



Antarctica

## Monster Solutions

# The Two Monsters at the Antarctica Research Station

Even in Antarctica, one of the coldest, most barren corners of the Earth, there is a wastewater treatment plant that is processing sewage. In January, the McMurdo Station, America's research facility on Antarctica, completed construction of a new 121,000 GPD (5.3 l/s) plant and is quickly bringing the facility up to speed. Constructed in the warmer weather months of 2003, this is the station's first treatment plant.

Prior to construction of the \$6 million, 170-foot-by-140-foot indoor plant, wastewater treatment consisted simply of maceration and discharge into nearby McMurdo Bay. The primary reason for updating the process was concern for the environment.

"The goal now is to treat (McMurdo's) wastewater to the same levels expected in the U.S.," said Bill Marshall, Supervisor of the WWTP.

The McMurdo Station is located on the volcanic rock of Hut Point Peninsula and inhabits the solid rock ground at the southernmost point accessible to ships. During the long Antarctic winter, which is spring and summer in the U.S., it is virtually inaccessible. The wastewater equipment was delivered by ship during the Antarctic summer when ships have access to the station's port.

**PROBLEM:** High percentage of solids in the wastewater flow

**SOLUTION:** A pair of Muffin Monsters

**CUSTOMER:** Raytheon Polar Services

While similar to municipal plants, the McMurdo plant's design is meant to accommodate higher than normal solids loads due to water conservation efforts at the station. First, the flow goes through two powerful Muffin Monster® grinders, which turn solids like rags, plastics and trash into small particles to protect downstream equipment. The process includes neither screens nor primary clarifiers.

"The Muffin Monsters play an important role in the treatment of wastewater in McMurdo. A macerator (Muffin Monster) operates 24 hours per day," said Marshall.

The plant also deals with fluctuating wastewater flow by using additional storage space in their tanks. Population at the station increases from 150 people in the winter to 1,000 during the short Antarctic summer which greatly increases wastewater flow. Before being discharged the flow is also subject to a UV disinfection process. After secondary treatment the leftover dried solid material is packed up and shipped back to the U.S. for disposal.

"I feel like this is the right thing to do, that we minimize our impact on the continent," Ric Morris, a director for Raytheon Polar Services Company told the Antarctic Sun, the station's newspaper. "It's not like it's a high-tech thing. It's done in every town and every city in the world."



*A pair of Muffin Monsters grind influent entering the McMurdo Research Station wastewater treatment plant, built in 2003.*



To ensure the treatment plant would go together smoothly in the short period of warmer temperatures, the entire structure was "test-built" in Spokane, Washington in 2002, according to Mark Neeley, the Director of Facilities (source: Antarctic Sun). Then it was disassembled, packed and shipped on an ice breaker to McMurdo.

Antarctica is situated on the Southern tip of the world and consists of 14 million square miles of land, 98% of which is covered with ice. Scientists and researchers from 27 nations visit the continent, with a population ranging from 1,000 to 4,000 people depending on the season.

Established in 1955, McMurdo is the logistics center of the U.S. Antarctic Program, complete with a harbor, landing strips on sea and shelf ice, a helicopter pad and approximately 85 buildings ranging from a one-story radio shack to three-story structures. The facilities include a power plant, firehouse, water distillery, living quarters, research offices and now a wastewater treatment plant.

At the South Pole there is only one period of sunlight each year, and it lasts six months, according to the World Fact Book, published by the U.S. government. The other six months are a different story because the sun does not come above the horizon during that time. With distance northward from the South Pole there are increasing (but still very short) periods of sunlight during winter (and night during summer).

Researchers on Antarctica can sometimes face monstrous weather conditions: katabatic (gravity-driven) winds that blow coastward from the high interior; frequent blizzards that form near the foot of the plateau; cyclonic storms that form over the ocean and move clockwise along the coast; volcanoes on Deception Island and isolated areas of West Antarctica; as well as the extreme cold and six months of darkness.

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***McMurdo plant's design is meant to accommodate higher than normal solids loads.***



***McMurdo's wastewater treatment plant is housed in a heated warehouse so the treatment process can continue year round.***



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