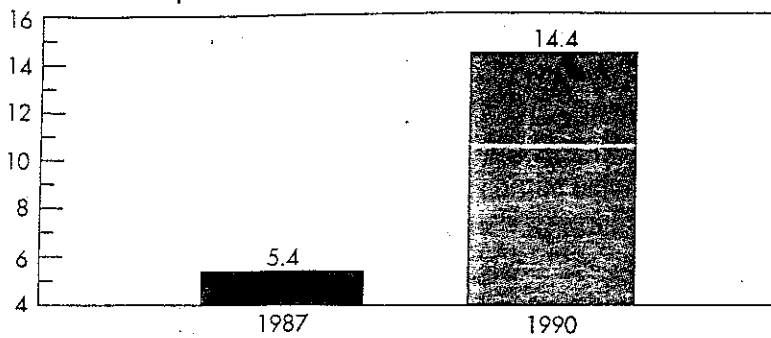
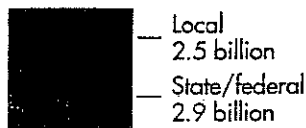


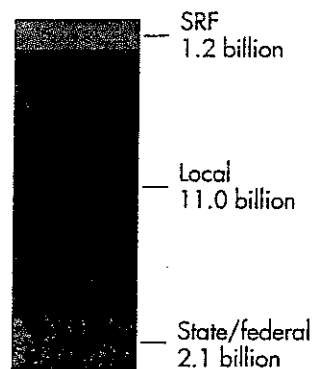
## 1987 vs 1990 expected PL92-500 costs



1987 breakdown of expected costs for AMSA member agencies



1990 breakdown of expected costs for AMSA member agencies



Source: AMSA 1990 Financial Survey

ment at this level. In 1989, over 85% of the wastewater received by the responding agencies was treated to secondary or more stringent permit levels.

Operating and maintenance expenses for 1989 for the surveyed respondents totaled \$2.5 billion. Budgeted expenditures for 1990 totalled \$2.9 billion. Actual operating and maintenance costs have been increasing at approximately 8% per year since the mid-1980s. These increases are because of an increased volume of wastewater being treated, treatment to more stringent effluent limits, and inflation.

### SERVICE CHARGES ON THE RISE NATIONWIDE

Currently, service charges are doubling every 6 years. The AMSA survey documents residential sewer service charges ranging from a low of \$53/yr to a high of \$694/yr. The median charge was \$144/yr. From 1986 to 1989 the median annual residential service charge increased 12.5%/yr. Because of declining state and federal funding for wastewater facilities and increasing local capital financing costs, and because of increasing operation and maintenance costs associated with higher levels of treatment and other newly mandated environmental programs, service charges are expected to increase at an even greater rate in the future.

Copies of the 1990 AMSA Municipal Wastewater Treatment Agency Financial Survey may be obtained by contacting AMSA's national office at 1000 Connecticut Avenue N.W., Suite 1006, Wash-

ington, DC 20036; (202) 833-AMSA.

—Jon W. Schellpfeffer, Madison Metropolitan Sewerage District, Madison, Wis.

## Nutrient Strategy Sponsors Nonpoint Control

The Tar-Pamlico River Basin Association, which is a consortium of North Carolina wastewater dischargers, will be funding an innovative program to reduce nutrient loadings to the Tar and Pamlico rivers from point and nonpoint sources. The program adopts a strategy developed by a coalition of dischargers in the basin, in conjunction with local environmental groups. This alternative strategy provides the option of allowing expanding wastewater treatment plants (WWTPs) to meet nutrient load reduction goals by funding the implementation of best management practices (BMPs) for agricultural runoff instead of facility capital improvements.

The association will provide up to \$11.8 million over a 5-year period for agricultural BMP implementation of a nutrient trading program. This amount was based on achieving a 200,000 kg/yr reduction in nitrogen and phosphorus by the year 1995, solely through BMP implementation. The costs cover both the agricultural cost share and administration for the BMP program.

The North Carolina Division of Environmental Management (DEM) has identified nutrient loading to the Tar and Pamlico rivers as the primary cause of de-

## Tar-Pamlico Basin

The 3700-km (2300-mi) Tar-Pamlico River system in eastern North Carolina drains approximately 14,000 km<sup>2</sup> (5400 mi<sup>2</sup>) in portions of 17 counties before it empties into the Pamlico River estuary and joins Pamlico Sound. The Pamlico estuary and sound are part of Albemarle-Pamlico Sound, which has been designated an estuary of national significance by the U.S. Environmental Protection Agency (EPA) and for which a comprehensive management plan is now being developed, funded in part by EPA's Office of Marine and Estuarine Protection.

Most of the land in the basin is forested or used for agricultural purposes, with a small amount of urban land use. About 20 municipal and industrial wastewater treatment plants with design flows greater than 0.004 m<sup>3</sup>/s (0.1 mgd) discharge into the basin's surface waters.

In September 1989, North Carolina's Environmental Management Commission (EMC) formally designated the entire Tar-Pamlico River watershed as nutrient sensitive waters (NSW), which means that the water in this watershed is experiencing excessive growths of microscopic or macroscopic vegetation that are impairing its best use.

The Tar-Pamlico Basin has experienced recent outbreaks of fish diseases, increased sediment and nutrient loads, algal blooms, and locations with low dissolved oxygen. The loss of aquatic vegetation has had a significant impact on the valuable fisheries of the Pamlico River estuary. Loss of wetland areas and hydraulic modifications to smaller tributaries serving as spawning areas are continuing problems adversely affecting wildlife and aquatic habitats.

teriorating water quality in the Pamlico River estuary. DEM initially proposed interim nutrient reduction goals for point sources and planned to rely on the state's voluntary Agriculture Cost Share Program, which pays farmers 75% of the cost to implement appropriate BMPs to address nonpoint source (NPS)-nutrient loadings.

In December 1989, however, the North Carolina Environmental Management Commission (EMC) decided to approve the dischargers' coalition proposal as an innovative but experimental approach to

addressing the accelerated eutrophication problems in the basin. When adopted, the proposal was referred to as the Nutrient Sensitive Waters Implementation Strategy and saved an estimated \$50 million to \$70 million in capital costs.

#### BASIN-WIDE APPROACH

This study, also called the Tar-Pamlico nutrient management strategy (NMS), uses a basin-wide approach with nutrient reductions in both point and nonpoint sources. This innovative strategy acceler-

ates agricultural BMP implementation because the majority of nutrients in the basin originate from NPSs. It helps to address multifaceted problems (for example, wetlands loss and habitat restoration) while also achieving pollutant reduction benefits. These habitat concerns are often more important than simple water-quality improvements. The beauty of the NMS is captured in four major components: point source controls, nutrient discharge trading that funds NPS controls, basin nutrient modeling, and a new waste treatment planning agency.

**Point source controls.** Members of the Tar-Pamlico Basin Association will evaluate their plants to determine operational or minor capital improvements that could meet nutrient limits or improve process removal of nutrients. If WWTPs cannot achieve nutrient goals without large capital outlays, the dischargers may meet the balance of the nutrient requirements by nutrient trading or providing funds to sponsor the use of BMPs.

**Nutrient trading.** Nutrient trading allows expanding facilities to achieve nutrient limits by substituting other cost-effective pollutant reduction measures, which includes BMPs, for more costly capital improvements in their plants. Nutrient trading is significant because nutrient removal by agricultural BMPs is thought to be more cost-effective than removal by wastewater treatment plants. The trading aspect of the NMS provides for funding from the private sector for the existing state NPS control program.

**Nutrient modeling.** The association is also required to provide approximately \$400,000 to develop a nutrient model and geographic information systems (GIS) tracking system for the Tar-Pamlico Basin under the direction of DEM. These models will be used to determine nutrient target levels and appropriate management strategies and target NPS controls that will provide the greatest water-quality benefits.

The strategy delegates responsibility to the State Division of Soil and Water Conservation and the local soil and water conservation districts for selecting, installing, and evaluating agricultural BMPs, and for managing the financial process as they currently do in the established Agriculture Cost Share Program.

In addition to the \$11.8-million, 5-year fund to sponsor nutrient trading, the strategy requires the association to provide \$150,000 to the State Division of Soil and Water Conservation to help administer BMP implementation under the nutrient trading program.

The strategy requires dischargers who are not members of the association to meet nutrient removal requirements when they expand from existing permitted flows to

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flows greater than 0.022 m<sup>3</sup>/s (0.5 mgd). Individual nutrient trading proposals may be submitted to DEM for consideration in lieu of meeting the established effluent limits.

If the association fails to meet any of its requirements, existing dischargers with flows greater than 0.004 m<sup>3</sup>/s (0.1 mgd) must meet nutrient limits within 5 years from the date EMS determines the association has not met the necessary conditions.

**Planning agency.** The final element of

the Tar-Pamlico NSW implementation strategy creates an area-wide waste treatment planning agency under Section 208 of the Clean Water Act. The agency will include representatives of municipal and industrial dischargers, counties, soil and water conservation districts, environmental groups, DEM and Division of Soil and Water Conservation representatives, representatives of the North Carolina Agricultural Task Force, and other state agencies.

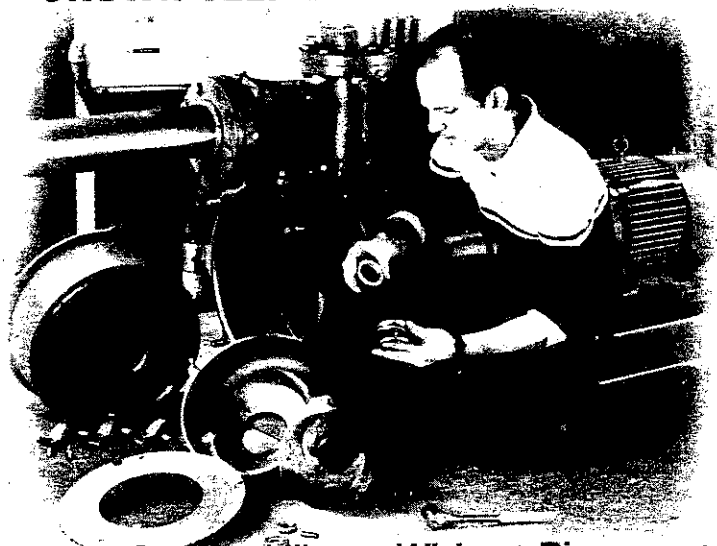
The agency will promote positive pub-

lic relations and encourage widespread participation in the overall nutrient management strategy; provide recommendations for nutrient tradeoffs, BMP targeting, and tracking; and compete for federal funding exclusive of Section 319 funds.

The program provides incentives for municipal and industrial entities to help NPS programs and to ensure their effective implementation. Pollution reduction credits granted from BMP participation provide incentives for participation in the program, even for those entities with relatively minor loadings. This same approach may be used eventually to address other basinwide pollution concerns caused by point and nonpoint sources, such as heavy-metals loadings.

—John C. Hall, Kilpatrick and Cody, Washington, D.C., and Malcolm Green, Greenville Utilities Commission, Greenville, N.C.

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## Smooth Startup Is Critical to Successful Operations

A smooth startup is the first critical step to long-term successful operations. Startup problems can delay efficient full-scale operations. According to the recent American Society of Civil Engineers' *Manual on Quality in the Constructed Project*, "To accomplish a successful startup, an effective organization is critical." Planning must begin well ahead of the actual scheduled startup date.

Startup at a wastewater treatment facility can be trying for owners, regulatory agencies, plant operational staff, engineers, and contractors. Each group has a special interest in seeing that startup proceeds smoothly and expeditiously.

The owner and regulatory agencies generally contract with the engineer and contractor to see that the startup goes smoothly. All involved in the startup have particular expectations. The operational staff wants to bring the facility on-line and into compliance as quickly as possible. The engineer wants to show the owner that payment for his services is well deserved, while the contractor wants to show that he has constructed the facility properly and to minimize costly delays that can develop during this critical period. And the equipment manufacturers involved are interested in a smooth startup to avoid costly problems and bad press.

In many cases, the startup period marks the first time the engineer, contractor, and plant staff have worked as a team. Often, the operational staff are unfamiliar with equipment incorporated into the facility.

A startup program should include establishing startup requirements in the