Treatability Studies to Support On-Site Beneficial Re-Use of Tidal Flats Sediment at a CERCLA Site

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Background/Objectives. Bench-scale treatability studies to support the potential on-site re-use of tidal flats sediments have been conducted as a component of a CERCLA Feasibility Study for a tidal flats site. Site contaminants include elevated metals, mercury, and poly-chlorinated biphenyl (PCB) concentrations as the result of historic aircraft engine manufacturing and testing operations. Sediments within the tidal flats are targeted for removal as part of a site redevelopment plan which includes land and shoreline improvements and land transfer to the future property owner. A key aspect and major economic driver of the project is the potential to re-use processed sediments on-site as fill material. Bench-scale studies presented here were developed to evaluate the physical and chemical properties of the sediments, and the effectiveness of various technologies to dewater and solidify dredged materials to meet both leachability and strength requirements, and treat dewatering fluids for ultimate discharge on site.

Approach/Activities. Sediment samples were composited from a variety of locations across the site. These locations were selected based upon higher PCB levels to ensure the most difficult to treat contaminants would be present in the sample and to ensure that sediment with “typical” physical characteristics were used in the study. The dewatering study was conducted to simulate dewatering performance of hydraulic dredging (an approximately 8% to 10% slurry conditioned with polymer was used to test mechanical dewatering methods and geotextile bag methods) and mechanical dredging (gravity or “slack” dewatering). Mechanical dewatering technologies evaluated include belt press, centrifugation, and recessed plate filter press. Solidification/stabilization (S/S) was performed on both dewatered and “as is” sediments to simulate standard S/S and pneumatic flow tube mixing (PFTM). Portland cement and Calciment were evaluated as potential additives to render the material suitable for beneficial re-use on site or off-site disposal. Solidified sediments were subjected to both leachability testing and strength testing. Dewatering fluids were tested using 0.45µ and 0.1µ filters and several ratios of activated carbon designed for removal of specific metal contaminants.

Results/Lessons Learned. For the dewatering study, all technologies evaluated performed adequately: mechanical dewatering technologies and geotextile bag filtering all increased the percent solids to a point where dewatered sediments passed the paint filter test. The belt press solids were selected for further S/S testing. Dewatering fluids generated from the belt press tests were used in water treatment testing based on their higher PCB and copper concentrations relative to geotextile bag filtering. Gravity drainage of sediments did not achieve a percent solids high enough to pass the paint filter test. Both gravity drained and filter press dewatered sediments were used in traditional S/S testing. Results show that Portland cement added at ratios of at least 4% by wet weight produced a material with no free liquids and significant strength (>40 psi as measured by the unconfined compressive strength test) while calciment did not produce any significant strength. In addition, raw sediments (not dewatered) were also subjected to PFTM simulated testing using four ratios of Portland cement. All PFTM samples achieved significant strength (40 to 200 psi). All solidified samples met state of CT

leachability standards. Water treatment tests showed that untreated dewatering fluids could potentially fail likely water quality criteria for PCBs and copper. Results show that filtration and carbon sufficiently removed PCBs and copper to meet water quality criteria. In conclusion, tidal flats sediments can be dewatered and solidified using traditional technologies or innovative PFTM and are suitable for on-site beneficial re-use or off-site disposal.