NATIONAL WATER RESEARCH INSTITUTE

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JOHN CRITTENDEN TO RECEIVE 2015 NWRI CLARKE PRIZE
Georgia Tech Professor Honored for Research Contributions to Water Treatment Technology and Water Resource Sustainability

FOUNTAIN VALLEY, Calif. – The National Water Research Institute (NWRI) is pleased to announce that environmental engineer, John C. Crittenden, Ph.D., P.E., N.A.E, C.A.E., Director of the Brook Byers Institute for Sustainable Systems at Georgia Institute of Technology, will be the twenty-second recipient of the NWRI Athalie Richardson Irvine Clarke Prize for excellence in water research. Crittenden is the Hightower Chair and Georgia Research Alliance Eminent Scholar in Environmental Technologies and a professor in the School of Civil and Environmental Engineering at Georgia Tech in Atlanta, Georgia.

Consisting of a medallion and $50,000 award, the NWRI Clarke Prize is given out each year to recognize research accomplishments that solve real-world water problems and to highlight the importance and need to continue funding this type of research. Crittenden was selected as the 2015 recipient because of his outstanding contributions to treating chemical contaminants in water and his leadership in addressing water demand for transportation, energy production, and domestic use in a holistic, sustainable manner. "I consider the Clarke Prize to be one of the greatest honors that one who conducts water research can receive," said Crittenden.

With a career spanning 37 years, Crittenden has been a pioneer in the research and development of water treatment technologies, particularly physical-chemical treatment processes. He first began examining the use of granular activated carbon (GAC) to absorb toxic organic compounds, such as industrial chemicals, from air and water while working with the American Water Works Association Research Foundation and U.S. Environmental Protection Agency in the early 1980s. At some treatment plants, air stripping is used to transfer organics out of the water and into air, and then GAC is used to adsorb these organics from the air. Crittenden found that if the relative humidity of the contaminated air stream is reduced through heating, then GAC becomes more effective in adsorbing organics. It is now common practice to heat air before it enters the GAC system. Crittenden's research has also paved the way for a greater practical understanding of advanced oxidation, which uses chemical treatment processes to destroy organic compounds present in groundwater and wastewater.

One of Crittenden's passions has been the development of mathematical models to predict the performance of physical-chemical treatment processes. This pursuit led him to develop a model called the Rapid Small Scale Column Test (RSSCT), which uses a simple set of experiments to simulate the operation of full-scale GAC treatment systems. Now an industry standard, RSSCT makes it possible for engineers to efficiently design GAC treatment systems more quickly and

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cost-effectively than traditional methods. "Dr. Crittenden's development of the RSSCT method was a major breakthrough in absorption technology," said Michael McGuire, Ph.D., P.E., N.A.E., of the University of California, Los Angeles.

An intellectual leader in environmental engineering, Crittenden served as the senior author of the 2011 textbook, *Water Treatment: Principles and Design,* which has sold more than 10,000 copies. Another significant collaboration was the development of software to assess and implement effective treatment strategies. Together with his colleagues, he developed mathematical models called the Environmental Technologies Design Option Tools (ETDOTs), software routinely used for the preliminary design of GAC, air stripping, and advanced oxidation systems. These tools have also been used to optimize the water treatment system for the International Space Station. Crittenden and his colleagues worked with NASA to alleviate the costs of sending fresh water to space by helping to design a system on board the International Space Station to recycle impaired waters like wastewater, urine, and humidity condensation containing volatile organics from electronic equipment. NASA launched the system into space three years ago, and it has been in use ever since.

Crittenden is also distinguished among his peers for his vision and dedication to developing sustainable urban water resources. He takes a holistic approach that considers more than designing water treatment plants to remove contaminants – for him, it is essential to find alternative chemicals and approaches to keep harmful chemicals from being used in commerce. At Michigan Technical University, he directed a center for "green" chemistry and environmentally responsible engineering that focused on eliminating contaminants rather than just treating them. It involved engaging professionals from various disciplines to collaborate on research such as developing clean technologies for manufacturing and chemical production. Because of his leadership in this area, Crittenden was selected by the American Institute of Engineers as one of the *100 Eminent Chemical Engineers in Modern Times.*

In 2008, Crittenden was recruited to Georgia Tech to direct the Brook Byers Institute for Sustainable Systems (www.sustainable.gatech.edu), established to create technological, management, and policy strategies to ensure a sustainable future (that is, "living within the means of nature"). To do so, researchers there, led by Crittenden, take a comprehensive approach in which systems are studied as a whole with all their complexities. Crittenden's particular interest is in developing sustainable water resources for people, agriculture, and the environment through a system-wide examination of water use in transportation, energy production, low-impact development (such as green roofs and permeable pavement), and land use. As an example, Crittenden's team estimated that the electrification of personal cars driven in the City of Atlanta would use more water than the amount of water consumed for irrigation and household use combined. "His work in sustainability is particularly bold and innovative, and will change the way we will promote water security, enhance economic development, and alleviate concerns of wars over water," said Joseph B. Hughes, Ph.D, P.E., DEE, of Drexel University.

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The Clarke Prize will be presented to Crittenden on Friday, October 30, 2015, at the Twenty-Second Annual NWRI Clarke Prize Lecture and Award Ceremony, to be held in Huntington Beach, California. The award ceremony is the highlight of the NWRI Clarke Prize Conference, a one-day event that features a mix of leading-edge research by academics complimented with practical case studies by industry practitioners.

Established in 1993 in honor of NWRI's co-founder, the late Athalie Richardson Irvine Clarke, the Clarke Prize is one of only a dozen water prizes awarded worldwide and has been distinguished by the International Congress of Distinguished Awards as one of the most prestigious awards in the world. Recent past recipients of the Clarke Prize include: civil and environmental engineer David L. Sedlak, Ph.D., of the University of California, Berkeley (2014); civil and environmental engineer R. Rhodes Trussell, Ph.D., P.E., BCEE, NAE, of Trussell Technologies, Inc. (2013); environmental engineer Pedro J.J. Alvarez, Ph.D., P.E., DEE, of Rice University (2012); environmental engineer Mark R. Wiesner, Ph.D., P.E., of Duke University (2011); and environmental engineer Jerald L. Schnoor, Ph.D., of the University of Iowa (2010).

More information about the NWRI Clarke Prize Conference and Award Ceremony can be found at www.clarkeprize.com.

The National Water Research Institute (NWRI) was founded in 1991 by a group of Southern California water agencies in partnership with the Joan Irvine Smith and Athalie R. Clarke Foundation to promote the protection, maintenance, and restoration of water supplies and to protect the freshwater and marine environments through the development of cooperative research work. NWRI's member agencies include Inland Empire Utilities Agency, Irvine Ranch Water District, Los Angeles Department of Water and Power, Orange County Sanitation District, Orange County Water District, and West Basin Municipal Water District. Please visit www.nwri-usa.org for more information.

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