

Management of PAH and NAPL-Impacted Dredge Residuals – Former Manufactured Gas Plant Site Located in the Portland Harbor Superfund Site

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Background/Objectives. Environmental dredging has most often been the remedial technology employed at contaminated sediment sites. Monitoring during these projects has clearly documented that surface and subsurface sediments remaining after environmental dredging operations contained elevated chemical concentrations that posed a residual risk to aquatic biota. The presence and magnitude of these remaining contaminated sediments, referred to as post-dredging “generated residuals” and “undisturbed residuals,” can often dictate the success of an environmental dredging project. The U.S. Environmental Protection Agency (EPA) and NW Natural are currently developing a basis of design document for the Gasco Sediments Site (Gasco) located in the Portland Harbor Superfund Site. Post-dredging residual evaluation and management is an important part of the design process.

Approach/Activities. EPA, NW Natural, and EPA’s partners are working collaboratively to establish dredge residuals management protocols for Gasco. Extensive pre- and post-dredge characterization findings at several recent Superfund environmental dredging projects have been considered during this process, including site-specific dredging equipment, controlled operations, and best management practices (BMPs). The Hudson River and Lower Fox River projects, for example, demonstrated that improvements in operational BMPs resulted in approximately twofold reductions of generated residuals, but these reductions were insufficient to eliminate elevated post-dredge generated and undisturbed residuals. Site specific conditions at Gasco, including the presence of non-aqueous phase liquids (NAPLs), requires innovative design considerations informed by successful approaches used at other sites. A site-specific residuals management framework is being developed for Gasco to manage polycyclic aromatic hydrocarbon (PAH) and NAPL residuals.

Results/Lessons Learned. The Gasco residuals management framework establishes subareas that will be dredged in a single dredge pass. The framework includes an approach to manage measured residuals using established design criteria during construction. Residual management in the subareas includes placement of three 6-inch layers of clean sand cover sequenced as follows: immediately following confirmation the dredge residuals are below concentrations of concern after design dredge elevations are achieved in a subarea, following completion of a dredge season, and following completion of all dredging activities after multiple seasons. This sequenced placement will minimize transport of potentially mobile generated residuals from each subarea, as well as any generated residuals that could potentially migrate outside the dredge subareas during each dredge season. The framework includes a decision tree that summarizes the collection of stepwise, multipoint, composited post-dredge and post-cover verification samples throughout dredging subareas and tiered subsampling to evaluate for missed inventory and generated residuals concentrations, respectively. If elevated residual concentrations or NAPL are identified in a subarea, the remedial design of the cover layer will be modified during construction in accordance with pre-established design alternatives. These alternatives include incorporation of active amendments in the clean cover or additional sand placement. The framework also provides clear decision points for EPA to confirm that dredging and cover activities are complete to minimize construction delays.