

PROJECT SUMMARY

Instructions:

The summary is limited to 250 words. The names and affiliated organizations of all Project Directors/Principal Investigators (PD/PI) should be listed in addition to the title of the project. The summary should be a self-contained, specific description of the activity to be undertaken and should focus on: overall project goal(s) and supporting objectives; plans to accomplish project goal(s); and relevance of the project to the goals of the program. The importance of a concise, informative Project Summary cannot be overemphasized.

Title: Sources And Transport Of Phosphorus In Tile Drained Agricultural Watersheds Using Advanced Chemical Analysis

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Phosphorus loss from agricultural fields in the Midwestern US occurs through surface runoff and tile drainage. Illinois has just developed a Nutrient Loss Reduction Strategy, which develops a plan for reducing P loads by 45%. Many management practices are proposed to reduce P losses, but there is great uncertainty about sources, transport, and forms. Our objectives are to: 1) develop a rapid and simple method for determining which fields have large P losses through tile lines; 2) identify the forms of colloidal P (CP) and particulate P (PP) in tile and river water; 3) understand how soil P pools in fields control the dissolved reactive P (DRP), CP, and PP losses; and 4) assess the contribution of various P sources, including tiles, surface runoff, and riverine sources to overall watershed export of P. We will apply cutting edge chemical techniques including zetasizer (surface charge properties), dynamic light scattering (particle size distribution), high-resolution transmission electron microscopy (morphology, structure, and elemental distribution with P), synchrotron based XRD (characterization of amorphous or crystalline materials), and microfocused X-ray microprobe spectroscopy (solid state P speciation) to better understand and determine sources and transport. In addition to ISCO and grab sampling of tile and river water, we will install a continuous DRP sensor in the watershed outlet. Samples will be primarily collected in the Embarras River watershed of Illinois. This knowledge will allow for better targeting and application of management practices, helping us reduce P losses by the large amounts needed in nutrient loss reduction strategies.

Program Area Priority A1401: Nitrogen and Phosphorus Cycling