

Innovative Sand and Sand Cap Stabilization Methods Using Protein Polysaccharide Biopolymers (PPBs)

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Background/Objectives. Conventional sand cap and amended sand cap stability are an on-going concern in adverse hydrodynamic conditions. An in-situ technology that uses PPB amendments has been developed to stabilize sandy beaches through sand cohesion enhancement. The technology can also be used to enhance the stability of sediment sand caps, and to efficiently transport powdered activated carbon (PAC) amendments through the water column for in situ placement within a sand cap matrix.

Approach/Activities. Testing was conducted at the University of Connecticut (UCONN) to assess the sand cohesion-enhancing properties of PPB amendments by measuring geotechnical properties (direct shear strength and compressive strength) of treated sand and PAC-amended sand. In addition, an evaluation of transport through the water column of PPB-treated PAC/sand mixtures was conducted to assess whether the PPB treatment could minimize PAC and fine sand dispersion in the water column. Finally, aquatic toxicity testing was conducted to assess ecotoxicity of the PPB amendments.

Results/Lessons Learned. The laboratory results showed a very significant increase in shear strength, cohesion and compressive strength of PPB-treated sand and PPB- treated PAC-amended sand. This indicates that the PPB treatment can enhance erosion resistance of sand caps and amended isolation caps. The water column transport tests showed that the PPB treatment of sand amended with PAC resulted in the complete reduction of suspended PAC and fine sand particles in the water column as compared to untreated PAC/sand mixtures. This indicates that the PPB treatment can enhance the in situ placement of PAC and sand. Aquatic toxicity testing of the PPB treatment indicates that the PPB treatment is not toxic. The presentation will include results from laboratory and ecotoxicity testing.