MASSACHUSETTS' WALL EXPERIMENT STATION: AN ENVIRONMENTAL GUARDIAN

by *Marie France,* writer

Rich as it is in history, the Senator William X. Wall Experiment Station (WES) is now a construction zone, said its director, Oscar C. Pancorbo, PhD, and it is his job to ensure that this National Historic Civil Engineering Landmark operates smoothly even as it undergoes a major expansion and upgrade.

Fortunately, Pancorbo's bent for laboratory know-how surfaced early in his career. The environmental health services lab he established at East Tennessee State University, Johnson City, still operates much as he devised it when he was an associate professor there in the 1980s. His mastery of environmental health science also is well established. From 1986 to 1992, he was an associate professor in that field, as well as in toxicology and ecology, at the University of Georgia, Athens. His research results have appeared in more than 50 peer-reviewed publications, on topics in environmental microbiology, toxicology, and chemistry—all at the interface of environmental protection and public health.

Born in Matanzas, Cuba, Pancorbo came to this country with his family when he was seven years old. He grew up in Miami and studied at the University of Florida, Gainesville, where he received advanced degrees in environmental engineering sciences, and a bachelor's degree in zoology.

LOCATION

Lawrence, MA, grew out of the visionary plans of nineteenth-century industrialists who capitalized on easy access to Boston and the power of the Merrimack River. They combined these assets with an engineered system of canals to generate huge mills. By the early twentieth century, the city was among the world's top textile producers and remained a great wool-processing center until the 1950s. When that industry declined, Lawrence struggled. In recent years, however, new investors put the former mill buildings to new residential and commercial uses. Today industry continues to drive more than a third of the economy, including textiles, apparel and shoes.

It was because of its industry that Lawrence earned its nickname, "Immigrant City." Early on, the city drew workers from all over Europe. Today the population of about 72,000 is largely of Latino descent but also includes recent arrivals from Southeast Asia.

FACILITY

Situated in the heart of Lawrence, WES houses the Division of Environmental Analysis (DEA), which Pancorbo also directs. DEA consists of two units, the Massachusetts Environmental Laboratory, and the Laboratory Certification Office. WES also houses the Air Assessment Branch, which monitors ambient air quality throughout the state. All of these entities operate as part of the Massachusetts Department of Environmental Protection.

Celebrated as the birthplace of environmental research in America, WES has been associated with innovation since 1887, when the state Board of Health established what was then called the Lawrence Experiment Station. From the first, the station's purpose was to develop practical methods for treating sewage, industrial waste and public drinking water supplies. Scientists from the Massachusetts Institute of Technology pioneered station studies of community water supply, wastewater disposal problems and sanitary-related investigations. They and their colleagues laid the foundation for modern methods of wastewater treatment and of drinking water purification, eventually used throughout the world.

Hiram Mills, the "Father of American Sanitary Engineering," was the station's first director, while William Sedgwick, a biology professor at MIT, oversaw its early bacteriological and biological research. In the 1890s, the two men identified sewage-polluted water from the Merrimack River as the cause of the typhoid fever epidemics (*Salmonella typhi*) that plagued the cities of Lawrence and Lowell, which used the river as their water supply. Mills designed slow sand filters to deal with the pollution, and in 1893 Lawrence began using his innovation. Thus the city became the first in the country to filter its water as a disease-prevention measure, and not just as a means of aesthetic improvement. Known as the Mills-Reincke phenomenon, the filtration innovation led to marked reductions in the city's typhoid fever rate and in the overall death rate.

The American Public Health Association has recognized the station's contributions in its *Milestones of Public Health in America,* a poster later reprinted in the *American Journal of Public Health's* 75th anniversary issue, which traced three centuries of public health achievements from colonial America to 1926.

Currently DEA operates with the support of 24 full-time employees, and soon hopes to fill two vacancies for a total of 26. Staff members work in DEA's Environmental Laboratory and in its Laboratory Certification Office, and Pancorbo and his deputy director manage the station facility as a whole.

Experience in environmental laboratory sciences averages 17 years, with a range of 5 to 28 years among DEA's 19 scientists. All of them hold at least a bachelor's and several hold doctoral degrees in disciplines that include chemistry, biochemistry, environmental science, environmental engineering sciences, geochemistry, marine science and microbiology.

Stability is high. "The only turnover is associated with older employees retiring," Pancorbo said. Yet finding new hires will remain a challenge, as a "significant" number will retire over the next 10 to 15 years.

In 1993, the Lawrence Experiment Station was rededicated as the Senator William X. Wall Experiment Station to honor the late senator's instrumental contributions to the station's success.

REVENUE

DEA receives $2 million annually to operate, with 81% from state operating accounts, and the remaining 19% from the EPA. Twenty-five percent of the budget is used to operate the Laboratory Certification Office, which also collects some $200 million each year in certification fees from state labs.

TESTING

DEA performs some 15,000 analyses annually. Water, wastewater, air, soil, hazardous wastes, fish and other samples for contaminants are analyzed. Largely associated with enforcement cases and special environmental monitoring studies, environmental monitoring data are used to make operational and programmatic decisions, support major criminal and civil enforcement actions, and investigations that identify pollution sources, which then become the subject of enforcement. The data are also used to measure the success and environmental impact of protection efforts.

The new WES building will incorporate high energy efficiency, renewable energy (photovoltaic cells on the roof), day lighting in a significant portion of its work areas, a green roof, a native meadow landscape that requires no irrigation, a rain garden for storm water treatment and management and grey water reuse, among other features.

DEA does not usually analyze routine compliance monitoring samples from public water supplies. Commercial and municipal laboratories are vetted to do so instead. This deputizing approach allows DEA to focus on enforcement and other critical samples too often neglected precisely because of the demands placed on labs to perform everyday analyses.

DEA plays a critical role in the investigation and prosecution of environmental crimes by the state Environmental Strike Force, in water quality assessments associated with the Massachusetts Watershed Initiative and in investigations and cleanup of hazardous waste sites and landfills that affect public health.

SUCCESS STORIES

In the spirit of its innovative history, DEA remains deeply engaged in better characterizing and protecting the environment and public health. Examples include two new ways to more accurately assess petroleum-contaminated water and soil—the Massachusetts Volatile Petroleum Hydrocarbon and the Extractable Petroleum Hydrocarbon Methods—now used widely throughout the United States and in parts of Canada. In 1998, Pancorbo and his staff of organic chemistry supervisors received the Commonwealth of Massachusetts Citation for Outstanding Performance for their development and validation of the methods.

More recently, DEA developed and implemented a laboratory program to monitor low-level perchlorate (down to 1.0 µg/L) in public drinking water systems. Based on the resulting data, Massachusetts established the first perchlorate drinking water standard (2 µg/L) in the United States. In recognition of this milestone, DEA received the state's Citation for Outstanding Performance and the 2005 Manuel Carballo Governor's Award for Excellence in Public Service.

BIGGEST CHALLENGE

Undoubtedly, the biggest challenge that faces the station today is to operate a production laboratory during a major renovation, Pancorbo said.

GOAL

Likewise, the biggest goal is to successfully complete the $25.3-million WES Renovation-Expansion Project on time and within budget, with minimal impact on analytical productivity, he said. A new four-story laboratory wing attached to the existing WES building is scheduled for completion in July 2009. Renovation of the existing building, including added laboratories, should be complete in April 2010.

The station's renovation includes a carefully considered plan to achieve gold—or even platinum—certification in the Leadership in Energy and Environmental Design (LEED®) – US Green Building Council rating system. To achieve the much-vaunted certification, the new WES building will incorporate high energy efficiency, renewable energy (photovoltaic cells on the roof), day lighting in a significant portion of its work areas, a green roof, a native meadow landscape that requires no irrigation, a rain garden for storm water treatment and management and grey water reuse, among other features.

DISTINGUISHING CHARACTERISTICS

Thus far, the Laboratory Certification Office has certified 145 laboratories in Massachusetts and neighboring states to perform routine chemical and/or microbiological analyses of potable and/or nonpotable water. As the largest in New England, the program works to ensure that contractors produce high-quality monitoring data.

The arrangement allows WES scientists to focus on special compliance and enforcement (C&E) laboratory work that "we believe is inherently governmental and cannot and should not be privatized," Pancorbo said, namely, to stop illegal pollution. Some states focus on C&E more than others. In Massachusetts, the focus is sharp. ■