

More than 250 attendees comprised of industry professionals, end-users and various interested parties were exposed to the many benefits ozone delivers to humans, animals and industrial applications at the recent International Ozone Association (IOA) conference and exposition held at the end of August in Orlando, Fla.

By Paul Overbeck

Ozone: Sustaining Life

The conference included more than 60 technical papers, two workshops and a unique technical tour. In addition, 25 companies exhibited ozone-market-specific products and services.

Technical Program

The conference opened with a summary of ongoing research on reduction and cellular transmission of bromate ions in living organisms by Dr. Joseph Cotruvo. This work will aid to support the establishment of realistic threshold levels in future regulations to protect public health.

Jackson detailed the pilot work that showed ozone superior to current chemical oxidation and absorption practices. The resulting full-scale ozone process analysis showed pay-back from several areas, including:

- Recovery of lost product from the waste liquor, valued in excess of \$300,000 per year;
- Cost-effective advanced oxidation of waste liquor organics at less than half the cost of chemical oxidation; and
- Cost avoidance of nearly \$3 million estimated for needed repair and expansion of the facility's waste liquor containment evaporation pond.

Technical Tour

The technical tour provided attendees a first-hand, behind-the-scenes look at ozone use in multiple applications within Walt Disney World.

Attendees first visited Disney's Epcot Center and the Land Pavilion aquaculture facility where fish are raised for the various Walt Disney World restaurants. This is no small freshwater fish farm—the turnover rate of the 25,000-gal four-tank and two sets of aqua tube operation is just 42 minutes. Pressurized sand and carbon filtration along with ozone are used to control the suspended solids, pathogens, ammonia and oxygen levels, allowing high-density aquaculture operations.

The tour then visited the 5.7-million-gal aquarium tank at the Seas with Nemo & Friends Pavilion. The Living Seas aquarium is the largest inland saltwater aquarium in the world. The aquatic life support system protects the health of more than 8,000 total inhabitants, representing more than 70 varieties of fish and other marine animals while maximizing guest visibility.

The aquarium volume turnover rate is every three hours. The 31,666-gal-per-minute (gpm) water treatment flow rate makes this aquatic life-support operation the equivalent of a 45-million-gal-per-day (mgd) municipal water or wastewater treatment plant.

The treatment process includes pressurized sand filtration, carbon filtration and ozone injection, and the Living Seas has a filter backwash reclaim system to conserve man-made seawater. The treatment process overall simultaneously maintains healthy

conditions for the animals on display and water clarity for the viewing public.

Tour participants then visited Disney's Typhoon Lagoon and the water treatment system at Shark Reef—one component of the 56-acre tropical water park. This 362,000-gal shallow saltwater pool allows snorkelers to get up close and personal with sharks and schools of tropical fish.

Shark Reef must meet both Florida swimming pool and Disney aquatic life support standards while delivering the water clarity expected at a pristine Caribbean island for the adventurers. This requires a 3,000-gpm pressurized filtration and ozonation system. In an unusual change from the operating protocol most people are familiar with, reverse osmosis (RO) is used to dewater the salt water after rain events, with the permeate discharged and RO concentrate returned to the reef to maintain salinity.

Last but not least, the Toho Drinking Water Treatment Plant (DWTP) in Kissimmee, Fla., showcased ozone protecting public health. Ozone is known to many municipal utilities for delivering multiple benefits including improved filtered water turbidity and suspended solids; reduced chemical consumption; bacteria, virus and parasite inactivation; organic oxidation; improved water taste and odor; and reduced disinfection byproduct levels on surface water supplies.

In central Florida, most raw water supplies are from groundwater sources. These groundwaters are typically of high quality but contain hydrogen sulfide (H_2S/S_2^-) imparting aesthetically unpleasant taste and odor. Ozone is used to oxidize hydrogen sulfide directly to sulfate ion (SO_4^{2-}) without production of elemental sulfur, thereby eliminating the need for filtration.

The Toho DWTP ozonation system, designed by Malcolm Pirnie, includes two 400 ppd at 9% wt. ozone generators to treat between 4.3 and 9.8 mgd with 1.0 to 1.8 mg/L H_2S and was commissioned in 2007. This DWTP is the first in Florida to use pressurized side-stream ozone contacting to oxidize and disinfect groundwater, all in a fraction of the footprint of neighboring ozone systems. *wqp*

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2008 IOA conference summary



Conference attendees visited the Land Pavilion at Disney's Epcot Center, the 5.7-million-gal aquarium tank at the Seas with Nemo & Friends Pavilion, the water treatment system at Disney's Typhoon Lagoon Shark Reef and the Toho DWTP in Kissimmee, Fla. (Clockwise from upper left.)

Dr. Shane Snyder presented updated research and U.S. Senate testimony he had given on emerging contaminants, including endocrine disruption compounds (EDCs) and personal pharmaceutical and health care products (PPHPs). Both have been identified in discharge from wastewater treatment plants and in many U.S. treated drinking water supplies. Ozone is shown to be a cost-effective option for reduction of these currently unregulated contaminants in both drinking water and wastewater.

One of many success stories from the technical program was a paper by Jim Jackson of Mazzei Injector Co. that detailed an industrial pilot study that has led to a full-scale system at a soda ash (Na_2CO_3) manufacturer. Soda ash is used in glass manufacturing, and the process yields both a purified soda ash for sale and organic rich waste liquor, requiring significant treatment before safe discharge.