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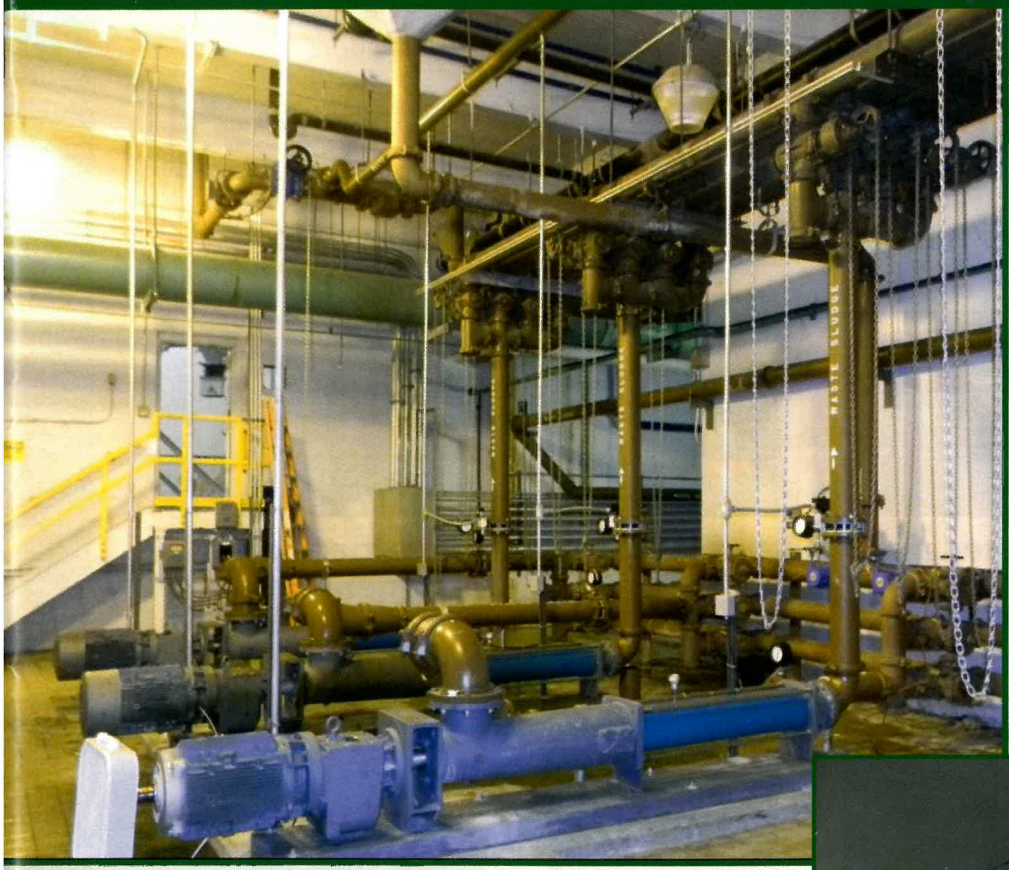
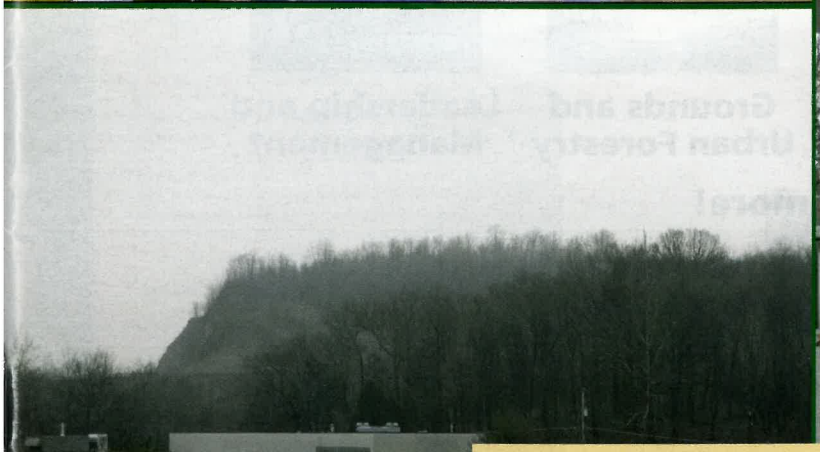




2013 Superior Achievement in Environmental Engineering and Science Award Winner,

Gwin, Dobson & Foreman, Inc. and
Bassett Engineering

American Academy of Environmental Engineers and Scientists

Excellence in Environmental Engineering & Science

The Excellence in Environmental Engineering & Science® Awards recognize and promote quality in environmental engineering and science. The Academy encourages entries from all areas of environmental engineering and science practice, such as odors and air pollution control, air quality management, industrial hygiene, radiation protection, solid waste management, resource recovery, waste minimization, hazardous waste management, toxic materials control, water supply, wastewater treatment, residuals and biosolids, nutrients, renewable energy, microconstituents/trace organics and field and lab instrumentation.

The competition is open to all individuals, companies, or organizations, regardless of affiliation with the Academy.

Entries and awards are made in each of nine separate categories.

Research – Research of a basic or applied nature that advances the state of the art of environmental engineering or science including research leading to new or improved environmental engineering or science equipment (process, control, instrumentation, environmental testing, etc.)

Planning – Planning related to an environmental control project, system or environmental management facilities or activities.

Design – Design of pollution control or other environmental facilities including projects delivered by alternate methods, such as, design-build or design-build-operate.

Operations/Management – Operations or Management of pollution control or other environmental facilities, a pollution prevention program, or environmental regulatory programs (federal, state or local).

University Research – Research of a basic or applied nature that advances the state of the art of environmental engineering or science conducted by a university under the direction of a full-time faculty member. This category differs from the Research category in that a person other than one involved directly with the work can "nominate" another for the award and provide the entry materials, which must be supplied.

Small Projects – Any Research, Planning, Design, or Operations/Management work related to a potential or actual capital expenditure of $5 million or less or an operation or management activity with an annual budget of $500,000 or less.

Small Firms – Any Research, Planning, Design, Operations/Management or Small Project conducted by a small firm. A small firm is defined as one that has annual gross revenue of $5,000,000 or less.

Environmental Sustainability – Environmental Sustainability is the supporting of the quality of life while living within the carrying capacity of all systems. A long term balance of environmental stewardship, economic development, and social well being must be achieved. Research, Planning, Design, or Operations/Management including renewable resources timely regenerated, timely substitute replacement of nonrenewable resources, harmful substances absorbed timely or made harmless.

Industrial Waste Practice Award – The Industrial Waste Practice recognizes outstanding projects that incorporate innovative management and technological approaches to industrial water and waste management issues at pilot or full scale, in the following areas: Treatment of water for industrial uses; Management, including reclamation of industrial liquid, solid, toxic and hazardous wastes and integrated waste management and industrial process modifications to achieve waste minimization and pollution prevention objectives; Management of air emissions; Remediation of groundwater and riverine, lake, estuarine, and marine water resources contaminated by industrial activities; Brownfields/Greenfields restoration; and Management of radioactive waste materials.

Honor Awards are presented to other deserving entries, as determined by competition rules, in each category. Grand Prizes are awarded in each category. The Superior Achievement for Excellence in Environmental Engineering and Science Award is presented to the overall best entry.

An independent panel of judges assesses each entry with respect to the following criteria:

1. Demonstration of a comprehensive, integrated approach that considers all environmental media, i.e., air, water, and land.
2. Quality as evidenced by the degree of user satisfaction and proven performance.
3. Originality and innovation, representing the application of new knowledge, a new application of existing knowledge, or an innovative mix of existing knowledge.
4. The complexity of the problem or situation addressed.
5. The extent to which the project contributes to or offers the prospect of contributing to social and economic advancement.

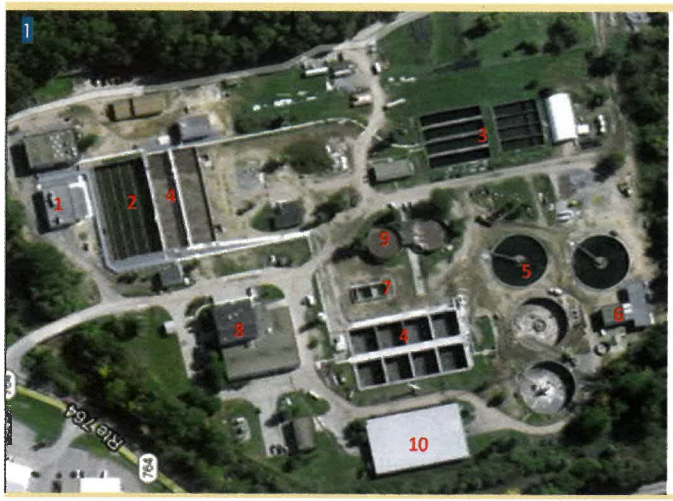
AAEES thanks the following for their time and expertise in serving as judges for the 2013 E3 Competition:

Timothy Berry
David Cavender
William Celenza
Majid Chaudhry
James Condon
Thomas Gillogly
Paul Gremillion
Doug Kobrick
James Law
Charles Licht
Colin McKenna
Webster Owen
Dennis Papa
Beth Petrillo
Momo Savovic
Norbert Schmidtke
James Sheetz
Milind Wable
Marc Walch
Thomas Wilson

Superior Achievement Award

ENTRANT: Gwin, Dobson & Foreman, Inc., and Bassett Engineering
ENGINEER IN CHARGE: Mark Glenn, P.E., BCEE
LOCATION: Altoona, Pennsylvania

Altoona Westerly WWTP Biological Nutrient Removal Upgrade & Expansion



The $30 million Altoona Water Authority Westerly Wastewater Treatment Facility BNR Upgrade and Expansion was designed by the team of Gwin, Dobson & Foreman, Inc., which performed all engineering, design, and construction management-related work, and Bassett Engineering, which provided BNR process design modeling and consultation. This project was undertaken to achieve compliance with the Chesapeake Bay nutrient control initiative and is among the first in Pennsylvania to fully integrate nutrient removal with high pollutant loads from a combined sewer system.

This 235-mile network of sanitary and combined sewers discharge to two wastewater treatment plants: the Westerly plant, which was recently upgraded for Biological Nutrient Removal (BNR) technology and expanded to handle more flow, and the Easterly plant, which is currently undergoing similar construction.

Existing tanks were modified and converted to bio-reactors, minimizing land disturbance; and energy efficiency was emphasized to reduce power consumption. A hydraulic design using gravity flow eliminated the need for costly pumping.

Plant capacity was doubled by use of an innovative step-feed process to minimize untreated wet weather discharges. Finally, the plant was upgraded to biologically remove nutrients without the need for chemical addition. The production of waste solids has been reduced accordingly. The plant has the flexibility of using any of five BNR processes. The fact that the plant is far surpassing nutrient standards with less energy and at a lower operating cost is a testimony to the effectiveness of the planning and design.

One hundred thousand pounds of nutrients in excess of permit standards were removed during the first year of operation, generating $215,000 of revenues in the PA nutrient credit market. With the Westerly plant's 60 MGD capacity, untreated, wet-weather bypasses were virtually eliminated while achieving optimal nutrient removal and realizing an annual $75,000 reduction in operating costs through less chemical and power consumption.

Technically, few plants can achieve nutrient removal under high combined sewer flow conditions. An innovative step-feed system solves this by effectively treating flow 10 times in excess of normal conditions while still maintaining nutrient levels. The design team successfully met all schedule goals by designing a phased construction plan to achieve early compliance, particularly challenging since the plant was to remain fully operational during construction.

The BNR process is more sustainable and relies on natural biological removal processes to reduce nutrients than expensive chemical addition systems. Savings in chemicals, power and sludge disposal are significant. Prudent financing enabled Altoona to maintain affordable rates. Finally, this project has a built-in reserve capacity to support future economic development in the Interstate 99 corridor. Altoona will be ready with one of the best wastewater treatment systems in Pennsylvania.

1. In this aerial photo taken during construction, the following main treatment units of the AWA Westerly Treatment Plant are shown: 1) Headworks building, 2) Primary Equalization Tanks, 3) Secondary Equalization Tanks 4) BNR Reactors, 5) Final Clarifiers, 6) UV Units, 7) Aerobic Digesters, 7) Sludge Holding Tank, 8) Control/ Sludge Handling Building. Raw wastewater enters the headworks building and then to BNR reactors. Effluent from the reactors flows to the clarifiers and then to UV units for disinfection. Settled sludge from the clarifiers is aerobically digested in the digesters (9) and dewatered using a centrifuge. Dewatered biosolids are stored in an open building (10) for farmland application.
2. The above photo shows Reactor No.'s 3 & 4. Two of the seven zones can operate as either oxic or anoxic zones. This design feature, along with other operational features, provides ample flexibility so that the reactors can be operated in different operational modes. For instance to move from MLE mode to 4-stage Bardenpho mode, the operator stops airflow and starts a submersible mixer in the last aerobic zone. Switch zones are also provided in several zones for operational mode flexibility.