Test Report No. [2/01081/21]

Customer Information

Customer	TetraTech International Development
Samples Count	26
Samples Received on	13/09/2021
Condition of received sample(s)	Accepted
Report Issuance Date	26/09/2021

Project Information

Analysis Order No.	221091301081
Sampled On	13/09/2021 12:50:00
Sample ID(s)	2-2103567 :: 2-2103592
Date of Test	13/09/2021
Sampling	* EL-WQ-SOP-01, EL-WQ-S
Tests Fees	Against Contract

Eng. Mwaffaq Al-Khu

Laboratories Dire

- Test results represent the sample that is sent to BEN HAYYAN - Aqaba International Laboratories by the customer. It may not represent the whole p
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Test Results:

	Total THMs * Method: (EL-OL-SOP-001) Unit: ug/L	Free Cl2 * Method: (EL-WL-SOP-007) Unit: mg/L
(2-2103567) Bathing Water-Kemapco Cooling Water Outlet At Source Surface	**<16.0**	**<0.10**
(2-2103568) Bathing Water-Kemapco Cooling Water Outlet At Source Surface2	**<16.0**	**<0.10**
(2-2103569) Bathing Water-Kemapco Cooling Water Marina Open Sea Interface	**<16.0**	**<0.10**
(2-2103570) Bathing Water-Kemapco Cooling Water Marina Open Sea Interface	**<16.0**	**<0.10**
(2-2103571) Bathing Water-Kemapco Cooling Water Marina Open Sea Interface	**<16.0**	**<0.10**
(2-2103572) Bathing Water-Kemapco Cooling Water Marina Open Sea Interface	**<16.0**	**<0.10**
(2-2103573) Bathing Water -Jpmc Ic Cooling Water Outlet Surface	**<16.0**	**<0.10**
(2-2103574) Bathing Water -Jpmc Ic Cooling Water Outlet Surface 2	**<16.0**	**<0.10**
(2-2103575) Bathing Water -Jpmc Ic Cooling Water Outlet -At Source 25 M	**<16.0**	**<0.10**
(2-2103576) Bathing Water -Jpmc Ic Cooling Water Outlet -At Source 25 M	**<16.0**	**<0.10**

	Total THMs * Method: (EL-OL-SOP-001) Unit: ug/L	Free Cl2 * Method: (EL-WL-SOP-007) Unit: mg/L
(2-2103577) Bathing Water -Aawdc Proposed Intake Surface	**<16.0**	**<0.10**
(2-2103578) Bathing Water -Aawdc Proposed Intake Surface 2	**<16.0**	**<0.10**
(2-2103579) Bathing Water -Aawdc Proposed Intake Near Bottom 15 M Depth	**<16.0**	**<0.10**
(2-2103580) Bathing Water -Aawdc Proposed Intake Near Bottom 15 M Depth 2	**<16.0**	**<0.10**
(2-2103581) Bathing Water -Thermal Power Station Cooling Water Outfall	**<16.0**	**<0.10**
(2-2103582) Bathing Water -Thermal Power Station Cooling Water Outfall	**<16.0**	**<0.10**
(2-2103583) Bathing Water -Thermal Power Station Cooling Water Outfall At	**<16.0**	**<0.10**
(2-2103584) Bathing Water -Thermal Power Station Cooling Water Outfall At	**<16.0**	**<0.10**
(2-2103585) Bathing Water -Aqapa Marina Reseve Visitors Center Surface	**<16.0**	**0.18**
(2-2103586) Bathing Water -Aqapa Marina Reseve Visitors Center Surface 2	**<16.0**	**<0.10**
(2-2103587) Bathing Water -Aqapa Marina Reseve Visitors Center 20 M	**<16.0**	**<0.10**

	Total THMs * Method: (EL-OL-SOP-001) Unit: ug/L	Free Cl2 * Method: (EL-WL-SOP-007) Unit: mg/L
(2-2103588) Bathing Water -Aqapa Marina Reseve Visitors Center 20 M	**<16.0**	**0.11**
(2-2103589) Bathing Water -Aqapa Marina Reseve Marina Science Station	**<16.0**	**0.11**
(2-2103590) Bathing Water -Aqapa Marina Reseve Marina Science Station	**<16.0**	**<0.10**
(2-2103591) Bathing Water -Aqapa Marina Reseve Marina Science Station	**<16.0**	**<0.10**
(2-2103592) Bathing Water -Aqapa Marina Reseve Marina Science Station	**<16.0**	**<0.10**

Approval of Test Results:

Dr. Abdalmajeed Al

(*) Within the accreditation scope
(N.D) Not Detected

Water Quality Measu
Division Hea

Note:
- This test report consits of (4) pages including the cover page. It shall only be reproduced in full. The results are only the sample(s) / location(s) mentioned in this report.

- Expanded uncertainty for each reported value (K=2, of 95% probability) is separately provided.

Aqaba Special Economic Zone Authority (ASEZA), P.O. 2565, Aqaba 77110, Jordan
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Test Report No. [2/01085/21]

Customer Information

Customer	TetraTech International Development
Samples Count	6
Samples Received on	14/09/2021
Condition of received sample(s)	Accepted
Report Issuance Date	26/09/2021

Project Information

Analysis Order No.	221091401085
Sampled On	14/09/2021 10:30:00
Sample ID(s)	2-2103600 :: 2-2103605
Date of Test	14/09/2021
Sampling	* EL-WQ-SOP-01, EL-WQ-S
Tests Fees	Against Contract

Eng. Mwaffaq Al-Khu

Laboratories Dire

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Test Results:

	Total THMs * Method: (EL-OL-SOP-001) Unit: ug/L	Free Cl2 * Method: (EL-WL-SOP-007) Unit: mg/L
(2-2103600) Tala Bay -Marina Inside Central Surface	**<16.0**	**<0.10**
(2-2103601) Tala Bay -Marina Inside Central Surface 2	**<16.0**	**<0.10**
(2-2103602) Tala Bay -Marina Open Sea Interface Surface	**<16.0**	**<0.10**
(2-2103603) Tala Bay -Marina Open Sea Interface Surface 2	**<16.0**	**<0.10**
(2-2103604) Tala Bay -Marina Open Sea Interface Bottom 20M Depth	**<16.0**	**<0.10**
(2-2103605) Tala Bay -Marina Open Sea Interface Bottom 20M Depth 2	**<16.0**	**<0.10**

Approval of Test Results:

Dr. Abdalmajeed Al

(*) Within the accreditation scope
(N.D) Not Detected

Water Quality Measu
Division Hea

Note:
- This test report consits of (3) pages including the cover page. It shall only be reproduced in full. The results are only the sample(s) / location(s) mentioned in this report.

- Expanded uncertainty for each reported value (K=2, of 95% probability) is separately provided.

Aqaba Special Economic Zone Authority (ASEZA), P.O. 2565, Aqaba 77110, Jordan
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Jordanian Accreditation System
نظام الاعتماد الأردني
Accreditation Unit

Certificate of Accreditation

The certificate number: JAS Test– 040

Aqaba International Laboratories - Ben Hayyan / Aqaba Special Economic Zone Authority

Tel: 03-2090666, Fax: 03-2090688
P.O. Box: 2565 PC Aqaba 77110 Jordan
E-mail: wabutuaimeh@aseza.jo

As this lab is competent under the terms of the "Instructions for Administration of Accreditation Procedures of Conformity Assessment Bodies No. (4) for the Year 2016" and the requirements of the International Standard ISO/IEC 17025:2017 to carry out:

Chemical and Microbiological Testing of Food and Water and Wastewater and Sampling of Drinking Water and Wastewater according to Annex No. (1)

and Testing of Wheat Impurities according to Annex No. (2)

and Testing of Ambient air and Indoor & outdoor Noise according to Annex No. (3)

Issued in Amman on: 08-07-2018 and is valid until: 07-07-2023.
This certificate was updated on: 2021-07-13.

Accreditation Unit Director

Eng. Lana Marashdeh

- The annex and the documents submitted in connection with the accreditation certificate are deemed to form an integral part of the certificate. Thereof any amendments made to the certificate are to be reflected also on them.
- The approved and most recent version of this document can be viewed on AU website at http://www.au.gov.jo/AU_directory.htm
- The accredited laboratory is obliged to issue test reports carrying the accreditation Symbol only in the scope of accreditation specified in Annex no. (1),(2) and (3), and according to the internal instructions "Conditions of using JAS Symbol and logo No.(6) for the year 2016 and its amendment No. (1) for the year 2017" prepared by the Accreditation Unit.
- The Accreditation Unit is authorized to withdraw this accreditation certificate if the requirements specified in the "Instructions for Administration of Accreditation Procedures of Conformity Assessment Bodies" No.(4) for the year 2016 and the ISO/IEC 17025:2017 are no longer met.

Annex (1)

To the Accreditation Certificate No. JAS Test - 040 Dated 08/07/2018

For Aqaba International Laboratories - Ben Hayyan /

Aqaba Special Economic Zone Authority

Scope of Accreditation

Chemical & Microbiological Testing of Food and Water and Wastewater and Sampling of Drinking Water and Wastewater

Tested Parameter/ Type of Test/ Measured Quantity	Test Methods/ Standards
Chemical Analysis of Food	
Aflatoxins: B1, B2, G1 and G2	▪ SOP No. FL– OL– SOP-001 , Rev. No./ Date:01/01.03.17 Determination Of Aflatoxins: B1, B2, G1 And G2 In Cashew, Pistachio, Peanut, Wheat, Rice Almond. By Quechers/HPLC.
Nitrite	▪ BS 4401-8:1976 for determination of Nitrite In Cured Meat By Photometric Measurement
Titratable Acidity	▪ Jordanian Standard JS 1359:2012 (ISO 6091:2010) for Determination Of Titratable Acidity Of Dried Milk By Potentiometrically Titration ▪ BS 1741 – 10.1:1989 for Determination Of Titratable Acidity Of Liquid Milk By Titrimetricdetermination
Acidity & Acid value	▪ AOAC,940.28, 2019 for the Determination Of Acidity And Acid Value Of Refined Oils & Crude Oils By Titrimetric Determination
Peroxide Value	▪ AOAC, 965.33, 2019 for the Determination Of Peroxide Value Of Fats And Oils By Titrimetric Determination
Sodium Benzoate and Potassium sorbate	▪ SOP No. FL-OL-SOP-005 , Rev. No./ Date:04/17.11.11 for Determination Of Sodium Benzoate And Potassium Sorbate For Jam , Pickles ,Milk Products.
Fe, Cu, Zn, Pb, Cd, As,Sn,Hg,Na, K,Ca and Mg	▪ SOP No.FL- IL- SOP- 005, Rev. No/ Date: 00/13.04.17 for Determination of Metals in Food Samples By Inductively Coupled Plasma /Mass Spectrometry (ICP/MS)
BHT and BHA for oil	▪ SOP No.FL-OL-SOP-011, Rev. No./ Date:03/1.12.15 for Determination of BHT and BHA content in Oils and Fats
Ethanol	▪ SOP No.FL-OL-SOP-008, Rev. No./ Date:03/17.11.11 for Determination of Ethanol in Juices
Fat	▪ AOAC 2007.04, 2019 for Determination Of Fat In Meat/ Meat Products by NIR
Moisture	▪ AOAC 2007.04, 2019 for Determination Of Moisture In Meat/ Meat Products by NIR
Protein	▪ AOAC 2007.04, 2019 for Determination Of Protein In Meat/ Meat Products by NIR
Histamine	▪ SOP NO. FL-PE-SOP-010, Rev No./ Date:01/22.03.18 for Determine of Histamine by ELISA technique

Annex (1)

To the Accreditation Certificate No. JAS Test - 040 Dated 08/07/2018

For Aqaba International Laboratories - Ben Hayyan /

Aqaba Special Economic Zone Authority

Scope of Accreditation

Chemical & Microbiological Testing of Food and Water and Wastewater and Sampling of Drinking Water and Wastewater

Tested Parameter/ Type of Test/ Measured Quantity	Test Methods/ Standards
Chemical Analysis of Drinking Water and Domestic Waste Water	
pH	▪ SM 4500-H+ B. Electrometric method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Total Dissolved Solids (TDS)	▪ SM 2540 C Total Dissolved Solids dried at 180 0C, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Total Hardness	▪ SM 2340 C Titrimetric Method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Turbidity	▪ SM 2130 B Nephelometric method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Electrical Conductivity	▪ SM-2510 B Laboratory Method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Chlorine	▪ SM-4500- Cl G. DPD Colorimetric Method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Total suspended solids	▪ SM-2540 D Total suspended solids dried at 103 – 105 0C, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Chemical Oxygen Demand (COD)	▪ SM-5220C , Closed Reflux Method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Alkalinity	▪ SM-2320 B, SM 2310 B Potentiometric titration, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
(Cl, F, PO4, NO2, NO3, SO4)	▪ SM 4110 B Ion Chromatography with Chemical Suppression of Eluent Conductivity Method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
(Fe, Cu, Zn, Mn, Na, K, Ca, Mg, Cd, Pb, Ni, Cr, Co, Be, Li, Al, Mo, Ba, V, Ag, Sb, As, Se, Hg, Sn, Sr, B and Si)	▪ SOP No.EL-IL-SOP-015 -Determination of Metals in water By Inductively Coupled Plasma /Mass Spectrometry (ICP/MS),Rev. No/ Date: 00/13.04.17
Chemical Analysis of Drinking Water and Domestic Waste Water	
Cyanide (CN)	▪ SM 4500- CN F Ion Selective Electrode Method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.

Annex (1)

To the Accreditation Certificate No. JAS Test - 040 Dated 08/07/2018

For Aqaba International Laboratories - Ben Hayyan /

Aqaba Special Economic Zone Authority

Scope of Accreditation

Chemical & Microbiological Testing of Food and Water and Wastewater and Sampling of Drinking Water and Wastewater

Tested Parameter/ Type of Test/ Measured Quantity	Test Methods/ Standards
Chemical Analysis of Drinking Water and Domestic Waste Water	
Total Nitrogen, Kjeldahl	▪ SM 4500-Norg B, Macro- KJELDAHL Method, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Color	▪ SM 2120 B, Visual Comparison, Standard Methods for the Examination of Water and Wastewater, 23rd edition, 2017.
Chemical Analysis of Drinking Water	
THMs (Chloroform, Dichlorobromomethane Dibromochloromethane Bromoform)	• SOP NO. EL-OL-SOP-001 - determination of volatile organic compounds (vocs & thms) in water by headspace capillary-column gas chromatography/mass spectrometric method - Rev. No/ Date: 03/17.11.11
VOCs (Benzene, Tetrachloroethylene Trichloroethylene, Ethyl benzene,Total Xylene, Toluene)	• SOP NO. EL-OL-SOP-001 - determination of volatile organic compounds (vocs & thms) in water by headspace capillary-column gas chromatography/mass spectrometric method - Rev. No/ Date: 03/17.11.11
Organochlorine. Pesticides (Endrin, Lindane, Heptachlor, Heptachlor Epoxide, Aldrin, Dieldrin & p,p DDT)	• SOP NO. EL-OL-SOP-002 -determination of organochlorine pesticides residue in drinking and ground water, by capillary-column gas chromatography - Rev. No/ Date: 03/17.11.11
Sampling of Drinking Water and wastewater	
Sampling of drinking water and domestic wastewater for microbiology analysis	• SOP No. EL-WQ-SOP-001 -Collection, transport and storage of water samples for microbiological tests -Rev.No./ Date: 01/25. 02.18
Sampling of drinking water and domestic wastewater for chemical analysis	• SOP No. EL-WQ-SOP-002 -collection, transport and storage of water samples for chemical tests - Rev.No./ Date: 01/25. 02.18
Microbiological Analysis of Water	

Annex (1)

To the Accreditation Certificate No. JAS Test - 040 Dated 08/07/2018

For Aqaba International Laboratories - Ben Hayyan /

Aqaba Special Economic Zone Authority

Scope of Accreditation

Chemical & Microbiological Testing of Food and Water and Wastewater and Sampling of Drinking Water and Wastewater

Tested Parameter/ Type of Test/ Measured Quantity	Test Methods/ Standards
Total coliform	• SM 9221 B, Multiple-tubes fermentation technique 23rd edition, 2017
E.coli (MPN)	• SM 9221 F & SM 9221 B Multiple-tubes fermentation technique 23rd edition, 2017
Pseudomonas aeruginosa	• ISO 16266:2008 Membrane filtration technique
Enumeration of Enterococcus in water by membrane filtration technique.	• BS EN ISO 7899-2:2000 Membrane filtration technique
Enumeration of Coliform bacteria	• ISO 9308-1:2014 Standard test Membrane filtration technique
Enumeration of Escherichia coli	• ISO 9308-1:2014 Standard test Membrane filtration technique
Legionella	• ISO 11731-:2017 Membrane filtration technique
Heterotrophic Plate count (HPC) By Pour Plate Method	• SM 9215 B ,23rd edition, 2017
Microbiological Analysis of Food	
Enumeration of microorganisms by colony count Technique at 30°c	• BS EN ISO 4833-2:2013
Enumeration Of Enterobacteriacea e By Colony Counting	• ISO 21528-2:2017
Enumeration of Coagulase–positive Staphylococci (Staphylococcus aureus)	• ISO 6888-1:1999
Enumeration Clostridium perfringens colony count technique	• BS EN ISO 7937:2004

Annex (1)

To the Accreditation Certificate No. JAS Test - 040 Dated 08/07/2018

For Aqaba International Laboratories - Ben Hayyan /

Aqaba Special Economic Zone Authority

Scope of Accreditation

Chemical & Microbiological Testing of Food and Water and Wastewater and Sampling of Drinking Water and Wastewater

Tested Parameter/ Type of Test/ Measured Quantity	Test Methods/ Standards
Enumeration of -Glucuronidase-positive Escherichia coli	• BS ISO 16649-2:2001
Microbiological Analysis of Food	
Coliforms colony count technique	• BS ISO 4832:2006
Enumeration Of Listeria monocytogenes	• ISO 11290-1-2:2017
Detection Of Listeria monocytogenes	• ISO 11290-1-2:2017
Enumeration of yeast &mold in products with water activity less than or equal to 0.95	• BS ISO 21527-1-2:2008
Enumeration of yeast &mold in products with water activity greater than 0,95	• BS ISO 21527-1-2:2008
Salmonella	• ISO 6579-1: 2017 (E)
Bacillius cereus	• BS EN ISO 7932:2004
Detection OF Vibrio parahaemolyticus	• ISO 21872-1:2017(E)
Detection Of Salmonella By Rapid Culture Method	• SOP NO.FL-ML-SOP-004 • -detection of salmonella by rapid culture method • -Rev.No./ Date:00/01.05.17

List of employees in the laboratory who are technically responsible for issuing the test reports in the scope of accreditation:

1- **Laboratories Division Head:** Qussay Yanes

2- **Water quality Measurements** Division Head : **Dr. Abdalmajeed Alajlouni.**

3- **Quality Assurance Manager : Wael Abu Tuaimeh.**

THE HASHEMITE KINGDOM OF JORDAN

Accreditation Unit

JAS
Jordanian Accreditation System
نظام الاعتماد الأردني
Accreditation Unit

Annex (2)
Issued on: 11-07-2019

To the Accreditation Certificate No. JAS Test - 040 Dated 08-07-2018

For Aqaba International Laboratories - Ben Hayyan /

Aqaba Special Economic Zone Authority

Scope of Accreditation

Testing of Wheat Impurities

Tested Parameter/ Type of Test/ Measured Quantity	Test Methods/ Standards
Physical Examination for Wheat Impurities	The International Standard, Wheat (Triticum aestivum L.) — Specification ISO 7970:2011, The Jordanian Standard – Technical Regulation JS 1200:2015

List of employees in the laboratory who are technically responsible for issuing the test reports in the scope of accreditation:

1. **Lab Division Head (LDH): Mr. Qussay Yanis**
2. **Quality Assurance Manager: Mr. Wael Abu Tuaimeh**

THE HASHEMITE KINGDOM OF JORDAN

Accreditation Unit

JAS
Jordanian Accreditation System
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Accreditation Unit

Annex (3)
Issued on : 13/7/2021

To the Accreditation Certificate No. JAS Test - 040 Dated 08-07-2018

For Aqaba International Laboratories - Ben Hayyan /

Aqaba Special Economic Zone Authority

Scope of Accreditation

Testing of Ambient air and Indoor & outdoor Noise

Tested Parameter/ Type of Test/ Measured Quantity	Test Methods/ Standards
Testing of Air quality (City AQMS (CS) Southern AQMS (SS),Port AQMS (PS)Mobile AQMS (MS))	
Sulfur dioxide (SO2)	• UV-Fluorescence-JS 1140/2006
Nitrogen oxides (NO, NO2, NOX)	• Chemiluminescence-JS 1140/2006
Carbon monoxide (CO)	• Infrared absorption-JS 1140/2006
Ozone (O3)	• UV-Photometry-JS 1140/2006
Particulates Matter (PM10, PM2.5)	• Beta Attenuation Method (BAM)-JS 1140/2006
Ammonia (NH3)	• Chemiluminescence-JS 1140/2006
Hydrogen Sulfide (H2S)	• UV-Fluorescence-JS 1140/2006
Noise (sound level) (Indoor & outdoor)	
Noise (sound level)	• Sound Pressure Level-ISO 1996-2:2017(E)

List of employees in the laboratory who are technically responsible for issuing the test reports in the scope of accreditation:

1- **Air quality Division Head : Eng. Hasan Al-Marayeh.**
2- **Quality Assurance Manager : Wael Abu Tuaimeh.**

Test Report No. [2/01081/21]

Customer Information		Project Information	
Customer	TetraTech International Development	Analysis Order No.	221091301081
		Sampled On	13/09/2021 12:50:00
Samples Count	26	Sample ID(s)	2-2103567 :: 2-2103592
Samples Received on	13/09/2021	Date of Test	13/09/2021
Condition of received sample(s)	Accepted	Sampling	* EL-WQ-SOP-01, EL-WQ-SOP-02
Report Issuance Date	20/09/2021	Tests Fees	Against Contract

Eng. Mwaffaq Al-Khushman

Laboratories Director

20.9.2021

المهندس موفق الخشمان
مدير مديرية مختبرات العقبة الدولية

بن حيان
BEN HAYYAN
قسم
قياسات نوعية المياه
مختبرات العقبة الدولية
Aqaba International Laboratories

Test results represent the sample that is sent to BEN HAYYAN - Aqaba International Laboratories by the customer. It may not represent the whole product
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Customer: TetraTech International Devel **Test Report No. [2/01081/21]** Samples Received on: 13/09/2021

Test Results:

	Total THMs * Method: (EL-OL-SOP-001) Unit: ug/L	Free Cl2 * Method: (EL-WL-SOP-007) Unit: mg/L
(2-2103567) Bathing Water-Kemapco Cooling Water Outlet At Source Surface	<16.0	<0.10
(2-2103568) Bathing Water-Kemapco Cooling Water Outlet At Source Surface2	<16.0	<0.10
(2-2103569) Bathing Water-Kemapco Cooling Water Marina Open Sea Interface Surface	<16.0	<0.10
(2-2103570) Bathing Water-Kemapco Cooling Water Marina Open Sea Interface.Surface 2	<16.0	<0.10
(2-2103571) Bathing Water-Kemapco Cooling Water Marina Open Sea Interface 20M Depth	<16.0	<0.10
(2-2103572) Bathing Water-Kemapco Cooling Water Marina Open Sea Interface 20M Depth 2	<16.0	<0.10
(2-2103573) Bathing Water -Jpmc Ic Cooling Water Outlet Surface	<16.0	<0.10
(2-2103574) Bathing Water -Jpmc Ic Cooling Water Outlet Surface 2	<16.0	<0.10
(2-2103575) Bathing Water -Jpmc Ic Cooling Water Outlet -At Source 25 M Depth	<16.0	<0.10
(2-2103576) Bathing Water -Jpmc Ic Cooling Water Outlet -At Source 25 M Depth 2	<16.0	<0.10

بن حيان BEN HAYYAN قسم قياسات نوعية المياه مختبرات العقبة الدولية Aqaba International Laboratories

Aqaba Special Economic Zone Authority (ASEZA), P.O. 2565, Aqaba 77110, Jordan
Tel: +962 3 20 90 666 Ext.156 Fax: +962 3 20 90 688 Email: labcrm@aseza.jo

Customer: TetraTech International Deve

Test Report No. [2/01081/21]

Samples Received on: 13/09/2021

	Total THMs * Method: (EL-OL-SOP-001) Unit: ug/L	Free Cl2 * Method: (EL-WL-SOP-007) Unit: mg/L
(2-2103577) Bathing Water -Aawdc Proposed Intake Surface	<16.0	<0.10
(2-2103578) Bathing Water -Aawdc Proposed Intake Surface 2	<16.0	<0.10
(2-2103579) Bathing Water -Aawdc Proposed Intake Near Bottom 15 M Depth	<16.0	<0.10
(2-2103580) Bathing Water -Aawdc Proposed Intake Near Bottom 15 M Depth 2	<16.0	<0.10
(2-2103581) Bathing Water -Thermal Power Station Cooling Water Outfall Surface	<16.0	<0.10
(2-2103582) Bathing Water -Thermal Power Station Cooling Water Outfall Surface 2	<16.0	<0.10
(2-2103583) Bathing Water -Thermal Power Station Cooling Water Outfall At Source 20 M	<16.0	<0.10
(2-2103584) Bathing Water -Thermal Power Station Cooling Water Outfall At Source 20 M	<16.0	<0.10
(2-2103585) Bathing Water -Aqapa Marina Reseve Visitors Center Surface	<16.0	0.18
(2-2103586) Bathing Water -Aqapa Marina Reseve Visitors Center Surface 2	<16.0	<0.10
(2-2103587) Bathing Water -Aqapa Marina Reseve Visitors Center 20 M Depth	<16.0	<0.10

بن حيان BEN HAYYAN قسم قياسات نوعية المياه مختبرات العقبة الدولية Aqaba International Laboratories

Customer: TetraTech International Deve

Test Report No. [2/01081/21]

Samples Received on: 13/09/2021

	Total THMs * Method: (EL-OL-SOP-001) Unit: ug/L	Free Cl2 * Method: (EL-WL-SOP-007) Unit: mg/L
(2-2103588) Bathing Water -Aqapa Marina Reseve Visitors Center 20 M Depth 2	<16.0	0.11
(2-2103589) Bathing Water -Aqapa Marina Reseve Marina Science Station Surface	<16.0	0.11
(2-2103590) Bathing Water -Aqapa Marina Reseve Marina Science Station Surface 2	<16.0	<0.10
(2-2103591) Bathing Water -Aqapa Marina Reseve Marina Science Station 20 M Depth	<16.0	<0.10
(2-2103592) Bathing Water -Aqapa Marina Reseve Marina Science Station 20 M Depth 2	<16.0	<0.10

Approval of Test Results:

(*) Within the accreditation scope
(N.D) Not Detected

Dr. Abdalmajeed Al-Ajlouni

Water Quality Measurements Division Head

بن حيان BEN HAYYAN قسم قياسات نوعية المياه مختبرات العقبة الدولية Aqaba International Laboratories

Note:
- This test report consits of (4) pages including the cover page. It shall only be reproduced in full. The results are only related to the sample(s) / location(s) mentioned in this report.

- Expanded uncertainty for each reported value (K=2, of 95% probability) is separately provided.

JAS
Jordanian Accreditation System
نظام الاعتماد الأردني
Accreditation Unit
Test - 040

بن حيان
BEN HAYYAN
Aqaba International Laboratories

سلطة منطقة العقبة الإقتصادية الخاصة
AQABA SPECIAL ECONOMIC ZONE AUTHORITY

Test Report No. [2/01085/21]

Customer Information		Project Information	
Customer	TetraTech International Development	Analysis Order No.	221091401085
		Sampled On	14/09/2021 10:30:00
Samples Count	6	Sample ID(s)	2-2103600 :: 2-2103605
Samples Received on	14/09/2021	Date of Test	14/09/2021
Condition of received sample(s)	Accepted	Sampling	* EL-WQ-SOP-01, EL-WQ-SOP-02
Report Issuance Date	20/09/2021	Tests Fees	Against Contract

Eng. Mwaffaq Al-Khushman

Laboratories Director

20.9.2021

المهندس موفق الخشمان
مدير مديرية مختبرات العقبة الدولية
بن حيان

بن حيان
BEN HAYYAN
قسم
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Aqaba Special Economic Zone Authority (ASEZA), P.O. 2565, Aqaba 77110, Jordan
Tel: +962 3 20 90 666 Ext.156 Fax: +962 3 20 90 688 Email: labcrm@aseza.jo

Customer: TetraTech International Devel **Test Report No. [2/01085/21]** Samples Received on: 14/09/2021

Test Results:

	Total THMs * Method: (EL-OL-SOP-001) Unit: ug/L	Free Cl2 * Method: (EL-WL-SOP-007) Unit: mg/L
(2-2103600) Tala Bay -Marina Inside Central Surface	<16.0	<0.10
(2-2103601) Tala Bay -Marina Inside Central Surface 2	<16.0	<0.10
(2-2103602) Tala Bay -Marina Open Sea Interface Surface	<16.0	<0.10
(2-2103603) Tala Bay -Marina Open Sea Interface Surface 2	<16.0	<0.10
(2-2103604) Tala Bay -Marina Open Sea Interface Bottom 20M Depth	<16.0	<0.10
(2-2103605) Tala Bay -Marina Open Sea Interface Bottom 20M Depth 2	<16.0	<0.10

Approval of Test Results:

(*) Within the accreditation scope
(N.D) Not Detected

BEN HAYYAN قسم باسلات نوعية المياه مختبرات العقبة الدولية Aqaba International Laboratories

Dr. Abdalmajeed Al-Ajlouni

Water Quality Measurements Division Head

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Aqaba International Laboratories | مختبرات العقبة الدولية

BENHAYYAN AQABA INTERNATIONAL LABORATORIES

Water Tests Consultancy Report

Submitted to

REPORT REVIEW & EVALUATION OF TETRA TECH INTERNATIONAL DEVELOPMENT B.V., UK BRANCH PROJECT

20 Sep 2021

Introduction

BEN HAYYAN - Aqaba International Laboratories / ASEZA were approached by tetra tech international development B.V., UK branch project to conduct an ambient water quality monitoring for Aqaba sea water.

The water quality analysis was conducted for two parameters (THM`s and free chlorine).

The study area lies within the Jordanian portion of the Gulf of Aqaba (Figure 1). It is a partially enclosed water body that constitutes the eastern segment of V-shaped situated at the northern tip of the Gulf and extends south for about 27 km to the Saudi Arabia border. It is in a sub-tropical arid area between longitude 34° 25' to 35° 00' E and latitude 28°00' to 29°33' N.

Figure 1: Satellite Jordanian Coast of Gulf of Aqaba

Materials and Methods

Sampling Sites

Thirty-two sea water samples from 16 locations were collected between Marine Science Station site and Aqaba New Port site as shown in Table 1 and Figure 2.

Figure 2: Satellite water samples sites

Table 1: Sea water samples locations

NO.	Site's description
1.	KEMAPCO Cooling Water - Outlet at source, Surface
2.	KEMAPCO Cooling Water - Marina Open Sea Interface, Surface
3.	KEMAPCO Cooling Water - Marina Open Sea Interface, 20m depth
4.	JPMC IC Cooling Water Outlet - Surface
5.	JPMC IC Cooling Water Outlet - At Source, 25m depth
6.	AAWDC Proposed Intake - Surface
7.	AAWDC Proposed Intake - Near Bottom, 15m depth
8.	Thermal Power Station Cooling Water Outfall - Surface
9.	Thermal Power Station Cooling Water Outfall at Source, 20m depth
10.	Tala Bay - Marina Inside Central, Surface
11.	Tala Bay - Marina Open Sea Interface, Surface
12.	Tala Bay - Marina Open Sea Interface, Bottom 20m depth
13.	Aqaba Marine Reserve Visitors Centre - Surface
14.	Aqaba Marine Reserve Visitors Centre20 - m depth
15.	Aqaba Marine Reserve – Marine Science Station Surface
16.	Aqaba Marine Reserve – Marine Science Station 20m depth

Sampling Methodology

The samples were taken from the surface and the other were taken from 15, 20 and 25 m depth using Kemmerer Water Sampler Vertical Acrylic TT PU Type (Figure 3) in 250 ml plastic bottles for free chlorine test and 50 ml amber glass vial with 1:1 Acetic acid and distilled water preservative for THM`s test. Collected samples were immediately transported to the laboratory in ice boxes.

THM`s sea water samples were analysed by GC-MS. Free chlorine sea water samples analysed by portable data logging colorimeter.

Figure 3: Kemmerer Water Sampler

Results and Interpretation

The results of this analysis showed that THM`s concentrations for all sea water samples were below the detection limit of analytical instrument. Free Chlorine were lower than 0.1 ppm except Aqaba Marine Reserve Visitors Centre – Surface and Aqaba Marine Reserve – Marine Science Station 20m depth were above 0.1 ppm, but still these results

indicate slight increase of free chlorine, and this is because of sampling and analysis measurement uncertainty. Beside that chlorine gas maybe form slightly due to microorganism's activity.

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