

## **Issue Paper: Analysis of the October 2007 Excursion Of The Long-Term Phosphorus Levels for the Refuge**

- Purpose: to address questions raised at the December 2007 TOC meeting regarding the cause of the excursion and whether it indicates a need for the Parties to alter their agreed upon course of remedies presently being implemented.
- October 2007: geometric mean TP concentration was 8.4 ppb, which exceeded the long-term level of 7.2 ppb.
- External TP loading was not a factor in the excursion: 10.2 metric tons in previous 12 months (90% reduction from 1979-1988 Base Period).
- TP in the Refuge is better than the adjusted geometric mean TP concentration of the “Clean 3” sites during baseline.
- While the excursion is within the expected Type I error rate of 10% and could be explained as a false positive, further examination suggests that the excursion stems from failure of multiple assumptions underlying the Appendix B compliance methodology:
  1. Large scale reductions of phosphorus inflows would prevent exceedances;
  2. Using surface water elevation (stage) in the compliance equation accurately reflects the relationship between marsh water depth and phosphorus concentrations;
  3. The “Clean 3” sites are the three least impacted stations in the Refuge;
  4. The strong inverse relationship between stage and phosphorus forming the basis for the compliance equation was real and would remain constant; and
  5. A model built to predict month-to-month changes in phosphorus levels could be based on a data set without month-to-month data.
- Under these circumstances, neither the October 2007 excursion -- nor any similar future excursions -- provide grounds to alter the Parties’ current suite of remedies.