

OSV ANTELOPE CRUISE REPORT

JUNE 1983

Contribution #30

DACW33-83-M-0627

January 15, 1984

SAI Report #

SAI-83/1191-049

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1.0 INTRODUCTION

In June of 1983 a multi-agency cruise was made aboard the EPA ship OSV ANTELOPE to the Portland Disposal Site south of Casco Bay. The purpose of this cruise was to determine the environmental effects of disposal operations in the area. This was to be accomplished by conducting side scan sonar and underwater TV observations and by measuring the concentrations of contaminants in water, sediment, benthic biota and in local lobster populations.

The role of Science Applications, Inc. (SAI) on this cruise was twofold. Principally, SAI was to provide coordination between this cruise and previous DAMOS studies, by providing navigational support to insure that the sampling occurred at relevant locations, and secondly, to assist the scientific crew in the sampling effort.

2.0 FIRST ATTEMPT

On the evening of June 6, 1983, SAI personnel drove to the OSV ANTELOPE in Portland, Maine for installation and checkout of Navigation and Data Acquisition Equipment in preparation for a June 7th sailing at 0830. However, a small fire had severely damaged the generator and consequently the ship was required to remain in port for the next several days. After a meeting of the scientific party and the ship's crew, a tentative sailing date of Friday, June 10th at 1200 was established, and SAI personnel then returned to Newport.

3.0 OSV ANTELOPE CRUISE; JUNE 10-11, 1983

SAI and other scientific personnel reported onboard the OSV ANTELOPE during the morning of June 10th and the ship was underway at 1200. Because of the delay in the ships schedule created by the generator fire, modifications were made to the original cruise plan. The modified cruise plan included the following tasks:

- Deployment and retrieval of lobster traps for the purpose of collecting lobster and/or crabs
- Piston cores at 5 stations
- Benthic grabs at 5 stations
- Two TV transects
- Four TV spot lowerings
- Side Scan Sonar survey along specified Loran-C lines

3.1 Navigation Services

Shortly after reporting aboard, SAI personnel began setting up a Loran-C Navigation System with the intention of interfacing this to an Apple II microcomputer already onboard. However, after this system was interfaced to the computer and assembled, the Loran-C receiver failed. Attempts to repair the unit were unsuccessful and subsequently, the unit was returned to the factory where a new DC power supply was installed. Although other Loran-C units were aboard the OSV ANTELOPE, none were capable of supplying the proper digital data string to the Apple II for processing. Consequently, all subsequent navigation was done using the computer to calculate positions and reading the Loran-C receiver on the bridge for ship control. All positions

including Piston Core and Smith McIntyre grab locations were manually recorded in the scientific log.

3.2 Loran-C Correction Factors

In order to properly utilize Loran-C in a specific area, it is first necessary to calibrate the receiver against some known standard position. Using this technique, anomalies due to the variability in overland signal propagation can be removed. Calibration performed at the U.S. Coast Guard Lighted Buoy 'DS' marking the disposal site produced the following correction factors.

Coding Delay	Loran-C Correction Factor
11000	-0.1
39000	-1.2

Computations and measurements detailing the origin of these correction factors are presented in Appendix A.

These correction factors were then applied to the computed Loran coordinates of all of the stations to be sampled during this cruise. These locations are presented below as Table 3.1.

4.0 DATA COLLECTION

Following calibration of the Loran-C receiver, coring activities commenced at approximately 1400 on June 10, 1983.

4.1 Piston Cores

The periphery of this disposal site consists of rock ledge which could severely damage a piston corer. Therefore, to insure a soft bottom and to gather additional samples, a Smith McIntyre grab sample was taken at each site before coring. The

Table 3.1. Proposed Sample Locations
Portland, Maine Disposal Site

<u>Benthic Grab</u> <u>Locations</u>	<u>Lat/Long</u>	<u>Corrected Loran-C</u>
B1	43°34.2N 70°01.95W	13247.4 44543.9
B2	43°34.1N 70°01.90W	13247.7 44543.4
B3	43°33.9N 70°01.8W	13248.4 44542.4
B4	43°33.8N 70°01.75W	13248.7 44541.8
R5	43°32.8N 70°01.2W	13245.4 44534.7
<u>Piston Core</u> <u>Locations</u>		
C1	43°34.14N 70°01.97W	13247.9 44543.7
C2	43°34.1N 70°02.06W	13248.7 44543.7
C3	43°34.09N 70°01.97W	13248.2 44543.5
C4	43°34.08N 70°01.89W	13247.8 44543.3
R5	43°32.8N 70°00.2W	13245.4 44534.7

location and type of sample for each location is detailed in Table 4.1 and presented in Figures 4.1 and 4.2.

The material recovered at the disposal site consisted of a very cohesive grey clay. At the time of this cruise, dredging was still taking place in Portland harbor and at least two scows were observed dumping dredge material during the course of this cruise. Because of the cohesiveness of this material, it was not possible to obtain a large amount of penetration into the sediment. Further, small rocks, generally about 2cm in diameter, were sometimes present in both cores and Smith-McIntyre grabs. These small rocks often damaged the cutting head of the piston core, requiring frequent changes or filing off of the dented portion. In addition to damaging the core cutter, this combination of stones and very cohesive material caused a large amount of stress to be placed on the threads of the core barrel where the core cutter attached. Eventually these threads failed, thereby putting the piston corer out of commission.

4.2 Smith McIntyre Grabs

Following the failure of the piston corer late on the evening of June 10th, subsequent bottom sediment samples were obtained using the Smith-McIntyre grab. Once the grab was brought on deck, two short pieces of core liner were inserted into the deepest portion of the sample and two short core samples extracted. All of the samples obtained on June 11th were done in this manner, as shown in Table 4.1.

4.3 TV Transects

A TV transect was made between the two locations designated by #1 in Table 4.2. While there were no equipment

TABLE 4.1

ACTUAL SAMPLE LOCATIONS
6-10-83

<u>SITE</u> <u>SAMPLE</u>	<u>TIME</u>	<u>TYPE</u>	<u>LORAN-C</u>	
R5	1414	SM	13245.0	44534.4
R5	1620	PISTON	13245.1	44535.3
R5	1711	PISTON	13243.9	44534.8
R5	1804	PISTON	13246.4	44534.8
B4	1837	SM	13248.6	44541.8
B3	1934	SM	13247.1	44543.0
B2	1953	SM	13248.0	44541.9
B1	2006	SM	13247.1	44543.6
B1	2016	PISTON	13246.9	44543.6
B1	2109	PISTON	13247.0	44543.6
B2	2145	PISTON	13247.7	44543.4
B2	2220	PISTON	13247.9	44543.5
B2	2328	PISTON	13248.2	44542.5

PISTON CORE BROKEN
Two Short Cores Taken at Each Site
6-11-83

B3	0003	SM	13248.0	44542.3
B3	0013	SM	13248.4	44542.2
B4	0110	SM	13248.7	44541.8
B4	0132	SM	13248.8	44541.9
C1	0244	SM	13247.9	44543.4
C1	0251	SM	13247.9	44543.3
C1	0257	SM	13247.8	44543.0
C2	0320	SM	13248.8	44543.8
C2	0337	SM	13248.6	44543.5
C2	0343	SM	13249.2	44543.1
C3	0406	SM	13248.0	44543.5
C3	0419	SM	13246.2	44543.7
C3	0427	SM	13245.6	44543.7
C4	0441	SM	13247.0	44543.3
C4	0455	SM	13246.7	44542.3
C4	0502	SM	13246.5	44542.1

OSV ANTELOPE SAMPLE LOCATIONS

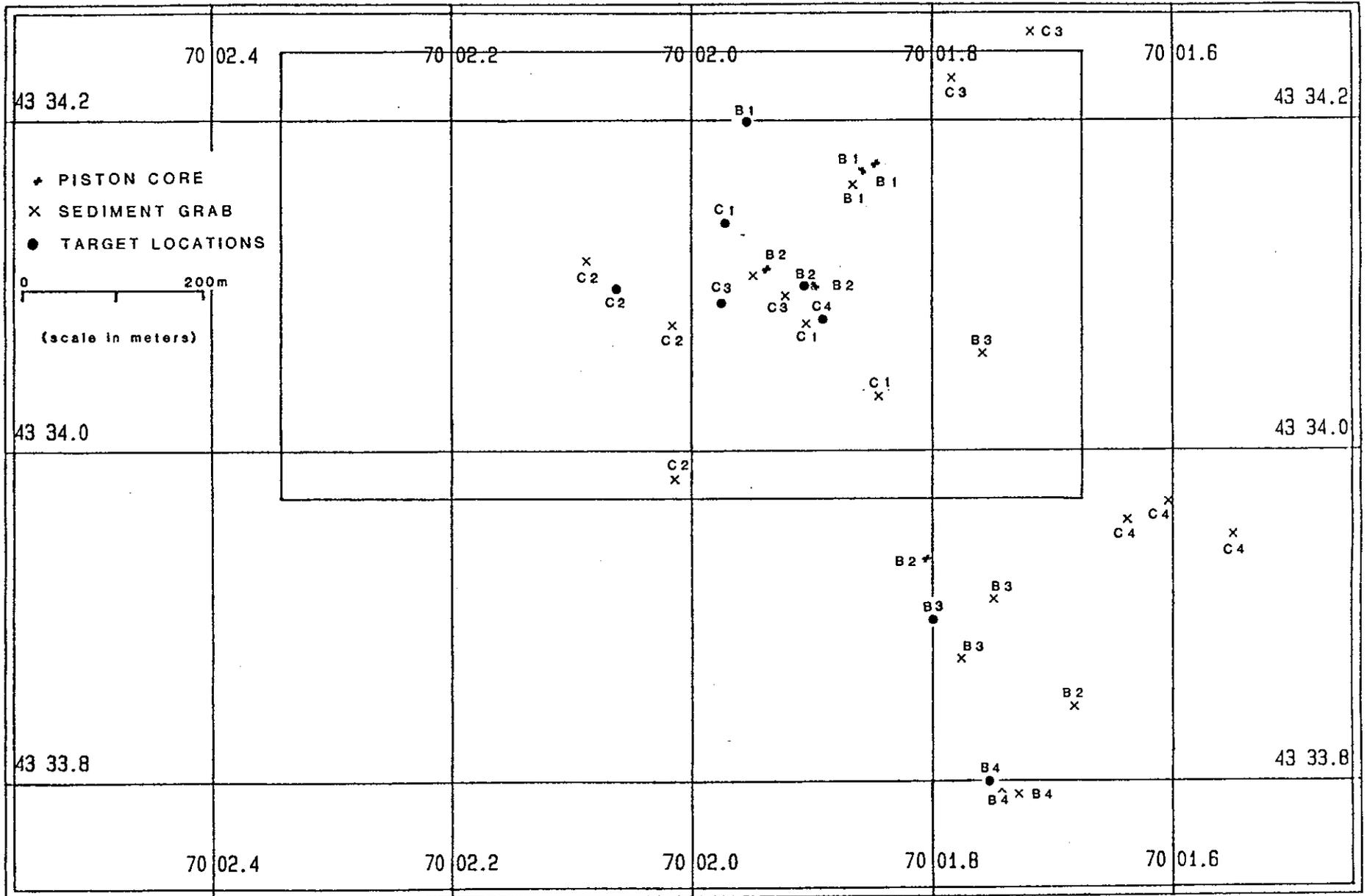


Figure 4.1

OSV ANTELOPE REFERENCE SAMPLE LOCATION

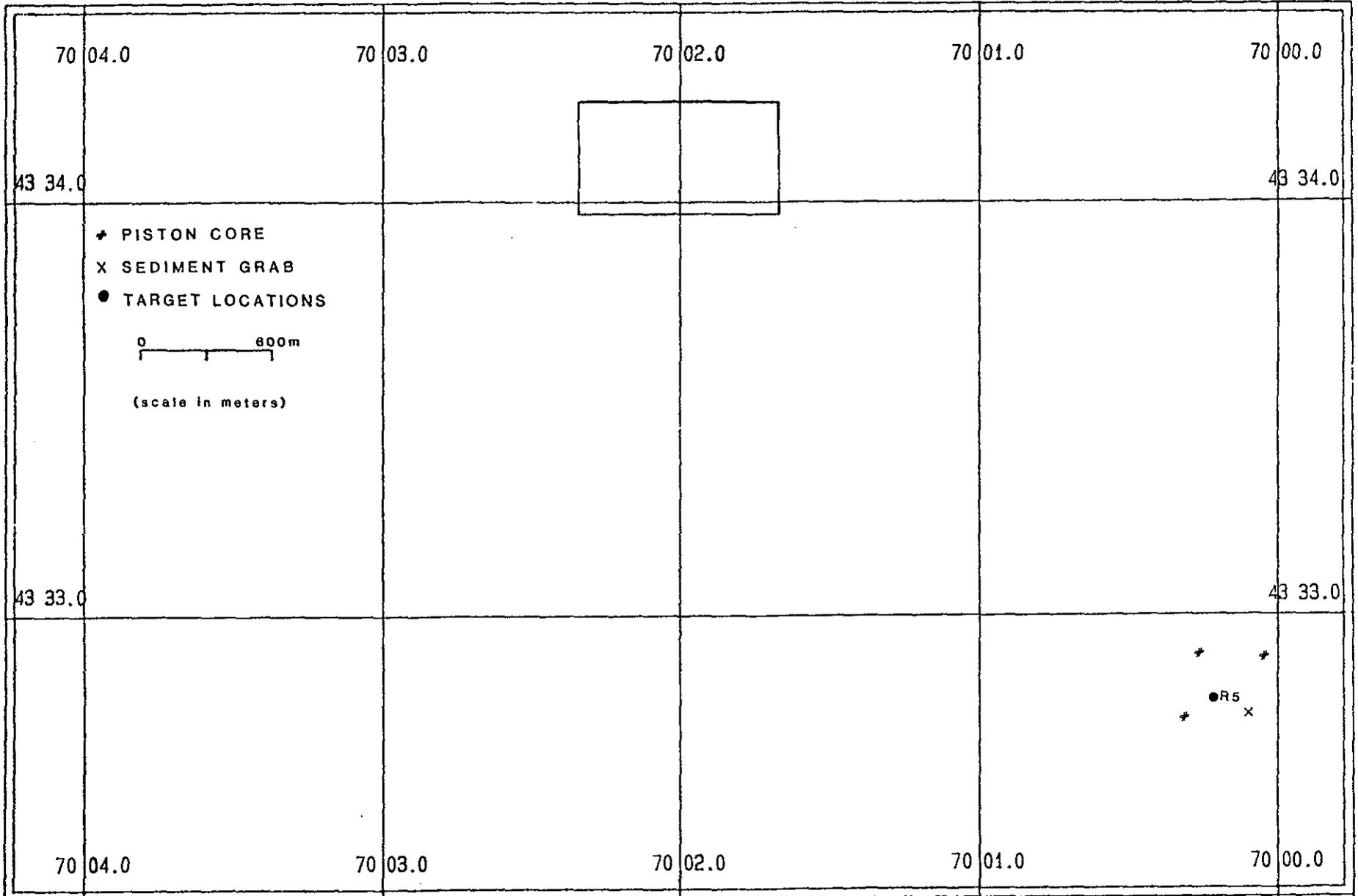


Figure 4.2

Table 4.2. Sample Locations for TV and Side Scan Sonar Transects
Portland, Maine Disposal Site, June 10, 1983.

TV Transects

1.	43°34.1N	to	43°34.06N	13248.7	to	13246.7
	20°34.04N	to	70°01.85W	44543.7	to	44543.1
2.	43°34.04N	to	43°34.18N	13248.7	to	13246.9
	70°02.00W	to	70°01.85W	44543.3	to	44543.6

Side Scan Sonar Transects*

1.	43°34.1N	to	43°33.8N	on line 44542.9
	70°01.5W	to	70°02.3W	13245.0 to 13252.0
2.	43°33.9N	to	43°34.2N	on line 44543.3
	70°02.4W	to	70°01.6W	13252.0 to 13245.0
3.	43°34.3N	to	43°33.9N	on line 44543.7
	70°01.15W	to	70°02.4W	13245.0 to 13252.0
4.	43°34.0N	to	43°34.3N	on line 44544.1
	70°02.5W	to	70°01.7W	13252.0 to 13245.0
5.	43°34.4N	to	43°34.1N	on line 44544.5
	70°01.8W	to	70°02.6W	13245.0 to 13252.0

*Note: These transect lines are presented as they would be sailed
(i.e. the start of line 2 is adjacent to the end of line 1).

failures during this portion of the cruise, the quality of the TV picture was poor. Silt and other suspended material in the water prevented the camera from providing a clean picture of the bottom. Although several changes in the locations of the floodlights and camera position were made on the towing sled, no satisfactory TV picture was obtained. Because dumping of dredged material was observed to be taking place at the dumpsite, it is speculated that this was the most likely cause of the turbid bottom water. By contrast, the surface water was observed to be very clear as the Smith-McIntyre grab could be observed approximately 20-25 feet below the water surface. As a consequence of the poor TV pictures obtained for transect #1 and transect #2, the spot lowerings were not performed.

4.4 Side Scan Sonar

Side scan sonar transects were made using an Edo Western side scan sonar system on June 11, 1983 from approximately 1200 to 1500. The location of the five transect lanes is given as part of Table 3.2. From these records, which were retained by the OSV ANTELOPE, it was possible to distinguish a dredge material signature, as well as rocks and other prominent bottom features. These records are currently held by EPA for future analysis.

4.5 Lobster Pots

At the completion of the side scan sonar work, the lobster pots that were deployed the previous day were retrieved. Several large crabs and two small (approx 1/2 - 3/4 lb) lobsters were obtained from the five traps. These were bagged, labelled and subsequently frozen for later analysis. Retrieval of the

lobster traps was completed by approximately 1630 at which time the OSV ANTELOPE returned to Portland Harbor, arriving at the reserve pier at approximately 1730. During transit from the dumpsite to Portland Harbor, SAI personnel collected and packed the Loran-C navigation equipment and this was offloaded shortly after docking.

5.0 SUMMARY

Primarily due to ship problems, which cut down the amount of cruise time available, the cohesive nature of the dredge material which limited sampling penetration, and the ongoing disposal operation which reduced visibility, little data were obtained on this cruise. Questions regarding the distribution and stability of dredged material at this site cannot be answered from the data that were collected.

Once disposal of Portland material has stopped, a cruise to the site will be necessary to assess the distribution of material through bathymetric surveys and underwater TV pictures on the ledge surrounding the site. Side Scan Sonar transects using accurate navigation should also be made to evaluate the coverage of natural bottom within the site. Optional studies to assess the repopulation of the mound in relation to the previously sampled reference station should also be made. Finally, using the methods discussed here, repetitive observations are necessary to evaluate the long-term stability of the dredged material.

