## EXECUTIVE SUMMARY

In late August of 2002, SAIC performed a sediment transport study in the region of the Confined Aquatic Disposal (CAD) cells in the Mystic River, Boston, MA in conjunction with Environmental Tracing Systems (ETS) of Helensburgh, U.K.. The study was designed as a relatively small-scale pilot study, and the work was funded by the U.S. Army Corps of Engineers, New England District under the Disposal Area Monitoring System (DAMOS) Program. The purpose of the study was to determine if fine-grained harbor sediments in the vicinity of the CAD cells are being resuspended and transported into the CAD cells. To achieve this goal, artificial fluorescent sediment tracer was deployed at positions upstream and downstream of the Supercell using two different tracer colors. Tracer particles were mixed with ambient material, frozen in blocks, and placed on the seafloor. Sediment grab sampling surveys were then conducted upstream and downstream, as well as within the Supercell, at two-week intervals (surveys T18 and T32), and surface samples were sent to ETS for tracer analysis.

Concentrations of sediment tracer from the grab sample surveys showed that tracers from both deployment locations were transported in the upstream and downstream directions from the deployment site. Very high concentrations of tracer were evident at stations in the immediate vicinity of the deployment locations, at T18 for the upstream deployment site, and at T32 for the downstream deployment site. This indicates that following the initial deployment in blocks, a substantial volume of the tracer material remained in close proximity to the deployment location within the time-frames of this study.

In addition to the high concentrations found near each deployment site, lower concentrations of both upstream- and downstream-deployed tracers were observed throughout most of the survey area by T18, and more widely distributed to virtually all stations, and detected at lower concentrations, by T32. This provides evidence for continued redistribution of tracer material throughout the study area over time, as well as evidence of fine-grained material from both upstream and downstream locations being deposited in the CAD cell. At the time of the T18 survey, tracer concentrations were greater in the Supercell than outside it, and the increased concentrations of the tracer deployed downstream persisted in the Supercell for the T32 survey. This provides some evidence for preferential settling of tracer (hence, fine-grained sediment) in the Supercell.

Previous investigations in the vicinity of the Supercell have indicated that tidal currents are relatively weak and likely do not account for erosion of bed material. However, vessel traffic in the vicinity (e.g., passage of the liquid natural gas (LNG) carrier

*M/V Matthews*) caused substantial, short-term increases in current velocities that correlated with increased turbidity above the substrate. Therefore, vessel traffic in the river is likely the primary mechanism for resuspension of bottom sediments. This tracer study provided information on sediment transport indicating that both upstream and downstream transport of sediment, including deposition in the CAD cell, occurs in the study area. However, changes in tracer concentration from one survey to another cannot be explained with the available information, and could be due to dispersal and/or localized redistribution of tracer, resuspension of tracer with subsequent transport away from the study area, or burial.

Determining whether tracer material deposited in the CAD cell remains in the cell (being redistributed throughout the cell and eventually buried) would require a more comprehensive within-cell sampling scheme, including more stations throughout the cell and sub-samples at various depth intervals. Additional information to confirm whether there is net upstream or downstream transport of resuspended fine-grained sediment in this location of the Mystic River would also require a more comprehensive sampling scheme, and would require a broader field of stations in both upstream and downstream directions.

This pilot study provided useful information on field and laboratory methods using tracers that will be useful in future studies.