Developing a Robust Design for Consideration of Climate Change Impacts: Hunters Point Sediment Case Study

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Background/Objectives. The Hunters Point Naval Shipyard Site (HPNS Site) is located in San Francisco, California. The Parcel F remedial unit is comprised of the shoreline and nearshore sediments. Follow-on investigations conducted by the Navy concluded that polychlorinated biphenyls (PCBs), copper, lead, and mercury are present in sediment at concentrations that pose an unacceptable risk to human health and the environment at three Parcel subareas: Areas III, IX, and X. The natural hydrological processes that can disturb sediment and bring contaminants to the surface where receptors may be exposed are wave action and strong currents. Area III is subject to strong tidal currents during ebb and flood tides (except along the northern shoreline, where an eddy current flow is present). In contrast, circulation in Areas IX/X is restricted and tidal currents are weak. The most significant sediment resuspension occurs from storm waves generated from the southeast winds during the winter.

Approach/Activities. As part of the *Optimization Review of the Remedial Alternatives Analysis (RAA) and Green and Sustainable Remediation (GSR) Evaluation*, water depth and hydrodynamic forces were identified as primary factors to controlling remedy effectiveness within Parcel F. The multi-component remedy is comprised of removal and backfill, capping, and in situ treatment. A qualitative evaluation of water depth and hydrodynamic forces aided in determining remedial technology applicability in Areas III and IX/X to ensure long-term effectiveness and permanence, as well as defining treatment footprints of a multi-component sediment remedy. In addition, a resiliency baseline evaluation identified sediment remediation system vulnerabilities and associated resiliency best management practices (BMPs) to mitigate them in accordance with the U.S. EPA (2015) *Climate Change Adaptation Technical Fact Sheet: Contaminated Sediment Remedies*. These evaluations are followed by a quantitative hydrodynamic study to aid in the design of cap, post-removal backfill, and in situ amendment that is resilient to tidal currents and wave action. The study utilizes FEMA's San Francisco Bay Regional Coastal Model and will evaluate the 25-year and 100-year storm-surge and wind-wave events.

Results/Lessons Learned. The resiliency baseline evaluation identified cap enhancement, amendment setting enhancement, and periodic climate change vulnerability monitoring as BMPs to be integrated into the remedial design. In addition, stakeholder and community comment during the Proposed Plan review period identified climate change impacts on the remedy as a high priority (stakeholder value). This presentation will include a summary of the results and findings from the hydrodynamic study, and integration of resiliency BMPs to develop a robust sediment remedial design and long-term monitoring plan for Area III and Area IX/X.