U.S. EXHIBIT 1258

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF FLORIDA
CASE NO. 88-1886-CIV-MORENO

UNITED STATES OF AMERICA,	)	
	)	
Plaintiff,	)	EXPERT REPORT OF WILLIAM W. WALKER
	)	
v.	)	
	)	
	)	
SOUTH FLORIDA WATER MANAGEMENT DISTRICT, et al.,	)	
	)	
	)	
Defendants.	)	

I, William Walker, submit the following report for the liability hearings before the Special Master currently scheduled for October 25-29, 2010. This report addresses the following issues raised either by the Plaintiff United States and/or the Plaintiff-intervenor Miccosukee Tribe of Indians:

- What the maximum annual discharge limit under the Consent Decree should be if the requirement is for the South Florida Water Management District ("SFWMD") and the Florida Department of Environmental Protection ("DEP") (collectively, the "State") to achieve a long-term geometric mean of 10 parts per billion ("ppb") total phosphorus throughout the A.R.M. Loxahatchee National Wildlife Refuge ("Refuge").
- What it means for the State to achieve phosphorus load reductions of 85% to the Refuge, and to achieve phosphorus load reductions of 80% to the Everglades Protection Area ("EVPA"), under the Consent Decree, and whether the State has failed to achieve those reductions.
- Whether the SFWMD used inappropriate data in calculating whether discharges to Everglades National Park ("ENP" or "Park") during Water Year 2008 (October 1, 2007 -

September 30, 2008) achieved Consent Decree, Appendix A discharge limits for that water year.

- Whether the SFWMD has designed and implemented adequate control programs for watersheds outside the Everglades Agricultural Area ("EAA"), including the L3, S140, and L28I, as provided in the Consent Decree

My curriculum vitae, which summarizes my academic background and experience as an environmental engineer providing technical assistance to various private-sector, municipal, state, and federal clients since 1972, appears in U.S. Exhibit 1259. My participation in this case and implementation of the ensuing Consent Decree started in 1989 and has continued since then. While most of my involvement has been financially supported by the U.S. Departments of Justice and Interior, specific tasks have been funded by the South Florida Water Management District ("SFWMD"), the Florida Department of Environmental Protection ("DEP), U.S. Environmental Protection Agency ("USEPA"), and U.S. Army Corps of Engineers ("Corps"). Most of the documents that I have prepared for the federal agencies are posted at my web site (http://www.wwwalker.net/doi/index.htm). I have had major or supporting roles in the following areas:

- Development of testimony to support the federal position in the instant action, United States v. South Florida Water Management District, No. 88-1886 (S. D. Fla.), specifically documenting increasing trends in phosphorus concentration at Everglades National Park ("ENP") inflow structures between 1978 and 1991;
- Participation in technical negotiations leading to the 1992 Consent Decree;
- Development of statistical models underlying Consent Decree compliance tests, including Refuge Marsh Phosphorus Levels and ENP Inflow Limits (Levels and Limits);
- Data analysis and modeling to support implementation of the Consent Decree, as an advisor to federal TOC representatives;
- Participation in technical mediation leading to the 1994 Conceptual Plan to achieve an interim goal of phosphorus concentration levels not exceeding 50

parts-per-billion ("ppb") at inflow points to the Everglades Protection Area and subsequently to the 1995 motions by the United States, the SFWMD, and FDEP ("settling parties") to modify the Consent Decree (granted by the Court in 2001);

- Development of a model for sizing stormwater treatment areas ("STAs") to achieve discharge concentrations that do not exceed 50 ppb;

- Development of a model (DMSTA) used by the state parties to optimize STAs for achieving compliance with the 10 ppb phosphorus criterion under the SFWMD's Long-Term Plan;

- Development of software to assist the state parties in tracking compliance with the Consent Decree;

- Development of compliance tests and software used by the DEP to determine STA compliance with DEP permits containing 50 ppb discharge limits and for tracking the performance of Best Management Practices ("BMPs") in agricultural areas ((Everglades Agricultural Area ("EAA") and C139) that discharge run-off into the Everglades Protection Area, including the Refuge and the Park;

- Participation on a technical panel convened by DEP to establish a phosphorus concentration goal for control of nuisance algal blooms in Lake Okeechobee and to estimate the maximum phosphorus load consistent with achieving that goal;

- Evaluation of Comprehensive Everglades Restoration Plan ("CERP") alternatives being considered by the U.S. Army Corps of Engineers as of 1998, with respect to their impacts on STA performance and phosphorus loads to the Everglades;

- Estimation of flow and nutrient loads discharged into Florida Bay to support water quality modeling by the Corps of Engineers;

- Participation in various technical workgroups focusing on STA design, the State of Florida's numerical interpretation of the Class III phosphorus standard, and development/implementation of the State's Long-Term Plan.

- Technical support to federal representatives of the Everglades Technical Oversight Committee.

- Review of Long-Term Restoration Alternatives under the River of Grass Initiative.

- Expert Testimony for the U.S. Department of Justice and U.S. Department of the Interior - March 2006 Hearings for Special Master on Exceedances of the Interim

Levels of Appendix B (Consent Decree) in the Refuge

- Expert Testimony for U.S. Department of Justice and U.S. Bureau of Indian Affairs, Oregon Office of Administrative Hearings, Klamath Basin Adjudication, Case 286, Claims 616 and 622 (Upper Klamath Lake elevation), Direct Testimony Ex. 286-US-500, September 2010.

- Technical support to the U.S. Environmental Protection Agency in developing water-quality based effluent limits for STA discharges (EPA AD, Attachment G) and evaluating regional phosphorus control alternatives for achieving those limits (USEPA AD, Attachment H).

My testimony in this Report focuses on issues related to compliance with the Consent Decree requirements for restoration and protection of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge). A list of articles and studies that I have authored and co-authored appears in Attachment A.

I. Opinion Concerning What The Maximum Annual Discharge Limit Should Be To Achieve A Long-Term Geometric Mean of 10 ppb Total Phosphorus Throughout The Refuge

1. It is my client's (United States') legal position that the State is currently subject to a maximum annual discharge limit under the Consent Decree that will achieve compliance with the State's Class III numeric criterion throughout the Refuge, including areas immediately downstream of STA discharges, and not cause or contribute to imbalances of native flora or fauna anywhere in the Refuge. The U.S. EPA has recently derived a two-part water quality based effluent limitation (WQBEL) for phosphorus in discharges into the Everglades Protection Area, including the Refuge, that will neither exceed the State's Class III numeric criterion, nor cause or contribute to imbalances of native flora or fauna. If the United States' legal interpretation of the Consent Decree is correct, then the maximum annual discharge limit should be no less stringent than (no higher than) the WQBEL that EPA derived in its September 3, 2010 Amended Determination (EPA AD).

2. Portions of the exterior marsh of the Refuge are located immediately adjacent to the

outflow pumps from the Refuge STAs (STA-1 West (STA-1W) and STA-1 East (STA-1E)). The remainder of the exterior marsh of the Refuge is linked to the STA discharges through the rim canal, which is strongly dominated by those discharges, especially during periods of high runoff and increasing stage, when intrusion of STA discharges into the marsh is most likely (Walker & Kadlec, 2003, U.S. Exhibit 1262). Given the direct contact of the exterior marsh of the Refuge with the STA discharges and Refuge rim canal, discharges from the Refuge STAs would have to meet a maximum annual discharge limit that is no less protective than the EPA WQBEL in order to guarantee that the entire Refuge marsh meets the Class III criterion.

3. I received financial support from the USEPA to assist in the statistical derivation of the WQBEL. My technical input is reflected in the Attachment G to the Amended Determination Sept 2010, Technical Support Document [U.S. Exhibit 1220]. I collaborated with Daniel Scheidt of EPA in that effort. The derivation of the 18 ppb annual limit of the two-part WQBEL was based primarily upon the statistical framework that I had previously developed for deriving a discharge limit for the 50-ppb STAs (Walker, 1996, U.S. Exhibit 1272). The FDEP adopted essentially the same framework to update the 50-ppb discharge permit limit (Nearhoof et al, 2005, U.S. Exhibit 1234) and to derive WQBELs that were periodically updated to reflect the additional data available (FDEP, 2005 [U.S. Exhibit 1231]; 2008; 2010 [U.S. Exhibit 1232]). FDEP's most recent work (2010) derived a maximum annual flow-weighted mean WQBEL of 18 ppb. That result is identical to the annual limit that I derived in my analysis for the EPA AD using one additional year of data from Water Year 2010. The technical details on my derivation of the 18 ppb limit are described in the EPA AD Attachment G.

4. While each of the previous derivations of discharge limits differed with respect to the calibration datasets and scaling algorithms to express the design objective (e.g. long-term flow-weighted mean or long-term geometric mean), each derived the annual limit by fitting a log-normal frequency distribution to the calibration data and setting the discharge limit at the upper 90^{th} percentile of that distribution. Statistical models are needed in deriving discharge limits in order to account for the expected random year-to-year variations in discharge concentrations

around the performance requirements typically expressed as "long-term" (multi-year) values. Engineering models used for designing the STAs (Walker, 1995, U.S. Exhibit 1260; Walker & Kadlec, 2005, U.S. Exhibit 1261) are more accurate when predicting the long-term-average performance, as compared with the weekly, monthly, or annual performance.

5. I agree with USEPA's requirement that phosphorus concentrations in the STA discharges must be at or below the Long-term Geometric Mean (LTGM) Class III Criterion of 10 ppb in order to achieve compliance with the Class III criterion throughout the Everglades Protection Area. Otherwise, marsh areas adjacent to the discharges would be degraded and function as de facto wetland treatment areas; these degraded marsh areas would finish the phosphorus removal job that would otherwise be accomplished by basin source controls and Stormwater Treatment Areas (STAs), if they were sufficiently designed and operated. The rationale is expressed in the USEPA AD Attachment G, as well as in FDEP (2010) WQBEL derivation, cited as follows:

1) *The WQBEL will be applied at each discharge structure. In the case of multiple discharge structures for a Stormwater Treatment Area (STA), the WQBEL will be applied to the flow-weighted mean (FWM) TP concentration across all discharge points and pump stations (including any diversions that cannot be attributed to low flow water supply deliveries or rainfall in the source basins tributary to the STAs which exceeds the maximum annual rainfall that occurred during the period of record used for deriving the WQBEL). By deriving a WQBEL applicable to the discharge points, the complexities associated with monitoring compliance in areas of the marsh not represented by the existing TP criterion assessment monitoring network are avoided and assurances are provided that all portions of the marsh are adequately protected. Application of the WQBEL proposed herein to the discharges to the EPA will not alter the monitoring required by the TP criterion rule (62 -302.540, F.A.C.) in any manner.*

2) *Since the WQBEL is applicable to the point of discharge, changes in concentration between the discharge point and the location where the discharge enters the marsh are ignored for the purpose of this derivation. In most cases, the discharge through a canal for some distance before actually entering the EPA marsh. While in the canal, the discharge may be mixed with other water and be subject to other biogeochemical processes, which may result in increases (e.g., sediment reflux) or decreases (e.g., assimilation or adsorption) in TP concentration in the water actually entering the marsh. The changes in TP concentrations resulting from these processes are likely highly site-specific and would be difficult to evaluate.*

3) For consistency with the National Pollutant Discharge Elimination System (NPDES) permits, the WQBEL derived herein is expressed as a maximum annual FWM TP concentration that is equivalent to the phosphorus criterion, which is expressed as a long-term geometric mean concentration of 10 ppb.

4) The derivation of the WQBEL is independent of antecedent phosphorus conditions in the downstream marsh receiving waters, i.e., there is no distinction between discharges to previously impacted portions of the marsh and discharges to unimpacted portions of the marsh for the purposes of this derivation.

In order to measure compliance of the STA discharges with the Class III criterion, allowances must be made for differences in measurement metric (flow-weighted vs. geometric) and the expected year-to-year variability in the discharge concentrations

A. Previous Derivations of the STA Annual Discharge Limits

6. The design basis and performance requirement for initial the Everglades Construction Project (ECP, Burns & Mc Donnell, 1994, U.S. Exhibit 1268) STAs, i.e., the six STAs required to be constructed by the Consent Decree, was a long-term, flow-weighted mean (LTFWM) discharge concentration of 50 ppb. After calibrating and applying a statistical model that allows for random year-to-year variability in the discharge concentrations, that long-term requirement was translated into an annual discharge limit of 76 ppb (Walker, 1996) and later re-calibrated to 68 ppb (Nearhoof et al, 2005). The decrease in the limit reflected enhancements to the calibration datasets. Because data from operating STAs were not available, the 1996 derivation (76 ppb) was calibrated to historical data from the EAA pump stations discharging into the Water Conservation Areas; it was assumed that year-to-year in the STA outflow concentrations, (expressed in percentage terms) would be similar to the year-to-year variability in the WCA inflow concentrations. When Nearhoof et al (2005) updated the calculations using actual STA outflow concentration data for calibration, the limit dropped from 76 ppb to 68 ppb. This decrease reflected the fact that there was less variability in the STA discharge concentrations, as compared with the historical EAA pump station discharges.

7. The LTFWM is essentially the multi-year average discharge load divided by the average discharge volume, or, viewed conceptually, the concentration that you would measure in a giant bucket after it collected all of the STA discharge for a long period, say 5 years as an example. It would not be practical or protective to wait for 5 years to measure compliance. In order to measure compliance, it is necessary to use smaller buckets and shorter time intervals to collect the samples. One year is convenient because it captures the expected seasonal variability and permit reporting requirements. We have to use even smaller buckets to measure the yearly FWM; i.e., small jugs collected analyzed on a weekly basis and then combined numerically at the end of the year. That computation essentially involves adding up the mass of phosphorus in the sample jugs and dividing by the total sample volume. Once the yearly FWM is measured, it can be compared with the yearly limit to determine compliance.

8. Statistics are needed to account for the expected year-to-year variability in the FWM around the LTFWM in determining compliance. The statistical model established in the first discharge-limit derivation (Walker, 1996) essentially involves fitting a frequency distribution to historical discharge data from the operating STAs. That distribution (log-normal in this case, skewed to the right) characterizes the year-to-year variability in the FWM expressed approximately as a percentage of the LTWFM value. The annual limit in each of the discharge limit derivations has been set at the upper 90^{th} percentile of the frequency distribution. That means that we would expected the FWM to exceed the discharge limit in about 10% of the years, assuming that the STA is performing exactly as expected (providing a LTFGM of 10 ppb) and that the estimate of statistical variability (calibration of the frequency distribution using historical data) is accurate. The 90^{th} percentile has been used to set the annual limit in existing STA discharge permits, and has also been used for other compliance tests implemented under the Consent Decree (Appendix A ENP inflow limits, Appendix B Refuge marsh interim and long-term concentration levels) and in the Regulatory Rule adopted by the SFWMD to assess compliance in the EAA and C139 basin with respect to BMP performance requirements (SFWMD, 2010c, U.S. Exhibit 1264).

B. Derivations of the WQBEL Annual Discharge Limit

9. Whereas the previous discharge limits were designed to measure compliance with the initial 50 ppb LTFWM performance requirement, the USEPA WQBEL is the discharge limit that will result in attainment of the Class III numeric criterion, which is expressed as long-term geometric mean (LTGM) of 10 ppb. For purposes of measuring achievement of the Everglades Class III P criterion, the LTGM has been defined by the FDEP as the 5-year arithmetic average of the yearly geometric mean concentrations (GM). That definition is embedded in the derivation of the 10 ppb Class III Criterion and in 4-Part Test used for determining compliance at marsh sites (SFWMD, 2010d, U.S. Exhibit 1203]. In this case, "long-term" is precisely defined as five years.

10. There is no need for a giant (multi-year) bucket or even large jugs (weekly) to measure the yearly geometric mean (GM) concentration in the STA discharge. As described in USEPA AD Attachment G, we can collect samples in laboratory bottles on a routine basis (weekly when discharges are occurring) from each outflow structure and analyze each separately. At end of the year, we compute the geometric mean of all of the samples collected in the STA discharge, which would reflect the various sampling events and STA outlet structures. A simple way to estimate the geometric mean is to take the 50^{th} percentile (median) of the individual measurements. We expect the median and geometric mean to be similar as a consequence of the underlying log-normal distribution that is typically seen in this type of data. So, in basic terms, the discharge GM is the concentration that would be exceeded about 50% of the time when flow is being discharged from the STA. That is taken to represent the concentration of phosphorus entering the marsh immediately adjacent to the discharge.

11. Derivation of the 18 ppb FWM WQBEL annual limit involves an additional step because the long-term requirement is expressed as a geometric mean (LTGM = 10 ppb) instead of a flow-weighted mean (LTFWM = 50 ppb). Based upon paired yearly FWM and GM annual discharge concentrations in the WQBEL derivation dataset (USEPA, AD, Attachment G, Appendix 1), the

yearly FWMs average about 20% higher than GMs for a given STA. Similar results were found by FDEP (2010) and in my previous WQBEL analysis (Walker, 2005). As described in Mr Scheidt's testimony (U.S. Exhibit 1215 at 20), when we account for the differences in the flow-weighted vs. geometric mean, the annual FWM limit (18 ppb) is similar to the 15 ppb geometric mean limit for single marsh stations under the FDEP's 4-Part Test.

12. As discussed above, the annual discharge limits for ECP STAs ranged from 68 to 76 ppb, or 36% to 52 % above the long-term performance requirement of 50 ppb. The WQBEL yearly limit derived by the USEPA AD (2010) and by FDEP (2010) is 18 ppb, or approximately 50% above the LTFWM objective of 12 ppb, which is, in turn, equivalent to a LTGM of 10 ppb. The allowance for year-to-year variability in the WQBEL (50%) is similar to that reflected the previous STA discharge permits.

C. The Use Of A Two-Part WQBEL To Determine Compliance With The Class III Numeric Criterion

13. Aside from the distinction between the flow-weighted and geometric means and the differences in the numeric values, there is another difference between the EPA WQBEL and the 50-ppb STA discharge permit limits. The initial compliance test for the STAs had only one part, the annual FWM limit that has ranged from 68 to 76 ppb, as described above. The WQBEL compliance test has two parts: maximum annual FWM limit of 18 ppb and additional provision requiring that the yearly geometric mean in the discharge not exceed 10 ppb in more than 2 consecutive years. The USEPA refers to these provisions as "Part 2" and "Part 1", respectively. Each provision must be met in order to achieve compliance with the WQBEL.

14. It is my understanding that EPA included a second part in the two-part Class III WQBEL to provide a clear and direct translation of the 10 ppb geometric mean marsh criterion to the STA discharge, while allowing for the expected year-to-year variability in the GM concentration. In addition, as described in Mr. Scheidt's testimony and in the EPA AD Attachment G, the calibration of the annual limit (Part 1 of the WQBEL) to the historical discharge data may be

questionable, given that the STAs in the calibration dataset were operating in much higher concentration ranges than will be needed to meet the WQBEL. I also agree with the concern expressed by Tribal representatives at the April 2010 TOC meeting that applying a yearly discharge limit alone would not guarantee achievement of the Class III criterion in the discharge or downstream marsh. Discharge concentrations from STAs designed to achieve the Class III criterion may have considerably less variability, as compared with discharges from the existing STAs operating in higher concentration ranges and used in the statistical derivation of the yearly limits. The uncertainty in the variability estimates is borne out by the wide range of values across the individual STAs and marsh sites (EPA AD, Att G, Fig 6,). As discussed above, the discharge limit for the ECP STAs decreased from 76 (Walker, 1996) to 68 ppb (Nearhoof et al, 2005) as additional data more representative of STA discharges were included in the calibration.

15. If future discharge concentrations (from STAs designed to achieve the Class III criterion) were less variable than projected based upon the calibration to the historical discharge data, STA discharge FWMs could be consistently below the 18 ppb limit and not achieve the LTGM criterion of 10 ppb. This pattern of the monitoring data below the compliance limit but above the long-term target (objective) has been consistently observed in tracking compliance with Refuge marsh TP levels (Walker & Kadlec, 2003) and ENP inflow P limits (Walker, 2009, U.S. Exhibit 1263) established under the Consent Decree. The WQBEL requirement that discharges not exceed 10 ppb (GM) in more than two consecutive years guards against that problem and is insensitive to the assumed variability in the discharge. The simulations that I performed to evaluate that WQBEL test confirmed that including the maximum 2-year test (USEPA Part 1) significantly improved the power of the test (probability of detecting a violation when the discharge is above the Class III criterion, LGGM = 10 ppb), especially if there is less year-to-year variability in the future STA discharge FWMs. as compared with the WQBEL calibration dataset. (EPA AD, Attachment G, Figure 9)

16. The two-part methodology for deriving the WQBEL is analogous to and consistent with a multi-part compliance test approach adopted by state regulators. The FDEP applies a 4-Part test

to marsh sites in the P Criterion monitoring network. The EPA WQBEL 2-Part test is directly analogous to the 2-Part tests used by SFWMD for measuring compliance of the EAA and C139 basins with load reduction requirements (SFWMD, 2010c), Like the EPA WQBEL, the SFWMD (2010c) 2-Part test for the EAA and C139 basins has a one-year limit based upon the 90th percentile as well as a maximum 2 consecutive year test based upon the target set at the 50th percentile of the expected yearly load if the basins were achieving the required load reductions.

17. The USEPA WQBEL is based on a water year that begins on May 1st and ends on April 30 of the following calendar year. I recognize that the Consent Decree refers to potential imposition of 12-month discharge limits that may not be restricted to the water year (May 1 to April 30) assumed in the EPA Class III WQBEL derivation. While the statistical derivation was based upon data from each independent water year (May-April), the annual discharge limit (18 ppb) could be applied on a 12-month rolling basis if the Consent Decree language were interpreted to justify that more protective provision.

C. Comparisons of Recent STA Discharge Concentrations with the WQBEL.

18. The Miccosukee Tribe, in its October 15, 2009 Motion Seeking a Declaration of Violations argues that the State is in violation of the discharge limit of the Decree, because the FWM of the discharges into the Refuge from STA 1-East, STA 1-West, and bypass structures G-300 and G-301, each exceeded 10 ppb during water years 2008 and 2009. I disagree that the 10 ppb expressed as an annual FWM is the correct maximum annual discharge limit designed to achieve the Class III long-term geometric mean of 10 ppb at inflows to the Refuge. For reasons stated above and reflected in the WQBEL derivation, I do not agree that each inflow must have a FWM discharge concentration less than 10 ppb in each year in order to comply with the Class III criterion, which is defined as a long-term geometric mean of 10 ppb. As described in Mr. Scheidt's expert report (U.S. Exhibit 1215),the historical STA discharges had FWM concentrations that typically exceeded GM concentrations by about 20%. Therefore, a FWM requirement of 10 ppb would be equivalent to a requirement of about 8 ppb when expressed as a

GM, which is lower than the Class III LTGM criterion of 10 ppb, and would not allow for the expected year-to-year variability in the discharge concentrations..

19. I agree with the Tribe that the STAs have not achieved compliance with the maximum annual discharge limit designed to achieve the Class III long-term geometric mean of 10 ppb at inflows to the Refuge. If the Court adopts the EPA WQBEL as the maximum annual discharge limit under the Consent Decree, STA discharge concentrations to the Refuge have consistently exceeded the 18 ppb annual limit in the EPA-AD WQBEL.

20. Historical discharge concentrations for the operational period of each STA provided by SFWMD are listed in Appendix 1 of the EPA AD Attachment G. The annual FWM was above 18 ppb in 45 out of the 54 STA-years listed in that table. The yearly FWM was above 18 ppb in 10 out of 10 years for STA-1W and in 3 out of 3 years for STA-1E. Discharge concentration data for inflows to the Refuge are also reported in the South Florida Environmental Reports for Water Years 2008 and 2009 (SFWMD, 2009b [U.S. Exhibit 1265], 2009c, U.S. Exhibit 1266), 2010a, [U.S. Exhibit 1267]). Those data establish that discharges from STA-1 West, STA-1 East, G-300 and G-301 into the Refuge exceeded Part 2 of the EPA WQBEL (18 ppb) in WYs 2008 and 2009, and thus exceeded the maximum annual limit necessary to achieve a long-term geometric mean of 10 ppb.

II. Opinion Concerning Whether The State Violated The Load Reduction Requirements Of The Consent Decree As of June 2009, As Alleged By Miccosukee Tribe

21. At page 2 of its October 15, 2009 violation motion, the Miccosukee Tribe asserts:

> "The Settlement Agreement entered as a Consent Decree ("SA") entered by this Court required an 85% reduction of phosphorus loads from the Everglades Agricultural Area to the Loxahatchee National Wildlife Refuge ("Loxahatchee") by February 1, 1999, as compared to mean levels measured from 1979 to 1988. Ex. A-3, SA at ¶ 8A. The base period load for Loxahatchee was 105 metric tons.

> Based on an 85% reduction of 105 tons, the maximum annual load that was required to have been met by February 1, 1999 is 15.75 metric tons. Based on the 12 month cumulative phosphorus inflow load, the State has violated the load requirement, with phosphorus loads of 19.8 metric tons by the end of June, 2009."

Assuming that the Consent Decree requires the State to achieve an 85% reduction in phosphorus loads from the EAA to the Refuge by February 1, 1999, and an 80% load reduction from the EAA to the EVPA, I disagree with the Tribe that the State failed to achieve the 85% load reduction requirement for the Refuge, and the 80% load reduction for the EVPA, as of June 2009.

22. Section 8A of the Settlement Agreement requires the following phosphorus load reductions to the Everglades Protection Area (EVPA) and Loxahatchee National Wildlife Refuge (Refuge):

> Phosphorus loads discharged from the EAA will be reduced by approximately 80% to the EVPA by October 1, 2003 and will be reduced by approximately 85% to the Refuge by February 1, 1999, as compared with mean levels measured from 1979 to 1988.

23. The Settlement Agreement remedies (STAs, BMPs) were negotiated and designed based upon an assumed set of flows and phosphorus loads discharged into the Everglades Protection Area (EVPA) and the Refuge from EAA structures and pump stations during a 1979-1988 baseline period. The EAA structures and pump stations included S5A, S6, S7, S150, and S8, which discharged P loads primarily originating in the EAA and Lake Okeechobee, but also containing small proportions of the total P loads from the C51W and C139 basins. Monitoring data indicated that the 1979-1988 average-annual phosphorus load from those sources to the Everglades Protection Area was 205 metric tons per year ("mt/yr") and that the load to the Refuge was 105 mt/yr. Those load estimates, sources, and time frames provide reference points for measuring achievement of the load-reduction requirements of Paragraph 8A of that Agreement.

24. The 80% (EVPA) and 85% (Refuge) load reduction provisions of Paragraph 8A were developed in the context of the sources contemplated by the 1992 Settlement Agreement, i.e.,

that loads from the EAA pump stations and structures S5A, S6, S7, S150, and S8 would be reduced by 80% to the EVPA, and by 85% to the Refuge, relative to those that occurred in 1979-1988. Had there been no modifications of the Decree relative to source flows and loads, the 80% load reduction requirement would have been achieved by delivery of a long-term average load to the EVPA of approximately 41 mt/yr, while the 85% load reduction requirement for the Refuge would have been achieved by delivery of a long-term average load to the Refuge of approximately 15 mt/yr.

25. After the Settlement Agreement was approved in 1992 as a Consent Decree, however, the Settling Parties refined and expanded the remedies in the Consent Decree in what is known as the 1994 Everglades Conceptual Plan (ECP, Burns & McDonnell, 1994). The ECP reflected refinements to the historical flow and load estimates from the EAA structures and augmentation of the remedial projects to treat additional sources of flows and loads delivered to the EVPA and Refuge, as compared with those contemplated in the original 1992 Settlement Agreement.

26. In a document prepared for the TOC (Walker, 2007, U.S. Exhibit 1269), I developed revised target loads to account for the differences sources of flows and loads delivered to the EVPA and Refuge, as between the 1992 SA and 1994 ECP projects. I also developed statistical methodologies for tracking compliance with the long-term 80/85% load reduction requirements using measured yearly loads to the Refuge and EVPA. Under this approach, the loads measured for determining compliance would include all STA outflows, STA bypasses, ACME Basin B discharges into the Refuge, and any other current or future discharges to the EVPA/Refuge from sources considered to be part of the 1994 CP.

27. The net result of the adjustments was to increase the target load for measuring achievement of the Refuge 85% load reduction requirement from 15 mt/yr to 24 mt/yr (Walker, 2007). The 9 mt/yr increase was attributed to addition of ACME basin B discharges (5 mt/yr), refinements to the estimates of historical loads from the S5A and S6 pump stations (1 mt/yr), and

accounting for loads associated with offsetting reductions in runoff expected to result from implementation of BMPs, but not considered in the 1992 SA calculations (3 mt/yr)

28. The net result of the adjustments was also to increase the target load for measuring achievement of the EVPA 80% load reduction requirement from 41 mt/yr to 84 mt/yr (Walker, 2007). The 43 mt/yr increase was attributed to ACME Basin B (5 mt/yr), BMP replacement flows (11 mt/yr), and an overall net increase of 24 mt/yr attributed due to revision of historical load estimates and expansion of the project scope to treat additional loads from the C139 basin and additional flows released from Lake Okeechobee for hydrologic restoration purposes.

29. The Tribe's position appears to be that the State Parties are in violation of the 80% load reduction requirement because cumulative load delivered to the EVPA during the 12-month period ending in June 2009 amounted to 47.4 metric tons (according to the Tribe's calculations), and that load exceeded the 41 mt/yr value that the Tribe asserts to be the 80% target load. For reasons discussed above, I do not agree that 41 mt/yr. is the appropriate benchmark for measuring compliance with the 80% load-reduction requirement. Because the 47.4 metric tons asserted to be the load delivered to the EVPA during that period did not exceed the 84 mt/yr target load developed in my report to TOC (Walker, 2007) the State did not, in my opinion, fail to achieve the 80% load reduction requirement of Paragraph 8A of the Consent Decree.

30. The Tribe alleges that the State Parties are in violation of the 85% load reduction requirement applicable to the Refuge because the cumulative load delivered to the Refuge in the 12-month period ending in June 2009 amounted to 19.8 metric tons (according to the Tribe's calculations), and that exceeded the 15.7 mt/yr asserted by the Tribe to be the 85% target load. For reasons discussed above, I do not agree that 15.7 mt/yr. is the appropriate benchmark for measuring compliance with the 80% load-reduction requirement. Because the 19.8 metric tons asserted to be the load delivered to the Refuge during that period did not exceed the 24.0 mt/yr target load developed in my report to TOC (Walker, 2007), the State did not, in my opinion, fail to achieve the 85% load reduction requirement of Paragraph 8A of the Consent Decree. I have

also confirmed that the observed phosphorus loads to the EVPA and Refuge in WY 2008 and WY 2009 were well below those required for compliance with the load-reduction requirements when allowance is made for year-to-year variability in rainfall, as described in my derivation of the compliance test (Walker, 2007).

III. Opinion Concerning Whether The State Failed To Achieve The Discharge Limit In Appendix A of the Consent Decree For Discharges Into Everglades National Park During Water Year 2008 (October 1, 2007 through September 30, 2008), As Alleged By The Miccosukee Tribe

31. The Tribe's October 15, 2009 Violations Motion states (at pp. 11-12):

> "Appendix A of the Consent Decree sets phosphorus limits that 'apply to flow-weighted-mean concentrations computed on an annual Water Year basis, with data reported and calculated on a monthly basis. Compliance with these limits is expected to provide a long term average flow weighted mean inflow concentration of approximately 8 ppb for the Shark River Slough Basin and 6 ppb for the Taylor Slough and Coastal Basins.' The long-term limit [for Shark River Slough for the time period from 10/1/2007 to 9/30/2008 was 10.2 ppb. Based on the reported SFWMD data, the actual value for that same time period was 10.6 ppb. However, the SFWMD reported the value in its Quarterly Settlement Agreement Report to the TOC as 10.2 ppb, based on a unilateral judgment call that deviated from the stated protocol used to ensure quality assurance and quality control. Because the actual limit was higher than the long term limit established by the Consent Decree, a violation of Appendix A occurred, unless the TOC makes a determination that such an exceedance is based on error or extraordinary natural phenomena.

(Citations omitted.)

32. I agree with the Tribe that the SFWMD deviated from data-reporting protocols in recording the value for WY 2008 in the Settlement Agreement Report as 10.2 ppb, instead of 10.6 ppb. I also agree that SFWMD improperly included data in its computation of the 12-monthly rolling flow-weighted mean TP concentration at the Shark River Slough inflow structures during WY 2008 and that had those data been correctly excluded, the compliance report would have indicated that there was an exceedance of the Appendix A long-term limit in

WY 2008. The Consent Decree specifies long-term TP limits at inflow structures for Everglades National Park (ENP), both for Shark River Slough and for Taylor Slough. For Shark River Slough, those limits are designed to achieve inflow water quality equivalent to or better than that which occurred during a base period of 1978-1979 at the S12 inflow structures, which were not directly affected by canal discharges. Water quality samples are collected biweekly and flow measurements are made continuously at all inflow structures to Shark River Slough.

33. Using these monitoring data, a 12-monthly rolling flow-weighted mean TP concentration is computed for the combined inflows through all structures and is compared with the long-term limit, which varies with the annual total inflow (CD Appendix A). The limit is set at the 90th percentile of data observed in the 1978-1979 period, adjusted for variations in flow. Results are assessed monthly, but compliance with the limit is determined only once per year. At the end of each water year (September 30), the 12-month, flow-weighted TP concentration is compared to the calculated compliance limit. If the flow-weighted mean is equal to or less than the limit for that water year, inflows to Shark River Slough are considered to be in compliance with the long-term limits (Appendix A). A similar assessment is conducted for inflows to Taylor Slough and the Coastal Basins, although the target does not vary with hydrology.

34. For the Water Year 2008 (October 1, 2007 – September 30, 2008), the SFWMD reported that the 12-month, flow-weighted mean (FWM) for Shark River Slough was 10.2 ppb TP. The long-term limit for that period also was also 10.2 ppb – indicating that inflows to Shark River Slough as reported would have "tied" the limit and thus would have been in compliance. However, the SFWMD included data in their calculation of the flow-weighted mean that had initially been rejected using the state's own QA/QC protocols. I prepared a report for TOC on this topic (Walker, 2009, U.S. Exhibit 1270).

35. Specifically, the SFWMD recorded positive blanks for two of the compliance sampling events during that water year. Data from one of those sampling events (September 3, 2008) were used by SFWMD in the compliance calculations. The Florida Department of Environmental

Protection's 2004 QA/QC protocol for measuring compliance with the Class III phosphorus criterion (U.S. Exhibit 1271) specifies that:

> "*Blank Contamination. A blank will be considered contaminated if the laboratory result is greater than the MDL (i.e. the parameter was detected). If any analytical result associated with a contaminated blank is less than 5 times the value of the contaminated blank, all the associated samples for that parameter for that sampling event shall be disqualified*"

36. In preparing the compliance report and before the results were presented to TOC, the SFWMD chose to override that QA/QC protocol and include data from the September 3, 2008 sampling event in the compliance determination. Had the SFWMD adhered to its protocol and disqualified the associated samples, the 12-month, flow-weighted mean would have been above the long-term limit by 0.4 ppb, and that would have constituted an exceedance of the Appendix A ENP inflow limit. The exceedance would have been a violation unless the TOC determined that the exceedance was due to error or extraordinary natural phenomena.

37. The QA/QC protocols are established to minimize unavoidable risk of statistical bias introduced unintentionally by subjective data screening, particularly if specific data points are subject to unusual scrutiny only if they have a relatively large affect on the compliance determination. Screening of data beyond that applied to the historical data from which the compliance test was developed can result in artificial bias in the reported inflow concentrations in one direction or another. This bias would weaken the compliance test; i.e. make it less likely that an exceedance would occur if the actual long-term requirement were not being met (i.e. if the SRS inflow concentration exceeded 1978-1979 levels).

38. The SFWMD attached an appendix to its compliance report explaining the rationale for including the questioned data. While potentially useful for interpreting results and discussion by the full TOC, the reversal of QA/QC protocol and consideration of supplementary data discussed by SFWMD in that appendix should not have affected the initial compliance determination because it was inconsistent with the sampling protocol used in the baseline period used to derive

the limits.

39. Regardless of the merits of the SFWMD's explanations, any data interpretations should have been made only after careful consideration by all TOC members in the context of the "error or extraordinary natural phenomena" clause of the Consent Decree. Instead, the SFWMD made a unilateral decision to deviate from normal reporting procedures, and misreported the annual flow-weighted TP concentration of discharges into the Park during WY 2008.

40. Regardless of the WY 2008 compliance determination, federal TOC representatives have repeatedly expressed their concern that for the past several water years, inflows to Shark River Slough have been at, or very near the limit, which represents the 90th percentile of the values for the 1978-1979 baseline period. If water quality improvement projects underway had been successful at reducing park inflow P concentrations to 1978-1979 levels, one would expect that inflow concentrations would be closer to the 50th percentile than the 90th percentile. In my report (Walker, 2009,) I also recommended that further analyses of data from WCA-3A be conducted in order to develop a better understanding of the factors driving variations in TP concentration at the Park inflow structures, but I am not aware that any follow-up study plans or results have been performed by SFWMD or discussed at TOC meetings.

41. In its October 15, 2009 motion seeking a declaration of violations, the Tribe objected to the SFWMD's results for Shark River Slough for Water Year 2008, and seeks a finding that the state violated the Appendix A long-term limits for Everglades National Park. I believe that the flagged data should have been excluded from the initial compliance determination in order to be consistent with the established QA/QC protocol. That would have triggered TOC review for whether the reported discharges were the result of "error or extraordinary natural phenomena," and absent an official determination by the TOC that the discharge data resulted from error or extraordinary natural phenomena, the discharges into the Park for WY 2008 would have violated the Consent Decree.

IV. Opinion Concerning Whether The Tribe Is Correct That The State Has Not Designed and Implemented Adequate Control Programs for Watersheds Outside the EAA, including the L3, S140, and L28I

42. At page 2 of its October 15, 2009 Violations Motion, the Miccosukee Tribe states that the State has violated a "Western Basins requirements" of the Consent Decree. At page 13 of that motion, the Tribe states that

> Appendix C of the Settlement Agreement requires: "The District will also design and implement control programs for other watersheds outside of the EAA discharging into the EPA, including the L3, S140, L28I." The phosphorus levels being discharged through these structures from the western basins are well above 10 ppb. Discharges from the S190 water control structures, which discharges into the L28 Interceptor canal (L28I) shows all discharges were above 10 ppb phosphorus concentrations. *Id.* Flow weighted samples were as high as 368 ppb and 71% of the samples collected had phosphorus concentrations greater than 50 ppb.

In my opinion, the Tribe is correct that the State has not designed and implemented an adequate control program for the non-EAA Western Basins that discharges into the EVPA, although attempts to do so have been recently initiated subsequent to the Tribe's motion.

43. Appendix C of the Consent Decree calls for the District to "design and implement control programs for other watersheds outside of the EAA discharging into the EPA, including L3, S140, L28I." CD at Appendix C at C-7. Appendix C of the Decree also states: "the control program described below and in Appendix E is anticipated to meet interim and long term concentration levels and limits for Everglades National Park (Park) and Loxahatchee National Wildlife Refuge (Refuge)." CD at Appx C at C-1. Appendix C goes on to provide:

> "The research program will provide additional data to support the interpretation of Class III water quality criteria for the Refuge, Park, and the WCAs. Modification of the control program to achieve Class III criteria will reflect new information obtained in the research program and observed performance of the BMPs and STAs in the interim phase of the control program."

CD Appendix C at C-8.

44. The L3, S140, and L28I canals and pump stations are components of the Non-Everglades Construction Project (Non-ECP) L-28 Basin and the Everglades Construction Project (ECP) C-139 Basin. Discharges from these basins are outside the EAA, yet contribute P loads to WCA-3A, which, in turn, are likely to impact the phosphorus concentrations in outflows from WCA-3A, which discharge into Everglades National Park. Based upon Water Year 2009 data reported in the 2010 SFER, runoff from these basins had annual FWM TP concentrations of 40 ppb at the S140 pump station (L28 basin), 137 ppb at S190 pump station (Feeder Canal), 254 ppb at the inflow to STA-5 (C139 Basin), and 264 ppb at the inflow to STA-6 (C139, C139 Annex, & EAA basins.

45. As a result of these elevated runoff TP concentrations and flows, the STA inflow TP loads have frequently exceeded their design capacities and outflows from STAs 5 and 6, which discharge primarily into WCA-3A, had FWM concentrations of 56 ppb and 93 ppb, respectively. The above yearly discharge concentrations reported for 2009 were generally within the ranges reported in previous years and well above the 18 ppb limit, which the USEPA (AD, Att G) has developed as a yearly FWM limit (WQBEL) to guarantee compliance with the Class III criterion. The Tribe presents more than two years of TP concentration measurements taken at the S190 pump station, which discharges into the L-28I canal. These data show that all samples were greater than 10 ppb and that more than 70% of the samples greater than 50 ppb. The yearly FWM concentration at S190 (137 ppb, SFWMD, 2010b) is a more valid statistic for measuring compliance with the Class III criterion and clearly exceeds the annual maximum limit (18 ppb) required to achieve that compliance, as reflected in the USEPA's WQBEL

46. The 2010 SFER presents a list of phosphorus source control activities planned and underway in the L-28 Basin (SFWMD, 2010c). The 2010 SFER also describes the State's intent to divert the C-139 Annex component of the L-28 Basin into STA-6 during WY2010. One major benefit of nutrient control programs is to reduce the inflow phosphorus concentration entering stormwater treatment areas (STAs) and thereby reduce P loads to WCA-3A.

47. The C-139 Basin has had a limited BMP program in place for the past ten years, but the existing regulatory rule does not require strict enforcement of BMPs until the total loads from the basin exceed the 1979-1988 baseline period values, adjusted for variations in yearly rainfall. The 2010 SFER (SFWMD, 2010c) reports that the C-139 Basin has been out of compliance with the existing rule since water year (WY) 2003, except for 2008. These results have triggered actions to reduce loads and increase the probability of compliance.

48. Failure to comply in WY2006 triggered a rule-making process to develop and implement a comprehensive BMP plan, similar to that implemented in the EAA. More than four years after initiating this process, the State has indicated that it will finalize the new C-139 BMP rule in WY2011 (May 2010 – April 2011). The United States provided technical input into the C-139 Basin rule development, and understands that there are aspects of the draft revised C-139 rule that provide greater protection to downstream receiving bodies relative to the existing rule, as well as significantly increase monitoring requirements. Preliminary data indicate that the C139 runoff loads were in compliance in WY 2010 (draft SFER, 2011), but considerably more data will be required to determine whether this favorable result reflects a long-term improvement or a statistical fluctuation.

49. In WY 2009, the State initiated "preliminary activities necessary for implementation of a BMP regulatory program for the Feeder Canal Basin" (SFWMD, 2010c). In the 2010 SFER, the State acknowledged that the activities in the Water Quality Improvement Plan (WQIP) for the Feeder Canal Basin, including the use of voluntary BMPs, had not been sufficient to meet 50 ppb, much less the 18 ppb annual FWM limit required for compliance with Class III numeric criterion. While additional steps have been taken by SFWMD to reduce phosphorus loads from the C139 basin since the time the Tribe's motion was filed, the control program established for the Western Basins was inadequate to achieve the Class III criterion, as set forth at pages C-7 and C-8 of Appendix C of the Consent Decree.

Pursuant to 28 U.S.C. § 1746, I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct to the best of my knowledge, information, and belief.

Executed this 6th day of October 2010

William W. Walker, Jr., Ph.D.

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