

# **UNH Materials Science Seminar**

11:10-12:00, Thursday, September 18, 2008

DeMeritt Hall 238

University of New Hampshire

## **Evaluation of Sorbents and Geotextile Materials for Reactive Capping of Contaminated Sediments**

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The main objective of this research is to develop and evaluate a composite active capping system consisting of apatite minerals, which sequester heavy metals, with other sorbent materials, which sequester hydrophobic organic contaminants, within an engineered geotextile mat. The technical objectives of this research include characterization of sorbents and sorbent mixture, characterization of the clogging potential and gas transmission of the geotextile materials and composites, and determination of interferences caused by different fractions of natural organic matter present in typical site conditions.

In this study the performances of activated carbon and organoclay were evaluated as reactive cap sorbents that can be used to sequester organic contaminants in the presence of natural organic materials that are present in sediment porewaters. Results showed significant effect of Aldrich humic acid on 2, 2', 5, 5'-tetrachlorobiphenyl adsorption on both the sorbents. The effect of Suwannee River humic acid and fulvic acid varied with sorbent and there was no effect of NOM on either of the sorbents for 2, 2', 5, 5'-tetrachlorobiphenyl adsorption. In the case of phenanthrene adsorption, no effect of any fraction of natural organics was noticed for organoclay but similar reducing effects of Aldrich humic acid, Suwannee River humic acid, Suwannee River fulvic acid and Suwannee River NOM were noticed for activated carbon. A significant effect of Hudson River porewater (high in humic content) was observed on the performance of both the sorbents for both the contaminants, although only a small effect was found for the Passaic River porewater (which was low in humics). Geotechnical performance of a number of materials was evaluated with the gradient ratio test and materials with low clogging potential were selected for

field testing. Results of geotechnical and environmental performance of mats retrieved from a field deployment will also be presented.

**Kevin Gardner** is an associate professor of civil engineering and director of the Environmental Research Group at UNH. His research is primarily in contaminated sediments and sustainable engineering areas. Before coming to UNH in 1999 he was assistant professor at Case Western Reserve University for 3 years. Dr. Gardner received his graduate degrees from Clarkson University (1991 and 1996).

Host: Professor Jim Harper x1962