



Deer Island plant designed for 1.3 billion gallons per day.

Cleaning Up Boston Harbor

THREE U.S. FILTER LOCATIONS SUPPLY TECHNOLOGY AT THE COUNTRY'S SECOND LARGEST WASTEWATER TREATMENT PLANT

The Deer Island wastewater treatment plant in Boston, MA, is a perfect example of how U.S. Filter provides single-source solutions to municipal wastewater treatment customers. The Deer Island plant—the second largest in the United States—includes wastewater treatment technology and equipment from three different U.S. Filter locations.

U.S. Filter/Envirex of Waukesha, WI, is supplying 72 chain and flight sludge collectors and motorized scum collectors for the plant's Battery C, Secondary Treatment Facilities, and is also providing two of its flexible PFT-Dystor[®] gas holders. U.S. Filter/LO-CAT of Schaumburg, IL, is supplying a LO-CAT[®] hydrogen sulfide (H₂S) oxidation system for digester gas desulfurization at the plant. U.S. Filter/CPC of

Sturbridge, MA, is providing three separate odor control systems consisting of eight scrubbers and 11 carbon systems.

Situated on Deer Island—a 210-acre peninsula that juts into Boston Harbor—the Deer Island wastewater treatment plant is part of a massive project to clean up Boston Harbor, which until recently was one of the most heavily polluted harbors in the country. Over 122 metric tons of effluent solids, and nearly 64 metric tons of digested sludge, were discharged to the harbor twice a day into outgoing tides close to shore.

In 1989, the Massachusetts Water Resources Authority (MWRA) began constructing a \$3.4 billion wastewater treatment plant to upgrade the area's sewage treatment system and end pollution in the harbor. The plant will replace a

primary facility on Deer Island built in 1968, and one on Nut Island, built in 1952. The new 1.3 billion gallon per day (bgd) primary and secondary treatment facilities will handle wastewater from all 43 of MWRA's sewer communities.

The primary portion of the wastewater treatment plant, as well as a sludge-to-fertilizer facility, are already serving the communities in MWRA's north-system service area. When the entire project is completed in 1999, wastewater discharges from the 43 sewer-service communities will meet all state and federal standards for protecting public health and marine life.

Modern Continental Construction Co., Inc., of Cambridge, MA, is the general contractor for the wastewater treatment plant's Battery C, Secondary Treatment Facilities, and the consulting engineer is Metcalf and Eddy of Wakefield, MA.

SLUDGE COLLECTORS

The U.S. Filter/Envirex chain and flight sludge collectors and motorized scum collectors collect settleable and floatable solids from 18 stacked rectangular secondary clarifier tanks at the wastewater treatment plant. U.S. Filter/Envirex provided similar equipment for the plant's Battery A, B, C and D primary collectors, and for the Battery A and B secondary collectors. The total number of collectors supplied by U.S. Filter is 408, making this the largest installation of chain and flight collectors in the world.

U.S. Filter/Envirex's sludge collectors are composed of stainless steel chain, supplied by a partnering manufacturer, and patented Sigma Plus fiberglass flights. Fabricated with high strength fiberglass strands that are totally encapsulated in a water-resistant resin, the U.S. Filter/Envirex Sigma Plus flights are designed for longer service life than conventional channel flights.

The PFT-Dystor® gas holder uses a dome-shaped engineered membrane system to store methane gas generated during sludge digestion. The Dystors



PFT-Dystor® gas holders front the digesters.



World's largest installation of chain and flight collectors.



View across project to Boston Harbor.

have several advantages over conventional steel or fiberglass gas holders and floating covers, including lower installed cost, three times more gas-holding capacity, greater storage capability and low maintenance costs.

U.S. Filter/LO-CAT worked closely with MWRA's engineers to design a LO-CAT H₂S oxidation system that would treat the digester gas at the plant. The system had to remove 90 percent of the H₂S and be flexible enough to handle fluctuating gas flow and H₂S levels while maintaining a low pressure drop. To meet these requirements, U.S. Filter/LO-CAT designed a LO-CAT unit that uses two parallel treatment trains, each utilizing a two-stage venturi absorber, independent oxidizers and vacuum belt filters for removing the sulfur that is generated from the removal of the H₂S. The unit is designed to reduce inlet H₂S from 2,770 parts per million down to less than 227 ppm. The sulfur is discharged from the system as a 60-wt percent cake from the filters.

In addition to the LO-CAT system, odor control is achieved with equipment supplied by U.S. Filter/CPC. Commissioned by JWP Mechanical Services of Stoughton, MA, the equip-

ment treats 50,000 actual cubic feet per minute (ACFM) of air from the gravity thickeners and 25,000 ACFM of air from the centrifuges in separate scrubber systems. The flow is then combined before treatment by a carbon system. Packed bed scrubbers remove 99 percent of the hydrogen sulfide odors and also remove ammonia odors, while carbon adsorption filters remove 90 percent of the volatile organic compounds. The entire U.S. Filter/CPC system consists of three 11-foot scrubbers, three 12-foot scrubbers, five 10-foot diameter horizontal carbon units, six fans and heaters, chemical storage and feed, and all controls and instrumentation.

A similar but smaller odor-control system, consisting of two scrubbers, two fans and two carbon units, is installed at the wastewater treatment plant's North Main Pump Station. This equipment was purchased and installed by PKF/J.F. White of Newton, PA. PKF/J.F. White also purchased a U.S. Filter/CPC activated carbon system for the Reactor Batteries A and B. This system—consisting of four 12-foot diameter dual bed carbon units, four fans, dampers and controls—removes hydrogen sulfide and volatile organic compounds.

U.S. FILTER EQUIPMENT:

408 chain and flight sludge collectors and motorized scum collectors

Two PFT-Dystor gas holders

LO-CAT® H₂S oxidation system

Eight packed bed scrubbers, seven carbon adsorption filters, eight fans and heaters, chemical storage and feed, controls and instrumentation

Four dual-bed carbon units, four fans

WHAT IT DOES:

Collects settleable and floatable solids from primary and secondary clarifier tanks.

Stores methane gas generated during sludge digestion.

Removes hydrogen sulfide generated during sludge digestion, thus reducing odors and corrosion at the plant.

Scrubbers remove hydrogen sulfide and ammonia odors. Carbon filters remove volatile organic compounds.

Removes hydrogen sulfide and volatile organic compounds.

USFilter