Announcing the Final Examination of Maria Arenas for the degree of Master of Science

Time & Location: April 5, 2018 at 9:00 AM in Engineering I 288
Title: Assessing the impact of radionuclides released into the Floridan aquifer by a massive sinkhole on local municipal water supplies

In late August 2016, a sinkhole spanning 45 feet (13.7 meters) in diameter opened at a phosphate fertilizer facility (Mosaic Company) near Mulberry, Florida, leaking an estimated 215 million gallons (813,000 cubic meters) of radionuclide-contaminated water 300 feet into the Floridan aquifer. An investigation to determine possible impacts to the environment and local community drinking water supplies was implemented that focused on two 1.5 million gallon per day (MGD) Tampa Bay Water (TBW) production wells and two Polk County Utilities (PCU) water treatment facilities. Water samples collected between June 2017 and January 2018 at the TBW and PCU sites were found to contain radionuclides below regulated levels. To evaluate the effectiveness of membrane treatment should the TBW and PCU drinking water wells be affected by the spill in the future, bench-scale, flat-sheet reverse osmosis (RO) and nanofiltration (NF) membrane process testing was performed using TBW and PCU wellfield sample aliquots. NF and RO were shown to be capable of removing at minimum of 86 and 92 percent, respectively, of the barium content that had been spiked into groundwater testing aliquots. Based on testing results, a conceptual opinion of probable capital cost for a membrane process ranged from $1.7 and $3.5 million for a 0.25 MGD and 2.0 MGD design capacity, respectively. Process operation and maintenance costs ranged between $0.99/Kgal and $0.26/Kgal for a 0.25 MGD and 2.0 MGD design capacity, respectively. The amortized total cost based on a 20-year period and 8 percent interest rate ranged between $1.88/Kgal for a 0.25 MGD and $0.49/Kgal for a 2.0 MGD design capacity plant. An estimate of unavailable water value due to a long-term well shut-down was approximated as $0.64/Kgal.

Major: Environmental Engineering

Educational Career:
Bachelor's of Environmental Engineering, BS, 2016, University of Central Florida

Committee in Charge:
Steven Duranceau, Chair, Civil, Environmental, & Construction Engineering
Dingbao Wang, Civil, Environmental, & Construction Engineering
A H M Anwar Sadmani, Civil, Environmental, & Construction Engineering

Approved for distribution by Steven Duranceau, Committee Chair, on March 21, 2018.

The public is welcome to attend.