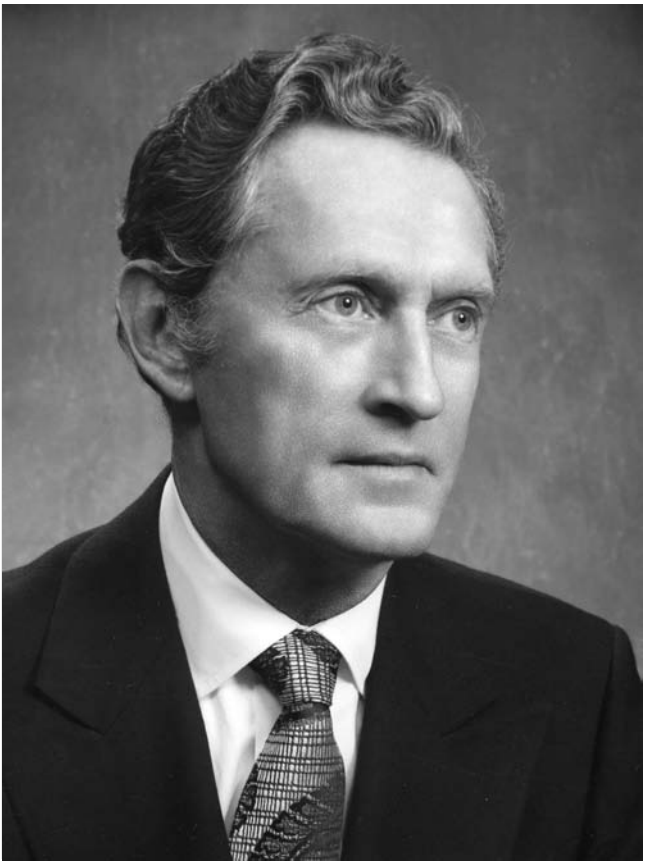

Donald F. O'Connor

DONALD J. O'CONNOR

1922–1997

Elected in 1978

"For leadership in the field of mathematical modeling to gauge the effects of pollution and abatement measures."

BY KEVIN J. FARLEY
SUBMITTED BY THE HOME SECRETARY

DONALD J. O'CONNOR, a distinguished professor at Manhattan College and a pioneer in the field of water quality modeling, died on April 18, 1997, at the age of 74.

Don was born in Brooklyn, New York, on November 7, 1922, the son of a scenic artist who painted sets for films, operas, and Broadway plays. His younger years with his mother, father, and younger brother Robert were happy times filled with laughter and early exposure to literature, philosophy, religion, and the arts. His early family influences initially led Don toward the liberal arts, with thoughts of following his father into a career as a scenic artist. The tough economic times of the 1930s, however, led Don to ultimately pursue a more practical career in engineering.

In 1940, Don accepted a partial scholarship to study civil engineering at Manhattan College. Although he had very little idea of what engineering involved, he was intrigued with its logic and its puzzle-solving nature. It was during his studies at Manhattan College that Don started to appreciate what he calls the beauty and the power of mathematics. In his junior year he was drawn to the civil engineering department's sanitary engineering option, where he studied under Professor Clarence J. Velz. It was Professor Velz who introduced Don to the Streeter-Phelps dissolved oxygen equation, which served as a focal point of Don's seminal work on water quality modeling over the next two decades.

After receiving his bachelor's degree in civil engineering from Manhattan College in 1944, Don served in the U.S. Army Medical Corps in Europe during the final years of World War II. He returned home in 1946 ready to continue his studies and pursue his career. He completed his master's degree in civil engineering at the Polytechnic Institute of Brooklyn in 1947 and accepted a job as a structural engineer with the design firm Parsons, Brinckerhoff, Hall and MacDonald. Away from the office, Don's fancy was soon captured by Anita Lordi, a dress buyer for a New York–based department store. They married in 1948 and soon after had three children—Dennis, Arlene, and Jeanette.

While juggling the responsibilities of a full-time job and a new family, Don began his doctoral work in sanitary engineering at New York University. Shortly after, he left his full-time job as a structural design engineer to assume a full-time teaching position at Manhattan College. He continued his doctoral studies at night. Don's research initially focused on the hydraulics of side-channel weirs for combined storm water systems. However, he found water quality issues much more challenging, and he was particularly intrigued by what happened to oxygen levels in streams impacted by wastewater discharges. This led Don to reexamine the Streeter-Phelps equation, which he had first studied at Manhattan College 10 years earlier.

Don received his doctorate in engineering science from New York University in 1956 for his dissertation titled "The Mechanism of Reaeration in Natural Streams." This work established the basis for quantitative definition of the reaeration coefficient in streams. It is still being used today and is the basis of the O'Connor-Dobbins equation, named after Don and his doctoral adviser, William Dobbins.

Don's work on reaeration was followed by further work on dissolved oxygen depletion in streams. He extended the range of applicability of the Streeter-Phelps dissolved oxygen equation with the addition of the photosynthetic source, nitrification, and benthic sinks. His most lasting accomplishment, though, was his solution to the estuary problem, which involved application

of the Streeter-Phelps dissolved oxygen framework to what appeared to be a hopelessly complex physical setting that included tidal motion, stratification, and irregular geometry. His solution was to model the slack water distributions and represent longitudinal mixing using a dispersion coefficient. According to his colleagues, "This was vintage O'Connor: an insightful manipulation of the data (slack time concentrations translated to mean tide positions) combined with an intuitive leap to a mathematical model (tidal- and density-driven mixing modeled as a dispersion coefficient)." His 1960 paper in the sanitary engineering journal on the subject is considered by many to mark the beginning of modern water quality modeling.

Realizing the need for expert services in sanitary engineering and water quality modeling, Don and fellow faculty colleague Wes Eckenfelder founded Hydroscience, Inc., in 1962. This was one of the first consulting firms in the country to specialize in combined wastewater treatment planning and analysis of water quality impacts. One of the firm's early projects was a comprehensive water quality study of the New York–New Jersey Harbor complex. The work, which was based largely on Don's application of the Streeter-Phelps framework to the estuary problem, has served as a basis for subsequent water quality studies of the harbor.

The implementation of secondary wastewater treatment in the late 1960s and early 1970s brought tremendous improvements in dissolved oxygen levels in streams and estuaries, as well as a new set of water quality concerns. During this time, Don and his colleagues at Manhattan College turned their attention to problems of nutrient enrichment. Don worked extensively with Bob Thomann and Dominic Di Toro in developing eutrophication models to assess the impact of nutrients on algal growth. Those models were applied in studies of the Great Lakes and a number of estuaries. Expanding his seminal work on estuaries in the 1960s, Don focused largely on eutrophication problems in the Sacramento–San Joaquin Delta, the Chesapeake Bay, and the New York Bight.

In the late 1970s and early 1980s, Don expanded his work

on estuaries to address new concerns of toxic contamination by pesticides and other industrial chemicals. During this time I had the honor of working with Don in developing the first model for the pesticide Kepone in the James River estuary of the Chesapeake Bay. The model synthesized multiple factors, including hydrodynamics, sediment transport, and chemical behavior, into a comprehensive analysis. This approach continues to serve as a basis for current modeling studies of toxic contamination in rivers, lakes, and estuaries. In the late 1980s, Don carved out a new research topic, namely, seasonal and long-term variations of dissolved solids in lakes and reservoirs. His final work in the 1990s led him back to his earlier work on gas exchange in natural waters.

Don's work in mathematical modeling of water quality will always stand next to that of the great researchers and practitioners in the environmental field. The insights gained through carefully constructed analytical models of water quality processes, developed long before the advent of modern computers, and the steadfast insistence on comparison of model results to observed data are hallmarks of his work.

Don's accomplishments are documented by his many publications and awards. He received four Rudolf Hering medals (1959, 1966, 1984, 1989) and the J. James R. Croes Medal (1991) from the American Society of Civil Engineers (ASCE) Environmental Engineering Division (EED). These awards clearly reflect the four decades of significant contributions that Don made to the environmental engineering field. Based on his work in water quality modeling, Don was elected to the National Academy of Engineering in 1978. The following decade he was named the Association of Environmental Engineering Professors Distinguished Lecturer in 1986, the Gordon M. Fair Distinguished Educator by the Water Pollution Control Federation in 1989, and the ASCE-EED Simon W. Freese Distinguished Lecturer in 1990.

In addition to his research and consulting activities, Don gave generously of his time to serve on countless boards and advisory panels. From 1972 to 1977, he served on the advisory committee to chart the role of the National Oceanic

and Atmospheric Administration. During the 1980s and early 1990s, he served on the Environmental Engineering Committee of the U.S. Environmental Protection Agency's Scientific Advisory Board and the Water Science and Technology Board of the National Research Council.

Perhaps it is Don's legacy as a teacher of so many members of our profession that will stand as his greatest achievement. Over his five decades at Manhattan College, he combined a remarkably clear teaching style with an infectious excitement and enthusiasm for environmental engineering. His chalk renderings on the blackboard reminded us of the scenic artist that he could have been, and his tales of consulting experiences from around the world kept us glued to our seats. But it was his enthusiasm for using mathematics to solve real-world problems that was most contagious. Don opened our minds to the many dynamic processes affecting streams, lakes, and estuaries through the beauty of mathematical modeling for which we are all forever grateful.

Don is survived by his children—Dennis O'Connor, Arlene O'Connor Bell, and Jeanette O'Connor—and by two grandchildren, Christopher and Kristin, as well as by many of his former colleagues and students whom he deeply inspired during his wonderful career.