Data Submittal for Water Quality Monitoring Event #6 on 11 July 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: CAD Cell 3R – spring low tide disposal on 11 July

Applicable Water Quality Certification Conditions:

- 26d – dissolved metals and TSS for a low tide disposal within the first 100 disposal events

Associated Files:

- Prov_R_6_summary – Microsoft Word document containing this summary
- Prov_R_6_tables – Microsoft Word document containing station and sample ID information (Table 6-1), and analytical results (Table 6-2)
- Prov_R_6_figure – pdf document showing the sampling locations (Figure 6-1)

Criteria Exceedences: None

Summary:

The sixth monitored disposal event took place at 1148 on 11 July, at approximately the time of predicted low tide for Providence (-0.3 feet at 1144). Dredged material taken from the top of cell 7R was released into cell 3R (see Figure 6-1) during a spring low water slack tide. Spring tide conditions represent the largest tidal fluctuations and strongest ambient currents experienced in the monthly lunar cycle. At the time of the disposal event, two dredges were working in the area (see Figure 6-1). Dredge 55 was anchored and working in cell 6R removing parent material (disposed offshore). Dredge 51 was spudded and working in cell 7R, removing unsuitable maintenance material that was being disposed into cell 3R.

Prior to and immediately after the disposal event, ambient currents in the study area consisted of two distinct layers. Specifically, in the upper half of the water column, flow was to the south (ebbing) and in the lower half, flow was to the north (flooding). The thickness of the near surface ebbing current layer decreased with time until a completely flooding current regime was established. This two layer current structure is important because the transport of the disposed dredged material is dependent on the ambient current conditions.

Pre-disposal monitoring was performed early in the flood tide cycle when ambient currents were as described above. A reference sample was collected south of the dredging and disposal locations prior to disposal (UCR1 on Figure 6-1 and Table 6-1). Turbidity values ranged from approximately 3 NTU to 6 NTU through the water column. Given the split current regime, reference measurements could potentially have been influenced by dredging activities. However, given the location of the dredging relative to the sample location (Figure 6-1) and the stage of the tide, potential influence was expected to be limited.

Salinity ranged from approximately 19 PSU at the surface to 26 PSU near the bottom. Water samples were collected from within the identified dredging turbidity plume approximately 200 feet down current from Dredge 55, during flood tide prior to the disposal event (DRG1 on Figure 6-1).

The disposal event occurred at 1148, 4 minutes after the predicted low tide (1144), after which the scow was slowly maneuvered to the south of the disposal cell and back into position with Dredge 51 over cell 7R. Similar to previous monitoring events, some discoloration and small patches of oil sheen were noted at the surface immediately following the disposal. ADCP measurements collected over cell 3R immediately following the disposal event and relocation of the scow identified an area of elevated backscatter within and above the cell and for a distance of 500 feet south of the cell. The area of elevated backscatter to the south of the cell was likely due to a combination of factors including that flow in the upper half of the water column was to the south and that the tugboat and scow initially moved toward the south following disposal.

Within one-half hour of the disposal event a plume was observed extending both to the south of the disposal cell (as described above) and to the north of the disposal cell (with the increasing flood tide current). Specifically, turbidity measurements of 3 to 12 NTU were observed at 500 feet south of cell 3R and turbidity measurements of 3 to 10 NTU were observed at 1000 feet north of cell 3R. These measurements are consistent with the presence of moderate two-directional currents (to the south and to the north) in the study area. Dredging activities underway in the study area could also potentially have influenced these measurements, particularly to the north with the operation of Dredge 55 and the westerly component of the flood tide currents approaching the mouth of the Seekonk River.

Approximately one-hour after the disposal event, the two-layer ambient current structure was replaced by nearly uniform northerly (flood) currents, as expected. A low intensity plume was tracked in the region from cell 3R to the 1500 foot down current compliance transect for metals. Turbidity measurements in the plume ranged from 3 NTU to 8 NTU, and Dredge 55 activities may have influenced the observed plume as discussed above. The timing and location of compliance sample collection were based on both observations of the low plume and the calculated travel time from the disposal cell (CM1 on Figure 6-1). The maximum turbidity measurement collected at the 1500 foot compliance location was 7.5 NTU.

Dredges 51 and 55 continued to work throughout the monitoring period, with Dredge 51 removing unsuitable maintenance material overlying cell 7R and Dredge 55 removing parent material from cell 6R

Results of the analysis of TSS and dissolved metals are presented in Table 6-2. TSS levels at the 1500 foot down current location were slightly higher, but on the order of TSS levels at the reference location. The highest reported TSS (40 mg/L) was collected from the bottom down current of the dredge. Dissolved silver concentrations were below the reporting limit of 0.5 ug/L for all samples, well below the acute water quality criterion of 1.9 ug/L. Dissolved copper concentrations were all below the acute water quality

criterion (4.8 ug/L) with concentrations ranging from 0.48 to 1.6 ug/L. Highest copper concentrations were reported for the surface samples at all three locations.