



## Analytical Results

Matrix: WATER				Client sample ID	OEM	OSM	ONM	OWM	OCM
Sub-Matrix: WATER				Client sampling date / time	09-Dec-2020 09:30	09-Dec-2020 09:45	09-Dec-2020 09:50	09-Dec-2020 09:55	09-Dec-2020 10:05
Compound	CAS#	LOR	Unit	JD2002720-001	JD2002720-002	JD2002720-003	JD2002720-004	JD2002720-005	
<b>MAJOR CATIONS &amp; ANIONS - TOTAL</b>									
Sodium	7440-23-5	1	mg/L	11900	11800	12400	12000	11700	
Sulfate as SO4 2-	14808-79-8	1	mg/L	3180	3180	3390	3250	3150	
<b>METALS - TOTAL</b>									
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
<b>NUTRIENTS</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.15	0.13	0.11	0.08	0.08	
^ Inorganic Nitrogen as N	----	0.01	mg/L	0.15	0.13	0.11	0.08	0.08	
^ Phosphate as PO4-P	----	0.01	mg/L	0.05	0.09	0.05	0.05	0.04	
Total Kjeldahl Nitrogen as N	----	0.10	mg/L	0.43	0.21	0.40	0.16	<0.10	
Total Phosphorus as P	----	0.01	mg/L	0.05	0.09	0.05	0.05	0.04	
<b>PHYSICAL PARAMETERS</b>									
Total Suspended Solids	----	1	mg/L	<1	<1	<1	<1	<1	
<b>TOTAL PETROLEUM HYDROCARBON (TPH)</b>									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20	
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
C37 - C40 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
^ C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100	
<b>VOLATILE ORGANIC COMPOUNDS - SURROGATES</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	92.1	94.8	96.1	96.3	96.2	
Toluene-D8	2037-26-5	2	%	104	101	88.6	104	88.9	
4-Bromofluorobenzene	460-00-4	2	%	94.2	92.9	90.9	91.2	92.3	



## Analytical Results

Matrix: WATER		Client sample ID		SOM	----	----	----	----
Sub-Matrix: WATER		Client sampling date / time		09-Dec-2020 10:10	----	----	----	----
Compound	CAS#	LOR	Unit	JD2002720-006	-----	-----	-----	-----
<b>MAJOR CATIONS &amp; ANIONS - TOTAL</b>								
Sodium	7440-23-5	1	mg/L	11700	----	----	----	----
Sulfate as SO4 2-	14808-79-8	1	mg/L	3210	----	----	----	----
<b>METALS - TOTAL</b>								
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Iron	7439-89-6	0.01	mg/L	<0.01	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
<b>NUTRIENTS</b>								
Ammonia as N	7664-41-7	0.01	mg/L	0.08	----	----	----	----
^ Inorganic Nitrogen as N	----	0.01	mg/L	0.08	----	----	----	----
^ Phosphate as PO4-P	----	0.01	mg/L	0.05	----	----	----	----
Total Kjeldahl Nitrogen as N	----	0.10	mg/L	0.17	----	----	----	----
Total Phosphorus as P	----	0.01	mg/L	0.05	----	----	----	----
<b>PHYSICAL PARAMETERS</b>								
Total Suspended Solids	----	1	mg/L	<1	----	----	----	----
<b>TOTAL PETROLEUM HYDROCARBON (TPH)</b>								
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	----	----	----	----
C37 - C40 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
<b>VOLATILE ORGANIC COMPOUNDS - SURROGATES</b>								
1,2-Dichloroethane-D4	17060-07-0	2	%	94.3	----	----	----	----
Toluene-D8	2037-26-5	2	%	99.5	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	99.9	----	----	----	----

### Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS#	Low	High
<b>VOLATILE ORGANIC COMPOUNDS - SURROGATES</b>			
1,2-Dichloroethane-D4	17060-07-0	66	138
4-Bromofluorobenzene	460-00-4	74	118
Toluene-D8	2037-26-5	79	120

## Brief Method Summaries

The analytical procedures used by the Life Sciences Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA AS, NEPM, FDA/BAM, AOAC, ISO etc. In house developed procedures are employed in the absence of documented standards or by client request.

Analytical Methods	Method	Matrix	Method Descriptions
Total Suspended Solids - Low Level	EA025	WATER	APHA 2540 D, 23rd ed. 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 .
Total Recoverable Sulfate as SO4 2-	ED040T	WATER	US EPA 6010 ICP/AES, Samples are digested by USEPA 3005 prior to analysis. The ICPAES technique ionises the filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification.
Total Recoverable Major Cations by ICPAES	ED093T	WATER	US EPA 6010 ICP/AES; Samples are digested by USEPA 3005 prior to analysis. The ICPAES technique ionises the filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	US EPA 6020 ICP/MS; Samples are digested using nitric & hydrochloric acids prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N/NH3	EK055-G	WATER	SM 4500-NH3 H, APHA 23rd ed. / Aquakem NH3-W-P-V. Ammonia is determined by direct colorimetry via discrete analyser.
Total Kjeldahl Nitrogen as N	EK061-G	WATER	APHA 4500-Norg, 23rd ed; Aquakem Labmedics TKN002; Samples are digested using a traditional Kjeldahl digestion followed by determination via discrete analyser.
Inorganic Nitrogen as N	EK063-G	WATER	APHA 4500-NH3 / 4500-NO3- 23rd ed., Inorganic Nitrogen is calculated as the addition of Ammonia and NOx.
Total Phosphorus as P	EK067-G	WATER	APHA 4500-P H, 23rd ed. Samples are digested using a traditional Kjeldahl digestion followed by determination via discrete analyser. Phosphate calculated (if required) by multiplying 3.065 with TP result.
TPH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015B (M); The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards.
TPH Volatiles/BTEX	EP080	WATER	US EPA 8260 P&T GC/MS; Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve.

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25-AES	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS.
Digestion for Total Recoverable Metals	EN25-MS	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS.
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 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.
Volatile Sample 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.
Preparation for TKN / TP	TKN/TP-PREP	WATER	Preparation for TKN / TP

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Work Order : JD2002720  
Client : KING ABDULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY (KAUST)  
Project : KAUST- Marine Water Analysis

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A \*\* symbol preceding any method indicates laboratory or subcontractor non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited. Please refer to General Comment section on front page for information. If the report contains subcontracted analysis, those are made in a subcontracted laboratory.

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