

October 1993

# **WATER**

## **Engineering & Management**

Technology Trends for Water/Wastewater Industry Leaders



**WASTEWATER PROCESS  
LIVES UP TO  
EARLY PROMISE**



# Wastewater Process Lives Up To Early Promise

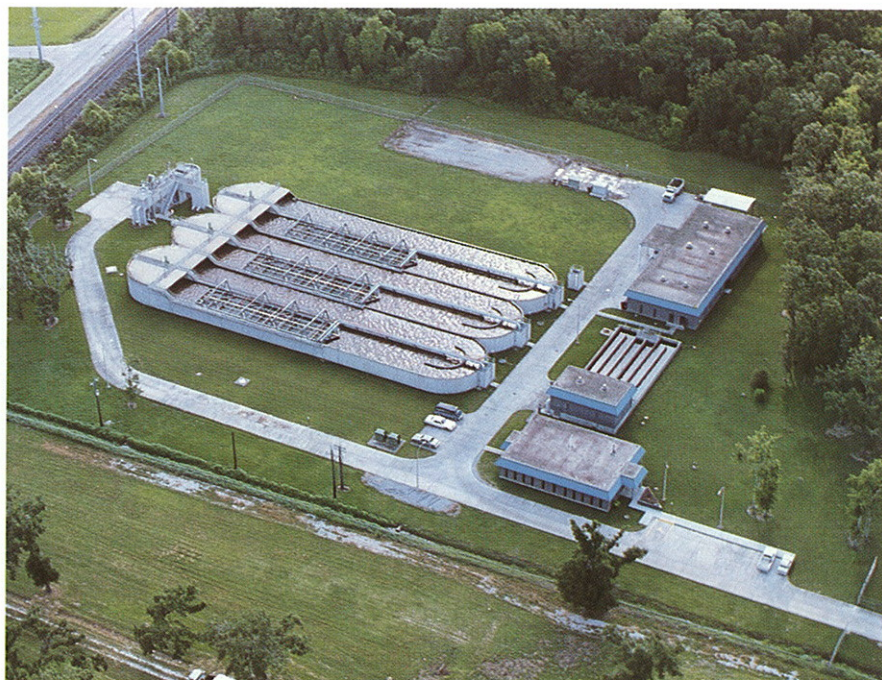
*by Murphy Arcemont*

Six years ago Water Engineering & Management published an article in the May, 1987, issue entitled "Oxidation Ditch Modification Shows Promise." That promise has been fulfilled at the Morgan City wastewater treatment plant in Louisiana, which was the subject of the article. Operational data compiled during the seven years since start-up indicate that the intra-channel clarification system installed there has been a success. Once classified as innovative technology, the process now has a proven track record.

An independent 1987 report by Dr. David Stensel of the University of Washington describing the Morgan City installation was given at a joint conference of the American Society of Civil Engineers and the Canadian Society of Civil Engineers. Subsequently the WEM adaptation of this report offered the first trade magazine account of the new technology.

In the early 80s Morgan City was one of the last remaining municipalities in a six-state area that had no wastewater treatment facility. Raw sewage was collected and pumped directly into a receiving stream. The city's engineers had proposed an enclosed treatment plant which was to be located in the industrial park near the center of the city. This plant was to use the trickling filter process, and the estimated construction cost was more than \$17 million. The treated effluent was anticipated to meet the BOD and TSS maximum limits of 30 mg/l—typically achievable with trickling filter systems.

Before committing to spend such a large amount of money, city officials decided to investigate other processes. After many discussions they selected another engineering firm to design the project. This firm had



*An aerial view of the Morgan City wastewater plant's three oxidation ditches with their intra-channel clarifiers.*

proposed the use of a relatively new process which eventually became known as the BOAT intra-channel clarifier. The cost savings projected by using this system were realized when the low bidder for the construction of the 3 mgd treatment plant submitted a price of approximately \$3.9 million.

From the first day of operation the effluent from the facility has been excellent and advanced secondary treatment conditions have been maintained. The table shows actual performance data for the years 1987 through 1992, average figures for the entire period, and the equivalent design values as included in the original discharge permit.

The data illustrate clearly that this facility with its innovative process

equipment has performed better than called for in the design requirements. As a result the state environmental authorities approved a discharge permit modification. Originally the plant had a 3-mgd design capacity. However, the effluent produced was of such high and consistent quality the state allowed an increase of 1.5 mgd in the daily flow. Thus Morgan City was able to achieve 50 percent more throughput at this plant without making any capital outlays. It is noteworthy that while peak flows have been extremely high at times (and peak-to-average ratios of 8:1 have been experienced), the effluent quality has been maintained.

Another indication of the effectiveness of the system is the low cost of



SUMMARY OF RESULTS			
YEAR	FLOW (mgd)	BOD <sub>5</sub> (mg/l)	TSS (mg/l)
1987	4.1	7.8	10.8
1988	4.0	6.3	4.2
1989	4.2	8.4	4.9
1990	3.7	4.5	3.8
1991	4.3	5.0	3.6
1992	3.9	5.7	5.2
Average	4.0	6.4	5.8
Design Values	3.0	30	30

operation and maintenance activities. Since the intra-channel clarifiers do not have any mechanical devices for sludge recirculation, and since they are fabricated in stainless steel, they need little O&M attention. No additional power is required for sludge removal from the clarifier, as opposed to the energy needs of external units. The only energy required in the biological process is for aeration and mixing. Vertical turbine aerators are used to achieve oxygen transfer in the oxidation ditches. Both the BOAT® intra-channel clarifiers and the SIMCAR vertical turbine aerators are available from one manufacturer, United Industries in Baton Rouge, Louisiana.

Energy consumption at the Morgan City plant costs approximately \$80,000 per year. This includes the cost of running not only the biological process, but also the headworks, the dissolved air flotation thickening system, the belt press, and the discharge pumping. The total cost for operating and maintaining the entire treatment plant, including the discharge pumping system and the sludge handling process, is about \$280,000 annually. This is the cost for treating an average of 4 mgd, or about \$190 per day for each one million gallons of water.

Although the cost for operating and maintaining the system is low, the city has been able to use its special treatment process to generate additional revenues, which help to off-set further the O&M costs. Another advantage of the system is that it can handle high-strength biological loads and still produce advanced secondary effluent levels, un-

like the trickling filters originally proposed. This capability has allowed the city to accept the high-strength wastes generated by the offshore oil and gas industries.

Barges containing the wastes are off-loaded at docks along the river and the material is transported to the plant. The city receives over \$150,000 each year in additional revenues from this operation. Municipal officials are now investigating offers from other industries which

intend to build facilities in the city and would like to use the treatment plant to handle their wastes.

Further proof of the sound performance of this system is that Morgan City has twice received the O&M Award of Excellence from EPA Region 6. As a result of its superior award-winning performance, this plant has served as a training facility for operators from across the country, especially from other cities which have selected the same process. And many wastewater treatment managers and engineers from overseas have inspected the facility.

The "gamble" taken by Morgan City officials years ago has paid off for local citizens. Today the technology is a proven concept, with over 120 BOAT® clarifiers operating throughout the United States, and foreign corporations licensing the system for application in other countries.

#### About the Author

Murphy Arcemont is director of environmental affairs for Morgan City, Louisiana

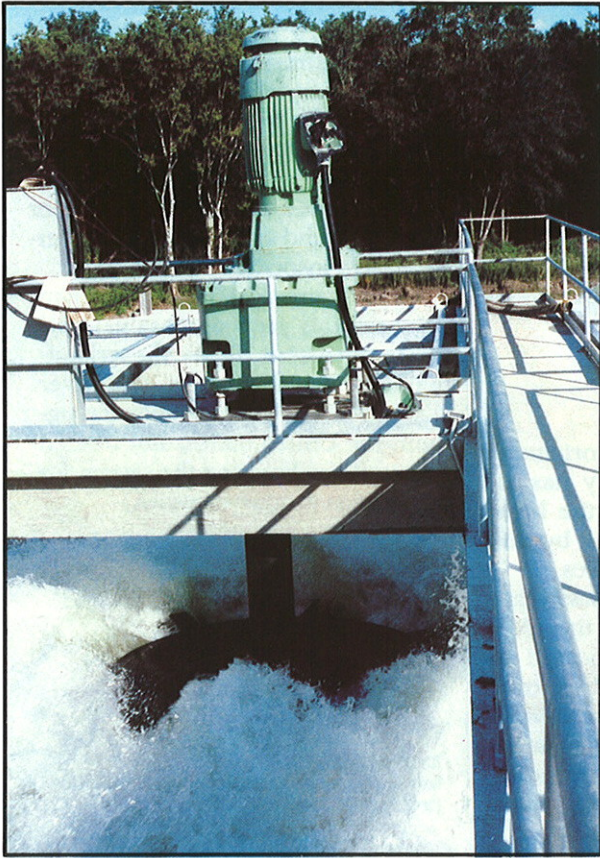


The BOAT® clarifier's suspension structure and the motor for the vertical turbine aerator are seen in this close-up.

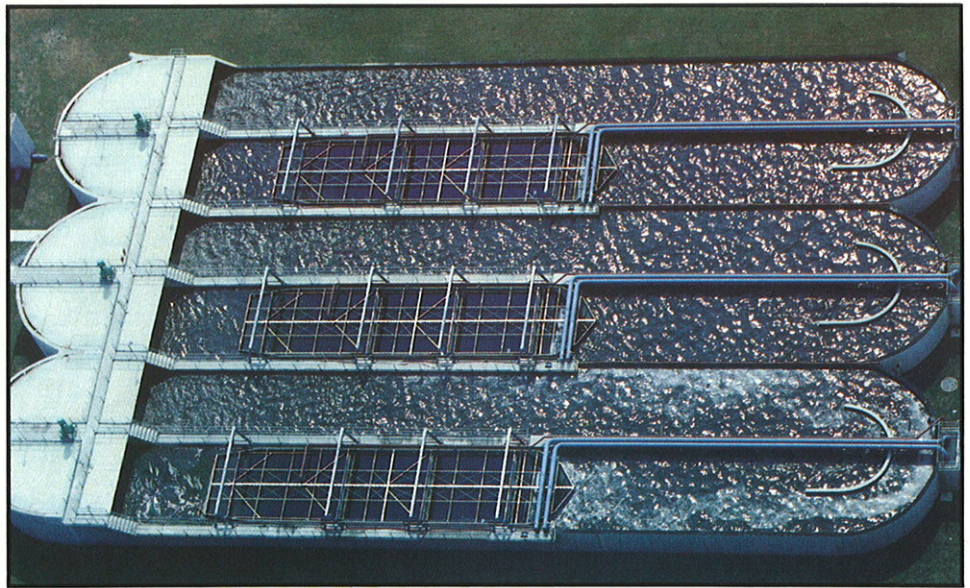


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