Data Submittal for Water Quality Monitoring Event #4 on 6 June 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: 11th disposal event – CAD Cell 1R – low tide disposal on 6 June

Applicable Water Quality Certification Conditions:

- 26d – dissolved metals and TSS for a low tide disposal within the first 100 disposal events
- 26e(2) – dissolved metals and TSS for disposal when the starter CAD cell is approximately 5 feet from the surface
- 33b – toxicity for a low tide disposal occurring within disposal events 2 through 11

Associated Files:

- Prov_R_4_summary – Microsoft Word document containing this summary
- Prov_R_4_tables – Microsoft Word document containing station and sample ID information (Table 4-1), and analytical results (Tables 4-2, 4-3, and 4-4)
- Prov_R_4_figure – pdf document showing the sampling locations (Figure 4-1)

Criteria Exceedences: None

Summary:

The 11th disposal event into cell 1R took place at 0657 on 6 June, 34 minutes after the predicted time of low tide for Providence (0.1 feet at 0623). The material being disposed had been removed from the top of cell 4R to the east of disposal cell 1R (see Figure 4-1). Dredge 51 had been inactive for more than one hour as it had filled the scow and was awaiting the low tide for disposal. The dredge returned to work over cell 4R approximately 25 minutes following the disposal event.

Pre-disposal monitoring was performed during the last of the ebb tide and the beginning of the flood tide. A reference sample was collected up current (south) of the dredging and disposal locations as the tide began to flood prior to disposal (UCR1 on Figure 4-1 and Table 4-1). Turbidity ranged from 3-5 NTU. A large salinity gradient was noted over the water column as was observed in the monitoring performed on 04 June, ranging from approximately 10 PSU at the surface to nearly 30 PSU at the bottom.

Following the disposal at 0657, the scow was slowly maneuvered back to the dredge just east of the disposal cell. ADCP measurements performed over cell 1R immediately following the disposal event and relocation of the scow identified an area of elevated backscatter above the cell which began to migrate northward with the incoming tide. Approximately 20 minutes following the disposal, turbidity near the down current edge of the cell ranged from approximately 6 NTU at the surface to 15 NTU in the middle-lower water column with a spike to nearly 40 NTU just above the bottom.

As the tide continued to flood, the ADCP measurements were able to track the migration of the parcel of water with elevated backscatter. At approximately 1 hour following disposal, the area of elevated backscatter had moved to approximately 350 feet down current of the cell with corresponding turbidity ranging from 4 NTU at the surface to 15 NTU near the bottom. At approximately 1 hour and 40 minutes, the area of elevated backscatter had moved to approximately 500 feet down current of the cell with corresponding turbidity ranging from 4 NTU at the surface to 9 NTU at the bottom.

As the tide continued to flood, subsequent monitoring was unable to identify a turbidity plume beyond the 500 foot transect. No measurements above background conditions (4 NTU) were observed along the 1500-foot down current compliance transect for metals. As a result, the timing and location of compliance sample collection were based on measured current velocities and the calculated travel time and direction from the disposal cell (CM1 on Figure 4-1).

Dredge 51 continued to work removing maintenance material from over cell 4R during the remainder of the flood tide. An area of elevated backscatter/turbidity was identified from east to southeast of the dredge (there appeared to be some current reversal in this area), but it was clearly separated from the plume generated by the disposal and did not extend beyond several hundred feet from the dredge. Samples were collected from within the identified turbidity plume approximately 200 feet down current of the dredge (DRG1 on Figure 4-1).

Subsequent monitoring down current of the compliance transect (station CM1) was unable to identify any disposal (or dredging) related turbidity plumes. As a result, the compliance samples for toxicity were collected north of the I-195 bridge at low water slack tide as required by the Water Quality Certification.

Results of the analysis of TSS and dissolved metals are presented in Table 4-2. TSS levels at the 1500 foot down current location were similar to or lower than at the reference location. The highest reported TSS (36 mg/L) was collected from the bottom water within the dredge plume. 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 2.2 ug/L. Highest copper concentrations were reported for the surface samples at all three locations.

Results of the *Arbacia punctulata* fertilization test are presented in Table 4-3, and the mean fertilization was above 99% for all of the collected samples, with no statistically significant difference between the reference sample and the samples collected down current at the compliance point (I-195 bridge) or in an additional near field sample at 1500 feet from the disposal cell (metals compliance transect). The additional

sample (not required in the WQC) was collected at the 1500-foot compliance point to provide additional information to aid in evaluating the monitoring program results.

Results of the *Arbacia punctulata* embryo survival and development test are presented in Table 4-4. The mean embryo survival was above 93% for all samples, with no statistically significant difference between the reference sample and the samples collected down current at the compliance point (I-195 bridge) or in the additional near field sample at 1500 feet from the disposal cell (metals compliance transect). The mean normal embryo development was above 95% for all collected samples, with no statistically significant difference between the reference sample and the samples collected down current at the compliance point (I-195 bridge) or in the additional near field sample at 1500 feet from the disposal cell (metals compliance transect).