The 2000 Excellence in Environmental Engineering® competition reflects recent trends in practice, an increasing focus on water supply and wastewater treatment. This year’s entries ranged from projects costing more than $1 billion, which took years to complete, to projects costing a couple of million dollars implemented in just a few months. Nevertheless, all demonstrated a commitment to quality, comprehensive solutions to real-world problems which improve human life and the environment they serve.

Launched 14 years ago, the Academy’s Excellence in Environmental Engineering® competition singles out those projects and programs for recognition which testify to the genius of mankind. Its criteria define what it takes to be the best in environmental engineering practice — a holistic environmental perspective, innovation, proven performance and customer satisfaction, and contribution to an improved quality of life and economic efficiency. The winners in 2000 exemplify these criteria.
Hyperion Wastewater Quality Improvement Program

Updating the 1950s Hyperion Wastewater Treatment Plant to provide full secondary treatment employed an impressive collaboration of the City of Los Angeles, the Joint Venture of Daniel, Mann, Johnson and Mendenhall/Black & Veatch plus 21 MBE firms, ten WBE firms, two other consultants and citizens to complete this $1.1 billion project. A flexible, phased, “fast-track” design and construction system was employed to fully maintain all operations during the 11 years of construction.

Constrained to the existing 144-acre site, space-saving processes were used, e.g., high-purity oxygen activated sludge and egg-shaped digesters. Closed oxygen reactors employing surface aerators with draft tubes were key to complying with increasingly stringent air regulations. Residuals are thickened and conditioned enabling land application. And, a $21 million water treatment facility employing microscreens, pressure filtration and disinfection treats 77 million gallons per day of secondary effluent for reuse. More than one million cubic yards of sand generated by site grading were used to restore nearby beaches.
Red water is a big problem in the nation’s older cities. It is often made worse by changing water quality to control lead. Advanced testing methods and pilot-scale simulations using representative pipe sections identified both the cause of red water and methods for its control. By increasing the pH and alkalinity and providing a small dose of orthophosphate both red water and lead levels can be controlled in Boston’s 3000-mile transmission network for only $169,000 per year.

Development of Red Water Control Strategies

Proposed rules limiting radon to 300 picoCuries per liter will impact at least 18,640 groundwater-based systems across the U.S. The report on a critical assessment of available and emerging radon removal technology systems provides timely, comprehensive, practical guidance for water utility personnel. An innovative technology — vacuum deaeration and granular activated carbon — was also pilot tested.

Critical Assessment of Radon Removal Systems

Right: The first pilot water distribution system simulator to use excavated large diameter pipe (6 inches). These pipes were excavated from in-service pipes from the Boston Water and Service Commission and fabricated into a multiple pipe rack pilot system. Below: This pipe shows the iron scale on the inside of the unlined cast iron pipe.

Pilot-scale facilities tested an innovative vacuum deaeration and granular activated carbon radon removal process.
In Tucson, the practice of blending treated Colorado River water and groundwater produced corrosion by-products which turned the drinking water brown. Bench-scale and pilot-scale testing determined that pH adjustment and polyphosphate addition could control corrosion in the blended water. An innovative demonstration program, which temporarily supplied the treated, blended water to clusters of 15 to 20 volunteer homes throughout the city for a 90-day test period reassured, a skeptical public enabling the design and construction of the necessary treatment facilities to proceed.

Homes in test areas were supplied with blended water delivered in specially-identified stainless steel tanker trucks.

Tucson Water Planning Project

New York City relies on an extensive network of protected watersheds and reservoirs to supply approximately 90% of its water — 1.9 billion gallons per day. A 30-month long pilot testing program proved that direct filtration with ozone could inactivate 99.999% of cryptosporidium organisms at filtration rates up to 13 gpm/sq ft, a rate higher than any other in the Northeast.

Custom-built pilot facilities enabled concurrent testing of multiple process trains and unit process operations.
South Bay Ocean Outfall

The City of San Diego and the International Boundary and Water Commission partnered to solve the decades-old South Bay pollution. Extensive modeling determined that an ocean outfall terminated 4.5 miles offshore could dispose treated, unchlorinated wastewater and meet California Ocean Plan standards.

The 335 MGD ocean outfall includes a 190-feet deep, a 36-feet diameter landside access shaft constructed using freeze-wall technology, 19,000 feet of 11-feet diameter tunnel terminating at a 9-feet diameter ocean riser leading to a 4,000 feet diffuser system 75 feet under water. The project included many construction feats. Most notable was the main outfall tunnel. It was constructed in a difficult geologic setting with an earthquake-resistant, single-pass liner composed of five, fully-gasketed pre-cast segments installed as an earth pressure balance tunneling machine progressed.

Yarmouth Landfill Closure & Reuse

In closing its 40-year old landfill, Yarmouth, Massachusetts turned a 57-acre liability into a community asset. The key is a revenue-generating, 9-hole golf course. Buried pipes irrigate the course with wastewater effluent and surface water runoff detention basins double as water hazards. Playgrounds, ball fields, a recreation center, a 3-mile biking trail and a recycling/composting facility surrounding the golf course provide something for everyone.

A golfer enjoys Yarmouth’s new golf course. In the background is one of the multi-purpose lined ponds which control surface runoff, provide irrigation water, and also serve as water hazards.
Hillview Reservoir Sediment Cleaning Program

New York City's one billion gallon, two-cell Hillview distribution reservoir needed cleaning to remove 90 years of sediments suspected of contaminating the water. To protect the environment and not disrupt the City’s supply required raising the dividing wall 48 feet. To prevent collapse of this wall holding back more than 450 million gallons of water, an innovative groundwater management and monitoring system enabled lowering the groundwater table as the other half the reservoir was slowly drained. Once drained, the sediment was pushed into corrals, pumped out as a slurry, dewatered, and landfilled.

Monitoring and Maintenance of Ocean Outfalls

The Sanitation Districts of Los Angeles County sends approximately 350 MG of effluent to the ocean each day through four large outfalls. The Districts' have long maintained an intensive and diligent ocean monitoring program, using a fully-equipped ocean research vessel and divers, which has proved that as the effluent quality improved, so did marine biological health.

Recently, these outfalls were reballasted using telescopic tremie fall pipes and multi-beam sonar technology to place more than 36,000 tons of rock along 21,000 linear feet of outfall pipe at water depths ranging from 36 to 200 feet in eight weeks.
Carbon fiber liners were applied in situ; the number of layers of carbon fiber were determined by tests of the pipe’s pressure rating and loading condition.

Aqueduct Repair and Rehabilitation

A rupture of Providence Water’s 5-mile long, 102-inch diameter aqueduct provided the impetus for development of an innovative prestressed concrete pipe rehabilitation method using a carbon fiber liner — a composite of epoxy chemicals and woven carbon fiber fabric. The technique enabled strengthening vulnerable sections without digging up the pipe. The project saved Providence Water millions and proved a new method for in situ repair of prestressed concrete pipe.

City of Mackinac Island Water Filtration Plant

The historic city of Mackinac Island with 500 permanent residents swells to 15,000 during the peak summer tourist season. Microfiltration proved capable of producing high quality water with large swings in demand. The small size of the process facilities permitted installation within the existing plant building, thereby preserving the natural beauty of lakeshore and the historic setting.