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LIFT award honors MWRD data analytics for intelligent water systems

(L–R) MWRD Assistant Director of Monitoring and Research and President of the Water Environment Federation Tom Kunetz, Commissioner Frank Avila and Senior Environmental Soil Scientist Kuldip Kumar celebrate the MWRD's award winning data analytics project.

Nina Kshetry, president of Ensaras, Inc. and MWRD Senior Environmental Soil Scientist Kuldip Kumar presented a complex approach to using data to develop odor control measures that can be practically applied at locations throughout the world.

A team of scientists with the Metropolitan Water Reclamation District of Greater Chicago (MWRD) and research partners earned second place honors in an inaugural competition challenging participants to develop new tools to improve local water and environmental quality through data analytics and artificial intelligence.

The Intelligent Water Systems Challenge was a national competition featuring 19 teams of students, professionals and technology experts who used innovation and data to help solve difficult issues facing water and wastewater utilities. Winners were announced following finalists' presentations that were delivered last week at WEFTEC, the Water Environment Federation's Technical Exhibition and Conference, in New Orleans.

"Congratulations to our participants striving to improve our quality of life and our water environment through their many talents and resourceful thinking," said MWRD President Mariyana Spyropoulos. "Our two competing teams voluntarily went beyond their daily tasks to demonstrate ingenuity, leadership and problem solving skills."

The Intelligent Water Systems Challenge was hosted by the Leaders Innovation Forum for Technology (LIFT), a joint effort of the Water Environment Federation (WEF) and the Water Research Foundation. The challenge began in April and required the 19 participating teams to address real-world problems.

"As we continue to support and promote innovation in the water sector, we are also looking for ways to integrate practical applications," WEF Executive Director Eileen O'Neill said. "Our hope is that the Intelligent Water Systems Challenge will demonstrate the value of intelligent water systems to utilities and help foster the adoption of smart water technologies."

Each team was comprised with both professionals and students. Joined by graduate students from the University of Illinois at Chicago, a professor from the University of Illinois at Urbana-Champaign and Ensaras, Inc., which specializes in wastewater treatment and analytics, the MWRD team set out to create solutions to odor issues. The team, led by MWRD's Senior *(continued)*

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Environmental Soil Scientist Kuldip Kumar and Environmental Soil Scientist Dominic Brose, developed a predictive model to provide MWRD staff with advanced warning before odors emerge at the Thornton Composite Reservoir so corrective actions could be taken in advance. The algorithm that was developed can also be used to evaluate the efficacy of odor mitigation solutions at Thornton Reservoir and at other locations.

Completed in 2015, the Thornton Composite Reservoir works to mitigate flooding and has nearly eliminated combined sewer overflows in the Calumet Rivers and Cal-Sag Channel by collecting untreated water before it enters waterways. The reservoir benefits 556,000 people in 14 communities throughout the South Side of Chicago and south suburbs and protects 182,000 homes, businesses and other facilities. In addition to building a system unequalled in size throughout the world, the MWRD has invested millions of dollars in odor control measures and closely monitors odor issues, while addressing water quality and flooding.

A second MWRD team, led by the MWRD Senior Environmental Research Scientist Fenghua Yang and Assistant Director of Monitoring and Research Tom Kunetz, provided a tool to address ammonia and enhanced biological phosphorus removal at the Kirie Water Reclamation Plant. The team created a data-driven model using routinely-collected data to make one-day-ahead predictions of ammonia and orthophosphate in treated water. The model does not require the installation of new sensors or laboratory procedures.

"Thank you to LIFT, WEF and the Water Resource Foundation for encouraging these talented minds to work toward critical solutions in the water industry," said MWRD Commissioner Frank Avila. "Our scientists and engineers are developing complex algorithms and data analytics to make predictions most humans cannot foresee and in the process build efficient solutions that protect our taxpayers and provide residents of Cook County with the best water environment."

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