

Ohio Water Development Authority

Research and Development Grant Program

Wastewater Projects

Village of Amesville

Decentralized Wastewater Project (2005, Grant Award - \$110,300)

The project will serve as a case study for other small communities where conventional centralized wastewater alternatives are not financially feasible. Small communities across Ohio will be able to use the Amesville model of establishing a core project team, conducting routine public meetings, working closely with the Ohio EPA regarding permitting, designing publicly-owned decentralized wastewater systems, establishing an operation and management plan, and establishing an installer training program to deal with their wastewater problems through more financially and technically feasible alternatives.

The project will also demonstrate to other small communities across Ohio that wastewater problems can be dealt with through unique but basic means where village officials as well as village residents are directly involved in decision-making, planning, and management of a publicly-owned and operated decentralized wastewater system.

The final report has not been completed

City of Barberton

Lime Pasteurization of Raw Sludge with Bio-Filtration Odor Control (1993, Grant Award - \$231,240)

The goal of this study was to improve lime stabilization through improved mixing, reduced lime requirements, and reduced emissions from the process. In 1993 the proposed use of a bio-filter for reduced emission control (odor control) is unique and an important innovative part of the project. Burgess and Niple submitted a final report on July 1996. The report provides a summary of the improvements to the lime stabilization process including estimated costs.

Final Report

City of Barberton

Comparison of Staged Introduction of Sodium Hypochlorite on Fecal Coliform and Chlorine Discharge Reduction (2000, Grant Award - \$37,500)

The goal of this study was to determine the reason why the addition of sodium hypochlorite at the beginning of the treatment process, instead of the more common practice of addition at the end of the treatment process, was successful. For years the City has been applying heavy doses of sodium hypochlorite at the beginning of the treatment process. The City discovered that odor and fecal coli form were reduced thus affecting the need for final stage dechlorination.

This project was never completed and a *final report* was never prepared.

City of Clyde

Combined Sewer Overflow Screening System (2002 and 2004, Grant Award - \$175,000)

The goal of this study was to evaluate a combined sewer overflow screening system that is self cleaning and does not require power. Combined sewer overflows (CSOs) are the focus of EPA's mandate to improve the water quality of Ohio's water resources. In Ohio, there are 102 communities that are known to have CSOs. Most of these communities are small cities or villages that have limited sources of capital for implementing projects to reduce the impacts of CSOs. The US EPA identified nine minimum control measures to be used for dealing with CSOs. One of the key terms is control of solid and floatable materials in CSO discharges. This project constructed a CSO screening chamber upstream of Clyde's WWTP. The project will monitor the effluent quality.

Final Report

City of Fremont

Autothermal Thermophilic Digestion of Municipal Biosolids (2003, Grant Award - \$75,000)

The problem of disposing of municipal biosolids has brought attention to new treatment techniques that allow biosolids to be recycled back to the environment. With an abundance of farmland, Ohio is an ideal candidate for utilizing these "exceptional quality" biosolids. One of these new treatment methods is referred to as Autothermal Thermophilic Aerobic Digestion (ATAD), which is classified as a Process to Further Reduce Pathogens (PFRP), Exceptional Quality Pathogen Reduction, in the Ohio EPA Biosolids Land Application Regulations. This process requires the temperature of the sludge to be at least 55° C (131° F) with a detention period of at least 10 days. This ATAD Process will be the only one to utilize a Jet Nozzle foam control dissipation process. The end product has no limitations to its use and can be applied directly to food crops, similar to commercial fertilizer products. The beneficial reuse of sewage sludge or biosolids reduces the disposal costs of municipal biosolids while providing a marketable product.

The ATAD process, with its unique foam control dissipation process, produces stabilized sewage sludge with a neutral pH and differs from other processes that use the addition of lime in their treatment of sewage sludge and generally have a high pH value (12), which is not suitable for use on all soil. A study to determine the biosolids quality when produced through the ATAD process would fulfill a general need in Ohio. If proven, this technology would provide a lower-cost option for producing exceptional quality biosolids.

Once the proposed Fremont ATAD system is operational, city personnel will monitor the biosolids quality and summarize the findings in a report that can be used by other cities and regulatory agencies for evaluating biosolids treatment options.

The final report has not been completed

City of Fremont

IFAS Pilot Plant Water Pollution Control Facility (2005, Grant Award - \$196,000)

In order to alleviate an organic treatment problem, and expand the organic treatment capacity of the wastewater treatment plant, the City of Fremont wants to investigate the use of a new technology called Integrated Fixed-Film Activated Sludge (IFAS) by conducting a one year-long pilot study. The pilot plant would consist of a modification to one of the plants six aeration tanks. The one tank will be separated into three chambers simulating an activated sludge tank with IFAS biomass carrier media, an activated sludge tank without the media, and a clarifier. Data will be collected on the effluent from this tank for one year and then analyzed. Potentially, this IFAS process could be implemented in all six aeration tanks, thereby doubling the organic capacity of the plant.

The final report has not been completed

Gallia County

Computer Controlled Septic Tank Pump System (1994, Grant Award - \$239,155)

The goal of this study was to reduce the size of a wastewater treatment system by controlling the pumping of septic tanks through the use of computers. According to the final report the project failed due to improper installation. In order for the system to become operational, all of the wiring controlling the pumping would need to be replaced. Also according to the final report, the concept of controlled flow pressure sewer system with computer control is still a valid concept. The project went to litigation between the County, engineer, and the contractor.

Final Report

City of Kent

Creation of Aeration Tank Anoxic Zones – Biological Nutrient Removal (1993, Grant Award - \$58,860)

This project evaluated the effectiveness of an aerobic/anoxic zone in an aeration tank to reduce the amount of pH control chemical and to increase effluent quality. The project was inspired by a similar test in Phoenix, Arizona, that uses a biological modification that allows existing control bacteria to physically release alkalinity.

The Biological Nutrient Removal (BNR) system was able to consistently perform as well as the conventional system as long as the dissolved oxygen concentrations in the oxic zones of the BNR system remained above 3 mg/L. The BNR system was also able to operate at a lower cost than the conventional system by using NO₃-N as an oxygen source instead of plant air. If the BNR improvements are installed in the remainder of the plant, the chemical usages for phosphorus removal and alkalinity addition would likewise decrease.

Final Report

Lake County

Demonstration of Submerged Flat Plate Membrane Bioreactor (MRB) Technology for the Upgrading, Expansion, or Replacement of Packaged Activated Sludge Treatment Plants (2002, Grant Award - \$308,000)

The goal of this study was to demonstrate the submerged flat plate membrane bioreactor (MRB) technology at the Rio Grande WWTP. The WWTP was constructed in 1973 and is permitted for 21,500 gallons per day. The membranes submerged into the aeration tank eliminate the need for both secondary clarification and tertiary filtration.

The project will develop and document the design, construction and operation and maintenance requirements of the facility for the review and consideration of the OEPA as a well-developed technology. 12-months of operational data concluded that the technology met or greatly exceeded the original design criteria.

Final Report

The Ohio State University

Development of New Disinfection Systems for Virus and Parasite Control for Small and Onsite Sewage Treatment Systems; Phase 1 – Dispensing Device, Phase 2 - Automation (2004, 2006 Grant Award - \$189,895 and \$102,590)

Small communities are seeking effective and affordable wastewater treatment technology that is easy to operate. When proposing to reuse treated wastewater through irrigation, especially in public access areas, neighbors are understandably concerned about the hazards of exposure to disease.

Chlorine dioxide is an extremely effective disinfection agent. It is a completely different chemical than chlorine. Chlorine dioxide (ClO_2) reacts differently, produces different by-products and has little in common with chlorine. It has the advantage of working over a wide range of pH levels and does not form trihalomethanes and is a promising disinfectant to kill viruses and parasites in wastewater. The commercial availability of small chemical packets to produce small quantities of chlorine dioxide onsite opens up the possibility for use in small communities. However, no delivery system has been developed to introduce the chlorine dioxide packets into a small wastewater treatment system.

The goal of the project is to develop a new disinfection strategy to kill pathogenic viruses, pathogens and bacteria in small and onsite wastewater treatment systems. The first phase involves working in the laboratory to develop delivery-devise for chlorine dioxide packets. Demonstrating the effectiveness of promising onsite disinfection systems in a small wastewater treatment/irrigation system is the second phase. In November 2007, The Ohio State University submitted an application to the US Patent Office for a dispensing devise.

Phase 2 will develop an automatic control system to deliver chlorine dioxide packets to wastewater effluent. The control system will have on/off capability, monitor system performance, and communicate to a remote operator. The system will be fail-safe to prevent the discharge of inadequately disinfected wastewater.

The final report has not been completed

City of Port Clinton

Pilot Scale Study of Ballasted Flocculation Technology for Use in the Treatment of CSO (1999, Grant Award - \$70,000)

This study dealt with the treatment performance of the Actiflo process and the ballasted flocculation technology. The study focused on the quality of the effluent and the various potential operating conditions as would be expected treating storm water or combined sewer overflows.

The project determined that the Actiflo ballasted flocculation technology exceeded the performance of primary clarification in all aspects of the testing protocol compared with conventional primary clarification. The Actiflo process showed the ability to produce a quality effluent at flow rates exceeding the design capacity of the pilot plant. With respect to turbidity and suspended solids the Actiflo process produced single digit effluent under varying influent flows and concentrations.

Final report

Richland County

Decentralized Wastewater Treatment Systems (2003, Grant Award - \$250,000)

This study will evaluate the feasibility of a decentralized wastewater treatment systems throughout the state. New approaches to traditional planning and design, permitting, management and monitoring are needed for a successful decentralized project. Yet, once this approach is tested and revised, it will serve as a model for many other rural areas, going far to improve water resources and preserve public health across the state.

The Richland County Commissioners propose to use a decentralized approach in dealing with wastewater treatment issues in the unincorporated community of Shenandoah. Shenandoah is a small cross roads community of approximately 35 homes and businesses that suffers from water quality standards violations from inadequately treated wastewater from failing onsite systems in the area. The Richland County Division of Wastewater proposes to manage the system on behalf of the County Commissioners. The proposed system consists of 35 dual compartment 1500 gallon septic tanks discharging to a small diameter gravity collection system to serve the centralized area of the community. Wastewater will be conveyed to 2 treatment areas consisting of Peat Biofilters for pre-treatment and a soil absorption system for final treatment and dispersal. Individual Peat systems will be offered to residents outside the central area of the community with failing systems that will also be managed by the Richland County Division of Wastewater. This system is being proposed as an alternative to a conventional gravity sewer system and package treatment plant that is simply not affordable to residents of Shenandoah.

The proposed project will include the planning and design of the system, permitting, construction and installation, management and monitoring.

The final report has not been completed

City of Toledo

Wet Weather Treatment Facilities Performance Study of the Dense-Sludge High-Rate Clarification Process (2004, Grant Award - \$100,000)

The U.S. EPA has published a draft "Blending Policy" that provides guidance and direction that will result in a major increase in the interest and utilization of high-rate physical-chemical treatment systems nationwide for the treatment of dilute, wet weather flows to POTWs. Toledo is at the forefront of this movement, having pilot tested two alternative technologies and selected one that has not been implemented on a full-scale application to a POTW in the United States. The existence of a second, competing technology will be of critical importance over the next decade. Competing technologies will help to reduce costs to other CSO (combined sewer overflow) and SSO (sanitary sewer overflow) communities that are considering alternatives for treating wet weather flows.

The dense-sludge process has been proposed to provide treatment of wet weather flows at the Bay View Wastewater Treatment Plant. The dense-sludge process is a compact, high-rate clarification process that uses the recirculation of chemically conditioned thickened solids to form microfloc particles with the incoming wastewater. The proposed facility would provide treatment of up to 185 million gallons per day. Construction is scheduled to begin in 2005, with performance testing completed by the end of 2008.

The purpose of this grant would be to provide 2-year performance testing of the dense-sludge, high-rate clarification process to demonstrate efficient and effective treatment of CSOs and SSOs. The process will be tested under various influent flow conditions and operational control parameters.

The performance evaluation period was marked by several extreme wet weather events and a total number of events (29) that exceeded normal historical values. Twelve of the events had excess flow volumes that resulted in discharge of treated effluent to the combined treatment plant outfall. The wet weather treatment facilities produced an effluent of comparable quality to that of secondary treatment for TSS and Total P, plus sufficiently low concentrations of CBOD to comply with maximum allowable 7-day average NPDES Discharge Permit requirements. All of this was achieved at an average hydraulic loading rate of 35 gpm/sf of clarifier surface area, using relatively low chemical dosages that averaged 0.9 mg/L of polymer and 16 mg/L of ferric chloride.

The ballasted flocculation process proved very effective for treating wet weather flows, even at relatively low chemical dosages (10-30 mg/L ferric chloride; 1-2 mg/L polymer). Performance of the full scale facilities is very similar to that achieved during pilot testing, confirming the applicability of design criteria developed from the pilot tests. The plant has optimized the performance of the facility to manage variable influent flow and pollutant concentrations and treatment results have been better than expected for treating wet weather flows.

Performance parameters may be used as a basis of design for other projects. This would also provide a basis for Ohio EPA to approve future plans. This could save communities and Ohio EPA costs related to plan review and permitting.

Final Report