

Quality Assessment Report for Water Quality Monitoring

January – March 2016



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Technical Oversight Committee
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INTRODUCTION

This report is an assessment of the South Florida Water Management District (SFWMD) laboratory analysis and field sampling for total phosphorus (TP) monitoring, primarily for the following projects and their associated stations from January 1, 2016, through March 31, 2016.

- Everglades National Park Inflows North (PIN): S12A, S12B, S12C, S12D, S333, S355A, S355B, and S356-334
- Everglades National Park Inflow East (PIE): S332DX, S18C, DS4, and BERMB3
- Everglades Protection Area (EVPA): LOX3 through LOX16

Because field quality control (QC) samples are collected for sampling events that include multiple project samples for the stations of interest, the report may also cover information on stations or projects other than those in the above list.

The SFWMD's *Field Sampling Quality Manual* (SFWMD 2015b) provides the minimum requirements followed in field sample collection. The *Chemistry Laboratory Quality Manual* (SFWMD 2015a) provides the minimum requirements followed in preparing and analyzing laboratory samples, as well as data verification and validation. The Field Sampling Quality Assessment and Laboratory Analysis Quality Assessment sections in this report provide the field and laboratory QC results during this quarter. The SFWMD's Laboratory Information Management System (LIMS) provided the data used in this report. These data are available in SFWMD's DBHYDRO database. Appendix A contains all TP results for samples of interest to the Everglades Technical Oversight Committee (TOC), collected from January 1, 2016, through March 31, 2016.

The report also includes the results of the National Proficiency Testing Program, which is designed to evaluate the laboratory's performance through analysis of unknown samples provided by an external source. Proficiency testing study is one of the essential elements of on-going compliance with the National Environmental Laboratory Accreditation Conference (NELAC) Standards and continued certification.

FIELD SAMPLING QUALITY ASSESSMENT

PROCEDURE UPDATES

This period had no major procedural updates related to TP sample collection.

SAMPLES NOT COLLECTED

Table 1 lists the 21 samples that were not collected for this reporting period. Samples were not collected due to lack of flow. All marsh stations had sufficient water levels (total depth at least 0.10 meters) to collect TP samples.

Table 1. List of samples not collected from January 1, 2016, to March 31, 2016.

Project Code	Collection Date	Station	Comments
PIN	1/04/2016	S12B	No flow
PIN	1/11/2016	S12B	No flow
PIN	1/19/2016	S12B	No flow
PIN	1/21/2016	S355A	No flow
PIN	1/21/2016	S355B	No flow
PIN	1/25/2016	S12B	No flow
PIN	2/01/2016	S12B	No flow
PIN	2/08/2016	S12B	No flow
PIN	2/15/2016	S12B	No flow
PIN	2/18/2016	S355A	No flow
PIN	2/18/2016	S355B	No flow
PIN	2/22/2016	S12B	No flow
PIN	2/29/2016	S12B	No flow
PIE	3/01/2016	BERMB3	No flow
PIN	3/07/2016	S12B	No flow
PIN	3/14/2016	S12B	No flow
PIE	3/15/2016	BERMB3	No flow
PIN	3/17/2016	S355A	No flow
PIN	3/21/2016	S12B	No flow
PIN	3/28/2016	S12B	No flow
PIN	3/28/2016	S355A	No flow

FIELD QUALITY CONTROL

Field QC measures consist of field generated equipment blanks (EB), field-cleaned equipment blanks (FCEB), field blanks (FB), and replicate samples (RS). **Table 2** summarizes EB, FCEB, and FB results for projects of interest to the TOC, as referenced in the table's footnotes. **Table 3** summarizes the field precision results and shows that the field sampling precision was acceptable for all four project replicates.

Table 2. Field and equipment TP blank results.

Type of Blank	Project	Number of Blanks Collected	Number of Blanks with Analyte Detected
EB	EVPA	1	0
	PIE	1	0
	PIN	1	0
FCEB	EVPA	6	0
	PIE	26	0
	PIN	20	0
FB	EVPA	0	0
	PIE	12	0
	PIN	13	0
Total		80	0

Notes:

- All blanks were from sampling events containing grab and auto-sampler samples collected during the sampling event on the day of collection or day adjacent to the collection date for the compliance samples.
- FCEB, EB, and FB acceptance criteria: they must be less than the method detection limit (MDL), which is 0.002 milligrams per liter.
- When sample concentrations are less than 10 times the blank values that were equal or greater than the MDL, the qualifier "G" is assigned to the associated sample(s).

Table 3. Precision summary for TP field replicates.

Project Code	Number of Samples (Replicates)	Date Collected	Station	% RSD	Average Value (mg/L)	Comments
PIE	3	1/04/2016	S332DX	0.0	0.006	The precision criterion was met.
PIN	3	1/04/2016	US41-25*	5.4	0.011	The precision criterion was met.
EVPA	3	2/15/2016	CA316*	0.0	0.005	The precision criterion was met.
EVPA	3	3/01/2016	LOX8	7.5	0.008	The precision criterion was met.

Notes:

- The SFWMD Chemistry Laboratory conducted all TP analyses.
- Field precision must be ≤ 20 percent. The laboratory applied this criterion only if sample values were greater than the practical quantitation limit (PQL).
- % RSD – percent relative standard deviation
- mg/L – milligrams per liter
- *The replicate samples were collected at stations different than the stations of interest, which are listed in the Introduction section.

FIELD AUDIT

During the first quarter of 2016, an audit was conducted on the PIE project that included station S332DX. There was one process improvement issued on this audit concerning documentation. This process improvement did not have a direct effect on data quality and there was no recommendation to qualify data based on the audit finding.

LABORATORY ANALYSIS QUALITY ASSESSMENT

PROCEDURE UPDATES

The TP analytical procedure (Standard Methods 4500 P-F, Automated Ascorbic Acid Reduction Method) did not change during this reporting period.

LABORATORY QUALITY CONTROL

Routine laboratory QC samples include QC checks, matrix spikes, and precision checks. **Figures 1 through 7** show the TP recoveries from various types and levels of QC samples at the SFWMD laboratory from January 1, 2016, through March 31, 2016. Control charts provide a graphical means to demonstrate statistical control, monitor a measurement process, diagnose measurement problems, and document measurement uncertainty. They also are used to monitor and document critical aspects of samples and sampling operation.

Figure 1 shows the recoveries for a laboratory control sample (LCS1) at a TP concentration of 0.300 milligrams per liter (mg/L). Performance limits varied from 95 to 101 percent, and had a mean central line value of 98.4 percent based on 627 results. The acceptable control limit is 90–110 percent.

Figure 2 shows the recoveries for a laboratory control sample (LCS3) at a TP concentration of 0.020 mg/L. Performance limits varied from 90 to 108 percent, and had a mean central line value of 98.6 percent based on 106 results. The acceptable control limit is 90–110 percent.

Figure 3 shows the recoveries for a continuing calibration verification sample (CCV) at a TP concentration of 0.200 mg/L. Performance limits varied from 97 to 102 percent, and had a mean central line value of 99.8 percent based on 521 results. The acceptable control limit is 90–110 percent.

Figure 4 shows the recoveries for the method detection limit (MDL) check sample (LCS5) at a TP concentration 0.004 mg/L and acceptable range is 0.002 to 0.006 mg/L.

Figure 5 shows the recoveries for the practical quantitation limit (PQL) varied from 75 to 125 percent. The acceptable control limit is 55–145 percent.

Figures 6 and 7 present the precision and matrix spike recoveries for TP analyses during the reporting period. If QC recoveries are outside the set limits, then SFWMD's laboratory usually rejects the analytical batch and reanalyzes. **Figure 6** shows the precision for three results outside the control limits. However, the concentration of two results were below the PQL and within the reported uncertainty. Therefore the precision for these samples was acceptable and one duplicate set was reanalyzed and also acceptable.

The acceptable recoveries for the QC samples, except the PQL check, are within ± 10 percent of the true value. The daily MDL check with a true value of 0.004 mg/L indicates that the laboratory has consistently achieved the established MDL of 0.002 mg/L. The mean recovery for the organic check, a solution prepared from phytic acid and used to prepare matrix spikes, was 101.5 percent based on 219 results.

Figures 1 through 7 show also the distribution of QC samples (histograms) in the roughly symmetrical bell-shape form with most values clustered around the central line.

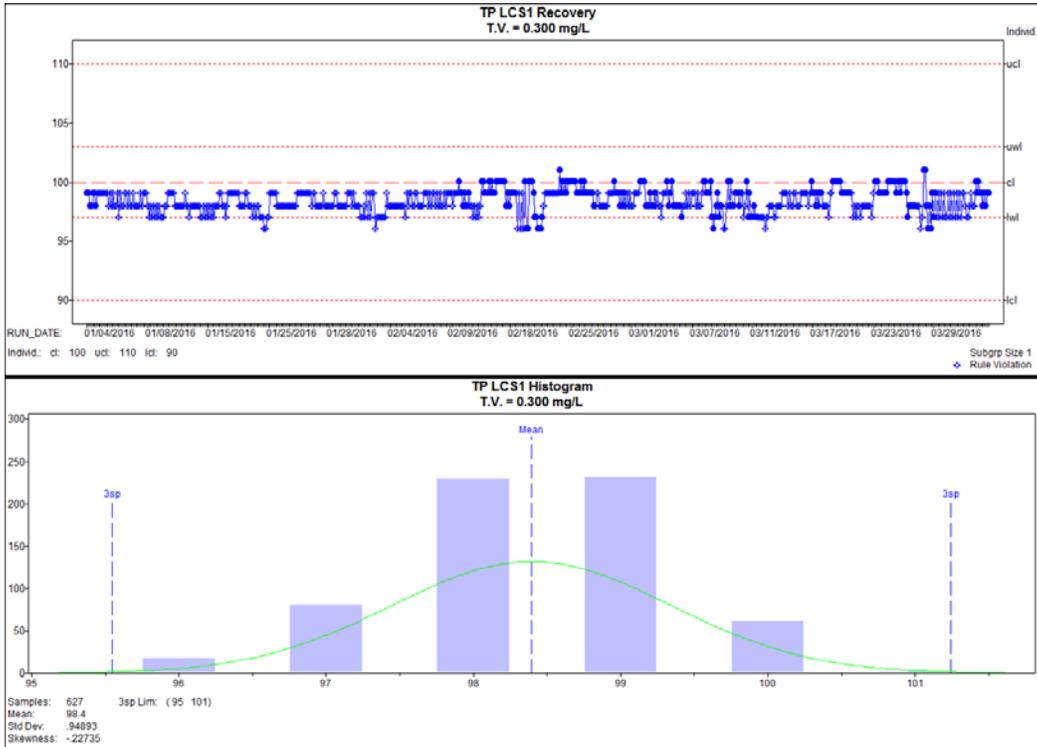


Figure 1. TP QC (Laboratory Control Sample 1, 0.300 mg/L) sample recoveries and histogram

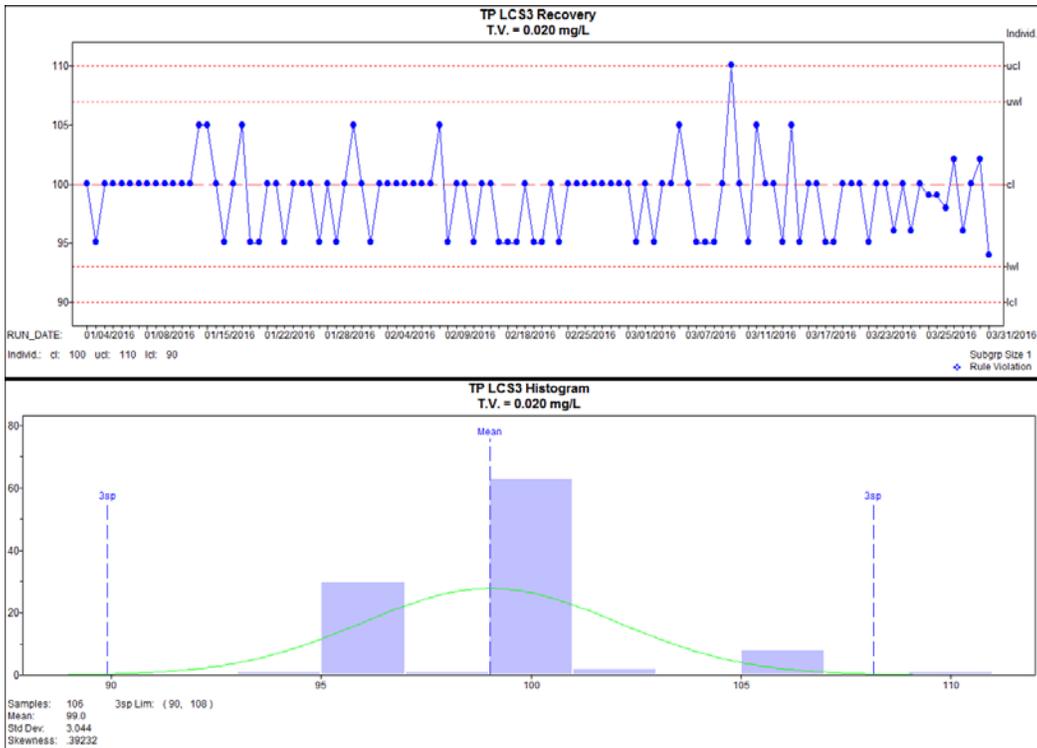


Figure 2. TP QC (Laboratory Control Sample 3, 0.020 mg/L) sample recoveries and histogram.

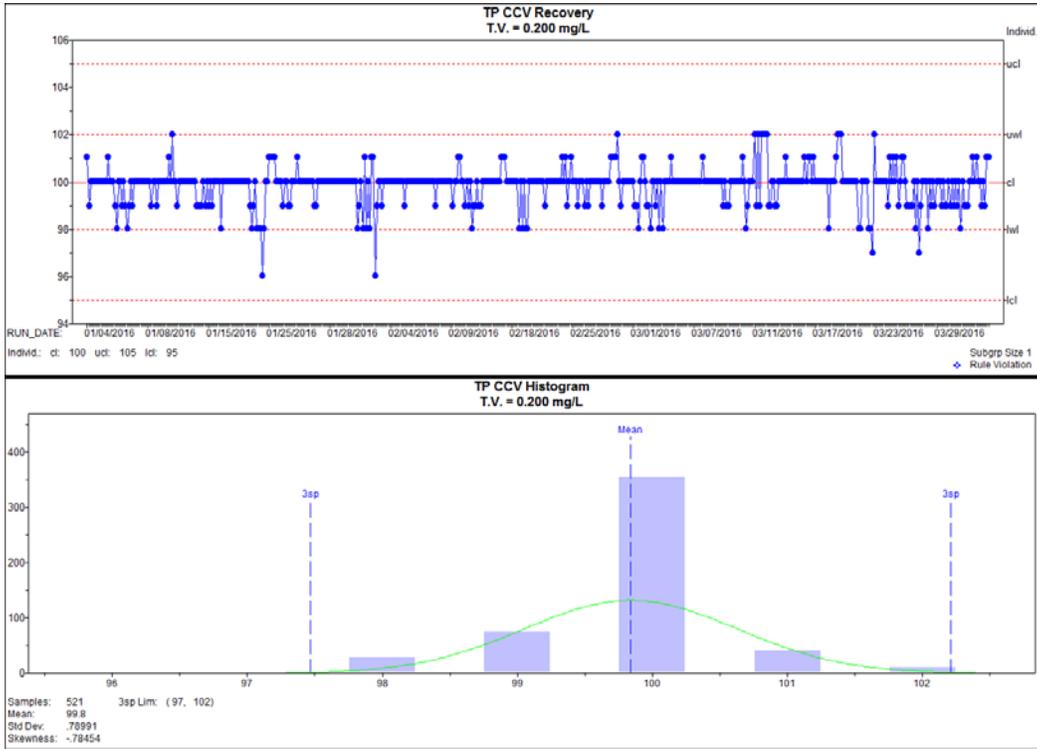


Figure 3. TP QC (Continuing Calibration Verification Sample, 0.200 mg/L) sample recoveries and histogram.

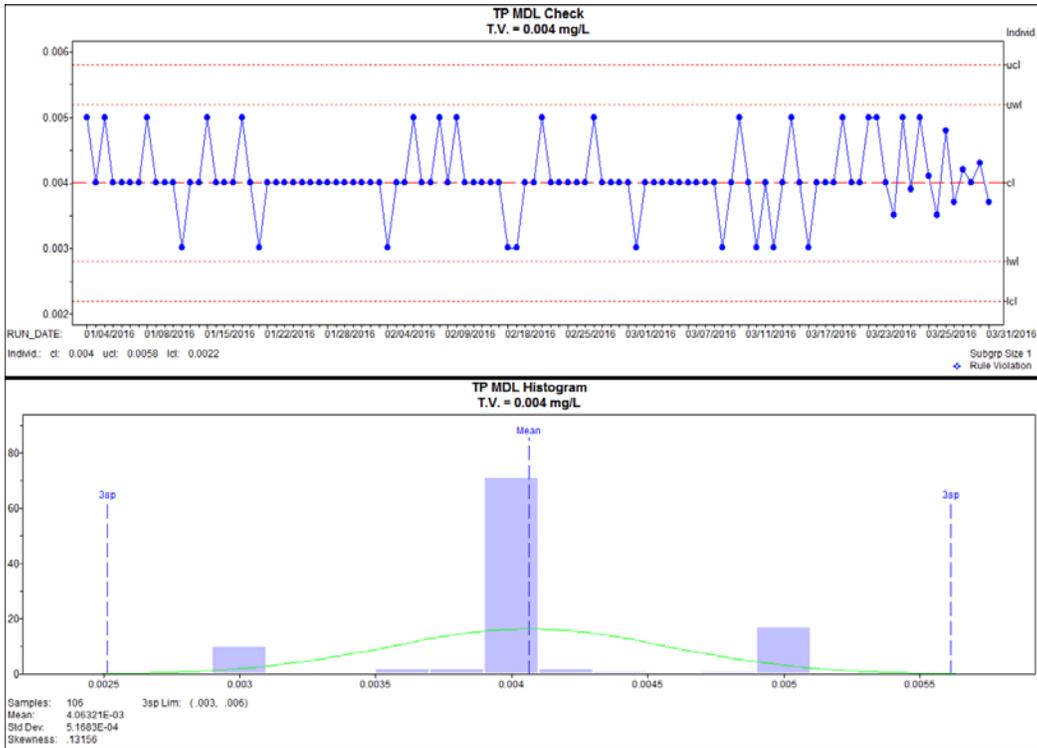


Figure 4. TP QC (Method Detection Limit Check, 0.004 mg/L) sample recoveries and histogram.

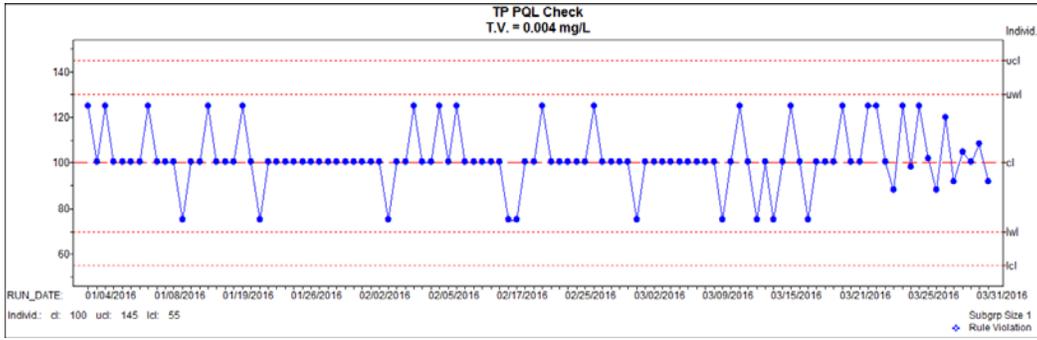


Figure 5. TP PQL (Practical Quantitation Limit) recovery.

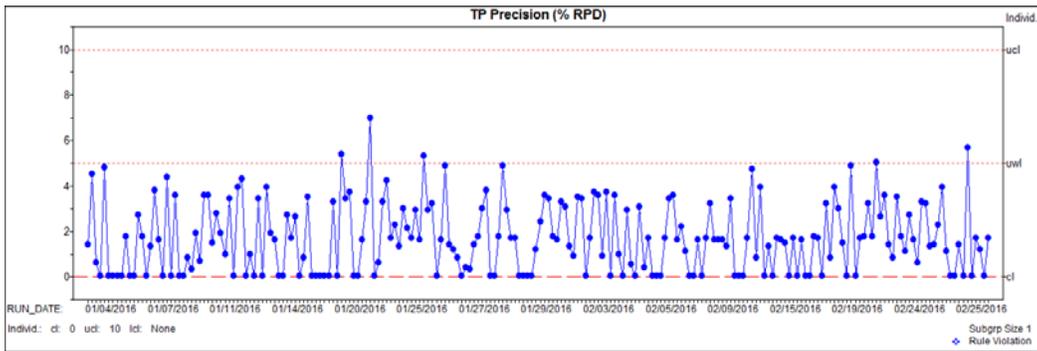


Figure 6. TP precision (%) relative percent different.

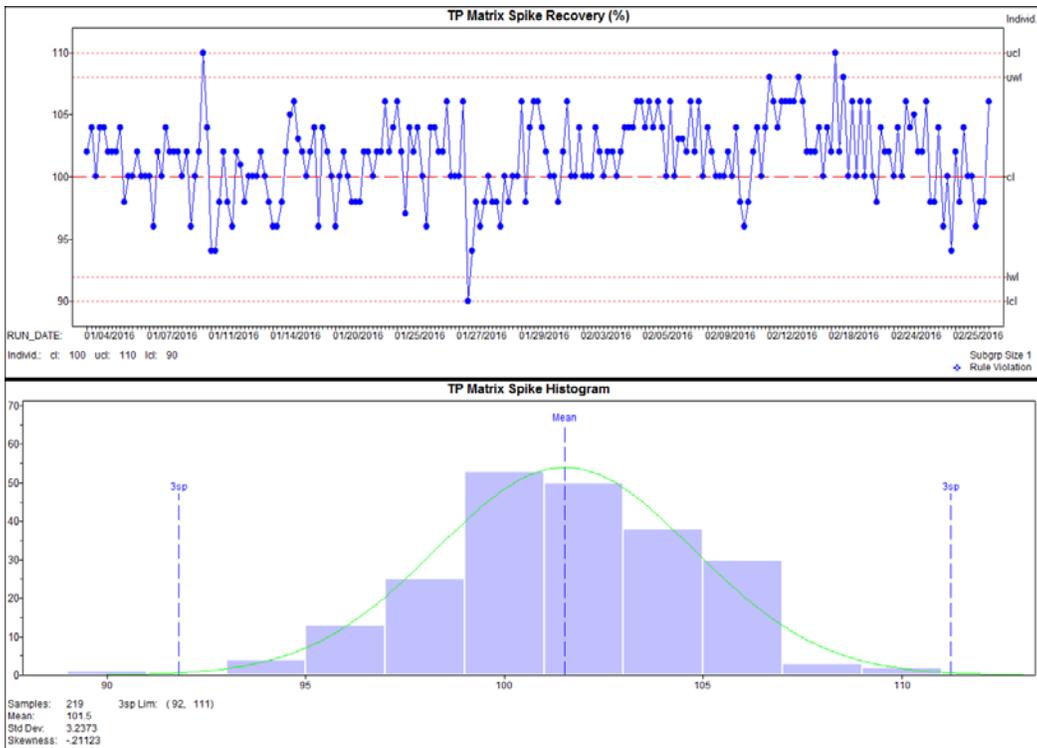


Figure 7. TP matrix spike recovery (%) and histogram

Notes for Figures 1 through 7:

- T.V. – true value
- ucl – upper control limit
- uwl – upper warning limit
- cl – central line
- lwl – lower warning limit
- lcl – lower control limit
- Min, Max – range (minimum and maximum) of acceptable limits
- Std Dev - standard deviation
- Samples – number of analyzed QC samples
- 3sp Lim – calculated limits for subgroup based on 3 sigma factor
- y-axis label for histogram indicates number of data points

METHOD DETECTION LIMIT AND PRACTICAL QUANTITATION LIMIT

MDL checks are routinely analyzed with each analytical run. From January 1, 2016, to March 31, 2016, 95 results for MDL checks were reported for TP measurements. The calculated MDL from these results was determined to be 0.0011 mg/L, using the procedure described in the Code of Federal Regulations (CFR), 40 CFR 136, Appendix B. These results validated the current laboratory MDL value of 0.002 mg/L.

The performance of PQL QC sample is presented in **Figure 5**. The average recovery for PQL was 97.6 percent. The average relative standard deviation for the third quarter was 12.7 percent, within acceptable criterion of 15 percent.

The reported values between the MDL (0.002 mg/L) and less than PQL (0.004 mg/L) are assigned the “P” qualifier, indicating that the results are at concentrations that cannot be accurately quantified.

ESTIMATION OF ANALYTICAL MEASUREMENT UNCERTAINTY

The definition of uncertainty (of measurement) can be found in the *International Vocabulary of Basic and General Standard Terms in Metrology*: “A parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand” (JCGM 1993).

The uncertainty has a probabilistic basis and reflects incomplete knowledge of the quantity. All measurements are subject to uncertainty and a measured value is only complete if it is accompanied by a statement of the associated uncertainty.

The uncertainty has been estimated using the nested hierarchical methodology by Ingersoll (2001) in combination with a mathematical model found in the Eurachem/CITAC (2000) guide on uncertainty. This QC-based nested approach uses the statistical QC data attributed to laboratory measurement activities and does not include uncertainty attributed to field sampling activities. The estimated uncertainty is calculated using the following equation:

$$u(x) = \sqrt{s_o^2 + (s_1^2 x^2)}$$

Where:

$u(x)$ is the combined standard uncertainty in the result x .

s_0 – a constant contribution to the overall uncertainty derived from the procedure to determine the MDL.

s_1 – proportionality constant derived from nested hierarchical methodology by Ingersoll.

Figure 8 is presented to clarify the concept of uncertainty of a measurement process relative to the MDL and PQL.

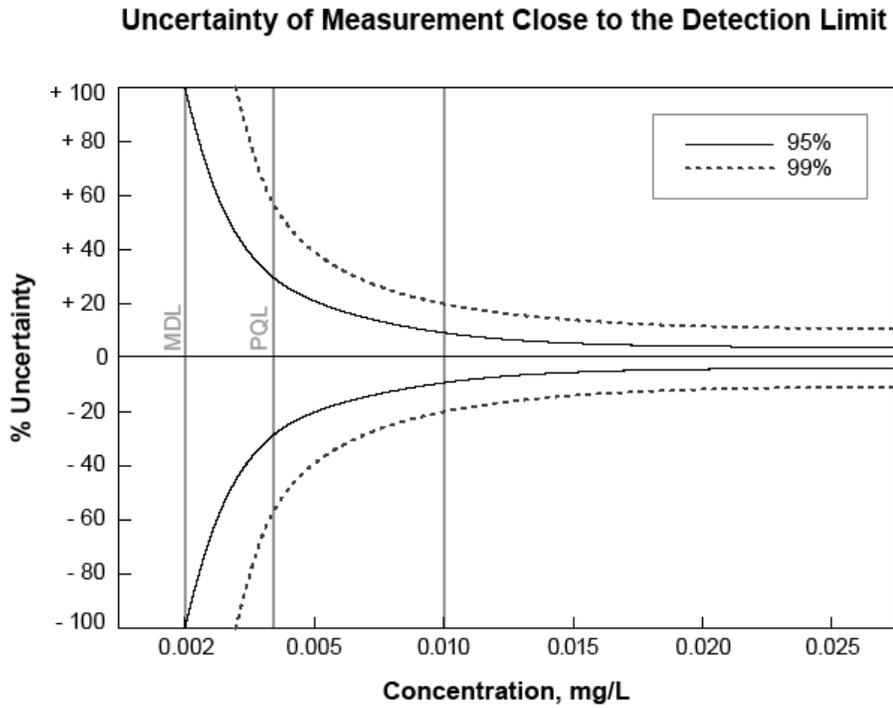


Figure 8. Uncertainty of TP measurement close to the detection limit.

INTER-LABORATORY QUALITY CONTROL ASSESSMENT

NATIONAL PROFICIENCY TESTING PROGRAM

To meet requirements for certification, the SFWMD's laboratory performs proficiency testing (PT) samples twice per year. The result for SFWMD's laboratory from the most recent proficiency testing study WP-254 (March–April 2016) are shown in **Table 7**.

Table 7. PT WP-254 study results.

Assigned Value	(mg/L)	4.16
Study Mean	(mg/L)	4.22
Reported Value	(mg/L)	4.19
Z-Score		-0.145
Acceptance Limits	(mg/L)	3.43 – 4.85
Performance Evaluation		Acceptable

Notes:

- Assigned Value – This value is the calculated true value of the standard based upon the actual composition of the standard.
- Reported Value – The test result reported to the study provider for a specific analyte.
- Acceptable – Reported value falls within the acceptance limits.
- Acceptance Limits – This limit is calculated upon the United States Environmental Protection Agency (USEPA) National Standards for Water Proficiency Testing Criteria Document. For the Water Pollution Program, USEPA acceptance limits are defined as ± 3 standard deviation from the mean.
- Z-Score – A measure of the deviation of the result (X_i) from the assigned value (X) for that determinant (calculated as $z = (X_i - X) / \sigma$, where σ is a standard deviation) (Eurachem/CITAC 2000).

REFERENCES

- Eurachem/CITAC. 2000. *Quantifying Uncertainty in Analytical Measurement, Second Edition*. Guide CG4, Eurachem/CITAC, Austria. ISBN 0-948926-15-5.
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- SFWMD. 2015a. *Chemistry Laboratory Quality Manual*. SFWMD-LAB-QM-2015-01, South Florida Water Management District, West Palm Beach, FL.
- SFWMD. 2015b. *Field Sampling Quality Manual*. SFWMD-FIELD-QM-001-08.2, South Florida Water Management District, West Palm Beach, FL.

GLOSSARY

Accuracy: The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that are due to sampling and analytical operations.

Equipment Blank (EB): Field quality control sample prepared using sampling equipment that has been brought to the site or processing area precleaned and is collected before the equipment has been used. The results of these blanks are used to monitor the on-site sampling environment, sampling equipment decontamination, sample container cleaning, the suitability of sample preservatives and analyte-free water, sample transport and storage conditions, and laboratory process.

Field Blank (FB): FBs are collected by pouring analyte-free water directly into the sample container, preserved, and kept open for the same approximate time and interval as required for collection and/or processing of the routine sample. The results of this blank are used to monitor the on-site sampling environment, sample container cleaning, the suitability of sample preservatives and analyte-free water, sample transport and storage conditions, and laboratory process.

Field Cleaned Equipment Blank (FCEB): Field quality control sample prepared using sampling equipment that has been cleaned in the field or at the processing area. The results of this blank are used to monitor the on-site sampling environment, sampling equipment field decontamination, sample container cleaning, the suitability of sample preservatives and analyte-free water, sample transport and storage conditions, and laboratory process.

Measurand: Particular quantity subject to measurement.

Method Detection Limit (MDL): The smallest concentration of an analyte of interest that can be measured and reported with 99 percent confidence that the concentration is greater than zero. The MDLs are determined from the analysis of a sample in a given matrix, using accepted sampling and analytical preparation procedures, containing the analyte at a specified level. The MDL is determined by the protocol defined in the Code of Federal Regulations (CFR) section 40 CFR, Part 136, Appendix B, as established by the United States Environmental Protection Agency.

Practical Quantitation Limit (PQL): The smallest concentration of an analyte of interest that can be quantitatively reported with a specific degree of confidence. The PQL is verified for each matrix, technology, and analyte. The validity of the PQL is verified by analysis of quality control sample containing the analyte of concern.

Precision: The agreement or closeness between two or more results and is an indication that the measurement system is operating consistently and is a quantifiable indication of variations introduced by the analytical systems over a given time and field sampling period.

Relative Percent Difference (RPD): A measure of precision, used when comparing two values. It is calculated as $\%RPD = [Value1 - Value2]/Mean \times 100$.

Relative Standard Deviation (RSD): A measurement of precision, used when comparing more than two results. It is calculated as $\%RSD = [Standard\ Deviation/Mean] \times 100$.

Replicate Sample (RS): A RS is collected by repeating (simultaneously or in rapid succession) the entire sample acquisition technique that was used to obtain the routine sample. A single RS set (e.g., one sample and two RSs) is collected per quarter, per project, at the same station, for the longest parameter list. RS data are compared to routine sample data to evaluate sampling precision.

Split Sample (SS): A second sample collected from the same sample obtained from the same sampling device. Results for SS are compared with routine sample results; agreement between these two results is mostly an indication of laboratory precision.

Uncertainty: The range of values within which the true value is estimated to lie. It is a best estimate of possible inaccuracy due to both random and systematic error.

Z-Score: A measure of the deviation of the result (X_i) from the assigned value (X) for that determinant (calculated as $z = (X_i - X)/\sigma$, where σ is a standard deviation) (Eurachem/CITAC 2000).

APPENDIX A

TP results for projects and their associated stations specified in the Introduction collected from January 1, 2016, to March 31, 2016. Among 145 reported TP results, five were qualified with a code “I”.

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIN	1/4/2016	S12A	0.011	+/- 0.002	
PIN	1/4/2016	S12C	0.006	+/- 0.002	
PIE	1/4/2016	S332DX	0.006	+/- 0.002	
PIN	1/4/2016	S12D	0.008	+/- 0.002	
PIN	1/4/2016	S333	0.008	+/- 0.002	
PIN	1/4/2016	S356-334	0.005	+/- 0.002	
EVPA	1/5/2016	LOX3	0.008	+/- 0.002	
EVPA	1/5/2016	LOX5	0.008	+/- 0.002	
EVPA	1/5/2016	LOX10	0.007	+/- 0.002	
PIE	1/5/2016	BERMB3	0.021	+/- 0.002	
PIN	1/5/2016	S355A	0.008	+/- 0.002	
EVPA	1/5/2016	LOX9	0.006	+/- 0.002	
EVPA	1/5/2016	LOX8	0.007	+/- 0.002	
EVPA	1/5/2016	LOX7	0.007	+/- 0.002	
PIN	1/5/2016	S355B	0.008	+/- 0.002	
EVPA	1/5/2016	LOX4	0.008	+/- 0.002	
PIE	1/5/2016	S18C	0.003	+/- 0.002	I
EVPA	1/6/2016	LOX12	0.007	+/- 0.002	
EVPA	1/6/2016	LOX15	0.005	+/- 0.002	
EVPA	1/6/2016	LOX16	0.006	+/- 0.002	
EVPA	1/6/2016	LOX14	0.005	+/- 0.002	
EVPA	1/6/2016	LOX13	0.006	+/- 0.002	
EVPA	1/6/2016	LOX11	0.006	+/- 0.002	
EVPA	1/6/2016	LOX6	0.006	+/- 0.002	
PIN	1/11/2016	S12A	0.008	+/- 0.002	
PIN	1/11/2016	S12C	0.006	+/- 0.002	
PIN	1/11/2016	S12D	0.006	+/- 0.002	
PIN	1/11/2016	S333	0.006	+/- 0.002	
PIE	1/11/2016	S332DX	0.005	+/- 0.002	
PIN	1/11/2016	S356-334	0.005	+/- 0.002	
PIE	1/12/2016	S18C	0.004	+/- 0.002	
PIN	1/19/2016	S12A	0.008	+/- 0.002	
PIE	1/19/2016	BERMB3	0.016	+/- 0.002	
PIN	1/19/2016	S12C	0.004	+/- 0.002	
PIN	1/19/2016	S12D	0.007	+/- 0.002	
PIN	1/19/2016	S333	0.006	+/- 0.002	
PIE	1/19/2016	S332DX	0.005	+/- 0.002	

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIN	1/19/2016	S356-334	0.006	+/- 0.002	
PIE	1/19/2016	S18C	0.003	+/- 0.002	I
PIN	1/25/2016	S12A	0.007	+/- 0.002	
PIN	1/25/2016	S12C	0.005	+/- 0.002	
PIN	1/25/2016	S12D	0.006	+/- 0.002	
PIN	1/25/2016	S333	0.006	+/- 0.002	
PIN	1/25/2016	S356-334	0.007	+/- 0.002	
PIE	1/25/2016	S332DX	0.004	+/- 0.002	
PIE	1/26/2016	S18C	0.003	+/- 0.002	I
PIN	2/1/2016	S12A	0.005	+/- 0.002	
PIN	2/1/2016	S12C	0.005	+/- 0.002	
PIN	2/1/2016	S12D	0.008	+/- 0.002	
PIN	2/1/2016	S333	0.007	+/- 0.002	
PIN	2/1/2016	S356-334	0.007	+/- 0.002	
PIE	2/1/2016	S332DX	0.005	+/- 0.002	
EVPA	2/2/2016	LOX4	0.008	+/- 0.002	
EVPA	2/2/2016	LOX7	0.005	+/- 0.002	
EVPA	2/2/2016	LOX8	0.007	+/- 0.002	
PIE	2/2/2016	BERMB3	0.253	+/- 0.017	
EVPA	2/2/2016	LOX9	0.005	+/- 0.002	
EVPA	2/2/2016	LOX10	0.005	+/- 0.002	
EVPA	2/2/2016	LOX5	0.006	+/- 0.002	
EVPA	2/2/2016	LOX3	0.005	+/- 0.002	
PIE	2/2/2016	S18C	0.005	+/- 0.002	
EVPA	2/3/2016	LOX12	0.005	+/- 0.002	
EVPA	2/3/2016	LOX15	0.004	+/- 0.002	
EVPA	2/3/2016	LOX16	0.006	+/- 0.002	
EVPA	2/3/2016	LOX14	0.004	+/- 0.002	
EVPA	2/3/2016	LOX13	0.006	+/- 0.002	
EVPA	2/3/2016	LOX11	0.005	+/- 0.002	
EVPA	2/3/2016	LOX6	0.004	+/- 0.002	
PIN	2/4/2016	S355A	0.007	+/- 0.002	
PIN	2/4/2016	S355B	0.007	+/- 0.002	
PIN	2/8/2016	S12A	0.006	+/- 0.002	
PIN	2/8/2016	S12C	0.005	+/- 0.002	
PIN	2/8/2016	S12D	0.007	+/- 0.002	
PIN	2/8/2016	S333	0.006	+/- 0.002	
PIE	2/8/2016	S332DX	0.006	+/- 0.002	
PIN	2/8/2016	S356-334	0.010	+/- 0.002	
PIE	2/9/2016	S18C	0.003	+/- 0.002	I
PIN	2/15/2016	S12A	0.006	+/- 0.002	
PIE	2/15/2016	S332DX	0.006	+/- 0.002	

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIN	2/15/2016	S12C	0.004	+/- 0.002	
PIN	2/15/2016	S12D	0.006	+/- 0.002	
PIN	2/15/2016	S333	0.005	+/- 0.002	
PIN	2/15/2016	S356-334	0.006	+/- 0.002	
PIE	2/16/2016	BERMB3	0.030	+/- 0.003	
PIE	2/16/2016	S18C	0.003	+/- 0.002	I
PIN	2/22/2016	S12C	0.004	+/- 0.002	
PIN	2/22/2016	S12A	0.007	+/- 0.002	
PIN	2/22/2016	S12D	0.004	+/- 0.002	
PIN	2/22/2016	S333	0.006	+/- 0.002	
PIE	2/22/2016	S332DX	0.005	+/- 0.002	
PIN	2/22/2016	S356-334	0.007	+/- 0.002	
PIE	2/23/2016	S18C	0.004	+/- 0.002	
PIN	2/29/2016	S12A	0.006	+/- 0.002	
PIN	2/29/2016	S12C	0.004	+/- 0.002	
PIN	2/29/2016	S12D	0.004	+/- 0.002	
PIN	2/29/2016	S333	0.007	+/- 0.002	
PIN	2/29/2016	S356-334	0.008	+/- 0.002	
PIE	2/29/2016	S332DX	0.005	+/- 0.002	
EVPA	3/1/2016	LOX3	0.005	+/- 0.002	
EVPA	3/1/2016	LOX5	0.006	+/- 0.002	
EVPA	3/1/2016	LOX10	0.007	+/- 0.002	
EVPA	3/1/2016	LOX9	0.006	+/- 0.002	
EVPA	3/1/2016	LOX8	0.008	+/- 0.002	
EVPA	3/1/2016	LOX7	0.007	+/- 0.002	
PIE	3/1/2016	S18C	0.004	+/- 0.002	
EVPA	3/3/2016	LOX12	0.005	+/- 0.002	
EVPA	3/3/2016	LOX15	0.005	+/- 0.002	
PIN	3/3/2016	S355A	0.006	+/- 0.002	
EVPA	3/3/2016	LOX16	0.007	+/- 0.002	
EVPA	3/3/2016	LOX14	0.006	+/- 0.002	
PIN	3/3/2016	S355B	0.006	+/- 0.002	
EVPA	3/3/2016	LOX13	0.004	+/- 0.002	
EVPA	3/3/2016	LOX11	0.005	+/- 0.002	
EVPA	3/3/2016	LOX6	0.008	+/- 0.002	
EVPA	3/3/2016	LOX4	0.006	+/- 0.002	
PIN	3/7/2016	S12A	0.007	+/- 0.002	
PIN	3/7/2016	S12C	0.005	+/- 0.002	
PIN	3/7/2016	S12D	0.004	+/- 0.002	
PIN	3/7/2016	S333	0.005	+/- 0.002	
PIE	3/7/2016	S332DX	0.005	+/- 0.002	
PIN	3/7/2016	S356-334	0.008	+/- 0.002	

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIE	3/8/2016	S18C	0.004	+/- 0.002	
PIN	3/14/2016	S12A	0.008	+/- 0.002	
PIN	3/14/2016	S12C	0.007	+/- 0.002	
PIN	3/14/2016	S12D	0.008	+/- 0.002	
PIN	3/14/2016	S333	0.008	+/- 0.002	
PIN	3/14/2016	S356-334	0.006	+/- 0.002	
PIE	3/14/2016	S332DX	0.006	+/- 0.002	
PIE	3/15/2016	S18C	0.004	+/- 0.002	
PIN	3/17/2016	S355B	0.006	+/- 0.002	
PIN	3/21/2016	S12A	0.011	+/- 0.002	
PIN	3/21/2016	S12C	0.007	+/- 0.002	
PIN	3/21/2016	S12D	0.006	+/- 0.002	
PIN	3/21/2016	S333	0.008	+/- 0.002	
PIE	3/21/2016	S332DX	0.006	+/- 0.002	
PIN	3/21/2016	S356-334	0.007	+/- 0.002	
PIE	3/22/2016	S18C	0.004	+/- 0.002	
PIN	3/28/2016	S12A	0.008	+/- 0.002	
PIN	3/28/2016	S12C	0.006	+/- 0.002	
PIN	3/28/2016	S12D	0.006	+/- 0.002	
PIN	3/28/2016	S333	0.007	+/- 0.002	
PIN	3/28/2016	S355B	0.006	+/- 0.002	
PIE	3/28/2016	S332DX	0.006	+/- 0.002	
PIN	3/28/2016	S356-334	0.008	+/- 0.002	
PIE	3/29/2016	18C	0.004	+/- 0.002	

Qualifier code:

I – indicates the reported value is greater than or equal to the MDL but less than PQL.