

Appendix H Surface water laboratory Analytical Results

Surface Water Analytical Results - Analysis Results QC02
East Arm Wharf

Location
Sample ID
Date Sampled
Sample Type

SW4
QC02_21/02/11
21/03/2011
Split Duplicate

Analyte	LOR	Units	ANZECC 2000 - Freshwater - 95%	ANZECC 2000 - Marine Water - 95%	
Physico-Chemical Parameters					
pH	0.01	ph unit			6.7
Total Alkalinity	1	mg/L			120
Total Dissolved Solids @180 °C	1	mg/L			800
Total Petroleum Hydrocarbons					
C6-C9 fraction	20	µg/L			<50
C10-C14 fraction	50	µg/L			<50
C15-C28 fraction	100	µg/L			<100
C29-C36 fraction	50	µg/L			<100
Sum of TPH C10 - C36	50	µg/L			ND
BTEX Compounds					
Benzene	1	µg/L	950	700	<1
Toluene	2	µg/L			<1
Ethylbenzene	2	µg/L			<1
m&p-Xylene	2	µg/L			<2
o-Xylene	2	µg/L	350		<1
Total Xylenes		µg/L			ND
Total BTEX		µg/L			ND
Metals (Dissolved)					
Arsenic	0.001	mg/L	0.013		0.001
Barium	0.001	mg/L			0.2
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L	0.001 *	0.0055	<0.0002
Chromium	0.001	mg/L	0.006 *	0.0044	<0.001
Cobalt	0.001	mg/L		0.001	<0.001
Copper	0.001	mg/L	0.008 *	0.0013	0.003
Lead	0.001	mg/L	0.05 *	0.0044	<0.001
Manganese	0.001	mg/L	1.9		0.44
Mercury	0.0001	mg/L	0.0006	0.001	
Nickel	0.001	mg/L	0.06 *	0.07	<0.001
Vanadium	0.01	mg/L		0.001	<0.005
Zinc	0.005	mg/L	0.05 *	0.015	0.006
Metals (Total)					
Arsenic	0.001	mg/L			0.001
Barium	0.001	mg/L			0.22
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L			<0.0002
Chromium	0.001	mg/L			<0.001
Cobalt	0.001	mg/L			<0.001
Copper	0.001	mg/L			0.003
Lead	0.001	mg/L			<0.001
Manganese	0.001	mg/L			0.11
Mercury	0.0001	mg/L			<0.0001
Nickel	0.001	mg/L			<0.001
Vanadium	0.01	mg/L			<0.005
Zinc	0.005	mg/L			0.011
Major Ions					
Calcium	1	mg/L			52
Chloride	1	mg/L			300
Magnesium	1	mg/L			27
Potassium	1	mg/L			9.6
Sodium	1	mg/L			170
Total Anions	0.01	meq/l			-
Total Cations	0.01	meq/l			-
Ionic Balance	0.01	%			-
Physical Properties					
Sulfate as SO4 - Turbidimetric	1	mg/L			60
Alkalinity					
Hydroxide Alkalinity as CaCO3	1	mg/L			-
Carbonate Alkalinity as CaCO3	1	mg/L			-
Bicarbonate Alkalinity as CaCO3	1	mg/L			-
Electrical Conductivity (Lab)					
Electrical Conductivity (Lab)	1	µs/cm			1500

Legend:

Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for marine water ecosystems - Level of protection 95% species
Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for freshwater ecosystems - Level of protection 95% species

- Not analysed / not calculated

* Guideline Value Modified for Hardness

ND - Not Detected

Surface Water Analytical Results - Analysis Results QC01
East Arm Wharf

Location
Sample ID
Date Sampled
Sample Type

SW4
QC01_21/02/11
21/02/2011
Duplicate Sample

Analyte	LOR	Units	ANZECC 2000 - Freshwater - 95%	ANZECC 2000 - Marine Water - 95%	
Physico-Chemical Parameters					
pH	0.01	ph unit			7.41
Total Alkalinity	1	mg/L			122
Total Dissolved Solids @180 °C	1	mg/L			846
Total Petroleum Hydrocarbons					
C6-C9 fraction	20	µg/L			<20
C10-C14 fraction	50	µg/L			<50
C15-C28 fraction	100	µg/L			<100
C29-C36 fraction	50	µg/L			<50
Sum of TPH C10 - C36	50	µg/L			ND
BTEX Compounds					
Benzene	1	µg/L	950	700	<1
Toluene	2	µg/L			<5
Ethylbenzene	2	µg/L			<2
m&p-Xylene	2	µg/L			<2
o-Xylene	2	µg/L	350		<2
Total Xylenes		µg/L			ND
Total BTEX		µg/L			ND
Metals (Dissolved)					
Arsenic	0.001	mg/L	0.013		0.001
Barium	0.001	mg/L			0.219
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L	0.001 *	0.0055	0.0001
Chromium	0.001	mg/L	0.006 *	0.0044	<0.001
Cobalt	0.001	mg/L		0.001	<0.001
Copper	0.001	mg/L	0.009 *	0.0013	0.002
Lead	0.001	mg/L	0.05 *	0.0044	<0.001
Manganese	0.001	mg/L	1.9		0.519
Mercury	0.0001	mg/L	0.0006	0.001	<0.0001
Nickel	0.001	mg/L	0.07 *	0.07	<0.001
Vanadium	0.01	mg/L		0.001	<0.01
Zinc	0.005	mg/L	0.05 *	0.015	<0.005
Metals (Total)					
Arsenic	0.001	mg/L			<0.001
Barium	0.001	mg/L			0.221
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L			<0.0001
Chromium	0.001	mg/L			<0.001
Cobalt	0.001	mg/L			<0.001
Copper	0.001	mg/L			0.003
Lead	0.001	mg/L			<0.001
Manganese	0.001	mg/L			0.519
Mercury	0.0001	mg/L			<0.0001
Nickel	0.001	mg/L			<0.001
Vanadium	0.01	mg/L			<0.01
Zinc	0.005	mg/L			<0.005
Major Ions					
Calcium	1	mg/L			54
Chloride	1	mg/L			310
Magnesium	1	mg/L			29
Potassium	1	mg/L			12
Sodium	1	mg/L			201
Total Anions	0.01	meq/l			14.3
Total Cations	0.01	meq/l			14.2
Ionic Balance	0.01	%			0.6
Physical Properties					
Sulfate as SO4 - Turbidimetric	1	mg/L			151
Alkalinity					
Hydroxide Alkalinity as CaCO3	1	mg/L			<1
Carbonate Alkalinity as CaCO3	1	mg/L			<1
Bicarbonate Alkalinity as CaCO3	1	mg/L			122
Electrical Conductivity (Lab)					
Electrical Conductivity (Lab)	1	µs/cm			1500

Legend:

Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for marine water ecosystems - Level of protection 95% species
Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for freshwater ecosystems - Level of protection 95% species

- Not analysed / not calculated

* Guideline Value Modified for Hardness

ND - Not Detected

Surface Water Analytical Results - Analysis Results SW4
East Arm Wharf

Location
Sample ID
Date Sampled
Sample Type

SW4
SW4_21/02/11
21/02/2011
Primary Sample

Analyte	LOR	Units	ANZECC 2000 - Freshwater - 95%	ANZECC 2000 - Marine Water - 95%	
Physico-Chemical Parameters					
pH	0.01	ph unit			7.32
Total Alkalinity	1	mg/L			122
Total Dissolved Solids @180 °C	1	mg/L			872
Total Petroleum Hydrocarbons					
C6-C9 fraction	20	µg/L			<20
C10-C14 fraction	50	µg/L			<50
C15-C28 fraction	100	µg/L			<100
C29-C36 fraction	50	µg/L			<50
Sum of TPH C10 - C36	50	µg/L			ND
BTEX Compounds					
Benzene	1	µg/L	950	700	<1
Toluene	2	µg/L			<5
Ethylbenzene	2	µg/L			<2
m&p-Xylene	2	µg/L			<2
o-Xylene	2	µg/L	350		<2
Total Xylenes		µg/L			ND
Total BTEX		µg/L			ND
Metals (Dissolved)					
Arsenic	0.001	mg/L	0.013		<0.001
Barium	0.001	mg/L			0.219
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L	0.001 *	0.0055	<0.0001
Chromium	0.001	mg/L	0.006 *	0.0044	<0.001
Cobalt	0.001	mg/L		0.001	<0.001
Copper	0.001	mg/L	0.009 *	0.0013	0.002
Lead	0.001	mg/L	0.05 *	0.0044	<0.001
Manganese	0.001	mg/L	1.9		0.454
Mercury	0.0001	mg/L	0.0006	0.001	<0.0001
Nickel	0.001	mg/L	0.07 *	0.07	<0.001
Vanadium	0.01	mg/L		0.001	<0.01
Zinc	0.005	mg/L	0.05 *	0.015	<0.005
Metals (Total)					
Arsenic	0.001	mg/L			0.001
Barium	0.001	mg/L			0.244
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L			<0.0001
Chromium	0.001	mg/L			<0.001
Cobalt	0.001	mg/L			<0.001
Copper	0.001	mg/L			0.003
Lead	0.001	mg/L			<0.001
Manganese	0.001	mg/L			0.541
Mercury	0.0001	mg/L			<0.0001
Nickel	0.001	mg/L			<0.001
Vanadium	0.01	mg/L			<0.01
Zinc	0.005	mg/L			<0.005
Major Ions					
Calcium	1	mg/L			55
Chloride	1	mg/L			306
Magnesium	1	mg/L			30
Potassium	1	mg/L			12
Sodium	1	mg/L			199
Total Anions	0.01	meq/l			14.2
Total Cations	0.01	meq/l			14.2
Ionic Balance	0.01	%			0.2
Physical Properties					
Sulfate as SO4 - Turbidimetric	1	mg/L			151
Alkalinity					
Hydroxide Alkalinity as CaCO3	1	mg/L			<1
Carbonate Alkalinity as CaCO3	1	mg/L			<1
Bicarbonate Alkalinity as CaCO3	1	mg/L			122
Electrical Conductivity (Lab)					
Electrical Conductivity (Lab)	1	µs/cm			1500

Legend:

Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for marine water ecosystems - Level of protection 95% species
Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for freshwater ecosystems - Level of protection 95% species

- Not analysed / not calculated

* Guideline Value Modified for Hardness

ND - Not Detected

Surface Water Analytical Results - Analysis Results SW3
East Arm Wharf

Location
Sample ID
Date Sampled
Sample Type

SW3
SW3_21/02/11
21/02/2011
Primary Sample

Analyte	LOR	Units	ANZECC 2000 - Freshwater - 95%	ANZECC 2000 - Marine Water - 95%	
Physico-Chemical Parameters					
pH	0.01	ph unit			6.21
Total Alkalinity	1	mg/L			46
Total Dissolved Solids @180 °C	1	mg/L			1130
Total Petroleum Hydrocarbons					
C6-C9 fraction	20	µg/L			<20
C10-C14 fraction	50	µg/L			<50
C15-C28 fraction	100	µg/L			<100
C29-C36 fraction	50	µg/L			<50
Sum of TPH C10 - C36	50	µg/L			ND
BTEX Compounds					
Benzene	1	µg/L	950	700	<1
Toluene	2	µg/L			<5
Ethylbenzene	2	µg/L			<2
m&p-Xylene	2	µg/L			<2
o-Xylene	2	µg/L	350		<2
Total Xylenes		µg/L			ND
Total BTEX		µg/L			ND
Metals (Dissolved)					
Arsenic	0.001	mg/L	0.013		0.001
Barium	0.001	mg/L			0.26
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L	0.001 *	0.0055	0.0001
Chromium	0.001	mg/L	0.005 *	0.0044	<0.001
Cobalt	0.001	mg/L		0.001	0.021
Copper	0.001	mg/L	0.007 *	0.0013	<0.001
Lead	0.001	mg/L	0.04 *	0.0044	<0.001
Manganese	0.001	mg/L	1.9		6.05
Mercury	0.0001	mg/L	0.0006	0.001	<0.0001
Nickel	0.001	mg/L	0.06 *	0.07	0.005
Vanadium	0.01	mg/L		0.001	<0.01
Zinc	0.005	mg/L	0.04 *	0.015	0.023
Metals (Total)					
Arsenic	0.001	mg/L			<0.001
Barium	0.001	mg/L			0.24
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L			0.0001
Chromium	0.001	mg/L			<0.001
Cobalt	0.001	mg/L			0.019
Copper	0.001	mg/L			0.001
Lead	0.001	mg/L			<0.001
Manganese	0.001	mg/L			5.86
Mercury	0.0001	mg/L			<0.0001
Nickel	0.001	mg/L			0.005
Vanadium	0.01	mg/L			<0.01
Zinc	0.005	mg/L			0.025
Major Ions					
Calcium	1	mg/L			30
Chloride	1	mg/L			574
Magnesium	1	mg/L			33
Potassium	1	mg/L			13
Sodium	1	mg/L			307
Total Anions	0.01	meq/l			18.6
Total Cations	0.01	meq/l			17.9
Ionic Balance	0.01	%			1.8
Physical Properties					
Sulfate as SO4 - Turbidimetric	1	mg/L			70
Alkalinity					
Hydroxide Alkalinity as CaCO3	1	mg/L			<1
Carbonate Alkalinity as CaCO3	1	mg/L			<1
Bicarbonate Alkalinity as CaCO3	1	mg/L			46
Electrical Conductivity (Lab)					
Electrical Conductivity (Lab)	1	µs/cm			1610

Legend:

Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for marine water ecosystems - Level of protection 95% species
Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for freshwater ecosystems - Level of protection 95% species

- Not analysed / not calculated

* Guideline Value Modified for Hardness

ND - Not Detected

Surface Water Analytical Results - Analysis Results SW2
East Arm Wharf

Location
Sample ID
Date Sampled
Sample Type

SW2
SW2_21/02/11
21/02/2011
Primary Sample

Analyte	LOR	Units	ANZECC 2000 - Freshwater - 95%	ANZECC 2000 - Marine Water - 95%	
Physico-Chemical Parameters					
pH	0.01	ph unit			5.25
Total Alkalinity	1	mg/L			1
Total Dissolved Solids @180°C	1	mg/L			181
Total Petroleum Hydrocarbons					
C6-C9 fraction	20	µg/L			<20
C10-C14 fraction	50	µg/L			<50
C15-C28 fraction	100	µg/L			<100
C29-C36 fraction	50	µg/L			<50
Sum of TPH C10 - C36	50	µg/L			ND
BTEX Compounds					
Benzene	1	µg/L	950	700	<1
Toluene	2	µg/L			<5
Ethylbenzene	2	µg/L			<2
m&p-Xylene	2	µg/L			<2
o-Xylene	2	µg/L	350		<2
Total Xylenes		µg/L			ND
Total BTEX		µg/L			ND
Metals (Dissolved)					
Arsenic	0.001	mg/L	0.013		<0.001
Barium	0.001	mg/L			0.031
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L	0.0003 *	0.0055	0.0001
Chromium	0.001	mg/L	0.001 *	0.0044	<0.001
Cobalt	0.001	mg/L		0.001	0.004
Copper	0.001	mg/L	0.002 *	0.0013	<0.001
Lead	0.001	mg/L	0.005 *	0.0044	0.001
Manganese	0.001	mg/L	1.9		0.059
Mercury	0.0001	mg/L	0.0006	0.0004	<0.0001
Nickel	0.001	mg/L	0.01 *	0.07	0.004
Vanadium	0.01	mg/L		0.1	<0.01
Zinc	0.005	mg/L	0.01 *	0.015	0.016
Metals (Total)					
Arsenic	0.001	mg/L			<0.001
Barium	0.001	mg/L			0.036
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L			<0.0001
Chromium	0.001	mg/L			<0.001
Cobalt	0.001	mg/L			0.004
Copper	0.001	mg/L			<0.001
Lead	0.001	mg/L			0.002
Manganese	0.001	mg/L			0.058
Mercury	0.0001	mg/L			<0.0001
Nickel	0.001	mg/L			0.003
Vanadium	0.01	mg/L			<0.01
Zinc	0.005	mg/L			0.007
Major Ions					
Calcium	1	mg/L			5
Chloride	1	mg/L			64
Magnesium	1	mg/L			7
Potassium	1	mg/L			<1
Sodium	1	mg/L			24
Total Anions	0.01	meq/l			1.93
Total Cations	0.01	meq/l			1.92
Ionic Balance	0.01	%			-
Physical Properties					
Sulfate as SO4 - Turbidimetric	1	mg/L			5
Alkalinity					
Hydroxide Alkalinity as CaCO3	1	mg/L			<1
Carbonate Alkalinity as CaCO3	1	mg/L			<1
Bicarbonate Alkalinity as CaCO3	1	mg/L			1
Electrical Conductivity (Lab)					
Electrical Conductivity (Lab)	1	µs/cm			206

Legend:

Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for marine water ecosystems - Level of protection 95% species
Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for freshwater ecosystems - Level of protection 95% species

- Not analysed / not calculated

* Guideline Value Modified for Hardness

ND - Not Detected

Surface Water Analytical Results - Analysis Results SW1
East Arm Wharf

Location
Sample ID
Date Sampled
Sample Type

SW1
SW1_21/02/11
21/02/2011
Primary Sample

Analyte	LOR	Units	ANZECC 2000 - Freshwater - 95%	ANZECC 2000 - Marine Water - 95%	
Physico-Chemical Parameters					
pH	0.01	ph unit			7.22
Total Alkalinity	1	mg/L			13
Total Dissolved Solids @180 °C	1	mg/L			726
Total Petroleum Hydrocarbons					
C6-C9 fraction	20	µg/L			<20
C10-C14 fraction	50	µg/L			<50
C15-C28 fraction	100	µg/L			<100
C29-C36 fraction	50	µg/L			<50
Sum of TPH C10 - C36	50	µg/L			ND
BTEX Compounds					
Benzene	1	µg/L	950	700	<1
Toluene	2	µg/L			<5
Ethylbenzene	2	µg/L			<2
m&p-Xylene	2	µg/L			<2
o-Xylene	2	µg/L	350		<2
Total Xylenes		µg/L			ND
Total BTEX		µg/L			ND
Metals (Dissolved)					
Arsenic	0.001	mg/L	0.013		<0.001
Barium	0.001	mg/L			0.061
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L	0.001 *	0.0055	0.0002
Chromium	0.001	mg/L	0.004 *	0.0044	<0.001
Cobalt	0.001	mg/L		0.001	0.003
Copper	0.001	mg/L	0.006 *	0.0013	0.006
Lead	0.001	mg/L	0.032 *	0.0044	<0.001
Manganese	0.001	mg/L	1.9		0.124
Mercury	0.0001	mg/L	0.0006	0.001	<0.0001
Nickel	0.001	mg/L	0.049 *	0.07	0.004
Vanadium	0.01	mg/L		0.001	<0.01
Zinc	0.005	mg/L	0.036 *	0.015	0.018
Metals (Total)					
Arsenic	0.001	mg/L			<0.001
Barium	0.001	mg/L			0.073
Beryllium	0.001	mg/L			<0.001
Cadmium	0.0001	mg/L			0.0007
Chromium	0.001	mg/L			<0.001
Cobalt	0.001	mg/L			0.003
Copper	0.001	mg/L			0.012
Lead	0.001	mg/L			0.003
Manganese	0.001	mg/L			0.12
Mercury	0.0001	mg/L			<0.0001
Nickel	0.001	mg/L			0.003
Vanadium	0.01	mg/L			<0.01
Zinc	0.005	mg/L			0.014
Major Ions					
Calcium	1	mg/L			29
Chloride	1	mg/L			346
Magnesium	1	mg/L			25
Potassium	1	mg/L			3
Sodium	1	mg/L			161
Total Anions	0.01	meq/l			11
Total Cations	0.01	meq/l			10.6
Ionic Balance	0.01	%			1.73
Physical Properties					
Sulfate as SO4 - Turbidimetric	1	mg/L			46
Alkalinity					
Hydroxide Alkalinity as CaCO3	1	mg/L			<1
Carbonate Alkalinity as CaCO3	1	mg/L			<1
Bicarbonate Alkalinity as CaCO3	1	mg/L			13
Electrical Conductivity (Lab)					
Electrical Conductivity (Lab)	1	µs/cm			943

Legend:

Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for marine water ecosystems - Level of protection 95% species
Exceeds the ANZECC/ARMCANZ, 2000, Trigger values for freshwater ecosystems - Level of protection 95% species

- Not analysed / not calculated

* Guideline Value Modified for Hardness

ND - Not Detected