PROFICIENCY TESTING PERFORMANCE REPORT

Water Pollution for Wastewater PT Scheme
Round 339
17 April 2023 through 01 June 2023

C875644

Compania de Proyectos Ambientales e Ingenieria S.A.S
Jenny Duenas
Calle 106 #59-21
Bogota, 111111
Colombia

ACCREDITED
Lab Code: 1539-01

ERA
A Waters Company
www.ERAQC.com

Introduction

Thank you for participating in Round 339 of ERA's Water Pollution for Wastewater PT Scheme. This performance report has been specifically designed and prepared to assist your organization with the monitoring and improvement of your laboratory data quality.

The samples for Round 339 of ERA's Water Pollution for Wastewater PT Scheme were initially distributed on 17 April 2023, and the deadline for returning final PT results was 01 June 2023.

ERA confirms that this final (or amended final) PT report meets the requirements of ISO/IEC 17043:2010 (A2LA certificate of accreditation number 1539.01). ERA has also verified that all data evaluations have been completed in accordance with these requirements.

The performance report is divided into sections describing the execution of the PT scheme, including outlining the objectives of the PT scheme, sample design, determination of assigned values, reporting of data, performance evaluation and additional information. Three specific sections are detailed below.

PT Round Discussion
The PT Round Discussion lists any comments pertaining to the PT round when appropriate.

Summary PT Performance Evaluation Report
The Summary PT Performance Evaluation Report provides a quick review of performance. Performance evaluations are provided in text form and as colored flags.

Group Summary
The Group Summary compares your reported PT result to all other participants in the round. Method Details are also provided showing results by different technologies, where sufficient data is available.

ERA is continually striving to improve its proficiency testing schemes. Please contact us by phone at +1 303-431-8454 or by email at info@eraqc.com if you have any questions or feedback. Thank you again for participating in Round 339 of ERA's Water Pollution for Wastewater PT Scheme. We appreciate working with you and look forward to your continued participation in ERA PT schemes.

Sincerely,

Craig Huff
Senior Technical Manager

PT Scheme Overview

This proficiency testing scheme is designed to evaluate laboratory performance against other participating laboratories throughout the world on the same set of environmental parameters. ERA is accredited by A2LA for the design, preparation, and operation of PT schemes that meet the requirements of ISO/IEC 17043:2010 (A2LA Certificate of Accreditation number 1539.01). All analytes except for 1,1'-Biphenyl, 1,2-Diphenylhydrazine, 1,3-Dinitrobenzene, 2,3-Dichloroaniline, Acetophenone, Atrazine, Azobenzene, Benzaldehyde, Caprolactam, n-Decane and n-Octadecane in the Base/Neutrals, catalog # 833 are included in ERA's A2LA accreditation.

Organization and Program Coordinator

Proficiency Testing Organization	ERA - A Waters Company 16341 Table Mountain Pkwy. Golden, CO 80403 USA
Senior Technical Manager (PT Coordinator)	Craig Huff craig_huff@waters.com P: +1 303-431-8454
Technical Specialist Organics/Microbiology	Matt Graves matt_graves@waters.com P: +1 303-431-8454
Technical Specialist Radiochemistry/ Inorganics	Brian Miller brian_miller@waters.com P: +1 303-431-8454
Customer Service	Available Monday thru Thursday from 6 am to 6 pm and Friday from 6 am to 5 pm United States Mountain Time (excluding U.S. holidays). Support is also available by email at info@eraqc.com.

PT Scheme Goal

ERA's Water Pollution for Wastewater PT Scheme is designed to assist environmental laboratories to monitor and improve the quality of their analytical data. This program has been used for several decades to help laboratories meet their proficiency testing requirements.

Laboratories can establish the competency of their testing services through routine participation in PT schemes based upon independent third party evaluation of their performance. This provides both the laboratory's customers and staff with confidence in the analytical ability of the laboratory.

Laboratory Participation Criteria

ERA's Water Pollution for Wastewater PT Scheme is open to all laboratories worldwide that test environmental samples and evaluate the analytes available in the same concentration range. As an open PT scheme, ERA does not require specific methods to be used. Laboratories are encouraged to use their routine methods of analysis and treat the samples in the same manner as routinely tested samples.

PT Scheme Organization

ERA's Water Pollution for Wastewater PT Scheme operates on a monthly basis. The PT scheme currently includes a series of samples containing specified environmental contaminants. A complete listing of samples and contaminants included in the scheme is available in the scheme description and at ERA's website, www.eraqc.com. Laboratories have flexibility in the selection of PT rounds and samples they wish to receive. Please contact ERA at info@eraqc.com for PT round dates and availability.

Reporting PT Results

Participants may submit their PT results by mail, fax, email or through our website using the secure online data entry and reporting system eData (www.eraqc.com). Results may be uploaded directly from the laboratory's LIMS to the secure online reporting system using an electronic export format that meets the specifications for upload. Faxed and emailed PT results must be received by ERA no later than the closing date of the specified PT round. Mailed PT results must be postmarked by the closing date of the specified PT round. The online data entry system allows data entry until 11:59:59 pm United States Mountain Time on the closing date. All online data entry may be edited up to the closing date of the specified PT round. No special software is required to enter data online. Online data entry is confirmed through an automatic email confirmation system.

Sample Design

The purpose of proficiency testing is to evaluate the technical ability of the laboratory. This goal is achieved by using sample matrices and appropriate sample designs. ERA's Water Pollution for Wastewater PT Scheme is designed to evaluate laboratories for a broad range of analytes at concentration ranges that are environmentally significant.

ERA samples are prepared by fortifying a well characterized matrix with high purity raw materials. ERA samples are designed to evaluate the critical steps of most analytical methods. In order to ensure both homogeneity and stability of the samples for the duration of the PT round, most samples are prepared as concentrates.

ERA's Water Pollution for Wastewater PT Scheme contains a broad range of analytes divided into different sample types. These samples are designated by common terminology such as Metals or Volatiles. Samples which are designed to contain inorganic analytes contain all analytes every round, since most inorganic methods are specific to a given analyte. In contrast, most organic methods are multi-component based and cover several analytes. Therefore, in the case of many multi-component methods, false positive or false negative PT results become much more important. For this reason, many organic samples are designed to contain a random selection of analytes in every round.

Determination of Assigned Value

Assigned Value (X) may be determined by one of the following methods:

- Robust Mean: Calculated from participant results utilizing commonly accepted bi-weight techniques or from ERA's historical grand mean derived from the culmination of historical PT results.

- Formulation: Determined from the exact quantities used to prepare the PT sample for quantitative analyses, or from the presence or absence of the analyte in the PT sample for qualitative analyses.

Quality Control

The most important characteristics of sound proficiency testing samples are homogeneity and stability. ERA evaluates the homogeneity of every sample lot for every analyte through the analysis of multiple random samples. Homogeneity is determined using the statistical procedures of ISO 13528 or the International Harmonized Protocol for Proficiency Testing. Homogeneity testing is accomplished prior to sample distribution.

ERA verifies the stability of every lot of material after the closing date of the PT round through the analysis of multiple random samples or statistical comparison with historical data.

Homogeneity testing is performed using SRMs from a national measurement institute for all analytes where a SRM is available. In cases where a SRM is not available from a national measurement institute, which include many of the organic analytes, the calibrant used for analysis is verified against a secondary source.

Data Reporting Format

Participating laboratories should report a single PT result for each method they use to analyze the sample. Laboratories are encouraged to report their chemistry and microbiology (MPN technology) PT results to three significant figures. It is essential that they report their PT results in the units specified in the instructions on the data reporting forms and in the online data entry system. Laboratories are strongly encouraged to report their method of analysis along with the final PT result. This will allow evaluation of their PT result against those from other laboratories using the same or similar methods.

If the participant does not report a PT result in the field provided, it is assumed that the laboratory did not test for this analyte and a "Not Reported" performance evaluation is given. Less than (<) values can be reported but will not be given a z Score and will receive an evaluation from the rules described on page 5 of this report. Should a participant report any other text value for a PT result, it will be given a performance evaluation of "Not Evaluated".

The online data entry and reporting system, eData, is available on our website (www.eraqc.com). Participants are encouraged to take advantage of this resource to promote quick and efficient data entry.

Performance Evaluation

ERA evaluates laboratory performance based upon the z Score, where z is calculated as:

$$z = (x-X)/SDPA$$

Where: x = Laboratory's reported PT result

X = Assigned Value, determined by formulation or Robust Mean (calculated from participant results utilizing commonly accepted bi-weight techniques or from ERA's historical grand mean, derived from the culmination of historical PT results).

SDPA = Standard Deviation for Proficiency Assessment based on a fixed percentage, estimated regression standard deviation or robust standard deviation, as applicable.

An absolute z Score of 2 or less is generally considered satisfactory. It is typical in proficiency testing programs to highlight PT results with an absolute z Score 3 or more as unsatisfactory. It is also typical to indicate a warning of questionable performance if the PT result has an absolute z Score between 2 and 3. The following absolute z Score ranges are used by ERA to identify levels of performance:

	Performance Evaluation	Color Code
z Score less than or equal to 2.0	Satisfactory	Green
z Score greater than 2.0 and less than 3.0	Warning	Orange
z Score greater than or equal to 3.0	Unsatisfactory	Red

ERA also provides a "Satisfactory Range" demonstrating the approximate analytical result values that are within a performance evaluation range of z Score -2.0 to 2.0 which are generally considered to be within the Satisfactory range of PT results. PT results outside the range of z Score -2.0 to 2.0 are generally considered to signal a Warning of questionable results or are Unsatisfactory. The range of acceptable results may differ between countries or jurisdictions based on their specific Proficiency Testing requirements.

For analytes where the z Score is greater than or equal to an absolute value of 3.0, it is suggested that the participant initiate corrective action within its quality management system procedures.

Final PT results that are reported as less than (<) values are evaluated as follows:

For analytes that have been added to the samples:

Final PT results reported as a less than (<) value will not receive a performance evaluation.

For analytes that have not been added to the samples and the assigned value is <PTRL:

Final PT results reported with a less than value (<) will be evaluated as Satisfactory.

Final PT results that are reported as zero (0) are evaluated as follows:

For analytes that have not been added to the samples and the assigned value is < PTRL:

Final PT results reported as zero (0) will be evaluated as Satisfactory.

For analytes that have been added to the samples:

Final PT results reported as zero (0) will be evaluated based on z Score.

Final PT results that are reported as greater than (>) values are evaluated as follows:

Final PT results reported as a greater than (>) value will not receive a performance evaluation.

Final PT Reports

Final PT reports will be emailed as an Adobe Acrobat pdf attachment within 10 business days of the closing date of the PT round, and posted to the online data entry and reporting system eData, available on our website (www.eraqc.com).

ERA makes extensive use of graphical data presentations to clearly illustrate the relationship between various elements. The online reporting system includes several graphical presentations designed to highlight method differences. The hardcopy reports contain data for a single PT round. The online reporting system contains all data reported in all ERA schemes.

Other Terms and Definitions

Reported PT Result is the laboratory's result from analysis of the PT sample reported to ERA.

Relative Recovery is the laboratory's reported PT result divided by the Formulation/Certified Value, expressed as a percentage.

Formulation/Certified Value is the value derived from the formulation based on weights and measures or the empirically certified value, depending on the specific analyte.

Uncertainty of Certified Value is the standard uncertainty associated with the Formulation/Certified Value, expressed as a percentage.

Assigned Value (X) is determined by Formulation or Robust Mean as defined below.

Robust Mean is calculated from participant results utilizing commonly accepted bi-weight techniques or from ERA's historical grand mean, derived from the culmination of historical PT results.

Formulation is determined from the exact quantities used to prepare the PT sample for quantitative analyses, or from the presence or absence of the analyte in the PT sample for qualitative analyses.

Standard Deviation for Proficiency Assessment (SDPA) is used for performance evaluation and may be based on a fixed value, percentage of the assigned value or robust standard deviation.

Satisfactory Range is the approximate range for analytical result values that are within a performance evaluation range of z score -2.0 to 2.0 which are generally considered to be within the Satisfactory range for PT results.

Average Relative Recovery is the Robust Mean divided by the Formulation/Certified Value, expressed as a percentage.

Relative Standard Deviation is the SDPA divided by the Robust Mean, expressed as a percentage.

Percent Acceptable: ERA employs multiple evaluation models designed to accommodate the regulatory and accreditation requirements across numerous jurisdictions. As such, Percent Acceptable is the percentage of participants in the PT Round with a z Score or reported value that received a Satisfactory or Warning evaluation plus those participants in the PT Round with a reported value that received Acceptable or Check for Error evaluations. While these evaluation models may not be based on equivalent scoring statistics, they do represent "Acceptable" evaluations respectively.

Proficiency Testing Reporting Limit (PTRL) is provided as guidance for laboratories to utilize a method that is sensitive enough to generate valid results at the PTRL provided for each analyte.

Participant Feedback

Participant feedback is encouraged and is reviewed periodically throughout the year and during management meetings. Participant complaints are recorded, tracked and investigated according to ERA's corrective action system and procedures.

Subcontracting/Collaboration

All activities associated with this proficiency testing scheme were performed by Waters/ERA with the exception of those noted below. The following physical samples/products were manufactured for Waters/ERA by a subcontractor:

Microbiology products with the following catalog numbers:
880, 935, 079, 077, 080, 595, 595A, 576, 576A

Notification of Program and Product Changes

As a part of ERA's continual improvement process it is sometimes necessary to make changes that potentially affect the participants of a PT scheme; for example, product size, packaging or data reporting. In order to ensure that participants are informed, a participant notification document will be included with the relevant shipment. At a minimum, the participant notification document will state the change that has occurred and any additional information that is relevant to ensure that the participant implements the change effectively, and contact information should any problems be encountered.

Exceptions to PT Scheme Operations

Exceptions are rare but may occur. Any issues are handled through our corrective action system. ERA's goal is to minimize the impact of any issue on the participants, provide clear information on the nature of the issue and the action taken to avoid the issue in the future. All affected participants are contacted immediately when an issue is detected.

Participant Confidentiality

Participants may not reveal their PT results or any aspect of a PT scheme or round to any unauthorized person or laboratory until after the closing date of the PT round. ERA ensures through both practice and policy that all employees shall be free of any commercial, financial or other pressures which may adversely affect the quality of their work. ERA also has a continuing obligation to identify and report any actual or potential conflicts of interest arising during the performance of this program. If an actual or potential organizational conflict of interest is identified, ERA will immediately make a full disclosure to the appropriate parties.

Participant reports both on paper and electronic will be released only to authorized personnel from the participant's organization or to third-parties expressly requested by the participant.

PT Round Discussion

There are no comments to report for this PT round

Summary PT Performance Evaluation Report

Dissolved Oxygen

Lot Number P339-213

	Reported PT Result	Satisfactory Range	z Score	Reported Method	Performance Evaluation
Oxygen, Dissolved	3.6 mg/L	2.74 - 5.18	-0.588	SM 4500-O G	Satisfactory

Settleable Solids

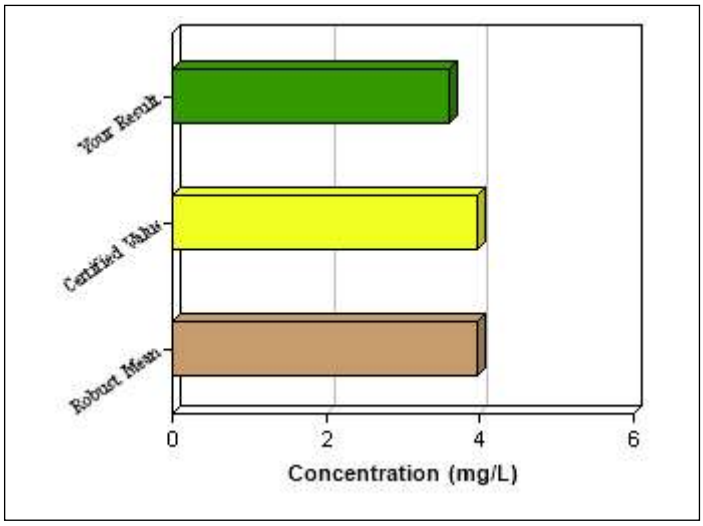
Lot Number P339-911

	Reported PT Result	Satisfactory Range	z Score	Reported Method	Performance Evaluation
Settleable Solids	18 mL/L	13.2 - 21.1	0.42	SM2540F	Satisfactory

Laboratory	C875644	**PT Scheme**	Water Pollution for Wastewater
Product Name	Dissolved Oxygen	**PT Round Number**	339
Lot Number	P339-213	**Analyst**	
Analyte (CAS)	Oxygen, Dissolved (—)	**Analysis Date**	16 May 2023

Group Summary

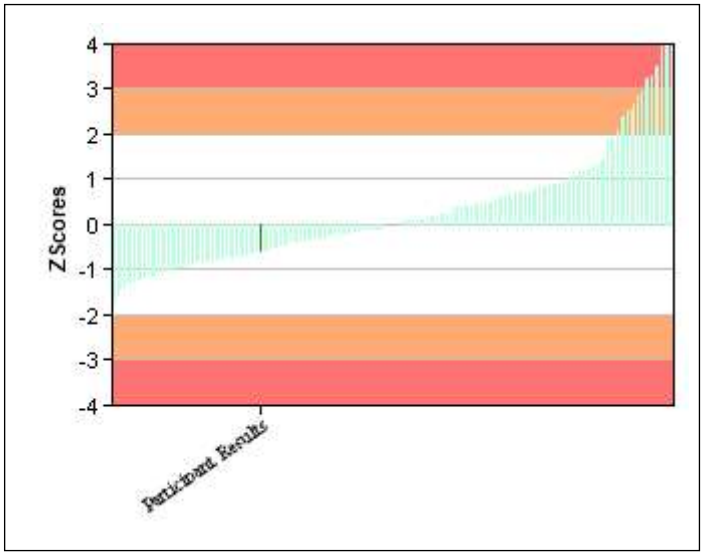
Your Reported PT Result	**3.6**
Your z Score	**-0.588**
Your Performance Evaluation	**Satisfactory**
Relative Recovery	**90.9 %**
Reported Method	SM 4500-O G
Formulation/Certified Value	3.96 mg/L
Uncertainty of Certified Value	0.100 %
Assigned Value (X)	3.96
Robust Mean	3.96
SDPA	0.609
Satisfactory Range	2.74 - 5.18
Average Relative Recovery	100 %
Relative Standard Deviation	15.4 %
Percent Acceptable	94.5 %
Number of Data Points	165



Method Details

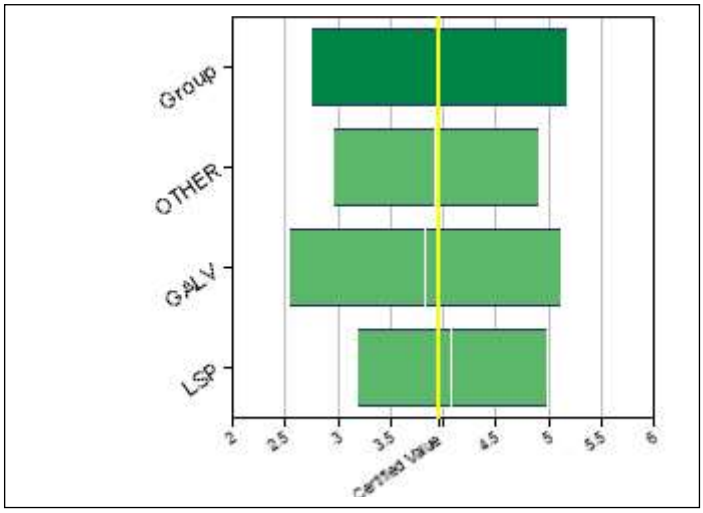
Other

Robust Mean	3.93
SDPA	0.489
Data Points	56
Satisfactory Range	2.95 - 4.91
Average Percent Recovery	99.3%
Relative Standard Deviation	12.4%
Percent Acceptable	92.9%



Galvanic Probe

Robust Mean	3.83
SDPA	0.649
Data Points	43
Satisfactory Range	2.53 - 5.13
Average Percent Recovery	96.7%
Relative Standard Deviation	16.9%
Percent Acceptable	93.0%
Your Method z Score	**-0.354**
Your Method Evaluation	**Satisfactory**



Luminescence-based Sensor

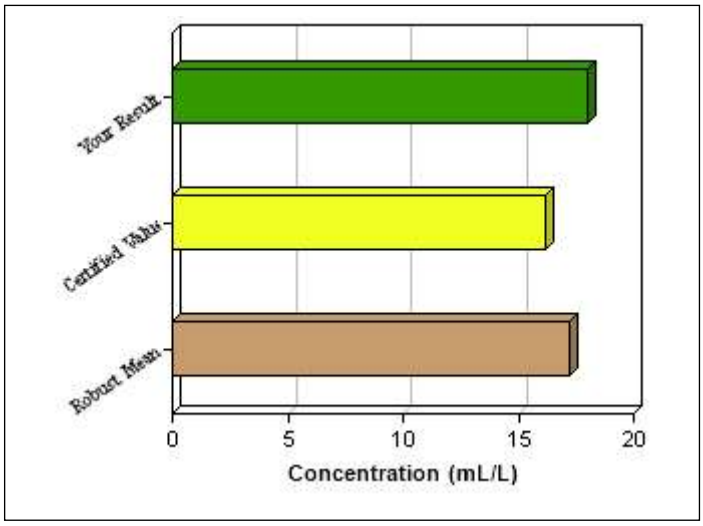
Robust Mean	4.08
SDPA	0.453
Data Points	29
Satisfactory Range	3.17 - 4.99
Average Percent Recovery	103%
Relative Standard Deviation	11.1%
Percent Acceptable	96.6%

ERA
A Waters Company

Laboratory	C875644	**PT Scheme**	Water Pollution for Wastewater
Product Name	Settleable Solids	**PT Round Number**	339
Lot Number	P339-911	**Analyst**	
Analyte (CAS)	Settleable Solids (591-49-1)	**Analysis Date**	15 May 2023

Group Summary

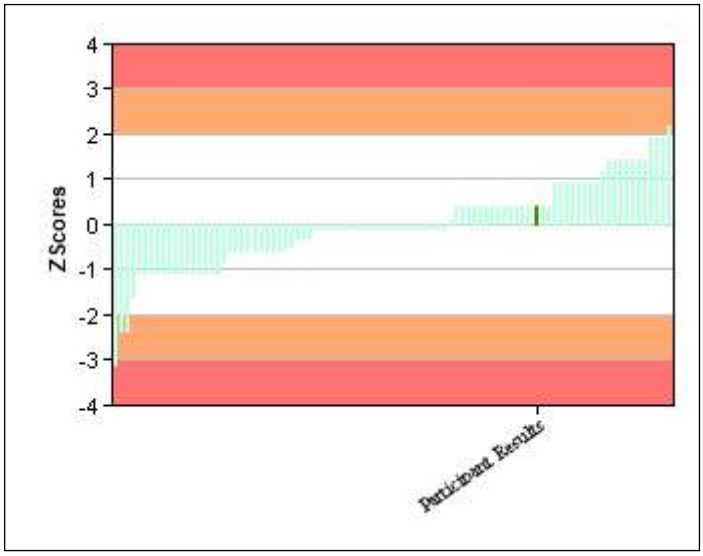
Your Reported PT Result	**18**
Your z Score	**0.42**
Your Performance Evaluation	**Satisfactory**
Relative Recovery	**111 %**
Reported Method	SM2540F
Formulation/Certified Value	16.2 mL/L
Uncertainty of Certified Value	0.250 %
Assigned Value (X)	17.2
Robust Mean	17.2
SDPA	1.99
Satisfactory Range	13.2 - 21.1
Average Relative Recovery	106 %
Relative Standard Deviation	11.6 %
Percent Acceptable	96.7 %
Number of Data Points	92



Method Details

Other

Robust Mean	16.6
SDPA	1.98
Data Points	59
Satisfactory Range	12.7 - 20.6
Average Percent Recovery	103%
Relative Standard Deviation	11.9%
Percent Acceptable	100%

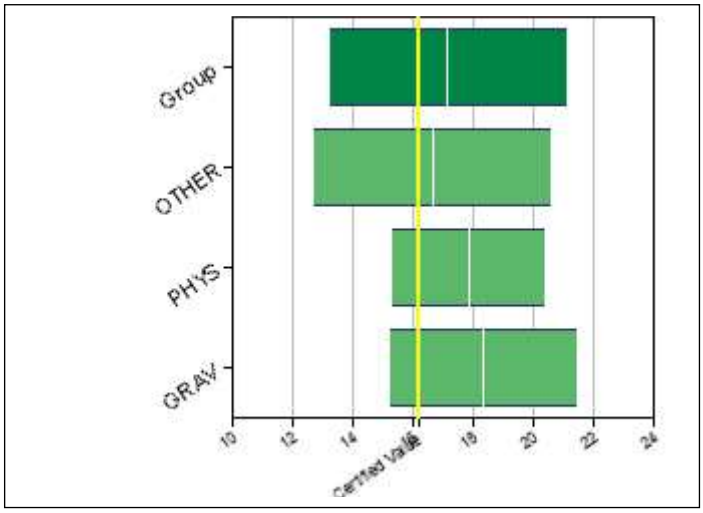


Physical Properties

Robust Mean	17.8
SDPA	1.30
Data Points	24
Satisfactory Range	15.2 - 20.4
Average Percent Recovery	110%
Relative Standard Deviation	7.27%
Percent Acceptable	100%

Gravimetry

Robust Mean	18.3
SDPA	1.58
Data Points	9
Satisfactory Range	15.2 - 21.5
Average Percent Recovery	113%
Relative Standard Deviation	8.62%
Percent Acceptable	100%
Your Method z Score	**-0.211**
Your Method Evaluation	**Satisfactory**



Print Date 13 June 2023

ERA
A Waters Company

Laboratory of Excellence

Compania de Proyectos Ambientales e Ingenieria S.A.S

This laboratory has been recognized by ERA as a
Laboratory of Excellence for achieving 100% acceptable data in the

April 2023 WP ERA Proficiency Testing Round 339

which included 1010 participating laboratories. This achievement is a demonstration of the superior quality of this laboratory in evaluation of the analyte(s) listed below.

Oxygen, Dissolved

Settleable Solids

ERA

A Waters Company

Craig Huff, *Senior Technical Manager*

ERA
A Waters Company

Labcare de Colombia Ltda
Autopista Medellín Km 2.5
Parcelas Parque empresarial
Portos Sabana 80 Bodega 97
Bogota 472, Colombia

P: 57+1 8985201

compras@labcarecolumbia.com

16341 Table Mountain Parkway
Golden, CO 80403
P:+1 303-431-8454
F:+1 303-421-0159

www.ERAQC.com
info@ERAQC.com