Quality Assessment Report for Water Quality Monitoring

January–March 2008

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INTRODUCTION

This report is an assessment of the South Florida Water Management District (SFWMD or District) laboratory analysis and field sampling for total phosphorus (TP) monitoring, primarily for the following projects/stations from January 1, 2008, through March 31, 2008.

- Everglades National Park Inflows North (PIN) S12A, S12B, S12C, S12D, S333, S355A, S355B, and S356
- Everglades National Park Inflow East (PIE) S332DX, S18C, DS2, DS4, and Berm B3
- Everglades Protection Area (EVPA) LOX3 through LOX16

Because field quality control (QC) samples are collected for trips 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. It should also be noted that as of February 25, 2008, a qualifier code "J9" was added to the list of Data Qualifier Codes to replace the code "V" for analyte detected in the field blank and/or associated samples.

The District's *Field Sampling Quality Manual*[1] provides the minimum requirements followed in field sample collection. The *Chemistry Laboratory Quality Manual*[2] 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 provided the data used in this report. These data are considered preliminary until release into the District's DBHYDRO database.

This report is therefore a quality assurance QA/QC summary of collective efforts contributing from both field and laboratory staff. Its contents have been reviewed by the Quality Assurance Administrator of the District. The main conclusion of this report could be reflected in the SFWMD Annual Quality Assessment Report for the Water Year 2008.

Additionally, this report includes an analysis of the District laboratory's performance on the split and inter-laboratory studies with the Florida Department of Environmental Protection (FDEP) and other laboratories for the selected projects (EVPA and Everglades TP Round Robins) for a one-year period. The results of the U.S. Geological Survey Analytical Evaluation Program and the Inter-laboratory of the phosphorus Everglades Round Robin XVIII designed to evaluate the laboratory's performance are also included.

[1] SFWMD. 2006. Field Sampling Quality Manual, Version 3.0. South Florida Water Management District, Water Quality Monitoring Division and Quality Assurance Staff. West Palm Beach, FL.

[2] SFWMD. 2008. Chemistry Laboratory Quality Manual and Field Sampling Quality Manual (Rev. No. 08-01). South Florida Water Management District, Water Quality Monitoring Division, Environmental Resource Assessment Department. West Palm Beach, FL.

FIELD SAMPLING QUALITY ASSESSMENT

PROCEDURE UPDATES

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

MISSING DATA

Table 1 presents the list of missing data for this reporting period. Fifty-two data were missing due to samples not collected because of lack of flow.

Table 1. Missing data for the period from January 1–March 31, 2008.

Project	Collection Date	Station	Comments
PIN	03-Jan-08	S12B	No flow, no sample collected
PIN	03-Jan-08	S12C	No flow, no sample collected
PIN	03-Jan-08	S12D	No flow, no sample collected
PIN	03-Jan-08	S355A	No flow, no sample collected
PIN	03-Jan-08	S355B	No flow, no sample collected
PIN	08-Jan-08	S12B	No flow, no sample collected
PIN	08-Jan-08	S12C	No flow, no sample collected
PIN	08-Jan-08	S12D	No flow, no sample collected
PIN	16-Jan-08	S12B	No flow, no sample collected
PIN	16-Jan-08	S12C	No flow, no sample collected
PIN	16-Jan-08	S12D	No flow, no sample collected
PIN	16-Jan-08	S355A	No flow, no sample collected
PIN	16-Jan-08	S355B	No flow, no sample collected
PIN	23-Jan-08	S12B	No flow, no sample collected
PIN	23-Jan-08	S12C	No flow, no sample collected
PIN	23-Jan-08	S12D	No flow, no sample collected
PIN	23-Jan-08	S355A	No flow, no sample collected
PIN	23-Jan-08	S355B	No flow, no sample collected
PIN	29-Jan-08	S12B	No flow, no sample collected
PIN	29-Jan-08	S12C	No flow, no sample collected
PIN	29-Jan-08	S12D	No flow, no sample collected
PIN	29-Jan-08	S355A	No flow, no sample collected
PIN	29-Jan-08	S355B	No flow, no sample collected
PIN	12-Feb-08	S12B	No flow, no sample collected
PIN	12-Feb-08	S12C	No flow, no sample collected

PIN	12-Feb-08	S12D	No flow, no sample collected
PIN	12-Feb-08	S355A	No flow, no sample collected
PIN	12-Feb-08	S355B	No flow, no sample collected
PIN	20-Feb-08	S12B	No flow, no sample collected
PIN	20-Feb-08	S12C	No flow, no sample collected
PIN	20-Feb-08	S12D	No flow, no sample collected
PIN	20-Feb-08	S355A	No flow, no sample collected
PIN	20-Feb-08	S355B	No flow, no sample collected
PIN	27-Feb-08	S12B	No flow, no sample collected
PIN	27-Feb-08	S12C	No flow, no sample collected
PIN	27-Feb-08	S355A	No flow, no sample collected
PIN	27-Feb-08	S355B	No flow, no sample collected
PIN	04-Mar-08	S12B	No flow, no sample collected
PIN	04-Mar-08	S12C	No flow, no sample collected
PIN	11-Mar-08	S12B	No flow, no sample collected
PIN	11-Mar-08	S12C	No flow, no sample collected
PIN	11-Mar-08	S12D	No flow, no sample collected
PIN	11-Mar-08	S355A	No flow, no sample collected
PIN	11-Mar-08	S355B	No flow, no sample collected
PIN	18-Mar-08	S12B	No flow, no sample collected
PIN	18-Mar-08	S12C	No flow, no sample collected
PIN	18-Mar-08	S355A	No flow, no sample collected
PIN	18-Mar-08	S355B	No flow, no sample collected
PIN	25-Mar-08	S12B	No flow, no sample collected
PIN	25-Mar-08	S12C	No flow, no sample collected
PIN	25-Mar-08	S355A	No flow, no sample collected
PIN	25-Mar-08	S355B	No flow, no sample collected

QUALITY CONTROL

Field QC measures consist of Equipment Blanks (EB), Field-Cleaned Equipment Blanks (FCEB), Field Blanks (FB), Split Samples (SS), and Replicate Samples (RS). **Table 2** summarizes EB, FB, and FCEB results for projects of interest to the Technical Oversight Committee (TOC), as referenced in the table footnotes below. Two blanks associated with samples for the stations listed in the *Introduction* section were outside the acceptance criterion. **Table 3** summarizes the field precision results and shows that the field sampling precision was acceptable for all three projects. Data that did not meet the set criteria for blanks, field precision, or sampling protocols were qualified using FDEP data qualifier codes.

Table 2. Field and equipment blank results. [1, 2, 3, 4]

Type of Blank	Project	Number of Blanks Collected	% < 0.002	% ≥ 0.002
EB	EVPA	1	100	0
	PIE	1	100	0
	PIN	1	100	0
FCEB	EVPA	6	100	0
	PIE	17	94	6
	PIN	13	92	8

[1] Only blanks for sampling events from samples collected at stations listed in the *Introduction* section were included in this analysis.

[2] Blanks for TP, which were associated with a short-term autosampler project at some TOC stations, were not included in this analysis.

[3] FB, FCEB, and EB acceptance criteria must be < Method Detection Limit (MDL).

[4] When sample concentrations are less than five times the resulting blank values, “V” or “J9” is added.

Table 3. Field precision summary. [1, 2, 3]

Project Code	Number of Triplicates	Date Collected	% RSD	Comments
EVPA	1	06-Mar-08	9.1	Precision criteria met.
EVPA	1	11-Mar-08	9.1	Precision criteria met.
PIN	1	08-Jan-08	3.8	Precision criteria met.
PIE	1	14-Jan-08	0.0	Precision criteria met.

[1] Only replicates for sampling events from samples collected at stations listed in the *Introduction* section were included in this analysis.

[2] The District’s chemistry laboratory conducted all TP analyses.

[3] Field precision acceptance criterion must be ≤ 20%. The laboratory applied this criterion only if sample values > Practical Quantitation Limit (PQL), which is 4 times of the MDL.

Table 4. List of flagged data.

Project Code	Date Collected	Station	Flag	Comments
PIN	03-Jan-08	S356	V	Sample associated with contaminated field blank
PIN	03-Jan-08	S333	V	Sample associated with contaminated field blank
PIN	03-Jan-08	S12A	V	Sample associated with contaminated field blank
PIE	14-Jan-08	S18C	V	Sample associated with contaminated field blank

FIELD AUDIT

During this quarter, two audits were conducted by the District for the EVPA project. The sample collection and sample processing performed by District and USFWS personnel in Water Conservation Area 1 and the collection in Water Conservation Area 2 performed by the West Palm Beach field group.

The key audit findings were as follows: (1) quality manual was not available for reference during sample processing, (2) improper documentation protocol, and (3) improper instrument calibration protocol. The corrective actions from this audit are complete. After a review of the data associated to these key deficiencies, it was determined that the quality of the data was not affected.

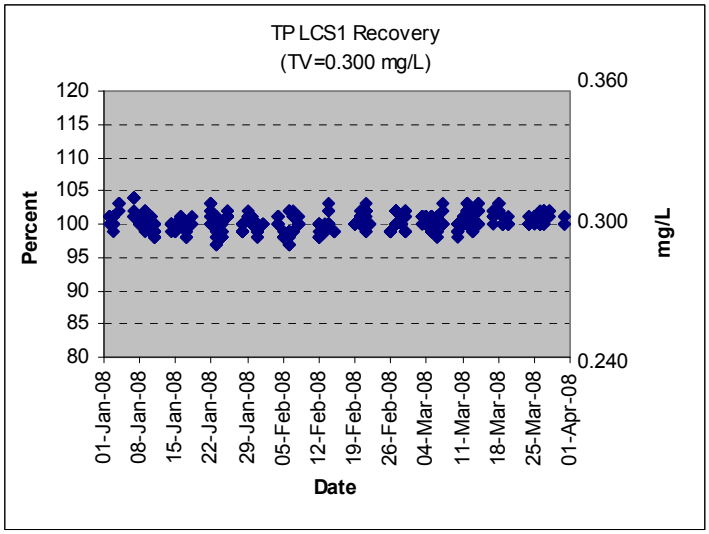
LABORATORY ANALYSIS QUALITY ASSESSMENT

PROCEDURE UPDATES

The TP analytical procedure did not change during this reporting period.

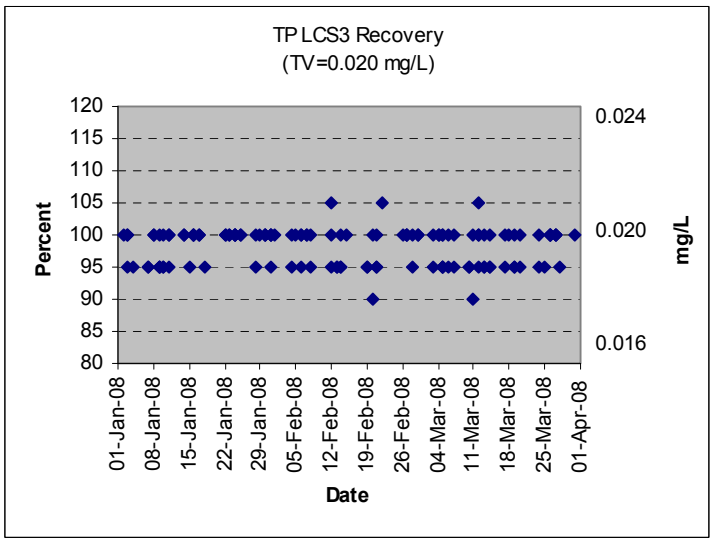
LABORATORY QUALITY CONTROL

Routine laboratory QC samples include QC checks, matrix spikes, and precision checks. **Figures 1** through **4** show recoveries from various types and levels of QC samples for the TP analysis at the District laboratory from January 1, 2008, through March 31, 2008.



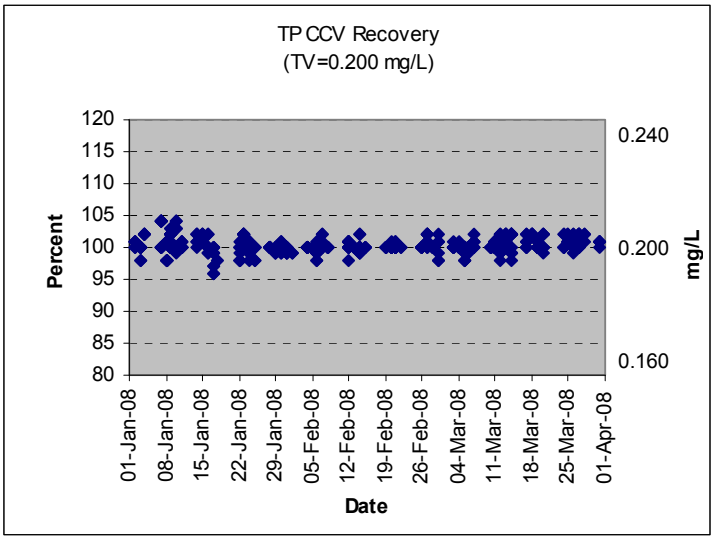
Mean = 100.3%, Max = 104.0%, Min = 97.0%

Figure 1. QC (Laboratory Control Solution) sample recoveries for TP analysis.



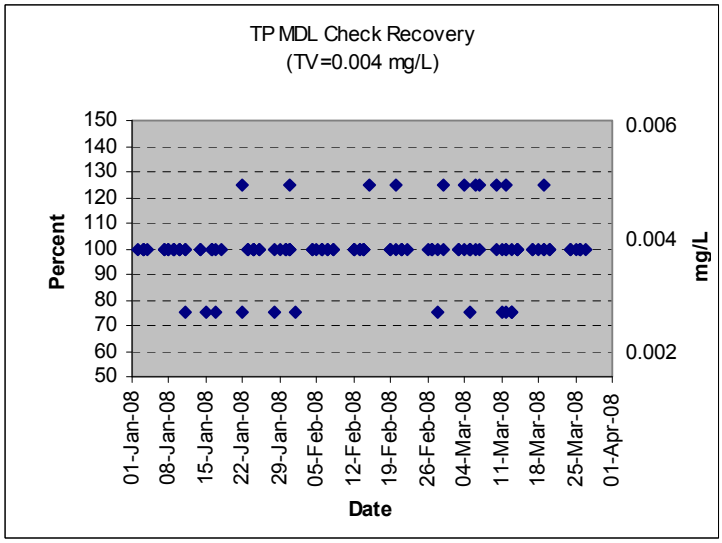
Mean = 98.2%, Max = 105.0%, Min = 90.0%

Figure 2. QC (Laboratory Control Solution) sample recoveries for TP analysis.



Mean = 100.2%, Max = 104.0%, Min = 97.0%

Figure 3. QC (Continuing Calibration Verification) sample recoveries for TP analysis.



Mean = 100.2%, Max = 125.0%, Min = 75.0%

Figure 4. QC5 (Method Detection Limit check) sample recoveries for TP analysis.

Tables 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 District's laboratory usually rejects the analytical batch. If any deficiencies are noted and the samples have exceeded the required holding times and the laboratory cannot re-analyze the data, then the sample is qualified accordingly.

Table 5. TP Precision Data.

Acceptance Limit	<10%
Analytical Range: 0.002-0.400 mg/L	
Maximum	7.0
Mean	1.3
Standard Deviation	1.29
3xSD	3.88
UCL	5.2
n	337

UCL Upper Control Limit
n Number of data points

Table 6. TP Spike Recovery Data.

Acceptance Limit	90 – 110%
Analytical Range: 0.002-0.400 mg/L	
Minimum	90
Maximum	108
Mean	100.0
Standard Deviation	3.44
3xSD	10.33
LCL	89.7
UCL	110.4
n	337

LCL Lower Control Limit
UCL Upper Control Limit
n Number of data points

Recoveries for the QC samples are usually within ±10 percent from the true value, which is acceptable. The Method Detection Limit (MDL) check (QC5), with a true value of 0.004 mg/L, had mean recoveries of 100.2 percent. The daily MDL check results indicate that the laboratory has consistently achieved the established MDL of 0.002 milligram per liter (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 100.0 percent.

INTER-LABORATORY QUALITY-CONTROL ASSESSMENT

Split Studies with FDEP Laboratory

To continuously assess comparability of results, the District routinely sends split samples to other laboratories. The EVPA Quarterly Splits and the Everglades TP Round Robin (ERR) split-study programs conducted between the FDEP and the District's laboratory from December 2006 to December 2007 (see **Appendix A**) provided the data used in this analysis. **Figures 5** through **7** present regression analysis of the data, and **Table 7** presents summary statistics for the data pairs.

ALL DATA

Figure 5 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 value is 0.9728. This information shows that the results from the two laboratories have a very high degree of agreement (close to 1:1 correlation) between the laboratories.

Table 7 shows that the mean difference (0.00097 mg/L) and median difference (0.001 mg/L) were statistically significant. However, the observed differences were well below the practical quantitation limit (PQL) of 0.008 mg/L. The paired t-test and signed-rank test yielded p-values of 0.0001 and <0.0001, respectively. **Note: The magnitudes of these differences are environmentally and practically insignificant.**

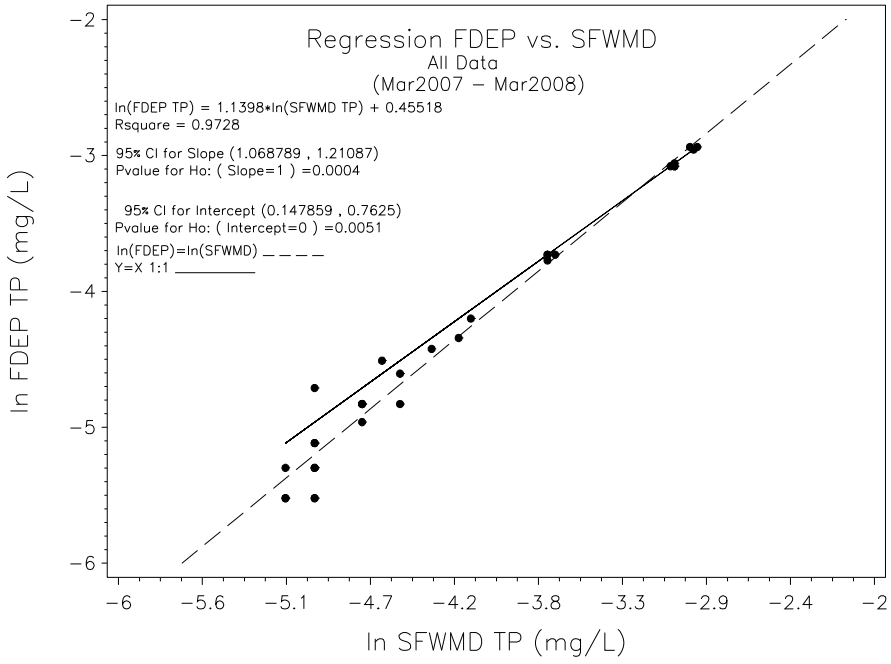


Figure 5. Regression analysis for all TP data.

TP ≥ 0.020 mg/L

Figure 6 shows that the intercept is not statistically different from 0 and the slope is not statistically different from 1 for samples with TP ≥ 0.020 mg/L. The r^2 value is 0.997.

Table 7 shows that the mean difference (0.0002 mg/L) and median difference (0.00 mg/L) were not statistically significant. The differences were below the PQL of the two laboratories. The paired t-test and signed-rank test yielded p-values of 0.5059 and 0.75, respectively.

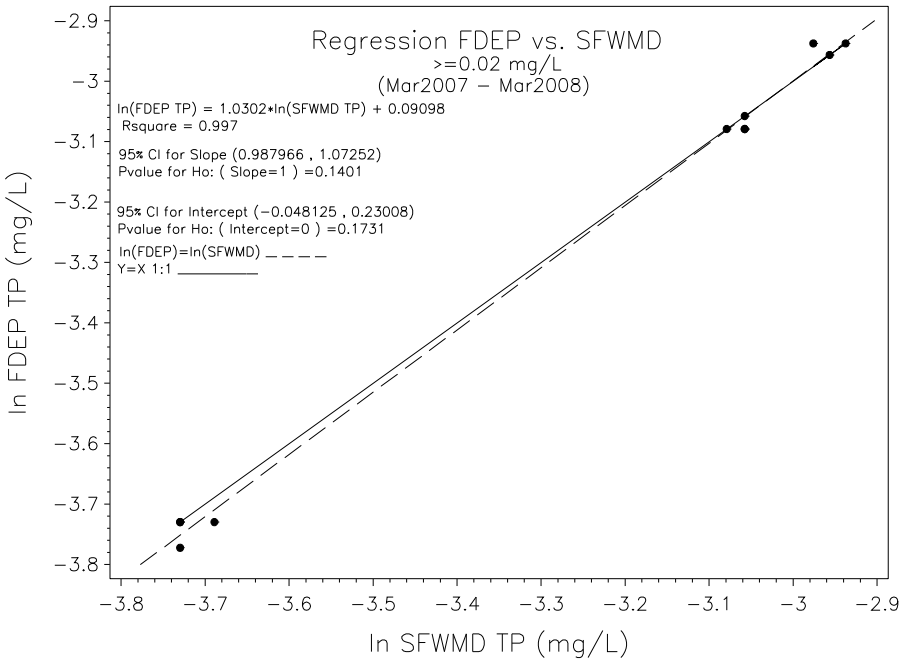


Figure 6. Regression analysis for TP greater or equal to 0.020 mg/L.

TP < 0.020 mg/L

Figure 7 shows that the slope is not significantly different from 1 (one) and the intercept is not significantly different from 0 (zero) for samples with TP < 0.020 mg/L. The r^2 for this regression is 0.8133. At this low level, the data sets do not agree very well, as expected, due to the relatively high variability within each laboratory and between the two laboratories.

Table 7 shows that the mean difference (0.0014 mg/L) and median difference (0.001 mg/L) were very small but statistically significant at this concentration level (< 0.020 mg/L). P-values for the paired t-test and signed-rank were less than 0.0001. **Note: The magnitudes of these differences are environmentally and practically insignificant.**

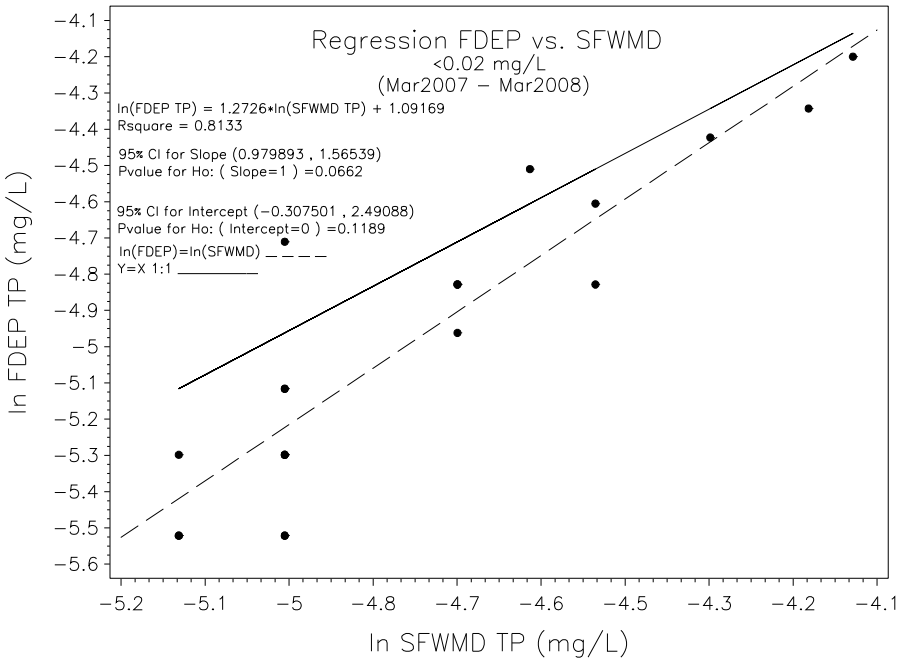


Figure 7. Regression analysis for TP less than 0.020 mg/L.

Table 7. Comparison of District and FDEP split TP samples.

All Data	**Summary Statistics**				
	Lab	**N**	**Mean**	**Median**	
	FDEP	32	0.0186	0.0095	
	District	32	0.0196	0.0105	
	Statistical Test of Hypotheses				
	Summary of Paired Differences		**Hypothesis**	**Test**	**P-value**
	Mean of Differences	0.00097	Mean of Differences = 0	Student's t	0.0001
	Median of Differences	0.0010	Median of Differences = 0	Signed Rank	<0.0001
≥ 0.020 mg/L	**Summary Statistics**				
	Lab	**N**	**Mean**	**Median**	
	FDEP	11	0.0398	0.046	
	District	11	0.0400	0.047	
	Statistical Test of Hypotheses				
	Summary of Paired Differences		**Hypothesis**	**Test**	**P-value**
	Mean of Differences	0.0002	Mean of Differences = 0	Student's t	0.5059
	Median of Differences	0.0000	Median of Differences = 0	Signed Rank	0.75
< 0.020 mg/L	**Summary Statistics**				
	Lab	**N**	**Mean**	**Median**	
	FDEP	21	0.0075	0.007	
	District	21	0.0089	0.007	
	Statistical Test of Hypotheses				
	Summary of Paired Differences		**Hypothesis**	**Test**	**P-value**
	Mean of Differences	0.0014	Mean of Differences = 0	Student's t	<0.0001
	Median of Differences	0.0010	Mean of Differences = 0	Signed Rank	<0.0001

Notes:

- Differences calculated as District TP minus FDEP TP. The mean and median differences for all concentration levels are at or below the PQL.
- Data not used if FDEP value was less than FDEP laboratory's MDL.

U.S. Geological Survey Analytical Evaluation Program

The SFWMD's laboratory participates in the semiannual U.S Geological Survey (USGS) performance evaluation program on environmental samples for the Comprehensive Everglades Restoration Plan (CERP). The results have been published in a final report to the CERP Quality Assurance Oversight Team. Evaluation of the results is based on the deviation (Z-value) from the median and percent difference. Following usual practices, a Z-value less than ±2 is considered satisfactory. **Table 8** provides the results of the spring (January–March) 2008 study.

Table 8. USGS Performance Evaluation study for TP results.

Sample I.D	Reported Result, mg/L	Most Probable Value, mg/L	Z-Value	% Difference
M-186	0.077	0.080	-0.33	-3.75
N-97	0.410	0.410	0.00	0.00

Total Phosphorus Everglades Round Robin Inter-laboratory Comparison Program

Appendix B contains the results of the Everglades Round Robin 18 compared with other participating laboratories. Evaluation of the study results indicates that the SFWMD laboratory is at or about the central tendency and acceptable precision at all levels. An FDEP contractor is performing a statistical evaluation of this study.

GLOSSARY

Accuracy. The agreement between the actual obtained result and the expected result. QC-check samples, having known or "true" values, are used to test for the accuracy of a measurement system.

Equipment Blank (EB). A general terminology used for analyte-free water that is processed onsite 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-Value. A measure of the deviation of the result (Xi) from the assigned value (X) for that determinant (calculated as $z = (Xi–X)/\sigma$, where σ is a standard deviation) (EURACHEM).

APPENDIX A

Results of TP split studies between the District and FDEP laboratories, EVPA Project and Everglades Round Robin, March 2007–March 2008.

Sample	Date	District	FDEP	% RPD/Comments
EVPA	05-Mar-07	0.010	<0.008	FDEP MDL was elevated[1]
EVPA	06-Mar-07	0.006	<0.008	FDEP MDL was elevated[1]
EVPA	06-Mar-07	0.007	<0.008	FDEP MDL was elevated[1]
EVPA	06-Mar-07	0.006	<0.008	FDEP MDL was elevated[1]
EVPA	12-Jun-07	0.013	0.012	8.0
EVPA	12-Jun-07	0.016	0.015	6.5
EVPA	12-Jun-07	0.015	0.013	14.3
EVPA	12-Jun-07	0.011	0.010	9.5
EVPA	18-Sep-07	0.006	0.004	<PQL
EVPA	18-Sep-07	0.007	0.006	<PQL
EVPA	18-Sep-07	0.007	0.005	<PQL
EVPA	18-Sep-07	0.011	0.008	<PQL
EVPA	12-Nov-07	0.006	0.005	<PQL
EVPA	12-Nov-07	0.007	0.004	<PQL
EVPA	12-Nov-07	0.007	0.009	<PQL
EVPA	12-Nov-07	0.007	0.005	<PQL
ERR-18	12-Feb-08	0.007	0.004	<PQL
ERR -18	12-Feb-08	0.007	<0.004	<PQL
ERR-18	12-Feb-08	0.006	0.004	<PQL
ERR-18	12-Feb-08	0.024	0.023	4.2
ERR-18	12-Feb-08	0.024	0.024	0.0
ERR-18	12-Feb-08	0.024	0.024	0.0
ERR-18	12-Feb-08	0.025	0.024	4.1
ERR-18	12-Feb-08	0.009	0.008	<PQL
ERR-18	12-Feb-08	0.009	0.008	<PQL
ERR-18	12-Feb-08	0.009	0.008	<PQL
ERR-18	12-Feb-08	0.009	0.007	<PQL
ERR-18	12-Feb-08	0.046	0.046	0.0
ERR-18	12-Feb-08	0.047	0.046	2.2
ERR-18	12-Feb-08	0.047	0.047	0.0
ERR-18	12-Feb-08	0.047	0.046	2.2
ERR-18	12-Feb-08	0.053	0.053	0.0
ERR-18	12-Feb-08	0.051	0.053	3.8
ERR-18	12-Feb-08	0.052	0.052	0.0
EVPA	06-Mar-08	0.010	0.011	9.5
EVPA	06-Mar-08	0.007	0.005	<PQL
EVPA	06-Mar-08	0.006	<0.004	<PQL
EVPA	06-Mar-08	0.007	0.006	<PQL

[1] According to the FDEP, the MDL was elevated due to sample matrix interference

APPENDIX B

Round Robin TP-18

Results (ug/L)

Laboratory	SITE																		
	CA2			E1				F4				S10C				S6A			
FL Dept. of Environmental Protection	4 I	4 U	4 I	23	24	24	24	8 I	8 I	8 I	7 I	46	46	47	46	53	53	52	
	16	17	8	18	7	12	4	15	1	13	9	5	2	3	11	6	10	14	
Harbor Branch Environmental Laboratory	11	11	10	32	32	32	31	22	12	19	17	54	52	56	50	52	55	53	
	10	12	3	11	9	14	6	18	2	17	7	13	5	16	1	4	15	8	
Short Environmental Laboratories	5 I	5 I	6 I	22	23	26	23	9 I	8 I	8 I	8 I	47	44	44	46	51	51	49	
	9	17	3	6	8	2	10	11	4	12	18	1	7	13	15	14	16	5	
IFAS Everglades Research & Education Center	6.3 U	11	8.8 U	26	21	25	24	6.4 U	21	12	12	44	46	50	44	53	59	52	
	17	8	6	18	15	4	11	3	1	10	16	14	5	2	12	7	9	13	
FL International University	9.41	8.27	8.27	20.32	21.71	23.75	22.00	12.41	10.40	10.78	10.48	47.78	48.26	44.70	47.66	53.03	52.44	52.90	
	9	12	11	17	4	7	5	10	13	3	15	6	2	18	8	1	14	16	
Jupiter Environmental Laboratories, Inc.	6.5	7.3	6.0	8.3	8.5	7.6	8.8	5.5	5.9	5.8	6.3	14	14	10	12	13	11	12	
	11	1	13	6	4	18	8	5	15	12	17	7	14	3	10	2	16	9	
Metro Dade County Environmental Resources Mgt.	7.78	7.78	7.97	25.73	26.25	26.21	25.97	10.87	11.40	11.06	11.16	47.56	47.99	47.92	47.67	52.32	52.11	52.15	
	6	11	18	13	10	8	12	2	7	3	17	1	4	5	15	16	14	9	
Columbia Analytical Services - Jax	6.2	9.1	3.4 I	25	25	24	24	9.8	11	41	9.7	47	45	64	43	50	49	48	
	11	2	9	18	13	14	12	6	16	10	5	4	3	1	17	15	8	7	
Advanced Environmental Laboratories	7 I	7 I	7 I	23	22	25	22	9	10	9	10	43	42	40	44	46	46	46	
	11	16	6	18	17	1	2	4	14	12	8	9	10	5	7	3	13	15	
Everglades Laboratories, Inc.	30.7	13.0	22.3	25.8	37.2	31.0	59.9	19.5	18.0	25.1	20.6	105	83.6	73.5	145	83.0	83.3	85.1	
	9	10	13	8	2	6	14	5	18	16	15	1	4	11	7	12	17	3	
U.S. Sugar Corp.- South Bay Laboratory	6.40	5.70 I	6.40	25.60	25.60	24.90	24.90	9.20	9.20	9.20	9.90	46.30	47.70	45.60	46.30	53.40	53.40	53.40	
	7	13	2	18	15	9	6	12	5	3	8	1	10	17	14	4	16	11	
Genapure Analytical services (US Biosystems, Inc)	7.7	7.7	8.3	25.5	27.6	26.2	26.0	11.5	12.0	11.6	12.4	46.2	46.5	46.6	44.6	53.1	51.5	50.1	
	4	16	7	8	9	18	2	6	3	10	17	11	12	5	1	13	14	15	
TestAmerica Tallahassee (formerly STL Tallahassee)	4.0 U	4.0 U	10	21	24	20	18	4.0 U	4.8 I	4.1 I	16	43	43	50	37	45	50	48	
	5	2	6	4	16	15	3	18	1	14	8	17	12	7	10	9	13	11	
Collier County Pollution Department	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	5.0 I	4.0 U	25.0	25.0	29.0	
	2	12	8	4	5	9	15	1	14	3	16	13	17	11	6	7	10	18	
South FL Water Mgt. District	7 I	7 I	6 I	24	24	24	25	9	9	9	9	46	47	47	47	53	51	52	
	5	3	13	8	16	10	17	1	2	14	4	9	6	12	15	18	7	11	
Accutest Laboratories Southeast	69 I	250	20 I	39 I	46 I	40 I	42 I	9 I	11 I	13 I	30 I	67 I	60 I	28 I	50 I	54 I	67 I	56 I	
	7	16	3	14	8	5	4	18	15	17	10	13	1	2	6	12	9	11	
TestAmerica, Inc	3.3 U	4.0 I	3.3 U	22.0	21.0	26.0	19.0	5.0 I	10.0	9.0 I	7.0 I	41.0	41.0	46.0	52.0	51.0	52.0	49.0	
	15	18	11	6	4	16	13	10	8	7	5	2	14	9	17	12	3	1	
Orange County Environmental Protection Division	4 I	3 U	3 U	19	16	16	18	5 I	5 I	7 I	8 I	43	37	38	41	43	44	47	
	14	16	8	3	9	17	2	12	1	10	7	13	18	11	5	15	6	4	
UF/IFAS Wetlands Biogeochemistry Laboratory	4	6	5	22	23	22	25	9	9	7	7	43	45	46	44	50	48	50	
	14	15	18	10	9	5	16	13	1	17	4	6	7	3	2	11	8	12	
DB Environmental Laboratories, Inc.	7 I	7 I	6 I	25	25	25	25	10 I	9 I	9 I	9 I	46	47	47	46	52	54	51	
	11	7	17	6	4	2	14	16	10	9	5	18	15	12	8	13	3	1	
UF/IFAS Tropical Research & Education Center	5.5	5.8	5.9	23.8	23.5	23.4	23.6	9.0	8.8	10.2	8.2	47.1	49.2	47.9	45.9	53.4	52.6	53.9	
	1	9	15	2	16	5	10	4	8	6	14	12	3	13	11	17	18	7	
Test America Denver (formerly STL Denver)	51.9	7.16	7.10	22.4	21.8	21.9	22.6	19.3	21.1	23.7	17.9	41.1	36.3	40.4	34.5	51.8	52.0	52.3	
	11	9	8	6	10	2	3	16	13	14	18	4	17	5	7	15	12	1	
Lee County Environmental Labs	10 U	10 U	10 U	15 I	19 I	20 I	14 I	10 U	10 U	10 U	10 U	40	39 I	34 I	34 I	41	47	41	
	18	8	5	16	6	9	13	1	7	11	4	3	2	17	14	12	10	15	
ELAB, Inc.	11.2	12.7	12.8	33.6	33.3	37.4	33.6	17.8	19.1	17.2	17.0	62.4	55.5	55.4	54.8	56.6	56.1	55.5	
	18	8	7	5	4	13	14	17	2	16	12	10	1	9	3	6	15	11	