NEW THREE-YEAR PROJECT TO ADVANCE THE USE OF FGD GYPSUM TO IMPROVE WATER QUALITY

By Ken Ladwig, Senior Program Manager, Electric Power Research Institute

Sediment-laden water runoff from agricultural fields is a major source of nutrient loading in many impaired waterways in the United States. Excess nutrients lead to harmful algal blooms that damage aquatic resources and degrade water supplies. The dead zone in the Gulf of Mexico, disruption to recreation and fisheries in Western Lake Erie, and decline of native oysters in Chesapeake Bay are illustrations of the damage caused by these excess nutrients.

Development of effective and economical practices to restore soil conditions is necessary to prevent the continuing loss of nutrients in runoff and the key to mitigating non-point source pollution in agricultural landscapes and improving water quality.

The value of using flue gas desulfurization (FGD) gypsum in agriculture to improve crop yields and overall soil quality is well demonstrated (see accompanying articles). More recently, FGD gypsum has been shown to play an important role in controlling total phosphorus and soluble reactive phosphorous, which are major contributors to the nutrient problem in waterways. The United States Department of Agriculture-Agricultural Research Service (USDA-ARS) and others have been evaluating the use of FGD gypsum for phosphorous control in the Southeast, upper Midwest, and Chesapeake Bay for about the last five years. It is estimated that phosphorous reductions of 40 – 70 percent can be achieved using FGD gypsum*.

The Electric Power Research Institute (EPRI) initiated a three-year project in 2012 designed to take this application from research to practice in partnership with leading research scientists, agronomists, industry participants, and outreach professionals. The project will consist of three major components:

- Demonstrate at a field scale the practical application of FGD gypsum to reduce the potential for release of phosphorous and other nutrients from agricultural soils at several sites;
- Use the field demonstration results as a basis for developing best management practices (BMPs) that are incorporated into USDA-Natural Resources Conservation Service (NRCS) Practice Standards.
- Perform extensive education and outreach activities to extend the practice to the agricultural community.

Field demonstrations will be performed over a minimum of two years using the following methods: 1) selecting operating fields with high soil phosphorous levels, 2) applying FGD gypsum to portions of these fields, 3) collecting soil and water samples from the gypsum treated and untreated areas of the fields, 4) measuring soil characteristics that influence nutrient export, and 5) measuring nutrient export in water. The main objective of this part of the project is to transition previous research at the laboratory and field plots stage to larger-scale field application.

Areas currently targeted for field demonstrations are the Maumee River and Grand Lake St. Marys watersheds in northwestern Ohio, and the Lower Fox River watershed in east-central Wisconsin. These watersheds discharge to Lake Erie, the Wabash River (Mississippi River watershed), and Lake Michigan, respectively, and have been cited as areas with severe water quality problems related to non-point agricultural runoff. The Maumee River and Grand Lake St. Marys field demonstrations will be led by The Ohio State University, and the Lower Fox River field demonstration will be led by the University of Wisconsin. The GYPSOIL Division of Beneficial Reuse Management will provide the FGD gypsum and ground support with field applications and monitoring. The demonstrations will require collaboration with local growers and agricultural consultants.

Using the findings from the field demonstrations, we will work with state officials and the USDA-NRCS to develop the use of FGD gypsum application as a BMP for phosphorous control in Ohio and Wisconsin. We will also engage other states in

the region, to begin development of BMPs and initiate additional field demonstrations. In addition to setting standards for use, BMPs for nutrient control have implications for water quality trading that will be qualitatively explored in this project. We hope to begin the process whereby farmers can benefit from using FGD gypsum BMPs, not only through improved crop productivity, but also by selling nutrient credits within nutrient markets that are under development in these watershed communities.

Education and outreach are major components of this project, and are critical to its successful execution. Greenleaf Advisors will lead extensive education and outreach activities, which will include workshops, meetings, and communication briefs in Ohio and Wisconsin, as well as surrounding states. We will engage with watershed leadership, crop producers and consultants, state officials, NRCS staff, and conservation groups to communicate project findings and to transfer knowledge for improving land management practices and water quality in the region.

Successful use of FGD gypsum for controlling phosphorous in runoff from agricultural fields provides benefits on many different levels. The public benefits include improved water quality and associated recreation and resource utilization. Crop producers stand to realize benefits such as reduced fertilizer requirements, improved soil conditions, improved crop yields, and higher profits. And for power companies, every ton of FGD gypsum used is one less ton going to a landfill.

The project is currently funded by EPRI, power companies, and the ACAA Educational Foundation. Proposals have been submitted for a USDA Conservation Innovation Grant and Great Lakes Restoration Initiative Grant. The project has also received a broad level of support from regional conservation organizations, including The Nature Conservancy, Ducks Unlimited, and the Ohio Environmental Council.

FGD gypsum is a vastly underused resource. In 2010, U.S. utilities produced 22 million tons of FGD gypsum, and only about one-half was used, primarily in wallboard production. Significant quantities of FGD gypsum are currently produced in the Midwest agricultural belt. While use of FGD gypsum in agriculture has been proven through previous research, adoption of the practice has generally been slow, although it has been increasing in recent years. The development of agricultural BMPs, along with the extensive education and outreach proposed here, are necessary to encourage broader adoption. ❖

*Brauer et al., 2005; Bryant et al., 2011; Favaretto et al., 2006; Norton, 2008; Watts et al., 2010

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