



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003PA11B

Title: Using Crumb Rubber Filtration for Ballast Water Treatment

Project Type: Research

Focus Categories: Treatment, Ecology, Water Quality

Keywords: ballast water treatment, crumb rubber medium, invasive species, waste tires, water filtration

Start Date: 03/01/2003

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Matching Funds: \$30221.00

Congressional District: 17th of PA

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Abstract: Discharging ballast water from ships causes many water resource problems in Pennsylvania, especially in Lake Erie, Susquehanna River, Delaware River, and their tributaries. When non-indigenous species (e.g., Zebra mussel) transported from a foreign environment are introduced to a new water body, the water quality could be significantly impacted. A cost effective treatment technology is needed to remove or inactivate these invasive species in ballast water. Water filtration is an effective process to remove microorganisms in water and wastewater. However, due to its heavy weight and low production efficiency, conventional sand/anthracite filtration is not economically feasible for ballast water treatment. An innovative crumb rubber filtration technology has been developed at Penn State Harrisburg. The crumb rubber filter allows greater depth filtration and it then allows a greater filtration rate. The significant light weight of crumb rubber filters could be an advantage to be used in mobile and in-vessel treatment facilities for ballast water filtration. The objective of this research is to investigate the application of crumb rubber filtration for ballast water treatment. The invasive species removal efficiency in ballast water will be used to evaluate the technology. The research will be conducted in two phases. Phase I consists of laboratory studies to evaluate the effects of size and depth of crumb rubber on the filter performance using water from Susquehanna River. The results from our current wastewater filtration study will be evaluated and modified for ballast water filtration. Phase II consists of field

studies to evaluate the filter performance using ballast water or water from the ports of Baltimore or Philadelphia. The filter performance will be evaluated using the removal of invasive species and water production. The success of the proposed project will provide a cost effective ballast water treatment technology. The technology also reduces scrap tire problems in the nation. The highly efficient and light weight crumb rubber filter could be installed as in-vessel treatment units, mobile treatment facilities, and shore based treatment facilities. This project is significantly different from our current project, Water Reuse: Using Crumb Rubber for Wastewater Filtration. The current project is to evaluate the crumb rubber filtration for the removal of organics and suspended solids in wastewater and explore a new water resource, reclaimed water. The goal of the proposed project is to remove invasive biological species from ballast water and protect the ecosystem in coastal waters, major rivers and their tributaries. Because of the crumb rubber filtration is used in both studies, the results from the current project will benefit the proposed project.

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