

Quality Assessment Report for Water Quality Monitoring

October – December 2011



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Technical Oversight Committee
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Zdzislaw Kolasinski (zkolasin@sfwmd.gov)

**Analytical Services
Water Quality Bureau
South Florida Water Management District
West Palm Beach, Florida**

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 October 1, 2011, through December 31, 2011:

- Everglades National Park Inflows North (PIN): S12A, S12B, S12C, S12D, S333, S355A, S355B, and S356-334
- Everglades National Park Inflow East (PIE): S332DX, S18C, DS2, 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 2011a) provides the minimum requirements followed in field sample collection. The *Chemistry Laboratory Quality Manual* (SFWMD 2011b) 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 total phosphorus results for samples of interest to the Everglades Technical Oversight Committee (TOC) collected from October 1, 2011, through December 31, 2011.

This report includes an analysis of the District laboratory's performance on the split (EVPA) and inter-laboratory studies 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.

MISSING DATA

Table 1 lists the thirty-six missing data for this reporting period. Thirty-five samples were not collected due to lack of flow, shallow water depth, or insufficient water level. One sample was re-collected due to improper sample preservation.

Table 1. Missing data for October 1, 2011, to December 31, 2011.

Project	Collection Date	Station	Comments
EVPA	4-Oct-11	LOX3	Total depth less than 0.10 m, no sample collected
EVPA	4-Oct-11	LOX5	Total depth less than 0.10 m, no sample collected
PIE	4-Oct-11	BERMB3	No flow, no sample collected
EVPA	5-Oct-11	LOX13	Total depth less than 0.10 m, no sample collected
PIN	5-Oct-11	S12B	No flow, no sample collected
PIN	5-Oct-11	S12C	No flow, no sample collected
PIN	12-Oct-11	S12B	No flow, no sample collected
PIN	12-Oct-11	S12C	No flow, no sample collected
PIN	12-Oct-11	S355A	No flow, no sample collected
PIN	12-Oct-11	S355B	No flow, no sample collected
PIN	18-Oct-11	S12B	No flow, no sample collected
PIN	18-Oct-11	S355A	No flow, no sample collected
PIN	18-Oct-11	S355B	No flow, no sample collected
PIN	25-Oct-11	S355A	No flow, no sample collected
PIN	25-Oct-11	S355B	No flow, no sample collected
PIN	8-Nov-11	S355A	No flow, no sample collected
PIN	8-Nov-11	S355B	No flow, no sample collected
PIN	15-Nov-11	S355A	No flow, no sample collected
PIN	15-Nov-11	S355B	No flow, no sample collected
PIN	15-Nov-11	S355A	No flow, no sample collected
PIN	15-Nov-11	S355B	No flow, no sample collected
PIN	22-Nov-11	S355A	No flow, no sample collected
PIN	22-Nov-11	S355B	No flow, no sample collected
PIE	28-Nov-11	BERMB3	Total depth less than 0.10 m, no sample collected
PIN	29-Nov-11	S12B	No flow, no sample collected
PIN	29-Nov-11	S355A	No flow, no sample collected
PIN	29-Nov-11	S355B	No flow, no sample collected
PIN	6-Dec-11	S12D	Improper sample preservation (sample re-collected)
PIN	13-Dec-11	S355A	No flow, no sample collected
PIN	13-Dec-11	S355B	No flow, no sample collected
PIN	20-Dec-11	S355A	No flow, no sample collected
PIN	20-Dec-11	S355B	No flow, no sample collected
PIE	27-Dec-11	BERMB3	Site dry, no sample collected
PIN	28-Dec-11	S12B	No flow, no sample collected
PIN	28-Dec-11	S355A	No flow, no sample collected
PIN	28-Dec-11	S355B	No flow, no sample collected

Note: Water sample taken at S12D on December 6, 2011 was not properly preserved in the field, thus not analyzed. The site was re-sampled on December 8, 2011, as per the protocol specified in the Resampling Guidance for District Water Quality Sampling document approved by the TOC in January 2009 (SFWMD 2009).

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. **Table 4** summarizes the qualified field blank. TP data was qualified with "J" code for one EB from the LOX9 station because the analyte was detected in the field blank. **Table 5** shows all TP data associated with this EB and qualified with a "J" code.

Table 2. Field and equipment TP blank results.

Type of Blank	Project	Number of Blanks Collected	Number of Blanks With Analyte Detected	% < 0.002 mg/L	% ≥ 0.002 mg/L
EB	PIN	1	0	100	0
	EVPA	1	1	0	100
	PIE	1	0	100	0
FCEB	EVPA	6	0	100	0
	PIE	15	0	100	0
	PIN	13	0	100	0
FB	PIN	13	0	100	0
	PIE	13	0	100	0
Total		63	1	98	2

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).
- mg/L – milligram per liter

Table 3. Precision summary for TP field replicates.

Project Code	Number of Samples (Replicates)	Date Collected	Station	% RSD	Average Value (mg/L)	Comments
PIN	3*	3-Oct-11	TAMBR105	10.0	0.010	The precision criterion was met.
PIN	3*	6-Oct-11	US41-25	4.0	0.014	The precision criterion was met.
PIE	3*	3-Oct-11	S178	0.0	0.015	The precision criterion was met.
EVPA	3	13-Oct-11	LOX10	7.9	0.007	The precision criterion was met.
EVPA	3*	20-Oct-11	CA27	0.0	0.006	The precision criterion was met.

Notes:

- *Samples not associated with the stations of interest
- Only replicates from sampling events containing samples collected at stations listed in the Introduction are included in this analysis. The QC replicates may have been collected during the sampling event on the day adjacent to the collection date for the compliance samples.
- The SFWMD's chemistry laboratory conducted all TP analyses.
- Field precision must be $\leq 20\%$. 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.

Table 4. Field blanks qualified with "J" code

Type of Blank	Project	Station	Date Collected	Value (mg/L)	Comments
EB	EVPA	LOX9	13-Dec-11	0.060	EB \geq MDL

Table 5. List of qualified TP data

Project Code	Date Collected	Station	Flag	Result (mg/L)	Comments
EVPA	13-Dec-11	LOX3	J	0.007	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
EVPA	13-Dec-11	LOX4	J	0.010	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
EVPA	13-Dec-11	LOX5	J	0.006	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
EVPA	13-Dec-11	LOX7	J	0.007	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
EVPA	13-Dec-11	LOX8	J	0.009	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
EVPA	13-Dec-11	LOX9	J	0.008	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
EVPA	13-Dec-11	LOX10	J	0.008	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).

- The value of 10 times the blank value equal to or greater than the sample value qualified with data code "J" (FDEP QA Rule Chapter 62-160.700, F.A.C.)

FIELD AUDIT

There were no audits related to TOC water quality stations conducted during the fourth quarter of 2011.

LABORATORY ANALYSIS QUALITY ASSESSMENT

PROCEDURE UPDATES

The TP analytical procedure 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, 2011, through December 31, 2011. Control charts provide a graphical means to demonstrate statistical control, monitoring 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) varied from 97 to 103 percent, and had a mean central line value of 99.9 percent based on 555 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 varied from 90 to 110 percent, and had a mean central line value of 99.0 percent based on 100 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 varied from 97 to 104 percent, and had a mean central line value of 100.2 percent based on 455 results. The acceptable control limit is 95-105 percent.

Figure 4a shows the recoveries for the method detection limit (MDL) sample (LCS5) at a TP concentration 0.004 mg/L varied from 0.003 to 0.005 mg/L based on 100 results. **Figures 4a and 4c** show the recoveries for the practical quantitation limit varied from 75 to 125 percent and are within ± 30 percent of the true value, which is acceptable.

Figures 5 and 6 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. If any deficiencies are noted, the samples have exceeded the required holding times, and the laboratory cannot reanalyze the data, then the sample is qualified accordingly.

Recoveries for the QC samples are within ± 10 percent of the true value, which is acceptable. 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. An organic check is a solution prepared from phytic acid, which is a stable form of organic phosphate used to prepare matrix spikes, the mean recovery for which was 99.6 percent.

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.

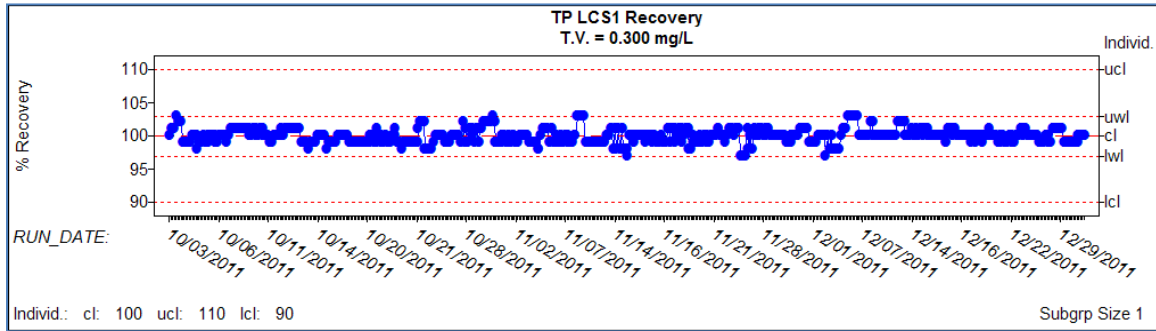


Figure 1a TP QC (Laboratory Control Sample, 0.300 mg/L) sample recoveries

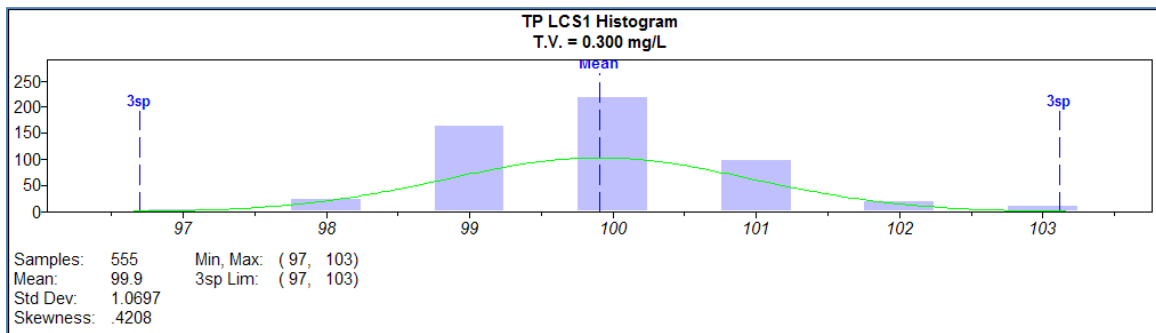
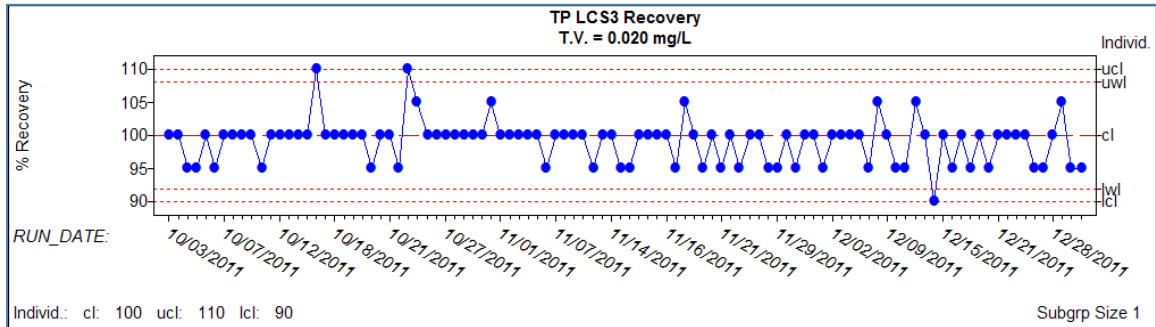
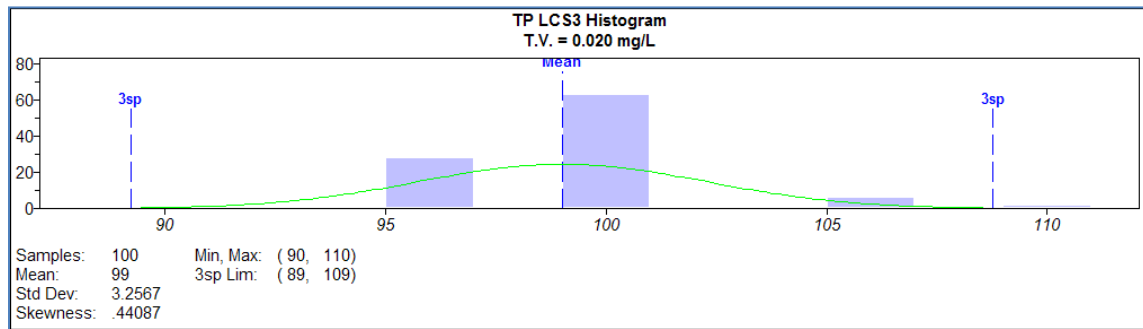


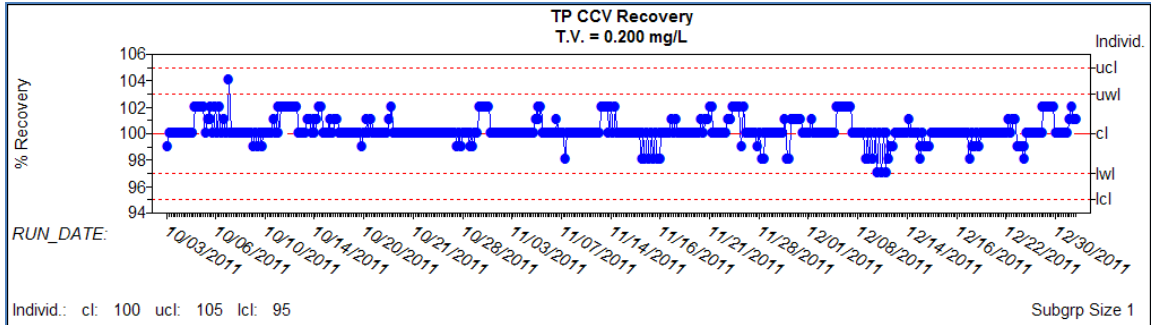
Figure 1b TP QC (Laboratory Control Sample, 0.300 mg/L) sample histogram



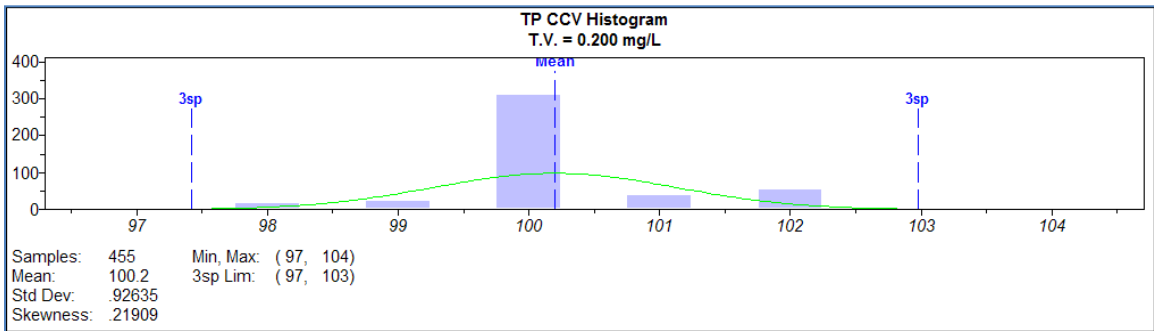
Figures 2a. TP QC (Laboratory Control Sample, 0.020 mg/L) sample recoveries.



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



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



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

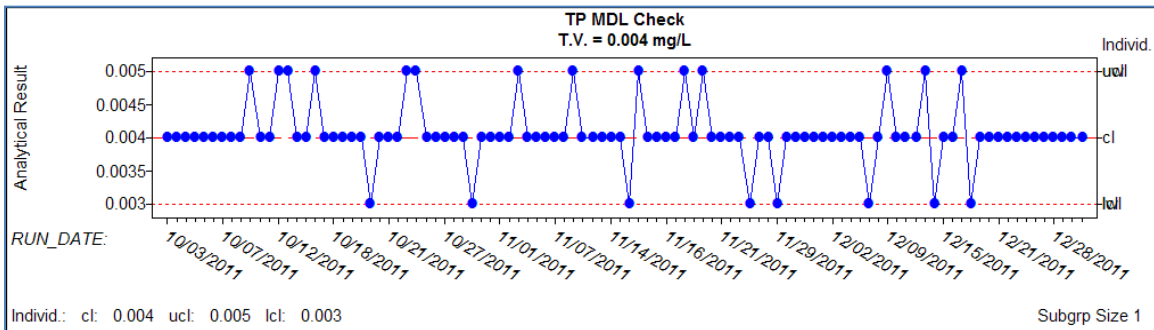


Figure 4a. TP QC5 (Method Detection Limit Check, 0.004 mg/L) sample recoveries.

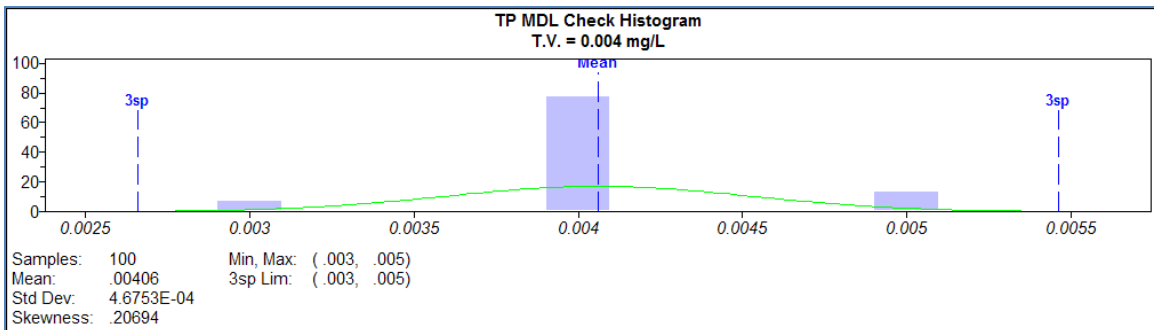


Figure 4b. TP QC5 (Method Detection Limit Check, 0.004 mg/L) sample histogram.

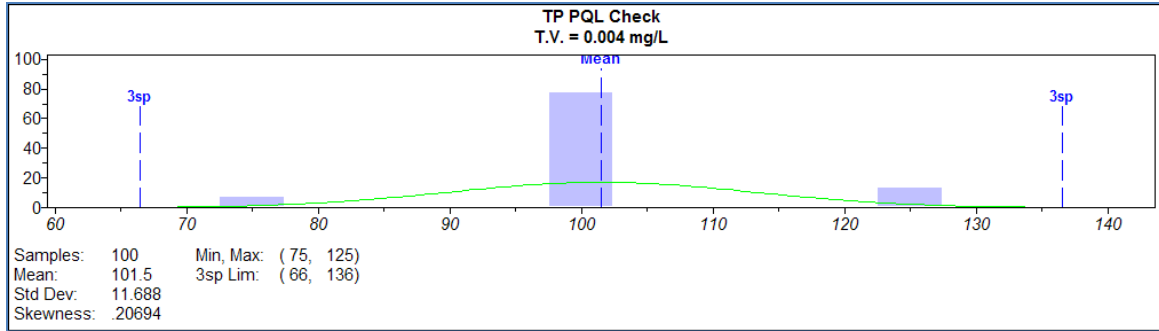


Figure 4c. TP PQL (Practical Quantitation Limit) check.

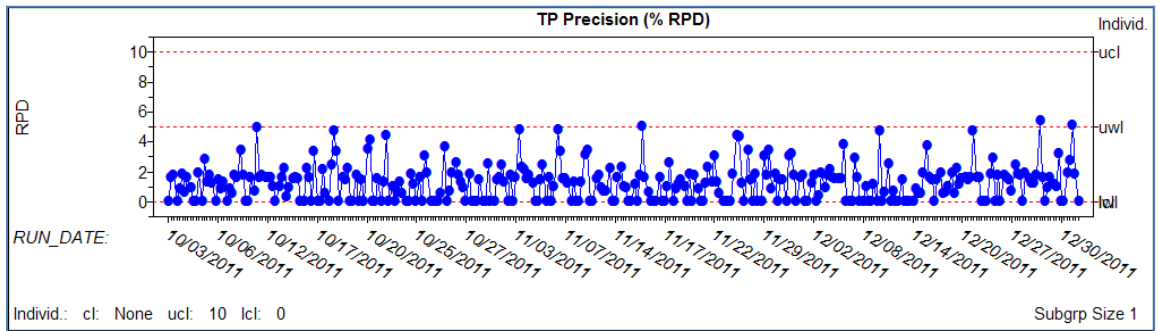


Figure 5a TP precision (%) relative percent different.

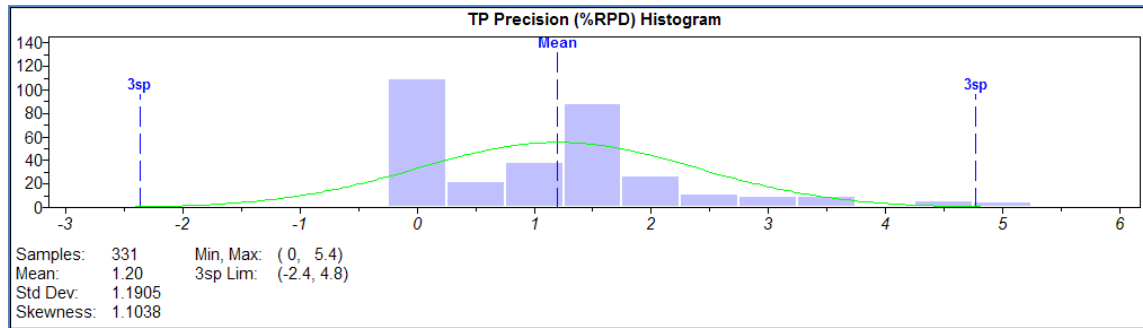


Figure 5b. TP precision (%) relative percent different histogram.

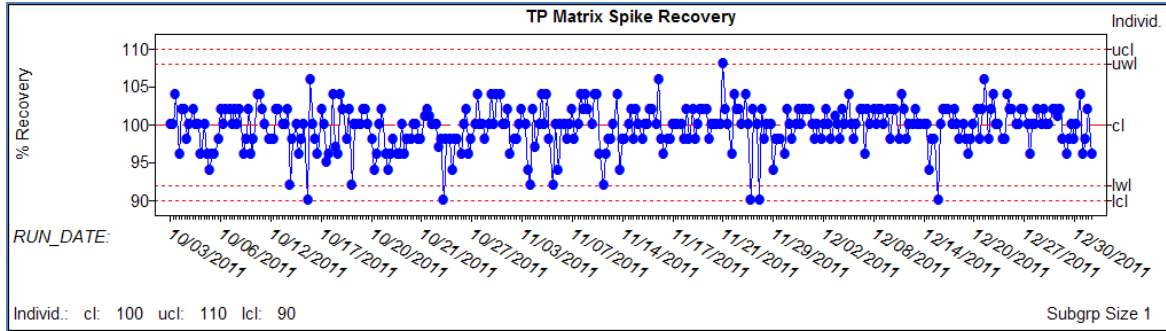
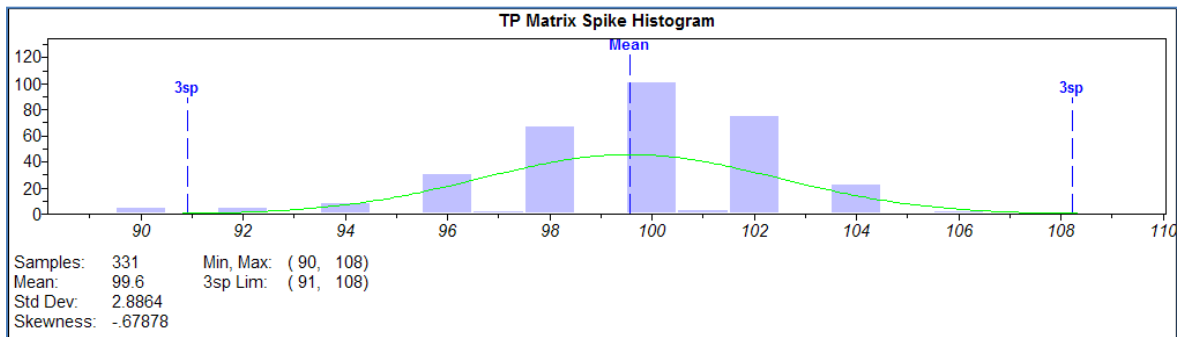


Figure 6a. TP spike recovery (%) data.



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 estimated analytical uncertainty for total phosphorus conducted by the SFWMD laboratory for the last quarter (October–December 2011) was determined to be 5.5 percent (with a 95 percent confidence level). This result applies to the analytical process and does not include uncertainty attributed to field sampling activities (e.g., sample collection and sample location effects). **Figure 7** is presented to clarify the concept of MDL and practical quantitation limit (PQL) of a measurement process.

Uncertainty of Measurement Close to the Detection Limit

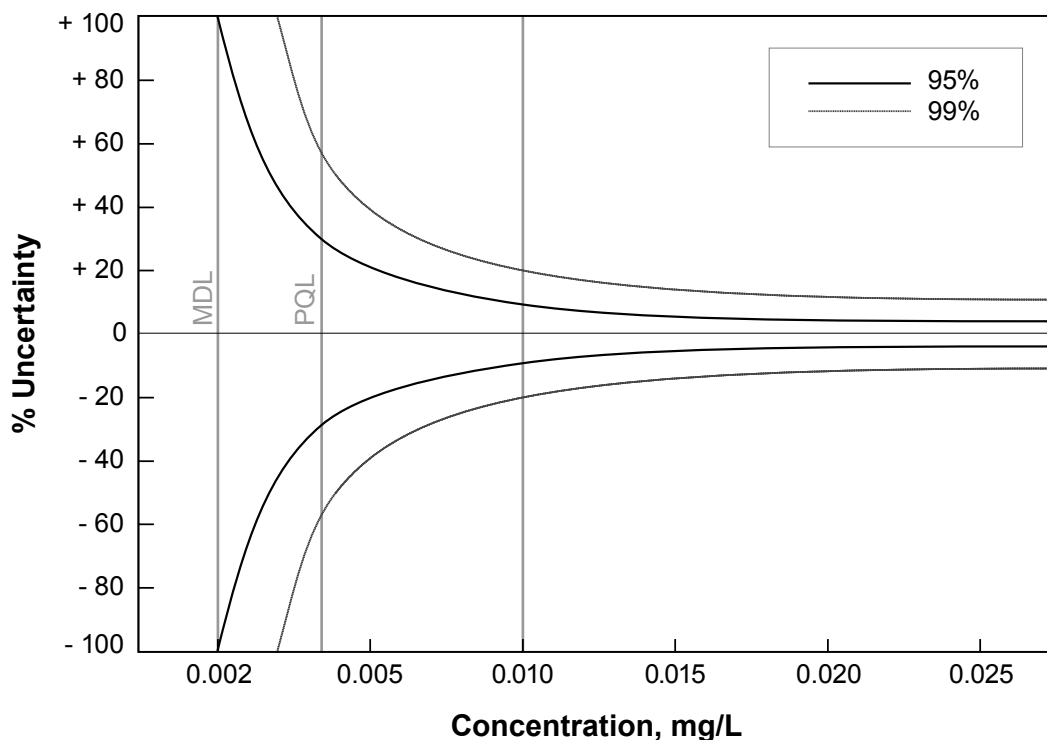


Figure 7. Uncertainty of TP measurement close to the detection limit.

METHOD DETECTION LIMIT AND PRACTICAL QUANTITATION LIMIT

MDL checks are routinely analyzed with each analytical run. From October 1, 2011, to December 31, 2011, 100 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 40 CFR 136 Appendix B.

Since July 1, 2011 the PQL with a determined value of 0.004 mg/L has been continuously measured by analysis of a quality control sample (LCS5) with an acceptable level of uncertainty ($\pm 30\%$ at 95% probability level). The performance of PQL QC sample is presented in **Figures 4a, 4b** and **4c**. The reported values between the MDL (established at 0.002 mg/L) and 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 EVPA Quarterly Splits conducted between the FDEP and the SFWMD's laboratory from December 2010 to December 2011 (see **Appendix A**) provided the data used in this analysis. This comparison contains the TP qualified data. **Figure 8** presents regression analysis of all data, and **Table 6** presents summary statistics for the data pairs.

ALL DATA

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 r^2 (R-square) value is 0.9229. 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.

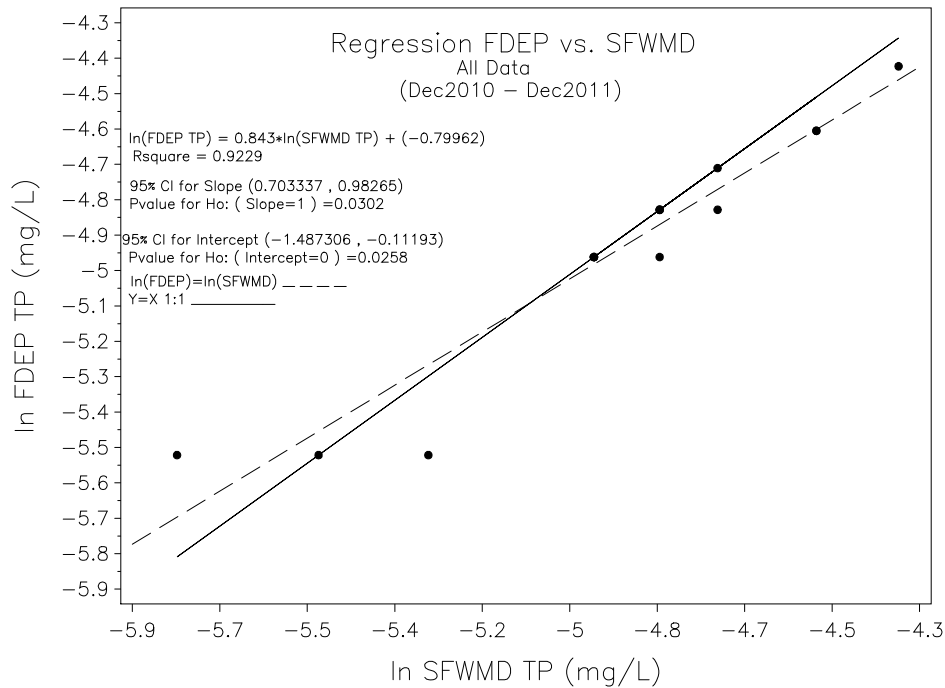


Figure 8. Regression analysis for all TP data.

Table 6 shows that the mean difference and the median difference are not statistically significant. The paired t-test and signed-rank test yield p-values of 0.056 and 0.125, respectively.

TP \geq 0.020 mg/L

There were not any data points in this range where the TP was greater than or equal to 0.020 mg/L.

Table 6. Comparison of SFWMD and FDEP split TP samples.

All Data	Summary Statistics			
	Lab	N	Mean (mg/L)	Median (mg/L)
	FDEP	16	0.008	0.008
	SFWMD	16	0.008	0.008
	Statistical Test of Hypotheses			
	Summary of Paired Differences (mg/L)	Hypothesis	Test	P-value
Mean of Differences	0.000	Mean of Differences = 0	Student's t	0.056
Median of Differences	0.000	Median of Differences = 0	Signed Rank	0.125

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 (0.004 mg/L).

TP < 0.020 mg/L

All results for this analysis fell into the TP less than 0.020 mg/L range. The results for the "All Data" range are comparisons of concentrations at this level.

In summary, the differences for all TP data were below the MDL for both laboratories and the difference was statistically insignificant in both; the sign-rank test ($p > 0.05$) for the normally distributed paired data and linear regression.

NATIONAL PROFICIENCY TESTING PROGRAM

As a requirement for laboratory certification, the SFWMD's laboratory performs proficiency testing on environmental samples on a semiannual basis. The result for the SFWMD's laboratory from the most recent proficiency testing study (September to October 2011) are shown in **Table 7**.

Table 7. Proficiency testing WP-200

Assigned Value	5.53 mg/L
Study Mean Value	5.51 mg/L
Reported Value	5.51 mg/L
Acceptance Limits	4.55 – 6.57 mg/L
Z-Score	-0.00161
Performance Evaluation	Acceptable

Notes:

- Assigned Value – this value is the calculated True Value of the standard based upon the actual composition of the standard.
- Study Mean Value – this value is calculated using all reported values after the removal of outliers.
- Reported Value – the test result reported to the study provider for a specific analyte.
- Acceptance Limits – this limit is calculated upon the US Environmental Protection Agency (EPA) National Standards for Water Proficiency Testing Criteria Document. For the Water Pollution Program (WP), EPA Acceptance Limits are defined as \pm three (3) EPA Standard Deviation from the EPA Mean.

REFERENCES

- Ingersoll, W.S. 2001. Environmental Analytical Measurement Uncertainty Estimation. Nested Hierarchical Approach. Defense Technical Information Center #ADA396946, Fort Belvoir, VA.
- SFWMD. 2009. Resampling Guidance for District Water Quality Sampling. South Florida Water Management District, West Palm Beach, FL.
- SFWMD. 2011a. Field Sampling Quality Manual, SFWMD-FIELD-QM-001-07. South Florida Water Management District, Water Quality Monitoring Division. West Palm Beach, FL.
- SFWMD. 2011b. Chemistry Laboratory Quality Manual, SFWMD-LAB-QM-2011-01. South Florida Water Management District, Analytical Services Division, West Palm Beach, FL.
- Taylor, J.K. 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Chelsea, MI.

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):** A general term used for analyte-free water that is processed on site through all sampling equipment used in routine sample processing. May be an assessment of effectiveness of laboratory decontamination or on site (field) decontamination (FCEB).
- Field Blank (FB):** Analyte-free water that is poured directly into the sample container on site during routine collection, preserved, and kept open until sample collection is completed for the routine sample at that site. FB values are indicative of environmental contamination on site.
- Field Cleaned Equipment Blank (FCEB):** Analyte-free water that is processed on-site, after the first sampling site, through all sampling equipment used in routine sample processing. EB values are indicative of the effectiveness of the decontamination process.
- 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 section 40 CFR, Part 136, Appendix B, as established by the U.S. 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 MDL, or can be assumed to be four times the MDL.
- 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 $\%RSD = [Std. Deviation / Mean] * 100$.
- Replicate Sample (RS):** A second sample collected from the same source as the routine sample, using the same sampling equipment. RS data are compared to routine sample 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 σ is a standard deviation) (EURACHEM).

APPENDIX A

Results of TP split studies between the SFWMD and FDEP laboratories,
EVPA Project, December 2010–December 2011.

Sample	Date	SFWMD	FDEP	%RPD/Comments
EVPA	6-Dec-10	0.007 (I) (J)	0.007 (I)	<PQL
EVPA	7-Dec-10	0.003 (I)	0.004 (I)	<PQL
EVPA	7-Dec-10	0.004 (I)	0.004 (I)	<PQL
EVPA	7-Dec-10	0.005 (I)	0.004 (I)	<PQL
EVPA	6-Apr-11	0.007 (I)	0.007 (I)	<PQL
EVPA	6-Apr-11	0.011	0.010 (I)	9.5
EVPA	6-Apr-11	0.008	0.008 (I)	<PQL
EVPA	6-Apr-11	0.007 (I)	0.007 (I)	<PQL
EVPA	8-Sep-11	0.011	0.010 (I)	9.5
EVPA	8-Sep-11	0.008	0.008 (I)	<PQL
EVPA	8-Sep-11	0.013	0.012	8.0
EVPA	8-Sep-11	0.009	0.008 (I)	<PQL
EVPA	13-Dec-11	0.008 (J)	0.008 (I) (J)	<PQL
EVPA	13-Dec-11	0.008 (J)	0.007 (I) (J)	<PQL
EVPA	13-Dec-11	0.009 (J)	0.009 (I) (J)	<PQL
EVPA	13-Dec-11	0.007 (J)	0.007 (I) (J)	<PQL

Notes:

Qualifier codes:

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

J: sample associated with $EB \geq MDL$ and ≤ 10 times of EB

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

FDEP: reported MDL = 0.004 mg/L and PQL = 0.010 mg/L

APPENDIX B

Total phosphorus results for projects and their associated stations specified in the Introduction from October 1 to December 31, 2011. One hundred thirty nine results were reported. Eleven results were qualified with the following codes: two with “I”, two with “PMR” and seven results were qualified with “J9”.

Project	Date Collected	Station	TP Result (mg/L)	Qualifier Code
PIE	3-Oct-11	S18C	0.004	
PIE	4-Oct-11	S332DX	0.007	
EVPA	4-Oct-11	LOX4	0.011	
EVPA	4-Oct-11	LOX7	0.005	
EVPA	4-Oct-11	LOX8	0.008	
EVPA	4-Oct-11	LOX9	0.006	
EVPA	4-Oct-11	LOX10	0.010	
EVPA	5-Oct-11	LOX6	0.006	
EVPA	5-Oct-11	LOX11	0.007	
EVPA	5-Oct-11	LOX12	0.008	
EVPA	5-Oct-11	LOX14	0.007	
EVPA	5-Oct-11	LOX15	0.007	
EVPA	5-Oct-11	LOX16	0.008	
PIN	5-Oct-11	S12A	0.032	
PIN	5-Oct-11	S12D	0.011	
PIN	5-Oct-11	S333	0.013	
PIN	5-Oct-11	S355A	0.024	
PIN	5-Oct-11	S355B	0.025	
PIN	5-Oct-11	S356-334	0.013	
PIE	11-Oct-11	S18C	0.017	
PIE	11-Oct-11	S332DX	0.006	
PIN	12-Oct-11	S12A	0.014	
PIN	12-Oct-11	S12D	0.011	
PIN	12-Oct-11	S333	0.012	
PIN	12-Oct-11	S356-334	0.012	
PIE	17-Oct-11	BERMB3	0.057	
PIN	18-Oct-11	S12A	0.027	
PIN	18-Oct-11	S12C	0.009	
PIN	18-Oct-11	S12D	0.013	
PIN	18-Oct-11	S333	0.014	
PIN	18-Oct-11	S356-334	0.026	
PIE	19-Oct-11	S332DX	0.007	
PIE	19-Oct-11	S18C	0.005	

Project	Date Collected	Station	TP Result (mg/L)	Qualifier Code
PIE	24-Oct-11	S18C	0.004	
PIE	24-Oct-11	S332DX	0.007	
PIN	25-Oct-11	S12A	0.020	
PIN	25-Oct-11	S12B	0.012	
PIN	25-Oct-11	S12C	0.007	
PIN	25-Oct-11	S12D	0.011	
PIN	25-Oct-11	S333	0.009	
PIN	25-Oct-11	S356-334	0.011	
PIE	31-Oct-11	BERMB3	0.039	PMR
PIE	31-Oct-11	S332DX	0.007	
PIE	31-Oct-11	S18C	0.006	
PIN	1-Nov-11	S12A	0.012	
PIN	1-Nov-11	S12B	0.008	
PIN	1-Nov-11	S12C	0.006	
PIN	1-Nov-11	S12D	0.015	
PIN	1-Nov-11	S333	0.011	
PIN	1-Nov-11	S355A	0.011	
PIN	1-Nov-11	S355B	0.013	
PIN	1-Nov-11	S356-334	0.013	
EVPA	2-Nov-11	LOX3	0.007	
EVPA	2-Nov-11	LOX4	0.018	
EVPA	2-Nov-11	LOX5	0.007	
EVPA	2-Nov-11	LOX7	0.007	
EVPA	2-Nov-11	LOX8	0.010	
EVPA	2-Nov-11	LOX9	0.007	
EVPA	2-Nov-11	LOX10	0.008	
EVPA	3-Nov-11	LOX6	0.006	
EVPA	3-Nov-11	LOX11	0.009	
EVPA	3-Nov-11	LOX12	0.007	
EVPA	3-Nov-11	LOX13	0.009	
EVPA	3-Nov-11	LOX14	0.006	
EVPA	3-Nov-11	LOX15	0.006	
EVPA	3-Nov-11	LOX16	0.007	
PIE	7-Nov-11	S332DX	0.008	
PIE	7-Nov-11	S18C	0.004	
PIN	8-Nov-11	S12A	0.013	
PIN	8-Nov-11	S12B	0.007	
PIN	8-Nov-11	S12C	0.006	
PIN	8-Nov-11	S12D	0.010	
PIN	8-Nov-11	S333	0.011	

Project	Date Collected	Station	TP Result (mg/L)	Qualifier Code
PIN	8-Nov-11	S356-334	0.010	
PIE	14-Nov-11	BERMB3	0.086	
PIE	14-Nov-11	S332DX	0.007	
PIE	14-Nov-11	S18C	0.005	
PIN	15-Nov-11	S12A	0.012	
PIN	15-Nov-11	S12B	0.008	
PIN	15-Nov-11	S12C	0.005	
PIN	15-Nov-11	S12D	0.007	
PIN	15-Nov-11	S333	0.014	
PIN	15-Nov-11	S356-334	0.009	
PIE	21-Nov-11	S332DX	0.006	
PIE	21-Nov-11	S18C	0.004	
PIN	22-Nov-11	S12A	0.013	
PIN	22-Nov-11	S12B	0.008	
PIN	22-Nov-11	S12C	0.007	
PIN	22-Nov-11	S12D	0.009	
PIN	22-Nov-11	S333	0.008	
PIN	22-Nov-11	S356-334	0.009	
PIE	28-Nov-11	S332DX	0.008	
PIE	28-Nov-11	S18C	0.004	
PIN	29-Nov-11	S12A	0.012	
PIN	29-Nov-11	S12C	0.006	
PIN	29-Nov-11	S12D	0.008	
PIN	29-Nov-11	S333	0.012	
PIN	29-Nov-11	S356-334	0.010	
PIE	5-Dec-11	S332DX	0.006	
PIE	5-Dec-11	S18C	0.002	I
PIN	6-Dec-11	S12A	0.016	
PIN	6-Dec-11	S12B	0.008	
PIN	6-Dec-11	S12C	0.004	
PIN	6-Dec-11	S333	0.008	
PIN	6-Dec-11	S355A	0.009	
PIN	6-Dec-11	S355B	0.009	
PIN	6-Dec-11	S356-334	0.009	
PIN	8-Dec-11	S12D	0.007	
PIE	12-Dec-11	S332DX	0.006	
PIE	12-Dec-11	BERMB3	0.072	PMR
PIE	12-Dec-11	S18C	0.004	
EVPA	13-Dec-11	LOX3	0.007	J
EVPA	13-Dec-11	LOX4	0.010	J

Project	Date Collected	Station	TP Result (mg/L)	Qualifier Code
EVPA	13-Dec-11	LOX5	0.006	J
EVPA	13-Dec-11	LOX9	0.008	J
EVPA	13-Dec-11	LOX10	0.008	J
PIN	13-Dec-11	S12A	0.011	
PIN	13-Dec-11	S12B	0.008	
PIN	13-Dec-11	S12C	0.006	
PIN	13-Dec-11	S12D	0.008	
PIN	13-Dec-11	S333	0.009	
PIN	13-Dec-11	S356-334	0.008	
EVPA	13-Dec-11	LOX7	0.007	J
EVPA	13-Dec-11	LOX8	0.009	J
EVPA	14-Dec-11	LOX6	0.005	
EVPA	14-Dec-11	LOX11	0.007	
EVPA	14-Dec-11	LOX13	0.008	
EVPA	14-Dec-11	LOX14	0.006	
EVPA	14-Dec-11	LOX16	0.007	
EVPA	14-Dec-11	LOX15	0.005	
EVPA	14-Dec-11	LOX12	0.006	
PIE	19-Dec-11	S332DX	0.006	
PIE	19-Dec-11	S18C	0.004	
PIN	20-Dec-11	S12A	0.018	
PIN	20-Dec-11	S12B	0.013	
PIN	20-Dec-11	S12C	0.007	
PIN	20-Dec-11	S12D	0.007	
PIN	20-Dec-11	S333	0.008	
PIN	21-Dec-11	S356-334	0.008	
PIE	27-Dec-11	S332DX	0.007	
PIE	27-Dec-11	S18C	0.003	I
PIN	28-Dec-11	S12A	0.018	
PIN	28-Dec-11	S12C	0.010	
PIN	28-Dec-11	S12D	0.008	
PIN	28-Dec-11	S333	0.008	
PIN	28-Dec-11	S356-334	0.008	

Notes:

Qualifier codes:

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

J: indicates that the analyte was detected in field blank and associated sample

PMR: Project Manager Remark