

# **Quality Assessment Report for Water Quality Monitoring**

**October – December 2013**



**Submitted to the  
Technical Oversight Committee  
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## INTRODUCTION

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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 October 1, 2013, through December 31, 2013:

- 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 October 1, 2013 through December 31, 2013.

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.

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## FIELD SAMPLING QUALITY ASSESSMENT

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### PROCEDURE UPDATES

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

### SAMPLES NOT COLLECTED

**Table 1** lists the 31 samples that were not collected for this reporting period. Samples were not collected due to lack of flow, shallow water depth, or insufficient water level.

**Table 1.** Samples not collected for period from October 1, 2013 to December 31, 2013.

Project	Collection Date	Station	Comments
PIN	7-Oct-2013	S355A	No flow, no sample collected
PIN	7-Oct-2013	S355B	No flow, no sample collected
PIN	21-Oct-2013	S355A	No flow, no sample collected
PIN	21-Oct-2013	S355B	No flow, no sample collected
PIN	28-Oct-2013	S355A	No flow, no sample collected
PIN	28-Oct-2013	S355B	No flow, no sample collected
PIE	29-Oct-2013	BERMB3	No flow, no sample collected
PIN	4-Nov-2013	S355A	No flow, no sample collected
PIN	4-Nov-2013	S355B	No flow, no sample collected
PIE	13-Nov-2013	BERMB3	No flow, no sample collected
PIN	18-Nov-2013	S355A	No flow, no sample collected
PIN	18-Nov-2013	S355B	No flow, no sample collected
PIN	25-Nov-2013	S355A	No flow, no sample collected
PIN	25-Nov-2013	S355B	No flow, no sample collected
PIN	2-Dec-2013	S355A	No flow, no sample collected
PIN	2-Dec-2013	S355B	No flow, no sample collected
EVPA	3-Dec-2013	LOX3	Total depth less than 0.10 meters, no sample collected
PIN	16-Dec-2013	S12B	No flow, no sample collected
PIN	16-Dec-2013	S12C	No flow, no sample collected
PIN	16-Dec-2013	S355A	No flow, no sample collected
PIN	16-Dec-2013	S355B	No flow, no sample collected
PIN	23-Dec-2013	S355A	No flow, no sample collected
PIN	23-Dec-2013	S355B	No flow, no sample collected
PIN	23-Dec-2013	S12B	No flow, no sample collected
PIN	23-Dec-2013	S12C	No flow, no sample collected
PIE	23-Dec-2013	BERMB3	No flow, no sample collected
PIN	30-Dec-2013	S12B	No flow, no sample collected
PIN	30-Dec-2013	S12C	No flow, no sample collected
PIN	30-Dec-2013	S12D	No flow, no sample collected
PIN	30-Dec-2013	S355A	No flow, no sample collected
PIN	30-Dec-2013	S355B	No flow, no sample collected

## 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	6	0
	PIE	26	0
	PIN	14	0
FB	EVPA	0	0
	PIN	12	0
	PIE	10	0
<b>Total</b>		<b>72</b>	<b>0</b>

**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 milligram per liter (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*	14-Oct-2013	S700	7.1	0.014	The precision criterion was met.
PIE	3*	15-Oct-2013	AJC1	0.0	0.005	The precision criterion was met.
PIN	3	15-Oct-2013	S355A	6.7	0.009	The precision criterion was met.
EVPA	3*	18-Nov-2013	CA315	24.7	0.002	All replicates results < PQL
EVPA	3	3-Dec-2013	LOX8	13.3	0.004	The precision criterion was met.

**Notes:**

- \*The replicate samples were collected at the stations different than stations of interest, which are listed in the Introduction section.
- The SFWMD's chemistry laboratory conducted all TP analyses.
- Field precision must be  $\leq 20$  percent. The laboratory applied this criterion only if sample values were greater than the practical quantitation limit (PQL).
- Qualifiers applied to samples (replicates) that a precision criterion was not met if average concentration exceeds 5 times PQL.
- % RSD – percent relative standard deviation
- mg/L – milligrams per liter

**FIELD AUDIT**

There were no audits related to TOC water quality stations conducted during the fourth quarter of 2013.

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## LABORATORY ANALYSIS QUALITY ASSESSMENT

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### PROCEDURE UPDATES

The TP analytical procedure (Standard Method 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 October 1, 2013 through December 31, 2013. 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 97 to 103 percent, and had a mean central line value of 100.0 percent based on 518 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 92 to 107 percent, and had a mean central line value of 99.4 percent based on 94 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 103 percent, and had a mean central line value of 100 percent based on 424 results. The acceptable control limit is 90–110 percent.

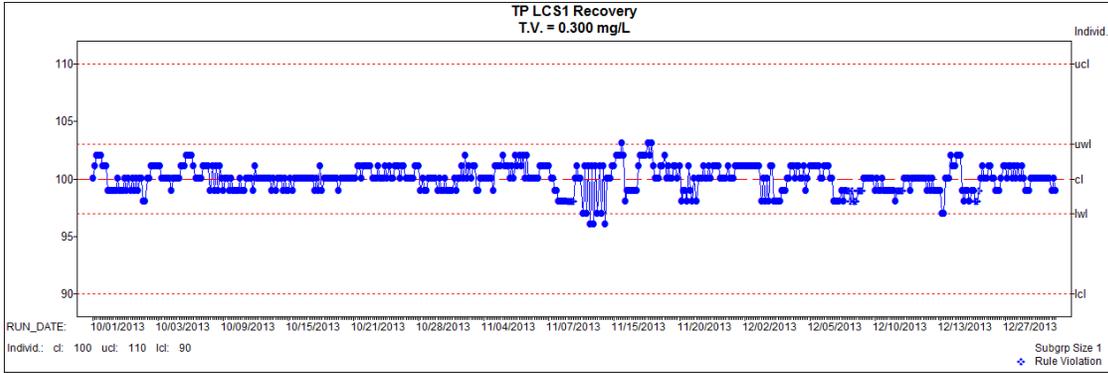
**Figure 4a** shows the recoveries for the method detection limit (MDL) sample (LCS5) at a TP concentration 0.004 mg/L and results varied from 0.003 to 0.005 mg/L based on 94 results.

**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.

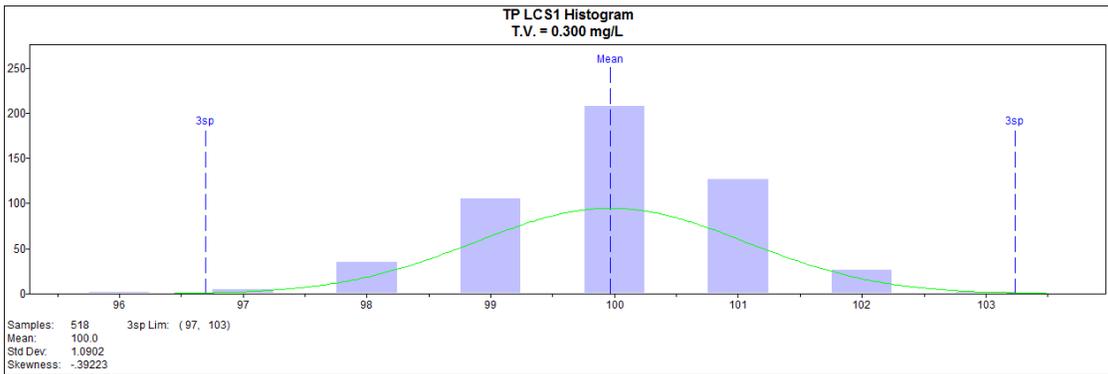
**Figures 5a** and **6a** present the precision and matrix spike recoveries for TP analyses during the reporting period. If QC recoveries are outside the set limits, then the SFWMD's laboratory usually rejects the analytical batch and re-analyzes.

The acceptable recoveries for the QC samples, except the PQL check, are within  $\pm 10$  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 99.9 percent based on 292 results.

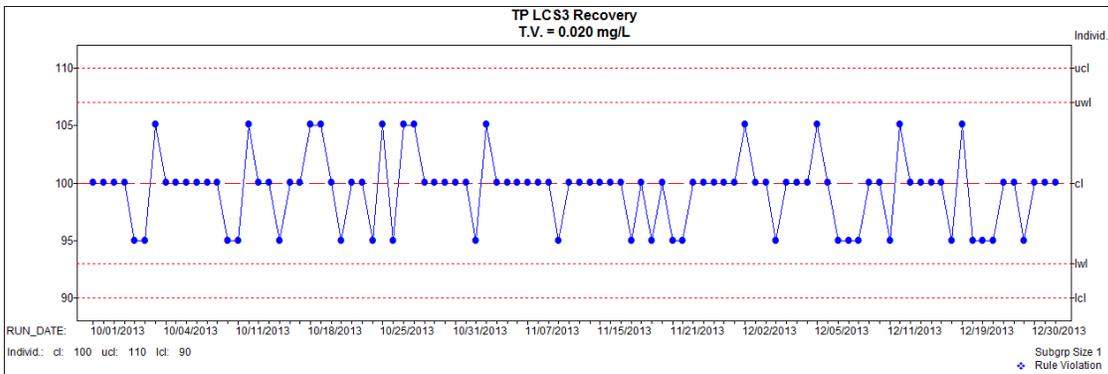
**Figures 1b** through **6b** show the distribution of quality control samples in the roughly symmetrical bell-shape form with most values clustered around the central line.



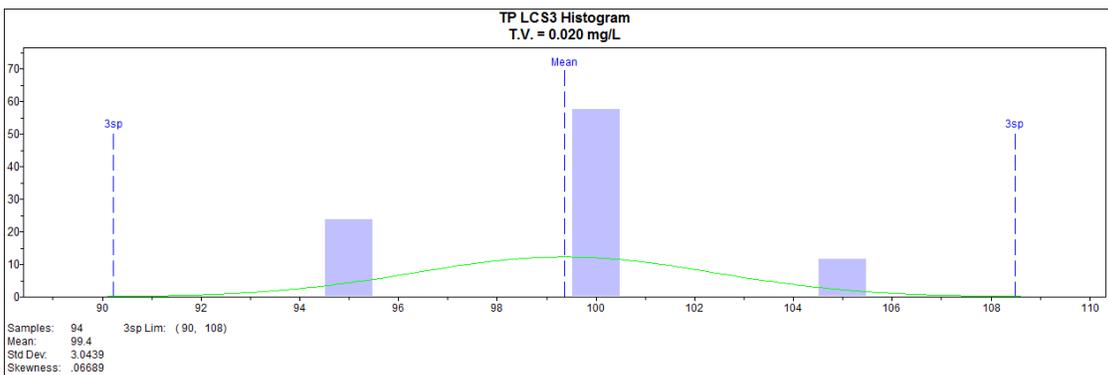
**Figure 1a** TP QC (Laboratory Control Sample, 0.300 mg/L) sample recoveries.



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



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



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

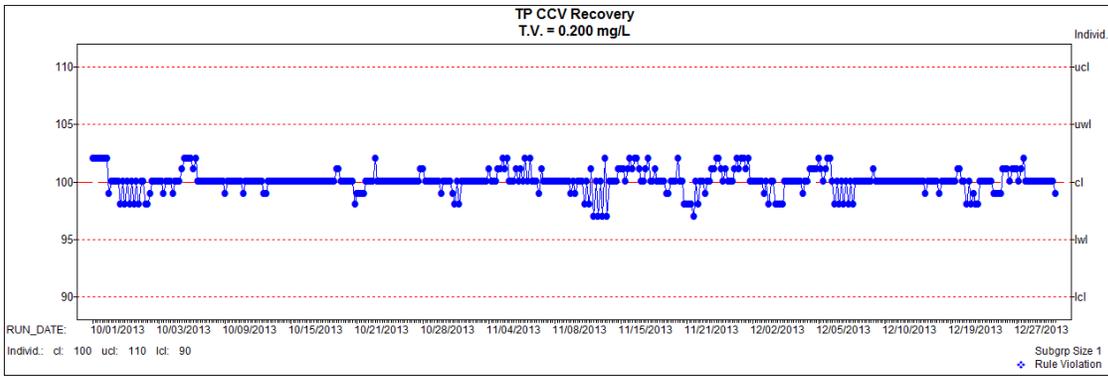


Figure 3a. TP QC (Continuing Calibration Verification Sample, 0.200 mg/L) sample recoveries.

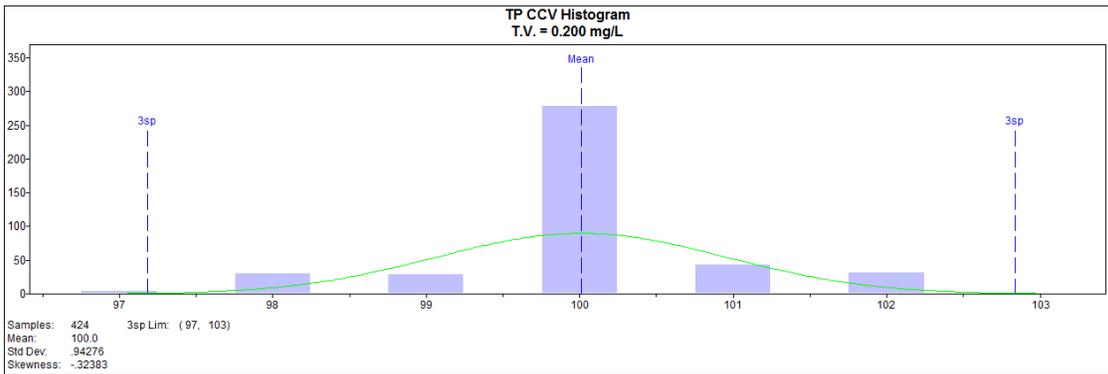


Figure 3b. TP QC (Continuing Calibration Verification Sample, 0.200 mg/L) sample histogram.

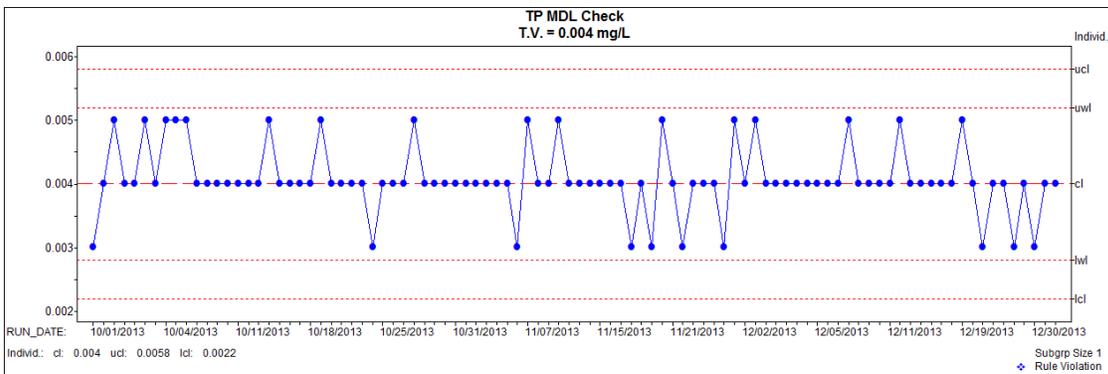


Figure 4a. TP QC5 (Method Detection Limit Check, 0.004 mg/L) sample recoveries.

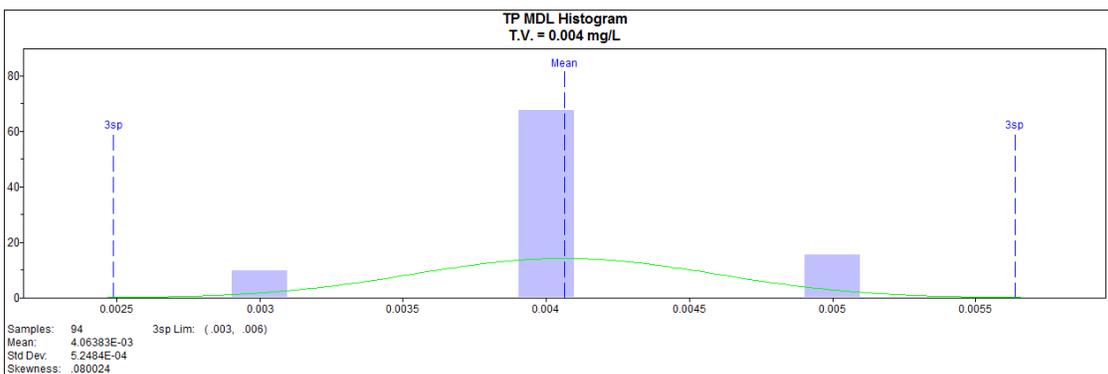


Figure 4b. TP QC5 (Method Detection Limit Check, 0.004 mg/L) sample histogram.

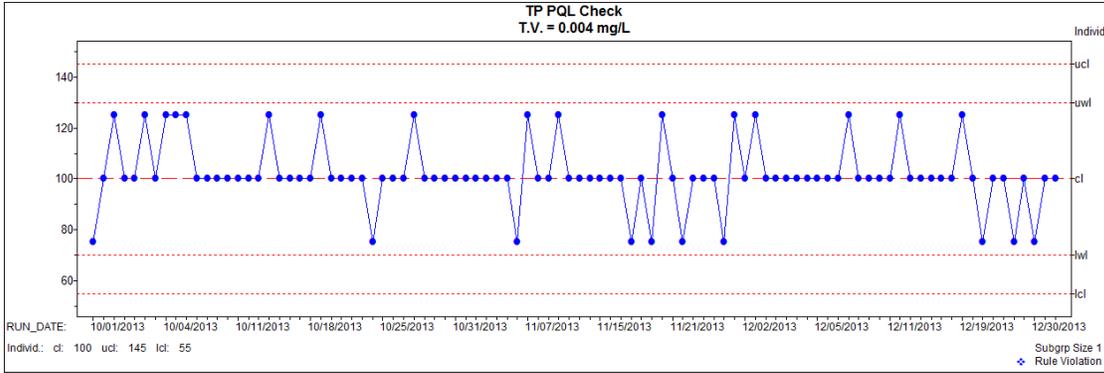


Figure 4c. TP PQL (Practical Quantitation Limit) check.

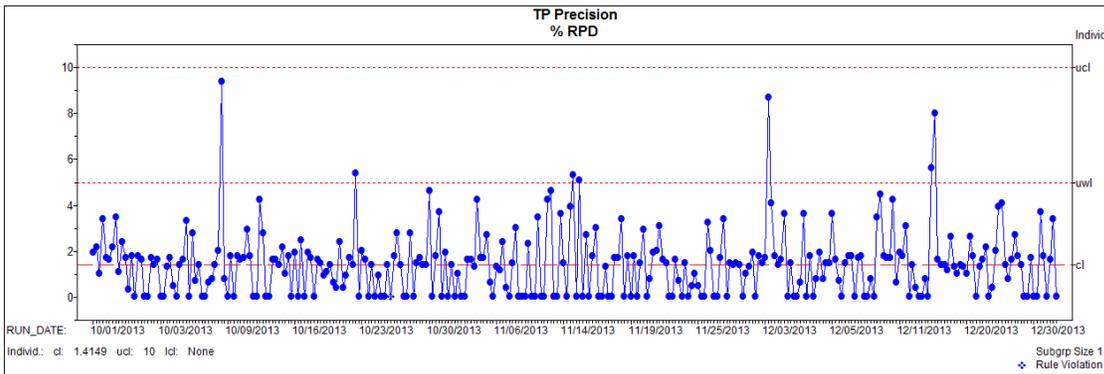


Figure 5a TP precision (%) relative percent different.

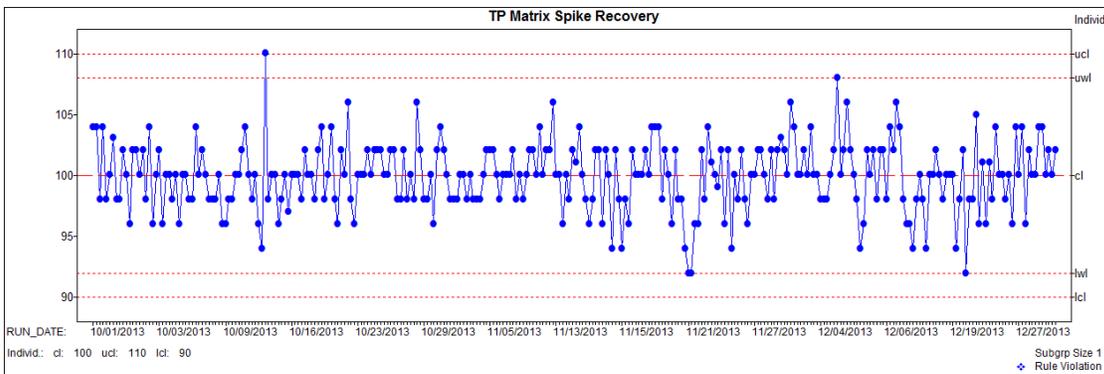
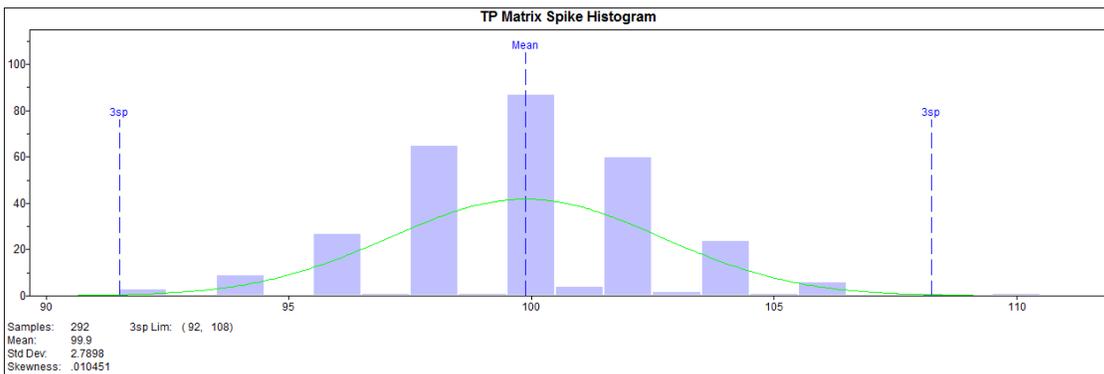


Figure 6a. TP spike recovery (%) data.



Figures 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

**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 quality control 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:

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

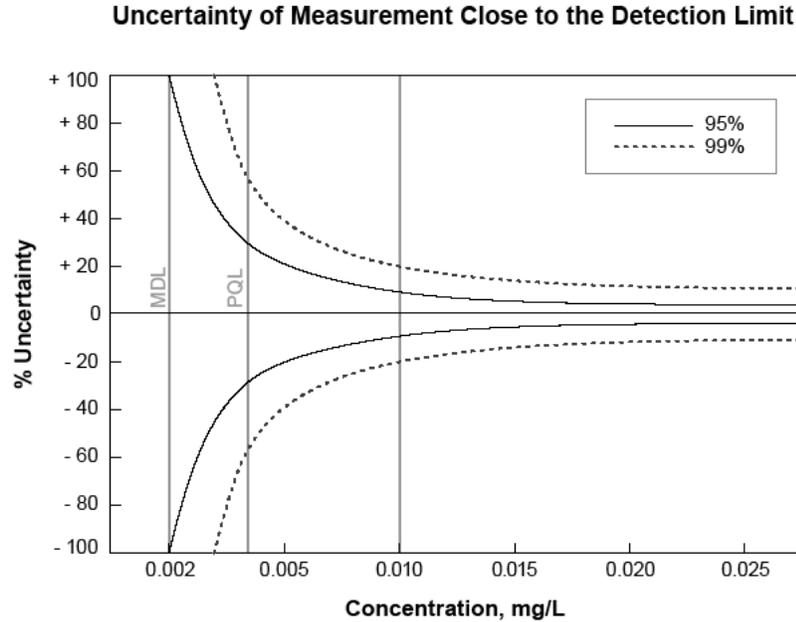
where:

$u(\mathbf{x})$  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.

## METHOD DETECTION LIMIT AND PRACTICAL QUANTITATION LIMIT

MDL checks are routinely analyzed with each analytical run. From October 1, 2013 to December 31, 2013, 94 results for MDL checks were reported for TP measurements. The calculated MDL from these results was determined to be 0.001 mg/L, using the procedure described in the Code of Federal Regulations (CFR), 40 CFR 136 Appendix B.

The performance of PQL QC sample is presented in **Figures 4a, 4b, and 4c**. The average recovery for PQL was 101.6%. The average relative standard deviation was 13.1%, which was less than acceptable criterion of 15%. These results validated the current 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.

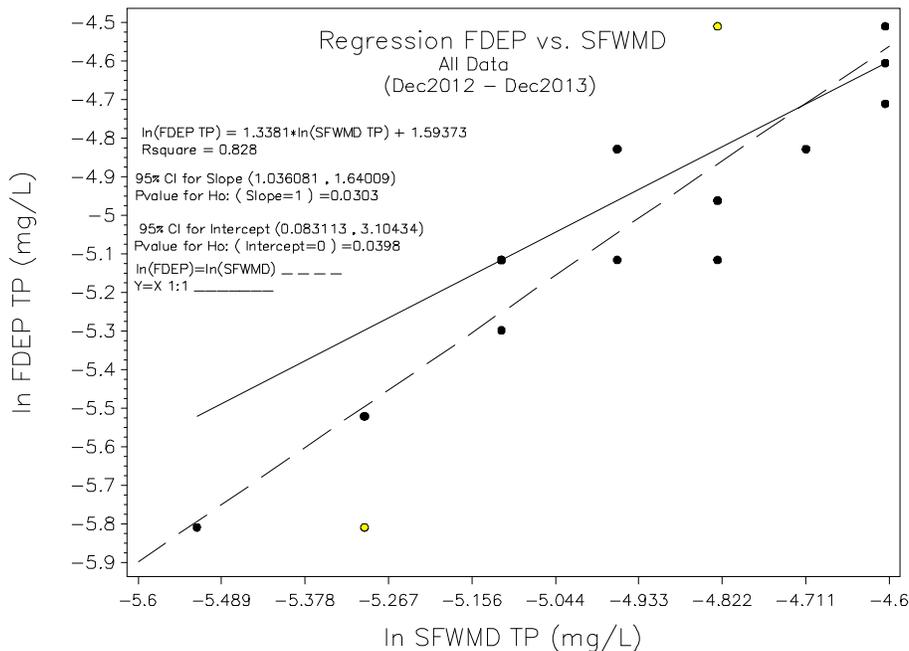
## INTER-LABORATORY QUALITY CONTROL ASSESSMENT

### 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 December 2012 to December 2013 (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 0.828 indicates strong agreement between two laboratories results. **Table 4** shows that the mean difference (0.0004 mg/L) and the median difference (0.001 mg/L) are statistically insignificant with p-values of 0.1485 and 0.1077, respectively.



**Figure 8.** Regression analysis for all TP data.

**Table 4.** Comparison of SFWMD and FDEP split TP samples (December 2012–December 2013).

All Data	Summary Statistics				
	Lab	N	Mean (mg/L)	Median (mg/L)	
	FDEP	20	0.0066	0.006	
	SFWMD	20	0.0074	0.007	
	Statistical Test of Hypotheses				
	Summary of Paired Differences (mg/L)		Hypothesis	Test	P-value
Mean of Differences		0.0004	Mean of Differences = 0	Student's t	0.1485
Median of Differences		0.001	Median of Differences = 0	Signed Rank	0.1077

**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 below the MDL for both laboratories and both differences were statistically insignificant. Due to non-normally distributed paired differences (Shapiro-Wilk, p value = 0.0032), the sign-rank test ( $p > 0.05$ ) indicates no statistical difference.

**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 (September to October 2013) are shown in **Table 5**.

**Table 5.** Proficiency testing WP-224 study TP.

<b>Assigned Value</b>	5.73 mg/L
<b>Study Mean</b>	5.72 mg/L
<b>Reported Value</b>	5.73 mg/L
<b>Z-Score</b>	-0.0334
<b>Acceptance Limits</b>	4.75–6.64 mg/L
<b>Performance Evaluation</b>	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  $\pm 3$  USEPA standard deviation from the USEPA mean.

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## REFERENCES

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Taylor, J.K. 1987. *Quality Assurance of Chemical Measurements*. Lewis Publishers, Chelsea, MI.

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## GLOSSARY

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**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. Generally, the PQL is 12 times the standard deviation that is derived from the procedure used to determine the method detection limit, or can be assumed to be four times the method detection limit.

**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.

**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  $\sigma$  is a standard deviation) (Eurachem/CITAC 2000).

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## APPENDIX A

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Results of TP split studies between the SFWMD and FDEP laboratories, EVPA Project, December 2012– December 2013.

Sample	Date collected	Station	SFWMD TP result	FDEP TP result	%RPD/Comments
EVPA	4-Dec-2012	LOX10	0.008	0.007	13.3
EVPA	4-Dec-2012	LOX7	0.008	0.006	28.6
EVPA	4-Dec-2012	LOX4	0.006	0.005	18.2
EVPA	5-Dec-2012	LOX12	0.007	0.006	15.4
EVPA	5-Mar-2013	LOX8	0.009	0.008	11.8
EVPA	5-Mar-2013	LOX7	0.006	0.006	0.0
EVPA	6-Mar-2013	LOX16	0.005	0.004(I)	FDEP result < PQL
EVPA	6-Mar-2013	LOX15	0.006	0.006	0.0
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

**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

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## APPENDIX B

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TP results for projects and their associated stations specified in the Introduction from October 1, 2013, to December 31, 2013. Among 149 reported results, 12 were qualified with a code "I".

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIE	10/1/2013	BERMB3	0.030	+/- 0.002	
PIE	10/1/2013	S18C	0.004	+/- 0.002	
PIN	10/7/2013	S12A	0.004	+/- 0.002	
PIN	10/7/2013	S12B	0.004	+/- 0.002	
PIN	10/7/2013	S12C	0.006	+/- 0.002	
PIE	10/7/2013	S332DX	0.006	+/- 0.002	
PIN	10/7/2013	S12D	0.007	+/- 0.002	
PIN	10/7/2013	S333	0.007	+/- 0.002	
PIN	10/7/2013	S356-334	0.009	+/- 0.002	
PIE	10/8/2013	S18C	0.004	+/- 0.002	
PIN	10/14/2013	S12A	0.004	+/- 0.002	
PIN	10/14/2013	S12B	0.004	+/- 0.002	
PIE	10/14/2013	S332DX	0.005	+/- 0.002	
PIN	10/14/2013	S12C	0.005	+/- 0.002	
PIN	10/14/2013	S12D	0.006	+/- 0.002	
PIN	10/14/2013	S333	0.006	+/- 0.002	
PIN	10/14/2013	S356-334	0.009	+/- 0.002	
PIE	10/15/2013	BERMB3	0.015	+/- 0.002	
PIN	10/15/2013	S355A	0.008	+/- 0.002	
PIN	10/15/2013	S355B	0.006	+/- 0.002	
PIE	10/15/2013	S18C	0.004	+/- 0.002	
PIN	10/21/2013	S12A	0.005	+/- 0.002	
PIN	10/21/2013	S12B	0.004	+/- 0.002	
PIN	10/21/2013	S12C	0.006	+/- 0.002	
PIN	10/21/2013	S12D	0.006	+/- 0.002	
PIN	10/21/2013	S333	0.006	+/- 0.002	
PIE	10/21/2013	S332DX	0.006	+/- 0.002	
PIN	10/21/2013	S356-334	0.007	+/- 0.002	
EVPA	10/22/2013	LOX6	0.006	+/- 0.002	
EVPA	10/22/2013	LOX11	0.006	+/- 0.002	
EVPA	10/22/2013	LOX13	0.008	+/- 0.002	
EVPA	10/22/2013	LOX14	0.009	+/- 0.002	
EVPA	10/22/2013	LOX16	0.008	+/- 0.002	
EVPA	10/22/2013	LOX15	0.006	+/- 0.002	
EVPA	10/22/2013	LOX12	0.007	+/- 0.002	
PIE	10/22/2013	S18C	0.003	+/- 0.002	I
EVPA	10/23/2013	LOX4	0.010	+/- 0.002	
EVPA	10/23/2013	LOX7	0.005	+/- 0.002	
EVPA	10/23/2013	LOX8	0.008	+/- 0.002	
EVPA	10/23/2013	LOX9	0.007	+/- 0.002	
EVPA	10/23/2013	LOX10	0.006	+/- 0.002	
EVPA	10/23/2013	LOX5	0.004	+/- 0.002	
EVPA	10/23/2013	LOX3	0.005	+/- 0.002	

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIN	10/28/2013	S12A	0.005	+/- 0.002	
PIN	10/28/2013	S12B	0.004	+/- 0.002	
PIN	10/28/2013	S12C	0.006	+/- 0.002	
PIN	10/28/2013	S12D	0.007	+/- 0.002	
PIN	10/28/2013	S333	0.007	+/- 0.002	
PIE	10/28/2013	S332DX	0.005	+/- 0.002	
PIN	10/28/2013	S356-334	0.008	+/- 0.002	
PIE	10/29/2013	S18C	0.003	+/- 0.002	I
PIE	11/4/2013	S332DX	0.005	+/- 0.002	
PIN	11/4/2013	S12A	0.008	+/- 0.002	
PIN	11/4/2013	S12B	0.008	+/- 0.002	
PIN	11/4/2013	S12C	0.006	+/- 0.002	
PIN	11/4/2013	S12D	0.008	+/- 0.002	
PIN	11/4/2013	S333	0.008	+/- 0.002	
PIN	11/4/2013	S356-334	0.009	+/- 0.002	
PIE	11/5/2013	S18C	0.003	+/- 0.002	I
PIN	11/12/2013	S12A	0.010	+/- 0.002	
PIN	11/12/2013	S12B	0.007	+/- 0.002	
PIN	11/12/2013	S12C	0.006	+/- 0.002	
PIN	11/12/2013	S12D	0.007	+/- 0.002	
PIN	11/12/2013	S333	0.006	+/- 0.002	
PIN	11/12/2013	S355A	0.010	+/- 0.002	
PIN	11/12/2013	S355B	0.009	+/- 0.002	
PIN	11/12/2013	S356-334	0.012	+/- 0.002	
EVPA	11/13/2013	LOX3	0.007	+/- 0.002	
EVPA	11/13/2013	LOX5	0.004	+/- 0.002	
EVPA	11/13/2013	LOX10	0.007	+/- 0.002	
EVPA	11/13/2013	LOX9	0.006	+/- 0.002	
EVPA	11/13/2013	LOX8	0.007	+/- 0.002	
EVPA	11/13/2013	LOX7	0.004	+/- 0.002	
EVPA	11/13/2013	LOX4	0.007	+/- 0.002	
PIE	11/13/2013	S332DX	0.004	+/- 0.002	
PIE	11/13/2013	S18C	0.004	+/- 0.002	
EVPA	11/14/2013	LOX12	0.006	+/- 0.002	
EVPA	11/14/2013	LOX15	0.005	+/- 0.002	
EVPA	11/14/2013	LOX16	0.006	+/- 0.002	
EVPA	11/14/2013	LOX14	0.005	+/- 0.002	
EVPA	11/14/2013	LOX13	0.007	+/- 0.002	
EVPA	11/14/2013	LOX11	0.005	+/- 0.002	
EVPA	11/14/2013	LOX6	0.004	+/- 0.002	
PIN	11/18/2013	S12A	0.011	+/- 0.002	
PIN	11/18/2013	S12B	0.007	+/- 0.002	
PIN	11/18/2013	S12C	0.005	+/- 0.002	

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIN	11/18/2013	S12D	0.007	+/- 0.002	
PIN	11/18/2013	S333	0.007	+/- 0.002	
PIN	11/18/2013	S356-334	0.007	+/- 0.002	
PIE	11/18/2013	S332DX	0.005	+/- 0.002	
PIE	11/19/2013	S18C	0.002	+/- 0.002	I
PIN	11/25/2013	S12A	0.008	+/- 0.002	
PIN	11/25/2013	S12B	0.006	+/- 0.002	
PIN	11/25/2013	S12C	0.006	+/- 0.002	
PIN	11/25/2013	S12D	0.007	+/- 0.002	
PIN	11/25/2013	S333	0.008	+/- 0.002	
PIE	11/25/2013	S332DX	0.005	+/- 0.002	
PIN	11/25/2013	S356-334	0.008	+/- 0.002	
PIE	11/26/2013	BERMB3	0.093	+/- 0.005	
PIE	11/26/2013	S18C	0.003	+/- 0.002	I
PIN	12/2/2013	S12A	0.007	+/- 0.002	
PIN	12/2/2013	S12B	0.005	+/- 0.002	
PIN	12/2/2013	S12C	0.004	+/- 0.002	
PIN	12/2/2013	S12D	0.006	+/- 0.002	
PIN	12/2/2013	S333	0.006	+/- 0.002	
PIN	12/2/2013	S356-334	0.008	+/- 0.002	
PIE	12/2/2013	S332DX	0.004	+/- 0.002	
EVPA	12/3/2013	LOX5	0.004	+/- 0.002	
EVPA	12/3/2013	LOX10	0.007	+/- 0.002	
EVPA	12/3/2013	LOX9	0.003	+/- 0.002	I
EVPA	12/3/2013	LOX8	0.004	+/- 0.002	
EVPA	12/3/2013	LOX7	0.005	+/- 0.002	
EVPA	12/3/2013	LOX4	0.005	+/- 0.002	
PIE	12/3/2013	S18C	0.003	+/- 0.002	I
EVPA	12/4/2013	LOX12	0.005	+/- 0.002	
EVPA	12/4/2013	LOX15	0.004	+/- 0.002	
EVPA	12/4/2013	LOX16	0.005	+/- 0.002	
EVPA	12/4/2013	LOX14	0.005	+/- 0.002	
EVPA	12/4/2013	LOX13	0.005	+/- 0.002	
EVPA	12/4/2013	LOX11	0.004	+/- 0.002	
EVPA	12/4/2013	LOX6	0.003	+/- 0.002	I
PIN	12/9/2013	S12A	0.011	+/- 0.002	
PIE	12/9/2013	S332DX	0.005	+/- 0.002	
PIN	12/9/2013	S12B	0.005	+/- 0.002	
PIN	12/9/2013	S12C	0.004	+/- 0.002	
PIN	12/9/2013	S12D	0.006	+/- 0.002	
PIN	12/9/2013	S333	0.007	+/- 0.002	
PIN	12/9/2013	S355A	0.006	+/- 0.002	
PIN	12/9/2013	S355B	0.006	+/- 0.002	

Project	Date Collected	Station	Total Phosphorus Result (mg/L)	Uncertainty (mg/L)	Qualifier Code
PIN	12/9/2013	S356-334	0.008	+/- 0.002	
PIE	12/10/2013	BERMB3	0.017	+/- 0.002	
PIE	12/10/2013	S18C	0.002	+/- 0.002	I
PIN	12/16/2013	S12A	0.006	+/- 0.002	
PIN	12/16/2013	S12D	0.008	+/- 0.002	
PIN	12/16/2013	S333	0.007	+/- 0.002	
PIN	12/16/2013	S356-334	0.006	+/- 0.002	
PIE	12/16/2013	S332DX	0.004	+/- 0.002	
PIE	12/17/2013	S18C	0.002	+/- 0.002	I
PIN	12/23/2013	S12A	0.007	+/- 0.002	
PIN	12/23/2013	S12D	0.007	+/- 0.002	
PIN	12/23/2013	S333	0.006	+/- 0.002	
PIN	12/23/2013	S356-334	0.006	+/- 0.002	
PIE	12/23/2013	S332DX	0.005	+/- 0.002	
PIE	12/26/2013	S18C	0.003	+/- 0.002	I
PIN	12/30/2013	S12A	0.008	+/- 0.002	
PIN	12/30/2013	S333	0.008	+/- 0.002	
PIN	12/30/2013	S356-334	0.005	+/- 0.002	
PIE	12/30/2013	S332DX	0.005	+/- 0.002	
PIE	12/31/2013	S18C	0.003	+/- 0.002	I

**Notes:**

Qualifier code:

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