

Quality Assessment Report for Water Quality Monitoring

April – June 2014



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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 April 1, 2014, through June 30, 2014:

- 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 2013b) provides the minimum requirements followed in field sample collection. The *Chemistry Laboratory Quality Manual* (SFWMD 2013a) 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 the SFWMD's DBHYDRO database. Appendix B contains all TP results for samples of interest to the Everglades Technical Oversight Committee (TOC), collected from April 1, 2014 through June 30, 2014.

This report includes an analysis of the SFWMD laboratory's performance on the split (EVPA) samples with the Florida Department of Environmental Protection (FDEP) for a one-year period. 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 is one of the essential elements of the National Environmental Laboratory Accreditation Program (NELAP) accreditation process.

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 64 samples that were not collected for this reporting period. Samples were not collected due to lack of flow, site dry, shallow water depth, or insufficient water level.

Table 1. List of samples not collected for period from April 1, 2014 to June 30, 2014.

Project	Collection Date	Station	Comments
EVPA	4/01/2014	LOX3	Total depth less than 0.10 m, no sample collected
EVPA	4/01/2014	LOX10	Total depth less than 0.10 m, no sample collected
PIN	4/01/2014	S355A	No flow, no sample collected
PIN	4/01/2014	S355B	No flow, no sample collected
PIE	4/01/2014	BERMB3	No flow, no sample collected
PIN	4/07/2014	S12B	No flow, no sample collected
PIN	4/07/2014	S12C	No flow, no sample collected
PIN	4/07/2014	S12D	No flow, no sample collected
PIN	4/07/2014	S355A	No flow, no sample collected
PIN	4/07/2014	S355B	No flow, no sample collected
PIN	4/14/2014	S12B	No flow, no sample collected
PIN	4/14/2014	S12C	No flow, no sample collected
PIN	4/14/2014	S12D	No flow, no sample collected
PIE	4/15/2014	BERMB3	Site dry
PIN	4/21/2014	S12B	No flow, no sample collected
PIN	4/21/2014	S12C	No flow, no sample collected
PIN	4/21/2014	S12D	No flow, no sample collected
PIN	4/21/2014	S355A	No flow, no sample collected
PIN	4/21/2014	S355B	No flow, no sample collected
PIN	4/28/2014	S12B	No flow, no sample collected
PIN	4/28/2014	S12C	No flow, no sample collected
PIN	4/28/2014	S12D	No flow, no sample collected
PIE	4/29/2014	BERMB3	Site dry
PIN	5/05/2014	S12B	No flow, no sample collected
PIN	5/05/2014	S12C	No flow, no sample collected
PIN	5/05/2014	S12D	No flow, no sample collected
EVPA	5/06/2014	LOX3	Total depth less than 0.10 m, no sample collected
EVPA	5/06/2014	LOX4	Total depth less than 0.10 m, no sample collected
EVPA	5/06/2014	LOX5	Total depth less than 0.10 m, no sample collected
EVPA	5/06/2014	LOX9	Total depth less than 0.10 m, no sample collected
EVPA	5/06/2014	LOX10	Total depth less than 0.10 m, no sample collected
PIN	5/12/2014	S12B	No flow, no sample collected
PIN	5/12/2014	S12C	No flow, no sample collected
PIN	5/12/2014	S12D	No flow, no sample collected
PIE	5/13/2014	BERMB3	Site dry
PIN	5/19/2014	S12B	No flow, no sample collected
PIN	5/19/2014	S12C	No flow, no sample collected
PIN	5/19/2014	S12D	No flow, no sample collected
PIN	5/27/2014	S12B	No flow, no sample collected
PIN	5/27/2014	S12C	No flow, no sample collected
PIN	5/27/2014	S12C	No flow, no sample collected
PIE	5/27/2014	BERMB3	No flow, no sample collected
PIN	6/02/2014	S12B	No flow, no sample collected
PIN	6/02/2014	S12C	No flow, no sample collected
PIN	6/02/2014	S12D	No flow, no sample collected
EVPA	6/03/2014	LOX3	Site dry
EVPA	6/03/2014	LOX4	Site dry
EVPA	6/03/2014	LOX5	Site dry
EVPA	6/03/2014	LOX7	Total depth less than 0.10 m, no sample collected
EVPA	6/03/2014	LOX8	Total depth less than 0.10 m, no sample collected
EVPA	6/03/2014	LOX9	Site dry
EVPA	6/03/2014	LOX10	Total depth less than 0.10 m, no sample collected
EVPA	6/04/2014	LOX6	Total depth less than 0.10 m, no sample collected
PIE	6/09/2014	BERMB3	Site dry
PIN	6/09/2014	S12B	No flow, no sample collected
PIN	6/09/2014	S12C	No flow, no sample collected

Project	Collection Date	Station	Comments
PIN	6/09/2014	S12D	No flow, no sample collected
PIN	6/16/2014	S12B	No flow, no sample collected
PIN	6/16/2014	S12C	No flow, no sample collected
PIN	6/16/2014	S12D	No flow, no sample collected
PIN	6/23/2014	S12B	No flow, no sample collected
PIN	6/23/2014	S12C	No flow, no sample collected
PIN	6/23/2014	S12D	No flow, no sample collected
PIE	6/09/2014	BERMB3	Site mostly dry

FIELD QUALITY CONTROL

Field QC measures consist of field generated equipment blanks (EB), field-cleaned equipment blanks (FCEB), field blanks (FB), split samples (SS), 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 three project replicates.

Type of Blank	Project	Number of Blanks Collected	Number of Blanks With Analyte Detected
EB	EVPA	1	0
	PIE	2	0
	PIN	1	0
FCEB	EVPA	5	0
	PIE	25	0
	PIN	18	0
FB	EVPA	0	0
	PIE	10	0
	PIN	13	0
Total		75	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).
- When sample concentrations are less than 10 times the blank values that were equal or greater than the MDL, the qualifier "J" is assigned to the associated sample(s).
- MDL – 0.002 mg/L

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	4/14/2014	S357*	24.7**	0.005	All replicates results < 5 times PQL***
PIE	3	4/14/2014	S178*	3.8	0.026	The precision criterion was met.
PIN	3	4/15/2014	S355A	6.1	0.038	The precision criterion was met.
PIN	3	4/15/2014	TAMBR105*	0.8	0.127	The precision criterion was met
EVPA	3	5/20/2014	CA317*	6.9	0.008	The precision criterion was met.
EVPA	3	6/4/2014	LOX12	14.3	0.007	The precision criterion was met

Notes:

- The SFWMD's 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 the stations different than stations of interest, which are listed in the Introduction section.
- **% RSD was larger than 20 percent precision criterion. However, the replicate sample values were not qualified because all values were lower than 5 times the PQL.
- ***Qualifiers would have applied to samples (replicates) if average concentration exceeded 0.020 mg/L, which is 5 times the PQL (0.004 mg/L).

FIELD AUDIT

During the second quarter of 2014, an audit was conducted on the sample processing of the PIE project that includes stations S18C and BERMB3. There were four process improvements issued on this audit concerning documentation, sample processing protocol and auto-sampler installation. None of the process improvements had a direct effect on data quality and there was no recommendation to qualify data based on audit findings.

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 6** show the TP recoveries from various types and levels of QC samples at the SFWMD laboratory from April 1, 2014 through June 30, 2014. 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 1a 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 98 to 103 percent, and had a mean central line value of 100.2 percent based on 448 results. The acceptable control limit is 90–110 percent.

Figure 2a 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 99.1 percent based on 84 results. The acceptable control limit is 90–110 percent.

Figure 3a 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 99.9 percent based on 364 results. The acceptable control limit is 90–110 percent.

Figure 4a shows the recoveries for the method detection limit (MDL) sample (LCS5) at a TP concentration 0.004 mg/L and results varied from 0.003 to 0.005 mg/L based on 84 results.

Figure 4c show the recoveries for the practical quantitation limit (PQL) varied from 75 to 125 percent. The acceptable control limit is 55–145 percent.

Figures 5a and **6a** present the precision and matrix spike recoveries for TP analyses during the reporting period. If QC recoveries are outside the set limits, then the SFWMD's laboratory usually rejects the analytical batch and re-analyzes.

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 99.4 percent based on 270 results.

Figures 1b through **6b** show the distribution of QC samples in the roughly symmetrical bell-shape form with most values clustered around the central line.

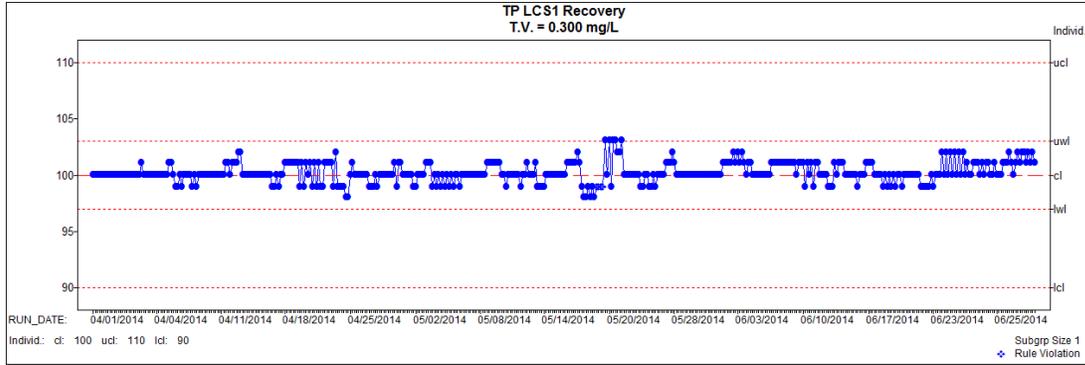


Figure 1a TP QC (Laboratory Control Sample 1, 0.300 mg/L) sample recoveries.

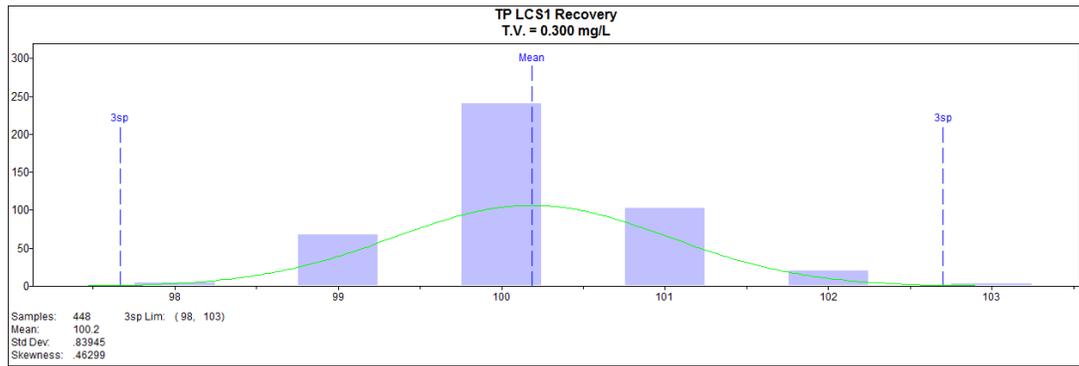


Figure 1b TP QC (Laboratory Control Sample 1, 0.300 mg/L) sample histogram.

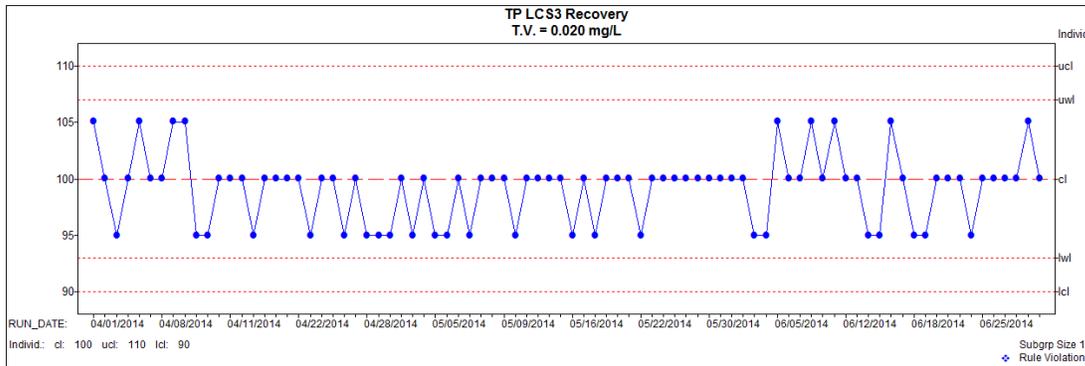


Figure 2a. TP QC (Laboratory Control Sample 3, 0.020 mg/L) sample recoveries.

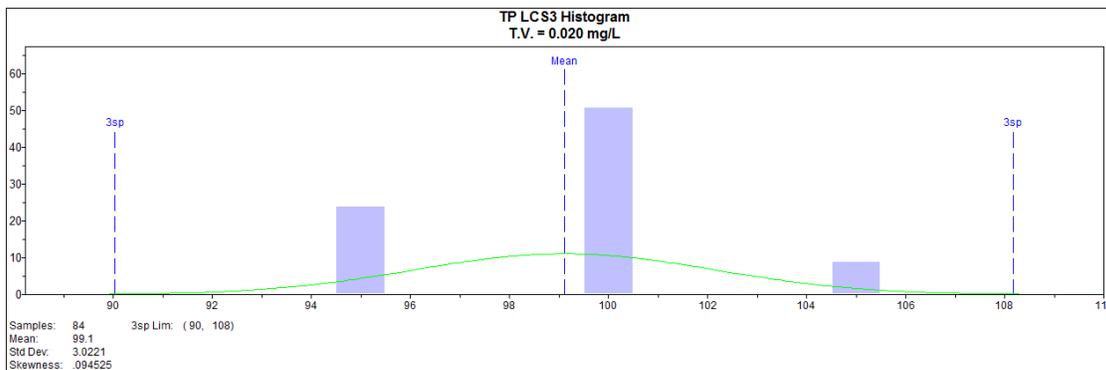


Figure 2b. TP QC (Laboratory Control Sample 3, 0.020 mg/L) sample histogram.

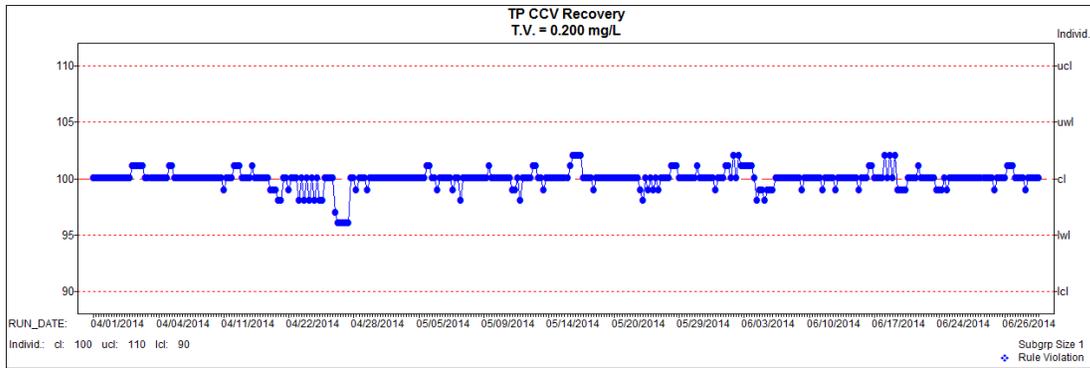


Figure 3a. TP QC (Continuing Calibration Verification Sample, 0.200 mg/L) sample recoveries.

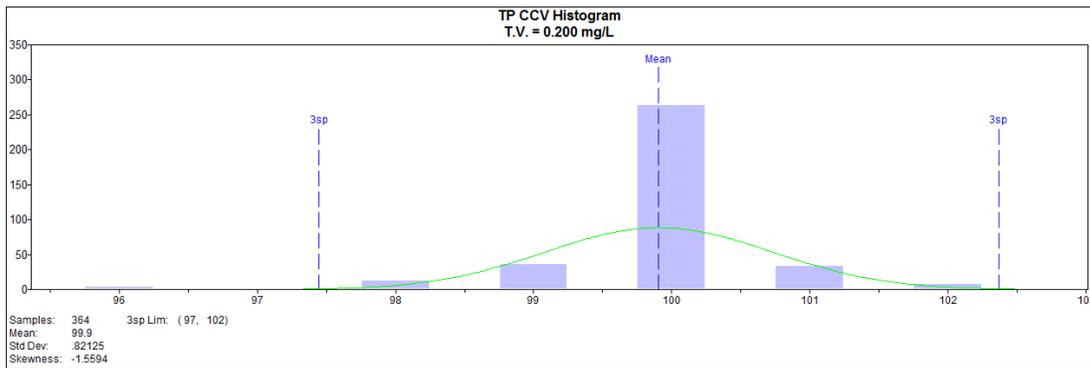


Figure 3b. TP QC (Continuing Calibration Verification Sample, 0.200 mg/L) sample histogram.

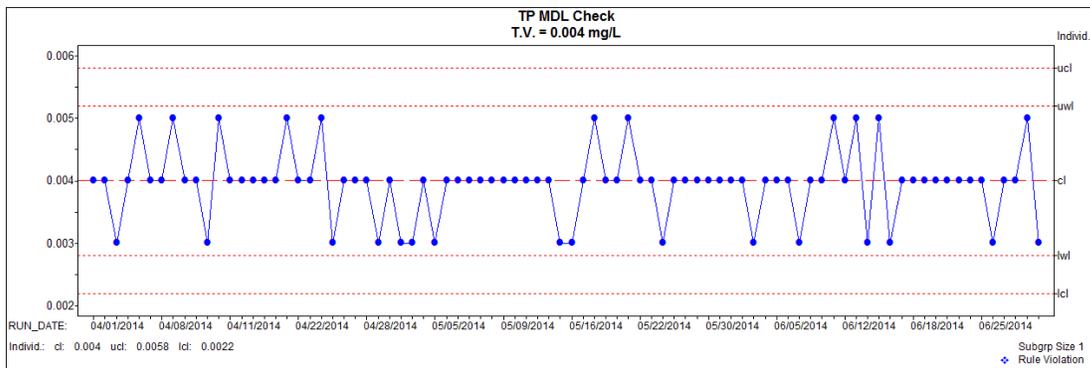


Figure 4a. TP QC5 (Method Detection Limit Check, 0.004 mg/L) sample recoveries.

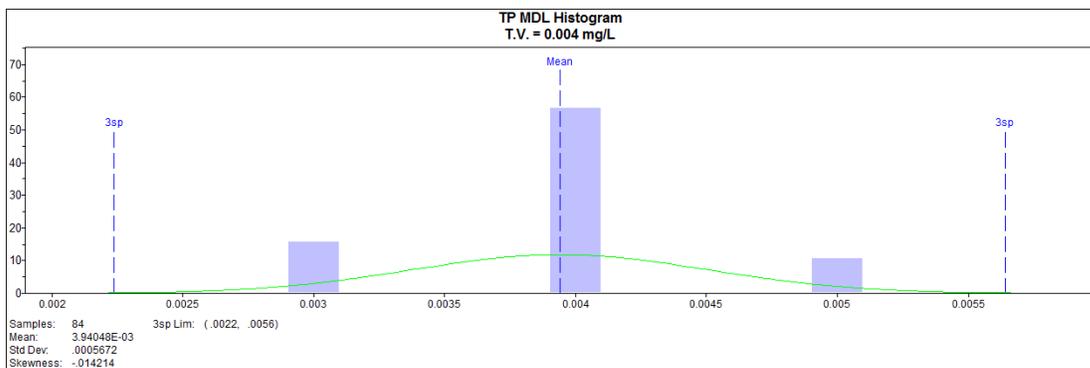


Figure 4b. TP QC5 (Method Detection Limit Check, 0.004 mg/L) sample histogram.

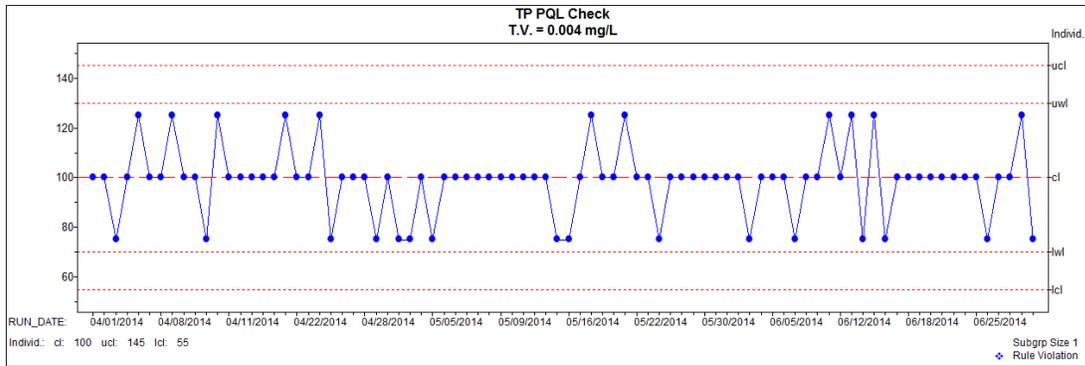


Figure 4c. TP PQL (Practical Quantitation Limit) check.

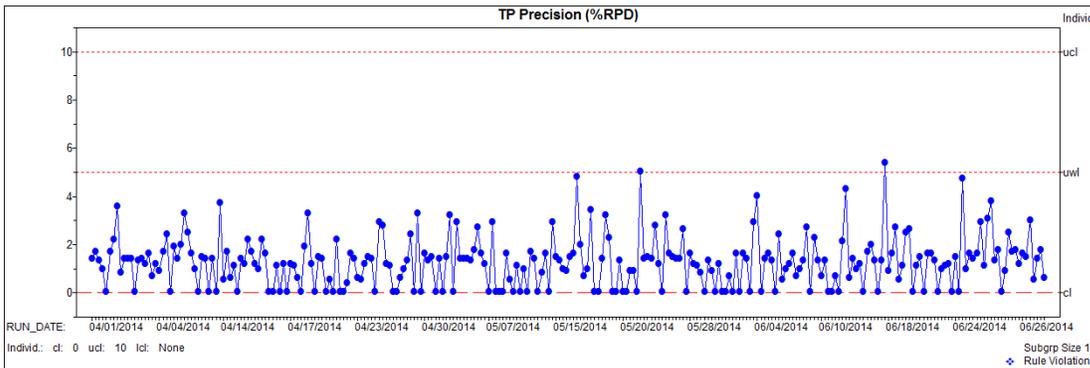


Figure 5a TP precision (%) relative percent different.

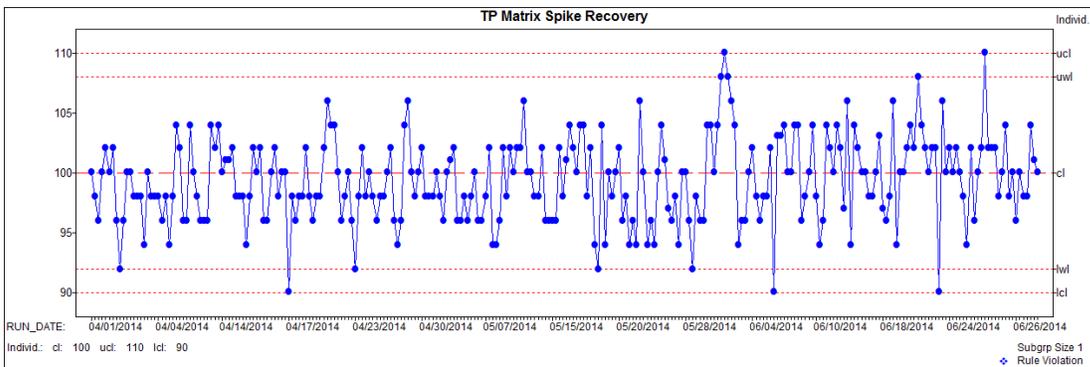


Figure 6a. TP spike recovery (%) data.

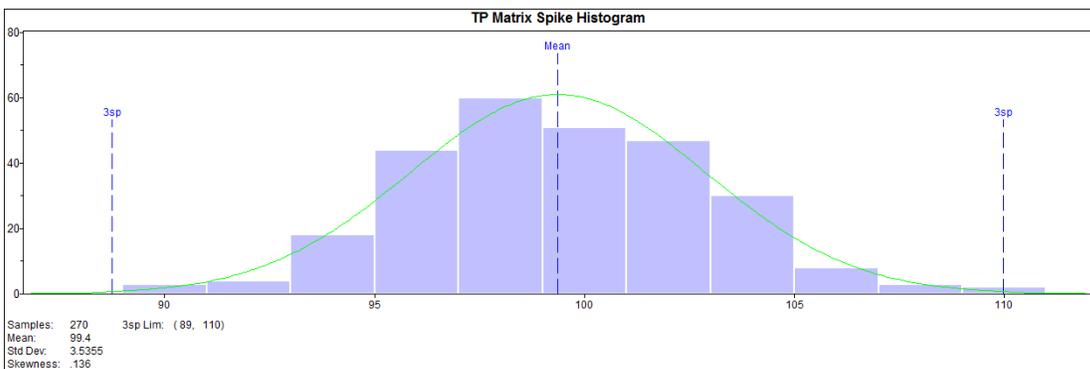


Figure 6b. TP spike recovery (%) histogram.

Notes for Figures 1 through 6:

- 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 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 April 1, 2014 to June 30, 2014, 84 results for MDL checks were reported for TP measurements. The calculated MDL from these results was determined to be 0.0013 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 **Figures 4a, 4b, and 4c**. The average recovery for PQL was 98.5 percent. The average relative standard deviation was 14.2 percent, which was less than acceptable criterion of 15 percent. These results validated the current laboratory PQL value of 0.004 mg/L.

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

ESTIMATION OF ANALYTICAL MEASUREMENT UNCERTAINTY

The reporting of estimated analytical measurement uncertainty values for all analytes was implemented in July 2012. 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:

$$u(\mathbf{x}) = \sqrt{s_0^2 + (s_1^2 x^2)}$$

where:

$u(\mathbf{x})$ 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 7 is presented to clarify the concept of uncertainty of a measurement process relative to the MDL and PQL.

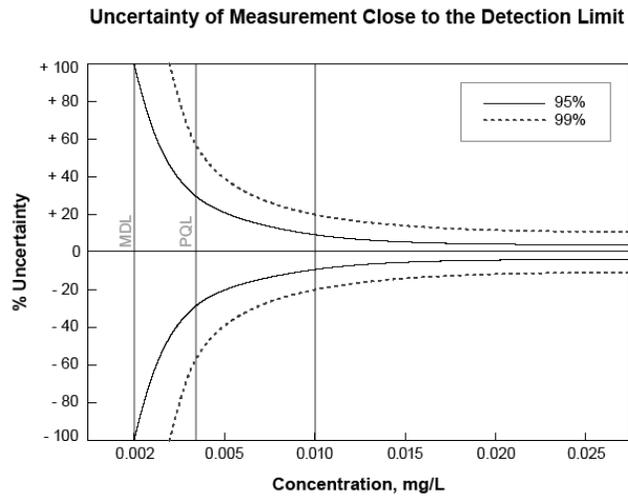


Figure 7. Uncertainty of TP measurement close to the detection limit.

INTER-LABORATORY QUALITY CONTROL ASSESSMENT

SPLIT STUDIES WITH FDEP LABORATORY

To continuously assess comparability of results, the SFWMD routinely sends split samples to other laboratories. The statistical evaluation contains the data from the EVPA quarterly splits conducted by the FDEP and the SFWMD laboratories from June 2013 to June 2014 (see **Appendix A**). This comparison contains the TP qualified data. **Figure 8** presents regression analysis of all data, and **Table 4** presents summary statistics for the data pairs.

ALL DATA (TP < 0.020 mg/L)

Figure 8 shows that the intercept is not statistically different from zero and the slope is not statistically different from one for all TP data from both laboratories. The intercept of the regression is not statistically different from zero since the 95 percent confidence interval for the intercept contains zero. The slope of the regression is not different from one statistically since the 95 percent confidence interval for slope contains one. The r^2 (R-square) value of 0.83 indicates strong agreement between two laboratories results. **Table 4** shows that the mean difference (-0.00005 mg/L) and the median difference (0.000 mg/L) are statistically insignificant with p-values of 0.8474 and 0.999, respectively.

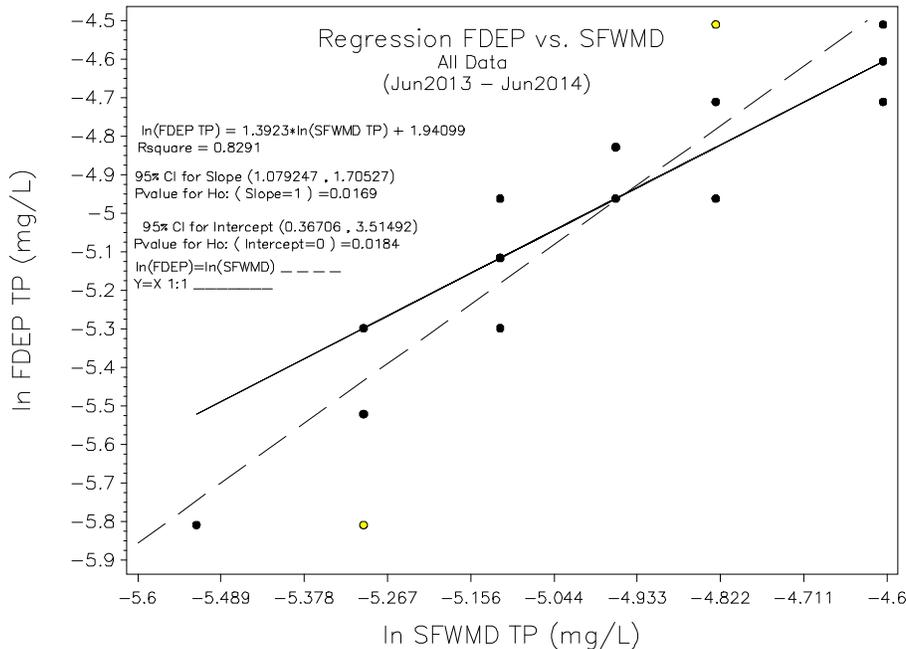


Figure 8. Regression analysis for all TP data.

Table 4. Comparison of SFWMD and FDEP split TP samples (June 2013–June 2014).

All Data	Summary Statistics			
	Lab	N	Mean (mg/L)	Median (mg/L)
	FDEP	20	0.00685	0.0070
	SFWMD	20	0.00680	0.0065
	Statistical Test of Hypotheses			
	Summary of Paired Differences (mg/L)	Hypothesis	Test	P-value
	Mean of Differences	-0.00005	Mean of Differences = 0	Student's t
Median of Differences	0.000	Median of Differences = 0	Signed Rank	0.999

Notes:

- Differences calculated as the SFWMD TP minus the FDEP TP. The mean and median differences for all concentration levels are at or below the MDL.
- Data were not used in this comparison study if the FDEP value was below the FDEP's detection limit (0.002 mg/L).

TP > 0.020 mg/L

No data points were in the range where the TP was greater than or equal to 0.020 mg/L. In summary, the mean and median differences for all TP data were practically zero and statistically insignificant. The pair differences were statistically insignificant in both; the sign-rank test ($p > 0.05$) and Shapiro-Wilk ($p=0.0463$) for the non-normally distributed paired data.

NATIONAL PROFICIENCY TESTING PROGRAM

As a requirement for laboratory continued accreditation, the SFWMD's laboratory performs proficiency testing on environmental samples twice per year. The result for the SFWMD's laboratory from the most recent proficiency testing study (March–April 2014) are shown in **Table 5**.

Table 5. Proficiency testing WP-230 study TP.

Assigned Value	5.26 mg/L
Study Mean	5.26 mg/L
Reported Value	5.35 mg/L
Z-Score	0.253
Acceptance Limits	4.36–6.11 mg/L
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 USEPA standard deviation from the USEPA mean.

REFERENCES

Eurachem/CITAC. 2000. *Quantifying Uncertainty in Analytical Measurement, Second Edition*. ISBN 0-948926-15-5, Eurachem/CITAC, Guide CG4.

Ingersoll, W.S. 2001. Environmental Analytical Measurement Uncertainty Estimation. Nested Hierarchical Approach. Defense Technical Information Center #ADA396946, Fort Belvoir, VA.

JCGM. 1993. *International Vocabulary of Basic and General Standard Terms in Metrology*. Joint Committee on Guides for Metrology, Geneva, Switzerland (ISBN 92-67-10175-1).

SFWMD. 2013a. Chemistry Laboratory Quality Manual, SFWMD-LAB-QM-2013-01. South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2013b. Field Sampling Quality Manual, SFWMD-FIELD-QM-001-08. 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 QC 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 QC 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 $\%RPD = [Value1 - Value2] / Mean * 100$.

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

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 RS) 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

Results of TP split studies between the SFWMD and FDEP laboratories,
EVPA Project, June 2013– June 2014.

Sample	Date collected	Station	SFWMD TP result	FDEP TP result	%RPD/Comments
EVPA	5-Jun-2013	LOX14	0.010	0.011	9.5
EVPA	5-Jun-2013	LOX16	0.010	0.009	10.5
EVPA	5-Jun-2013	LOX15	0.007	0.008	13.3
EVPA	5-Jun-2013	LOX12	0.008	0.011	31.6
EVPA	4-Sep-2013	LOX7	0.006	0.006	0.0
EVPA	4-Sep-2013	LOX4	0.007	0.008	13.3
EVPA	5-Sep-2013	LOX15	0.008	0.007	13.3
EVPA	5-Sep-2013	LOX16	0.010	0.010	0.0
EVPA	4-Dec-2013	LOX12	0.005	0.003 (I)	FDEP result < PQL
EVPA	4-Dec-2013	LOX15	0.004	0.003 (I)	FDEP result < PQL
EVPA	4-Dec-2013	LOX16	0.005	0.004 (I)	FDEP result < PQL
EVPA	4-Dec-2013	LOX14	0.005	0.004 (I)	FDEP result < PQL
EVPA	5-Mar-2014	LOX12	0.007	0.007	0.0
EVPA	5-Mar-2014	LOX15	0.005	0.005	0.0
EVPA	5-Mar-2014	LOX16	0.006	0.007	15.4
EVPA	5-Mar-2014	LOX14	0.006	0.005	18.2
EVPA	4-June-2014	LOX12	0.007	0.008	13.3
EVPA	4-June-2014	LOX15	0.006	0.006	0.0
EVPA	4-June-2014	LOX14	0.006	0.006	0.0
EVPA	4-June-2014	LOX12	0.008	0.009	11.8

Notes:

Qualifier code:

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

SFWMD: reported MDL = 0.002 mg/L and PQL = 0.004 mg/L

FDEP: reported MDL = 0.002 mg/L and PQL = 0.005 mg/L

APPENDIX B

TP results for projects and their associated stations specified in the Introduction from April 1, 2014 to June 30, 2014. Among 106 reported results, one was qualified with a code "I".

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
EVPA	4/1/2014	LOX4	0.006	+/- 0.002	
EVPA	4/1/2014	LOX7	0.007	+/- 0.002	
EVPA	4/1/2014	LOX8	0.009	+/- 0.002	
EVPA	4/1/2014	LOX9	0.007	+/- 0.002	
EVPA	4/1/2014	LOX5	0.006	+/- 0.002	
PIE	4/1/2014	S18C	0.004	+/- 0.002	
EVPA	4/2/2014	LOX12	0.005	+/- 0.002	
EVPA	4/2/2014	LOX15	0.005	+/- 0.002	
EVPA	4/2/2014	LOX16	0.007	+/- 0.002	
EVPA	4/2/2014	LOX14	0.006	+/- 0.002	
EVPA	4/2/2014	LOX13	0.007	+/- 0.002	
EVPA	4/2/2014	LOX11	0.007	+/- 0.002	
EVPA	4/2/2014	LOX6	0.003	+/- 0.002	I
PIN	4/7/2014	S12A	0.023	+/- 0.002	
PIN	4/7/2014	S333	0.012	+/- 0.002	
PIN	4/7/2014	S356-334	0.008	+/- 0.002	
PIE	4/7/2014	S332DX	0.004	+/- 0.002	
PIE	4/8/2014	S18C	0.004	+/- 0.002	
PIN	4/14/2014	S12A	0.023	+/- 0.002	
PIN	4/14/2014	S333	0.010	+/- 0.002	
PIE	4/14/2014	S332DX	0.005	+/- 0.002	
PIE	4/14/2014	S18C	0.006	+/- 0.002	
PIN	4/14/2014	S356-334	0.007	+/- 0.002	
PIN	4/15/2014	S355A	0.039	+/- 0.003	
PIN	4/15/2014	S355B	0.049	+/- 0.003	
PIN	4/21/2014	S12A	0.024	+/- 0.002	
PIN	4/21/2014	S333	0.011	+/- 0.002	
PIE	4/21/2014	S332DX	0.006	+/- 0.002	
PIN	4/21/2014	S356-334	0.010	+/- 0.002	
PIE	4/22/2014	S18C	0.005	+/- 0.002	
PIN	4/28/2014	S12A	0.021	+/- 0.002	
PIN	4/28/2014	S333	0.013	+/- 0.002	
PIE	4/28/2014	S332DX	0.006	+/- 0.002	
PIN	4/28/2014	S356-334	0.013	+/- 0.002	
PIE	4/29/2014	S18C	0.004	+/- 0.002	
PIN	4/29/2014	S355A	0.012	+/- 0.002	

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIN	4/29/2014	S355B	0.013	+/- 0.002	
PIN	5/5/2014	S12A	0.031	+/- 0.003	
PIN	5/5/2014	S333	0.014	+/- 0.002	
PIN	5/5/2014	S356-334	0.017	+/- 0.002	
PIE	5/5/2014	S332DX	0.008	+/- 0.002	
EVPA	5/6/2014	LOX7	0.009	+/- 0.002	
EVPA	5/6/2014	LOX8	0.010	+/- 0.002	
PIE	5/6/2014	S18C	0.005	+/- 0.002	
EVPA	5/7/2014	LOX12	0.008	+/- 0.002	
EVPA	5/7/2014	LOX15	0.006	+/- 0.002	
EVPA	5/7/2014	LOX16	0.009	+/- 0.002	
EVPA	5/7/2014	LOX14	0.007	+/- 0.002	
EVPA	5/7/2014	LOX13	0.008	+/- 0.002	
EVPA	5/7/2014	LOX11	0.009	+/- 0.002	
EVPA	5/7/2014	LOX6	0.008	+/- 0.002	
PIN	5/12/2014	S12A	0.041	+/- 0.003	
PIN	5/12/2014	S333	0.015	+/- 0.002	
PIN	5/12/2014	S356-334	0.025	+/- 0.002	
PIE	5/12/2014	S332DX	0.008	+/- 0.002	
PIE	5/13/2014	S18C	0.006	+/- 0.002	
PIN	5/14/2014	S355A	0.016	+/- 0.002	
PIN	5/14/2014	S355B	0.016	+/- 0.002	
PIN	5/19/2014	S12A	0.040	+/- 0.003	
PIN	5/19/2014	S333	0.018	+/- 0.002	
PIE	5/19/2014	S332DX	0.013	+/- 0.002	
PIN	5/19/2014	S356-334	0.022	+/- 0.002	
PIE	5/20/2014	S18C	0.005	+/- 0.002	
PIN	5/27/2014	S12A	0.050	+/- 0.004	
PIN	5/27/2014	S333	0.030	+/- 0.003	
PIE	5/27/2014	S332DX	0.014	+/- 0.002	
PIN	5/27/2014	S356-334	0.024	+/- 0.002	
PIE	5/27/2014	S18C	0.007	+/- 0.002	
PIN	5/29/2014	S355A	0.023	+/- 0.002	
PIN	5/29/2014	S355B	0.021	+/- 0.002	
PIN	6/2/2014	S12A	0.065	+/- 0.004	
PIN	6/2/2014	S333	0.038	+/- 0.003	
PIN	6/2/2014	S356-334	0.037	+/- 0.003	
PIE	6/2/2014	S332DX	0.012	+/- 0.002	
PIE	6/3/2014	S18C	0.008	+/- 0.002	
EVPA	6/4/2014	LOX12	0.008	+/- 0.002	

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
EVPA	6/4/2014	LOX15	0.006	+/- 0.002	
EVPA	6/4/2014	LOX16	0.006	+/- 0.002	
EVPA	6/4/2014	LOX14	0.006	+/- 0.002	
EVPA	6/4/2014	LOX13	0.007	+/- 0.002	
EVPA	6/4/2014	LOX11	0.007	+/- 0.002	
PIN	6/9/2014	S12A	0.062	+/- 0.004	
PIN	6/9/2014	S333	0.034	+/- 0.003	
PIN	6/9/2014	S356-334	0.031	+/- 0.003	
PIE	6/9/2014	S18C	0.011	+/- 0.002	
PIE	6/10/2014	S332DX	0.018	+/- 0.002	
PIN	6/10/2014	S355A	0.030	+/- 0.003	
PIN	6/10/2014	S355B	0.032	+/- 0.003	
PIN	6/16/2014	S12A	0.048	+/- 0.004	
PIN	6/16/2014	S333	0.037	+/- 0.003	
PIE	6/16/2014	S332DX	0.012	+/- 0.002	
PIN	6/16/2014	S356-334	0.024	+/- 0.002	
PIE	6/17/2014	S18C	0.007	+/- 0.002	
PIN	6/23/2014	S12A	0.043	+/- 0.003	
PIN	6/23/2014	S333	0.041	+/- 0.003	
PIN	6/23/2014	S356-334	0.016	+/- 0.002	
PIE	6/23/2014	S332DX	0.007	+/- 0.002	
PIN	6/24/2014	S355A	0.032	+/- 0.003	
PIN	6/24/2014	S355B	0.038	+/- 0.003	
PIE	6/24/2014	S18C	0.005	+/- 0.002	
PIN	6/30/2014	S12A	0.044	+/- 0.003	
PIN	6/30/2014	S12C	0.019	+/- 0.002	
PIN	6/30/2014	S12D	0.035	+/- 0.003	
PIN	6/30/2014	S333	0.037	+/- 0.003	
PIE	6/30/2014	S332DX	0.006	+/- 0.002	
PIN	6/30/2014	S356-334	0.014	+/- 0.002	

Qualifier code: I: indicates the reported value is greater than or equal to the MDL but less than PQL