

LOCAL UTILITY AND INDUSTRIES PARTNER TO ACHIEVE PHOSPHORUS REDUCTION

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Abstract. The cooperative efforts of the Pollution Prevention Assistance Division (P²AD), Dalton Utilities and Dalton businesses resulted in a 50% reduction in wastewater phosphorus levels, the avoidance of an estimated \$30 million capital investment, and in the extension of the service life of Dalton Utilities' land application system. In 2002, Dalton Utilities noted an increase of more than 100% in the phosphorus levels of its incoming wastewater. The utility discovered that additional treatment needed to lower phosphorus levels would require extensive capital investment and increased operating expenses.

Instead of making costly upgrades or imposing strict limits, Dalton Utilities identified the facilities generating the highest levels of phosphorus and turned to P²AD for assistance. P²AD facilitated a meeting between these facilities and the utility. Initial trials carried out by participating facilities indicate that chemical substitution will dramatically reduce the levels of phosphorus, without significantly increasing production costs.

INTRODUCTION

Cooperation is not a word that often comes up when discussing the relationship between a local wastewater utility and its regulated industries. Generally, when a utility has an issue with a particular pollutant, the solution is to either install additional equipment or to impose strict limits on the industrial community. However, when Dalton Utilities was recently faced with rising levels of phosphorus in its industrial wastewater, the utility decided to take a different route. The result of this change in approach was a win-win situation for both the utility and the Dalton-area businesses.

Dalton Utilities is located in the City of Dalton in northwest Georgia. The utility provides services for electricity, water, wastewater, natural gas, and telecommunications to both residential and business customers throughout the Dalton area. To meet its wastewater treatment needs, Dalton Utilities operates four separate wastewater treatment facilities. Two of the facilities process primarily residential wastewater. Most

of the incoming wastewater for the other two sites comes from industrial sources. The Dalton area is well known for carpet production and the vast majority of the industrial sources for the utility are carpet-manufacturing facilities.

The utility discharges wastewater to a 9,200-acre land application system (LAS). The utility built the LAS in 1986 and expanded the system in 1997. Shortly after the LAS expansion, Dalton Utilities estimated the lifespan of the LAS to be approximately 20 years. At the time of this estimation, the concentration of phosphorus entering the wastewater treatment system was 10-12 parts per million (PPM). By 2002, the phosphorus levels had reached 20-25 PPM. Because a land application system can only take in a limited amount of phosphorus, these increased levels threatened to dramatically reduce the amount of time that Dalton Utilities can discharge to the LAS. Once the LAS has reached its maximum loading of phosphorus, the utility will be forced to discharge to either a new LAS or directly to a receiving stream. Neither option is economically desirable. Finding an amount of land sufficient for a new LAS, even if possible, would be extremely expensive. Likewise, discharging to a receiving stream would require extensive upgrades in processing equipment.

Dalton Utilities first explored several options for modifying its wastewater treatment equipment to handle the increased phosphorus loading. The utility found that these modifications would require money for capital expansion and additional operating expenses. If Dalton Utilities made these capital improvements, it would then need to pass the cost of the expansion along to its customers in the form of increased rates and fees. Another option for the utility would be to impose strict phosphorus limits on the regulated industries. The utility does not currently have a limit on phosphorus. Many of the industrial dischargers in the area do not currently use on-site pretreatment. To meet any type of strict limit, these industries would need to install expensive treatment units at their facilities. Not satisfied with either option, Dalton Utilities decided to approach the facilities directly responsible for the high phosphorus levels and ask them to employ voluntary efforts to reduce the phosphorus levels.

PHOSPHORUS REDUCTION EFFORTS

After deciding to pursue a voluntary approach with local industry, Dalton Utilities next contacted the Pollution Prevention Assistance Division (P²AD). P²AD is a non-regulatory division of the Georgia Department of Natural Resources and focuses on providing free and confidential waste reduction services to Georgia businesses and organizations. Dalton Utilities had previously worked with P²AD on a similar project to reduce biochemical oxygen demand (BOD) and chemical oxygen demand (COD). Dalton Utilities asked P²AD to moderate the process and to assist industries in reducing phosphorus levels.

Beginning in 2002, Dalton Utilities monitored the phosphorus levels at the industries feeding into the wastewater system. After reviewing data from 2002, the utility discovered that, of the 28 facilities discharging into the utility system, six facilities accounted for more than 68% by mass of the total phosphorus loading. Dalton Utilities and P²AD decided to begin the phosphorus reduction process by focusing on those six facilities. Dalton Utilities contacted each facility and asked them to attend a planning meeting in the fall of 2003.

At this meeting, P²AD outlined the situation and the participants discussed possible solutions. Of the six facilities, four were carpet manufacturers owned by two carpet companies. Representatives of these companies felt that the issue could be addressed by chemical substitution. The meeting participants decided to have these two companies, Mohawk Industries, Inc. (Mohawk) and Shaw Industries, Inc. (Shaw) investigate chemical substitution alternatives.

The carpet companies quickly discovered the cause of the increased phosphorus levels. In 1999, the U.S. EPA removed phosphoric acid from its Toxic Release Inventory (TRI) reporting program. As a result, many carpet manufacturers increased the use of phosphoric acid as a buffer in the carpet dyeing process. Phosphoric acid proved to be an effective and affordable pH buffer chemical. Phosphoric acid was also very effective from the standpoint of product quality, a major concern for the carpet industry. Both Mohawk and Shaw began efforts toward finding replacements for the buffer chemical, though each company pursued a different approach.

Phosphorus Reduction in the Carpet Industry

Mohawk purchases its chemicals from several different vendors. Mohawk approached its vendors for chemical substitutes, not only for the phosphoric acid used for a pH buffer but for all chemicals containing phosphorus. Mohawk has now replaced most phosphorus-containing chemicals used in its Dalton-area carpet facilities and is in

the process of removing phosphorus from its rug-manufacturing operations.

Mohawk replaced phosphoric acid with various organic and inorganic acids for use as pH buffer. While these substitutions dramatically reduced phosphorus loading from Mohawk facilities, their use increased the BOD and COD levels at those facilities. This created another opportunity for cooperation between the utility and industry. In its latest permit from the Georgia Environmental Protection Division (EPD), Dalton Utilities asked for and received flexibility in its ability to issue permits to the regulated community. As a result, Dalton Utilities could allow a slightly higher BOD and COD levels from Mohawk as long as the utility could still meet its overall discharge limits.

Shaw decided to take a slightly different approach. Shaw manufactures and blends its own chemicals instead of relying on vendors. To address the phosphorus issue, Shaw developed a new buffer blend that greatly reduced the levels of phosphorus in its wastewater. Shaw is now in the process of converting all of its Dalton-area facilities to the new chemical blend.

To date, both Mohawk and Shaw have demonstrated very promising results. Phosphorus levels for both companies have been dramatically reduced. In addition, these reductions have been accomplished with no adverse effect on product quality and with negligible impact on product cost.

Other Phosphorus Reduction Efforts

Following the successes of Mohawk and Shaw, Dalton Utilities and P²AD contacted the other two industries that were among the six highest discharges of wastewater phosphorus. One is a contract carpet dyeing business and the other is a poultry processor. So far, the results from these facilities have been mixed. The carpet dyer found a situation similar to that of Shaw and Mohawk in that it used buffer chemicals that contained phosphoric acid. The company had replaced all phosphorus-containing chemicals within its processes and greatly reduced its phosphorus discharge. Unfortunately, the company was unable to make these changes without incurring additional cost. The chemical substitution will cost the company an estimated \$50,000 per year.

The poultry processor contacted the Engineering Outreach Service of the University of Georgia for assistance in reducing its phosphorus levels. These efforts are ongoing. In contrast with the carpet manufacturers, there is no simple chemical substitution solution for this industry. At this time it is believed that the source of the phosphorus is the customer-mandated marinade used in the process. Efforts are underway to capture the waste marinade and prevent it from entering the wastewater stream. Similar efforts are also being made to prevent

blood and poultry waste from entering the wastewater stream.

Next Steps

To date, Dalton Utilities has experienced a reduction of 50% in the incoming levels of phosphorus. These levels are expected to continue to drop as the participating industries complete their efforts. Dalton Utilities has been extremely pleased with the improvements made to this point. Dalton Utilities and P²AD plan to approach other local industries in the coming months to discuss phosphorus reduction at their facilities. The utility does intend to impose a phosphorus limit, but that limit has not yet been determined. The limit should not be difficult for the participating industries to meet.

SUMMARY

This project demonstrates the power of cooperative efforts between government, utilities, and industry. In particular, the project shows that these entities can work together to address a common problem, without the threat of regulation and enforcement. Both the industries and the utility worked to accomplish a common goal. The industries took voluntary steps to address their phosphorus levels before the utility imposed a limit. The utility provided permit flexibility and recognized industry concerns over confidentiality. After the first group meeting, each business met separately with P²AD and Dalton Utilities. Details of each company's efforts were not discussed with other participants.

The project can serve as a blueprint to both regulators and industries for addressing future environmental issues. The project clearly demonstrates that the relationship between regulators and industry does not have to be adversarial. By working together, both groups can protect the environment in a manner that also protects the economic viability of industry in the state.