0074

Test	Method	Units	276977-9 Site 4	276977-10 Site 3	276977-11 Site 11	276977-12 Site 2
Tributyltin	EFF235	ng/L	<2	<2	<2	<2
Total Phosphorus	EFF029.1	mg/L	0.04	0.09	0.08	0.09
Ammonia-Nitrogen	EFF044	mg/L	<0.005	<0.005	<0.005	<0.005
Solids (Suspended)	EFF009	mg/L	8.0	27	19	38
Nitrite-Nitrogen	EFF005.1	mg/L	<0.005	<0.005	<0.005	<0.005
Nitrate-Nitrogen	EFF004.1	mg/L	0.033	0.069	0.081	0.022
Total Nitrogen	EFF029.1	mg/L	0.09	0.13	0.16	0.17
Naphthalene	ENV103	µg/L	<1	<1	<1	<1
Acenaphthylene	ENV103	µg/L	<1	<1	<1	<1
Acenaphthene	ENV103	µg/L	<1	<1	<1	<1
Fluorene	ENV103	µg/L	<1	<1	<1	<1
Phenanthrene	ENV103	µg/L	<1	<1	<1	<1
Anthracene	ENV103	µg/L	<1	<1	<1	<1
Fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Pyrene	ENV103	µg/L	<1	<1	<1	<1
Benz(a)anthracene	ENV103	µg/L	<1	<1	<1	<1
Chrysene	ENV103	µg/L	<1	<1	<1	<1
Benzo(b)fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Benzo(k)fluoranthene	ENV103	µg/L	<1	<1	<1	<1
Benzo(a)pyrene	ENV103	µg/L	<1	<1	<1	<1
Indeno(1,2,3-cd)pyrene	ENV103	µg/L	<1	<1	<1	<1
Dibenz(a,h)anthracene	ENV103	µg/L	<1	<1	<1	<1
Benzo(g,h,i)perylene	ENV103	µg/L	<1	<1	<1	<1
Surrogate Nitrobenzene-d5	ENV103	%	94.0	90.0	98.0	97.0
Surrogate 2-fluorobiphenyl	ENV103	%	91.0	100.0	101.0	99.0

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Test	Method	Units	276977-9 Site 4	276977-10 Site 3	276977-11 Site 11	276977-12 Site 2
Surrogate Phenanthrene-d10	ENV103	%	90.0	97.0	97.0	94.0
Surrogate 4-terphenyl-d14	ENV103	%	110.0	120.0	122.0	120.0
Benzene	ENV105	µg/L	<1	<1	<1	<1
Ethylbenzene	ENV105	µg/L	<1	<1	<1	<1
Toluene	ENV105	µg/L	<1	<1	<1	<1
ortho-Xylenes	ENV105	µg/L	<1	<1	<1	<1
meta- & para-Xylenes	ENV105	µg/L	<2	<2	<2	<2
Surrogate 1,2-dichlorobenzene-d4	ENV105	%	96.0	122.0	105.0	106.0
Surrogate Chlorobenzene-d5	ENV105	%	83.0	109.0	97.0	95.0
Surrogate Fluorobenzene	ENV105	%	85.0	120.0	118.0	99.0
Aluminium (Total)*	EWM02	mg/L	0.042	0.050	0.099	0.11
Aluminium (Dissolved)*	EWM01	mg/L	<0.005	<0.005	<0.005	<0.005
Arsenic (Dissolved)	EWM01	mg/L	0.0016	0.0016	0.0016	0.0016
Arsenic (Total)	EWM02	mg/L	0.0016	0.0018	0.0019	0.0018
Cadmium (Dissolved)	EWM01	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium (Total)	EWM02	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (Dissolved)	EWM01	mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Chromium (Total)	EWM02	mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt (Total)	EWM02	mg/L	0.00015	0.00018	0.00045	0.00043
Cobalt (Dissolved)	EWM01	mg/L	<0.0001	<0.0001	<0.0001	0.00020
Copper (Total)	EWM02	mg/L	0.00092	0.00099	0.0081	0.0015
Copper (Dissolved)	EWM01	mg/L	<0.0005	<0.0005	0.00089	0.0014
Iron (Total)*	EWM02	mg/L	0.092	0.10	0.18	0.29
Iron (Dissolved)*	EWM01	mg/L	<0.005	<0.005	<0.005	<0.005
Lead (Total)	EWM02	mg/L	0.00078	0.00033	0.0010	0.00059
Lead (Dissolved)	EWM01	mg/L	0.00020	0.00012	<0.0001	0.0001
Manganese (Total)*	EWM02	mg/L	0.0079	0.0088	0.016	0.033
Manganese (Dissolved)*	EWM01	mg/L	0.0013	0.0016	0.0032	0.016
Mercury (Total)	EWM02	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Mercury (Dissolved)	EWM01	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Total)	EWM02	mg/L	0.00096	0.0013	0.0088	0.0016
Nickel (Dissolved)	EWM01	mg/L	0.00041	0.00051	0.00050	0.00064
Selenium (Dissolved)	EWM01	mg/L	0.0021	0.0020	0.0020	0.0020
Selenium (Total)	EWM02	mg/L	0.0031	0.0021	0.0020	0.0028
Zinc (Dissolved)	EWM01	mg/L	0.0011	0.0073	0.0079	0.0012
Zinc (Total)	EWM02	mg/L	0.0042	0.036	0.052	0.0044

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Test	Method	Units	276977-13 Site 2D	276977-14 Site 1
Tributyltin	EFF235	ng/L	<2	<2
Total Phosphorus	EFF029.1	mg/L	0.09	0.09
Ammonia-Nitrogen	EFF044	mg/L	<0.005	<0.005
Solids (Suspended)	EFF009	mg/L	34	25
Nitrite-Nitrogen	EFF005.1	mg/L	<0.005	<0.005
Nitrate-Nitrogen	EFF004.1	mg/L	0.043	0.14
Total Nitrogen	EFF029.1	mg/L	0.17	0.22
Naphthalene	ENV103	µg/L	<1	<1
Acenaphthylene	ENV103	µg/L	<1	<1
Acenaphthene	ENV103	µg/L	<1	<1
Fluorene	ENV103	µg/L	<1	<1
Phenanthrene	ENV103	µg/L	<1	<1
Anthracene	ENV103	µg/L	<1	<1
Fluoranthene	ENV103	µg/L	<1	<1
Pyrene	ENV103	µg/L	<1	<1
Benz(a)anthracene	ENV103	µg/L	<1	<1
Chrysene	ENV103	µg/L	<1	<1
Benzo(b)fluoranthene	ENV103	µg/L	<1	<1
Benzo(k)fluoranthene	ENV103	µg/L	<1	<1
Benzo(a)pyrene	ENV103	µg/L	<1	<1
Indeno(1,2,3-cd)pyrene	ENV103	µg/L	<1	<1
Dibenz(a,h)anthracene	ENV103	µg/L	<1	<1
Benzo(g,h,i)perylene	ENV103	µg/L	<1	<1
Surrogate Nitrobenzene-d5	ENV103	%	118.0	120.0
Surrogate 2-fluorobiphenyl	ENV103	%	121.0	118.0
Surrogate Phenanthrene-d10	ENV103	%	131.0	129.0
Surrogate 4-terphenyl-d14	ENV103	%	124.0	127.0
Benzene	ENV105	µg/L	<1	<1
Ethylbenzene	ENV105	µg/L	<1	<1
Toluene	ENV105	µg/L	<1	<1
ortho-Xylenes	ENV105	µg/L	<1	<1
meta- & para-Xylenes	ENV105	µg/L	<2	<2
Surrogate 1,2-dichlorobenzene-d4	ENV105	%	88.0	95.0
Surrogate Chlorobenzene-d5	ENV105	%	74.0	87.0
Surrogate Fluorobenzene	ENV105	%	82.0	92.0
Aluminium (Total)*	EWM02	mg/L	0.13	0.094
Aluminium (Dissolved)*	EWM01	mg/L	<0.005	<0.005
Arsenic (Dissolved)	EWM01	mg/L	0.0017	0.0016
Arsenic (Total)	EWM02	mg/L	0.0018	0.0019
Cadmium (Dissolved)	EWM01	mg/L	<0.0001	<0.0001
Cadmium (Total)	EWM02	mg/L	<0.0001	<0.0001
Chromium (Dissolved)	EWM01	mg/L	<0.0005	<0.0005
Chromium (Total)	EWM02	mg/L	<0.0005	0.0052

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Test	Method	Units	276977-13 Site 2D	276977-14 Site 1
Cobalt (Total)	EWM02	mg/L	0.00045	0.00038
Cobalt (Dissolved)	EWM01	mg/L	0.00020	<0.0001
Copper (Total)	EWM02	mg/L	0.0013	0.0019
Copper (Dissolved)	EWM01	mg/L	0.0012	0.0014
Iron (Total)*	EWM02	mg/L	0.32	0.24
Iron (Dissolved)*	EWM01	mg/L	<0.005	<0.005
Lead (Total)	EWM02	mg/L	0.0011	0.00079
Lead (Dissolved)	EWM01	mg/L	0.00012	<0.0001
Manganese (Total)*	EWM02	mg/L	0.033	0.019
Manganese (Dissolved)*	EWM01	mg/L	0.016	0.0022
Mercury (Total)	EWM02	mg/L	<0.0001	0.00012
Mercury (Dissolved)	EWM01	mg/L	<0.0001	<0.0001
Nickel (Total)	EWM02	mg/L	0.0017	0.0014
Nickel (Dissolved)	EWM01	mg/L	0.00068	0.00076
Selenium (Dissolved)	EWM01	mg/L	0.0020	0.0016
Selenium (Total)	EWM02	mg/L	0.0021	0.0020
Zinc (Dissolved)	EWM01	mg/L	0.015	0.0082
Zinc (Total)	EWM02	mg/L	0.084	0.012

DEFINITIONS: < = Less than, > = Greater than, - = Not Tested, DWB = Dry Weight Basis.
* This test is not covered by the scope of our NATA accreditation.
# The result is derived from calculation.

Please note: Tributyltin testing performed by an external subcontracted NATA certified Laboratory.
Accreditation No.: 198 Report No: RN1012208
Results were reported on an "as received" basis unless otherwise indicated.
Sampling was carried out by the customer and results reported pertain only to the samples submitted, responsibility for representative sampling rests with the customer.

Betty Bi, Analyst

Jason Roumimper, Chemist

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CERTIFICATE NO.: 309842 Page 1 of 13 **REVISION NO:** 00
ISSUE DATE: 24/09/14 This certificate supersedes any previous revisions

CLIENT DETAILS: Brad Hiles
BMT WBM Pty Ltd
Level 8
200 Creek Street
Brisbane QLD 4000

DATE RECEIVED: 28/08/2014
CLIENT REF. NO:
ORDER NO:

CONDITIONS OF SAMPLE: Receipt Temp °C: Chilled (0 ~ 5 °C)
Storage Temp °C: Refrigerated

TEST DATE: Sample tested between date received and reported

RESULTS OF ANALYSIS:

Test	Method Code	LOR	Unit	309842-1 1A 27/08/2014 4:00 PM	309842-2 2A 27/08/2014 3:19 PM	309842-3 3 27/08/2014 2:06 PM	309842-4 4 27/08/2014 1:45 PM	309842-5 5 27/08/2014 12:45 PM
Elements (Filtered)								
Aluminium (Dissolved)	EWM01	0.005	mg/L	0.011	0.014	0.010	0.013	0.011
Arsenic (Dissolved)	EWM01	0.0005	mg/L	0.0018	0.0019	0.0019	0.0019	0.0020
Cadmium (Dissolved)	EWM01	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt (Dissolved)	EWM01	0.0001	mg/L	0.00018	0.00020	0.00016	<0.0001	<0.0001
Chromium (Dissolved)	EWM01	0.0005	mg/L	<0.0005	0.00071	<0.0005	<0.0005	0.00071
Copper (Dissolved)	EWM01	0.0005	mg/L	0.0022	0.0015	0.00074	0.00081	0.00070
Iron (Dissolved)	EWM01	0.005	mg/L	0.025	<0.005	<0.005	<0.005	0.0078
Manganese (Dissolved)	EWM01	0.0005	mg/L	0.0056	0.0068	0.0079	0.0046	0.0056
Lead (Dissolved)	EWM01	0.0001	mg/L	0.00013	<0.0001	<0.0001	<0.0001	0.0001
Mercury (Dissolved)	EWM01	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Dissolved)	EWM01	0.0001	mg/L	0.0015	0.0012	0.00076	0.00018	0.00021
Selenium (Dissolved)	EWM01	0.0005	mg/L	0.0019	0.0022	0.0021	0.0021	0.0020
Zinc (Dissolved)	EWM01	0.0005	mg/L	0.0050	0.0033	0.0041	0.0041	0.0039

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Elements (total)								
Aluminium (Total)	EWM02	0.005	mg/L	0.20	0.36	0.16	0.071	0.024
Arsenic (Total)	EWM02	0.0005	mg/L	0.0020	0.0022	0.0021	0.0019	0.0020
Cadmium (Total)	EWM02	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (Total)	EWM02	0.0005	mg/L	0.00074	0.0017	0.0012	0.00095	0.00071
Cobalt (Total)	EWM02	0.0001	mg/L	0.00037	0.00056	0.00027	0.00012	<0.0001
Copper (Total)	EWM02	0.0005	mg/L	0.0030	0.0056	0.0016	0.0015	0.0061
Iron (Total)	EWM02	0.005	mg/L	0.37	0.72	0.28	0.11	0.037
Manganese (Total)	EWM02	0.0005	mg/L	0.022	0.032	0.017	0.0098	0.0069
Lead (Total)	EWM02	0.0001	mg/L	0.00031	0.00057	0.00024	0.00027	0.0001
Mercury (Total)	EWM02	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Total)	EWM02	0.0001	mg/L	0.0018	0.0016	0.0013	0.00079	0.00083
Selenium (Total)	EWM02	0.0005	mg/L	0.0024	0.0023	0.0021	0.0024	0.0023
Zinc (Total)	EWM02	0.0005	mg/L	0.0065	0.0057	0.0045	0.0041	0.0040
Total Nitrogen & Phoshorus								
Total Nitrogen	EFF029.1	0.05	mg/L	0.22	0.12	0.099	0.060	<0.05
Total Phosphorus	EFF029.1	0.01	mg/L	0.096	0.069	0.068	0.054	0.041
General Tests								
Ammonia-Nitrogen	EFF044	0.005	mg/L	0.010	<0.005	<0.005	<0.005	<0.005
Nitrate-Nitrogen	EFF004.1	0.005	mg/L	0.14	0.14	0.013	<0.005	<0.005
Nitrite-Nitrogen	EFF005.1	0.005	mg/L	0.0090	0.021	<0.005	<0.005	<0.005
Solids (Suspended)	EFF009	2	mg/L	54	38	26	35	47
Tributyltin	EFF235	2	ng/L	<2.00	<2.00	<2.00	<2.00	<2.00
Organics - PAH's								
Acenaphtene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[ghi]perylene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benz[a]anthracene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[b+k]fluoranthe	ENV103.2 A	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

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Benzo(a)pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz[a,h]anthracen	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno[1,2,3-cd]pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Napthalene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Organics - Pesticides								
cis-Chlordane	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Endosulfan	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-Endosulfan	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos-methyl	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos-methyl	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Diazinon	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dichlorvos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ethion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2

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trans-Chlordane	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC (Lindane)	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor epoxide	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methyl parathion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Mevinphos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
ENV105W BTEX in Water								
Benzene	ENV105	1	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	ENV105	1	µg/L	<1	<1	<1	<1	<1
Toluene	ENV105	1	µg/L	<1	<1	<1	<1	<1
ortho-Xylenes	ENV105	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
meta- & para-Xylenes	ENV105	2	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Xylenes - Total	ENV105	3	µg/L	<3.0	<3.0	<3.0	<3.0	<3.0
Surrogate 1,2-dichlorobenzene-d4	ENV105		%	85	75	72	74	71
Surrogate Chlorobenzene-d5	ENV105		%	83	74	73	74	73
Surrogate Fluorobenzene	ENV105		%	97	92	95	80	76

Test	Method Code	LOR	Unit	309842-6 6 27/08/2014 12:15 PM	309842-7 7 27/08/2014 11:30 AM	309842-8 8 27/08/2014 11:45 AM	309842-9 9 27/08/2014 1:05 PM	309842-10 10 27/08/2014 1:30 PM
Elements (Filtered)								
Aluminium (Dissolved)	EWM01	0.005	mg/L	0.0081	0.034	0.0068	0.0087	0.0086
Arsenic (Dissolved)	EWM01	0.0005	mg/L	0.0017	0.0014	0.0019	0.0019	0.0020
Cadmium (Dissolved)	EWM01	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt (Dissolved)	EWM01	0.0001	mg/L	0.0001	0.00016	<0.0001	<0.0001	<0.0001
Chromium (Dissolved)	EWM01	0.0005	mg/L	<0.0005	<0.0005	0.00056	<0.0005	<0.0005
Copper (Dissolved)	EWM01	0.0005	mg/L	0.00091	0.0010	0.0010	<0.0005	0.00065

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Iron (Dissolved)	EWM01	0.005	mg/L	<0.005	0.072	<0.005	<0.005	0.0052
Manganese (Dissolved)	EWM01	0.0005	mg/L	0.0052	0.010	0.0054	0.0030	0.0041
Lead (Dissolved)	EWM01	0.0001	mg/L	<0.0001	0.00013	0.00014	<0.0001	<0.0001
Mercury (Dissolved)	EWM01	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Dissolved)	EWM01	0.0001	mg/L	0.00036	0.00060	<0.0001	0.00022	0.00023
Selenium (Dissolved)	EWM01	0.0005	mg/L	0.0017	0.0026	0.0016	0.0018	0.0020
Zinc (Dissolved)	EWM01	0.0005	mg/L	0.0025	0.0020	0.0042	0.0026	0.0040
Elements (total)								
Aluminium (Total)	EWM02	0.005	mg/L	0.055	0.053	0.057	0.025	0.029
Arsenic (Total)	EWM02	0.0005	mg/L	0.0017	0.0014	0.0019	0.0021	0.0020
Cadmium (Total)	EWM02	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (Total)	EWM02	0.0005	mg/L	0.00063	<0.0005	0.00092	0.00082	0.00052
Cobalt (Total)	EWM02	0.0001	mg/L	0.00015	0.00016	<0.0001	<0.0001	<0.0001
Copper (Total)	EWM02	0.0005	mg/L	0.00095	0.0011	0.0012	0.0013	0.00077
Iron (Total)	EWM02	0.005	mg/L	0.099	0.12	0.10	0.046	0.052
Manganese (Total)	EWM02	0.0005	mg/L	0.0094	0.012	0.0096	0.0050	0.0070
Lead (Total)	EWM02	0.0001	mg/L	0.00013	0.00014	0.00014	0.00038	<0.0001
Mercury (Total)	EWM02	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Total)	EWM02	0.0001	mg/L	0.00081	0.00065	0.00067	0.00036	0.00026
Selenium (Total)	EWM02	0.0005	mg/L	0.0017	0.0029	0.0025	0.0024	0.0020
Zinc (Total)	EWM02	0.0005	mg/L	0.0033	0.0021	0.0051	0.0056	0.0042
Total Nitrogen & Phoshorus								
Total Nitrogen	EFF029.1	0.05	mg/L	0.062	0.19	<0.05	<0.05	0.082
Total Phosphorus	EFF029.1	0.01	mg/L	0.042	0.082	0.042	0.042	0.045
General Tests								
Ammonia-Nitrogen	EFF044	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate-Nitrogen	EFF004.1	0.005	mg/L	<0.005	0.19	<0.005	<0.005	0.059
Nitrite-Nitrogen	EFF005.1	0.005	mg/L	<0.005	0.018	<0.005	<0.005	0.014
Solids (Suspended)	EFF009	2	mg/L	43	34	31	32	26
Tributyltin	EFF235	2	ng/L	<2.00	<2.00	<2.00	<2.00	<2.00
Organics - PAH's								
Acenaphtene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01

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Anthracene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[ghi]perylene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benz[a]anthracene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[b+k]fluoranthe	ENV103.2 A	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz[a,h]anthracen	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno[1,2,3-cd]pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Napthalene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Organics - Pesticides								
cis-Chlordane	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Endosulfan	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-Endosulfan	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos-methyl	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos-methyl	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2

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Diazinon	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dichlorvos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ethion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
trans-Chlordane	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC (Lindane)	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor epoxide	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methyl parathion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Mevinphos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
ENV105W BTEX in Water								
Benzene	ENV105	1	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	ENV105	1	µg/L	<1	<1	<1	<1	<1
Toluene	ENV105	1	µg/L	<1	<1	<1	<1	<1
ortho-Xylenes	ENV105	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
meta- & para-Xylenes	ENV105	2	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Xylenes - Total	ENV105	3	µg/L	<3.0	<3.0	<3.0	<3.0	<3.0
Surrogate 1,2-dichlorobenzene-d4	ENV105		%	76	71	77	77	73
Surrogate Chlorobenzene-d5	ENV105		%	75	75	74	78	72
Surrogate Fluorobenzene	ENV105		%	84	94	110	85	80

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Test	Method Code	LOR	Unit	309842-11 11A 27/08/2014 2:30 PM	309842-12 12 27/08/2014 10:40 AM	309842-13 1B 27/08/2014 4:00 PM	309842-14 2B 27/08/2014 1:45 PM	309842-15 11B 27/08/2014 2:30 PM
Elements (Filtered)								
Aluminium (Dissolved)	EWM01	0.005	mg/L	0.011	0.0084	0.0062	0.011	0.011
Arsenic (Dissolved)	EWM01	0.0005	mg/L	0.0019	0.0017	0.0017	0.0018	0.0019
Cadmium (Dissolved)	EWM01	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt (Dissolved)	EWM01	0.0001	mg/L	0.00013	0.00014	0.00015	0.00017	0.00019
Chromium (Dissolved)	EWM01	0.0005	mg/L	<0.0005	0.00052	<0.0005	<0.0005	<0.0005
Copper (Dissolved)	EWM01	0.0005	mg/L	0.0013	0.0013	0.0026	0.0010	0.0011
Iron (Dissolved)	EWM01	0.005	mg/L	<0.005	<0.005	0.0060	<0.005	<0.005
Manganese (Dissolved)	EWM01	0.0005	mg/L	0.010	0.0081	0.0060	0.0066	0.011
Lead (Dissolved)	EWM01	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.00011
Mercury (Dissolved)	EWM01	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Dissolved)	EWM01	0.0001	mg/L	0.00059	0.00081	0.00052	0.00051	0.00027
Selenium (Dissolved)	EWM01	0.0005	mg/L	0.0016	0.0019	0.0014	0.0015	0.0023
Zinc (Dissolved)	EWM01	0.0005	mg/L	0.0047	0.0042	0.0035	0.0033	0.0040
Elements (total)								
Aluminium (Total)	EWM02	0.005	mg/L	0.10	0.15	0.19	0.22	0.12
Arsenic (Total)	EWM02	0.0005	mg/L	0.0019	0.0019	0.0018	0.0020	0.0019
Cadmium (Total)	EWM02	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (Total)	EWM02	0.0005	mg/L	0.0011	0.0011	0.0014	0.0011	0.00092
Cobalt (Total)	EWM02	0.0001	mg/L	0.00030	0.00032	0.00053	0.00040	0.00035
Copper (Total)	EWM02	0.0005	mg/L	0.0061	0.0017	0.0027	0.0023	0.0017
Iron (Total)	EWM02	0.005	mg/L	0.20	0.30	0.39	0.42	0.23
Manganese (Total)	EWM02	0.0005	mg/L	0.017	0.019	0.023	0.021	0.019
Lead (Total)	EWM02	0.0001	mg/L	0.00030	0.00030	0.00035	0.00032	0.00023
Mercury (Total)	EWM02	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Total)	EWM02	0.0001	mg/L	0.00059	0.00087	0.00091	0.00071	0.00046
Selenium (Total)	EWM02	0.0005	mg/L	0.0023	0.0022	0.0019	0.0025	0.0024
Zinc (Total)	EWM02	0.0005	mg/L	0.0056	0.0048	0.0075	0.0062	0.0053
Total Nitrogen & Phoshorus								
Total Nitrogen	EFF029.1	0.05	mg/L	0.15	0.17	0.24	0.15	0.21
Total Phosphorus	EFF029.1	0.01	mg/L	0.082	0.076	0.095	0.072	0.11
General Tests								
Ammonia-Nitrogen	EFF044	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005

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Nitrate-Nitrogen	EFF004.1	0.005	mg/L	0.13	0.15	0.074	0.094	0.012
Nitrite-Nitrogen	EFF005.1	0.005	mg/L	0.018	0.017	0.0090	0.014	0.029
Solids (Suspended)	EFF009	2	mg/L	27	36	34	41	21
Tributyltin	EFF235	2	ng/L	<2.00	<2.00	<2.00	<2.00	<2.00
Organics - PAH's								
Acenaphtene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[ghi]perylene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benz[a]anthracene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo[b+k]fluoranthe	ENV103.2 A	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz[a,h]anthracen	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno[1,2,3-cd]pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Napthalene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	ENV103.2 A	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Organics - Pesticides								
cis-Chlordane	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2

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Test	Method Code	LOR	Unit	309842-11 11A 27/08/2014 2:30 PM	309842-12 12 27/08/2014 10:40 AM	309842-13 1B 27/08/2014 4:00 PM	309842-14 2B 27/08/2014 1:45 PM	309842-15 11B 27/08/2014 2:30 PM
alpha-Endosulfan	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-Endosulfan	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos-methyl	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos-methyl	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Diazinon	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dichlorvos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ethion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
trans-Chlordane	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC (Lindane)	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor epoxide	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methyl parathion	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Mevinphos	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	ENV104	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
ENV105W BTEX in Water								
Benzene	ENV105	1	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	ENV105	1	µg/L	<1	<1	<1	<1	<1
Toluene	ENV105	1	µg/L	<1	<1	<1	<1	<1
ortho-Xylenes	ENV105	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
meta- & para-Xylenes	ENV105	2	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0

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Xylenes - Total	ENV105	3	µg/L	<3.0	<3.0	<3.0	<3.0	<3.0
Surrogate 1,2-dichlorobenzene-d4	ENV105		%	74	71	75	82	71
Surrogate Chlorobenzene-d5	ENV105		%	73	76	78	82	71
Surrogate Fluorobenzene	ENV105		%	77	84	91	96	71

Test	Method Code	LOR	Unit	309842-16 13 27/08/2014 4:00 PM
Elements (Filtered)				
Aluminium (Dissolved)	EWM01	0.005	mg/L	<0.005
Arsenic (Dissolved)	EWM01	0.0005	mg/L	<0.0005
Cadmium (Dissolved)	EWM01	0.0001	mg/L	<0.0001
Cobalt (Dissolved)	EWM01	0.0001	mg/L	<0.0001
Chromium (Dissolved)	EWM01	0.0005	mg/L	<0.0005
Copper (Dissolved)	EWM01	0.0005	mg/L	<0.0005
Iron (Dissolved)	EWM01	0.005	mg/L	<0.005
Manganese (Dissolved)	EWM01	0.0005	mg/L	<0.0005
Lead (Dissolved)	EWM01	0.0001	mg/L	<0.0001
Mercury (Dissolved)	EWM01	0.0001	mg/L	<0.0001
Nickel (Dissolved)	EWM01	0.0001	mg/L	<0.0001
Selenium (Dissolved)	EWM01	0.0005	mg/L	<0.0005
Zinc (Dissolved)	EWM01	0.0005	mg/L	<0.0005
Elements (total)				
Aluminium (Total)	EWM02	0.005	mg/L	<0.005
Arsenic (Total)	EWM02	0.0005	mg/L	<0.0005
Cadmium (Total)	EWM02	0.0001	mg/L	<0.0001
Chromium (Total)	EWM02	0.0005	mg/L	<0.0005
Cobalt (Total)	EWM02	0.0001	mg/L	<0.0001
Copper (Total)	EWM02	0.0005	mg/L	<0.0005
Iron (Total)	EWM02	0.005	mg/L	<0.005
Manganese (Total)	EWM02	0.0005	mg/L	<0.0005
Lead (Total)	EWM02	0.0001	mg/L	<0.0001

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Test	Method Code	LOR	Unit	309842-16 13 27/08/2014 4:00 PM
Mercury (Total)	EWM02	0.0001	mg/L	<0.0001
Nickel (Total)	EWM02	0.0001	mg/L	0.00013
Selenium (Total)	EWM02	0.0005	mg/L	<0.0005
Zinc (Total)	EWM02	0.0005	mg/L	<0.0005
Total Nitrogen & Phoshorus				
General Tests				
Organics - PAH's				
Organics - Pesticides				
ENV105W BTEX in Water				

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DEFINITIONS: < : Less than, > : Greater than, - : Not Tested, DWB : Dry Weight Basis.
* Test not covered by NATA scope of accreditation.
# : The result is derived from a calculation. Only results above the LOR are included in the calculation.

Please note: Tributyltin testing performed by an external subcontracted NATA certified Laboratory.
Accreditation No.: 198 Report No: RN1037612
Results were reported on an "as received" basis unless otherwise indicated.
Sampling was carried out by the customer and results reported pertain only to the samples submitted, responsibility for representative sampling rests with the customer.

Betty Bi, Analyst

Jason Roumimper, Chemist

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Appendix C Laboratory Results - Secondary Laboratory

CERTIFICATE OF ANALYSIS

Work Order	: **EB1404727**	Page	: 1 of 6
Client	: **BMT WBM GROUP LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR BRAD HILES	Contact	: Customer Services
Address	: PO BOX 203 SPRING HILL BRISBANE QLD 4004	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: brad.hiles@bmtwbm.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3831 6744	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3832 3627	Facsimile	: +61 7 3243 7218
Project	: B20259 PoB	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 27-FEB-2014
Sampler	: Brad Hiles	Issue Date	: 06-MAR-2014
Site	: ----		
		No. of samples received	: 1
Quote number	: BN/450/13	No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

General Comments

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

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient 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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **EG093-F (Filtered Metals by ORC) were found to be higher than EG093-T (Total Metals by ORC) for sample eb1404727-001 (2T).This was confirmed by re-extraction and re-analysis.**
- **EK055G (Ammonia as N): Sample 2T was diluted due to matrix interference. LOR adjusted accordingly.**

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	Brisbane Inorganics
		WB Water Lab Brisbane
Ryan Story	2IC Organic Instrument Chemist	Brisbane Organics

Analytical Results

Sub-Matrix: SALINE WATER (Matrix: WATER)			Client sample ID	2T	----	----	----	----
			Client sampling date / time	26-FEB-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1404727-001	----	----	----	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	**18**	----	----	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS								
Aluminium	7429-90-5	5	µg/L	<5	----	----	----	----
Selenium	7782-49-2	2	µg/L	<2	----	----	----	----
Iron	7439-89-6	5	µg/L	<5	----	----	----	----
Arsenic	7440-38-2	0.5	µg/L	**1.7**	----	----	----	----
Cadmium	7440-43-9	0.2	µg/L	<0.2	----	----	----	----
Chromium	7440-47-3	0.5	µg/L	<0.5	----	----	----	----
Cobalt	7440-48-4	0.2	µg/L	<0.2	----	----	----	----
Copper	7440-50-8	1	µg/L	**1**	----	----	----	----
Lead	7439-92-1	0.2	µg/L	<0.2	----	----	----	----
Manganese	7439-96-5	0.5	µg/L	**19.6**	----	----	----	----
Nickel	7440-02-0	0.5	µg/L	**0.5**	----	----	----	----
Zinc	7440-66-6	5	µg/L	**13**	----	----	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS								
Aluminium	7429-90-5	5	µg/L	**526**	----	----	----	----
Selenium	7782-49-2	2	µg/L	<2	----	----	----	----
Iron	7439-89-6	5	µg/L	**795**	----	----	----	----
Arsenic	7440-38-2	0.5	µg/L	**2.0**	----	----	----	----
Cadmium	7440-43-9	0.2	µg/L	<0.2	----	----	----	----
Chromium	7440-47-3	0.5	µg/L	**1.8**	----	----	----	----
Cobalt	7440-48-4	0.2	µg/L	**0.5**	----	----	----	----
Copper	7440-50-8	1	µg/L	**2**	----	----	----	----
Lead	7439-92-1	0.2	µg/L	**0.4**	----	----	----	----
Manganese	7439-96-5	0.5	µg/L	**42.0**	----	----	----	----
Nickel	7440-02-0	0.5	µg/L	**1.1**	----	----	----	----
Zinc	7440-66-6	5	µg/L	<5	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.05	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----

Analytical Results

Sub-Matrix: SALINE WATER (Matrix: WATER)			Client sample ID	2T	----	----	----	----
			Client sampling date / time	26-FEB-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1404727-001	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.22**	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP090: Organotin Compounds (Soluble)								
Tributyltin	56573-85-4	2	ngSn/L	<2	----	----	----	----

Analytical Results

Sub-Matrix: SALINE WATER (Matrix: WATER)			Client sample ID	2T	----	----	----	----
			Client sampling date / time	26-FEB-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1404727-001	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	46.6	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	93.9	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%	106	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	117	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	112	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	121	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	85.5	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	83.8	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	93.0	----	----	----	----
EP090S: Organotin Surrogate								
Tripropyltin	----	0.1	%	90.3	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SALINE WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	71.9
2-Chlorophenol-D4	93951-73-6	26.8	130.2
2.4.6-Tribromophenol	118-79-6	19.3	180.8
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	13.9	146.1
Anthracene-d10	1719-06-8	34.6	137.4
4-Terphenyl-d14	1718-51-0	36.2	154.2
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	66.1	137.9
Toluene-D8	2037-26-5	79.2	119.6
4-Bromofluorobenzene	460-00-4	74.2	118.0
EP090S: Organotin Surrogate			
Tripropyltin	----	24	116

QUALITY CONTROL REPORT

Work Order	: **EB1404727**	Page	: 1 of 8
Client	: **BMT WBM GROUP LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR BRAD HILES	Contact	: Customer Services
Address	: PO BOX 203 SPRING HILL BRISBANE QLD 4004	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: brad.hiles@bmtwbm.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3831 6744	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3832 3627	Facsimile	: +61 7 3243 7218
Project	: B20259 PoB	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 27-FEB-2014
Sampler	: Brad Hiles	Issue Date	: 06-MAR-2014
Order number	: ----		
		No. of samples received	: 1
Quote number	: BN/450/13	No. of samples analysed	: 1

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

This Quality Control Report contains the following information:

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

General Comments

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

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

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

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

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

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	Brisbane Inorganics WB Water Lab Brisbane
Ryan Story	2IC Organic Instrument Chemist	Brisbane Organics

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA025: Suspended Solids (QC Lot: 3317278)									
EB1403356-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	17	16	6.1	No Limit
EB1404725-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	5	0.0	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 3317427)									
EB1404727-001	2T	EG093A-F: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0	No Limit
		EG093A-F: Cobalt	7440-48-4	0.2	µg/L	<0.2	0.2	0.0	No Limit
		EG093A-F: Lead	7439-92-1	0.2	µg/L	<0.2	<0.2	0.0	No Limit
		EG093A-F: Arsenic	7440-38-2	0.5	µg/L	1.7	1.7	0.0	No Limit
		EG093A-F: Chromium	7440-47-3	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EG093A-F: Manganese	7439-96-5	0.5	µg/L	19.6	20.8	5.5	0% - 20%
		EG093A-F: Nickel	7440-02-0	0.5	µg/L	0.5	<0.5	0.0	No Limit
		EG093A-F: Copper	7440-50-8	1	µg/L	1	2	0.0	No Limit
		EG093A-F: Aluminium	7429-90-5	5	µg/L	<5	<5	0.0	No Limit
		EG093A-F: Zinc	7440-66-6	5	µg/L	13	11	10.8	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 3317428)									
EB1404727-001	2T	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.0	No Limit
		EG093B-F: Iron	7439-89-6	5	µg/L	<5	<5	0.0	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 3317429)									
EB1404727-001	2T	EG093A-T: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0	No Limit
		EG093A-T: Cobalt	7440-48-4	0.2	µg/L	0.5	0.5	0.0	No Limit
		EG093A-T: Lead	7439-92-1	0.2	µg/L	0.4	0.5	0.0	No Limit
		EG093A-T: Arsenic	7440-38-2	0.5	µg/L	2.0	1.9	8.0	No Limit
		EG093A-T: Chromium	7440-47-3	0.5	µg/L	1.8	0.6	99.1	No Limit
		EG093A-T: Manganese	7439-96-5	0.5	µg/L	42.0	44.2	5.1	0% - 20%
		EG093A-T: Nickel	7440-02-0	0.5	µg/L	1.1	1.0	0.0	No Limit
		EG093A-T: Copper	7440-50-8	1	µg/L	2	2	0.0	No Limit
		EG093A-T: Aluminium	7429-90-5	5	µg/L	526	539	2.4	0% - 20%
		EG093A-T: Zinc	7440-66-6	5	µg/L	<5	6	0.0	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 3317430)									
EB1404727-001	2T	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.0	No Limit
		EG093B-T: Iron	7439-89-6	5	µg/L	795	788	0.9	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3318134)									
EB1404665-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB1404665-011	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3317281)									
EB1404724-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3318133)									
EB1404665-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.18	0.19	0.0	0% - 50%
EB1404665-011	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.10	0.10	0.0	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3321730)									
EB1404704-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	3.42	3.39	0.9	0% - 20%
EB1404746-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.02	56.2	No Limit
EP080: BTEXN (QC Lot: 3317196)									
EB1404656-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	2	2	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	3	3	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EB1404714-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Suspended Solids (QCLot: 3317278)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	103	82	120
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 3317427)								
EG093A-F: Aluminium	7429-90-5	5	µg/L	<5	50 µg/L	98.0	85	118
EG093A-F: Arsenic	7440-38-2	0.5	µg/L	<0.5	10 µg/L	102	87	116
EG093A-F: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	94.1	88	114
EG093A-F: Chromium	7440-47-3	0.5	µg/L	<0.5	10 µg/L	96.4	86	115
EG093A-F: Cobalt	7440-48-4	0.2	µg/L	<0.2	10 µg/L	99.5	90	114
EG093A-F: Copper	7440-50-8	1	µg/L	<1	20 µg/L	98.9	89	116
EG093A-F: Lead	7439-92-1	0.2	µg/L	<0.2	10 µg/L	100	86	117
EG093A-F: Manganese	7439-96-5	0.5	µg/L	<0.5	10 µg/L	103	87	119
EG093A-F: Nickel	7440-02-0	0.5	µg/L	<0.5	10 µg/L	90.0	87	117
EG093A-F: Zinc	7440-66-6	5	µg/L	<5	20 µg/L	107	81	120
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 3317428)								
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	104	87	117
EG093B-F: Iron	7439-89-6	5	µg/L	<5	50 µg/L	93.6	78	123
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 3317429)								
EG093A-T: Aluminium	7429-90-5	5	µg/L	<5	50 µg/L	103	85	125
EG093A-T: Arsenic	7440-38-2	0.5	µg/L	<0.5	10 µg/L	101	86	117
EG093A-T: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	92.6	84	115
EG093A-T: Chromium	7440-47-3	0.5	µg/L	<0.5	10 µg/L	103	92	120
EG093A-T: Cobalt	7440-48-4	0.2	µg/L	<0.2	10 µg/L	104	86	116
EG093A-T: Copper	7440-50-8	1	µg/L	<1	20 µg/L	97.3	93	119
EG093A-T: Lead	7439-92-1	0.2	µg/L	<0.2	10 µg/L	107	89	120
EG093A-T: Manganese	7439-96-5	0.5	µg/L	<0.5	10 µg/L	109	86	124
EG093A-T: Nickel	7440-02-0	0.5	µg/L	<0.5	10 µg/L	91.6	90	120
EG093A-T: Zinc	7440-66-6	5	µg/L	<5	20 µg/L	107	81	124
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 3317430)								
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	99.2	89	119
EG093B-T: Iron	7439-89-6	5	µg/L	<5	50 µg/L	104	80	128
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3318134)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.0 mg/L	97.8	84	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3317281)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	83	111
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3318133)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3318133) - continued								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	95.5	89	115
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3321730)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	100	77	110
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3317847)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	# 116	47	101
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	94.3	46	109
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	93.8	50	104
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	99.4	50	114
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	75.6	49	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	97.4	45	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	101	46	120
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	100	46	119
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	95.5	48	125
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	95.1	43	119
EP075(SIM): Benzo(b)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	104	43	135
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	90.1	42	130
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	96.1	44	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	129	40	137
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	126	42	140
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	# 145	37	136
EP080: BTEXN (QCLot: 3317196)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	102	81	119
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	104	80	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	110	81	119
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	20 µg/L	108	81	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	105	81	121
EP080: Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	99.3	80	120
EP090: Organotin Compounds (Soluble) (QCLot: 3317866)								
EP090S: Tributyltin	56573-85-4	2	ngSn/L	<2	147 ngSn/L	96.0	24.1	115

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report: Spike	SpikeRecovery(%)	Recovery Limits (%)

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 3317427)							
EB1404729-002	Anonymous	EG093A-F: Arsenic	7440-38-2	50 µg/L	103	70	130
		EG093A-F: Cadmium	7440-43-9	50 µg/L	98.3	70	130
		EG093A-F: Chromium	7440-47-3	50 µg/L	105	70	130
		EG093A-F: Cobalt	7440-48-4	50 µg/L	106	70	130
		EG093A-F: Copper	7440-50-8	100 µg/L	105	70	130
		EG093A-F: Lead	7439-92-1	50 µg/L	101	70	130
		EG093A-F: Manganese	7439-96-5	50 µg/L	102	70	130
		EG093A-F: Nickel	7440-02-0	50 µg/L	99.8	70	130
		EG093A-F: Zinc	7440-66-6	100 µg/L	104	70	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 3317429)							
EB1404729-002	Anonymous	EG093A-T: Arsenic	7440-38-2	50 µg/L	102	70	130
		EG093A-T: Cadmium	7440-43-9	50 µg/L	100	70	130
		EG093A-T: Chromium	7440-47-3	50 µg/L	108	70	130
		EG093A-T: Cobalt	7440-48-4	50 µg/L	108	70	130
		EG093A-T: Copper	7440-50-8	100 µg/L	106	70	130
		EG093A-T: Lead	7439-92-1	50 µg/L	106	70	130
		EG093A-T: Manganese	7439-96-5	50 µg/L	104	70	130
		EG093A-T: Nickel	7440-02-0	50 µg/L	103	70	130
		EG093A-T: Zinc	7440-66-6	100 µg/L	103	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3318134)							
EB1404665-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	102	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3317281)							
EB1404727-001	2T	EK057G: Nitrite as N	----	0.4 mg/L	119	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3318133)							
EB1404665-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	73.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3321730)							
EB1404704-002	Anonymous	EK067G: Total Phosphorus as P	----	1.0 mg/L	# Not Determined	70	130
EP080: BTEXN (QCLot: 3317196)							
EB1404679-001	Anonymous	EP080: Benzene	71-43-2	10 µg/L	109	70	130
		EP080: Toluene	108-88-3	10 µg/L	109	70	130

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EP080: BTEXN (QCLot: 3317196)										
EB1404679-001	Anonymous	EP080: Benzene	71-43-2	10 µg/L	109	----	70	130	----	----
		EP080: Toluene	108-88-3	10 µg/L	109	----	70	130	----	----
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3317281)										
EB1404727-001	2T	EK057G: Nitrite as N	----	0.4 mg/L	119	----	70	130	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 3317427)										
EB1404729-002	Anonymous	EG093A-F: Arsenic	7440-38-2	50 µg/L	103	----	70	130	----	----
		EG093A-F: Cadmium	7440-43-9	50 µg/L	98.3	----	70	130	----	----
		EG093A-F: Chromium	7440-47-3	50 µg/L	105	----	70	130	----	----
		EG093A-F: Cobalt	7440-48-4	50 µg/L	106	----	70	130	----	----
		EG093A-F: Copper	7440-50-8	100 µg/L	105	----	70	130	----	----
		EG093A-F: Lead	7439-92-1	50 µg/L	101	----	70	130	----	----
		EG093A-F: Manganese	7439-96-5	50 µg/L	102	----	70	130	----	----
		EG093A-F: Nickel	7440-02-0	50 µg/L	99.8	----	70	130	----	----
		EG093A-F: Zinc	7440-66-6	100 µg/L	104	----	70	130	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 3317429)										
EB1404729-002	Anonymous	EG093A-T: Arsenic	7440-38-2	50 µg/L	102	----	70	130	----	----
		EG093A-T: Cadmium	7440-43-9	50 µg/L	100	----	70	130	----	----
		EG093A-T: Chromium	7440-47-3	50 µg/L	108	----	70	130	----	----
		EG093A-T: Cobalt	7440-48-4	50 µg/L	108	----	70	130	----	----
		EG093A-T: Copper	7440-50-8	100 µg/L	106	----	70	130	----	----
		EG093A-T: Lead	7439-92-1	50 µg/L	106	----	70	130	----	----
		EG093A-T: Manganese	7439-96-5	50 µg/L	104	----	70	130	----	----
		EG093A-T: Nickel	7440-02-0	50 µg/L	103	----	70	130	----	----
		EG093A-T: Zinc	7440-66-6	100 µg/L	103	----	70	130	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3318133)										
EB1404665-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	73.0	----	70	130	----	----
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3318134)										
EB1404665-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	102	----	70	130	----	----
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3321730)										
EB1404704-002	Anonymous	EK067G: Total Phosphorus as P	----	1.0 mg/L	# Not Determined	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1404727**	Page	: 1 of 8
Client	: BMT WBM GROUP LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR BRAD HILES	Contact	: Customer Services
Address	: PO BOX 203 SPRING HILL BRISBANE QLD 4004	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: brad.hiles@bmtwbm.com.au	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3831 6744	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3832 3627	Facsimile	: +61 7 3243 7218
Project	: B20259 PoB	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 27-FEB-2014
Sampler	: Brad Hiles	Issue Date	: 06-MAR-2014
Order number	: ----		
		No. of samples received	: 1
Quote number	: BN/450/13	No. of samples analysed	: 1

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Suspended Solids							
Miscellaneous Plastic bottle -unpreserved (EA025H)							
2T	**26-FEB-2014**	---	05-MAR-2014	----	**28-FEB-2014**	05-MAR-2014	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Miscellanous Nitric Preserved - field filtered (EG093A-F)							
2T	**26-FEB-2014**	---	25-AUG-2014	----	**28-FEB-2014**	25-AUG-2014	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Miscellaneous Nitric preserved - unfiltered (EG093A-T)							
2T	**26-FEB-2014**	**28-FEB-2014**	25-AUG-2014	✓	**28-FEB-2014**	25-AUG-2014	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Miscellanous Nitric Preserved - field filtered (EG093B-F)							
2T	**26-FEB-2014**	---	25-AUG-2014	----	**28-FEB-2014**	25-AUG-2014	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Miscellaneous Nitric preserved - unfiltered (EG093B-T)							
2T	**26-FEB-2014**	**28-FEB-2014**	25-AUG-2014	✓	**28-FEB-2014**	25-AUG-2014	✓
EK055G: Ammonia as N by Discrete Analyser							
Miscellaneous Plastic bottle -unpreserved (EK055G)							
2T	**26-FEB-2014**	---	27-FEB-2014	----	**28-FEB-2014**	27-FEB-2014	×
EK057G: Nitrite as N by Discrete Analyser							
Miscellaneous Plastic bottle -unpreserved (EK057G)							
2T	**26-FEB-2014**	---	28-FEB-2014	----	**28-FEB-2014**	28-FEB-2014	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Miscellaneous Plastic bottle -unpreserved (EK059G)							
2T	**26-FEB-2014**	---	28-FEB-2014	----	**28-FEB-2014**	28-FEB-2014	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Miscellaneous Plastic bottle -unpreserved (EK067G)							
2T	**26-FEB-2014**	**05-MAR-2014**	27-FEB-2014	×	**05-MAR-2014**	02-APR-2014	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Miscellaneous Glass Bottle - unpreserved (EP075(SIM))							
2T	**26-FEB-2014**	**03-MAR-2014**	05-MAR-2014	✓	**04-MAR-2014**	12-APR-2014	✓
EP080: BTEXN							
Clear glass VOC vial - HCl (EP080)							
2T	**26-FEB-2014**	**28-FEB-2014**	12-MAR-2014	✓	**28-FEB-2014**	12-MAR-2014	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP090: Organotin Compounds (Soluble)							
Miscellaneous Glass Bottle - unpreserved (EP090S)							
2T	**26-FEB-2014**	**03-MAR-2014**	05-MAR-2014	✓	**05-MAR-2014**	12-APR-2014	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	15	**13.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	1	**100.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	1	**100.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	15	**13.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	2	**50.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	2	17	**11.8**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	1	**100.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	15	**13.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organotin Compounds (Soluble)	EP090S	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	**14.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	1	17	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organotin Compounds (Soluble)	EP090S	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	7	**14.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	1	17	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	1	**100.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In-House, APHA 21st ed., 2540D A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (2013) Schedule B(3)
Organotin Compounds (Soluble)	EP090S	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by GC/MS coupled with high volume injection and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals - ORC	EN25-ORC	WATER	Modified USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.
Organotin Sample Preparation	ORG34	WATER	In-house. A specified volume of sample is spiked with surrogate, acidified and vacuum filtered. Reagents and solvent are added and the mixture tumbled. The butyltin compounds is derivitisated, extracted and the subtitution reaction completed. The extract is transferred to a separatory funnel and further extracted two times with petroleum ether. The resultant extracts are combined and concentrated for analysis.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	3962186-008	----	**Naphthalene**	91-20-3	116 %	47-101%	**Recovery greater than upper control limit**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	3962186-008	----	**Benzo(g.h.i)perylene**	191-24-2	145 %	37-136%	**Recovery greater than upper control limit**
Matrix Spike (MS) Recoveries							
EK067G: Total Phosphorus as P by Discrete Analyser	EB1404704-002	Anonymous	**Total Phosphorus as P**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK055G: Ammonia as N by Discrete Analyser						
Miscellaneous Plastic bottle -unpreserved 2T	----	----	----	28-FEB-2014	27-FEB-2014	**1**
EK067G: Total Phosphorus as P by Discrete Analyser						
Miscellaneous Plastic bottle -unpreserved 2T	05-MAR-2014	27-FEB-2014	**6**	----	----	----

Outliers : Frequency of Quality Control Samples

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

- **No Quality Control Sample Frequency Outliers exist.**

CERTIFICATE OF ANALYSIS

Work Order	: **EB1441369**	Page	: 1 of 6
Client	: **BMT WBM GROUP LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR BRAD HILES	Contact	: Customer Services EB
Address	: PO BOX 203 SPRING HILL BRISBANE QLD 4004	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: brad.hiles@bmtwbm.com.au	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3831 6744	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3832 3627	Facsimile	: +61-7-3243 7218
Project	: B20259 PoB	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 28-Aug-2014 10:45
Sampler	: BRAD HILES	Issue Date	: 08-Sep-2014 13:41
Site	: ----		
		No. of samples received	: 2
Quote number	: ----	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

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	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	WB Water Lab Brisbane
Matt Frost	Senior Organic Chemist	Brisbane Organics

General Comments

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

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient 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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- **Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.**
- **It is recognised that EG093T (Total Metals) is less than EG093F (Dissolved Metals) for some samples. However, the difference is within experimental variation of the methods.**

Analytical Results

Sub-Matrix: SALINE WATER (Matrix: WATER)				Client sample ID	IC	----	----	----	----
				Client sampling date / time	27-Aug-2014 16:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1441369-001	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EA025: Suspended Solids									
^ **Suspended Solids (SS)**	----	1	mg/L		**39**	----	----	----	----
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Aluminium	7429-90-5	5	µg/L		<5	----	----	----	----
Selenium	7782-49-2	2	µg/L		<2	----	----	----	----
Iron	7439-89-6	5	µg/L		<5	----	----	----	----
Arsenic	7440-38-2	0.5	µg/L		**1.1**	----	----	----	----
Cadmium	7440-43-9	0.2	µg/L		<0.2	----	----	----	----
Chromium	7440-47-3	0.5	µg/L		<0.5	----	----	----	----
Cobalt	7440-48-4	0.2	µg/L		<0.2	----	----	----	----
Copper	7440-50-8	1	µg/L		**3**	----	----	----	----
Lead	7439-92-1	0.2	µg/L		<0.2	----	----	----	----
Manganese	7439-96-5	0.5	µg/L		**3.7**	----	----	----	----
Nickel	7440-02-0	0.5	µg/L		<0.5	----	----	----	----
Zinc	7440-66-6	5	µg/L		<5	----	----	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS									
Aluminium	7429-90-5	5	µg/L		**378**	----	----	----	----
Selenium	7782-49-2	2	µg/L		<2	----	----	----	----
Iron	7439-89-6	5	µg/L		**627**	----	----	----	----
Arsenic	7440-38-2	0.5	µg/L		**1.2**	----	----	----	----
Cadmium	7440-43-9	0.2	µg/L		<0.2	----	----	----	----
Chromium	7440-47-3	0.5	µg/L		**0.9**	----	----	----	----
Cobalt	7440-48-4	0.2	µg/L		**0.5**	----	----	----	----
Copper	7440-50-8	1	µg/L		**2**	----	----	----	----
Lead	7439-92-1	0.2	µg/L		<0.2	----	----	----	----
Manganese	7439-96-5	0.5	µg/L		**18.5**	----	----	----	----
Nickel	7440-02-0	0.5	µg/L		**1.0**	----	----	----	----
Zinc	7440-66-6	5	µg/L		<5	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SALINE WATER (Matrix: WATER)				Client sample ID	IC	----	----	----	----
				Client sampling date / time	27-Aug-2014 16:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1441369-001	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDT	50-29-3	2	µg/L		<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	----	----	----	----
Methoxychlor	72-43-5	2	µg/L		<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	----	0.5	µg/L		<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	----	----	----	----
Monocrotophos	6923-22-4	2	µg/L		<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	----	----	----	----
Parathion-methyl	298-00-0	2	µg/L		<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	----	----	----	----
Parathion	56-38-2	2	µg/L		<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SALINE WATER (Matrix: WATER)				Client sample ID	IC	----	----	----	----
				Client sampling date / time	27-Aug-2014 16:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1441369-001	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Carbophenothion	786-19-6	0.5	µg/L		<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1	µg/L		<1.0	----	----	----	----
Acenaphthylene	208-96-8	1	µg/L		<1.0	----	----	----	----
Acenaphthene	83-32-9	1	µg/L		<1.0	----	----	----	----
Fluorene	86-73-7	1	µg/L		<1.0	----	----	----	----
Phenanthrene	85-01-8	1	µg/L		<1.0	----	----	----	----
Anthracene	120-12-7	1	µg/L		<1.0	----	----	----	----
Fluoranthene	206-44-0	1	µg/L		<1.0	----	----	----	----
Pyrene	129-00-0	1	µg/L		<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L		<1.0	----	----	----	----
Chrysene	218-01-9	1	µg/L		<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2	1	µg/L		<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L		<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L		<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L		<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L		<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP090: Organotin Compounds (Soluble)									
Tributyltin	56573-85-4	2	ngSn/L		<2	----	----	----	----
Ultra-Trace Nutrients									
Ammonia as N	7664-41-7	0.005	mg/L		**0.033**	----	----	----	----
Nitrite as N	----	0.002	mg/L		**0.060**	----	----	----	----

Analytical Results

Sub-Matrix: SALINE WATER (Matrix: WATER)				Client sample ID	IC	----	----	----	----
				Client sampling date / time	27-Aug-2014 16:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1441369-001	--------	--------	--------	--------
					Result	Result	Result	Result	Result
Ultra-Trace Nutrients - Continued									
^ **Nitrate as N**	14797-55-8	0.002	mg/L		**0.054**	----	----	----	----
Total Nitrogen as N	----	0.05	mg/L		**0.27**	----	----	----	----
Total Phosphorus as P	----	0.005	mg/L		**0.058**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		**65.8**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		**94.6**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		**41.8**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%		**99.5**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%		**74.7**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		**79.5**	----	----	----	----
Anthracene-d10	1719-06-8	1	%		**89.7**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1	%		**91.4**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**117**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**97.0**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**115**	----	----	----	----
EP090S: Organotin Surrogate									
Tripropyltin	----	5	%		**79.4**	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB1441369**	Page	: 1 of 8
Client	: **BMT WBM GROUP LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR BRAD HILES		
Project	: B20259 PoB	Date Samples Received	: 28-Aug-2014 10:45
Site	: ----	Issue Date	: 08-Sep-2014 13:41
Sampler	: BRAD HILES	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 1

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

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 ir compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	WB Water Lab Brisbane
Matt Frost	Senior Organic Chemist	Brisbane Organics

General Comments

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA025: Suspended Solids (QC Lot: 9284)									
EB1441369-001	IC	EA025-SW: Suspended Solids (SS)	----	1	mg/L	39	34	12.9	0% - 20%
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 8759)									
EB1441369-001	IC	EG093B-F: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
		EG093B-F: Iron	7439-89-6	5	µg/L	<5	<5	0.00	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 8760)									
EB1441369-001	IC	EG093A-F: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.00	No Limit
		EG093A-F: Cobalt	7440-48-4	0.2	µg/L	<0.2	<0.2	0.00	No Limit
		EG093A-F: Lead	7439-92-1	0.2	µg/L	<0.2	<0.2	0.00	No Limit
		EG093A-F: Arsenic	7440-38-2	0.5	µg/L	1.1	1.2	0.00	No Limit
		EG093A-F: Chromium	7440-47-3	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EG093A-F: Manganese	7439-96-5	0.5	µg/L	3.7	3.3	10.6	No Limit
		EG093A-F: Nickel	7440-02-0	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EG093A-F: Copper	7440-50-8	1	µg/L	3	3	0.00	No Limit
		EG093A-F: Aluminium	7429-90-5	5	µg/L	<5	<5	0.00	No Limit
		EG093A-F: Zinc	7440-66-6	5	µg/L	<5	<5	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 8761)									
EB1441369-001	IC	EG093B-T: Selenium	7782-49-2	2	µg/L	<2	<2	0.00	No Limit
		EG093B-T: Iron	7439-89-6	5	µg/L	627	670	6.66	0% - 20%
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 8762)									
EB1441369-001	IC	EG093A-T: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.00	No Limit
		EG093A-T: Cobalt	7440-48-4	0.2	µg/L	0.5	0.4	0.00	No Limit
		EG093A-T: Lead	7439-92-1	0.2	µg/L	<0.2	<0.2	0.00	No Limit
		EG093A-T: Arsenic	7440-38-2	0.5	µg/L	1.2	1.2	0.00	No Limit
		EG093A-T: Chromium	7440-47-3	0.5	µg/L	0.9	2.9	106	No Limit
		EG093A-T: Manganese	7439-96-5	0.5	µg/L	18.5	19.8	6.36	0% - 20%
		EG093A-T: Nickel	7440-02-0	0.5	µg/L	1.0	0.8	23.5	No Limit
		EG093A-T: Copper	7440-50-8	1	µg/L	2	2	0.00	No Limit
		EG093A-T: Aluminium	7429-90-5	5	µg/L	378	390	3.10	0% - 20%
		EG093A-T: Zinc	7440-66-6	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 9217)									
EB1441436-021	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 9217) - continued									
EB1441436-021	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EB1441436-028	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
Ultra-Trace Nutrients (QC Lot: 8768)									
EB1441369-001	IC	EK257A-SW: Nitrite as N	----	0.002	mg/L	0.060	0.072	18.9	0% - 20%
Ultra-Trace Nutrients (QC Lot: 8770)									
EB1441369-001	IC	EK255A-SW: Ammonia as N	7664-41-7	0.005	mg/L	0.033	0.028	17.8	No Limit
Ultra-Trace Nutrients (QC Lot: 8771)									
EB1441369-001	IC	EK267PA-SW: Total Phosphorus as P	----	0.005	mg/L	0.058	0.060	3.88	0% - 50%
Ultra-Trace Nutrients (QC Lot: 8772)									
EB1441369-001	IC	EK262PA-SW: Total Nitrogen as N	----	0.05	mg/L	0.27	0.27	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Suspended Solids (QCLot: 9284)								
EA025-SW: Suspended Solids (SS)	----	1	mg/L	<1	150 mg/L	96.8	82	120
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 8759)								
EG093B-F: Iron	7439-89-6	5	µg/L	<5	50 µg/L	91.4	78	123
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	90.8	87	117
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 8760)								
EG093A-F: Aluminium	7429-90-5	5	µg/L	<5	50 µg/L	94.3	85	118
EG093A-F: Arsenic	7440-38-2	0.5	µg/L	<0.5	10 µg/L	95.7	87	116
EG093A-F: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	93.2	88	114
EG093A-F: Chromium	7440-47-3	0.5	µg/L	<0.5	10 µg/L	92.4	86	115
EG093A-F: Cobalt	7440-48-4	0.2	µg/L	<0.2	10 µg/L	94.8	90	114
EG093A-F: Copper	7440-50-8	1	µg/L	<1	20 µg/L	95.1	89	116
EG093A-F: Lead	7439-92-1	0.2	µg/L	<0.2	10 µg/L	92.5	86	117
EG093A-F: Manganese	7439-96-5	0.5	µg/L	<0.5	10 µg/L	91.0	87	119
EG093A-F: Nickel	7440-02-0	0.5	µg/L	<0.5	10 µg/L	89.2	87	117
EG093A-F: Zinc	7440-66-6	5	µg/L	<5	20 µg/L	99.4	81	120
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 8761)								
EG093B-T: Iron	7439-89-6	5	µg/L	<5	50 µg/L	99.3	80	128
EG093B-T: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	91.9	89	119
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 8762)								
EG093A-T: Aluminium	7429-90-5	5	µg/L	<5	50 µg/L	85.3	85	125
EG093A-T: Arsenic	7440-38-2	0.5	µg/L	<0.5	10 µg/L	99.0	86	117
EG093A-T: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	94.6	84	115
EG093A-T: Chromium	7440-47-3	0.5	µg/L	<0.5	10 µg/L	98.8	92	120
EG093A-T: Cobalt	7440-48-4	0.2	µg/L	<0.2	10 µg/L	98.3	86	116
EG093A-T: Copper	7440-50-8	1	µg/L	<1	20 µg/L	97.0	93	119
EG093A-T: Lead	7439-92-1	0.2	µg/L	<0.2	10 µg/L	104	89	120
EG093A-T: Manganese	7439-96-5	0.5	µg/L	<0.5	10 µg/L	91.6	86	124
EG093A-T: Nickel	7440-02-0	0.5	µg/L	<0.5	10 µg/L	95.1	90	120
EG093A-T: Zinc	7440-66-6	5	µg/L	<5	20 µg/L	98.8	81	124
EP068A: Organochlorine Pesticides (OC) (QCLot: 9150)								
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	77.2	52	124
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	77.2	56	122
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	79.7	35	131
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	79.5	52	123

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 9150) - continued								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	76.5	45	125
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	83.7	54	128
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	69.8	39	122
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	85.0	50	126
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	59.6	51	125
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	86.4	53	112
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	81.6	50	124
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	72.8	37	124
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	79.9	47	129
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	67.2	49	131
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	57.1	45	129
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	69.7	42	119
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	84.5	45	118
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	70.2	52	124
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	74.3	41	121
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	116	32	135
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	60.9	48	125
EP068B: Organophosphorus Pesticides (OP) (QCLot: 9150)								
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	# 39.7	44	130
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	62.5	52	124
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	53.2	48	128
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	69.8	50	127
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	73.7	54	119
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	72.8	50	118
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	59.9	44	118
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	69.4	44	129
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	107	49	115
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	69.7	41	111
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	70.2	50	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	48.7	43	121
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	67.9	49	121
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	68.2	51	122
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	# 2.78	16	49
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	72.5	43	123
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	63.8	52	126

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 9150) - continued								
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	61.9	53	126
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 9151)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	77.3	50	104
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	73.0	46	109
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	83.5	48	113
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	91.2	48	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	89.6	49	125
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	93.9	43	130
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	75.5	39	136
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	98.0	44	130
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	85.9	45	119
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	72.3	42	140
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	83.0	48	120
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	77.4	50	114
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	75.1	40	132
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	75.9	47	101
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	81.6	49	114
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	81.9	47	119
EP080: BTEXN (QCLot: 9217)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	98.2	81	119
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	92.0	81	119
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	20 µg/L	98.6	81	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	113	80	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	103	81	121
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	88.7	80	122
EP080: Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
EP090: Organotin Compounds (Soluble) (QCLot: 9102)								
EP090S: Tributyltin	56573-85-4	2	ngSn/L	<2	147 ngSn/L	70.2	20	120
Ultra-Trace Nutrients (QCLot: 8768)								
EK257A-SW: Nitrite as N	----	0.002	mg/L	<0.002	0.1 mg/L	104	70	130
Ultra-Trace Nutrients (QCLot: 8770)								
EK255A-SW: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.1 mg/L	91.7	70	129
Ultra-Trace Nutrients (QCLot: 8771)								
EK267PA-SW: Total Phosphorus as P	----	0.005	mg/L	<0.005	0.42 mg/L	96.0	70	128
Ultra-Trace Nutrients (QCLot: 8772)								
EK262PA-SW: Total Nitrogen as N	----	0.05	mg/L	<0.05	1 mg/L	95.2	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 9217)							
EB1441436-022	Anonymous	EP080: Benzene	71-43-2	10 µg/L	104	70	130
		EP080: Toluene	108-88-3	10 µg/L	91.4	70	130

QA/QC Compliance Assessment for DQO Reporting

Work Order	: **EB1441369**	Page	: 1 of 8
Client	: BMT WBM GROUP LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR BRAD HILES		
Project	: B20259 PoB	Date Samples Received	: 28-Aug-2014 10:45
Site	: ----	Issue Date	: 08-Sep-2014 13:41
Sampler	: BRAD HILES	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP068B: Organophosphorus Pesticides (OP)	QC-9150-002	----	**Azinphos Methyl**	86-50-0	39.7 %	44-130%	**Recovery less than lower control limit**
EP068B: Organophosphorus Pesticides (OP)	QC-9150-002	----	**Monocrotophos**	6923-22-4	2.78 %	16-49%	**Recovery less than lower control limit**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
Ultra-Trace Nutrients						
Miscellaneous Plastic bottle -unpreserved						
IC	29-Aug-2014	28-Aug-2014	**0**	01-Sep-2014	28-Aug-2014	**3**
Miscellaneous Plastic bottle -unpreserved						
IC	29-Aug-2014	28-Aug-2014	**0**	29-Aug-2014	28-Aug-2014	**0**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	1	0	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organotin Compounds (Soluble)	0	1	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	0	9	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	0	1	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)					
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	1	0	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)					
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	1	0	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)					
Ammonia as N - Ultra-Trace in Saline Waters	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	0	0	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organotin Compounds (Soluble)	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	0	9	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	0	1	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Suspended Solids							
Miscellaneous Plastic bottle -unpreserved (EA025-SW)							
IC	**27-Aug-2014**	**02-Sep-2014**	03-Sep-2014	✓	**03-Sep-2014**	03-Sep-2014	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Miscellanous Nitric Preserved - field filtered (EG093A-F)							
IC	**27-Aug-2014**	**29-Aug-2014**	23-Feb-2015	✓	**04-Sep-2014**	23-Feb-2015	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Miscellaneous Nitric preserved - unfiltered (EG093A-T)							
IC	**27-Aug-2014**	**29-Aug-2014**	23-Feb-2015	✓	**03-Sep-2014**	23-Feb-2015	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Miscellanous Nitric Preserved - field filtered (EG093B-F)							
IC	**27-Aug-2014**	**29-Aug-2014**	23-Feb-2015	✓	**04-Sep-2014**	23-Feb-2015	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Miscellaneous Nitric preserved - unfiltered (EG093B-T)							
IC	**27-Aug-2014**	**29-Aug-2014**	23-Feb-2015	✓	**03-Sep-2014**	23-Feb-2015	✓
Ultra-Trace Nutrients							
Miscellaneous Plastic bottle -unpreserved (EK255A-SW)							
IC	**27-Aug-2014**	**29-Aug-2014**	28-Aug-2014	×	**29-Aug-2014**	28-Aug-2014	×
Ultra-Trace Nutrients							
Miscellaneous Plastic bottle -unpreserved (EK257A-SW)							
IC	**27-Aug-2014**	**29-Aug-2014**	28-Aug-2014	×	**29-Aug-2014**	28-Aug-2014	×
Ultra-Trace Nutrients							
Miscellaneous Plastic bottle -unpreserved (EK259A-SW)							
IC	**27-Aug-2014**	**29-Aug-2014**	28-Aug-2014	×	**29-Aug-2014**	28-Aug-2014	×
Ultra-Trace Nutrients							
Miscellaneous Plastic bottle -unpreserved (EK262PA-SW)							
IC	**27-Aug-2014**	**29-Aug-2014**	28-Aug-2014	×	**01-Sep-2014**	28-Aug-2014	×
Ultra-Trace Nutrients							
Miscellaneous Plastic bottle -unpreserved (EK267PA-SW)							
IC	**27-Aug-2014**	**29-Aug-2014**	28-Aug-2014	×	**01-Sep-2014**	28-Aug-2014	×
EP068S: Organochlorine Pesticide Surrogate							
Miscellaneous Glass Bottle - unpreserved (EP068)							
IC	**27-Aug-2014**	**01-Sep-2014**	03-Sep-2014	✓	**03-Sep-2014**	11-Oct-2014	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)S: Phenolic Compound Surrogates							
Miscellaneous Glass Bottle - unpreserved (EP075(SIM))							
IC	**27-Aug-2014**	**01-Sep-2014**	03-Sep-2014	✓	**03-Sep-2014**	11-Oct-2014	✓
EP080/071: Total Petroleum Hydrocarbons							
Clear glass VOC vial - HCl (EP080)							
IC	**27-Aug-2014**	**01-Sep-2014**	10-Sep-2014	✓	**04-Sep-2014**	10-Sep-2014	✓
EP090: Organotin Compounds (Soluble)							
Miscellaneous Glass Bottle - unpreserved (EP090S)							
IC	**27-Aug-2014**	**01-Sep-2014**	03-Sep-2014	✓	**03-Sep-2014**	11-Oct-2014	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	1	0	**0.00**	**10.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organotin Compounds (Soluble)	EP090S	0	1	**0.00**	**10.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	9	**0.00**	**10.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	0	1	**0.00**	**10.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids - Saline Water	EA025-SW	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	1	1	**100.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	16	**12.50**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	1	0	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organotin Compounds (Soluble)	EP090S	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	9	**11.11**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids - Saline Water	EA025-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	1	0	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organotin Compounds (Soluble)	EP090S	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	9	**11.11**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids - Saline Water	EA025-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	1	1	**100.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	0	1	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	0	1	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	0	0	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	0	1	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organotin Compounds (Soluble)	EP090S	0	1	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	9	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	0	1	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	0	1	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	0	1	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	0	1	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids - Saline Water	EA025-SW	WATER	In-House, APHA 21st ed., 2540D A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-T	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	WATER	APHA 21st ed., 4500-NH3 H Ammonia is determined by direct colorimetry by FIA. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by FIA.
Nitrate as N - Ultra-Trace in Saline Waters	EK258A-SW	WATER	APHA 21st ed., 4500-NO3- I Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by FIA. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	WATER	APHA 21st ed., 4500-P J. Persulfate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus. As sample is digested with persulfate under alkaline conditions yielding orthophosphate and nitrate. Following digestion, analytes are determined by flow injection analysis. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	WATER	APHA 21st ed., 4500-P J. Persulfate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus. As sample is digested with persulfate under alkaline conditions yielding orthophosphate and nitrate. Following digestion, analytes are determined by flow injection analysis. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Pesticides by GCMS	EP068	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Organotin Compounds (Soluble)	EP090S	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by GC/MS coupled with high volume injection and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

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