

Total Phosphorus: Significant or Not?

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Phosphorus can be present in water samples in at least three forms: orthophosphate, acid-hydrolysable phosphate and organic phosphorus. Organic phosphorus is changed to inorganic by bacterial action. Orthophosphate can be measured directly and the other two forms must be converted to orthophosphate prior to testing. Total phosphorus measurements in precipitation samples from the National Atmospheric Deposition Network (NADP) were determined by flow injection analysis from samples received in February 2011 to present. Precipitation samples for this study were collected from the Atmospheric Integrated Monitoring Network (AIRMoN). These samples are collected within a 24 hour precipitation event, are immediately refrigerated, and remain chilled during shipment to the NADP Central Analytical Laboratory (CAL) in Champaign, IL.

These samples were tested by the CAL for Orthophosphate and Total Phosphorus within one week of arrival at the CAL. A second set of samples were collected at Bondville, IL (IL11) site as a special study from February 2011 till October 2011. These samples were collected side by side with the AIRMoN sample at this site but the sample was collected directly into a refrigerated compartment and never allowed to come to seasonal temperature. Only total phosphorus was analyzed on the special study samples. Filtered vs. unfiltered samples were also measured to identify any differences.

A second set of precipitation samples were also analyzed for total phosphorus. These samples were collected and kept frozen by The Canadian Air and Precipitation Monitoring Network (CAPMoN), in Toronto, Canada. The samples were shipped to the CAL in coolers and analyzed for total phosphorus and orthophosphate.

The total phosphorus method detection limit was determined to be 0.005 mg/L. Total conversion to orthophosphate was determined by using two quality control standards every six samples during analysis. The recovery for a 0.025 mg/L trimethyl phosphate (TMP) was found to be 96% and a 0.050 mg/L sodium tripolyphosphate (3P) was found to be 100%. Seasonal data from this study will be presented as well as site specific total phosphorus vs. orthophosphate concentrations throughout the year.