

Quality Assessment Report for Water Quality Monitoring

April – June 2012



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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, 2012, through June 30, 2012:

- 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 April 1, 2012, through June 30, 2012.

This report includes an analysis of the District 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.

MISSING DATA

Table 1 lists the 62 missing data for this reporting period due to lack of flow, dry, shallow water depth, or insufficient water level. One sample was misplaced in the laboratory and could not be analyzed.

Table 1. Missing data for April 1, 2012, to June 30, 2012.

Project	Collection Date	Station	Comments
PIE	3-Apr-12	BERMB3	Site dry, no sample collected
EVPA	4-Apr-12	LOX3	Site dry, no sample collected
EVPA	4-Apr-12	LOX5	Site dry, no sample collected
EVPA	4-Apr-12	LOX9	Total depth less than 0.10 m, no sample collected
EVPA	4-Apr-12	LOX10	Total depth less than 0.10 m, no sample collected
PIN	4-Apr-12	S12B	No flow, no sample collected
PIN	4-Apr-12	S12C	No flow, no sample collected
PIN	4-Apr-12	S12D	No flow, no sample collected
PIN	10-Apr-12	S12B	No flow, no sample collected
PIN	10-Apr-12	S12C	No flow, no sample collected
PIN	10-Apr-12	S12D	No flow, no sample collected
PIN	10-Apr-12	S355A	No flow, no sample collected
PIN	10-Apr-12	S355B	No flow, no sample collected
PIE	16-Apr-12	BERMB3	Site dry, no sample collected
PIN	17-Apr-12	S12B	No flow, no sample collected
PIN	17-Apr-12	S12C	No flow, no sample collected
PIN	17-Apr-12	S12D	No flow, no sample collected
PIN	17-Apr-12	S355A	No flow, no sample collected
PIN	17-Apr-12	S355B	No flow, no sample collected
PIN	24-Apr-12	S12B	No flow, no sample collected
PIN	24-Apr-12	S12C	No flow, no sample collected
PIN	24-Apr-12	S12D	No flow, no sample collected
PIN	24-Apr-12	S355A	No flow, no sample collected
PIN	24-Apr-12	S355B	No flow, no sample collected
PIE	30-Apr-12	BERMB3	Total depth less than 0.10 m, no sample collected
PIN	1-May-12	S12B	No flow, no sample collected
PIN	1-May-12	S12C	No flow, no sample collected

Project	Collection Date	Station	Comments
PIN	1-May-12	S12D	No flow, no sample collected
PIN	9-May-12	S12B	No flow, no sample collected
PIN	9-May-12	S12C	No flow, no sample collected
PIN	9-May-12	S355A	No flow, no sample collected
PIN	9-May-12	S355B	No flow, no sample collected
PIE	14-May-12	BERMB3	Site dry, no sample collected
EVPA	15-May-12	LOX3	Total depth less than 0.10 m, no sample collected
EVPA	15-May-12	LOX5	Total depth less than 0.10 m, no sample collected
PIN	15-May-12	S12B	No flow, no sample collected
PIN	15-May-12	S12C	No flow, no sample collected
PIN	15-May-12	S355A	No flow, no sample collected
PIN	15-May-12	S355B	No flow, no sample collected
PIN	22-May-12	S12B	No flow, no sample collected
PIN	22-May-12	S12C	No flow, no sample collected
PIN	22-May-12	S355A	No flow, no sample collected
PIN	22-May-12	S355B	No flow, no sample collected
PIN	30-May-12	S12B	No flow, no sample collected
PIN	30-May-12	S12C	No flow, no sample collected
PIN	30-May-12	S12D	Sample was misplaced and could not be analyzed
PIN	30-May-12	S355A	No flow, no sample collected
PIN	30-May-12	S355B	No flow, no sample collected
PIN	5-Jun-12	S12B	No flow, no sample collected
PIN	5-Jun-12	S12C	No flow, no sample collected
PIN	12-Jun-12	S12B	No flow, no sample collected
PIN	12-Jun-12	S12C	No flow, no sample collected
PIN	12-Jun-12	S355A	No flow, no sample collected
PIN	12-Jun-12	S355B	No flow, no sample collected
PIN	19-Jun-12	S12B	No flow, no sample collected
PIN	19-Jun-12	S12C	No flow, no sample collected
PIN	19-Jun-12	S355A	No flow, no sample collected
PIN	19-Jun-12	S355B	No flow, no sample collected
PIE	25-Jun-12	BERMB3	Total depth less than 0.10 m, no sample collected
PIN	26-Jun-12	S12B	No flow, no sample collected
PIN	26-Jun-12	S12C	No flow, no sample collected
PIN	26-Jun-12	S355A	No flow, no sample collected
PIN	26-Jun-12	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. All seven replicates were acceptable, including the replicate for the EVPA project collected on May 17, 2012 (34%RSD), because the sample concentration did not exceed 5 times the practical quantitation limit (PQL). **Table 4** summarizes the qualified field blanks. One TP result was qualified with "J" code for the EB from S12A, because analyte was detected in the field blank. **Table 5** shows all TP data associated with this EB and qualified with a "J" code and one sample from BERMB3, qualified with a Project Manager Flag "PMF" code for improper collection procedure.

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	EVPA	2	0	100	0
	PIE	1	0	100	0
	PIN	1	1	0	100
FCEB	EVPA	6	0	100	0
	PIE	14	0	100	0
	PIN	13	0	100	0
FB	PIN	12	0	100	0
	PIE	13	0	100	0
Total		62	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
PIE	3*	2-Apr-12	S177	17.3	0.007	The precision criterion was met.
PIN	3*	2-Apr-12	TAMBR105	12.3	0.059	The precision criterion was met.
EVPA	3	3-Apr-12	LOX14	8.7	0.007	The precision criterion was met.
PIN	3 ^x	4-Apr-12	S12A	6.7	0.015	The precision criterion was met.
PIE	3 [#]	3-May-12	S200	13.3	0.004	The precision criterion was met.
EVPA	3*	17-May-12	CA318	34.4	0.009	The precision criterion was met.
EVPA	3	11-Jun-12	LOX8	6.0	0.010	The precision criterion was met.

Notes:

- *Samples not associated with the stations of interest
- #Sample associated with contaminated field blank and qualified with a code ‘J’
- 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 if average concentration exceeds 5 times PQL.

Table 4. Field blanks qualified with “J” code

Type of Blank	Project	Station	Date Collected	Value (mg/L)	Comments
EB	PIN	S12A	4-Apr-12	0.002	EB \geq MDL

Table 5. List of qualified TP data

Project Code	Date Collected	Station	Flag	Result (mg/L)	Comments
PIN	4-Apr-12	S12A	J	0.016	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
PIN	4-Apr-12	S333	J	0.010	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
PIN	4-Apr-12	S356-334	J	0.013	Sample associated with EB \geq MDL and ≤ 10 times of EB (see Table4).
PIE	29-May-12	BERMB3	PMF	0.161	Improper collection procedure (sample was collected at depth < 0.020 cm and the container used for collection was incorrect size).

FIELD AUDIT

During this quarter, one audit was conducted on the sample processing of the EVPA project in Water Conservation Area 1 (WCA-1) collected by the Water Quality Monitoring Division of the SFWMD and U.S. Fish and Wildlife Service personnel.

Two corrective actions were issued as a result of (1) improper processing protocol and (2) improper protocol for field cleaned equipment blank and equipment rinsing. The corrective actions from this audit are complete. After a review of the key deficiencies and the results for the blanks collected during this sampling trip, it was determined the deficiencies observed during the audit did not negatively affect the quality of the sample data.

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 April 1, 2012, through June 30, 2012. 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) varied from 97 to 103 percent, and had a mean central line value of 99.9 percent based on 428 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 91 to 107 percent, and had a mean central line value of 98.9 percent based on 80 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 98 to 103 percent, and had a mean central line value of 100.2 percent based on 348 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 80 results. **Figures 4a** and **4c** show the recoveries for the practical quantitation limit varied from 75 to 125 percent. The acceptable control limit is 50–150 percent.

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 a deficiency was noted but the laboratory could not be re-analyzed because the samples had exceeded the required holding times, then the sample is qualified accordingly.

Recoveries for the QC samples, except the PQL check 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. The mean recovery for the organic check, a solution prepared from phytic acid and used to prepare matrix spikes, 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.

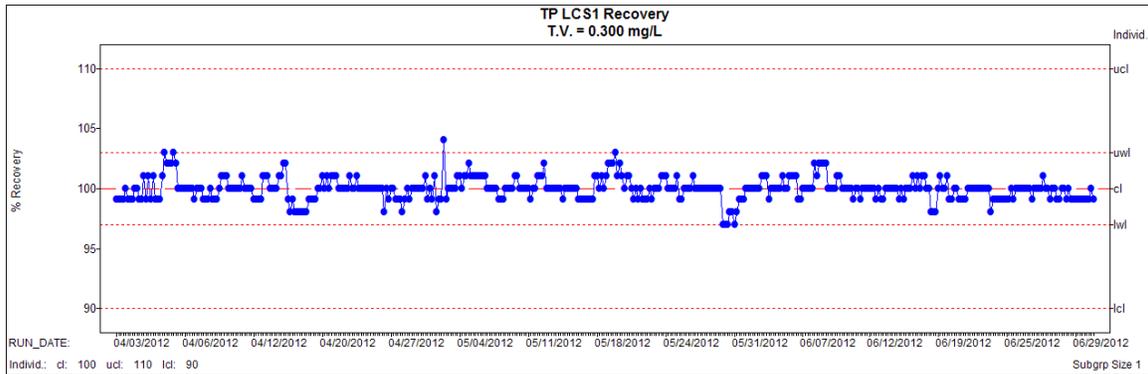


Figure 1a TP QC (Laboratory Control Sample, 0.300 mg/L) sample recoveries

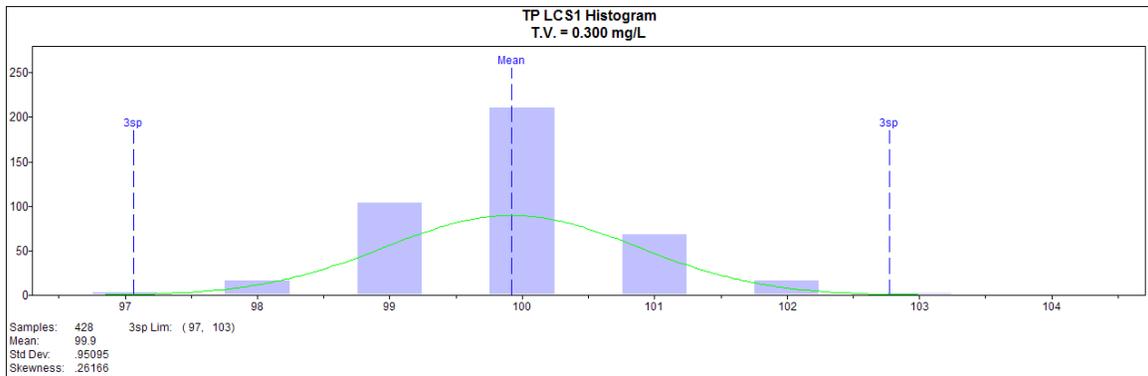


Figure 1b TP QC (Laboratory Control Sample, 0.300 mg/L) sample histogram

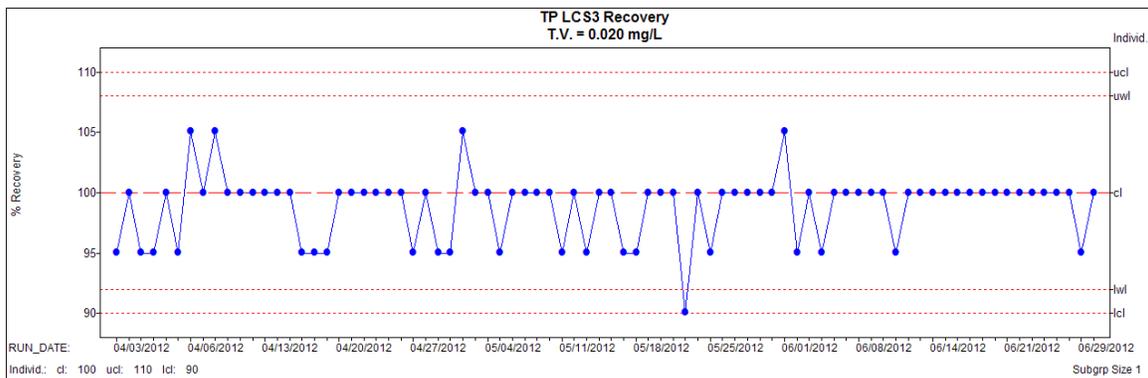


Figure 2a. TP QC (Laboratory Control Sample, 0.020 mg/L) sample recoveries.

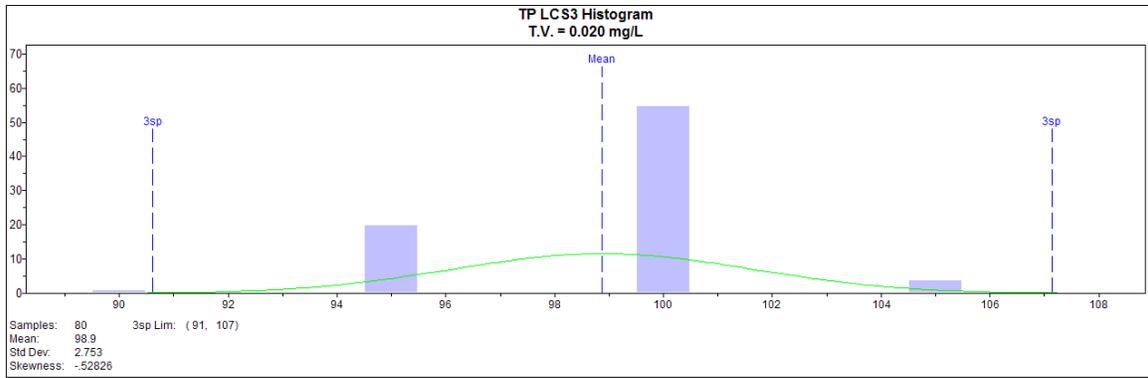


Figure 2b. TP QC (Laboratory Control Sample, 0.020 mg/L) sample histogram.

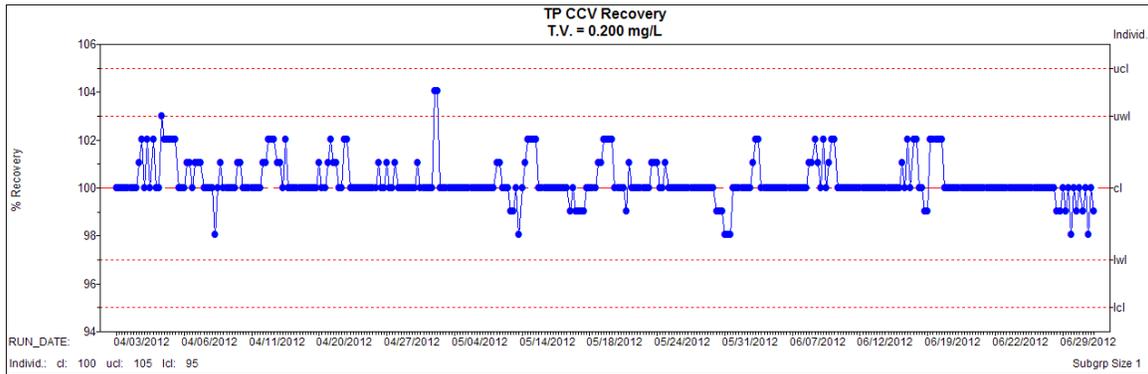


Figure 3a. TP QC (Continuing Calibration Verification Sample, 0.200 mg/L) sample recoveries.

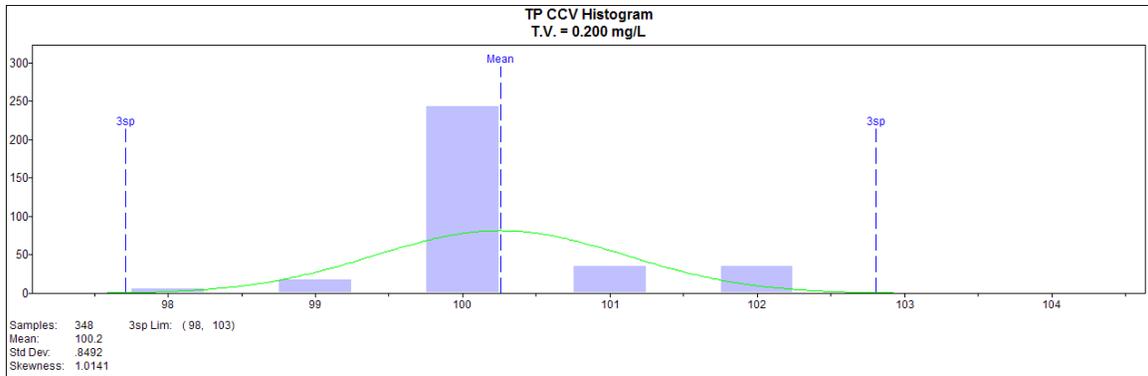


Figure 3b. TP QC (Continuing Calibration Verification Sample, 0.200 mg/L) sample histogram.

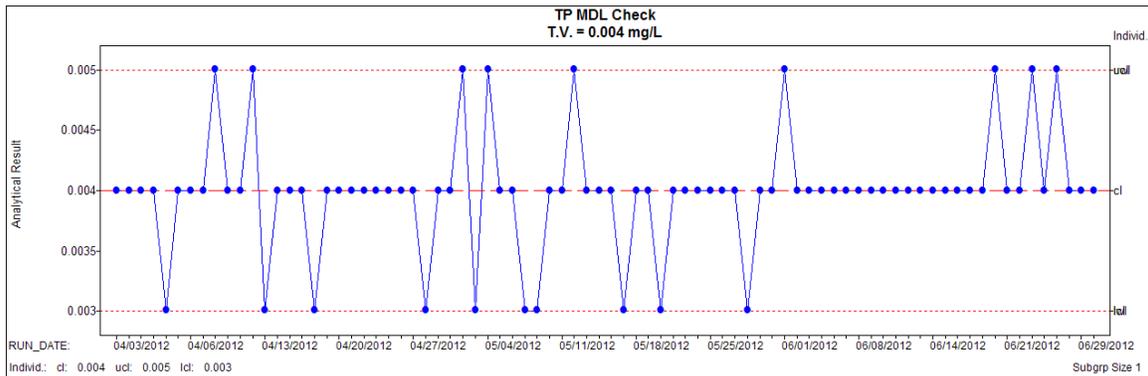


Figure 4a. TP QC5 (Method Detection Limit Check, 0.004 mg/L) sample recoveries.

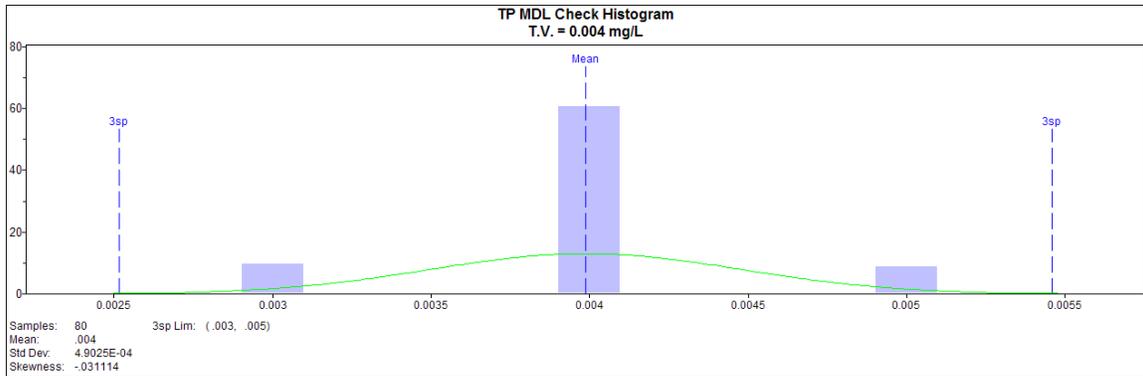


Figure 4b. TP QC5 (Method Detection Limit Check, 0.004 mg/L) sample histogram.

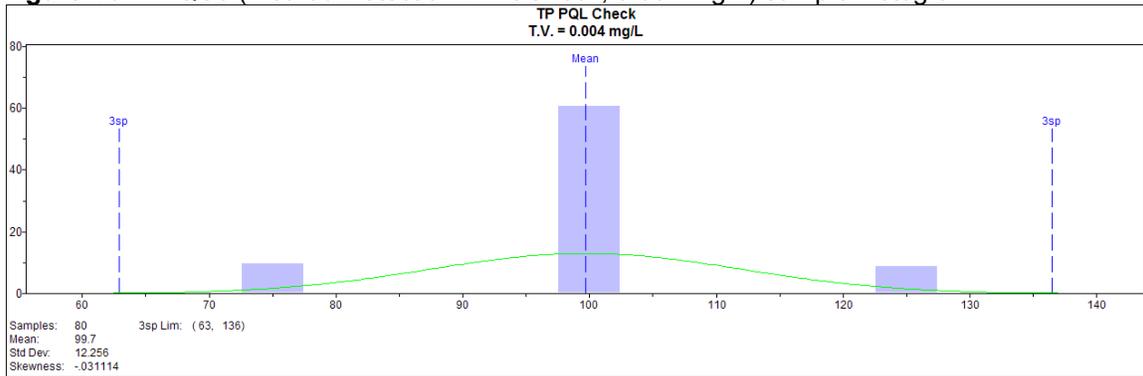


Figure 4c. TP PQL (Practical Quantitation Limit) check.

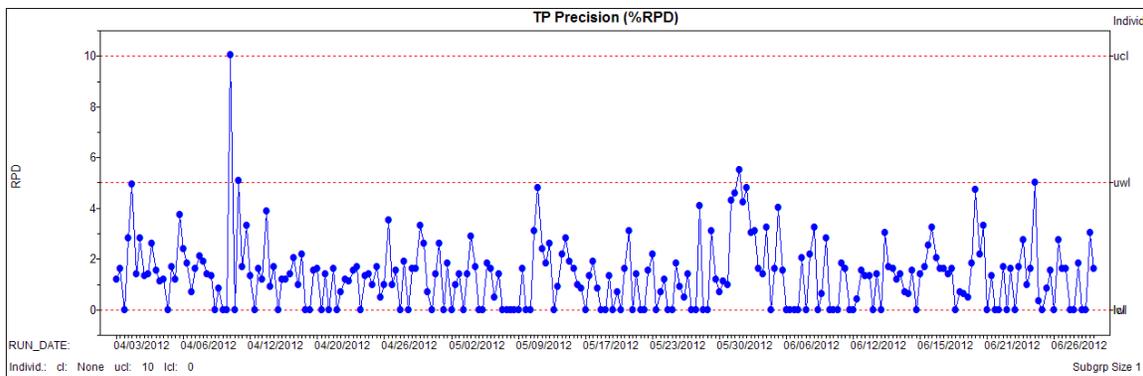


Figure 5a TP precision (%) relative percent different.

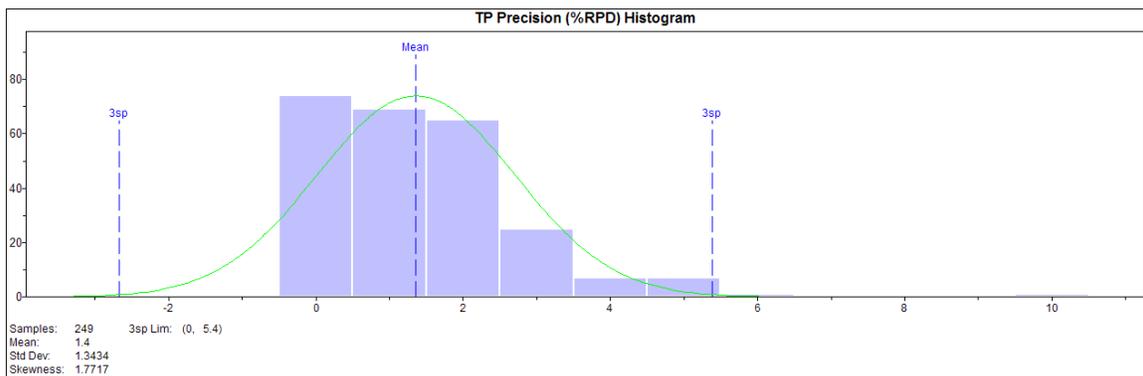


Figure 5b. TP precision (%) relative percent different histogram.

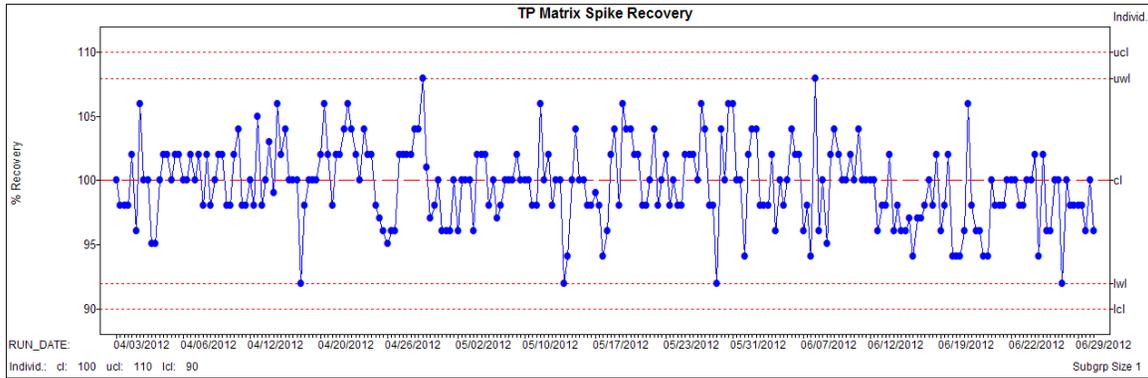
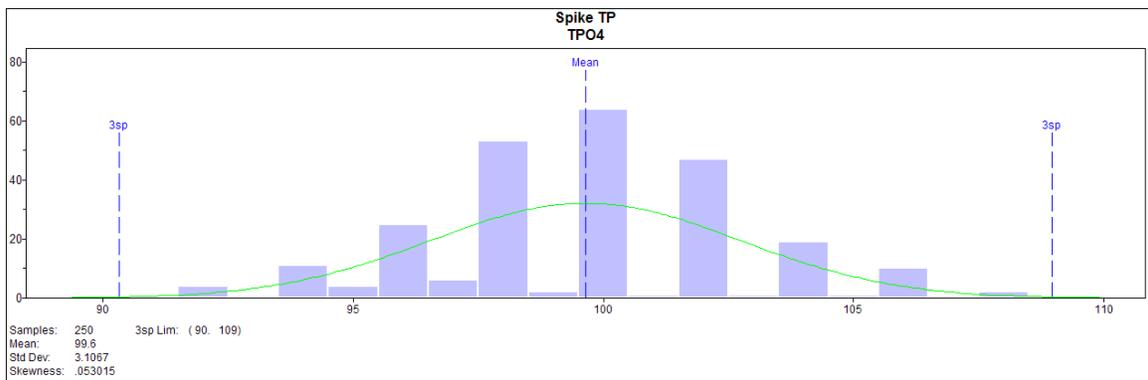


Figure 6a. TP spike recovery (%) data.



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 reporting of estimated analytical measurement uncertainty values for total phosphorus was implemented in July 2012. The procedure has been conducted using a nested hierarchical methodology by Ingersoll (2001). This QC-based nested approach uses the statistical quality control data attributed to laboratory measurement activities and do not include uncertainty attributed to field sampling activities. A mathematical model in concentration range uses the Eurachem/CITAC (2000) guide on uncertainty. **Figure 7** is presented to clarify the concept of MDL and PQL of a measurement process.

Uncertainty of Measurement Close to the Detection Limit

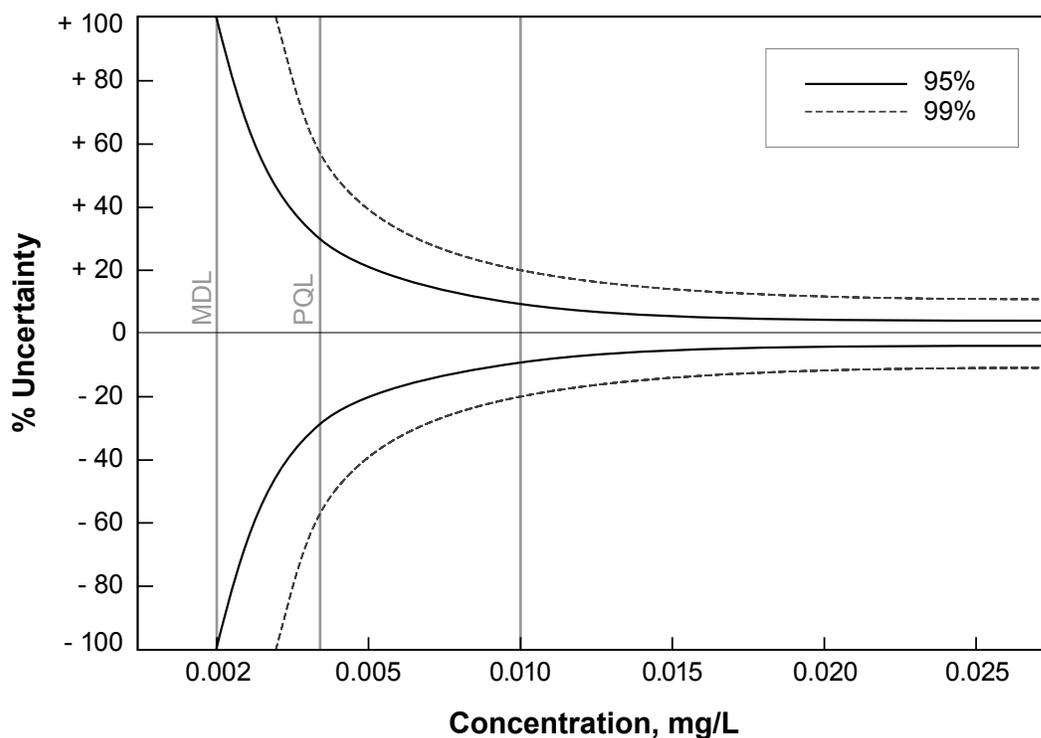


Figure 7. Uncertainty of TP measurement close to the detection limit.

METHOD DETECTION LIMIT AND PRACTICAL QUANTITATION LIMIT

MDL checks are routinely analyzed with each analytical run. From April 1, 2011, to June 30, 2012, 80 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 “T” 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. From April 2012 to June 2012, two sets of split TP samples were collected. The statistical evaluation contains the data from the EVPA Quarterly Splits conducted between the FDEP and the SFWMD's laboratory from April 2011 to June 2012 (see **Appendix A**). 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 of 0.8038 indicates strong agreement between two 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.

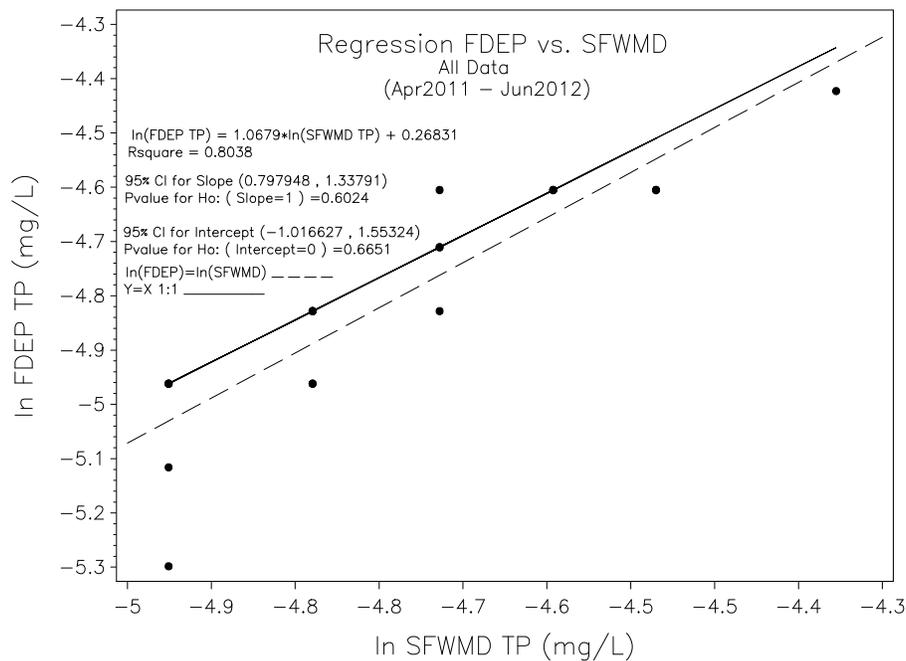


Figure 8. Regression analysis for all TP data.

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 0.016 and 0.035, respectively.

TP ≥ 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	19	0.008	0.008
	SFWMD	19	0.009	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	0.016
Median of Differences	0.000	Median of Differences = 0	Signed Rank	0.035

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 differences were statistically significant in both; the sign-rank test ($p = 0.003$) for the normally distributed paired data and linear regression, as expected at that concentration.

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 (March to April 2012) are shown in **Table 7**.

Table 7. Proficiency testing WP-206 study

Assigned Value	2.52 mg/L
Reported Value	2.56 mg/L
Z-Score	0.118
Acceptance Limits	2.03 – 3.06 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.
- 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.

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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 pre-cleaned 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 AFW water, sample transport and storage conditions, and laboratory process.

Field Blank (FB): FBs are collected by pouring AFW 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 AFW 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 AFW water, sample transport and storage conditions and laboratory 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 Replicate Sample (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 σ is a standard deviation) (EURACHEM).

APPENDIX A

Results of TP split studies between the SFWMD and FDEP laboratories,
EVPA Project, April 2011– June 2012.

Sample	Date	SFWMD	FDEP	%RPD/Comments
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
EVPA	3-Apr-12	0.008	0.007 (I)	<PQL
EVPA	3-Apr-12	0.007	0.006 (I)	<PQL
EVPA	3-Apr-12	0.007	0.005 (I)	<PQL
EVPA	3-Apr-12	0.006	<0.004 (U)	<PQL
EVPA	11-Jun-12	0.010	0.010	0.0
EVPA	11-Jun-12	0.010	0.010	0.0
EVPA	11-Jun-12	0.009	0.009 (I)	<PQL
EVPA	11-Jun-12	0.009	0.010 (I)	<PQL

Notes:

Qualifier codes:

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

U: Indicates that an analysis was performed for the analyte but the analyte was not detected

J: sample associated with EB \geq MDL and \leq 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 April 1 to June 30, 2012. One hundred seventeen results were reported. Three results were qualified with a code “J”; one result was qualified with code “PMF”, and one result with code “I”.

Project	Date Collected	Station	TP Result (mg/L)	Qualifier Code
PIE	2-Apr-12	S18C	0.004	
EVPA	3-Apr-12	LOX6	0.005	
EVPA	3-Apr-12	LOX11	0.008	
EVPA	3-Apr-12	LOX12	0.008	
EVPA	3-Apr-12	LOX13	0.007	
EVPA	3-Apr-12	LOX14	0.007	
EVPA	3-Apr-12	LOX15	0.006	
EVPA	3-Apr-12	LOX16	0.009	
PIE	3-Apr-12	S332DX	0.009	
EVPA	4-Apr-12	LOX4	0.011	
EVPA	4-Apr-12	LOX7	0.010	
EVPA	4-Apr-12	LOX8	0.013	
PIN	4-Apr-12	S355A	0.035	
PIN	4-Apr-12	S355B	0.029	
PIN	4-Apr-12	S12A	0.016	J
PIN	4-Apr-12	S333	0.010	J
PIN	4-Apr-12	S356-334	0.013	J
PIE	9-Apr-12	S332DX	0.008	
PIE	13-Apr-12	S18C	0.004	
PIN	13-Apr-12	S12A	0.020	
PIN	13-Apr-12	S333	0.012	
PIN	13-Apr-12	S356-334	0.013	
PIE	16-Apr-12	S332DX	0.010	
PIE	16-Apr-12	S18C	0.004	
PIN	17-Apr-12	S12A	0.019	
PIN	17-Apr-12	S333	0.012	
PIN	17-Apr-12	S356-334	0.011	
PIE	23-Apr-12	S332DX	0.007	
PIE	23-Apr-12	S18C	0.007	
PIN	24-Apr-12	S12A	0.018	
PIN	24-Apr-12	S333	0.011	
PIN	24-Apr-12	S356-334	0.010	
PIE	30-Apr-12	S332DX	0.006	
PIE	30-Apr-12	S18C	0.006	
PIN	1-May-12	S12A	0.016	
PIN	1-May-12	S333	0.012	

Project	Date Collected	Station	TP Result (mg/L)	Qualifier Code
PIN	1-May-12	S355A	0.031	
PIN	1-May-12	S355B	0.040	
PIN	1-May-12	S356-334	0.011	
PIE	8-May-12	S332DX	0.006	
PIE	8-May-12	S18C	0.004	
PIN	9-May-12	S12A	0.032	
PIN	9-May-12	S12D	0.009	
PIN	9-May-12	S333	0.009	
PIN	9-May-12	S356-334	0.017	
EVPA	14-May-12	LOX6	0.005	
EVPA	14-May-12	LOX11	0.007	
EVPA	14-May-12	LOX12	0.006	
EVPA	14-May-12	LOX13	0.007	
EVPA	14-May-12	LOX14	0.006	
EVPA	14-May-12	LOX15	0.006	
EVPA	14-May-12	LOX16	0.008	
PIE	14-May-12	S332DX	0.005	
PIE	14-May-12	S18C	0.003	I
EVPA	15-May-12	LOX8	0.008	
EVPA	15-May-12	LOX9	0.009	
EVPA	15-May-12	LOX10	0.009	
PIN	15-May-12	S12A	0.014	
EVPA	15-May-12	LOX4	0.009	
EVPA	15-May-12	LOX7	0.008	
PIN	15-May-12	S12D	0.012	
PIN	15-May-12	S333	0.012	
PIN	15-May-12	S356-334	0.014	
PIE	21-May-12	S332DX	0.006	
PIE	21-May-12	S18C	0.005	
PIN	22-May-12	S12A	0.012	
PIN	22-May-12	S12D	0.015	
PIN	22-May-12	S333	0.017	
PIN	22-May-12	S356-334	0.011	
PIE	29-May-12	S332DX	0.006	
PIE	29-May-12	S18C	0.004	
PIE	29-May-12	BERMB3	0.161	PMF
PIN	30-May-12	S12A	0.026	
PIN	30-May-12	S333	0.013	
PIN	30-May-12	S356-334	0.019	
PIE	4-Jun-12	S332DX	0.006	
PIE	4-Jun-12	S18C	0.004	
PIN	5-Jun-12	S12A	0.021	

Project	Date Collected	Station	TP Result (mg/L)	Qualifier Code
PIN	5-Jun-12	S12D	0.009	
PIN	5-Jun-12	S333	0.013	
PIN	5-Jun-12	S355A	0.013	
PIN	5-Jun-12	S355B	0.018	
PIN	5-Jun-12	S356-334	0.012	
PIE	5-Jun-12	BERMB3	0.048	
EVPA	11-Jun-12	LOX3	0.010	
EVPA	11-Jun-12	LOX4	0.009	
EVPA	11-Jun-12	LOX5	0.009	
EVPA	11-Jun-12	LOX7	0.009	
EVPA	11-Jun-12	LOX8	0.010	
EVPA	11-Jun-12	LOX9	0.010	
EVPA	11-Jun-12	LOX10	0.007	
PIE	11-Jun-12	BERMB3	0.373	
PIE	11-Jun-12	S332DX	0.006	
PIE	11-Jun-12	S18C	0.004	
EVPA	12-Jun-12	LOX6	0.006	
EVPA	12-Jun-12	LOX11	0.007	
EVPA	12-Jun-12	LOX13	0.007	
EVPA	12-Jun-12	LOX14	0.005	
EVPA	12-Jun-12	LOX15	0.005	
EVPA	12-Jun-12	LOX16	0.006	
PIN	12-Jun-12	S12A	0.018	
EVPA	12-Jun-12	LOX12	0.006	
PIN	12-Jun-12	S12D	0.009	
PIN	12-Jun-12	S333	0.019	
PIN	12-Jun-12	S356-334	0.011	
PIE	18-Jun-12	S332DX	0.006	
PIE	18-Jun-12	S18C	0.006	
PIN	19-Jun-12	S12A	0.016	
PIN	19-Jun-12	S12D	0.008	
PIN	19-Jun-12	S333	0.017	
PIN	19-Jun-12	S356-334	0.011	
PIE	25-Jun-12	S332DX	0.007	
PIE	25-Jun-12	S18C	0.006	
PIN	26-Jun-12	S12A	0.020	
PIN	26-Jun-12	S12D	0.008	
PIN	26-Jun-12	S333	0.013	
PIN	26-Jun-12	S356-334	0.008	