EXECUTIVE SUMMARY

Biological and chemical monitoring results from the Mill-Quinnipiac River Disposal Mound (MQR) have indicated slow, and perhaps retrograde, recolonization rates relative to other mounds formed within the same time period. These results triggered a more intensive investigation of the MQR mound. Monitoring data have been collected as a part of the Disposal Area Monitoring System (DAMOS) Program since the formation of MQR during the 1982-1983 disposal seasons. MQR was constructed as one of several disposal mounds at the Central Long Island Sound Disposal Site (CLIS), including the two Cap Site mounds (CS-1 and CS-2) and the uncapped Field Verification Program mound (FVP).

REMOTS® sediment-profile photographs obtained in 1987 first identified the anomalous species assemblages and low organism-sediment indices at MQR as compared to both Cap Site mounds and FVP. Tissue body burden trace metal data were collected at several CLIS capped mounds in 1986 and indicated elevated levels at both MQR and FVP. Although benthic conditions had improved in the 1987 survey relative to the previous year, the 1991 CLIS monitoring survey indicated retrograde benthic recolonization as documented by REMOTS® photographs.

In August of 1991, sediment was collected for a bioassay test, and, at the same time, six gravity cores were collected from the mound center. The cores were described, and sampled for inorganic and organic chemical analyses. Core samples were stored until completion of the bioassay test; results showed that the MQR sediment caused significant amphipod toxicity. Following the tiered approach to disposal mound monitoring, sediment samples from the coring cruise were analyzed in order to identify the contaminant(s) potentially responsible for the benthic conditions at MQR.

Sediment core samples were analyzed for grain size, pesticides and polychlorinated biphenyls (PCBs), priority pollutant metals, polynuclear aromatic hydrocarbons (PAHs), and volatile organics. Core descriptions indicated that two primary lithologies had been recovered. The top 1-1.5 meters of each core consisted of black silty clay, overlying a sandier interval with clasts and plant fragments. Chemical results and core descriptions suggested that at least one core recovered ambient sediment below a depth of approximately 1.5 meters. This core was apparently recovered in the flanks of MQR, where the total thickness of dredged material was thinner.

Physical and chemical analyses were used to construct a stratigraphy of the MQR mound in order to identify the origin of the surface sediments. Trace metal results were compared with historical data compiled from the sources of the dredged material. Trace metal ratios indicated that most of the cored sediments were derived from the New Haven Harbor, the location of the capping material used to cover the MQR mound. The sandier sediments in the lower part of the cores appeared to be either Mill or Quinnipiac River sediments, or a combination of both.

Both bathymetric and modelled dredged material thickness estimates were consistent with the presence of a thick (1.5 m) New Haven cap on the surface of MQR. The cap sediments contained relatively high PAH concentrations, indicating that the material dredged from New Haven Harbor for the MQR cap contained these contaminants at the time of disposal. PAHs have been included as part of the regional testing protocol since 1989, so that at the time of disposal (1982), the presence of PAHs would have been overlooked by routine chemical testing. New Haven Harbor material has been used successfully as cap material at other CLIS capped mounds. In the case of MQR, material may have been dredged from inner New Haven Harbor, which is influenced by the input of both Mill and Quinnipiac River sediments.