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the  
**KAPPE**  
**LECTURE**  
Series

2008

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# THE 2008 KAPPE LECTURER



## **JEANETTE A. BROWN, PE, BCEE**

Executive Director, Stamford Water Pollution Control Authority

### **EDUCATION**

University of Maryland, BS  
Manhattan College, MS

### **PROFESSIONAL CREDENTIALS**

Registered Professional Engineer, Connecticut  
Board Certified Environmental Engineer, AAEE  
Fellow, American Society of Civil Engineers

### **PROFESSIONAL HONORS**

Water Pollution Control Federation Hatfield Award for outstanding contribution to the field of wastewater treatment  
NEWPCA Operator of the Year, for excellence in operations  
Governor's Environment 2000 Award for contributions to improving the water quality of Long Island Sound  
Stamford Water Pollution Control Facility selected by EPA as the best large, advance wastewater treatment plant in the United States  
ASCE State-of-Art award for Water Residuals manual  
NEWEA Alfred E. Peloquin Award for significant contribution to the field 2000  
Tau Chi Alpha, Environmental Engineering Honor Society  
NEWEA Public Educators Award  
Water Environment Federation Public Educators Award  
EPA Region 1 Merit Award-Stamford WPCA

Jeanette Brown has worked as an environmental engineer for over 30 years. She is responsible for the operation of a 24 million gallon per day advance wastewater treatment plant, 25 pumping stations and 300 miles of sanitary sewer systems. In addition, she is responsible for the implementation and compliance of the Phase 1 Stormwater Permit for the City of Stamford and has been a leader in the nitrogen program for Long Island Sound and serves on the Nitrogen Credit Advisory Committee. She is also responsible for all capital projects associated with the wastewater treatment plant and collection system, including the recently complete \$105 million upgrade and expansion of the wastewater treatment plant. Her areas of expertise included biological nitrogen removal and biosolids management. In addition, she is an adjunct professor of Environmental Engineering at Manhattan College where she teaches wastewater treatment plant design. In March 2007, she had the opportunity to appear before the House Appropriations Subcommittee on Interior and Environment to discuss the need for wastewater funding.

Jeanette has been involved in many research projects including developing operational modifications of existing activated sludge treatment plants to remove nitrogen with little or no capital investment and development of the "Stamford Baffle", which is used nationally and internationally to improve clarifier performance. Currently, she is Project Manager for a Department of Energy sponsored waste-to-energy research project and EPA sponsored river restoration project.

Jeanette is Past President of the American Academy of Environmental Engineers and is currently President of the Environmental and Water Resources Institute of the American Society of Civil Engineers. She is a member of the Water Environment Federation House of Delegates, has been nominated to the WEF Board of Trustees and is Chair of the ASCE National Water and Energy Policy Committee. In addition, she has been a principal contributing author on several WEF manuals of practice and has presented numerous papers at technical conferences in US and Europe.

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# ABSTRACTS OF LECTURES OFFERED

## **LECTURE 1: NUTRIENT REMOVAL TO HELP RESTORE WATER QUALITY IN LONG ISLAND SOUND**

During the early 1980's, the waters of Long Island Sound showed significant degradation, mostly in the form of low dissolved oxygen. This resulted in the death of lobsters and a decline in numbers and species of finfish in the southwestern portion of the Sound. Legislators in the States of New York and Connecticut supported monitoring and research programs and development of an action plan to preserve and protect the waters of Long Island Sound. Their support resulted in legislation and financial assistance from congress and the creation of the Comprehensive Conservation Management Plan (CCMP) which with the approval EPA, New York and Connecticut. The CCMP was an important document, which identified several problems associated with the degradation of water quality in Long Island Sound, including hypoxia, or low dissolved oxygen (DO), toxic contamination, pathogen contamination, floatable debris, habitat loss and its impact on living marine resources, and land use and development that degrades habitat and water quality. Of these problems, hypoxia was determined to be the most serious.

Hypoxia appears to be caused by large amounts of nitrogen discharged to Long Island Sound by wastewater treatment plants, surface runoff and atmospheric deposition. Nitrogen is typically the limiting nutrient for phytoplankton, a microscopic plant. When phytoplankton dies, it sinks to the bottom where the decaying phytoplankton use oxygen in the water column, thus reducing the dissolved oxygen in many cases to less than 2 mg/L. The CCMP concluded that the main objective for Long Island Sound corrective actions was to reduce the amount of nitrogen entering the Sound to increase the DO concentrations.

Located in the Western reach of Long Island Sound near New York City, the Stamford, CT, Water Pollution Control Authority (SWPCA) became pro-active in working to protect and improve the

water quality in the sound and was the first municipality in CT and the New York City metropolitan area to begin experimenting with nitrogen removal. In the early 1990's, SWPCA conducted a study funded by the U.S. Environmental Protection Agency (EPA) to demonstrate new nitrogen removal technology. This project was followed in the late 90's by plant improvements to further enhance nitrogen removal (50 to 60% nitrogen removal) and then a \$105 million upgrade and expansion of the treatment facility of which about \$50M was associated with nitrogen removal processes. Designed to achieve nitrogen removal on the order of 80 to 90% to levels of 4 mg/L Total nitrogen (TN) or less, the upgraded plant has been operating in the high level nitrogen removal mode since the spring of 2006.

This lecture will describe how SWPCA participated in the nitrogen reduction program on both a state and regional level and the various research and development projects and benefits. Furthermore, it will include a description of the upgrade and expansion project, complexities of funding and approval processes for the project, the Connecticut Nitrogen Credit Trading Program and current plant performance.

## **LECTURE 2: UNIQUE BIOSOLIDS MANAGEMENT PROGRAM**

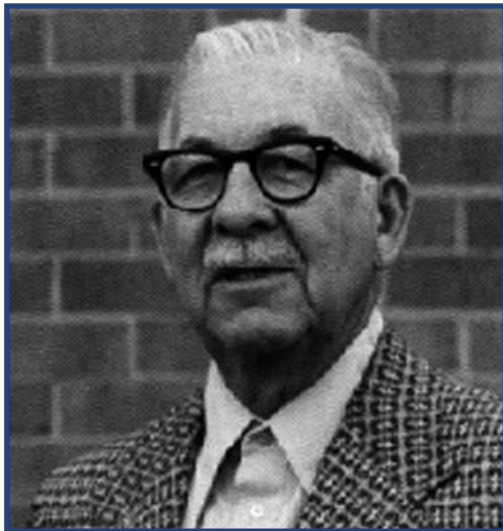
Stamford has a unique history in biosolids management. In the early 1970's until mid 1990's, Stamford dried waste solids using heat supplied from their refuse incinerator and then burned the dried sludge along with the refuse. This was a very economical process and the only drying system in the United States that used waste heat. In the 1990's, the City of Stamford decided to shut down the refuse incinerators because of the cost of upgrading to meet air emission standards. They choose to haul solid waste out of town where it was either landfilled or incinerated. The decision was a serious problem for the SWPCA which resulted in increased operating costs from about \$52 per dry ton to \$320 per dry ton. Furthermore, it meant hauling

dewatered sludge long distances to either a landfill or incinerator. From 1996 to 2005, the SWPCA tried to get approval to build a solids drying and pelletizing facility, however neither City officials nor Connecticut Department of Environmental Protection were willing to fund it. Since the drying process is a very sound environmental method of disposal, the SWPCA continued to pursue this option, but included the use of the dried pellets as a potential energy source rather than to be used on land.

Stamford is located in southwestern Connecticut which is the fastest growing area of Connecticut. Many corporations have chosen Stamford as the location for their corporate office. Increasing population has resulted in an increased need for housing and has placed demands on utilities. The power utility has been impacted the most and Stamford is in an electrical congestion area with residential, commercial and industrial users paying extremely high surcharges for electricity. Because of the demand and high cost of energy coupled with a concern about the dependence of the United States on foreign oil and non-renewable energy sources, the Stamford Water Pollution Control Authority (SWPCA) proposed a project to demonstrate that dried and pelletized wastewater residuals could be used as a renewable energy source to generate electrical power. This waste to energy project has received research and development funding from the Department of Energy and US EPA with the goal to determine the technology needed to convert pellets of dried wastewater residual into a renewable fuel and then design and construct that facility.

This lecture will describe the various aspects of biosolids management in Stamford including public acceptance, regulatory issues and permitting requirements. It will also describe the research and development program and project status. Furthermore, it will describe concepts of energy management districts and the positive impact on procuring funding and approval for electrical generation facilities.

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"A man's debt  
to his profession  
is to help  
those that follow"

**STANLEY E. KAPPE, P.E., DEE**, a successful environmental engineer, believed he owed a debt to the profession that rewarded him so well. During his life, he gave of himself to his university and to his profession through countless hours of volunteer activity. And, through this Lecture Series, he continues to share his good fortune with tomorrow's environmental engineers.

He graduated from Pennsylvania State University in 1930 with a bachelor's degree in sanitary engineering. He served with the Pennsylvania State Health Department and the U.S. Army Corps of Engineers before joining the Chicago Pump Company as its Eastern Regional Manager in 1935. In 1945, he founded Kappe Associates, Inc., a water supply and wastewater equipment company headquartered in Rockville, Maryland, and continued as its Chief Executive Officer until his death in 1986.

His peers recognized his contributions to the profession by numerous awards, including the AWWA Fuller Award, the WPCF Arthur Sidney Bedell Award, the WPCAP Ted Moses and Ted Haseltine Awards, and the AAEE Gordon Maskew Fair Award. In 1985, Pennsylvania State University named him Outstanding Engineer Alumnus.

Stanley E. Kappe was an activist member and leader in several national and Chesapeake region professional societies. He served as the Executive Director of the American Academy of Environmental Engineers from 1971 to 1981.



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