Technology Brief

CRUSHED GLASS AS A FILTER MEDIUM FOR THE ON-SITE TREATMENT OF WASTEWATER

Crushed and graded recycled glass underwent testing as a filtration medium for on-site residential wastewater treatment. The testing considered substituting this glass for the standard C-33 sand that the State of Washington Department of Health specified.

Key Words

Materials:	Recycled glass
Technologies:	On-site Wastewater Treatment
Applications:	Filtration media
Market Goals:	Gain approval for use as s filtration medium in sand filters in Washington State.
Abstract:	A two-year test of the use of processed glass as a filtration medium for on-site wastewater treatment.

Specification Amendment

The goal of the project, if the demonstration proved to be successful, was to amend the state health department's specifications to include glass as a filtration medium. Following the two year study, in August 1996 the Washington State On-site Wastewater Technical Review Committee approved the use of waste glass, crushed to the C-33 specification, for use in sand filters.

Sand Filters

Historically, sand filters have been proven to be an effective method of final treatment for effluent from residential septic tanks. In sand filters, the effluent from the primary treatment system is directed to the filter, where final biological treatment takes place.

Market Significance

The use of on-site wastewater treatment systems using sand filters is growing in Washington for three reasons. First, groundwater standards are requiring higher levels of effluent water quality. Second, property values have increased insofar as property that once was not buildable because it failed percolation tests has increased in value enough to justify the cost of sand filters. Third, many of the existing septic treatment systems in the state have reached an age where failure rates are high.

Several factors make the potential use of recycled glass attractive as a sand filtration medium. First, rural communities in which recycling economics make collection of recycled glass difficult if not impossible, are also the communities with the highest proportion of septic treatment systems. Second, residential sand filters use between ten and twenty cubic yards per installation, a convenient volume for even small recycling centers. Third, the application has a considerably higher value than construction aggregate applications, ranging from $10 to $20 per ton, compared with aggregate values from $3 to $10 per ton. Finally, sand of suitable quality for sand filters is not available everywhere in Washington.

An important concern for this project was the cost of the material. Therefore, processing was kept to a minimum. The glass for the tests was processed to 1/4 inch and finer by a concrete recycler in Renton, Washington.

Sand filter installations could use all the recycled glass collected in the state, and more. This raises the possibility that glass processing systems in rural counties could process all the local recycled glass for this application. This is exactly what has happened in San Juan County, Washington.

The approximate cost for processing this material is $10 to $15 per yard. One yard equals approximately one ton. Economic models and information on processing equipment are available from the Clean Washington Center.

Testing Procedures

Initial permeability tests indicated that recycled glass processed to C-33 sand specifications was nine times as permeable as the local sand. This permeability was thought to have two causes: one, because of the absence of any clay particles in the glass, and next, because of the fact that the glass particles tended to be more cubical than the round sand particles, leaving larger interstitial space. An initial concern, therefore, was that the glass would be too permeable to support adequate biological treatment.

On the other hand, the most common failure mode for sand filters of clogging due to lenses built up from the accumulation of clay particles, organic materials, and fine sand. The higher permeability of glass might mean that failure due to clogging would not occur.

Two systems were installed; one being a split filter, which is effectively two side-by-side filters. This system compares the C-33 sand to a glass material crushed to a similar specification. The two halves of the split filter were loaded with waste from a single family home on an equivalent flow basis. The filters were monitored for two years and the output was analyzed for various biological and chemical parameters to evaluate the performance. A second system was installed using only crushed glass. This was a much smaller filter, with a loading rate higher than generally accepted for sand filter construction in Washington. In addition, this filter was an above-ground installation in Eastern Washington.

Test Results

The glass has performed as well as the sand in the split filter system. The second filter, containing only crushed glass, failed because it froze. It is not believed that the failure of this filter had anything to do with the filtration medium.

Report Dated: March 1997
Fact Sheet Issued: April 1997

For More Information

For a copy of the report, *Crushed Glass as a Filter Medium for the On-Site Treatment of Wastewater (GL-97-2)*, use the CWC Publication Order Form or, if you want more information, please call (206) 443-7746, email info@cwc.org, or visit the CWC Internet Website at www.cwc.org.

This technology brief was prepared by **CWC,** Managing Partner of the **Recycling Technology Assistance Partnership (ReTAP)**. ReTAP is an affiliate of the national Manufacturing Extension Partnership (MEP), a program of the U.S. Commerce Department's National Institute of Standards and Technology. ReTAP is also funded by the U.S. Environmental Protection Agency and the American Plastics Council.

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