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Synthesis Report

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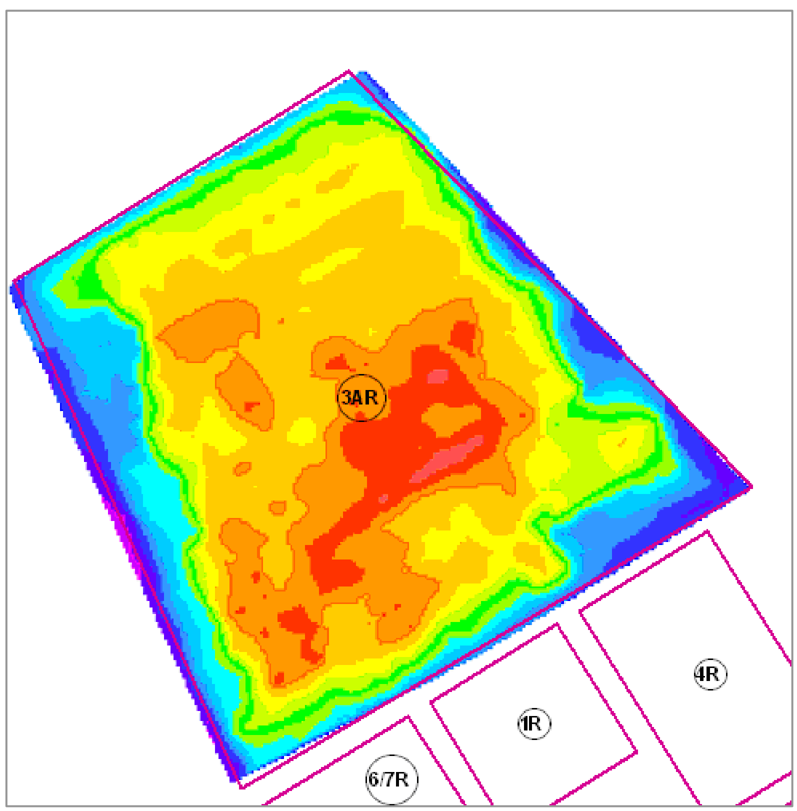

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13. ABSTRACT

The Providence River and Harbor Maintenance Dredging Project (PRHMDP) was an extensive dredging project designed and implemented to address the increasing navigational constraints within the principal commercial waterway in Rhode Island. A total of 3.8 million cubic yards (mcy) (2.9 million m^3) of maintenance material was dredged from April 2003 through July 2005. Material that was determined to be unsuitable for unconfined open water disposal was placed in confined aquatic disposal (CAD) cells constructed within the footprint of the Federal Navigation Channel at the head of Providence Harbor. The majority of the material that was suitable for unconfined open water disposal, including the 2.0 mcy (1.5 million m^3) dredged to create the CAD cells, was placed at the Rhode Island Sound Disposal Site (RISDS).

Extensive environmental monitoring was performed by a number of parties during and following PRHMDP dredging and disposal operations. Monitoring included surveys to characterize the spatial extent and suspended sediment concentrations of plumes generated by maintenance dredging, CAD cell construction, disposal into the CAD cells, and disposal at RISDS. Other studies examined benthic conditions, and included bathymetric surveys, a benthic community survey, a study on flounder hatching success, and an assessment of lobster abundance. In general, monitoring indicated minimal environmental impacts. All suspended solids plumes studied, including those generated by both dredging and disposal operations in the Providence River and at RISDS, were found to be near-field and short-lived phenomena, with the highest suspended sediment concentrations found near the bottom of the water column. Modeling of dredging and disposal plumes performed for the Environmental Impact Statement (EIS) were within the envelope of observed conditions for concentration after model results were scaled to actual release rates derived from measured production rates and sediment flux; modeled plume footprints were larger than observed because actual plumes largely stayed within the channel or CAD cell. Dredging was not found to negatively impact winter flounder hatching success. Benthic recolonization at RISDS met or exceeded expectations six months following disposal, with a benthic community comprised primarily of Stage II organisms, with some Stage III organisms. Disposal at RISDS was not found to have a long-term effect on local lobster populations.
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TABLE OF CONTENTS

Page

LIST OF TABLES ... iv
LIST OF FIGURES ... vi
LIST OF ABBREVIATIONS ... x
EXECUTIVE SUMMARY ... xii

1.0 INTRODUCTION ... 1
1.1 Project Description ... 1
1.2 Project Background ... 4
1.3 Project Roles and Responsibilities ... 6
1.4 Project Concerns ... 6
1.4.1 Dredging Concerns ... 8
1.4.2 Disposal Alternative Concerns ... 8
1.4.3 Concerns with Potential Environmental Impacts ... 10
1.5 Report Overview ... 13

2.0 EIS SUMMARY ... 15
2.1 EIS Overview ... 15
2.2 Predictive Modeling ... 18
2.3 Windows and Sequencing ... 20

3.0 DREDGING AND DISPOSAL OPERATIONS ... 22
3.1 General Overview ... 22
3.2 Equipment ... 22
3.3 Construction of CAD Cells ... 27
3.4 Maintenance Dredging ... 38
3.5 Disposal in CAD Cells ... 38
3.6 Disposal at RISDS ... 41
3.7 Overall Project Schedule ... 44

4.0 Environmental Monitoring ... 46
4.1 General Overview ... 46
4.2 Maintenance Dredging ... 46
4.2.1 Methods ... 46
4.2.2 Results ... 50
4.3 CAD Cell Construction ... 56
4.3.1 Methods ... 56
4.3.2 Results ... 57
4.4 Disposal into CAD Cells ... 64
4.4.1 Methods ... 64
4.4.2 Results ... 68
4.5 Disposal at RISDS ... 78

Page

4.5.1 Plume Tracking and Assessment....78
4.5.2 Bathymetric Monitoring Surveys....82
4.5.3 2003 Benthic Monitoring Surveys....87
4.5.4 2005 Benthic Monitoring Survey....90
4.5.5 Lobster Surveys....91
4.6 Fisheries Protection....102

5.0 DISCUSSION....105
5.1 Dredging....105
5.1.1 General Performance....105
5.1.2 Comparison with Model Predictions....105
5.1.3 Biological Impacts....110
5.2 Disposal into CAD Cells....113
5.2.1 General Performance....113
5.2.2 Comparison with Model Predictions....113
5.2.3 Adaptive Approach to Monitoring....119
5.3 Disposal at RISDS....119
5.3.1 General Performance....119
5.3.2 Comparison of Model Predictions and Monitoring....120
5.3.3 Biological Impacts....123
5.4 Capping of CAD Cells....124
5.5 Overall Project Public Perception....125

6.0 CONCLUSIONS....127

7.0 REFERENCES....129

APPENDICES

A WATER QUALITY CERTIFICATION
B DREDGING AND DISPOSAL INFORMATION
C PROJECT PHOTOGRAPHS
D WATER QUALITY MONITORING SUBMITTALS TO RIDEM

INDEX

LIST OF TABLES

Page

Table 1-1. PRHMDP Roles and Responsibilities 7
Table 2-1. EIS Organization – Section Titles 16
Table 2-2. EIS Appendices 17
Table 2-3. Summary of Predictive Modeling....19
Table 3-1. Dredged Material Volume by Reach 23
Table 3-2. Equipment Used for PRHMDP 24
Table 3-3. CAD Cell Construction Sequence and Completed Dimensions....30
Table 3-4. Estimated Volumes of Dredged Material Disposed in CAD Cells during the PRHMDP....39
Table 3-5. Estimated Volumes of Private Project Dredged Material Disposed in CAD Cell 6/7R Through January 2007....40
Table 4-1. Summary of PRHMDP Dredging and Disposal Monitoring Activities 47
Table 4-2. Observed Turbidity During Maintenance Dredging in the Sabin Point and Bullock Point Reaches of the Providence River....51
Table 4-3. Observed Turbidity During CAD Cell Construction in the Fox Point Reach of the Providence River 58
Table 4-4. Monitoring Requirements for Disposal into CAD Cells 65
Table 4-5. Monitoring Events for Turbidity, TSS, Metals and Toxicity Testing with Applicable WQC Requirements 69
Table 4-6. Summary of Observed TSS during CAD Cell Disposal Monitoring 74
Table 4-7. Monitoring Requirements of Disposal at RISDS 79
Table 4-8. Monitoring of Benthic Conditions at RISDS Following Disposal....86
Table 4-9. Differences in Means Between 2005 and 1999 Surveys by Month and Site for Lobster Abundance (Count) and Size Data 101
Table 5-1. Maximum Predicted TSS Concentration during Maintenance Dredging for All Release Rates....107
Table 5-2. Observed and Modeled Conditions for TSS data 108
Table 5-3. Comparison of Observed and Predicted TSS Concentration Following Maintenance Dredging....110
Table 5-4. Maximum Predicted TSS Concentration for 6000 cy Release in CAD Cells 115

Page

Table 5-5. Dump Barge Dimensions for STFATE Model Scenarios at RISDS..............120
Table 5-6. Model Predicted Maximum TSS Concentrations at RISDS...........................121

LIST OF FIGURES

Page

Figure 1-1. Providence River and Harbor Maintenance Dredging Project in Narragansett Bay 2

Figure 1-2. Providence River and Harbor Maintenance Dredging Project reaches 3

Figure 1-3. DEIS alternative open water disposal site locations....................9

Figure 1-4. Location of Rhode Island Sound Disposal Site 11

Figure 1-5. Location of CAD cells within Providence River....................12

Figure 3-1. Example of mechanical dredge (#51) and split-hulled disposal scow used on the PRHMDP 25

Figure 3-2. Open clamshell bucket (top) and enclosed clamshell bucket (bottom) used on the PRHMDP 26

Figure 3-3. Attending tugs with split-hull scow initiating disposal into CAD cell in Providence Harbor 28

Figure 3-4. Approximate CAD cell footprints in Fox Point Reach....................29

Figure 3-5. Schematic of CAD cell construction (top) and CAD cell disposal (bottom) 31

Figure 3-6. Bathymetry of post-construction CAD Cell 1R prior to initiation of disposal 32

Figure 3-7. Bathymetry of post-construction CAD Cell 3R prior to initiation of disposal 33

Figure 3-8. Bathymetry of post-construction CAD Cell 4R prior to initiation of disposal 34

Figure 3-9. Bathymetry of post-construction CAD Cell 5R prior to initiation of disposal 35

Figure 3-10. Bathymetry of post-construction CAD Cell 6/7R prior to initiation of disposal36

Figure 3-11. Bathymetry of post-construction CAD Cell 3AR prior to initiation of disposal37

Page

Figure 3-12. Bathymetry of the six CAD cells in May 2005 following completion of major PRHMDP disposal operations 42

Figure 3-13. Reported dredged material disposal locations at RISDS over baseline bathymetry 43

Figure 3-14. Overall schedule for PRHMDP dredging and disposal 45

Figure 4-1. Study sites showing dredge locations, ADCP transects and OBS locations during monitoring at Sabin Point and Bullock Point.......................................49

Figure 4-2. Inner near-field plume turbidities at depths at various depths down-current from the dredging operation at Sabin Point during a flood tide. 52

Figure 4-3. Comparison of acoustic TSS estimates and direct TSS measurements in rank order (units are in $mg \cdot l^{-1}$). 53

Figure 4-4. Vertical cross-sectional profiles of TSS concentration estimates at various distances from the dredging operation during a flood tide in the Sabin Point Reach of Providence River. 55

Figure 4-5. Plume turbidities down-current of CAD cell construction in the near-field and in the far-field. 59

Figure 4-6. Comparison of acoustic TSS estimates and direct TSS measurements in rank order. 60

Figure 4-7. Composite locations of ADCP flood and ebb transects during CAD cell construction in the Fox Point Reach of Providence River with depth-averaged TSS concentration estimates..62

Figure 4-8. Vertical cross-sectional profiles of TSS concentration estimates at various distances from the dredging operation during a flood tide..............................63

Figure 4-9. Water quality metals and toxicity compliance locations for CAD cell disposal on an ebb tide..66

Figure 4-10. Water quality metals and toxicity compliance locations for CAD cell disposal on a flood tide. 67

Page

Figure 4-11. ADCP backscatter and water column turbidity measurements along the channel through the disposal cell, ten minutes following disposal. 71

Figure 4-12. ADCP backscatter transects and turbidity profiles 1500 ft (460 m) from disposal on 20 May 2003, 80 minutes following disposal, and 4 June 2003, 90 minutes following disposal...72

Figure 4-13. Results of September neap tide DO monitoring survey 77

Figure 4-14. Disposal locations for RISDS plume studies...80

Figure 4-15. Total suspended solids (TSS) concentration near the plume centroid versus time for RISDS plume monitoring, April 2004 and September 2004. 83

Figure 4-16. Positions of the centroid and direction of transport of the three sediment plumes tracked during the April 2004 plume monitoring survey relative to RISDS boundaries. 84

Figure 4-17. Positions of the centroid and direction of transport of the three sediment plumes tracked during the September 2004 plume monitoring survey relative to RISDS boundaries. 85

Figure 4-18. Bathymetric contour map of RISDS, August 2005. 88

Figure 4-19. Enlarged view of the disposal trail feature detected in the September 2003 side-scan sonar mosaic. 89

Figure 4-20. The distribution of infaunal successional stages at the RISDS reference areas, July 2005...92

Figure 4-21. The distribution of infaunal successional stages at RISDS, July 2005 93

Figure 4-22. Plan view image from Station BE-02 showing the typical surface appearance of a soft, muddy bottom with a few large burrow openings and epifaunal foraging tracks. 94

Figure 4-23. August, September, and November 2005 lobster trawl locations at RISDS in relation to the dredged material deposited from the Providence River dredging project. 96

Figure 4-24. Total and average number of captured lobsters at each site by month.............97

Page

Figure 4-25. Percentage of lobsters with shell lesions or other deformities at each site by month, 2005 98

Figure 4-26. Average number of lobsters per trap at each site by month for all years of sampling...100

Figure 4-27. Percent total hatch of winter flounder eggs, and length of time to hatch at various sediment exposure depths 104

Figure 5-1. Modeled and observed TSS during maintenance dredging operations 112

Figure 5-2. Predicted distribution of TSS concentration for 6000 cy release, four hours after release (60% clumps and 30% free water and 80% clumps and 30% free water). 117

Figure 5-3. Comparison of predicted and observed TSS following disposal into a CAD cell...118

Figure 5-4. Predicted TSS at RISDS for 6000 cy placement at t=4 hrs and maximum concentration over time. 122

Figure 5-5. Comparison of predicted (STFATE model) and observed (Plumes 1 through 3) TSS concentrations for disposal at RISDS. 123

LIST OF ABBREVIATIONS

ADCP	acoustic Doppler current profiler
Ag	silver
ANOVA	analysis of variance
ASA	Applied Science Associates, Inc.
BOD	biological oxygen demand
CPUE	catch per unit effort
CWA	Clean Water Act
CRAC	Coastal Resources Advisory Committee
CAD	confined aquatic disposal
CTD	conductivity, temperature, and depth
Cu	copper
Cy	cubic yards
DEIS	Draft Environmental Impact Statement
DO	dissolved oxygen
EIS	Environmental Impact Statement
ERDC	USACE Engineer Research and Development Center
FEIS	Final Environmental Impact Statement
MPRSA	Marine Protection, Research, and Sanctuaries Act
Mcy	million cubic yards
MLLW	mean lower low water
NMFS	National Marine Fisheries Service

NEPA	National Environmental Policy Act of 1969
NTU	Nephelometric Turbidity Units
OBS	optical backscatter sensor
PLUMES	PLUme MEasurement System
PRHMDP	Providence River and Harbor Maintenance Dredging Project
RPD	redox potential discontinuity
RICRMC	Rhode Island Coastal Resources Management Council
RIDEM	Rhode Island Department of Environmental Management
RISDS	Rhode Island Sound Disposal Site
SAIC	Science Applications International Corporation
SPI	sediment-profile imaging
SSFATE	Suspended Sediment Fate model
STFATE	Short Term Fate model
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WRDA	Water Resources Development Act
WQC	Water Quality Certification
WHG	Woods Hole Group, Inc.

The Providence River and Harbor Maintenance Dredging Project (PRHMDP) was an extensive dredging project designed and implemented to address the increasing navigational constraints within the principal commercial waterway in Rhode Island. Project planning began in 1994, and the main project was completed in 2005. The project included removal of a large volume of dredged material, which necessitated identification of disposal options for sediments of varying quality.

An Environmental Impact Statement (EIS) was prepared to identify and evaluate dredging and disposal options to minimize environmental impact while achieving the goals of the project. The EIS included extensive predictive modeling to support assessment of potential impacts of dredging and disposal on marine resources.

Dredging commenced in April 2003 and continued through July 2005. A total of 3.8 million cubic yards (mcy) (2.9 million m^3) of maintenance material was dredged. Material that was determined to be unsuitable for unconfined open water disposal (1.2 mcy [0.9 million m^3]) was placed in confined aquatic disposal (CAD) cells constructed within the footprint of the Federal Navigation Channel at the head of Providence Harbor. An additional 2.0 mcy (1.5 million m^3) was dredged to create these CAD cells. The majority of the material that was suitable for unconfined open water disposal was placed at the Rhode Island Sound Disposal Site (RISDS), with a lesser volume being used beneficially for upland fill purposes. The dredging was sequenced to allow uninterrupted operations while minimizing the potential for impacts to sensitive resources.

Extensive environmental monitoring was performed by a number of parties during and following PRHMDP dredging and disposal operations. Monitoring was conducted to fulfill the requirements of the Water Quality Certification and the environmental monitoring plan developed for the project. Monitoring included surveys to characterize the spatial extent and suspended sediment concentrations of plumes generated by maintenance dredging, CAD cell construction, disposal into the CAD cells, and disposal at RISDS. Other studies examined benthic conditions, and included bathymetric surveys, a benthic community survey, a study on flounder hatching success, and an assessment of lobster abundance.

All suspended solids plumes studied, including those generated by both dredging and disposal operations in both the Providence River and at RISDS, were found to be near-field and short-lived phenomena, with the highest suspended sediment concentrations found near the bottom of the water column. Lower concentrations of suspended solids were generally detected for up to several hours and up to 3000 feet (1000 m) down-current of the source, at which point suspended solids concentrations returned to ambient or near-ambient conditions. Modeling of dredging and disposal plumes performed for the EIS were within the envelope of observed conditions for concentration after model results were scaled to actual release rates derived from measured production rates and sediment flux; modeled plume footprints were larger than observed because actual plumes largely stayed within the channel or CAD cell.

The potential impacts on winter flounder eggs from sediment deposition by dredging operations within the harbor were studied in both the laboratory and field. The field study found no significant difference in egg survival between dredging and background conditions. The laboratory study demonstrated the potential for high levels of sediment deposition to smother winter flounder eggs and reduce hatching success. While the levels of deposition shown to inhibit hatching are not thought to have been realized in flounder habitat during PRHMDP, modeling or monitoring of such deposition may be useful for future projects with similar fisheries concerns.

Several monitoring studies were conducted at RISDS during and following the cessation of disposal. A series of six bathymetric surveys were conducted throughout disposal at RISDS. The survey results were used in part to direct disposal locations in order to (1) use the coarser grained sediments to construct a continuous berm of sediment along the rim of a natural seafloor depression and (2) to evenly distribute the finer grained maintenance sediments within the depression. The purpose of the berm was to enhance the capacity of the depression and to limit the lateral spread of finer grained maintenance sediment. The final bathymetric survey illustrated a well-defined berm with sufficient remaining capacity in the artificial containment cell.

A benthic survey at RISDS, which utilized sediment-profile imaging and sediment grab samples for benthic community analysis, was conducted six months following the last disposal at RISDS. The benthic community was comprised primarily of Stage II organisms, with some Stage III organisms, indicative of an intermediate to advanced phase of recolonization. Overall, the infauna at the disposal site was represented by fewer species, fewer individuals and lower species diversity compared to the reference areas, but benthic recolonization met or exceeded expectations six months following disposal.

A study of lobster abundance was conducted seven months after the last disposal at RISDS. The objective of this study was to compare lobster abundance at RISDS to two other sites in Rhode Island Sound and to results of a similar survey in 1999 to examine whether disposal impacted local lobster populations. There was an overall decrease in lobster abundance observed at all three sites in Rhode Island Sound between the 1999 and 2005 sampling events, consistent with a longer-term trend of decreasing lobster abundance throughout southern New England waters. Statistical comparisons indicated no significant changes in lobster abundance or size at RISDS between 1999 and 2005 that were unusually strong or anomalous compared to the changes observed at the other sites over the same time period. Thus, disposal activities did not appear to have caused significant adverse impacts to lobster populations at RISDS compared to nearby areas of Rhode Island Sound.

1.0 INTRODUCTION

The Providence River and Harbor Maintenance Dredging Project (PRHMDP) was an extensive dredging project designed and implemented to address the increasing navigational constraints within the principal commercial waterway in Rhode Island. Project planning began in 1994, and the main project was completed in 2005; minor ledge removal was completed in September 2007. The project included removal of a large volume of dredged material, which necessitated identification of disposal options for sediments of varying quality. An environmental impact study was undertaken to identify and evaluate dredging and disposal options to minimize environmental impact while achieving the goals of the project. This report provides an overview of the project, the environmental studies performed prior to, during, and after the project, and an analysis of the results and potential implications for future projects.

1.1 Project Description

The Providence River is formed by the junction of two small rivers, the Woonasquatucket and Moshassuck Rivers, which originate in northern Rhode Island (Figure 1-1). The Providence River flows southerly for one mile (1.6 km) to the head of Providence Harbor in Providence, where it is joined by the Seekonk River.

The Federal Navigation Project, a 16.8 mile-long (27 km) channel, begins near the head of Providence Harbor and follows the Providence River on a southerly course adjacent to the communities of East Providence, Cranston, Warwick, and Bristol (Figures 1-1 and 1-2). The upper two and one-half miles (4.0 km) comprise the Main Harbor, which is that portion of the river south of Fox Point and India Point and extending generally south of Fields Point. The Outer Harbor consists of the approach channel extending south from the Main Harbor to deep water in Narragansett Bay just south of Prudence Island (Figures 1-1 and 1-2).

Providence River and Harbor together constitute the principal commercial waterway in Rhode Island. The deep-draft traffic in Providence River and Harbor consists mainly of tankers, barges, and general cargo vessels. As of 2001, there were 27 water terminal facilities serving the port of Providence. Three-fourths of all facilities had railway connections. Four facilities were owned by the City of Providence and two by the State of Rhode Island. There were ten wharves with major oil-handling capabilities on the main channel.

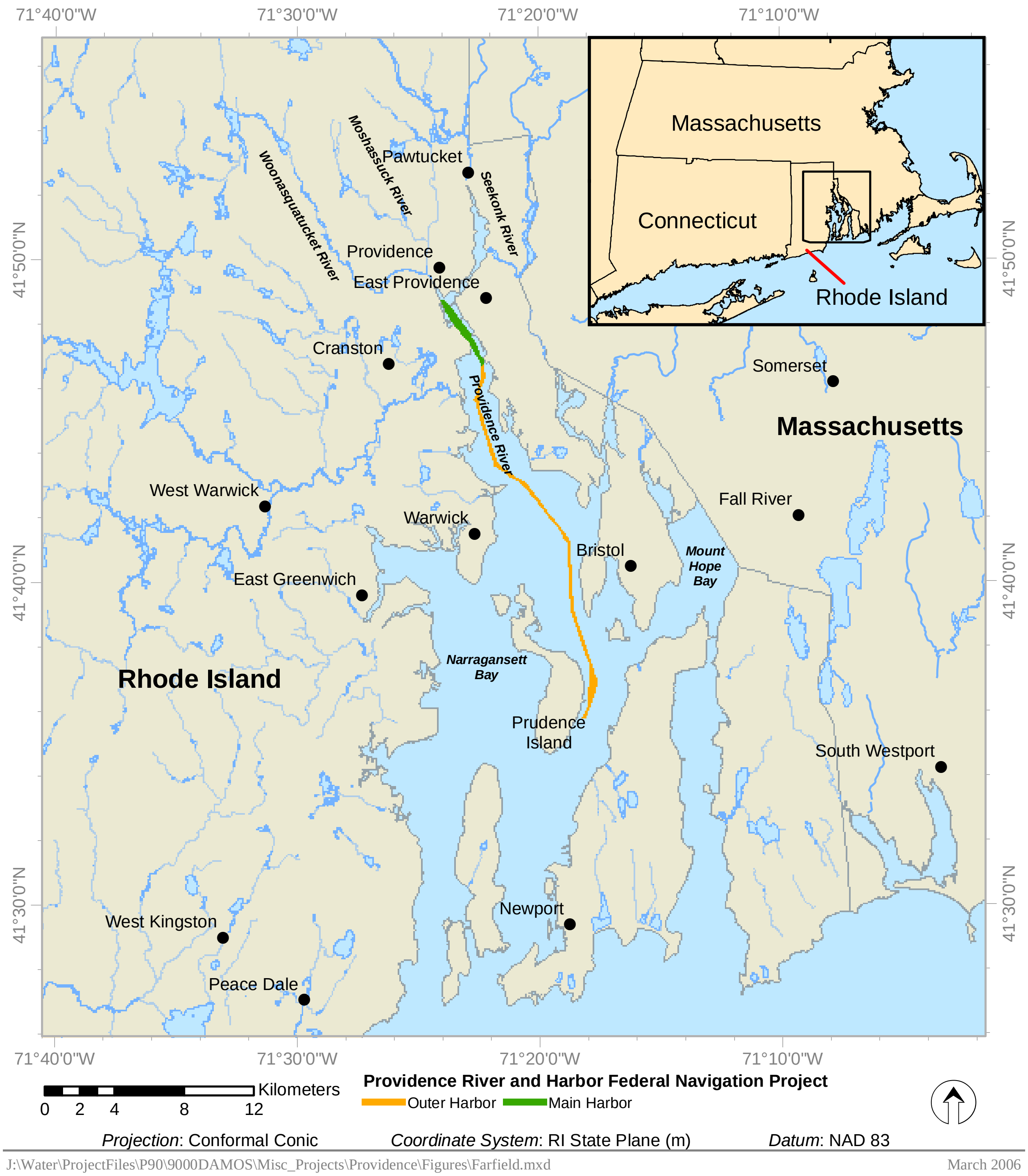


Figure 1-1. Providence River and Harbor Maintenance Dredging Project in Narragansett Bay

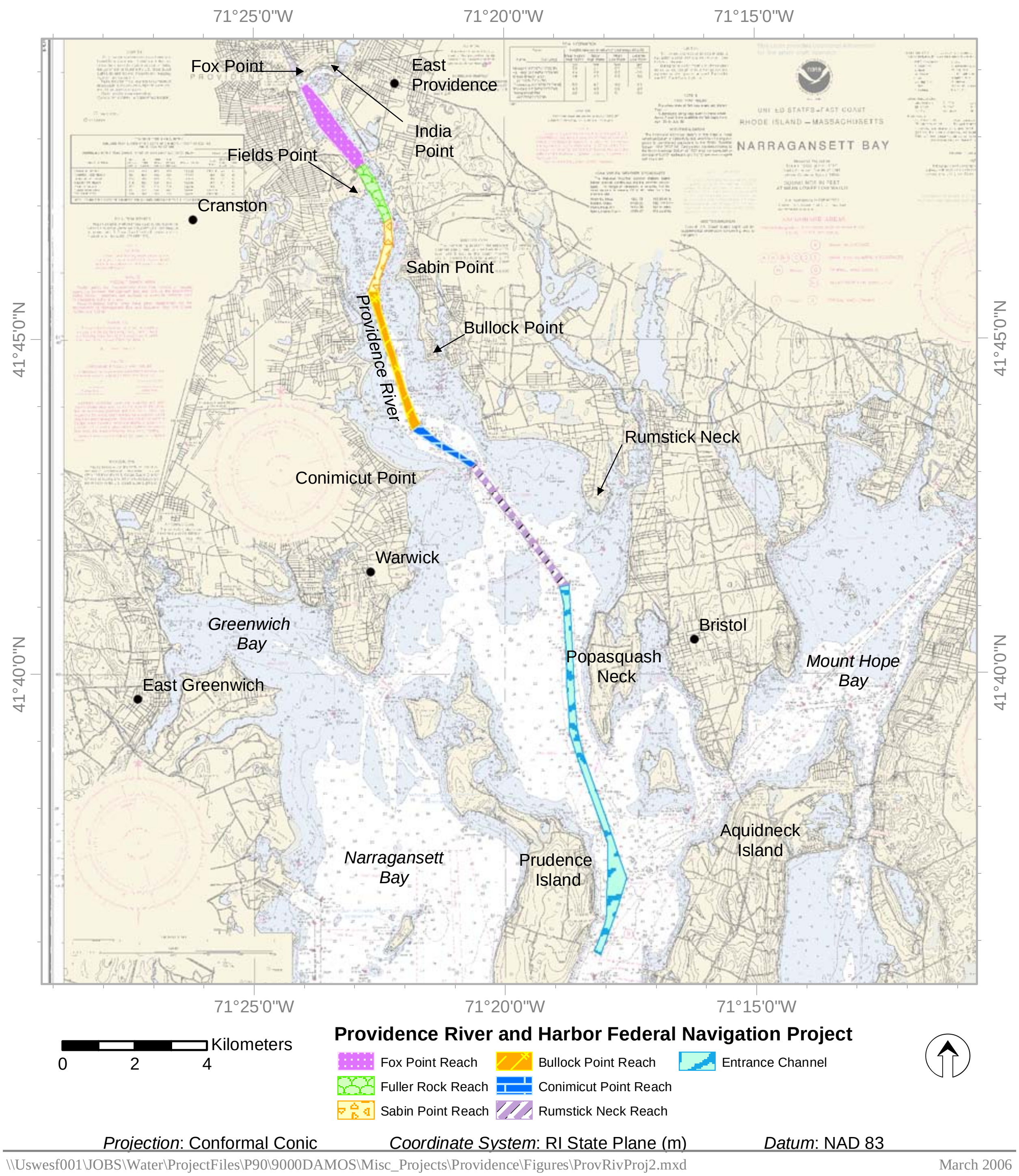


Figure 1-2. Providence River and Harbor Maintenance Dredging Project reaches

The primary purpose of the PRHMDP was to restore the navigation efficiency in the Federal channel and safety of the Providence River Shipping Channel for deep draft vessels that currently transit the project area. To restore the Federal channel to its authorized dimensions, an estimated 4.3 million cubic yards (mcy) (3.3 million cubic meters [m^3]) of material needed to be removed. In addition, 27 non-Federal projects were dredged while the Federal project was undertaken, making use of the disposal sites selected for the Federal project and adding approximately 325,000 cubic yards (cy) (248,000 m^3) of additional material to be removed. These non-Federal projects fell into three categories: 1) marine terminals and port facilities in Providence Harbor, 2) private marinas in various locations throughout Narragansett Bay, and 3) small, private projects such as privately-owned docks. The purpose of the channel, marine terminal, and port facility dredging was to allow efficient use of the facilities to ensure continued commercial operations, to maintain adequate depths to ensure public safety, and to maintain environmental safety (for example, to increase depths to avoid ship propellers stirring up contaminated sediments or spills from lightering operations, and to decrease the need to deliver cargo by trucks). The purpose of the marina and dock dredging projects was to allow continued use of the marina and dock facilities for commercial and recreational boating.

1.2 Project Background

Prior to the PRHMDP, there had been no significant dredging in Rhode Island for nearly 25 years. In 1976, under the Federal Providence River and Harbor Navigation Project, approximately 100,000 cy of material (76,000 m^3) was dredged. Previous to that project, the last large-scale dredging was conducted in 1971, when 2.7 mcy (2.1 million m^3) of material was dredged.

Federal involvement in the Providence River dates back to 1853 when 17,000 cy (13,000 m^3) of material was removed from a shoal area to provide for a 9-ft (2.7 m) deep channel. Subsequent improvements involved the construction of a 5.5-mi (8.9 kilometer [km]) long channel, 25 ft (7.6 m) deep and generally 600 ft (183 m) wide, extending from Fox Point to Bullock Point in East Providence and extension of this channel 5.1 mi (8.2 km) southward to North Point (Popasquash Neck) in Bristol to a depth of 35 ft (10.7 m) through its entire length. Under authority of the Rivers and Harbors Act of 1965, a modification to the project was completed in 1976. This involved extending the channel 6.2 mi (10 km) southward to the southeasterly side of Prudence Island, and deepening the entire channel to 40 ft (12.2 m). The channel is generally 600 ft (183 m) wide, except for the stretch between Fields Point (near the Providence-Cranston city line) and Fox Point, where it has varying widths of up to 1700 ft (520 m). The Rivers and Harbors Act also authorized a channel 30 ft (9.2 m) deep and 150 ft (46 m) wide from the upper end of the existing project to the vicinity of India Point at the mouth of the Seekonk River; however, this section was deauthorized by the Water Resources Development Act (WRDA) of 1986. Since the completion of construction in January 1976, the Federal channel had not been maintained.

In the late 1970s and early 1980s, attempts to dredge the nearby Fall River ship channel in Massachusetts and to designate a regional disposal site failed. This failure was not due to opposition to the dredging, but rather due to the inability to identify an acceptable disposal site for the southeastern Massachusetts and Rhode Island regions. The State of Rhode Island faced potentially severe economic consequences because the unavailability of a regional disposal site meant that the primary commercial waterway could not be dredged. The magnitude of the dredging project required to maintain Providence River and Harbor made the disposal issue difficult to resolve. Dredging the State's largest port facility, the Providence River Federal Navigation Project, required removal of an estimated 4.3 mcy (3.3 million m^3) of sediment. This volume is enough material to cover 160 acres (0.65 km^2) of land 20 ft (6.1 m) high. Disposed in the water, the material was predicted to take on a mound shape and cover up to 800 acres (3.2 square kilometers [km^2]) to a height of 0.5 ft (0.15 m) or more depending on how it was distributed. Furthermore, because of the level of industrialization surrounding the harbor, more than a quarter of the material (1.2 mcy or 920,000 m^3) was contaminated to such a level that it could not be disposed in open water without some type of confinement. Viable disposal options had to be identified before the project could move forward.

In 1992, at the request of the Governor of Rhode Island, the U.S. Army Corps of Engineers (USACE) completed a survey of the Providence River ship channel to assess the dredging needs. That survey showed mid-channel shoaling (the reduction in water depth due to deposition of sediment) of generally 3 to 11 ft (0.9 to 3.4 m) and shoaling of the outer edges of the channel of 6 to 12 ft (1.8 to 3.7 m). This level of shoaling affected navigation safety and, as a result of the survey findings, the U.S. Coast Guard (USCG) placed emergency restrictions on ship traffic in Providence River. These restrictions included limiting transit of the channel to one-way traffic and restricting vessel drafts.

Shortly after the survey results were released, then Rhode Island Governor Sundlun established an Interagency Task Force to Preserve Shipping in Narragansett Bay to consider the problem of maintaining the Federal channel and other commercial and recreational navigation projects and marinas throughout the State. The Task Force determined that there was an economic and environmental need to dredge the channel and related port facilities and restore the federally authorized depth of 40 ft (12.2 m). Strong support for dredging in a cooperative interagency framework continued under the subsequent governor, Lincoln Almond, who established the Governor's Commission on Dredging. The Commission created the Coastal Resources Advisory Committee (CRAC) with the objective of developing solutions to the dredging and disposal issues and assisting USACE with its Environmental Impact Statement (EIS [USACE 1998, USACE 2001], see Section 2). The CRAC convened a number of meetings and provided a substantial amount of information to USACE to support preparation of the EIS.

1.3 Project Roles and Responsibilities

Dredging of the Providence River was, by design, a partnership between the Federal and State Governments, similar to all USACE maintenance dredging projects. The USACE was the lead agency for the PRHMDP, including the development of the EIS. Federal Cooperating Agencies included National Marine Fisheries Service (NMFS), US Environmental Protection Agency (USEPA), and US Fish and Wildlife Service (USFWS). The State Government was represented by Rhode Island Coastal Resources Management Council (RICRMC), Rhode Island Department of Environmental Management (RIDEM), and the Governor's office. RICRMC was designated as the State's lead agency in coordinating dredging issues. The State was an integral part of the planning process, and through the Project Cost Share Agreement was a financial partner in the conduct of the work. Monitoring of the dredging and disposal was a collaborative effort amongst government agencies (USACE Engineer Research and Development Center [ERDC], USEPA Narragansett Laboratory and USEPA Region 1), contractors (Applied Science Associates [ASA], Science Applications International Corporation [SAIC] Woods Hole Group [WHG]/ENSR, and DAMOSVision), and other entities (University of Rhode Island Graduate School of Oceanography). Table 1-1 outlines each entity's roles and responsibilities, as well as any supporting documentation produced in association with the project.

1.4 Project Concerns

Public concerns regarding the PRHMDP were raised in response to the publication of the draft Environmental Impact Statement (DEIS) in August 1998 (USACE 1998). Concerns generally fell into three main categories: dredging, disposal alternatives, and potential environmental impacts. A summary of each area of concern is provided below, as well as how each concern was addressed in the Final Environmental Impact Statement (FEIS) (USACE 2001).

Table 1-1.

PRHMDP Roles and Responsibilities

Entity	Role	Supporting Documentation
Federal		
USACE New England District	Lead agency for EIS and PRHMDP	DEIS (USACE 1998) and FEIS (USACE 2001)
USACE Engineer Research and Development Center (ERDC)	Dredging plume monitoring Disposal plume modeling Mound creation and stability modeling	FEIS, App. P
USEPA New England	One of the Federal Cooperating Agencies RISDS monitoring – sediment-profile imaging	
USEPA Narragansett Laboratory	Winter flounder egg burial studies	Presentation (Klein-MacPhee et al. 2004) Poster presentation (Berry et al. 2004)
National Marine Fisheries Service (NMFS)	One of the Federal Cooperating Agencies	
U.S. Fish and Wildlife Service (USFWS)	One of the Federal Cooperating Agencies	
State		
Rhode Island Department of Environmental Management (RIDEM)	Water Quality Certification. Integral part of planning process	WQC File No. 01-61, 15 February 2002, revised 20 March 2003
Rhode Island Coastal Resources Management Council (RICRMC)	State's lead agency in coordinating dredging issues. Integral part of planning process and financial partner	
RI Governor's office	Integral part of planning process and financial partner	
Academia		
University of Rhode Island Graduate School of Oceanography	Winter flounder egg burial studies	Presentation (Klein-MacPhee et al. 2004) Poster presentation (Berry et al. 2004)
Contractor		
Applied Science Associates	Dredging plume modeling	FEIS, App. D of App. L
SAIC	RISDS plume tracking and assessment RISDS benthic monitoring – bathymetry, side-scan sonar, sediment-profile imaging and towed video	SAIC 2004, 2005a, 2005b
WHG/ENSR	CAD cell disposal monitoring	Water column monitoring summary reports submitted to RIDEM and posted at http://www.dem.ri.gov/programs/benviron/assist/prdredge/index.htm
ENSR	RISDS benthic monitoring – sediment-profile and plan view imaging, benthic grabs	ENSR 2007b
DAMOSVision	Lobster surveys	DAMOSVision 2007

1.4.1 Dredging Concerns

Public comments on the DEIS were generally in favor of the dredging (USACE 2001). The two most substantial concerns related to dredging involved the timing of the dredging to minimize impact on the biological community and the extensive size of the dredging project. To address the concerns about the timing of the dredging operation, a substantial effort was undertaken to evaluate the need for and effectiveness of environmental windows and sequencing with full consideration of available information about aquatic resources in the dredging area. Environmental windows and sequencing are management practices based on restrictions on the timing and/or location of the operation to avoid impact to sensitive organisms (or life history stages of specific organisms). Additional water quality modeling and a series of interagency meetings to explore and discuss environmental windows and sequencing were conducted (See Section 2 for a discussion of windows and sequencing).

To address the concerns about the overall project size, four alternatives with dimensions smaller than the congressionally-authorized project were assessed. These alternatives reduced the cost and predicted environmental impacts of the project, but would likely have affected navigation efficiency and safety. Upon further analysis, the Corps of Engineers concluded that the full project dimensions, with the exception of two small areas that were no longer in use, best served the needs and goals of the project. However, since use of the upper river area had changed since its construction, a few of the turning areas were eliminated to reduce overall dredging quantities.

1.4.2 Disposal Alternative Concerns

The public expressed concern over the selection of disposal locations (both open water and confined disposal) for the dredged material. During the DEIS analyses after a screening process involving dozens of preliminary alternatives, several alternative locations were more fully considered for potential open water disposal sites in both Narragansett Bay and Rhode Island Sound (Figure 1-3). Comments on the DEIS clearly indicated a lack of public acceptance for dredged material disposal in Narragansett Bay. Evaluation of the alternative sites continued in the final EIS, including a more detailed evaluation of Site 69b within Rhode Island Sound (which resulted in a slightly modified boundary from the original Site 69b location). Upland disposal and alternative treatment technologies were also further considered. Ultimately, the modified Site 69b in Rhode Island Sound was selected for open water disposal of dredged material. Concurrently, USACE was directed by Congress to conduct a study to identify a long term disposal site for Rhode Island and Southern Massachusetts, and in a subsequent action by the USEPA in December 2004, this site was officially designated the Rhode Island Sound Disposal

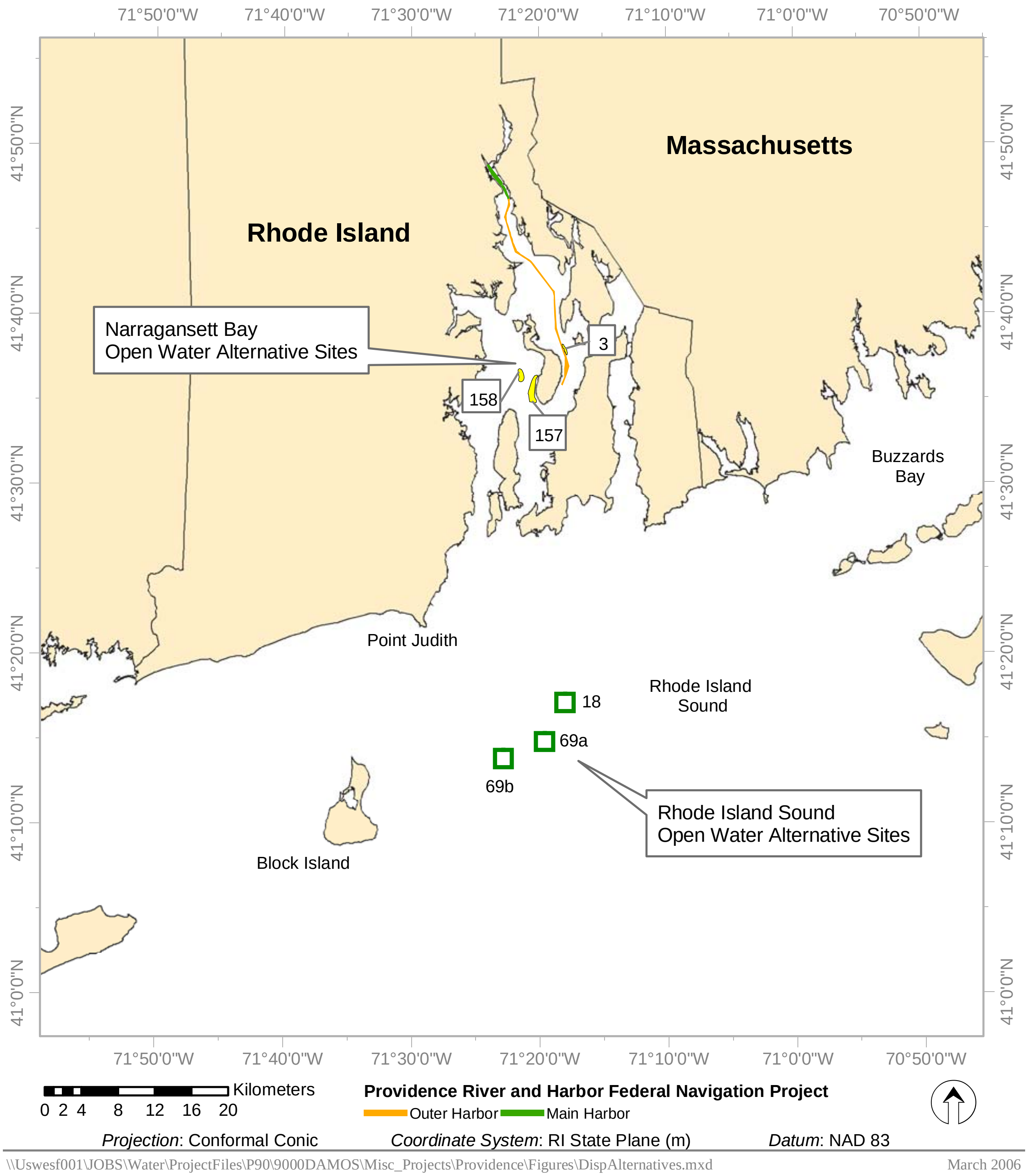


Figure 1-3. DEIS alternative open water disposal site locations

Site (RISDS, Figure 1-4), an open water disposal site for dredged materials from Rhode Island, southeastern Massachusetts, and surrounding harbors (40 CFR Part 228.15(b)(3)).

The use of confined aquatic disposal (CAD) cells for managing the material classified as unsuitable for unconfined ocean disposal was generally favorably received. CAD cell locations were evaluated in the Providence Harbor Federal Navigation channel and near Watchemoket Cove in East Providence. A further evaluation of these potential CAD cell locations was conducted in support of the EIS. Users of Watchemoket Cove were questioned about future use of the area adjacent to and upstream of the proposed location of the in-channel cells (CAD cells were proposed to be located at the upstream end of the 40' channel), and it was determined that no deepening of the area was contemplated. However, concerns about the Watchemoket site included the limited available area and relatively shallow water depths, uncertain long term structural stability, and future use of the adjacent areas. Although the evaluation indicated that either of the potential CAD cell locations was feasible, the in-channel CAD cell location was ultimately selected for disposal of material that could not go to RISDS (Figure 1-5).

1.4.3 Concerns with Potential Environmental Impacts

Environmental concerns related to potential water quality and fisheries impacts were raised following the publication of the DEIS. Concern was expressed for the potential effects of dredged material disposal on water quality and the potential for erosion of sediments from the open water disposal sites. Additional modeling and field studies were performed to address these concerns. In general, these studies concurred with earlier studies, indicating minimal predicted impact on water quality and predicted overall mound stability at the open water disposal sites. One exception was model predictions regarding the potential effects of storm-driven currents. These model predictions indicated that there was a greater potential for erosion under storm conditions at the Narragansett Bay sites than at the Rhode Island Sound sites. This information contributed in part to the decision to identify Site 69b in Rhode Island Sound as the preferred disposal location, rather than the Narragansett Bay locations.

The most substantial comments concerning environmental impacts related to the effects of dredged material disposal on the temperature refuge characteristics for the candidate sites located within bay floor depressions in Narragansett Bay. Specifically, commenters suggested that these depressions may serve as seasonal cold water refuges in the warmer months for valuable fishery resources such as winter flounder, tautog, and lobster and may be important components of their migration routes. To address these concerns, additional sampling of shellfish and lobsters was performed, as well as research

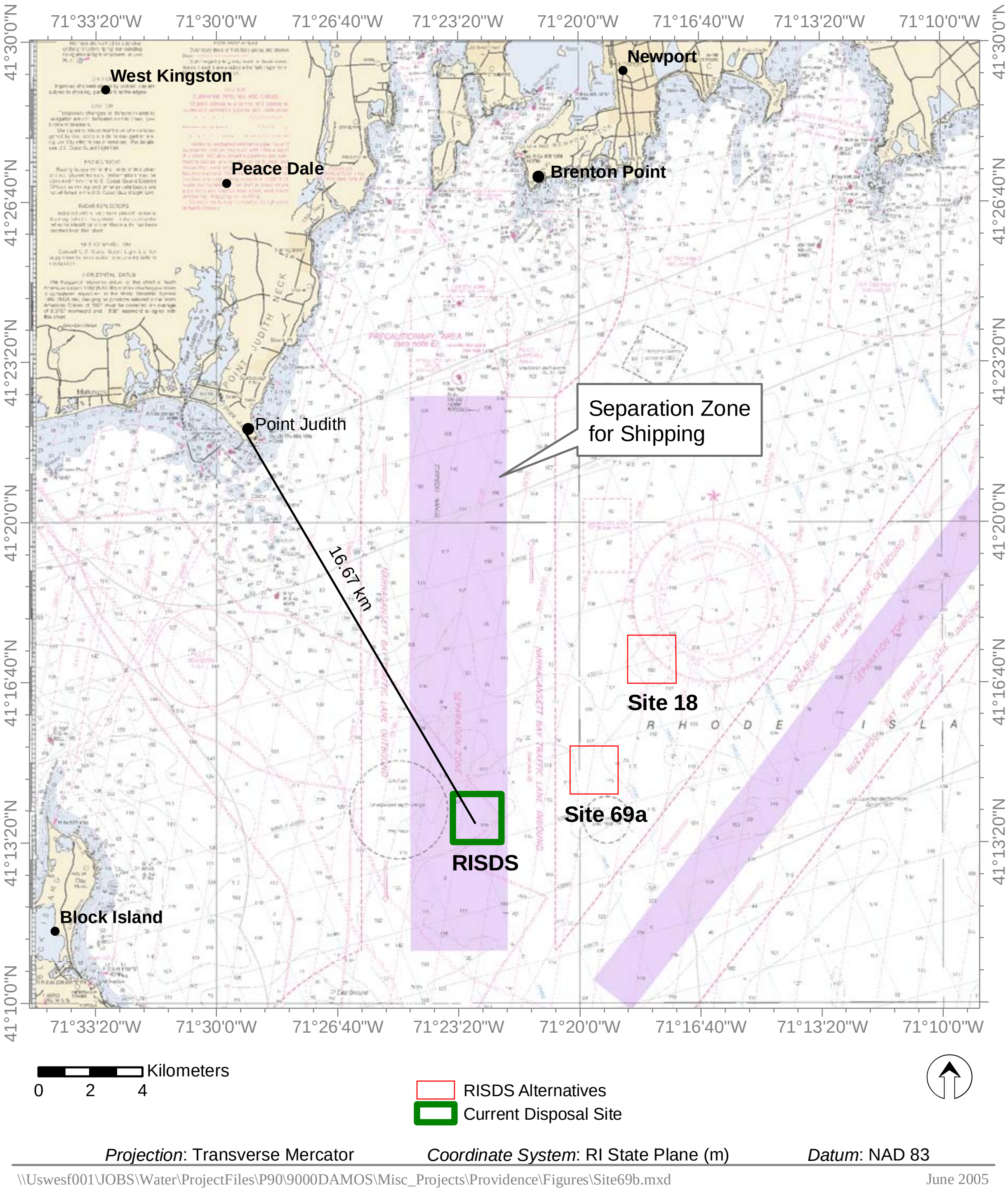


Figure 1-4. Location of Rhode Island Sound Disposal Site

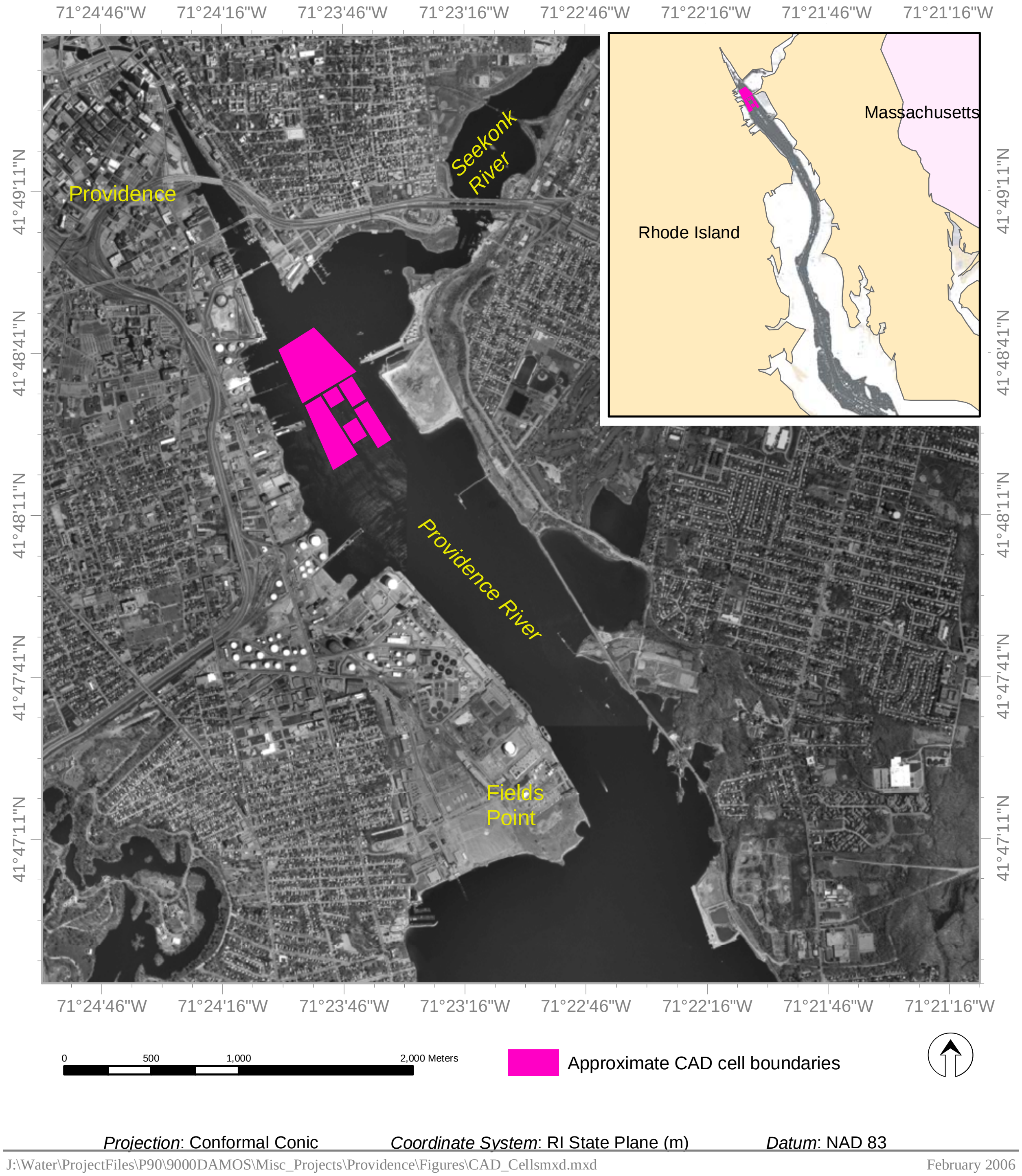


Figure 1-5. Location of CAD cells within Providence River

of available literature and existing information. The available data did not support the concern that the proposed disposal locations in Narragansett Bay serve as a temperature refuge or a winter flounder and tautog migration route. However, it was determined that a substantial change in depth due to dredged material disposal was more likely to negatively impact lobster populations at the Narragansett Bay sites compared to the Rhode Island Sound sites. This additional information further influenced the selection of RISDS for open water disposal.

1.5 Report Overview

This PRHMDP summary report is intended to provide an overview of the history of the project, the EIS written in support of the project, and the dredging and disposal operations and associated environmental modeling and monitoring. It also presents a comparison of monitoring results to the evaluations in the EIS. The report is largely a summary of existing documents, most notably the FEIS (for Sections 1 and 2), but also SAIC (2004, 2005[a] and 2005[b]), ENSR (2007b), and DAMOSVision (2007) (for Section 4.5). The majority of the information presented in Section 3 has not been published elsewhere.

The remainder of this report is organized as follows:

- Section 2 – EIS Summary provides an overview of the Draft and Final Environmental Impact Statement for the project.
- Section 3 – Dredging and Disposal Operations provides an overview of the equipment, procedures, and scheduling of the actual project.
- Section 4 – Environmental Monitoring provides a summary of the monitoring performed during dredging, disposal into CAD cells, and disposal offshore at the RISDS.
- Section 5 – Discussion of the monitoring results in the context of overall performance and previous modeling predictions.
- Section 6 – Conclusions and lessons learned from the project.

The following additional information is provided in appendices to this report:

- Appendix A – Water Quality Certification issued by the State of Rhode Island
- Appendix B – Dredging and Disposal Operations – Tables detailing specific operations.
- Appendix C – Project Photographs representing dredging, disposal, and environmental monitoring.
- Appendix D – Submittals to RIDEM on the disposal water quality monitoring.

2.0 EIS SUMMARY

This section provides an overview of the PRHMDP Environmental Impact Statement (EIS) and presents more detailed information on two key aspects of the EIS, predictive modeling and windows and sequencing for dredging operations, given their relevance to this report.

2.1 EIS Overview

The Draft Environmental Impact Statement (DEIS) for the PRHMDP was published in August 1998 (USACE 1998). It described the potential environmental impacts of various dredging and disposal alternatives for the PRHMDP and several associated non-Federal dredging projects. Following numerous comments on the DEIS related to potential impacts of dredging and disposal operations, further analyses were performed, and the Final Environmental Impact Statement (FEIS) was published in August 2001 (USACE 2001).

The decision to prepare an EIS was based on the controversy associated with the extent of the required dredging in Providence River and Harbor and the lack of a suitable existing disposal site for the material. The Notice of Intent to Prepare a Draft EIS for the project was published in the Federal Register in April 1994 (Volume 59, Number 82). The EIS was prepared in compliance with the National Environmental Policy Act of 1969 (NEPA) and described compliance with all applicable Federal and State environmental regulations, laws, and executive orders. In particular, it contained detailed descriptions and data to support decisions under NEPA and Sections 401 and 404 of the Clean Water Act (CWA) and Sections 102 and 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA).

The USACE, the lead agency for this EIS, met frequently with the Federal Cooperating Agencies, RICRMC, and RIDEM throughout the development of the EIS. Cooperating Agencies were invited to participate in the preparation of the EIS according to the regulations for implementing NEPA and were selected based on their expertise and jurisdictional authority. USACE staff also met numerous times during the development of the EIS with the CRAC assembled by the RICRMC.

The EIS followed the outline suggested in the regulations for implementing NEPA (40 CFR Parts 1500-1508). The section and appendix titles are outlined in Tables 2-1 and 2-2. The Alternatives section of the EIS described dredging and disposal alternatives and the screening process for identifying alternatives to be evaluated in detail, and summarized and compared impacts of the alternatives. Methods used to evaluate the

Table 2-1.

EIS Organization – Section Titles

Section	Title
1	Introduction
2	Scoping and Public Involvement [1]
3	Purpose and Need
4	Alternatives
5	Preferred Alternative
6	Affected Environment
7	Environmental Consequences
8	Compliance/Consistency with Environmental Laws, Regulations and Programs
9	References
10	List of Preparers
11	Acronym List
12	List of Agencies, Organizations, and Persons to Whom Copies of the EIS Were Sent
13	Index

[1] Not included in the DEIS

Table 2-2.

EIS Appendices

Appendix	Title
	Published with DEIS
A	Preliminary Disposal Site Screening
B	Engineering
C	Biological Resources
D	Sediment Chemistry and Bioaccumulation/Toxicity Testing
E	EIS Related Correspondence
F	Non-Federal Dredging Applications Summary
	Published with FEIS
G	Response to Comments on DEIS
H	Geotechnical
I	Biological Resources [supplemental sampling]
J	CAD Cell Sediment Chemistry
K	FEIS Correspondence
L	Environmental windows
M	Archaeology
N	Biological Assessment
O	Essential Fish Habitat Assessment
P	Modeling
Q	Cost Analysis
R	Economic Fishery Impacts
S	Non-Federal Dredging Applications

alternatives and associated potential environmental impacts included biological sampling; physical and chemical sediment analysis; physical oceanographic characterization; numerical modeling; review of existing information and literature; and coordination with appropriate agencies, organizations, and knowledgeable people. The description of the USACE Preferred Alternative for dredging and disposal showed the reasoning for identifying this alternative. The Affected Environment section described the environment in the area affected by the alternatives. This section was organized by resource type (e.g., fish resources, economics) and generally provided a brief discussion of resources on a broad scale, and then summarized the resources for each alternative site.

2.2 Predictive Modeling

Predictive modeling was performed as part of the EIS to support assessment of potential impacts of dredging and disposal operations on marine resources. Both dredging and disposal can impact water quality by increasing total suspended solids (TSS) in the water column in the vicinity of the operations. Because of the complexity of estimating TSS resulting from dredging and disposal, predictive models were developed and applied to site-specific data, and water column TSS concentrations were predicted for a range of potential conditions and/or scenarios. These model results were used to compare impacts on aquatic biota for the various alternatives. During dredging and disposal operations, monitoring data were collected and compared to model results (See Section 5).

Separate models were developed for dredging and disposal events (Table 2-3). Channel and CAD cell dredging was simulated with the same model application, as the geographic domain and physical processes were the same for both operations. CAD cell and open water disposal were simulated with the same model, although separate model applications were developed to represent the differing physical characteristics of the disposal areas. Model descriptions are presented in Section 5.

Model results included spatially and temporally varying predictions of TSS concentrations at different depths in the water column. The models generally incorporated conservative assumptions, so that predicted TSS concentrations were likely the upper bounds of what could be expected. The model results are summarized in greater detail in Section 5. In general, model results indicated that TSS concentrations declined rapidly with distance from the operation, and upon cessation of the operation, predicted water quality returned quickly to ambient conditions.

Table 2-3.

Summary of Predictive Modeling

Dredging Operation	Numerical Model	Entity Performing Modeling	Reference
CAD cell and channel dredging	WQMAP/SSFATE – dredging plume	ASA	App. D of App. L
CAD cell disposal	STFATE – disposal plume SURGE – material leaving CAD cell	ERDC ERDC	App. P (summarized in App. L) App. P
RISDS disposal	STFATE – disposal plume MDFATE – mound creation LTFATE – stability of mound under storm conditions	ERDC	App. P

2.3 Windows and Sequencing

Environmental windows and sequencing are management practices used during dredging projects to help protect marine resources and limit potential environmental impacts. Environmental windows are restrictions placed on a project that allow dredging to occur only during specified time periods (i.e., certain times of the year). Certain marine fish and invertebrate life history stages (e.g., egg and larval stages) are considered to be more susceptible to impacts by dredging operations than other life history stages (e.g., juveniles and adults). Environmental windows are implemented to avoid dredging during periods when sensitive life history stages of marine organisms are likely to be present and significantly affected by sediments suspended during dredging and disposal operations.

Because environmental windows require dredging to cease during certain time periods, windows can result in an extension of the overall duration and cost of the project. In addition, impacts from disposal of dredged material at the disposal site would be spread out over a longer period of time, with periods of recovery followed by periods of new disposal-related impacts potentially countering some of the benefits that may be realized by the implementation of environmental windows.

Extensive predictive modeling of dredging and disposal impacts on water column TSS and an assessment of impacts to aquatic organisms due to dredging indicated minimal impacts due to the operations. Therefore, environmental windows in the traditional sense were not implemented in the PRHMDP, as the additional costs of increased length of dredging operations and additional mobilization, and demobilization were not justified by the minimal impacts predicted by the modeling and impact analyses (USACE 2001).

Unlike environmental windows, sequencing allows dredging to occur continuously, but the dredging is scheduled to avoid particular areas during time periods when sensitive marine organisms are abundant. Hence, sequencing is not typically expected to extend the length of a project as environmental windows would. Sequencing was determined to be a feasible alternative to strict windows for PRHMDP due to the long length of the dredging area (7 miles) and the differences in surrounding habitats along the different reaches. Sequencing of dredging operations was selected as an appropriate means to protect marine organisms.

The predictive TSS modeling, a larval mortality analysis, and a seasonal larval abundance assessment were used to optimize the dredging sequence within reaches of the navigation channel, depending on the start date of the project. This sequence established priorities and constraints to minimize impact to aquatic resources without delaying progress of the dredging operations. The sequencing scheme was developed to achieve four major priorities agreed upon by USACE and Cooperating Agencies during project planning:

1. Avoid dredging and disposal north of Fields Point (Fox Point and upper Fuller Rock Reaches) during the period when winter flounder larvae are most abundant in the water column (February 1 through April 30).

2. Avoid dredging between Bullock Point and 3500 ft south of Conimicut Point (northern portion of Rumstick Neck Reach) during the winter flounder spawning (egg) period (February 1 through March 30).

3. Dredge the Rumstick Neck Reach during the rainy season (March/April). This reach is located in a conditionally open shellfishing area, which is closed to harvesting in March and April. Although available information did not indicate that the project would cause additional closures of this area, conducting the dredging of this reach when the conditional area would be closed anyway eliminated a potential conflict.

4. Avoid dredging between Sabin Point and Conimicut Point during the quahog spawning season (June 1 through July 14).

More information on the dredging and sequencing analyses can be found in Appendix L of the PRHMDP FEIS. The actual sequence of dredging operations used for the project is described in Section 3.

3.0 DREDGING AND DISPOSAL OPERATIONS

This section describes the execution of the dredging and disposal conducted for the PRHMDP, including the equipment used for the project and details on the construction of the CAD cells, maintenance dredging, and disposal into the CAD cells and at the Rhode Island Sound Disposal Site (RISDS).

3.1 General Overview

The PRHMDP was performed by Great Lakes Dredge and Dock Company of Oak Brook, Illinois, under contract to the USACE. Dredging commenced in April 2003 and continued generally around the clock through January 2005 (Appendix B). The contractor returned in late June 2005 and completed the removal of some minor shoaling in July 2005. Approximately 400 cy of ledge that could not be removed with the equipment on site was removed under another contract in August and September 2007 and disposed in CAD cell 3AR. A total of 3.8 mcy (2.9 million m^3) of maintenance material was dredged from the six reaches (Table 3-1). In addition, 2.0 mcy (1.5 million m^3) of native parent material was dredged to create the CAD cells.

In the project planning phase, the sediments to be dredged were evaluated in accordance with Section 103 of MPRSA to determine suitability for unconfined open water disposal. All maintenance material was determined to be suitable for disposal at RISDS, with the exception of 1.2 mcy (0.9 million m^3) of material from Fox Point Reach. This unsuitable material was disposed in the CAD cells.

3.2 Equipment

The dredging was performed using mechanical dredges, with clamshell buckets ranging in capacity from 7 to 32 cy (5 to 24 m^3) (Table 3-2, Figure 3-1, Figure 3-2). Enclosed clamshell buckets were used for removing maintenance material in order to minimize sediment release and resuspension of this silty material (Figure 3-2). Open buckets, which have teeth and are typically smaller and heavier that the typical maintenance bucket, were used to excavate parent material from the CAD cells in order to expedite removal of these compacted sediments and thus avoid dredging during ecologically sensitive times of the year. Further, because this material was compacted and coarser grained, sediment resuspension was less of a concern than for the silty maintenance material.

Table 3-1.

Dredged Material Volume by Reach

Area (Reach)	Required Depth (MLLW ft)	Maintenance Material (cy)
Fox Point	-42 and CAD cells	225,000 suitable 1,184,000 unsuitable
Fuller Rock	-42	946,000
Sabin Point	-42	489,000
Bullock Point	-42	433,000
Conimicut Point	-42	328,000
Rumstick Neck	-42	217,000
Total Dredged (suitable for open water disposal)		2,637,000
Total Dredged (unsuitable for open water disposal)		1,184,000
Grand Total (all material)		3,821,000

Note: An additional 2.0 million cy of parent material (underlying the surficial maintenance material) was removed during construction of the CAD cells with the majority disposed at the open water RISDS.

Table 3-2.

Equipment Used for PRHMDP

Name/Number	Specifications
Mechanical Dredges	
#50	Bucket capacity 7-18 cy, total power 1260 hp
#51	Bucket capacity 7-18 cy, total power 1890 hp
#53	Bucket capacity up to 32 cy, total power 2550 hp
#54	Bucket capacity up to 32 cy, total power 2340 hp
#55	Bucket capacity up to 30 cy, total power 1745 hp
Tug Boats	
McCormack Boys	
Iona McAllister	
Eileen McAllister	
Rowan McAllister	
Justine McAllister	
Lemmerhirt	
Lucinda Smith	
Stephanie Dann	
Camerons Point	
William A. Colnon	
Survey Boats	
Thames River	Single beam hydrographic survey, 40-foot
Calcasieu River	Multi-beam hydrographic survey, 40-foot
Pearl River	Single beam hydrographic survey, 40-foot
Barges	
GL-34, 35	Split-hull barge, 3000 cy
BTS-401, 402, 403	Split-hull barge, 4000 cy
GL-61, 62, 63, 64, 65, 66	Split-hull barge, 6000 cy
GL-230, 231, 232	Hopper barge, 2000 cy
GL-173	Drag barge

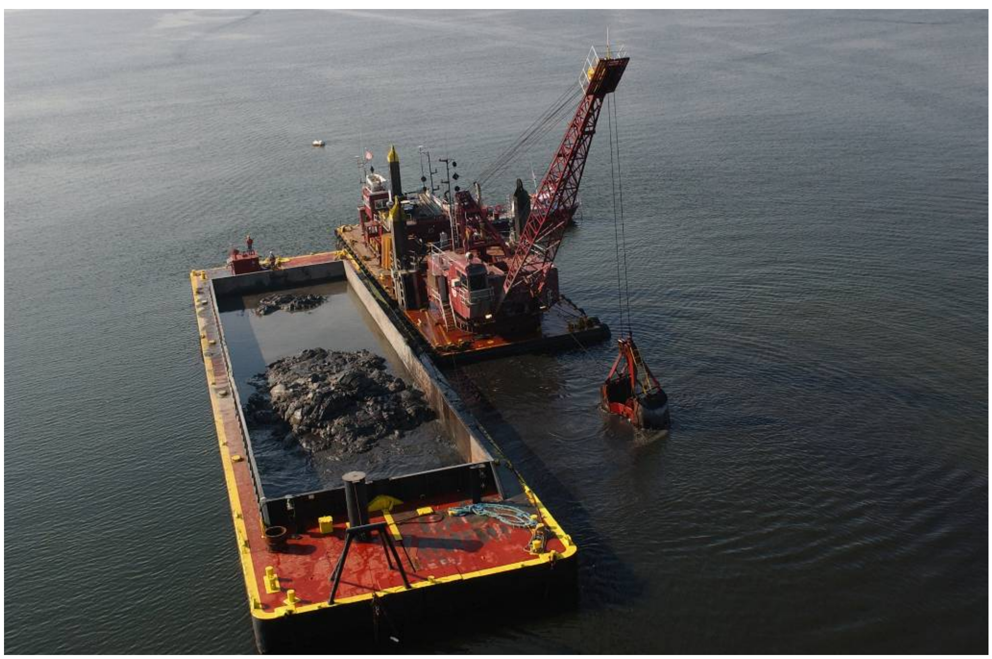


Figure 3-1. Example of mechanical dredge (#51) and split-hulled disposal scow used on the PRHMDP

Figure 3-2. Open clamshell bucket (top) and enclosed clamshell bucket (bottom) used on the PRHMDP

Dredged material was placed on split-hull scows (barges) with 3000 to 6000 cy (2300 to 4600 m^3) capacity, which were relocated to disposal sites by tugs (Figure 3-3). Hopper barges with 2000 cy (1500 m^3) capacity were used for extended storage of the surficial material from the first CAD cell (1R) (as further explained in Section 3.3). Hydrographic surveys were performed using dedicated survey vessels. A barge with a drag bar system was used to smooth the channel bottom after dredging, a common practice generally known as bed leveling.

3.3 Construction of CAD Cells

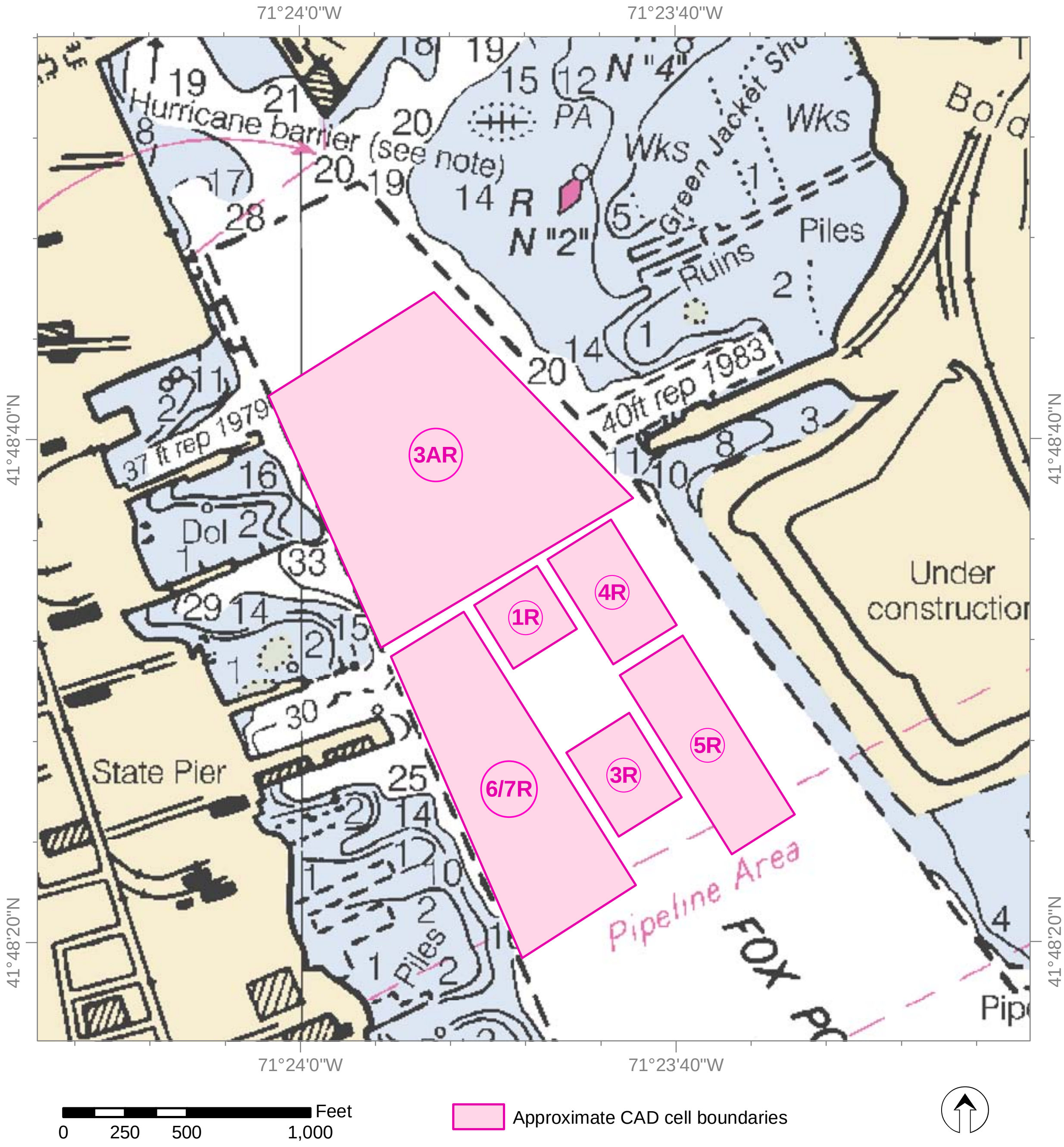
CAD cells were constructed below the channel at the head of Providence Harbor in order to sequester the dredged material determined to be unsuitable for unconfined open water disposal (Figure 1-5, Figure 3-4). In order to build cells sufficiently large to contain all of the unsuitable maintenance material from the project, a series of smaller cells were constructed first. Each subsequent cell was constructed larger than the previous one, ending with the largest cell, 3AR.

CAD cells were constructed between May 2003 and January 2004. Eight cells were originally planned; however, one of the smaller cells (originally designated as 2R) was not needed, and two cells (6R and 7R) were combined during construction due to instability of the wall between them, resulting in a total of six cells. The cells were constructed as square or rectangular pits (or slightly trapezoidal in the case of Cell 3AR) with dimensions at the sediment-water interface ranging from approximately 300 x 300 ft (90 x 90 m) to 1100 x 1100 ft (340 x 340 m) (Table 3-3).

The cells were dug to depths of -70 to -100 ft (-21 to -30 m) MLLW, or 28 to 58 ft (9 to 18 m) below the authorized channel bottom (Figure 3-5) with side slopes generally ranging from slightly steeper than 1:2 (vertical:horizontal) to slightly flatter than 1:3. The cells were constructed up to 20 ft (6 m) shallower than originally planned. This was because the initial clearing of the CAD cell area revealed less unsuitable surficial material than anticipated; thus, less overall CAD cell capacity was needed. The bathymetry of each cell bottom following construction but prior to any disposal into the cell is presented in Figures 3-6 through 3-11.

The surficial material removed during initial clearing of the CAD cells was unsuitable for unconfined open water disposal and was placed into completed cells. Surficial material from the first cell, 1R, was held in hopper barges and later disposed into a completed cell. Following the construction of CAD Cell 1R, additional cells were uncovered, with surficial material placed into Cell 1R. The interface between surficial and parent material varied across cells and ranged from -39 to -49 ft (-11 to -15 m)

Figure 3-3. Attending tugs with split-hull scow initiating disposal into CAD cell in Providence Harbor



Projection: Conformal Conic *Coordinate System*: RI State Plane (m) *Datum*: NAD 83

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Figure 3-4. Approximate CAD cell footprints in Fox Point Reach

Table 3-3.

CAD Cell Construction Sequence and Completed Dimensions

CAD Cell	Construction Dates		Dimensions				
	Started	Completed	Length - Western Side (ft)	Length - Eastern Side (ft)	Width - Upstream Side (ft)	Width Downstream Side (ft)	Depth (ft MLLW)
1R	5/2/03	5/16/03	300	300	300	300	-75
3R	5/20/03	6/10/03	400	400	300	300	-78
4R	6/1/03	7/10/03	500	500	300	300	-70
5R	7/15/03	9/6/03	850	850	300	300	-75
6/7R	6/11/03	10/14/03	1313	1300	353	540	-75/100
3AR	9/7/03	2/1/04	1111	1118	786	1137	-90

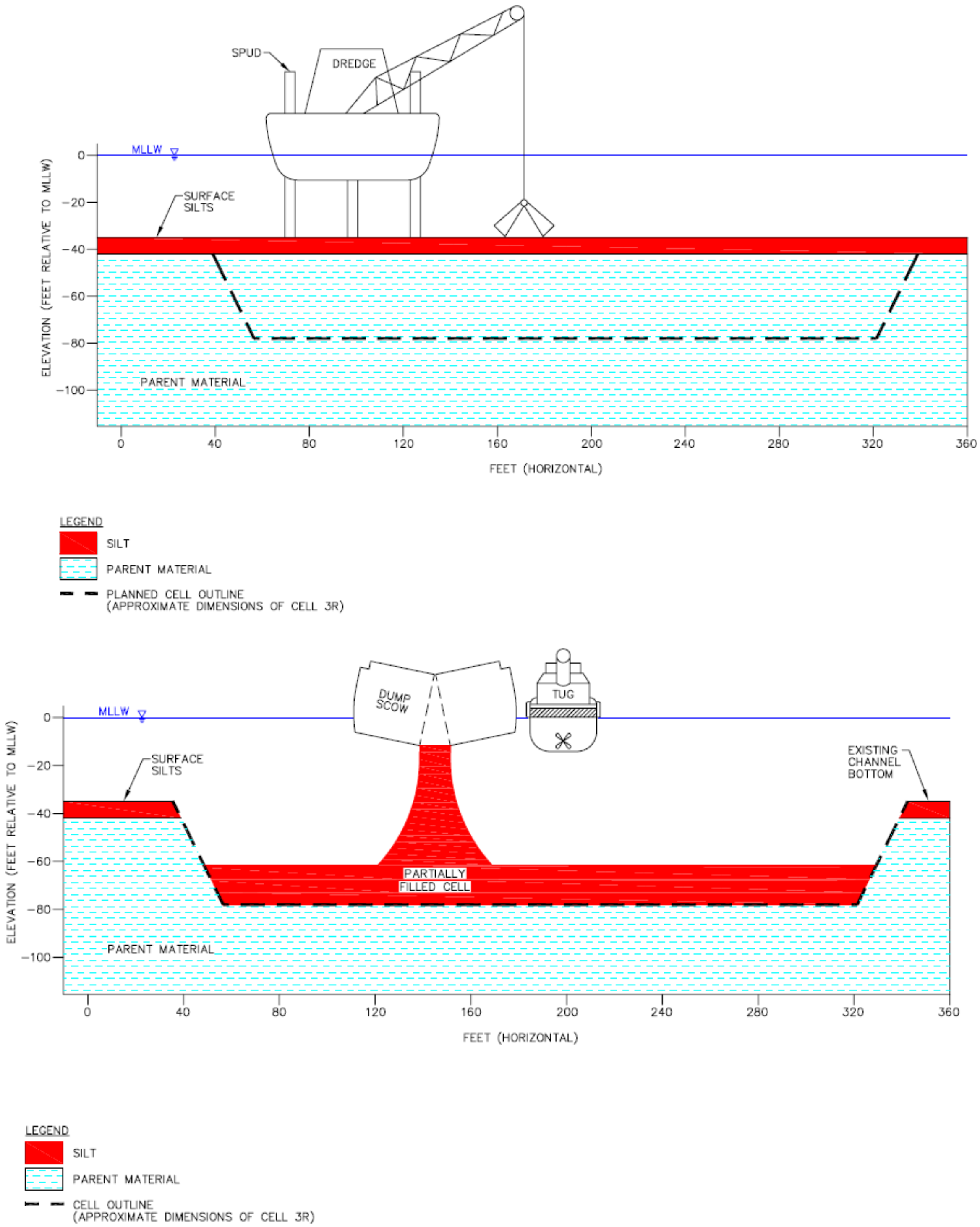


Figure 3-5. Schematic of CAD cell construction (top) and CAD cell disposal (bottom)

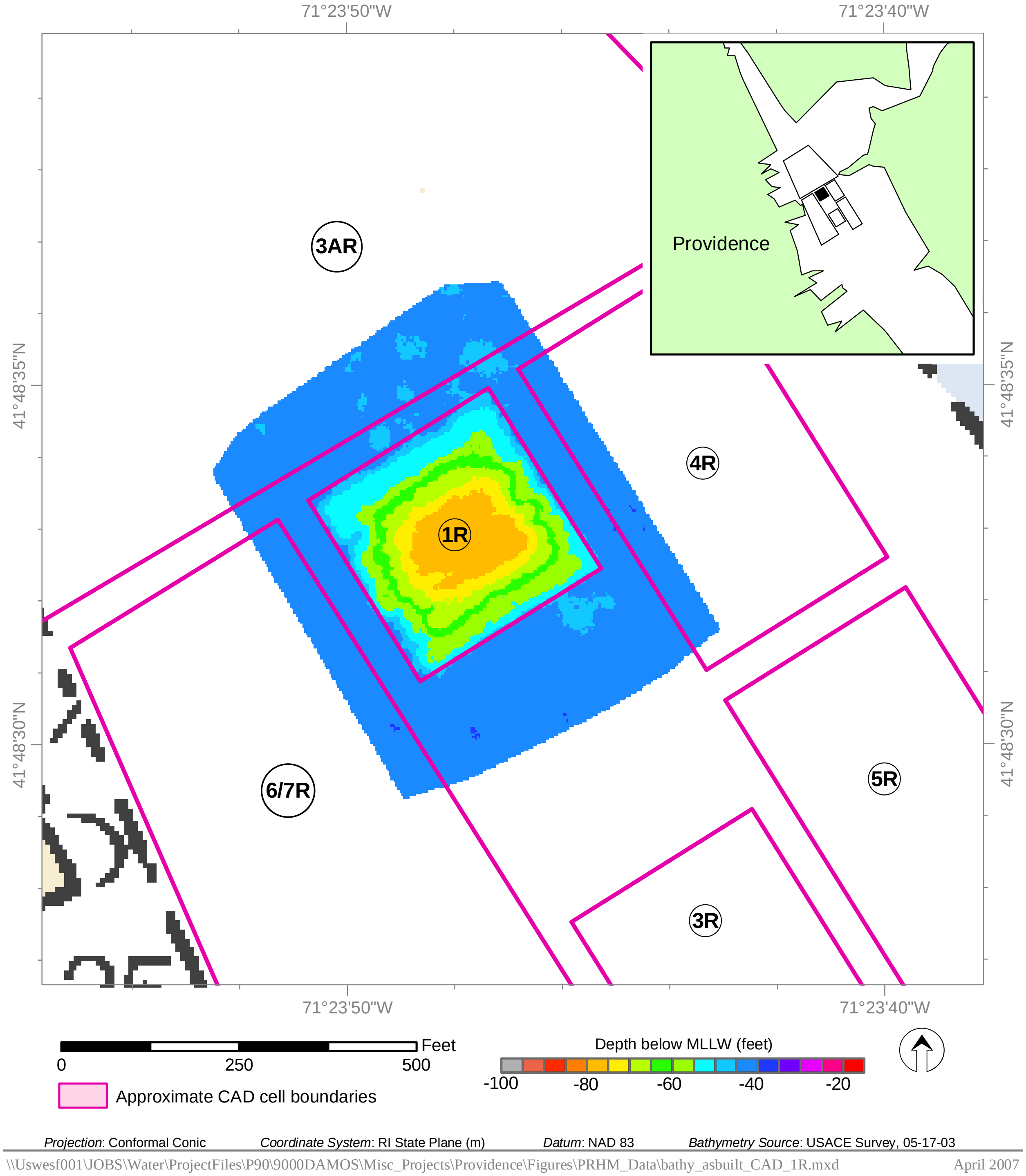


Figure 3-6. Bathymetry of post-construction CAD Cell 1R prior to initiation of disposal

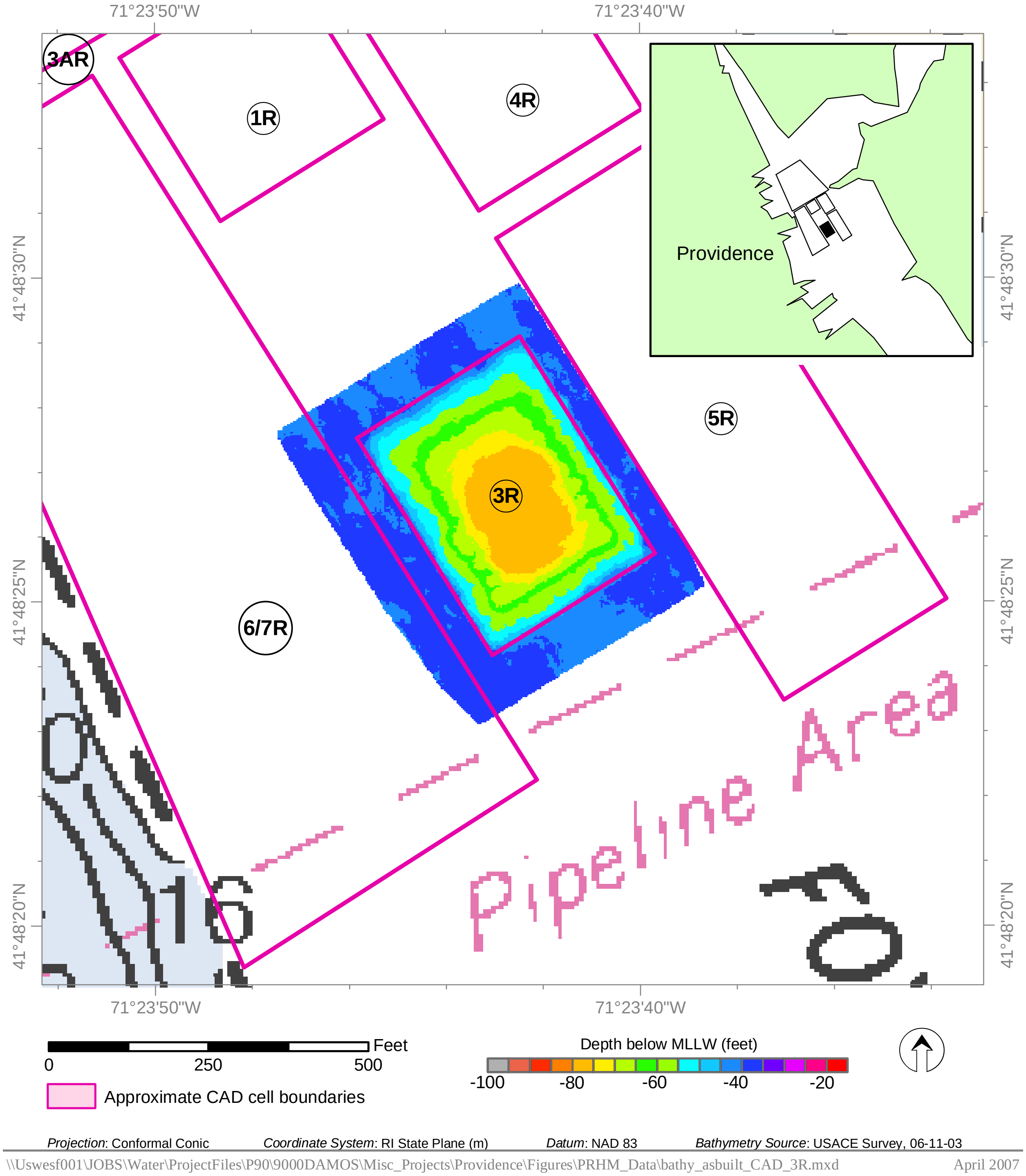


Figure 3-7. Bathymetry of post-construction CAD Cell 3R prior to initiation of disposal

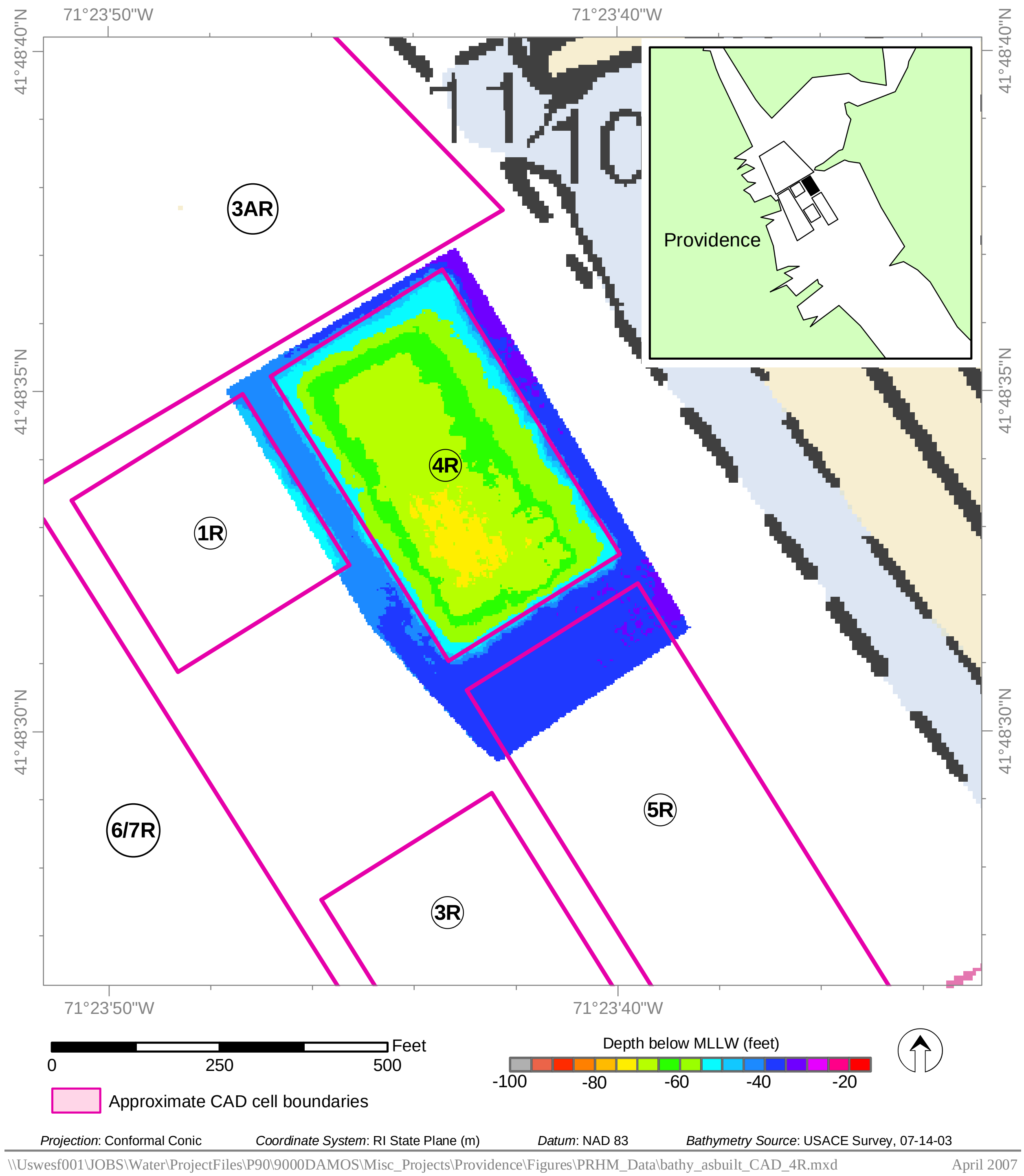


Figure 3-8. Bathymetry of post-construction CAD Cell 4R prior to initiation of disposal

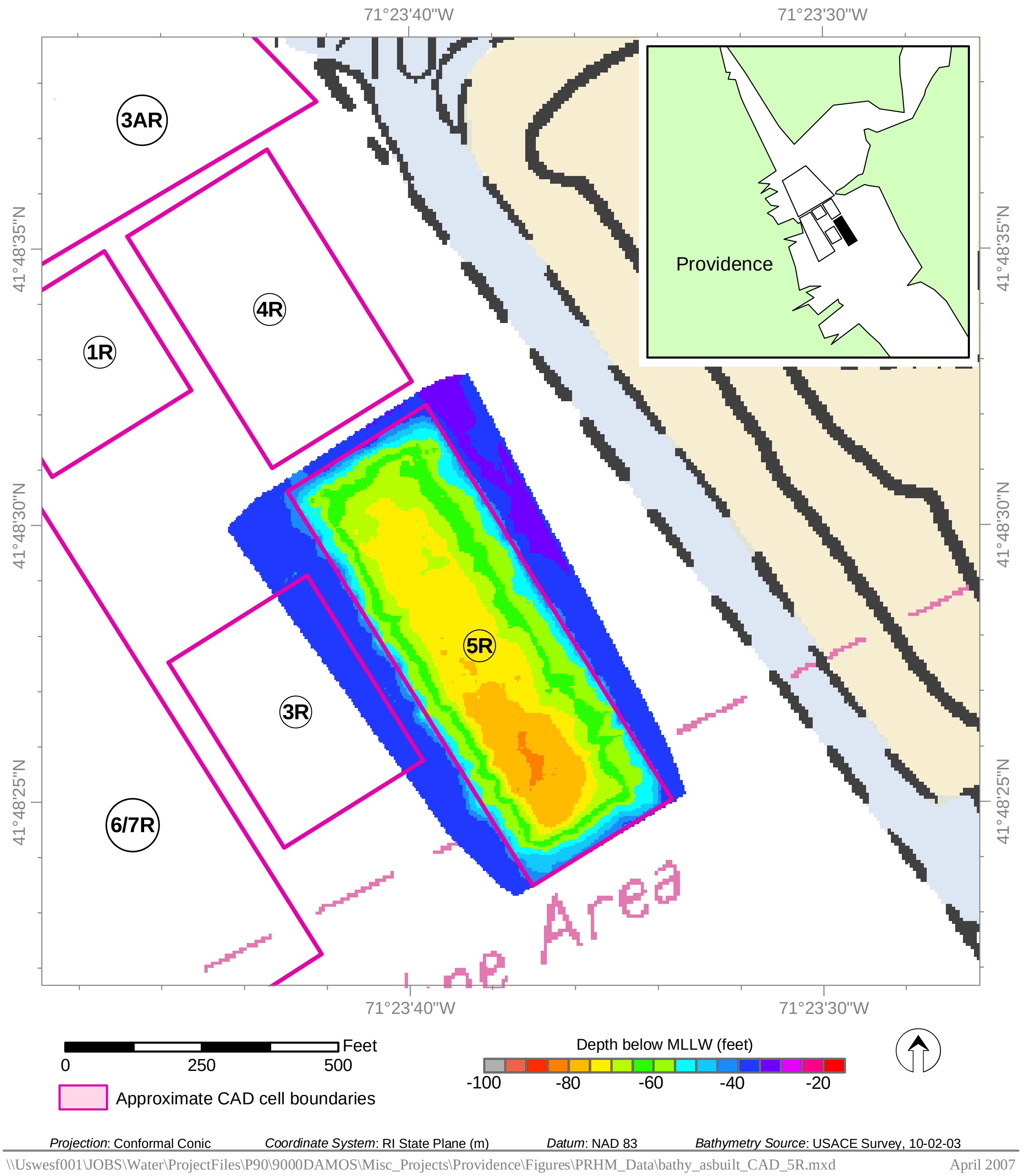


Figure 3-9. Bathymetry of post-construction CAD Cell 5R prior to initiation of disposal

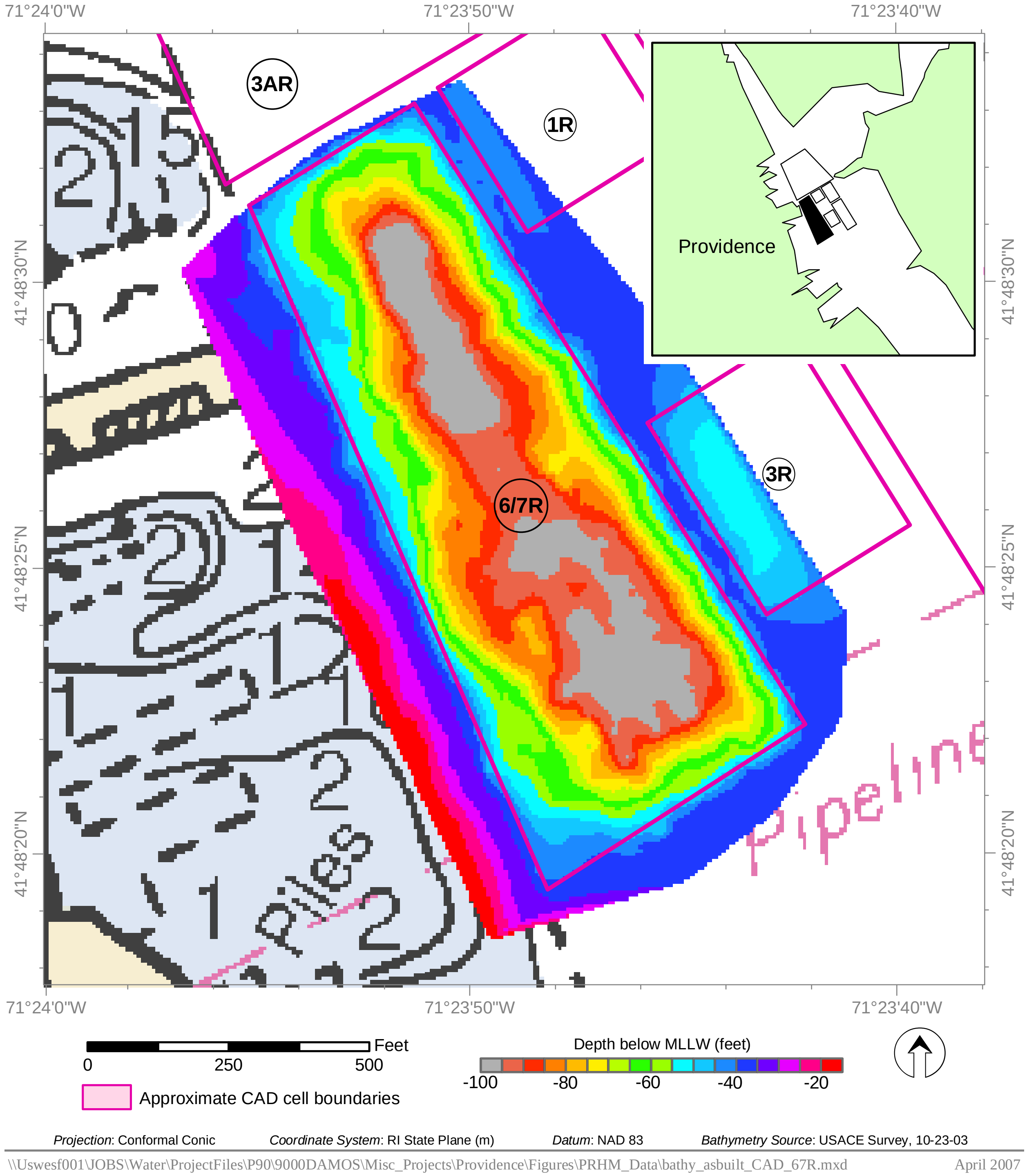
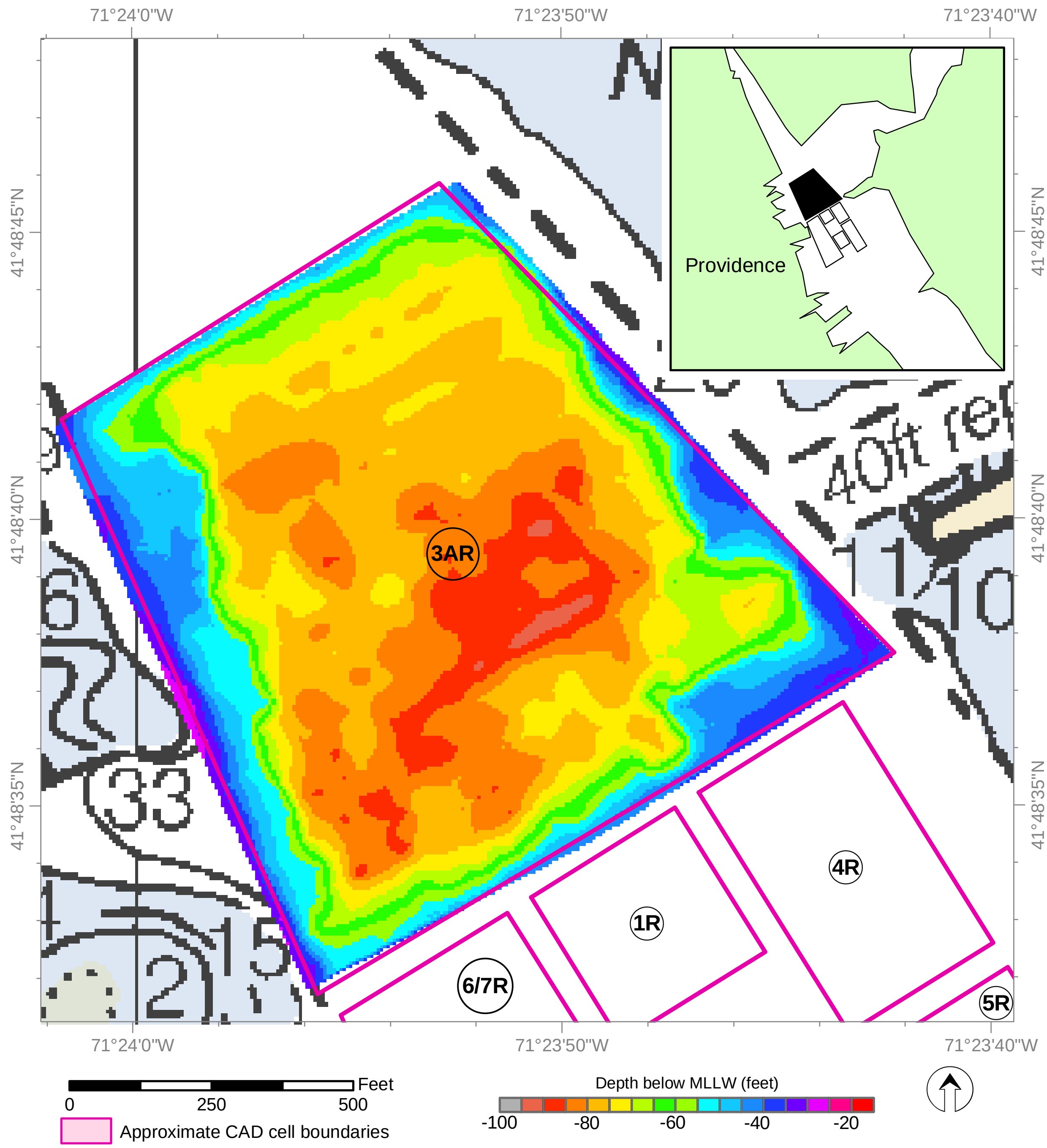


Figure 3-10. Bathymetry of post-construction CAD Cell 6/7R prior to initiation of disposal



Projection: Conformal Conic *Coordinate System*: RI State Plane (m) *Datum*: NAD 83 *Bathymetry Source*: USACE Survey, 02-25-04

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Figure 3-11. Bathymetry of post-construction CAD Cell 3AR prior to initiation of disposal

MLLW. A total of 2.0 mcy (1.5 million m^3) of parent material, composed of a mixture of gravel, sand, and clay (glacial till), was transported to RISDS for disposal. A portion of the parent material from Cell 3AR (52,000 cy, or 40,000 m^3) was designated for beneficial use and used as fill for sports facilities at Johnson and Wales University, located adjacent to Providence Harbor at Fields Point. The original plan was to place up to 250,000 cy (190,000 m^3) of the coarse grained material at this site. However, the sponsor was very specific regarding the quality of material that would be allowed on site, and only a portion of the original volume was deemed suitable.

3.4 Maintenance Dredging

Maintenance dredging was executed according to the sequencing designed to minimize impacts to biological resources in each reach (Appendix L of the PRHMDP FEIS). The majority of the maintenance dredging occurred from February 2004 through January 2005, with limited dredging in Conimicut Point and Rumstick reaches between April and May 2003, and in Fox Point and Fuller Rock reaches in July 2005 (Appendix B). All reaches were dredged to -42 ft (-13 m) MLLW (Table 3-1).

3.5 Disposal in CAD Cells

Disposal into CAD cells occurred via split-hull scows throughout the dredging project (Table 3-4, Appendix B). The smaller CAD cells (dimensions presented Table 3-3) were filled with material generated from the construction of the other CAD cells (Table 3-4). Cell 3AR was used primarily for disposal of unsuitable maintenance material from Fox Point Reach (outside of the CAD cell footprint). The second largest cell, 6/7R, was reserved for unsuitable material from private dredging projects (e.g., marinas and berths) in the vicinity of Providence Harbor, and was managed by RICRMC. Approximately 260,000 cy (200,000 m^3) of dredged material from these private projects was disposed in cell 6/7R as of completion of the project in July 2005. Cell 6/7R continues to be used for private project dredged material disposal, and as of January 2007, an additional 65,000 cy (50,000 m^3) of material had been disposed into this cell (Table 3-5).

The cells were originally planned to be capped at the conclusion of the PRHMDP with upper Fuller Rock Reach material, determined to be suitable for unconfined open water disposal (USACE 2001). However, due to the limited disposal options for dredged material that is unsuitable for open water disposal or beneficial use, the RICRMC requested that the CAD cells be left uncapped for several years. Leaving the cells uncapped would allow the State to take advantage of disposal space created by sediment consolidation along with the additional unused capacity within the cells, thus providing

Table 3-4.

Estimated Volumes of Dredged Material Disposed in CAD Cells during the PRHMDP

CAD Cell	Disposal Dates	Estimated Volume (cy)	Source of Dredged Material
1R	20 May 2003 – 21 May 2003 3 June 2003 – 6 June 2003 11 June 2003 – 13 June 2003	55,000	CAD 3R CAD 4R CAD 6R
3R	13 June 2003 – 17 June 2003 15 June 2003 – 16 June 2003 10 July 2003 – 15 July 2003 15 July 2003 – 16 July 2003	55,000	CAD 6R CAD 4R CAD 7R CAD 5R
4R	16 July 2003 – 21 July 2003 21 July 2003 24 July 2003 – 26 July 2003 31 July 2003 – 1 August 2003 6 Sept 2003 – 12 Sept 2003	88,000	CAD 5R CAD 7R CAD 7R CAD 7R CAD 3AR
5R	12 Sept 2003 – 23 Sept 2003 14 Oct 2003 – 16 Oct 2003	113,000	CAD 3AR CAD 1R
6/7R	Intermittent	325,000	Private projects
3AR	01 June 2004 – 20 July 2004 22 Sept 2004 – 25 Sept 2004 08 Oct 2004 – 26 Oct 2004 05 Nov 2004 – 08 Nov 2004 13 Nov 2004 – 14 Nov 2004 25 Dec 2004 27 Dec 2004 – 29 Dec 2004 19 July 2005 – 20 July 2005 20 July 2005	873,000	Fox Point Unsuitable Fox Point Unsuitable Fox Point Unsuitable Fox Point Unsuitable Fox Point Unsuitable Fox Point Unsuitable Fox Point Unsuitable Fox Point Fuller Rock

Table 3-5.

Estimated Volumes of Private Project Dredged Material Disposed in CAD Cell 6/7R Through January 2007

Permittee	Estimated Volume (cy)
Port and Commercial	
Motiva	73,000
St. Lawrence Cement	11,000
Hudson Terminal	2000
US Generating	2000
Prov Port Berths	30,000
Sprauge Energy	16,000
Newport Shipyard	2000
General Dyanics	15,000
Marina	
Marina Realty	14,000
Pettis Boat Yard	6000
Bay Marina	16,000
Brewer Cove Haven	80,000
Rhode Island Yacht Club	42,000
Bullock Cove Marina	2000
Pawtuxet Cove Marina	2000
Ocean Ave Marina	2000
Brewers Wickford	8000
Other	
Georfffrey Tapper	60
Donald Theroux	240
Sandra Lani	430
Edmund Fuller	380
Robert Kenyon	50
David White	60
Frederick Costello	270
Erturk Ozbek	170
Michael Revens	30
Tillman	250
Total	325,000

disposal capacity for additional dredging projects within Rhode Island. Management of the cells and responsibility for the Water Quality Certification requirements was turned over to RICRMC in October 2005. The bathymetry of the six cells following completion of major PRHMDP disposal into the cells showed that the surface of each cell remained well-depressed below the surrounding harbor bottom, with more significant capacity remaining in cells 5R and 6/7R (Figure 3-12). At the completion of the dredging in 2005 there was over 400,000 cy (300,000 m^3) of additional capacity available. Ultimately, the cells are planned to be capped with suitable maintenance material from State and private projects as cell capacity is reached.

3.6 Disposal at RISDS

Over the course of the project, approximately 5.3 mcy (4.0 million m^3) of dredged material determined to be suitable for unconfined open water disposal was disposed at RISDS (Figure 1-4, Appendix B4). This volume was based on estimates of the material in scows. The volume estimate based on pre- and post dredging bathymetric surveys conducted by USACE was 5.2 mcy (2.6 mcy of maintenance material, 2.0 mcy of parent material, and 0.6 mcy non-pay yardage[1]). Discrepancies between dredged material volumes estimated by two different methods are typical. Scow volume estimates are generally greater than in-channel volume estimates due to the greater fluid content of dredged sediment (due to the bulking that occurs during capture and transport in the bucket and release into the barge) compared to *in situ* sediment. In-channel volume estimates, determined using pre and post dredge surveys, typically provide a more accurate volume computation.

The parent material from the CAD cells was primarily used to develop a continuous ridge of sediment along the western boundary of RISDS (Figure 3-13) (SAIC 2004). The purpose of the ridge was to form an artificial berm to increase the capacity of the natural bottom depression located in the east-central area of the disposal site and limit the lateral spread of unconsolidated sediment. The suitable maintenance material removed from the six reaches was directed to a series of disposal points across the site to create a relatively linear deposit. The usage of particular locations for disposal of portions of the maintenance material depended on the stage of the tide and predicted transport direction of the sediment plume through the water column. Disposal locations were selected to maximize the settlement of material within the disposal site (SAIC 2004).

[1] Non-pay yardage is material dredged from below the allowable overdepth (in this case, 42 ft MLLW), and thus, the contractor is not paid for it. The production of non-pay yardage is typical when using large dredging equipment.

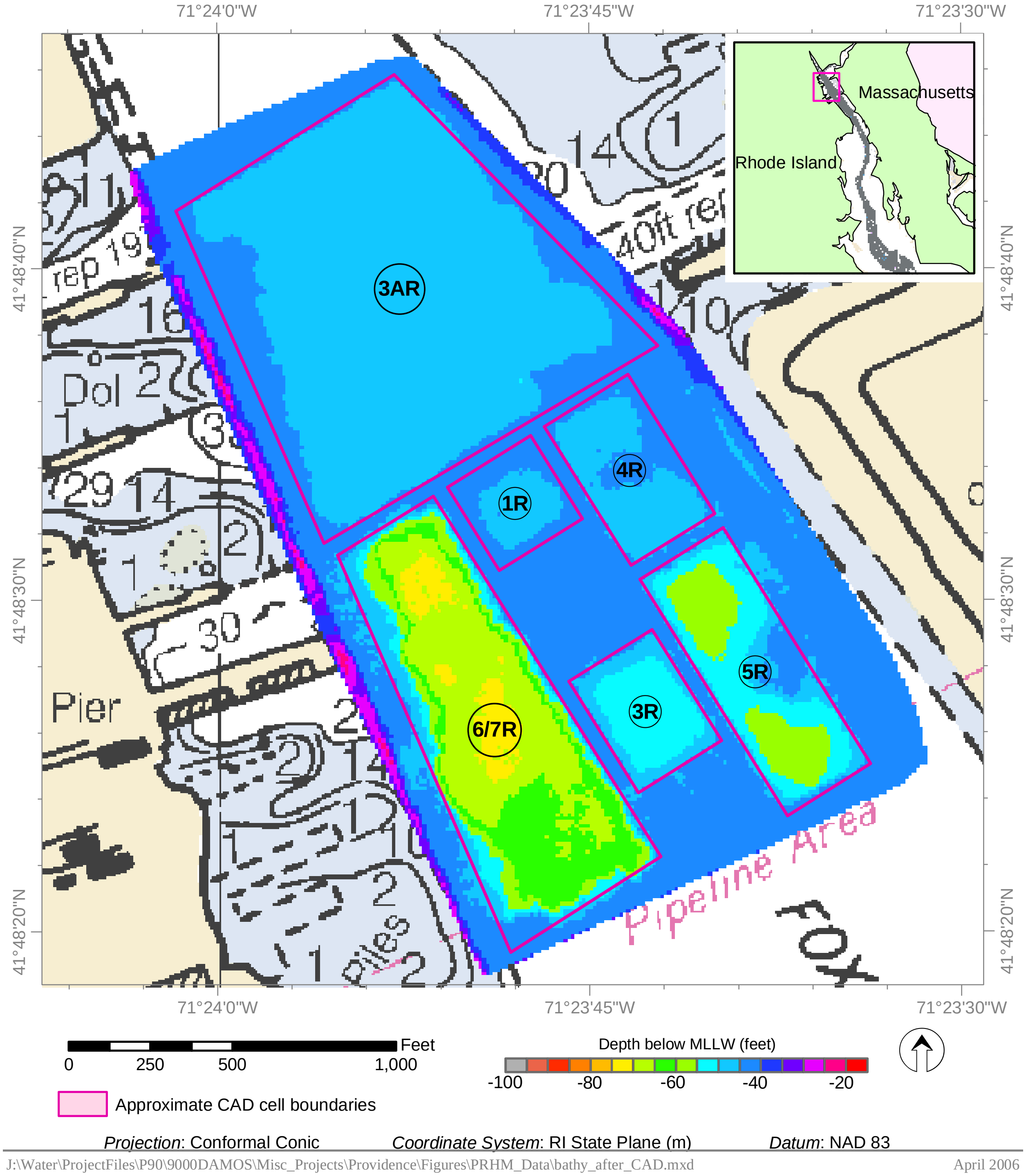


Figure 3-12. Bathymetry of the six CAD cells in May 2005 following completion of major PRHMDP disposal operations

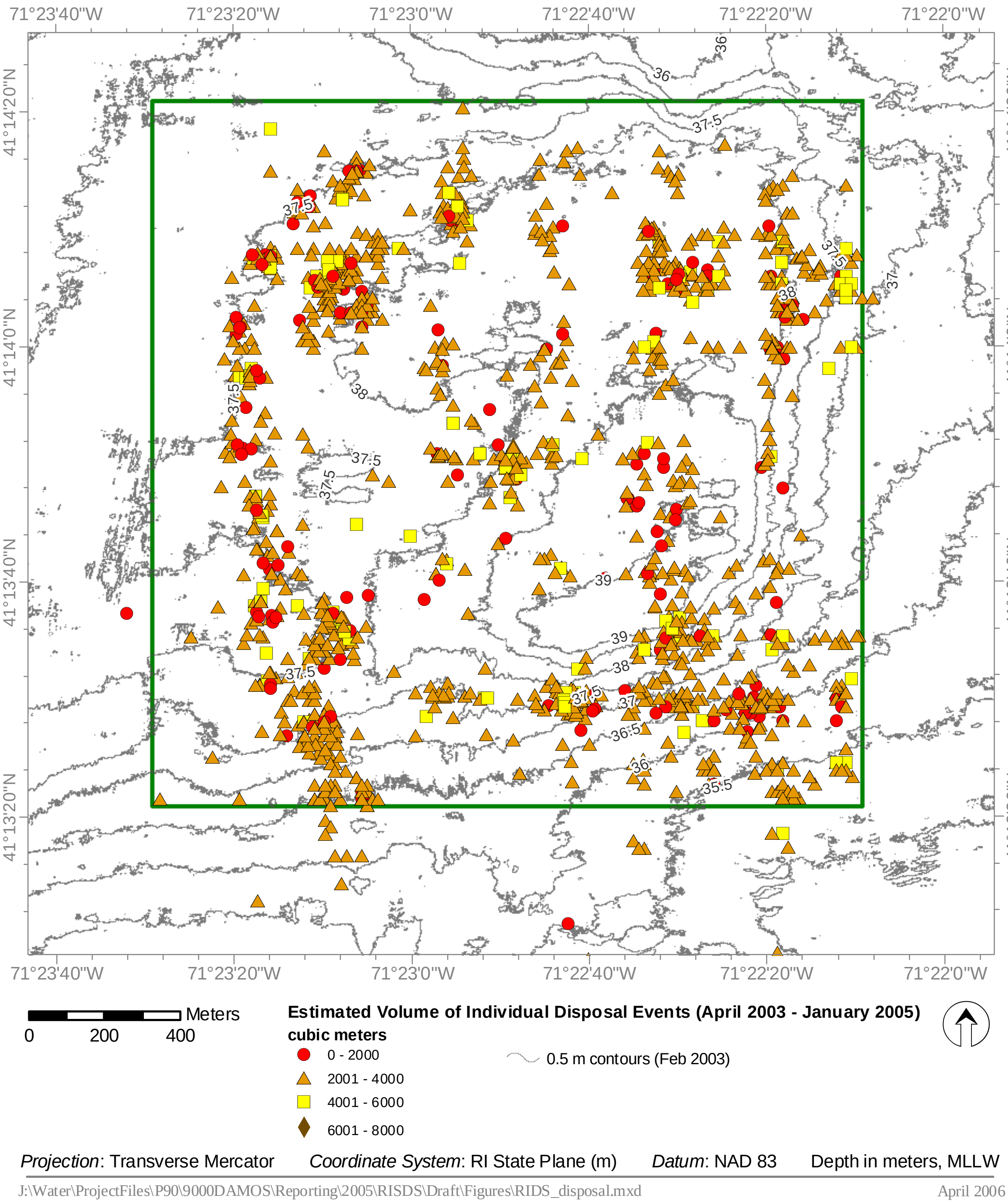
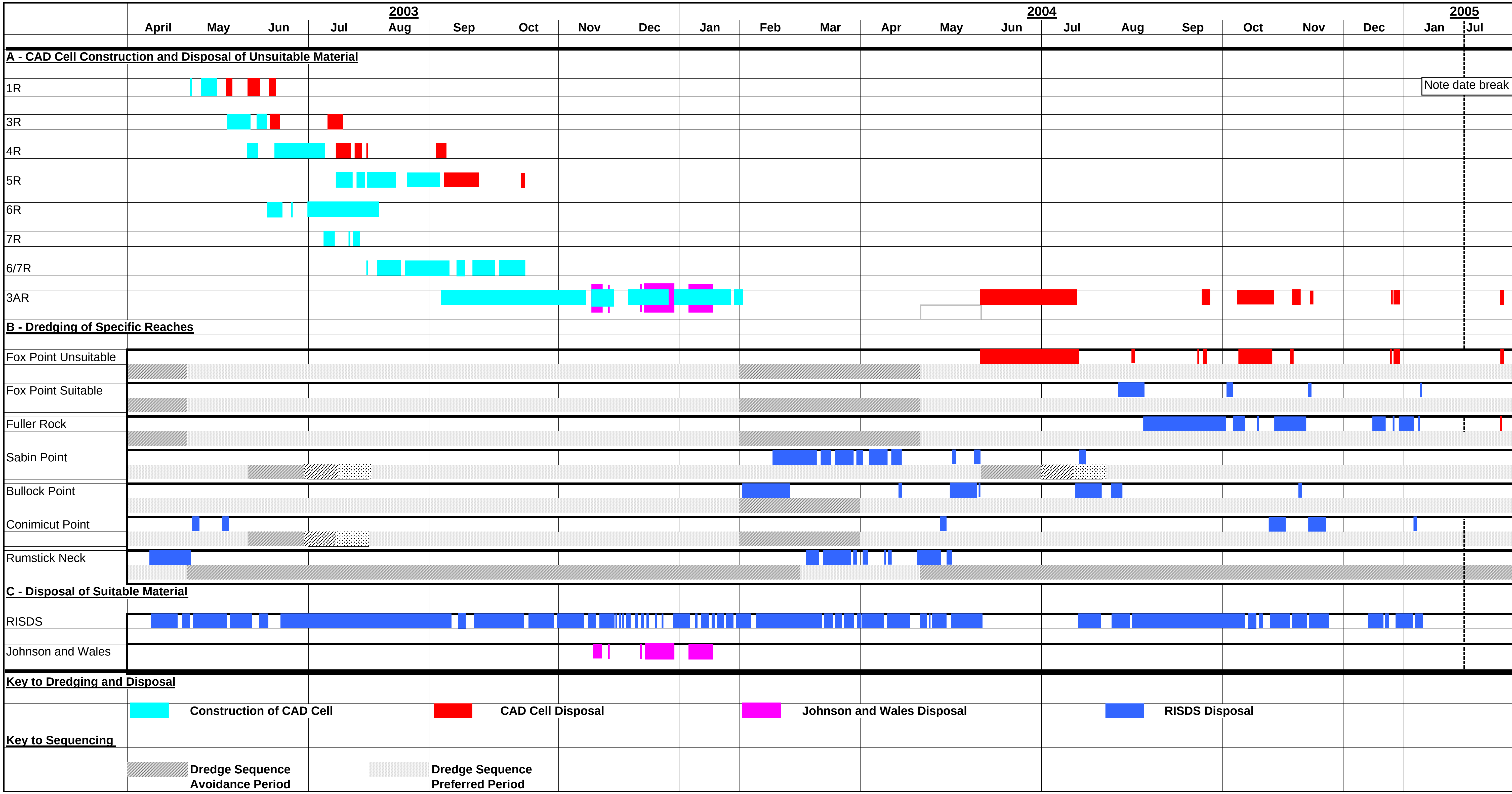


Figure 3-13. Reported dredged material disposal locations at RISDS over baseline bathymetry

3.7 Overall Project Schedule

A graphical summary of the schedule of CAD cell construction and dredging and disposal operations is presented in Figure 3-14. The staged nature of the CAD cell construction is apparent in Figure 3-14, beginning with the smaller Cell 1R and Cell 3R and progressing up to the largest Cell 3AR. The continuous record of dredging and disposal operations apparent in Figure 3-14 highlights that the sequencing scheme (also presented in Figure 3-14) allowed for a successful balance of project work and reduction of potential environmental impacts with 95% of the work performed during the preferred sequence period.

Figure 3-14. Overall schedule for PRHMDP dredging and disposal



4.0 ENVIRONMENTAL MONITORING

4.1 General Overview

Extensive environmental monitoring was performed during PRHMDP dredging and disposal operations (Table 4-1). This monitoring was conducted to fulfill the requirements of the Water Quality Certification (WQC) (Appendix A) and the environmental monitoring plan developed for the project. Monitoring of maintenance dredging, CAD cell construction, disposal into the CAD cells, disposal plumes at RISDS, and benthic conditions at RISDS following disposal are summarized below. Also included are results of laboratory and field experiments to examine the effects of dredging on winter flounder egg hatching success.

4.2 Maintenance Dredging

A study was undertaken by ERDC in April 2004 to characterize the spatial dimensions and suspended sediment concentration gradients of plumes generated during maintenance dredging (Reine et al., *in prep.*). These data were identified during the interagency and stakeholder coordination process as a priority in evaluating predictions and assessing potential impacts described in the EIS. In particular, the data were considered valuable for evaluation of the accuracy of far-field dredge plume simulations using the Suspended Sediment Fate (SSFATE) model, and for assessment of potential impacts on winter flounder spawning habitat.

4.2.1 Methods

Plumes were characterized by tandem deployments of moored optical backscatter sensors (OBS) for turbidity measurements and mobile acoustic Doppler current profiler (ADCP) surveys to map TSS concentration gradients. Current velocity data were also obtained from the ADCP surveys.

ADCP surveys allowed for essentially real time tracking of the plume. The ADCP was used to measure acoustic backscatter throughout the water column by sending out two sonar pings and measuring the Doppler shift in each of their echoes. The pings reflect, or backscatter, off particles in the water column as well as off the sediment bed. The level of backscatter can be related to a concentration of particles and provides a measure of the suspended sediment load within the water column. The application of acoustic technology to determine relative concentrations of suspended sediments in an aqueous environment has been applied for over 20 years. The USACE Waterways Experiment Station first described using ADCP technology as part of an integrated system

Table 4-1.

Summary of PRHMDP Dredging and Disposal Monitoring Activities

Type of Monitoring	Date	Reference for Monitoring Report
Maintenance dredging	April 2004	Reine et al., *in prep.*
CAD cell construction	September 2003	Reine and Clarke, *in prep.*
Disposal into CAD cells	May – September 2003	ENSR, unpublished. Posted at http://www.dem.ri.gov/programs/benviron/assist/prdredge/index.htm
Disposal at RISDS	April and September 2004	SAIC, 2005a and 2005b
RISDS benthic survey	October 2003 July 2005	SAIC 2004 ENSR 2007b
Winter flounder egg burial study – laboratory	January – March 2004 and 2005	Berry et al. 2005
Winter flounder egg burial study – field	2003-2004	Klein-MacPhee et al. 2004
Lobster surveys	1999, 2005	DAMOSVision 2007

in the PLUme MEasurement System (PLUMES) (Kraus and Thevenot 1992). A recent application of an integrated system to characterize a dredging plume can be found in Battisto and Friedrichs (2003).

TSS was estimated from ADCP data using Sediview Software provided by Dredging Research Ltd. The Sediview Method (Land and Bray 2000) derived estimates of suspended solids concentration in each ADCP data bin by converting relative backscatter intensity to TSS concentration. This process required collection of a calibration data set consisting of discrete water samples analyzed gravimetrically for TSS concentration. The direct measurements of TSS covered the range of expected TSS concentrations at the study site and was used to "groundtruth", or calibrate, the acoustic data. The calibration samples were collected at known locations within the water column, and individual TSS samples were directly compared with acoustic estimates of TSS concentration for a "bin" of water as close to the water sample as possible.

Plume characterization data were collected in both Sabin Point and Bullock Point reaches during local dredging at flood tide. To cover the full extent of the plume, numerous east-west transects were occupied (Figure 4-1). Transects typically did not extend the full width of the river. Each transect terminus was determined based on real-time display of the ADCP return. Total transect length encompassed the plume and extended sufficiently into adjacent waters to clearly define plume boundaries against background conditions.

OBS units were used to develop time series records of turbidity at predetermined locations within and outside plumes. OBS sensors project a beam of light into a known volume of water and measure the amount of light that is reflected back to the sensor. The higher reflection values equate to a greater quantity of suspended particulate material in the volume of water being measured. The OBS data presented in this report are stated in terms of Nephelometric Turbidity Units (NTU), which provide a relative measure of suspended particulate matter.

Ambient turbidity data were collected prior to commencement of dredging activities. During dredging, 10 OBS units were deployed during each monitoring event to capture both ambient and plume data. Four monitoring stations were occupied in the Sabin Point Reach: one ambient (located on the west side of the channel beyond the influence of the plume) and three in the central portion of the plume at inner near-field, outer near-field and far-field locations (100, 155, and 255 m from dredging operations, respectively) as determined by ADCP real-time output. OBS units were deployed at two or three depths at each station for 2 to 3 hours (Figure 4-1). On the same day a second

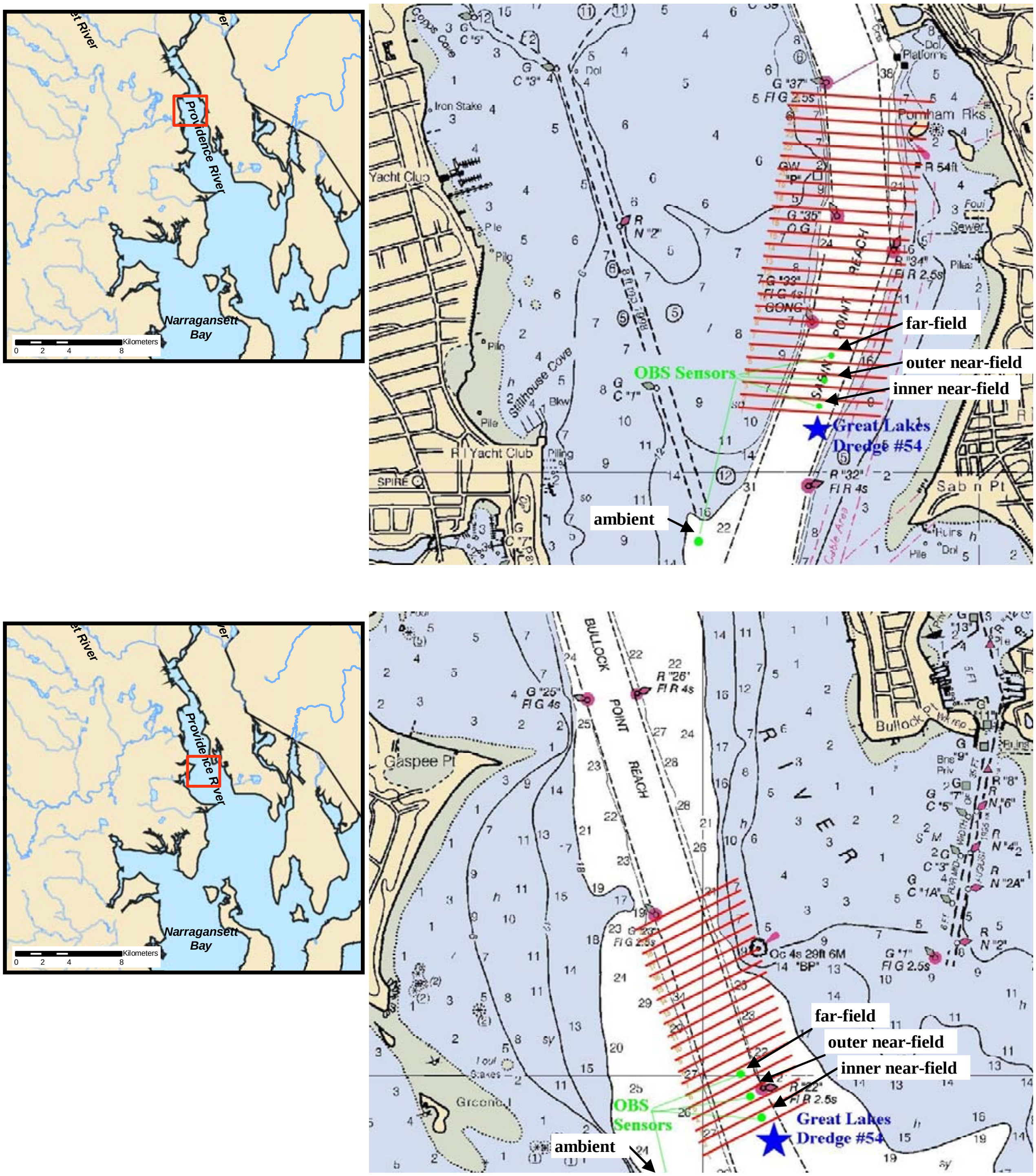


Figure 4-1. Study sites showing dredge locations, ADCP transects (in red) and OBS locations
during monitoring at Sabin Point (top) and Bullock Point (bottom) (Figure from Reine et al., *in prep*).

deployment was made for a plume monitoring event at Bullock Point at four stations, including ambient, inner near-field, outer near-field, and far-field locations.

4.2.2 Results

Depth-averaged current vectors indicated general flows to the north and northwest in the study areas during the flood tide. Depth-averaged current velocity at Bullock Point ranged from 0.26 to 0.43 ft/sec (0.08 to 0.13 m/sec) during most of the survey. Somewhat higher flow velocities were observed at Sabin Point, with a peak depth-averaged current velocity of 0.66 ft/sec (0.2 m/sec). No evidence of stratified flows was observed at either site.

Turbidity

Ambient turbidity was generally less than 3 NTU in the upper portion of the water column (8.2 ft [2.5 m]) (Table 4-2). Ambient turbidity increased with increasing water depth, averaging 14.9 NTU at 19.7 ft (6.0 m) and 17.1 NTU at 27.9 ft (8.5 m). Plume turbidities were highest closest to the dredging and at depth for both Sabin Point and Bullock Point plumes. Mean turbidities (i.e., turbidities averaged across each monitoring event for each OBS unit) at the inner near-field stations ranged from 8.5 to 38.7 NTU. Maximum turbidities occurred in short pulses, with a maximum recorded turbidity of 106.5 NTU. Turbidities at the outer near-field stations ranged from 2.0 to 18.6 NTU, with no readings at the deepest unit due to sensor failure. At the far-field stations, average turbidities were not appreciably lower than those at the outer near-field stations, although maximum turbidities tended to be lower at the most distant stations.

Figure 4-2 displays turbidities at the inner near-field station at Sabin Point, where the highest turbidities were recorded. The first turbidity pulse at the deep sensor occurred 55 minutes after deployment and following the onset of dredging. An approximate 50 minute delay was observed between the onsets of elevated turbidities at the deep and shallow instruments, indicating that plume evolution progressed from bottom to surface. Turbidities generally “pulsed” in short spikes of 5 to 10 minute duration, reflecting the repetitive bucket cycle and small spatial scale movement of the source relative to the fixed location of the sensor array.

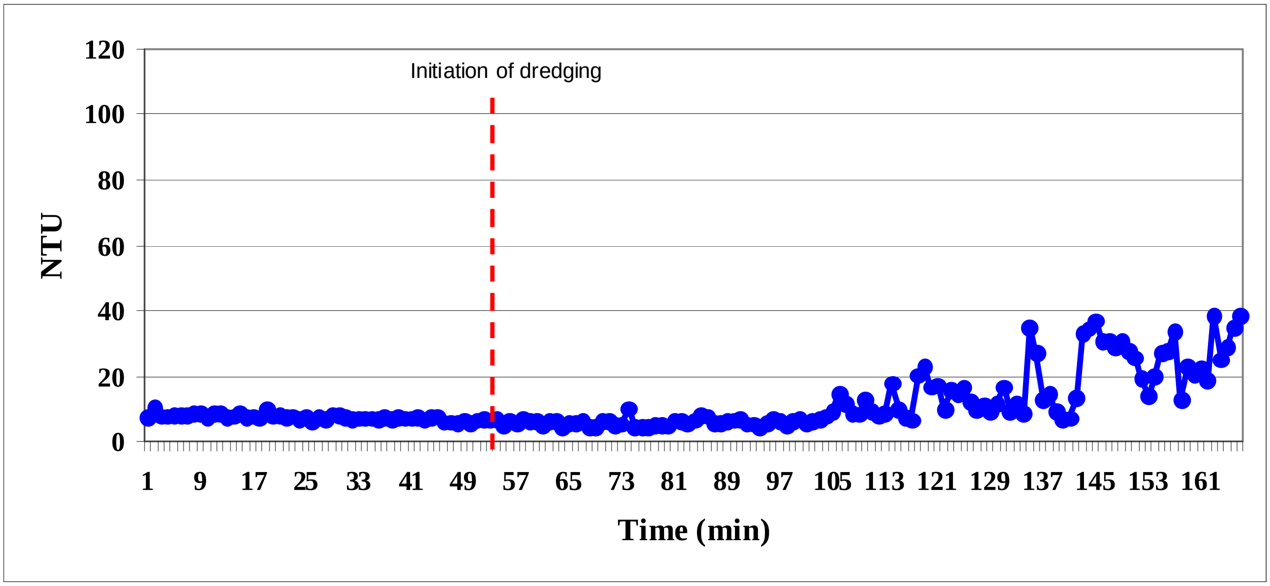
Total Suspended Solids

Direct TSS measurements comprising the calibration data set (n=142) corresponded well to acoustic backscatter (ADCP) TSS estimates between 1 and 100 $mg \cdot l^{-1}$ (Figure 4-3). Obtaining calibration data at the higher TSS concentrations proved

Table 4-2.

Observed Turbidity During Maintenance Dredging in the Sabin Point and Bullock Point Reaches of the Providence River

Station	Location	Date	Distance to Dredge (ft)	Deployment Type	Depth (ft)	Turbidity (NTU)	
						Mean	Range
1	Sabin Point	4/19/2004	2460	Ambient	8.2	2.4	2.1-3.1
					27.9	17.1	16.1-18.0
1	Sabin Point	4/20/2004	2460	Ambient	8.5	2.3	1.8-2.9
					19.7	14.9	13.9-16.6
2	Sabin Point	4/20/2004	330	Near-Field (Inner)	8.2	11.4	4.5-38.6
					18.4	26.0	4.6-93.8
					26.9	31.2	6.6-106.5
3	Sabin Point	4/20/2004	510	Near-Field (Outer)	8.2	6.2	2.1-30.2
					18.4	18.6	2.9-59.4
					27.9	Sensor Failed	
4	Sabin Point	4/20/2004	840	Far-Field	8.5	6.7	3.2-19.1
					19.7	13.7	2.2-56.4
2	Bullock Point	4/20/2004	440	Near-Field (Inner)	8.2	8.5	3.8-34.0
					18.4	38.7	11.2-85.4
					26.9	Sensor Failed	
3	Bullock Point	4/20/2004	660	Near-Field (Outer)	8.2	2.0	1.0-11.5
					18.7	16.4	4.0-44.6
					26.9	Sensor Failed	
4	Bullock Point	4/20/2004	1150	Far-Field	8.2	2.2	1.9-2.5
					18.4	15.8	4.1-35.3



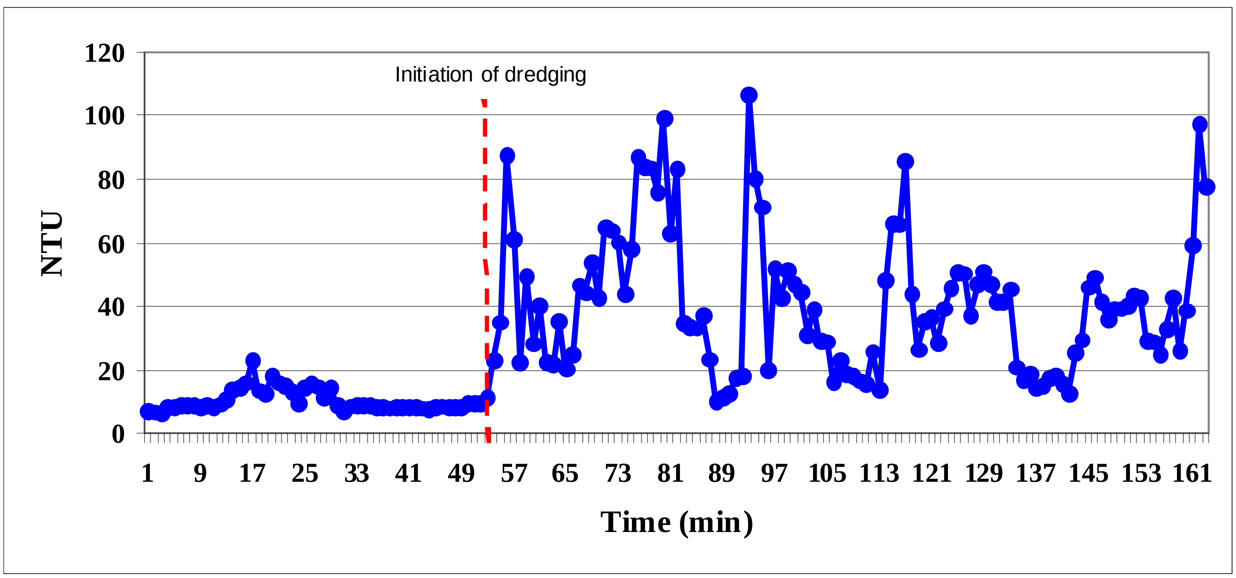


Figure 4-2. Inner near-field plume turbidities at depths of 8.2 ft (2.5 m) (top) and 27 ft (8.3 m) (bottom) 328 ft (100 m) down-current from the dredging operation at Sabin Point during a flood tide (Figure from Reine et al., *in prep*).

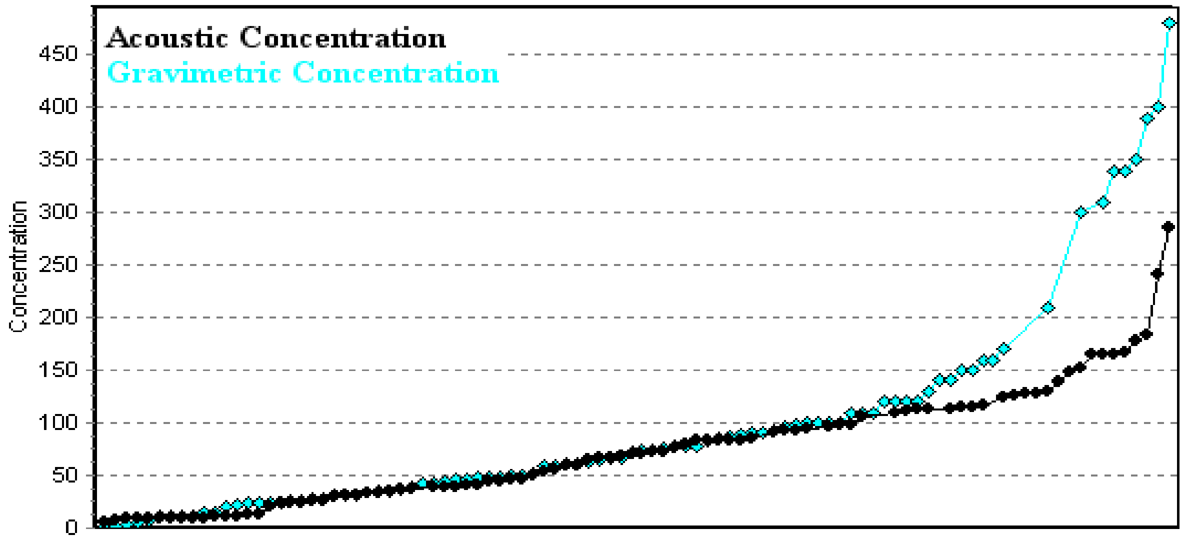


Figure 4-3. Comparison of acoustic TSS estimates and direct TSS measurements in rank order (units are in mg·l^{-1}) (Figure from Reine et al., *in prep*).

difficult. Due to the rapidly decaying plume, it was necessary to collect high TSS samples in close proximity to the operating bucket. However, acoustic backscatter data appeared to be strongly influenced by air entrainment at this location. The eight samples with greatest variability between TSS concentrations and acoustic estimates were taken within 130 ft (40 m) from the point of bucket insertion. Consequently, near-field profiles of TSS should be viewed as likely underestimates, whereas far-field profiles (> 660 ft [200 m] from the source) can be considered to be relatively accurate estimates of TSS concentration. There was also a strong linear relationship between TSS concentration and turbidity (NTU) data sets (r^2=0.90).

Ambient TSS concentrations, as estimated from acoustic backscatter data, ranged from 6.5 to 20.5 $mg \cdot l^{-1}$ at the Sabin Point and Bullock Point study sites (data not shown). Highest ambient concentrations were routinely found in the lower portion of the water column, typically within 7 ft (2 m) of the channel bottom. At the time of the Sabin Point and Bullock Point surveys, the dredge had been operating for sufficient time to generate a fully-developed plume with maximum concentration gradients and spatial dispersion. Figure 4-4 presents cross-sectional profiles of estimated TSS concentrations for several transects in the Sabin Point Reach. At the time, the dredge was operating on the east side of the channel removing material along the toe of the channel's side slope. The eastern shoal is depicted on the left side of the profiles.

At 95 ft (29 m) down-current of the dredging, TSS concentrations as high as 1000 $mg \cdot l^{-1}$ were detected (Figure 4-4a). Suspended sediment settled rapidly; by 250 ft (75 m) down-current, maximum concentrations declined to 300 $mg \cdot l^{-1}$ (Figure 4-4b). It should be noted, however, that based on the calibration data set, TSS concentration estimates this close to the dredge are likely underestimates. At 250 ft (75 m), the plume extended from the surface to the bottom of the water column; however, the surface component dissipated with increasing distance from the dredge. By 500 ft (150 m) down-current of the dredge, surface water TSS concentrations returned to ambient levels (data not shown). At 1890 ft (577 m) from the source, maximum TSS concentrations fell to below 60 $mg \cdot l^{-1}$ (Figure 4-4c). Throughout its detected range, lateral dispersion of sediments was limited. The plume primarily remained in the eastern portion of the channel, with a plume "footprint" width generally of 500 ft (150 m) or less. The highest TSS concentrations were found in a central core less than 160 ft (50 m) wide within the bottom 7 to 10 ft (2 to 3 m) of the water column. Beyond 3600 ft (1100 m), a distinct plume signature was not detected against background conditions. At Bullock Point, the plume behaved similarly, but did not travel as far as the plume at Sabin Point. TSS concentrations fell to less than 100 $mg \cdot l^{-1}$ by 820 ft (250 m) from the source at Bullock Point. Ambient TSS concentrations returned by 2100 ft (650 m) down-current of the dredging operation.

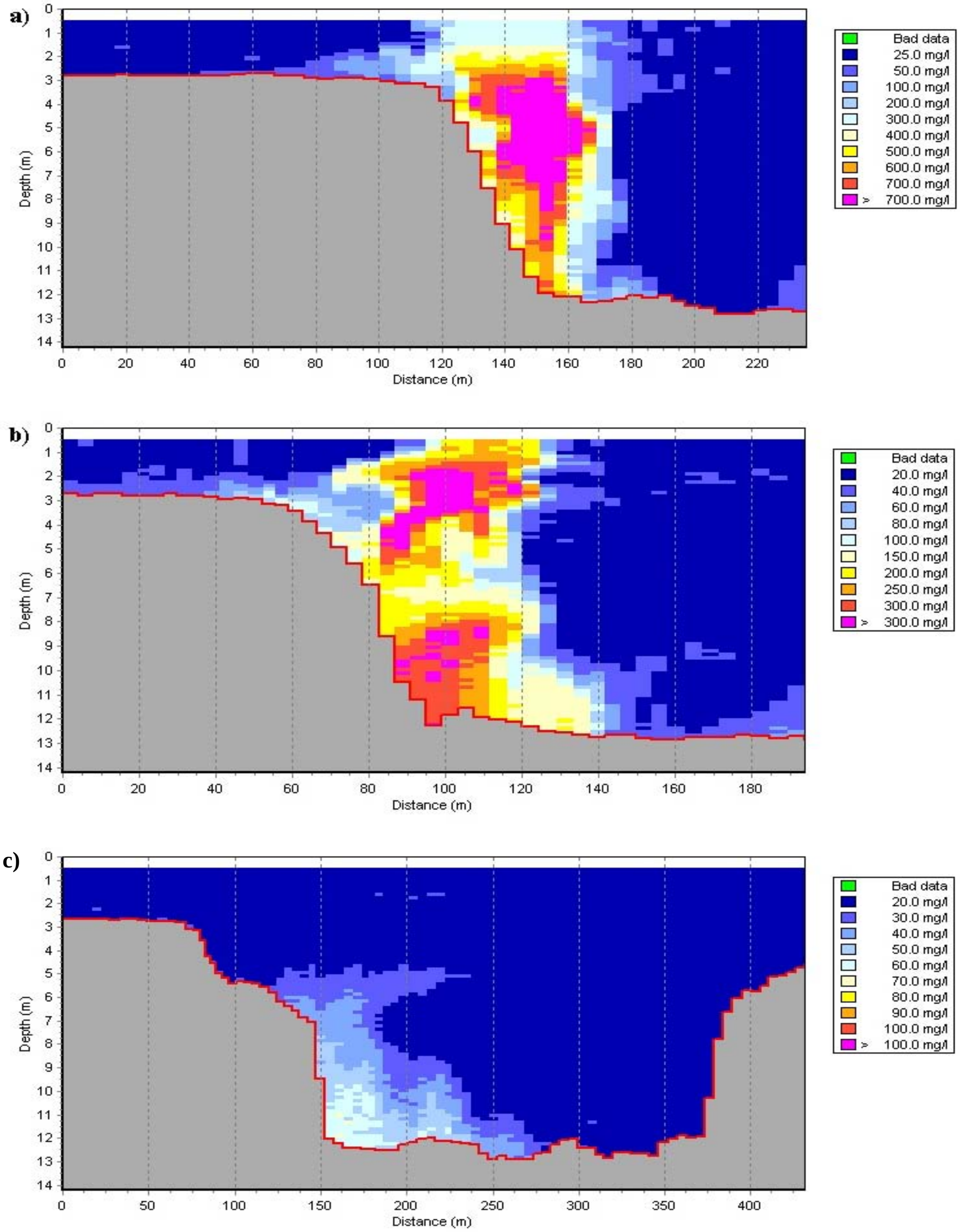


Figure 4-4. Vertical cross-sectional profiles of TSS concentration estimates at a) 95 ft (27 m), b) 250 ft (76 m) and c) 1890 ft (576 m) from the dredging operation during a flood tide in the Sabin Point Reach of Providence River. Note changes in concentration scale and x-axis distances for each graph (Figure from Reine et al., *in prep*).

4.3 CAD Cell Construction

Plumes were monitored during CAD cell construction in Fox Point Reach in September 2003 by ERDC (Reine and Clarke, *in prep.*). Plumes were characterized in terms of their spatial dimensions, concentration gradient structures, and temporal dynamics during flood and ebb tides. The purpose of the monitoring was to provide basic information on plumes associated with CAD cell construction, on which little information exists, and to use this information to make inferences regarding biological impacts.

4.3.1 Methods

Plumes were characterized using OBS to measure turbidity and ADCP to estimate TSS concentrations. On two consecutive days seven OBS units were deployed during CAD cell construction for approximately six hours during flood tide. Three stations were occupied on each monitoring day, with units at two or three depths. The ambient station, located on the eastern periphery of the waterway and removed from the influence of dredge plumes, consisted of one sensor located at a depth of 18 ft (5.5 m). Near-field and far-field stations were located in the central axis of plume movement, as determined by ADCP real time plume signatures, to record time series data. The near-field station, located 230 to 260 ft (70 to 80 m) from the dredge, consisted of two sensors located at depths of 5.9 and 18 ft (1.8 and 5.5 m). At the far-field station three sensors were deployed at depths of 5.9, 19, and 33 ft (1.8, 5.8, and 10 m) at a distance of 380 to 460 ft (120 to 140 m) from the dredge.

For the ADCP survey, numerous parallel transects aligned perpendicular to the channel axis and down-current of the dredging were occupied during one flood tide and one ebb tide. The Sediview Method was used to estimate TSS from the acoustic backscatter data. ADCP was also used to collect current velocity data.

Because the bucket dredging cycle injects air into the water column as the bucket breaks the air-water interface, and air bubbles are acoustic reflectors, a series of experiments were conducted in which the dredger completed bucket cycles without actually excavating sediment. That is, the bucket was intentionally cycled through the air-water interface to create a “bubble signature” pattern. ADCP transects were run repeatedly through the near-field to determine the closest distance that could be surveyed without air contamination of the acoustic data.

4.3.2 Results

Current flow was generally to the north and northwest in the study area during the flood tide. Depth-averaged current velocity was typically very slow, at less than 0.39 ft/sec (0.12 m/sec) during most of the tide. Current velocities within the CAD cell below 39 ft (12 m) ranged from 0.07 to 0.23 ft/sec (0.02 to 0.07 m/sec). Current velocities did not differ appreciably during the ebb tide, although the depth-averaged peak velocity was slightly slower at 0.3 ft/sec (0.1 m/sec).

The air bubble experiment indicated that with the prevailing current velocities, the ADCP could sample as close as 160 ft (50 m) from the bucket without backscatter being influenced by air bubbles.

Turbidity

Ambient turbidity ranged from 1.5 to 4.0 NTU across the two monitoring days, with the exception of a short period on the second day when ambient turbidity reached 7.6 NTU (Table 4-3). At the near-field stations, mean turbidity was 8.9 to 13.4 NTU, with no clear depth pattern. Maximum turbidity levels reached 64 NTU at the OBS stations, although turbidities as high as 370 NTU were found in the calibration data set in the immediate vicinity of the dredge. The pulsed nature of the bucket cycle was evident in the turbidity spikes of 30 to 60 minutes duration (Figure 4-5). Turbidity increased with depth at the far-field stations, with average turbidities at 33 ft (10 m) depth of 13.9 and 9.2 NTU for the two monitoring events. The frequency and duration of the turbidity pulses were diminished compared to those at the near-field stations (Figure 4-5).

Total Suspended Solids

Direct measurements of TSS comprising the calibration data set (n=56) correlated well to acoustic backscatter TSS estimates (Figure 4-6). Samples in the low concentration range showed some deviation in which the TSS estimates derived from ADCP data underestimated the TSS concentrations (for TSS estimates less than 100 $mg \cdot l^{-1}$). This effect generally is associated with samples that contain a high percentage of coarse sediment particles. Likewise, the acoustic backscatter TSS estimates underestimated TSS concentrations in the very high concentration range (TSS estimates greater than 300 $mg \cdot l^{-1}$). There was a strong linear relationship between TSS and turbidity (NTU) data sets (r^2=0.99).

Table 4-3.

Observed Turbidity During CAD Cell Construction in the Fox Point Reach of the Providence River

Station	Date	Distance to Dredge (ft)	Deployment Type	Depth (ft)	NTU	
					Mean	Range
1	5 Sep 2003	1690	Ambient	18.0	2.2	1.5 – 3.3
2	5 Sep 2003	260	Near-Field	6.0	8.9	2.4 – 42.0
				18.0	11.0	1.1 – 37.6
3	5 Sep 2003	460	Far-Field	6.0	7.6	2.0 – 42.7
				19.0	8.5	1.4 – 25.9
				32.8	13.9	6.7 – 23.0
1	6 Sep 2003	1970	Ambient	18.0	3.0	1.4 – 7.6
2	6 Sep 2003	230	Near-Field	6.0	13.4	4.1 – 50.4
				18.0	12.3	3.1 – 63.6
3	6 Sep 2003	390	Far-Field	6.0	6.6	2.4 – 29.5
				19.0	7.1	3.7 – 15.1
				32.8	9.2	4.6 – 30.5

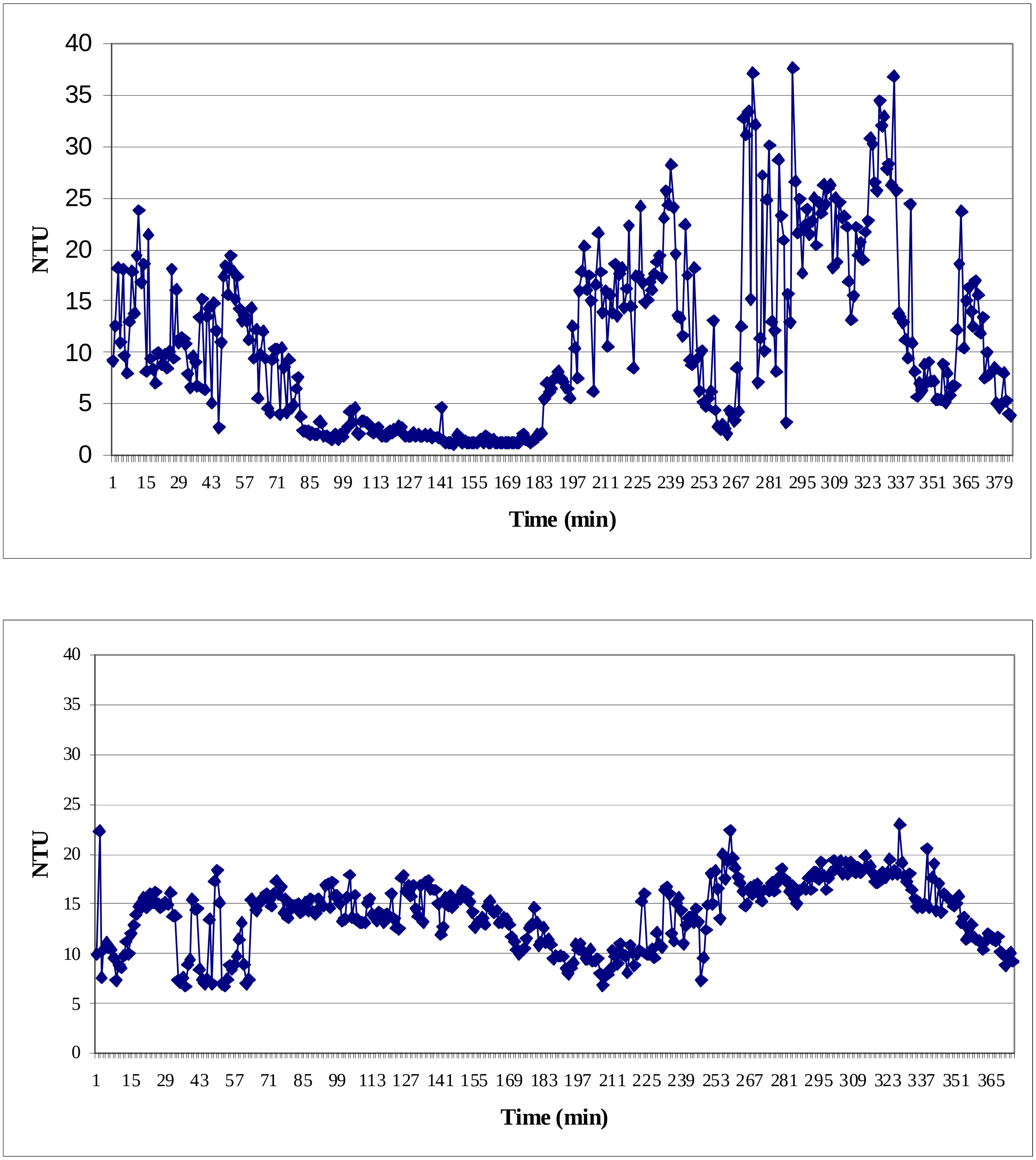


Figure 4-5. Plume turbidities down-current of CAD cell construction in the near-field (260-ft (79 m) down-current from dredging) at a depth of 18.0 ft (5.5 m) (top) and in the far-field (460-ft (140 m) down-current from dredging) at a depth of 32.8 ft (10 m) (bottom) (Figure from Reine and Clarke, *in prep*).

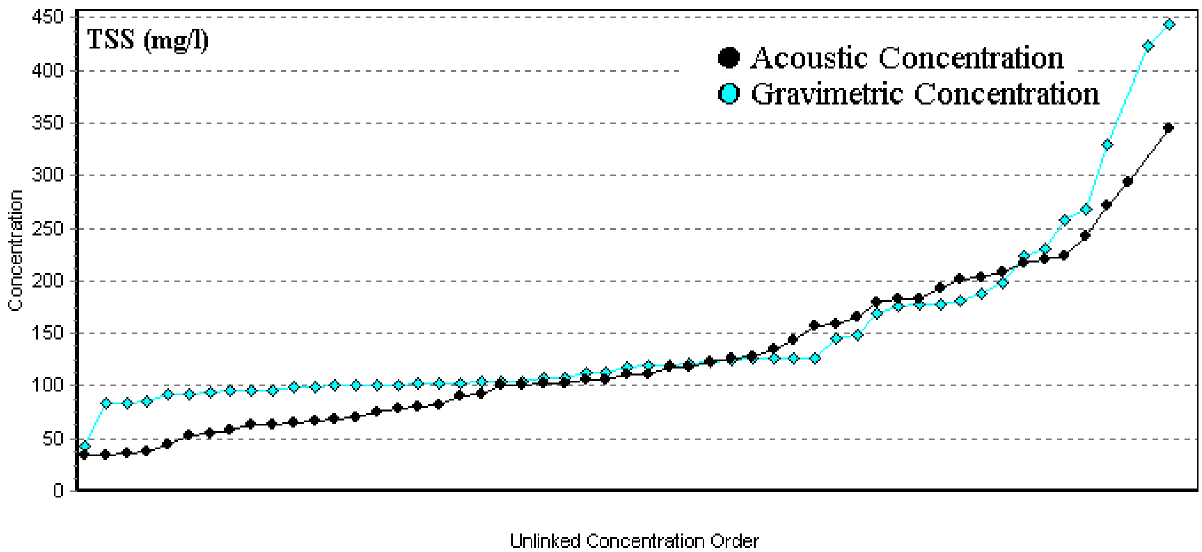


Figure 4-6. Comparison of acoustic TSS estimates and direct TSS measurements in rank order (Figure from Reine and Clarke, *in prep*).

Ambient TSS concentrations estimated from acoustic backscatter data ranged from 8.5 to 22.5 mg·l^{-1}, with highest concentrations found along the channel bottom (data not shown). The flood tide ADCP survey was completed when the dredge had been in full production mode for several hours prior to the start of the survey. Thus a fully developed plume with maximum concentration gradients and spatial dispersion was established. A plan view layout of transect locations and depth-averaged TSS concentrations displayed a clear plume signature in the western half of the river, on both the flood and ebb tides (Figure 4-7). During the flood tide survey, plume movement was to the north.

Vertical profiles of the flood tide survey provided further detail of plume behavior. At 260 ft (80 m) from dredging operations, an intense plume signature extended across the width of the CAD cell (Figure 4-8a). Highest concentrations (200-300 mg·l^{-1}) were found at water depths > 39 ft (12 m) in a central core of the plume about 330 ft (100 m) wide. At 750 ft (230 m) down-current from the dredging, some suspended sediments were dispersed along the channel bottom, but highest concentrations remained largely confined within the CAD cell (Figure 4-8b). By the time the plume had traversed from the southern to the northern end of the CAD cell, suspended sediment concentrations were 25 mg·l^{-1} above ambient conditions. By 1100 ft (330 m) down-current, and beyond the extent of the CAD cell, maximum TSS concentrations were contained within a bottom "footprint" approximately 330 ft (100 m) wide and were generally confined to the bottom 7 ft (2 m) of the water column (Figure 4-8c). By 1700 ft (530 m) from the source, plume signatures were not detected against background conditions.

A suspended sediment plume was also tracked during an ebb tide. Unlike the flood tide survey, dredging operations had been intermittent leading up to the ebb tide survey. Direction of plume movement was to the south (Figure 4-7). The configuration of the dredge and barge prevented surveying of much of the near-field plume, which was carried directly under the dredge and barge. Highest recorded TSS concentrations were slightly less than 70 mg·l^{-1}. These estimates were somewhat lower than those observed during the flood tide survey (100-150 mg·l^{-1}) at an equivalent distance and water depth, likely because the plume had not had sufficient time to develop maximum concentration gradients and because of spatial dispersion due to the intermittent dredging preceding the survey. Although maximum concentrations in the flood tide survey exceeded those in the ebb tide survey, maximum concentrations outside the CAD cell were slightly higher during the ebb tide survey (50 mg·l^{-1} above ambient, compared to 25 mg·l^{-1} above ambient in the flood tide survey), possibly reflecting the shorter distance the plume had to traverse before exiting the CAD cell. The plume continued to decay, and distinct plume signatures were no longer detectable above background at 1800 ft (550 m) down-current.

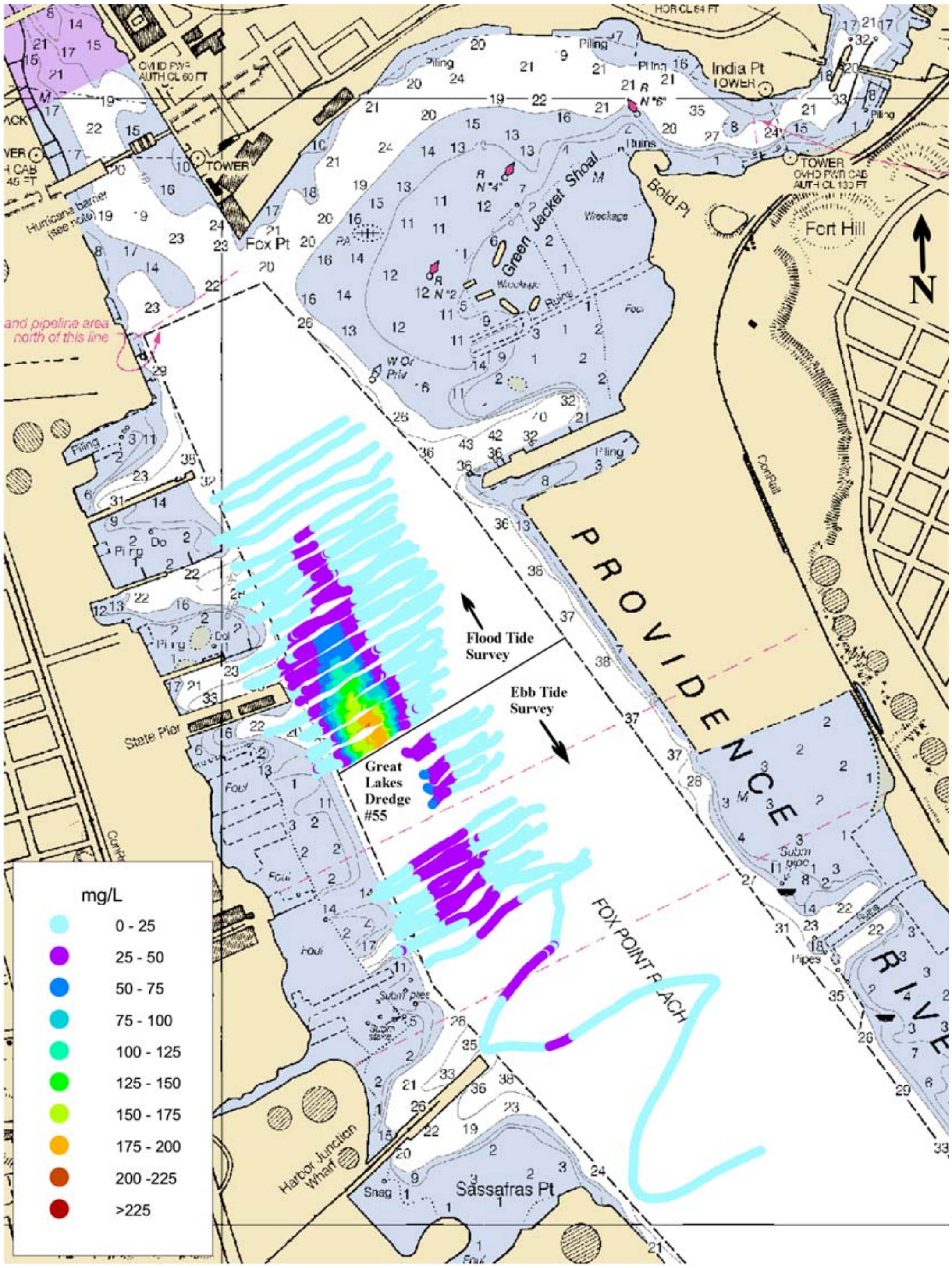


Figure 4-7. Composite locations of ADCP flood and ebb transects during CAD cell construction in the Fox Point Reach of Providence River with depth-averaged TSS concentration estimates (Figure from Reine and Clarke, *in prep*).

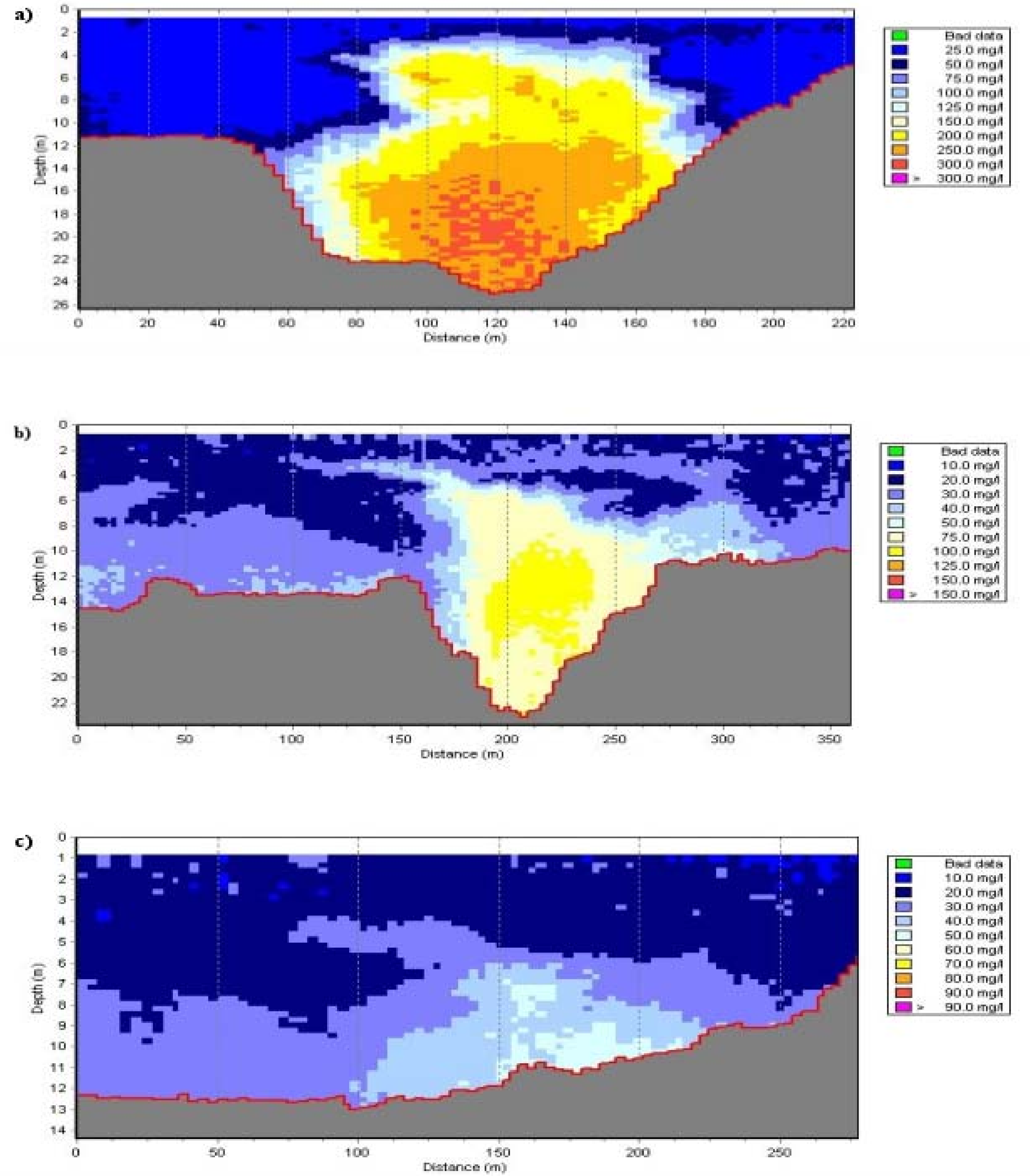


Figure 4-8. Vertical cross-sectional profiles of TSS concentration estimates at a) 260 ft (78 m), b) 755 ft (230 m) and c) 1080 ft (329 m) from the dredging operation during a flood tide. Note change in concentration scale and x-axis distances for each graph (Figure from Reine and Clarke, *in prep*).

4.4 Disposal into CAD Cells

The CAD cells were constructed in the upper reach of the Providence River (Figure 1-5) to provide a disposal location for material unsuitable for open water disposal. The Rhode Island Department of Environmental Management (RIDEM) issued a WQC for the PRHMDP (Appendix A), the development of which was a collaborative effort between RIDEM and USACE. This WQC included requirements for monitoring following disposal into CAD cells under a variety of tidal conditions and at various project milestones. Required monitoring included: 1) real-time measurement of turbidity, backscatter and current (using ADCP), temperature, salinity, and dissolved oxygen (DO) to track plume movement and assess water mass movement and water quality; 2) collection of water samples for analysis of TSS during all plume monitoring events; 3) collection of water samples for analysis of copper and silver during all plume monitoring events (these parameters were determined in the EIS to have the greatest potential for exceedance of water quality criteria); 4) collection of water samples for toxicity testing during a subset of the plume monitoring events; and 5) more extensive DO monitoring during summer neap tide disposal events (Table 4-4). The water quality metals compliance location was established at 1500 ft (460 m) from the location of disposal (which depended on the CAD cell location and tide cycle), and the toxicity compliance point was established at Fields Point for an ebb tide monitoring event and north of the I-195 bridge for a flood tide monitoring event based on the results of the predictive modeling performed as part of the EIS (Figures 4-9 and 4-10). The compliance locations mark the boundaries of the mixing zone, or the area within which it is determined that dilution of the dredged material may occur and numeric water quality criteria may be exceeded.

4.4.1 Methods

Disposal plume monitoring was conducted by WHG and ENSR in spring and summer of 2003 and spring of 2004. Initial monitoring of the disposal plumes was performed with ADCP, which allowed for real-time tracking of the plume. The ADCP measurements were supplemented with point measurements of water quality parameters using a traditional multi-probe instrument. The instrument was deployed for vertical profiles along transects identified by the ADCP to be within the plume. Turbidity measurements were collected to confirm the presence of elevated suspended solids, while temperature, salinity, and DO measurements were collected to provide additional water quality data. The combination of ADCP and water quality measurements was used to determine sample locations for TSS, metals analyses, and toxicity testing. Water samples were collected for TSS, metals analyses and toxicity testing using a pump and tubing

Table 4-4.

Monitoring Requirements for Disposal into CAD Cells

Type of Monitoring	Requirements			Reference for Requirement
	Sample Locations	Frequency	Standards	
Continuous measurements: ADCP Vertical profiles: Turbidity, DO, Temperature, Salinity Discrete measurements: Metals (Cu, Ag), TSS	1500 ft down-current (mixing zone boundary), up-current (background), dredging plume	Minimum of 11 events: • 1st disposal, 1 hr after high tide • By 5th disposal, 1 hr after low tide • High tide, 2 during spring tide (4 total) • Low tide, 2 during spring tide (4 total) • When starter CAD cell is ~20 ft from surface* • When starter cell is ~5 ft from surface* • When first cap material is placed at CAD cell* † • High tide, when disposal is occurring in northern limits of northernmost CAD cell	Cu and Ag ≤ State standards for acute toxicity (Cu – 4.8 $ug \cdot l^{-1}$, Ag – 1.9 $ug \cdot l^{-1}$) at 1500 ft down-current	WQC, Conditions 26-28
Toxicity – sea urchin fertilization and embryo survival and development	Fields Point or Washington Bridge (I-195) (mixing zone boundaries), up-current (background), dredging plume	6 events High tide: • 1st disposal into starter cell • 1 of the next 10 disposal events • Placement of cap material on first CAD cell to be capped † Low tide: • 1st disposal into starter cell • 1 of the next 10 disposal events • Placement of cap material on first CAD cell to be capped†	Mixing zone toxicity ≤ reference	WQC, Conditions 30-34
Dissolved Oxygen – continuous monitoring with undulating body	Transect 500 ft up-current from CAD cell disposal to 1500 ft down-current	3 events each month during neap tide, June-Sept 2004‡	N/A	WQC, Condition 40

* May occur as a subset of the 4 sampling events required during high and low tides.
† Monitoring was not performed because cells have not yet been capped.
‡ Monitoring was not performed in June or August because disposal did not occur during neap tide in these months. In July monitoring was conducted on the one day that disposal occurred during neap tide. In September monitoring was performed during a two-day period. Monitoring was not conducted on the third day because of the passage of Hurricane Isabel.

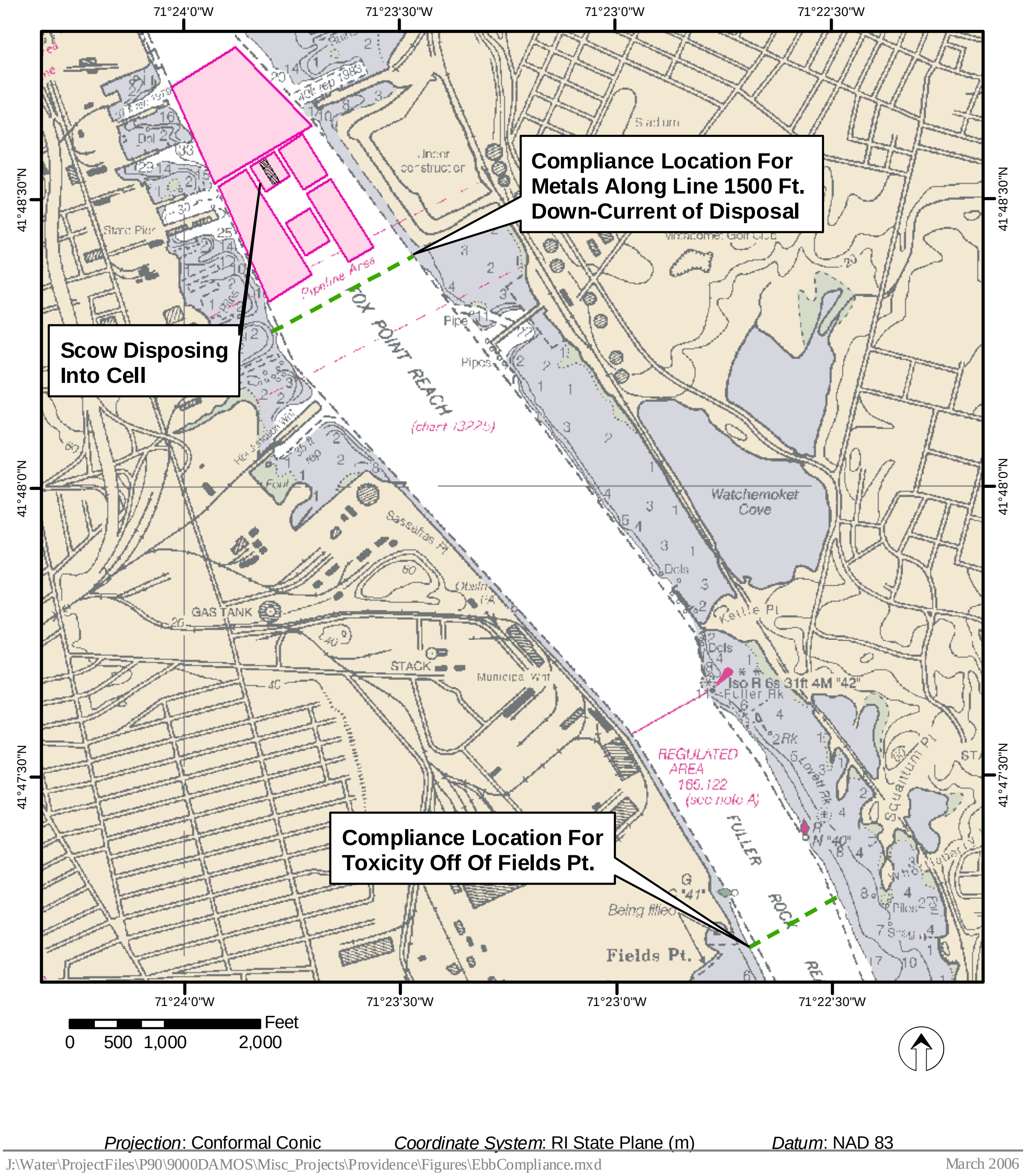


Figure 4-9. Water quality metals and toxicity compliance locations for CAD cell disposal on an ebb tide.

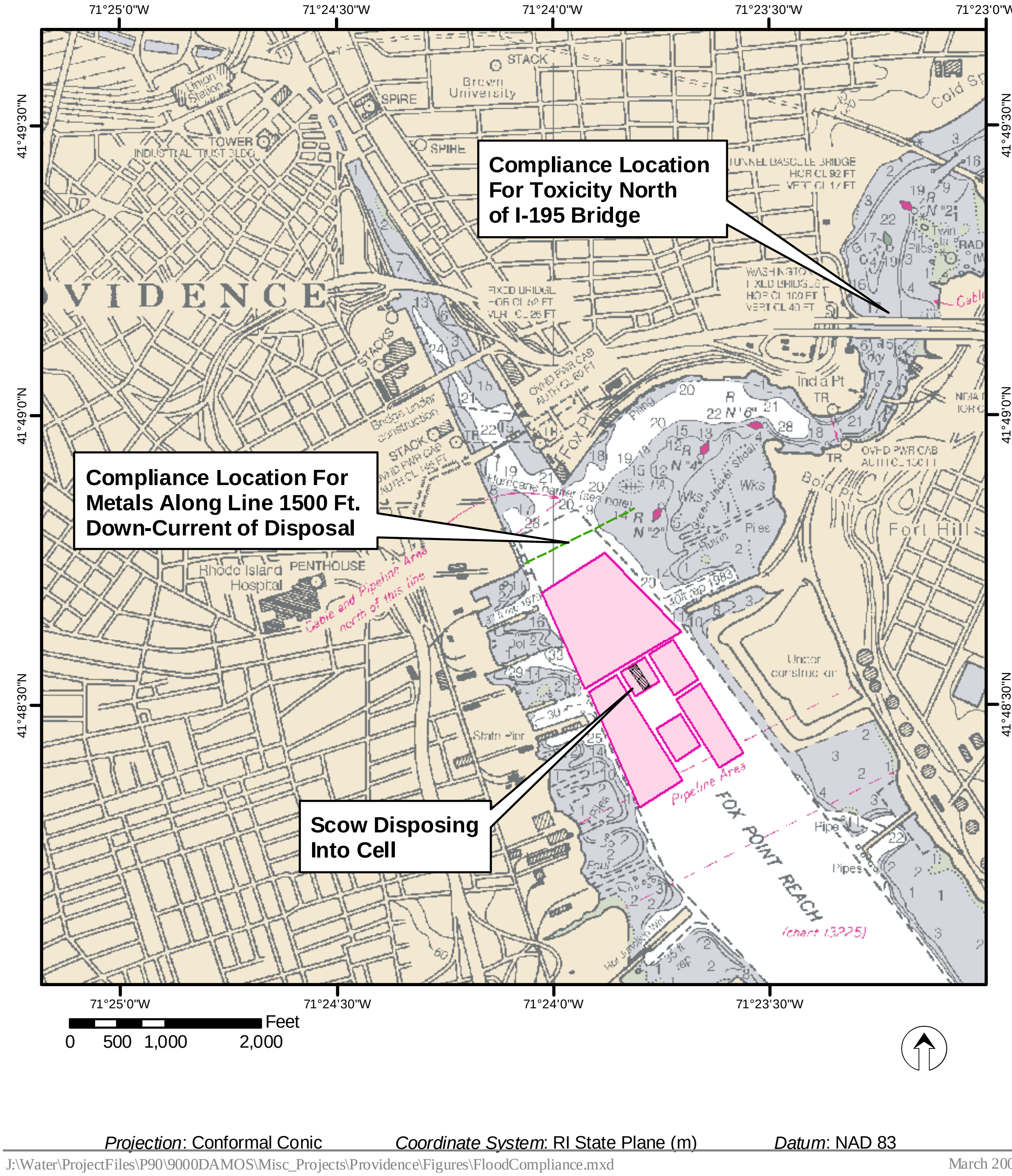


Figure 4-10. Water quality metals and toxicity compliance locations for CAD cell disposal on a flood tide.

system with the tubing intake located adjacent to the water quality multi-probe sensor package.

Each monitoring sequence began several hours before the scheduled disposal event to allow for characterization of background conditions. The disposal event triggered initiation of a series of ADCP transects and water quality measurements over and down-current of the cell to characterize plume development and track plume movement. Water samples were collected for dissolved silver and copper analysis at three locations: up-current reference, within the dredge plume (if dredging occurred in the monitoring area simultaneously with disposal), and at the 1500-ft (460 m) down-current compliance location. At these locations, discreet samples for metals analyses were collected at the surface, mid-depth and bottom of the water column. The Water Quality Certification specified additional sampling for silver and copper if the disposal plume was identified at >10 NTU above background at the 1500-ft (460 m) down-current location. Samples were collected throughout the monitoring event for TSS analysis to provide a larger set of paired turbidity and TSS measurements. For the monitoring events that required toxicity testing, samples were collected at an up-current reference location and the specified down-current compliance location (I-195 bridge in the Seekonk for flood tide and Fields Point for ebb tide). Given the extended distance between the disposal point and down-current compliance point (see Figures 4-9 and 4-10), the USACE chose to collect an additional sample for toxicity testing at the 1500-foot down-current metals compliance location to better characterize potential disposal impacts. All samples for toxicity testing were composited over the water column at each station. The toxicity testing included the sea urchin (*Arbacia punctulata*) 80-minute fertilization test and the 48-hour embryo development and survival test.

4.4.2 Results

Monitoring was performed on 11 separate events following disposal into the CAD cells, including ADCP and vertical profiling as well as sampling for laboratory analyses (Table 4-5). Two additional monitoring events were performed that focused on dissolved oxygen measurements following disposal under summertime neap time conditions (Table 4-5). As permitted by the WQC, several of these monitoring events satisfied the requirements of more than one WQC condition (Table 4-5). At the time of writing of this report, two monitoring events remained to be performed, keyed to capping of the disposal cells. The results of each monitoring event were submitted to RIDEM within 7 days of completion of the monitoring, and these submittals are included in Appendix D of this summary report.

Table 4-5.

Monitoring Events for Turbidity, TSS, Metals and Toxicity Testing with Applicable WQC Requirements

Monitoring Event No.	Date Performed	Disposal Event No.	Disposal Cell	Activity Triggering WQC Specified Monitoring	WQC Condition(s)	Tide	Turbidity, TSS and Metals	Toxicity	Description
1	5-20-03	1	1R	Disposal #1	26a, 31a	High	√	√	First disposal required to be monitored (assumed high tide)
2	5-21-03	2	1R	Disposal #2-5	26b, 33a	Low	√	√	First low tide disposal required to be monitored
3	6-4-03	5	1R	Disposal #2-11	26c,31b	High	√	√	Within the first 11 disposal events for toxicity (31b); Within the first 100 disposal events for metals (26c)
3	6-4-03	5	1R	20 ft from top	26e	Any	√		Performed when cell contents are 20’ from top of cell
4	6-6-03	11	1R	Disposal # 2-11	26d, 33b	Low	√	√	Within the first 11 disposal events for toxicity (33b); within the first 100 disposal events for metals (26d)
4	6-6-03	11	1R	5 ft from top	26e	Any	√		Performed when cell contents are 5’ from top of cell
5	7-10-03	14	3R	First 100 disposals	26c	Spring high	√		During a period when the tidal range is 5.5 ft or greater
6	7-11-03	17	3R	First 100 disposals	26d	Spring low	√		During a period when the tidal range is 5.5 ft or greater
7	7-11-03	21	3R	First 100 disposals	26c	Spring high	√		During a period when the tidal range is 5.5 ft or greater
8	7-14-03	31	3R	First 100 disposals	26d	Spring low	√		During a period when the tidal range is 5.5 ft or greater
9	7-21-03	70	4R	First 100 disposals	26c	High	√		Event 10 was performed after the first 100 disposal events based on discussions with RIDEM
10	6-9-04	>100	3AR	First 100 disposals	26d	Low	√		
11	6-9-04	>100	3AR	Northern cell	26f	High	√		During disposal at the northernmost limits of the project
DO#1	7-21-03		4R	DO survey	40	High			During neap tide
DO#2	9-17/18-03		5R	DO survey	40	High			During neap tide
				First Capping	26e, 31c	High	√	√	Capping yet to be performed
				First Capping	33c	Low		√	

Real-Time Measurements of Acoustic Backscatter and Turbidity

The ADCP was the primary tool for locating and tracking the suspended solids plume. Although the acoustic backscatter data were not post-survey processed to estimate TSS levels (as in the research-based dredge monitoring presented in Sections 4.2 and 4.3), it was sufficient for determining where and when to sample for compliance monitoring when supplemented with water column turbidity measurements.

Typically, an ADCP transect was performed directly over the disposal cell immediately following the disposal and repositioning of the scow to gauge the initial plume development. An example of an initial ADCP transect is presented in Figure 4-11 for a low tide/beginning of flood tide disposal event into Cell 3R on July 11, 2003. The map on the left side of the figure shows the location of the transect, starting from center channel and proceeding north-northwest crossing directly over cell 3R approximately 10 minutes following disposal. The ADCP backscatter image along the transect is presented in the center of Figure 4-11. The transect begins to the south, up-current of the cell, with the blue/green shading indicative of low acoustic backscatter. Higher acoustic backscatter (yellow/red) was recorded initially in the upper water column and then extending over the full water column as the vessel passed over the disposal cell. The approximate cell boundary is shown on the transect, but the acoustic trace of the cell bottom is obscured by high suspended solids within the cell. As the transect proceeds to the north, down-current of the cell, the acoustic backscatter is reduced, and the arrival at Cell 1R is evident at the very end of the transect by the dip in bottom elevation.

Immediately following completion of the transect across the cell, a vertical water quality profile was collected within the area of highest acoustic backscatter adjacent to Cell 3R (depicted by the white bar in Figure 4-11). The profile of turbidity from this location is presented in the graph on the right side of Figure 4-11. Although the acoustic backscatter was high in the upper water column, the turbidity was relatively low, and the acoustic return was attributed to air entrainment related to the disposal event and prop wash from the support vessels used to position and relocate the disposal scow. Turbidity was elevated in the lower water column, with a maximum value of 50 NTU.

Additional ADCP transects were completed across the channel and longitudinally along the axis of the initially defined plume. The acoustic signal of the disposal plume dissipated rapidly and was generally not identifiable at the compliance transect 1500 ft (460 m) down-current from the disposal point. Examples of cross-channel transects at this compliance location are presented in Figure 4-12 for disposal events into Cell 1R that took place on May 20 and June 4, 2003. Both of these events occurred during high tide/beginning of ebb tide with flow directed to the south-southeast along the channel.

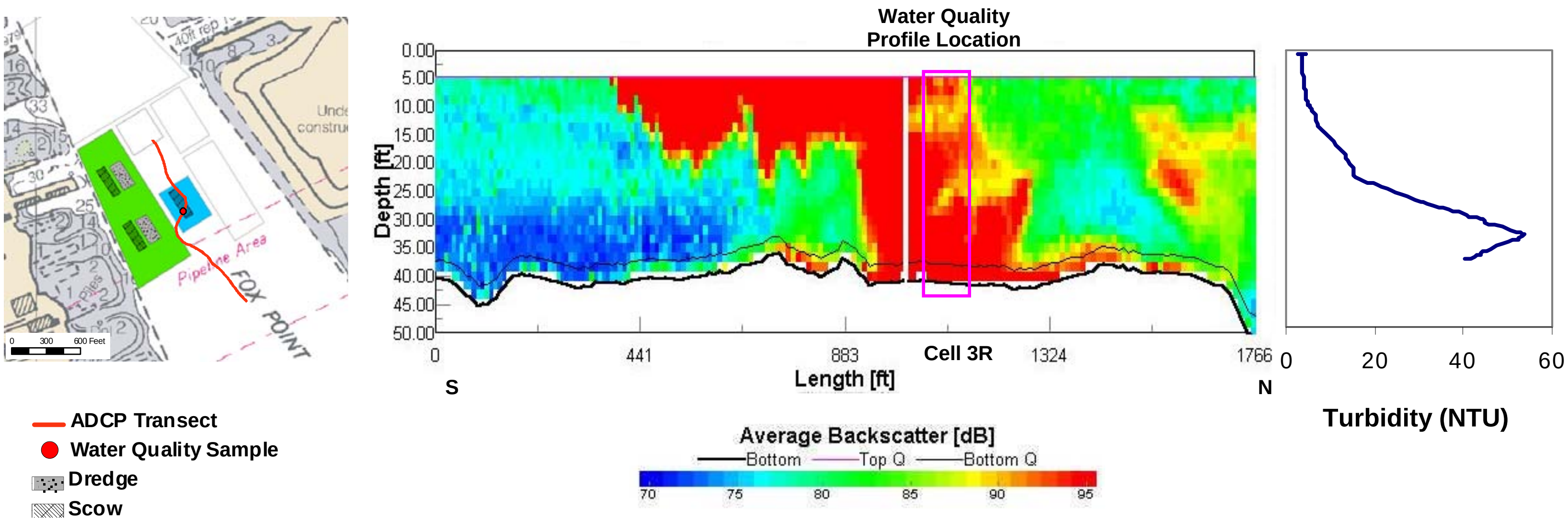
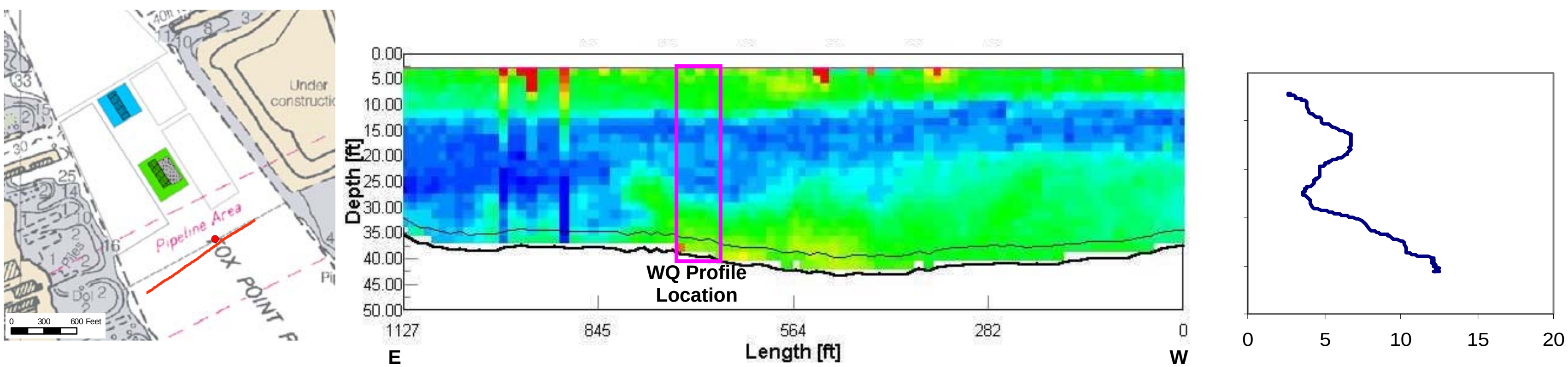


Figure 4-11. ADCP backscatter (center) and water column turbidity measurements (right) along the channel through the disposal cell on 11 July 2003, ten minutes following disposal.



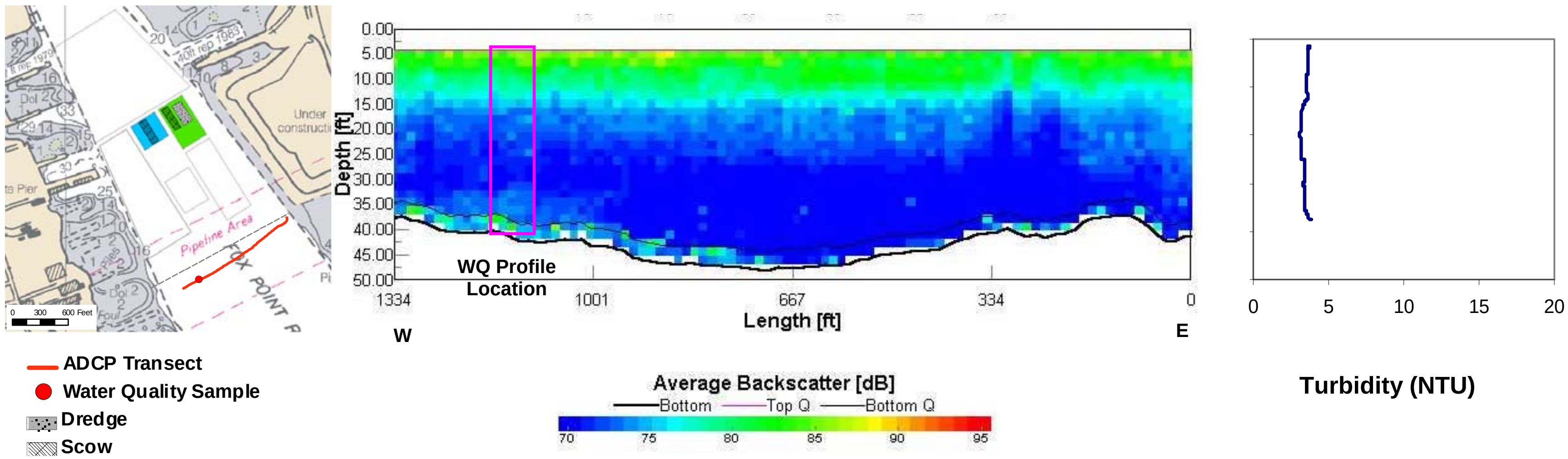


Figure 4-12. ADCP backscatter transects and turbidity profiles 1500 ft (460 m) from disposal on 20 May 2003, 80 minutes following disposal (top), and 4 June 2003, 90 minutes following disposal (bottom).

The data in the upper panel of Figure 4-12 were collected approximately 80 minutes following disposal on May 20, 2003, when the water mass from Cell 1R at the time of disposal was estimated to cross the compliance transect based on current data collected with the ADCP. The acoustic backscatter data from the ADCP (center image) revealed some limited signal elevation in the lower half of the water column. A vertical water quality profile collected along the transect (Figure 4-12, upper panel, right graph) revealed slightly elevated values in the lower portion of the water column, up to 12 NTU (compared against a background value of 3-5 NTU). This turbidity elevation was considered likely related to the ongoing dredging rather than the disposal event as the dredge was positioned between the disposal cell and compliance transect and was much closer (Figure 4-12, upper panel, map on left).

The data in the lower panel of Figure 4-12 were collected approximately 90 minutes following disposal on June 4, 2003, when the water mass from Cell 1R at the time of disposal was estimated to cross the compliance transect based on current data collected with the ADCP. The acoustic backscatter data from the ADCP (center image) revealed conditions similar to background measurements across the entire channel. A vertical water quality profile collected along the transect (Figure 4-12, lower panel, right graph) confirmed uniform turbidity of 3-4 NTU. Although dredging was also occurring during this monitoring event, the dredge was located adjacent to the disposal cell, approximately the same distance from the compliance transect (Figure 4-12, lower panel, map on left).

Total Suspended Solids

Results of the TSS analysis are presented in Table 4-6 for the 11 monitored disposal events. Summary statistics are provided, grouping the high tide/beginning ebb tide and low tide/beginning flood tide data for samples collected at the surface, middle, and bottom depths in the water column and at the three designated locations: 1) an up-current (background) location prior to the disposal event; 2) immediately down-current of dredging operations if they were co-occurring within the monitoring area; and 3) at the compliance location 1500 ft (460 m) down-current of CAD cell in which the disposal occurred.

Up-current concentrations of TSS ranged from 4 to 35 $mg \cdot l^{-1}$ for the high tide/early ebb tide samples and were higher for the low tide/early flood tide samples ranging from 7 to 55 $mg \cdot l^{-1}$ (Table 4-6). Highest TSS concentrations were generally found in the samples collected within the dredging plume, ranging up to 440 $mg \cdot l^{-1}$, with maximum values consistently occurring near the bottom of the water column. This was expected given that the sampling was performed closer to the dredging operation (within

Table 4-6.

Summary of Observed TSS during CAD Cell Disposal Monitoring

	High Tide TSS ($mg \cdot l^{-1}$) n=6			Low Tide TSS ($mg \cdot l^{-1}$) n=5		
	1500-ft Compliance Location	**Up-current**	**Dredge Plume**	**1500-ft Compliance Location**	**Up-current**	**Dredge Plume**
Surface						
Minimum	9	4	17	10	7	11
Average	25	18	33	21	25	20
Maximum	46	35	40	30	55	30
Middle						
Minimum	14	15	9	10	7	24
Average	23	20	47	33	18	60
Maximum	32	26	140	62	25	140
Bottom						
Minimum	15	17	17	10	17	20
Average	35	23	101	30	21	63
Maximum	75	34	440	69	28	190
Water column (all depths)						
Minimum	9	4	9	10	7	11
Average	28	20	60	28	21	48
Maximum	75	35	440	69	55	190

several hundred feet) and given that the dredging represented a more continuous source of suspended solids than the single disposal event. TSS concentrations at the 1500-ft (460 m) compliance transect were on average somewhat above background, ranging from 9 to 75 $mg \cdot l^{-1}$ for the high tide/early ebb tide samples and from 10 to 69 $mg \cdot l^{-1}$ for the low tide/early flood tide samples with highest concentrations occurring in the middle to lower portion of the water column. Given that one or two dredges were operating in the vicinity of the disposal cell during all but two of the monitoring events, some of the elevation in TSS noted at the 1500-ft (460 m) down-current transect was likely due to the dredging operations.

Silver and Copper

Dissolved silver and copper concentrations were analyzed in the samples collected during the 11 monitoring events at surface, middle, and bottom depths at an up-current (background) location, within the dredging plume (if dredging was ongoing in the monitoring area), and at the 1500-ft (460 m) down-current compliance point (Table 4-5). Dissolved silver concentrations were less than the reporting limit (0.5 $ug \cdot l^{-1}$) for all samples. Dissolved copper was detected in most samples, with concentrations ranging from less than 1 $ug \cdot l^{-1}$ to a maximum of 8.2 $ug \cdot l^{-1}$. Concentration varied among stations with no discernable trend. At a given station, concentrations were generally highest at the surface for the nine events performed in 2003. For the two events performed in 2004, concentrations were generally higher at depth. Only one sample was above the chronic/acute water quality criterion for copper (4.8 $ug \cdot l^{-1}$); this sample was the bottom depth collected at the up-current background location prior to the monitored disposal event on June 9, 2004 (8.2 $ug \cdot l^{-1}$).

Toxicity

Toxicity testing was performed on samples collected during four sampling events from an up-current (background) location, in the adjacent dredging plume, at the 1500-ft (460 m) down-current metals compliance point (not required by the WQC), and at the toxicity compliance point (either at Fields Point or the I-195 Bridge, depending on tidal condition) (Table 4-5). At each location, one composite was formed from samples collected at surface, middle and bottom depths. Sea urchin (*Arbacia punctulata*) fertilization rates ranged from 98 to 100% for all tests. Embryo survival ranged from 86 to 100%, and embryo development ranged from 88 to 98% of normal. The only significant difference between the up-current and down-current samples was for the monitoring performed on May 21, 2003. The results for normal embryo development at the 1500-ft (460 m) down-current location on this date were less than that at the up-current location (89.2 vs. 93.8% normal embryo development, statistically significant at the 0.05 level).

In addition to the toxicity testing described above, one sampling event included sampling directly within the disposal plume (not required by the WQC). Mean sea urchin fertilization was 99.4%. Mean embryo survival was 58.8%, with the control treatments (artificial seawater and natural seawater) also demonstrating low survival (56.7 and 62.3%, respectively).

Dissolved Oxygen

The WQC required that more extensive dissolved oxygen (DO) monitoring be performed following CAD cell disposal during neap tide periods in June, July, August, and September when ambient DO levels were expected to be low and tidal exchange was at a minimum. As CAD cell disposal did not occur during the neap tides in June or August, this focused DO monitoring was only performed in July and September 2003. During these two surveys, water column profiles were collected at multiple stations along a longitudinal section up-current of, over, and down-current of the disposal cell prior to and following the disposal events.

There were no apparent trends in DO concentrations related to disposal identified in either of the monitoring events. Results of the September 2003 DO monitoring survey are presented in Figure 4-13. Sampling was performed in conjunction with the ebb tide disposal event on 17 September 2003 (upper panel, Figure 4-13) and in conjunction with the flood tide disposal event on 18 September 2003 (lower panel, Figure 4-13), both following disposal into CAD Cell 5R. During both events, DO was measured approximately 30 minutes prior to (left graph in Figure 4-13) and 30-60 minutes following disposal (right graph in Figure 4-13). Dredging was ongoing at CAD Cell 7R during the monitoring.

Monitoring performed prior to and following the disposal events on 17 and 18 September did not identify any significant variations in DO concentrations relative to the disposal event. Monitoring on both days revealed similar patterns in DO. Concentrations were fairly uniform in the upper 12 to 20 ft (4 to 6 m) of the water column. Below this, DO concentrations decreased with depth, and values near the bottom of the water column were 2-3 $mg \cdot l^{-1}$ lower than those near the surface. For the monitoring performed during the ebb tide on 17 September, DO concentrations ranged from approximately 7 $mg \cdot l^{-1}$ near the surface to 4.5 $mg \cdot l^{-1}$ near the bottom prior to the disposal event and showed no apparent change following the disposal event. For the monitoring performed during the flood tide on 18 September, DO concentrations ranged

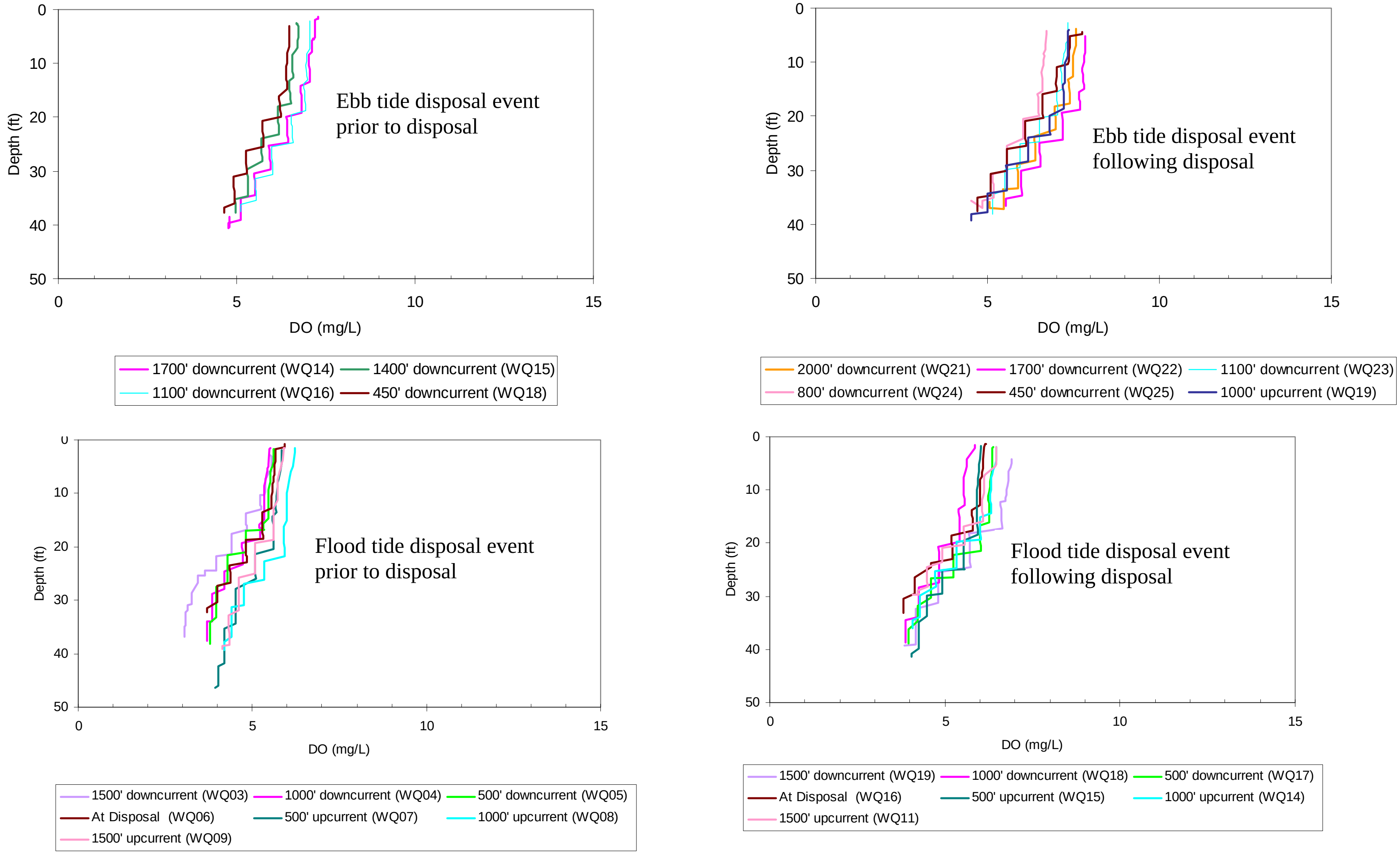


Figure 4-13. Results of September neap tide DO monitoring survey

from approximately 6 mg·l^{-1} near the surface to 3.5 mg·l^{-1} near the bottom prior to the disposal. Following the disposal event, DO concentration increased slightly as expected with the onset of the flood tide cycle, ranging from approximately 6.5 mg·l^{-1} near the surface to 4 mg·l^{-1} near the bottom.

Dissolved oxygen monitoring performed in July 2003 during one high tide disposal event indicated a similar pattern of relatively uniform DO concentrations in the upper water column and decreasing with water depth (data not shown). DO concentrations were generally higher in the July monitoring with more vertical variability as compared to the September monitoring event. However, like the September results, DO concentrations were stable before and after the disposal event and up-current and down-current of the disposal location.

4.5 Disposal at RISDS

Various monitoring efforts were conducted at the open water disposal site, RISDS, during and following disposal including characterization of disposal plumes; periodic bathymetric surveys; and a benthic community survey and assessment of lobster abundance both conducted following the conclusion of disposal at RISDS.

4.5.1 Plume Tracking and Assessment

Two sediment plume tracking and assessment surveys were completed over RISDS, one in April 2004 and the other in September 2004 (Table 4-7). These two surveys were performed by SAIC and are described in detail in DAMOS Contributions 166 (SAIC 2005a) and 167 (SAIC 2005b), respectively. Each survey tracked three individual sediment plumes generated by release of PRHMDP maintenance material into RISDS (Figure 4-14). Both surveys monitored disposal of material dredged from the Federal Navigation Channel; the April survey monitored material from the Sabin Point Reach, and the September survey monitored material from the Fuller Rock Reach. The same monitoring methodology was employed during both surveys.

Methods

During the disposal scow filling process, sediment samples were collected at the dredging site for geotechnical and geochemical characterization prior to each disposal event. The material was comprised primarily of silts and clays, and exhibited a water content in excess of 200%. Upon disposal of this material at RISDS, oceanographic equipment aboard two survey vessels obtained a variety of measurements related to sediment plume formation and subsequent transport (current speed and direction, physical

Table 4-7.

Monitoring Requirements of Disposal at RISDS

Type of Monitoring	Requirements			Reference for Requirement
	Sample Locations	**Frequency**	**Goal**	
Plume monitoring – ADCP	Vicinity of disposal operations	Up to 5 disposal events*	Track horizontal and vertical extent of plume	FEIS
Water sampling – TSS	Plume centroid	Up to 5 disposal events*	Evaluate short-term impacts to water quality	FEIS
Water sampling - toxicity	Plume centroid	N/A*	Evaluate short-term impacts to water quality	N/A

* Six disposal events were monitored: three in April 2004 and three in September 2004 (SAIC 2005a and SAIC 2005b).

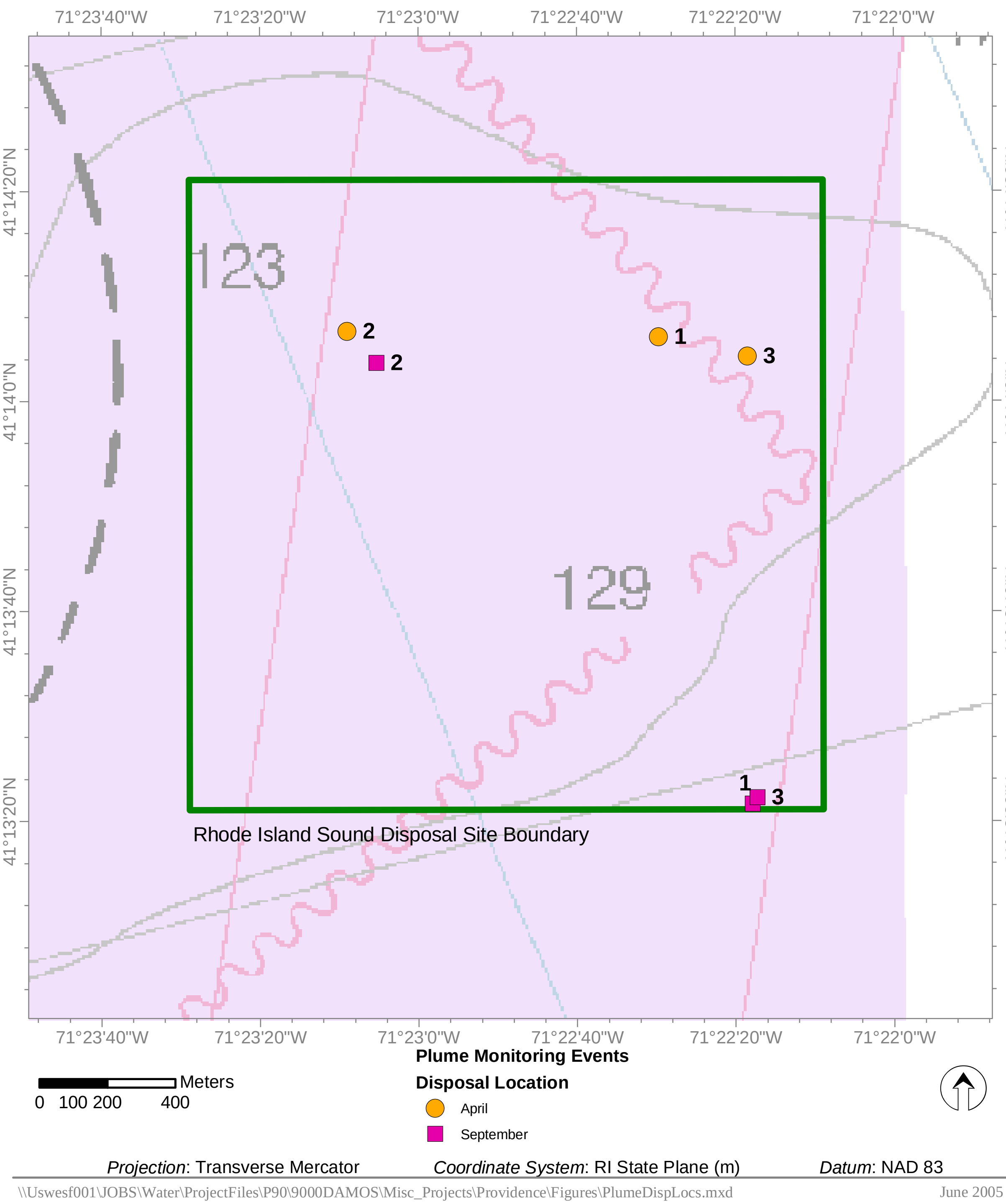


Figure 4-14. Disposal locations for RISDS plume studies

characteristics of the receiving water, turbidity, etc.) for a period of 3.5 hours following each disposal event. A series of optical and acoustic remote sensors were employed for the collection of digital data, while water column samples were obtained for determination of TSS concentrations and toxicity.

A conductivity, temperature, and depth (CTD) probe, along with a series of water sampling bottles, served as the primary instruments on a vessel that continually profiled the water column to measure turbidity. A second vessel was equipped with a downward-looking acoustic Doppler current profiler (ADCP) to examine the relative concentration of suspended sediments within the water column and to collect cross-sectional data related to the overall morphology, transport rate, and diffusion of each disposal plume. In addition, a bottom-mounted ADCP mooring and an optical backscatter sensor (OBS) turbidity string were deployed in close proximity to the target disposal point to provide information pertaining to movement of the water mass and relative turbidity before and after each disposal event.

Results

The three April tracking events were each conducted during a period of flood tide, and the September tracking events were each conducted during an ebb tide. During the April survey, water column currents were relatively uniform with the water typically flowing to the west or northwest on each of the three days. More variation in water column currents was observed during the September survey, and water flowed to the west, south, and/or southeast depending upon the stage of the tide at which the disposal event occurred. The trajectories of the sediment plumes were tracked with surface, middle, and bottom current drogues.

When initially formed, each plume was characterized as a discrete column of suspended sediment with the size and suspended sediment concentrations dependent upon the dimensions of the disposal barge and volume of dredged material disposed. The sediment plumes formed after each disposal event were detectable within the water column both optically and acoustically for a period of three to four hours.

The portion of the plume exhibiting the highest concentration of suspended sediments, or centroid, was the primary target of water sampling operations. Although the height of the centroid above the seafloor depended on the oceanographic conditions at the time of the survey, it was often detected at 2 to 5 m above the seafloor both immediately following plume formation and for several hours thereafter. Water samples collected at or near the plume centroid twenty minutes following disposal in the April survey displayed TSS concentrations ranging from 24 to 64 $mg \cdot l^{-1}$, strongly contrasting with the ambient seawater, which exhibited background TSS values of 2.0 to 2.9 $mg \cdot l^{-1}$ (Figure 4-15). TSS concentrations in the September survey were higher all around, with concentrations ranging from 47 to 111 $mg \cdot l^{-1}$ in the centroid 20 min following disposal, compared to 5.6 to 8.9 $mg \cdot l^{-1}$ in the ambient seawater.

In general, optical measures of turbidity decreased rapidly through both diffusion and particle settlement. Within one hour following disposal, TSS values of <10 $mg \cdot l^{-1}$ for the April survey and <30 $mg \cdot l^{-1}$ for the September survey were observed near the centroid of each plume (Figure 4-15, 4-16, 4-17). Despite the rapid reduction in suspended particulate matter, each sediment plume remained a distinct feature in the water column and was detectable in both the acoustic backscatter and transmissometer data. The influx of ambient seawater and particle settlement over the next 2.5 hours resulted in suspended sediment load reduction near the centroid over time. At 3.5 hours post-placement, the turbidity within the centroid was at or approaching background levels. The one exception was the third plume event of the September survey. Weak and variable water column currents at mid-depth and near-bottom at this time allowed the sediment plume to linger within the southeast quadrant of RISDS and limited the influx of ambient seawater into the plume. As a result, this plume became quite broad and diffuse, but exhibited higher turbidity values in comparison to the other plumes at comparable times. Based upon the information collected during earlier survey efforts, it was anticipated that current velocities were likely to accelerate approximately 30 minutes after the conclusion of the survey. This increase in current flow would have likely provided the influx of ambient seawater necessary to rapidly dissipate the sediment plume and allow turbidity levels to return to background conditions. Plume residence time within RISDS varied from 75 to 120 minutes for the April survey and 30 to 180 minutes for the September survey, depending upon the target disposal point utilized and the direction and magnitude of water column currents.

Discrete water samples were obtained for toxicity analysis at or near the plume centroid 40, 60, and 120 minutes post-placement for the April and September surveys. After a 96-hour exposure to waters collected from the plumes, neither the mysid (*Americamysis bahia*) nor juvenile silverside (*Menidia* spp.) test organisms exhibited a lethal response.

4.5.2 Bathymetric Monitoring Surveys

A series of six bathymetric surveys were performed at RISDS in 2003 through 2005, which included both single-beam and multi-beam techniques (Table 4-8). The surveys were designed to provide baseline conditions and to document the changes in seafloor topography resulting from dredged material deposition. The survey results were

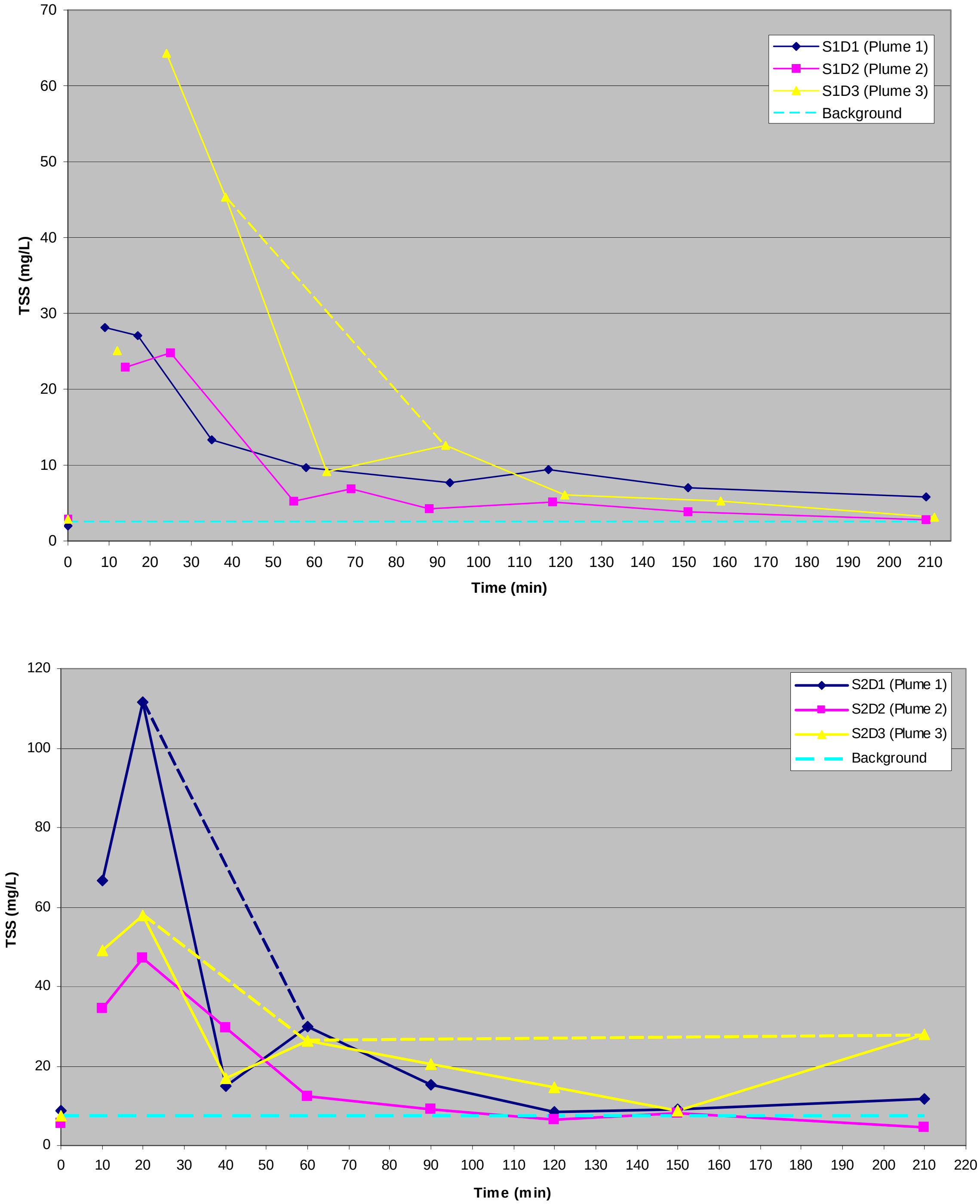


Figure 4-15. Total suspended solids (TSS) concentration near the plume centroid versus time for RISDS plume monitoring, April 2004 (top) and September 2004 (bottom) (Figure from SAIC 2005a, SAIC 2005b).

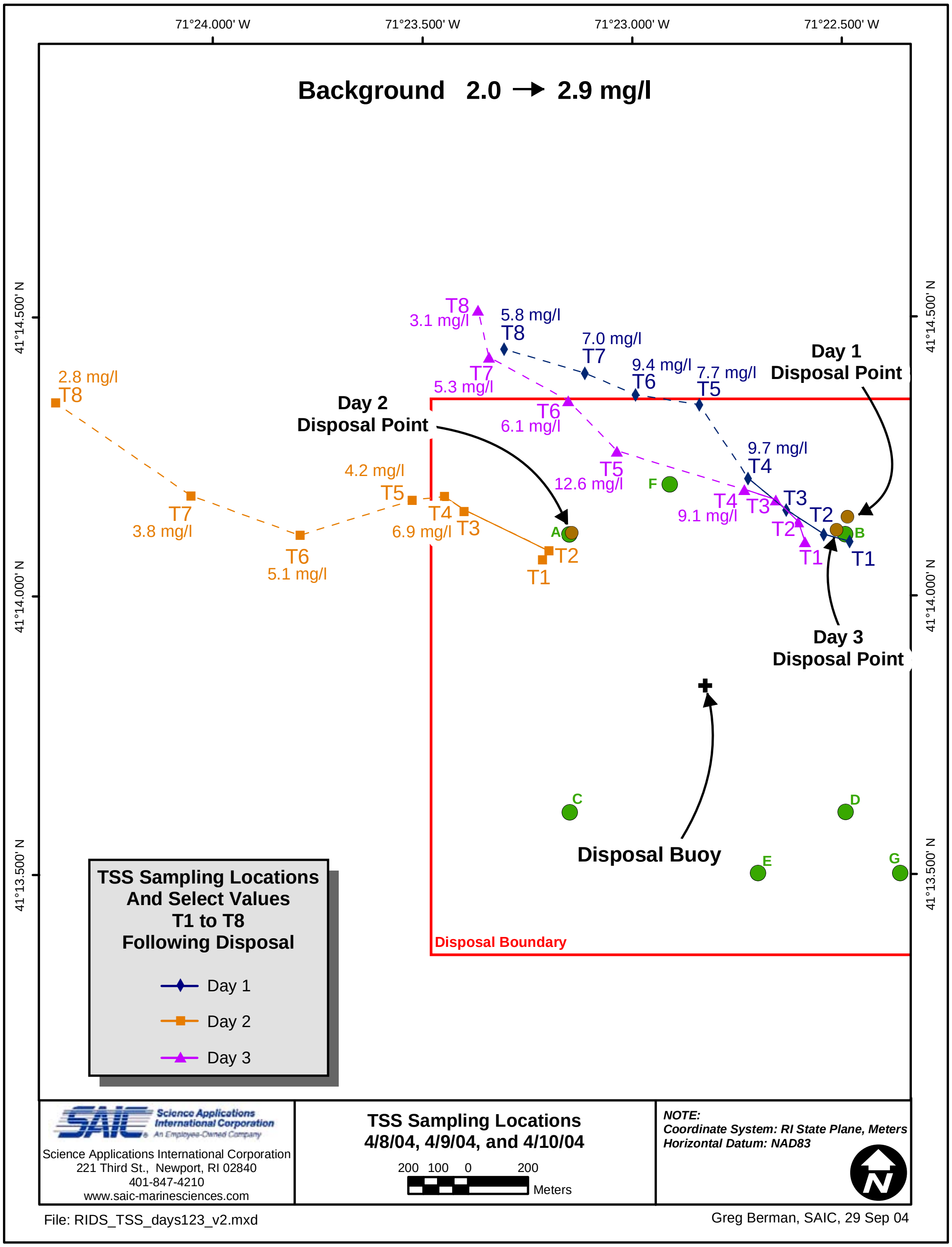


Figure 4-16. Positions of the centroid and direction of transport of the three sediment plumes tracked during the April 2004 plume monitoring survey relative to RISDS boundaries (Figure from SAIC 2005a).

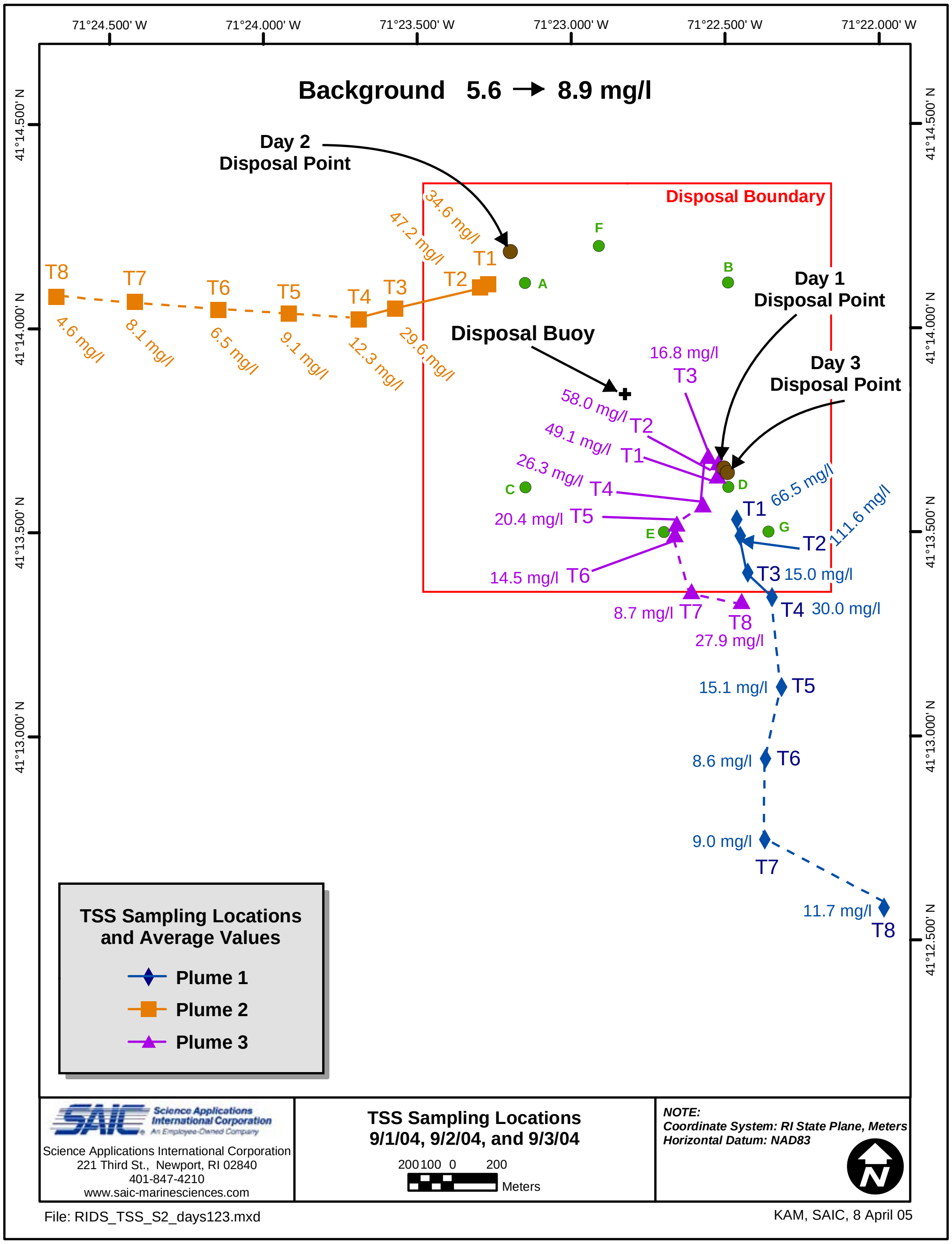


Figure 4-17. Positions of the centroid and direction of transport of the three sediment plumes tracked during the September 2004 plume monitoring survey relative to RISDS boundaries (Figure from SAIC 2005b).

Table 4-8.

Monitoring of Benthic Conditions at RISDS Following Disposal

Type of Monitoring		Requirements		Reference for Requirement
	Sample Locations	Frequency	Goal	
Bathymetry	RISDS and vicinity	6-10 surveys • Feb 2003 (M)[1] • July 2003 (S)[1] • Sept 2003 (S)[1] • Feb 2004 (S)[2] • May 2004 (S)[2] • Sept 2004 (S)[2] • Aug 2005 (S)[2]	Document changes in seafloor topography; redirect sediment disposal positions as needed (e.g., to form berm). Note: M denotes multi-beam survey and S denotes single-beam survey.	FEIS
Side-scan sonar	RISDS and vicinity	1 survey • Sept 2003[1]	Evaluate distribution of dredged material; examine sediment trails outside RISDS found in previous survey	N/A
Sediment-profile imaging (1)	RISDS and vicinity	1 survey • Oct 2003[1]	Document changes in surficial sediment composition; examine sediment trails outside RISDS found in previous survey	N/A
Towed video	RISDS and vicinity	1 survey • Oct 2003[1]	Characterize surficial sediment composition; examine sediment trails outside RISDS found in previous survey	N/A
Sediment-profile imaging (2)	RISDS and vicinity	1 survey • July 2005[3]	Assess recovery of benthic community 1 year after completion of project	FEIS
Benthic grabs	RISDS and vicinity	1 survey • July 2005[3]	Characterize benthic community	N/A

[1]SAIC 2004
[2]Unpublished DAMOS data
[3]ENSR 2007b

also used to direct disposal locations for berm formation, maintain even distribution of dredged material, and to ensure that pre-established disposal locations resulted in minimal sediment transport outside of the disposal site. The final bathymetric survey, in August 2005, illustrated a well defined berm with sufficient remaining capacity in the artificial containment cell (Figure 4-18).

4.5.3 2003 Benthic Monitoring Surveys

Benthic monitoring surveys were performed by SAIC in July to October 2003, and included side-scan sonar, sediment-profile imaging (SPI) and underwater video (Table 4-8) (SAIC 2004). The surveys were designed to examine the distribution and composition of recently disposed sediments, the majority of which was parent material from CAD cell construction. In particular, the surveys investigated disposal trails and trawl scars observed during a separate survey to the west of RISDS.

Monitoring surveys performed over RISDS and the surrounding area of the disposal site in July 2003 detected a variety of features on the seafloor both inside and outside the disposal site boundaries that prompted further evaluation (SAIC 2004). In September 2003, a side-scan sonar survey was completed over a 1.8 x 1.8 mi (2900 × 2900 m) area known as Area W to evaluate the distribution of dredged material in the area surrounding RISDS. The side-scan sonar data displayed several areas of interest, including disposal trails and the bathymetric ridge constructed within RISDS, areas of concentrated trawl scars (recent and relic) to the west of the disposal site, a naturally occurring ridge of coarse sediment to the north of RISDS, and apparent trails of recently deposited dredged material outside the disposal site boundaries (Figure 4-19).

Underwater video and sediment-profile imaging performed in October 2003 confirmed that the majority of the features and seafloor composition detected outside the disposal site boundary were the product of ambient conditions in Rhode Island Sound. Both past and ongoing fishing activity adjacent to RISDS appeared to be the basis for a number of linear trawl scar features that existed in the ambient sediment to the west of RISDS. The depth of the furrows created by the dragging doors of a trawl net and the silty sand comprising the seafloor in this area likely allowed the scars on the seafloor to persist for a substantial length of time after the disturbance and remain detectable in the side-scan sonar record.

The seafloor imagery also confirmed the presence of dredged material outside the disposal site boundaries in the form of continuous narrow, low-relief trails of deposited sediment. Similar disposal trail features were also detected within the confines of RISDS, and it was believed that these deposits were the product of residual dredged material

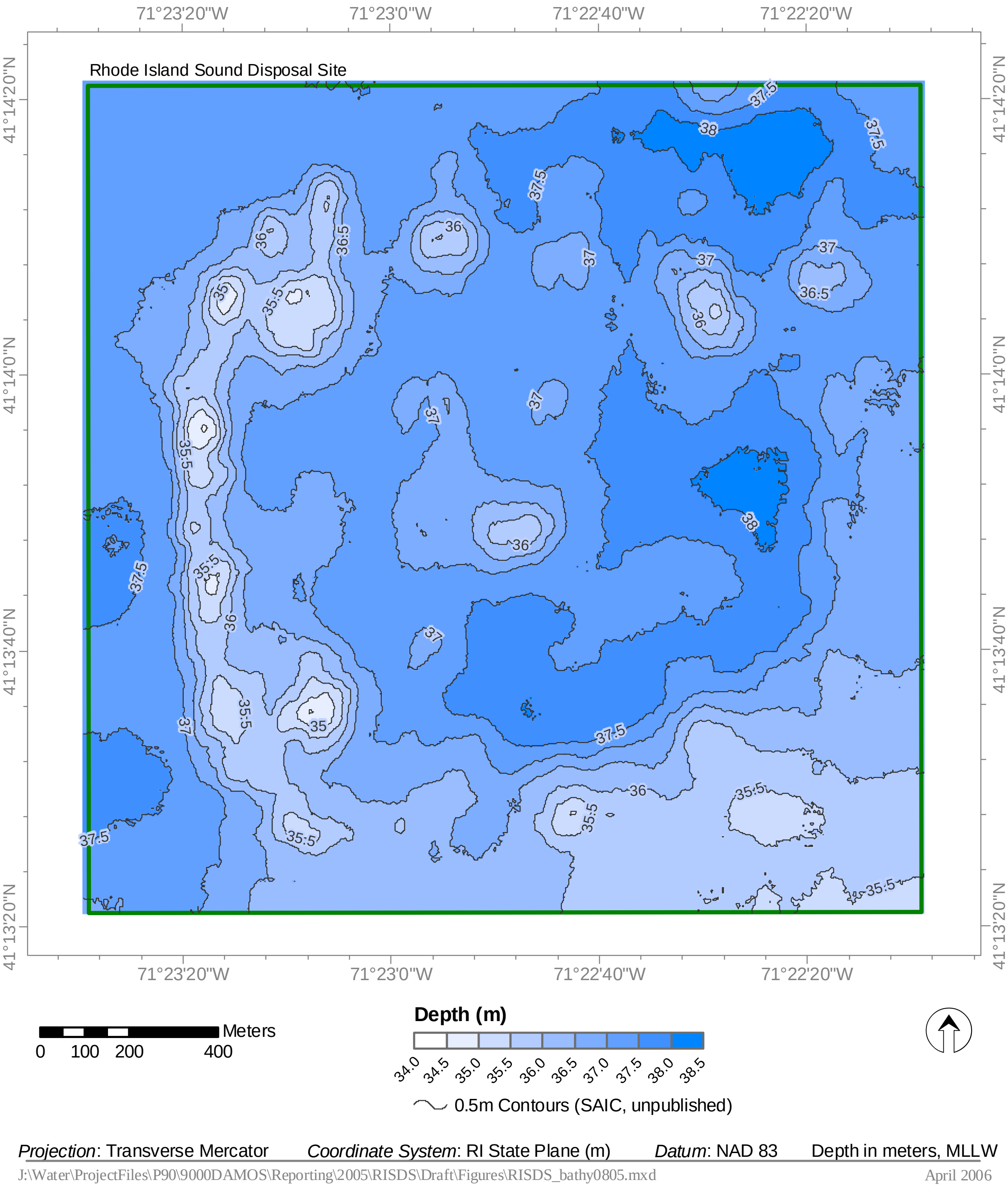


Figure 4-18. Bathymetric contour map of RISDS, August 2005 (Figure from ENSR 2007b).

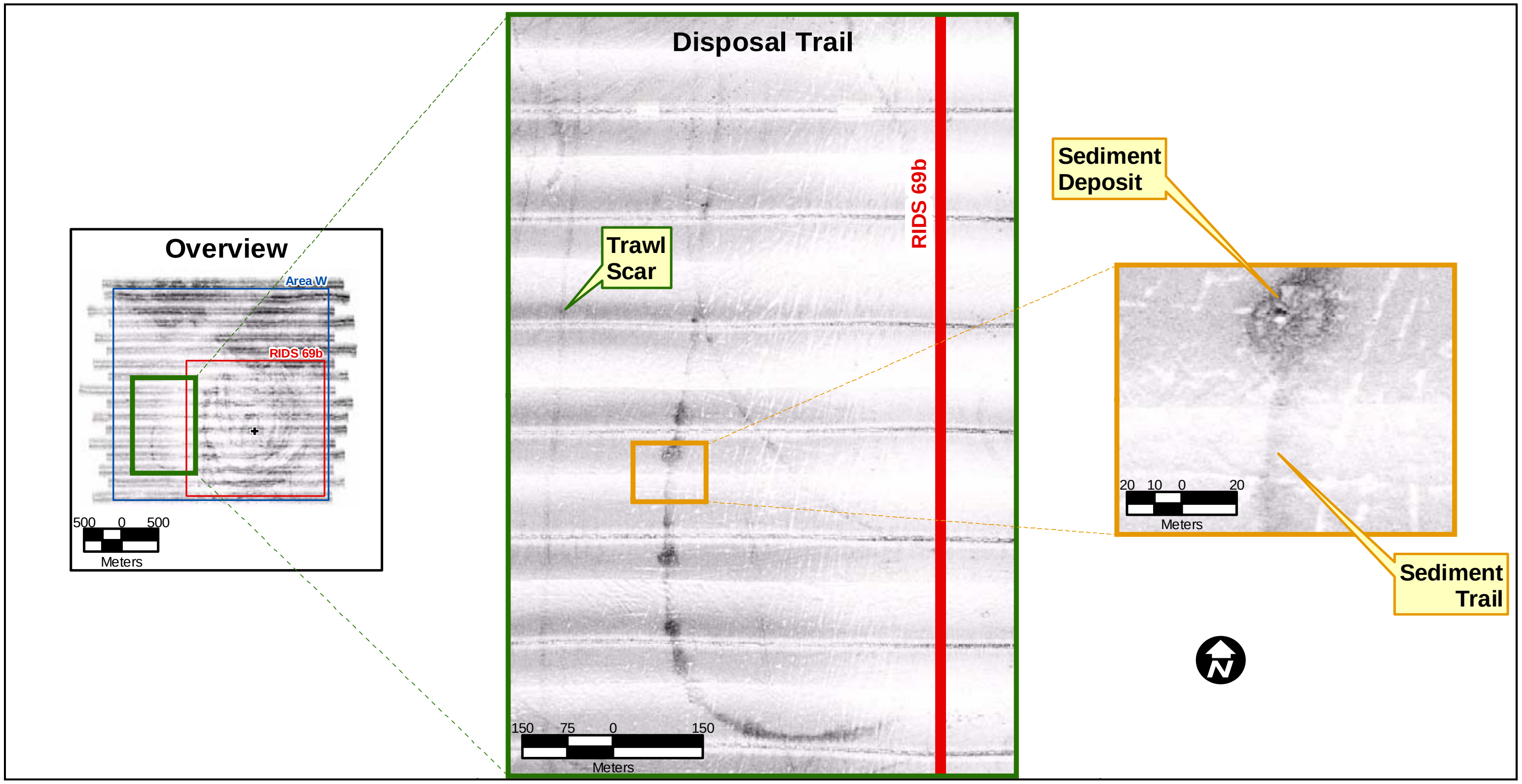


Figure 4-19. Enlarged view of the disposal trail feature detected in the September 2003 side-scan sonar mosaic showing larger, circular sediment deposits (high acoustic return) in between linear sediment trails (faint acoustic return). A trawl scar is also visible near the disposal trail, suggesting the presence of fishing activity (i.e., trawling) in this region (Figure from SAIC 2004).

being washed from open split-hull disposal scows as they left the site following a disposal event. The presence of disposal trails outside the boundary was the result of scows continuing their course after the load was placed at one of the 11 predetermined disposal points established along the western disposal site boundary. The observations in July resulted in an immediate change in disposal practices that required the scows to be fully closed before leaving the site boundaries.

The most prominent disposal trail was found approximately 1500 ft (450 m) outside the disposal site boundary and was approximately 3600 ft (1100 m) in overall length, with widths ranging from 39 to 115 ft (12 to 35 m). The sediment detected in this trail in the October 2003 survey was comprised of a mix of coarser-grained material (sand, gravel, and cobble) and clumps of cohesive clay. Based on its composition and contrast to the ambient sediments, it appeared this disposal trail was a deposit of material removed from the Fox Point Reach of the Providence River during CAD cell construction. Despite the change in surface sediment composition, sediment-profile images over the trail indicated an advanced successional community with deep apparent redox potential discontinuities (RPDs), suggesting that the impacts to the benthic community were nonexistent to minimal or that the resident benthic community readily recovered from the small-scale benthic disturbance.

4.5.4 2005 Benthic Monitoring Survey

An additional benthic survey was performed at RISDS in July 2005, approximately six months following the last disposal event at the site. The survey performed by ENSR, included SPI, plan view imaging, and sediment grab samples for benthic community analysis (ENSR 2007b). Images and grab samples collected within RISDS were primarily focused on the sediments within the artificial containment cell, where the PRHMDP maintenance material was directed. Stations were also occupied within three surrounding reference areas. The survey was designed to assess benthic recolonization following cessation of disposal, and to compare conditions at RISDS to surrounding, ambient conditions.

SPI, plan view images, and sediment grabs at the disposal site confirmed the presence of fine-grained surficial sediment with high water content and low bearing strength, properties characteristic of the maintenance material disposed there. Sediments were very reduced (black in color below the surface oxidized layer); however, there was no evidence of low dissolved oxygen in the overlying water or subsurface methane generation at any of the locations sampled. Apparent RPD depths averaged 1.5 cm across the site, typical of a recently utilized disposal site. Sediments at the reference areas were very fine to fine sands with varying degrees of silt. There was no evidence of dredged material at any of the reference stations, as well as no evidence of low dissolved oxygen or sedimentary methane. Apparent RPD depths were greater at the reference stations, averaging 3.4 cm (ENSR 2007b).

The biological community across RISDS appeared to be recovering relatively rapidly. The images and benthic grabs both indicated that the benthic community was comprised primarily of Stage II organisms such as small filter-feeding sabellid polychaetes; phoronids; bivalve mollusks; and burrowing, omnivorous nephtyid polychaetes. Stage III infauna were also present, although at densities lower than at the reference areas (Figure 4-20, Figure 4-21). Commonly evident in the plan view images from RISDS, as well as the reference areas, were burrow holes and the foraging tracks of crabs and shrimp, two indications of the presence of Stage III infauna (Figure 4-22).

Overall, the infauna on the disposal mounds were represented by fewer species, fewer individuals and lower species diversity compared to the reference areas. However, the rate of recovery of the benthic community six months post-disposal met and even exceeded predictions.

4.5.5 Lobster Surveys

A study of lobster abundance was conducted in 2005 by DAMOSVision to address concerns over the potential effects of dredged material disposal at RISDS on local lobster populations (DAMOSVision 2007). This investigation followed several previous studies of lobster abundance at sites in Rhode Island Sound being considered for dredged material disposal in the PRHMDP EIS process and the designation of RISDS as a long-term regional disposal site. In August, September, and November of 1999, lobster abundance was quantified at Sites 18, 69A, and 69B (Figure 1-4). At the time, each of these three sites was under consideration for selection to receive dredged material for the PRHMDP. Lobster abundance at Site 69B was found to be lower than at Sites 18 and 69A across the three months (Battelle 2000). Subsequently, Site 69B was selected for placement of PRHMDP dredged material. As part of the baseline studies conducted in support of the RISDS designation process, additional surveys of lobster abundance were conducted at the three sites in August and October of 2002 and in the vicinity of Site 69B in August 2003. The objective of the 2005 study was to examine differences in lobster abundance between the three sites, and compare the 2005 results with those from 1999, in order to assess whether the disposal of dredged material at RISDS resulted in significant changes in lobster abundance.

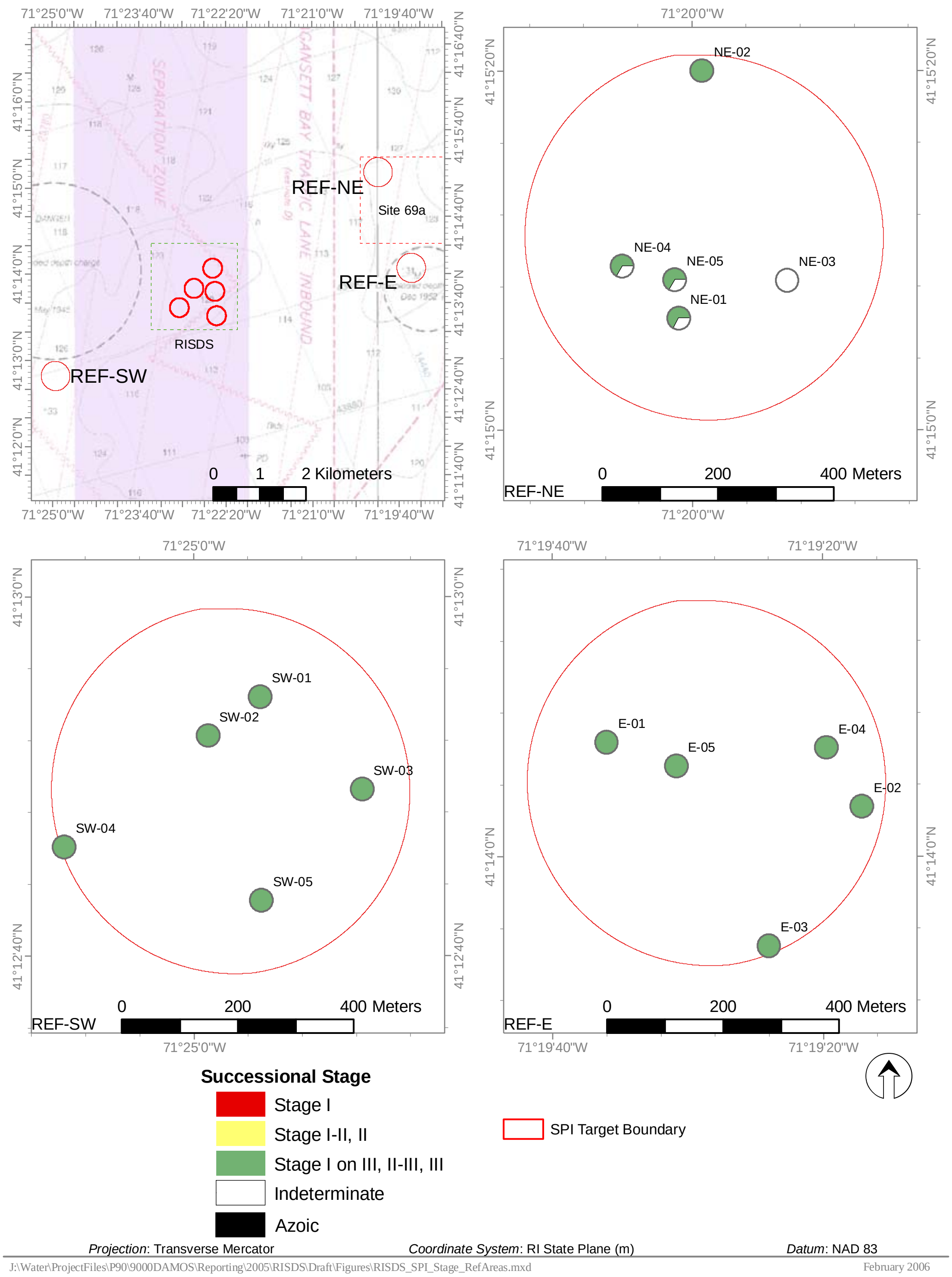


Figure 4-20. The distribution of infaunal successional stages at the RISDS reference areas, July 2005 (Figure from ENSR 2007b)

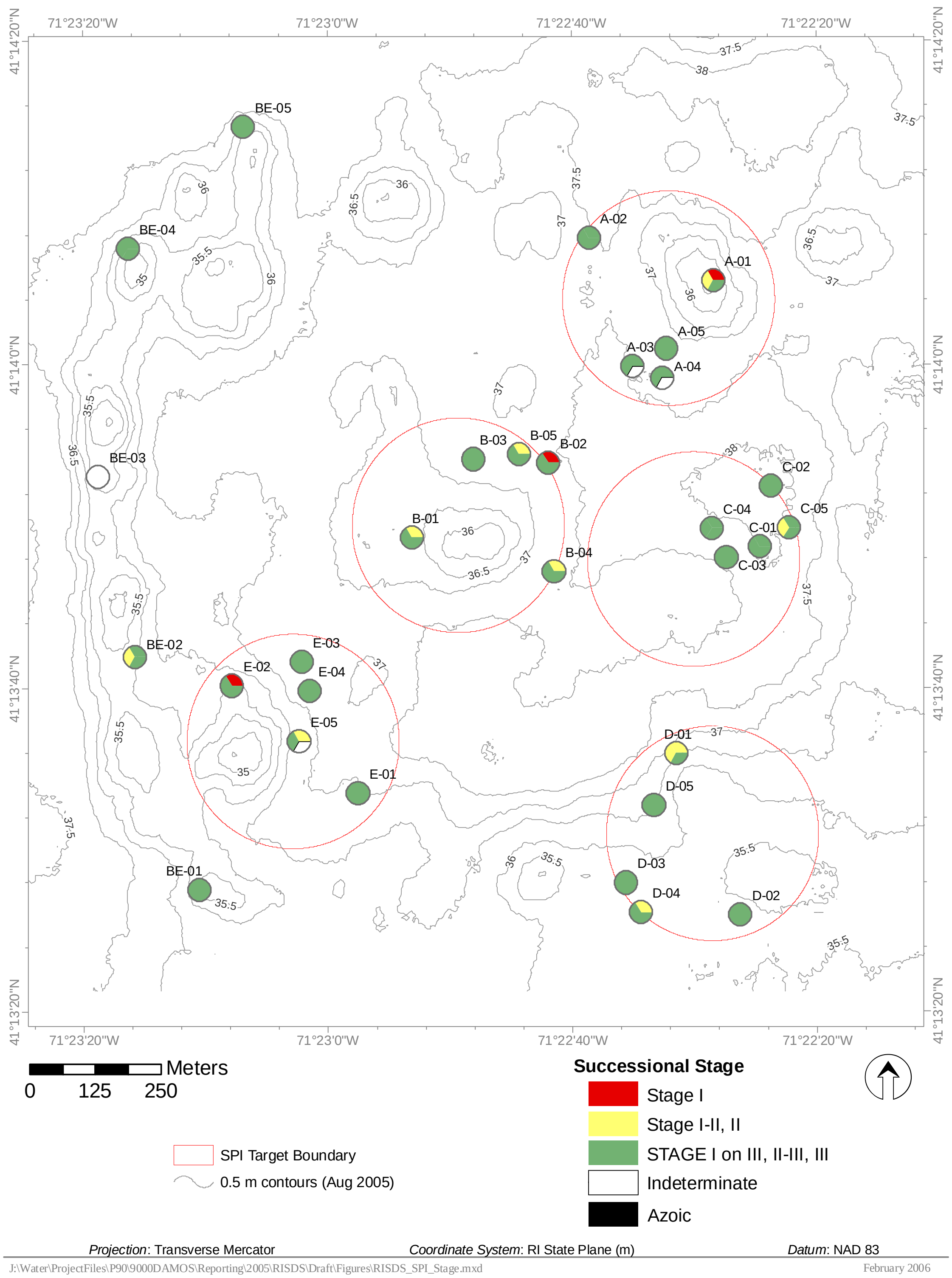


Figure 4-21. The distribution of infaunal successional stages at RISDS, July 2005 (Figure from ENSR 2007b)

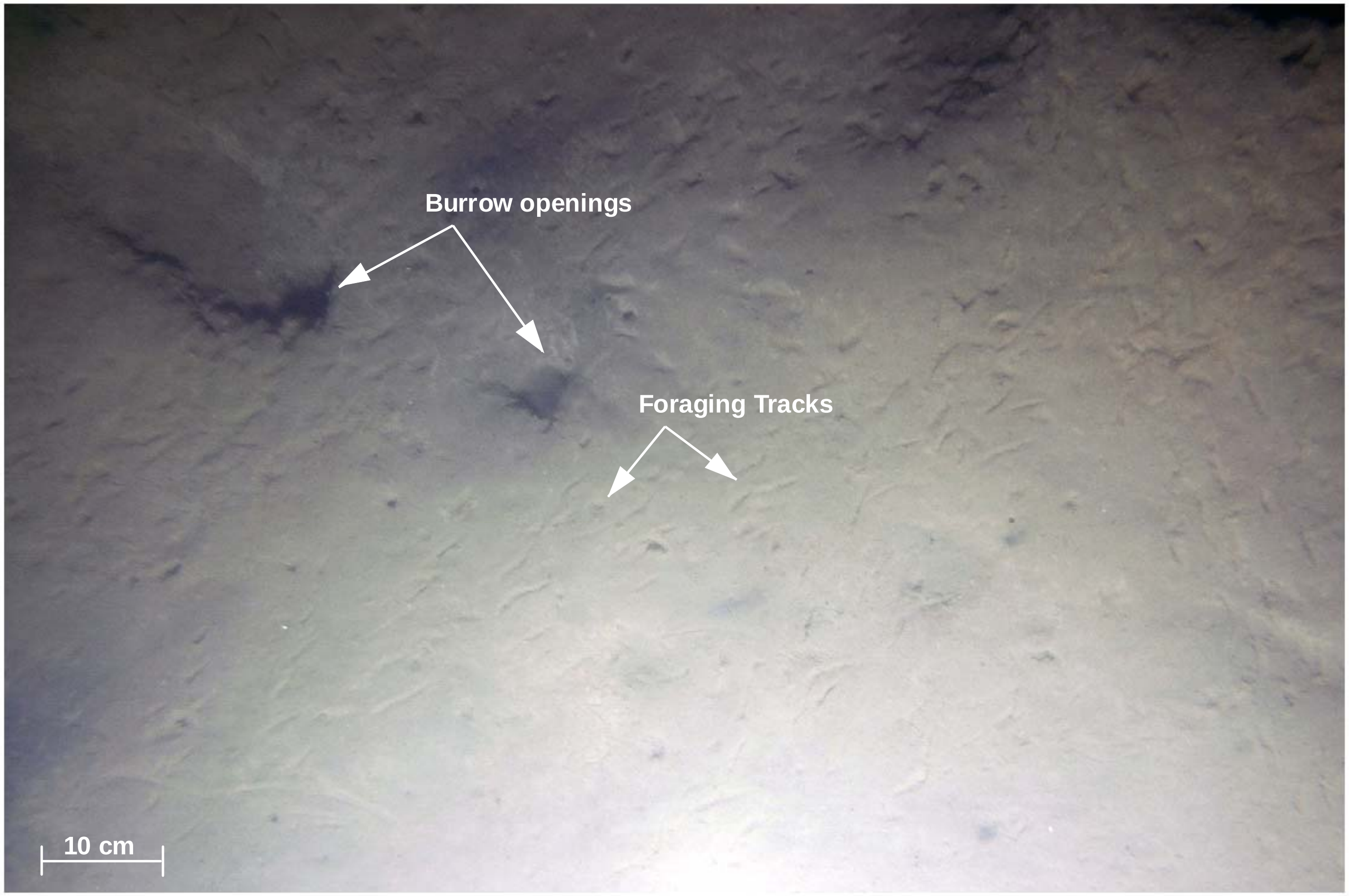


Figure 4-22. Plan view image from Station BE-02 showing the typical surface appearance of a soft, muddy bottom with a few large burrow openings and epifaunal foraging tracks (Figure from ENSR 2007b).

Methods

In August, September, and November 2005, lobster abundance was determined by setting 20 standard commercial lobster traps (1 x 1.5 x 3 ft [30.5 x 45.7 x 91.4 cm]) at each of the three sites (18, 69A, and 69B, Figure 1-4) for three days, pulling the traps, and recording the number, size, sex, and reproductive status, along with the presence of any shell disease of the lobsters collected in each trap. Five traps were strung together to create a trawl line, with a distance of about 118 ft (36 m) between each trap. Four trawl lines of five traps each were deployed in randomly selected depositional areas within each of the three sites, for a total of 20 traps per site in each of the three surveys. Traps were deployed in trawls to more closely mirror the fishing and population survey methods used in Rhode Island Sound, although in the earlier (1999, 2002, and 2003) surveys, traps were deployed individually, and their locations were randomized each month. The escape vents on all traps were covered to ensure the capture of subadult and juvenile lobsters. Traps were baited with skate and herring and deployed over the same 72-hour period at each of the three sites.

The 2005 RISDS trap deployment locations were concentrated in the central and eastern areas of the disposal site, coincident with the former topographic depression where large volumes of dredged material from the PRHMDP were placed (Figure 4-23). Because the 1999 study was conducted before a decision was made on the final configuration of RISDS, some of the trap deployment locations ended up being outside the site boundary that was ultimately selected. For the purpose of comparing the two datasets, the 1999 lobster catch data were limited to those traps that were located in the same general area within the RISDS as the 2005 traps. Therefore, only the data from 10 of the 20 traps deployed in August 1999, eight of the 20 traps deployed in September 1999, and nine of the 20 traps deployed in November 1999 were utilized in calculating summary statistics.

2005 Results

Across all three sites (18, 69A, and 69B [now RISDS]) in 2005, the most lobsters were collected in August (474 lobsters), with slightly fewer captured in September (467), and a markedly lower catch in November (290). Combining the catch data for all three months, the most lobsters were captured at Site 69A (549), followed by Site 18 (373) and RISDS (309). On the basis of individual months/sites, both the total number of lobsters and the average catch per trap were highest at Site 69A, followed by Site 18 and RISDS (Figure 4-24). Within each site, the percentage of lobsters with shell lesions increased steadily from August to November (Figure 4-25).

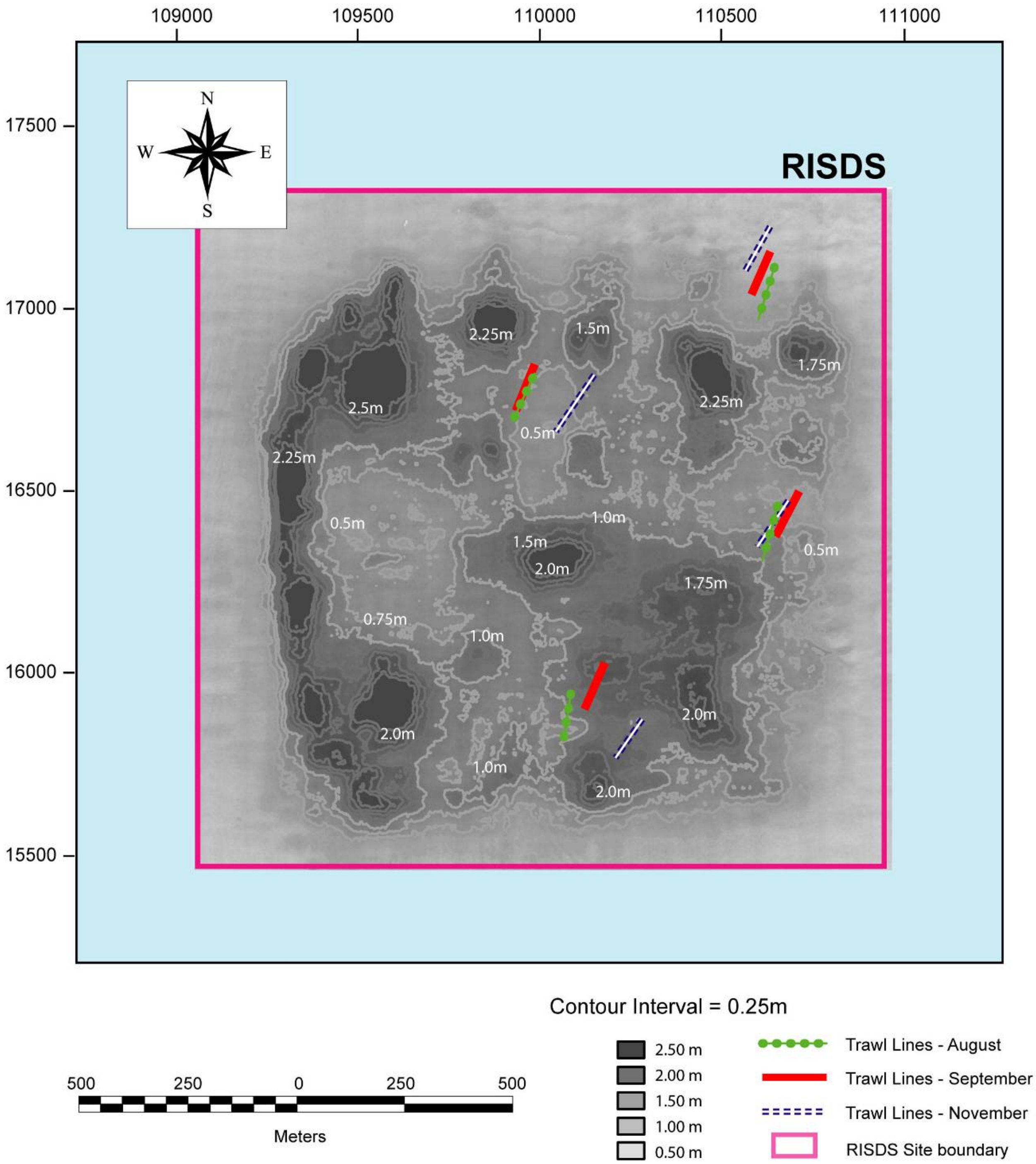
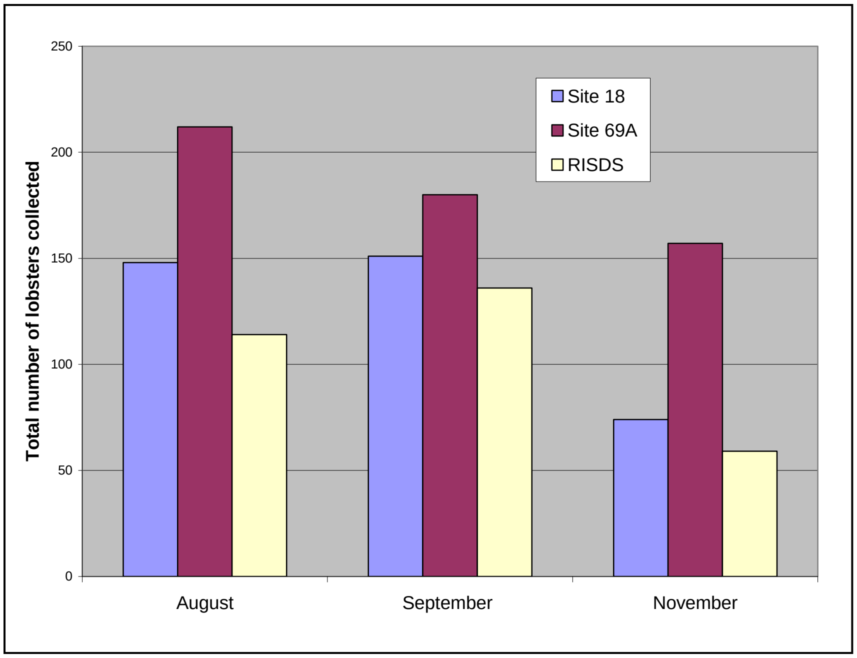


Figure 4-23. August, September, and November 2005 lobster trawl locations at RISDS in relation to the dredged material deposited from the Providence River dredging project. Contour lines depict dredged material thickness, based on the change in depth detected between predisposal and postdisposal bathymetric surveys (Figure from DAMOSVision 2007).



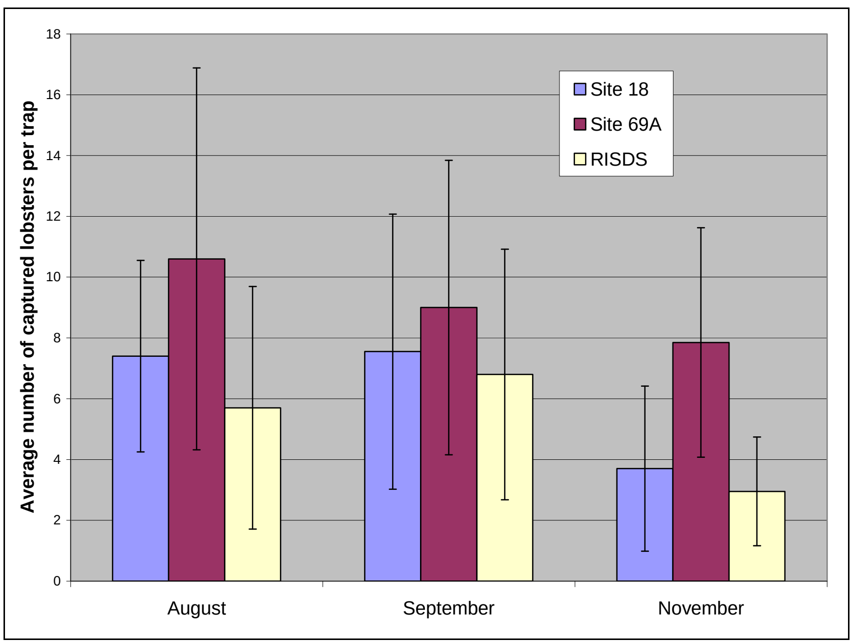


Figure 4-24. Total (top) and average (bottom) number of captured lobsters at each site by month. Error bars in bottom graph are ± 1 standard deviation (Figure from DAMOSVision 2007).

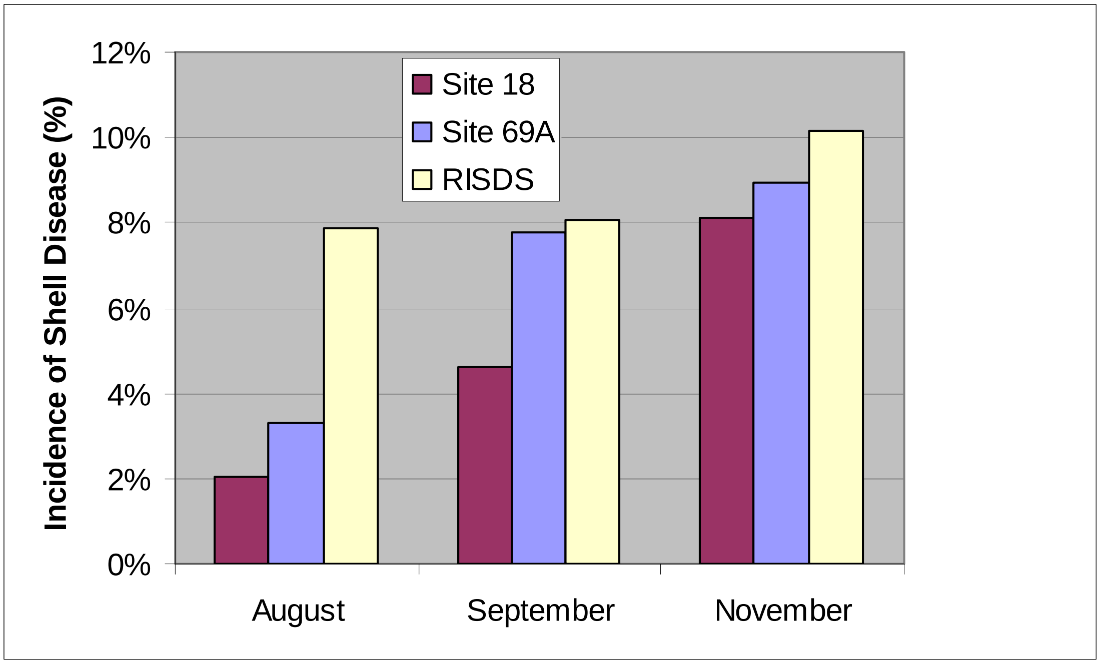


Figure 4-25. Percentage of lobsters with shell lesions or other deformities at each site by month, 2005 (Figure from DAMOSVision 2007)

Comparison of 1999 and 2005 Lobster Results

There was an overall decrease in lobster abundance observed at all three sites in Rhode Island Sound between the 1999 and 2005 sampling events, in terms of both the total catch and the average catch per unit effort (CPUE) (Figure 4-26). This is consistent with a longer term trend of decreasing lobster abundance throughout southern New England waters that began in the mid to late 1990s and has continued through recent years. The decline has been attributed to decreases in newly settled lobster in the early 1990s: new settler abundance trended downward from 1990 to 1995, reached a minimum in 1996, and has remained low in recent years (RIDEM 2004). A marked increase in the intensity and severity of shell disease in southern New England lobsters since 1996 also may have contributed to the reduced catches of recent years (DAMOSVision 2007).

The primary goal of the statistical comparison was to assess whether disposal activities had any significant effect on lobster abundance at the RISDS. The relevant question is whether or not the difference between predisposal (1999) and postdisposal (2005) CPUE at the disposal site was greater than the pre- and postdisposal differences at the other two sites. A greater decrease in average catch at the RISDS compared to the other two sites would indicate a potential disposal impact.

The differences in means between 2005 and 1999 for the average number of lobsters captured per trap (both total catch, and females and males separately) by month and site are displayed in Table 4-9. Most of the values are negative, indicating a decrease between 1999 and 2005 in the average number of lobsters captured at each site in each month. Where there was a decrease in average abundance or size between 1999 and 2005 at all three sites, the magnitude of this decrease was generally less at the RISDS than the average decrease at the other two sites, or d_M is less than 0, according to the following equation.

$$\hat{d}_M = \underbrace{\frac{1}{2}\Big[\underbrace{\left(\overline{X}_{M,18,05} - \overline{X}_{M,18,99}\right)}_{\substack{Post-disposal\ to\ pre-disposal\\ change\ at\ Site\ 18\ in\ Month\ M}} + \underbrace{\left(\overline{X}_{M,69a,05} - \overline{X}_{M,69a,99}\right)}_{\substack{Post-disposal\ to\ pre-disposal\\ change\ at\ Site\ 69a\ in\ Month\ M}}\Big]}_{Average\ change\ for\ non-disposal\ sites\ in\ Month\ M} - \underbrace{\underbrace{\left(\overline{X}_{M,RISDS,05} - \overline{X}_{M,RISDS,99}\right)}_{\substack{Post-disposal\ to\ pre-disposal\\ change\ at\ RISDS\ in\ Month\ M}}}_{Change\ for\ RISDS\ in\ Month\ M}$$

Where the M subscript on the means indicates the month; other subscripts indicate site and year.

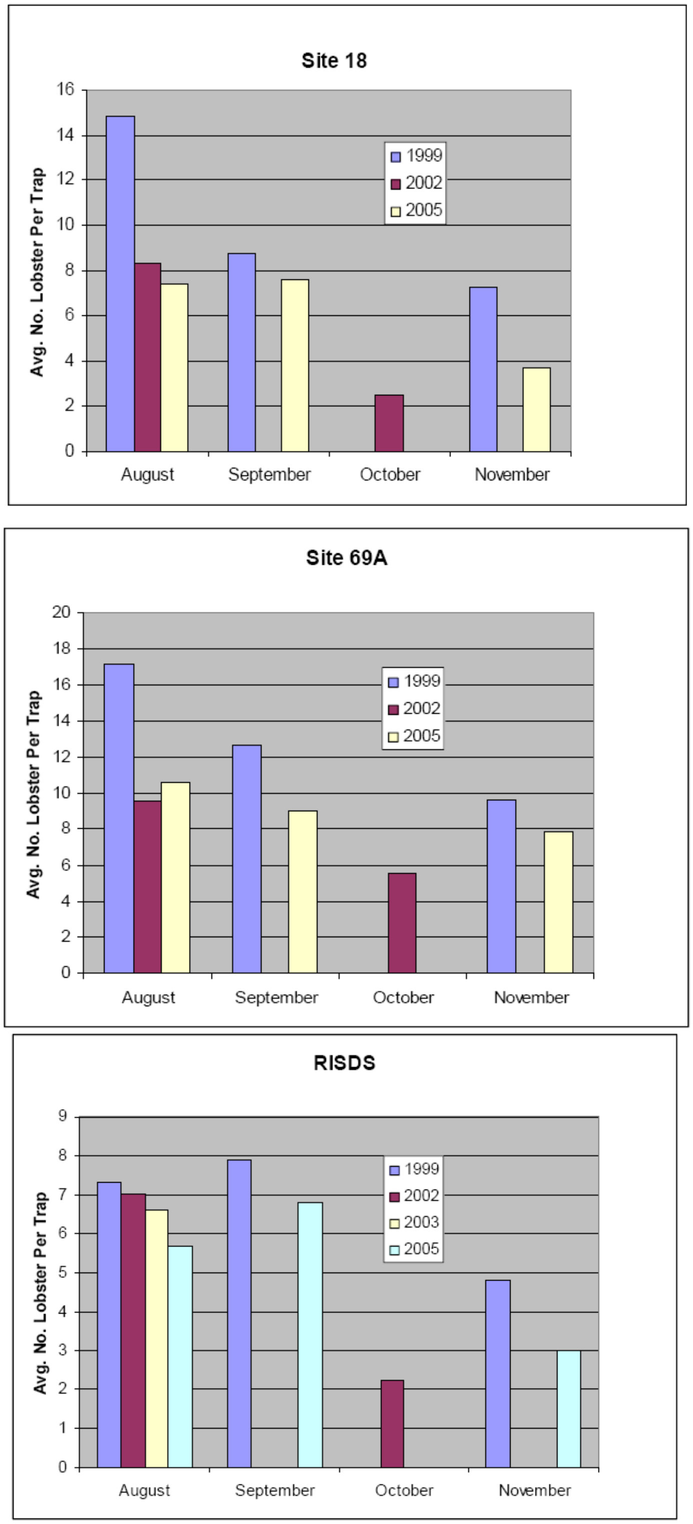


Figure 4-26. Average number of lobsters per trap at each site by month for all years of sampling (Figure from DAMOSVision 2007)

Table 4-9.

Differences in Means Between 2005 and 1999 Surveys by Month and Site for Lobster Abundance (Count) and Size Data

		Differences in Means* (2005 mean minus 1999 mean)			
Month	**Site**	**Total Lobster Count**	**Female Lobster Count**	**Male Lobster Count**	**Average Size**
August	18	-7.5	-5.5	-2.0	-1.2
	69A	-6.6	-3.5	-3.0	3.0
	Average	-7.0	-4.5	-2.5	0.9
	RISDS	-1.6	-2.3	0.7	-0.1
	d_{Aug}	-5.4	-2.2	-3.2	1.0
September	18	-1.3	-1.4	0.2	-0.4
	69A	-3.1	-1.9	-1.3	-0.2
	Average	-2.2	-1.6	-0.6	-0.3
	RISDS	-1.1	-1.8	0.8	0.7
	d_{Sep}	-1.1	0.2	-1.4	-1.0
November	18	-3.6	-2.5	-1.2	6.8
	69A	-1.8	-4.2	2.4	9.7
	Average	-2.7	-3.3	0.6	8.2
	RISDS	-1.8	-2.0	0.1	3.4
	d_{Nov}	-0.9	-1.3	0.5	4.8

* A positive difference indicates an increase over time. Locations for which the RISDS difference is less than the average difference at the other two sites are shaded gray.

Instances where the magnitude of the decrease was greater at RISDS than at the other sites (d_M>0) are shaded in Table 4-9. These differences were generally not statistically significant (p>0.05 in one-tailed ANOVA). The one exception was that the increase in lobster size between November 1999 and November 2005 was significantly less at RISDS than at the other two sites (p<0.05).

Statistical comparisons indicate that between 1999 and 2005, lobster populations at RISDS did not experience any changes that were unusually strong or anomalous compared to the changes observed at Sites 18 and 69A over the same time period. Roughly seven to nine months following the last disposal at RISDS from PRHMDP, the disposal activities did not appear to have caused significant adverse impacts to lobster populations at RISDS compared to nearby areas of Rhode Island Sound.

4.6 Fisheries Protection

Sequencing of dredging operations in the PRHMDP was conducted in large part due to concerns for potential impacts to winter flounder (*Pseudopleuronectes americanus*), particularly from dredging-induced sediment deposition during the sensitive life stages of eggs and larvae adjacent to the channel. Little is known about the effects of dredging on winter flounder egg survival and hatching. In an attempt to provide more information on which to base decisions for future dredging projects, laboratory and field studies were conducted by USEPA's Narragansett Laboratory and University of Rhode Island Graduate School of Oceanography in association with PRHMDP.

A field study conducted during dredging operations in 2003 and 2004 found no significant difference in egg survival between dredging and background conditions. Newly spawned flounder eggs were placed in weighted arrays holding 9 chambers with 100 winter flounder eggs per chamber. One array was placed adjacent to the dredging operation, and one was placed at a control location. Divers retrieved the arrays at hatch time. Numbers of eggs and larvae, amount of sediment settled in the chambers, and size of larvae were compared. Significantly more sediment was deposited in the chambers of the array adjacent to the dredging compared to the background location (3.59 vs. 0.69 g dry weight). No statistical difference was found in the numbers of live eggs and larvae between the dredging and background arrays.

In a series of three laboratory experiments conducted in winter of 2004 and 2005, recently spawned eggs (3 to 5 days after fertilization) were exposed to clean, fine-grained sediment until hatch. Sediment deposition depths ranged from a dusting (<0.5 mm) up to 9.3 mm (>10 egg diameters), and also included a control (no sediment). There was a trend of decreased hatch success and increased time to hatch with increasing depth of sediment deposition (Figure 4-27). Percent total hatch of eggs exposed to <1.0 mm sediment was generally not statistically different from that of the controls. Percent total hatch was highly variable in eggs exposed to approximately 3 mm of sediment, while there was little or no hatch in eggs exposed to >3 mm of sediment. Delayed hatch date (compared to controls) was observed in eggs exposed to as little as 1 mm of sediment (Results from first of three experiments are presented in Figure 4-27).

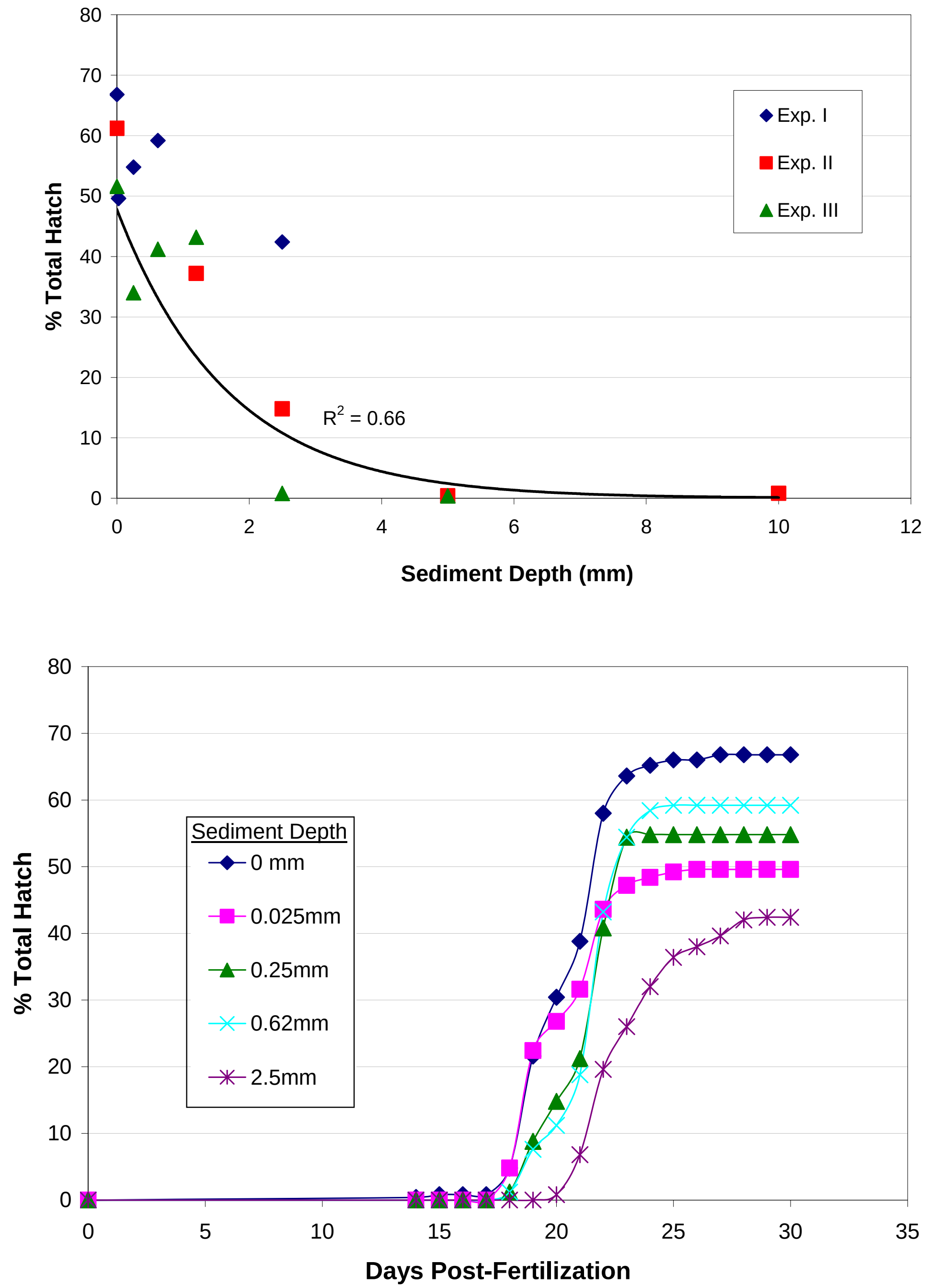


Figure 4-27. Percent total hatch of winter flounder eggs from all three experiments (I-III) (top), and length of time to hatch (bottom) at various sediment exposure depths from Experiment I (Figure courtesy of Walter Berry)

5.0 DISCUSSION

The PRHMDP was performed with no violations of State Water Quality Criteria and no observed significant impact to the marine environment. The project was also completed within the scheduled time and budget. Predictive modeling was performed as part of the EIS to gauge potential impacts, and extensive monitoring was performed during implementation of the project. This section provides a comparison of the predictive modeling with the field measurements as well as discussion of other relevant aspects of the project.

5.1 Dredging

5.1.1 General Performance

The dredging for CAD cell construction and the maintenance dredging of channels that were part of the PRHMDP were performed according to plans and met the needs and expectations of the project. The sequencing, while causing some scheduling difficulties for the dredging contractor, allowed the dredging to continue in an efficient manner with nearly all of the dredging performed within the preferred sequence periods, minimizing environmental impacts.

Sediment plumes observed during maintenance dredging consisted of relatively narrow bands of elevated suspended sediment concentrations that decayed rapidly with increasing distance from the dredging operation. TSS concentrations as high as 1000 $mg \cdot l^{-1}$ were found in the near field adjacent to the dredge. Once at steady state, the suspended solids plumes extended vertically throughout the water column adjacent to the dredge, but the surface component dissipated within 500 ft [150 m] of the dredging. Moving down-current, the highest TSS concentrations were found in a central core less than 160 ft (50 m) wide within the bottom 7 to 10 ft (2 to 3 m) of the water column. The plumes were generally detectable against background conditions to a width of 500 ft (150 m) and to a maximum distance of 3000 ft (1 km) from the dredging.

Sediment plumes generated by the dredging associated with CAD cell construction also dissipated rapidly, resulting in the bulk of re-suspended sediments settling inside the CAD cell. Maximum observed TSS concentrations exceeded ambient conditions by as much as 250 $mg \cdot l^{-1}$ in the near-field (<330 ft [100 m]). These occurrences were largely limited to depths greater than the natural channel bottom within the CAD cell itself. Plumes were detectable within 1600 ft (0.5 km) of the dredging operation. These plumes traveled less distance than the maintenance dredging plumes, due in part to slower flood and ebb currents during the CAD cell construction surveys and also attributed to the coarser nature of the native material being dredged.

5.1.2 Comparison with Model Predictions

Numerical models were developed in support of the EIS to predict potential water column impacts resulting from sediment resuspension during dredging and disposal operations. A variety of numerical models were applied, ranging from steady state, localized models to time varying large-scale models. The models either predicted or applied current patterns representative of those expected in the vicinity of the dredging and disposal operations, and predicted water column TSS resulting from the simulated dredging and disposal operations. Typically, conservative assumptions (e.g., regarding loading rate or dredge operation duration) were applied to develop a likely worst-case prediction of potential impact. The model predictions were used during the EIS process to select alternatives and to evaluate potential impacts. During the dredging operations, two monitoring programs were performed focused on the project dredging (see Section 4). This monitoring provided an opportunity for a comparison of model predictions developed prior to project implementation with observations collected during the dredging as discussed below. Comparison of model predictions and observations can serve to refine model applications for future dredging and disposal operations.

Appendix L of the FEIS (USACE 2001) presented the results of the modeling study that was performed to predict the extent and duration of sediment plumes resulting from dredging within the Federal Navigation Channel. A hydrodynamic model (WQMAP) was applied to generate representative current patterns in Providence River and upper Narragansett Bay. These currents were used as input to SSFATE, a suspended sediment fate and transport model, to predict TSS throughout the water column resulting from dredged material released within the channel. Predictions of dredged material released at three locations (Fox Point Reach, Bullock Point Reach, and Rumstick Neck Reach) were developed for a range of release rates, selected to represent different types of buckets and barge filling processes. The release rates ranged from 1.5 to 4% of the total dredged material removed.

Model predictions indicated that TSS concentrations were highest in Fox Point Reach. The model predicted the highest TSS concentrations at depth in the water column, with TSS concentrations decreasing quickly with distance from the simulated dredging operation (Table 5-1). Maximum TSS concentrations predicted at the location of the simulated dredging operation ranged from 22 to 150 $mg \cdot l^{-1}$, depending on release rate and release location. The model predicted TSS concentrations decreased by 50% within 150 m, and by 66% within 300 m of the simulation dredging operation.

Table 5-1.

Maximum Predicted TSS Concentration during Maintenance Dredging for All Release Rates

	Fox Point Reach		Bullock Point Reach		Rumstick Neck Reach	
Location	**Maximum TSS ($mg \cdot l^{-1}$)**	**Depth of Maximum TSS (m)**	**Maximum TSS ($mg \cdot l^{-1}$)**	**Depth of Maximum TSS (m)**	**Maximum TSS ($mg \cdot l^{-1}$)**	**Depth of Maximum TSS (m)**
300 m up-river	16-39	9	5-14	7	15-41	9
150 m up-river	22-59	9	13-35	9	19-51	9
Source	54-150	11	27-53	7	22-60	9
150 m down-river	14-35	5-7	9-18	9	13-35	7
300 m down-river	12-30	1	8-15	9	8-21	9

The model predictions of TSS, when scaled to the actual release rate of the dredging operations, were within the envelope of the observed water column TSS concentrations. Observed concentrations in the immediate vicinity of the dredging operations were on the same order of those predicted by the scaled SSFATE model (see below), whereas the footprint of the observed plumes was smaller than predicted. The plumes were only observed in the deepest portion of the channel, and did not spread to the shallower areas adjacent to the channel as predicted. The down-current extent of the observed plume was also generally less than that predicted by the model.

To assess the utility of the model approach used in the FEIS, the model-predicted TSS was compared with the observed TSS and turbidity for maintenance dredging activities. In order to compare the results, the observed turbidity data were transformed to TSS and the model results scaled to the actual dredging activities recorded during the project.

Monitoring activities of channel maintenance dredging included ADCP, turbidity and TSS data collection. Grab samples of TSS were used to convert ADCP backscatter and turbidity measurements to TSS (Land et al. 2007). Based on these data, a correlation between TSS and turbidity was developed. The observed data presented in the report as turbidity (Table 4-3), were converted to TSS based on this correlation. The conversion from turbidity to TSS allowed for direct comparison of the observed and the modeled data.

In order to compare modeled and observed data, it was first necessary to compare dredging operations and conditions (simulated or actual) to ensure that the two sets of data were comparable. The comparison focused on model and observed data from Bullock Reach, as this is the only location for which both data were available (Table 5-2). This comparison indicated that some of the assumptions applied in the modeling were different than actual operations. The modeled production rate was based on an estimated rate specified by the USACE New England District, while the actual production rate, calculated from field observations, was much higher. Similarly, a range of release rates were assumed for the model, assumed to be representative of different bucket types and operation protocols, while the observed release rate derived from a regression analysis of the TSS data indicated a higher release rate.

The modeled sediment release rates were 9 to 24 times lower than the release rate derived from the regression analysis of the observed data. However, analysis of the model results indicated that the predicted TSS concentration approximately scaled linearly with release rate (FEIS, App L of App D). Therefore, to compare the observed with the

Table 5-2.

Observed and Modeled Conditions for TSS data

Parameter	**Observed**	**Modeled**
Production Rate (m^3/hr)	1700	245
Release rate (kg/s)	12.7	0.53 - 1.42
Particle size - % clay and silt	90	90

modeled values, the model results were scaled so that the release rates were equivalent (by multiplying the predicted values for the highest release rate by a factor of 9).

The modeled and predicted TSS concentrations resulting from channel dredging in Bullock Reach were very comparable (Table 5-3). Model results included only the maximum predicted TSS in the water column at 150 m and 300 m from the dredge (along with the water depth at which the maximum was predicted). Only observed data conducive to the most direct comparison were presented (i.e., the observed data at a water depth of 2 m was not presented, as the TSS was observed to vary significantly through the water column).

Once the modeled results were adjusted such that the modeled and estimated observed source strength were the same, the model predictions of TSS were well matched to observed values (Figure 5-1). Because of the underestimate of the source strength, the model predictions of TSS in the water column in the vicinity of the operation presented in the FEIS were lower than the observed values. This comparison of predicted and observed TSS resulting from dredging operations demonstrates the importance of accurate estimates of source strength in the prediction of TSS plumes.

5.1.3 Biological Impacts

The primary biological concern for the dredging area that was identified in the EIS was impacts to flounder egg hatching success. The dredging sequencing was orchestrated to avoid dredging and disposal in areas where and at times when eggs and larvae were thought to be plentiful. Thus, it is expected that this biological resource was not negatively impacted by the PRHMDP. However, because impacts of dredging and disposal on flounder egg hatching success are poorly understood, laboratory and field studies were conducted, largely to provide information on which to base future decisions about dredging sequencing on projects with similar biological concerns. The laboratory experiments conducted by Berry et al. (2004) demonstrated the potential for impacts to hatching success of winter flounder (*Pseudopleuronectes americanus*) eggs following exposure to fine-grained sediments. The monitoring results of suspended solids generated by the dredging indicated that the dredged material footprint was less than predicted, as discussed above, reducing the potential for depositional impacts. However, the amount of sediment deposition resulting from the dredging operations on a time scale that may impact hatching is poorly understood, thus limiting the ability to extrapolate the results of the laboratory studies to the PRHMDP. In order to better apply the laboratory results, modeling or monitoring of such deposition may be useful for future projects with similar fisheries concerns.

Table 5-3.

Comparison of Observed and Predicted TSS Concentration Following Maintenance Dredging

Observed			**Predicted**			
Distance to Dredge (m)	**Depth (m)**	**Max observed TSS (mg/L)**	**Distance to Dredge (m)**	**Depth (m)**	**Max Predicted TSS (mg/L)**	**Scaled Max Predicted TSS (mg/L)**
134	6	346				
			150	9	35	315
201	6	167				
			300	7	14	126
			300	9	15	135
351	6	126				

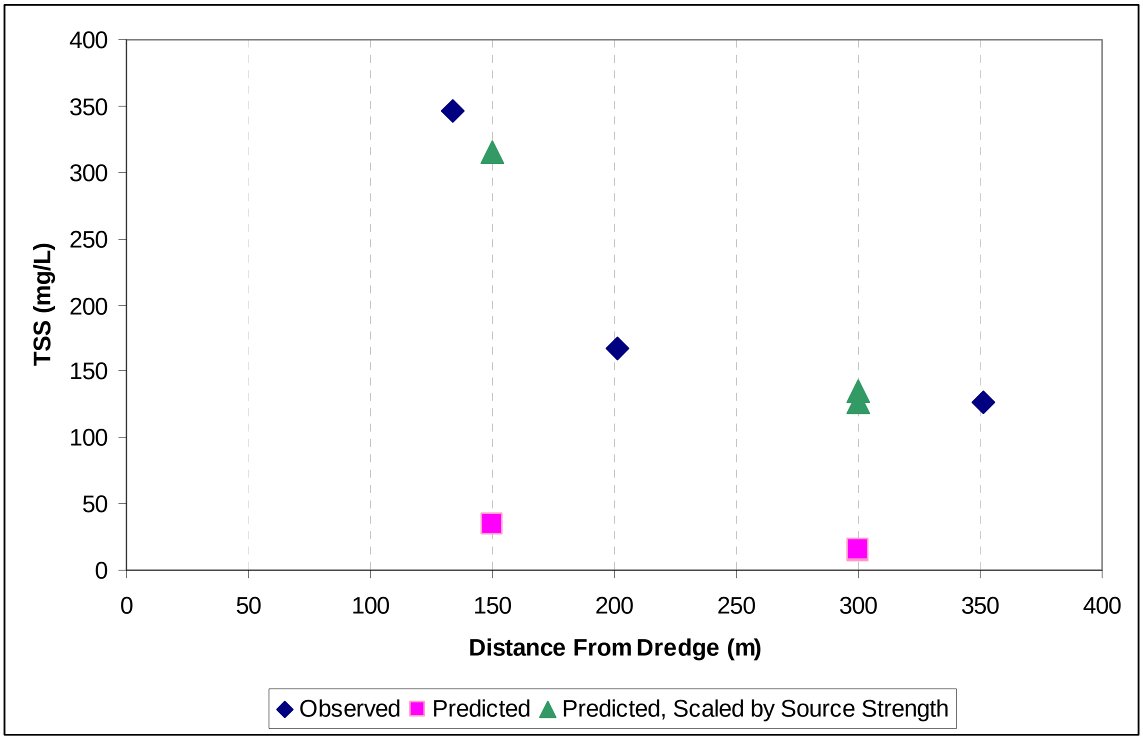


Figure 5-1. Modeled and observed TSS during maintenance dredging operations

In a related field study, winter flounder eggs deployed adjacent to dredging operations did not display any hatching impacts relative to eggs deployed at a background location (Klein-MacPhee et al. 2004). The limited potential for impacts indicated by the water column and biological monitoring, coupled with the sequencing of dredging operations around active winter flounder spawning periods, support a conclusion that impacts to this species were effectively minimized.

5.2 Disposal into CAD Cells

5.2.1 General Performance

Dredged material unsuitable for open water disposal was placed into the CAD cells constructed within the Providence River Federal Navigation Channel. The CAD cells proved to be stable structures, providing sufficient space for the placement of dredged material unsuitable for open water disposal. The size, depth, and side slopes of the cells allowed for successful disposal, with no apparent transport of material out of the cells during or following placement.

Eleven separate monitoring surveys were performed to track suspended solids plume formation and transport related to the disposal as specified in the Water Quality Certification for the project. The plumes were generally not discernable by real-time measurements of acoustic or optical backscatter at the Water Quality Certification specified compliance point 1500 ft (460 m) down-current of the disposal (i.e., the outer boundary of the mixing zone), and TSS concentrations generally fell to within a factor of two above background levels at this distance down-current. Thus, similar to suspended solids plumes generated by dredging, plumes from disposal into the CAD cells were generally limited to the near-field (i.e., less than 1500 ft). However, unlike the dredging plumes, those related to the disposal were transient, given the single pulse input of suspended solids during disposal.

Given the low intensity of the disposal plumes, the suspended solids were not likely to have negatively impacted resident biota beyond the immediate vicinity of the disposal. Analysis of water samples collected in each of the 11 surveys for dissolved silver and copper at the 1500-ft (460 m) down-current location did not identify any disposal related increases in concentration of these parameters. Further, sampling for toxicity testing (performed during four of the surveys) did not identify water column impacts at the 1500-ft (460 m) down-current location. Dissolved oxygen measurements performed during each survey as well as during two dedicated surveys during neap tide periods with lower levels of tidal flushing did not identify any disposal related impacts. Taken together, the real-time and analytical measurements demonstrated that the disposal operations did not result in significant negative environmental impacts for the measured parameters outside of the near-field mixing zone.

5.2.2 Comparison with Model Predictions

A numerical model was applied to predict the depositional footprint and resulting suspended sediment concentrations in the water column resulting from disposal of dredged material into the CAD cells (FEIS, Appendix L and Appendix P). STFATE (Short Term Fate) is a numerical model developed to simulate the dynamics of dredged material disposal plumes resulting from disposal from a split-hull barge in open water. STFATE has evolved in a collaborative effort over the past 25 years as field data have become available for model calibration. It was initially developed by Brandsma and Divorky (1976) based on work by Koh and Chang (1973), and took its present form in the release developed by Johnson et al. (1994). It predicts release dynamics and physical mixing and contaminant dilution during the first few hours after the release of dredged material into the water column based on what is known about 1) the disposal operation, 2) the ambient physical conditions at the release site, and 3) the physical characteristics of the dredged material.

STFATE is intended for simulations of dredged material disposal in open water. Disposal within a confined navigation channel, as was the case in the PRHMDP, represents a departure from the intended application of the model. This departure was expected to result in higher estimates of suspended sediment plume concentrations as compared to the actual plume that would be observed during disposal operations. This is because during open water disposal, dispersion of a plume is primarily driven by the ambient turbulence. In confined channels the ambient turbulence is significantly higher than in open water because of greater longitudinal dispersion, caused by lateral gradients in velocity. The ambient turbulence and the resulting plume dilution in a confined channel can be expected to be orders of magnitude higher than in open water or as estimated by STFATE, other things (e.g., currents) being equal. The STFATE model estimates of the spatial extent of the plume, as opposed to the suspended sediment concentrations, will be only modestly affected by this assumption of open water flow since currents transport the plume at velocities that are orders of magnitude higher still than ambient turbulence (FEIS, Appendix L).

The STFATE model simulations were performed on a 50-ft (15 m) resolution grid centered on the disposal site. A worst-case velocity profile was selected to simulate spring tide currents that would result in the maximum expected extent of plume transport. Density stratification was determined from temperature and salinity data collected during September and October 1999. The dredged material model parameters were determined from analysis of sediment samples that were collected along the length of the navigation channel to be dredged. A series of STFATE simulations were run to predict TSS for various sediment types and for various barge volumes.

STFATE modeling predicted TSS in areas adjacent to the convective descent sediment column to be as high as 1000 $mg \cdot l^{-1}$ immediately after release. Concentrations were predicted to decline to 30 $mg \cdot l^{-1}$ above background one hour after release. Over the next 4 hours, concentrations were predicted to decline from 30 $mg \cdot l^{-1}$ to 2 $mg \cdot l^{-1}$ above background. The results for two model runs with the likely range of sediment physical characteristics (60 and 80% clumps, respectively, and 30% free water for both) for time periods of 1 to 4 hours after release are presented in Table 5-4 and Figure 5-2. These STFATE estimated concentrations assume that no dredging-induced plume was present in the reach at the time of disposal.

When compared with observed data, the STFATE model results over predicted water column TSS concentrations from disposal into the CAD cells. The model predicted a discrete plume one hour following disposal with central concentrations of 50-100 $mg \cdot l^{-1}$ with concentrations returning to near background approximately three hours following disposal (Figure 5-3, lower left panels). ADCP acoustic backscatter data for a representative sampling event on July 11, 2003 revealed a distinct signature just down-current of the disposal cell shortly after the disposal event, but by one hour following the disposal, the acoustic signal had diminished and remained in the same location (Figure 5-3, right panel). By 1.5 hours following disposal, the acoustic signal diminished further with limited movement down-current. Although the predicted TSS concentrations (left panel, Figure 5-3) are in $mg \cdot l^{-1}$ and cannot be directly compared with the observed backscatter (dB) (right panel, Figure 5-3), samples collected during this and the other surveys indicate that TSS concentrations were approaching background levels by one hour after disposal, with only remnants of a discernable plume.

Reductions in dissolved oxygen concentrations resulting from disposal were predicted using two methods described by ERDC (1989) (USACE 2001). In the EIS, these estimates were applied to open water disposal but are compared to CAD cell disposal here for illustrative purposes. The first method uses the relationship between biological oxygen demand (BOD) and volatile solids concentrations to estimate reduction in dissolved oxygen. The second approach assumes that oxygen is a short-term phenomenon related to the chemical reaction of the most frequently encountered, readily oxidizable chemical compounds found in most marine and estuarine sediments (*i.e.*, ferrous iron and free sulfides). For the BOD method, BOD data from Haverstraw Bay on the Hudson River were used and were expected to be very conservative. Suspended solids concentration and residence time used in the calculation were conservative

Table 5-4.

Maximum Predicted TSS Concentration for 6000 cy Release in CAD Cells

	TSS ($mg \cdot l^{-1}$)	
Time (hr)	**60% clumps, 30% free water**	**80% clumps, 30% free water**
1	30	21
2	7	5
3	4	2
4	2	2

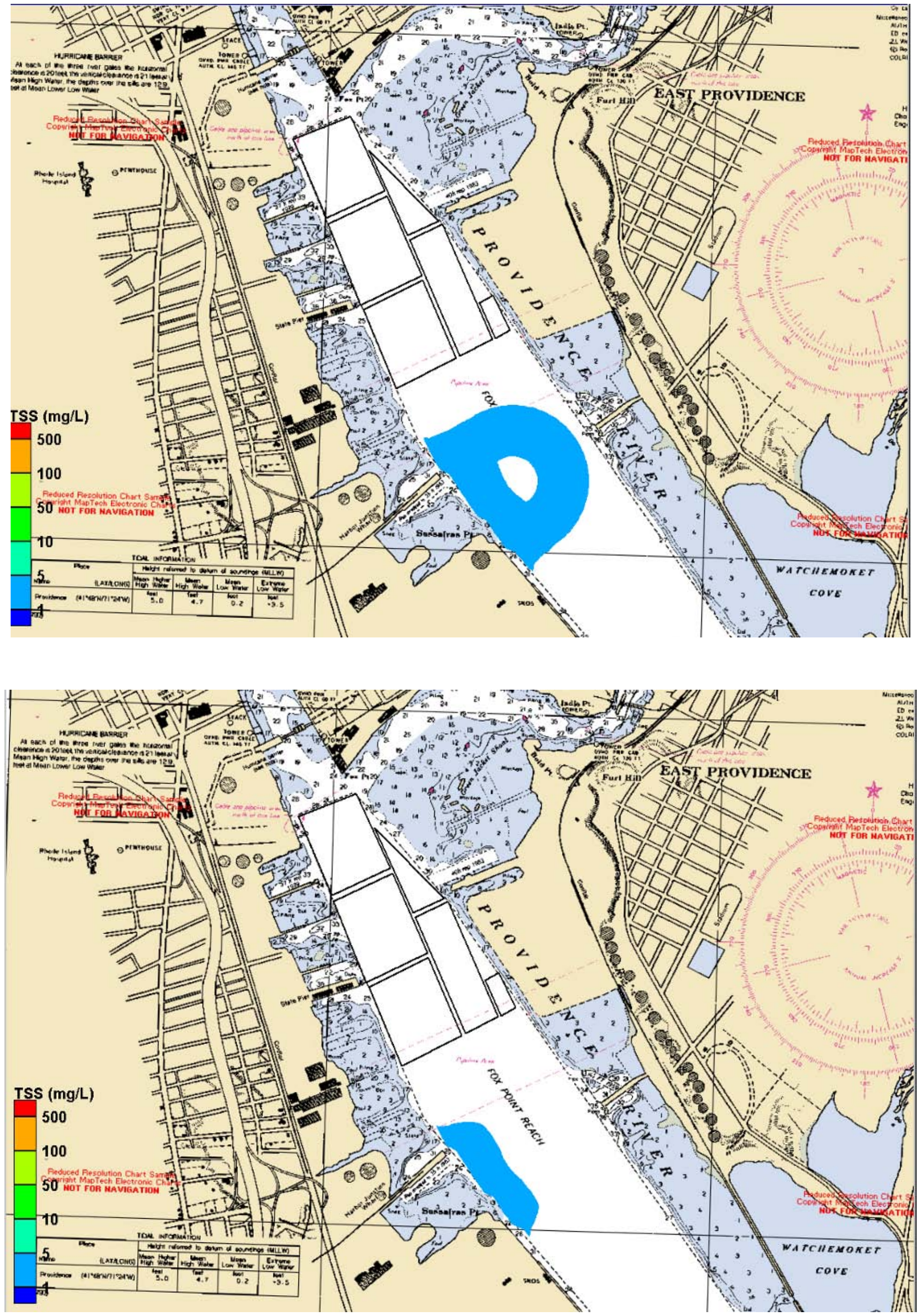


Figure 5-2. Predicted distribution of TSS concentration for 6000 cy release, four hours after release (60% clumps and 30% free water [upper] and 80% clumps and 30% free water [lower]). CAD cell footprint shown is an earlier plan (Figure from USACE 2001).

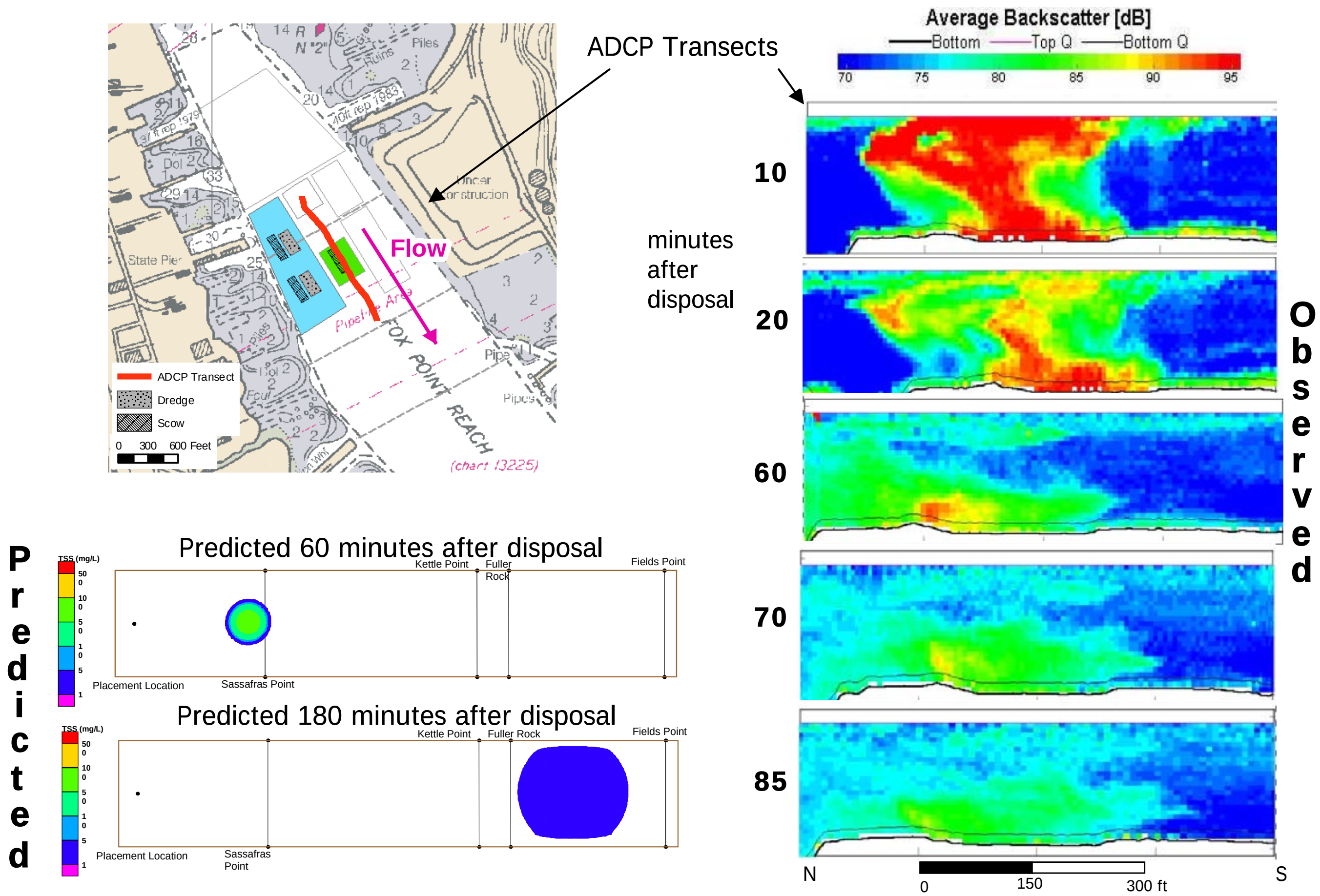


Figure 5-3. Comparison of predicted and observed TSS following disposal into a CAD cell. Map (upper left) shows location of ADCP transects. Model predictions (lower left) extend to Fields Point (approximately 8500 ft) and observed backscatter (right) extend approximately 700 ft from disposal location (Figure of model predictions from USACE 2001, App. P).

estimates from the STFATE modeling for open water disposal. For the second approach, ferrous iron and free sulfides data from an adjoining embayment (O'Sullivan et al. 1997) were used. The first approach yielded the largest reduction in dissolved oxygen: a 0.4 $mg \cdot l^{-1}$ reduction for a 4000 cy barge and a 0.6 $mg \cdot l^{-1}$ reduction for a 6000 cy barge. These reductions are small relative to the absolute values measured during the CAD cell disposal monitoring events (6 to 7 $mg \cdot l^{-1}$ near the surface to 3.5 to 4.5 $mg \cdot l^{-1}$ near the bottom of the water column for the September 17 and 18 events). Nonetheless, as anticipated, the predicted reductions were conservative relative to observed, since no change in DO following disposal was detected.

5.2.3 Adaptive Approach to Monitoring

The disposal monitoring defined in the Water Quality Certification was extensive in both the scope of individual efforts as well as the number of required monitoring events. Given the thoroughness of the monitoring and short turnaround for completion of summary data reports, it was evident after several monitoring events that the predictive modeling was conservative, providing over-estimates of potential water column impacts under the specified disposal conditions. The monitoring program could have benefited from an adaptive approach rather than that stipulated in the Water Quality Certification. Such an approach could have assigned technical review of the data to an independent group charged with recommending modifications to the monitoring program. This adaptive approach could have reduced the overall cost of monitoring and/or allowed for re-evaluation of how to best use the monitoring resources. For example, as it became apparent that there was limited far-field transport of suspended solids following disposal into the CAD cells and that compliance with water quality standards was not an issue, the subsequent required monitoring could have been refocused to investigate plume dynamics in the near-field area. Such supplemental data could be helpful for refining modeling input parameters for future projects.

5.3 Disposal at RISDS

5.3.1 General Performance

The selection of RISDS as an open water disposal site took advantage of a natural depression on the seafloor to decrease the spread of material placed at this location. Parent material removed during the construction of the CAD cells was placed to form a berm to augment the capacity of the natural depression. Monitoring surveys performed during and following disposal at RISDS indicated that the majority of the material placed at the site remained within the site boundaries. It is recognized in the designation and management of open water disposal sites that the site boundary defines the location at the water's surface in which sediment disposal is permitted, and that during descent and the lateral bottom surge some dredged material may extend across the boundary on the seafloor.

Although oceanographic conditions were markedly different at RISDS compared to Providence Harbor (e.g., water depth, currents), the observed sediment plumes behaved similarly. TSS concentrations were highest at the bottom of the water column, and plumes dissipated relatively quickly. Greatest concentrations (up to 111 $mg \cdot l^{-1}$) were found 7 to 17 ft (2 to 5 m) above the seafloor. Plumes were detectable within the water column for the entire duration of the study (three to four hours). However, by the time the plumes exited RISDS (30 to 180 minutes post-disposal), TSS concentrations were generally less than two times ambient concentrations.

5.3.2 Comparison of Model Predictions and Monitoring

The STFATE model was used to predict TSS concentrations resulting from open water disposal at RISDS at various times, depths and distances from the disposal point (Appendix P, FEIS, USACE 2001). Field data, including bathymetry, current measurements, and sediment characterization, were collected to characterize the site and develop model input parameters. Variables that were analyzed included: 1) range of disposal scow sizes (dimensions were developed from actual scows available for use on the project and are summarized in Table 5-5); 2) current and wave conditions; 3) sediment characteristics; and 4) effects of overtopping.

The potential effects of elevated TSS concentrations due to dredging and disposal were assessed by comparing expected concentrations to normal background concentrations and typical episodic concentrations. Model predictions showed that TSS concentrations were expected to return to near-background levels within 3 to 4 hours after disposal (Table 5-6). For the largest scow modeled, the predicted plume was small relative to the disposal site boundary and generally remained within the boundary of the site (Figure 5-4).

The STFATE model results for disposal at RISDS over-predicted TSS concentrations in the first 1 to 2 hours following disposal, when compared to observed concentrations (Figure 5-5). The TSS concentrations observed at or near the plume centroid during the first 90 minutes of each plume monitoring survey were approximately 10% of those predicted by STFATE. The dissimilarity between the model and survey results for the early stages of each sediment plume could be due to a mismatch between modeled and actual sediment properties or the inability to monitor the actual centroid of the plume immediately following disposal, where TSS levels would be highest. However, it may also be a reasonable representation of over-prediction by the model.

Table 5-5.

Dump Barge Dimensions for STFATE Model Scenarios at RISDS

Barge Volume (cy)	Hull Dimensions (ft)	Pocket Dimensions (ft)	Draft (light) (ft)
3000	258 x 45	176 x 35	3
4000	234 x 53	152 x 39.8	3.5
6000	277 x 64	180 x 48	4

Table 5-6.

Model Predicted Maximum TSS Concentrations at RISDS

Time (hr)	TSS ($mg \cdot l^{-1}$)
0.5	500
1	130
2	15
3	5
4	3

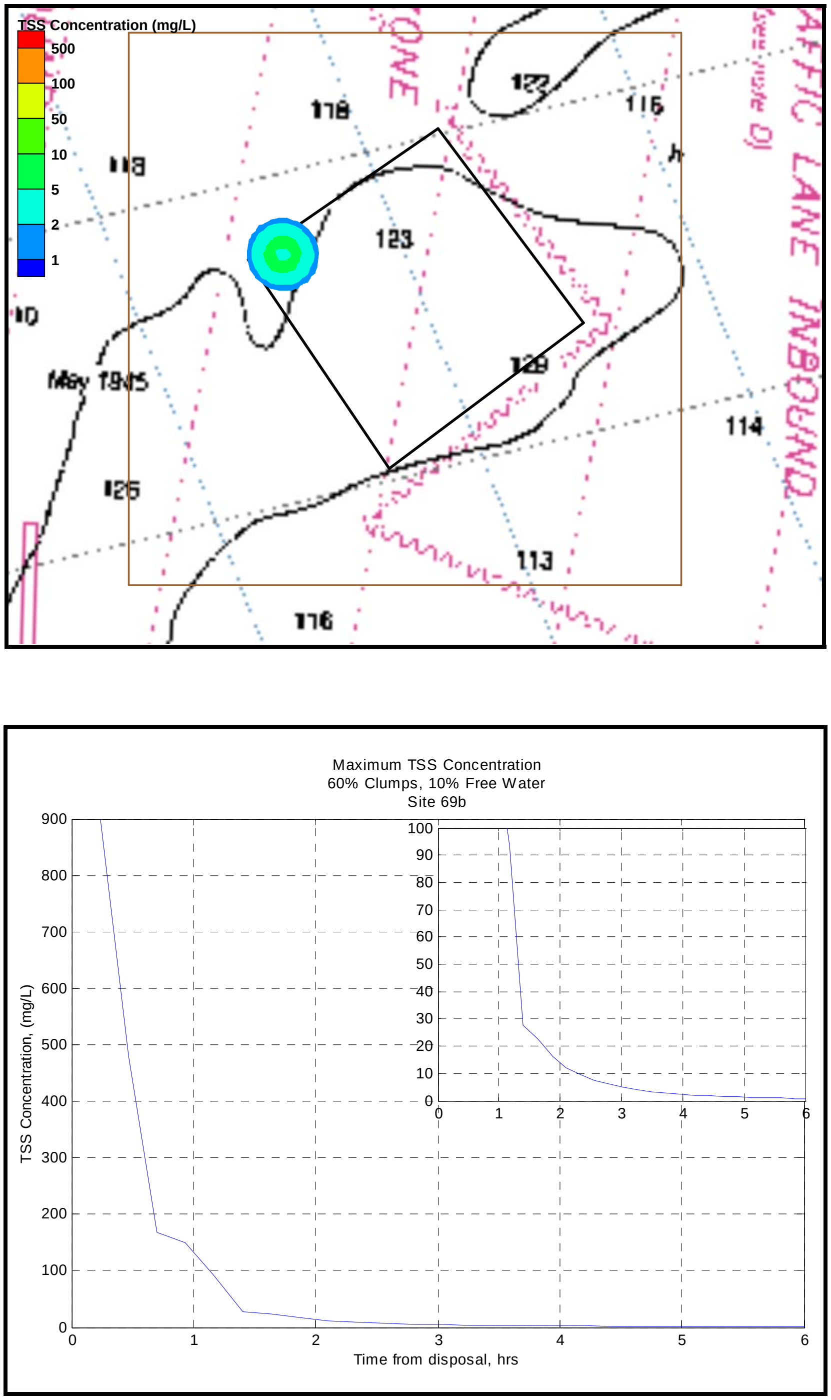


Figure 5-4. Predicted TSS at RISDS for 6000 cy placement at t=4 hrs (upper figure) and maximum concentration over time (lower figure). Inset in lower figure is an enlargement of TSS concentrations over time from 0 to 100 (Figure from USACE 2001).

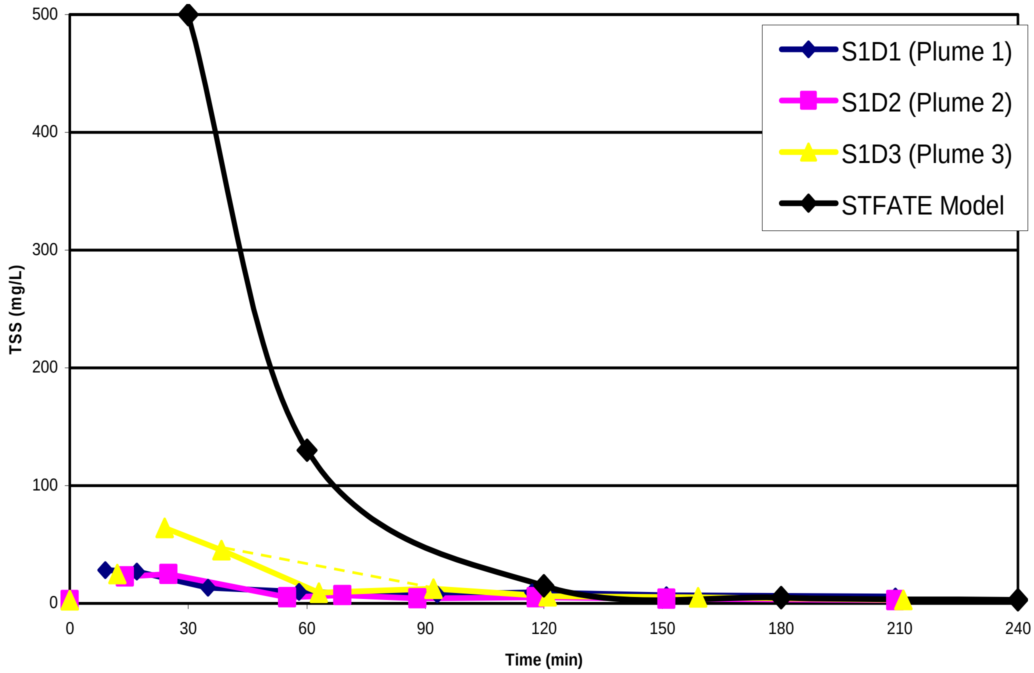


Figure 5-5. Comparison of predicted (STFATE model) and observed (Plumes 1 through 3) TSS concentrations for discrete water samples collected during CTD profiling operations for RISDS plume monitoring in comparison to TSS concentrations predicted for the disposal of 6000 cy of dredged material (Figure from SAIC 2005a).

5.3.3 Biological Impacts

A series of biological monitoring events were performed at the RISDS as part of the DAMOS Program designed to track disposal and benthic recovery at open water sites (SAIC 2004, ENSR 2007b, DAMOSVision 2007). The EIS evaluation predicted that following disposal RISDS would be rapidly recolonized by pioneering Stage I and II benthic organisms, primarily surface-dwelling tubicolous polychaetes and amphipods (USACE 2001). Over time, the site would advance to a more stable, head-down deposit-feeding community (i.e., Stage III). A survey of the artificial containment cell conducted six months following the last disposal event at the site confirmed the EIS predictions. The RISDS benthic community was comprised primarily of Stage II organisms, with some Stage III infauna. The infauna on the disposal mounds were represented by fewer species, fewer individuals and lower species diversity compared to the reference areas. However, the benthic community was typical of an area six months following disposal. Recovery is expected to continue until the benthic community within RISDS begins to resemble that found in the surrounding ambient sediments.

Analyses conducted for the EIS predicted that disposal at RISDS would have less negative impact on local lobster populations than if disposal occurred at the other sites considered (USACE 2001). It was predicted that the site would be of limited use to lobsters for at least several months following disposal until the sediments consolidated and the site was recolonized by benthic organisms. The lobster survey conducted seven to nine months post-disposal indicated that the local lobster population did not appear to be negatively affected relative to those of other areas of Rhode Island Sound. Relative abundance at RISDS compared to two nearby sites in Rhode Island Sound, Sites 69A and 18, showed no evidence of disposal impacts. Statistical comparisons indicated no significant changes in lobster abundance or size at RISDS between 1999 and 2005 that were unusually strong or anomalous compared to the changes observed at Sites 18 and 69A over the same time period. Thus, post-disposal monitoring indicated that the recovery of the local lobster population occurred in the timeframe predicted in the EIS. There was, however, an overall decrease in lobster abundance at all three sites from 1999 to 2005, consistent with a longer term trend of decreasing lobster abundance in southern New England.

5.4 Capping of CAD Cells

At the completion of the PRHMDP, capacity remained in the CAD cells for additional material not suitable for reuse or unconfined open water disposal. Therefore, the decision was made by the State not to cap the CAD cells at that time, but rather leave them open to receive additional material from future dredging projects. Cell 6/7R had the largest remaining capacity, but all cells remained as distinct features depressed 5 to 10 ft (1.5 to 3 m) or more below the surrounding harbor bottom (see Figure 3-12 for a map of bathymetry of the cells following completion of the PRHMDP). The CAD cells continue to consolidate at a rate faster than the normal shoaling rate for the area, as evidenced by recent surveys of the area. As of August 2007 the cells have an estimated capacity of approximately 400,000 cy (300,000 m^3). The current plan is to provide an interim cap using material from Bullock's Cove Federal navigation project dredging scheduled for the fall of 2008.

Continued monitoring of the CAD cells conducted as part of the Boston Harbor Navigation Improvement Project provides insight into the longer term stability of CAD cells in a setting similar to Providence Harbor. In the Boston Harbor Project, nine cells were constructed beneath the navigation channel from 1997 to 2000. Studies during the project indicated that material within open cells remained in place during vessel passage over the cells (SAIC 2000). One entire cell and portions of the surface of several other cells remained uncapped following completion of the project. A follow up study in 2004 showed that the cells continued to be stable structures four to seven years following completion of disposal and capping operations (ENSR 2007a). Some additional consolidation of the material within the cells had taken place, resulting in the cell surface taking on the features of the original cell bottom topography. As expected, natural deposition was occurring over the cells, and little of the coarse-grained cap material was still apparent at the surface of the capped cells. Biologically, both the capped and uncapped cells were similar to the surrounding harbor bottom.

Similar processes are expected to occur for the PRHMDP CAD cells. As long-term consolidation of the disposed material progresses, the surface of the cells is expected to take on the topography of the original cell floor for each cell (Figures 3-6 through 3-11). This consolidation could allow for future disposal into PRHMDP cells in addition to Cell 6/7R. The surface of the cells (whether capped or uncapped) is expected to receive ongoing deposition and return to the ambient harbor bottom biological community.

5.5 Overall Project Public Perception

The execution of the PRHMDP was generally well received and proceeded without incident, with one exception unrelated to the actual dredging operations. On 20 August 2003, more than one million menhaden were found dead in Greenwich Bay (Figure 1-2), along with other finfish, eels, crabs, and soft shell clams (RIDEM 2003). Within weeks, millions of dead soft shell clams washed ashore in the same area. Residents of nearby Conimicut Point (Figure 1-2) complained of a stench similar to sewage that seemed to be causing respiratory problems. At the same time, many houses turned black and developed a slimy coating, while metal surfaces inside houses also discolored (Howell and Smith 2003). Some local residents attributed these events to the ongoing dredging (Barbarisi 2003, Howell and Smith 2003). However, a study by RIDEM concluded that the fish kills were due to anoxic or hypoxic conditions that were caused by ongoing eutrophication of Narragansett Bay and exacerbated by unusually high rains and stormwater runoff (RIDEM 2003). The stench and discoloration of surfaces was attributed to hydrogen sulfide released from the decaying marine organisms washed up on the shoreline (Barbarisi 2003). Various parties, including RIDEM, Save the Bay, and USACE, concurred that the dredging was not the source of this issue (Howell and Smith 2003, Barbarisi 2003), and a public meeting was held in September 2003 to allay public concerns.

Despite many years of public debate concerning performance of this project, the PRHMDP was in the end perceived as a success by the agencies involved and by the general public (Lord 2005). Shipping was not affected during dredging, and, with the exception of the incident described above, construction proceeded without much attention (Lord 2005). The public benefited not only from the restoration of two-way shipping traffic in the Upper Harbor, but from the opportunity for 27 non-Federal projects, including marinas and fuel terminals, to dispose of their dredged material in the CAD cells. Further, where Rhode Island previously had no open water dredged material disposal sites, two sites were established through PRHMDP for future use. RISDS was designated as a permanent disposal site for suitable material, and CAD cell capacity remains for non-Federal dredging projects with sediments unsuitable for RISDS.

The project took over 13 years to fully complete and involved a significant amount of coordination throughout the process. During that time dredging progressed from an action the State of Rhode Island actively discouraged through regulation or policy, to something they came to look upon as a resource. Prior to initiation of the Providence River and Harbor project there was little likelihood that any of the dozens of dredging projects that were in planning would have found suitable disposal options. Local maritime businesses realized they were in danger of being forced out of business and worked with their representatives to get the State's dredging regulations changed. They also identified the need for long term disposal options for the State and realized that the State needed to take a more active roll in identifying potential sites. The State designated RICRMC as the lead agency for dredging and instead of just regulating the dredging they became active participants in identifying suitable disposal sites. The CAD site will remain open and has helped RICRMC meet short term disposal needs as they continue their efforts to locate other suitable sites within the State. CRMC has designated a dredging coordinator for the State, an action that has facilitated the process for projects. They have also activated a State dredging team that meets quarterly and facilitates coordination of proposed dredging projects in the State. This whole process shows that while a project can be shown to meet economic and environmental standards, if there is not the will to move forward politically the project will not likely succeed. Without the continued backing of the marine interests in the State of Rhode Island it's unlikely the project would have moved forward.

6.0 CONCLUSIONS

From April 2003 to July 2005, a total of 5.8 mcy (4.4 million m^3) of material was dredged as part of the Providence River and Harbor Maintenance Dredging Project (PRHMDP) to restore navigation and create confined aquatic disposal (CAD) cells. Dredged material suitable for offshore disposal was placed at the Rhode Island Sound Disposal Site (RISDS). Dredged material unsuitable for offshore disposal, because of contaminant-related toxicity concerns (comprising approximately 1.2 mcy [0.9 million m^3] of the total dredged), was placed into six CAD cells constructed beneath the Federal Channel at the head of the main channel in the Providence River.

Environmental concerns related to the dredging and particularly the disposal of dredged material extended the assessment of the project and delayed implementation for many years. However, through careful planning and execution, environmental impacts of this large project were either avoided or minimized, and it was considered successful by all metrics. Given the amount of pre-project assessment performed and the extensive monitoring conducted during the project, a number of lessons learned and conclusions can be drawn from the PRHMDP as summarized below:

- <u>Sequencing</u> – The sequencing of dredging operations allowed the project to proceed cost-effectively without interruption, and provided additional reassurance that environmental impacts would be minimized.
- <u>Dredging</u> – Water column monitoring performed during the dredging of maintenance material, as well as during dredging of native material during CAD cell construction, identified suspended solids plumes that dissipated rapidly with distance. The water column monitoring indicated that predictive modeling performed as part of the EIS (when adjusted to reflect actual operation) provided reasonable predictions of suspended solids in the vicinity of the operation. Biological monitoring performed during the dredging, while limited in scope, did not detect any significant impacts to hatching success of winter flounder eggs.
- <u>Disposal into CAD Cells</u> – Water column monitoring performed following disposal into the CAD cells demonstrated that the resulting suspended solids plumes were limited in both extent and duration. Collection of samples for laboratory analysis and toxicity testing revealed no water column impacts. Dissolved silver was not detected above the reporting limit in any samples. Only one sample exceeded the chronic/acute water quality criterion for dissolved copper, and this sample was collected at the up-current background location prior to the monitored disposal event. Similar to the dredging, the water column monitoring following disposal indicated that predictive modeling performed as part of the EIS provided reasonable, if not conservative estimates.
- <u>Disposal at RISDS</u> – Water column monitoring performed following disposal at RISDS, the open water disposal site, demonstrated that the suspended solids plumes

predominantly remained within the boundaries of the site and that modeling predictions provided a conservative estimate of plume footprint and suspended solids concentrations. Biological monitoring performed within a year of completion of disposal at RISDS identified that the benthic community was recolonizing quickly and that lobster populations were not significantly impacted.

- Capping of CAD Cells – Given the lack of any significant water column impacts during disposal, the expected stability of the CAD cells, and the expected natural deposition of sediment over the disposed material, the PRHMDP CAD cells could remain uncapped, allowing the excess cell capacity to be preserved for future projects.
- Adaptive Management Approach to Environmental Monitoring – An extensive water column monitoring program was required for the PRHMDP given the significant concerns regarding disposal-related impacts. The monitoring was prescribed in detail within the Water Quality Certification. Following completion of the first several monitoring events, it became evident that there were no significant impacts related to the disposal. In the future, a Water Quality Certificate that provides some level of adaptive management to large environmental monitoring programs such as the one in the PRHMDP would allow for early confirmation of model predictions and a potential shifting of focus or scaling back of the monitoring that could provide more relevant field data and potentially a more cost effective program.

Despite many years of public debate concerning performance of this project, the PRHMDP was in the end perceived as a success by the agencies involved and by the general public (Lord 2005). The project provided a good example of multiple agencies coming together to solve a regional problem, with political, economic, technical, and environmental challenges. Shipping was not affected during dredging, and, with the exception of the unrelated fish kill in Greenwich Bay, the project proceeded without much attention (Lord 2005). The public benefited not only from the restoration of the authorized channel depth and two-way shipping traffic in the Upper Harbor, but from the opportunity for 27 non-Federal projects, including marinas and fuel terminals, to dispose of their dredged material in the CAD cells. Further, where Rhode Island previously had no open water dredged material disposal sites, two sites were established through PRHMDP for future use. RISDS was designated as a permanent disposal site for suitable material, and CAD cell capacity remains for non-Federal dredging projects with sediments unsuitable for RISDS.

7.0 REFERENCES

Barbarisi, D. 2003. Bay decay threatens Conimicut residents. Providence Journal, 11 September.

Battisto, G. M.; Friedrichs, C. T. 2003. Monitoring suspended sediment plume formed during dredging using ADCP, OBS, and bottle samples. Proceedings, Coastal Sediments 2003, Sponsored by the American Society of Civil Engineers, Clearwater Beach, FL, 18-23 May 2003, 14 pp.

Berry, W. J.; Rubinstein, N. I.; Hinchey, E. K.; Klein-MacPhee, G. 2004. Winter Flounder, *Pseudopleuronectes americanus*, Hatching Success as a Function of Burial Depth in the Laboratory. Poster presentation at SETAC 26th Annual Meeting in North America, 13-17 November 2005. Baltimore, MD.

Brandsma, M. G.; Divoky, D. J. 1976. Development of models for prediction of short-term fate of dredged material discharged in the estuarine environment. CR-D-76-5, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. http://el.erdc.usace.army.mil/elpubs/pdf/crd76-5.pdf.

DAMOSVision. 2007. Postdisposal monitoring of lobster abundance at the Rhode Island Sound Disposal Site in 2005 compared to the 1999 predisposal survey. Contribution No. 174. U.S. Army Corps of Engineers, New England District, Concord, MA. http://www.nae.usace.army.mil/damos/pdf/174.pdf.

ENSR. 2007a. Monitoring Survey at the Boston Harbor CAD Cells, August 2004. DAMOS Contribution No. 168. U.S. Army Corps of Engineers, New England District, Concord, MA. http://www.nae.usace.army.mil/damos/pdf/168.pdf.

ENSR. 2007b. Monitoring survey at the Rhode Island Sound Disposal Site, July 2005. Contribution No. 176. U.S. Army Corps of Engineers, New England District, Concord, MA. http://www.nae.usace.army.mil/damos/pdf/176.pdf.

Fredette, T. J. 2005. CADS – Why they make sense. Proceedings, Third International Conference on Remediation of Contaminated Sediments, 24-27 January 2005, New Orleans, LA.

Fredette, T. J.; French, G.T. 2004. Understanding the physical and environmental consequences of dredged material disposal: history in New England and current perspectives. Mar. Pollut. Bull. 49:93-102.

Howell, J.; Smith, Kelly. 2003. Bay stench raises health concerns. Cranston Herald, 9 September.

Johnson, B. H.; McComas, D. N.; McVan, D. C.; Trawle M. J. 1994. Development and verification of numerical models for predicting the initial fate of dredged material disposed in open water. Report 1, Physical model tests of dredged material disposal from a split-hull barge and a multiple bin vessel. Draft Technical Report, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Klein-MacPhee, G.; Macy, W. K.; Berry, W. 2004. In situ effects of suspended particulate loads produced by dredging on eggs of winter flounder (*Pseudopleuronectes americanus*). Presentation at Ninth Flatfish Biology Conference, December 1-2, 2004, Westbrook, CT.

Koh, R. C. Y.; Chang, Y. C. 1973. Mathematical model for barged ocean disposal of waste. Environmental Protection Technology Series EPA 660/2-73-029, U.S. Environmental Protection Agency, Washington, DC.

Kraus, N. C.; Thevenot, M. M. 1992. The PLUme MEasurement System (PLUMES): First announcement. Dredging Research Technical Notes, DRP-1-06. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. http://el.erdc.usace.army.mil/elpubs/pdf/drp1-06.pdf.

Land, J. M.; Bray, R. N. 2000. Acoustic measurement of suspended solids for monitoring of dredging and dredged material disposal. Journal of Dredging Engineering 2(3):1-17.

Land, J.; Clarke, D.; Reine, K.; Dickerson, C. 2007. Acoustic determination of sediment loss terms for mechanical dredging operations. Proc. 18th World Dredging Congress (WODCON XVIII), May 27-June 1, 2007, Lake Buena Vista, FL, 21 pp.

Lord, P. B. 2005. Sedimentary journey: Dredging at end of line. Providence Journal, 12 January.

O'Sullivan, D.W; Hanson, A.K.; Kester, D.R. 1997. The distribution and Redox Chemistry of Iron in the Pettaquamscutt Estuary. Estuarine, Coastal, and Shelf Science 45(6): 769-788.

Reine, K.; Clarke, D. In preparation. Suspended sediment plumes during construction of confined aquatic disposal cells in the Providence River. U.S. Army Engineer Research and Development Center.

Reine, K.; Clarke, D.; Dickerson, C. In preparation. Suspended sediment plumes associated with maintenance dredging in the Providence River, Rhode Island. U.S. Army Engineer Research and Development Center.

Rhode Island Department of Environmental Management. 2004. Rhode Island fisheries stock status: an overview. Rhode Island Department of Environmental Management, Division of Fish and Wildlife, Jamestown, RI.

Rhode Island Department of Environmental Management. 2003. The Greenwich Bay Fish Kill – August 2003: Causes, Impacts, and Responses.

SAIC. 2000. Boston Harbor Water Quality Monitoring – Vessel Passage over Confined Aquatic Disposal Cells; Monitoring in the Wake of LNG Carrier Matthew on March 31, 2000. SAIC Report No. 491. Final Report submitted to U.S. Army Corps of Engineers, New England District, Concord, MA.

SAIC. 2005a. Disposal plume tracking and assessment at the Rhode Island Sound Disposal Site, spring 2004. DAMOS Contribution No. 166. U.S. Army Corps of Engineers, New England District, Concord, MA, 184 pp. http://www.nae.usace.army.mil/damos/pdf/166.pdf.

SAIC. 2005b. Disposal plume tracking and assessment at the Rhode Island Sound Disposal Site, summer 2004. DAMOS Contribution No. 167. U.S. Army Corps of Engineers, New England District, Concord, MA, 194 pp. http://www.nae.usace.army.mil/damos/pdf/167.pdf.

SAIC 2004. Monitoring surveys of the Rhode Island Sound Disposal Site, summer 2003. DAMOS Contribution No. 155. U.S. Army Corps of Engineers, New England District, Concord, MA, 81 pp. http://www.nae.usace.army.mil/damos/pdf/155.pdf.

U.S. Army Corps of Engineers, New England District. 2005. Proposed Change to Ongoing Maintenance Dredging of the Providence River and Harbor Federal Navigation Project, Providence, Rhode Island, Environmental Assessment. Concord, MA.

U.S. Army Corps of Engineers, New England District. August 2001. Providence River and Harbor Maintenance Dredging Project Final Environmental Impact Statement. Concord, MA.

U.S. Army Corps of Engineers, New England District. August 1998. Providence River and Harbor Maintenance Dredging Project Draft Environmental Impact Statement. Concord, MA.

U.S. Code of Federal Regulations. Title 40 Protection of the Environment. Part 228 – Criteria for the Management of Disposal Sites for Ocean Dumping. Section 15 - Dumping sites

designated on a final basis. Subsection (b)(3) – Region 1 Final Dredged Material Sites, Rhode Island Sound Disposal Site.

INDEX

anoxic, 147
barge, v, 28, 31, 45, 70, 97, 127, 135, 136, 140, 142, 154
baseline, vii, 48, 98, 109
bathymetry, vii, 15, 31, 45, 48, 141, 146
Bathymetry, vi, vii, 36, 37, 38, 39, 40, 41, 47, 101
capping, ii, 81, 83, 146, 151
deposition, xviii, 5, 99, 122, 131, 146, 151
dissolved oxygen (DO), 77, 91
flounder, xi, xvii, xviii, 11, 13, 15, 25, 52, 53, 122, 124, 131, 134, 150, 153, 154
habitat, xviii, 52
hypoxic, 147
lobster, ii, v, xi, xvii, xix, 11, 13, 16, 53, 94, 109, 115, 116, 119, 121, 122, 145, 151, 153
methane, 108
optical backscatter sensor (OBS), vii, xv, 52, 54, 56, 64, 66, 97, 153
reference area, xi, xviii, 108, 109, 112, 145
RPD, xv, 108
scow, vi, 29, 32, 45, 84, 94, 141
sediment
  clay, 43, 108, 130
  cobble, 108
  sand, 43, 102, 108
  silt, 109, 130
sediment-profile imaging, xv, xviii, 15, 101, 102, 108
sequencing, i, 7, 18, 24, 25, 43, 49, 122, 126, 131, 134, 150
short term fate model (STFATE), v, xiii, xv, 23, 135, 136, 140, 141, 142, 144
side-scan sonar, xi, 15, 101, 102, 107
successional stage, xi, 112, 113
Suspended Sediment Fate model (SSFATE), xv, 23, 52, 127, 129
temperature, xiv, 10, 13, 74, 75, 76, 97, 136
topography, 99, 101, 146
video, 15, 101, 102
water quality certification (WQC), iv, xvi, xvii, 14, 15, 44, 52, 74, 76, 77, 80, 82, 90, 91, 134, 140, 151
windows, 7, 18, 20, 24

Appendix A

Water Quality Certification

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767 TDD 401-831-5508

March 20, 2003

Colonel Brian E. Ostendorf
New England Division
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: **Water Quality Certification**
Providence River and Harbor Maintenance Dredging Project
WQC File No. 01-61

Dear Sir:

On February 15, 2002, the Rhode Island Department of Environmental Management (RIDEM) issued Water Quality Certification (WQC) for the above referenced project. Subsequent to issuance of the WQC, it has come to our attention that certain conditions within this Certification require revision. The following is the revised Water Quality Certification.

The Rhode Island Department of Environmental Management has reviewed your application for a Water Quality Certificate for the above referenced project. The Army Corps of Engineers (ACOE) proposes to conduct maintenance dredging of the federal channel and harbor of the Providence River from Fox Point in Providence Harbor to a location in the channel just north of Prudence Island. The waters associated with this project are classified in the Rhode Island Water Quality Regulations as SB (Providence Harbor south to a line from Conimicut Point in Warwick to Nayatt Point in Barrington) and SA (the remainder of the project).

We have reviewed the document entitled, Providence River and Harbor Maintenance Dredging Project, Final Environmental Impact Statement (FEIS), dated August 2001, and associated Appendices A through S. Based on the information submitted, the Department has determined that the project complies with the State Water Quality Regulations and hereby grants Water Quality Certification for this project subject to the provisions contained in this Certification. This Certification is for the one-time activity detailed in the FEIS.

Project Description

The project as described in the FEIS documentation is summarized as follows:

The Providence River federal channel begins near the head of Providence Harbor and follows the Providence River south to the deep water near Prudence Island (Figure 1). The upper two and one-half miles comprise the main harbor of the Port of Providence. The channel will be dredged to the authorized width of 600 feet except for a length between Fields Point and Providence where the channel has varying widths of up to 1,700 feet. The channel will be excavated to the authorized depth of 40 feet.

The total volume of material to be removed from the federal channel is 3.9 million cubic yards of maintenance material. The material defined as suitable for unconfined open water disposal (2.8 million cubic yards) will be disposed of at the off-shore disposal site defined as Site 69B. Site 69B is located outside of state waters, however, the transport barges will travel through state waters to reach the disposal site. Material defined as unsuitable for unconfined open water disposal (1.1 million CY) will be placed in Confined Aquatic Disposal (CAD) cells located in the upper reaches of the Providence River. Five CAD cells will be excavated to a depth of approximately –95 feet MLLW. The estimated storage capacity in the CAD cells is approximately 2.3 million cubic yards. This volume is adequate for the estimated 1.1 million cubic yards of unsuitable material from the federal channel and an estimated 0.5 million cubic yards of material from potential non-federal dredging projects, even considering a bulking factor of 1.3. For the federal project, approximately 1.6 million cubic yards of material will be excavated from the CAD cells. The parent material from the CAD cells is composed of approximately 0.7 million cubic yards of silt and 0.9 million cubic yards of sand and gravel. The parent material from the CAD cells is considered suitable for unconfined open water disposal. A portion of this parent material will be transferred to two upland dewatering sites. Any parent material not utilized at an upland dewatering/disposal site will be disposed at Site 69B. Sediment from sediment sampling locations G and H, as identified in the FEIS, will be used to cap the CAD cells.

There are two dewatering sites associated with the project, identified in the FEIS as the Providence and Worcester Railroad Company property on the east shore of the Providence Harbor and the Johnson and Wales University property located on the southern portion of Fields Point. The Providence and Worcester Railroad site will dewater and retain a quantity estimated at 250,000 CY of material at the existing South Quay bermed area. An additional quantity estimated at 300,000 CY of material will be transported to the proposed dewatering site at the Johnson and Wales site. In both cases, the dewatered material will be used as construction fill on these sites as described in the FEIS.

In the EIS process, there has been exhaustive review of the project through a cooperating agencies review process. In the course of these processes, the ACOE has incorporated the following measures into the project for the purpose of minimizing the potential environmental impacts from the dredging portion of the project.

- Dredge maintenance silt from all reaches of the federal channel and harbor using an enclosed clamshell bucket dredge. A hopper dredge may be used instead of the enclosed clamshell bucket dredge after prior review and approval by the Department. No overflow of the scow will be permitted when dredging maintenance silts.

- Dredge parent material from the CAD cells using an open bucket. The scows shall be permitted to overflow while sand and gravel is being removed from the CAD cells.

- Conduct monitoring for dissolved oxygen, turbidity, and total suspended solids at the dredge sites within the federal channel, as proposed. ACOE will submit a Monitoring Plan to the Department for review prior to commencement of dredging. The analytical data from the monitoring will be provided to the Department within 7 calendar days of receipt from the laboratory.

- Sequence dredging operations to minimize impacts to fishery resources. (Sequencing priorities are addressed in more detail in Appendix A attached to this Water Quality Certificate.)

- Sequence dredging activities as a continuous operation without the need for (additional) de-mobilizations/mobilizations.

- Work cooperatively with the dredging contractor and DEM to implement the sequencing priorities noted in Appendix A to the maximum extent practicable.

The ACOE expects to develop a final sequencing plan in accordance with the above. Should it subsequently appear necessary to deviate from the sequencing plan, the ACOE will consult with the Department prior to implementing any changes. The ACOE will identify the dates, duration and need for the variation along with a discussion of the potential environmental and economic impacts to the project and provide an explanation of the steps taken to minimize deviations from the approved sequencing plan. The Department has agreed to review this information within twenty-four hours of receiving it. The Department's review of proposed deviations will take into account both the need to protect valuable resources and the need to maintain project goals.

The estimated start date for this project is November 2002 with estimated project duration of 18 months. The ACOE will notify the Department one week prior to the start of dredging to enable staff to be available for project inspection.

This Water Quality Certification approves the project as described above, subject to the following conditions:

General Conditions

1. This permit shall be referenced and included as an attachment in the project specifications.

2. The ACOE shall coordinate with the Department during the development of the plans and specifications for the project.

3. The applicant and their contractors shall meet with the Department at a pre-construction meeting prior to undertaking any construction activity. This meeting will provide an opportunity for the regulatory and project staff to review permit conditions.

4. All waters, including wetlands, are protected by anti-degradation provisions of the Rhode Island Water Quality Regulations. The ACOE shall ensure that their contractor will take all steps necessary to assure that the proposed activities will be conducted in a manner that will avoid violation of said standards.

5. The ACOE shall be responsible for compliance with the conditions set forth in this Water Quality Certificate for all disposal activities at the CAD cells, and will coordinate disposal activities with the non-federal applicants.

6. The two upland sites referenced and described in the FEIS as the Providence and Worcester Railroad Company property and the Johnson and Wales University property are the only sites authorized by this Certification to receive materials for dewatering and disposal. Any other upland disposal site that may be proposed subsequent to the issuance of this Water Quality Certificate will require approval from the Department.

7. All capping of the CAD cells shall be completed within the18-month estimated project construction period. An extension may be requested at least 60 days prior to the expiration date.

8. Once a CAD cell has been capped, it shall not be re-excavated.

9. Any non-federal disposal of dredged material into a CAD cell must occur during the 18-month federal navigation project construction period. An extension may be requested at least 60 days prior to the expiration date.

10. In order to accommodate unanticipated delays in the project, this Water Quality Certificate will expire 5 years from the date of issuance. An extension may be requested at least 60 days prior to the expiration date.

11. Any barge used to transport dredged material shall be in good operating condition and shall contain the sediment and water placed in it so that minimal discharge of sediment or water occurs until the barge has been transported to an authorized disposal location.

CAD Cell Disposal Operations

12. The Department shall be notified 7 calendar days prior to the initial disposal of any material into a CAD cell.

13. During construction, the unsuitable material from the surface of the starter CAD cell shall be temporarily stored on barges or scows. This material shall be permanently disposed of in the CAD cell.

14. All dredge material considered unsuitable for unconfined open water disposal shall be placed in the CAD cells. The 1.1 million cubic yards of unsuitable material from the federal channel is located in the Fox Point Reach (identified in the FEIS as sediment sample locations A through E). Material from the Upper Fuller Rock Reach (identified as sample location G and H) shall be used to cap the material in the CAD cells with one to three feet of material after the unsuitable material has been allowed to consolidate. Reference Figure 2 to view the location of the suitable and unsuitable areas of dredged material.

15. A detailed plan outlining the methods to be used to ensure disposal barges are within the boundaries of the disposal cell during sediment discharge must be submitted to the Department for review and approval prior to the commencement of any disposal into the CAD cells.

16. Bathymetric surveys of each CAD cell shall be conducted at the following intervals: 1) prior to placement of any material into the cell, 2) following the last placement of unsuitable material into the cell, 3) just prior to placing the cap, and 4) within 15 days after placement of the cap. A report including the data and an assessment of the data shall be submitted to the Department within 90 days of completion of the surveys. The assessment shall include contoured bathymetry and calculations of the total volume of material placed in each CAD cell.

CAD Cell Disposal Compliance Monitoring

<u>General</u>

17. Monitoring shall be completed as specified below. The monitoring requirements may be modified after consultation with the applicant following Department review of the initial monitoring data.

18. The results of any state monitoring or state approved monitoring conducted in the Providence River when disposal operations are ongoing may be used by the Department to assess compliance with the Rhode Island Water Quality Standards.

19. A detailed plan outlining the reporting format and schedules to be utilized for all compliance monitoring shall be submitted to the Department for review and approval prior to the commencement of compliance monitoring.

20. All monitoring data results shall be forwarded to the Department within 7 calendar days after the completion of the monitoring event.

21. A copy of the draft Quality Assurance/ Quality Control (QA/QC) Plan to be utilized for all field sampling and chemical/biological testing shall be submitted to Department for review and approval prior to awarding of the dredge contract. The Plan shall contain all elements outlined in the "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations" EPA QA/R-5, October 1998.

22. A measurement system that includes the real-time measurement, recording, and display of turbidity, dissolved oxygen, temperature, salinity, depth, latitude and longitude shall be used to track the movement of the sediment plume resulting from dredging and dredge disposal operations. This system shall be utilized to conduct the monitoring outlined in Conditions 24 through 34. The turbidity and dissolved oxygen measurements will be monitored with sensors mounted on an undulating body towed behind the survey vessel so that measurements may be made and reported continuously as the vessel moves through the plume field. An acoustic Doppler current profiler (ADCP) will be mounted to the vessel hull to provide preliminary information on the location of the plume field to the vessel operator and survey crew. Equipment specifications, pre- and post- cruise calibration procedures for each sensor and cruise sampling protocols for the system will be included in the QA/QC Plan submitted for Department approval under Condition 21, above.

23. The disposal contractor shall provide the sampling/monitoring contractor with a signal acceptable to both parties indicating when the disposal of sediment from the barge or scow begins.

Monitoring

24. Post-dredge disposal monitoring will include sampling for toxicity, dissolved silver, dissolved copper, turbidity, total suspended solids, dissolved oxygen, temperature, and salinity. Toxicity and dissolved metals will be evaluated at the edge of the applicable mixing zone. Measurements of the other parameters will be conducted to support interpretation of the compliance parameters.

25 The mixing zone boundary for dissolved copper and dissolved silver will be 1500 feet from the disposal point. At the boundary, concentrations of dissolved copper and silver in the water column may not exceed the state's standard for acute concentrations. The acute concentration for copper is 4.8 micrograms per liter and the acute concentration for silver is 1.9 micrograms per liter.

26. A minimum of eleven disposal events shall be monitored for dissolved metals, turbidity, Total Suspended Solids, dissolved oxygen, temperature, and salinity. The events shall encompass the following environmental and operational conditions:

   a. The first dredge disposal event will occur within one hour after the time of <u>high tide</u> in Providence Harbor. The first sampling event will start immediately following this disposal event;

b. The second sampling event will occur by the fifth dredge disposal operation. The disposal event will be timed to occur within one hour after the time of low tide in Providence Harbor. The first low tide sampling event will start immediately after this disposal event;

c. Four more of the first 100 dredge disposal operations will be scheduled to occur within one hour after high tide. Two of these events will be scheduled to occur during a period of spring tide range, when the predicted tide range in Providence Harbor is at least 5.5 feet. Monitoring of these four disposal operations shall commence immediately following disposal;

d. Another four of the first 100 dredge disposal operations will be scheduled to occur within one hour after low tide. Two of these events will be scheduled to occur during a period of spring tide range, when the predicted tide range in Providence Harbor is at least 5.5 feet. Monitoring of these four disposal operations shall commence immediately following disposal;

e. Three sampling events shall occur at the following intervals: 1) when the starter CAD cell is approximately 20 feet from the surface, 2) when the starter cell is approximately 5 feet from the surface, and 3) when the first cap material is placed at the CAD cell. If properly timed, these events may occur as a subset of the sampling outlined in Conditions 31(c) and 31(d), above;

f. One sampling event shall occur when disposal is occurring in the northern limits of the northernmost CAD cell. The disposal operation associated with this sampling shall occur within one hour of high tide in Providence Harbor. The sampling shall commence immediately following disposal.

27. Each of the sampling events outlined in Condition 26 require discrete samples to be obtained at each of the following three locations.

   a. Sample 1 shall be obtained at a point 1500 feet downcurrent of the disposal site as the peak concentration of the plume passes through the mixing zone boundary;

   b. Sample 2 shall be obtained at a point outside the influence of the dredging and disposal plumes; and,

   c. Sample 3 shall be obtained within the dredge plume.

28. As described in Condition 27, water samples shall be obtained for analysis at each of three sample locations. At each location samples shall be obtained from 1 meter above the bottom, mid-depth, and 1 meter below the surface and shall be analyzed for dissolved copper, dissolved silver, total suspended solids, and turbidity.

29. If the plume extends beyond 1500 feet from the disposal point as evidenced by turbidity measurements of >10 NTU's above background (Sample 2 for each sampling event), additional samples shall be obtained. Turbidity monitoring shall continue downcurrent of the mixing zone boundary to the point where peak turbidity meets the 10 NTU threshold. Additional sampling and analysis as described in Condition 28 shall be conducted at that point. Three discrete samples shall be obtained at 1 meter above the bottom, mid-depth, and 1 meter below the surface.

30. The mixing zone boundary for water column toxicity will be extended both upstream and downstream of the disposal point. The southern limit falls at the southern tip of Fields Point and the northern limit is located at the upstream face of the Washington Bridge (Route 195). At the boundary, the water column-averaged chronic toxicity will be determined from a composite of samples obtained from 1 meter below the surface, mid-water column, and 1 meter above the bottom. The *Arbacia* rapid chronic 80-minute sea urchin sperm cell toxicity water column test and 48-hour embryo development and survival tests shall be conducted on samples collected in accordance with the requirements of Conditions 31 through 34. There shall not be a statistically significant reduction in the percent fertilization (determined from the 80 minute test) or the percentage of normally developed embryos (determined from the 48 hour test), between the composite sample collected at the mixing zone boundary and the reference site (defined as Sample 2 in conditions 32 and/or 34).

31. Sampling for toxicity following high tide shall be conducted following each of the three disposal events defined below. A high tide disposal event is defined as a disposal occurring within 1-hour of the predicted high tide in Providence.

    a. Toxicity sampling event 1 shall occur following the first high tide disposal event into the starter cell;

    b. Toxicity sampling event 2 shall occur following one of the next ten high tide disposal events;

    c. Toxicity sampling event 3 shall occur during the placement of cap material on the first CAD cell to be capped.

32. Samples for each high tide event shall be obtained at the following three locations:

    a. Sample 1 shall be obtained as the peak turbidity concentration of the plume passes through a point at the edge of the down current mixing zone (Fields Point), or, if the plume does not reach the edge of the mixing zone by slack low tide, the sample shall be obtained at slack low tide;

    b. Sample 2 shall be obtained at a point outside the influence of the dredging and disposal plumes; and,

    c. Sample 3 shall be obtained within the dredge plume.

33. Sampling for toxicity following low tide shall be conducted following each of the three low tide disposal events. A low tide disposal event is defined as a disposal occurring within 1-hour of the predicted low tide in Providence.

    a. Toxicity sampling event 1 shall occur following the first disposal event into the starter cell;

    b. Toxicity sampling event 2 shall occur following one of the next ten disposal events;

    c. Toxicity sampling event 3 shall occur during the placement of cap material on the first CAD cell to be capped.

34. Samples for each low tide event shall be obtained at the following three locations:

a. Sample 1 shall be obtained as the peak turbidity concentration of the plume passes through a point at the edge of the down current mixing zone (Washington Bridge), or, if the plume does not reach the edge of the mixing zone by slack high tide, the sample shall be obtained at slack high tide;

b. Sample 2 shall be obtained at a point outside the influence of the dredging and disposal plumes; and,

c. Sample 3 shall be obtained within the dredge plume.

Decision Criteria for Failing Sample Results

35. For either toxicity or dissolved metals, a failing sample is defined as any sample collected at the edge of the applicable mixing zone, (Sample 1 as noted above) with results that exceed criteria specified above in Conditions 25 and 30or the test results for the Reference Site sample, whichever is greater. The Reference Site sample is collected at a point outside the influence of the dredge and disposal plume and is defined herein as Sample 2 in any condition of this Certificate that describes sampling locations. A failing sample shall require the testing protocol be repeated for the applicable parameters. Within 24 hours of receipt of a failing test result from the laboratory, the ACOE shall notify the Department. Repeat sampling and testing shall occur within three (3) working days of Department notification, unless the Department approves a longer period.

36 If repeat sampling results in a second failing sample for either toxicity or dissolved metals at the **original** barge disposal volume, the volume of material released with each barge disposal shall be reduced by one-third of the original volume. The testing protocol shall be repeated at the reduced disposal volume. If testing at the reduced disposal volume meets criteria, disposal shall continue at the reduced barge disposal volume (see Condition 39).

37. If testing at the reduced disposal volume results in a failing sample, the procedures outlined in Condition 35 shall be repeated at the reduced volume. If the repeated sample results in a failing sample, see Condition 38.

38. Two failing samples (per Condition 36) for either toxicity or dissolved metals at the **reduced** disposal volume shall require that each barge disposal event occur at slack tide. The ACOE must submit a plan outlining the proposed strategy for the remaining disposal events within two weeks of receipt of the second failing sample. This strategy should include a list of priorities that the ACOE would like to initiate to ensure compliance with toxicity and dissolved metals criteria. These priorities may include adjustments to the timing of the disposal events, or further reduction in the disposal volume. Additional monitoring will occur at the direction of the Department.

39. If testing at the reduced disposal volume meets criteria, the ACOE may request that the barge disposal volume be increased. This request must be submitted in writing to the Department and must include documentation as to why the increase in volume should be permitted. The request can be submitted any time the ACOE believes there is sufficient documentation to justify the request. The Department will make a determination as to whether the increase in barge disposal volume will be permitted. Repeat sampling and testing will occur at the direction of the Department.

Other Monitoring

40. Additional sampling for dissolved oxygen, salinity and temperature shall occur three times per month during the months of June, July, August, and September for the first 12 months of operation.

Measurements shall be taken along a transect beginning 500 feet upcurrent from the CAD cell disposal to 1,500 feet downcurrent, beginning within 30 minutes after the disposal event. This sampling shall only occur at neap tides and shall be separated by 24-hour intervals. Measurements shall be monitored with sensors mounted on an undulating body towed behind the survey vessel so that the measurements may be made and reported continuously as the vessel moves through the plume field. The monitoring shall be conducted in accordance with the QA/QC Plan, as identified in Condition 21. All monitoring results shall be submitted within 7 days of the end of each calendar month.

Dewatering and Upland Disposal

41. All transfer, movement, offloading and other handling of material and sediments associated with the proposed dewatering and upland disposal sites must implement Best Management Practices to minimize the migration of sediments from the site and the occurrence of suspended solids in waters of the State.

42. Detailed site plans and documents addressing the following items must be submitted to the Department for review and approval prior to the commencement of any dewatering activities. The selection, design and operation of the proposed dewatering, settling and storage basins must follow the ACOE publication entitled <u>Engineering and Design, Confined Disposal of Dredged Material</u>, Engineer Manual No. 1110-2-5027. Both the dewatering sites and the upland disposal sites must be addressed.

    a. A Materials Management Plan shall be developed that includes a Sediment and Erosion Control Plan, methods to reduce material losses when offloading the dredge scows, Best Management Practices for treatment of discharges from the dewatering sites that are to be utilized, a method of collecting stormwater runoff from any storage areas and directing it to the settling basins for treatment, and a statement that addresses all aspects of the day-to-day material transfer operations. The plan shall include contingency measures to be taken if material is released at the dock or other locations en-route to the dewatering site;

    b. The location of dewatering basins, settling basins and storage areas for all material. The location of any pier or dock proposed for transfer or offloading of material from scows to land and their position relative to the dredge site and the proposed dewatering site;

    c. All access roads to be utilized by trucks for offloading, transferring or removing dredge material;

    d. Engineering design specifications demonstrating that the dimensional area and volume of the proposed dewatering, settling and storage basins are sufficient to adequately handle the proposed rate and volume of material disposed. The basins should be shown on scale drawn site plans with cross sectional views of the berms provided;

    e. The material handling methods (i.e. hydraulic or mechanical) and an estimate of the volume of discharge water expected from the material;

    f. Details of the berms, overflow weirs, outlet weirs and runoff collection systems;

    g. Final site contours for the fully developed condition must be provided on the site plans; and

h. Monitoring shall be conducted to verify that discharges to the receiving waters are consistent with the design of the approved dewatering facility.

This is the State's Water Quality Certification. Violations of the terms and conditions of this Certification may result in a violation of the State's Water Quality Regulations and appropriate enforcement action. All submittals and questions relative to this Certification should be addressed to Ron Gagnon, Office of Customer and Technical Assistance at 401-222-4700 extension 7500.

Sincerely,

Jan H. Reitsma,
Director

cc: Alicia Good, RIDEM
Grover Fugate, CRMC
Vern Lang, USFW
Michael Ludwig, NMFS
David Tomey, USEPA
David Turin, USEPA
Edward O'Donnell, USACOE
Ron Gagnon, RIDEM
Angelo Liberti, RIDEM
Russ Chateauneuf, RIDEM
Mark Gibson, RIDEM
Terry Walsh, RIDEM

Appendix B

Dredging and Disposal Information

Appendix B1

Dredging and Disposal by CAD Cell/Reach

Dredging and Disposal by CAD Cell/Reach

Area Dredged	Start Date	End Date	Disposal Location
CAD 1R	5/2/2003	5/2/2003	CAD 5R (disposed 10/14 -10/16/2003)
CAD 1R	5/6/2003	5/16/2003	RISDS
CAD 3R	5/20/2003	5/21/2003	CAD 1R
CAD 3R	5/22/2003	6/1/2003	RISDS
CAD 3R	6/7/2003	6/10/2003	RISDS
CAD 4R	6/1/2003	6/6/2003	CAD 1R
CAD 4R	6/15/2003	6/17/2003	CAD 3R
CAD 4R	6/18/2003	7/10/2003	RISDS
CAD 5R	7/15/2003	7/16/2003	CAD 3R
CAD 5R	7/16/2003	7/21/2003	CAD 4R
CAD 5R	7/27/2003	7/30/2003	RISDS
CAD 5R	8/1/2003	8/14/2003	RISDS
CAD 5R	8/19/2003	9/6/2003	RISDS
CAD 6R	6/11/2003	6/12/2003	CAD 1R
CAD 6R	6/13/2003	6/14/2003	CAD 3R
CAD 6R	6/16/2003	6/17/2003	CAD 3R
CAD 6R	6/23/2003	6/23/2003	RISDS
CAD 6R	7/1/2003	8/7/2003	RISDS
CAD 7R	7/10/2003	7/15/2003	CAD 3R
CAD 7R	7/21/2003	7/21/2003	CAD 4R
CAD 7R	7/23/2003	7/26/2003	CAD 4R
Combine CAD 6/7R	7/31/2003	7/31/2003	CAD 4R
CAD 6/7R	8/8/2003	8/19/2003	RISDS
CAD 6/7R	8/21/2003	9/9/2003	RISDS
CAD 6/7R	9/13/2003	9/16/2003	RISDS
CAD 6/7R	9/19/2003	9/27/2003	RISDS
CAD 6/7R	10/2/2003	10/14/2003	RISDS
CAD 3AR	9/6/2003	9/12/2003	CAD 4R
CAD 3AR	9/13/2003	9/23/2003	CAD 5R
CAD 3AR	9/24/2003	11/13/2003	RISDS
CAD 3AR	11/16/2003	11/28/2003	RISDS
CAD 3AR	11/17/2003	11/21/2003	Johnson & Wales
CAD 3AR	11/24/2003	11/24/2003	Johnson & Wales
CAD 3AR	12/5/2003	12/11/2003	RISDS
CAD 3AR	12/12/2003	12/12/2003	Johnson & Wales
CAD 3AR	12/13/2003	12/13/2003	RISDS
CAD 3AR	12/14/2003	12/26/2003	Johnson & Wales/RISDS
CAD 3AR	12/28/2003	12/29/2003	Johnson & Wales/RISDS
CAD 3AR	12/30/2003	1/5/2004	RISDS
CAD 3AR	1/6/2004	1/15/2004	Johnson & Wales/RISDS
CAD 3AR	1/16/2004	1/27/2004	RISDS
CAD 3AR	1/29/2004	2/1/2004	RISDS
Fox Point Unsuitable	6/1/2004	7/20/2004	CAD 3AR

Dredging and Disposal by CAD Cell/Reach

Area Dredged	Start Date	End Date	Disposal Location
Fox Point Unsuitable	8/14/2004	8/15/2004	CAD 3AR
Fox Point Unsuitable	9/21/2004	9/21/2004	CAD 3AR
Fox Point Unsuitable	9/24/2004	9/25/2004	CAD 3AR
Fox Point Unsuitable	10/9/2004	10/26/2004	CAD 3AR
Fox Point Unsuitable	11/7/2004	11/8/2004	CAD 3AR
Fox Point Unsuitable	12/25/2004	12/25/2004	CAD 3AR
Fox Point Unsuitable	12/27/2004	12/29/2004	CAD 3AR
Fox Point Unsuitable	7/19/2005	7/20/2005	CAD 3AR
Fox Point Suitable	8/10/2004	8/21/2004	RISDS
Fox Point Suitable	10/2/2004	10/5/2004	RISDS
Fox Point Suitable	11/13/2004	11/14/2004	RISDS
Fox Point Suitable	1/9/2005	1/9/2005	RISDS
Fuller Rock Point	8/21/2004	10/2/2004	RISDS
Fuller Rock Point	10/5/2004	10/11/2004	RISDS
Fuller Rock Point	10/14/2004	10/15/2004	RISDS
Fuller Rock Point	10/18/2004	10/18/2004	RISDS
Fuller Rock Point	10/29/2004	11/12/2004	RISDS
Fuller Rock Point	12/15/2004	12/20/2004	RISDS
Fuller Rock Point	12/26/2004	12/26/2004	RISDS
Fuller Rock Point	12/30/2004	12/31/2004	RISDS
Fuller Rock Point	1/1/2005	1/4/2005	RISDS
Fuller Rock Point	1/8/2005	1/8/2005	RISDS
Fuller Rock Point	7/20/2005	7/20/2005	CAD 3AR
Sabin	2/19/2004	3/10/2004	RISDS
Sabin	3/12/2004	3/16/2004	RISDS
Sabin	3/18/2004	3/27/2004	RISDS
Sabin	3/30/2004	4/1/2004	RISDS
Sabin	4/5/2004	4/13/2004	RISDS
Sabin	7/20/2004	7/22/2004	RISDS
Bullock Point	2/2/2004	2/27/2004	RISDS
Bullock Point	4/20/2004	4/21/2004	RISDS
Upper Bullock	5/17/2004	5/17/2004	RISDS
Upper Bullock	5/24/2004	5/24/2004	RISDS
Lower Bullock	5/18/2004	5/29/2004	RISDS
Lower Bullock	5/31/2004	5/31/2004	RISDS
Sabin	4/17/2004	4/20/2004	RISDS
Sabin	5/16/2004	5/17/2004	RISDS
Sabin	5/29/2004	5/31/2004	RISDS
Lower Bullock	7/23/2004	7/31/2004	RISDS
Lower Bullock	8/5/2004	8/10/2004	RISDS
Lower Bullock	11/5/2004	11/6/2004	RISDS
Conimicut	5/3/2003	5/5/2003	RISDS
Conimicut	5/17/2003	5/19/2003	RISDS
Conimicut	5/10/2004	5/12/2004	RISDS
Conimicut	10/26/2004	11/1/2004	RISDS

Dredging and Disposal by CAD Cell/Reach

Area Dredged	Start Date	End Date	Disposal Location
Conimicut	11/14/2004	11/22/2004	RISDS
Conimicut	1/6/2005	1/7/2005	RISDS
Rumstick	4/12/2003	5/1/2003	RISDS
Rumstick	3/4/2004	3/10/2004	RISDS
Rumstick	3/12/2004	3/28/2004	RISDS
Rumstick	4/2/2004	4/4/2004	RISDS
Rumstick	4/13/2004	4/13/2004	RISDS
Rumstick	4/15/2004	4/16/2004	RISDS
Rumstick	4/30/2004	5/9/2004	RISDS
Rumstick	5/13/2004	5/15/2004	RISDS

Appendix B2

Summary of Disposal in CAD Cells

Summary of Disposal in CAD Cells

CAD Cell Disposal Event #	Cell	Cell Specific Disposal Event #	GLDD Event # (Dredge_event)	Date	Time	Scow #	Estimated Volume Disposed (cy)	Origin of Material	Disposal Position N	Disposal Position E	Weather (wind, rainfall)
1	1R	1	51_50	5/20/2003	11:31	65	3000	3R	264524	528043	SE 0-5,clear
2	1R	2	51_51	5/21/2003	7:21	62	3000	3R	264312	528066	SE 5-10,light rain
3	1R	3	51_52	5/21/2003	18:52	65	3000	3R	264347	528978	SE 5-10,light rain
4	1R	4	51_68	6/3/2003	18:02	65	3000	4R	264566	528050	W 5-15,cloudy
5	1R	5	51_69	6/4/2003	11:57	65	3000	4R	264537	527985	W 5-15,rain
6	1R	6	51_70	6/4/2003	18:42	65	3000	4R	264541	527980	W 5-15,rain
7	1R	7	51_71	6/5/2003	1:36	65	3000	4R	246558	528025	W 5-15,rain
8	1R	8	51_72	6/5/2003	7:59	65	3000	4R	264585	528040	W 5-15,rain
9	1R	9	51_73	6/5/2003	16:44	65	3000	4R	264554	528046	W 5-15,rain
10	1R	10	51_74	6/6/2003	2:23	65	3000	4R	264564	527998	W 5-10, clear
11	1R	11	51_75	6/6/2003	6:56	65	3000	4R	264546	527960	W 5-10, clear
12	1R	12	51_76	6/6/2003	14:32	65	3000	4R	264526	527965	W 5-10, clear
13	1R	13	51_84	6/11/2003	12:10	62	3000	6R	264012	527934	E 5-10, rain
14	1R	14	51_85	6/12/2003	0:06	62	3000	6R	264324	528085	E 5-10, rain
15	1R	15	51_86	6/12/2003	8:58	62	3000	6R	264363	528155	E 5-10, rain
16	1R	16	51_87	6/12/2003	18:53	65	3000	6R	264298	528059	E 5-10, rain
17	1R	17	51_88	6/13/2003	6:40	65	3000	6R	264315	528053	E 5-10, rain
18	3R	1	51_89	6/13/2003	15:50	65	3000	6R	263696	528459	E 5-10, rain
19	3R	2	51_90	6/14/2003	1:36	65	3000	6R	263696	528436	E 5-10, clear
20	3R	3	51_91	6/14/2003	5:35	65	3000	6R	263724	528407	E 5-10, clear
21	3R	4	51_92	6/14/2003	13:08	65	3000	6R	263681	528544	E 5-10, clear
22	3R	5	51_93	6/15/2003	2:15	65	3000	6R	263850	528355	NE 5-10, clear
23	3R	6	51_94	6/15/2003	10:30	65	3000	6R	263847	528359	NE 5-10, clear
24	3R	7	51_95	6/15/2003	23:52	65	3000	4R	263691	528568	NE 5-10, clear
25	3R	8	51_96	6/16/2003	9:13	65	3000	4R	263681	528521	E 5-10, clear
26	3R	9	51_97	6/16/2003	15:40	65	3000	6R	263731	528436	E 5-10, clear
27	3R	10	51_98	6/16/2003	23:50	65	3000	6R	263687	528448	E 5-10, clear
28	3R	11	51_99	6/17/2003	10:21	65	3000	6R	263725	528522	E 5-10, rain
29	3R	12	51_130	7/10/2003	8:25	402	2200	7R	263709	528536	E 10, clear
30	3R	13	51_131	7/10/2003	13:46	402	2200	7R	263728	528467	N 5-10, clear
31	3R	14	51_132	7/10/2003	18:14	402	2200	7R	263668	528494	N 5-10, clear
32	3R	15	51_133	7/10/2003	23:12	402	2200	7R	263669	528543	N 5-10, clear
33	3R	16	51_134	7/11/2003	4:49	402	2200	7R	263734	528343	NE 10-15, rain
34	3R	17	51_135	7/11/2003	11:48	402	2200	7R	263674	528525	NE 10-15, rain
35	3R	18	51_136	7/11/2003	18:47	402	2200	7R	263688	528516	E 5-10, rain
36	3R	19	51_137	7/12/2003	1:35	402	2200	7R	263671	528355	E 5-10, cloudy
37	3R	20	51_138	7/12/2003	9:26	402	2200	7R	263730	528511	E 15-20, cloudy
38	3R	21	51_139	7/12/2003	16:50	402	2200	7R	263705	528468	E 20, cloudy
39	3R	22	51_140	7/12/2003	23:25	402	2200	7R	263728	528551	E 15-20, cloudy
40	3R	23	51_141	7/13/2003	6:30	402	2200	7R	263711	528481	S 15-20, clear
41	3R	24	51_142	7/13/2003	12:45	402	2200	7R	263640	528543	S 15-20, clear
42	3R	25	51_143	7/13/2003	19:40	402	2200	7R	263659	528562	S 15-20, clear
43	3R	26	51_144	7/14/2003	1:35	402	2200	7R	263636	528523	N 5-10, cloudy
44	3R	27	51_145	7/14/2003	9:15	402	2200	7R	263932	528309	N 5-10, cloudy
45	3R	28	51_146	7/14/2003	14:45	402	2200	7R	263653	528411	N 10-15, cloudy
46	3R	29	51_147	7/14/2003	21:27	402	2200	7R	263737	528548	N 10-15, cloudy
47	3R	30	51_148	7/15/2003	4:10	402	2200	7R	263701	528450	W 5-10, clear
48	3R	31	51_149	7/15/2003	13:07	402	2200	5R	263685	528550	W 5-10, clear
49	3R	32	51_150	7/15/2003	20:31	402	2200	5R	263658	528466	W 5-10, clear
50	3R	33	51_151	7/16/2003	3:22	402	2200	5R	263685	528550	E 5-10, clear
51	3R	34	51_152	7/16/2003	10:05	402	2200	5R	263740	528544	E 15-20, rain
52	3R	35	51_153	7/16/2003	16:30	402	2200	5R	263743	528553	E 15-20, cloudy
53	4R	1	51_154	7/16/2003	22:55	402	2200	5R	264498	528438	E 15-20, rain
54	4R	2	51_155	7/17/2003	6:27	402	2200	5R	264662	528261	E 5-10, sunny
55	4R	3	51_156	7/17/2003	12:23	402	2200	5R	264579	528294	E 5-10, sunny
56	4R	4	51_157	7/17/2003	18:38	402	2200	5R	264634	528307	E 5-10, sunny
57	4R	5	51_158	7/18/2003	0:55	402	2200	5R	264261	528359	NE 5-10, clear
58	4R	6	51_159	7/18/2003	7:45	402	2200	5R	264589	528302	E 5-10, clear
59	4R	7	51_160	7/18/2003	14:25	402	2200	5R	264591	528341	E 5-10, clear
60	4R	8	51_161	7/18/2003	20:16	402	2200	5R	264647	528295	E 5-10, clear
61	4R	9	51_162	7/19/2003	2:40	402	2200	5R	264623	528379	E 5-10, clear
62	4R	10	51_163	7/19/2003	9:28	402	2200	5R	264620	528328	S 5-10, clear
63	4R	11	51_164	7/19/2003	15:05	402	2200	5R	263622	528388	S 5-10, clear
64	4R	12	51_165	7/19/2003	21:17	402	2200	5R	264614	528361	S 5-10, clear
65	4R	13	51_166	7/20/2003	3:54	402	2200	5R	264499	528320	SE 5-10, clear
66	4R	14	51_167	7/20/2003	9:47	402	2200	5R	264664	528322	SE 5-10, clear
67	4R	15	51_168	7/20/2003	16:05	402	2200	5R	264656	528346	SE 5-10, clear
68	4R	16	51_169	7/20/2003	23:50	402	2200	5R	264679	528343	SE 5-10, clear
69	4R	17	51_170	7/21/2003	7:15	402	2200	5R	264657	528243	SE 15-20, cloudy

Summary of Disposal in CAD Cells

CAD Cell Disposal Event #	Cell	Cell Specific Disposal Event #	GLDD Event # (Dredge_ event)	Date	Time	Scow #	Estimated Volume Disposed (cy)	Origin of Material	Disposal Position		Weather (wind, rainfall)
									N	E	
70	4R	18	51_171	7/21/2003	14:59	402	2200	7R	264507	528497	SE 15-20, cloudy
71	4R	19	51_172	7/21/2003	18:25	402	2200	7R	264307	528432	SE 15-20, cloudy
72	4R	20	51_173	7/24/2003	1:15	402	2200	7R	264373	528516	S 15-20, rain
73	4R	21	51_174	7/24/2003	8:14	402	2200	7R	264332	528425	S 15-20, rain
74	4R	22	51_175	7/24/2003	14:39	402	2200	7R	264309	528431	S 20-25, rain
75	4R	23	51_176	7/25/2003	21:32	402	2200	7R	264392	528440	S 5-10, p. cloudy
76	4R	24	51_177	7/25/2003	3:57	402	2200	7R	264392	528442	S 5-10, p. cloudy
77	4R	25	51_178	7/25/2003	10:52	402	2200	7R	264327	528526	S 5-10, p. cloudy
78	4R	26	51_179	7/25/2003	18:47	402	2200	7R	264384	528453	S 5-10, p. cloudy
79	4R	27	51_180	7/26/2003	0:17	402	2200	7R	264359	528504	S 5-10, p. cloudy
80	4R	28	51_181	7/26/2003	7:24	402	2200	7R	264329	528489	S 5-10, p. cloudy
81	4R	29	51_182	7/26/2003	14:56	402	2200	7R	264427	528408	S 5-10, p. cloudy
82	4R	30	51_183	7/26/2003	20:16	402	2200	7R	264358	528390	S 5-10, p. cloudy
83	4R	31	51_192	7/31/2003	22:20	402	2200	7R	264368	528444	W 5-10, sunny
84	4R	32	51_193	8/1/2003	2:32	402	2200	7R	264401	528519	W 5-10, rain
85	4R	33	51_257	9/6/2003	21:09	402	2200	3AR	264564	528313	W 5-10, clear
86	4R	34	51_258	9/7/2003	3:16	402	2200	3AR	264676	528336	S 5-10, clear
87	4R	35	51_259	9/7/2003	9:43	402	2200	3AR	264515	528342	S 5-10, clear
88	4R	36	51_260	9/7/2003	16:19	402	2200	3AR	264584	528236	light wind, clear
89	4R	37	51_261	9/7/2003	22:46	402	2200	3AR	264601	528293	NW 5-10, clear
90	4R	38	51_262	9/8/2003	4:25	402	2200	3AR	264739	528373	light wind, clear
91	4R	39	51_263	9/8/2003	10:50	402	2200	3AR	264639	528457	NE 5, clear
92	4R	40	51_264	9/9/2003	16:45	402	2200	3AR	264559	528390	NE 10-15, clear
93	4R	41	51_265	9/9/2003	23:51	402	2200	3AR	264382	528429	light wind, clear
94	4R	42	51_266	9/9/2003	6:48	402	2200	3AR	264658	528395	light wind, clear
95	4R	43	51_267	9/9/2003	13:08	402	2200	3AR	264634	528332	light wind, clear
96	4R	44	51_268	9/9/2003	19:00	402	2200	3AR	264624	528325	NE 15, clear
97	4R	45	51_269	9/10/2003	1:20	402	2200	3AR	264674	528257	light wind, clear
98	4R	46	51_270	9/10/2003	7:38	402	2200	3AR	264573	528214	calm, clear
99	4R	47	51_271	9/10/2003	13:37	402	2200	3AR	264640	528245	calm, clear
100	4R	48	51_272	9/10/2003	21:10	402	2200	3AR	264551	528330	calm, clear
101	4R	49	51_273	9/11/2003	3:11	402	2200	3AR	264620	528245	light wind, clear
102	4R	50	51_274	9/11/2003	8:00	35	2200	3AR	264692	528419	S 10, clear
103	4R	51	51_275	9/11/2003	16:50	65	3000	3AR	264567	528328	S 10, clear
104	4R	52	51_276	9/11/2003	23:15	65	3000	3AR	264338	528409	S 10, clear
105	4R	53	51_277	9/12/2003	4:45	65	3000	3AR	264640	528382	SE 5-10, clear
106	5R	1	51_278	9/12/2003	12:35	65	3000	3AR	263922	528887	SE 5-10, clear
107	5R	2	51_279	9/12/2003	20:40	65	3000	3AR	264031	528756	SE 5-10,clear
108	5R	3	51_280	9/13/2003	3:30	65	3000	3AR	263854	528857	SE 5-10, clear
109	5R	4	51_281	9/13/2003	10:06	65	3000	3AR	263935	528787	SE 5-10, clear
110	5R	5	51_282	9/13/2003	14:07	35	2200	3AR	263939	528820	SE 5-10, clear
111	5R	6	51_283	9/13/2003	19:00	35	2200	3AR	263954	528798	SE 5-10, clear
112	5R	7	51_284	9/13/2003	23:48	35	2200	3AR	263925	528743	SE 5-10, clear
113	5R	8	51_285	9/14/2003	0:40	35	2200	3AR	263998	528729	SE 5-10, clear
114	5R	9	51_286	9/14/2003	11:14	35	2200	3AR	263988	528820	SE 5-10, clear
115	5R	10	51_287	9/14/2003	18:17	35	2200	3AR	263984	528783	SE 5-10, clear
116	5R	11	51_288	9/15/2003	0:15	35	2200	3AR	264062	528663	ESE 5-10, clear
117	5R	12	51_289	9/15/2003	7:20	35	2200	3AR	264064	528702	ESE 5-10, clear
118	5R	13	51_290	9/15/2003	14:10	35	2200	3AR	264034	528726	ESE 5-10, clear
119	5R	14	51_291	9/15/2003	21:12	35	2200	3AR	263975	528776	ESE 5-10, clear
120	5R	15	51_292	9/16/2003	3:05	35	2200	3AR	264054	528750	W 0-5, Rain
121	5R	16	51_293	9/16/2003	10:20	35	2200	3AR	264036	528715	W 0-5, Rain
122	5R	17	51_294	9/16/2003	18:54	35	2200	3AR	264160	528664	W 0-5, Rain
123	5R	18	51_295	9/17/2003	1:10	35	2200	3AR	264007	528780	SW 0-5, Clear
124	5R	19	51_296	9/17/2003	9:56	35	2200	3AR	264072	528642	SW 0-5, Clear
125	5R	20	51_297	9/17/2003	15:30	35	2200	3AR	264031	528755	SW 0-5, Clear
126	5R	21	51_298	9/17/2003	21:49	35	2200	3AR	264070	528773	SW 0-5, Clear
127	5R	22	51_299	9/18/2003	4:22	35	2200	3AR	263963	528839	S 15-20, overcast
128	5R	23	51_300	9/18/2003	11:06	35	2200	3AR	264007	528733	S 15-20, overcast
129	5R	24	51_301	9/19/2003	17:03	35	2200	3AR	263886	528820	S 10-15, Rain
130	5R	25	51_302	9/19/2003	0:40	35	2200	3AR	264029	528767	S 10-15, Rain
131	5R	26	51_303	9/19/2003	7:51	35	2200	3AR	264004	528767	S 10-15, Rain
132	5R	27	51_304	9/19/2003	14:39	35	2200	3AR	263954	528821	S 10-15, Rain
133	5R	28	51_305	9/19/2003	21:14	35	2200	3AR	264116	528688	S 10-15, Rain
134	5R	29	51_306	9/20/2003	3:20	35	2200	3AR	264027	528774	W 5-10, Clear
135	5R	30	51_307	9/20/2003	11:45	35	2200	3AR	263947	528674	W 5-10, clear
136	5R	31	51_308	9/20/2003	18:31	35	2200	3AR	264014	528741	W 5-10, clear
137	5R	32	51_309	9/21/2003	2:09	35	2200	3AR	263985	528800	SW 0-5, cloudy
138	5R	33	51_310	9/21/2003	9:33	35	2200	3AR	264063	528800	SW 0-5, cloudy

Summary of Disposal in CAD Cells

CAD Cell Disposal Event #	Cell	Cell Specific Disposal Event #	GLDD Event # (Dredge_ event)	Date	Time	Scow #	Estimated Volume Disposed (cy)	Origin of Material	Disposal Position		Weather (wind, rainfall)
									N	E	
139	5R	34	51_311	9/21/2003	15:54	35	2200	3AR	263883	528878	SW 0-5, cloudy
140	5R	35	51_312	9/21/2003	22:58	35	2200	3AR	264057	528785	SW 0-5, cloudy
141	5R	36	51_313	9/22/2003	4:35	35	2200	3AR	263906	528897	S 0-5, cloudy
142	5R	37	51_314	9/22/2003	11:22	35	2200	3AR	264045	528756	S 0-5, cloudy
143	5R	38	51_315	9/22/2003	22:06	35	2200	3AR	264014	528821	S 0-5, cloudy
144	5R	39	51_316	9/23/2003	6:24	35	2200	3AR	264108	528719	SW 10-15, rain
145	5R	40	51_317	9/23/2003	12:50	35	2200	3AR	263800	528842	SW 10-15, rain
146	5R	41	51_318	9/23/2003	19:32	35	2200	3AR	264003	528829	SW 10-15, rain
*	5R			10/14/2003				1R			
*	5R			10/15/2003				1R			
*	5R			10/16/2003			8100	1R			
889	3AR	42		6/1/2004	14:12	65	5800	Fox Pt	265392	527300	
890	3AR	43		6/1/2004	20:40	61	5800	Fox Pt	265479	527793	
891	3AR	44		6/2/2004	3:25	65	3720	Fox Pt	264723	527747	
892	3AR	45		6/2/2004	8:35	61	3720	Fox Pt	264874	528123	
893	3AR	46		6/2/2004	13:55	402	3720	Fox Pt	264891	527767	
894	3AR	47		6/2/2004	18:24	65	3720	Fox Pt	265204	527679	
895	3AR	48		6/2/2004	23:35	61	3720	Fox Pt	265077	527432	
897	3AR	49		6/3/2004	8:47	402	4180	Fox Pt	264635	527682	
898	3AR	50		6/3/2004	13:30	63	4180	Fox Pt	264744	528019	
899	3AR	51		6/3/2004	16:15	402	4180	Fox Pt	264881	528186	
900	3AR	52		6/3/2004	22:00	63	4180	Fox Pt	264498	527579	
896	3AR	53		6/4/2004	20:25	65	2700	Fox Pt	265496	527791	
901	3AR	54		6/4/2004	19:15	65	2700	Fox Pt	264760	527708	
902	3AR	55		6/4/2004	7:29	402	2700	Fox Pt	264740	527959	
903	3AR	56		6/4/2004	11:10	402	2700	Fox Pt	No Data	Telemtry Malfnctn	
904	3AR	57		6/4/2004	14:15	402	2700	Fox Pt	No Data	Telemtry Malfnctn	
906	3AR	58		6/5/2004	11:45	61	2917	Fox Pt	264954	528083	
907	3AR	59		6/5/2004	2:00	402	2917	Fox Pt	No Data	Telemtry Malfnctn	
908	3AR	60		6/5/2004	7:25	63	2917	Fox Pt	264974	527389	
909	3AR	61		6/5/2004	10:16	402	2917	Fox Pt	265309	527750	
910	3AR	62		6/5/2004	16:25	63	2917	Fox Pt	264616	527764	
911	3AR	63		6/5/2004	20:00	61	2917	Fox Pt	265064	527833	
912	3AR	64		6/6/2004	0:25	65	3400	Fox Pt	264867	528135	
913	3AR	65		6/6/2004	5:50	61	3400	Fox Pt	265288	527135	
914	3AR	66		6/6/2004	9:58	65	3400	Fox Pt	265290	527733	
915	3AR	67		6/6/2004	14:05	61	3400	Fox Pt	264623	527651	
916	3AR	68		6/6/2004	18:35	65	3400	Fox Pt	264738	527885	
917	3AR	69		6/7/2004	0:30	65	3900	Fox Pt	264941	528192	
918	3AR	70		6/7/2004	6:15	65	3900	Fox Pt	265153	527482	
919	3AR	71		6/7/2004	10:20	65	3900	Fox Pt	265257	527728	
920	3AR	72		6/7/2004	15:35	65	3900	Fox Pt	264649	527734	
921	3AR	73		6/7/2004	20:44	65	3900	Fox Pt	264965	528025	
922	3AR	74		6/8/2004	1:35	65	2880	Fox Pt	264925	528171	
923	3AR	75		6/8/2004	7:20	65	2880	Fox Pt	265179	527496	
924	3AR	76		6/8/2004	13:15	65	2880	Fox Pt	265357	527834	
925	3AR	77		6/8/2004	18:40	65	2880	Fox Pt	264797	527964	
926	3AR	78		6/9/2004	7:50	65	3240	Fox Pt	264869	527493	
927	3AR	79		6/9/2004	3:50	61	3240	Fox Pt	264622	527773	
928	3AR	80		6/9/2004	9:00	402	3240	Fox Pt	264920	527401	
929	3AR	81		6/9/2004	15:05	402	3240	Fox Pt	265209	527803	
930	3AR	82		6/9/2004	18:12	65	3240	Fox Pt	264741	527487	
931	3AR	83		6/9/2004	21:43	402	3240	Fox Pt	264767	527910	
932	3AR	84		6/10/2004	2:37	65	2960	Fox Pt	264936	527915	
933	3AR	85		6/10/2004	8:10	402	2960	Fox Pt	264807	528077	
934	3AR	86		6/10/2004	14:30	65	2960	Fox Pt	265205	527547	
935	3AR	87		6/10/2004	19:30	402	2960	Fox Pt	264770	528023	
936	3AR	88		6/10/2004	23:15	65	2960	Fox Pt	265007	527779	
937	3AR	89		6/11/2004	2:57	402	2880	Fox Pt	265009	528118	
938	3AR	90		6/11/2004	7:12	65	2880	Fox Pt	265291	527329	
939	3AR	91		6/11/2004	11:21	402	2880	Fox Pt	265238	527833	
940	3AR	92		6/11/2004	16:16	65	2880	Fox Pt	264656	527729	
941	3AR	93		6/11/2004	20:50	402	2880	Fox Pt	264700	527870	
942	3AR	94		6/12/2004	0:43	65	2417	Fox Pt	264966	528099	
943	3AR	95		6/12/2004	3:52	402	2417	Fox Pt	265114	527540	
944	3AR	96		6/12/2004	9:30	65	2417	Fox Pt	265306	527734	

*Material was dredged from CAD Cell 1R in May 2003 and held in hopper barges until disposal via clamshell dredge in CAD cell 5R. The 8100 cy disposed represents the three day total.

Summary of Disposal in CAD Cells

CAD Cell Disposal Event #	Cell	Cell Specific Disposal Event #	GLDD Event # (Dredge_ event)	Date	Time	Scow #	Estimated Volume Disposed (cy)	Origin of Material	Disposal Position N	Disposal Position E	Weather (wind, rainfall)
945	3AR	97		6/12/2004	12:50	402	2417	Fox Pt	266652	527674	
946	3AR	98		6/12/2004	17:17	65	2417	Fox Pt	264912	527864	
947	3AR	99		6/12/2004	20:40	402	2080	Fox Pt	264994	528213	
948	3AR	100		6/13/2004	1:30	65	2080	Fox Pt	265256	527450	
949	3AR	101		6/13/2004	5:30	402	2080	Fox Pt	265524	527669	
950	3AR	102		6/13/2004	11:17	65	2080	Fox Pt	265173	527552	
951	3AR	103		6/13/2004	15:27	402	2080	Fox Pt	264754	528010	
952	3AR	104		6/13/2004	20:41	65	2080	Fox Pt	264986	528143	
953	3AR	105		6/14/2004	0:25	402	2217	Fox Pt	265057	527551	
954	3AR	106		6/14/2004	4:48	65	2217	Fox Pt	264887	527806	
955	3AR	107		6/14/2004	8:55	402	2217	Fox Pt	264904	528018	
956	3AR	108		6/14/2004	13:16	65	2217	Fox Pt	No Data	Telemtry Malfnctn	
957	3AR	109		6/14/2004	17:45	402	2217	Fox Pt	No Data	Telemtry Malfnctn	
958	3AR	110		6/14/2004	22:46	65	2217	Fox Pt	264703	527570	
959	3AR	111		6/15/2004	2:16	402	2100	Fox Pt	265325	527899	
960	3AR	112		6/15/2004	6:43	65	2100	Fox Pt	265275	527235	
961	3AR	113		6/15/2004	11:30	402	2100	Fox Pt	264794	527991	
962	3AR	114		6/15/2004	16:11	65	2100	Fox Pt	265505	527706	
963	3AR	115		6/15/2004	20:12	402	2100	Fox Pt	265134	527471	
964	3AR	116		6/16/2004	0:31	65	2417	Fox Pt	265076	528165	
965	3AR	117		6/16/2004	4:18	402	2417	Fox Pt	264627	527623	
966	3AR	118		6/16/2004	8:45	65	2417	Fox Pt	264806	527868	
967	3AR	119		6/16/2004	11:46	402	2417	Fox Pt	264982	528206	
968	3AR	120		6/16/2004	16:56	65	2417	Fox Pt	264691	527581	
969	3AR	121		6/16/2004	20:47	402	2417	Fox Pt	264672	527691	
970	3AR	122		6/17/2004	0:56	65	2550	Fox Pt	264777	527723	
971	3AR	123		6/17/2004	4:20	402	2550	Fox Pt	265002	528265	
972	3AR	124		6/17/2004	14:01	65	2550	Fox Pt	264623	527532	
973	3AR	125		6/17/2004	23:23	65	2550	Fox Pt	265320	527786	
974	3AR	126		6/18/2004	3:15	402	1583	Fox Pt	264694	527782	
975	3AR	127		6/18/2004	7:15	65	1583	Fox Pt	264799	527764	
976	3AR	128		6/18/2004	11:20	402	1583	Fox Pt	264973	528232	
977	3AR	129		6/18/2004	16:02	65	1583	Fox Pt	265419	527381	
978	3AR	130		6/18/2004	19:25	402	1583	Fox Pt	264807	527623	
979	3AR	131		6/18/2004	23:30	65	1583	Fox Pt	264849	527759	
980	3AR	132		6/19/2004	4:20	402	3200	Fox Pt	265044	527785	
981	3AR	133		6/19/2004	9:14	65	3200	Fox Pt	265326	527450	
982	3AR	134		6/19/2004	13:00	402	3200	Fox Pt	265200	527348	
983	3AR	135		6/19/2004	19:30	65	3200	Fox Pt	264840	527414	
984	3AR	136		6/19/2004	22:30	402	3200	Fox Pt	264918	527895	
985	3AR	137		6/20/2004	2:23	65	2867	Fox Pt	265127	527987	
986	3AR	138		6/20/2004	6:15	402	2867	Fox Pt	265108	527539	
987	3AR	139		6/20/2004	10:22	65	2867	Fox Pt	265570	527648	
988	3AR	140		6/20/2004	14:12	402	2867	Fox Pt	264669	527674	
989	3AR	141		6/20/2004	19:36	65	2867	Fox Pt	265032	527724	
990	3AR	142		6/20/2004	22:45	402	2867	Fox Pt	265429	527399	
991	3AR	143		6/21/2004	3:20	65	1700	Fox Pt	265301	527632	
992	3AR	144		6/21/2004	9:15	402	1700	Fox Pt	264571	527564	
993	3AR	145		6/21/2004	15:44	65	1700	Fox Pt	264894	527810	
994	3AR	146		6/21/2004	19:55	402	1700	Fox Pt	265009	528156	
995	3AR	147		6/22/2004	0:40	65	1450	Fox Pt	265064	528010	
996	3AR	148		6/22/2004	4:45	402	1450	Fox Pt	265339	527773	
997	3AR	149		6/22/2004	9:38	65	1450	Fox Pt	265109	527484	
998	3AR	150		6/22/2004	20:20	402	1450	Fox Pt	264768	527935	
999	3AR	151		6/23/2004	0:45	65	1500	Fox Pt	265519	527696	
1000	3AR	152		6/23/2004	4:45	402	1500	Fox Pt	265029	527600	
1001	3AR	153		6/23/2004	9:20	65	1500	Fox Pt	264719	527719	
1002	3AR	154		6/23/2004	13:58	402	1500	Fox Pt	264992	527680	
1003	3AR	155		6/23/2004	19:12	65	1500	Fox Pt	264918	527700	
1004	3AR	156		6/23/2004	22:15	402	1500	Fox Pt	265120	528245	
1005	3AR	157		6/24/2004	2:40	65	1600	Fox Pt	265017	528055	
1006	3AR	158		6/24/2004	6:47	402	1600	Fox Pt	265170	527883	
1007	3AR	159		6/24/2004	11:30	65	1600	Fox Pt	265142	527417	
1008	3AR	160		6/24/2004	15:55	402	1600	Fox Pt	264842	528011	
1009	3AR	161		6/24/2004	20:50	65	1600	Fox Pt	265464	527725	
1010	3AR	162		6/24/2004	0:00	402	1600	Fox Pt	265055	528260	
1011	3AR	163		6/25/2004	4:45	65	2280	Fox Pt	264685	527473	
1012	3AR	164		6/25/2004	9:10	402	2280	Fox Pt	265508	527755	
1013	3AR	165		6/25/2004	14:30	65	2280	Fox Pt	264725	527667	

Summary of Disposal in CAD Cells

CAD Cell Disposal Event #	Cell	Cell Specific Disposal Event #	GLDD Event # (Dredge_ event)	Date	Time	Scow #	Estimated Volume Disposed (cy)	Origin of Material	Disposal Position N	Disposal Position E	Weather (wind, rainfall)
1014	3AR	166		6/25/2004	19:08	402	2280	Fox Pt	265264	527704	
1015	3AR	167		6/25/2004	23:45	65	2280	Fox Pt	265045	528035	
1016	3AR	168		6/26/2004	3:00	402	3250	Fox Pt	264693	527360	
1017	3AR	169		6/26/2004	8:37	65	3250	Fox Pt	265169	527433	
1018	3AR	170		6/26/2004	15:08	402	3250	Fox Pt	265117	528119	
1019	3AR	171		6/26/2004	20:40	65	3250	Fox Pt	265435	527674	
1020	3AR	172		6/27/2004	0:40	402	2317	Fox Pt	265270	527790	
1021	3AR	173		6/27/2004	5:40	65	2317	Fox Pt	264702	527581	
1022	3AR	174		6/27/2004	9:44	402	2317	Fox Pt	264346	528113	
1023	3AR	175		6/27/2004	14:45	65	2317	Fox Pt	264958	527658	
1024	3AR	176		6/27/2004	19:17	402	2317	Fox Pt	265185	527580	
1025	3AR	177		6/27/2004	22:40	65	2317	Fox Pt	264871	527774	
1026	3AR	178		6/28/2004	2:45	402	2740	Fox Pt	265592	527893	
1027	3AR	179		6/28/2004	7:55	65	2740	Fox Pt	265136	527424	
1028	3AR	180		6/28/2004	12:05	402	2740	Fox Pt	264650	527736	
1029	3AR	181		6/28/2004	16:55	65	2740	Fox Pt	264455	527754	
1030	3AR	182		6/28/2004	20:50	402	2740	Fox Pt	264814	527964	
1031	3AR	183		6/29/2004	1:05	65	2567	Fox Pt	264737	527483	
1032	3AR	184		6/29/2004	5:00	402	2567	Fox Pt	264932	528235	
1033	3AR	185		6/29/2004	9:50	65	2567	Fox Pt	264850	527828	
1034	3AR	186		6/29/2004	15:05	402	2567	Fox Pt	265176	527415	
1035	3AR	187		6/29/2004	19:55	65	2567	Fox Pt	265069	527965	
1036	3AR	188		6/29/2004	23:41	402	2567	Fox Pt	265307	527743	
1037	3AR	189		6/30/2004	4:15	65	3180	Fox Pt	265498	527283	
1038	3AR	190		6/30/2004	8:29	402	3180	Fox Pt	264582	527769	
1039	3AR	191		6/30/2004	13:40	65	3180	Fox Pt	265412	527648	
1040	3AR	192		6/30/2004	17:15	402	3180	Fox Pt	264707	527856	
1041	3AR	193		6/30/2004	22:05	65	3180	Fox Pt	264709	527591	
1042	3AR	194		7/1/2004	1:25	402	3160	Fox Pt	264833	528030	
1043	3AR	195		7/1/2004	6:00	65	3160	Fox Pt	264931	527725	
1044	3AR	196		7/1/2004	10:20	402	3160	Fox Pt	265121	527550	
1045	3AR	197		7/1/2004	15:48	65	3160	Fox Pt	265033	528033	
1046	3AR	198		7/1/2004	20:30	402	3160	Fox Pt	265154	527768	
1047	3AR	199		7/2/2004	0:58	65	1850	Fox Pt	264861	527858	
1048	3AR	200		7/2/2004	4:40	402	1850	Fox Pt	264586	527932	
1049	3AR	201		7/2/2004	10:11	65	1850	Fox Pt	264488	527663	
1050	3AR	202		7/2/2004	14:05	402	1850	Fox Pt	265081	527657	
1051	3AR	203		7/2/2004	19:24	65	1850	Fox Pt	265152	527551	
1052	3AR	204		7/2/2004	23:35	402	1850	Fox Pt	264726	527717	
1053	3AR	205		7/3/2004	3:22	65	2160	Fox Pt	265344	527844	
1054	3AR	206		7/3/2004	8:15	402	2160	Fox Pt	265166	527808	
1055	3AR	207		7/3/2004	12:46	65	2160	Fox Pt	264947	527030	
1056	3AR	208		7/3/2004	16:35	402	2160	Fox Pt	265472	527841	
1057	3AR	209		7/3/2004	21:33	65	2160	Fox Pt	264743	527831	
1058	3AR	210		7/4/2004	1:15	402	2720	Fox Pt	264787	528029	
1059	3AR	211		7/4/2004	5:58	65	2720	Fox Pt	264621	527534	
1060	3AR	212		7/4/2004	10:50	402	2720	Fox Pt	265375	527406	
1061	3AR	213		7/4/2004	16:27	65	2720	Fox Pt	265276	527385	
1062	3AR	214		7/4/2004	21:00	402	2720	Fox Pt	264982	527484	
1063	3AR	215		7/5/2004	1:16	65	2250	Fox Pt	265406	527732	
1064	3AR	216		7/5/2004	4:55	402	2250	Fox Pt	264988	528017	
1065	3AR	217		7/5/2004	9:40	65	2250	Fox Pt	265219	527543	
1066	3AR	218		7/5/2004	13:55	402	2250	Fox Pt	265235	527614	
1067	3AR	219		7/5/2004	19:15	65	2250	Fox Pt	265210	527484	
1068	3AR	220		7/5/2004	22:35	402	2250	Fox Pt	264777	527867	
1069	3AR	221		7/6/2004	3:09	65	2160	Fox Pt	264730	527732	
1070	3AR	222		7/6/2004	6:57	402	2160	Fox Pt	265085	527482	
1071	3AR	223		7/6/2004	12:18	65	2160	Fox Pt	264682	527581	
1072	3AR	224		7/6/2004	16:25	402	2160	Fox Pt	264750	527600	
1073	3AR	225		7/6/2004	21:25	65	2160	Fox Pt	265038	528135	
1074	3AR	226		7/7/2004	2:15	402	1575	Fox Pt	265101	528240	
1075	3AR	227		7/7/2004	8:14	65	1575	Fox Pt	265080	527397	
1076	3AR	228		7/7/2004	16:14	402	1575	Fox Pt	265260	527632	
1077	3AR	229		7/7/2004	21:56	65	1575	Fox Pt	265190	527513	
1078	3AR	230		7/8/2004	2:25	402	1400	Fox Pt	264724	527659	
1079	3AR	231		7/8/2004	7:38	65	1400	Fox Pt	264340	527860	
1080	3AR	232		7/8/2004	11:46	402	1400	Fox Pt	265006	527570	
1081	3AR	233		7/8/2004	16:19	65	1400	Fox Pt	265079	528243	
1082	3AR	234		7/8/2004	21:25	402	1400	Fox Pt	264529	527638	

Summary of Disposal in CAD Cells

CAD Cell Disposal Event #	Cell	Cell Specific Disposal Event #	GLDD Event # (Dredge_ event)	Date	Time	Scow #	Estimated Volume Disposed (cy)	Origin of Material	Disposal Position N	Disposal Position E	Weather (wind, rainfall)
1083	3AR	235		7/9/2004	7:22	65	1850	Fox Pt	264902	527916	
1084	3AR	236		7/9/2004	12:42	402	1850	Fox Pt	264957	528160	
1085	3AR	237		7/9/2004	17:30	65	1850	Fox Pt	265054	527775	
1086	3AR	238		7/9/2004	21:47	402	1850	Fox Pt	265131	527838	
1087	3AR	239		7/10/2004	3:27	65	1825	Fox Pt	265324	527227	
1088	3AR	240		7/10/2004	8:39	402	1825	Fox Pt	264672	527929	
1089	3AR	241		7/10/2004	13:53	65	1825	Fox Pt	265453	527422	
1090	3AR	242		7/10/2004	19:30	402	1825	Fox Pt	265003	527534	
1091	3AR	243		7/11/2004	1:51	65	1560	Fox Pt	265097	528209	
1092	3AR	244		7/11/2004	5:42	402	1560	Fox Pt	264587	527684	
1093	3AR	245		7/11/2004	10:28	65	1560	Fox Pt	264791	527943	
1094	3AR	246		7/11/2004	14:35	402	1560	Fox Pt	264989	527935	
1095	3AR	247		7/11/2004	19:59	65	1560	Fox Pt	262721	528169	
1096		Missing									
1097	3AR	249		7/12/2004	4:52	65	1820	Fox Pt	265184	527468	
1098	3AR	250		7/12/2004	9:41	402	1820	Fox Pt	264886	527982	
1099	3AR	251		7/12/2004	14:25	65	1820	Fox Pt	265406	527759	
1100	3AR	252		7/12/2004	18:20	402	1820	Fox Pt	265050	527618	
1101	3AR	253		7/12/2004	23:18	65	1820	Fox Pt	265004	527935	
1102	3AR	254		7/13/2004	3:44	402	1560	Fox Pt	264611	527746	
1103	3AR	255		7/13/2004	9:07	65	1560	Fox Pt	264993	527799	
1104	3AR	256		7/13/2004	12:39	402	1560	Fox Pt	265103	528223	
1105	3AR	257		7/13/2004	17:20	65	1560	Fox Pt	264876	527846	
1106	3AR	258		7/13/2004	21:53	402	1560	Fox Pt	265210	527735	
1107	3AR	259		7/14/2004	4:10	65	2025	Fox Pt	264697	527575	
1108	3AR	260		7/14/2004	9:25	402	2025	Fox Pt	264751	527885	
1109	3AR	261		7/14/2004	14:41	65	2025	Fox Pt	265187	527434	
1110	3AR	262		7/14/2004	22:15	402	2025	Fox Pt	265012	527653	
1111	3AR	263		7/15/2004	3:25	65	1400	Fox Pt	265388	527747	
1112	3AR	264		7/15/2004	8:00	402	1400	Fox Pt	264725	527528	
1113	3AR	263		7/15/2004	10:51	65	1400	Fox Pt	265063	527957	
1114	3AR	266		7/15/2004	21:55	65	1400	Fox Pt	265258	527399	
1115	3AR	267		7/16/2004	2:00	402	1600	Fox Pt	265056	528144	
1116	3AR	268		7/16/2004	6:55	65	1600	Fox Pt	264695	527617	
1117	3AR	269		7/16/2004	9:57	402	1600	Fox Pt	265096	527632	
1118	3AR	270		7/16/2004	13:45	65	1600	Fox Pt	265480	527582	
1119	3AR	271		7/16/2004	17:05	402	1600	Fox Pt	265243	527633	
1120	3AR	272		7/16/2004	22:00	65	1600	Fox Pt	264793	527696	
1121	3AR	273		7/17/2004	2:20	402	2100	Fox Pt	264610	527512	
1122	3AR	274		7/17/2004	7:40	65	2100	Fox Pt	264949	528036	
1123	3AR	275		7/17/2004	12:00	402	2100	Fox Pt	264830	527987	
1124	3AR	276		7/17/2004	17:10	65	2100	Fox Pt	265638	527595	
1125	3AR	277		7/18/2004	1:45	402	1867	Fox Pt	264971	528276	
1126	3AR	278		7/18/2004	5:54	65	1867	Fox Pt	264612	527641	
1127	3AR	279		7/18/2004	9:04	402	1867	Fox Pt	265294	527540	
1128	3AR	280		7/18/2004	13:00	65	1867	Fox Pt	264907	527764	
1129	3AR	281		7/18/2004	16:45	402	1867	Fox Pt	265278	527872	
1130	3AR	282		7/18/2004	22:05	65	1867	Fox Pt	265067	528100	
1131	3AR	283		7/19/2004	4:40	402	1840	Fox Pt	264507	527811	
1132	3AR	284		7/19/2004	9:00	65	1840	Fox Pt	264793	527735	
1133	3AR	285		7/19/2004	13:25	402	1840	Fox Pt	264873	528020	
1134	3AR	286		7/19/2004	18:55	65	1840	Fox Pt	261619	529496	
1135	3AR	287		7/19/2004	23:14	402	1840	Fox Pt	264873	528020	
1136	3AR	288		7/20/2004	3:36	65	1433	Fox Pt	264730	527640	
1137	3AR	289		7/20/2004	7:11	402	1433	Fox Pt	265296	527567	
1138	3AR	290		7/20/2004	9:30	65	1433	Fox Pt	264775	527784	
1373	3AR	291		9/22/2004	0:55	401	3800	Fox Pt.	265233	527793	
1382	3AR	292		9/23/2004	23:31	34	3800	Fox Pt.	265338	527773	
1383	3AR	293		9/24/2004	2:53	34	1886	Fox Pt.	265399	527881	
1385	3AR	294		9/24/2004	5:55	34	1886	Fox Pt.	265607	527784	
1387	3AR	295		9/24/2004	9:10	34	1886	Fox Pt.	265260	527629	
1388	3AR	296		9/24/2004	12:10	34	1886	Fox Pt.	265372	527800	
1390	3AR	297		9/24/2004	15:35	34	1886	Fox Pt.	265416	527816	
1391	3AR	298		9/24/2004	19:35	34	1886	Fox Pt.	265328	527946	
1393	3AR	299		9/24/2004	22:35	34	1886	Fox Pt.	265216	527649	
1395	3AR	300		9/25/2004	1:40	34	1733	Fox Pt.	265342	527675	
1396	3AR	301		9/25/2004	4:50	34	1733	Fox Pt.	265567	527657	
1398	3AR	302		9/25/2004	8:09	34	1733	Fox Pt.	265450	527786	
1460	3AR	303		10/8/2004	20:05	401	3800	Fox Pt.	265305	527801	

Summary of Disposal in CAD Cells

CAD Cell Disposal Event #	Cell	Cell Specific Disposal Event #	GLDD Event # (Dredge_ event)	Date	Time	Scow #	Estimated Volume Disposed (cy)	Origin of Material	Disposal Position N	Disposal Position E	Weather (wind, rainfall)
1464	3AR	304		10/9/2004	4:15	401	3675	Fox Pt.	265406	527650	
1466	3AR	305		10/9/2004	10:25	401	3675	Fox Pt.	265204	527801	
1469	3AR	306		10/9/2004	16:00	401	3675	Fox Pt.	265508	527574	
1471	3AR	307		10/9/2004	20:25	401	3675	Fox Pt.	265305	527574	
1473	3AR	308		10/10/2004	0:45	401	2880	Fox Pt.	265204	527817	
1476	3AR	309		10/10/2004	5:10	401	2880	Fox Pt.	265407	527725	
1478	3AR	310		10/10/2004	9:43	401	2880	Fox Pt.	265350	527855	
1480	3AR	311		10/10/2004	14:07	401	2880	Fox Pt.	265317	527582	
1483	3AR	312		10/10/2004	20:35	401	2880	Fox Pt.	265238	527843	
1486	3AR	313		10/11/2004	1:11	401	2800	Fox Pt.	265333	527695	
1487	3AR	314		10/11/2004	18:38	63	3500	Fox Pt.	265437	527705	
1488	3AR	315		10/11/2004	5:52	401	2800	Fox Pt.	265529	527530	
1490	3AR	316		10/11/2004	17:21	401	2800	Fox Pt.	265425	527752	
1491	3AR	317		10/11/2004	21:27	401	2800	Fox Pt.	265189	527752	
1492	3AR	318		10/11/2004	23:27	65	3500	Fox Pt.	265346	527823	
1493	3AR	319		10/12/2004	2:12	401	3100	Fox Pt.	265540	527773	
1494	3AR	320		10/12/2004	4:24	65	4475	Fox Pt.	265518	527667	
1495	3AR	321		10/12/2004	7:05	401	3100	Fox Pt.	265191	527845	
1496	3AR	322		10/12/2004	9:02	65	4475	Fox Pt.	265323	527773	
1497	3AR	323		10/12/2004	10:50	401	3100	Fox Pt.	265196	527854	
1498	3AR	324		10/12/2004	14:34	65	4475	Fox Pt.	265303	527720	
1499	3AR	325		10/12/2004	15:05	401	3100	Fox Pt.	265810	527861	
1500	3AR	326		10/12/2004	18:51	401	3100	Fox Pt.	265852	527877	
1501	3AR	327		10/12/2004	19:43	65	4475	Fox Pt.	265448	527762	
1502	3AR	328		10/12/2004	22:55	401	3100	Fox Pt.	264845	527879	
1503	3AR	329		10/13/2004	0:41	65	2867	Fox Pt.	265258	527696	
1504	3AR	330		10/13/2004	2:35	401	2733	Fox Pt.	265032	527648	
1505	3AR	331		10/13/2004	5:05	65	2867	Fox Pt.	265365	527824	
1506	3AR	332		10/13/2004	6:40	401	2733	Fox Pt.	264864	527838	
1507	3AR	333		10/13/2004	9:55	65	2867	Fox Pt.	265385	521713	
1511	3AR	334		10/13/2004	22:20	401	2733	Fox Pt.	264811	527813	
1514	3AR	335		10/14/2004	2:30	401	3120	Fox Pt.	265051	527597	
1516	3AR	336		10/14/2004	6:30	401	3120	Fox Pt.	264881	527869	
1518	3AR	337		10/14/2004	10:25	401	3120	Fox Pt.	264782	527847	
1520	3AR	338		10/14/2004	15:25	401	3120	Fox Pt.	265097	527638	
1523	3AR	339		10/14/2004	20:35	401	3120	Fox Pt.	264909	527977	
1525	3AR	340		10/15/2004	0:50	401	2620	Fox Pt.	264961	527642	
1527	3AR	341		10/15/2004	5:55	401	2620	Fox Pt.	264940	527750	
1529	3AR	342		10/15/2004	10:30	401	2620	Fox Pt.	264865	527849	
1530	3AR	343		10/15/2004	14:52	63	6200	Fox Pt.	264919	527750	
1531	3AR	344		10/15/2004	17:30	402	2620	Fox Pt.	264737	527754	
1532	3AR	345		10/15/2004	20:00	63	6200	Fox Pt.	265421	527768	
1533	3AR	346		10/15/2004	21:42	402	2620	Fox Pt.	264993	527957	
1534	3AR	347		10/16/2004	1:03	63	3460	Fox Pt.	264815	527918	
1535	3AR	348		10/16/2004	1:47	402	2517	Fox Pt.	264950	528018	
1536	3AR	349		10/16/2004	5:34	402	2517	Fox Pt.	264962	528042	
1537	3AR	350		10/16/2004	6:35	63	3460	Fox Pt.	265253	528038	
1538	3AR	351		10/16/2004	10:05	402	2517	Fox Pt.	265006	527961	
1539	3AR	352		10/16/2004	12:24	63	3460	Fox Pt.	264833	527856	
1540	3AR	353		10/16/2004	13:47	402	2517	Fox Pt.	264911	527699	
1541	3AR	354		10/16/2004	17:40	63	3460	Fox Pt.	264814	527838	
1542	3AR	356		10/16/2004	18:00	402	2517	Fox Pt.	264836	527908	
1543	3AR	357		10/16/2004	23:00	402	2517	Fox Pt.	264867	528017	
1544	3AR	358		10/16/2004	23:20	63	3460	Fox Pt.	265316	527749	
1545	3AR	359		10/17/2004	3:20	402	4175	Fox Pt.	265020	527602	
1546	3AR	360		10/17/2004	5:39	63	4625	Fox Pt.	264978	527744	
1547	3AR	361		10/17/2004	7:46	402	4175	Fox Pt.	264865	528028	
1548	3AR	362		10/17/2004	10:57	63	4625	Fox Pt.	265219	527702	
1549	3AR	363		10/17/2004	14:13	402	4175	Fox Pt.	264688	527776	
1550	3AR	364		10/17/2004	16:31	63	4625	Fox Pt.	265173	527834	
1551	3AR	365		10/17/2004	19:45	402	4175	Fox Pt.	264925	527921	
1552	3AR	366		10/17/2004	21:40	63	4625	Fox Pt.	264920	527697	
1553	3AR	367		10/18/2004	0:35	402	3438	Fox Pt.	265116	527647	
1554	3AR	368		10/18/2004	4:20	63	3350	Fox Pt.	265110	527534	
1555	3AR	369		10/18/2004	7:40	402	3438	Fox Pt.	264757	527894	
1556	3AR	370		10/18/2004	10:15	63	3350	Fox Pt.	264823	527857	
1557	3AR	371		10/18/2004	12:05	402	3438	Fox Pt.	264813	527701	
1560	3AR	372		10/18/2004	20:05	402	3438	Fox Pt.	264784	527856	
1562	3AR	373		10/19/2004	1:10	402	3260	Fox Pt.	264924	527695	

Summary of Disposal in CAD Cells

CAD Cell Disposal Event #	Cell	Cell Specific Disposal Event #	GLDD Event # (Dredge_ event)	Date	Time	Scow #	Estimated Volume Disposed (cy)	Origin of Material	Disposal Position N	Disposal Position E	Weather (wind, rainfall)
1565	3AR	374		10/19/2004	6:15	402	3260	Fox Pt.	264794	527850	
1567	3AR	375		10/19/2004	11:05	402	3260	Fox Pt.	264739	527849	
1570	3AR	376		10/19/2004	17:24	402	3260	Fox Pt.	264978	527927	
1571	3AR	377		10/19/2004	21:45	402	3260	Fox Pt.	264813	527701	
1572	3AR	378		10/20/2004	10:29	402	3720	Fox Pt.	265076	527675	
1573	3AR	379		10/20/2004	2:00	402	3720	Fox Pt.	264699	527855	
1574	3AR	380		10/20/2004	3:58	63	4825	Fox Pt.	264893	527906	
1575	3AR	381		10/20/2004	8:30	402	3720	Fox Pt.	264794	527850	
1576	3AR	382		10/20/2004	9:18	63	4825	Fox Pt.	265225	527848	
1577	3AR	383		10/20/2004	13:05	402	3720	Fox Pt.	265202	527860	
1578	3AR	384		10/20/2004	16:12	63	4825	Fox Pt.	265200	527718	
1579	3AR	385		10/20/2004	18:10	402	3720	Fox Pt.	264799	527780	
1580	3AR	386		10/20/2004	21:15	63	4825	Fox Pt.	265122	527863	
1581	3AR	387		10/20/2004	22:10	402	3720	Fox Pt.	264947	527923	
1583	3AR	388		10/21/2004	3:00	402	3267	Fox Pt.	265225	527848	
1584	3AR	389		10/21/2004	7:40	63	4260	Fox Pt.	264885	527669	
1585	3AR	390		10/21/2004	8:05	402	3267	Fox Pt.	265051	527951	
1586	3AR	391		10/21/2004	12:11	63	4260	Fox Pt.	265002	527909	
1587	3AR	392		10/21/2004	14:50	402	3267	Fox Pt.	265200	527886	
1588	3AR	393		10/21/2004	16:14	63	4260	Fox Pt.	264960	527865	
1589	3AR	394		10/21/2004	20:50	63	4260	Fox Pt.	265106	527764	
1590	3AR	395		10/22/2004	2:05	63	3540	Fox Pt.	265235	527689	
1591	3AR	396		10/22/2004	7:32	63	3540	Fox Pt.	265167	527546	
1592	3AR	397		10/22/2004	12:00	63	3540	Fox Pt.	265171	527923	
1593	3AR	398		10/22/2004	16:48	63	3540	Fox Pt.	265064	527633	
1594	3AR	399		10/22/2004	23:15	402	3540	Fox Pt.	264911	527699	
1595	3AR	400		10/22/2004	23:39	63	3540	Fox Pt.	265068	527722	
1596	3AR	401		10/23/2004	3:50	402	3800	Fox Pt.	264865	527849	
1597	3AR	402		10/23/2004	5:00	63	4360	Fox Pt.	265211	527824	
1598	3AR	403		10/23/2004	8:55	402	3800	Fox Pt.	264911	527699	
1599	3AR	404		10/23/2004	9:21	63	4360	Fox Pt.	265061	527848	
1600	3AR	405		10/23/2004	13:25	402	3800	Fox Pt.	265051	527597	
1601	3AR	406		10/23/2004	13:36	63	4360	Fox Pt.	264759	527646	
1603	3AR	407		10/23/2004	21:29	63	4360	Fox Pt.	264804	527843	
1604	3AR	408		10/24/2004	3:04	63	3863	Fox Pt.	265051	527750	
1605	3AR	409		10/24/2004	8:31	63	3863	Fox Pt.	264927	527597	
1606	3AR	410		10/24/2004	17:13	63	3863	Fox Pt.	264984	527831	
1607	3AR	411		10/24/2004	22:33	63	3863	Fox Pt.	265019	527758	
1608	3AR	412		10/25/2004	4:05	63	3933	Fox Pt.	265163	527768	
1609	3AR	413		10/25/2004	11:39	63	3933	Fox Pt.	264857	527669	
1610	3AR	414		10/25/2004	14:22	63	3933	Fox Pt.	265178	527625	
1611	3AR	415		10/25/2004	23:32	63	3933	Fox Pt.	264861	527744	
1612	3AR	416		10/26/2004	5:17	63	6800	Fox Pt.	265337	527685	
1678	3AR	417		11/5/2004	19:33	61	4000	Fox Pt.	264905	527883	
1681	3AR	418		11/6/2004	17:34	402	4400	Fox Pt.	265164	527717	
1682	3AR	419		11/6/2004	21:17	402	3083	Fox Pt.	265906	527797	
1683	3AR	420		11/7/2004	1:07	402	3083	Fox Pt.	265317	527753	
1684	3AR	421		11/7/2004	5:14	402	3083	Fox Pt.	265274	527719	
1685	3AR	422		11/7/2004	9:49	402	3083	Fox Pt.	264947	528005	
1687	3AR	423		11/7/2004	13:50	402	3083	Fox Pt.	265032	527531	
1689	3AR	424		11/7/2004	18:31	402	3083	Fox Pt.	264917	527863	
1691	3AR	425		11/7/2004	21:58	402	3083	Fox Pt.	264867	527793	
1693	3AR	426		11/8/2004	2:00	402	1700	Fox Pt.	265199	527507	
1734	3AR	427		11/13/2004	15:10	61	1650	Fox Pt.	264962	527870	
1735	3AR	428		11/13/2004	22:09	63	1650	Fox Pt.	265096	527691	
1736	3AR	429		11/14/2004	5:26	63	1000	Fox Pt.	265080	527841	
1804	3AR	430		12/25/2004	9:30	401	2000	Fox Pt.	264943	528213	
1808	3AR	431		12/27/2004	12:43	401	2000	Fox Pt.	264993	527995	
1810	3AR	432		12/27/2004	21:25	401	2000	Fox Pt.	264985	527801	
1811	3AR	433		12/28/2004	5:44	401	2000	Fox Pt.	265284	527799	
1812	3AR	434		12/28/2004	12:33	401	2000	Fox Pt.	265472	527685	
1813	3AR	435		12/28/2004	19:04	401	2000	Fox Pt.	265353	527605	
1814	3AR	436		12/29/2004	3:18	401	2000	Fox Pt.	265090	527976	
1834	3AR	437		7/19/2005	14:48	401	2390	Fox Pt.	264831	527699	
1835	3AR	438		7/20/2005	2:08	401	1583	Fox Pt.	264531	527901	
1836	3AR	439		7/20/2005	10:22	401	1583	Fuller Rk	265067	527810	
1837	3AR	440		7/20/2005	21:31	401	1583	Fuller Rk	264946	527683	

Appendix B3

Disposal Barge Log Summary

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
4/13/2003 11:57:00 PM	5600	41.229167	-71.385	Trip 1; Split scow; Disposal Site C
4/14/2003 3:18:00 PM	4200	41.234667	-71.375833	computer
4/15/2003 12:48:00 PM	4000	41.226606	-71.385245	Trip 3, Disposal Site C, Split Scow
4/16/2003 2:58:00 AM	4100	41.234167	-71.3715	Trip 4; Disposal Site B
4/16/2003 2:57:00 PM	4600	41.234333	-71.384833	Trip 5; Disposal Site A, Split Scow
4/17/2003 3:15:00 AM	4000	41.235333	-71.375667	Trip 6; Disposal Site F, Split Scow
4/18/2003 12:06:00 AM	3500	41.224764	-71.379137	Trip 7; Disposal Site E, scow draft data still not recording accurately on computer
4/18/2003 5:39:00 PM	3000	41.234167	-71.385333	Trip 8; Disposal Site A
4/19/2003 7:09:00 AM	3500	41.235	-71.375667	Trip 9; Disposal Site F
4/19/2003 9:42:00 PM	3500	41.234333	-71.3715	Trip 10; Disposal Site B
4/20/2003 9:39:00 AM	3500	41.234333	-71.384833	Trip 11; Disposal Site A
4/20/2003 9:43:00 PM	3500	41.234333	-71.384667	Trip 12; Disposal Site A
4/21/2003 11:05:00 AM	3500	41.234333	-71.385	Trip 13; Disposal Site A
4/22/2003 8:46:00 AM	3500	41.2345	-71.384833	Trip 14; Disposal Site A
4/23/2003 5:27:00 AM	3500	41.224798	-71.377814	Trip 15; Disposal Site E
4/23/2003 4:33:00 PM	3000	41.222667	-71.384667	Trip 16; Disposal Site C
4/24/2003 8:28:00 AM	3500	41.234333	-71.384833	Trip 17; Disposal Site A
4/25/2003 12:18:00 AM	3500	41.224667	-71.376333	Trip 18; Scow dumped by buoy - Computer had no data on scow - Dumping mechanism also inoperable - crewman boarded scow to open mannually for disposal
4/25/2003 4:12:00 PM	3750	41.227065	-71.386116	Trip 19; Disposal Site C, No problems discharging vessel
4/28/2003 1:31:00 AM	3500	41.235167	-71.3755	Trip 20; Disposal Site F, computer lost tug positioning capabilities - Had to call Mike C. for assistance with program. Time was also shown incorrectly; Disposal was made and recorded in proper cell.
4/28/2003 1:22:00 PM	3800	41.222667	-71.384667	Trip 21; Disposal in Cell C, no problems discharging vessel. Had to stand by for dredge to finish next load upon return at 18:30
4/29/2003 11:35:00 AM	1800	41.224614	-71.372398	Trip 22; Disposal in Cell G, no problems discharging this vessel.
4/30/2003 12:37:00 AM	4100	41.22691	-71.374106	Trip 23; Disposal in Cell D, No problems discharging this vessel.
4/30/2003 4:51:00 PM	1800	41.235167	-71.375667	Trip 24; Disposal in Cell F, No problems discharging this vessel.
5/1/2003 3:14:00 AM	1800	41.234333	-71.371333	Trip 25; Disposal in Cell B, No problems discharging this vessel.
5/1/2003 2:20:00 PM	1200	41.234667	-71.384833	Trip 26; Disposal in Cell A; Disposal approx. 50 ft west of cell center. Computer system failed and unable to correct after communicating with Great Lakes officer while less than one hr from disposal site. Scow was dumped successfully in cell using tug'
5/3/2003 10:10:00 PM	2500	41.230667	-71.380333	Trip 27; Computer not available, smooth run no problems
5/4/2003 8:22:00 AM	4200	41.235167	-71.374	Trip 28; Disposal in center of Cell B, Smooth run, no problems
5/4/2003 4:40:00 PM	1350	41.235167	-71.374	Trip 29; Disposal in center of Cell B, Smooth run, no problems
5/5/2003 5:27:00 AM	4300	41.235167	-71.385833	Trip 30; Disposal in center of Cell A, Smooth run, no problems
5/6/2003 2:00:00 AM	2000	41.227054	-71.385738	Trip 31; Disposal in center of Cell C, Smooth run, no problems
5/7/2003 2:06:00 AM	5000	41.226833	-71.385833	Trip 32; Disposal in Cell C 25 west of center, Smooth run, no problems
5/8/2003 1:06:00 AM	6000	41.235167	-71.385833	Trip 33; Disposal in Cell A, 25 ft west of center, Smooth run, No problems
5/8/2003 8:41:00 PM	4500	41.235167	-71.374833	Trip 34; Disposal in center of Cell B. Smooth Run, no problems

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
5/9/2003 8:20:00 PM	5200	41.225	-71.378333	Trip 35; Disposal 25 ft west of center of Cell E. Scow did not fully discharge load. Aprox. 1,000 cy still left in scow upon return. Unable to determine that scow had fully discharged at site due to poor visibility in fog. Draft upon return was 6.1 ft
5/10/2003 10:15:00 AM	5000	41.225	-71.378333	Trip 35; Disposal 20 ft east of center of Cell E. Smooth run, no problems
5/11/2003 8:13:00 AM	5500	41.225	-71.378333	Trip 37; Disposal in Cell E. Smooth run, no problems. Vessel arrived at site at 07:00 and lingered until 08:00 until site was open to dump.
5/12/2003 6:26:00 AM	5800	41.226833	-71.385833	Trip 38; Disposal in Cell C, 25 ft east of cell center, no problems, smooth run
5/13/2003 2:14:00 AM	5800	41.235167	-71.385833	Trip 39; Disposal in Cell A, 25 ft NE of cell center, no problems, smooth run, some material remained in scow forward draft 9 ft, aft draft 10 ft
5/13/2003 6:29:00 PM	5400	41.226857	-71.375334	Trip 40; Disposal in Cell D, 50 ft west of center. Smooth run, no problems, sighted unknown species of whale in dump zone, only sighted once during closing of scow and was not able to make positive ID
5/14/2003 5:34:00 PM	5900	41.230667	-71.380333	Trip 41; Smooth run, no problems. Vessel received call from project manager that all dumps now and in future would be made at the buoy.
5/15/2003 6:06:00 PM	5400	41.2375	-71.385	Trip 42; Disposal in center of CAD 1, smooth run, no problems
5/16/2003 9:55:00 AM	5700	41.2385	-71.387667	Trip 43; Disposal 100 ft south of CAD #2. Smooth run, no problems, material remained in scow did not dump. Approx 1000 yards remained after dump was made.
5/16/2003 2:45:00 PM	5500	41.228889	-71.383333	CAD4.
5/17/2003 11:56:00 PM	6000	41.224222	-71.37475	Trip 45; Disposal at site D
5/18/2003 12:38:00 PM	5500	41.2269	-71.385557	Trip 46; Disposal at site C
5/19/2003 1:52:00 AM	5000	41.225089	-71.375103	Trip 47; Disposal at site G
5/19/2003 1:50:00 PM	5400	41.230694	-71.377944	Trip 48; Disposal at site E, Computer changed load number to #50, should be load #48
5/19/2003 11:10:00 PM	5700	41.235333	-71.385333	Load 49; Disposal at site A
5/22/2003 6:47:00 PM	5800	41.23685	-71.385427	Trip 53; Disposal at site CAD 1
5/23/2003 10:27:00 AM	5900	41.235458	-71.388217	Trip 54; Disposal at site CAD 2
5/24/2003 3:36:00 AM	5600	41.232668	-71.388663	Trip 55; Disposal at site 3
5/24/2003 10:23:00 PM	5900	41.229312	-71.387917	Trip 56; Disposal at site CAD 4
5/25/2003 7:57:00 PM	5200	41.226906	-71.388132	Trip 57; Disposal at site CAD 5
5/26/2003 6:10:00 PM	5600	41.236833	-71.385425	Trip 58; Disposal at site CAD 1
5/27/2003 9:51:00 AM	5700	41.235293	-71.387695	Trip 59; Disposal at site CAD 2
5/28/2003 7:02:00 AM	5600	41.232614	-71.388439	Trip 60; Disposal at site CAD 3
5/28/2003 9:55:00 PM	5000	41.229497	-71.387781	Trip 61; Disposal at site CAD 4, No mud visible, only water is visible in hopper
5/29/2003 10:30:00 PM	3700	41.222667	-71.386	Trip 62; Dispsoal in CAD 5; Disposal ok
5/30/2003 3:07:00 PM	3700	41.223722	-71.386206	Trip 63; Disposal in CAD 6; Disposal ok
5/31/2003 9:13:00 AM	3700	41.2355	-71.384667	Trip 64; Disposal in CAD 1, Good disposal
6/1/2003 5:59:00 AM	3700	41.234333	-71.386	Trip 65; Disposal in CAD 2, Good Disposal
6/2/2003 5:18:00 AM	3700	41.231595	-71.387999	Trip 66; Disposal in CAD 3, Good Disposal
6/2/2003 11:46:00 PM	3700	41.224167	-71.385667	Trip 67; Disposal in CAD 4, Good Disposal
6/7/2003 3:30:00 PM	3700	41.226546	-71.388444	Trip 77; Disposal in CAD 5, A ok
6/8/2003 6:17:00 AM	3700	41.223756	-71.386486	Trip 78; Disposal in CAD 6, A ok
6/8/2003 5:35:00 PM	3700	41.2355	-71.384333	Trip 79; Disposal in CAD 1, A ok

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
6/9/2003 3:05:00 AM	3700	41.234333	-71.3845	Trip 80; Disposal in CAD 2, A ok
6/10/2003 11:15:00 PM	3700	41.224	-71.385833	Trip 82; Disposal in CAD 4, A ok
6/11/2003 12:05:00 AM	3700	41.226333	-71.386167	Trip 81; Disposal in CAD 3, A ok
6/11/2003 9:00:00 AM	3700	41.222833	-71.386	Trip 83; Disposal in CAD 5, A ok
6/18/2003 11:03:00 AM	5500	41.2375	-71.385	Trip 100; Disposal 25 ft west of cell CAD 1, Smooth run, no problems
6/19/2003 8:41:00 PM	6500	41.2355	-71.387667	Trip 101; Disposal center of CAD 2, Smooth run, no problems
6/20/2003 11:53:00 AM	6000	41.232667	-71.388333	Trip 102; Disposal 100 ft north of CAD 3 Center, Radio control device failed to start engine on scow at 11:46, dump was made at 11:53 using emergency dump option on remote control panel, no other problems
6/21/2003 5:27:00 AM	6500	41.229833	-71.388167	Trip 103; Disposal 100 ft west of center of CAD 4, smooth run, no problems
6/21/2003 8:21:00 PM	6200	41.227333	-71.388	Trip 104; Disposal 25 ft east of center of CAD 5, smooth run, no problems
6/22/2003 9:16:00 PM	6200	41.2245	-71.386667	Trip 105; Disposal 100 ft east of center CAD 6, smooth run, no problems
6/23/2003 10:35:00 PM	6200	41.2375	-71.385	Trip 106; Disposal center of CAD 1, smooth run, no problems
6/24/2003 8:32:00 AM	6000	41.2355	-71.387667	Trip 107; Disposal 50 ft west of center of CAD 2, smooth run, no problems
6/24/2003 11:31:00 PM	6500	41.232667	-71.388333	Trip 108; Disposal center of CAD 3, Smooth run, no problems
6/25/2003 11:43:00 PM	6500	41.229833	-71.388167	Trip 109; Disposal center of CAD 4, Smooth run, no problems
6/26/2003 8:20:00 PM	3700	41.226167	-71.386	Trip 110; Disposal in CAD 5. A-ok.
6/27/2003 11:46:00 AM	3700	41.228	-71.387667	Trip 111; Disposal in CAD 6. Disposal, A-ok. Traffic delay 05:35 - 07:15 hrs.
6/28/2003 7:45:00 AM	3700	41.2355	-71.384333	Trip 112; Disposal in CAD 1. Disposal, A-ok. Traffic delay 02:00 - 02:50 hrs.
6/29/2003 1:15:00 AM	3700	41.234167	-71.3855	Trip 113; Disposal in CAD 2. A-ok.
6/29/2003 7:20:00 PM	3000	41.225667	-71.383833	Trip 114; Disposal in CAD 3.
6/30/2003 9:40:00 AM	3000	41.224333	-71.386333	Trip 115; Disposal in CAD 4. A-ok.
6/30/2003 10:40:00 PM	3000	41.227634	-71.387224	Trip 116; Disposal in CAD 5. A-ok.
7/1/2003 12:20:00 PM	3000	41.223626	-71.386108	Trip 117; Disposal in CAD 6. A-ok.
7/2/2003 4:27:00 AM	4000	41.235667	-71.384167	Trip 118; Disposal in CAD 1. A-ok.
7/3/2003 12:02:00 AM	3000	41.226167	-71.386333	Trip 119; Disposal in CAD 3. A-ok.
7/3/2003 12:22:00 PM	4000	41.223	-71.386333	Trip 120; Disposal in CAD 4.
7/3/2003 7:05:00 PM	4000	41.2375	-71.385	Trip 121; Disposal Center of CAD 1, smooth run, no problems, vessel laid-up outside of Newport due to thick fog
7/3/2003 11:40:00 PM	3000	41.222667	-71.386333	Trip 122; Disposal in CAD 5. A-ok.
7/4/2003 2:25:00 PM	3000	41.223975	-71.386598	Trip 123; Disposal in CAD 6. A-ok.
7/4/2003 3:05:00 PM	4000	41.2355	-71.387667	Trip 124; Disposal 50 ft west of center CAD 2, no problems discharging scow
7/5/2003 6:15:00 AM	4000	41.232667	-71.388333	Trip 126; Disposal 100 ft east of center of CAD 3
7/5/2003 12:30:00 PM	3000	41.236074	-71.384959	Trip 125; Disposal in CAD 1. Departure delay- five hours -holiday traffic. Scow remote control failed to function at disposal site necessitating further delay from replacement of battery.
7/6/2003 12:13:00 AM	4000	41.2345	-71.386	Trip 128; Disposal in CAD 2. A-ok.
7/6/2003 11:25:00 AM	2500	41.230667	-71.380333	Trip 127; Vessel arrived at dump site at 23:05 (7/5/03). Remote system failed to operate, emergency dump function failed to operate (two attempts) vessel returned to Narragansett Bay to pick up technition to repair sysi vessel returned to dump site, on sc
7/6/2003 12:01:00 PM	3000	41.223667	-71.3895	Trip 129; Disposal in CAD 3. Scow icon not recorded on computer - disposal made by GPS cord's
7/7/2003 2:42:00 AM	4000	41.224167	-71.386	Trip 130; Disposal in CAD 4. A-ok.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
7/7/2003 9:15:00 AM	4000	41.229833	-71.388167	Trip 131; Disposal center of CAD 4, smooth run, no problems discharging scow
7/7/2003 2:22:00 PM	3000	41.222667	-71.386167	Trip 132; Disposal in CAD 5. A-ok.
7/8/2003 3:05:00 AM	4000	41.227333	-71.388167	Trip 133; Disposal center of CAD 5, smooth run, no problems discharging load
7/8/2003 9:15:00 AM	3000	41.223921	-71.386802	Trip 134; Disposal in CAD 6. Scow #402 did not close after disposal, wouldn't close until 11:30 hours.
7/8/2003 5:35:00 PM	4000	41.2245	-71.386667	Trip 135; Disposal from center to 100 ft south of CAD 6
7/9/2003 6:30:00 PM	3000	41.235	-71.384167	Trip 136; Disposal in CAD 1. Scow did not close until one hour after opening and disposal.
7/9/2003 8:42:00 PM	4000	41.2375	-71.385	Trip 137; Disposal 100 ft SE of Center of CAD 1, from dredge 55, load 8 smooth run, scow did not fully discharge
7/10/2003 6:15:00 AM	3000	41.2345	-71.386	Trip 138; Disposal in CAD 2. A-ok. GLDD Trip#51-129
7/10/2003 5:23:00 PM	4000	41.2355	-71.387667	Trip 139; Disposal 100 ft W of center of CAD 2. From drege 55, load 10, smooth run, some material was left on port side of scow.
7/11/2003 2:45:00 AM	3500	41.23179	-71.387842	Trip 140; Disposal in CAD 3, Starboard badly needs to be cleaned on Scow 62, GLDD Trip #55-11
7/11/2003 5:09:00 PM	4000	41.232667	-71.388333	Trip 141; Disposal 100 ft E of center of CAD 3, dredge 55, load 12, smooth run, no problems discharging
7/12/2003 3:50:00 AM	3500	41.224667	-71.386333	Trip 142; Disposal in CAD 4, A ok, GLDD trip #55-13
7/12/2003 2:57:00 PM	4000	41.229833	-71.388167	Trip 143; Disposal center of CAD 4, dredge 55, load 14, smooth run no problems
7/13/2003 11:49:00 AM	3500	41.222667	-71.386333	Trip 144; Disposal in CAD 5, 7/12/03 at 21:25 secure to mooring. Await weather SW 20-25 6-8 ft, GLDD Trip #55-15
7/13/2003 10:41:00 PM	4000	41.227333	-71.388	Trip 145; Disposal in CAD 5, dredge 55, load 16, smooth run no problems
7/14/2003 11:50:00 AM	3500	41.224706	-71.387345	Trip 146; Disposal in CAD 6, GLDD Trip #55-17
7/15/2003 12:50:00 AM	4000	41.2245	-71.386667	Trip 147; Disposal in center of CAD 6, dredge 55, load 18, smooth run, no problems discharging scow, track log not available
7/15/2003 3:00:00 PM	3500	41.236	-71.384333	Trip 148; Disposal in CAD 1, GLDD Trip #55-19
7/16/2003 12:50:00 AM	4000	41.2375	-71.385	Trip 149; Disposal center of CAD 1, Dredge 55 load 20, smooth run, no problems discharging scow
7/16/2003 11:50:00 AM	4700	41.235528	-71.388333	Trip 150; Disposal in CAD 2, GL Load 21 from D-55, No problems discharging scow
7/16/2003 8:40:00 PM	4000	41.2355	-71.387667	Trip 151; Disposal in center of CAD 2, Dredge 55 Load 22 smooth run no problems discharging scow
7/17/2003 9:42:00 AM	5000	41.232694	-71.388778	Trip 152; Disposal in center of CAD 3, GL-55 Load #23, No problems discharging scow, GL computer load #27
7/17/2003 10:46:00 PM	4000	41.232667	-71.388333	Trip 153; Disposal in center of CAD 3, Dredge 55 Load #24, Smooth run, no problems discharging scow
7/18/2003 10:08:00 AM	6100	41.229361	-71.387972	Trip 154; Disposal in CAD 4. No problems discharging scow. GL D-55 #25 GL CRT#29
7/18/2003 11:20:00 PM	4000	41.229833	-71.388167	Trip 155; Disposal 50 ft east of center of CAD 4, Dredge 55, Load #26, Smooth run, no problems discharging scow
7/19/2003 11:24:00 PM	4000	41.227333	-71.388	Trip 157; Disposal in center of CAD 5, dredge 55, load 26 smooth run, no problems discharging scow
7/20/2003 10:40:00 AM	4700	41.223972	-71.386278	Trip 158; Disposal in CAD 6. Dredge load #29 and Computer Load #37.
7/20/2003 9:55:00 PM	4000	41.2245	-71.386667	Trip 159; Disposal 100 ft north of center of CAD 6, Dredge 55, load #30, smooth run, no problems discharging scow
7/21/2003 4:24:00 PM	5100	41.237361	-71.385222	Trip 160; Disposal in RISDS-1. Dredge load #31 and CRT load #38.
7/22/2003 2:26:00 AM	4000	41.2375	-71.385	Trip 161; Disposal in center of CAD 1, Dredge 55 Load 32, smooth run, no problems discharging scow
7/22/2003 3:45:00 PM	5700	41.235222	-71.387667	Trip 162; Disposal in RISDS-2. Dredge load #33 and CRT load #43.
7/23/2003 1:04:00 AM	4000	41.2355	-71.387667	Trip 163; Disposal in center of CAD 2, dredge 55, load 34, smooth run, no problems discharging scow
7/23/2003 11:30:00 AM	5000	41.232778	-71.388333	Trip 164; Disposal in RISDS-3. Dredge load #35 and CRT load #44.
7/24/2003 11:53:00 AM	4000	41.232667	-71.388333	Trip 165; Disposal 50 ft E of RISDS 3, dredge 55, load 36, smooth run, no problems discharging scow

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
7/25/2003 10:43:00 AM	4000	41.229833	-71.388167	Trip 166; Disposal center of RISDS 4, dredge 55, load 38, smooth run, no problems discharging scow
7/25/2003 1:00:00 PM	4000	41.230646	-71.387703	Trip 167; Disposal in RISDS-4. Dredge load #37 and Computer load #40
7/25/2003 9:36:00 PM	2500	41.230667	-71.380333	Trip 168; Dredge 55, load 39, Telemetry not working on scow, load taken to bouy and dumped using radar fix, no problems dischargin scow
7/26/2003 8:25:00 AM	4000	41.222667	-71.386167	Trip 169; Disposal in RISDS-5. Dredge load #40 and Computer load #43
7/26/2003 7:04:00 PM	4000	41.227333	-71.388	Trip 170; Disposal 75 ft SE of center of RISDS 5, dredge 55, load 41, smooth run, no problems discharging scow
7/27/2003 11:57:00 AM	4000	41.224486	-71.387273	Trip 171; Disposal in RISDS #6, Dredge Load #42
7/27/2003 11:02:00 PM	4000	41.235667	-71.384333	Trip 173; Disposal in RISDS-1. Dredge load #43.
7/28/2003 12:16:00 AM	2500	41.230667	-71.380333	Trip 172; Dredge 51, load 184, scow failed to discharge normally or in emergency mode, returned with loaded scow in Newport RI at 19:44 repair technition was placed on scow, could not start scow due to low voltage in battery, tug boosted battery and proce
7/28/2003 3:39:00 PM	4000	41.2245	-71.386667	Trip 174; Disposal in center of RISDS 6, Dredge 55, load 44, smooth run, no problems discharging scow
7/28/2003 4:42:00 PM	3000	41.231321	-71.387556	Trip 175; Disposal in RISDS-2. Scow did not read computer data; Disposal was made by GPS and cord's
7/29/2003 3:25:00 AM	3000	41.226	-71.386333	Trip 176; Disposal in RISDS-3. Dredge load #186.
7/29/2003 11:14:00 AM	4000	41.2375	-71.385	Trip 177; Disposal 100 ft S of center of RISDS 1, dredge 55, load 45, smooth run, no problems discharging scow
7/30/2003 3:10:00 AM	4000	41.2355	-71.387667	Trip 179; Disposal 100 ft N of center of RISDS 2, dredge 55, load 46, smooth run, no problems discharging scow
7/30/2003 7:07:00 AM	3000	41.222667	-71.386167	Trip 178; Disposal in RISDS-5. Dredge load #188.
7/31/2003 2:16:00 AM	4000	41.232667	-71.388333	Trip 182; Disposal center of RISDS 3, dredge 55, load 47, smooth run, no problems discharging scow
7/31/2003 7:07:00 AM	3000	41.2355	-71.3845	Trip 180; Disposal in RISDS-1. Dredge load #190.
7/31/2003 2:11:00 PM	4000	41.229833	-71.388333	scow
7/31/2003 6:39:00 PM	3000	41.234667	-71.386	Trip 181; Disposal in RISDS-2. Dredge load #191.
8/1/2003 2:19:00 AM	4000	41.227333	-71.388	Trip 186; Disposal center of RISDS 5, dredge 55, load 49, smooth run, no problems discharging scow
8/1/2003 4:34:00 PM	4000	41.2245	-71.386667	Trip 187; Disposal center of RISDS 6, dredge 55, load 50, smooth run, no problems discharging scow
8/2/2003 10:08:00 AM	4000	41.2375	-71.385	Trip 189; Disposal 100ft N of center of RISDS 1, dredge 55, load 51, 3 hour weather hold for thick fog, smooth run, no problems discharging scow
8/2/2003 10:49:00 AM	3000	41.224167	-71.386333	Trip 183; Disposal in RISDS-4. Dredge load #195.
8/2/2003 9:15:00 PM	4000	41.2355	-71.387667	Trip 191; Dist/Dir is from center of RISDS #2; Dredge 55 load #52, smooth run no problems discharging scow, however scow did not fully discharge load;
8/2/2003 9:15:00 PM	4000	41.2355	-71.387667	Trip 191; Disposal 50ft NE of center of RISDS 2, dredge 55, load 52, smooth run, scow did not fully discharge load
8/2/2003 9:55:00 PM	3000	41.2307	-71.381317	Trip 196; Disposal in OH Bouy. GL Load #51-196
8/3/2003 9:00:00 AM	4000	41.232667	-71.388333	Trip 193; Disposal in center of RISDS 3, dredge 55, load 53, smooth run, no problems discharging scow
8/3/2003 9:00:00 AM	4000	41.232667	-71.388333	Trip 193; Dis/Dir is at center of RISDS #3; Dredge 55 load #53, smooth run, no problems discharging scow;
8/3/2003 3:07:00 PM	3000	41.222667	-71.386167	Trip 185; Disposal in RISDS-5. Dredge load #195
8/3/2003 10:46:00 PM	4000	41.229833	-71.388167	Trip 195; Disposal in center of RISDS 4, dredge 55, load 54, smooth run, no problems discharging scow, two hour delay due to harbor traffic
8/4/2003 2:42:00 AM	3000	41.223926	-71.386522	Trip 186; Disposal site RISDS #6; Dredge load #196;

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
8/4/2003 9:48:00 AM	4000	41.227333	-71.388	Trip 197; Disposal in center of RISDS 5, dredge 55, load 55, smooth run, no problems discharging scow
8/4/2003 2:47:00 PM	3000	41.235833	-71.384167	Trip 187; Disposal site RISDS #1; Dredge load 199;
8/4/2003 8:00:00 PM	4000	41.2245	-71.386667	Trip 199; Disposal in RISDS 6, dredge 55, load 56, smooth run, no problems discharging scow
8/5/2003 3:22:00 AM	3000	41.235245	-71.387731	Trip 188; Disposal in RISDS-2. Dredge load #198
8/5/2003 6:45:00 AM	4000	41.2375	-71.385	Trip 201; Disposal in center of RISDS 1, dredge 55, load 57, smooth run, no problems discharging scow
8/5/2003 3:37:00 PM	3000	41.234971	-71.387484	Trip 189; Disposal site RISDS #2; Dredge load 201; 09:30-09:50 traffic delay - Providence Harbor;
8/6/2003 2:49:00 AM	4000	41.2375	-71.387667	Trip 203; Disposal 100 ft of center of RISDS 2, dredge 55, load 58, smooth run, no problems discharging scow, track log chart N/A
8/6/2003 5:02:00 AM	3000	41.226	-71.3865	Trip 190; Disposal in RISDS-3. Dredge load #202
8/6/2003 5:02:00 AM	3000	41.226	-71.3865	Trip 190; Disposal site RISDS #3; Dredge load #202;
8/6/2003 1:46:00 PM	4000	41.232667	-71.388333	Trip 205; Disposal center of RISDS 3, dredge 55, load 59, smooth run, no problems discharging scow
8/6/2003 5:50:00 PM	3000	41.224667	-71.386	Trip 191; Disposal site RISDS #4; Dredge load 203; 10:45-12:00 traffic delay - Providence Harbor;
8/7/2003 3:51:00 AM	4000	41.229833	-71.388167	Trip 207; Disposal RISDS 4, dredge 55, load 60, smooth run, no problems discharging scow, 2hr delay for broken fish plate wire on scow
8/7/2003 6:29:00 AM	3000	41.226557	-71.38804	Trip 192; Disposal site RISDS #5; Dredge load 204;
8/7/2003 6:29:00 AM	3000	41.226493	-71.387931	Trip 192; Disposal in RISDS-5. Dredge load #204
8/7/2003 3:01:00 PM	4000	41.227333	-71.388	Trip 209; Disposal center of RISDS 5, dredge 55, load 61, smooth run, no problems discharging scow
8/7/2003 7:00:00 PM	3000	41.237833	-71.385	Load 401; Trip number crossed out for load number for the remainder of report 03-31; Disposal 1/2mile NE
8/8/2003 3:53:00 AM	4000	41.2245	-71.386667	scow
8/8/2003 8:50:00 AM	3000	41.237337	-71.385041	Load 402;
8/8/2003 8:46:00 PM	2500	41.2375	-71.385	Trip 213; Disposal Center of RISDS 1, dredge 51, load 207, scow did not fully discharge, scow did not appear to fully open. Scow was opened and towed through dump site from northern end to southern end and back to northern end and failed to completely di
8/9/2003 2:00:00 AM	4500	41.235833	-71.3845	Load 403;
8/9/2003 8:29:00 AM	2500	41.2355	-71.387667	Trip 215; Disposal center 75 ft N of center of RISDS 2, dredge 51, load 208, open dep scow had noticable stba list, smooth run, no problems discharging scow
8/9/2003 12:35:00 PM	3500	41.233333	-71.388167	Load 404;
8/9/2003 7:13:00 PM	2600	41.231942	-71.388475	Trip 217; RISDS 3; Load 209, material return to dredge 51, approx. 700 yds, volume dump at sea - Cad 3, is 1900 cy, material look like clay in scow pocket;
8/9/2003 11:48:00 PM	3500	41.231303	-71.388941	Load 405;
8/10/2003 7:15:00 AM	2400	41.228637	-71.387155	Trip 218; DISDS 4; Load 210, ok;
8/10/2003 12:05:00 PM	3500	41.229479	-71.388021	Load 406;
8/10/2003 6:54:00 PM	2500	41.227067	-71.39218	Trip 219; DISDS 5; Load 211, ok;
8/11/2003 12:35:00 AM	3500	41.224333	-71.385833	Load 407;
8/11/2003 8:02:00 AM	2400	41.224608	-71.385808	Trip 220; DSIDS 6; Load 212, ok;
8/11/2003 12:00:00 PM	3000	41.222667	-71.391167	Load 408;
8/11/2003 7:34:00 PM	2500	41.23397	-71.386762	Trip 221; DSIDS 7; Load 213, ok;
8/11/2003 11:42:00 PM	3500	41.224182	-71.387379	Load 409;
8/12/2003 7:19:00 AM	2600	41.234053	-71.388765	Trip 222; DSIDS 8; Load 214, ok, clean dump;
8/12/2003 12:20:00 PM	3000	41.235833	-71.384167	Load 410;

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
8/12/2003 6:29:00 PM	2400	41.231053	-71.388706	Trip 221; DSIDS 9; Load 215, ok;
8/13/2003 12:00:00 AM	4500	41.225352	-71.388183	Trip 225; DSIDS 11; Load 72, dredge 55;
8/13/2003 12:01:00 AM	3000	41.234167	-71.386333	Load 411;
8/13/2003 8:43:00 AM	2500	41.226978	-71.388047	Trip 224; DSIDS 5; Load 216, dredge 51, electronic machine didn't work, place man aboard scow for manual dump;
8/13/2003 7:25:00 PM	3000	41.223	-71.385833	Load 412;
8/14/2003 8:20:00 AM	3000	41.224139	-71.385689	Load 413;
8/14/2003 3:31:00 PM	4424	41.237463	-71.385117	Trip 226; RISDS 1; Load 73, dredge 53, exchange light GL 62 scow for loaded GL 35 scow to go to sea. Narragansett Bay inlet P.River;
8/14/2003 9:57:00 PM	2000	41.235523	-71.388245	Trip 227; RISDS 2; Load 217;
8/15/2003 6:41:00 AM	2700	41.232918	-71.388745	Trip 228; RISDS 3; Load 220, dredge 51;
8/15/2003 6:09:00 PM	4700	41.229627	-71.388348	Trip 229; RISDS 4; Load 74, was slow going out (material), the scow has a port list (return trip);
8/16/2003 3:30:00 AM	3000	41.235333	-71.385333	Trip 413;
8/16/2003 11:24:00 AM	2800	41.230865	-71.376144	Trip 230; RISDS 5, Load 76; electronic dump didn't register the scow on the monitor screen, scow was dumped at the buoy. Scow engine wouldn't start, a man was put aboard to start the engine;
8/17/2003 12:20:00 AM	3600	41.233833	-71.386667	Trip 77; GL Load 77;
8/17/2003 8:10:00 AM	2400	41.226959	-71.387513	Trip 231; RISDS 5, Load 78, ok;
8/17/2003 5:00:00 PM	3000	41.230167	-71.3885	Trip 79;
8/17/2003 10:40:00 PM	4800	41.224156	-71.386629	Trip 232; RISDS 6, Load 80, ok;
8/18/2003 4:26:00 AM	3000	41.222167	-71.386	Trip 81;
8/18/2003 12:26:00 PM	2700	41.216936	-71.380921	Trip 233; RISDS 6, Load 82, place man on scow to start engine, lost track of scow on monitor, dump at the buoy, lat/long from tug;
8/18/2003 7:35:00 PM	3600	41.224167	-71.383167	Trip 83;
8/19/2003 3:18:00 PM	2600	41.231867	-71.380817	Trip 234; RISDS 7, Load 221, ok. Scow no show on monitor;
8/20/2003 8:14:00 AM	3600	41.235667	-71.3835	Trip 222;
8/20/2003 6:46:00 PM	2730	41.23651	-71.386686	Trip 235; RISDS 7, Load 84, ok, dredge 55;
8/20/2003 10:16:00 PM	3300	41.2355	-71.385	Trip 223;
8/21/2003 12:45:00 PM	4910	41.233487	-71.388871	Trip 236; RISDS 8, Load 224, ok dredge 51;
8/22/2003 12:26:00 AM	2400	41.23082	-71.388581	Trip 237; RISDS 9, Load 225, ok dredge 51;
8/22/2003 5:07:00 AM	3200	41.224333	-71.386333	Trip 86; No problems discharging this vessel;
8/22/2003 3:47:00 PM	2500	41.228188	-71.387444	Trip 238; RISDS 10, Load 87, ok;
8/23/2003 3:08:00 AM	2300	41.225276	-71.387678	Trip 239; RISDS 11, Load 227, ok;
8/23/2003 5:38:00 AM	3200	41.223	-71.386	Trip 88; No problems discharging this vessel;
8/23/2003 9:09:00 PM	3200	41.235667	-71.385167	Trip 89; No problems discharging this vessel;
8/24/2003 8:31:00 AM	3200	41.235667	-71.386333	Trip 90; No problems discharging this vessel;
8/24/2003 11:47:00 AM	1800	41.232604	-71.388029	yds;
8/24/2003 2:37:00 PM	2150	41.237503	-71.385225	Trip 240; RISDS 1, Load 228, ok;
8/24/2003 7:34:00 PM	3000	41.225333	-71.3865	Trip 91; No problems discharging this vessel;
8/24/2003 10:11:00 PM	2400	41.229482	-71.388129	Trip 243; RISDS 4, Load 231, ok;
8/25/2003 1:02:00 AM	2300	41.235313	-71.387962	Trip 241; RISDS 2, Load 229, ok;

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
8/25/2003 6:26:00 AM	3200	41.223833	-71.386	Trip 92; No problems discharging this vessel;
8/25/2003 9:41:00 AM	1700	41.22685	-71.387618	Trip 244; RISDS 5, Load 232; Scow 35 dump ok, but was very slow in closing. Material return to dredge 51 500 yds. Dump at Cad 5 1700 yds;
8/25/2003 7:43:00 PM	3200	41.221833	-71.386	Trip 93; No problems discharging this vessel;
8/25/2003 9:12:00 PM	2400	41.224356	-71.386379	Trip 245; RISDS 6, Load 233, ok;
8/26/2003 6:53:00 AM	3200	41.236	-71.384667	Trip 94; no problems discharging this vessel;
8/26/2003 7:51:00 AM	2400	41.236772	-71.386833	Trip 246; RISDS 7, load 234; Half of the load in the scow 35 was dump in CAD 7. The other half was release in dump area; total time 41 min;
8/26/2003 12:17:00 PM	0	41.233814	-71.388646	Trip 247; RISDS 8;
8/26/2003 6:41:00 PM	3200	41.234833	-71.385667	Trip 95; no problems discharging this vessel;
8/27/2003 6:21:00 AM	3200	41.226333	-71.386333	Trip 96; no problems discharging this vessel;
8/27/2003 11:12:00 AM	2100	41.230953	-71.388296	Trip 248; RISDS 9, load 236, scow has port list, material in scow approx 3? (page cut off from xerox) 236. Return to dredge 51, scow load 2400-300 = 21? (page cut off);
8/27/2003 6:55:00 PM	3200	41.224667	-71.386333	Trip 97; no problems discharging this vessel;
8/27/2003 10:19:00 PM	2300	41.228242	-71.387905	Trip 249; RISDS 10, load 237, ok;
8/28/2003 5:50:00 AM	3200	41.222833	-71.386	Trip 98; no problems discharging this vessel;
8/28/2003 9:41:00 AM	2000	41.225392	-71.387675	Trip 250; RISDS 11, load 238, half of scow dump at CAD 11, the rest was dump at the RISDS dump area, material was slow going out, return material approx 400 yds (2400-400=2000);
8/28/2003 5:41:00 PM	3200	41.224204	-71.384994	Trip 99; no problems discharging this vessel;
8/28/2003 11:54:00 PM	2500	41.23753	-71.384873	Trip 251; RISDS 1, load 239, ok;
8/29/2003 8:41:00 AM	3200	41.2355	-71.385333	Trip 100; no problems discharging this vessel;
8/29/2003 11:21:00 AM	2400	41.235522	-71.387847	Trip 252; RISDS 2, load 240, ok;
8/30/2003 2:32:00 AM	3200	41.2335	-71.386333	Trip 101; no problems discharging this vessel in the disposal area, difficulties closing scow after dump, after numerous attempts the mate contested (?) the dredge #55 and was told to bring it back open, during the *xerox cut off) return the drafts were 4
8/30/2003 2:04:00 PM	3200	41.225167	-71.386333	Trip 102; no problems discharging this vessel;
8/30/2003 2:39:00 PM	2400	41.229646	-71.388215	Trip 254; RISDS 4, load 242, ok, good dump;
8/31/2003 2:22:00 AM	2400	41.227083	-71.388123	Trip 255; RISDS 5, load 243, circle the dump area until the scow closed;
8/31/2003 2:47:00 AM	3200	41.220667	-71.3855	Trip 103; problem tracking scow at dump site, both scow on site at same time had the boats picking up either scow randomly, picked up one lobster buoy on bridle;
8/31/2003 1:43:00 PM	2800	41.224478	-71.38572	process of dumping, when it stop opining. Some of the material was dump in CAD 6 - the rest was scattered in the dump site area;
8/31/2003 1:53:00 PM	3200	41.222	-71.385833	Trip 104; no problems discharging this vessel, material very slow to release;
9/1/2003 12:31:00 AM	2400	41.23627	-71.38696	Trip 257; RISDS 7, load 245, ok;
9/1/2003 1:10:00 AM	3200	41.235333	-71.384333	Trip 105; no problems discharging this vessel;
9/1/2003 11:14:00 AM	2000	41.233839	-71.388624	on port side;
9/1/2003 12:25:00 PM	3200	41.234667	-71.386167	Trip 106; no problems discharging this vessel;
9/2/2003 12:25:00 AM	2400	41.230973	-71.388573	Trip 259; RISDS 9, load 247, good dump;
9/2/2003 3:16:00 AM	3200	41.233333	-71.386333	Trip 107; no problems discharging this vessel;
9/2/2003 11:02:00 AM	2500	41.228093	-71.387731	Trip 260; RISDS 10, load 248, ok;

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
9/2/2003 2:57:00 PM	3200	41.2245	-71.385667	Trip 108; no problems discharging this vessel. Picked up one red and white lobster buoy in bridle;
9/3/2003 3:55:00 AM	3200	41.222833	-71.385667	Trip 109; no problems discharging this vessel;
9/3/2003 11:27:00 AM	2600	41.802798	-71.39144	Trip 262; RISDS 1; Load 250, port list on scow, some left over material in scow, return to dredge 51.
9/3/2003 3:38:00 PM	3200	41.221333	-71.385667	Trip 110; no problems discharging this vessel;
9/4/2003 3:51:00 AM	3200	41.235333	-71.3855	Trip 111; problems with scow engine;
9/4/2003 4:35:00 AM	2400	41.235284	-71.387883	Trip ?; RISDS 2; Load 251, good dump.
9/4/2003 4:21:00 PM	3200	41.233667	-71.3865	Trip 112; no problems discharging this vessel;
9/4/2003 8:46:00 PM	2600	41.232785	-71.388106	Trip 264; RISDC 3, load 252;
9/5/2003 5:16:00 AM	4000	41.231083	-71.388889	Trip 113; Computer trip #116, Dredge 55, Load #113.
9/5/2003 7:59:00 AM	2500	41.23668	-71.386467	Trip 265; Load 253, ok.
9/5/2003 6:02:00 PM	4000	41.228583	-71.388111	Trip 114; Computer load #117; Dredge load #114.
9/5/2003 6:02:00 PM	4000	41.22025	-71.388111	Trip 114; computer load 118, dredge 55 load 114;
9/5/2003 8:12:00 PM	2500	41.227004	-71.38765	Trip 266; Load 254, ok.
9/6/2003 6:29:00 AM	5400	41.225467	-71.387783	Trip 115; Computer load #118, Dredge 55 Load #115.
9/6/2003 7:28:00 AM	2400	41.224174	-71.387183	Trip 267; Load 255, ok.
9/6/2003 6:56:00 PM	2500	41.23693	-71.38643	Trip 268; Load 256, good dump, scow has port list.
9/6/2003 7:33:00 PM	5100	41.237467	-71.384683	Trip 116; Computer load #116, Dredge 55 Load #116.
9/7/2003 5:55:00 AM	1700	41.233649	-71.388753	Trip 269; Load 117, good dump.
9/7/2003 5:30:00 PM	5030	41.238	-71.386	Trip 118; Dumped fully in about 30 sec.
9/8/2003 6:29:00 AM	4700	41.232667	-71.380283	Trip 270; Load 119, no show, scow on monitor. Scow engine wouldn't start from tug. Place deckhand on scow to start engine. Deck hand shut the scow engine down. To see if we could start the engine from the tug. Didn't work. The deckhand dump the scow. Pick
9/8/2003 7:47:00 PM	4700	41.231	-71.3865	Trip 120; No problem dischargingf scow, green running light on scow inop.
9/9/2003 12:00:00 AM	4850			Trip 271; ___?
9/9/2003 9:22:00 PM	4500	41.2245	-71.386167	Trip 122; Dredge 55, computer and trip #'s coordinated, All #122, Scow discharges load rapidly.
9/10/2003 11:57:00 AM	2800	41.229483	-71.39665	Trip 123; from dredge #55 scow GL #62, good disposal all okay;
9/11/2003 2:50:00 AM	3800	41.2225	-71.385833	Trip 124; depiction of dump sites on computer do not correlate to actual coordinates listed in table 1 - update #3;
9/14/2003 2:03:00 AM	4200	41.228747	-71.387817	Trip 125; scow #GL 65, good dump all okay;
9/14/2003 12:51:00 PM	2800	41.226	-71.387167	Trip 126; draft sensor showing -4.7 ft when scow full;
9/15/2003 12:30:00 AM	5200	41.22535	-71.388025	Trip 127; all okay;
9/15/2003 9:50:00 AM	2800	41.224417	-71.386833	Trip 128; Draft sensors on 402 reading incorrectly, bow showing -4 ft, stern did not change when dumped.
9/16/2003 12:56:00 AM	3200	41.235833	-71.3845	Trip 129; no problems discharging this vessel;
9/16/2003 10:07:00 AM	2800	41.237083	-71.386833	Trip 130; no problems discharging this vessel;
9/16/2003 7:12:00 PM	3200	41.2345	-71.385833	Trip 131; no problems discharging this vessel;
9/20/2003 2:31:00 PM	3200	41.226333	-71.386167	Trip 133; no problems discharging this vessel, two lobster buoy in bridle, blue and yellow;
9/20/2003 10:25:00 PM	2800	41.233333	-71.388667	Trip 133; no GPS telemetry from scow, position plotted by radar;
9/21/2003 3:03:00 PM	3200	41.2245	-71.386	Trip 134; No problems discharging this vessel. Same two ___ ___ ____.
9/21/2003 11:35:00 PM	2800	41.231167	-71.388167	Trip 135; draft sensors on 402 not reading properly, no problems discharging scow;
9/22/2003 3:31:00 PM	3200	41.223	-71.386	Trip 136; no problems discharging this vessel;

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
9/23/2003 1:36:00 AM	2800	41.2285	-71.387633	Trip 137; draft sensors inop, port running light out on 402 - was dim outbound;
9/23/2003 2:06:00 PM	3300	41.234667	-71.385833	Trip 138; mate was injured at approx. 14:45 hrs. Capt got orders to dump in closer cell #2 [was supposed to be cell #6] due to deteriorating weather and to facilitate getting the injured mate and deck-hand back for medical attention quicker. NOAA predicte
9/24/2003 3:18:00 AM	3800	41.228583	-71.3881	Trip 139; no problems discharging scow;
9/24/2003 3:45:00 PM	3200	41.221333	-71.385333	Trip 140; capt orders were to dump in #6 [was supposed to be #7] as to get back into sequence, no problems discharging this vessel;
9/25/2003 2:00:00 AM	3800	41.237683	-71.385	Trip 141; scow dumps very rapidly - about 3 sec from sending open command;
9/25/2003 12:30:00 PM	2500	41.235333	-71.385167	Trip 319; no problems discharging this vessel;
9/25/2003 5:42:00 PM	3800	41.2313	-71.386667	Trip 142; scow would not dump after 6 tries with remote and several emergency dump attempts. Scow opened only about 1 foot. Put man o/b and dumped it from scow;
9/26/2003 12:31:00 AM	3200	41.2335	-71.386333	Trip 143; No problems discharging this vessel;
9/26/2003 9:38:00 AM	3800	41.2356	-71.38755	Trip 144; Gr. Lake computer read #142.
9/26/2003 10:54:00 AM	3205	41.225333	-71.386333	Trip 320; No problems discharging this vessel;
9/26/2003 11:00:00 PM	3800	41.23095	-71.380117	not work. After about 45 min of __ , ___ it finally opened.
9/27/2003 12:20:00 AM	1500	41.2245	-71.386	Trip 146; No problems discharging this vessel.
9/27/2003 12:20:00 AM	1500			Trip 146; No problems discharging this vessel.
9/27/2003 10:26:00 AM	3000	41.225664	-71.387722	buoys;
9/27/2003 3:25:00 PM	3800	41.229167	-71.386667	Trip 147; No problems discharging scow.
9/27/2003 11:10:00 PM	2800	41.235833	-71.384333	Trip 322; No problems discharging this vessel;
9/28/2003 12:11:00 PM	3200	41.2345	-71.385833	Trip 323; No problems discharging this vessel;
9/29/2003 1:04:00 AM	3800	41.227	-71.3875	Trip 324; Dredge 51, Load #324.
9/29/2003 1:43:00 PM	3200	41.226167	-71.386167	Trip 325; No problems discharging this vessel;
9/29/2003 9:50:00 PM	3800	41.224083	-71.386333	Trip 326; No problems discharging scow, draft sensors inop or incorrect.
9/30/2003 10:21:00 AM	3200	41.224167	-71.385833	Trip 327; Material very slow to release from scow but no problems dumping in correct area;
9/30/2003 8:19:00 PM	3800	41.23668	-71.386467	Trip 328; No problems dumping scow.
10/1/2003 7:33:00 AM	5400	41.227241	-71.388184	Trip 329; Material was slow going out.
10/1/2003 8:33:00 PM	3000	41.233517	-71.388305	Trip 330; No problems discharging scow. Draft sensors working.
10/2/2003 4:11:00 PM	4400			Trip 331; Scow no show on monitor. T-L-M-Try?;
10/3/2003 7:48:00 AM	4500	41.224273	-71.385613	Trip 332; RISDS 6, Dump ok;
10/3/2003 12:23:00 PM	3800	41.23075	-71.388967	Trip 148; No problems dumping scow. Fwd and aft draft sensors reading - 3.7 ft;
10/3/2003 9:51:00 PM	4800	41.236683	-71.386391	Trip ?; Good dump.
10/4/2003 4:14:00 AM	3800	41.225	-71.387167	Trip 333; No problems discharging scow. RISDS #10 skipped this round as it was done out of turn earlier;
10/4/2003 7:52:00 AM	4800			Trip 150; Good dump.
10/4/2003 9:57:00 PM	4600			Trip 151; Dump ok.
10/5/2003 12:20:00 PM	4500	41.228504	-71.387125	Trip 335; Dump ok.
10/5/2003 1:28:00 PM	3800	41.237167	-71.3855	Trip 334; No problems dumping scow, draft sensors inop on scow.
10/5/2003 9:40:00 PM	4700	41.225532	-71.387799	Trip 153; Mechanical failure. Low hydraulic fluid. Return open. Scow to dredge 55. Dump the scow at cad cell time 9:40 pm. Left RISDS at 10:55 pm.
10/5/2003 11:38:00 PM	3800	41.236667	-71.386333	Trip 152; No problems discharging scow, this scow dumps very fast.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
10/6/2003 9:48:00 AM	4500	41.237652	-71.384583	Trip 336; RISDS 1, Material was slow going out. Some material remain in scow. Circled RISDI. From 9:48 am to 10:20 am scow was closed;
10/6/2003 11:40:00 AM	3800	41.235333	-71.388333	Trip 154; No problems discharging scow. Draft sensors on scow inaccurate. Showing no change on fwd draft and reading -6.7 ft.
10/7/2003 3:08:00 AM	4500	41.235426	-71.387873	Trip 155; RISDS 2;
10/7/2003 8:40:00 AM	3800	41.222667	-71.388667	Trip 337; No problems discharging scow.
10/7/2003 2:27:00 PM	4800			Trip 156; Good dump.
10/7/2003 8:32:00 PM	3800	41.233333	-71.3885	Trip 338; No problems discharging scow, fwd draft sensor inop reading -6 ft always, scow loaded above __ line by 2-3 ft.
10/8/2003 4:16:00 AM	4850	41.229068	-71.388208	Trip 157; Good dump.
10/8/2003 8:34:00 AM	3800	41.230054	-71.389234	Trip 339; No problems discharging scow.
10/8/2003 7:19:00 PM	5100	41.22718	-71.387383	Trip 340; Dump ok, scow 62#.
10/8/2003 9:27:00 PM	3800	41.229867	-71.387717	Trip 158;
10/9/2003 5:59:00 AM	5200	41.236966	-71.386771	Trip 159; Good dump, scow 65#.
10/9/2003 10:24:00 AM	3800	41.226833	-71.3883	Trip 341; No problems discharging scow.
10/9/2003 11:22:00 PM	5300	41.232839	-71.388266	Trip 342; Dump ok, Scow 63.
10/10/2003 6:08:00 AM	3800	41.224133	-71.386667	Trip 160; Scow changed fwd draft -3 ft - 4 ft. Post running light out on scow. __ to RISDS.
10/10/2003 10:56:00 AM	4800	41.230894	-71.388826	Trip 343; Good dump, Scow 65.
10/10/2003 8:45:00 PM	3000	41.225367	-71.388017	Trip 161; No problems discharging scow.
10/10/2003 10:42:00 PM	5300	41.227646	-71.387937	Trip 344; Good dump.
10/11/2003 10:09:00 AM	3800	41.235633	-71.385533	Trip 162; No problems discharging scow;
10/11/2003 2:30:00 PM	4400	41.22565	-71.387696	Trip 345; Good dump, Scow 65.
10/11/2003 6:47:00 PM	4400	41.237035	-71.385172	Trip 346; Dump ok, Scow 63.
10/12/2003 9:30:00 PM	3800	41.235583	-71.388083	Trip 164; No problems discharging scow;
10/13/2003 7:32:00 AM	5000	41.2353	-71.387684	Trip 347; Dump ok.
10/13/2003 10:40:00 AM	3800	41.229717	-71.388117	Trip 165; Scow opens very slowly. Fwd draft sensor inop - shows -6.6 ft always. Had to send open command several times before it started to open;
10/13/2003 10:10:00 PM	3800	41.232633	-71.387833	Trip 166; No problems discharging scow;
10/13/2003 10:21:00 PM	5300	41.712672	-71.337432	Trip 348; Good dump, Scow 63.
10/14/2003 5:58:00 AM	5150	41.229351	-71.388051	Trip 349; Good dump, Scow 65.
10/14/2003 10:50:00 AM	3800	41.227967	-71.388517	Trip 167; Fwd draft sensor inop - reading -6.6 all the time.
10/14/2003 1:40:00 PM	3800	41.2363	-71.38595	Trip 163; Port running light out on scow.
10/14/2003 5:34:00 PM	5300	41.227233	-71.386861	Trip 350; Good dump.
10/16/2003 1:01:00 PM	3200	41.221333	-71.384833	Trip 170; Material slow to release but no problems hitting correct area. Picked up one yellow lobster buoy on bridler out-bound and a white buoy in-bound;
10/16/2003 11:11:00 PM	3200	41.235333	-71.385333	Trip 171; No problems discharging this vessel;
10/17/2003 1:01:00 AM	3800	41.22455	-71.386467	Trip 169; No problems discharging scow.
10/17/2003 11:43:00 AM	3800	41.224267	-71.387967	Trip 351; Port running light out on scow.
10/17/2003 1:32:00 PM	3200	41.2335	-71.386667	Trip 172; No problems discharging this vessel. Picked up one yellow and white buoy while out-bound on bridle;
10/17/2003 11:50:00 PM	3800	41.233083	-71.389117	Trip 173; Fwd draft sensor. Reading -6.6 throught out trip.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
10/18/2003 3:55:00 AM	3200	41.225167	-71.386667	Trip 352; Material very slow to release but no problems discharging in correct area;
10/18/2003 1:30:00 PM	3800	41.228417	-71.3878	Trip 174; No problems discharging scow.
10/18/2003 3:15:00 PM	3200	41.2235	-71.385833	Trip 168; Very slow to open and release but dumped in the correct area;
10/19/2003 1:30:00 AM	3800	41.236867	-71.385633	Trip 175; Port running light out on scow.
10/19/2003 4:44:00 AM	3200	41.225655	-71.386882	Trip 353; No problems discharging this vessel;
10/19/2003 12:18:00 PM	3800	41.225533	-71.387533	Trip 176; Scow down 5-6 ft starboard stern. Inspected hopper to see where mud was. Sticking and hopper was clear. Suspect water inside one or more compartments on starboard side of scow.
10/19/2003 6:32:00 PM	3200	41.235667	-71.384333	Trip 354; Slow to open second release spoil but dumped on station;
10/19/2003 10:10:00 PM	3800	41.23545	-71.387467	Trip 177; No problems discharging scow.
10/20/2003 6:12:00 AM	3200	41.234333	-71.386	Trip 178; No problems discharging this vessel;
10/20/2003 8:05:00 AM	3800	41.229117	-71.3882	Trip 355; Scow telemetry not working (fixed at state pier upon return).
10/20/2003 5:02:00 PM	3200	41.226167	-71.386167	Trip 179; No problems discharging this vessel;
10/20/2003 9:00:00 PM	3800	41.229647	-71.387701	Trip 356; No problems discharging scow.
10/21/2003 5:06:00 AM	3200	41.224333	-71.386	Trip 180; Weather deteriorating badly but no problem with this disposal;
10/22/2003 8:55:00 AM	3200	41.222667	-71.3855	Trip 181; Scow very slow to open and release material but dumped in cell;
10/22/2003 9:38:00 AM	3800	41.237383	-71.381783	Trip 181;
10/22/2003 7:20:00 PM	3200	41.223961	-71.385627	Trip 357; Trip # given by G.L. office (Heather). No problem discharging this vessel;
10/23/2003 5:13:00 AM	3800	41.237	-71.385333	Trip 183;
10/23/2003 6:12:00 AM	3200	41.235167	-71.385167	Trip 184; No problems discharging this vessel;
10/23/2003 4:58:00 PM	3800	41.23758	-71.375536	Trip 358; No problems discharging scow.
10/23/2003 7:50:00 PM	3200	41.2335	-71.3865	Trip 185; No problems discharging this vessel;
10/24/2003 6:32:00 AM	3800	41.236486	-71.371502	Trip 359; No problems discharging scow.
10/24/2003 7:01:00 AM	3200	41.225167	-71.386333	Trip 186; No problems discharging this vessel;
10/24/2003 6:35:00 PM	3200	41.223667	-71.3855	Trip 187; Very slow to release material but no problems discharging in prescribed area;
10/24/2003 10:41:00 PM	3800	41.235429	-71.371195	Trip 361;
10/25/2003 9:30:00 AM	3200	41.224864	-71.385895	Trip 361; Very slow to release but no problems discharging in the proper area;
10/25/2003 10:00:00 AM	3800	41.2378	-71.381617	Trip 189;
10/25/2003 8:05:00 PM	3200	41.2355	-71.384667	Trip 189; Computer diagram of dumpsite does not match the hard copy received. Scow was dumped using computer and DGB. No other problems. Please advise on above;
10/26/2003 1:22:00 AM	3800	41.237417	-71.378	Trip 362; Daylight savings ended.
10/26/2003 6:21:00 AM	3200	41.235833	-71.3755	Trip 190; Clocks changed back 1 hr at 02:00 hrs;
10/26/2003 1:02:00 PM	3800	41.23736	-71.37514	Trip 363.
10/26/2003 9:30:00 PM	3200	41.235667	-71.3715	Trip 191; No problems discharging this vessel. G.L. office Engineer fixed previous problem with computer/hardcopy. OK H+W?;
10/27/2003 12:30:00 PM	3200	41.2355	-71.369667	Trip 364; Slow to release product but no problems;
10/27/2003 1:04:00 PM	3800	41.237167	-71.371633	Trip 192; No problems discharging scow.
10/28/2003 3:26:00 PM	3000	41.2345	-71.368833	Trip 195; No problems discharging this vessel;
10/28/2003 5:30:00 PM	3800	41.23445	-71.370283	Trip 194; Marked dump too early, reset computer and remarked dump. May show on next trip #. Draft sensors inop showing -7 ft;
10/30/2003 3:26:00 PM	3800	41.236667	-71.381667	Trip 197; Computer still on daylight savings time. Mate of Iona warned about speed at disposal;

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
10/30/2003 5:46:00 PM	4200	41.236942	-71.384749	Trip 196; Scow 64 dump ok;
10/31/2003 2:37:00 AM	3800	41.23805	-71.37805	Trip 365; Mate on Iona warned again about speed at disposal;
10/31/2003 5:38:00 AM	5100	41.235456	-71.388068	Trip 193; Dump ok scow 61;
10/31/2003 3:12:00 PM	3800	41.238133	-71.37345	Trip 198; Scow opens very slowly. Draft sensors inop.
10/31/2003 6:13:00 PM	5000	41.232567	-71.388308	Trip 366; Scow 64, Material in scow was slow empting out of scow;
11/1/2003 9:28:00 AM	3800	41.235633	-71.3708	Trip 199; Draft sensors work properly. Scow opens/closes quickly;
11/1/2003 6:49:00 PM	5100	41.229304	-71.388032	Trip 367; Scow 61, dump ok.
11/2/2003 1:34:00 AM	3800	41.23695	-71.372217	Trip 200; Mate of Iora worried again about speed at disposal. Draft sensors inop or incorrect.
11/2/2003 6:12:00 AM	5100	41.227427	-71.387553	Trip 368; Scow 63; dump ok.
11/2/2003 3:26:00 PM	3800	41.23805	-71.381667	Trip 201;
11/3/2003 2:37:00 AM	4800	41.224393	-71.386198	Trip 202; 63 scow dump ok.
11/3/2003 12:34:00 PM	5000	41.236536	-71.38694	Trip 203; 64 scow dump ok.
11/4/2003 12:14:00 AM	4800	41.233903	-71.388529	Trip 204; scow 64 dump ok.
11/4/2003 12:00:00 PM	4800	41.23087	-71.389083	Trip 205; scow 63 dump ok.
11/4/2003 5:46:00 PM	3800	41.237783	-71.379217	Trip 369;
11/5/2003 12:47:00 AM	4800	41.227859	-71.387376	Trip 206; scow 65 dump ok.
11/5/2003 7:37:00 AM	3800	41.237283	-71.375	Trip 370;
11/5/2003 1:53:00 PM	4900	41.225853	-71.386569	Trip 207; can't see scow because of fog!
11/6/2003 2:02:00 AM	3800	41.236813	-71.372189	Trip 371; Disposal aok;
11/6/2003 3:06:00 AM	4800	41.23761	-71.381618	Trip 208; 65 scow good dump.
11/6/2003 4:11:00 PM	3800	41.234179	-71.370631	Trip 372; Disposal aok;
11/6/2003 4:22:00 PM	5000	41.237743	-71.378407	Trip 209; Scow 63; Good dump!
11/7/2003 3:09:00 AM	3800	41.236167	-71.375833	Trip 210; Disposal aok;
11/7/2003 4:25:00 AM	5200	41.237496	-71.375236	Trip 373; dump ok.
11/7/2003 2:29:00 PM	4900	41.237152	-71.371938	Trip 211; dump ok.
11/7/2003 9:54:00 PM	3800	41.236	-71.373167	Trip 374; Disposal aok, Channel traffic delay;
11/8/2003 3:10:00 AM	4600	41.235036	-71.370717	Trip 212; dump ok.
11/8/2003 7:02:00 PM	4700	41.237272	-71.385728	Trip 213; dump ok.
11/9/2003 6:38:00 AM	3800	41.237388	-71.371344	Trip 376; Disposal aok;
11/9/2003 8:20:00 AM	4600	41.23546	-71.387744	Trip 214; very good dump.
11/9/2003 9:48:00 PM	3700	41.232199	-71.371343	Trip 377; Because of computer malfunction, disposal was estimated by use of boat's instruments;
11/9/2003 10:45:00 PM	5000	41.232194	-71.388609	Trip 215; dump ok.
11/10/2003 9:14:00 AM	4700	41.229426	-71.388011	Trip 216; Very good dump;
11/10/2003 12:23:00 PM	3800	41.235667	-71.385833	Trip 378; Computer is not functioning - ?? Was reported to Great Lakes office by captian ? Was permitted to make disposal at his discretion but limited to disposal within restricted area - this was done at co-ods? Indicated (traffic delay 0605-0730);
11/10/2003 7:26:00 PM	4900	41.226928	-71.387745	Trip 217; very good dump.
11/10/2003 11:01:00 PM	3700	41.236167	-71.3735	Trip 379; Computer now functions very well after wire replacement disposal - aok;
11/11/2003 6:34:00 AM	4800	41.224544	-71.386285	Trip 218; very good dump.
11/11/2003 6:32:00 PM	4900	41.236224	-71.386319	Trip 219; dump ok.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
11/11/2003 8:18:00 PM	3700	41.236167	-71.375667	Trip 380; Disposal aok;
11/12/2003 7:29:00 AM	4700	41.233738	-71.38867	Trip 220; very good dump.
11/12/2003 9:44:00 AM	3800	41.234833	-71.378333	Trip 381; Computer out! No signal! Disposal made using vessel instruments;
11/12/2003 7:19:00 PM	4500	41.231615	-71.38888	Trip 221; very good dump.
11/12/2003 11:18:00 PM	3800	41.234333	-71.382667	of buoy;
11/15/2003 9:50:00 PM	5200	41.223333	-71.385667	Trip 383; No problems discharging but very slow release of material;
11/15/2003 10:26:00 PM	3700	41.2355	-71.369833	Trip 220; Disposal aok;
11/16/2003 8:40:00 AM	5200	41.224986	-71.387036	Trip 224; No problems but slow release of material;
11/16/2003 10:36:00 AM	3800	41.225762	-71.380971	Trip 223; Scow radio connections disfunctional - necessary to have crew member board scow for manual disposal - channel traffic delay 04:00-05:10;
11/16/2003 9:02:00 PM	5200	41.235667	-71.3755	Trip 225; Trip # on computer could not be changed. It is incorrectly as # 227. No other problems;
11/17/2003 4:37:00 AM	3800	41.2345	-71.369167	Trip 384; Deposit - aok;
11/17/2003 8:25:00 AM	3200	41.235833	-71.3735	Trip 226; No problems discharging this vessel. Picked up one lobster buoy on bridle while out-bound;
11/17/2003 5:56:00 PM	3800	41.236	-71.3755	Trip 385; Disposal - aok;
11/18/2003 3:13:00 AM	5200	41.235833	-71.3715	Trip 227; No problems discharging this vessel;
11/18/2003 5:43:00 AM	5200	41.2355	-71.369667	Trip 229; No problems discharging this vessel. Light on buoy out at dump;
11/18/2003 3:00:00 PM	3800	41.237989	-71.378386	Trip 228; Disposal - aok;
11/21/2003 12:33:00 PM	5200	41.23509	-71.37044	Trip 231; No problems discharging this vessel;
11/21/2003 3:32:00 PM	3650	41.236	-71.374	Trip 230; Good placement note made two complete circles around dump buoy till scow closed all okay;
11/21/2003 9:32:00 PM	5200	41.235667	-71.384333	Trip 233; No problems discharging this vessel. Slow to release material;
11/22/2003 7:47:00 AM	3800	41.2365	-71.3715	Trip 234; Disposal aok;
11/22/2003 12:04:00 PM	5200	41.234333	-71.385833	Trip 232; No problems but slow to release material. Scow would not close. Delayed by scow operations;
11/22/2003 9:52:00 PM	3800	41.235667	-71.369667	Trip 235; Disposal aok;
11/23/2003 2:54:00 AM	5200	41.226167	-71.386333	Trip 386; Slow to release material but no other problems;
11/23/2003 12:07:00 PM	3800	41.235464	-71.371072	Trip 236; Disposal aok;
11/23/2003 10:20:00 PM	5100	41.235833	-71.371667	Trip 388; Disposal ok;
11/23/2003 10:40:00 PM	5200	41.224333	-71.386	Trip 387; Slow to release material but no problems staying in dump zone;
11/24/2003 2:27:00 AM	3700	41.2355	-71.369333	Trip 237; Disposal ok;
11/24/2003 2:36:00 PM	5200	41.222833	-71.385667	Trip 238; No problems discharging this vessel;
11/25/2003 4:13:00 AM	5200	41.223889	-71.225188	Trip 239; No problems discharging this vessel;
11/25/2003 12:35:00 PM	3800	41.235667	-71.369667	Trip 389;
11/25/2003 1:45:00 PM	5200	41.235167	-71.385	Trip 240; No problems discharging this vessel;
11/25/2003 10:20:00 PM	3700	41.235833	-71.371667	Trip 388; Disposal ok.
11/26/2003 8:01:00 AM	3700	41.235266	-71.370483	Trip 390; Disposal ok;
11/26/2003 9:35:00 AM	5200	41.2255	-71.3735	Trip 231; Problems with scow ? At dump. Captain did an emergency dump starting at approx. 275 ft NE of buoy. Mt? At N 41 deg 13.76 min and W 71 deg 22.82 min;
11/26/2003 11:04:00 PM	5200	41.225	-71.3865	Trip 391; No problems discharging this vessel;
11/26/2003 11:40:00 PM	3700	41.239	-71.381667	Trip ?; Disposal ok;
11/27/2003 11:48:00 AM	5200	41.223833	-71.386	Trip 392; No problems discharging this vessel. Material very slow to release;
11/27/2003 12:12:00 PM	3700	41.2355	-71.373667	Trip 243; Bad coms ? Scow didn't open immediately;

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
11/27/2003 11:45:00 PM	5200	41.225188	-71.386654	Trip 244; No problems discharging this vessel;
11/29/2003 2:37:00 AM	3700	41.235833	-71.3715	Trip 393; Disposal ok;
12/3/2003 11:19:00 AM	4900	41.23739	-71.381388	Trip 394; dump ok, scow slow dumping.
12/3/2003 12:39:00 PM	3900	41.236	-71.376	Trip 246; First trip - new boat - new inspector;
12/3/2003 6:20:00 PM	4300	41.237985	-71.375522	Trip 395; dump good.
12/3/2003 11:14:00 PM	4700	41.237429	-71.379276	Trip 245; dump ok.
12/5/2003 2:34:00 PM	3900	41.236	-71.374167	Trip 247;
12/8/2003 2:23:00 PM	4700	41.237049	-71.3718	Trip 249;
12/8/2003 4:47:00 PM	3900	41.235667	-71.371833	Trip 248; Circled for almost 1 hr, some material stayed in scow;
12/9/2003 12:18:00 AM	3900	41.235282	-71.370896	Trip 250; good dump.
12/9/2003 5:15:00 PM	3900	41.650667	-71.383667	Trip 251; Would not open remote - called in a man to open manually. Then would not close - after several hours the tech closed door;
12/9/2003 7:29:00 PM	3900	41.237203	-71.385257	Trip 396; very good dump; Stephanie Dann, took scow 64 from tug Eileen.
12/10/2003 7:40:00 AM	3800	41.235	-71.388889	Trip 252; See attached letter dated 10 December 03 authorizing disposal @ RISDS without Corps of Engineers disposal inspector;
12/10/2003 5:59:00 PM	5000	41.231967	-71.381967	Trip 397; dump at the buoy.
12/13/2003 12:20:00 PM	5200	41.226167	-71.386167	Trip 399; No problems discharging this vessel;
12/14/2003 1:20:00 PM	3800	41.2245	-71.386	Trip 398; disposal aok.
12/16/2003 4:51:00 PM	3800	41.222833	-71.385833	Trip 400; Disposal aok;
12/17/2003 3:40:00 PM	3900	41.225167	-71.3865	Trip 405; Possible problems with remote dump - Had a scow man on board - all ok;
12/19/2003 10:48:00 AM	3400	41.224393	-71.386245	Trip 401; dump ok; scow slow dumping; material sand and clay.
12/19/2003 8:52:00 PM	4300	41.236596	-71.386996	Trip 402; Good dump;
12/21/2003 4:39:00 AM	4000	41.233852	-71.388955	Trip 403; Very good dump;
12/24/2003 2:02:00 PM	3900	41.2335	-71.3865	Trip 404;
12/29/2003 11:13:00 AM	4400	41.2235	-71.385667	Trip 406; Remote not working - man on scow;
12/30/2003 1:20:00 PM	5800	41.235833	-71.3755	Trip 253; LNG tanker out bound, we were on hold 3 hrs, remote still not working, scow man on board;
12/31/2003 9:10:00 AM	6500	41.235833	-71.373667	Trip 254;
1/1/2004 4:06:00 AM	6500	41.235333	-71.371667	Trip 255; Remote still not working - man on scow.
1/2/2004 12:00:00 AM	4500	41.235333	-71.3695	Trip 256; light out on dump buoy!
1/2/2004 10:11:00 AM	5300	41.232823	-71.37019	Trip 257;
1/3/2004 12:09:00 AM	6000	41.235667	-71.383667	Trip 258; fog in bound - slow.
1/3/2004 4:23:00 PM	6000	41.2345	-71.385833	Trip 259;
1/4/2004 5:57:00 AM	5400	41.226	-71.3865	Trip 260;
1/4/2004 5:09:00 PM	4500	41.224	-71.386167	Trip 261;
1/5/2004 5:02:00 AM	5350	41.226117	-71.387816	Trip 262; Wide turn - went on the line south end of dump site.
1/5/2004 3:57:00 PM	3800	41.223741	-71.38586	Trip 263; Disposal - aok.
1/6/2004 5:45:00 AM	3800	41.235	-71.385	Trip 264; Disposal - aok.
1/6/2004 4:23:00 PM	3800	41.2335	-71.386333	Trip 265; Disposal - aok.
1/9/2004 4:29:00 AM	3800	41.225	-71.386333	Trip 266; Disposal - aok.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
1/9/2004 9:31:00 PM	3800	41.22644	-71.386575	Trip 267; Disposal made in CAD #5 instead of CAD #10 - decision mae due to sea fog, wind and seas and commercial fishing vessel in area.
1/10/2004 9:29:00 AM	6000	41.235167	-71.385833	Trip 521;
1/10/2004 3:17:00 PM	3800	41.223333	-71.385333	Trip 268; Disposal ok , time delay as disposal site from approximately 1100 to 1500 hrs due to inoperative radio contact with scow - dredge personal came on site and found need to replace battery.
1/12/2004 4:39:00 AM	3800	41.225219	-71.386937	Trip 269; Disposal - ok.
1/12/2004 7:10:00 PM	3800	41.235667	-71.386833	Trip 270; Disposal - ok.
1/13/2004 5:29:00 AM	3800	41.234333	-71.386	Trip 271; Disposal - ok.
1/14/2004 3:26:00 PM	3800	41.226	-71.385833	Trip 273; Disposal - ok.
1/15/2004 3:27:00 AM	3800	41.224167	-71.385833	Trip 272; Disposal ok.
1/17/2004 7:39:00 PM	3800	41.223	-71.385667	Trip 276; disposal ok.
1/18/2004 6:35:00 AM	3800	41.224131	-71.385667	Trip 275; Disposal ok.
1/18/2004 7:57:00 PM	3800	41.235	-71.3865	Trip 277; disposal ok.
1/20/2004 4:54:00 PM	3900	41.23248	-71.38837	Trip 278; scow 64 was slow dumping; load should be 279.
1/21/2004 6:00:00 AM	5000	41.224667	-71.374833	Trip 274;
1/21/2004 10:56:00 AM	4000	41.229002	-71.387489	Trip 281; scow 61, material was slow going out!; Load should be 280.
1/21/2004 7:46:00 PM	5000	41.224833	-71.375167	Trip 279; very slow closing - over 1 hr.
1/22/2004 6:08:00 AM	4000	41.228005	-71.386862	Trip 282; scow was very very slow opening; load should be 281.
1/24/2004 1:50:00 PM	4200	41.2245	-71.374	Trip 282; slow dumping, over 1 hr.
1/24/2004 4:27:00 PM	3700	41.225558	-71.38715	Trip 282; dump ok; scow has port list.
1/25/2004 2:35:00 PM	5500	41.2245	-71.374167	Trip 2; slow dumping - frozen.
1/25/2004 5:13:00 PM	3800	41.237615	-71.382128	Trip 283; majority of the material dump out side of cell 12.
1/26/2004 5:05:00 AM	5354	41.224833	-71.3745	Trip 284;
1/26/2004 6:35:00 AM	3700	41.237735	-71.378504	Trip 284; the scow was dump before entering the cell. To allow enough time, so the scow would dump in the cell.
1/27/2004 1:45:00 AM	4000	41.237413	-71.374903	Trip 285; dump ok.
1/27/2004 6:18:00 AM	6400	41.225	-71.375167	Trip 4;
1/27/2004 12:47:00 PM	4200	41.237041	-71.37208	Trip 286; very good dump.
1/30/2004 2:29:00 PM	3600	41.235101	-71.370992	Trip 287; 90% of material dump outside of cell 16.
1/30/2004 8:57:00 PM	5500	41.2375	-71.385	Trip 288; upon returning to harbor, inspected scow as it had 6 foot or more port list but no sand left in scow. Suspect water in hull. Marked dump on Great Lakes computer late. Scow opened and raised on target. Due to list I waited to mark dump. Aspect of
1/31/2004 8:58:00 AM	3800	41.237053	-71.385534	Trip 288; good dump.
1/31/2004 12:36:00 PM	5100	41.2357	-71.387667	Trip 6; no problems discharging scow.
1/31/2004 7:34:00 PM	4000	41.235203	-71.387684	Trip 289; dump ok.
2/1/2004 8:02:00 AM	4500	41.231017	-71.388633	Trip 7; RISDS #9; Last scow from harbor area. No problems discharging scow.
2/1/2004 6:09:00 PM	3600	41.226574	-71.37488	Trip 290; Dump ok.
2/1/2004 8:58:00 PM	5353	41.230833	-71.381117	Trip 500; No problems dumping scow.
2/2/2004 5:42:00 AM	2800	41.227117	-71.386083	Trip 09; Scow was slow dumping.
2/2/2004 10:00:00 AM	4800	41.227167	-71.3738	Trip 502; Scow opens slowly.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
2/2/2004 6:17:00 PM	2900	41.224413	-71.372362	Trip 503; Good dump.
2/2/2004 10:56:00 PM	5563	41.22695	-71.385633	Trip 504; No problems discharging scow.
2/3/2004 6:41:00 AM	3900	41.230757	-71.382421	Trip 505; Good dump.
2/3/2004 1:19:00 PM	5147	41.236633	-71.382133	Trip 506; No problems discharging scow.
2/4/2004 8:08:00 PM	3800	41.224689	-71.373241	Load 507; Disposal ok.
2/5/2004 4:03:00 AM	4450	41.236583	-71.3833	Trip 508; No problems discharging scow.
2/5/2004 9:15:00 AM	3800	41.225	-71.374167	Load 509; Disposal ok.
2/5/2004 3:30:00 PM	6000	41.2351	-71.374517	Trip 510; No problems discharging scow.
2/5/2004 10:41:00 PM	3800	41.225246	-71.378646	Load 511; Disposal ok.
2/6/2004 12:25:00 AM	4015	41.216289	-71.382042	Trip 512; Started scow near buoy but engine died. Scow opened 1-2' and dumped 3-4' draft worth of material. Put man on scow but could not start it or open it further. Towed scow around buoy for 2 hrs. Lost 3-4 more feet of draft in first 15-20 min then no
2/6/2004 8:05:00 AM	3800	41.222667	-71.371667	Load 573; Disposal ok.
2/6/2004 12:00:00 PM	6900	41.23155	-71.381967	Trip 514; No problems discharging scow.
2/9/2004 1:08:00 AM	4000	41.226367	-71.385133	Trip 515; No problems discharging scow.
2/9/2004 3:16:00 AM	3800	41.2345	-71.371333	Load 516; Disposal ok; Picked up scow from lines of assisting tug, returned scow to state docks.
2/9/2004 11:54:00 AM	6000	41.225717	-71.378088	Trip 517; Delay in a.m., remote dump problem; Delay in p.m., circled waiting for LPG tanker.
2/9/2004 12:34:00 PM	5563	41.22505	-71.381	Trip 518; No problems discharging scow.
2/10/2004 8:10:00 AM	3800	41.228333	-71.382167	Load 520; Disposal ok. Tied to scow at mooring at state docks.
2/10/2004 9:58:00 AM	5100	41.235217	-71.374883	Trip 519; No problems discharging scow.
2/10/2004 5:36:00 PM	3800	41.234167	-71.385	Load 527/522?; Disposal ok. Picked up scow from lines of assisting tug.
2/11/2004 12:44:00 AM	4500	41.230833	-71.378883	Trip 524; Dumped at buoy as scow telemetry inop. Otherwise no problems discharging scow.
2/11/2004 7:37:00 AM	3800	41.234167	-71.384667	Trip 525; Disposal - ok; Scow secured to ___ ___.
2/11/2004 12:28:00 PM	5353	41.22644	-71.385237	Trip 526;
2/11/2004 2:46:00 PM	4100	41.22505	-71.37825	Trip 527; No problems discharging scow.
2/11/2004 10:16:00 PM	3800	41.222833	-71.371667	Trip 528; Disposal - ok; Picked up scow at ____ tug.
2/12/2004 12:13:00 AM	6000	41.226492	-71.375042	Trip 523; Scow would not close, scow remote malfunction repaired, dumped ok. Same load and trip number as 2/10/04.
2/12/2004 6:00:00 AM	4441	41.23455	-71.38575	Trip 529; No problems discharging scow.
2/12/2004 11:08:00 AM	5300	41.234877	-71.385833	Trip 530;
2/12/2004 11:32:00 PM	3810	41.234167	-71.3845	Trip 531; Disposal - ok.
2/13/2004 12:47:00 AM	4600	41.230833	-71.37935	Trip 532; No problems discharging scow.
2/13/2004 8:36:00 AM	6000	41.236336	-71.381507	Trip 533;
2/13/2004 5:27:00 PM	4600	41.2306	-71.378883	Trip 534; No problems discharging scow.
2/13/2004 6:59:00 PM	4318	41.226344	-71.388537	Trip 535;
2/13/2004 10:34:00 PM	3800	41.234333	-71.384833	Trip 536; Disposal - ok; Delay at dredge 0220 - 0450 hours.
2/14/2004 4:47:00 AM	4935	41.224546	-71.37784	Trip 537;
2/14/2004 8:26:00 AM	4600	41.226417	-71.37435	Trip 538; No problems discharging scow.
2/14/2004 1:31:00 PM	4000	41.234167	-71.3845	Trip 539; Disposal - ok.
2/14/2004 5:59:00 PM	6000	41.226865	-71.385883	Trip 540;

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
2/14/2004 8:23:00 PM	4728	41.23075	-71.378867	Trip 541; No problems discharging scow.
2/15/2004 3:23:00 AM	3800	41.224833	-71.374667	Trip 542; Disposal - ok.
2/15/2004 5:12:00 AM	4728	41.230617	-71.379667	Trip 543; No telemetry on scow updating erratically. Sometimes 4-5 sec and as much as 120 sec. Dumped at buoy. Otherwise, no problems discharging scow.
2/15/2004 1:57:00 PM	5100	41.235881	-71.374513	Trip 545;
2/15/2004 2:29:00 PM	3800	41.222833	-71.372	Trip 544; Disposal - ok.
2/15/2004 8:18:00 PM	5100	41.226925	-71.385811	Trip 546; No problems discharging scow.
2/16/2004 1:17:00 AM	3800	41.235	-71.375667	Trip 547; Disposal - ok.
2/16/2004 6:48:00 AM	4728	41.2265	-71.369283	Trip 548; No problems discharging scow.
2/16/2004 8:33:00 AM	6000	41.225175	-71.378167	Trip 549; Scow did not open on first attempt at approx. 8:10. Dump was successful at 8:32 (2nd attempt), returned to Prov. Port Pier with scow until dredge is ready.
2/16/2004 2:05:00 PM	3800	41.224833	-71.3745	Trip 550; Disposal ok. Dredge delay 1800-1930 hours.
2/16/2004 11:03:00 PM	4728	41.23525	-71.385617	Trip 551; No problems discharging scow.
2/17/2004 3:10:00 AM	3800	41.234167	-71.385	Trip 552; Disposal - ok.
2/17/2004 8:30:00 AM	3912	41.225117	-71.378383	Trip 553; No problems discharging scow.
2/17/2004 10:16:00 AM	6000	41.227093	-71.385747	gone.
2/17/2004 4:06:00 PM	2800	41.23609	-71.38195	Trip 555; Good dump.
2/17/2004 11:55:00 PM	4100	41.226117	-71.37625	Trip 556; No problems discharging scow.
2/18/2004 3:42:00 AM	4523	41.236532	-71.381746	Trip 557;
2/18/2004 8:03:00 AM	2900	41.226415	-71.386313	Trip 558; Scow was slow dumping; most of the material was released outside of the cell.
2/18/2004 9:47:00 AM	4523	41.226337	-71.385514	Trip 559; No problems discharging scow.
2/19/2004 10:09:00 PM	5000	41.230167	-71.384	the center buoy. We dumped 2.2 min. after tug passed buoy at approx. 4.5 kts. Scow was 1033 back to the bow of the scow.
2/20/2004 12:07:00 AM	4000	41.230217	-71.380217	Trip 563; Sporatic telemetry from scow. Dumped at buoy with radar plot.
2/20/2004 12:43:00 AM	2400	41.224874	-71.378984	Trip 564; Dump ok.
2/20/2004 1:35:00 PM	2800	41.226542	-71.385453	Trip 560; Good dump.
2/20/2004 4:53:00 PM	4523	41.236765	-71.381704	Trip 564; Scow would not start. Hydraulic oil temp fault showing on comm box. Would not e dump. Brought to Newport and put man on scow. Returned to dump and dumped from scow manually.
2/20/2004 8:48:00 PM	5000	41.23496	-71.374938	Trip 565;
2/20/2004 11:04:00 PM	2500	41.227494	-71.384642	Trip 566; Dump ok.
2/21/2004 2:38:00 AM	4728	41.235227	-71.385844	Trip 567; No problems discharging scow.
2/21/2004 6:27:00 AM	6000	41.235015	-71.386237	Trip 568;
2/21/2004 11:38:00 AM	4900	41.231033	-71.380083	Trip 569; No problems discharging scow.
2/21/2004 5:46:00 PM	2800	41.235847	-71.381545	Trip 570; Good dump.
2/21/2004 9:21:00 PM	4103	41.226967	-71.375217	Trip 571; No problems discharging scow.
2/22/2004 2:55:00 AM	1850	41.235344	-71.374457	Trip 572; Disposal ok.
2/22/2004 5:04:00 AM	2800	41.236232	-71.381436	Trip 573; Good dump.
2/22/2004 11:26:00 AM	4100	41.2248	-71.378167	Trip 574; No problems discharging scow.
2/22/2004 12:45:00 PM	2900	41.224902	-71.372375	Trip 575; Disposal ok.
2/22/2004 8:26:00 PM	4100	41.234917	-71.38525	Trip 576; No problems discharging scow.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
2/22/2004 11:13:00 PM	2900	41.227117	-71.385961	Trip 577; The load for this trip is 577. The computer monitor shows 578 for the load.
2/23/2004 5:15:00 AM	4000	41.234933	-71.375017	Trip 578; No problems discharging scow.
2/23/2004 7:53:00 AM	2950	41.234044	-71.385497	Trip 579; Disposal ok.
2/23/2004 1:22:00 PM	2800	41.227242	-71.375113	Trip 580; Very good dump.
2/23/2004 5:29:00 PM	4728	41.237283	-71.382333	Trip 581; No problems discharging scow.
2/24/2004 1:45:00 AM	4728	41.2267	-71.38575	Trip 582; No problems discharging scow.
2/24/2004 4:09:00 AM	2800	41.236256	-71.382032	Trip 583; Very good dump.
2/24/2004 1:25:00 PM	3000	41.224977	-71.378399	Trip 584; Disposal ok.
2/24/2004 2:32:00 PM	4935	41.229917	-71.380167	Trip 585; No problems discharging scow; Scow takes 50 seconds to dump.
2/24/2004 8:22:00 PM	2800	41.236688	-71.382284	Trip 586; Good dump.
2/25/2004 2:00:00 AM	3000	41.226582	-71.374946	Trip 587; Disposal ok.
2/25/2004 5:20:00 AM	2500	41.230226	-71.379992	Trip 588; Good dump. The buoy is missing (gone).
2/25/2004 12:05:00 PM	4523	41.22675	-71.385917	Trip 589; No problems discharging scow; Scow dumps in 4-5 seconds; Volume estimate from scow card.
2/25/2004 8:28:00 PM	2400	41.234712	-71.385862	Trip 590; Good dump.
2/25/2004 10:09:00 PM	5563	41.235333	-71.385467	Trip 591; No problems discharging scow; Scow dumps in 15 seconds; Volume estimate from scow card.
2/26/2004 5:36:00 AM	2700	41.234783	-71.375281	Trip 592; Good dump.
2/26/2004 7:42:00 AM	4935	41.226667	-71.374917	Trip 593; No problems discharging scow; Scow dumps in 15 seconds; Volume estimate from scow card.
2/26/2004 6:21:00 PM	2500	41.236259	-71.381935	Trip 594; Good dump.
2/26/2004 7:42:00 PM	4114	41.23025	-71.3803	Trip 595; No problems discharging scow; Scow dumps in 3-4 seconds; Volume estimate from scow card.
2/27/2004 3:25:00 AM	2700	41.226315	-71.385427	Trip 596; Good dump.
2/27/2004 4:24:00 AM	5143	41.22655	-71.3857	Trip 597; No problems discharging scow; Scow dumps in 3-4 seconds; Volume estimate from scow card.
2/27/2004 12:05:00 PM	2500	41.23482	-71.375231	Trip 598; Bulk of the material was released outside of Cell B. Scow was slow opening.
2/27/2004 1:29:00 PM	4935	41.226333	-71.375083	Trip 599; No problems discharging scow; Scow dumps in 10 seconds; Volume estimate from scow card.
2/27/2004 9:15:00 PM	2500	41.236327	-71.382034	Trip 600; Good dump. Scow wouldn't close, circle dump area for 45 min. Return scow open to dredge. Mechanical failure.
2/27/2004 10:30:00 PM	4114	41.2307	-71.3807	Trip 601; No problems discharging scow; Scow dumps in 5 seconds; Volume estimate from scow card.
2/28/2004 5:45:00 AM	2600	41.225964	-71.385515	Trip 602; Disposal ok.
2/28/2004 7:50:00 AM	2500	41.227439	-71.38529	Trip 603; Scow was slow opening. Bulk of the material went outside of the cell C.
2/28/2004 1:55:00 PM	4935	41.23525	-71.375083	Trip 605; No problems discharging scow; Scow dumps in 5 seconds; Volume estimate from scow card.
2/28/2004 6:37:00 PM	2900	41.230248	-71.38008	Trip 605; Disposal ok.
2/28/2004 10:09:00 PM	2500	41.234861	-71.385879	Trip 606; Good dump.
2/29/2004 6:35:00 AM	5774	41.226833	-71.385533	Trip 607; No problems discharging scow; Scow dumps in 11 seconds; Volume estimate from scow card.
2/29/2004 4:04:00 PM	2800	41.226532	-71.374328	Trip 608; Disposal ok.
2/29/2004 11:29:00 PM	5143	41.236883	-71.38175	Trip 609; No problems discharging scow; Scow dumps in 20 seconds; Volume estimate from scow card.
3/1/2004 12:53:00 AM	3000	41.235086	-71.385278	Trip 610; Good dump.
3/1/2004 6:15:00 AM	3100	41.224898	-71.378512	Trip 611; Disposal ok.
3/1/2004 10:42:00 AM	4935	41.235117	-71.374917	Trip 612; No problems discharging scow. Scow dumps in 5 seconds. Volume estimate from scow card.
3/1/2004 11:18:00 AM	2600	41.23053	-71.379945	Trip 613; Good dump.
3/1/2004 6:55:00 PM	2700	41.227222	-71.389344	GL 62.
3/1/2004 7:25:00 PM	4935	41.224667	-71.378383	Trip 615; No problems discharging scow. Scow dumps in 15 seconds. Volume estimate from scow card.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
3/2/2004 1:31:00 AM	2400	41.236384	-71.382053	Trip 616; Good dump.
3/2/2004 6:21:00 AM	4935	41.2253	-71.378717	Trip 617; No problems discharging scow. Volume estimate from scow card.
3/2/2004 1:27:00 PM	2900	41.22597	-71.37542	Trip 618; Disposal ok.
3/3/2004 1:27:00 AM	3800	41.224833	-71.374833	Trip 619; Disposal ok. Scow secured to state docks.
3/3/2004 6:03:00 AM	5143	41.2306	-71.380367	Trip 620; No problems discharging scow. Volume estimate from scow card.
3/3/2004 2:10:00 PM	3800	41.225	-71.374667	Trip 621; Disposal ok. 1. Secured scow from assisting vessel, the boys. 2. Secured scow at state docks.
3/3/2004 10:26:00 PM	5143	41.2305	-71.380033	Trip 623; No problems discharging scow. Volume estimate from scow card.
3/3/2004 11:30:00 PM	3200	41.231542	-71.38131	Trip 622; Lost comm with GL 61.
3/4/2004 8:18:00 AM	4216	41.2252	-71.373	Trip 625; No problems discharging scow. Volume estimate from scow card.
3/4/2004 1:40:00 PM	2600	41.234713	-71.385398	Trip 626; Disposal ok.
3/4/2004 4:55:00 PM	3000	41.230333	-71.376	Trip 628; Disposal ok. #1 lost computer icon for scow and made disposal at buoy.
3/4/2004 5:23:00 PM	3811	41.23505	-71.374833	Trip 627; No problems discharging scow. Volume estimate from scow card.
3/5/2004 12:25:00 AM	2900	41.226497	-71.374964	Trip 629; Disposal ok.
3/5/2004 11:55:00 AM	5353	41.230667	-71.38	Trip 631; Sporatic telemetry from scow. Dumped at buoy. Volume estimate from scow card.
3/5/2004 12:12:00 PM	3800	41.230667	-71.374667	Trip 630; Disposal ok - made at buoy because of continued computer problems and faulty radio contact with scow. #1 scow secured at state docks.
3/5/2004 5:35:00 PM	2900	41.233971	-71.386348	Trip 632; Disposal ok. Running lights on GL 61 are not working.
3/6/2004 10:10:00 AM	5143	41.2252	-71.378767	Trip 633; No problems discharging scow. Volume estimate from scow card.
3/6/2004 10:24:00 AM	3800	41.225135	-71.379438	Trip 634; Disposal ok.
3/6/2004 11:30:00 AM	3000	41.225086	-71.378006	Trip 635; Disposal ok.
3/7/2004 12:32:00 PM	3800	41.225329	-71.379067	Trip 637; Disposal ok. #1 - picked up scow at state docks.
3/7/2004 1:03:00 PM	5353	41.2305	-71.380333	Trip 636; No problems discharging scow. Volume estimate from scow card.
3/7/2004 1:41:00 PM	3500	41.23067	-71.38033	Trip 638; Disposal ok. GL 62 opened and closed slowly.
3/7/2004 8:19:00 PM	3800	41.234167	-71.371667	Trip 639; Disposal ok.
3/7/2004 10:07:00 PM	5143	41.226883	-71.385533	Trip 640; No problems discharging scow. Volume estimate from scow card.
3/8/2004 3:41:00 AM	2800	41.235326	-71.374991	Trip 647; Disposal ok.
3/8/2004 4:46:00 AM	3800	41.235167	-71.376	Trip 642; Disposal ok. #1 Scow secured at state docks.
3/9/2004 12:12:00 PM	4831	41.224883	-71.378367	Trip 645; No problems discharging scow. Volume estimate from scow card.
3/9/2004 12:25:00 PM	3800	41.224741	-71.378239	Trip 646; Disposal ok.
3/9/2004 6:02:00 PM	2925	41.234453	-71.374531	Trip 644; Disposal ok.
3/9/2004 9:01:00 PM	5353	41.23475	-71.386433	Trip 647; No problems discharging scow. Volume estimate from scow card.
3/9/2004 9:38:00 PM	3800	41.229667	-71.380833	at buoy.
3/10/2004 3:06:00 AM	2800	41.230482	-71.380323	Trip 648; Disposal ok.
3/10/2004 5:23:00 AM	3800	41.235333	-71.375833	Trip 649; Disposal ok.
3/10/2004 12:01:00 PM	2775	41.22706	-71.386644	Trip 650; Disposal ok.
3/10/2004 1:41:00 PM	2800	41.224833	-71.378217	Trip 651; No problems discharging scow. Volume estimate from scow card.
3/12/2004 11:08:00 AM	4318	41.235033	-71.37445	Trip 653; No problems discharging scow. Volume estimate from scow card.
3/12/2004 11:26:00 AM	3800	41.234167	-71.3715	Trip 652; Disposal ok. #1 Picked up scow at state docks. #2 Scow secured at state docks.
3/12/2004 2:33:00 PM	2950	41.226743	-71.384696	Trip 654; Disposal ok.
3/13/2004 8:56:00 AM	3800	41.23505	-71.386117	Trip 655; No problems discharging scow. Volume estimate from scow card.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
3/13/2004 9:47:00 AM	3800	41.234167	-71.384833	Trip 656; Disposal ok. #1 Scow secured at state docks.
3/13/2004 4:30:00 PM	5880	41.2298	-71.3802	Trip 657; No problems discharging scow. Volume estimate from scow card.
3/13/2004 5:46:00 PM	2875	41.2296	-71.379972	Trip 658; Disposal ok.
3/13/2004 11:22:00 PM	3800	41.222833	-71.371667	Trip 659; Disposal ok.
3/14/2004 2:10:00 AM	4831	41.235191	-71.375141	Trip 660; No problems discharging scow. Volume estimate from scow card.
3/14/2004 9:02:00 AM	3800	41.234167	-71.371833	Trip 662; Disposal ok.
3/14/2004 9:44:00 AM	3000	41.227977	-71.375747	Trip 661; Problems with starting engines on scow GL 61 and dumping.
3/14/2004 12:42:00 PM	3831	41.235	-71.385867	Trip 663; No problems discharging scow. Volume estimate from scow card.
3/14/2004 5:21:00 PM	3800	41.222667	-71.3715	Trip 664; Disposal ok.
3/14/2004 5:55:00 PM	2925	41.227194	-71.375668	Trip 665; Disposal ok.
3/15/2004 1:37:00 AM	5563	41.226933	-71.374883	Trip 666; No problems discharging scow. Volume estimate from scow card.
3/15/2004 3:36:00 AM	3800	41.223167	-71.385	Trip 667; Disposal ok.
3/15/2004 4:54:00 AM	2975	41.225059	-71.378122	Trip 668; Scow 402 opened fine, but wouldn't close.
3/15/2004 10:37:00 AM	5040	41.235133	-71.385417	Trip 669; No problems discharging scow. Volume estimate from scow card.
3/15/2004 1:25:00 PM	3800	41.235167	-71.375667	Trip 670; Disposal ok.
3/15/2004 8:21:00 PM	2900	41.226425	-71.374517	Trip 671; Disposal ok.
3/15/2004 9:20:00 PM	3800	41.222667	-71.3845	Trip 672; Disposal ok.
3/16/2004 1:08:00 AM	3800	41.230667	-71.380083	Trip 673; No problems discharging scow. Volume estimate from scow card.
3/16/2004 5:23:00 AM	3800	41.223	-71.384833	Trip 674; Disposal ok; #1 secured scow at state docks.
3/16/2004 5:54:00 AM	3000	41.225086	-71.382141	Trip 675; Depth taken from sounder; Auto dump worked smoothly, material = mud.
3/16/2004 10:12:00 AM	5040	41.23495	-71.385217	Trip 676; No problems discharging scow. Volume estimate from scow card.
3/16/2004 1:42:00 PM	2000	41.234766	-71.386212	Trip 677; Remote malfunction on closing; Sea's increasing, visibility 1/4 mile; Mud.
3/16/2004 2:29:00 PM	2500	41.234915	-71.386308	Trip 678; Good dump!
3/18/2004 8:48:00 AM	2400	41.226638	-71.385206	Trip 681; Good dump.
3/18/2004 9:09:00 AM	5143	41.224717	-71.378133	Trip 679; No problems discharging scow. Volume estimate from scow card.
3/18/2004 9:32:00 AM	2800	41.226106	-71.385122	Trip 680; Opened slow, closed quick.
3/18/2004 6:37:00 PM	4318	41.230167	-71.380783	Trip 683; No problems discharging scow. Volume estimate from scow card.
3/19/2004 12:04:00 AM	3100	41.234647	-71.374684	Trip 684; Good dump.
3/19/2004 4:35:00 AM	2900	41.234333	-71.371833	Trip 685; Depth sounder malfunction; GL 65 __ smooth, real bumpy out here.
3/19/2004 5:52:00 AM	6198	41.237	-71.3821	Trip 686; No problems discharging scow. Volume estimate from scow card.
3/19/2004 9:24:00 AM	2900	41.226884	-71.385869	Trip 687; Good dump; Because of rough sea, we left the dump area, with the scow still open, and close the scow on the way in.
3/20/2004 12:27:00 PM	5353	41.225	-71.3785	Trip 690; No problems discharging scow. Volume estimate from scow card.
3/20/2004 12:42:00 PM	2800	41.224949	-71.378606	Trip 688; Good dump.
3/20/2004 12:55:00 PM	2800	41.22492	-71.378752	Trip 689; Engine stalled on approach, successfully restarted in time, smooth operation of scow GL 65, material mud.
3/20/2004 9:02:00 PM	5458	41.230325	-71.379843	Trip 691; No problems discharging scow. Volume estimate from scow card.
3/22/2004 11:08:00 AM	2900	41.224974	-71.373222	Trip 693; Disposal ok.
3/22/2004 12:34:00 PM	3800	41.226717	-71.386083	Trip 692; No problems discharging scow. Volume estimate from scow card.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
3/22/2004 12:50:00 PM	2900	41.226254	-71.385568	Trip 694; Good dump. Circle inside the dump area for fourty minute, scow wouldn't close, return scow to dredge open. Mechanical failure.
3/22/2004 8:52:00 PM	2850	41.234314	-71.386471	Trip 695; Disposal ok.
3/22/2004 9:20:00 PM	6090	41.234717	-71.3755	Trip 696; Scow opened much slower than usual. Volume estimate from scow card.
3/23/2004 12:22:00 AM	2900	41.225316	-71.378759	Trip 697; Good dump!
3/23/2004 4:50:00 AM	2900	41.234768	-71.374371	Trip 698; Disposal ok.
3/23/2004 7:05:00 AM	5040	41.235183	-71.38575	Trip 699; No problems discharging scow. Volume estimate from scow card.
3/23/2004 12:47:00 PM	2800	41.230722	-71.379841	Trip 700; Good dump.
3/23/2004 3:06:00 PM	5563	41.235367	-71.3856	Trip 701; No problems discharging scow. Volume estimate from scow card.
3/23/2004 7:58:00 PM	3000	41.236955	-71.381915	Trip 702; Disposal ok.
3/24/2004 8:05:00 AM	2900	41.236988	-71.382284	Trip 703; Good dump.
3/24/2004 12:15:00 PM	3100	41.233082	-71.37633	Trip 705; Disposal ok.
3/24/2004 3:07:00 PM	3800	41.235083	-71.3748	Trip 704; No problems discharging scow. Volume estimate from scow card.
3/24/2004 7:37:00 PM	2800	41.236544	-71.381661	Trip 706; Good dump.
3/24/2004 8:15:00 PM	2875	41.235516	-71.386411	Trip 707; Disposal ok.
3/25/2004 12:28:00 AM	5040	41.2308	-71.380467	Trip 708; No problems discharging scow. Volume estimate from scow card.
3/25/2004 3:16:00 AM	2800	41.224562	-71.372915	Trip 709; Good dump!
3/25/2004 6:29:00 AM	2900	41.234667	-71.375047	Trip 710; Disposal ok.
3/25/2004 10:07:00 AM	4523	41.23525	-71.375217	Trip 711; No problems discharging scow. Volume estimate from scow card.
3/25/2004 11:23:00 AM	2900	41.226646	-71.375018	Trip 712; Good dump.
3/25/2004 7:22:00 PM	2800	41.235307	-71.385804	Trip 713; Disposal ok.
3/25/2004 7:49:00 PM	5563	41.235367	-71.385883	Trip 714; No problems discharging scow. Volume estimate from scow card.
3/26/2004 1:20:00 AM	2500	41.231033	-71.380567	Trip 715; Scow no show on monitor telemetry. Lat/Long coordinates taken from tug position. Scow location 250 ft from tug. Scow was slow dumping.
3/26/2004 5:55:00 AM	2800	41.23469	-71.376021	Trip 716; Disposal ok.
3/26/2004 6:15:00 AM	5353	41.2267	-71.375133	Trip 717; No problems discharging scow. Volume estimate from scow card.
3/26/2004 4:21:00 PM	4523	41.230667	-71.380333	Trip 718; No problems discharging scow. Volume estimate from scow card. No telemetry on scow. Dumped at buoy with radar and gps plot.
3/26/2004 8:51:00 PM	4500	41.23498	-71.385825	Trip 719; See attached letter dated 3/29/04.
3/26/2004 11:25:00 PM	1700	41.226505	-71.374253	Trip 720; Dump ok. Scow 402 is 3000 yds.
3/27/2004 2:57:00 AM	5562	41.226617	-71.385383	Trip 721; No problems discharging scow. Volume estimate from scow card.
3/27/2004 9:55:00 AM	2900	41.230992	-71.380091	Trip 722; Scow no show on monitor! Telemetry. Circle inside dump area because scow engine would start then stop. Finally the scow open wide enough to let the material out. Return scow to dredge with scow open. Lat/Long reading from tug. 1213 ft between tu
3/27/2004 2:46:00 PM	3353	41.226867	-71.375	Trip 723; No problems discharging scow. Volume estimate from scow card.
3/27/2004 7:52:00 PM	2900	41.23372	-71.385883	Trip 724; Good dump!
3/30/2004 4:27:00 PM	4413	41.225033	-71.37995	Trip 725; No problems discharging scow. Volume estimate from scow card.
3/30/2004 5:18:00 PM	2800	41.225	-71.372667	Trip 727; GPS malfunction on scow 61. Depth taken from chart.
3/31/2004 2:29:00 AM	5353	41.236667	-71.381833	Trip 726; No problem discharging scow. Volume estimate from scow card. Position by GPS and Radar plot.
3/31/2004 5:45:00 AM	2600	41.224726	-71.377603	Trip 728; Auto dumped worked perfect; fog; depth taken from chart.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
3/31/2004 12:19:00 PM	6300	41.234395	-71.374477	Trip 729; No problems discharging scow. Volume estimate from scow card.
4/2/2004 6:30:00 AM	4730	41.224767	-71.3786	Trip 731; No problems discharging scow. Volume estimate from scow card.
4/2/2004 11:00:00 AM	2900			Trip 730; Rip 730 GPS malfunction on scow GL 63 (rough water? No reading).
4/2/2004 2:33:00 PM	5449	41.235	-71.374883	Trip 732; No problems discharging scow. Volume estimate from scow card.
4/2/2004 7:30:00 PM	2800	41.223552	-71.378296	Trip 733; Starboard light out, remote worked perfect.
4/2/2004 11:17:00 PM	5449	41.22495	-71.3785	Trip 734; No problems discharging scow. Volume estimate from scow card.
4/3/2004 5:31:00 AM	2800	41.223	-71.374	Trip 735; Remote starter on GL 62 very unreliable!!!
4/3/2004 10:09:00 AM	5353	41.22485	-71.3785	Trip 736; No problems discharging scow. Volume estimate from scow card.
4/3/2004 3:10:00 PM	2900	41.225	-71.374333	Trip 737; GL 63 worked perfectly.
4/3/2004 9:08:00 PM	4100	41.22475	-71.373833	Trip 738; No problems discharging scow. Volume estimate from scow card.
4/4/2004 3:42:00 AM	2850	41.2345	-71.3845	Trip 739; GL 61 performed perfectly. Advanced clocks 1 hr 0200 to DST.
4/4/2004 11:55:00 AM	5143	41.224833	-71.378217	Trip 740; No problems discharging scow except as noted below. Volume estimate from scow card. Scow lost about 6-7 ft of forward draft while under way from dredge to RISDS. Forward panama clock was fully underwater at dredge and about 4 ft out of the water
4/4/2004 10:25:00 PM	2500	41.225	-71.37	Trip 741; GL 62-2 repeated tries at Cell E engine kept shutting off.
4/5/2004 5:11:00 AM	5143	41.234967	-71.386133	Trip 742; No problems discharging scow. Volume estimate from scow card.
4/6/2004 12:25:00 AM	4935	41.224833	-71.379333	Trip 743; Very rough conditions at dump site. Lost comps at dump, mode calculated dump. Waypt dump. Lost STBD running lite. "743"
4/6/2004 7:14:00 AM	5353	41.235333	-71.38175	Trip 744; No problems discharging scow. Volume estimate from scow card.
4/6/2004 3:12:00 PM	4900	41.222667	-71.384333	Trip 745; GL 61 worked perfect. Dump buoy put back on station!
4/6/2004 3:51:00 PM	5143	41.2305	-71.38	Trip 746; No problems discharging scow. Volume estimate from scow card.
4/6/2004 11:35:00 PM	5300	41.225048	-71.380896	Trip 747; GL 62 open and closed uneventful.
4/7/2004 5:30:00 AM	5143	41.23645	-71.381867	Trip 748; No problems discharging scow. Volume estimate from scow card.
4/7/2004 10:12:00 AM	4935	41.225167	-71.374667	Trip 749; Science test taking water samples at dump site "Beaver Tail".
4/7/2004 2:13:00 PM	5143	41.225	-71.377967	Trip 750; No problems discharging scow. Volume estimate from scow card.
4/7/2004 7:22:00 PM	4114	41.234167	-71.385	Trip 751; A lot of ship traffic tonight. Smooth release on GL-61.
4/7/2004 11:13:00 PM	5033	41.226967	-71.385467	Trip 752; No problems discharging scow. Volume estimate from scow card.
4/8/2004 4:20:00 AM	4114	41.235167	-71.374833	Trip 753; GL-62 would not stay running. Tried repeatedly lost comps. Finally opened 6 inches and dumped . Brought back all of material.
4/8/2004 9:10:00 AM	5353	41.235017	-71.37495	Trip 754; No problems discharging scow. Volume estimate from scow card.
4/8/2004 4:26:00 PM	4728	41.234	-71.371167	Trip 755; GL-63 uneventful… A-ok release and close.
4/9/2004 12:21:00 AM	5353	41.225	-71.378533	Trip 756; No problems discharging scow. Volume estimate from scow card.
4/9/2004 3:03:00 AM	3000	41.22492	-71.37938	Trip 757; Close signal on 402 took long time to respond; Draft reported 18 ft fwd and aft at dredge (leak?).
4/9/2004 9:13:00 AM	5243	41.235167	-71.385867	Trip 758; No problems discharging scow. Volume estimate from scow card.
4/9/2004 1:23:00 PM	4114	41.226496	-71.384958	Trip 759; GL-61 cadilac of Great Lakes, worked perfect.
4/9/2004 7:28:00 PM	2800	41.2368	-71.381867	Trip 760; No problems discharging scow.
4/10/2004 12:43:00 AM	4728	41.223167	-71.385	Trip 761; GPS was not updating info to the tug. Screen went black twice at dump area!
4/10/2004 4:24:00 AM	5143	41.224917	-71.37295	Trip 762; No problems discharging scow. Volume estimate from scow card.
4/10/2004 10:18:00 AM	3000	41.2345	-71.371833	Trip 763; "402" dumped on Q as two research vessels conducted experiments.
4/10/2004 2:07:00 PM	5353	41.225167	-71.378467	Trip 764; No problems discharging scow. Volume estimate from scow card.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
4/10/2004 7:44:00 PM	4000	41.235167	-71.375667	Trip 765; Pushing water from castle neck to buoy, GL-61 worked perfect!
4/11/2004 12:21:00 AM	3800	41.2352	-71.3857	Trip 766; No problems discharging scow. Volume estimate from scow card.
4/11/2004 4:33:00 AM	4728	41.222833	-71.384833	Trip 767; GL-63 tracking not 100%, released fine.
4/11/2004 10:49:00 AM	5248	41.23485	-71.3861	Trip 768; No problems discharging scow. Volume estimate from scow card.
4/11/2004 5:39:00 PM	5774	41.2235	-71.369667	Trip 769; Lost comps just as GL-63 was entering dump zone. Throttled back and hit dump button.
4/11/2004 10:53:00 PM	5248	41.230667	-71.3802	Trip 770; No problems discharging scow. Volume estimate from scow card.
4/12/2004 3:08:00 AM	4318	41.223	-71.384667	Trip 771; "Uneventful" A-ok release.
4/12/2004 10:03:00 AM	5563	41.235083	-71.38585	Trip 772; No problems discharging scow. Volume estimate from scow card.
4/12/2004 4:07:00 PM	4600	41.225488	-71.378885	Trip 773; GL-63 behaved itself, dump right on target, seas getting rough.
4/12/2004 9:42:00 PM	4943	41.236533	-71.382367	Trip 774; No problems discharging scow. Volume estimate from scow card.
4/14/2004 1:16:00 AM	1222	41.224833	-71.375333	Trip 775; Very stormy cond. Scow was so light on tow to sea, difficult to see it pop-up.
4/15/2004 12:00:00 AM	3511	41.227933	-71.374633	Trip 776; No problems discharging scow. Volume estimate from scow card.
4/15/2004 5:58:00 PM	3100	41.232792	-71.382318	Trip 777; Disposal ok.
4/16/2004 1:38:00 AM	3000	41.235598	-71.375576	Trip 778; Disposal ok.
4/16/2004 1:40:00 PM	5038	41.236033	-71.37585	Trip 779; No problems discharging scow. Volume estimate from scow card.
4/16/2004 7:45:00 PM	2850	41.232541	-71.37825	Trip 780; Disposal ok.
4/17/2004 12:18:00 AM	3800	41.236117	-71.371667	Trip 781; No problems discharging scow. Volume estimate from scow card.
4/17/2004 7:04:00 AM	2850	41.232579	-71.375087	Trip 782; Disposal ok.
4/17/2004 1:58:00 PM	4831	41.233417	-71.381967	Trip 783; No problems discharging scow. Volume estimate from scow card.
4/17/2004 7:52:00 PM	3000	41.23308	-71.371789	Trip 784; Disposal ok.
4/18/2004 7:27:00 AM	3000	41.231616	-71.381397	Trip 786; Disposal ok.
4/18/2004 11:41:00 AM	4831	41.233283	-71.3791	Trip 785; Volume estimate from scow card. Scow would not start. Brought back with load to Newport and Great Lakes sent someone to repair it. Went back out after repair and dumped scow with no problems.
4/18/2004 4:47:00 PM	3000	41.231277	-71.377453	Trip 787; Disposal ok.
4/18/2004 10:29:00 PM	5353	41.23345	-71.375667	Trip 788; No problems discharging scow. Volume estimate from scow card.
4/19/2004 3:35:00 AM	3050	41.230687	-71.376665	Trip 789; Disposal ok.
4/19/2004 4:37:00 PM	3800	41.233333	-71.371417	Trip 790; No problems discharging scow. Volume estimate from scow card.
4/19/2004 8:12:00 PM	3000	41.230558	-71.372241	Trip 791; Disposal ok.
4/20/2004 11:26:00 AM	7058	41.228217	-71.382167	Trip 792; No problems discharging scow. Volume estimate from scow card.
4/20/2004 4:18:00 PM	2900	41.22704	-71.381509	Trip 793; Good dump.
4/20/2004 10:34:00 PM	3500	41.23075	-71.382467	Trip 794; No problems discharging scow. Volume estimate from scow card.
4/21/2004 2:51:00 AM	2900	41.228325	-71.379256	Trip 795; Good dump.
4/21/2004 8:43:00 AM	5458	41.231017	-71.37885	Trip 796; No problems discharging scow. Volume estimate from scow card.
4/21/2004 1:47:00 PM	1800	41.22749	-71.375492	Trip 797; Good dump; 3000 yds scow.
4/21/2004 6:24:00 PM	5248	41.231083	-71.375883	Trip 798; No problems discharging scow. Volume estimate from scow card.
4/21/2004 11:06:00 PM	2900	41.219033	-71.371841	Trip 799; Good dump.
4/22/2004 3:29:00 AM	3700	41.23085	-71.372117	Trip 800; No problems discharging scow. Volume estimate from scow card.
4/22/2004 1:50:00 PM	5563	41.228117	-71.378633	Trip 802; No problems discharging scow. Volume estimate from scow card.
4/22/2004 11:00:00 PM	3700	41.228083	-71.375083	Trip 803; No problems discharging scow. Volume estimate from scow card.
4/23/2004 3:12:00 PM	4935	41.228333	-71.37205	Trip 804; No problems discharging scow. Volume estimate from scow card.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
4/24/2004 8:41:00 AM	4728	41.236017	-71.379417	Trip 801; No problems discharging scow. Volume estimate from scow card.
5/1/2004 7:59:00 AM	3100	41.225328	-71.382676	Trip 805; Scow slow dumping, 70% dump outside of cell.
5/1/2004 6:29:00 PM	5563	41.221833	-71.371667	Trip 806; Dead center on Cell 17, starboard light out.
5/2/2004 1:16:00 AM	2900	41.226441	-71.370666	Trip 807; Dump ok.
5/2/2004 8:21:00 AM	5774	41.234667	-71.374	Trip 808; Impossible to see scow in this fog. Comps data on draft do not update very quickly.
5/2/2004 4:16:00 PM	3000	41.236725	-71.379038	Trip 809; Good dump.
5/3/2004 2:07:00 AM	5986	41.234833	-71.371667	Trip 810; Real rough cond. Actually saw the dump buoy for a brief moment, left wire long for softey.
5/3/2004 4:55:00 PM	3511	41.235	-71.371667	Trip 811; Real lumpy out here. Scow's dump slower with this material (clay?).
5/5/2004 12:53:00 AM	4935	41.2345	-71.371833	Trip 812; Everything worked smoothly, port light out.
5/7/2004 6:01:00 AM	2950	41.23467	-71.36983	Trip 813; Disposal ok.
5/8/2004 3:25:00 AM	3100	41.2265	-71.376	Trip 814; Disposal ok.
5/9/2004 6:20:00 AM	3200	41.2265	-71.374	Trip 815; Disposal ok.
5/10/2004 7:23:00 AM	2850	41.23333	-71.372	Trip 816; Disposal ok.
5/10/2004 4:42:00 PM	2900	41.2265	-71.36983	Trip 817; Disposal ok.
5/11/2004 9:33:00 AM	2900	41.22517	-71.37633	Trip 819; Disposal ok.
5/11/2004 7:51:00 PM	2700	41.22517	-71.37383	Trip 818; Disposal ok.
5/12/2004 5:09:00 AM	2900	41.225	-71.37183	Trip 820; Disposal ok.
5/12/2004 2:28:00 PM	3200	41.22517	-71.37	Trip 821; Disposal ok; Waited for dredge 54 to get set up in new location.
5/13/2004 5:29:00 AM	3000	41.22317	-71.37633	Trip 822; Disposal ok.
5/16/2004 1:12:00 AM	2875	41.223	-71.37383	Trip 823; Disposal ok.
5/16/2004 10:22:00 AM	2775	41.22333	-71.37183	Trip 824; Disposal ok.
5/16/2004 8:01:00 PM	2700	41.22333	-71.36967	Trip 825; Disposal ok.
5/17/2004 2:25:00 AM	1335			Trip 826; Computer not tracking scow on screen. Visual dump when scow was at center buoy.
5/17/2004 5:54:00 AM	2800	41.2215	-71.376	Trip 827; Disposal ok.
5/17/2004 1:41:00 PM	5000	41.236142	-71.379368	Trip 828; Trip # changed on computer to #830. #828 came from the main office.
5/17/2004 9:18:00 PM	2850	41.22183	-71.372	Trip 829; Disposal ok.
5/18/2004 4:40:00 AM	3596			Trip 830.
5/18/2004 3:05:00 PM	2600	41.236205	-71.378529	Trip 831; Great dump.
5/18/2004 7:14:00 PM	5000			Trip 832; Problem with tracking and coordinates on computer, made necessary adjustments with measurements manually.
5/19/2004 12:30:00 AM	1500	41.2273	-71.371867	Trip 833; Scow, no show on monitor. Telemetri out. Lon/Lat reading from tug location. Distance in ft from tug to scow 890 ft. Dump location at buoy, 200 ft. Slow ____ to dump area because of rough seas.
5/19/2004 4:18:00 AM	5000	41.23286	-71.382862	Trip 834.
5/19/2004 11:47:00 AM	2800	41.236142	-71.375751	Trip 835; Great dump.
5/19/2004 5:47:00 PM	5000	41.23299	-71.378615	Trip 836.
5/19/2004 11:30:00 PM	1600			Trip 837; Scow no show on monitor. Telemetri out. Tug distance to scow 700 ft. Lat/Long reading from tug.
5/20/2004 2:45:00 AM	4000	41.236992	-71.376977	Trip 838; Scow was not updating on computer, had to dump with manual measurement adjustment.
5/20/2004 10:14:00 AM	2700	41.235959	-71.372171	Trip 839; Great dump.
5/20/2004 8:04:00 PM	2900	41.232966	-71.382491	Trip 841; Good dump.
5/20/2004 8:25:00 PM	4000	41.233625	-71.372193	Trip 840; Tied up at south point dock at 23:25 until fog lifts.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
5/21/2004 4:51:00 AM	2900	41.23351	-71.378417	Trip 842; Good dump.
5/21/2004 9:38:00 AM	4000	41.232804	-71.382817	Trip 843; Scow stopped tracking, made necessary adjustments for proper dumping in cell #8.
5/21/2004 1:39:00 PM	2800	41.249985	-71.375229	Trip 844; Great dump.
5/21/2004 6:42:00 PM	4000	41.231109	-71.379158	Trip 845; Computer again updating every 4 minutes or so, therefore we are making necessary adjustments to insure we are dumping in the proper area.
5/22/2004 12:41:00 AM	3500	41.244717	-71.372545	Trip 846; Good dump.
5/22/2004 5:30:00 AM	4500	41.232951	-71.375449	Trip 847; Approx. 627 feet between tug and scow. Computer was not updating quickly enough - had to make adjustment for proper cell dump.
5/22/2004 2:46:00 PM	2900	41.230761	-71.381954	Trip 848; Great dump. ____ _____ along side of tug at ____ point.
5/22/2004 4:13:00 PM	2900	41.2355	-71.36967	Trip 849; Disposal ok.
5/22/2004 11:48:00 PM	3600	41.230769	-71.378762	Trip 850; Good dump.
5/23/2004 8:32:00 AM	2900	41.230672	-71.372141	Trip 852; Great dump. The next schedule dump was Grid 10. But the buoy was located in the grid. Scow 61 was dump in Grid 11.
5/23/2004 1:03:00 PM	3000	41.2235	-71.37417	Trip 853; Disposal ok. Stand by at Southport 15:55 to 17:30. Waited on dredge.
5/23/2004 7:30:00 PM	2700	41.228348	-71.38231	Trip 854; Great dump.
5/24/2004 12:49:00 AM	3100	41.2235	-71.37167	Trip 855.
5/24/2004 3:00:00 AM	2900	41.225	-71.376	Trip 851; Disposal ok.
5/24/2004 8:31:00 AM	2900	41.228014	-71.378768	Trip 857; Dump ok.
5/24/2004 6:45:00 PM	3000	41.22383	-71.36967	Trip 856; Disposal ok.
5/25/2004 4:31:00 AM	3500	41.228361	-71.375666	Trip 858; Great dump.
5/25/2004 9:03:00 AM	3000	41.2215	-71.37617	Trip 859; Disposal ok.
5/25/2004 1:53:00 PM	2800	41.228097	-71.371446	Trip 860; Great dump. Wait for scow, tug on slow bell.
5/25/2004 5:50:00 PM	3000	41.2215	-71.3715	Trip 861; Disposal ok.
5/26/2004 12:33:00 AM	2900	41.225179	-71.382114	Trip 862; Great dump.
5/26/2004 3:47:00 AM	3150	41.23483	-71.374	Trip 863; Disposal ok.
5/26/2004 9:43:00 AM	2000	41.224691	-71.375637	Trip 864; Departed dredge 54#, Scow 63 had draft of 18 ft 5 inches fwd and 19 ft aft, Scow 63 arrived at dump site, grid 17, was 14 ft 5 inches fwd and 15 ft aft [leaking].
5/26/2004 2:17:00 PM	2900	41.235	-71.37217	Trip 865; Disposal ok.
5/26/2004 7:11:00 PM	2800	41.235988	-71.378953	Trip 866; Great dump.
5/26/2004 11:54:00 PM	2900	41.23483	-71.36983	Trip 867; Disposal ok.
5/27/2004 4:47:00 AM	2800	41.235632	-71.375426	Trip 868; Great dump.
5/27/2004 9:14:00 AM	3000	41.2265	-71.37617	Trip 869; Disposal ok.
5/27/2004 2:31:00 PM	2000	41.236208	-71.372078	Trip 870; Scow 63 departed dredge 54#. Draft on scow had 18 ft fwd. And 19 ft 5 inches aft. Arrived at disposal site. The draft on the scow has 15 ft aft and 14 ft fwd [leaking].
5/27/2004 6:04:00 PM	2875	41.2265	-71.374	Trip 871; Disposal ok.
5/28/2004 12:15:00 AM	3100	41.249702	-71.382421	Trip 872; Dump ok.
5/28/2004 8:30:00 AM	2900	41.2265	-71.37183	Trip 873; Disposal ok.
5/28/2004 12:24:00 PM	3000	41.249758	-71.378874	Trip 874; Good dump.
5/28/2004 4:45:00 PM	3000	41.22633	-71.36983	Trip 875; Disposal ok.
5/28/2004 9:31:00 PM	2900	41.233046	-71.375526	Trip 876; I was unable to see draft marking on scow 63 tonight. Poor visibility [leak?], good dump.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
5/29/2004 2:06:00 AM	2875	41.22517	-71.37617	Trip 877; Problems with brake on winch. Disposal ok.
5/29/2004 7:19:00 AM	2800	41.233298	-71.371981	Trip 878; Great dump.
5/29/2004 4:41:00 PM	2900	41.22483	-71.3735	Trip 879; Disposal ok.
5/30/2004 12:07:00 AM	3500	41.225039	-71.37554	Trip 880; Scow was schedule to be dump at grid 8. Scow engine wouldn't start. Put man aboard scow to reset breakers. Material was dump at grid 17. Good dump.
5/30/2004 5:47:00 AM	3200	41.225	-71.36983	Trip 881; Buoy too close to cell 10. Disposal ok.
5/30/2004 1:45:00 PM	3000	41.230817	-71.382346	Trip 882; Great dump. Scow has no leaks.
5/30/2004 7:55:00 PM	2850	41.223	-71.376	Trip 883; Disposal ok.
5/31/2004 5:02:00 AM	3100	41.231093	-71.378881	Trip 884; Great dump.
5/31/2004 11:40:00 AM	2800	41.22333	-71.37383	Trip 885; Disposal ok.
5/31/2004 11:58:00 PM	2600	41.227828	-71.382418	Trip 886; Great dump.
6/1/2004 4:33:00 AM	2800	41.22317	-71.3695	Trip 887; Disposal ok. Skip cell 14 cause buoy was in the way.
6/1/2004 9:17:00 AM	1000	41.227986	-71.375876	Trip 888; Great dump.
7/21/2004 11:09:00 AM	2700	41.235631	-71.375916	Trip 1139; Good dump.
7/22/2004 1:15:00 AM	5774	41.235	-71.373667	Trip 1140; Scow would not tow straight at high speeds, shortwire (bow heavy), everything else went smooth.
7/22/2004 9:59:00 AM	2900	41.235575	-71.372181	Trip 1141; Good dump.
7/22/2004 4:50:00 PM	5143	41.232241	-71.375502	Trip 1142; Lots of traffic castle hill area! Scow worked perfect. Running lights not turned on.
7/23/2004 12:40:00 AM	2400	41.233758	-71.382447	Trip 1143; Monitor not tracking scow. Lat/Long taken from tug for dumping at grid 4. Slow bell waited for scow 61 to be loaded.
7/23/2004 4:50:00 AM	5986	41.2265	-71.371667	Trip 1144; Nice trip, everything went perfect 100%
7/23/2004 11:27:00 AM	2000	41.233643	-71.378545	Trip 1145; Leak! Scow left dredge 54 was fwd 14 ft aft 14 ft, at dump 9 fwd 9 aft. Slow bill (?), wait for ship.
7/23/2004 5:00:00 PM	5563	41.234833	-71.3695	Trip 1146; GL 63 performed perfect.
7/23/2004 9:32:00 PM	2800	41.232796	-71.375808	Trip 1147; Good dump.
7/24/2004 7:36:00 AM	2800	41.232264	-71.372083	Trip 1149; Dump ok.
7/24/2004 12:40:00 PM	4728	41.224667	-71.3765	Trip 1150; Port running light real dim, everything else worked perfect.
7/24/2004 4:48:00 PM	1100	41.23	-71.371667	Trip 1151; Scow no schow on monitor: telemetry. Lat/long reading from tug for dump at Grid 8. No lights on scow.
7/24/2004 11:55:00 PM	4318	41.224833	-71.372333	Trip 1152; Nice clear night with no ship traffic, all went smoothly.
7/25/2004 3:48:00 AM	2153	41.224833	-71.369833	Trip 1148; Lost scow 402 comps 2 miles from disposal site. Calculated sp + distance to achove (?) lat/long.
7/25/2004 5:21:00 AM	2700	41.231073	-71.375544	Trip 1153; Good dump, slow bell wait for scow.
7/25/2004 9:47:00 AM	3912	41.234833	-71.374	Trip 1154; Lost comps (2nd time) used radar + stop watch to calculate disposal.
7/25/2004 3:19:00 PM	2800	41.231162	-71.372075	Trip 1155; Great dump.
7/25/2004 9:00:00 PM	5563	41.234667	-71.369667	Trip 1156; Very nice night, no problems to report.
7/26/2004 2:39:00 AM	1500	41.22738	-71.382869	Trip 1157; Scow no show on monitor - telemetry. Reading info from tug. Tug GPS was used to dump scow. Distance 130 mn (?) from tug to scow. Waited for scow. Scow along side of tug 06:15. Equipment failure.
7/26/2004 7:10:00 AM	4728	41.223333	-71.371833	Trip 1158; A-ok, disposal.
7/26/2004 1:19:00 PM	2900	41.228138	-71.375063	Trip 1159; Great dump, 16:19 on hip. Waiting for scow being loaded.
7/26/2004 5:25:00 PM	2900	41.235865	-71.379164	Trip 1160; Scow 402 unable to update positions in a timely manner, was behind 302 seconds at disposal site.
7/27/2004 12:01:00 AM	2800	41.227934	-71.378297	Trip 1161; Great dump.
7/27/2004 4:20:00 AM	4935	41.233057	-71.375461	Trip 1162; Mark position button did not operate, used GPS on tug, recommend mouse pad be used

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
7/27/2004 8:40:00 AM	0	41.728365	-71.363432	Trip 1163; Draft on scow 13 fwd aft 15, estimate sq yds 1200. At Newport bridge draft was 7 ft. At dump scow was high out of water. Newport bridge you could see daylight in the scow pocket, because of gaps in the rubber seal. When the scow is closed. 12:3
7/27/2004 3:40:00 PM	3711	41.232421	-71.3794	Trip 1164; Computer screen accidently shut off could not get an accurate reading off tug's GPS. N-533260 E-54564.
7/27/2004 11:17:00 PM	2700	41.225111	-71.382613	Trip 1165; Great dump.
7/28/2004 8:35:00 AM	5353	41.235667	-71.369667	Trip 1166; Very inclimate weather, hit a squall poopr vis at dump, GL-63 starboard light quit.
7/28/2004 3:24:00 PM	3100	41.225393	-71.375584	Trip 1167; Great dump.
7/29/2004 12:06:00 AM	2900	41.235701	-71.378865	Trip 1168; Great dump. 04:40, scow on hip. Wait for scow.
7/29/2004 5:40:00 AM	5000	41.235	-71.374167	Trip 1169; Running lights appear to be off?! "FOG" 0% vis.
7/29/2004 9:52:00 AM	2400	41.236084	-71.375848	Trip 1170; Great dump. Scow left dredge draft = fwd 17.1 - aft 17.9. At dump = fwd 14.6 - aft 15.5. Draft reading from computer. 14:50 scow on hip. Wait for loaded scow.
7/29/2004 6:32:00 PM	4400	41.234833	-71.3735	Trip 1171; Quite rough out here tonight, real confused sea.
7/29/2004 10:04:00 PM	2900	41.236008	-71.372398	Trip 1172; Great dump.
7/30/2004 3:49:00 AM	4000	41.235762	-71.374601	Trip 1173; Comps worked good! GL-61 starboard running light out.
7/30/2004 8:43:00 AM	2900	41.232905	-71.382255	Trip 1174; Good dump. 13:45 scow on hip, wait for loaded scow.
7/30/2004 4:49:00 PM	5563	41.234833	-71.369833	Trip 1175; Thick "fog", 0% vis at times.
7/30/2004 11:33:00 PM	2900	41.236067	-71.379224	Trip 1176; Great dump. 03:30 scow on hip. Wait for loaded scow.
7/31/2004 5:09:00 AM	5563	41.233333	-71.376	Trip 1177; "Big" full moon this am, made for good visibility of scow.
7/31/2004 11:15:00 AM	3000	41.232934	-71.379543	Trip 1178; Great dump! 15:00 scow on hip! Wait for loaded scow.
7/31/2004 4:21:00 PM	4600	41.232621	-71.378912	Trip 1179; Nav lights out.
8/6/2004 4:55:00 AM	2800	41.227617	-71.3793	Trip 1180; Disposal - ok; computer not functioning properly - reported to GLD + D Co. office.
8/6/2004 12:28:00 PM	2950	41.226333	-71.371833	Trip 1181; Disposal - ok.
8/6/2004 4:57:00 PM	2800	41.225167	-71.371833	Trip 1182; Disposal Aok.
8/6/2004 10:18:00 PM	2800	41.226333	-71.37	Trip 1183; Disposal ok.
8/7/2004 3:51:00 AM	3000	41.225167	-71.369667	Trip 1184; Disposal Aok.
8/7/2004 10:10:00 AM	3100	41.225317	-71.376167	Trip 1185; Disposal ok.
8/7/2004 1:59:00 PM	3000	41.223333	-71.373833	Trip 1186; Disposal Aok.
8/7/2004 7:20:00 PM	3200	41.224833	-71.3725	Trip 1187; Disposal ok. Dump buoy is in the middle of cell 10.
8/8/2004 4:58:00 AM	3300	41.224833	-71.369667	Trip 1188; Disposal ok.
8/8/2004 2:29:00 PM	3000	41.225133	-71.3823	Trip 1189; Scow was tracking on computer, used tug's GPS, disposal ok.
8/8/2004 10:43:00 PM	3000	41.2235	-71.372	Trip 1190; Disposal Aok.
8/9/2004 5:51:00 AM	3150	41.228017	-71.375433	Trip 1191; Scow was not tracking on computer. Used tug's GPS. Disposal ok.
8/9/2004 10:44:00 AM	2850	41.223333	-71.369833	Trip 1192; Disposal Aok.
8/9/2004 6:05:00 PM	3000	41.223333	-71.372167	Trip 1193; Disposal ok.
8/9/2004 10:20:00 PM	3000	41.222833	-71.375	Trip 1194; Disposal Aok. Computer not functioning prior to and during disposal.
8/10/2004 3:16:00 AM	3100	41.223333	-71.37	Trip 1195; Disposal ok.
8/10/2004 12:18:00 PM	3100	41.225178	-71.381452	Trip 1196; Disposal ok.
8/10/2004 9:53:00 PM	3000	41.224841	-71.382569	Trip 1197; Disposal Aok.
8/11/2004 5:07:00 AM	3100	41.227167	-71.373	Trip 1198; Scow was not tracking on computer. Used tug's GPS. Disposal ok.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
8/11/2004 10:44:00 AM	3000	41.234833	-71.373833	Trip 1199; Disposal Aok.
8/11/2004 3:17:00 PM	3100	41.234833	-71.373833	Trip 1200; Disposal ok.
8/11/2004 8:38:00 PM	3000	41.235735	-71.375489	Trip 1201; Disposal Aok. Computer is not functioning accurately.
8/12/2004 1:51:00 AM	3100	41.234833	-71.371667	Trip 1202; Disposal ok.
8/12/2004 6:06:00 AM	2800	41.234833	-71.369667	Trip 1203; Disposal Aok.
8/12/2004 12:57:00 PM	3100	41.236	-71.372	Trip 1204; Scow was not tracking on computer. Used boats GPS. Disposal ok.
8/12/2004 6:10:00 PM	3100	41.232216	-71.382377	Trip 1205; Disposal Aok.
8/12/2004 11:52:00 PM	3250	41.233017	-71.382467	Trip 1206; Disposal ok.
8/13/2004 4:25:00 AM	2800	41.233952	-71.378513	Trip 1207; Disposal Aok.
8/13/2004 9:32:00 AM	3000	41.226333	-71.373833	Trip 1208; Disposal ok.
8/13/2004 2:11:00 PM	3000	41.233095	-71.375701	Trip 1209; Disposal Aok.
8/13/2004 7:27:00 PM	3200	41.233333	-71.3755	Trip 1210; Computer not tracking scow. Lost computer at dump site. Used boats GPS. Disposal ok.
8/13/2004 11:40:00 PM	3000	41.233333	-71.373	Trip 1211; Disposal Aok.
8/14/2004 6:01:00 AM	3100	41.232576	-71.372215	Trip 1212; Disposal ok.
8/14/2004 10:25:00 AM	2800	41.223	-71.371667	Trip 1213; Disposal Aok.
8/14/2004 3:54:00 PM	3000	41.230767	-71.382433	Trip 1214; Disposal ok.
8/14/2004 8:38:00 PM	2800	41.225	-71.37	Trip 1215; Disposal Aok.
8/16/2004 1:12:00 AM	3150	41.230517	-71.374817	Trip 1220; Disposal ok.
8/16/2004 4:00:00 AM	5700	41.226167	-71.376	Trip 1221; Everything Aok.
8/16/2004 11:14:00 AM	3100	41.225	-71.369833	Trip 1222.
8/16/2004 3:08:00 PM	5600	41.2255	-71.3695	Trip 1223; GL-63 towed off to port (25-30 ft), all the way to the dump (load shifted?).
8/16/2004 9:11:00 PM	3175	41.223333	-71.376	Trip 1224; Disposal ok.
8/17/2004 12:35:00 AM	5200	41.225	-71.3715	Trip 1225; Very nice night out here tonight, scow worked perfect.
8/17/2004 7:02:00 AM	3000	41.223333	-71.373833	Trip 1226; Disposal ok.
8/17/2004 11:04:00 AM	5600	41.223333	-71.371833	Trip 1227; Very calm not much traffic in Newport.
8/17/2004 4:12:00 PM	2950	41.228217	-71.37575	Trip 1228; Disposal ok.
8/17/2004 9:15:00 PM	5663	41.2265	-71.373833	Trip 1229; Port light out on scow GL-63, nice calm conditions at disposal site.
8/18/2004 1:21:00 AM	3100	41.228	-71.371855	Trip 1230; Disposal ok.
8/18/2004 6:50:00 AM	5563	41.224619	-71.382813	Trip 1231; Uneventful, everything was fine.
8/18/2004 1:41:00 PM	3100	41.22539	-71.38214	Trip 1232; Disposal ok.
8/18/2004 4:50:00 PM	5353	41.233333	-71.3695	Trip 1233; Trip to sea delayed 1 1/2 hr due to comp problem, worked fine once at disposal site.
8/18/2004 11:22:00 PM	2900	41.225555	-71.375396	Trip 1234; Disposal ok.
8/19/2004 2:36:00 AM	5563	41.2235	-71.37	Trip 1235; 600 ft ship + 50 ft sailboat out near the disposal site, in communication with both, disposal went smooth.
8/19/2004 1:07:00 PM	5143	41.225	-71.372	Trip 1237; Little bumpy out at dump site (buried the bow twice - hold on).
8/19/2004 3:01:00 PM	3100	41.234667	-71.374	Trip 1236; Engine to scow wouldn't start. Went back to Castle Hill for GLDD engineer. To fix problem with scow. Disposal ok.
8/19/2004 10:55:00 PM	5400	41.235	-71.369667	Trip 1238; Fishing boat fished straight through disposal site!
8/20/2004 10:25:00 AM	5200	41.2235	-71.376333	Trip 1240; Real pea soup, 0 visibility, no running lights on scow.
8/20/2004 4:27:00 PM	2700	41.226397	-71.37479	Trip 1241; Great dump.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
8/20/2004 10:23:00 PM	4400	41.234667	-71.3715	Trip 1239; The 401 has a mind of it's own when it comes to towing in a straight line, hit cell #2 dead center after expert boat handling.
8/21/2004 2:09:00 AM	2700	41.235068	-71.37446	Trip 1242; Great dump.
8/21/2004 9:35:00 AM	5563	41.2345	-71.369667	Trip 1243; Very rough at dump site, delayed getting in, waited for dredge 55 to get on line.
8/21/2004 3:04:00 PM	1700	41.235056	-71.374919	Trip 1244; Great dump.
8/22/2004 12:33:00 AM	5143	41.223333	-71.372	Trip 1245; Had a little difficulty with new computer program.
8/22/2004 5:23:00 AM	2990	41.224955	-71.37333	Trip 1246; Good dump.
8/22/2004 1:22:00 PM	3000	41.226167	-71.374	Trip 1247; Computer problem still exist, lat/long info questionable.
8/22/2004 5:28:00 PM	2990	41.226738	-71.385401	Trip 1248; Dump ok.
8/23/2004 12:15:00 AM	2995	41.2265	-71.370333	Trip 1249; Lat/Long does not (register) take onto GPS properly.
8/23/2004 5:51:00 AM	3005	41.228192	-71.37312	Trip 1250; Good dump.
8/23/2004 2:50:00 PM	3000	41.222833	-71.371333	Trip 1251; Computer program worked great.
8/23/2004 6:52:00 PM	2995	41.229897	-71.376531	Trip 1252; Dump ok. Dump s/w of buoy approximately 100 ft from buoy. Distance tug to scow 1274 ft.
8/24/2004 6:01:00 AM	3000	41.227188	-71.37454	Trip 1254; Dump ok.
8/24/2004 3:02:00 PM	3000	41.230333	-71.3845	little tricky.
8/24/2004 9:41:00 PM	2995	41.234849	-71.386099	Trip 1256; Return scow to dredge with pocket open. Engine will run and it will not close the pocket. Circle inside the disposal area for 54 minutes.
8/25/2004 1:57:00 AM	2950	41.234167	-71.384833	Trip 1253; Everything worked perfectly.
8/25/2004 9:03:00 AM	3000	41.222667	-71.384833	flawless.
8/25/2004 8:09:00 PM	2995	41.22497	-71.373092	Trip 1258; Dump well executed, Took scow from Lemmerhirt at Sandy Point to sea.
8/26/2004 11:48:00 AM	3000	41.230081	-71.375905	Trip 1260; Dump well executed. Distance tug to scow 639 ft, dump S/E side of the buoy, approx. 25 ft from buoy.
8/26/2004 9:02:00 PM	2990	41.226324	-71.385907	Trip 1261; 1st disposal for new crew. As with other crew, hard to adjust speed + direction on an hourly schedule, missed E by two minutes had to go to C.
8/27/2004 3:22:00 AM	3000	41.234167	-71.385167	Trip 1259; Everything fine at disposal site, but tug not tracking straight on computer.
8/27/2004 6:58:00 AM	2600	41.225149	-71.373039	Trip 1262; Great dump well executed. Distance tug to scow 666 ft. Wait for loaded scow and traffic.
8/27/2004 1:29:00 PM	3000	41.234167	-71.3715	Trip 1263; GL-61 reacted very slow to open (probably low on hydrolic fluid? Air bound?)
8/27/2004 6:46:00 PM	2990	41.227011	-71.385896	Trip 1264; Dump well executed. Great dump. Distance tug to scow 666 ft.
8/27/2004 11:14:00 PM	2995	41.2245	-71.371667	Trip 1265; Buoy appeared to be off station, Time frame called for disposal at buoy, lat/long did not line up?!?!
8/28/2004 7:09:00 AM	3000	41.229318	-71.375171	Trip 1266; Great dump on the button. Distance tug to scow 687 ft.
8/28/2004 1:05:00 PM	3000	41.224798	-71.372394	Trip 1267; Computer trouble at disp site. Had to re-boot, sailboat traffic very heavy in Newport area!
8/28/2004 6:23:00 PM	2500	41.229255	-71.375031	Trip 1268; Great dump. Distance tug to scow 672.
8/28/2004 10:53:00 PM	2985	41.224333	-71.373	Trip 1269; Scow GL-61 continues to open very slow, hard to gauge disposal.
8/29/2004 4:06:00 AM	2400	41.234938	-71.374993	Trip 1270; Great dump well executed. Distance tug to scow 682 ft. Draft bottom of keel 108 + 16 = 124 ft is depth. Wait for load scow.
8/29/2004 10:38:00 AM	3000	41.223947	-71.377695	Trip 1271; Real smooth operation, Capt Ron did great!
8/29/2004 2:28:00 PM	2400	41.235015	-71.385733	Trip 1272; Great dump. Distance tug to scow 690 ft.
8/29/2004 10:14:00 PM	2995	41.222667	-71.371333	Trip 1273; Very foggy conditions around Newport/Jamestown Bridge lots of pleasure boats! Disposal was fine.
8/30/2004 2:28:00 AM	2400	41.236448	-71.382094	Trip 1274; Great dump. All material in the cell. Distance tug to scow 688 ft.
8/30/2004 9:18:00 AM	3000	41.226456	-71.386165	Trip 1275; Pea soup fog, 0 visibility, broke through at disposal site

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
8/30/2004 2:55:00 PM	3000	41.236186	-71.381731	Trip 1276; Great dump. Right on the button. Distance tug to scow 693 ft. Army Corps office said to leave the approx volume blank.
8/30/2004 8:44:00 PM	2995	41.234333	-71.371333	Trip 1277; Tropical severe weather report tonight
8/31/2004 1:20:00 AM	3000	41.234803	-71.374826	Trip 1278; Great dump. Distance tug to scow 711 ft.
8/31/2004 10:47:00 AM	3000	41.225057	-71.37814	Trip 1279; Great dump. Distance tug to scow 1500 ft.
9/1/2004 12:28:00 AM	2990	41.22394	-71.378572	Trip 1280; Disposal Aok.
9/1/2004 5:54:00 AM	3000	41.236415	-71.382336	Trip 1281; Good dump. Distance tug to scow 1299 ft.
9/1/2004 2:12:00 PM	2900	41.222667	-71.371667	Trip 1282; Disposal Aok.
9/1/2004 7:31:00 PM	3000	41.236379	-71.381651	Trip 1283; Good dump. Distance tug to scow 1206 ft.
9/1/2004 11:18:00 PM	2990	41.224326	-71.37242	Trip 1284; Disposal Aok.
9/2/2004 5:38:00 AM	2995	41.234816	-71.385979	Trip 1285; Great dump. Right on the button. Distance tug to scow 867 ft.
9/2/2004 9:40:00 AM	3000	41.234333	-71.384833	Trip 1286; Disposal Aok.
9/2/2004 4:36:00 PM	2990	41.235167	-71.376	Trip 1287; Disposal ok.
9/2/2004 8:32:00 PM	2995	41.235167	-71.375667	Trip 1288; Disposal ok.
9/3/2004 3:16:00 AM	3000	41.225753	-71.377863	Trip 1289; Disposal ok.
9/3/2004 6:59:00 AM	3000	41.234333	-71.384667	Trip 1290; Disposal ok.
9/3/2004 1:15:00 PM	3000	41.222833	-71.3715	Trip 1291; Disposal ok.
9/3/2004 5:21:00 PM	2990	41.234333	-71.388167	Trip 1292; Disposal ok.
9/3/2004 11:55:00 PM	2995	41.228047	-71.374714	Trip 1293; Disposal ok.
9/4/2004 2:54:00 AM	2990	41.224689	-71.378279	Trip 1294.
9/4/2004 10:29:00 AM	2990	41.234	-71.3715	Trip 1295; Disposal ok.
9/4/2004 3:42:00 PM	2990	41.224115	-71.372791	Trip 1296; Disposal ok.
9/4/2004 9:06:00 PM	3000	41.224167	-71.372	Trip 1297; Disposal ok.
9/5/2004 1:30:00 AM	3000	41.226113	-71.375434	Trip 1298; Disposal ok.
9/5/2004 7:19:00 AM	2990	41.235	-71.376	Trip 1299; Disposal ok.
9/5/2004 11:50:00 AM	3000	41.224	-71.372667	Trip 1360; Disposal made at buoy after by-passing designated cell B with time as a factor (due to seas)
9/6/2004 12:23:00 AM	2995	41.235	-71.376	Trip 1301; Disposal ok.
9/6/2004 3:32:00 AM	2990	41.234333	-71.371833	Trip 1302; Disposal ok.
9/6/2004 11:25:00 AM	2950	41.234167	-71.371667	Trip 1303; Disposal ok.
9/6/2004 3:29:00 PM	2800	41.222833	-71.371667	Trip 1304; Disposal ok.
9/6/2004 9:07:00 PM	2200	41.234167	-71.385167	Trip 1305; Disposal ok.
9/7/2004 1:46:00 AM	2570	41.234333	-71.371667	Trip 1306; Disposal ok.
9/7/2004 7:45:00 AM	2700	41.225833	-71.3715	Trip 1307; Disposal ok.
9/7/2004 12:03:00 PM	2600	41.234167	-71.3855	Trip 1308; Disposal ok.
9/7/2004 9:00:00 PM	2850	41.234	-71.384667	Trip 1309; Disposal ok.
9/7/2004 10:06:00 PM	2950	41.234333	-71.371333	Trip 1310; Disposal ok.
9/8/2004 6:56:00 AM	2750	41.22606	-71.374318	Trip 1311; Disposal ok.
9/8/2004 11:28:00 AM	2650	41.234333	-71.384833	by us.
9/8/2004 4:45:00 PM	2600	41.225756	-71.385995	Trip 1305; Disposal ok. Swapped scow with tug Rowan McAllister, scow #65 to McAllister and scow #63 to us. Exchange made in vicinity of naval anchorage.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
9/8/2004 10:19:00 PM	2600	41.222833	-71.384833	Trip 1314; Disposal ok.
9/9/2004 2:39:00 AM	2700	41.234333	-71.371333	Trip 1315; Disposal ok.
9/9/2004 1:37:00 PM	2500	41.225333	-71.3725	Trip 1316; Engine didn't start. Returned to Newport Bridge, started engine, 2nd time at dump site engine wouldn't start. Did E-dump. Disposal ok.
9/9/2004 6:32:00 PM	2600	41.2245	-71.37	Trip 1318; Disposal ok.
9/9/2004 8:59:00 PM	2100	41.222833	-71.371667	Trip 1317; 12:15 Engine Failure on scow at dump site - turned around - head for calmer water to put man aboard scow to check engine problem. 15:30 Man on board scow checking engine problem. 16:45 Repairs complete - heading for dump - Good disposal.
9/9/2004 11:32:00 PM	2600	41.234167	-71.385	Trip 1319; Disposal ok.
9/10/2004 4:50:00 AM	2500	41.226167	-71.3755	Trip 1320; Disposal made in buoy area due to sea conditions.
9/10/2004 9:49:00 AM	2500	41.226515	-71.385278	Trip 1321; No marine mammals sighted, Good disposal.
9/10/2004 2:57:00 PM	1700	41.235	-71.375833	Trip 1322; Disposal ok.
9/10/2004 11:36:00 PM	3000	41.225218	-71.377435	Trip 1324; Good disposal.
9/11/2004 5:05:00 AM	2100	41.225049	-71.376432	Trip 1325; Disposal ok.
9/11/2004 4:05:00 PM	2995	41.234333	-71.384833	Trip 1327; Missed recording depth. Good disposal.
9/11/2004 7:37:00 PM	2200	41.222667	-71.384667	Trip 1323; Disposal ok.
9/11/2004 8:51:00 PM	2995	41.223667	-71.3725	Trip 1328; Disposal ok.
9/12/2004 12:51:00 AM	2900	41.222667	-71.384667	Trip 1329; Disposal ok.
9/12/2004 8:18:00 AM	3000	41.224955	-71.378053	Trip 1330; No marine mammals sighted. Good disposal.
9/12/2004 11:01:00 AM	3000	41.2245	-71.371	Trip 1331; Disposal ok.
9/12/2004 11:20:00 AM	2200	41.229745	-71.376496	Trip 1326; Disposal ok.
9/12/2004 3:21:00 PM	2990	41.234	-71.384167	Trip 1332; Disposal ok.
9/12/2004 7:49:00 PM	3000	41.2345	-71.371667	Trip 1333; No marine mammals or sea turtles sighted, good placement of material, obtained volume from GL dredge #55, no problems noted.
9/13/2004 12:40:00 AM	2100	41.226524	-71.372031	Trip 1334; Disposal ok.
9/13/2004 4:01:00 AM	2995	41.234333	-71.385	Trip 1335.
9/13/2004 6:18:00 AM	2800	41.222667	-71.3715	Trip 1338; Disposal ok.
9/13/2004 8:23:00 AM	2990	41.222667	-71.371333	Trip 1336; Good placement, no endangered species sighted, upon return 3 Lt scows = GL 61 + GL 65 secured to prov state pier, dredge #55 fueling up
9/14/2004 4:16:00 AM	2100	41.224667	-71.372667	Trip 1337; Disposal ok.
9/14/2004 12:19:00 PM	2200	41.224769	-71.373463	Trip 1339; Good placement, no threatened or endangered species sighted
9/14/2004 5:30:00 PM	2900	41.234333	-71.384833	Trip 1340.
9/14/2004 10:02:00 PM	2995	41.225057	-71.378497	Trip 1341; No marine mammals or sea turtles sighted, good placement of material, tug boats master is bound for home, Note: only the Lemmerhirt went out between our last trip.
9/15/2004 1:23:00 AM	2300	41.222667	-71.384667	Trip 1342; Disposal ok.
9/15/2004 5:10:00 AM	2100	41.233833	-71.384833	Trip 1343.
9/15/2004 9:16:00 AM	2900	41.234167	-71.384667	Trip 1344; Placement of material = "the finest kind", no endangered or threatened species sighted, 1105 hrs the Rowan McMilister passed LIS w/Ld scow GL #65, 1310 hrs the Lemmerhirt w/ Ld scow #61 passed by, we were returning on a slow bell, our next trip
9/15/2004 1:00:00 PM	2990	41.222667	-71.3845	Trip 1345; Disposal ok.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
9/15/2004 5:17:00 PM	2800	41.233833	-71.384833	Trip 1346.
9/15/2004 10:33:00 PM	2100	41.225053	-71.372561	Trip 1347; Another fine placement of material, didn't get to the Newport Bridge until it was dark, I didn't try to observe marine mammals etc., off duty.
9/16/2004 2:22:00 AM	2100	41.225214	-71.376613	Trip 1348; Disposal ok.
9/16/2004 5:51:00 AM	2800	41.234333	-71.385	Trip 1349.
9/16/2004 12:58:00 PM	2800	41.225015	-71.381136	Trip 1350; approx 3 hrs lost time, 1st obtained the Ld GL #61 from the Stephanie Damn in the thick fog, vis 1/2 to 3/4 mi, a tanker was on its way in (ships traffic), approx 2 hrs down time, 2nd = while entering cell E the computer failed, had to get it o
9/16/2004 2:15:00 PM	2100	41.229748	-71.376537	Trip 1351; GLDD est yds… distance tug to scow 1166 ft.
9/16/2004 7:55:00 PM	2900	41.233333	-71.384833	Trip 1352.
9/17/2004 12:30:00 AM	2900	41.225174	-71.372277	Trip 1353; It was raining at 22 to 2300 hrs. Now clearing, and wind is letting do, good placement of material, not possible to observe marine mammals etc.
9/17/2004 12:59:00 PM	2700	41.226961	-71.385414	Trip 1354; Dump, material 1/2 in cell and 1/2 outside of cell, speed a factor. GLDD est yds.
9/17/2004 7:07:00 PM	2100	41.234167	-71.384833	Trip 1355.
9/17/2004 11:29:00 PM	2995	41.226382	-71.37547	Trip 1356; Too dark to observe any marine mammals or sea turtles, placement was in the proper cell.
9/18/2004 2:16:00 AM	2700	41.226936	-71.374515	Trip 1357; Dump ok, GLDD est yds.
9/18/2004 8:15:00 AM	2700	41.235333	-71.375833	Trip 1358; Load # on comp wouldn't change.
9/19/2004 10:15:00 PM	2950	41.226608	-71.375387	Trip 1360; Dump ok, GLDD est yds computer clock off 1 hr, tug to scow 1191 distance.
9/19/2004 10:38:00 PM	2995	41.234333	-71.371333	Trip 1361; Actual coord are of tug at time of disposal with scow in proper disposal location.
9/19/2004 10:53:00 PM	2200	41.234675	-71.37484	Trip 1359.
9/20/2004 9:12:00 AM	2200	41.234333	-71.3715	Trip 1362; Actual coord are of tug - scow in proper disposal location, no marine mammals sighted, Good disposal, buoy seems to be 1/4 mile off station.
9/20/2004 2:14:00 PM	2995	41.222833	-71.384667	Trip 1363.
9/20/2004 6:39:00 PM	2200	41.227866	-71.377215	Trip 1364; Dump ok. GLDD est yds, computer clock off 1 hr.
9/21/2004 1:13:00 AM	2700	41.225947	-71.38506	Trip 1365; Actual coord are of tug - scow in proper location ("c") at time of disposal, good disposal.
9/21/2004 4:24:00 AM	2600	41.224792	-71.377556	Trip 1366; Dump ok. GLDD est yds, computer clock off 1 hr.
9/21/2004 8:43:00 AM	2700	41.222833	-71.384833	Trip 1367.
9/21/2004 2:13:00 PM	2200	41.2245	-71.373833	Trip 1368; Actual coord are of tug - scow at 105 ft NW of buoy, Checked buoy position - port side of tug at 150 ft SE (41 deg 13.85) - passing buoy, Buoy appears to be at 600 ft SE of where it should be
9/21/2004 8:53:00 PM	2800	41.230158	-71.374796	Trip 1369; Dump ok. GLDD est yds, computer clock off, correct time 9:53 PM.
9/22/2004 4:59:00 AM	2700	41.2225	-71.384667	Trip 1371; Actual coord are of tug position - scow in proper location ("c") at time of disposal, good disposal.
9/22/2004 11:30:00 AM	2700	41.226619	-71.374861	Trip 1372; Great dump, all material in the cell, GLDD est yds, Depth and tug draft = 132 ft. Computer clock on standard time.
9/22/2004 4:47:00 PM	2200	41.219721	-71.378398	Trip 1374.
9/22/2004 10:05:00 PM	2950	41.234333	-71.384833	Trip 1375; Actual coord are of scow at time of disposal, good disposal.
9/23/2004 12:56:00 AM	2800	41.234925	-71.37477	Trip 1376; Great dump, material all in the cell. GLDD est yds, Distance tug to scow 1000 ft.
9/23/2004 1:58:00 AM	2800	41.235333	-71.376167	Trip 1370; Trouble hooking up to scow.
9/23/2004 5:40:00 AM	3000	41.222667	-71.384833	Trip 1377.
9/23/2004 1:23:00 PM	2800	41.234333	-71.384833	Trip 1378; Actual coord are of scow position at time of disposal in disposal point "A", no marine mammals sighted, good disposal.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
9/23/2004 5:37:00 PM	2700	41.227303	-71.386081	Trip 1379; Dump ok. GLDD est yds. Distance tug to scow 1069 ft.
9/23/2004 9:26:00 PM	2800	41.222833	-71.3715	Trip 1380.
9/24/2004 4:17:00 AM	2700	41.234167	-71.3715	Trip 1381; Acutal coord are of scow in disposal point "B", good disposal.
9/24/2004 8:05:00 AM	2700	41.225248	-71.378219	Trip 1384; Great dump all in the cell. GLDD est yds. Tug to scow dist 1223 ft. Wait for loaded scow.
9/24/2004 3:06:00 PM	2800	41.235333	-71.375667	Trip 1386.
9/24/2004 7:44:00 PM	2800	41.222667	-71.384833	Trip 1389; Actual coord are of scow in disposal point "C", good disposal.
9/25/2004 5:20:00 AM	2700	41.224833	-71.374833	Trip 1394.
9/25/2004 9:36:00 AM	2700	41.22504	-71.377843	Trip 1397; Actual coord are of scow in disposal point "E", good disposal.
9/25/2004 12:50:00 PM	2700	41.234873	-71.385536	Trip 1392; Great dump all in the cell. GLDD est yds. Dist tug to scow 1140 ft.
9/25/2004 2:41:00 PM	2700	41.234677	-71.374106	Trip 1399; Dump ok. GLDD est yds. Dist tug to scow 1410 ft.
9/25/2004 7:22:00 PM	2800	41.222833	-71.384667	Trip 1400.
9/25/2004 11:51:00 PM	2700	41.2225	-71.384667	Trip 1401; Actual coord are of scow in disposal point "C", good disposal.
9/26/2004 6:27:00 AM	2700	41.225255	-71.378273	Trip 1402; Good dump. GLDD est yds. Dist tug to scow 1358 ft.
9/26/2004 10:53:00 AM	2800	41.224642	-71.378156	Trip 1403.
9/26/2004 3:26:00 PM	2800	41.234833	-71.375833	Trip 1404; 0615 hrs relieved inspector R Arnold, no marine mammals or sea turtles sighted, no problems w/ placement of material.
9/26/2004 8:43:00 PM	2700	41.227403	-71.386007	Trip 1405; Dump ok. GLDD est yds. Distance tug to scow 1223 ft.
9/27/2004 12:20:00 AM	2700	41.235333	-71.375833	Trip 1406.
9/27/2004 8:07:00 AM	2800	41.224333	-71.373333	Trip 1407; I was advised that the buoy has shifted from origin, no endangered or threatened species sighted, no problems noted.
9/27/2004 12:05:00 PM	2800	41.234973	-71.385647	Trip 1408; Great dump all in the cell. GLDD est yds. Distance tug to scow 1300 ft.
9/27/2004 6:25:00 PM	2700	41.2345	-71.3715	Trip 1409.
9/27/2004 11:34:00 PM	2800	41.224815	-71.372826	Trip 1410; After dark, no searching for endangered species, the EPA had called me at home and addressed the situation, they never sent me the Russian heat seeking binoculars that was mentioned, so be it, weather forecast: rain this eve, the southerly bree
9/28/2004 3:35:00 AM	2700	41.234851	-71.385797	Trip 1411; Great dump all in the cell. Great Lakes est yds. Distance tug to scow 1200 ft.
9/28/2004 11:38:00 AM	2600	41.224244	-71.372769	Trip 1412; Disposal ok.
9/28/2004 3:03:00 PM	2800	41.225167	-71.374833	Trip 1413; At the Newport/Jamestown Bridge on the way to sea, it became very foggy, Capt Jim slowed down to (1) bell for a while, I tried to lasier the buoy that was due east of us but, rock and roll, I failed to obtain the true distance, no endangered sp
9/28/2004 6:03:00 PM	2700	41.230063	-71.375023	Trip 1414; GLDD est yds. Dist tug to scow 1314 ft, dump ok. Depth 117 + tug draft 16 = 133.
9/29/2004 12:15:00 AM	2800	41.222833	-71.371667	Trip 1415; Disposal ok.
9/30/2004 5:03:00 AM	2700	41.236419	-71.381927	Trip 1416; GLDD est yds. Distance tug to scow 1381 ft. Great dump all in the cell.
9/30/2004 7:46:00 AM	2800	41.235167	-71.375833	Trip 1417; Disposal ok.
9/30/2004 10:53:00 AM	2700	41.2345	-71.384833	Trip 1418; Due to heavy weather, no trip was taken by this tug boat 29 Sept, good disposal, no marine mammals or sea turtles sighted.
9/30/2004 4:10:00 PM	2800	41.225607	-71.374555	Trip 1419; Disposal ok.
9/30/2004 5:42:00 PM	2700	41.223	-71.370667	Trip 1420; Disposal ok. Tracking of scow on computer could not be utilized due to computer malfunction - long/lat was used for disposal.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
10/1/2004 12:46:00 AM	2800	41.225167	-71.374833	Trip 1421; Buoy is easterly a bit off station, no problem; good placement of material; last trip for the Eileen McAllister in Sept 2004; No endangered or threatened species sighted.
10/1/2004 2:21:00 AM	2700	41.226085	-71.37506	Trip 1422; Scow tracking wasn't working; Departed dredge site, scow tracking was working.
10/1/2004 6:07:00 AM	2700	41.235167	-71.375667	Trip 1423; Disposal ok.
10/1/2004 11:38:00 AM	2700			Trip 1424; On this date and time the target specified was C but due to the telemetry going out of order, advised to address the buoy target/ failed to receive: (N Lat + W Long) for the actual placement/ it didn't record/ no endangered species sighted/ rec
10/1/2004 11:58:00 PM	2800	41.234167	-71.384667	Trip 1425; Disposal ok.
10/2/2004 7:54:00 AM	2800	41.2345	-71.384667	Trip 1426; Disposal ok.
10/2/2004 2:44:00 PM	2700	41.224949	-71.372859	Trip 1427; Good placement; Ship traffic, the tanker lyra pioneer came in to mobile dock, cost the eileen approx 1 hr down time/ no other problems noted.
10/2/2004 5:40:00 PM	2800	41.234167	-71.3715	Trip 1428; Disposal ok.
10/2/2004 10:35:00 PM	3075	41.222667	-71.3715	Trip 1429; Disposal ok.
10/3/2004 5:53:00 AM	3200	41.222667	-71.3715	Trip 1430; At or about 0545 hrs the cold front hit us/ at 0500 hrs (wx) scattered clouds/ wind light and variable/ flat and calm/ good placement of material.
10/3/2004 10:44:00 AM	4000	41.234167	-71.385167	Trip 1431; Disposal ok.
10/3/2004 4:07:00 PM	4100	41.22508	-71.37476	Trip 1432; Disposal ok.
10/3/2004 10:03:00 PM	4000	41.235333	-71.375833	Trip 1433; No problems, disposal ok.
10/4/2004 5:14:00 AM	3950	41.226634	-71.37488	Trip 1434; Disposal ok.
10/4/2004 4:19:00 PM	4100	41.226576	-71.385852	Trip 1438; No problems, good disposal.
10/4/2004 8:11:00 PM	3800	41.225167	-71.371833	Trip 1437; Scow 65; Disposal ok.
10/5/2004 2:37:00 AM	3900	41.222667	-71.371167	Trip 1435; Disposal ok.
10/5/2004 7:00:00 AM	4000	41.226	-71.374794	Trip 1436; Disposal ok.
10/5/2004 7:00:00 AM	4000	41.226	-71.374794	Trip 1439; Disposal ok.
10/5/2004 12:04:00 PM	4000	41.225	-71.375	Trip 1440; No problems, good disposal.
10/5/2004 6:26:00 PM	3000	41.224046	-71.380087	Trip 1441; Disposal ok.
10/5/2004 9:06:00 PM	2700	41.234198	-71.385897	Trip 1442; Disposal ok.
10/6/2004 2:29:00 AM	2800	41.234333	-71.3715	Trip 1443; No problems, good disposal.
10/6/2004 7:40:00 AM	2700	41.226833	-71.374833	Trip 1444; Scow not tracking on computer. Used tugs GPS.
10/6/2004 10:49:00 AM	2800	41.224833	-71.372	Trip 1445; Disposal ok.
10/6/2004 3:29:00 PM	2700	41.222667	-71.384833	Trip 1446; No problems, good disposal.
10/6/2004 6:21:00 PM	2600	41.2245	-71.371667	Trip 1447; Scow not tracking on computer; At 1342 scow started tracking on computer.
10/6/2004 10:32:00 PM	2700	41.2265	-71.3715	Trip 1448; Disposal ok; Scow is not tracking on computer.
10/7/2004 4:45:00 AM	3000	41.226066	-71.373082	Trip 1449; Oct 6 - 21:10 - took loaded scow GL 63 (Trip 1449) to state pier, 23:15 underway; Cruise ship in disposal area extended round trip time, good disposal.
10/7/2004 5:37:00 AM	2700	41.225119	-71.377344	Trip 1450; Disposal ok.
10/7/2004 2:43:00 PM	2600	41.234333	-71.384667	Trip 1452; No problems, good disposal.
10/7/2004 3:04:00 PM	3000	41.234167	-71.384833	Trip 1451; Disposal ok.
10/7/2004 5:01:00 PM	2600	41.224268	-71.377971	Trip 1453; Disposal ok.
10/8/2004 12:33:00 AM	2700	41.235167	-71.375667	Trip 1454; No problems, good disposal.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
10/8/2004 3:18:00 AM	2600	41.225165	-71.377519	Trip 1455; Disposal ok.
10/8/2004 6:40:00 AM	3000	41.224883	-71.378199	Trip 1456; Disposal ok.
10/8/2004 10:09:00 AM	3000	41.234167	-71.384833	Trip 1457; No problems, good disposal.
10/8/2004 6:30:00 PM	2600	41.222667	-71.384833	Trip 1458; Disposal ok.
10/8/2004 9:58:00 PM	2600	41.224824	-71.371754	Trip 1459; Disposal ok.
10/9/2004 1:45:00 AM	2700	41.234167	-71.384667	Trip 1461; No problems, good disposal.
10/9/2004 4:40:00 AM	2600	41.2295	-71.375	Trip 1462; Disposal ok; Scow not tracking on computer.
10/9/2004 7:37:00 AM	2950	41.225223	-71.377831	Trip 1463; Disposal ok.
10/9/2004 2:26:00 PM	2800	41.235076	-71.385863	Trip 1465; No problems, good disposal.
10/9/2004 3:01:00 PM	2900	41.235333	-71.375333	Trip 1467; Disposal ok.
10/9/2004 6:48:00 PM	2100	41.229583	-71.376233	Trip 1468; Scow not tracking on computer. Used tug's GPS. Disposal ok.
10/9/2004 11:44:00 PM	2900	41.225144	-71.378082	Trip 1470; No problems, good disposal.
10/10/2004 3:08:00 AM	2990	41.222667	-71.371333	Trip 1473; Disposal ok.
10/10/2004 6:46:00 AM	2900	41.226568	-71.372136	Trip 1474; Disposal ok.
10/10/2004 9:49:00 AM	2100	41.228833	-71.380333	Trip 1475; The telemetry has no contact with the scow so the capt was advised to make placement of material @ buoy's lat and long instead of G/ scow wouldn't close tightly/ came in with it a little open.
10/10/2004 12:11:00 PM	2990	41.234333	-71.384833	Trip 1477; Disposal ok.
10/10/2004 4:09:00 PM	2700	41.234	-71.371333	Trip 1479; Disposal ok.
10/10/2004 8:07:00 PM	2750	41.224577	-71.38198	Trip 1481; Scow was within (E) for placement, no problems.
10/10/2004 11:14:00 PM	2300	41.230333	-71.381833	Trip 1482; Scow was not tracking on computer, disposal ok.
10/11/2004 1:45:00 AM	2750	41.224	-71.372833	Trip 1484; Disposal ok.
10/11/2004 7:01:00 AM	3000	41.222833	-71.3715	Trip 1485; With the wind northerly, we were only 12 to 13 (N. Mi) within the lee of the land/ had the wind been (NE) to (SE) = trouble/ at 0830 hrs gave way to the LPG tanker Clipper Lady and followed her in plus 2 N Mi astern of her/ down time 1 hr.
10/13/2004 1:46:00 AM	2300	41.229583	-71.376233	Trip 1489; Scow not tracking on computer. Used tugs GPS.
10/13/2004 6:45:00 PM	2900	41.222833	-71.3715	Trip 1508; Disposal ok.
10/13/2004 9:30:00 PM	2850	41.223061	-71.378239	Trip 1509.
10/14/2004 1:00:00 AM	2900	41.222833	-71.371833	Trip 1510; No trip yesterday on 10/12/04 (tues) due to wind and sea state/ crew change on wed 10/13/04, scow eased into Cell D just at 0100 hrs; no problems
10/14/2004 3:57:00 AM	2900	41.234167	-71.384833	Trip 1512; Disposal ok.
10/14/2004 6:40:00 AM	2950	41.235	-71.375667	Trip 1513.
10/14/2004 10:43:00 AM	2900	41.224184	-71.380927	Trip 1515; Weather is changing/ at disposal site 9.7 hrs ago on trip no 1510 and wx was nearly perfect/ good placement of material/ no problems/ stemmed the tide for 1 hr in prov river thence to dredge #54.
10/14/2004 1:03:00 PM	2995	41.22487	-71.377513	Trip 1517; Dump ok, half in the cell and half outside, speed not a factor, distance tug to scow 1117 ft.
10/14/2004 7:40:00 PM	3000	41.224667	-71.374833	Trip 1519.
10/14/2004 9:08:00 PM	2995	41.225158	-71.378667	Trip 1521; No problems w/ placement of material, 0130 hrs arrived in prov river, stemmed the tide up river from the dredge w/ Lt. Scow on port hip for 1.8 hrs. 0315 hrs Lt scow all secure to dredge 54.
10/15/2004 12:00:00 AM	3000	41.225128	-71.372155	Trip 1522; Dump ok, Tug to scow 1190 ft.
10/15/2004 4:52:00 AM	3000	41.234333	-71.371667	Trip 1524.
10/15/2004 8:33:00 AM	2900	41.2345	-71.371667	stemming the tide, awaiting a berth.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
10/15/2004 11:30:00 AM	2950	41.224969	-71.378008	Trip 1528; Great dump. Tug to scow 1154 ft.
10/18/2004 7:08:00 PM	2950	41.234755	-71.385646	Trip 1558; Great dump, all in cell, tug to scow 1180 ft.
10/19/2004 12:10:00 AM	3000	41.234167	-71.371667	Trip 1559.
10/19/2004 4:32:00 AM	2900	41.222667	-71.371667	Trip 1561; No problems, good disposal.
10/19/2004 6:05:00 AM	2900	41.234856	-71.385985	Trip 1563; Great dump, all in the cell. Tug to scow 1100 ft.
10/19/2004 9:49:00 AM	2900	41.228709	-71.38058	Trip 1564.
10/19/2004 4:26:00 PM	2900	41.224749	-71.378209	Trip 1568; Great dump all in the cell. Tug to scow 1300 ft.
10/19/2004 8:10:00 PM	2800	41.235333	-71.375833	Trip 1569.
10/26/2004 10:55:00 PM	3800	41.225583	-71.372636	Trip 1613; Problems with the telemetry system/ 1st try for Cell G = problem/ 2nd try = A-ok/ nearly went for the buoy cell due to screen w/ telemetry comms./ they are dredging between no. 18 and no. 20 buoys between bullock point light and conimicut point
10/27/2004 6:48:00 AM	4000	41.225167	-71.374833	Trip 1614; Problems w/ telemetry/ capt Jim cancelled the disposal cell A and went for the buoy cell/ used tugs GPS converted to DGPS/ lasered tow cable = 930 ft from tugs stern to scows bow/ scow was 180 ft dead astern of tug/ the dredge #55 is still in t
10/27/2004 6:00:00 PM	4000	41.230483	-71.38	Trip 1615; Problems w/ telemetry scow contact/ Capt Jim went for the buoy cell/ grid no 1 cancelled/ 2nd problem = we circled about in the buoy area trying to close the scow / it took over 18 minutes to close it/ lasered tow cable = 966 ft from tugs stern
10/28/2004 3:10:00 AM	4500	41.234833	-71.372133	Trip 1616; No problems w/ telemetry comms and scow 61/ scow opened and closed the finest kind/ we will do Cad Grid #2 the next trip thence #3, #4, #5 etc.
10/28/2004 11:50:00 AM	3600	41.225667	-71.371333	Trip 1617; Computer down, dumped on buoy.
10/28/2004 8:23:00 PM	4000	41.226333	-71.374	Trip 1618; Scow engine shut down on its own. Restarted engines and dumped in the next grid. Disposal ok.
10/28/2004 11:47:00 PM	3200	41.230833	-71.3802	Trip 1619; Took ld scow from assist tug stephanie dann between bullock point light and coimict point light/ buoys #18 and #20/ the target was grid #3 but problems w/ telemetry, capt Jim cancelled #3 grid for buoy grid/ scow had a good rake and stayed 180
10/29/2004 6:54:00 AM	4600	41.234833	-71.373833	Trip 1620; Disposal ok.
10/29/2004 12:21:00 PM	3000	41.235	-71.371667	Trip 1622; Disposal ok.
10/29/2004 2:07:00 PM	5500	41.23585	-71.371633	Trip 1621; 1750 hrs arrived near dredge 55/ stemming the tide between buoys 16 and 18 for 1.6 hrs prior to returning the lt scow 63 to dredge 55/ no problems.
10/29/2004 4:36:00 PM	2900	41.234833	-71.371667	Trip 1623; Disposal ok.
10/29/2004 6:35:00 PM	3700	41.222667	-71.371667	Trip 1624; Actual coord are of tug position, computer down, dumped at buoy.
10/29/2004 9:29:00 PM	3000	41.235167	-71.3735	Trip 1625; Disposal ok.
10/30/2004 12:13:00 AM	4100	41.23345	-71.382233	Trip 1626; Scow was very slow opening/ most of the material went into cell Grid 4/ it took approx 20 minutes to become totally empty/ he kept it within the dump site until it was closed/ 18 minutes to close it tightly
10/30/2004 2:33:00 AM	2700	41.237167	-71.369667	Trip 1627; Disposal ok.
10/30/2004 5:42:00 AM	4500	41.2335	-71.372	Trip 1628; Actual coor are of tug position, computer down - no scow reading, scow at 900 ft behind tug
10/30/2004 7:13:00 AM	3000	41.226	-71.376167	Trip 1629; Disposal ok.
10/30/2004 9:41:00 AM	3300	41.233132	-71.379227	Trip 1630; Scow had no rake it was off tugs stern 190 degrees at grid 5/ 1410 hrs all secure at dock to change vessels oil filters/ no problems.
10/30/2004 12:27:00 PM	3000	41.226333	-71.376	Trip 1631; Disposal ok.
10/30/2004 4:18:00 PM	3000	41.232037	-71.379215	Trip 1633; Disposal ok.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
10/30/2004 8:19:00 PM	3000	41.233433	-71.372133	Trip 1634; From 2030 through 2100 hrs capt jim circled the buoy trying to close the scow/ it failed to close/ capt was advised to bring it back empty and open/ occasionally fog became dense/ traffic in route to disposal area/ = dangerous situation/ at 012
10/30/2004 9:28:00 PM	5100	41.233569	-71.37454	Trip 1635; Disposal ok.
10/31/2004 1:15:00 AM	3000	41.234667	-71.3695	Trip 1636; No problems, good disposal, shorter time to disposal site due to clock change.
10/31/2004 5:09:00 AM	3000	41.226333	-71.371667	Trip 1637; Disposal ok.
10/31/2004 7:47:00 AM	2900	41.226	-71.377833	Trip 1639; Scow not tracking, used tug's GPS.
10/31/2004 7:55:00 AM	4900	41.2333	-71.371983	Trip 1638; Via radar, scow was 961 ft directly off tugs stern/ not possible to laser distance.
10/31/2004 12:09:00 PM	3000	41.232372	-71.382479	Trip 1640; No problems, good disposal.
10/31/2004 2:45:00 PM	3600	41.2265	-71.369333	Trip 1641; Disposal ok.
10/31/2004 5:59:00 PM	3800	41.226333	-71.369667	Trip 1642; Scow wouldn't close, scow end up closing very slowly, disposal ok.
10/31/2004 7:40:00 PM	2700	41.230967	-71.382667	Trip 1643; Capt Jim tried for 20 min to close the scow circling within the disposal area/ it stayed open approx 2 ft at water/ he was told by dredge 54 to bring it back cracked open
10/31/2004 9:28:00 PM	3400	41.223167	-71.370833	Trip 1644; Computer not tracking scow; Actual coordinates are of tug position.
10/31/2004 10:42:00 PM	2900	41.225167	-71.376	Trip 1645; Disposal ok.
11/1/2004 3:27:00 AM	3000	41.225	-71.375833	Trip 1646; Disposal ok.
11/1/2004 4:33:00 AM	5100	41.230833	-71.37635	Trip 1647; The buoy is in the center of Grid 10/ Approx 75 degrees WSW/ had to stay westerly of it on a course of 186 degrees (T) so the scow wouldn't touch the buoy/ no problems with comm. on scow/good placement of material
11/1/2004 8:05:00 AM	2900	41.233333	-71.373667	Trip 1648; No problems, good disposal.
11/1/2004 11:00:00 AM	5400	41.226167	-71.372	Trip 1650; Disposal ok.
11/1/2004 3:05:00 PM	3000	41.2263	-71.37515	Trip 1649; Telemetry system failed/ capt was advised by GL to go to the buoy for disposal/ as we (tug) passed the buoy on a 180 degrees (T) course, I lasered the buoy 270 ft off our starboard/ took lat+long from vsls (GPS) when scow arrived it was opened.
11/1/2004 6:50:00 PM	2900	41.225	-71.372167	Trip 1652; Disposal ok.
11/1/2004 8:25:00 PM	3000	41.225167	-71.369833	Trip 1651; Disposal ok.
11/2/2004 1:20:00 AM	2900	41.225333	-71.37	Trip 1654; Intermittent telemetry between scow 402 and tug good disposal.
11/2/2004 3:28:00 AM	3000	41.228	-71.373333	Trip 1655; Scow not tracking - disposed on the buoy.
11/2/2004 5:49:00 AM	3000	41.223667	-71.375167	Trip 1656; Disposal ok.
11/2/2004 10:36:00 AM	3000	41.2235	-71.376	Trip 1657; No problems, good disposal.
11/2/2004 11:44:00 AM	2700	41.235478	-71.371028	Trip 1653; Scow picked up from Rowan McAllister at Prudence Island chasing batteries 08:30-0915 - man on board to dump disposal, ok.
11/2/2004 1:40:00 PM	0	41.233667	-71.375633	Trip 1658; No problems, good placement for placement but scow wouldn't close. It did close 1/2 way ___ dredge.
11/2/2004 9:19:00 PM	3000	41.223333	-71.374	Trip 1660; No problems, good disposal.
11/2/2004 9:48:00 PM	3000	41.233333	-71.369333	Trip 1659; Scow not tracking on dump site (7 minutes behind), used tug's GPS, disposal ok.
11/3/2004 12:07:00 AM	3000	41.2235	-71.374	Trip 1661; Disposal ok.
11/3/2004 3:00:00 AM	3000	41.233433	-71.3719	Trip 1662; No problem tracking or placement - good disposal with scow closed on return.
11/3/2004 10:26:00 AM	2800	41.228	-71.3825	Trip 1663; Scow not tracking, used tugs GPS.
11/3/2004 10:36:00 AM	3000	41.2235	-71.371667	Trip 1664; Disposal ok.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
11/3/2004 4:30:00 PM	2900	41.2307	-71.381883	Trip 1665; Good disposal in center of target grid 8.
11/3/2004 6:54:00 PM	3000	41.223333	-71.373833	Trip 1666; Good disposal.
11/3/2004 11:04:00 PM	2400	41.223	-71.373833	Trip 1667; Disposal ok.
11/3/2004 11:20:00 PM	3000	41.2235	-71.37	Trip 1668; Disposal ok.
11/4/2004 3:45:00 AM	0	41.228652	-71.375467	Trip 1669; Scow wasn't tracking so we disposed the material while passing on the east side of the buoy.
11/4/2004 6:52:00 AM	2400	41.223333	-71.372	Trip 1670; No problems, good disposal, 9:00 swapped scow with tug lemmerhirt at jamestown newport bridge - lemmerhirt taking empty GL 63 back to dredge - eileen taking loaded GL 35 to disposal area.
11/4/2004 8:29:00 AM	3000	41.223333	-71.372167	Trip 1671; Scow would not close; Disposal ok.
11/4/2004 2:43:00 PM	2700	41.231125	-71.37474	Trip 1673; Good disposal - no problems. Track scow all way to disposal area. Place material in Eastern edge of target grid 10 as buoy is in center of grid 10. At 200 we went weather bound.
11/4/2004 7:30:00 PM	2900	41.229583	-71.376567	Trip 1674; Scow not tracking; Disposal ok.
11/4/2004 9:25:00 PM	3000	41.221667	-71.376333	Trip 1675; Disposal ok.
11/4/2004 10:58:00 PM	3000	41.235893	-71.371566	Trip 1676; Very rough weather - cell has changed to _?_ sea conditions - no problems.
11/6/2004 1:41:00 PM	3000	41.2365	-71.371333	Trip 1679; Disposal ok.
11/7/2004 10:58:00 AM	3000	41.235624	-71.378932	Trip 1672; Telemetry changed every 30 seconds/ 1500 through 1625 hrs stemming the tide in the prov river waiting for the dredge #55 to complete loading the GL scow no 63.
11/7/2004 11:53:00 AM	3000	41.223333	-71.369833	Trip 1677; Disposal ok.
11/7/2004 12:45:00 PM	5300	41.23075	-71.372033	Trip 1680; From 1500 on the 6th of Nov to 0600 on the 7th Nov weather _?_ - left for dump site 08:00 Nov 7.
11/7/2004 3:59:00 PM	3000	41.224013	-71.375256	Trip 1686; Disposal ok.
11/7/2004 9:33:00 PM	3000	41.236267	-71.375933	Trip 1688.
11/8/2004 12:31:00 AM	2800	41.225098	-71.381612	Trip 1690; Disposal ok.
11/8/2004 5:50:00 AM	3000	41.2236	-71.376017	Trip 1692.
11/8/2004 8:45:00 AM	3000	41.235	-71.373667	Trip 1694; Disposal ok.
11/8/2004 11:12:00 AM	2700	41.23245	-71.375317	Trip 1695; Capt Jim couldn't close the scow at disposal site/ he phoned in and received permission to bring it in empty and open/ at 1400 hrs Capt Jack got it closed.
11/8/2004 1:14:00 PM	3000	41.224928	-71.376574	Trip 1696; Disposal ok.
11/8/2004 4:20:00 PM	3000	41.228333	-71.379117	Trip 1697; _?_ tracking on computer system going on and off during dump-run - a good read-out appeared before entering the cell and during the dump. But only for a short time.
11/8/2004 6:07:00 PM	2700	41.234833	-71.369833	Trip 1698; Disposal ok.
11/8/2004 9:46:00 PM	2800	41.233283	-71.3823	Trip 1699; From 1600 hrs through 1700 hrs went up river w/ scow on stbd hip, stemming the tide for ships traffic to clear/ 1 hr on stand by/ the only clouds I could see were over the shore N.W. to N.E. / no problems w/ telemetry or communication w/ scow t
11/8/2004 10:14:00 PM	3000	41.235167	-71.3705	Trip 1700; Disposal ok.
11/9/2004 3:25:00 AM	3000	41.227783	-71.375833	Trip 1701; Scow didn't open very far. However appeared to have dumped sucessfully.
11/9/2004 7:02:00 AM	2600	41.2333	-71.37905	Trip 1703; Capt Jackie checked telemetry and remote comms. W/ the scow prior to getting u/w underway = a-ok/ at disposal all systems go/ not a problem.
11/9/2004 7:27:00 AM	2700	41.234833	-71.371833	Trip 1704; Disposal ok.
11/9/2004 1:05:00 PM	3000	41.233333	-71.374	Trip 1706.
11/9/2004 1:45:00 PM	2800	41.228283	-71.37225	Trip 1705.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
11/9/2004 5:01:00 PM	2700	41.2333	-71.375733	Trip 1707. Prior to getting underway Capt Jack checked telemetry and communication w/ scow = a-ok/ at 1543 hrs the telemetry went down so we were bound for the buoy, just behind grid 6/ 1637 hrs telemetry = a-ok all systems go/ telemetry comms w/ scow = n
11/9/2004 5:15:00 PM	2700	41.234667	-71.369833	Trip 1708; Disposal ok.
11/9/2004 9:45:00 PM	3000	41.233333	-71.3715	Trip 1709.
11/9/2004 11:25:00 PM	3000	41.225083	-71.38225	Trip 1710.
11/10/2004 3:33:00 AM	3000	41.226333	-71.376	Trip 1712; Disposal ok.
11/10/2004 5:27:00 AM	2800	41.23315	-71.371933	buoy is without a light and captain Jim didn't pick it up on radar until after he came about w/ empty scow closing/ it was dark out.
11/10/2004 7:30:00 AM	2500	41.234	-71.371	Trip 1713.
11/10/2004 9:18:00 AM	3000	41.225217	-71.376	Trip 1714.
11/10/2004 12:16:00 PM	2995	41.226333	-71.373833	Trip 1715; Disposal ok.
11/10/2004 4:15:00 PM	2800	41.2308	-71.382217	Trip 1716; Took scow just below buoy #37/ All systems go/ not a problem.
11/10/2004 8:45:00 PM	2800	41.236467	-71.379383	Trip 1718.
11/10/2004 10:51:00 PM	2700	41.2265	-71.390167	Trip 1719; Scow not tracking, disposal ok.
11/10/2004 11:45:00 PM	2900	41.224333	-71.376	Trip 1717.
11/11/2004 1:26:00 AM	2995	41.230133	-71.374533	Trip 1720; Telemetry problems, thence when the helmsman addressed the buoy placement, the buoys light was out of service/ surveillance via radar was difficult for him due to fast moving white caps/ I was just aft of the wheelhouse and lasered it 50 yds of
11/11/2004 6:24:00 AM	2990	41.237	-71.37495	Trip 1721; Rough seas dislogal (?) compass and GPS - lost all record of tug but scow tranmitted up to dump site - unable to track tug and couldn't get scow into cell - dumped just north of grid 2.
11/11/2004 9:14:00 AM	2700	41.225833	-71.370833	Trip 1723; To avoid hitting center marker buoy, dump was made slightly out of grid.
11/11/2004 9:54:00 AM	2600	41.233058	-71.371615	Trip 1722; Dump ok, tug to scow 1171 ft; tug draft 14 ft + depth 108 ft = 124 ft.
11/11/2004 1:59:00 PM	2850	41.231483	-71.372117	Trip 1724; At 1349 hrs I lasered tugs stern to scows bow = 1026 ft/ when I returned to wheelhouse, the telemetry had fouled up/ fortunately it recovered just to the tug entering grid 11 and continued consistent contact with the scow/ the finest kind/ lase
11/11/2004 5:07:00 PM	2995	41.234833	-71.37	Trip 1725; 1700 - tug GPS lost sattelite signals (not tracking), 1707 - scow still tracking - dumped at grid 3.
11/11/2004 7:24:00 PM	2800	41.2235	-71.376	Trip 1726.
11/11/2004 8:10:00 PM	2800	41.230181	-71.382148	Trip 1727; Dump ok, tug to scow 1212 ft.
11/11/2004 11:52:00 PM	2600	41.2307	-71.375367	Trip 1728; No problems with telemetry or contact to open and close the scow/ good disposal/ had buoy on radar only/ not (1) one flash of light/
11/12/2004 2:51:00 AM	2995	41.226167	-71.376	Trip 1729; No problems, good disposal.
11/12/2004 5:30:00 AM	2900	41.223333	-71.374167	Trip 1730.
11/12/2004 6:52:00 AM	2600	41.230491	-71.375386	Trip 1731; Great dump. Distance tug to scow 1229 ft.
11/12/2004 11:05:00 AM	2995	41.227667	-71.372083	Trip 1732; Telemetry comms with scow = aok/ 63 went wide open in 10 minutes was secured or closed tight/ the lat and long is the closest I've seen to the center of a cell in a long time/ heavy weather on it's way on vhf-fm wx.
11/14/2004 8:24:00 PM	2600	41.230498	-71.372308	Trip 1733; Dump ok; Distance tug to scow 1059 ft.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
11/15/2004 12:53:00 AM	5000	41.228083	-71.3816	Trip 1737; No problem with telemetry and remote control consistency with the scow/ 0425 hrs took the Lt GL 65 on stbd hip and stemmed the tide just up river from GL dredges 54 and 55 dredging in the counimict point reach/ the 55s near #20 and 54s just bel
11/15/2004 1:10:00 AM	4900	41.223667	-71.373833	Trip 1738.
11/15/2004 6:39:00 AM	3500	41.233333	-71.374	Trip 1739; Tug not received GPS signal from satellites.
11/15/2004 7:03:00 AM	3700	41.228	-71.3825	Trip 1740; Scow no show on monitor, telemetry out. Disposal reading from tug. Tug to scow 1250 ft.
11/15/2004 10:49:00 AM	3800	41.22845	-71.378917	Trip 1741; Prior to getting under way the telemetry and remote comms = n/p/ after the scow was opened capt jim couldn't close it/ he called in on cell phone and spoke with red in order to bring it back open/ when capt terry reilly took over the helm, he c
11/15/2004 10:55:00 AM	3300	41.2235	-71.372	Trip 1742; No problems.
11/15/2004 3:20:00 PM	4400	41.228148	-71.378576	Trip 1743; Great dump; All in the cell. Tug to scow 1117 ft.
11/15/2004 9:00:00 PM	4600	41.223333	-71.369833	Trip 1745.
11/15/2004 11:50:00 PM	4000	41.227917	-71.375844	Trip 1746; Great dump, all in the cell. Distance tug to scow 992 ft. Exchange light scow for a loaded scow from tug lemmerhirt, north of newport bridge.
11/15/2004 11:59:00 PM	4900	41.233333	-71.371833	Trip 1744; Tug not receiving GPS signal from satellites.
11/16/2004 12:24:00 AM	3000	41.227983	-71.376583	Trip 1747; At 2400 hrs capt reilly at the helm/ all systems go/ telemetry and the remote communications = the finest kind/ a seaman sees a seaman from afar/ 0445 hrs took the lt 35 on their stbd hip and waited for the dredge 54 to take it 4.3 hrs downtime
11/16/2004 4:00:00 AM	4100	41.225058	-71.382613	Trip 1752; Great dump all in the cell; Tug to scow 1050 ft.
11/16/2004 5:50:00 AM	4500	41.22753	-71.372494	Trip 1748; North of newport bridge took a loaded scow from lemmerhirt to disposal site. Dump ok.
11/16/2004 9:28:00 AM	3800	41.233333	-71.369833	Trip 1749; Computer malfunctions - when tug gets within 1 mile of dump site tug GPS signal goes to on differential then loses signal - this has happened last 5 trips - scow signal stay differential and seems to work fine - update times should also be chec
11/16/2004 11:30:00 AM	4900	41.225176	-71.382426	Trip 1750.
11/16/2004 1:15:00 PM	4600	41.225183	-71.38315	Trip 1751; Telemetry and remote communications - a ok, no problems/ from about 1700 stemming the tide waiting for a scow to be loaded.
11/16/2004 6:14:00 PM	4000	41.224833	-71.376333	Trip 1753; Computer malfunction - tugs GPS goes to non-differential and loses sat signal.
11/16/2004 11:25:00 PM	3700	41.225536	-71.375319	Trip 1754.
11/17/2004 1:44:00 AM	4800	41.224833	-71.374833	Trip 1755; Telemetry and remote communication with the scow - the finest kind/ no problems.
11/17/2004 5:54:00 AM	4500	41.225333	-71.369833	Trip 1756; Tugs GPS to non-differential loses sat signal.
11/17/2004 8:15:00 AM	4800	41.235	-71.373833	Trip 1757.
11/17/2004 1:48:00 PM	3200	41.225405	-71.375724	Trip 1759; Great dump, all in the cell, dist tug to scow 1200 ft, wait for loaded scow.
11/17/2004 6:49:00 PM	4000	41.236167	-71.378833	Trip 1758; 0640 hrs u/w up river/ 0800 hrs secured ld 65 to prov state pier/ 0835 hrs lt boat a/s motiva dock taking on fuel/ 1345 hrs problem with ship traffic/ much lost time/ no problems with telemetry or remote communications with the scow/ opened and
11/17/2004 9:13:00 PM	3500	41.223333	-71.372	Trip 1760; Tug GPS to non-differential loses sat signal.
11/18/2004 12:20:00 AM	3200	41.235123	-71.378806	Trip 1761; Great dump, all in the cell, dist tug to scow 1150 ft, wait for loaded scow.
11/18/2004 1:00:00 AM	4000	41.235	-71.372	Trip 1762; Switched scows at sea with the Eileen McAllister so that the boat would be in time for their crew change.

Disposal Barge Log Summary

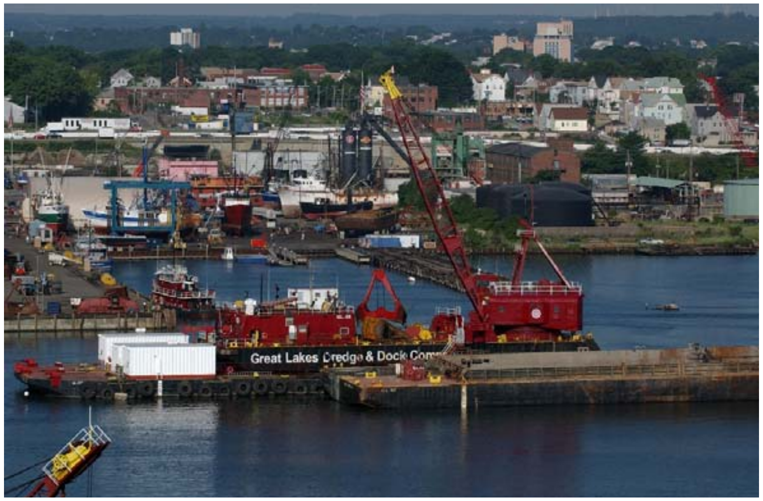
Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
11/18/2004 5:50:00 AM	2200	41.235	-71.369833	Trip 1763; Switch scows at sea in lieu of crew change. Problem with comms - dumped ok on target.
11/18/2004 7:04:00 AM	3000	41.223333	-71.371333	Trip 1764.
11/18/2004 9:39:00 AM	4400	41.235746	-71.375335	Trip 1765; Great dump, all in the cell. Dist tug to scow 1080 ft. Wait for loaded scow.
11/18/2004 11:05:00 AM	3000	41.236103	-71.375699	Trip 1766; All systems = no problem, stemmed the tide on the way in to dredge until told to secure Lt 401 to state pier.
11/18/2004 4:43:00 PM	3900	41.223274	-71.379885	Trip 1767.
11/18/2004 6:19:00 PM	4000	41.225098	-71.381612	Trip 1768; Computer malfunction - variable on scow update.
11/18/2004 6:33:00 PM	2600	41.234045	-71.371586	Trip 1769; Dump made outside of Grid 3. Scow engine wouldn't start. South of Newport bridge. Dredge deckhand went aboard the scow and rode the scow to the disposal site and made an emergency dump and rode the scow back to Newport bridge and pick up the de
11/19/2004 3:49:00 AM	2500	41.229667	-71.376167	Trip 1770; Telemetry failed at site/ heavy haze/ no light on buoy/ obtained buoy via radar/ but due to heavy haze it was very difficult to see the buoy/ after 45 mins circling about, we passed it off our port side/ I lasered it at 180 yds/ the scow was 19
11/19/2004 6:35:00 AM	3600	41.225029	-71.375218	Trip 1771.
11/19/2004 9:36:00 AM	2600	41.232905	-71.382308	Trip 1772; Great dump all in the cell; Dist tug to scow 1110 ft. Wait for loaded scow.
11/19/2004 5:21:00 PM	2300	41.224667	-71.372833	Trip 1773; No communication with scow tracking, dumped at buoy, tug position 41 deg 13.48 71 deg 22.37 (problem closing scow).
11/19/2004 6:56:00 PM	3300	41.235	-71.373833	Trip 1774.
11/19/2004 11:20:00 PM	3000	41.233146	-71.37853	Trip 1775; Great dump, all in the cell, dist tug to scow 1122 ft, wait for loaded scow.
11/20/2004 7:00:00 AM	2500	41.235	-71.372	Trip 1776.
11/20/2004 9:07:00 AM	3300	41.2345	-71.369667	Trip 1777.
11/20/2004 1:21:00 PM	2700	41.233124	-71.37557	Trip 1778; Great dump, all in the cell, dist tug to scow 1050 ft, wait for loaded scow.
11/20/2004 6:36:00 PM	2500	41.22645	-71.375324	Trip 1779; Scow not tracking, visual disposal at buoy, scow dumped but would not close! Distance between tug and scow is 945 ft.
11/20/2004 9:59:00 PM	3100	41.234833	-71.372	Trip 1780.
11/21/2004 2:37:00 AM	2500	41.23331	-71.372047	Trip 1781; Great dump, all in the cell, dist tug to scow 1314 ft, wait for loaded scow.
11/21/2004 6:15:00 AM	2200	41.233333	-71.371833	Trip 1782.
11/21/2004 11:00:00 AM	3700	41.234833	-71.369667	Trip 1783.
11/21/2004 2:46:00 PM	2200	41.230821	-71.382491	Trip 1784; Great dump! All in the cell, dist tug to scow 1160 ft, wait for loaded scow.
11/21/2004 7:52:00 PM	2300	41.230833	-71.376	Trip 1785; Scow malfunctioning would not close after dump.
11/22/2004 1:20:00 AM	3600	41.233341	-71.382532	Trip 1786; 0625 - standby prov river until dredge needs empty scow.
11/22/2004 6:34:00 AM	2700	41.230141	-71.374889	Trip 1787; Dump ok, dist tug to scow 1196 ft.
11/22/2004 11:35:00 AM	2400	41.230567	-71.376216	Trip 1788; Scow tracking was not updating, dumped at buoy - visual.
11/22/2004 3:02:00 PM	1200	41.235	-71.374	Trip 1789.
12/15/2004 1:45:00 PM	3000	41.22485	-71.37485	Trip 1790; Dump ok, tug to scow 900 ft telemetry out! Lat/Long reading from tug, Wait for loaded scow.
12/16/2004 3:37:00 AM	3000	41.223267	-71.372533	Trip 1791; Dump ok, tug to scow 900 ft, scow wouldn't close, wait for loaded scow.
12/16/2004 1:49:00 PM	3000	41.23175	-71.378367	Trip 1792; Good dump. Tug to scow 600 ft, Reading from tug to scow lat/long.
12/17/2004 1:24:00 AM	2850	41.228808	-71.375738	Trip 1793; Great dump! Tug to scow 900 ft.
12/17/2004 12:59:00 PM	3000	41.232967	-71.378733	Trip 1794; Dump ok, tug to scow 1000 ft, reading for lat/long from tug.
12/18/2004 1:38:00 AM	2800	41.226517	-71.373783	Tirp 1795; Dump ok, tug to scow line 700 ft, reading from tug for lat/long.

Disposal Barge Log Summary

Disposal Date	Volume Disposed (cy)	Disposal Latitude	Disposal Longitude	Comment
12/18/2004 12:39:00 PM	3000	41.227317	-71.37315	Trip 1796; Great dump, line tug to scow 600 ft, reading from tug for lat/long, telemetry out!
12/18/2004 10:55:00 PM	2800	41.22665	-71.374117	Trip 1797; Dump ok, tug to scow 600 ft line, lat/long, reading from tug.
12/19/2004 9:17:00 AM	3000	41.228117	-71.371783	Trip 1798; Great dump, line tug to scow 750 ft, reading from tug lat/long.
12/19/2004 7:30:00 PM	3000	41.22785	-71.37515	Trip 1799; Great dump, tug to scow 300 ft line, reading from tug lat/long.
12/20/2004 5:38:00 AM	3000	41.227217	-71.37565	Trip 1800; Great dump, tug to scow line 300 ft, reading lat/long from tug.
12/21/2004 1:50:00 PM	3000	41.229844	-71.376329	Trip 1801; Great dump! Telemetry working.
12/25/2004 10:46:00 PM	3000	41.228026	-71.375967	Trip 1805; Dump ok, line tug to scow 300 ft.
12/26/2004 10:49:00 AM	3000	41.230483	-71.374483	Trip 1806; Dump ok, line tug to scow 300 ft.
12/29/2004 5:35:00 PM	2997	41.226417	-71.374633	Trip 1815; Dump ok, line tug to scow 800 ft, reading from tug lat/long.
12/30/2004 7:49:00 AM	2997	41.224883	-71.37195	Trip 1816; Dump off target, line tug to scow 800 ft, lat/long reading from tug, wait for load scow.
12/30/2004 11:40:00 PM	2900	41.225517	-71.37275	Trip 1817; Dump off target! Line tug to scow 800 ft, lat/long reading from tug.
12/31/2004 11:59:00 AM	2990	41.226533	-71.372967	Trip 1818; Dump ok, line tug to scow 700 ft, lat/long reading from tug.
1/1/2005 2:15:00 AM	3000	41.225385	-71.377307	Trip 1819; Good dump, line tug to scow 1150 ft, lat/long reading from tug.
1/1/2005 2:36:00 PM	3000	41.229664	-71.374659	Trip 1820; Good dump, line tug to scow 600 ft, wait for scow 401.
1/2/2005 3:19	2950	41.228883	-71.3711	Trip 1821; Dump ok, line tug to scow 400 ft, reading from tug lat/long.
1/2/2005 5:08:00 PM	3000	41.228871	-71.376235	Trip 1822; Good dump, line 450 ft tug to scow.
1/3/2005 7:13:00 AM	3000	41.225533	-71.375283	Trip 1823; Dump ok, line tug to scow 700 ft, reading lat/long from tug.
1/3/2005 9:51:00 PM	3000	41.228782	-71.375235	Trip 1824; Dump ok, line 600 ft tug to scow.
1/4/2005 1:45:00 PM	3000	41.22755	-71.374833	Trip 1825; Dump ok, line 400 ft tug to scow, lat/long reading from tug.
1/5/2005 4:24:00 AM	2000	41.22898	-71.375601	Trip 1826; Dump ok, line 600 ft tug to scow.
1/7/2005 3:40:00 AM	2997	41.23018	-71.375067	Trip 1827; Dump ok, line 500 ft tug to scow.
1/7/2005 10:07:00 PM	2650	41.225867	-71.3749	Trip 1828; Dump ok, line 700 ft tug to scow, reading lat/long from tug.
1/8/2005 8:57:00 AM	2990	41.229699	-71.374563	Trip 1829; Dump ok, line 700 ft tug to scow.
1/8/2005 9:01:00 PM	2990	41.22535	-71.374283	Trip 1830; Dump ok, line 600 ft tug to scow, reading lat/long from tug.
1/9/2005 8:59:00 AM	2900	41.229399	-71.375485	Trip 1831; Great dump, line 700 ft tug to scow.
1/9/2005 10:15:00 PM	2995	41.22585	-71.374817	Trip 1832; Dump ok, line 700 ft tug to scow, lat/long/reading from tug.
1/10/2005 10:37:00 PM	2997	41.229326	-71.373609	Trip 1833; Dump ok, line 700 ft tug to scow.

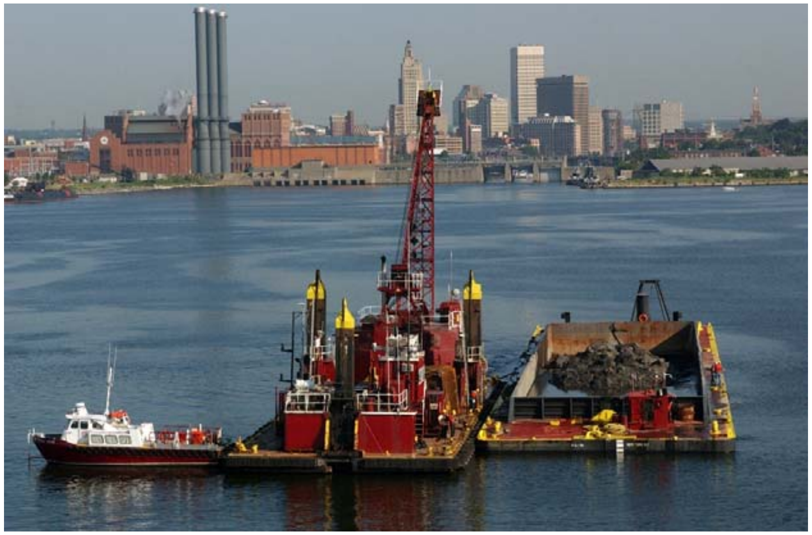
Appendix C

Project Photographs



1. Dredge 55 – Construction of Cell 6/7R off of the State Pier (07/30/2003)

2. Dredge 51 (foreground) and 55 (background) (07/30/2003)

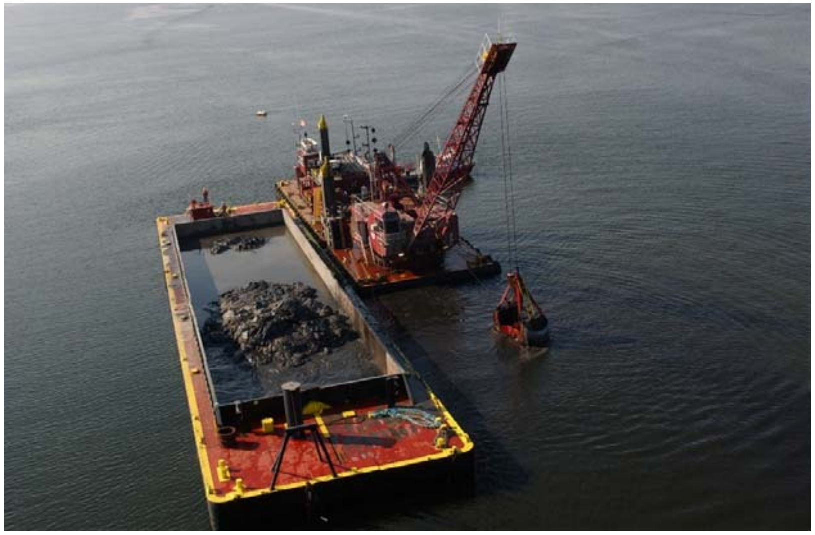


3. Dredge 51 – Construction of Cell 5R (07/30/2003)

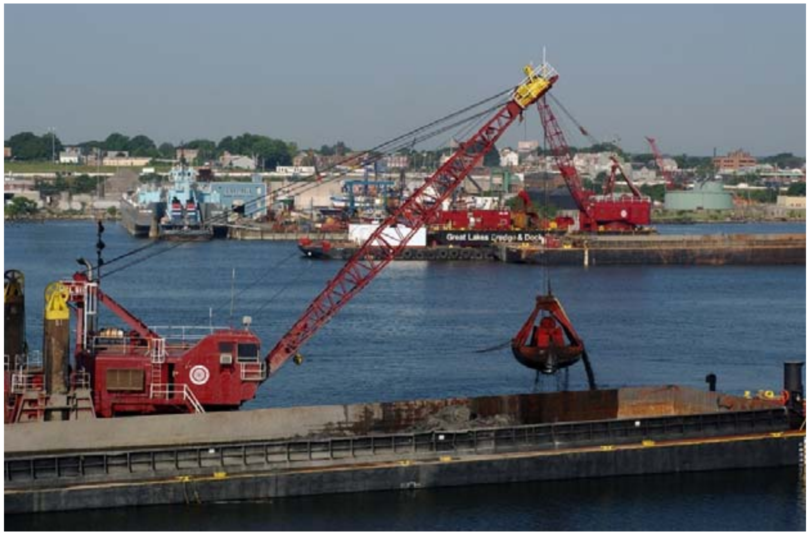
4. Dredge 55 – Positioned over Cell 6/7R (07/30/2003)

5. Dredge 55 – Positioned over Cell 6/7R (07/30/2003)

6. Dredge 55 – Positioned over Cell 6/7R, note anchor cables (07/30/2003)

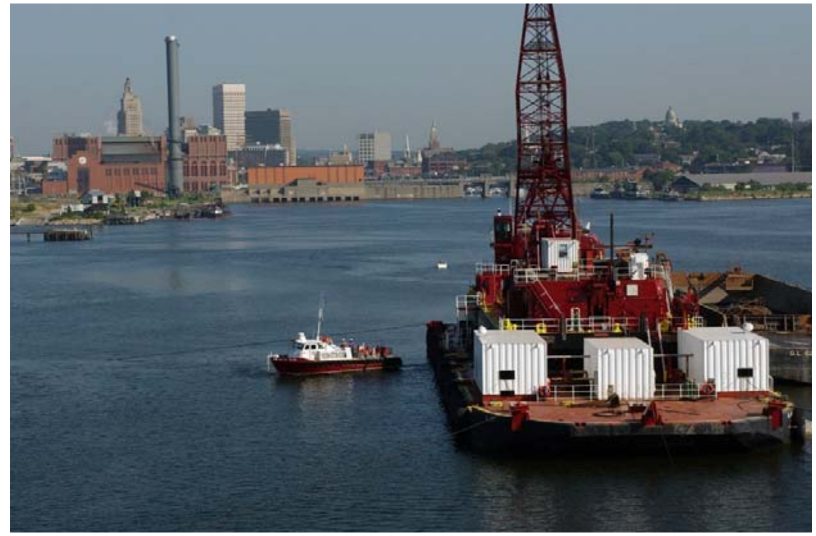


7. Dredge 55 – Construction of Cell 5R (07/30/2003)



8. Dredge 51 (foreground) and 55 (background) (07/30/2003)

9. Dredge 51 – Construction of Cell 5R (07/30/2003)



10. Dredge 55 over Cell 6/7R, note hurricane barrier in background (07/30/2003)

11. Dredge 51 – Construction of Cell 4R (07/10/2003)

12. Anchoring of Dredge??? (07/07/2003)

13. Loaded scow in transit (07/07/2003)

14. Dredge 51 over cell 4R (07/10/2003)

15. Dredge 54 – Construction of Cell 4R (06/09/2003)

16. Dredge 54 – Construction of Cell 4R (06/09/2003)

17. Closed bucket removing surficial material over Cell 4R (06/09/2003)

18. Closed bucket entering water (06/09/2003)

19. Open bucket removing native material in Cell 3R (05/20/2003)

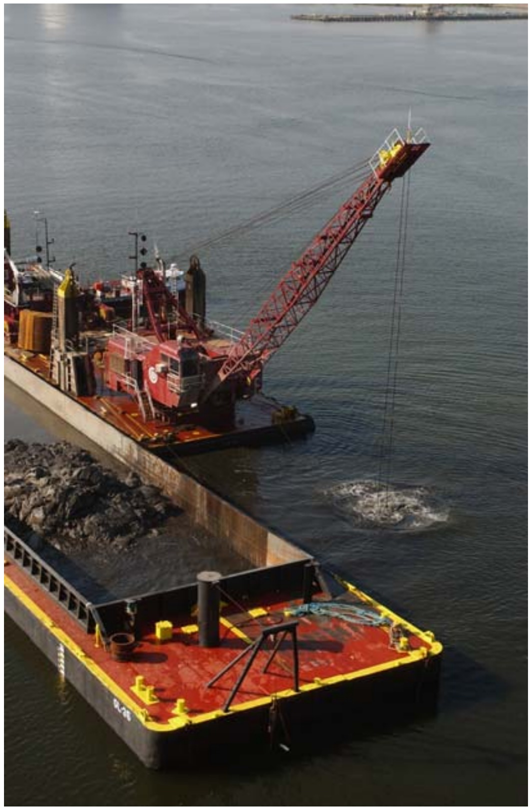
20. Open bucket removing native material in Cell 3R (05/20/2003)

21. Construction of Cell 4R (06/09/2003)

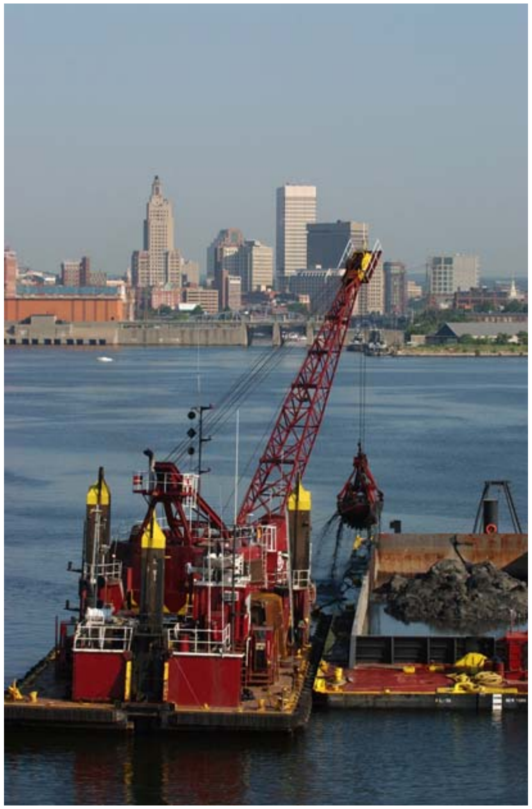
22. Closed bucket removing surficial material over Cell 3R (05/05/2003)

23. Open bucket (05/20/2003)

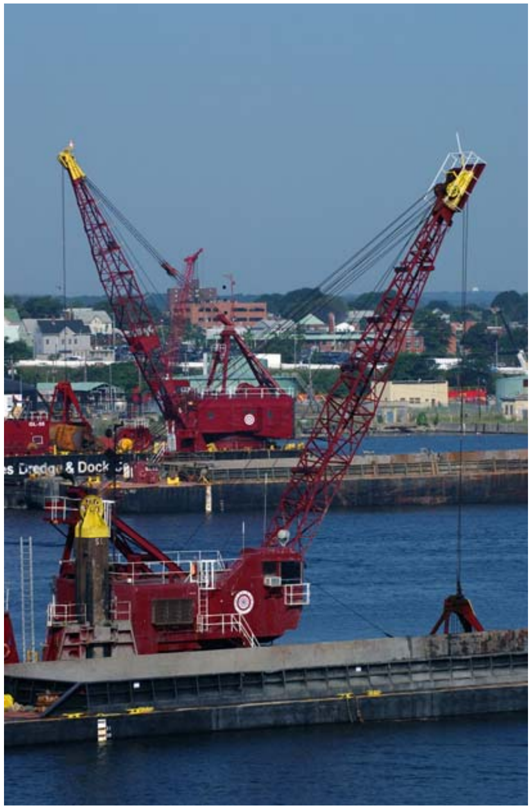
24. Closed bucket (05/05/2003)



25. Dredge 51 – Construction of Cell 5R (07/30/2003)



26. Dredge 51 – Construction of Cell 5R (07/30/2003)



27. Dredge 51 (foreground) and 55 (background) (07/30/2003)

28. Positioning loaded scow over Cell 3R (07/10/2003)

29. Scow opening over Cell 3R (07/10/2003)

30. Scow opening over Cell 3R (07/10/2003)

31. Scow opening over Cell 3R (07/10/2003)

32. Disposal into Cell 3R with ongoing construction of Cell 4R (07/10/2003)

33. Transit of loaded scow (06/09/2003)

34. Disposal into Cell 3R (06/09/2003)

35. Disposal into Cell 3R (06/09/2003)

36. Open scow over Cell 3R (06/09/2003)

37. Open scow over Cell 1R (05/20/2003)

38. Open scow over Cell 3R (06/09/2003)

39. Loaded scow being positiond for disposal into Cell 1R (05/20/2003)

40. Preparation for monitoring downcurrent of Cell 1R(05/20/2003)

41. Scow opening over Cell 1R (05/20/2003)

42. Scow opening over Cell 1R (05/20/2003)

43. Scow fully open over Cell 1R (05/20/2003)

44. Dredging surficial material over Cell 3R (note high water content) (05/20/2003)

45. Scow opening over Cell 1R (05/20/2003)

46. Surface slick and debris over Cell 3R following disposal (06/09/2003)

47. Crew vessel departing from project dock at head of harbor

48. Setup for viewing real-time monitoring data – disposal monitoring (05/20/2003)

49. Real-time data view for deck crew during disposal monitoring (05/20/2003)

50. Filling sample bottles from the pump system (05/20/2003)

51. Managing sample bottles (06/09/2003)

52. Lowering the datasonde/pump intake on station (06/09/2003)

53. ADCP mount on disposal monitoring vessel (05/20/2003)

54. Upriver extent of disposal monitoring (I-195 bridge over Seekonk River)

55. Downriver extent of disposal monitoring (Fields Point)

56. Typical parent material from CAD cell construction

57. Typical surficial material over CAD cells

58. Open-toothed bucket

59. Vessel docking at State Pier adjacent to CAD Cell 6/7R (06/09/2003)

60. Survey/crew vessel performing transect

61. Survey vessel performing transect off State Pier over Cell 6/7R

62. Schooling shad adjacent to project dock (05/20/2003)

Appendix D

Water Quality Monitoring Submittals to RIDEM

Note: The 11 plume tracking monitoring events and two neap tide dissolved oxygen monitoring events summarized in Table D-1 are provided in electronic format only.

Table D-1

Summary of Plume and Dissolved Oxygen Monitoring Summary Reports Submitted to RIDEM as Part of the PRHMDP

(included in electronic format as part of this Appendix)

Monitoring Event No.	Date Performed	Disposal Event No.	Disposal Cell	Activity Triggering WQC Specified Monitoring	WQC Condition(s)	Tide	Turbidity, TSS and Metals	Toxicity	Description
1	5-20-03	1	1R	Disposal #1	26a, 31a	High	√	√	First disposal required to be monitored (assumed high tide)
2	5-21-03	2	1R	Disposal #2-5	26b, 33a	Low	√	√	First low tide disposal required to be monitored
3	6-4-03	5	1R	Disposal #2-11	26c,31b	High	√	√	Within the first 11 disposal events for toxicity (31b); Within the first 100 disposal events for metals (26c)
3	6-4-03	5	1R	20 ft from top	26e	Any	√		Performed when cell contents are 20' from top of cell
4	6-6-03	11	1R	Disposal # 2-11	26d, 33b	Low	√	√	Within the first 11 disposal events for toxicity (33b); within the first 100 disposal events for metals (26d)
4	6-6-03	11	1R	5 ft from top	26e	Any	√		Performed when cell contents are 5' from top of cell
5	7-10-03	14	3R	First 100 disposals	26c	Spring high	√		During a period when the tidal range is 5.5 ft or greater
6	7-11-03	17	3R	First 100 disposals	26d	Spring low	√		During a period when the tidal range is 5.5 ft or greater
7	7-11-03	21	3R	First 100 disposals	26c	Spring high	√		During a period when the tidal range is 5.5 ft or greater
8	7-14-03	31	3R	First 100 disposals	26d	Spring low	√		During a period when the tidal range is 5.5 ft or greater
9	7-21-03	70	4R	First 100 disposals	26c	High	√		Event 10 was performed after the first 100 disposal events based on discussions with RIDEM
10	6-9-04	> 100	3AR	First 100 disposals	26d	Low	√		
11	6-9-04	> 100	3AR	Northern cell	26f	High	√		During disposal at the northernmost limits of the project
DO-1	7-21-03		4R	DO survey	40	High			During neap tide
DO-2	9-17/18-03		5R	DO survey	40	High			During neap tide

Data Submittal for Water Quality Monitoring Event #1 on 20 May 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: First disposal event – CAD Cell 1R – high tide disposal on 20 May

Applicable Water Quality Certification Conditions:

- 26a – dissolved metals and TSS for the first high tide disposal event
- 31a – toxicity for the first high tide disposal event

Associated Files:

- Prov_R_1_stn – Microsoft Excel document with station and sample ID information (Table 1-1)
- Prov_R_1_data – Microsoft Word document with analytical results (Tables 1-2 through 1-4)
- Prov_R_1_figure – pdf document showing the sampling locations (Figure 1-1)

Summary:

The first disposal event into cell 1R took place at 1233 on 20 May 2003, shortly after the predicted high tide for Providence (4.4 feet at 1225). Dredge 51 was actively working just south of the disposal cell prior to and following the disposal event, removing maintenance material from over cell 3R and a surrounding buffer (see Figure 1-1).

Pre-disposal monitoring was performed during the latter stage of the incoming flood tide, and a reference sample was collected up current (south) of the dredging and disposal locations prior to disposal (UCR1 in Figure 1-1 and Table 1-1). The monitoring revealed a relatively uniform water column of low turbidity water on the incoming tide. A turbidity plume was identified down current of Dredge 51 (moving north toward cell 1R), and samples were collected within the plume to characterize the potential influence of the dredging on the disposal monitoring (DRG1 in Figure 1-1).

Post-disposal monitoring revealed a turbidity plume of limited intensity (less than that identified for the dredging) down current of the cell (now in the ebb tide direction). As the tide continued to ebb, the monitoring tracked the low intensity plume moving south toward the dredge. Monitoring was then shifted to the down current side of the dredge as the trajectory of the disposal plume indicated it would pass beneath the dredge/scow working over cell 3R. A turbidity plume of greater intensity was identified near the bottom, down current of the dredge at the compliance point for metals (1500 feet down current of the disposal). Although the elevated turbidity was likely caused by the dredging (the disposal plume should have further dissipated by this time), it coincided with the estimated time for disposal plume migration to the compliance point for metals, and samples were collected in the location of peak turbidity (CM in Figure 1-1). Although not specifically required, a full-depth composite water sample was also collected at station CM for analysis of toxicity to further characterize potential impacts associated with the disposal.

As the turbidity was elevated to approximately 10-15 NTU above background near the bottom at the compliance location 1500 feet from the disposal, attempts were made to track the plume further down current and collect additional samples as per Condition 29 of the Water Quality Certification Condition. However, the plume was not identified further down current (turbidity returned to background levels), and the additional samples were collected at a location approximately 2500 feet from the disposal cell (CM2 in Figure 1-1) at the time the plume was estimated to be passing based on current velocity. Post-disposal monitoring continued, but was unable to identify any disposal (or dredging) related turbidity plume further down current. As a result, the compliance samples for toxicity were collected at Fields Point at the time of slack low tide.

Results of the analysis of TSS and dissolved metals are presented in Table 1-2. Elevations of TSS above background coincide with the elevated turbidity and acoustic backscatter measurements of the real-time monitoring. 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 0.56 to 2.1 ug/L, and the highest concentration was reported at the reference location.

Results of the *Arbacia punctulata* fertilization test are presented in Table 1-3, and the mean fertilization was above 98% for all samples with no statistically significant difference between the reference sample and the samples collected down current at the compliance point (Fields Point) and the additional sample at 1500 feet from the disposal cell. Results of the *Arbacia punctulata* embryo survival and development test are presented in Table 1-4. The mean embryo survival was at or above 96% for all samples. The mean normal embryo development was at or above 94% for all samples, with no statistically significant difference between the reference sample and the samples collected down current at the compliance point (Fields Point) and the additional sample at 1500 feet from the disposal cell.

TABLE 1-1
Summary of Water Samples Collected in Providence River
Disposal Monitoring Event 1   20 May 2003

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	Northing
DRG1	PR01 DRG1-T	Dredge Plume	1142	4.5	TSS/Metals	356364	264384
	PR01 DRG1-M		1141	20	TSS/Metals		
	PR01 DRG1-B		1139	40	TSS/Metals		
	PR01 DRG1-TOX		1139-1142	composite	Toxicity		
UCR1	PR01 UCR1-T	Upcurrent Reference	1210	4	TSS/Metals	357134	263257
	PR01 UCR1-M		1209	20.5	TSS/Metals		
	PR01 UCR1-B		1208	41	TSS/Metals		
	PR01 UCR1-TOX		1208-1210	composite	Toxicity		
CM1	PR01 CM1-T	Compliance Point 1500-feet down current	1407	4	TSS/Metals	357117	263275
	PR01 CM1-M		1406	20	TSS/Metals		
	PR01 CM1-B		1404	40	TSS/Metals		
	PR01 CM1-TOX		1404-1407	composite	*Toxicity* *		
CM2	PR01 CM2-T	Secondary Compliance Point 2500-feet down current	1500	4	TSS/Metals	357683	262348
	PR01 CM2-M		1458	20	TSS/Metals		
	PR01 CM2-B		1457	40	TSS/Metals		
FP	PR01 FP-TOX	Fields Point	1728-1731	composite 4/18/35	Toxicity	361489	257202

Notes: An asterisk (*) indicates an additional (non-required) sample collected and analyzed to provide further information on potential water quality impacts.

Table 1-2
Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #1 of the Providence River Dredging Monitoring. Samples were collected on 20 May 2003.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0305086-10	PRO1 DRG1-T	Surface	<0.5 [a]	0.72	37
0305086-11	PRO1 DRG1-M	Mid-depth	<0.5 [a]	0.94	24
0305086-12	PRO1 DRG 1-B	Bottom	<0.5 [a]	1.0	18
0305086-01	PRO1 CM1-T	Surface	<0.5 [a]	1.0	27
0305086-02	PRO1 CM1-M	Mid-depth	<0.5 [a]	1.1	18
0305086-03	PRO1 CM1-B	Bottom	<0.5 [a]	0.70	47
0305086-04	PRO1 CM2-T	Surface	<0.5 [a]	1.4	21
0305086-05	PRO1 CM2-M	Mid-depth	<0.5 [a]	1.0	17
0305086-06	PRO1 CM2-B	Bottom	<0.5 [a]	0.69	20
0305086-13	PRO1 UCR1-T	Surface	<0.5 [a]	2.1	10
0305086-14	PRO1 UCR1-M	Mid-depth	<0.5 [a]	1.1	15
0305086-15	PRO1 UCR1-B	Bottom	<0.5 [a]	0.56	18

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows: Ag - 1.9 µg/L; Cu - 4.8 µg/L.

Table 1-3
Results of the of Sea Urchin (*Arbacia punctulata*) Fertilization Test with Samples Collected During Monitoring Event #1 of the Providence River Dredging Monitoring. Samples were collected on 20 May 2003.

Sample Location Description	Mean % Fertilization
PRO1-DGR-1	98.4
PRO1 UCR-1	98.6
PRO1-CM	99.6
PRO1-FP	98.8
Artificial Seawater Control[a]	98.6
Natural Seawater Control[b]	97.6

[a]Artificial seawater control was required since samples were fortified with artificial sea salts to achieve the required salinity of 30 ± 2 ppt.
[b]Natural seawater control is the standard laboratory control.

Table 1-4
Results of the of Sea Urchin (*Arbacia punctulata*) Embryo Survival and Development Test with Samples Collected During Monitoring Event #1 of the Providence River Dredging Monitoring. Samples were collected on 20 May 2003.

Sample Location Description	**Mean % Normal Embryo Development**	**Mean % Embryo Survival**
PRO1 DRG1	97.4	96
PRO1-UCR1	96.8	100
PRO1 CM	94	100
PRO FP	94.2	97
Artificial Seawater Control[a]	95	100
Natural Seawater Control[b]	99.2	97

[a]Artificial seawater control was required since samples were fortified with artificial sea salts to achieve the required salinity of 30 ± 2 ppt.
[b]Natural seawater control is the standard laboratory control.

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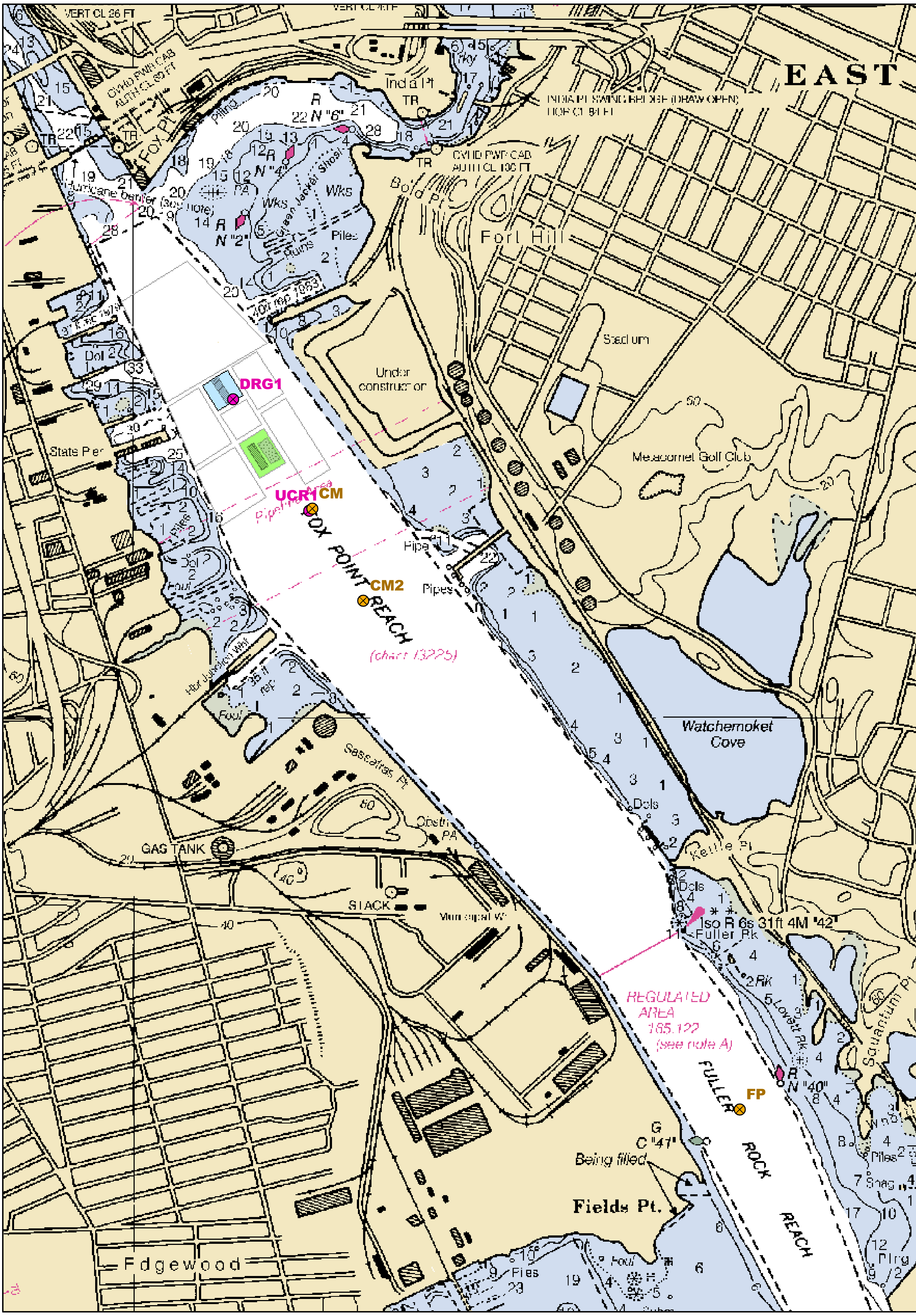

Legend

- Sampling Locations (Prior to disposal)
- Sampling Locations (Post disposal)
- CAD Cell 1R with Scow in Position
- CAD Cell 3R with Dredge 51 and Scow in Position

N

0 500 1,000 1,500 2,000 2,500 3,000 Feet

Figure 1-1
Sampling Locations
Monitoring Survey #1
20 May 2003
High Tide Disposal

NOAA Nautical Chart, 1997
CAD Cell Coordinates from USACE. 2002

Prepared by MSG
5 May 2003
Project No: 10310-003

ENSR INTERNATIONAL

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Data Submittal for Water Quality Monitoring Event #2 on 21 May 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: Second disposal event – CAD Cell 1R – low tide disposal on 21 May

Applicable Water Quality Certification Conditions:

- 26b – dissolved metals and TSS for a low tide disposal within the first five disposal events
- 33a – toxicity for the first low tide disposal event

Associated Files:

- Prov_R_2_stn – Microsoft Excel document with station and sample ID information (Table 2-1)
- Prov_R_2_data – Microsoft Word document with analytical results (Tables 2-2 through 2-4)
- Prov_R_2_figure – pdf document showing the sampling locations (Figure 2-1)

Criteria Exceedences: None

Summary:

The second disposal event into cell 1R took place at 0721, 41 minutes after the predicted low tide for Providence (0.3 feet at 0640). Dredge 51 was actively working just south of the disposal cell prior to and following the disposal event, removing maintenance material from over cell 3R and a surrounding buffer (see Figure 2-1).

Pre-disposal monitoring was performed during low water slack tide and early flood tide. A reference sample was collected up current (south) of the dredging and disposal locations prior to disposal (UCR2 on Figure 2-1 and Table 2-1). The background monitoring revealed a relatively uniform water column of low turbidity water (~4 NTU).

Post-disposal monitoring was conducted down current (north) of the CAD Cell 1R. A turbidity plume of limited intensity (e.g., a maximum of 10 NTU compared to a background of 4 NTU) was observed up to 1000 feet down current of the cell. All turbidity measurements collected 500 feet or greater down current of the cell were less than 10 NTU above background. Monitoring was also performed around Dredge 51, and a limited plume (turbidity values up to 10 NTU) was observed immediately down current (north) of the dredge. A dredge plume sample was collected and analyzed for the required analytes (DRG1 on Figure 2-1; Table 2-1).

As the tide continued to flood, the monitoring was unable to identify a turbidity plume beyond 1000 feet down current of the disposal cell. No measurements above background conditions (4 NTU) were observed along the 1500-foot down current compliance transect for metals. Since no discernable turbidity plume was observed along the down current compliance transect, samples were collected at the predicted transect location corresponding to where the plume was expected to pass based on measured current direction and plume trajectory (CM on Figure 2-1). Timing of the sampling along the 1500-foot down current transect was based on measured current velocities and the calculated travel time from the disposal cell to the 1500 foot transect.

Subsequent monitoring down current of the compliance transect (station CM) was unable to identify any disposal (or dredging) related turbidity plumes. As a result, the compliance samples for toxicity were collected at the I-195/Washington St Bridge (195 on Figure 2-1) at the time of high water slack tide as required by the Water Quality Certification.

Results of the analysis of TSS and dissolved metals are presented in Table 2-2. Elevated concentrations of TSS were observed in some of the down current samples (as high as 69 mg/L in the bottom water at the compliance transect - station CM). The TSS concentrations were not associated with high field-measured turbidity, field measured ADCP backscatter, or field observations of a plume, therefore, the data are currently being reviewed. 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 0.62 to 1.8 ug/L.

Results of the *Arbacia punctulata* fertilization test are presented in Table 2-3, and the mean fertilization was above 98% 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 an additional near field sample at 1500 feet from the disposal cell (metals compliance transect). (Additional samples not required in the WQC were collected at the 1500 ft 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 2-4. The mean embryo survival was at or above 86% 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 at or above 88% for all samples. A statistically significant difference in embryo development was noted between the reference sample and the additional near field sample collected at 1500 feet from the disposal (mean % of normal development of 93.8% for the reference versus 89.2% at the near field 1500 foot down current location). However, there was no statistically significant difference between the reference sample and the sample collected at the down current compliance point (I-195 bridge).

TABLE 2-1 Summary of Water Samples Collected in Providence River Disposal Monitoring Event 2 - 21 May 2003

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	Northing
UCR2	PR02 UCR2-T	Upcurrent Reference	0704	4	TSS/Metals	357137	263128
UCR2	PR02 UCR2-M		0702	22	TSS/Metals		
UCR2	PR02 UCR2-B		0701	40	TSS/Metals		
UCR2	PR02 UCR2-TOX		0701-0704	composite	Toxicity		
CM1	PR02 CM1-T	Compliance Point 1500-feet down current	0850	2	TSS/Metals	356106	266227
	PR02 CM1-M		0848	4.5	TSS/Metals		
	PR02 CM1-B		0846	7	TSS/Metals		
	PR02 CM1-TOX		0846-0850	composite	*Toxicity* *		
DRG1	PR02 DRG1-T	Dredge Plume	1006	4	TSS/Metals	356436	264345
	PR02 DRG1-M		1004	20	TSS/Metals		
	PR02 DRG1-B		1002	37	TSS/Metals		
	PR02 DRG1-TOX		1002-1006	composite	Toxicity		
195	PR02 195-TOX	I-195 Bridge	1301-1304	composite 4/9.5/15	Toxicity	to be provided	to be provided

Notes: An asterisk (*) indicates an additional (non-required) sample collected and analyzed to provide further information on potential water quality impacts.

Table 2-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #2 of the Providence River Dredging Monitoring. Samples were collected on 21 May 2003.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0305091-07	PRO2 DRG1-T	Surface	<0.5[a]	1.8	11
0305091-08	PRO2 DRG1-M	Mid-depth	<0.5[a]	0.71	66
0305091-09	PRO2 DRG1-B	Bottom	<0.5[a]	0.62	28
0305091-10	PRO 2 CM1-T	Surface	<0.5[a]	1.8	19
0305091-11	PRO2 CM1-M	Mid-depth	<0.5[a]	1.7	62
0305091-12	PRO2 CM1-B	Bottom	<0.5[a]	1.7	69
0305091-04	PRO2 UCR2-T	Surface	<0.5[a]	1.2	14
0305091-05	PRO2 UCR2-M	Mid-depth	<0.5[a]	0.71	18
0305091-06	PRO2 UCR2-B	Bottom	<0.5[a]	0.78	18

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows: Ag - 1.9 µg/L; Cu - 4.8 µg/L

Table 2-3 Results of the of Sea Urchin (*Arbacia punctulata*) Fertilization Test with Samples Collected During Monitoring Event #2 of the Providence River Dredging Monitoring. Samples were collected on 21 May 2003.

Sample Location ID	Mean % Fertilization
PRO2-DGR-1	99.6
PRO2 UCR-2	99.6
PRO2-CM	99.8
PRO1-195	100
Artificial Seawater Control[a]	98.6
Natural Seawater Control[b]	99.8

[a]Artificial seawater control was required since samples were fortified with artificial sea salts to achieve the required salinity of 30 ± 2 ppt.
[b]Natural seawater control is the standard laboratory control.

Table 2-4. Results of the of Sea Urchin (*Arbacia punctulata*) Embryo Survival and Development Test with Samples Collected During Monitoring Event #2 of the Providence River Dredging Monitoring. Samples were collected on 21 May 2003.

Sample Location ID	Mean % Normal Embryo Development	Mean % Embryo Survival
PRO2 DRG1	90.2	86
PRO2-UCR2	93.8	96
PRO2 CM	89.2*	100
PRO2 195	88	94
Artificial Seawater Control	93.6	96
Natural Seawater Control	93.4	100

[a]Artificial seawater control was required since samples were fortified with artificial sea salts to achieve the required salinity of 30 ± 2 ppt.
[b]Natural seawater control is the standard laboratory control.
*Indicates a statistically significant reduction (P<0.05) in the response relative to the corresponding response in the reference sample.

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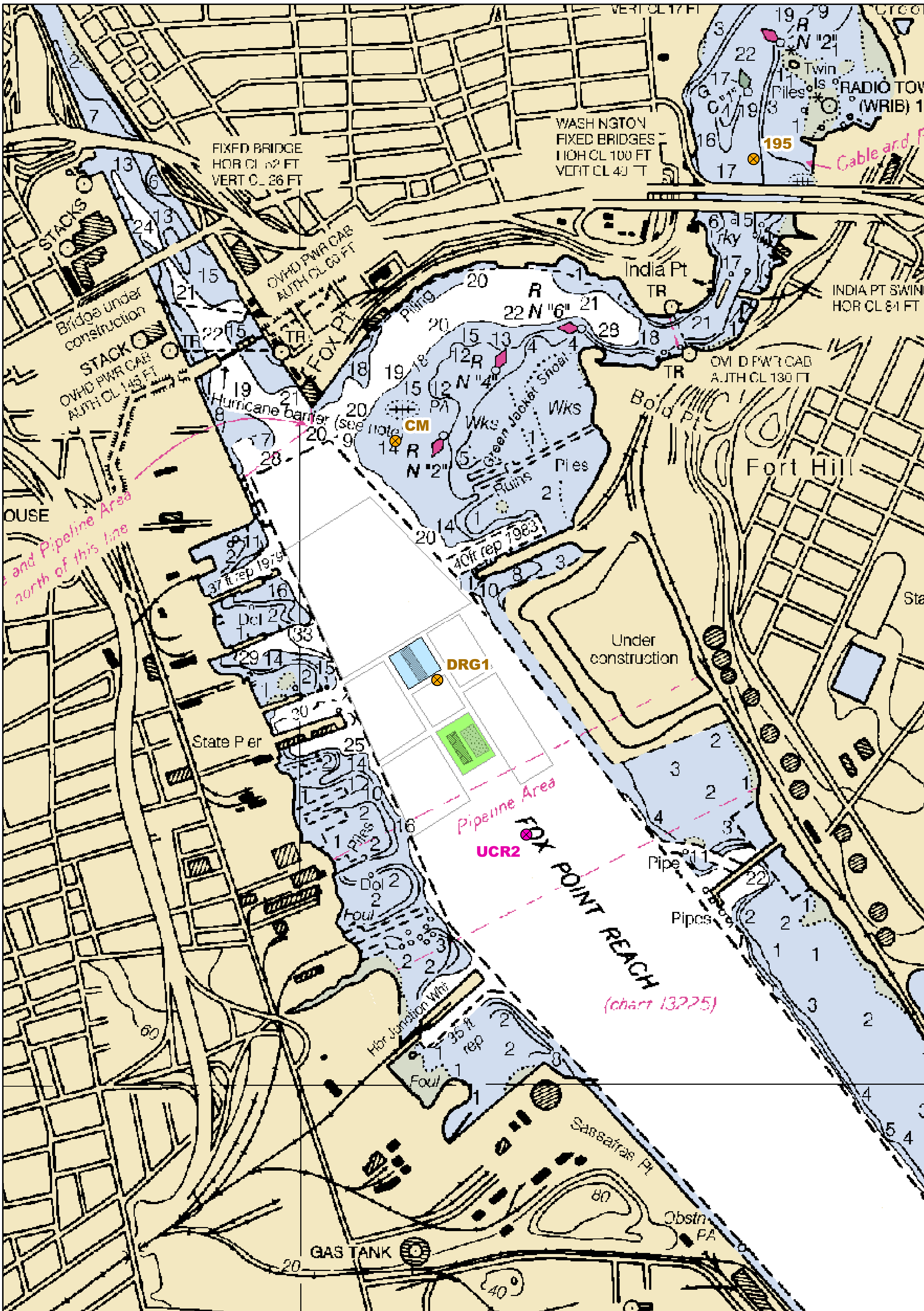

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Legend

- Sampling Locations (Prior to disposal)
- Sampling Locations (Post disposal)
- CAD Cell 1R with Scow in Position
- CAD Cell 3R with Dredge 51 and Scow in Position

0 500 1,000 1,500 2,000 2,500 Feet

Figure 2-1
Sampling Locations
Monitoring Survey #2
21 May 2003
Low Tide Disposal

NOAA Nautical Chart, 1997
CAD Cell Coordinates from USACE. 2002

Prepared by MSG
5 May 2003
Project No: 10310-003

ENSR INTERNATIONAL

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Data Submittal for Water Quality Monitoring Event #3 on 4 June 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: Fifth disposal event – CAD Cell 1R – high tide disposal on 4 June

Applicable Water Quality Certification Conditions:

- 26c – dissolved metals and TSS for a high tide disposal within the first 100 disposal events
- 26e(1) – dissolved metals and TSS for disposal when the starter CAD cell is approximately 20 feet from the surface
- 33b – toxicity for a high tide disposal occurring within disposal events 2 through 11

Associated Files:

- Prov_R_3_summary – Microsoft Word document containing this summary
- Prov_R_3_tables – Microsoft Word document containing station and sample ID information (Table 3-1), and analytical results (Tables 3-2, 3-3, and 3-4)
- Prov_R_3_figure – pdf document showing the sampling locations (Figure 3-1)

Criteria Exceedences: None

Summary:

The fifth disposal event into cell 1R took place at 1157 on 4 June, at the predicted time of high tide for Providence (3.8 feet at 1157). The material being disposed had been removed from the top of cell 4R to the east of disposal cell 1R (see Figure 3-1). Dredge 51 had been inactive for the entire flood tide as it had filled the scow and was awaiting the high tide for disposal. The dredge returned to work over cell 4R approximately 30 minutes following the disposal event.

Pre-disposal monitoring was performed during the last of the flood tide. A reference sample was collected up current (south) of the dredging and disposal locations prior to disposal (UCR1 on Figure 3-1 and Table 3-1). Although turbidity values were low (approximately 3-4 NTU through the water column), the surface water was discolored (brown) and had occasional patches of scum. Salinity ranged from approximately 8 PSU at the surface to nearly 30 PSU near the bottom. This appearance and salinity are consistent with a large freshwater discharge from the Seekonk associated with the large rainfall event several days prior.

The disposal occurred at the time of the predicted high tide (1157), and the scow was slowly maneuvered back to the dredge just east of the disposal cell. Some discoloration and small patches of oil sheen were noted at the surface immediately following the disposal, but dispersed within a short time. ADCP measurements performed over cell 1R immediately following the disposal event and relocation of the scow identified an area of elevated backscatter within and above the cell, with little movement beyond the cell boundaries in the near-slack tidal conditions. As the tide began to ebb, two distinct plumes of similar elevated backscatter were identified in the lower portion of the water column along a cross-channel line approximately 140 feet down current of cell 1R, one area down current of the dredge and one down current of cell 1R. Turbidity values ranged from 3 NTU at the surface to 11 NTU near the bottom in the area down current of the cell. This plume was identified further down current (approximately 380 feet from cell 1R) approximately 45 minutes after the disposal, with associated turbidity ranging from 3 NTU at the surface to 10 NTU at depth.

As the tide continued to ebb, the monitoring was unable to identify a turbidity plume beyond the 380 foot transect. No measurements above background conditions (4 NTU) were observed along the 1500-foot down current compliance transect for metals. Since no discernable turbidity plume was observed along the down current compliance transect, 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 3-1).

Dredge 51 continued to work removing maintenance material from over cell 4R during the remainder of the ebb tide, and water samples were collected from within the identified turbidity plume approximately 200 feet down current of the dredge mid way through the ebb tide (DRG1 on Figure 3-1).

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 off Fields Point at the high water slack tide as required by the Water Quality Certification (sampling time for this station was advanced approximately 30 minutes because of an incoming ship that was scheduled to pass prior to high tide).

Results of the analysis of TSS and dissolved metals are presented in Table 3-2. TSS levels at the 1500 foot down current location were lower than at the reference location for the mid and bottom depths, but were higher than the reference location for the surface sample. The highest reported TSS (40 mg/L) was collected from the surface 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 0.47 to 2.9 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 3-3, 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 (Fields Point) 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 3-4. The mean embryo survival was above 89% for all samples, with no statistically significant difference between the reference sample and the samples collected down current at the compliance point (Fields Point) or in the additional near field sample at 1500 feet from the disposal cell (metals compliance transect). The mean normal embryo development was above 94% for all samples, with no statistically significant difference between the reference sample and the samples collected down current at the compliance point (Fields Point) or in the additional near field sample at 1500 feet from the disposal cell (metals compliance transect).

TABLE 3-1 Summary of Water Samples Collected in Providence River Disposal Monitoring Event 3 - 04 June 2003

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	***Northing***
UCR1	PR03 UCR1-T	Upcurrent Reference	1130	2	TSS/Metals	356427	264198
	PR03 UCR1-M		1129	20	TSS/Metals		
	PR03 UCR1-B		1127	39	TSS/Metals		
	PR03 UCR1-TOX		1127-1130	Composite	Toxicity		
CM1	PR03 CM1-T	Compliance Point - Metals 1500-feet down current	1350	2	TSS/Metals	356790	262887
	PR03 CM1-M		1348	19	TSS/Metals		
	PR03 CM1-B		1347	38	TSS/Metals		
	PR03 CM1-TOX		1347-1350	Composite	Toxicity *		
DRG1	PR03 DRG1-T	Dredge Plume	1529	2	TSS/Metals	356725	264625
	PR03 DRG1-M		1528	19	TSS/Metals		
	PR03 DRG1-B		1526	38	TSS/Metals		
	PR03 DRG1-TOX		1526-1529	Composite	Toxicity		
FP	PR03 FP-TOX	Compliance Point – Toxicity - Fields Point	1623-1626	Composite 2/16/33	Toxicity	361783	256115

Notes: An asterisk (*) indicates an additional (non-required) sample collected and analyzed to provide further information on potential water quality impacts.

Table 3-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Disposal Monitoring Event #3 - 04 June 2003

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0306032-07	PRO3 DRG1-T	Surface	<0.5	1.6	40
0306032-08	PRO3 DRG1-M	Mid-depth	<0.5	0.47	8.5
0306032-09	PRO3 DRG1-B	Bottom	<0.5	0.92	23
0306032-04	PRO3 CM1-T	Surface	<0.5	2.9	9.0
0306032-05	PRO3 CM1-M	Mid-depth	<0.5	0.98	14
0306032-06	PRO3 CM1-B	Bottom	<0.5	0.73	15
0306032-01	PRO3 UCR1-T	Surface	<0.5	2.9	4.2
0306032-02	PRO3 UCR1-M	Mid-depth	<0.5	0.94	19
0306032-03	PRO3 UCR1-B	Bottom	<0.5	1.2	20

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.

*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows: Ag - 1.9 µg/L; Cu - 4.8 µg/L.

Table 3-3 Results of the of Sea Urchin (*Arbacia punctulata*) Fertilization Test with Samples Collected During Disposal Monitoring Event #3 - 04 June 2003

Sample Location ID	Mean % Fertilization
PRO3 DRG-1	99.6
PRO3 CM- 1	100
PRO3 FP	99.8
PRO3 UCR-1	100
Artificial Seawater Control[a]	94.6
Natural Seawater Control[b]	99.4

[a]Artificial seawater control was required since samples were fortified with artificial sea salts to achieve the required salinity of 30 ± 2 ppt.
[b]Natural seawater control is the standard laboratory control.

Table 3-4 Results of the Sea Urchin (*Arbacia punctulata*) Embryo Survival and Development Test with Samples Collected During Disposal Monitoring Event #3 - 04 June 2003

Sample Location ID	Mean % Normal Embryo Development	Mean % Embryo Survival
PRO3 DRG-1	97.8	93.3
PRO3 CM- 1	94.6	92.6
PRO3 FP	98.0[a]	89.8
PRO3 UCR-1	97.2	95.0
Artificial Seawater Control[b]	98.4	95.9
Natural Seawater Control[c]	98.4	93.7

[a]One replicate of PRO3-FP exhibited 10% normal development, while the remaining four replicate samples exhibited 97-99% normal development. This one replicate sample was believed to be an anomaly, and was not included in the mean % normal development.
[b]Artificial seawater control was required since samples were fortified with artificial sea salts to achieve the required salinity of 30 ± 2 ppt.
[c]Natural seawater control is the standard laboratory control.

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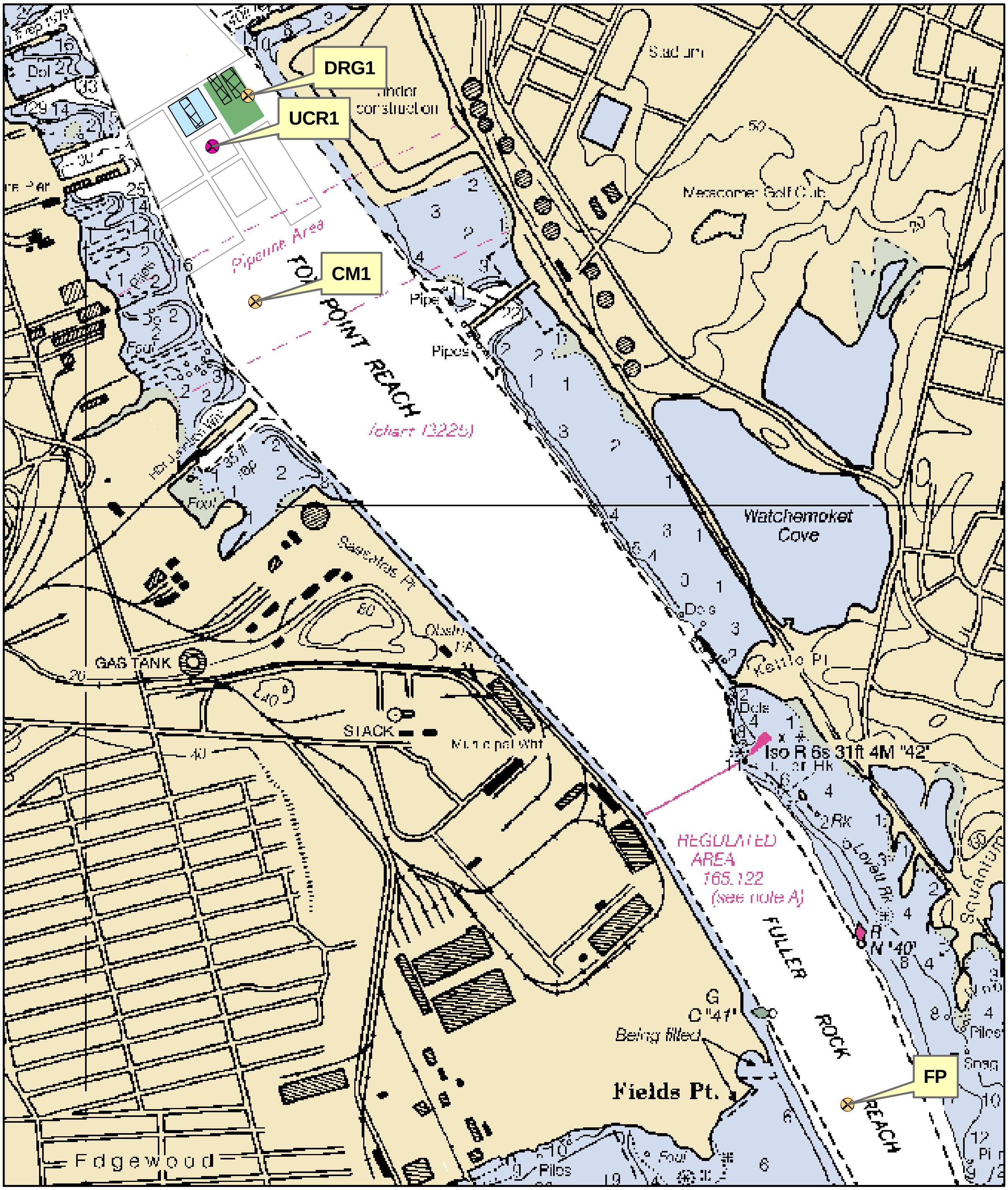
Providence River and Harbor Maintenance Dredging Project



Legend

- Sampling Locations (Post disposal)
- Sampling Locations (Prior to disposal)
- CAD Cell 1R with Scow in Postion
- CAD Cell 4R with Dredge 51 and Scow in Position

0 1,000 2,000 3,000 Feet

N

Figure 3-1

Sampling Locations Monitoring Survey #3

04 June 2003 - High Tide Disposal Cell 1R

NOAA Nautical Chart, 1997
CAD Cell Coordinates from USACE. 2002

Prepared by ME
10 June 2003
Project No: 10310-003

ENSR INTERNATIONAL

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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).

Table 4-1 Summary of Water Samples Collected during Providence River Disposal Monitoring Event 4 - 06 June 2003

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	*Northing*
UCR1	PR04 UCR1-T	Upcurrent Reference	0634	2	TSS/Metals	356522	264061
	PR04 UCR1-M		0633	20	TSS/Metals		
	PR04 UCR1-B		0631	46	TSS/Metals		
	PR04 UCR1-TOX		0631-0634	Composite	Toxicity		
DRG1	PR04 DRG1-T	Dredge Plume	0828	2	TSS/Metals	356745	264508
	PR04 DRG1-M		0826	20	TSS/Metals		
	PR04 DRG1-B		0824	37	TSS/Metals		
	PR04 DRG1-TOX		0824-0828	Composite	Toxicity		
CM1	PR04 CM1-T	Compliance Point - Metals 1500-feet down current	0941	2	TSS/Metals	355888	266130
	PR04 CM1-M		0939	15	TSS/Metals		
	PR04 CM1-B		0938	19	TSS/Metals		
	PR04 CM1-TOX		0938-0941	Composite	Toxicity*		
195	PR04 195-TOX	Compliance Point – Toxicity I-195 Bridge Seekonk River	1318-1321	Composite 1/10/19	Toxicity	358911	268498

Notes: An asterisk (*) indicates an additional (non-required) sample collected and analyzed to provide further information on potential water quality impacts.

Table 4-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected during Disposal Monitoring Event #4 - 06 June 2003

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0306048-04	PRO4 DRG1-T	Surface	<0.5[a]	1.6	21
0306048-05	PRO4 DRG1-M	Mid-depth	<0.5[a]	0.53	30
0306048-06	PRO4 DRG1-B	Bottom	<0.5[a]	0.48	36
0306048-07	PRO4 CM1-T	Surface	<0.5[a]	2.1	12
0306048-08	PRO4 CM1-M	Mid-depth	<0.5[a]	0.67	9.5
0306048-09	PRO4 CM1-B	Bottom	<0.5[a]	0.73	10
0306048-01	PRO4 UCR1-T	Surface	<0.5[a]	2.2	14
0306048-02	PRO4 UCR1-M	Mid-depth	<0.5[a]	0.58	6.8
0306048-03	PRO4 UCR1-B	Bottom	<0.5[a]	0.68	17

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows:
Ag - 1.9 µg/L; Cu - 4.8 µg/L

Table 4-3 Results of the of Sea Urchin (*Arbacia punctulata*) Fertilization Test with Samples Collected during Disposal Monitoring Event #4 - 06 June2003

Sample Location Description	**Mean % Fertilization**
PRO4 DRG-1	99.6
PRO4 CM- 1	99.4
PRO4 195	99.8
PRO4 UCR-1	99.8
Artificial Seawater Control[a]	99.8
Natural Seawater Control[b]	99.8

[a]Artificial seawater control was required since samples were fortified with artificial sea salts to achieve the required salinity of 30 ± 2 ppt.
[b]Natural seawater control is the standard laboratory control.

Table 4-4 Results of the of Sea Urchin (*Arbacia punctulata*) Embryo Survival and Development Test with Samples Collected during Disposal Monitoring Event #4 - 06 June 2003

Sample Location ID	**Mean % Normal Embryo Development**	**Mean % Embryo Survival**
PRO4 DRG-1	96.8	96.2
PRO4 CM- 1	95.6	97.1
PRO4 195	96	98.4
PRO4 UCR-1	96.6	93.6
Artificial Seawater Control	94.8	98
Natural Seawater Control	96.4	96.2

[a]Artificial seawater control was required since samples were fortified with artificial sea salts to achieve the required salinity of 30 ± 2 ppt.
[b]Natural seawater control is the standard laboratory control.

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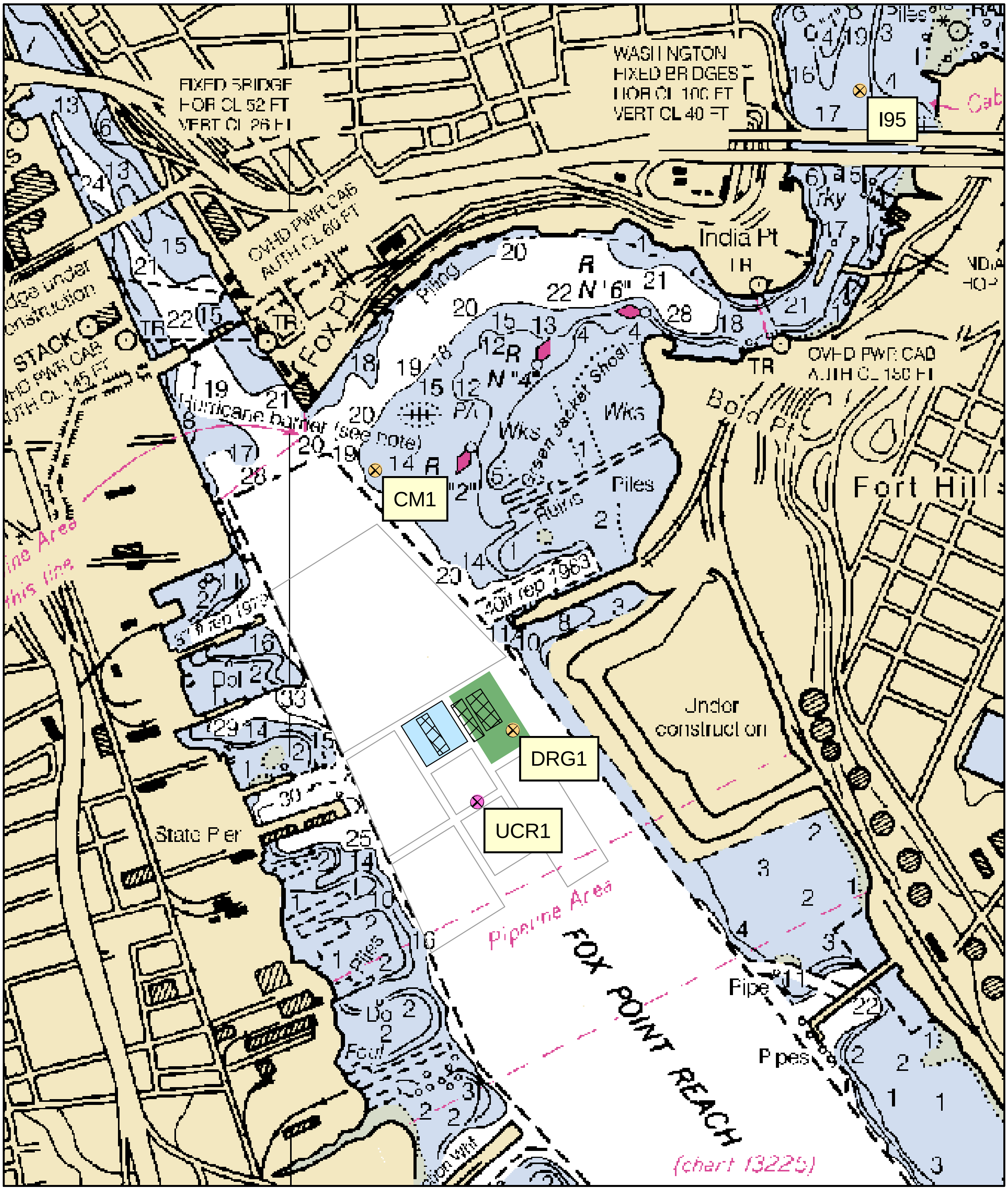

Legend
- Sampling Locations (Prior to disposal)
- Sampling Locations (Post disposal)
- CAD Cell 1R with Scow in Postion
- CAD Cell 4R with Dredge 51 and Scow in Position

0 500 1,000 1,500 2,000 2,500 Feet

Figure 4-1

Sampling Locations Monitoring Survey #4

06 June 2003 - Low Tide Disposal Cell 1R

NOAA Nautical Chart, 1997
CAD Cell Coordinates from USACE. 2002

Prepared by ME
10 June 2003
Project No: 10310-003

ENSR INTERNATIONAL

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Data Submittal for Water Quality Monitoring Event #5 on 10 July 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: CAD Cell 3R – spring high tide disposal on 10 July

Applicable Water Quality Certification Conditions:

- 26c – dissolved metals and TSS for a spring high tide disposal within the first 100 disposal events

Associated Files:

- Prov_R_5_summary – Microsoft Word document containing this summary
- Prov_R_5_tables – Microsoft Word document containing station and sample ID information (Table 5-1), and analytical results (Table 5-2)
- Prov_R_5_figure – pdf document showing the sampling locations (Figure 5-1)

Criteria Exceedences: None

Summary:
The fifth monitored disposal event took place at 1814 on 10 July at approximately the time of predicted high tide for Providence (5.7 feet at 1801). Dredged material was released into cell 3R during a spring high 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 5-1). 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.

Pre-disposal monitoring was performed during the last of the preceding flood tide. A reference sample was collected up current (south) of the dredging and disposal locations prior to disposal (UCR1 on Figure 5-1 and Table 5-1). Turbidity values were low, ranging from approximately 2-3 NTU through the water column. Salinity ranged from approximately 20 PSU at the surface to 28 PSU near the bottom. Water samples were collected from within the identified dredging turbidity plume approximately 150 feet down current from Dredge 55, during flood tide prior to the disposal event (DRG1 on Figure 5-1).

The disposal into cell 3R occurred at 1814, 13 minutes after the predicted high tide (1801), after which the scow was slowly maneuvered to the south of the disposal cell and back into position with Dredge 51 over cell 7R. At the time of disposal, a small northerly (flood) current was observed indicating that slack high water was occurring later than predicted. Similar to previous monitoring events, some discoloration and small patches of oil sheen were noted at the surface immediately following the disposal.

ADCP measurements performed 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 approximately 600 feet south of the cell, likely influenced by the track of the tugboat and scow. Turbidity measurements directly over the cell ranged from 3 NTU to 28 NTU (near bottom). Ambient currents in the study area following the disposal event were mixed with no strong current magnitude or dominant direction. In these conditions, the disposal plume quickly dissipated and became difficult to discern from background conditions north or south of the disposal location. Turbidity measurements performed within the area where the plume had been originally identified were less than 5 NTU a short time after the disposal event. Turbidity levels continued to diminish over the cell, and at 90 minutes following the disposal event, turbidity ranged from 3 NTU to 12 NTU (near bottom) directly over the cell.

As the tide began to ebb, multiple transects were performed across and along the channel, and no elevated backscatter or turbidity plumes were detected beyond approximately 500 feet down current of the disposal cell. No measurements above background conditions (4 NTU) were observed along the 1500-foot down current compliance transect for metals. Since no discernable turbidity plume was observed along the down current compliance transect, 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 5-1).

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 5-2. TSS levels at the 1500 foot down current location were lower than at the reference location at all depths. The highest reported TSS (78 mg/L) was collected from the bottom water 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 0.65 to 1.6 ug/L. The highest copper concentration was reported for the surface sample at the background location.

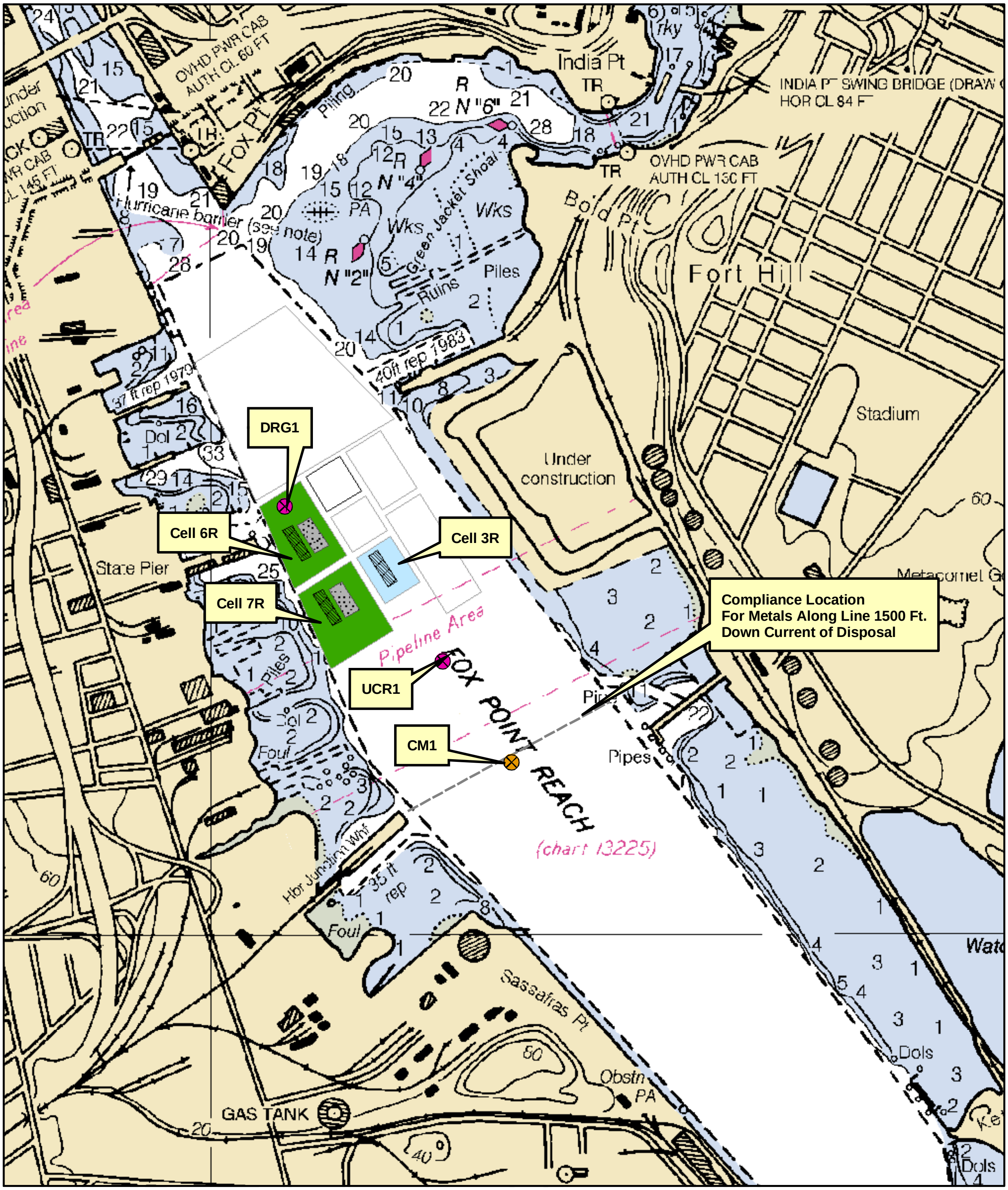
Table 5-1 Summary of Water Samples Collected During Monitoring Event #5 - 10 July 2003

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	*Northing*
UCR1	PR05 UCR-T	Upcurrent Reference	1740	4	TSS/Metals	357061	263175
	PR05 UCR-M		1740	23	TSS/Metals		
	PR05 UCR-B		1740	40	TSS/Metals		
CM1	PR05 CM-T	Compliance Point -Metals 1500-feet down current	2015	4	TSS/Metals	357567	262430
	PR05 CM-M		2015	23	TSS/Metals		
	PR05 CM-B		2015	42	TSS/Metals		
DRG1	PR05 DRG-T	Dredge Plume	1650	4	TSS/Metals	355899	264314
	PR05 DRG-M		1650	20	TSS/Metals		
	PR05 DRG-B		1650	39	TSS/Metals		

Table 5-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #5 - 10 July 2003.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0307039-04	PRO5-DRG-T	Surface	<0.5[a]	0.85	34
0307039-05	PRO5-DRG-M	Mid-depth	<0.5[a]	0.66	54
0307039-06	PR05-DRG-B	Bottom	<0.5[a]	1.0	78
0307039-07	PRO5-CM-T	Surface	<0.5[a]	1.2	28
0307039-08	PRO5-CM-M	Mid-depth	<0.5[a]	0.87	29
0307039-09	PRO5-CM-B	Bottom	<0.5[a]	0.65	31
0307039-01	PRO5-UCR-T	Surface	<0.5[a]	1.6	25
0307039-02	PRO5-UCR-M	Mid-depth	<0.5[a]	0.95	26
0307039-03	PRO5-UCR-B	Bottom	<0.5[a]	0.76	26

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows: Ag - 1.9 µg/L; Cu - 4.8 µg/L.



Legend

- Sampling Locations (Prior to disposal)
- Sampling Locations (Post disposal)
- CAD Cell 3R with Scow in Postion
- CAD Cells with Dredge and Scow in Position

N

0 1,000 2,000 Feet

NOAA Nautical Chart, 1997
CAD Cell Coordinates from USACE. 2002

Figure 5-1

CAD Cell and Sampling Locations

High Tide Disposal Cell 3R

Prepared by msg
16 July 2003
Project No: 10310-003

Woods Hole Group
ENVIRONMENTAL, INC. WBE
ENSR INTERNATIONAL

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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.

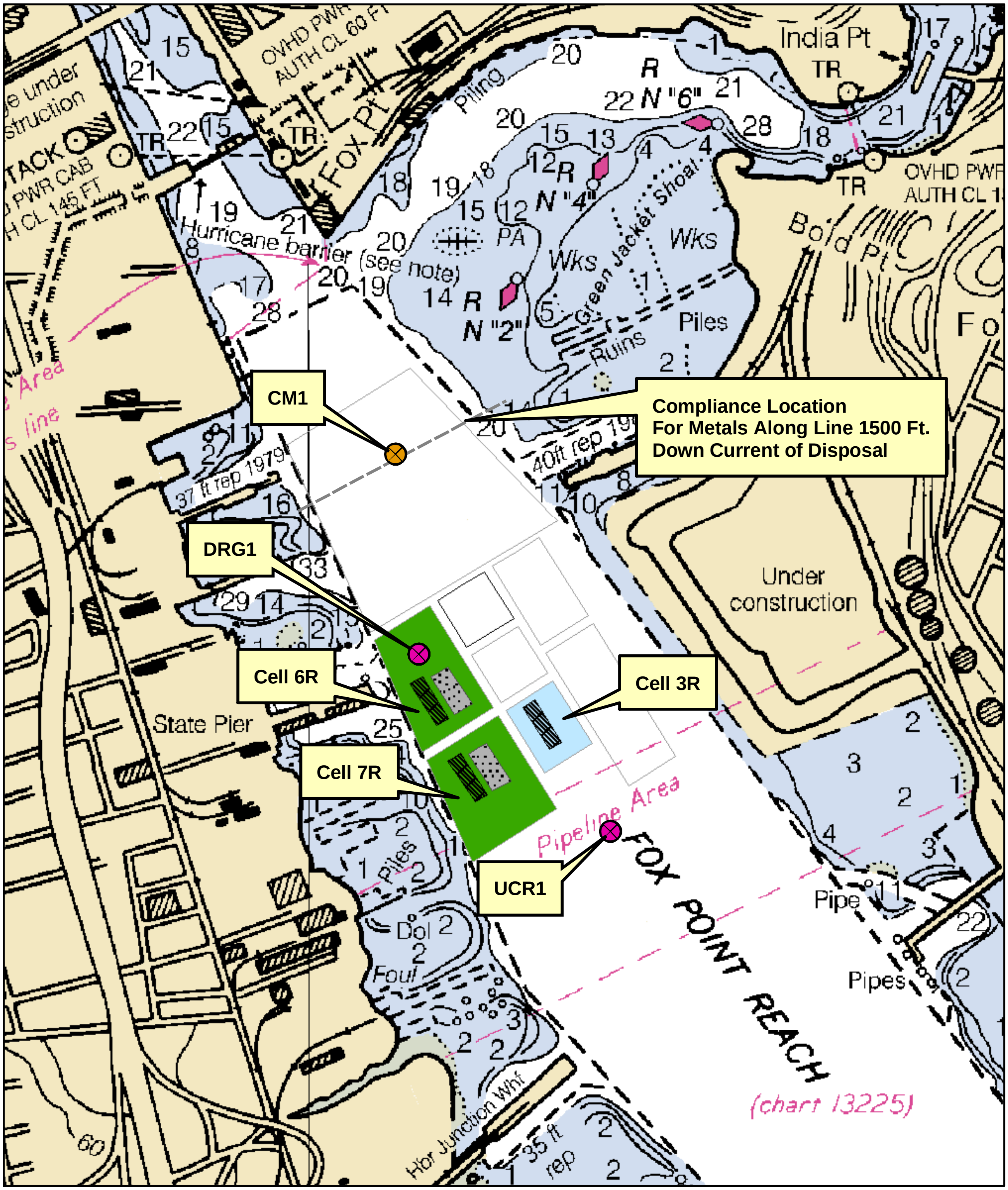
Table 6-1 Summary of Water Samples Collected During Disposal Monitoring Event #6 - 11 July 2003

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	***Northing***
UCR1	PR06 UCR-T	Upcurrent Reference	1115	4	TSS/Metals	356986	263277
	PR06 UCR-M		1115	21	TSS/Metals		
	PR06 UCR-B		1115	37	TSS/Metals		
CM1	PR06 CM-T	Compliance Point - Metals 1500-feet down current	1330	4	TSS/Metals	355823	265324
	PR06 CM-M		1330	22	TSS/Metals		
	PR06 CM-B		1330	40	TSS/Metals		
DRG1	PR06 DRG-T	Dredge Plume	1110	4	TSS/Metals	355949	264240
	PR06 DRG-M		1110	21	TSS/Metals		
	PR06 DRG-B		1110	38	TSS/Metals		

Table 6-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #6 - 11 July 2003.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0307042-04	PRO6-DRG-T	Surface	<0.5[a]	1.6	22
0307042-05	PRO6-DRG-M	Mid-depth	<0.5[a]	0.53	38
0307042-06	PR06-DRG-B	Bottom	<0.5[a]	0.50	40
0307042-07	PRO6-CM-T	Surface	<0.5[a]	1.1	25
0307042-08	PRO6-CM-M	Mid-depth	<0.5[a]	0.48	32
0307042-09	PRO6-CM-B	Bottom	<0.5[a]	0.63	24
0307042-01	PRO6-UCR-T	Surface	<0.5[a]	1.1	23
0307042-02	PRO6-UCR-M	Mid-depth	<0.5[a]	0.78	25
0307042-03	PRO6-UCR-B	Bottom	<0.5[a]	0.55	22

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows: Ag - 1.9 µg/L; Cu - 4.8 µg/L.



Legend

- Sampling Locations (Prior to disposal)
- Sampling Locations (Post disposal)
- CAD Cell 3R with Scow in Postion
- CAD Cells with Dredge and Scow in Position

N

0 500 1,000 1,500 Feet

NOAA Nautical Chart, 1997
CAD Cell Coordinates
from USACE. 2002

Figure 6-1

CAD Cell and Sampling Locations

Low Tide Disposal Cell 3R

Prepared by msg
16 July 2003
Project No: 10310-003

Woods Hole Group   RENVIRONMENTAL, INC. WBE   ENSR INTERNATIONAL

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Data Submittal for Water Quality Monitoring Event #7 on 11 July 2003
Providence River and Harbor Maintenance Dredging Project

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

Applicable Water Quality Certification Conditions:
- 26c – dissolved metals and TSS for a high tide disposal within the first 100 disposal events

Associated Files:
- Prov_R_7_summary – Microsoft Word document containing this summary
- Prov_R_7_tables – Microsoft Word document containing station and sample ID information (Table 7-1), and analytical results (Table 7-2)
- Prov_R_7_figure – pdf document showing the sampling locations (Figure 7-1)

Criteria Exceedences: None

Summary:
The seventh monitored disposal event took place on 11 July, at approximately the time of predicted high tide for Providence (5.9 feet at 1856). Dredged material taken from the top of cell 7R was released into cell 3R (see Figure 7-1) during a spring high 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 7-1). 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 after the disposal event, ambient currents in the study area were small in magnitude and mixed in direction. As a result, there was no significant ambient current. This is important because the transport of the disposed dredged material is dependent on ambient current conditions.

Pre-disposal monitoring was performed at the end of the flood tide under the slack water current conditions described above. A reference sample was collected south of the dredging and disposal locations prior to disposal (UCR1 on Figure 7-1 and Table 7-1). Turbidity values ranged from 2 NTU to 4 NTU through the water column. Salinity ranged from approximately 20 PSU at the surface to 28 PSU near the bottom. Water samples were collected from within the identified dredging turbidity plume approximately 200 feet away from Dredge 55, prior to the disposal event (DRG1 on Figure 7-1).

The disposal event occurred at 1848, 6 minutes before the predicted high tide (1856), 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 surveys, some discoloration and small patches of oil sheen were noted at the surface immediately following the disposal. ADCP measurements collected over cell 3R following the disposal event and relocation of the scow identified a plume within and above the cell and for a distance of 500 feet north of the cell. Specifically, 20 minutes after the disposal event, turbidity measurements collected within the cell ranged from 3 NTU to 40 NTU and turbidity measurements collected 500 feet north of the cell ranged from 6 NTU to 11 NTU. No plume was measured to the south of the disposal cell (maximum turbidity of 4 NTU was observed to the south).

One hour after the disposal event, no significant current was observed indicating that slack tide conditions persisted longer than expected. The plume was contained between the cell and 500 feet north of the cell. The maximum turbidity measurement collected outside of the cell was 7 NTU just north of the cell. Slack water conditions continued until approximately 1.5 hours after low water slack, when a small southerly (ebbing) current was established. By this time, the disposal plume appeared to be limited in extent to the cell area and limited in magnitude to less than 10 NTU.

Since no discernable turbidity plume was observed along the down current compliance transect, 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 7-1). Turbidity measurements at the 1500-foot down current compliance transect for metals were 3 NTU throughout the water column at the time of sampling.

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 7-2. TSS levels at the 1500-foot down current location were lower than at the reference location for all depths. The highest reported TSS (36 mg/L) was collected from the mid-depth location 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 0.64 to 2.0 ug/L. Highest copper concentrations were reported for the surface samples at all three locations.

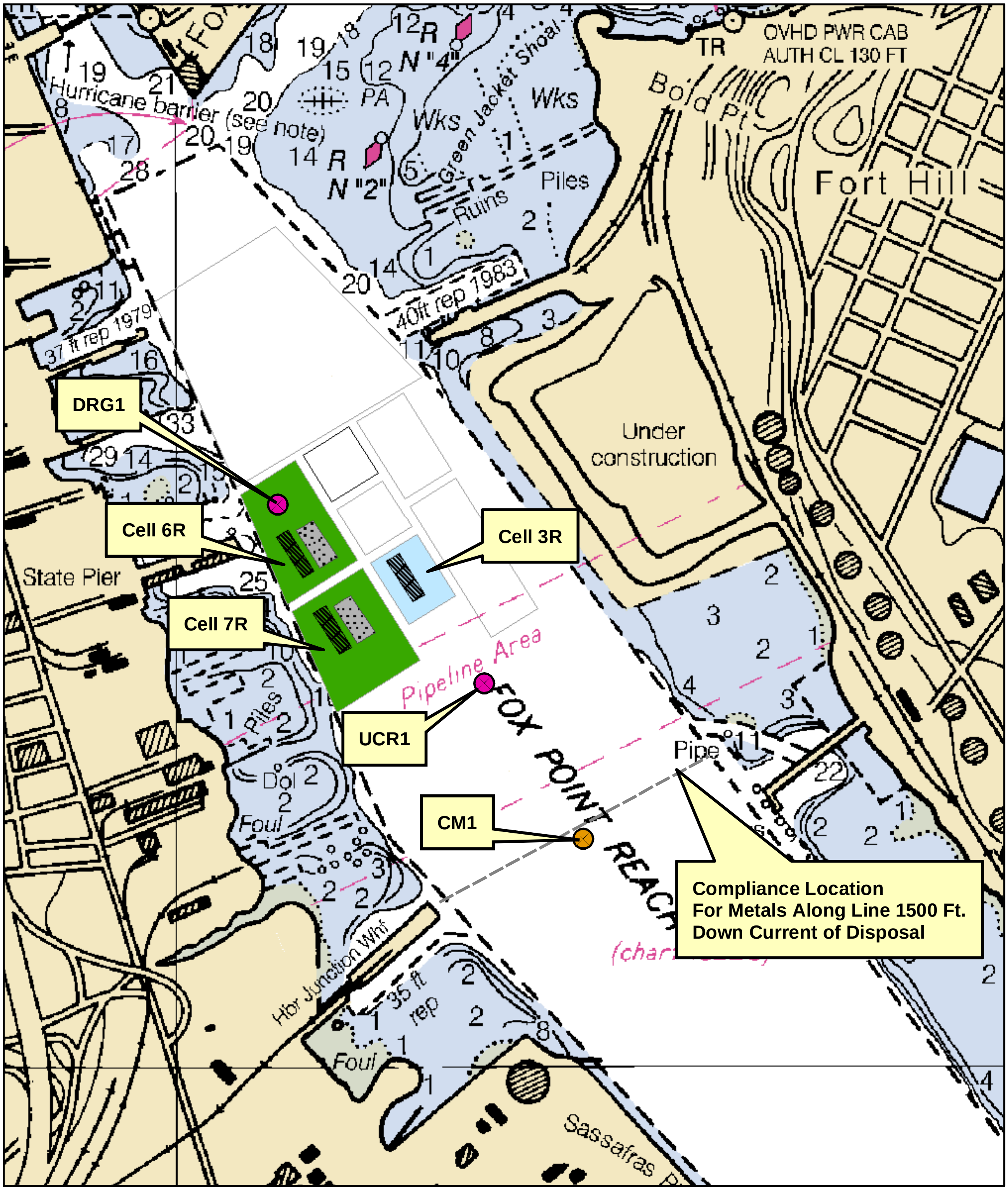
Table 7-1 Summary of Water Samples Collected r Disposal Monitoring Event #7 - 11 July 2003

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	***Northing***
UCR1	PR14 UCR-T	Upcurrent Reference	1807	4	TSS/Metals	357048	263273
	PR14 UCR-M		1807	22	TSS/Metals		
	PR14 UCR-B		1807	42	TSS/Metals		
CM1	PR14 CM-T	Compliance Point - Metals 1500-feet down current	2045	4	TSS/Metals	357594	262420
	PR14 CM-M		2045	22	TSS/Metals		
	PR14 CM-B		2045	32	TSS/Metals		
DRG1	PR14 DRG-T	Dredge Plume	1742	4	TSS/Metals	355914	264256
	PR14 DRG-M		1742	23	TSS/Metals		
	PR14 DRG-B		1742	42	TSS/Metals		

Table 7-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #7 - 11 July 2003.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0307043-04	PRO14-DRG-T	Surface	<0.5 [a]	1.3	35
0307043-05	PRO14-DRG-M	Mid-depth	<0.5 [a]	0.64	36
0307043-06	PR014-DRG-B	Bottom	<0.5 [a]	0.66	31
0307043-07	PRO14-CM-T	Surface	<0.5 [a]	2.0	14
0307043-08	PRO14-CM-M	Mid-depth	<0.5 [a]	0.90	19
0307043-09	PRO14-CM-B	Bottom	<0.5 [a]	0.68	24
0307043-01	PRO14-UCR-T	Surface	<0.5 [a]	1.4	18
0307043-02	PRO14-UCR-M	Mid-depth	<0.5 [a]	0.90	22
0307043-03	PRO14-UCR-B	Bottom	<0.5 [a]	0.68	25

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows:
Ag - 1.9 µg/L; Cu - 4.8 µg/L.



Legend

- Sampling Locations (Prior to disposal)
- Sampling Locations (Post disposal)
- CAD Cell 3R with Scow in Postion
- CAD Cells with Dredge and Scow in Position

0 500 1,000 1,500 Feet

N

NOAA Nautical Chart, 1997
CAD Cell Coordinates
from USACE. 2002

Figure 7-1

CAD Cell and Sampling Locations

High Tide Disposal Cell 3R

Prepared by msg
16 July 2003
Project No: 10310-003

Woods Hole Group
CR ENVIRONMENTAL, INC. WBE
ENSR INTERNATIONAL

Data Submittal for Water Quality Monitoring Event #8 on 14 July 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: CAD Cell 3R – spring low tide disposal on 14 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_8_summary – Microsoft Word document containing this summary
- Prov_R_8_tables – Microsoft Word document containing station and sample ID information (Table 8-1), and analytical results (Table 8-2)
- Prov_R_8_figure – pdf document showing the sampling locations (Figure 8-1)

Criteria Exceedences: None

Summary:
The eighth monitored disposal event took place at 1449 on 14 July, at approximately the time of predicted low tide for Providence (-0.2 feet at 1431). Dredged material removed from the top of cell 7R was released into cell 3R (see Figure 8-1) 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 8-1). 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.

Pre-disposal monitoring was performed late in the ebb tide cycle. Water samples were collected from within the identified dredging turbidity plume approximately 300 feet down current from Dredge 51, during ebb tide prior to the disposal event (DRG1 on Figure 8-1). Continued monitoring revealed an initiation of flood tide conditions (flow with a northward component) earlier than predicted. As a result, the reference sample was collected up current (south) of the dredging and disposal locations prior to disposal (UCR1 on Figure 8-1 and Table 8-1). Turbidity values ranged from approximately 3 NTU to 6 NTU through the water column. Salinity ranged from approximately 19 PSU at the surface to 28 PSU near the bottom. Given this current pattern, reference measurements could potentially have been influenced by dredging activities. However, given the location of the dredging relative to the sample location (Figure 8-1), potential influence was expected to be limited.

The disposal event occurred at 1449, 18 minutes after the predicted low tide (1431), 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 identified an area of elevated backscatter within and above the cell and for a distance of approximately 300 feet north of the cell.

Approximately 15 minutes after the disposal event backscatter water quality measurements were performed directly within the disposal plume over cell 3R (CELL on Figure 8-1 and Table 8-1). A maximum turbidity measurement of 48 NTU was collected at the bottom of the water column. Although not required by the water quality certification, samples were collected at this location for metals analysis and toxicity testing to further characterize potential impacts associated with disposal.

The relatively strong flood currents in the area resulted in transport of the disposal plume in a northerly direction. Within one-half hour, a plume was detected at approximately 500 feet north of cell 3R with maximum turbidity of 23 NTU. At this point in time, backscatter measurements performed over cell 3R revealed the disposal plume had dissipated in the area of the cell. Sixty minutes after of the disposal event, elevated backscatter measurements were noted extending from 300 feet to 1000 feet north of the cell 3R. A maximum turbidity value of 35 NTU was measured at 550 feet north of the cell near the bottom. Eighty minutes after the disposal event, elevated backscatter measurements identified a plume extending from 300 feet to 1200 feet from cell 3R. Dredging activities associated with Dredge 55 were ongoing adjacent to the disposal plume monitoring area (down current of cell 3R – see Figure 8-1) and likely contributed to the elevated backscatter and turbidity measurements.

Monitoring along the 1500 foot down current compliance transect revealed a low but measurable increase in turbidity over background (maximum value of 11.5 NTU). The timing and location of compliance sample collection (CM1 on Figure 8-1) were based on these observations and the calculated travel time from the disposal cell.

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 8-2. TSS levels at the 1500 foot down current location were slightly higher than TSS levels at the reference location for all depths. The highest reported TSS (110 mg/L) was collected from the bottom directly over the disposal cell (non-required sample). The highest TSS down current of the dredge (58 mg/L) was reported at the surface. 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 0.52 to 2.1 ug/L. Copper concentrations in the non-required samples collected directly within the plume over the disposal cell were slightly higher than reference concentration for the surface and mid depths, but lower than the reference concentration for the bottom depth. Results of the *Arbacia punctulata* fertilization and embryo survival tests for the non required sample (collected directly within the disposal plume over cell 3R) have not yet been finalized and will be presented in the full summary report.

Table 8-1 Summary of Water Samples Collected During Disposal Monitoring Event #8 - 14 July 2003

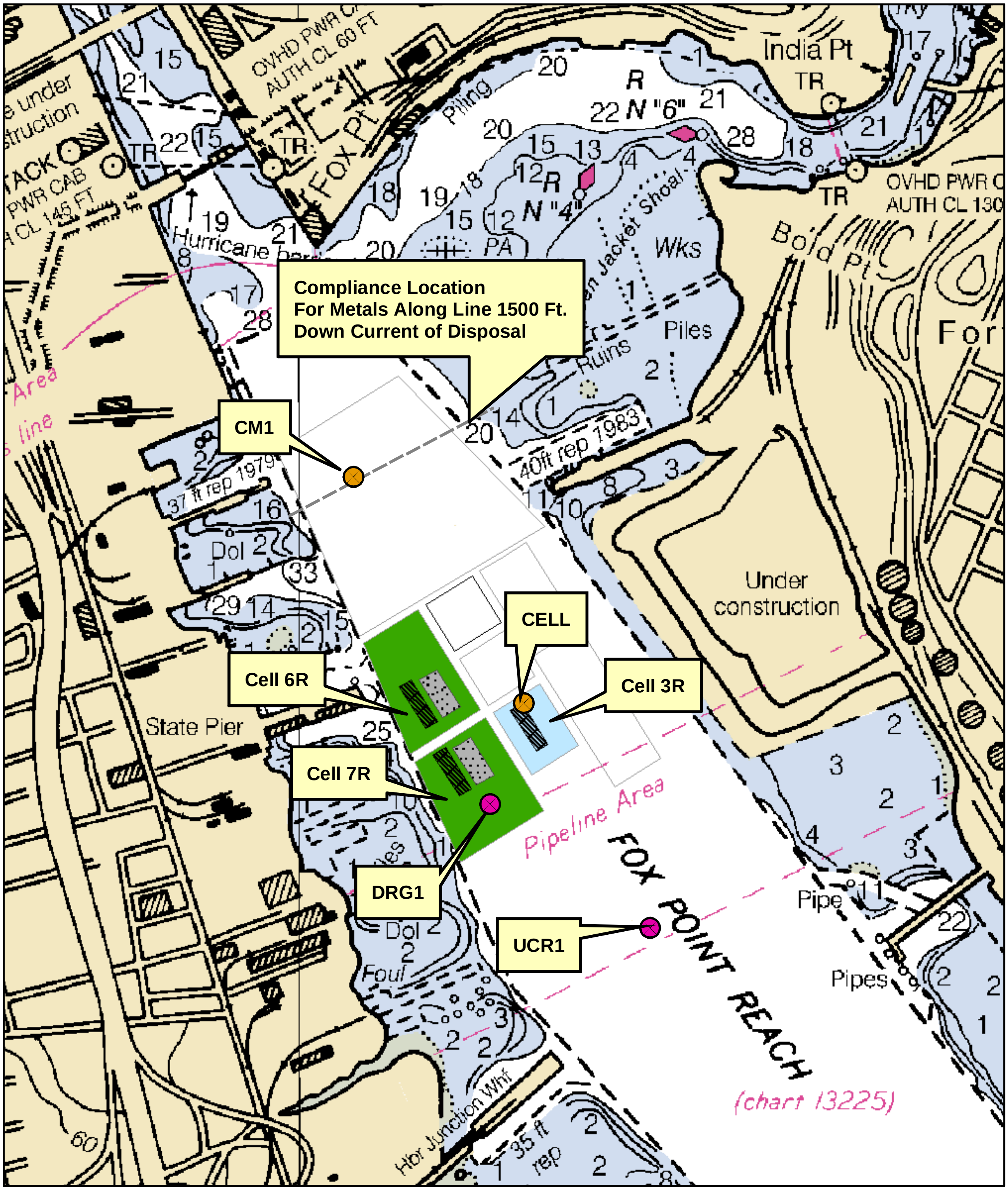
Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	***Northing***
UCR1	PR15 UCR-T	Upcurrent Reference	1416	4	TSS/Metals	357284	262750
	PR15 UCR-M		1416	21	TSS/Metals		
	PR15 UCR-B		1416	38	TSS/Metals		
CM1	PR15 CM-T	Compliance Point - Metals 1500-feet down current	1642	4	TSS/Metals	355655	265231
	PR15 CM-M		1642	21	TSS/Metals		
	PR15 CM-B		1642	39	TSS/Metals		
DRG1	PR15 DRG-T	Dredge Plume	1315	4	TSS/Metals	356405	263432
	PR15 DRG-M		1315	18	TSS/Metals		
	PR15 DRG-B		1315	32	TSS/Metals		
CELL	PR15 CELL-T*	Disposal Cell	1507	4	TSS/Metals	356405	263432
	PR15 CELL-M*		1507	18	TSS/Metals		
	PR15 CELL-B*		1507	34	TSS/Metals Composite Toxicity		

Notes: An asterisk (*) indicates an additional (non-required) sample collected and analyzed to provide further information on potential water quality impacts.

Table 8-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #8 - 14 July 2003.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0307047-01	PR15-UCR-T	Surface	<0.50[a]	1.3	18
0307047-02	PR15-UCR-M	Mid-depth	<0.50[a]	0.95	24
0307047-03	PR15-UCR-B	Bottom	<0.50[a]	0.62	20
0307047-04	PR15-DRG-T	Surface	<0.50[a]	0.83	58
0307047-05	PR15-DRG-M	Mid-depth	<0.50[a]	0.76	33
0307047-06	PR15-DRG-B	Bottom	<0.50[a]	0.53	41
0307047-07	PR15-CM-T	Surface	<0.50[a]	1.5	20
0307047-08	PR15-CM-M	Mid-depth	<0.50[a]	0.47	37
0307047-09	PR15-CM-B	Bottom	<0.50[a]	0.52	29
0307047-11	PR15-CELL-T	Surface	<0.50[a]	2.1	12
0307047-12	PR15-CELL-M	Mid-depth	<0.50[a]	1.6	110
0307047-13	PR15-CELL-B	Bottom	<0.50[a]	0.47	110

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows:
Ag - 1.9 µg/L; Cu - 4.8 µg/



Legend

- Sampling Locations (Prior to disposal)
- Sampling Locations (Post disposal)
- CAD Cell 3R with Scow in Postion
- CAD Cells with Dredge and Scow in Position

N

0 500 1,000 1,500 Feet

NOAA Nautical Chart, 1997
CAD Cell Coordinates
from USACE. 2002

Figure 8-1

CAD Cell and Sampling Locations

Low Tide Disposal Cell 3R

Prepared by msg
16 July 2003
Project No: 10310-003

Woods Hole Group
R ENVIRONMENTAL, INC. WBE
ENSR INTERNATIONAL

Data Submittal for Water Quality Monitoring Event #9 on 21 July 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: CAD Cell 4R – high tide disposal on 21 July

Applicable Water Quality Certification Conditions:
- 26c – dissolved metals and TSS for a high tide disposal within the first 100 disposal events

Associated Files:
- Prov_R_9_summary – Microsoft Word document containing this summary
- Prov_R_9_tables – Microsoft Word document containing station and sample ID information (Table 9-1), and analytical results (Table 9-2)
- Prov_R_9_figure – pdf document showing the sampling locations (Figure 9-1)

Criteria Exceedences: None

Summary:
The ninth monitored disposal event took place on 21 July, at approximately the time of predicted high tide for Providence (4.3 feet at 1446). Dredged material taken from the top of cell 7R was released into cell 4R (see Figure 9-1) during a high water slack tide. At the time of the disposal event, two dredges were working in the area (see Figure 9-1). 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 4R.

Ambient currents one-hour prior to the disposal event were small in magnitude and towards the north, indicating that the end of the flood tide was still ongoing. At the time of the disposal event, ambient currents were small in magnitude and mixed in direction, but had a net flow to the south, indicating that ebb tide was beginning.

Pre-disposal monitoring was performed at the end of the flood tide under the slack water current conditions described above. A reference sample was collected south of the dredging and disposal locations prior to disposal (UCR1 on Figure 9-1 and Table 9-1). Turbidity values ranged from 3 NTU to 5 NTU through the water column. Salinity ranged from approximately 21 PSU at the surface to 28 PSU near the bottom. Water samples were collected from within the identified dredging turbidity plume approximately 200 feet away from Dredge 51, prior to the disposal event (DRG1 on Figure 9-1).

The disposal event occurred at 1500, 14 minutes after the predicted high tide (1446), 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 surveys, some discoloration and small patches of oil sheen were noted at the surface immediately following the disposal. The ADCP data collection system experienced technical difficulties for a period of time immediately following the disposal event. Field data collection activities were adjusted accordingly using intensive water quality profiling, featuring turbidity measurement, as the primary method for plume tracking.

Measurements collected immediately following the disposal event and relocation of the scow identified a plume limited to within and above cell 4R. Specifically, 30 minutes after the disposal event, turbidity measurements collected directly over the cell ranged from 3 NTU to 80 NTU and turbidity measurements collected outside of the boundaries of the cell ranged from 3 NTU to 7 NTU.

One hour after the disposal event, the disposal plume extended from the cell to approximately 500 feet down current (south) of the cell. The maximum turbidity value measured outside of the cell was 9 NTU at a distance of 250 feet down current of the cell. Within the cell, the maximum turbidity measurement was 20 NTU. No measurements above 10 NTU were obtained outside of the cell area throughout the survey and no discernable plume was tracked beyond 500 feet down current (south) of the cell.

The timing and location of compliance sample collection along the 1500-foot down current transect were based on measured current velocities and the calculated travel time and direction from the disposal cell (CM1 on Figure 9-1). Turbidity measurements at the 1500-foot down current compliance transect for metals ranged from 4 NTU to 7 NTU throughout the water column at the time of sampling. The location of sampling along the compliance transect was selected based on maximum acoustic backscatter measured by the ADCP. This location was directly down current of the Dredge 51 (Figure 9-1) and was likely impacted by the dredging operations and not the disposal.

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 9-2. TSS levels were moderately elevated relative to background at the two down current stations, particularly 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 0.35 to 1.7 ug/L. Highest copper concentrations were reported for the surface samples at all three locations.

Table 9-1 Summary of Water Samples Collected for Disposal Monitoring Event #9 - 21 July 2003

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	***Northing***
UCR1	PR09 UCR-T	Upcurrent Reference	1410	4	TSS/Metals	357516	263127
	PR09 UCR-M		1410	20	TSS/Metals		
	PR09 UCR-B		1410	36	TSS/Metals		
CM1	PR09 CM-T	Compliance Point - Metals 1500-feet down current	1426	4	TSS/Metals	356893	262716
	PR09 CM-M		1426	20	TSS/Metals		
	PR09 CM-B		1426	37	TSS/Metals		
DRG1	PR09 DRG-T	Dredge Plume	1710	4	TSS/Metals	356405	263571
	PR09 DRG-M		1710	22	TSS/Metals		
	PR09 DRG-B		1710	39	TSS/Metals		

Table 9-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #9 - 21 July 2003.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0307084-01	PRO9-UCR-T	Surface	<0.50[a]	1.6	35
0307084-02	PRO9-UCR-M	Mid-depth	<0.50[a]	0.71	20
0307084-03	PRO9-UCR-B	Bottom	<0.50[a]	0.81	17
0307084-04	PRO9-DRG-T	Surface	<0.50[a]	1.7	74
0307084-05	PRO9-DRG-M	Mid-depth	<0.50[a]	0.54	58
0307084-06	PRO9-DRG-B	Bottom	<0.50[a]	0.35	68
0307084-07	PRO9-CM-T	Surface	<0.50[a]	1.6	46
0307084-08	PRO9-CM-M	Mid-depth	<0.50[a]	1.0	32
0307084-09	PRO9-CM-B	Bottom	<0.50[a]	0.58	75

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows: Ag - 1.9 µg/L; Cu - 4.8 µg/L.

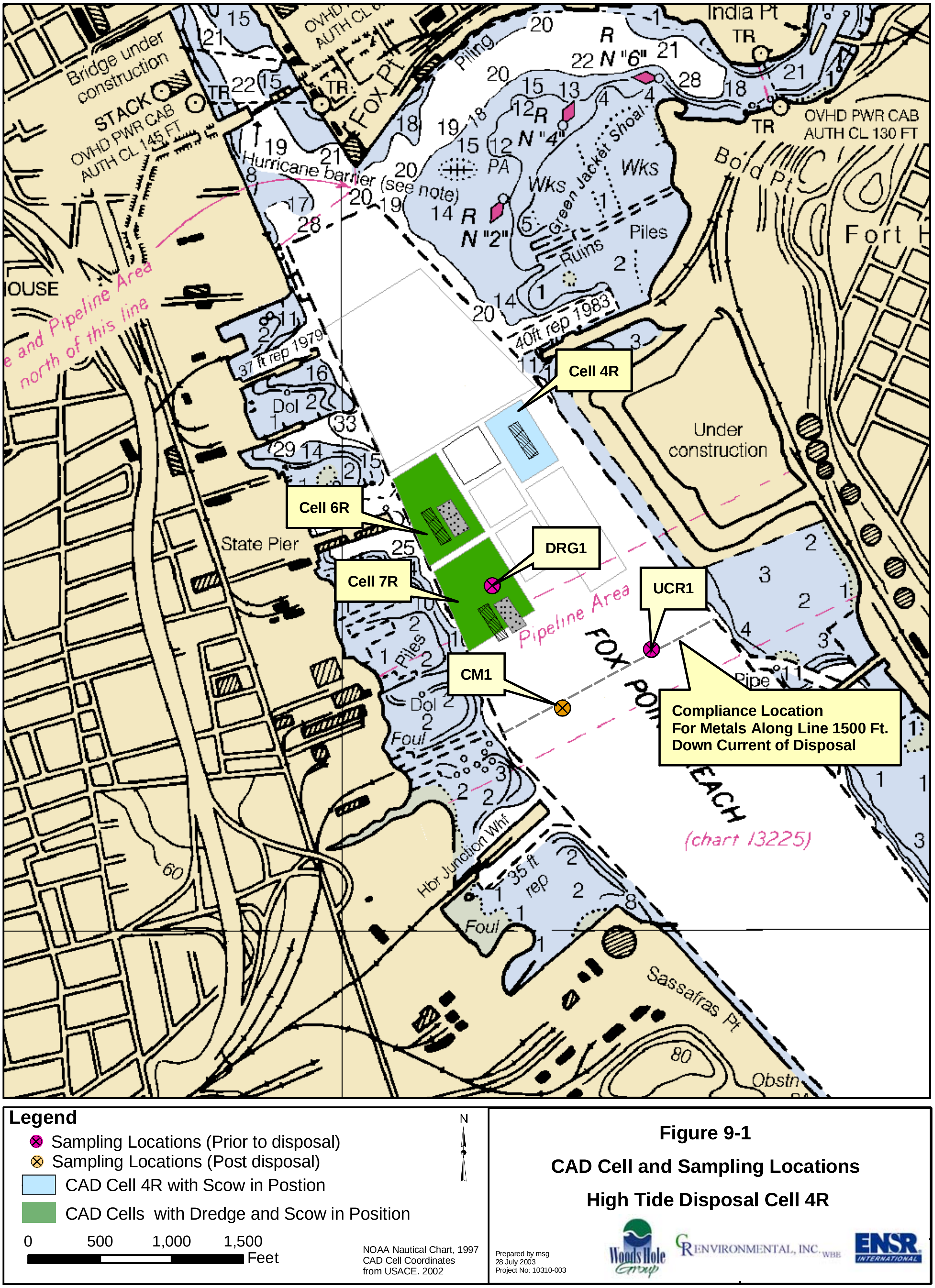


Figure 9-1

CAD Cell and Sampling Locations

High Tide Disposal Cell 4R

Prepared by msg
28 July 2003
Project No: 10310-003

Woods Hole Group · RENVIRONMENTAL, INC. WBE · ENSR INTERNATIONAL

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Data Submittal for Water Quality Monitoring Event #10 on 9 June 2004
Providence River and Harbor Maintenance Dredging Project

Event Monitored: CAD Cell 3AR – low tide disposal on 9 June

Applicable Water Quality Certification Conditions:

- 26d – dissolved metals and TSS for a low tide disposal (originally scheduled to occur within the first 100 disposals)

Associated Files:

- Prov_R_10_summary – Microsoft Word document containing this summary
- Prov_R_10_tables – Microsoft Word document containing station and sample ID information (Table 10-1), and analytical results (Table 10-2)
- Prov_R_10_figure – pdf document showing the sampling locations (Figure 10-1)

Criteria Exceedences: None

Summary:

The tenth monitored disposal event took place on 9 June, at approximately the time of predicted low tide for Providence (+0.4 feet at 0758). Maintenance material dredged from the west side of the Providence River Channel in the southern portion of the Fox Point Reach, approximately 1 mile downstream of cell 3AR, was released into cell 3AR (see Figure 10-1) during a low water slack tide. The dredge continued to remove unsuitable maintenance material during the monitoring period in the southern portion of the Fox Point Reach.

Ambient currents approximately one-hour prior to the disposal event were small and towards the south, indicating that ebb tide was still ongoing. At the time of the disposal event (0809), ambient currents were small in magnitude and mixed in direction, but had a net flow to the north, indicating that flood tide was beginning. A second disposal event occurred approximately 1 hour later near the same location over cell 3AR. At the time of the second disposal event (0905), ambient currents indicated that the flood tide was well underway. Monitoring and sampling focused on following transport of the first disposal plume to the north with the flood tide, but tracking of the second disposal plume was also performed.

Pre-disposal monitoring was performed near the end of the ebb tide under the slack water current conditions described above. A reference sample was collected north of the dredging and disposal locations, within the perimeter of cell 3AR, prior to disposal (UCR1 on Figure 10-1 and Table 10-1). Turbidity values ranged from 2 NTU to 11 NTU in the waters above the cell. Salinity ranged from approximately 16 PSU at the surface to 27 PSU near the bottom. As part of the monitoring event, water samples were also collected from within the identified dredging turbidity plume approximately 200 feet down current from Dredge 54 (DRG1 on Figure 10-1).

The first disposal event occurred at 0809 shortly after the predicted low tide (0758). Scow 65 released approximately 3,300 cy of material into the southwestern portion of the cell (Figure 10-1). This was the 26th disposal event into cell 3AR and the 184th overall disposal event into the CAD cells. A second disposal event occurred close to the same location in the cell at 0905 (Scow 402 with approximately 2,800 cy). After each disposal event, the scows were slowly maneuvered to the south of the disposal cell and back into position with Dredge 54, further south on the Fox Point Reach. Similar to previous surveys, some discoloration and small patches of oil sheen were noted at the surface immediately following the disposal. A limited amount of floating debris (generally small plastic items) was also noted. The material appeared to have been buried within the dredged sediments.

Measurements performed following the first disposal event and relocation of the scow identified a plume limited to within and above cell 3AR, with turbidity values 10 to 15 NTU above background. The plume appeared to arc to the north, following the main body of tidal flux into the Seekonk River. Turbidity values and plume track were similar following the second disposal event. The plume dissipated as it moved down current (northward), and only a slight elevation of turbidity (~2 NTU) was noted at the down current boundary of the disposal cell. The plume was not discernable at the 1500-foot down current compliance transect.

The timing and location of compliance sample collection along the 1500-foot down current transect were based on measured current velocities and the calculated travel time and direction from the disposal location (CM1 on Figure 10-1). Turbidity measurements at the 1500-foot down current compliance transect ranged from 2 NTU to 4 NTU throughout the water column at the time of sampling.

Dredge 54 continued working in the southern portion of the Fox Point Reach well outside of the area of influence to the monitoring.

Results of the analysis of TSS and dissolved metals are presented in Table 10-2. TSS concentrations ranged from 20 to 30 NTU at the 1500-foot compliance location. Compared to the reference sample, TSS levels at the 1500-foot down current compliance location were lower at the surface, slightly higher at mid depth, and similar near the bottom. The highest reported TSS (190 mg/L) was collected from the near-bottom location 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 ranged from 1.5 to 8.2 ug/L. Lowest concentrations were consistently found in the samples from the mid water column. One sample (8.2 ug/L) was above the acute water quality criterion for copper of 4.8 ug/L, but this sample was collected prior to the monitored disposal event at the reference station located over the central portion of cell 3AR (UCR1 in Figure 10-1).

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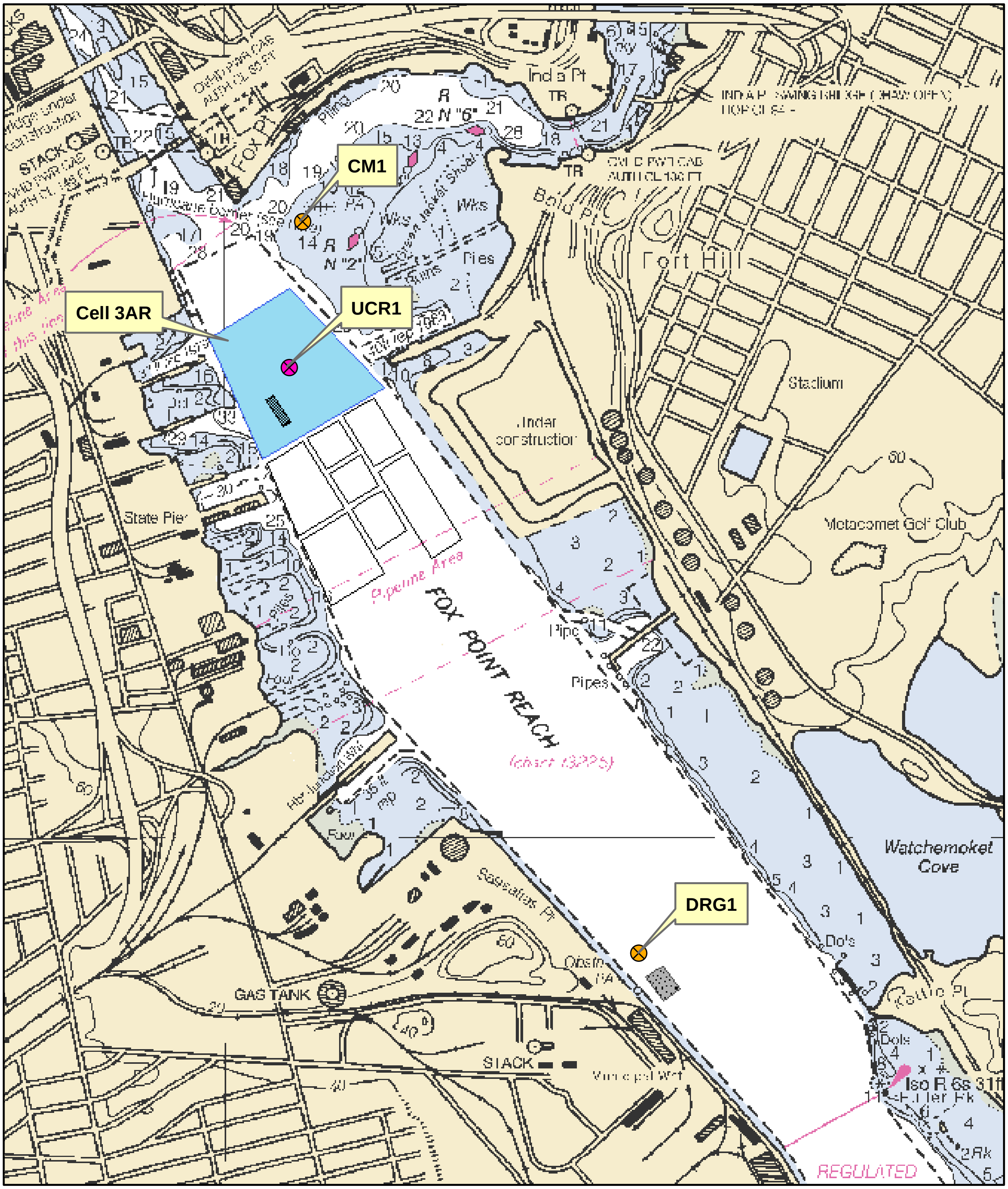

Legend

Sampling Locations

Prior to disposal

Post disposal

Dredge

Scow

CAD Cell 3AR with disposal scow in position

0 500 1,000 1,500 Feet

N

NOAA Nautical Chart, 1997
CAD Cell Coordinates from USACE. 2002

Figure 10-1
CAD Cell and Sampling Locations
Low Tide Disposal Cell 3AR
9 June 2004 - Low Tide Event

Prepared by sjk
June 2004
Project No: 10310-007

Woods Hole Group
ENVIRONMENTAL, INC.
ENSR INTERNATIONAL

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Table 10-1 Summary of Water Samples Collected for Disposal Monitoring Event #10 - 9 June 2004

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	***Northing***
UCR1	PR0401 UCR-T	Up-current Reference	0749	3	TSS/Metals	355897	265125
	PR0401 UCR-M		0747	23	TSS/Metals		
	PR0401 UCR-B		0745	35	TSS/Metals		
CM1	PR0401 CM-T	Compliance Point - Metals 1500-feet down current	1034	3	TSS/Metals	356011	266354
	PR0401 CM-M		1032	8	TSS/Metals		
	PR0401 CM-B		1030	12	TSS/Metals		
DRG1	PR0401 DRG-T	Dredge Plume	1106	3	TSS/Metals	358838	260192
	PR0401 DRG-M		1104	20	TSS/Metals		
	PR0401 DRG-B		1102	38	TSS/Metals		

Table 10-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #10 - 9 June 2004.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (µg/L)	Dissolved Cu (µg/L)	TSS (mg/L)
0406047-10	PRO401-DRG1-T	Surface	<0.50[a]	3.2	30
0406047-09	PRO401-DRG1-M	Mid-depth	<0.50[a]	1.5	140
0406047-08	PR0401-DRG1-B	Bottom	<0.50[a]	2.6	190
0406047-07	PRO401-CM1-T	Surface	<0.50[a]	3.0	30
0406047-06	PRO401-CM1-M	Mid-depth	<0.50[a]	2.2	23
0406047-05	PRO401-CM1-B	Bottom	<0.50[a]	4.4	20
0406047-03	PRO401-UCR1-T	Surface	<0.50[a]	3.4	55
0406047-02	PRO401-UCR1-M	Mid-depth	<0.50[a]	1.7	18
0406047-01	PRO401-UCR1-B	Bottom	<0.50[a]	8.2	19

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 µg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows: Ag - 1.9 µg/L; Cu - 4.8 µg/L.

Data Submittal for Water Quality Monitoring Event #11 on 9 June 2004
Providence River and Harbor Maintenance Dredging Project

Event Monitored: CAD Cell 3AR – high tide disposal on 9 June

Applicable Water Quality Certification Conditions:

- 26f – dissolved metals and TSS for a high tide disposal within the northern limits of the northernmost cell.

Associated Files:

- Prov_R_11_summary – Microsoft Word document containing this summary
- Prov_R_11_tables – Microsoft Word document containing station and sample ID information (Table 11-1), and analytical results (Table 11-2)
- Prov_R_11_figure – pdf document showing the sampling locations (Figure 11-1)

Criteria Exceedences: None

Summary:

The eleventh monitored disposal event took place on 9 June, soon after the time of predicted high tide for Providence (+4.9 feet at 1421). Maintenance material dredged from the west side of the Providence River Channel in the southern portion of the Fox Point Reach, approximately 1 mile downstream of cell 3AR, was released into cell 3AR (see Figure 11-1) following high water slack tide. The dredge continued to remove unsuitable maintenance material during the monitoring period in the southern portion of the Fox Point Reach.

Ambient currents approximately one-hour prior to the disposal event were small and towards the north, indicating that flood tide was still ongoing. At the time of the disposal event, ambient currents were small in magnitude and had shifted to the south, indicating that ebb tide was underway. Hence, monitoring focused on following transport of the disposal plume to the south with the ebb tide.

Pre-disposal monitoring was performed at the end of the flood tide under the slack water current conditions described above. A reference sample was collected north of cell 3AR prior to disposal (UCR1 on Figure 11-1 and Table 11-1). Turbidity values ranged from 2 NTU to 3 NTU throughout the water column. Salinity ranged from approximately 20 PSU at the surface to 29 PSU near the bottom. As part of the monitoring event, water samples were also collected from within the identified dredging turbidity plume approximately 400 feet down current from Dredge 54 (DRG1 on Figure 11-1).

The disposal event was delayed slightly because of the passage of a ship which was guided into the harbor by two tugboats and docked to the west of cell 3AR. The disposal occurred at 1505, 44 minutes after the predicted high tide (1421). Scow 402 released approximately 2,600 cy into the northeastern portion of the cell (Figure 11-1). This was the 28th disposal event into cell 3AR and the 186th overall disposal event into the CAD cells. Similar to the disposal monitoring event #10 performed earlier in the day, some discoloration and small patches of oil sheen and limited debris were noted at the surface immediately following the disposal.

Measurements performed following the disposal event and relocation of the scow identified a plume limited to within and above cell 3AR. The plume was tracked moving to the southeast with the ebb tide, paralleling the channel boundaries. As it moved beyond the southern boundary of cell 3AR, turbidity levels within the plume had dropped to near-background levels. The plume was not discernable at the 1500-foot down current compliance transect.

The timing and location of compliance sample collection along the 1500-foot down current transect were based on measured current velocities and the calculated travel time and direction from the disposal location (CM1 on Figure 11-1). Turbidity measurements at the 1500-foot down current compliance transect ranged from 2 NTU to 6 NTU throughout the water column at the time of sampling.

Dredge 54 continued working in the southern portion of the Fox Point Reach well outside of the area of influence to the monitoring.

Results of the analysis of TSS and dissolved metals are presented in Table 11-2. TSS concentrations ranged from 20 to 25 NTU at the 1500-foot compliance location. Compared to the reference sample, TSS levels at the 1500-foot down current compliance location were higher at the surface and mid-depth and lower near the bottom. The highest reported TSS (440 mg/L) was collected from the near-bottom location 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 <1.0 to 3.0 ug/L. Lowest copper concentrations were consistently found in the samples from the mid water column.

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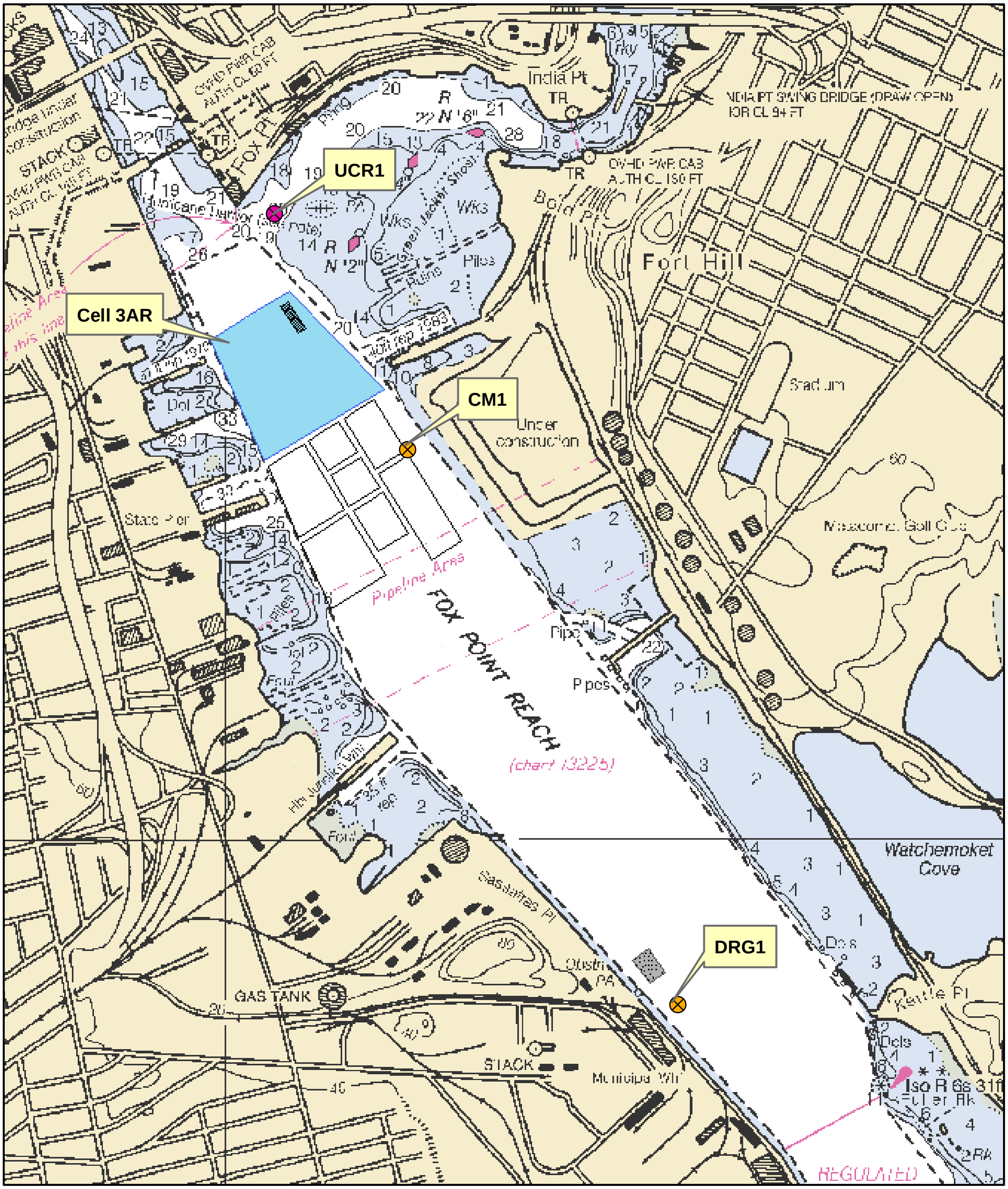

Legend

Sampling Locations

- Prior to disposal
- Post disposal

- Dredge
- Scow
- CAD Cell 3AR with disposal scow in position

0 500 1,000 1,500 Feet

N

NOAA Nautical Chart, 1997
CAD Cell Coordinates from USACE. 2002

Figure 11-1
CAD Cell and Sampling Locations
High Tide Disposal Cell 3AR
9 June 2004 - High Tide Event

Prepared by sjk
June 2004
Project No: 10310-007

Woods Hole Group

Environmental, Inc.

ENSR International

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Table 11-1 Summary of Water Samples Collected for Disposal Monitoring Event #11 - 9 June 2004

Station ID	Sample ID	Description	Time	Depth (feet)	Analyses	Station Location (NAD-83 RI State Plane - feet)	
						Easting	*Northing*
UCR1	PR0402 UCR-T	Up-current Reference	1355	2	TSS/Metals	355766	266436
	PR0402 UCR-M		1353	10	TSS/Metals		
	PR0402 UCR-B		1355	20	TSS/Metals		
CM1	PR0402 CM-T	Compliance Point - Metals 1500-feet down current	1606	2	TSS/Metals	356889	264450
	PR0402 CM-M		1603	19	TSS/Metals		
	PR0402 CM-B		1558	38	TSS/Metals		
DRG1	PR0402 DRG-T	Dredge Plume	1651	2	TSS/Metals	359161	259775
	PR0402 DRG-M		1649	20	TSS/Metals		
	PR0402 DRG-B		1647	40	TSS/Metals		

Table 11-2 Concentrations of Dissolved Copper, Silver and TSS in Samples Collected During Monitoring Event #11 - 9 June 2004.

Laboratory Sample ID	Sample Location ID	Position in Water Column	Analytical Results		
			Dissolved Ag (μg/L)	Dissolved Cu (μg/L)	TSS (mg/L)
0406048-10	PRO402-DRG1-T	Surface	<0.50[a]	2.2	17
0406048-09	PRO402-DRG1-M	Mid-depth	<0.50[a]	1.7	140
0406048-08	PR0402-DRG1-B	Bottom	<0.50[a]	3.0	440
0406048-07	PRO402-CM1-T	Surface	<0.50[a]	1.7	25
0406048-06	PRO402-CM1-M	Mid-depth	<0.50[a]	<1.0[b]	24
0406048-05	PRO402-CM1-B	Bottom	<0.50[a]	2.2	20
0406048-03	PRO402-UCR1-T	Surface	<0.50[a]	2.2	15
0406048-02	PRO402-UCR1-M	Mid-depth	<0.50[a]	1.4	18
0406048-01	PRO402-UCR1-B	Bottom	<0.50[a]	1.6	34

[a] Measured concentrations were less than the reporting limit for Dissolved Ag of 0.5 μg/L.
[b] Measured concentrations were less than the reporting limit for Dissolved Cu of 1.0 μg/L.
*Water Quality Standards for the State of Rhode Island for protecting marine organisms from acute toxicity are as follows:
Ag - 1.9 μg/L; Cu - 4.8 μg/L.

Data Submittal for Dissolved Oxygen Monitoring on 21 July 2003
Providence River and Harbor Maintenance Dredging Project

Event Monitored: CAD Cell 4R – neap high tide disposal on 21 July

Applicable Water Quality Certification Condition:

- 40 – dissolved oxygen monitoring during neap tide periods in June, July, August, September

Associated Files:

- Prov_R_DO_1-summary – Microsoft Word document containing this summary
- Prov_R_DO_figure1 – pdf document showing monitoring locations (8 ½ x 11)
- Prov_R_DO_figure2 – pdf document presenting monitoring data (11 x 17)

Criteria Exceedences: No criteria are specified in the Water Quality Certification for this monitoring. No issues of concern were identified during the monitoring.

Summary:

Condition 40 of the Water Quality Certification for the project specifies that monitoring of dissolved oxygen (as well as temperature and salinity) be performed following CAD cell disposal events during neap tide periods in June, July, August, and September (3 days each month). The dissolved oxygen monitoring was not performed during June, as disposal into CAD cells was not performed during the neap tide period for the month. During the neap tide period for July, disposal into a CAD cell was only performed over a one-day period (21 July). A full disposal monitoring event (#9) was performed on this day, and additional dissolved oxygen monitoring was performed as a part of the event. The results of the dissolved oxygen monitoring are summarized below, and the results of the associated disposal monitoring event #9 have been reported separately (submitted on 28 July).

Monitoring of dissolved oxygen was performed in conjunction with the high tide disposal event that took place on 21 July. High tide was predicted to occur at 1446, with a height of 4.3 feet and a range of 3.1 feet to the following low tide. The disposal event occurred at 1500. Maintenance material that was removed from the top of cell 7R by Dredge 51 (being unsuitable for open water disposal) was disposed into cell 4R (see Figure 1). Dredge 55 was also working in the area during the monitoring event, removing parent material from cell 6R.

Water quality monitoring was performed at six stations along a transect extending through cell 4R. One station was located up current of cell 4R, one was located directly over the cell, and four stations were located down current (see map inset of Figure 2 for locations). Measurement of dissolved oxygen, salinity, and temperature were performed over two time periods, one approximately 30 minutes following the disposal event and one approximately 1 hour following the disposal event.

A subset of the salinity and temperature measurements are presented in the two graphs in the upper portion of Figure 2. Salinity values displayed the characteristic increase with depth that has been observed in previous disposal monitoring events with values of approximately 20 PSU in the upper water column and an increase to approximately 28 PSU in the lower water column. Temperature displayed the inverse pattern with values of approximately 23°C in the upper water column decreasing to approximately 20°C near the bottom.

Profiles of dissolved oxygen concentration with depth are presented in the graphs in the lower portion of Figure 2. Measurements approximately 30 minutes following the disposal are depicted by the blue profiles. These measurements were performed at all stations except the furthest down current. The up current station (1) and station directly over the disposal cell (2) displayed surface concentrations of approximately 7 mg/L increasing to approximately 14 mg/L at mid depth, and decreasing again to approximately 5 mg/L near the bottom at station 1 and to 3 mg/L directly over the cell. The closest down current station (3) displayed a more uniform upper water column with concentrations of approximately 15 mg/L, decreasing to approximately 8 mg/L near the bottom. Moving down current, stations 4 and 5 displayed profiles that were progressively similar to the up current station (1) and station over the cell (2). At stations 4 and 5, the highest values were near the middle of the water column, decreasing to below 5 mg/L at depth at station 5.

Measurements performed approximately 1 hour following the disposal are depicted by the red profiles in the graphs in the lower portion of Figure 2 (note that the measurements at station 6 were performed approximately 2 hours following the disposal). All of these profiles displayed highest concentrations near the middle of the water column. These concentrations ranged from approximately 12 to 14 mg/L, with the highest values located at the further down current stations. Surface concentrations ranged from approximately 7 to 10 mg/L, with highest values located at the further down current. Near bottom concentrations ranged from approximately 7 to 10 mg/L with the lowest concentration directly over the cell and highest concentrations at the up current and 1500 foot down current stations.

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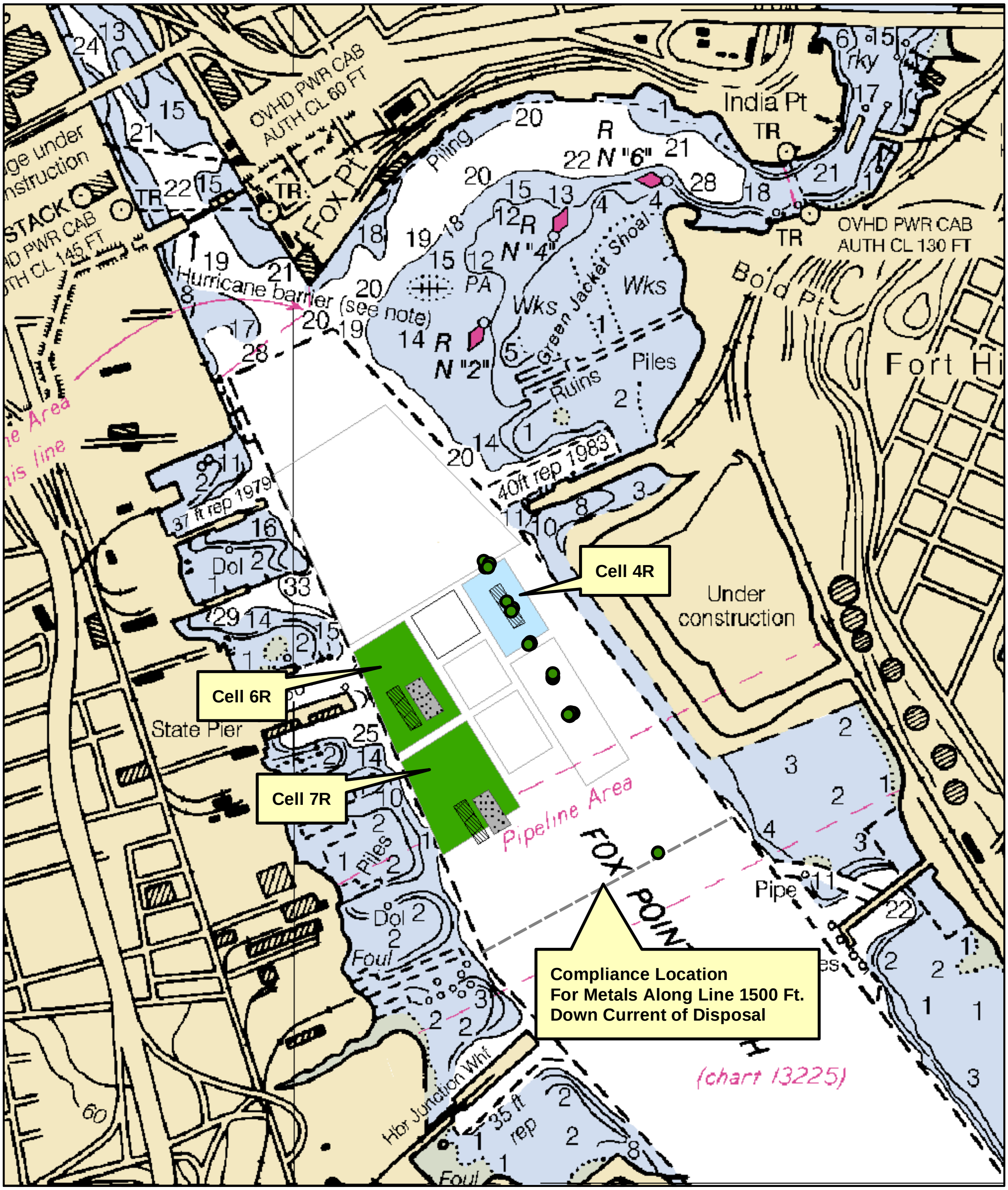
New England District

Dissolved Oxygen Monitoring July 2003
Providence River and Harbor Maintenance Dredging Project



Legend

- Water Quality Monitoring Locations
- CAD Cell 4R with Scow in Postion
- CAD Cells with Dredge and Scow in Position

0 500 1,000 1,500 Feet

N

NOAA Nautical Chart, 1997
CAD Cell Coordinates
from USACE. 2002

Figure 1

CAD Cell and DO Monitoring Locations

High Tide Disposal Cell 4R

Prepared by msg
28 July 2003
Project No: 10310-003

Woods Hole Group
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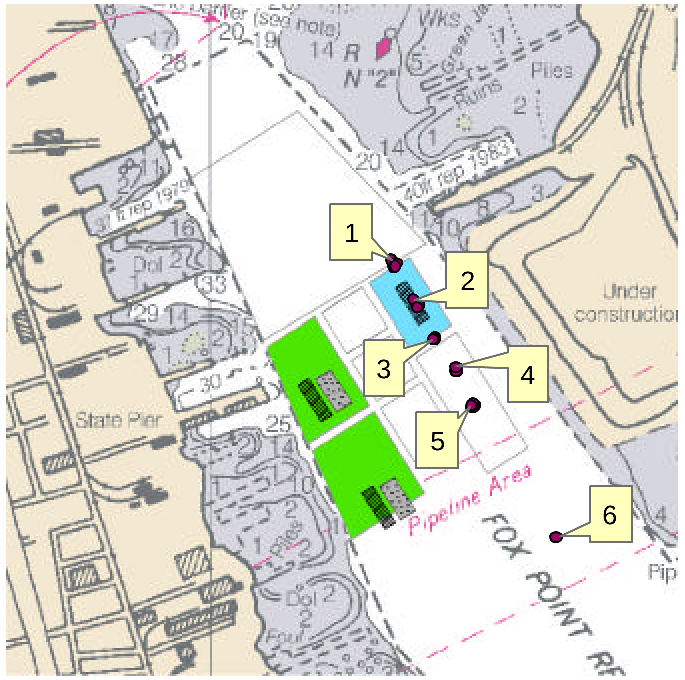
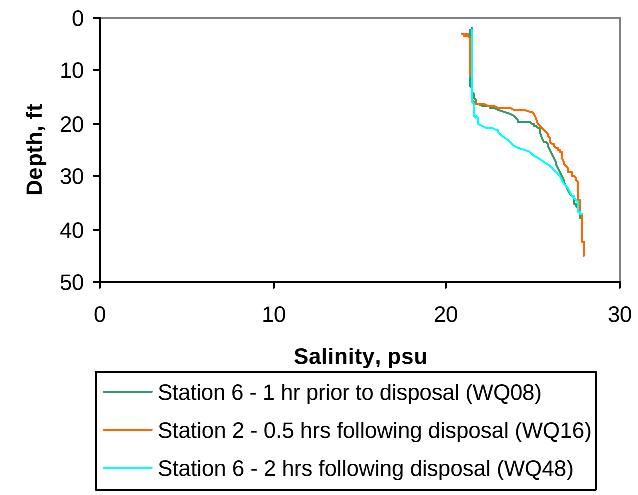
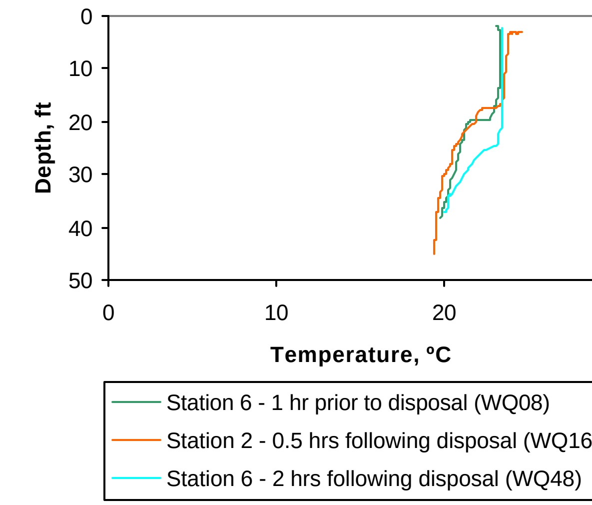
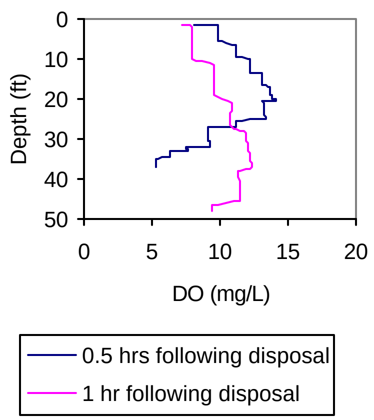


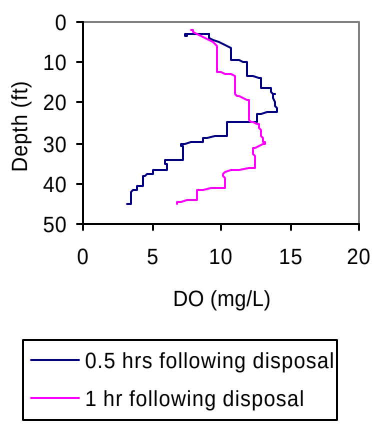
Dissolved oxygen monitoring stations



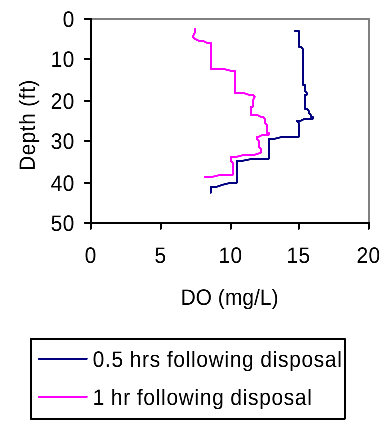




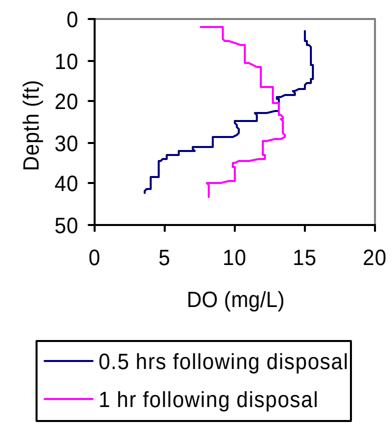
Station 1
Upcurrent of disposal
WQ17 & WQ26



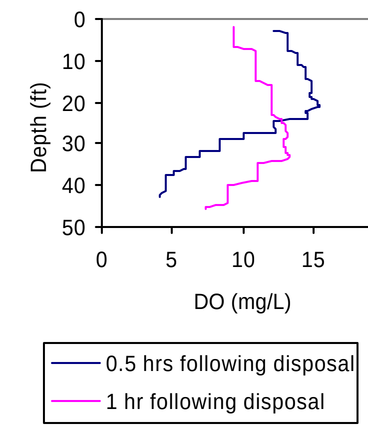
Station 2
Directly over disposal cell
WQ16 & WQ30



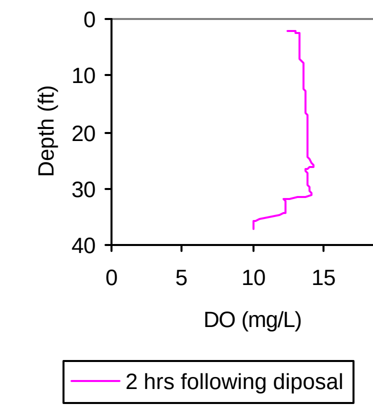
Station 3
Downcurrent edge of disposal cell
WQ15 & WQ29



Station 4
450 ft downcurrent of disposal
WQ14 & WQ28



Station 5
700 ft downcurrent of disposal
WQ13 & WQ27



Station 6
1500 ft downcurrent of disposal
WQ48

Figure 2
Dissolved oxygen, temperature and salinity profiles following high tide disposal event

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ENSR INTERNATIONAL

August, 2003

Data Submittal for Neap Tide Dissolved Oxygen Monitoring on 17-18 September 2003 Providence River and Harbor Maintenance Dredging Project

Event Monitored: CAD Cell 5R – neap ebb tide disposal on 17 September
– neap flood tide disposal on 18 September

Applicable Water Quality Certification Condition:

- 40 – dissolved oxygen monitoring during neap tide periods in June, July, August, September

Associated Files:

- Prov_R_DO_2-summary – Microsoft Word document containing this summary
- Prov_R_DO_2_figures - pdf file containing the following:
    - Figure 1 - 17 September monitoring locations
    - Figure 2 - 18 September monitoring locations
    - Figure 3 – Temperature and salinity profiles
    - Figure 4 – 17 September dissolved oxygen profiles
    - Figure 5 – 18 September dissolved oxygen profiles

Criteria Exceedences: No criteria are specified in the Water Quality Certification for this monitoring. No issues of concern were identified during the monitoring.

Summary:
Condition 40 of the Water Quality Certification for the project specifies that monitoring of dissolved oxygen (as well as temperature and salinity) be performed following CAD cell disposal events during neap tide periods in June, July, August, and September (3 days each month). The dissolved oxygen monitoring was not performed during June, as disposal into CAD cells was not performed during the neap tide period for the month. During the neap tide period for July, disposal into a CAD cell was only performed over a one-day period (21 July). A full CAD cell disposal monitoring event (#9) was performed on this day, and additional dissolved oxygen monitoring was performed as a part of the event. The results of the dissolved oxygen monitoring were presented in the summary submittal dated 7 August 2003. The dissolved oxygen monitoring was not performed during August, as disposal into CAD cells was not performed during the neap tide period for the month. During the neap tide period for September, dissolved oxygen monitoring was performed over a two-day period (17-18 Sep). The third day of monitoring could not be performed because of weather conditions associated with the passage of Hurricane Isabel. The results of the September dissolved oxygen monitoring are summarized below.

Monitoring of dissolved oxygen on 17 September was performed in conjunction with the ebb tide disposal event. High tide was predicted to occur at 1324, with a height of 4.2 feet and a range of 3.1 feet to the following low tide. The disposal event occurred at 1529. Monitoring on 18 September was performed in conjunction with the flood tide disposal event. Low tide was predicted to occur at 0641, with a height of 0.7 feet and a range of 3.4 feet to the following high tide. The disposal event occurred at 1108. Maintenance material that was removed by Dredge 51 from the top of cell 3AR (being unsuitable for open water disposal) was disposed into cell 5R (see Figures 1 and 2). Dredge 55 was also working in the area during the monitoring event, removing parent material from cell 7R.

Water quality monitoring was performed at multiple stations along a longitudinal transect extending through cell 5R, both prior to and following the disposal event. Stations ranged from approximately 1000 feet up current of cell 5R to 2000 feet down current, and included a station located directly over the cell. Measurement of dissolved oxygen, salinity, and temperature were performed over two time periods, one approximately 30 minutes prior to the disposal event and one approximately 30 to 60 minutes following the disposal event. Figure 1 presents the water quality stations monitored on 17 September, and Figure 2 presents the stations monitored on 18 September.

Water quality was also monitored along several transects in the vicinity of the disposal and throughout the harbor by towing the YSI instrument sonde. Discussions with the instrument manufacturer indicated that the sonde could be used for towing (by attachment to a v-fin) in addition to a standard drop application. However, after deployment of the sonde/v-fin unit to the target depth, the measured dissolved oxygen levels decreased by 20 to 40% with the initiation of towing. Dissolved oxygen measurements rebounded with the cessation of forward velocity. This inconsistency was likely due to flow patterns around the probe membrane induced during towing that artificially lowered the measurement value. Therefore, only the drop measurements have been included in this summary report.

A subset of the salinity and temperature measurements observed on both days of monitoring are presented in Figure 3. Salinity values displayed the characteristic increase with depth that has been observed in previous disposal monitoring events with values of approximately 24 ppt in the upper water column and an increase to approximately 29 to 30 ppt in the lower water column. Temperature decreased slightly with depth, with values of approximately 22°C in the upper water column decreasing to approximately 20°C near the bottom. Salinity and temperature profiles were similar prior to and following the disposal events at all locations.

Profiles of dissolved oxygen (DO) concentration with depth are presented in Figure 4 (17 September) and Figure 5 (18 September). The upper graph in each figure presents DO profiles along the longitudinal transect prior to the disposal event, and the lower graph presents DO profiles along the transect following the disposal event (see Figures 1 and 2 for sampling locations). Both monitoring events revealed similar patterns in dissolved oxygen. Dissolved oxygen concentrations were fairly uniform in the upper 12 to 20 feet of the water column. Below this, DO concentrations decreased with depth, and values near the bottom of the water column were 2-3 mg/L lower than those near the surface.

For the monitoring performed during the ebb tide on 17 September, DO concentrations ranged from approximately 7 mg/L near the surface to 4.5 mg/L near the bottom prior to the disposal event (Figure 4a). Following the disposal event, DO concentrations were quite similar and ranged from approximately 7.5 mg near the surface to 4.5 mg/L near the bottom (Figure 4b). For the monitoring performed during the flood tide on 18 September, DO concentrations ranged from approximately 6 mg/L near the surface to 3.5 mg/L near the bottom prior to the disposal (Figure 5a). Following the disposal event, DO concentration increased slightly, ranging from approximately 6.5 mg/L near the surface to 4 mg/L near the bottom (Figure 5b). An increase in DO concentration is a normal feature of the flood tide cycle.

In summary, monitoring performed prior to and following the disposal events on 17 and 18 September did not identify any significant variations in DO concentrations relative to the disposal.

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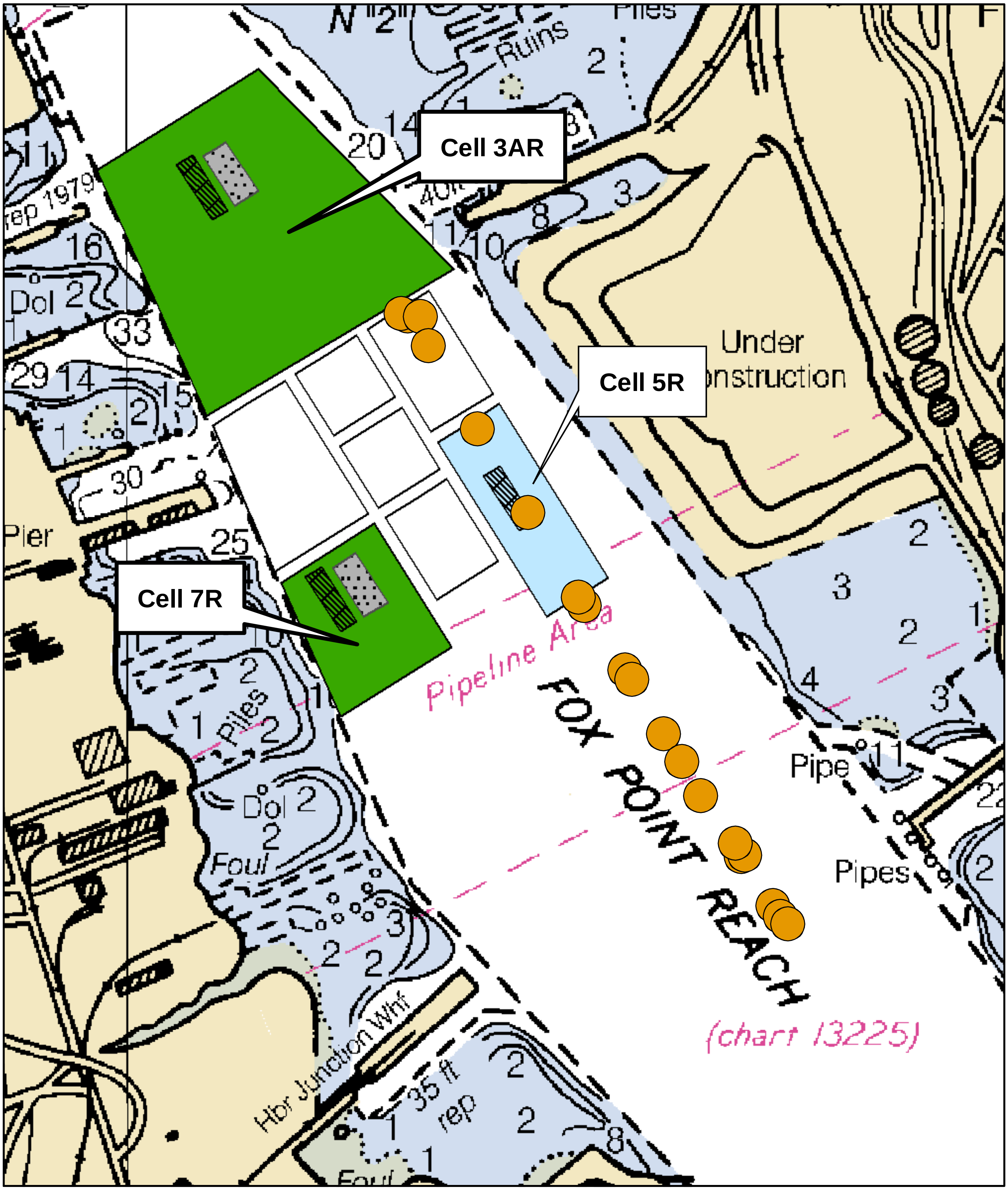

Legend

- Water Quality Sampling Locations
- CAD Cell 5R with Scow in Postion
- CAD Cells with Dredge and Scow in Position

0 500 1,000 1,500 Feet

N

NOAA Nautical Chart, 1997
CAD Cell Coordinates from USACE. 2002

Figure 1
CAD Cells and Sampling Locations
Ebb Tide Disposal Cell 5R
17 September 2003

Prepared by msg
2 October 2003
Project No: 10310-003

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U.S. Army Corps
of Engineers
New England District

Dissolved Oxygen Monitoring September 2003
Providence River and Harbor Maintenance Dredging Project

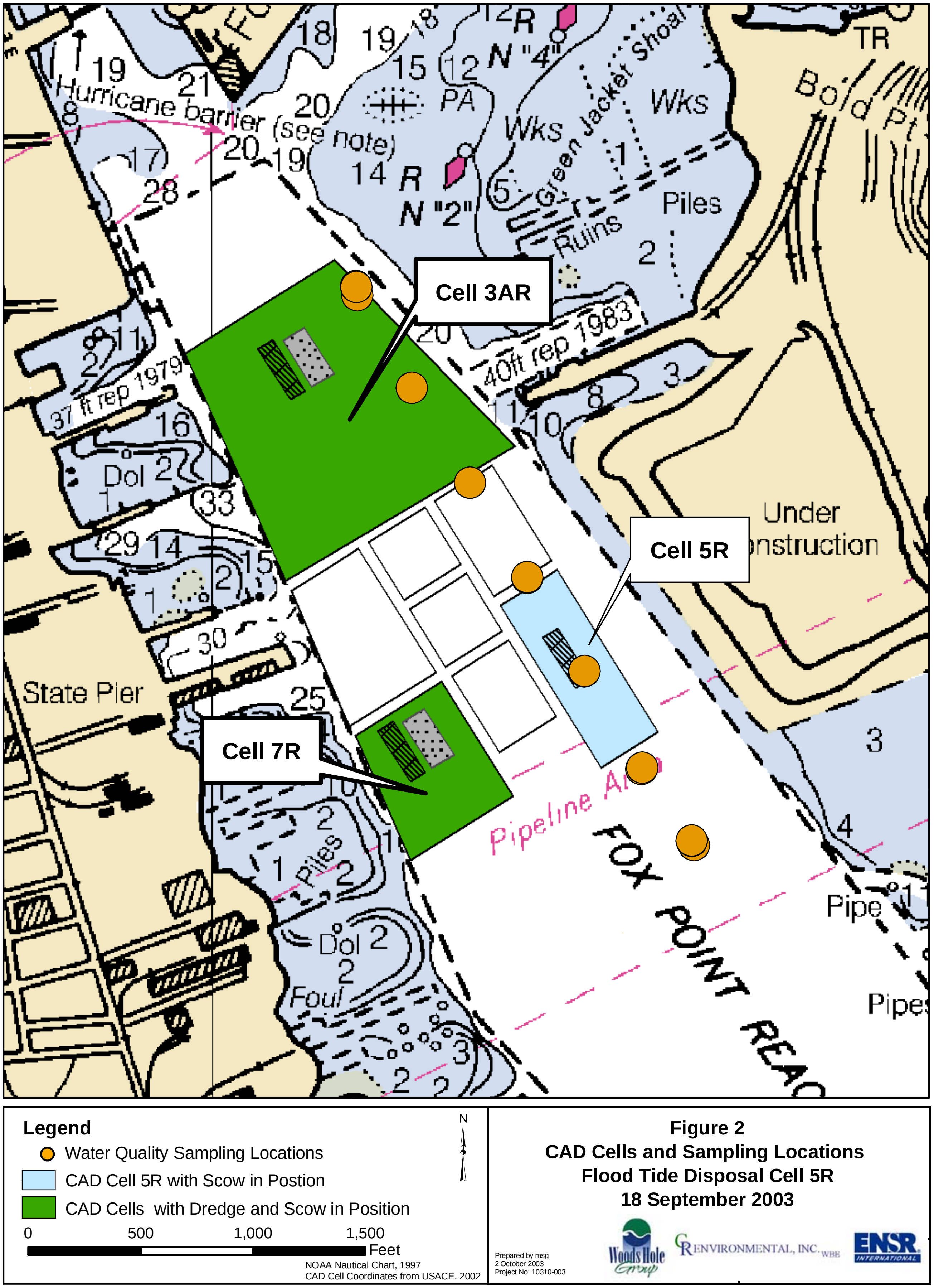

Figure 2
CAD Cells and Sampling Locations
Flood Tide Disposal Cell 5R
18 September 2003

Prepared by msg
2 October 2003
Project No: 10310-003

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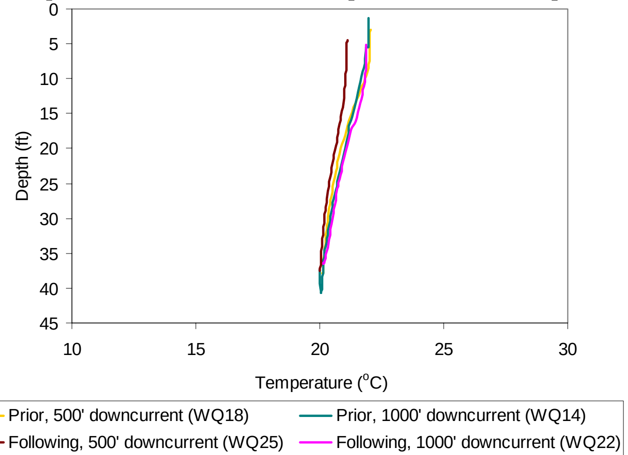
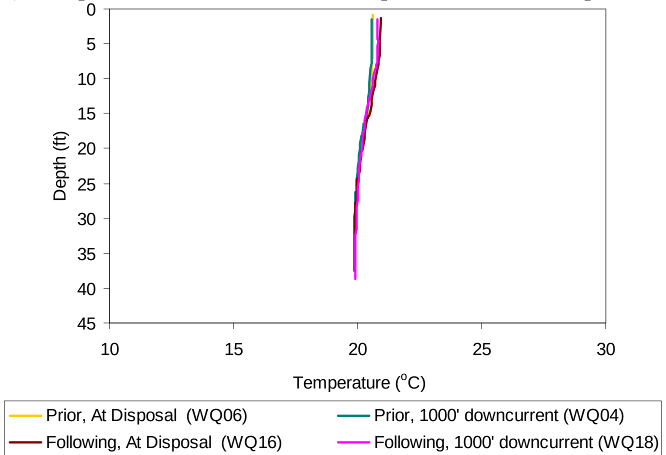
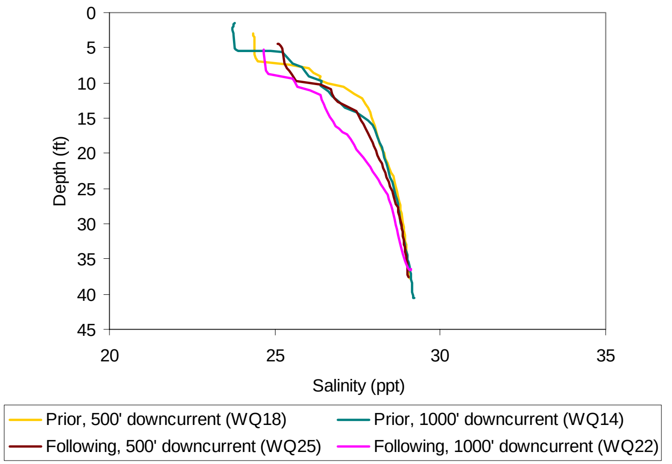
a) Temperature before and after disposal event - 17 September



c) Temperature before and after disposal event - 18 September



b) Salinity before and after disposal event - 17 September



d) Salinity before and after disposal event - 18 September

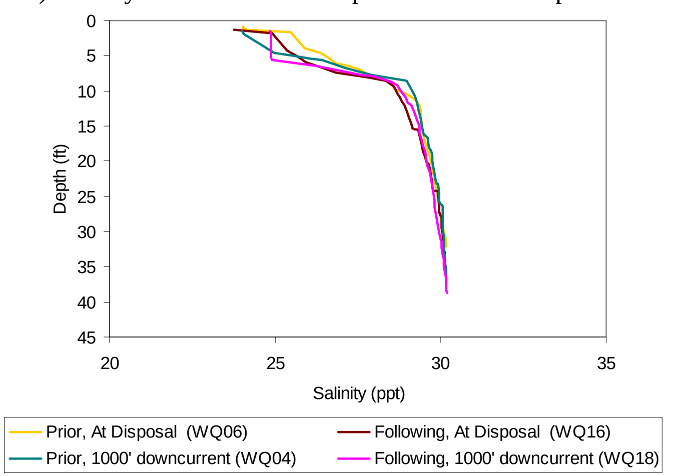
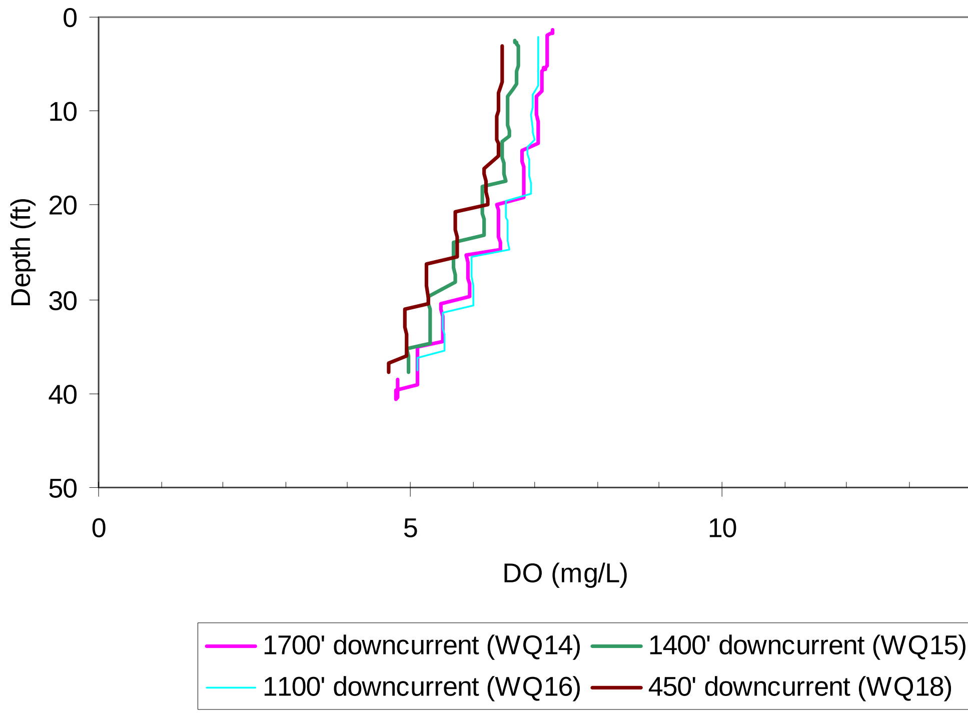


Figure 3 Temperature and Salinity Prior to and Following Disposal Events

a) Dissolved oxygen profiles prior to disposal event



b) Dissolved oxygen profiles following disposal event

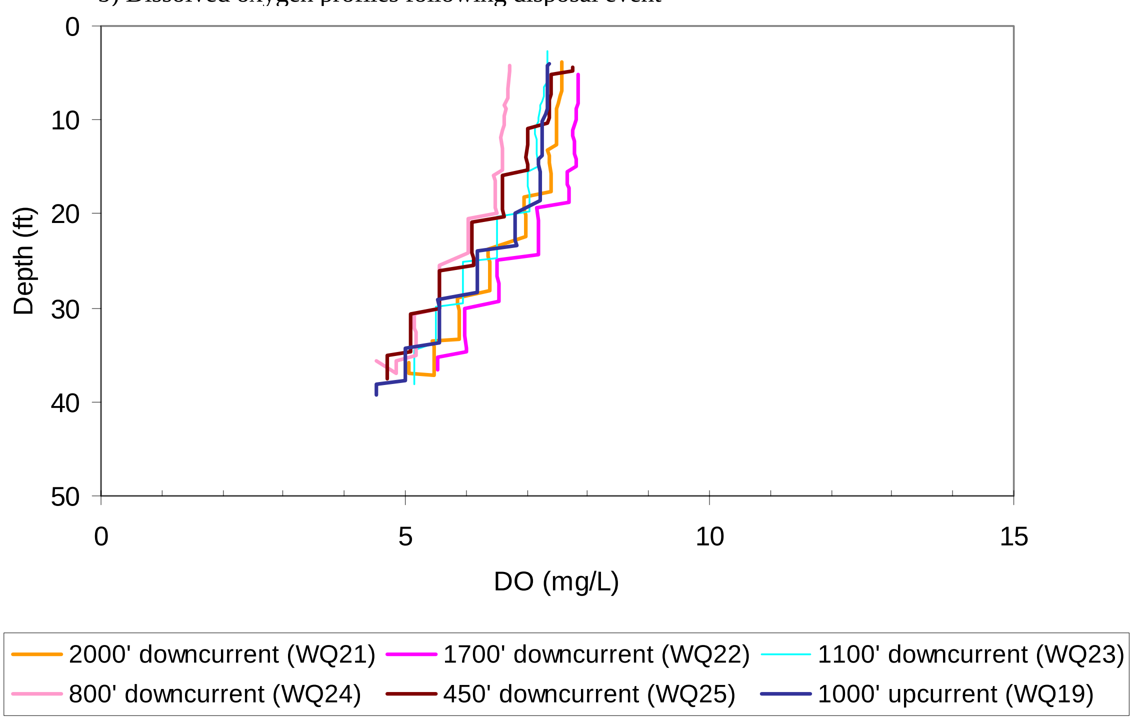
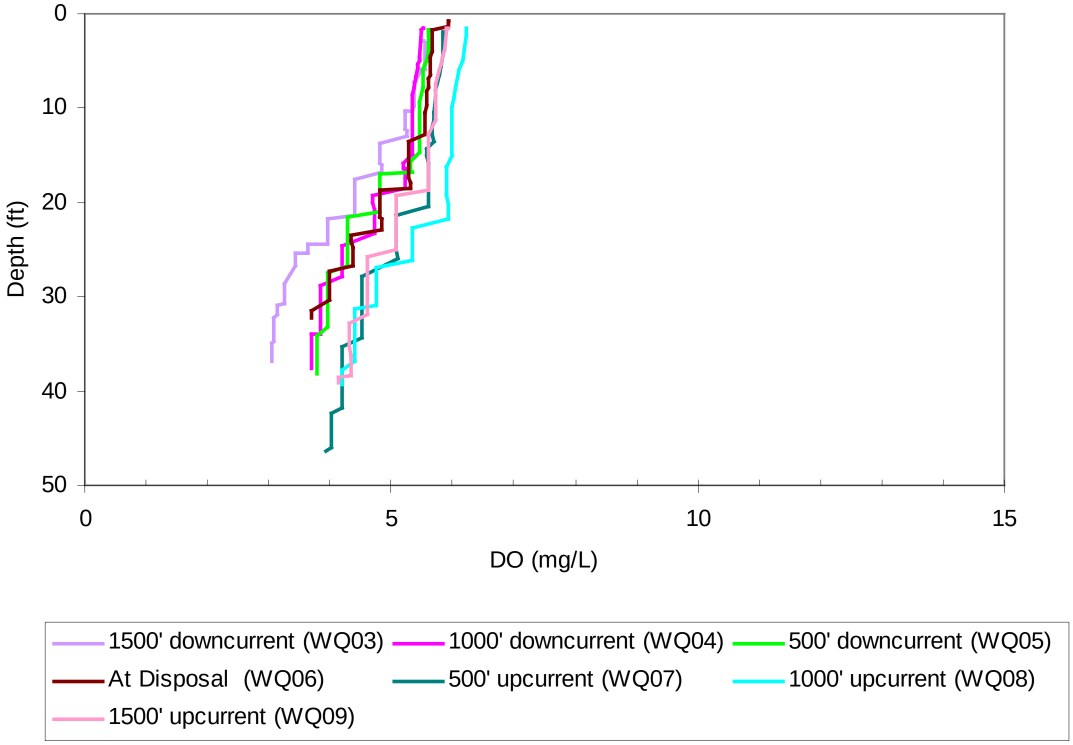


Figure 4 Dissolved Oxygen Profiles
17 September, Ebb Tide Disposal

a) Dissolved oxygen profiles prior to disposal event



b) Dissolved oxygen profiles following disposal event

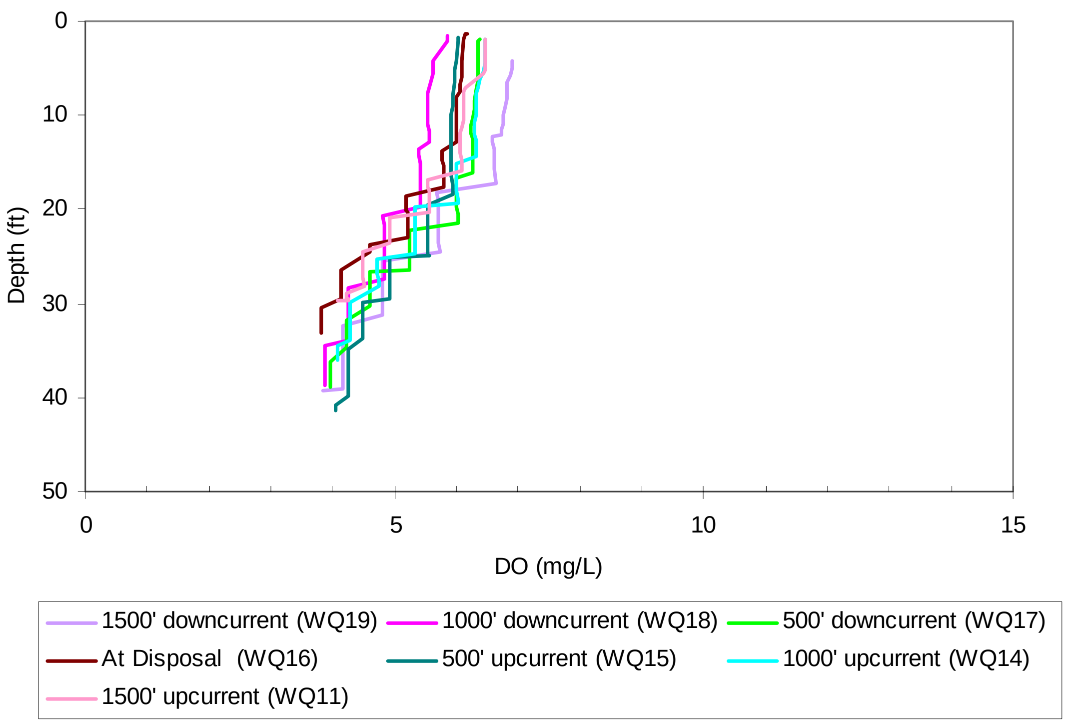


Figure 5 Dissolved Oxygen Profiles
18 September, Flood Tide Disposal