



# Proficiency Test Report

Final Report

Water Chemistry Scheme

WC1 Determination of (pH, Conductivity & TDS) in Water.

June 2022

Issue date: **July 2022**

Participant: **Central Lab for marine fish diagnosis & treatment & measuring fish and water quality.**

Lab No. **02**

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**ALL data and results related to this report considered confidential**

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**Report summary:**

Proficiency test (PT) report for the PT scheme conducted in June 2022 for WC1 Determination of (pH, Conductivity and TDS) in water, aims to provide an independent assessment of the competence of participating laboratories. Together with the use of validated methods, proficiency testing is an essential element of ensuring validity of results according to ISO/IEC 17025:2017.

11 labs participate in the scheme and they receive 11 test materials of water to be analyses as routine sample analysis in June 2022.

The whole scheme is according to ISO 17043:2010 and for statistical analysis according to ISO 13528:2015.

*TDS: Total Dissolved solids.*

**Test Materials:**

The item to be tested (water) collected from commercial supplier taking in consideration the environmental conditions (18-27 ° C) for this kind of test during preparation, also samples were transported in room temperature to the participants.

**Subcontracted services:**

- Homogeneity was performed in accredited lab according to ISO/IEC 17025:2017.
- Stability was performed in a competent lab according to ISO/IEC 17025:2017.

**Homogeneity and stability studies:**

Randomly selected 8 samples to be analyzed in duplicate, samples were prepared and analyzed in competent lab ISO 17025:2017 to test with interval then the results used for homogeneity and stability.

These data showed sufficient homogeneity and stability and were not included in the subsequent calculation of the assigned values.

**For pH:**

|                 |       |
|-----------------|-------|
| Overall Average | 7.59  |
| SD of averages  | 0.09  |
| S w             | 0.04  |
| S s             | 0.09  |
| $\sigma_{PT}$   | 0.234 |

|                        |           |
|------------------------|-----------|
| $\sqrt{C}$ Check value | 0.22      |
| Homogeneity            | <b>OK</b> |
| y1 -y2                 | 0.20      |
| Stability              | <b>OK</b> |

**For Conductivity**

|                 |           |
|-----------------|-----------|
| Overall Average | 655.6     |
| SD of averages  | 3.2       |
| S w             | 1         |
| S s             | 3.14      |
| $\sigma_{PT}$   | 14.83     |
| Check Value     | 4.45      |
| Homogeneity     | <b>OK</b> |
| y1 -y2          | 4         |
| Stability       | <b>OK</b> |

**For TDS**

|                 |           |
|-----------------|-----------|
| Overall Average | 370.7     |
| SD of averages  | 11.1      |
| S w             | 4.2       |
| S s             | 10.6      |
| $\sigma_{PT}$   | 44.5      |
| Check Value     | 13.5      |
| Homogeneity     | <b>OK</b> |
| y1 -y2          | 10        |
| Stability       | <b>OK</b> |

**Labelling and dispatch:**

All samples were labelled in GENUINE facility prior to dispatch and every samples accompanied with WC1 F-Q-28 PT instructions form and F-Q-29 PT results submission.

The packaging and method of transport of the samples are considered carefully to ensure that they are adequate and able to protect the stability and characteristics of the samples, all samples were transported in room temperature.

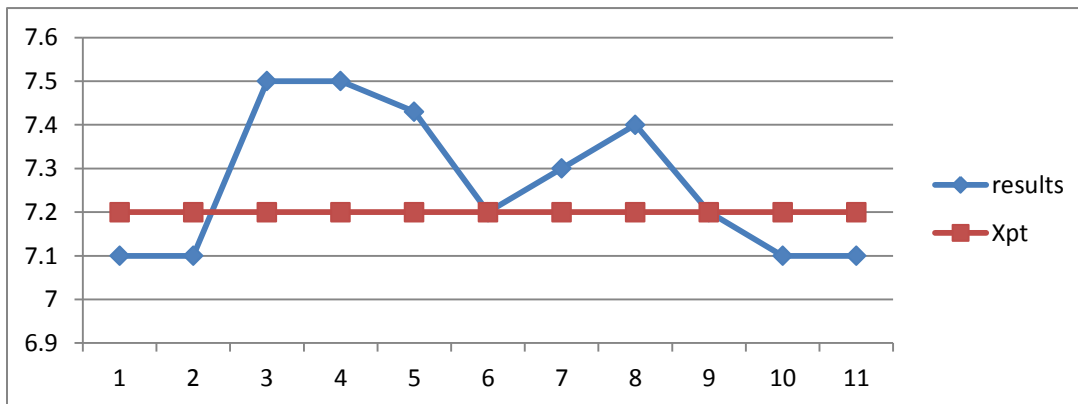
All of the samples were dispatched in June 2022.

**Results and performance evaluation**

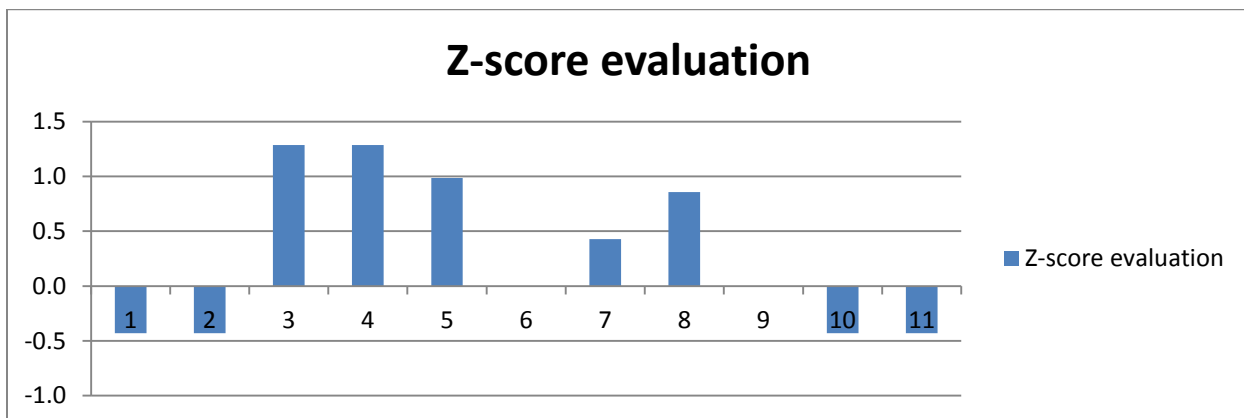
Table 1 **pH Determination** results compared to assigned value  $X = 7.2$ ; and  $(\sigma PT) = 0.23$

| Lab no. | Lab result | Z-Score | Evaluation   |
|---------|------------|---------|--------------|
| 1       | 7.1        | -0.4    | Satisfactory |
| 2       | 7.1        | -0.4    | Satisfactory |
| 3       | 7.5        | 1.3     | Satisfactory |
| 4       | 7.5        | 1.3     | Satisfactory |
| 5       | 7.43       | 1.0     | Satisfactory |
| 6       | 7.2        | 0.0     | Satisfactory |
| 7       | 7.3        | 0.4     | Satisfactory |
| 8       | 7.4        | 0.9     | Satisfactory |
| 9       | 7.2        | 0.0     | Satisfactory |
| 10      | 7.1        | -0.4    | Satisfactory |
| 11      | 7.1        | -0.4    | Satisfactory |

**Fig 1 Results compared to the assigned value  $X_{PT}$  for pH**



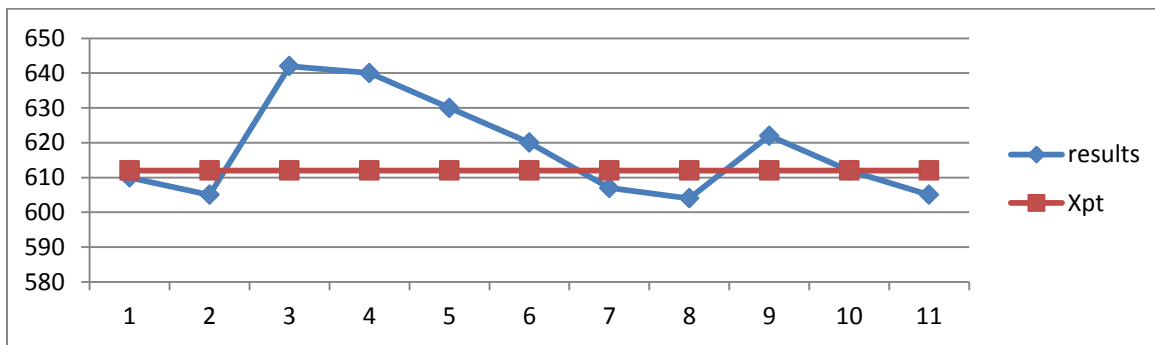
**Fig 2 Z-score for pH (Series represented as lab number).**



**Table 2 Conductivity determination results compared to assigned value X = 612; and ( $\sigma$  PT) = 14.83**

| Lab no. | Lab result | Z-Score | Evaluation   |
|---------|------------|---------|--------------|
| 1       | 610        | -0.1    | Satisfactory |
| 2       | 605        | -0.5    | Satisfactory |
| 3       | 642        | 2.0     | Satisfactory |
| 4       | 640        | 1.9     | Satisfactory |
| 5       | 630        | 1.2     | Satisfactory |
| 6       | 620        | 0.5     | Satisfactory |
| 7       | 607        | -0.3    | Satisfactory |
| 8       | 604        | -0.5    | Satisfactory |
| 9       | 622        | 0.7     | Satisfactory |
| 10      | 612        | 0.0     | Satisfactory |
| 11      | 605        | -0.5    | Satisfactory |

**Fig 3 Results compared to the assigned value X<sub>PT</sub> for Conductivity**



**Fig 4 Z-score for Conductivity (Series represented as lab numbers).**

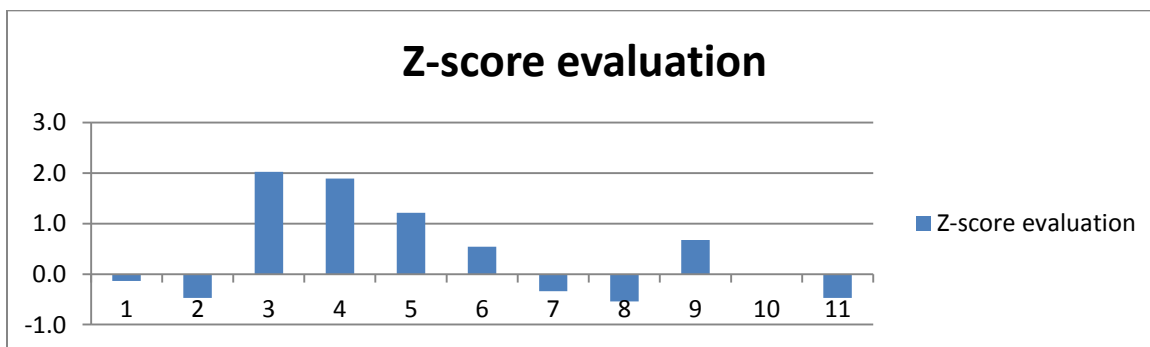


Table 3 **TDS Determination** results compared to assigned value  $X = 365$ ; and  $(\sigma PT) = 44.49$

| Lab no. | Lab result | Z-Score | Evaluation   |
|---------|------------|---------|--------------|
| 1       | 350        | -0.3    | Satisfactory |
| 2       | 405        | 0.9     | Satisfactory |
| 3       | 345        | -0.4    | Satisfactory |
| 5       | 340        | -0.6    | Satisfactory |
| 6       | 380        | 0.3     | Satisfactory |
| 7       | 395        | 0.7     | Satisfactory |
| 8       | 400        | 0.8     | Satisfactory |
| 9       | 420        | 1.2     | Satisfactory |
| 10      | 333        | -0.7    | Satisfactory |
| 11      | 335        | -0.7    | Satisfactory |

Fig 5 Results compared to the assigned value  $X_{PT}$  for TDS

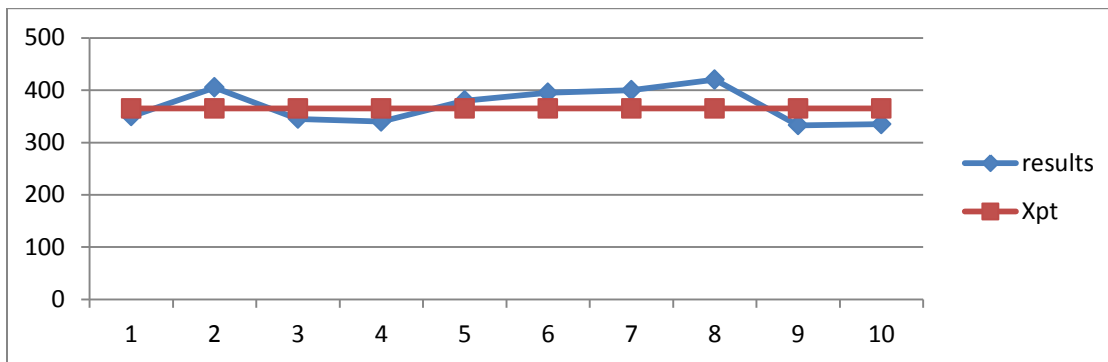
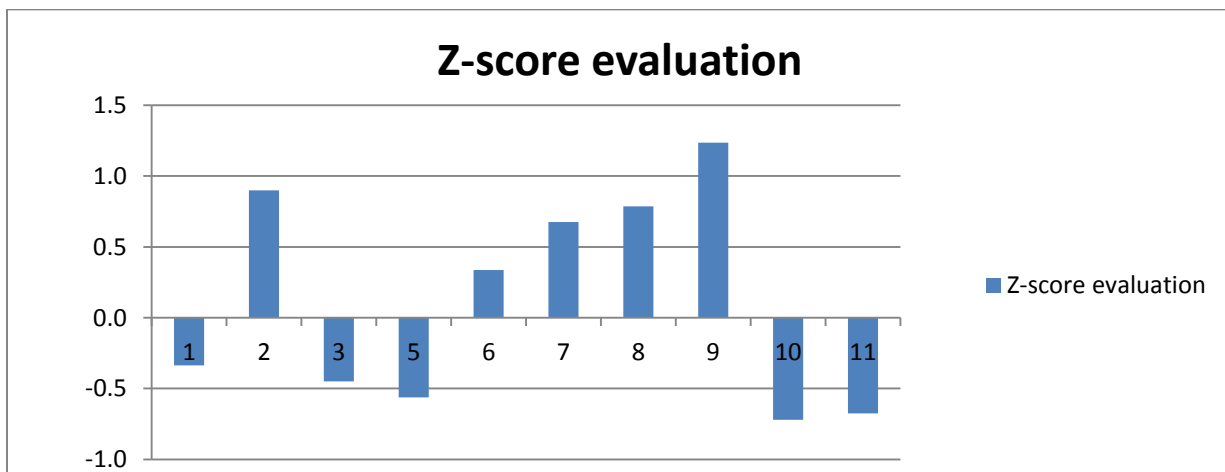


Fig 6 Z-score for TDS (Series represented as lab numbers).



**Participants' z-scores and it was calculated as:**

$$Z = (X - X_a) / \sigma_{PT}$$

- X is the participant's reported result
- $X_a$  is the assigned value
- $\sigma$  is the standard deviation for proficiency

### **Z-score criteria:**

$|Z| \leq 2$  Acceptable

$2 < |Z| \leq 3$  Questionable

$3 < |Z|$  unacceptable

### **Statistical data**

#### **Assigned value calculations:**

Value attributed to be true value of FM1 PT-scheme.

Assigned Value has been calculated from participant results (as Median) and will be expressed as Log 10, no outliers were found for all tests.

All results were included in the calculation of the assigned value.

#### **PT Standard deviation:**

The standard deviation for proficiency,  $\sigma_{PT}$  calculated from Normalized interquartile range nIQR.

### **Interpretation of participant results**

- ❖ 11 participants send results using official methods and equipment manual for pH and Conductivity.
- ❖ 10 participants send results using official methods and equipment manual for TDS.
- ❖ All labs send results within the closing date.
- ❖ All results are satisfactory for **pH** determination (No questionable and No unsatisfactory).



- ❖ All results are satisfactory for **Conductivity** enumeration (No questionable and No unsatisfactory).
- ❖ All results are satisfactory for **TDS** enumeration except Lab no. 8 its result is Questionable.
- ❖ All participants are accredited or competent for ISO 17025:2017 to complete the metrological traceability.
- ❖ The 11 labs send back the results as 1 result for the PT sample results.

## **References**

- 1- Baumeister: Homogeneity of EQA samples, EQALM Symposium 2013, Bucharest.
- 2- The international harmonized protocol for the proficiency testing of analytical chemistry laboratories, IUPAC Protocol.
- 3- ISO/IEC 17043:2010, Conformity assessment — General requirements for proficiency testing.
- 4- ISO 13528:2015, Statistical methods for use in proficiency testing by interlaboratory comparison.
- 5- QP-Q-06 GENUINE-PT Protocol.

**End of the report**