



Beach in a Bottle

Recycled glass may help one Florida county renourish its beaches.

GLASS IS ONE OF THE MOST challenging materials to recycle. While uses of recycled glass have been developed — glasscaping and landscaping — many cities incur net costs to recycle the materials. To combat higher costs, Broward County, Fla., is studying using recycled glass to renourish the county's beaches.

Broward County processes about 13,000 tons of glass per year through its materials recovery facility (MRF), and pays a fee to process and market the glass, which amounted to \$145,000 in 2002. As the county seeks to increase recycling levels to meet state recycling goals, it expects the tonnage of glass recycled to increase.

In 2002, the county and its consultant Malcolm Pirnie Inc., Ft. Lauderdale, began searching for a more cost-effective outlet for the recycled mixed cullet. Beach renourishment was found to be a good potential end-use for the glass because of its physical and chemical similarities to natural sand.

Broward County's beaches are in a constant state of erosion, and the county's beach management program aims to replace 2.5 million cubic yards of sand on about 12 miles of beach. This could provide erosion relief for about 10 years. During high erosion events, certain areas, called "hot spots", erode at an accelerated rate, in some cases causing premature need for renourishment.

Using recycled glass as a supplement to sand for beach renourishment is attractive because of its potentially reduced cost compared to natural sand. "By also helping to solve a waste disposal issue, using recycled glass for beach sand could truly be a win-win situation," said Stephen Higgins of the county's Environmental Protection Department, of the proposal.

In January 2004, Broward County began a multiphase

demonstration project, funded in part by a Florida Department of Environmental Protection grant, to determine if recycled glass could be used as a supplement to natural sand to help alleviate erosion. While the quantity of glass may not replace sand, it could extend the life of renourishment projects through direct application to hot spots during high erosion events.

Recognizing the potential concerns of all stakeholders, the first phase of the project was designed to address environmental and public acceptability concerns. Pending successful findings, the material will be tested for its effectiveness in mitigating erosion.

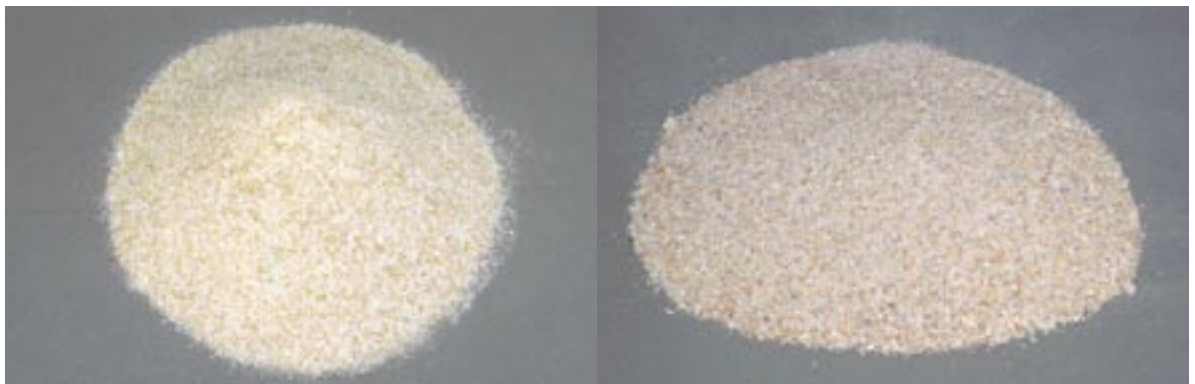
Environmental Findings

One of the key roadblocks to implementing the recycled glass program was obtaining regulatory approval. There were concerns that the breeding habits of endangered sea turtles that nest seasonally on the county's beaches might be affected by the glass.

Among the project's first tasks was to identify a glass processor or equipment manufacturer to produce glass of similar grain size distribution as natural sand. Selected companies were asked to provide samples to meet specifications similar to natural sand to be tested later on the beach in Hollywood, Fla. The material received from the processors was used in technical feasibility and public perception studies.

Geotechnical comparisons of sand and glass were conducted. Samples of beach sand and processed glass cullet were analyzed to compare grain, size distribution, color, carbonate content and grain angularity. The recycled glass cullet and natural sand were found to be geologically compatible.

In addition, the samples were analyzed for fecal



SAND SUBSTITUTE?: Natural sand, left, is similar in consistency to the recycled glass cullet, right, used in Broward County's pilot program to determine if recycled glass could be used to renourish the county's beaches.

coliform, enterococci bacteria, lead, mercury, semi-volatile organics, petroleum hydrocarbons and total salt. The contaminants were all found to be well within the acceptable regulatory limits specified for sand.

Aquarium tests also were conducted to determine any adverse impacts for lower invertebrates, as an indicator of potential impacts to higher vertebrates.

Public Acceptability

Two focus groups were held with tourism representatives and beach professionals. A telephone survey gauged the perceptions of 400 county residents. Despite questions about aesthetics and function, such as being able to build sand castles and whether it would be physically harmful, 81 percent of the participants believed the concept was “interesting.” Seventy-two percent found the concept “appealing.” The “closed loop” aspect of the program was its most attractive feature.

Next Steps

The project team is implementing the biological monitoring phase of the pilot to examine the effects of various sand-glass compositions on nesting sea turtle breeding grounds. Sea turtles typically breed from May

to October. If the materials do not adversely affect turtle nesting habits or create other environmental concerns, the material will be tested for its ability to prevent erosion.

Based on its findings to date, the project team believes that using recycled glass cullet for beach renourishment is technically feasible and publicly accepted. Upon demonstrating there are no adverse impacts to the nesting loggerhead turtles, the project team will evaluate both the benefits to erosion and the commercial viability.

Based on its initial efforts, the project team believes manufacturing a sand product from recycled glass has great potential for communities where glass costs more to recycle than the revenue it generates. In Broward County, where the beaches create significant economic benefits through tourism, this project could provide a dual solution to glass recycling and long-term beach erosion.

— Peter Foye

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