

## TURNING THE TIDE ON POLLUTED BEACHES

In its latest annual survey of water quality at U.S. beaches, the Natural Resources Defense Council (NRDC) listed more than 18,600 violations of public health standards in 2009 due to sewage, animal waste and runoff. "Nearly three-quarters of the 2009 beach closings and advisories were issued because water quality monitoring revealed bacteria levels exceeding health and safety standards," the NRDC reported. "Sewage overflows from aging sanitary and combined sewer systems, leaking sewage pipes, and malfunctioning sewage treatment plants and pump stations have always been a major cause of pollution at ocean, bay and Great Lakes beaches."



In 2008, a 27-year old lift station owned by the city of Laguna Beach, Calif., developed a pipe joint failure that resulted in a temporary loss of operation. After the incident, a major renovation of the pump station included restoring deteriorated concrete on the walls and ceiling of the wet well with a corrosion-resistant lining. "The existing epoxy liner and concrete substrate was deteriorated due to the hydrogen sulfide (H<sub>2</sub>S) environment," Tnemec coating consultant Denis Amyot explained. "The specification called for complete removal of the existing coating and deteriorated concrete by abrasive blasting or equivalent to a SSPC-SP13/NACE No. 6 surface condition and an ICRI-CSP5 or greater surface profile."

The wet well measured approximately 7.5 feet by 17 feet high to the top of its ceiling. The bottom elevation is 33.08 feet with influent sewer invert elevations of 43.75 feet for a 30-inch sewer and 45.25 feet for a 15-inch sewer. The project engineer, Dudek & Associates, Encinatas, Calif., being familiar with Perma-Shield lining systems, worked with Amyot to develop a solution for Laguna Beach. The coating applicator, National Coating & Lining Company, Lake Elsinore, Calif., filled voids, bugholes and other surface imperfections with Series 218 MortarClad, an epoxy-modified cementitious mortar, which was trowel-applied at 1/16-inch thickness to restore the walls and ceiling to a contiguous plane and reduce outgassing of the concrete. "The epoxy-polymer modification allows MortarClad to be applied as a resurfacer that prepared the surface for the high-build liner," Amyot noted.

The topcoat consisted of Series 436 Perma-Shield FR, a fiber-reinforced, 100 percent solids modified polyamine epoxy, which was spray-applied at 100 to 125 mils dry film thickness (DFT). "Series 436 provides excellent resistance to sewer gases and protects against microbiologically influenced corrosion (MIC) in severe wastewater environments," Amyot said. "The fiber reinforcement provides superior physical strength and higher film build. After one year in service, the wet well was inspected and all parties were very impressed with the performance of the Series 436 Perma-Shield FR system. The Series 436 was in perfect shape."

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In recent years, the city of Laguna Beach has invested more than \$16 million in capital improvements to replace or reline deteriorated sewer mains and to reconstruct pump stations. "These improvements have sharply reduced the frequency of sewer spills in Laguna Beach," reported the Laguna Beach City, Manager Kenneth Frank, in a 2009 news release. Today, the city's beaches are listed among U.S. beaches that are rated with five stars by the NRDC based on the cleanliness of the water and their monitoring and public notification practices.

Nationwide, however, the NRDC anticipates a continued high level of beach closing advisories fueled by increasing population densities in coastal counties. "Between 1980 and 2003, the coastal population grew by 33 million, and it is projected to increase by another 19 million by 2015," according to the NRDC. "At the current rate, by 2025 more than a quarter of all our coastal acreage will be developed."

On a positive note, the NRDC applauded the EPA's efforts to update its 20-year old beach water quality standards, which are expected to be complete in 2012. "The EPA's changes represent much-needed progress toward promoting safer and healthier beaches along U.S. coastlines," the NRDC acknowledged.

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According to the organization's annual report, Testing the Waters 2010, beach closings hit their sixth-highest level since tracking was initiated 20 years ago. "With the population growing in U.S. coastal areas, we can expect to see more Americans getting sick from beach water until the sources of contamination are addressed," the NRDC report stated. "Sewage treatment plants can, and often do, malfunction as the result of human error, breakage of old equipment, or unusual conditions in the raw sewage," the report explained. "When that happens, raw or partially treated sewage may be discharged into coastal waterways and their tributaries."



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