Research Project: ***SHA/MSU/4-10***
Date: ***August 2016***

RESEARCH SUMMARY

EVALUATION OF WASTE CONCRETE ROAD MATERIALS FOR USE IN OYSTER AQUACULTURE – PHASE 3

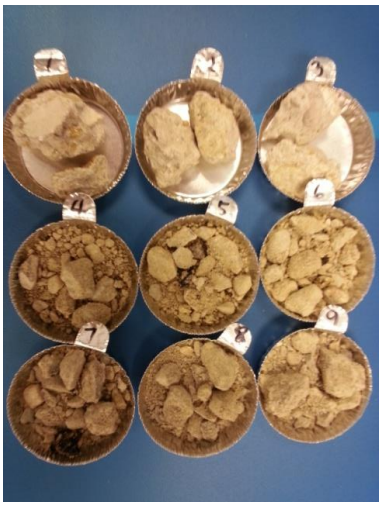
PROBLEM

The use of recycled materials has gained increased attention for the environmental benefits, and the reuse of industrial by-products and waste materials can provide a stream of revenue for producers and a durable, cost-effective material option for end users. Recycled concrete aggregate (RCA) is one of the recycled materials that the Maryland Department of Transportation, State Highway Administrative (SHA) is exploring its alternative uses. For example, using RCto condition portions of the Chesapeake Bay bottom to support spat-on-shell aquaculture projects. The RCA is created by crushing and milling old concrete pavement or other structure elements. For RCA to be used within the aquatic setting of the Chesapeake Bay, its chemical behavior under saturated conditions must be evaluated to avoid potential adverse impacts to the aquatic ecosystem. The major concern was that accidental spills onto the road surface from vehicles could contaminate the pavement and structure elements.

METHODOLOGY

The study evaluated the leaching of hydrocarbon components from RCA materials, and is a continuation of previous SHA projects *Evaluation of Waste Concrete Road Materials for Use in Oyster Aquaculture* (2013) and *Phase II Evaluation of Waste Concrete Road Materials for Use in Oyster Aquaculture - Field Test* (2015). These three phases of the research established a database of water quality impacts of RCA and oyster survivability.

Moisture content measurement of RCA



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RESULTS

The testing was designed to evaluate RCA for toxic organic substances and provide evaluation methodologies. Volatile components were not chosen in this research scope because volatile compounds spilled onto the roadway would evaporate quickly. Since RCA is usually placed in a recycling plant before the crushing process and stockpiling usually happens before application, it gives sufficient time for volatile components to evaporate. In almost all cases of hydrocarbon contamination, the compounds of interest were the semivolatile components included in polycyclic aromatic hydrocarbons. The resulting water chemistry from the following leaching tests was used to evaluate acute and chronic water quality necessary for protecting marine and estuarine life based on the water quality standard of Maryland (COMAR 26.08.02.03-2).

All results of organic chemical concentrations were below detection limit (BDL) for both EPA 1316 and 3570 extraction methods for RCA samples produced by Flanigan & Sons, Inc. Four organic chemicals for EPA 3570 extraction method were detected at the samples collected from Machado Construction Co., Inc. and The Recycling Center. However, the concentrations were at least 100 times lower than COMAR 26.08.02.03-2. These results confirmed that there is no cause for concern about hydrocarbon components released into the Chesapeake Bay watershed if RCA is used as a bottom conditioning material for oyster aquaculture.

Based on the findings of these evaluations, recommendations for the use of RCA on oyster-leased bottom in the Patuxent River may be made to the oyster industry, and useful information will be provided to state agencies.

REPORT INFORMATION

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Link to Phase 1 Report: http://www.roads.maryland.gov/OPR_Research/MD-13-SP109B4E_Waste-Concrete-for-Oyster-Aquaculture_Report.pdf
Link to Phase 2 Report: http://www.roads.maryland.gov/OPR_Research/MD-15-SHA-MSU-3-12_Waste-Concrete-for-Oyster-Aquaculture-Phase-II_Report.pdf
Link to Phase 3 Report: http://www.roads.maryland.gov/OPR_Research/MD-16-SHA-MSU-4-10_Oyster-Phase3_Report.pdf