DISPOSAL AREA MONITORING SYSTEM

PROGRESS REPORT

MAY 15 - JULY 30, 1980

DAMOS CONTRIBUTION #14

Submitted to:

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1.0 INTRODUCTION

During the period since the previous DAMOS progress report, the emphasis of the work has been centered on the analysis of data obtained during earlier field surveys. Several important accomplishments during this period include:

- Establishment of the mussel watch sampling routine and initial laboratory analysis of samples.
- The first field measurements of the sediment transport program have been obtained at the New London Disposal Site.
- Preliminary analysis of sediment chemistry at the Central Long Island Sound disposal site has confirmed the effectiveness of the capping procedures at both the north and south disposal mounds.

2.0 FIELD OPERATIONS

Although no major DAMOS cruises were planned during this period, several smaller operations have taken place primarily concerned with the Mussel Watch program, diver observations and sediment transport studies. In addition, a condition survey was performed at the Central Long Island Sound Disposal site to evaluate the disposal of Norwalk material and monitor the condition of the southern Stamford-New Haven mound.

A brief summary of the field work accomplished is as follows:

• May 15-16, 1980	Retrieve and redeploy New London Disposal Buoy
• May 14, 1980	Mussel Sampling - New London
• May 29, 1980	Mussel Sampling - Central Long Island Sound
• June 3, 1980	Mussel Sampling - Portland, ME
• June 6, 1980	Deploy Suspended Sediment Instrumentation
• June 9,10,11, 1980	Conduct Bathymetric Survey, Diver Observations, Remove Disposal Buoy-New London

•	June 12, 13, 1980	Conduct Bathymetric Surveys, Diver Observations, Remove Disposal Buoy-Central Long Island Sound
•	June 26, 1980	Mussel Sampling - Portland
•	July 1, 1980	Replace Portland Disposal Buoy
•	July 10, 1980	Recover Suspended Sediment Instrumentation

3.0 BATHYMETRY (Dr. R.W. Morton)

During this period, condition surveys were made at the New London and Central Long Island Sound Disposal areas to determine baseline conditions at the conclusion of disposal operations for the 1979-1980 dredging season ending in June, 1980. Software for analyses of all bathymetric surveys is being converted from the HP 9825 calculator to more powerful minicomputers and the SAI DEC 10 computer. Such a conversion will allow more precise presentation of data due to much larger memory storage and improved plotting capabilities. However, because of this change analysis of all surveys has not been completed.

Emphasis has been placed on the Norwalk Disposal Site in the Central Long Island Sound Disposal Area because this was a new operation and it was important to assess the results of point dumping to insure that disposal resulted in the expected configuration similar to the Stamford-New Haven operation. At the Norwalk Site spoils were dumped approximately 25 meters south of the taut wire buoy placed to mark the disposal point. The results of the operation are shown in Figure 3.0-1 indicating a mound approximately 2 meters high and 200 meters in diameter has been created. Further deliniation of the mound can be seen in a comparision of vertical profiles across the site from the 1 April survey and the 12 June survey shown in Figures 3.0-2 and 3.0-3. Although these profiles do not overlay because of scaling differences and because the June profiles have not been corrected for tide and sound velocity the flat bottom prior to disposal contrasts strongly with the mound topography developed by the disposal operation.

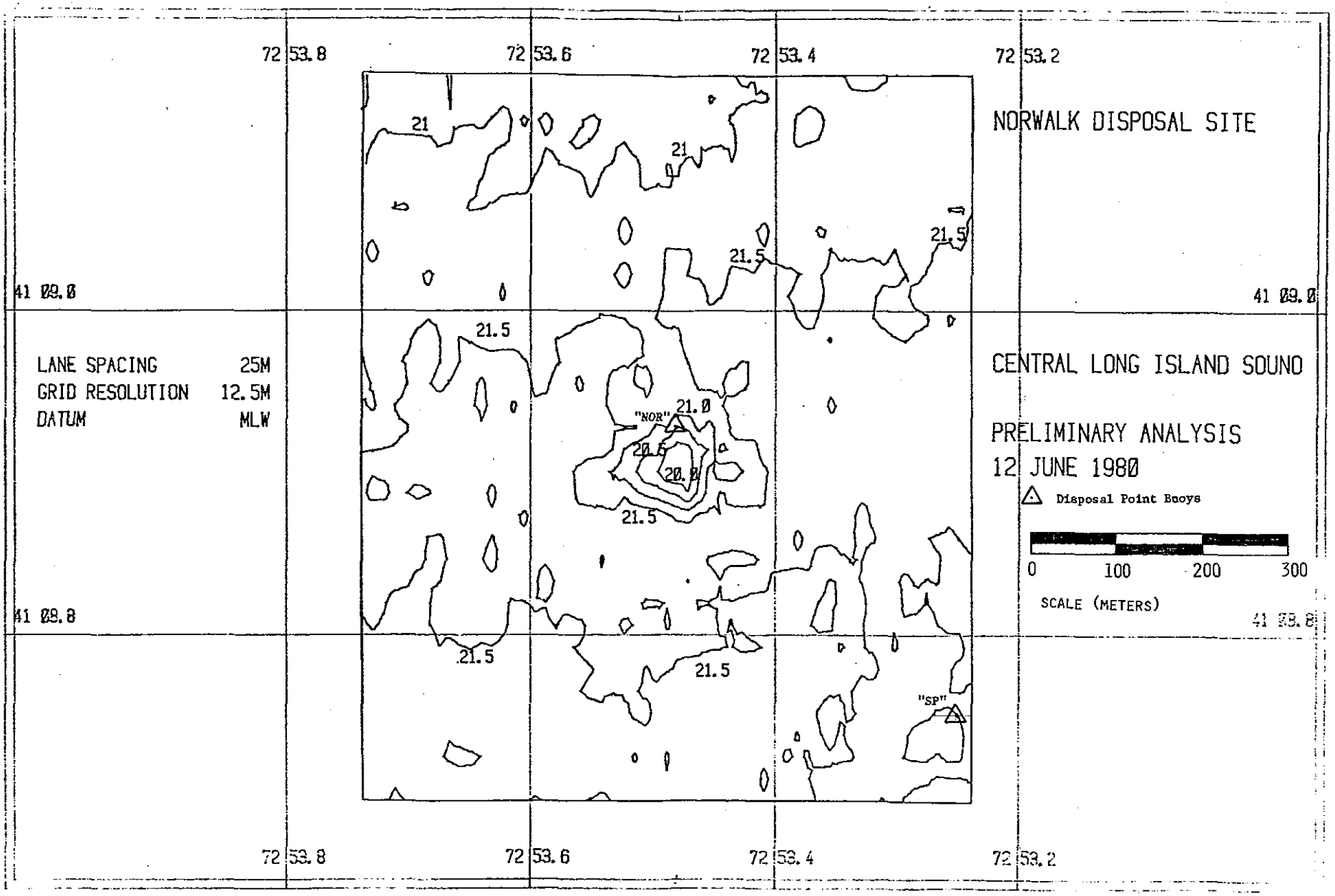

72 53.8
72 53.6
72 53.4
72 53.2
41 09.0
41 08.8
NORWALK DISPOSAL SITE
CENTRAL LONG ISLAND SOUND
PRELIMINARY ANALYSIS
12 JUNE 1980
LANE SPACING 25M
GRID RESOLUTION 12.5M
DATUM MLW
Disposal Point Buoys
"NOR"
"SP"
21
21.5
21.0
20.5
20.0
0
100
200
300
SCALE (METERS)

FIGURE 3.C-1

NORWALK DISPOSAL SITE PROFILES
PRE-DISPOSAL
APRIL 1980

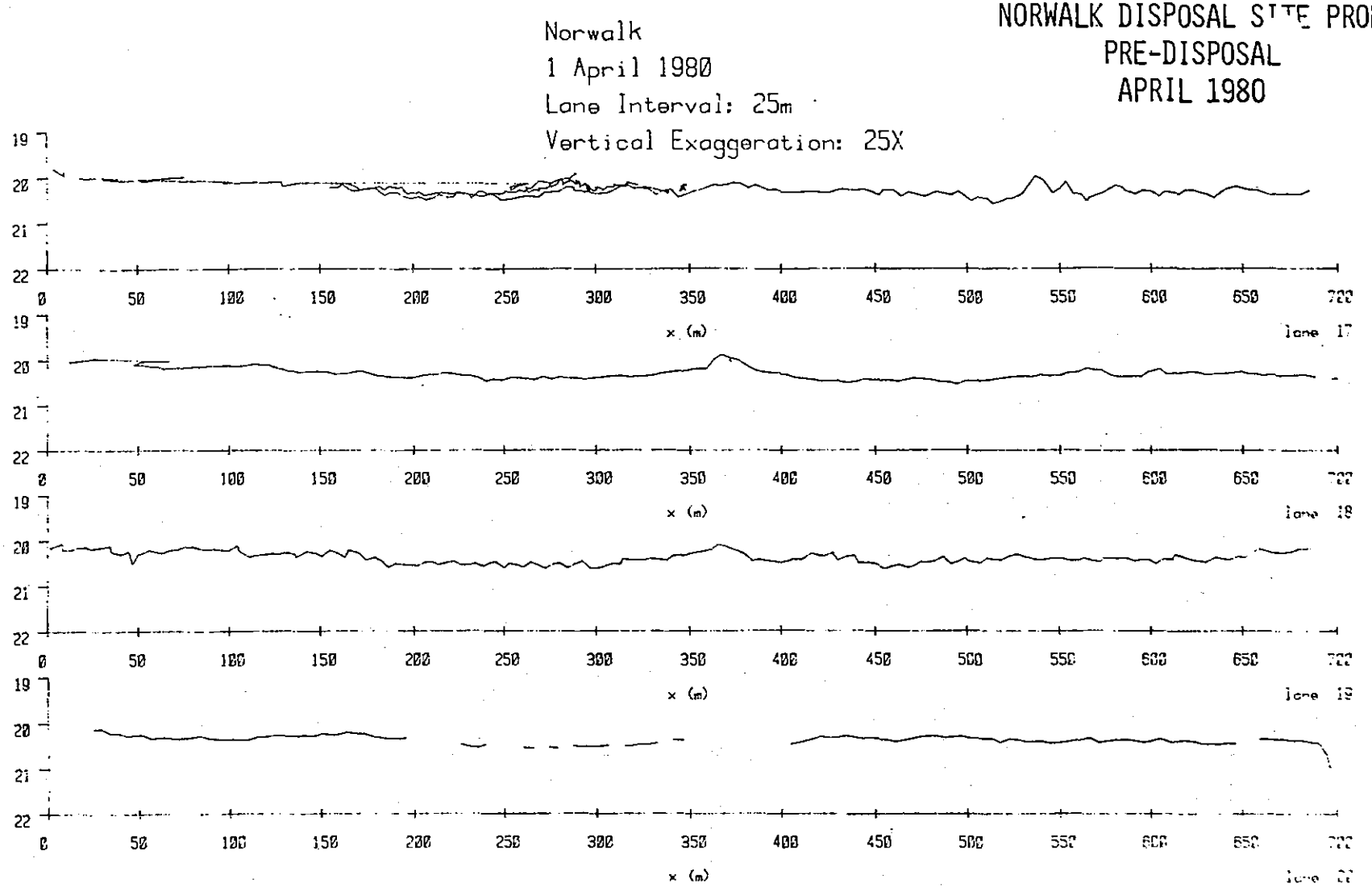


FIGURE 3.0-2

NORWALK DISPOSAL SITE PROFILES

POST-DISPOSAL

JUNE 1980

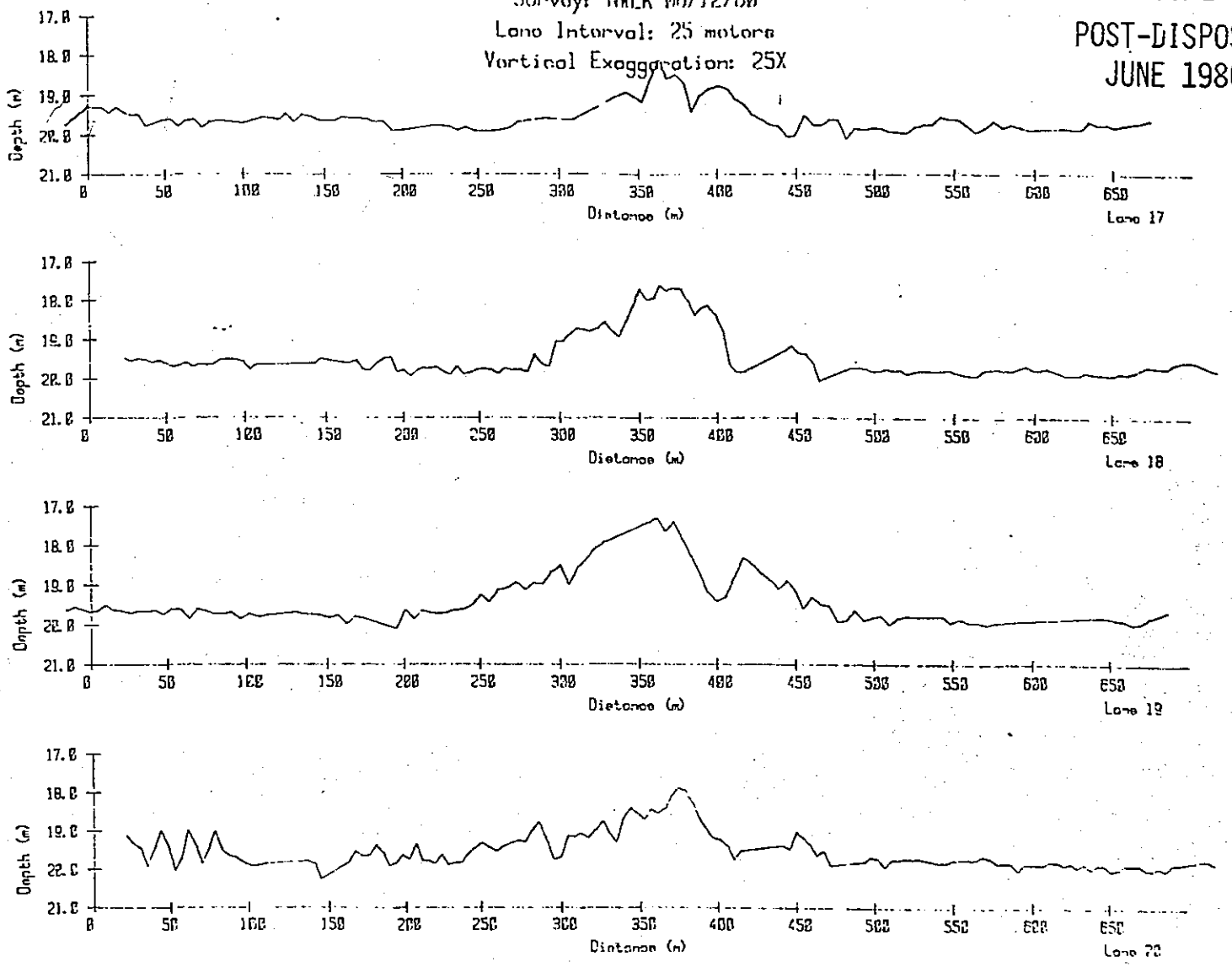


FIGURE 3.0-3

It is interesting to note the similarity in micro-topography developed on this project with the initial stages of the Stamford-New Haven operation (Figure 3.0-4). In both cases the cohesiveness of the dredged material combined with the accuracy of the disposal operation has created a mound with topographic variations on the order of the sediment thickness. As additional dredge material is added, the topography can be expected to become smaller relative to the spoil thickness as voids and depressions are filled.

In summary, the preliminary results of the Norwalk disposal operation are as expected and continued disposal according to the management plan is appropriate. Preliminary field observations of the New London and Stamford-New Haven disposal sites also confirms expected conditions and no problems related to significant spoil movement have been detected.

4.0 BOUNDARY LAYER TURBULENCE SYSTEM (BOLT)

Because of funding problems and workload schedules, the planned deployments of the BOLT system during the June-July time period have not taken place. Since this program is an integral part of the Suspended Sediment Program, steps have been taken to integrate this system under the Suspended Sediment Program with Dr. Frank Bohlen. Dr. Bohlen will be assisted in the development of a cohesive program and interpretation of data by Dr. Martin Miller of SAI. System hardware for the BOLT is fully operational, therefore, these steps to consolidate the program should result in field data within a short period of time.

5.0 SUSPENDED SEDIMENT (Dr. W. F. Bohlen)

During the initial period of the second year of this investigation, deployment of the instrumentation array described in the May 1980 progress report continued at the New London Disposal Site. Since this period marks the transition between the spring and summer seasons, deployments were scheduled to provide sampling of conditions during the end of the high energy winter storm season and observations during the beginning of the normally quiescent summer season. The winter-spring deployment commenced on March 17, 1980

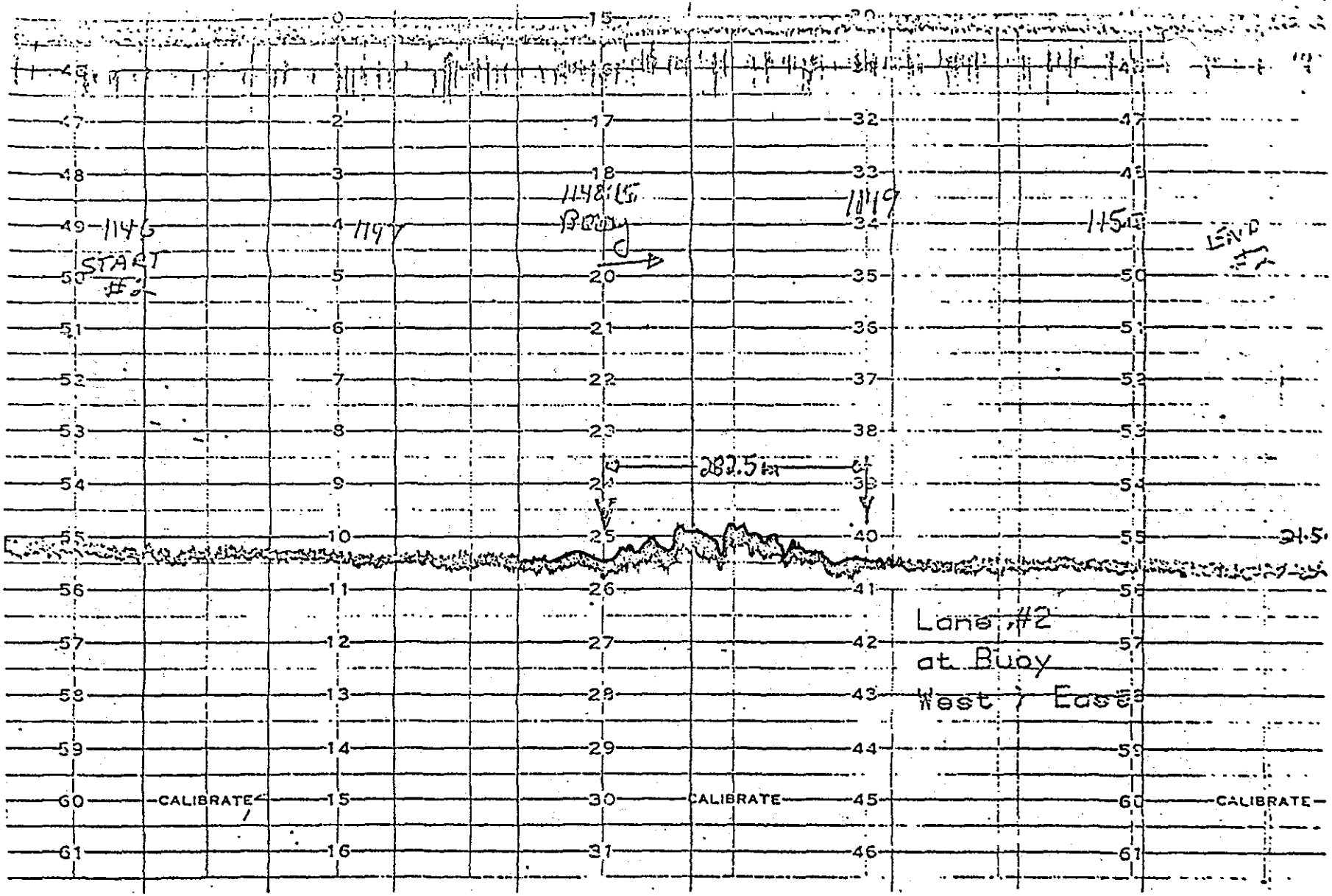


FIGURE 3.0-4

MIRCO-TOPOGRAPHY OF STNH-S SPOIL MOUND
20,000 YD^3 INCREMENT
STNH DISPOSAL OPERATION
MONITORING SURVEY REPORT #2

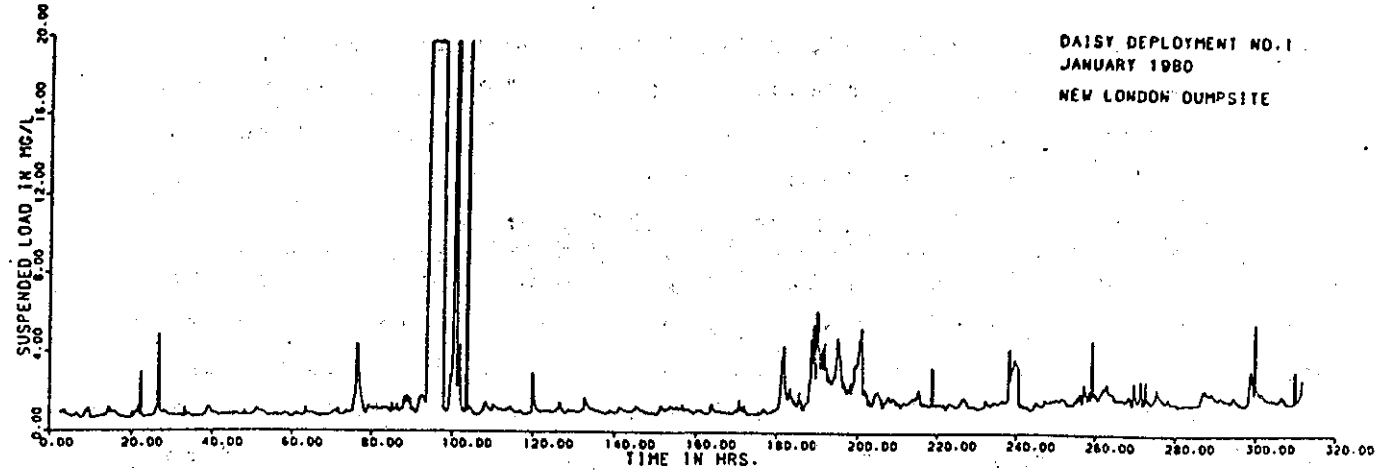
FIGURE 3.0-4

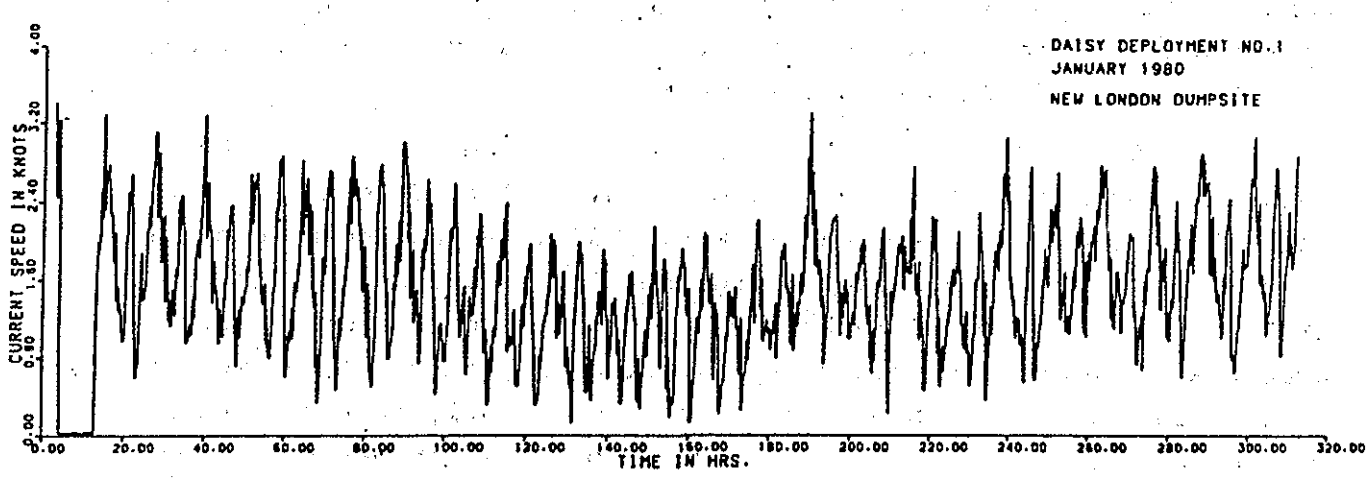
and ended April 18, 1980. All untis functioned satisfactorily. The spring-summer deployment commenced June 6, 1980 with recovery expected to take place during the first week of July 1980. During both deployments, the array was located at a site along the western margin of the disposal area in approximately 60 ft. of water.

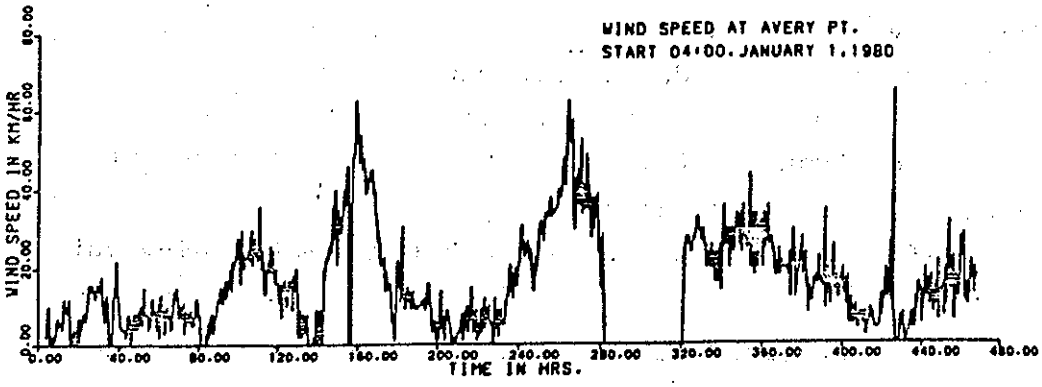
In addition to the field deployments emphasis during the March-June, 1980 period was also placed onthe reduction of the data obtained during the January and February, 1980 deployments and on some laboratory tests of a modified pump-filtration system intended for use with the instrumentation array. Computer programs designed to read the raw data provided by the Sea-Data system were completed and combined with a series of plotting routines to provide rapid access to the data. A sample output plot for the January, 1980 deployment period is shown in Figures 5.0-1 and 5.0-2.

The completion of the computer programming required to read and reveiw the field data permits initiation of detailed data analysis. These efforts began in May, 1980 with particular emphasis placed on the data developed during the first deployment in January, 1980. This was a period marked several high intensity wind stress events and regular disposal of spoils dredged from the lower Thames River. This combination of events is shown clearly in the nephelometer record (Figure 5.0-1a). The short duration peaks in material concentration coincide with disposal operations. The longer duration maxima tend to be associated with storm events. The response of the system to these latter events again appears to be highly non-linear and it is evident that several periods of high wind stress were not accompanied by increased suspended material concentrations. When comparing the wind record (Figure 3.0-1c) with the nephelometer output (Figure 3.0-1a), note the difference in time base.
(Nephelometer T = 0 @ 1050 est January 4, 1980. Winds T = 0 @ 0400 est January 1, 1980).

The cause of the observed non-linear response of the suspended material field to wind stress dominated storm events has received considerable attention during the past 3 months. Given the anomaly evident in the current meter (Figure 3.0-1b) record and the essential absence of significant freshwater inputs (see Conductivity record,



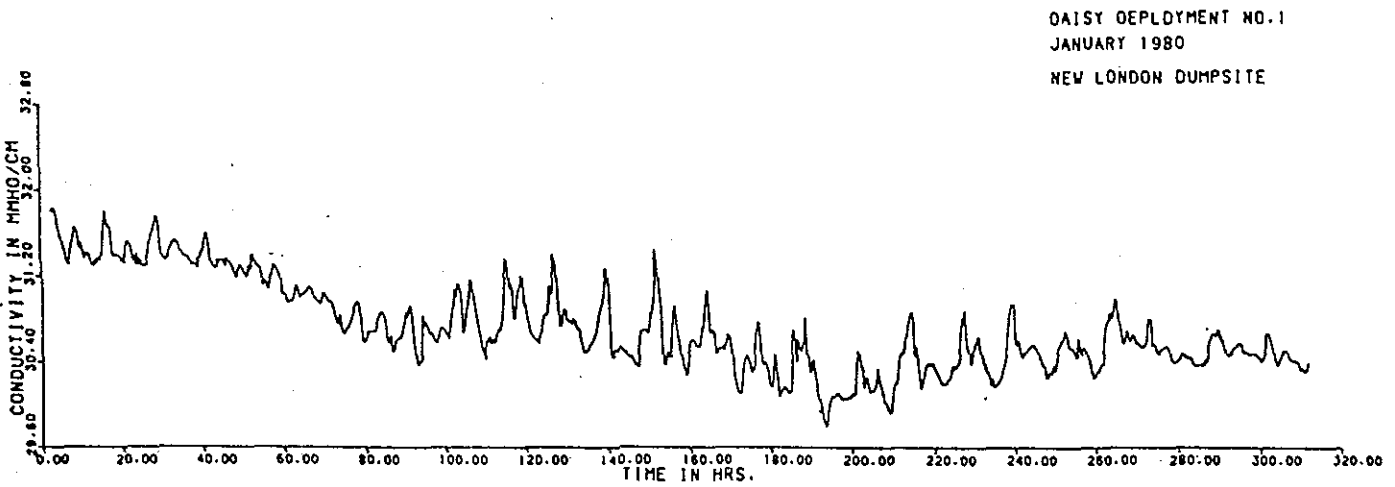




DAISY DATA - January 1980

1a (top) Nephelometer output
1b (middle) Current meter record
1c (bottom) Wind speed - Avery Point Station

FIGURE 5.0-1



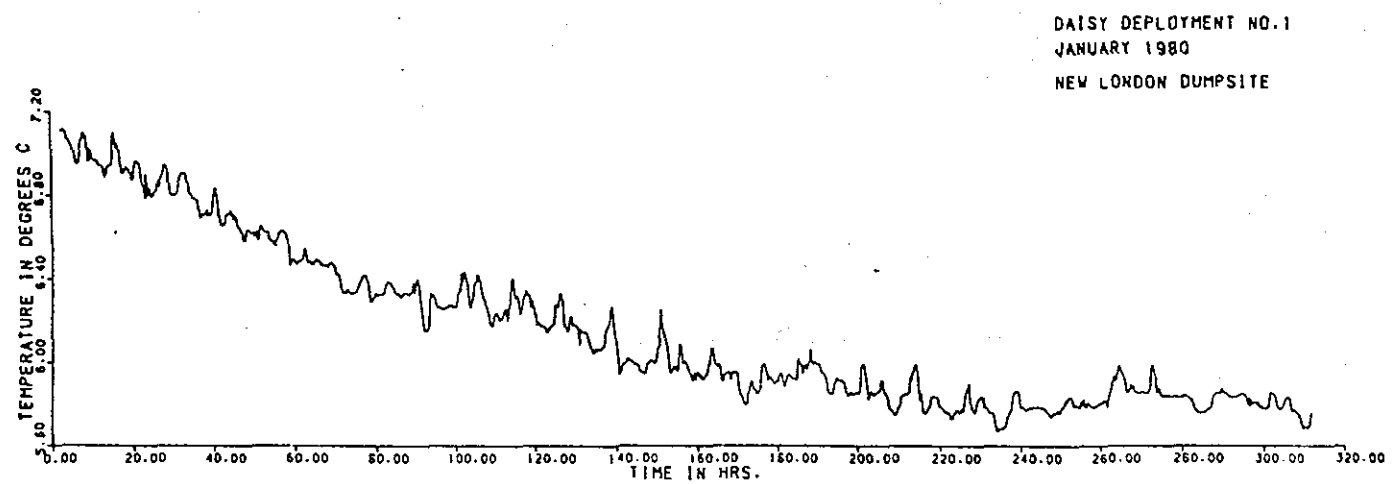


FIGURE 5.0-2

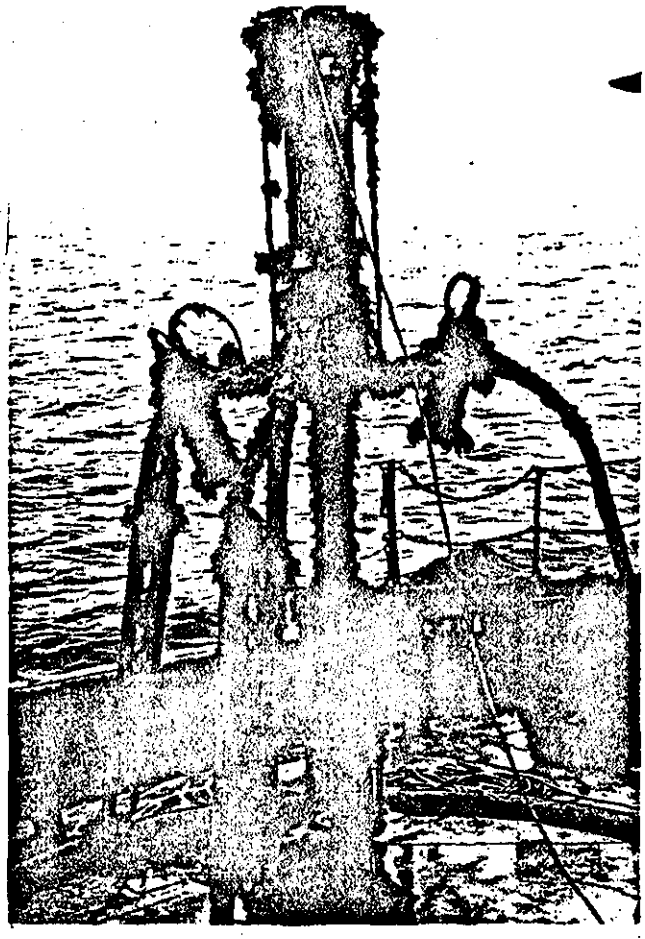
DAISY DATA - January 1980

2a (top) Conductivity cell output
2b (bottom) Near bottom water temperatures

Figure 5.0-2a). It appears that response is at least in part the result of wave-current interactions. Wave records obtained using a wave-rider buoy deployed just west of the dumpsite by the U.S. Coast Guard Research and Development unit are presently being reviewed to test the accuracy of this hypothesis. Those reveiws should be completed within the next month.

As indicated in the May, 1980 Progress Report, the pump filtration unit intended for use within the instrumentation array failed to function satisfactorily during its first deployment in January 1980 and was returned to the manufacturer, K-V Associates, for modification. The unit was again received on May 21, 1980 and subjected to a series of laboratory tests prior to field deployment. These tests again indicate that the unit as designed provides insufficient vacuum to permit sampling of the suspended material field using Nuclepore filters. In addition, there remains gross uncertainty regarding the volume of water passed through the filter. At the manufacturer's request a series of glass-fiber filters are being tested. Initial results indicate that they will not be able to provide the stability required to make accurate by-weight measurements of suspended material concentrations.

Despite the apparent difficulties, the pump-filtration unit was included in the array deployed on June 6, 1980. The purpose of the deployment was to provide a test of the unit under actual field conditions. The unit was recovered on July 10, 1980 from the monitoring site located along the western margin of the New London Disposal Area. On recovery the unit was found to be severly fouled by a fringing weed that appeared to be a hydroid (Figure 5.0-3). Despite the density of this growth, however, all primary instruments were functioning properly although data quality was significantly reduced. A review of the raw data plots (Figures 5.0-4-5.0-8) indicates that significant fouling commenced on the 10th day of the deployment and thereafter produced a rapid deterioration in data quality. This period and the observed rate of fouling are similar to that observed during previous experiments using buoyed arrays (Bohlen , 1974) and appear to be generally respesentative of conditions prevailing in the absence of an antifoulant coating. Such a coating will be tested on the next deployment if significant fouling conditions are still



DAISY Following Recovery From
Deployment No. 4
June-July,1980

FIGURE 5.0-3

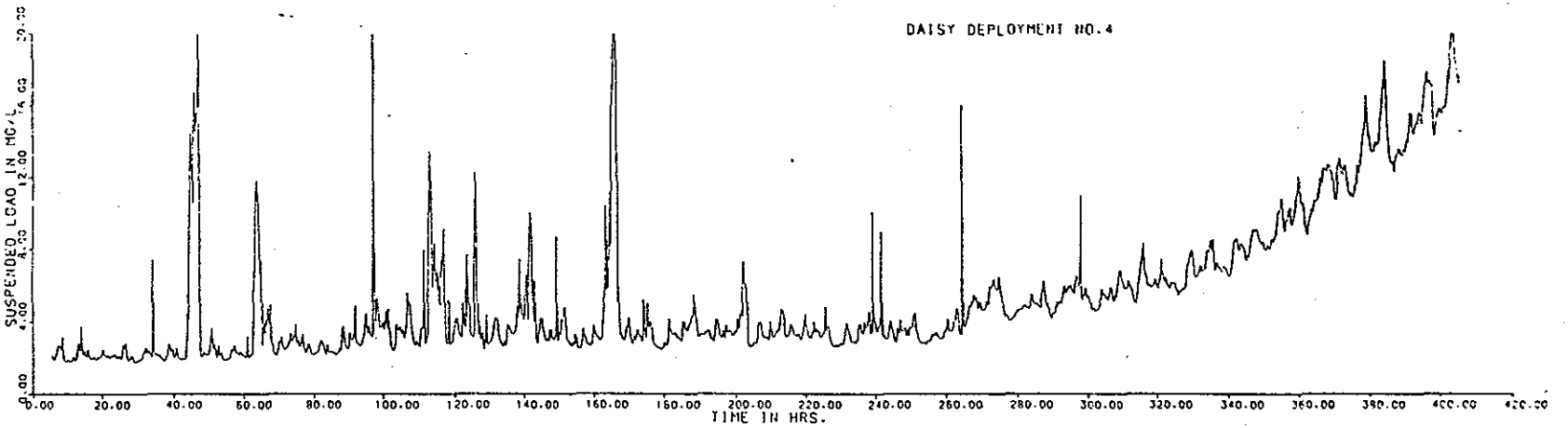
present. Despite this testing, however, it will continue to be our policy to minimize the use of antifoulants and instead to simply reduce deployment duration during the summer in order to permit frequent mechanical cleaning of the array and sensors in order to reduce the interaction of antifoulants with the ongoing and planned heavy metal monitoring.

In addition to the routine monitoring of hydrographic conditions and associated suspended material concentrations (results shown in Figures 5.0-4-5.0-8) the fourth deployment period was also used to test the modified pump-filtration unit. As indicated above, this unit, following failure in Deployment 1, had been returned to the manufacturer for redesign and repair. The June Deployment, therefore, represented its second major field test. Very briefly, the unit again failed to function satisfactorily. Disassembly following recovery indicates that this failure was the result of a frozen sampling piston apparently induced by sediment accumulations within the sample cylinder. These accumulations were sufficient to cause failure after one day of deployment. This duration indicates that piston binding was induced by a relatively small amount of sediment (suspended material concentrations were not particularly high during the first day; see Figures 5.0-4 and 5.0-5) and suggests that clearance on the piston seal (O-rings) is insufficient for normal operating conditions. Fouling and larger volume sediment accumulations represent a negligible influence in this case.

The next step in the design and development of a useful pump-filtration unit is unclear. The unit will again be returned to the manufacturer. However, given its present deficiencies, it is doubtful that simple repair will prove adequate. What is required is a total redesign incorporating a differenct sampling system. Such a system can be developed and it is recommended that such development be accomplished during the next year of this project. The incorporation of such a sampler within the DAISY array will significantly extend the utility of the sediment data, particularly relative to interpretation of Mussel Watch data.

As initiated during the March-June period the analysis of the data obtained during the first three deployments is continuing.

FIGURE 5.0-4



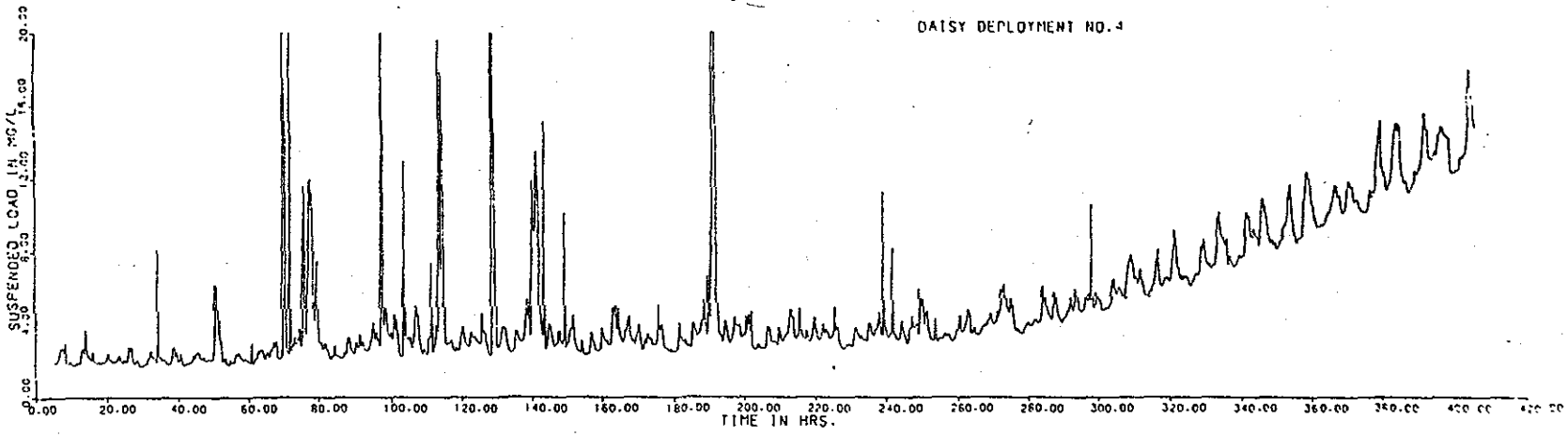
Suspended Material Concentrations

Nephelometer No. 1

New London Dumpsite Station

June-July 1980

FIGURE 5.0-5



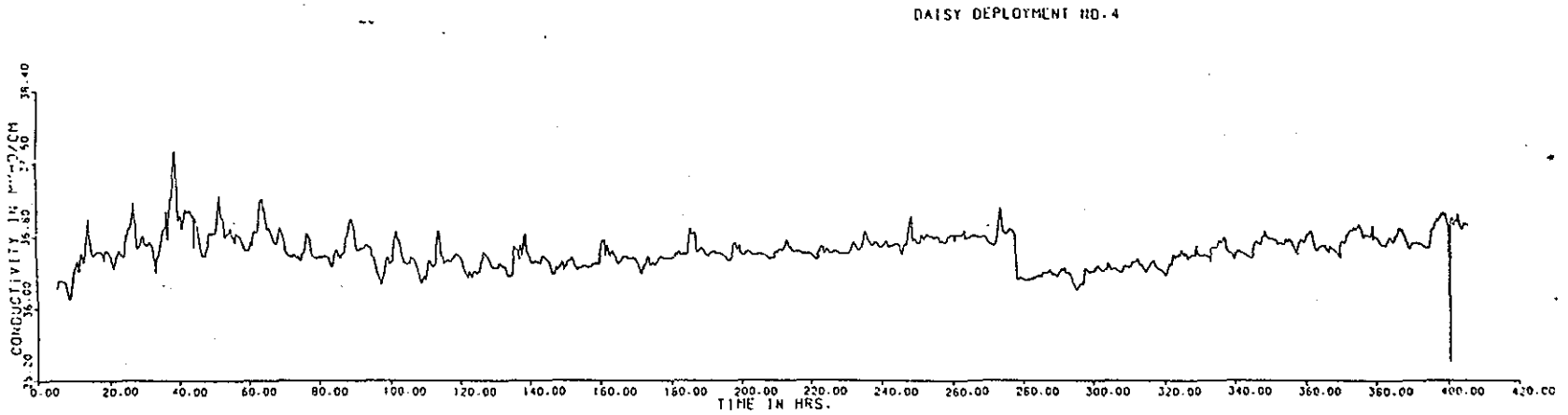
Suspended Material Concentrations

Nephelometer No. 2

New London Dumpsite Station

June-July 1980

FIGURE 5.0-6

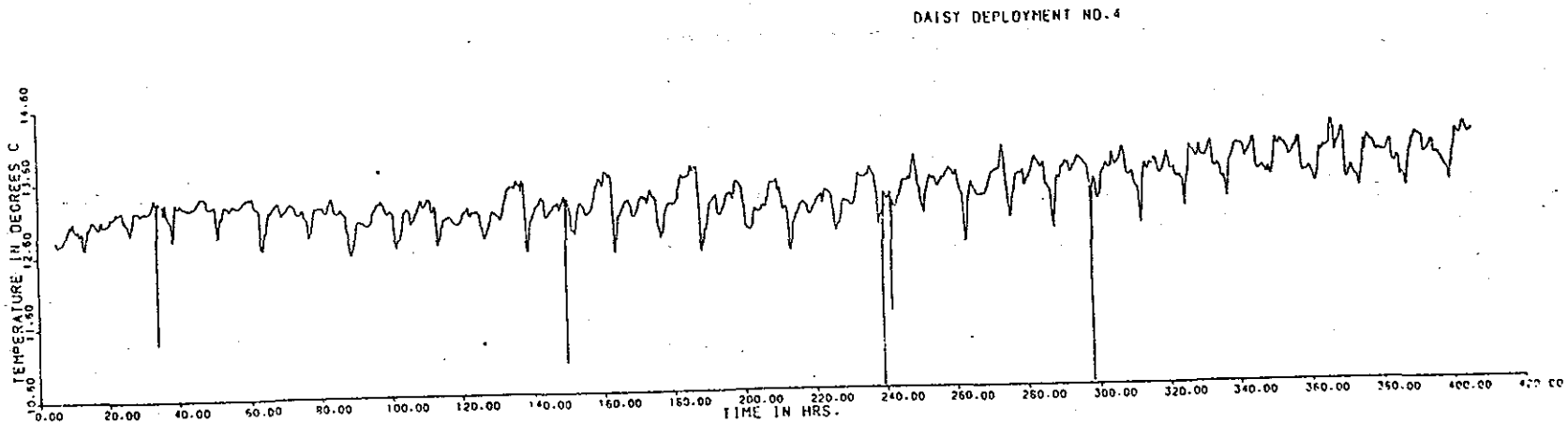


Near Bottom Conductivity

New London Dumpsite Station

June-July 1980

FIGURE 5.0-7

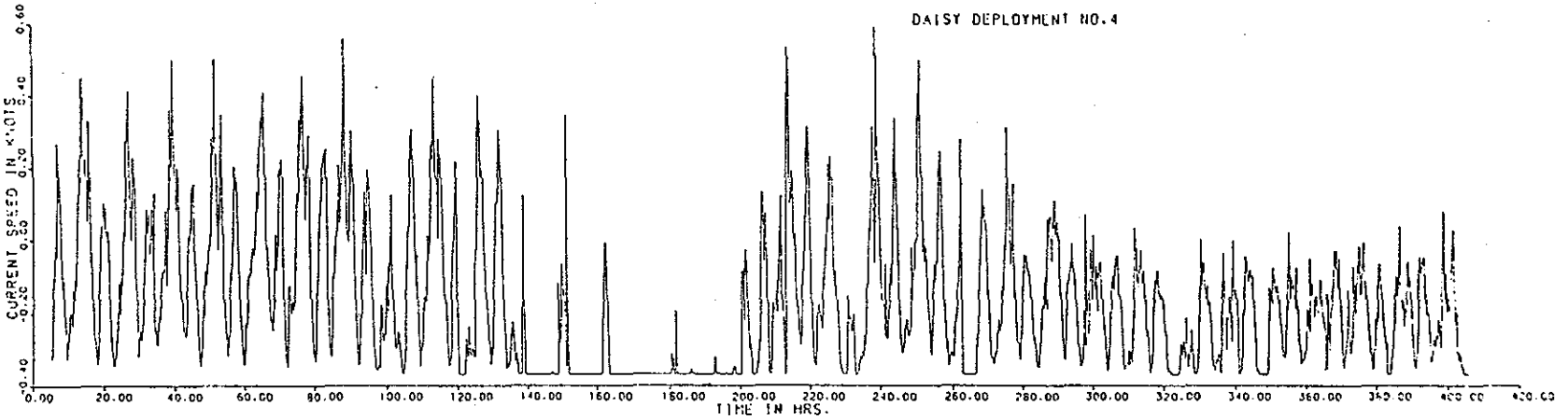


Near Bottom Water Temperature

New London Dumpsite Station

June-July 1980

FIGURE 5.0-8



Near Bottom Currents

New London Dumpsite Station

June-July 1980

Particular emphasis has been placed on four events which were observed during January 1980. These events clearly display the non-linearity inherent in the suspended material field found in eastern Long Island Sound. It appears that the magnitude of sediment resuspension is closely correlated with the response of local sealevel stands to the passage of a storm. The mechanics of this response are presently being investigated. If the correlation continues to hold up, it may prove feasible to monitor sediment resuspension in eastern Long Island Sound, using simple shore-side tide gages.

Finally, during the past two months it has been determined that the BOLT array will not be available for deployment this summer. As a result, our planned joint observations cannot be conducted. Discussions have been initiated in order to determine the best way to proceed so as to permit future BOLT-DAISY joint deployments. Such deployments are still considered essential to the DAMOS program and a final decision and future scheduling should be realized within the next month.

6.0 SEDIMENT CHEMISTRY (Dr. E. Jones)

Continued analysis of sediment chemistry from the Stamford-New Haven disposal operation has been accomplished. Although complete statistical results have not yet been determined, significant information has been obtained by examining and interpreting the distribution of mean heavy metal concentrations. From previous work under the DAMOS program it has been shown that there are statistically significant differences between natural bottom sediment at the disposal site, Stamford dredged material and New Haven dredged material. Furthermore, DAMOS data have shown that the greater the concentration of heavy metals, the larger the variation between samples and conversely the lower the concentration the less the variability.

With this knowledge and with the sample descriptions made aboard ship, interpretation of sediment chemistry data is readily accomplished and appears consistant with hypotheses. Figures 6.0-1 through 6.0-4 are examples of data for one metal (copper) observed at the STNH-S disposal site. These figures show copper concentration as a function of distance from the disposal point over the period of time

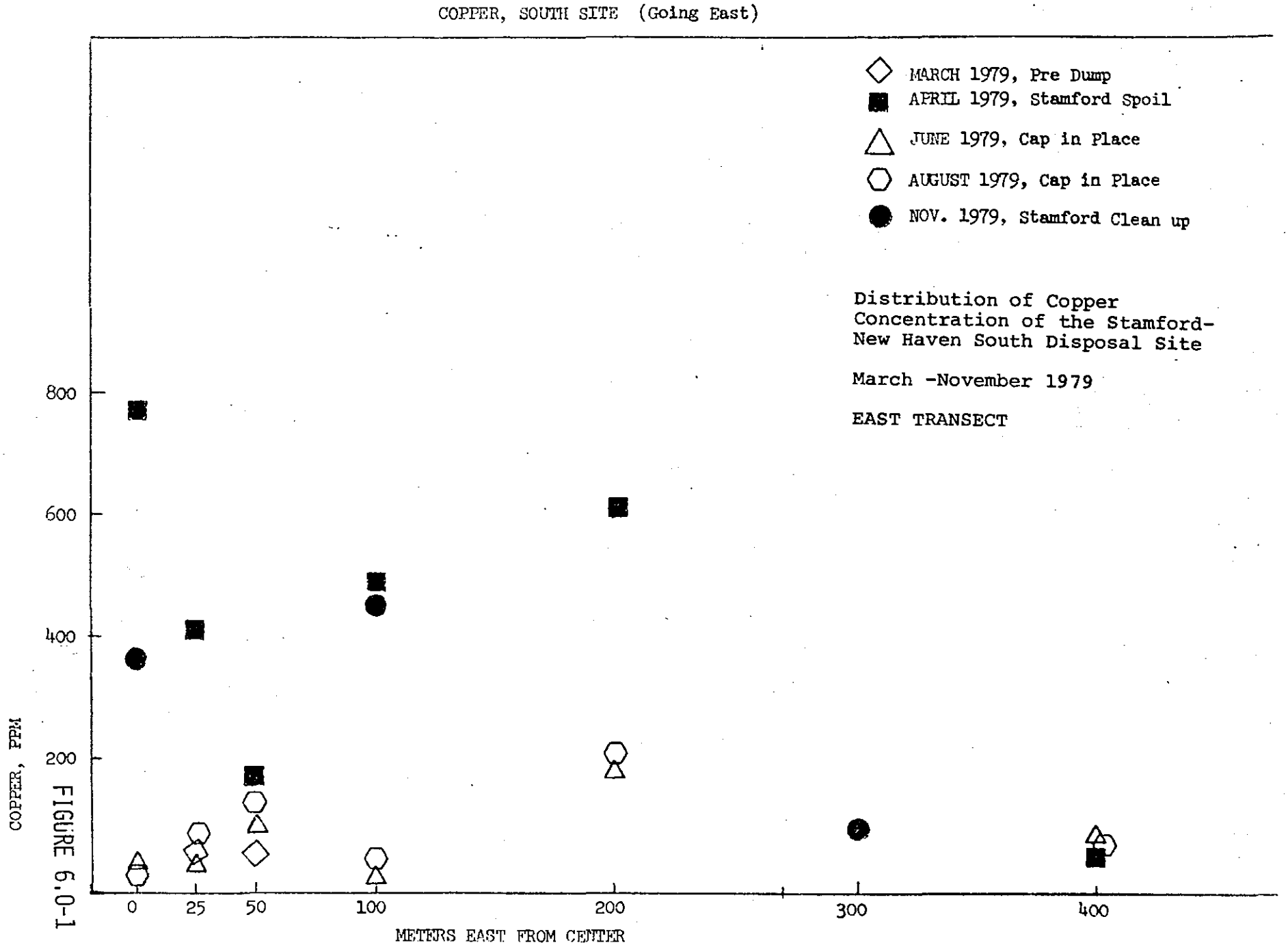

COPPER, SOUTH SITE (Going East)
MARCH 1979, Pre Dump
APRIL 1979, Stamford Spoil
JUNE 1979, Cap in Place
AUGUST 1979, Cap in Place
NOV. 1979, Stamford Clean up
Distribution of Copper Concentration of the Stamford-New Haven South Disposal Site
March -November 1979
EAST TRANSECT
800
600
400
200
COPPER, PPM
0
25
50
100
200
300
400
METERS EAST FROM CENTER

FIGURE 6.0-1

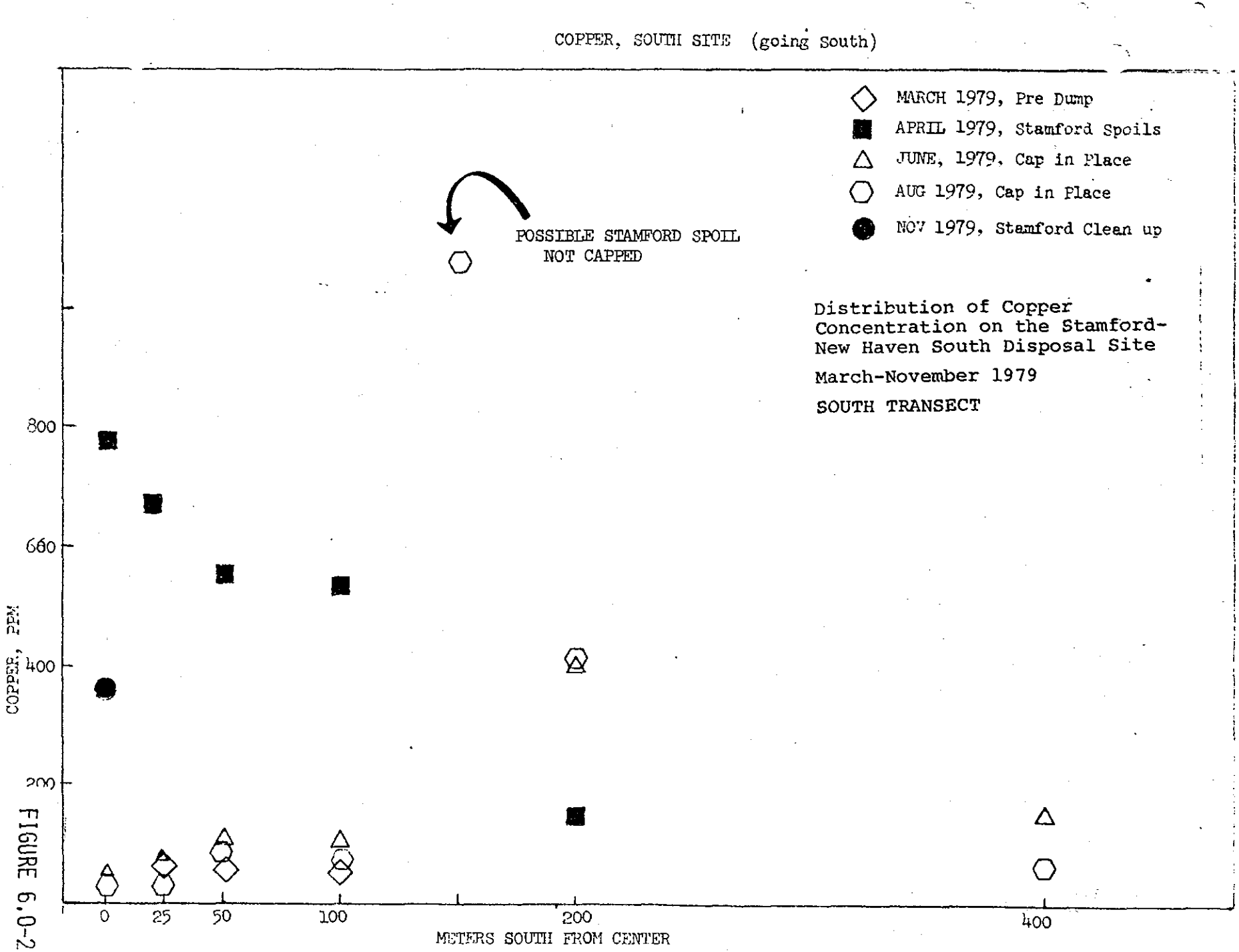

COPPER, SOUTH SITE (going South)
MARCH 1979, Pre Dump
APRIL 1979, Stamford Spoils
JUNE, 1979, Cap in Place
AUG 1979, Cap in Place
NOV 1979, Stamford Clean up
POSSIBLE STAMFORD SPOIL NOT CAPPED
Distribution of Copper Concentration on the Stamford-New Haven South Disposal Site
March-November 1979
SOUTH TRANSECT
800
600
400
200
COPPER, PPM
0
25
50
100
200
400
METERS SOUTH FROM CENTER

FIGURE 6.0-2

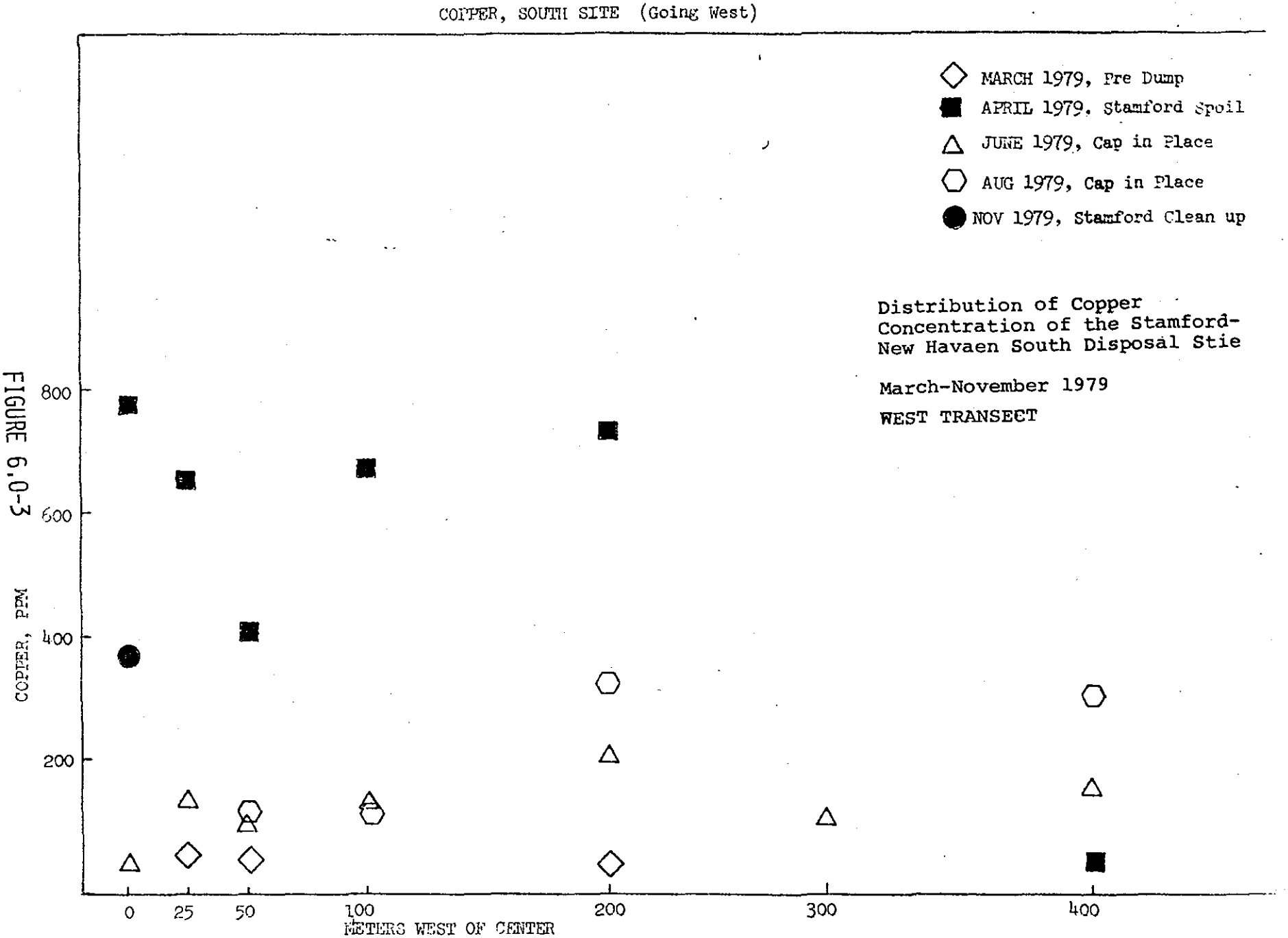

COPPER, SOUTH SITE (Going West)
MARCH 1979, Pre Dump
APRIL 1979, Stamford Spoil
JUNE 1979, Cap in Place
AUG 1979, Cap in Place
NOV 1979, Stamford Clean up
Distribution of Copper Concentration of the Stamford-New Havaen South Disposal Stie
March-November 1979
WEST TRANSECT
COPPER, PPM
800
600
400
200
0
25
50
100
200
300
400
METERS WEST OF CENTER

FIGURE 6.0-3

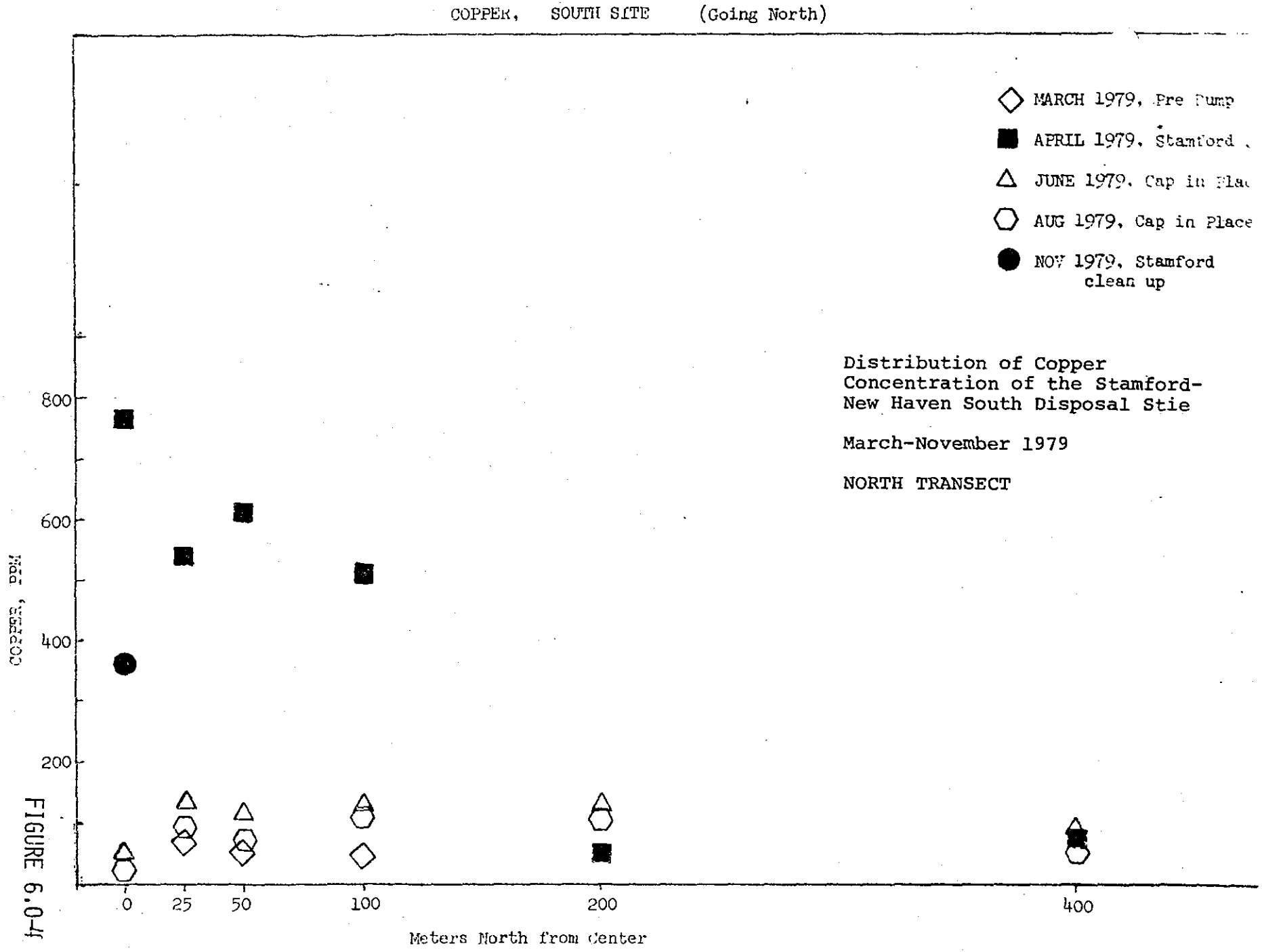

COPPER, SOUTH SITE (Going North)
MARCH 1979, Pre Pump
APRIL 1979, Stamford
JUNE 1979, Cap in Pla
AUG 1979, Cap in Place
NOV 1979, Stamford clean up
Distribution of Copper Concentration of the Stamford-New Haven South Disposal Stie
March-November 1979
NORTH TRANSECT
COPPER, ppm
800
600
400
200
0
25
50
100
200
400
Meters North from Center

FIGURE 6.0-4

prior to disposal until November 1979, the latest sample suite analyzed. The most striking aspect of these figures is the high concentration of copper found within a 100 meter radius of the disposal point during the April 1979 sample period. This cruise took place immediately after completion of Stamford disposal and as expected the material near the disposal point has high concentrations and high variability in copper content. At most distances beyond 100 m and all distances beyond 200 meters the copper content returns to background levels.

The June and August data all indicate significant drops in copper concentration within the 100 meter radius of the disposal point. The copper concertrations during that period approach background levels indicating that the capping material is in place and effectively isolating the Stamford material. The values during this period are on the order of 1-200 parts per million whereas the Stamford material has values from 400-800 parts per million. In all cases values at 400 meters from the disposal point are indicative of background sediment.

Sampling in November 1979 was conducted after disposal of additional clean up material from Stamford harbor at the disposal buoy. Because of time limitations the only samples retained were those that had indications of Stamford spoil present and these were all located east of the disposal buoy (Figure 6.0-1) This distribution reflected the general character of disposal observed at the beginning of operations where the drift of the scow from west to east resulted in an offset of the spoil mound relative to the disposal buoy. The results of the November sampling indicated copper levels higher than background but not as high as those characterizing the initial disposal. The one observation off the spoil mound 300 meters east indicated normal sediment levels of copper.

In summary, the sediment chemistry supports the physical and visual observations of capping material distribution and should provide a valid tool for long term monitoring of the effectiveness of the cap in isolating Stamford material. Background data on the Norwalk disposal operation will be obtained during the August 1980 cruise to permit similar evaluation of capping procedures at that site.

7.0 BENTHIC ECOLOGY (Dr. A. Brooks)

Since the previous progress report several computer programs have been obtained which include a variety of techniques for the numerical classification of ecologic data. It is anticipated that selected DAMOS benthic data collected between 1977 and 1979 will be subjected to analysis by these methods and that the results will aid in simplifying patterns of collection resemblance and species distribution patterns. Some of the program alterations necessary to make the programs compatible with available computer hardware have been effected and a few preliminary runs using trial data have been completed. A great deal of work on this aspect of the analysis of the benthic data remains to be done, however.

A large number of grain size analyses for samples collected at DAMOS stations has been received from the New England Division of the Army Corps of Engineers including some from the most recent sampling cruise during March-April 1980.

An updated listing of all DAMOS stations which have been sampled or will be sampled in the immediate future is shown in Table 7.0-1. Station identification numbers given in this report will be designated according to the numbering sequence in this listing.

Table 7.0-2 gives the total number of individuals (N), the total number of species (S), the Shannon-Weaver diversity index (H') and a vaule for equitability (J') for all grabs collected for benthic analysis during the first four major DAMOS cruises (i.e. Winter-Spring 1977078, Spring-Summer 1978, Winter 1978-79, and Spring-Summer 1979). Analytical data on the benthos collected during the most recent cruise (i.e. Spring, 1980) is not yet available.

Table 7.0-3 lists the mean number of individuals ($\bar{N}$), the mean number of species ($\bar{S}$), the mean diversity index ($\bar{H}'$), the mean equitability ($\bar{J}'$) and the number of dredges/grabs (n) upon which each mean is based for all sample collections shown in Table 7.0-2. Stations in Table 7.0-3 have been separated into three geographic regions, namely, those located in the Gulf of Maine, those in Rhode Island and the Long Island Sound stations.

Table 7.0-1

1. Rockland Disposal Site
2. Rockland Canyon
3. Portland Disposal Site
4. Portland Disposal Site - Inner Edge
5. Portland Disposal Site - Outer Edge
6. Portland Reference
7. Isle of Shoals
8. Boston Foul Ground
9. Boston Lightship
10. Branton Reef Disposal Site
11. Brenton Reef Disposal Site - Inner Edge
12. Brenton Reef Disposal Site - Outer Edge
13. Branton Reef Reference
14. New London Disposal Site (C-6)
15. New London Disposal Site - Inner Edge
16. New London Disposal Site - Outer Edge
17. New London Reference #1 (F-8)
18. New London Reference #2 (A10-3)
19. Cornfield Shoal Disposal Site
20. Cornfield Shoal Reference
21. New Haven Disposal Site
22. New Haven Reference (Northwest Control)
23. New Haven Reference (Southern)
24. Stamford-New Haven North - Disposal Point
25. Stamford-New Haven North - Inner Edge
26. Stamford-New Haven North - Outer Edge
27. Stamford-New Haven South - Disposal Point
28. Stamford-New Haven South - 1000M East
29. Stamford-New Haven South - 1000M West

Table 7.0-1 (continued)

30. Stamford-New Haven South - Inner Edge
31. Stamford-New Haven South - Outer Edge
32. New Haven - Norwalk - Disposal Point
33. New Haven - Norwalk - Inner Edge
34. New Haven - Norwalk - Outer Edge
35. Cable and Anchor Reef Disposal Site
36. Proposed Western Long Island Sound Disposal Site
37. Cable and Anchor and Western Long Island Sound Reference
38. Actual Western Long Island Sound Disposal Site
39. Greens Ledge

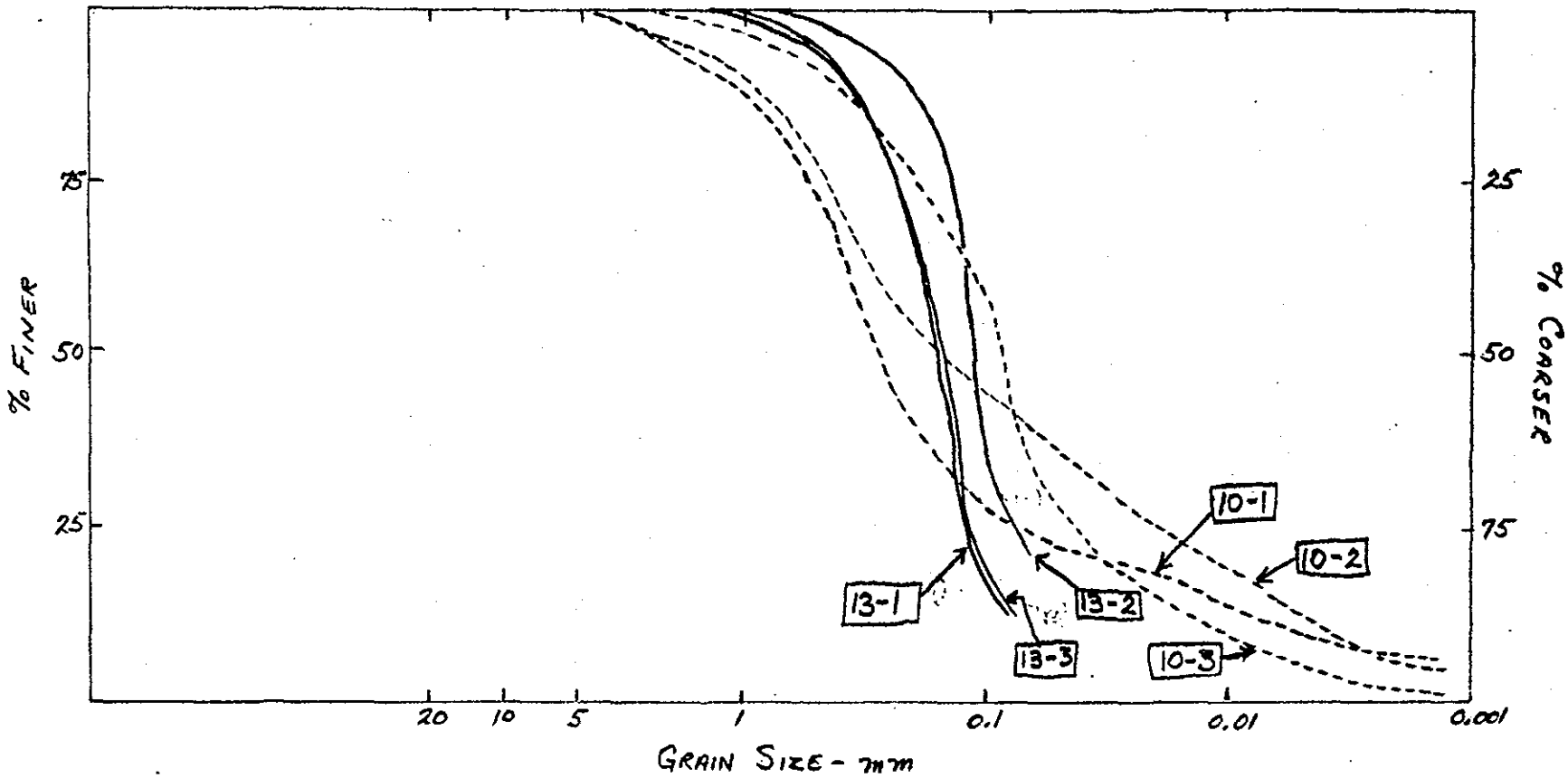


FIGURE 7.0-1

GRAIN SIZE ANALYSIS - BRENTON REEF REFERENCE - 13-1, 2 & 3
AND BRENTON REEF DUMPSITE - 10-1, 2 & 3
CUMULATIVE CURVES

DAMOS BENTHOS - GULF OF MAINE

STN No.	DATE	GRAB No.	N	S	H'	J'
1. ROCKLAND DISPOSAL SITE	12/77	1	790	16	0.41	0.15
		2	301	10	0.27	0.12
	5/78	1	73	13	1.36	0.53
		2	284	19	0.70	0.24
		3	94	11	0.89	0.37
	11/78	1	41	13	1.95	0.76
		2	71	16	1.98	0.72
		3	114	15	1.61	0.59
	6/79	1	72	15	2.24	0.83
		2	106	23	2.34	0.75
		3	194	28	2.32	0.70
		4	114	16	2.19	0.79
		5	54	15	2.34	0.87
3. PORTLAND DISPOSAL SITE	12/77	1	300	54	3.08	0.77
		2	26	18	2.78	0.96
		3	361	50	3.29	0.84
	5/78	1	77	35	3.21	0.90
		2	171	48	3.22	0.83
		3	128	49	3.46	0.89
	11/78	1	18	11	2.18	0.91
		2	59	32	3.09	0.89
		3	89	35	2.97	0.84
	6/79	1	156	49	3.28	0.83
		2	235	49	3.04	0.78
		3	180	56	3.30	0.82
		4	211	56	3.22	0.80
		5	141	49	3.34	0.86

TABLE 7.0-2

DAMOS BENTHOS - GULF OF MAINE

STN No.	DATE	GRAB No.	N	S	H'	J'
7.	12/77	1	109	35	3.10	0.87
		2	71	21	2.68	0.88
		3	236	51	3.16	0.80
		4	401	48	2.85	0.74
SITE						
DISPOSAL	5/78	1	174	32	2.63	0.76
		2	82	28	2.70	0.81
		3	1070	35	1.59	0.45
SHOALS	12/78	1	106	24	4.24	1.33
		2	108	27	2.75	0.83
		3	144	34	2.92	0.83
OF	6/79	1	360	35	1.98	0.56
		2	313	42	2.05	0.55
ISLE		3	239	26	1.35	0.42
		4	569	37	1.41	0.39
		5	247	29	2.09	0.62
8.	12/77	1	18	9	1.87	0.85
		2	97	31	3.12	0.91
		3	64	20	2.59	0.87
GROUND						
	5/78	1	52	24	2.83	0.90
		2	102	17	2.30	0.81
		3	54	23	2.75	0.88
FOUL	12/78	1	90	22	2.54	0.82
		2	58	17	2.44	0.86
		3	62	20	2.58	0.86
BOSTON						
	6/79	1	80	22	2.32	0.75
		2	105	22	1.96	0.63
		3	110	28	2.18	0.65
		4	138	29	2.36	0.70
		5	202	26	1.37	0.42

TABLE 7-0-2 (CONT'D)

DAMOS BENTHOS - GULF OF MAINE

STN No.	DATE	GRAB No.	N	S	H'	J'
4.	12/77	1	126	31	2.52	0.73
		2	119	29	2.61	0.77
		3	13	9	1.95	0.89
LIGHTSHIP	5/78	1	81	31	3.05	0.89
		2	81	26	2.90	0.89
		3	109	31	2.84	0.83
	12/78	1	79	26	2.67	0.82
		2	88	23	2.58	0.82
		3	120	25	2.49	0.77
BOSTON	6/79	1	425	38	1.83	0.50
		2	472	31	1.28	0.37
		3	602	35	1.30	0.37
		4	357	36	1.66	0.46
		5	263	30	1.74	0.51

DAMOS BENTHOS - R. I. BIGHT

10.	4/78	1	18	9	1.91	0.87
		2	2	2	0.69	1.00
		3	11	6	1.72	0.96
SITE						
	8/78	1	155	29	2.53	0.75
		2	206	26	1.21	0.37
		3	177	31	1.66	0.48
DISPOSAL						
	12/78	1	32	11	1.51	0.63
		2	36	15	2.45	0.91
		3	43	11	1.58	0.66
REEF						
	5/79	1	41	14	2.19	0.83
		2	71	18	2.31	0.80
		3	132	15	1.45	0.53
		4	34	16	2.22	0.80
BERM		5	41	12	1.87	0.75

TABLE 7.0-2 (CONT'D)

DAMOS BENTHOS - R.I. BIGHT

STN No.	DATE	GRAB No.	N	S	H'	J'
13. BRENTON REEF REFERENCE	4/78	1	2481	40	1.04	0.28
		2	4393	48	1.08	0.28
		3	3568	49	1.13	0.29
	8/78	1	2054	49	1.25	0.32
		2	2309	45	1.19	0.31
		3	2061	48	1.19	0.31
	12/78	1	2699	39	0.73	0.20
		2	1316	38	1.03	0.28
		3	2816	33	0.75	0.21
	5/79	1	856	40	1.52	0.41
		2	1270	45	1.18	0.31
		3	1540	46	0.97	0.25
		4	1593	45	0.95	0.25
		5	1529	53	1.10	0.28

DAMOS BENTHOS - LONG ISLAND SOUND

STN No.	DATE	GRAB No.	N	S	H'	J'
14. NEW LONDON DISPOSAL SITE	4/78	1	12	6	1.35	0.75
		2	75	30	2.40	0.75
		3	766	46	1.12	0.29
	8/78	1	359	46	1.91	0.50
		2	138	55	3.44	0.86
		3	148	49	3.06	0.79
	1/79	1	88	25	1.90	0.59
		2	31	8	1.73	0.83
		3	76	21	1.71	0.56
		4	65	12	1.92	0.77
		5	130	20	1.53	0.51

TABLE 7.0-2 (CONT'D)

DAMOS BENTHOS - LONG ISLAND SOUND

STN No.	DATE	GRAB No.	N	S	H'	J'
14. MLOSD SITE (C-6)	5/79	1	93	19	2.20	0.75
		2	109	21	2.14	0.70
		3	134	17	1.64	0.58
		4	206	31	2.27	0.66
		5	132	29	2.16	0.64
17. NEW LONDON REFERENCE SITE (A-8)	4/78	1	279	45	2.07	0.54
		2	131	40	3.06	0.83
		3	91	34	2.73	0.77
	8/78	1	345	46	2.20	0.57
		2	125	38	3.14	0.86
		3	193	51	3.13	0.80
	1/79	1	361	41	2.00	0.54
		2	231	28	1.77	0.53
		3	519	37	2.08	0.58
		4	235	36	2.07	0.58
		5	598	36	1.46	0.41
	5/79	1	145	33	2.14	0.61
		2	341	41	2.00	0.54
		3	317	31	1.65	0.48
		4	242	36	2.04	0.57
		5	269	38	2.13	0.58
19. CORNFIELD SHOAL DISPOSAL SITE	1/78	1	1	1	0	0
		2	2	2	0.69	1.00
		3	6	2	0.45	0.65
	7/78	1	25	20	2.92	0.97
		2	17	7	1.57	0.81
		3	0	0	0	0

TABLE 7.0-2 (CONT'D)

DAMOS BENTHOS - LONG ISLAND SOUND

STN No.	DATE	GRAB No.	N	S	H'	J'
19. CORNFIELD SHOAL DISPOSAL SITE	1/79	1	6	5	1.56	0.97
		2	3	2	0.64	0.92
		3	6	4	1.24	0.90
		4	6	5	1.56	0.97
		5	6	3	0.87	0.79
20. CORNFIELD SHOAL REFERENCE	1/78	1	0	0	0	0
		2	15	2	0.50	0.72
		3	74	18	2.33	0.81
	7/78	1	22	4	1.30	0.94
		2	3	3	1.10	1.00
		3	0	0	0	0
	1/79	1	12	5	1.15	0.71
		2	6	6	1.20	0.67
		3	11	6	1.42	0.79
		4	16	6	1.38	0.77
		5	12	8	1.49	0.72
21. NEW HAVEN DISPOSAL SITE	4/78	1	68	13	1.59	0.62
		2	55	17	2.40	0.85
		3	348	26	2.14	0.66
	7/78	1	84	17	1.93	0.68
		2	45	11	1.96	0.82
		3	27	7	1.29	0.66
	1/79	1	104	19	2.00	0.68
		2	148	21	2.10	0.69
		3	120	28	2.27	0.68
		4	193	28	2.10	0.63
		5	108	24	2.56	0.81

TABLE 7.0-2 (CONT'D)

DAMOS-BENTHOS- LONG ISLAND SOUND

STN No.	DATE	GRAB No.	N	S	H'	J'
21. N. HAVEN DISPOSAL SITE	5/79	1	42	14	2.16	0.82
		2	74	26	2.71	0.83
		3	86	30	2.99	0.88
		4	184	35	2.59	0.73
		5	114	30	2.76	0.81
22. NEW HAVEN REFERENCE (N.W. CONTROL)	4/78	1	36	13	2.21	0.86
		2	59	15	1.81	0.67
		3	31	16	2.49	0.90
	7/78	1	189	11	1.13	0.47
		2	283	13	0.82	0.32
		3	372	19	1.22	0.41
	1/79	1	15	5	0.95	0.59
		2	25	6	1.22	0.68
		3	20	7	1.47	0.76
		4	24	7	1.19	0.61
		5	21	5	0.57	0.35
NEW HAVEN	5/79	1	29	6	1.16	0.65
		2	27	4	1.01	0.73
		3	260	11	0.97	0.41
		4	118	16	1.76	0.63
		5	114	17	2.02	0.71
24. STAMFORD-N. HAVEN NORTH + DUMP POINT	3/79	1	44	10	2.09	0.91
		2	17	8	1.79	0.86
		3	41	9	1.59	0.72
		4	30	8	1.82	0.88
		5	16	5	1.04	0.65

TABLE 7.0-2 (CONT'D)

DAMOS BENTHOS - LONG ISLAND SOUND

LOC	DATE	GRAB No.	N	S	H'	J'
27. SOUTH N. HAVEN POINT	1/79	1	47	18	1.91	0.66
		2	41	11	1.66	0.69
		3	44	7	1.35	0.69
		4	39	6	1.11	0.62
		5	53	9	1.46	0.67
STAMFORD DUMP	8/79	1	9	7	1.89	0.97
		2	7	5	1.55	0.96
		3	9	7	1.89	0.97
		4	5	3	0.95	0.87
		5	4	3	1.04	0.95
28. SOUTH (G)	1/79	1	36	10	1.92	0.83
		2	18	7	1.73	0.89
		3	25	8	1.37	0.66
		4	51	11	1.95	0.81
		5	42	10	1.56	0.68
STAMFORD-NEW HAVEN 1000 M EAST	5/79	1	36	9	1.48	0.67
		2	32	7	1.54	0.79
		3	35	9	1.86	0.85
		4	65	17	2.32	0.82
		5	36	10	1.94	0.84
	8/79	1	165	14	1.79	0.68
		2	37	9	1.60	0.73
		3	58	11	1.94	0.81
		4	107	19	1.78	0.60
		5	124	10	1.45	0.63

TABLE 7.0-2 (CONT'D)

DAMOS BENTHOS - LONG ISLAND SOUND

	DATE	GRAB No.	N	S	H'	J'
29. STAMFORD - NEW HAVEN SOUTH (7) 1000 M WEST	1/79	1	42	12	1.91	0.77
		2	36	13	1.68	0.65
		3	41	14	2.19	0.83
		4	23	10	1.75	0.76
		5	28	9	1.62	0.74
	5/79	1	43	12	2.04	0.82
		2	39	15	2.40	0.89
		3	37	10	1.96	0.85
		4	30	10	1.85	0.80
		5	25	10	1.84	0.80
	8/79	1	225	21	1.69	0.55
		2	132	13	1.60	0.62
		3	145	14	1.58	0.60
		4	138	13	1.42	0.56
		5	145	12	1.46	0.59
35. CABLE AND ANCHOR REEF DISPOSAL SITE	4/78	1	17	6	1.49	0.83
		2	20	7	1.15	0.59
		3	8	2	0.38	0.54
	7/78	1	34	9	1.76	0.80
		2	97	10	1.51	0.66
		3	42	13	2.11	0.82
	1/79	1	28	12	1.98	0.80
		2	49	15	2.30	0.85
		3	30	10	1.75	0.76
		4	44	13	2.09	0.82
		5	26	11	1.88	0.78

TABLE 7.0-2 (CONT'D)

DAMOS BENTHOS- LONG ISLAND SOUND

	DATE	GRAB No.	N	S	H'	J'
36. Proposed Western L.I. Sound Disposal Site	4/78	1	6	4	1.33	0.96
		2	11	6	1.42	0.79
		3	2	2	0.69	1.00
	7/78	1	68	5	0.75	0.47
		2	13	4	1.16	0.83
		3	79	6	0.99	0.55
	1/79	1	15	2	0.25	0.35
		2	9	3	0.68	0.62
		3	20	10	1.08	0.47
		4	19	5	0.81	0.50
		5	10	3	0.64	0.58
37. CAR & WLIS Reference	4/78	1	30	5	0.58	0.36
		2	18	6	1.35	0.75
		3	31	7	1.24	0.64
	7/78	1	111	10	1.15	0.50
		2	111	8	1.50	0.72
		3	340	8	0.61	0.29
	1/79	1	59	15	2.11	0.78
		2	23	12	2.03	0.82
		3	12	5	1.15	0.71
		4	28	6	1.41	0.79
		5	15	7	1.58	0.81
38. V IS Disposal Site (Actual)	5/79	1	63	6	1.09	0.61
		2	36	3	0.66	0.60
		3	63	4	0.90	0.65
		4	41	5	1.08	0.67
		5	28	5	0.95	0.59

TABLE 7.0-2 (CONT'D)

DAMOS BENTHOS- LONG ISLAND SOUND

-N. o.	DATE	GRAB No.	N	S	H'	J'
39.	5/79	1	36	11	2.03	0.85
		2	10	4	1.09	0.79
GREEN'S EDGE		3	32	8	1.42	0.68
		4	20	10	1.99	0.86
		5	51	5	0.92	0.57

TABLE 7.0-2 (CONT'D)

DAMOS BENTHOS - GULF OF MAINE

STN.	DATE	$\bar{N}$	95% CONF. INT.	$\bar{S}$	95% CONF. INT.	$\bar{H}'$	95% CONF. INT.	$\bar{J}'$	95% CONF. INT.	n
1.	12/77	546	—	13	—	0.34	—	0.14	—	2
	5/78	150	0 - 439	14	4 - 25	0.98	0.14 - 1.82	0.38	0.01 - 0.75	3
	11/78	75	0 - 161	15	11 - 18	1.85	1.36 - 2.34	0.69	0.48 - 0.90	3
	6/79	108	40 - 176	19	12 - 26	2.29	2.20 - 2.38	0.79	0.70 - 0.87	5
3.	12/77	229	0 - 672	41	0 - 90	3.05	2.40 - 3.70	0.86	0.61 - 1.11	3
	5/78	125	8 - 242	44	25 - 63	3.30	2.95 - 3.65	0.87	0.77 - 0.97	3
	11/78	55	0 - 138	26	0 - 57	2.75	1.61 - 3.89	0.88	0.79 - 0.97	3
	6/79	185	136 - 234	52	47 - 57	3.24	3.09 - 3.39	0.82	0.78 - 0.86	5
7.	12/77	204	0 - 441	39	17 - 61	2.98	2.57 - 3.39	0.83	0.70 - 0.96	4
	5/78	442	0 - 1798	32	23 - 40	2.31	0.77 - 3.85	0.67	0.17 - 1.17	3
	12/78	119	69 - 169	28	16 - 40	3.30	1.39 - 5.21	1.00	0.32 - 1.68	3
	6/79	346	176 - 516	34	26 - 42	1.78	1.33 - 2.23	0.51	0.38 - 0.63	5
8.	12/77	60	0 - 158	20	0 - 47	2.36	1.47 - 3.25	0.80	0.60 - 1.00	3
	5/78	69	0 - 140	21	12 - 31	2.63	1.91 - 3.35	0.86	0.74 - 0.98	3
	12/78	70	29 - 111	20	14 - 26	2.52	2.36 - 2.68	0.85	0.80 - 0.90	3
	6/79	127	68 - 186	25	21 - 29	2.04	1.54 - 2.54	0.63	0.47 - 0.80	5
9.	12/77	86	0 - 243	23	0 - 53	2.53	0.96 - 4.10	0.88	0.81 - 0.95	3
	5/78	90	50 - 131	29	22 - 37	2.93	2.66 - 3.20	0.87	0.80 - 0.94	3
	12/78	96	46 - 146	25	21 - 28	2.58	2.37 - 2.79	0.81	0.74 - 0.88	3
	6/79	424	264 - 584	34	30 - 38	1.56	1.23 - 1.89	0.44	0.36 - 0.53	5

TABLE 7.0-3

DAMOS BENTHOS - RHODE ISLAND BIGHT

STN.	DATE	$\bar{N}$	95% CONF. INT.	$\bar{S}$	95% CONF. INT.	$\bar{H}'$	95% CONF. INT.	$\bar{J}'$	95% CONF. INT.	n
10.	4/78	10	0 - 29	6	0 - 14	1.44	0 - 3.08	0.94	0.77 - 1.11	3
	8/78	179	116 - 243	29	23 - 35	1.80	0.14 - 3.46	0.53	0.03 - 1.03	3
	12/78	37	23 - 51	12	7 - 18	1.85	0.56 - 3.14	0.73	0.36 - 1.10	3
	5/79	64	13 - 115	15	12 - 18	2.01	1.57 - 2.45	0.74	0.59 - 0.89	5
13.	4/78	3481	1095 - 5866	46	34 - 58	1.08	0.96 - 1.20	0.28	0.26 - 0.30	3
	8/78	2141	1780 - 2502	47	42 - 53	1.21	1.14 - 1.28	0.31	0.29 - 0.33	3
	12/78	2277	204 - 4350	37	29 - 45	0.84	0.42 - 1.26	0.23	0.13 - 0.33	3
	5/79	1358	971 - 1745	46	40 - 52	1.14	0.85 - 1.43	0.30	0.21 - 0.39	5

TABLE 7.0-3 (CONT'D)

DAMOS BENTHOS - LONG ISLAND SOUND

STN.	DATE	$\bar{N}$	95% CONF. INT.	$\bar{S}$	95% CONF. INT.	$\bar{H}'$	95% CONF. INT.	$\bar{J}'$	95% CONF. INT.	n
14.	4/78	284	0 - 1324	27	0 - 77	1.62	0 - 3.31	0.60	0 - 1.27	3
	8/78	215	0 - 525	50	39 - 61	2.80	0.81 - 4.79	0.72	0.25 - 1.19	3
	1/79	78	28 - 128	17	8 - 27	1.76	1.54 - 1.98	0.65	0.46 - 0.84	5
	5/79	135	80 - 190	23	15 - 31	2.08	1.76 - 2.40	0.67	0.59 - 0.74	5
17.	4/78	167	0 - 413	40	26 - 53	2.62	1.38 - 3.86	0.71	0.34 - 1.08	3
	8/78	221	0 - 501	45	29 - 61	2.82	1.48 - 4.16	0.74	0.37 - 1.11	3
	1/79	389	159 - 619	36	29 - 42	1.88	1.51 - 2.25	0.53	0.43 - 0.63	5
	5/79	263	166 - 360	36	31 - 41	1.99	1.74 - 2.24	0.56	0.49 - 0.62	5
19.	1/78	3	0 - 10	2	0 - 3	0.38	0 - 1.25	0.55	0 - 1.82	3
	7/78	14	0 - 46	9	0 - 34	1.50	0 - 5.13	0.59	0 - 1.88	3
	1/79	5	3 - 8	4	2 - 6	1.17	0.6 - 1.74	0.91	0.81 - 1.01	5
20.	1/78	30	0 - 127	7	0 - 31	0.94	0 - 4.00	0.51	0 - 1.60	3
	7/78	8	0 - 38	2	0 - 8	0.80	0 - 2.54	0.65	0 - 2.40	3
	1/79	11	6 - 16	6	5 - 8	1.33	1.12 - 1.54	0.73	0.66 - 0.80	5
21.	4/78	157	0 - 568	19	2 - 35	2.04	1.02 - 3.06	0.71	0.41 - 1.01	3
	7/78	52	0 - 124	12	0 - 24	1.73	0.79 - 2.67	0.72	0.50 - 0.94	3
	1/79	135	83 - 186	24	18 - 30	2.21	1.90 - 2.52	0.70	0.60 - 0.80	5
	5/79	100	32 - 168	27	17 - 37	2.64	2.25 - 3.03	0.81	0.74 - 0.89	5
22.	4/78	42	5 - 79	15	11 - 19	2.17	1.33 - 3.01	0.81	0.51 - 1.11	3
	7/78	281	54 - 509	14	4 - 25	1.06	0.54 - 1.58	0.40	0.20 - 0.60	3
	1/79	21	16 - 26	6	5 - 7	1.08	0.61 - 1.55	0.60	0.39 - 0.81	5
	5/79	110	0 - 230	11	4 - 18	1.38	0.77 - 1.99	0.63	0.46 - 0.79	5
24.	3/79	30	12 - 48	8	5 - 11	1.66	1.12 - 2.20	0.80	0.65 - 0.95	5
27.	1/79	45	37 - 52	10	4 - 17	1.50	1.08 - 1.92	0.67	0.63 - 0.71	5
	8/79	7	4 - 10	5	2 - 8	1.46	0.89 - 2.03	0.94	0.89 - 0.99	5

TABLE 7.0-3 (CONT'D)

DAMOS BENTHOS - LONG ISLAND SOUND (CONT'D)

STN.	DATE	$\bar{N}$	95% CONF. INT.	$\bar{S}$	95% CONF. INT.	$\bar{H}'$	95% CONF. INT.	$\bar{J}'$	95% CONF. INT.	n
28.	1/79	34	16 - 53	9	7 - 11	1.70	1.37 - 2.03	0.77	0.63 - 0.91	5
	5/79	41	24 - 58	10	5 - 15	1.83	1.40 - 2.26	0.79	0.71 - 0.88	5
	8/79	98	33 - 163	13	8 - 18	1.71	1.47 - 1.95	0.69	0.59 - 0.79	5
29.	1/79	34	23 - 46	12	9 - 15	1.83	1.51 - 2.15	0.75	0.67 - 0.83	5
	5/79	35	26 - 44	11	8 - 14	2.02	1.73 - 2.31	0.83	0.78 - 0.88	5
	8/79	157	109 - 205	15	10 - 20	1.55	1.41 - 1.69	0.58	0.55 - 0.62	5
35.	4/78	15	0 - 31	5	0 - 12	1.01	0 - 2.43	0.65	0.25 - 1.05	3
	7/78	58	0 - 143	11	6 - 16	1.79	1.04 - 2.54	0.76	0.54 - 0.98	3
	1/79	35	21 - 50	12	10 - 15	2.00	1.71 - 2.29	0.80	0.76 - 0.84	5
36.	4/78	6	0 - 18	4	0 - 9	1.15	0.16 - 2.14	0.92	0.65 - 1.19	3
	7/78	53	0 - 141	5	3 - 8	0.97	0.45 - 1.49	0.62	0.15 - 1.09	3
	1/79	15	8 - 22	5	0 - 9	0.69	0.27 - 1.11	0.51	0.36 - 0.66	5
37.	4/78	26	8 - 44	6	4 - 9	1.06	0.02 - 2.10	0.58	0.08 - 1.08	3
	7/78	187	0 - 516	9	6 - 12	1.09	0 - 2.21	0.50	0 - 1.05	3
	1/79	27	1 - 54	9	3 - 15	1.65	1.08 - 2.22	0.78	0.72 - 0.84	5
38.	5/79	46	26 - 66	5	4 - 6	0.94	0.73 - 1.15	0.62	0.57 - 0.67	5
39.	5/79	30	10 - 50	8	4 - 12	1.49	0.85 - 2.13	0.75	0.60 - 0.90	5

TABLE 7.0-3 (CONT'D)

These Tables are currently being scrutinized in detail to determine characteristics of the respective benthic communities which may be of significant importance in evaluating the effects of spoil materials on the resident organisms.

One example where important differences exist between two stations occurs at the Brenton Reef Dump site and Reference site (Table 7.0-4). The overall mean number of individuals collected from the Brenton Reef Reference site is almost 32 times the overall mean number of individuals found at the Brenton Reef Dumpsite. The overall mean number of species at the Reference site is nearly three times the number found at the Dumpsite. In an effort to determine the reason for this large discrepancy a comparison of a number of station characteristics was made. The two stations are separated by little more than one mile. Generally speaking, water quality, thermal structure and overall hydrographic regimes are very similar. Depth of water at the Dumpsite is about 27.5 meters versus about 32 meters at the Reference site. Grain size analyses of sediment samples collected at each station are shown as cumulative curves in Figure 7.0-1. Though the sediments at the Dumpsite are not quite as well-sorted and contain a slightly higher percentage of coarser, as well as finer material, these curves are all very similar and have been classified as either "silty sand" or "silty medium-fine sand) by the Corps of Engineers. In view of the between-station similarities in the above mentioned characteristics it is difficult to explain such large discrepancies in the benthic populations so a between-station comparison of heavy metals, percentage volatile solids and content of oil and grease was made. This comparison is shown in Table 7.0-5.

In general, the heavy metals concentrations in the sediments collected at the Dumpsite in March-April 1978 and in July-August 1978 were 2-2½ times that at the Reference site.

During November-December 1978 heavy metals concentrations were somewhat higher at the Reference site and during May 1979 certain heavy metals concentrations were almost three times higher at the Reference site than at the Dumpsite. Though this comparison is inconclusive in regards to the influence of the heavy metals concentrations on the benthic communities at these two stations it nevertheless

No. of Individuals/Species - Br. Reef Dumpsite & Reference

Station	No. Individuals/Grab Sample						No. Species/Grab Sample						
	$\bar{N}$	1	2	3	4	5	$\bar{S}$	1	2	3	4	5	
Br. Reef D.S.	10	18	2	11	-	-	6	9	2	6	-	-	APR
Br. Reef Ref.	3481	2481	4393	3568	-	-	46	40	48	49	-	-	1978
Br. Reef D.S.	179	155	206	177	-	-	29	29	26	31	-	-	AUG
Br. Reef Ref.	2141	2054	2309	2061	-	-	47	49	45	48	-	-	1978
Br. Reef D.S.	37	32	36	43	-	-	12	11	15	11	-	-	DEC
Br. Reef Ref.	2277	2699	1316	2816	-	-	37	39	38	33	-	-	1978
Br. Reef D.S.	64	41	71	132	34	41	15	14	18	15	16	12	MAY
Br. Reef Ref.	1358	856	1270	1540	1593	1529	46	40	45	46	45	53	1979

TABLE 7.0-4

HEAVY METALS ANALYSIS - BRENTON REEF DUMPSITE & REFERENCE

LOCATION	CD	CO	CR	CU	Fe (x10⁴)	HG	NI	PB	ZN	% VOL SOL	O/GR x10³ PPM	
BR. REEF D.S.	.24	5.0	14	6.0	1.4	.01	29	7.2	31	4.1	—	MAR-APR 1978
BR. REEF REF.	.12	2.4	7.2	2.6	.61	.01	11	8.4	17	1.6	2.2	
BR. REEF D.S.	.12	3.9	24	11	.94	.03	8.7	13	36	8.3	.27	JULY-AUG 1978
BR. REEF REF.	.12	1.9	13	2.5	.54	0	4.2	8.9	17	2.3	.34	
BR. REEF D.S.	.12	2.1	8.4	2.7	.46	.02	4.9	5.7	9.4	3.5	2.1	NOV-DEC 1978
BR. REEF REF.	.12	1.6	13	2.1	.42	.02	3.0	8.1	12	8.8	NIL	
BR. REEF D.S.	.25	2.1	5.6	1.6	.33	.001	2.7	7.0	8.3	1.6	0	MAY 1979
BR. REEF REF.	.33	2.9	16	3.2	.68	.02	3.8	10	21	3.5	0	

ALL FIGURES ARE MEANS OF 3 REPLICATE GRAB SAMPLES

TABLE 7.0-5

it possible that some casual relationship may exist. At the very least, it has been shown that while the two stations are very similar in many respects they may be highly dissimilar with respect to concentration of heavy metals. Differences in the species composition at the two stations is currently being investigated and will be discussed in ensuing reports.

On the basis of this analysis, it is recommended that during the August 1980 DAMOS cruise additional grab samples be taken at both sites for grain size analyses and analyses of heavy metals. It is further recommended that grab samples be taken across the Brenton Reef Disposal pile for the purpose of visual inspection of the spoil material. In addition, it may prove instructive to obtain cores from selected areas of the pile and analyze for heavy metals in the vertical direction.

8.0 DIVER OBSERVATIONS (Dr. L. Stewart)

During this period in-situ observations of disposal sites at Portland, New London and Central Long Island Sound were made according to the schedule shown as follows:

• New London Disposal Site	1 May 1980
• New London/M.I.T.	10 May 1980
• New London Disposal Site	14 May 1980
• Central Long Island Sound	29 May 1980
• Portland, ME Disposal Site	3 June 1980
• New London Disposal Site	10-11 June 1980
• Central Long Island Sound	12 June 1980

Field data resulting from these observations are presented on the following pages describing the operations and preliminary results. In addition to visual observations, DAMOS divers played an extensive role in establishing and sampling the Mussel Watch cages at the three sites under study and in support of the deployment of the suspended sediment instrumentation.

As a result of Portland observations in April and in anticipation of deep water observations at the Marblehead Disposal Site, preliminary design of a cost effective remote television and 35 mm photographic system has been initiated. Further information on this system will be available in the near future.

New London Disposal Site

1 May 1980.

Stn. D III - natural bottom NW of disposal site.

1. Original dive plan to locate station DIII and sample the platform. Collect data on individuals of Corymorpha pendula. Also conducted the search and sampling of D III. Dive transect involved swimming along ground cable until platform was encountered.

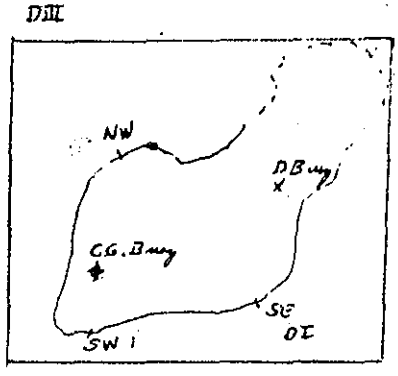
   Only observational data was obtained for in-situ study.

2. Bottom was flat and composed of cohesive sand/clay material.

No Corymorpha were noted. Dominant hydroid was Tubularia couthouyi.
Amphipod tubes were ubiquitous.
Heavy barnacle and Tubularia set on platform.
Metridrum 3 (on cement clump)
Lunatia heros 3
Psuedopleuronectes americanus 5
Pagurus longicarpus 40 - very dense in some areas.
Pagurus pollicaris 30
Myoxocephalus octodicemspinosus - 1
Homarus americanus - 2 in burrows under cable.
Many burrows under cable of various sizes but few occupied.
Macrobenthic community structure in the area resembles and/or approximates that of the SE perimeter station.

New London Disposal Survey/M.I.T. Advanced Diver Program

10 May 1980 -



Rockfish
1. D.P.V.
2. Sonic Receiver
3. Un. Photo equip.

PLANNED DIVES 7-9 NOT CONDUCTED.

Dive 1: SW perimeter sta. - tether buoy, epibenthic.

Rock
14716.3
43973.6
26137.0
60127.2 3 pps

locate lost stn. - swim to SW to detect spoil/ nat. bot. border -place tether buoy - collect Mytilus sample - photos - biolog. count.

Dive 2: SE perimeter stn. - transect line inspection - read all stakes - epibenthic
Libinia
(Bob)

on/off spoil - penetrometer readings biolog count - trap placement.

14711.7
43972.6
26134.7 6 pps

Dive 3: CG buoy chain - survey recent disp. conditons (new/old) - swim east
Rockfish
(Lance)

towing buoy to intercept new spoil border - biolog count.

14713.3
43974.0
26134.2

Dive 4: D1 spot dive - collect Mytilus bag - free of fouling
Libinia
(Bob) - Direct Surface
14711.5
43971.9
26130.5
60127.5 3 pps.

Dive 5: NW perimeter stn - locate w/ sonic receiver - replace botl. - read stakes - epibenthic - penctrometer - bio. count.
Libinia
Sonic SEarch

14717.3
43975.8 6pps

New London/M.I.T.(continued)

10 May 80

a. L/C located SE buoy (on station coord.) (see Bob's specific)

b. Sear Dl - no buoy.

c. L/C locate SW station (to relocate from spoil coverage)
buoy under tide strong.

d. Went 1 ms west free diver traverse to east to intercept border.
1. stake buoy placed at border 14716.5
43973.4
2. mussel sample
3. biol. count

e. search and locate NW sta. - found old buoy @ 14717.3
43975.8
1. Checked pinger
2. Deployed 25 m transect line nw 1
nw 10

f. dive base of "NL" buoy - penetrometer tests 14713.3
43974.0
26134.2
1. Penetrometer measure
2. mount top measures and burrow measures

g. Present dump buoy location (no diver) 14711.9
(witnessed 4 dumps 1100 - 1600) 43975.2
26133.5

h. Northeast sector - spoil coverage
L/C track evidence of new spoil on plotter sheet

i. Check Seaflower Reef L/C 14692.2
Dock MRL 43982.4
14668.0
43990.5

Dive 6: Eastern sector - determine spoil border via swim E - W to border
place tether buoy (DPV)
Rockfish - Lance Dir. surface.

Dive 7: Disposal Buoy - penetrometer tests - sediment topography. Clay ball collection
Libinia - Rockfish
Pete

Dive 8: Eastern Sector - Epsco plot - diver traverse of eastern spoil region.
Rockfish - Lance

Dive 9: Thames R. Channel - Dredge site - recon. E bank "R2" habitat
(on NL Light)

New London Disposal Site/M.I.T. (continued)

Dive	East Sector	14708.0	in 14708.1	WSW	(100 m)
NE Corner		43978.0	dive 43978.0		
SW traverse					

Mussel Bed
14718.E
43971.8

Objectives: Biological inventroy (coll. Corymorpha?)
Curstacea pathology
Sedimentary features (spoil/nat. bott) clay sphere

BI - CG Rock
14654.4
43965.5
26057.o

Topography measures
Perimeter determination
Penetrometer tests
Elevation stake reading

Transect line - biological fixed stn. (hard surf)
Photo stations (mosaic)

D3
14716.5
43980.1
26142.I

Epibenthics Nets & Traps
N.L. Light/St. Pier tank
Seaflower/Center Rands.

Station mainteance - sonic pinger batteries.

Sed. Array
14713.5
43974.6
26135.1

Dump Buoy (10 May)
14711.9
43975.2
26133.5

Mytilus platform - collect for M÷ analysis

Penetrometer tests "NL" buoy (SW and NE of chair)

@ 10#	2 cm	
	1	
	5	
	1	
	2.5	
2.	1	
	2	
3. Clay mound burrow	30 cm deep	
	9 cm wide	
	7 cm ht.	
Clay mound	50 cm high	with 10=20 cm fissure
	150 across	
	200 long	

New London Disposal Site/M.I.T. (continued)

10 May 1980

R/V Rockfish Stewart, Auster with MIT ADP
R/V Libnia DeGoursey

1. Located SE perimeter station with L/C for Libinia. Buoy up.

2. Search for DI - no buoy up.

3. Deployed buoy on SW perimeter station site - Buoy submerged due to current.

4. Rockfish went 1 microsecond west where divers descended and swam east to intercept spoil periphery. Pipe Anchor with buoy secured at border.

   Descended with 2 MIT divers west of spoil on mussel bed. Collected Mytilus for growth measurements. Patch size smaller then as previous surveyes. (30 - 80 cm dia. with same interpatch distances). Live animals attached to shell debris (mostly whole valves).

   3 - Crassostrae 10-12 cm
   Asterias forbesi
   Libinia emarginata
   Cancer irroratus
   Tubularia coothoyi

   Some debris - bottle cement block.
   As approaching pile - mussel patches partially or totally buried.
   Anchored buoy at edge with no mussel patches occuring.
   Color change from natural to spoil material.

5. Located NW perimeter station and marked with buoy - R/V Libinia.

6. Dive at base of CG buoy. Penetrometer measurements. Mound topography measurements. Burrow measurements.

7. Obtained dump buoy coordinates - no dives. Witnessed 4 barge dumps 1100 1600.

8. Dive at northeast sector. Descended at area thought to be free of spoil, but found spoil coverage.

9. Loran C check on Seaflower.

DeGoursey's notes -
#1 SE perimeter station with 2 MIT Divers.
Epibenthic SE 1 - 30 sec.
Epibenthic SE 10 - NW 30 sec.
Bob photographed stake at SE 5 and photo station at SE 1. No photos taken at SE 10 due to turbidity.
Corymorpha abundant.

New London Disposal Site/M.I.T. (continued)

#5 - NW perimeter station in with 3 MIT divers.
White buoy marked station.
Located pinger with receiver - battery 90% - did not replace.
Deployed 25 m transect line N/S direction with pinger at middle of line.
NW 1 on north end and NW 10 on south (spoil)
More stakes needed to secure line.
Pinger 3 pps.

New London Disposal Site

14 May 1980 - Dive #1 DI Platform Location. Auster/DeGoursey

Obtained Corymorpha densities.
1, 1, 0, 0, 4 quadrants adjacent and moving up current.
1, 0, 2, 0,
0, 0, 1, 2

Hydroids at low densities compared to NH site.
All animals with tentacles in water column. No substrate feeding noted.
Sediment coarser grained then NH site. More shell debris.
Current W - # 6-7 sec/50 cm at sed/water interace.
Approximately 15 animals were collected and returned to the lab.
Searched for and located D I - Buoy attached. Platform was dragged and damaged.
1 bag samples.

Dive #2 at D III - buoy was not on surface. Divers descended and located platform with receiver. 1 bag sampled.

Dive #3 - West of Mouse Island.
Tested quadrant camera systems.
Tested housed Nikon system.

New Haven Disposal Site Survey

29 May 1980

1. Loran C plot of stations occupied and buoy locations.
   Using the Epsco plotter interfaced with Northstar 6000 Loran C, a record was made of all buoy and station locations at the disposal site.
   Loran C grid line were also generated to act as overlays for future mapping.

2. North Site.
   Performed diver transect survey of Stamford-New Haven north site.
   Bottom is hard packed sand with 2-3 cm silt veneer.
   Some areas with oyster, scallop and jingle shell debris - Piling debris.
   .5 cm shell hash.
   .5 cm period ripple in sand.
   Tracks of naticid snail 8-10 cm under.
   Crab tracks noted by no active crabs seen on traverse to N.
   8 molts of Cancer irroratus.
   C. irroratus active on Se traverse.
   15 Pagurus longicarpus Hermit Crab
   4 Urophycis sp. Hake
   2 Scophthalmus aquosus Sand dab
   6 Tautogolabrus adspersus Cunner
   Asteria forbesii - juveniles.

3. Penetrometer measurements @ 10 lbs. - 3, 3, 4

4. Epibenthic net sample - 80 yds. northwest of platform - on spoil.

Norwalk Site

1. Diver transect survey.
   20-50 yds. north-northeast of buoy, dense, large .75 to 1.5 height clay clumps on soft cohesive sediment.
   2/15 meter topographic relief.
   Vertidical fissures in clumps, floc material filling in irregularities.
   Peat and shell debris (Mya, Spisula) embedded in clumps.
   Debris - metal conduit, foil, plastic.
   1 - Urophycis sp. - thigmotactic response to metal conduit.
   1 - Sand dab Scophthalmus aquosus.
   Molts of Libinia emarginata and Caner irroratus.

2. Penetrometer measurements @ 10 lbs. 4.5, 5.2 cm on spoil
   3.8 cm on clay clump.

3. Norwalk inspection dive paths.

Stamford - New Haven South Site (continued)

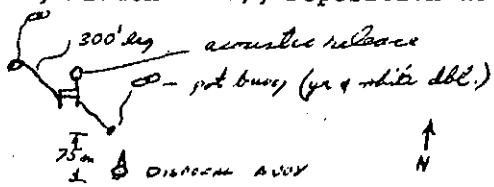
1. Diver transect survey.
   Dive to collect Corymorpha pendula and obtain density data.
   At Norwalk mussel platform location.
   Densities /.25 m^2 5,8, 14 - further measurements hampered by poor visibility and bottom time constraints.
   15 animals collected.
   Noted "pinched" stalk on several hydroids - predator or method of release of medusa stage?

   Epibenthic sample - at same location.

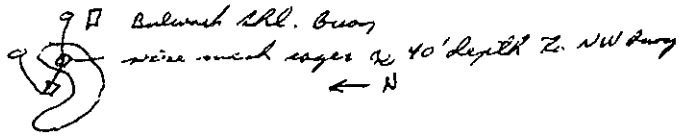
Portland, Maine Disposal Site Survey — Stewart, Auster, Petrillo.
F/V "Rand"

3 June 1980 -

1. Retrieve mussel samples; re-rig platform system to be tended by local fisherman (Ted Rand, Diamond Is.); reposition according to illustration (fig. 1).



2. Stock reference cages (2) plastic coated wire with Modiolus to be placed on Bulwark Shoal (fig. 2).



3. Photography of hard rock faunal communities; obtain reference samples (perserved) for identification and extrapolation to deep water (disposal site) populations present and subjected to disposal affects. Species list preparation.

4. Dive at site in Portland harbor to survey nearshore species composition and dredge operation vicinity. S.W. corner Cushing Is. in Catfish Rock area - sand dollars.

- Sample from disposal site mussel platform and redeploy with groundlines and surface buoys. Acoustic release functioned and platform recovered.
  1 bag mussels removed - no mortality 12 - h.m 10 fixed
  13 bags remaining /8 bags on top.
  One leg of platform broken below center cross-braces.
  Groundlines and surface buoys attached.

  Platform - 120 yds. north of disposal buoy.

- Collect mussels to stock cages for Bulwark Shoal reference station.
  Collected mussels (≈ 425), Modiolus modiolus, from top of shoal.
  Two coated wire mesh cages deployed with 15 bags of mussels (22-25 individuals/bag).
  Metal clips were removed and replaced by plastic tie-wraps.
  Cut wire ends of cage mesh remain exposed.

- Diver observations on Bulwark Shoal.
  Substrate - granite outcrop - no sediment cover.
  All substrate colonized.

Portland, Me. (continued)

Agarum dominant macroalgae
Callithiamnion (?) red algae - also extensive attached to Modiolus
Ophiopholis - brittle star
Boltenia - sea perch
Buccinum undatum - dog whelk
Strongylocentrotus - green urchin
Modiolus - mussel - dominant attached found organism - extensive patches at dive site.
Encrusting calcareous algae and poriferans.
Flatforms - Nemerstean
Cyclopterus possibly gravid/eggs. Whelk eggs also.
Stewart - photos and collection of organisms.

New London Disposal Site Survey

10-11 June 1980

Diver survey at SE perimeter station. Current W - E visibility 3-4 feet.

1. From SE 5 to SE 10 (on spoil), then SE 5 to SE 1 (off spoil.)
   Spoil less compact then natural sediment. Visually difficult from surface features colonization identical.
   Amphipod tubes dense on and off spoil.
   Noted egg cases (sand collers) abundant and scattered, Busycon.
   Tubularia spp. - colonial and solitary - dominant hydroids. (No Corymorpha observed).
   Tautogolabrus adspersus - 1
   Prionotus carolinus - 1
   Urophycis sp. - 1
   Scophthelmus aquasus - 1

2. Penetrometer measurments. @ 10# pressure.
   SE 1 2, 4, 5, mm off spoil
   SE 5 3, 4, 2 mm
   SE 10 5, 6, 6 mm on spoil

3. Epibenthic samples SE 1 to 270° 45 sec. (small net) on spoil
   SE 1p to SE 30 sec. - off spoil.

4. Stake at SE 5 reset to 0
   Stake at SE 10 below 0 - erosion or disturbed (?)
   Orange pot buoy anchored at SE 5 - buoy notched.

Diver survey at NW perimeter station.

1. Gravel, sand bottom.
   All substrate colonized.
   Amphipod tubes ubiquotous and dense.
   Noticed egg cases abundant and scattered.

   Asterias forbesii - abundant 20+ - many with regenerating arms.
   Nassarius trivittatus - abundant - dense.
   Tubularis spp. - solitary and colonied spp. - dominant hyrdoids (no Corymorpha)
   Pseudopleuronectes americanus - 3
   Libinia emarginata - 4
   Cancer borealis - 8 - several burrowing.

2. Calibrated stake set at "10" on NW 1 off spoil.

3. Epibenthic - spoil side to S (30 sec.) NW 10 to south
   off spoil side to N (30 sec.) NW 1 to North.

4. No buoy on this station.
   Land ranges - Millstone 320° Race Rock 145°
   NL Light 020° N. Dumpling 090°
   Long Roof on 125°
   Fishers

5. Traverse from NW perimeter Station to New Spoil Boundary.
   Traverse to periphery of present disposal phase spoil.
   Amphipod tubes ubiquotous to border.
   Cancer borealis and Homarus americanus excavating.
   Asterias forbesii - abundant.
   Noticed egg cases scattered.
   Busycon - 1
   Mercenaria - 1 cm surface
   Debris - i.e. logs - colonized by Tubularia sp.
   Solitary Tubularia sp. - common.
   Psuedopleuronectes americanus - 4
   Lophius americanus -1
   Area of dense oyster shell debris.
   Topographic relief to new spoil boundary - 2 meters min.
   Buoy with pipe anchor at periphery (60 yds west of CG buoy).

6. Epibenthic sample at spoil periphery on old spoil.
   Loran C coordinates.
   Disposal buoy removed by R/V U'Conn.
   Loran C - periphery buoy position (14713.8
   (43973.9

New Haven Disposal Site Survey

12 June 1980

1. Search for transect line at Stamford/New Haven North Site. Visibility 0-1 foot.

   R/V U'Conn placed a buoy, using the trisponder system, at the north site dump buoy location. A surface search with the acoustic receiver in the area revealed a local source, assumed the pinger attached to the groundline. (All pingers deployed on this site are 1 pps and differentiation is difficult).

   On the first search dive, the mussel platform was located. A second dive found second source but even after repeated cross-overs, no transect line or pinger was located. A third dive revealed an acoustic release buoy with attached pinger which was deployed over a year ago. Bottom time constraints halted the transect line search.

2. Diver survey at Stamford/New Haven North Site.

   Platform location to SE.
   Hard packed sand. 1-2 cm silt veneer, shell debris.

   Cerianthus americanus 1-4/.25 m^2 (visual) tube diameter .5 - 1.0 cm.
   (No Corymorpha observed)
   Pagurus longicarpus abundant (50+)
   P. pollicaris - 4
   Cancer irroratus - 12
   Libinia emarginata - 4
   Nassarius sp. - abundant
   Crangon septemspinosa - large - 3 cm length - abundant
   Psuedopleuronectes americanus - 2
   Urophycis sp. - 1

3. Collect epibenthic sample at Stamford/NH south site - Dive at south site buoy 30 sec. to N.

4. R/V U'Conn removed disposal buoy from this site. A pot buoy is attached to the sub-surface buoy.

9.0 MUSSEL WATCH (Dr. Sung Feng)

Since the previous report, Mussel Watch Stations at Portland, ME, New London and Central Long Island Sound Disposal site have been established and subsequently sampled at monthly intervals. Most of the installation was conducted by University of Connecticut divers who also have responsibility for sampling in Long Island Sound. UCONN divers also sampled the Portland stations, however, subcontracts have now been established to provide continuous sampling by local personnel.

The following data report summarizes heavy metal analyses conducted on two species of mussels: Modiolus modiolus and Mytilus edulis deployed at three study areas: Portland disposal site, New London disposal site and Central Long Island Sound disposal site.

I. Portland disposal site

A. Modiolus modiolus collected from Bulwark Shoals used as a reference for the disposal site.

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
4/11/80*	$\bar{X}$	7.48	0.81	0.27	27.42	130.55	0.158	1.74	222.49	6.97
	S.D.	1.61	0.22	0.09	4.68	15.10	0.036	0.40	53.27	1.99
	n	8	8	8	8	8	8	8	8	8
5/8/80	$\bar{X}$	6.78	0.77	0.44	31.09	131.11	0.188	2.59	265.61	6.01
	S.D.	0.66	0.27	0.06	3.76	15.73	0.024	0.40	71.67	0.31
	n	3	3	3	3	3	3	3	3	3
6/3/80*	$\bar{X}$	11.51	0.75	0.52	34.53	116.74	0.308	2.40	292.84	5.56
	S.D.	2.30	0.18	0.10	9.35	7.03	0.044	0.73	67.13	2.14
	n	8	8	8	8	8	8	8	8	8

*Denotes baseline data

B. Modiolus modiolus (from Bulwark Shoals) deployed at the Portland disposal site.

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	N	Zn	V
5/8/80	$\bar{X}$	11.96	0.50	0.57	30.77	132.91	0.263	2.26	265.49	5.90
	S.D.	1.16	0.13	0.06	5.78	7.21	0.018	0.34	41.27	0.43
	n	3	3	3	3	3	3	3	3	3
6/3/80	$\bar{X}$	13.03	1.47	0.67	36.39	179.13	0.291	3.44	275.78	6.83
	S.D.	1.82	0.36	0.06	12.06	9.02	0.048	0.77	39.16	0.21
	n	3	3	3	3	3	3	3	3	3

II. New London disposal site.

Mytilus edulis collected from Latimers Light were deployed at two disposal stations: D1 and D3 and one control station: Fishers Island Sound. In addition, sampling of the Latimers Light platform has been conducted continuously over a year on an MSI in-house project. Since these stations were established in September 1979, baseline data had already been obtained the. It would make little sense to compare the 1979 baseline data with the data obtained for April and May samples, therefore, the information is not presented. Basically, one should view the following data sets as references (Latimers Light and Fishers Island Sound) vs. experimentals (D1 and D3).

A. Mytilus edulis from Latimers Light (Reference)

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
4/17/80	$\bar{X}$	1.40	6.96	0.58	7.73	220.92	0.122	4.26	119.79	2.23
	S.D.	0.28	4.15	0.28	0.51	20.48	0.010	1.83	8.98	0.18
	n	3	3	3	3	3	3	3	3	3
5/14/80	$\bar{X}$	1.28	4.05	0.26	8.03	211.78	0.140	4.13	104.11	1.51
	S.D.	0.14	3.20	0.10	0.01	14.96	0.017	0.50	9.01	0.08
	n	3	3	3	3	3	3	3	3	3

B. *Mytilus edulis* deployed at Fishers Island Sound (Reference)

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
4/17/80	$\bar{X}$	1.12	7.23	0.60	8.33	210.56	0.103	4.34	104.13	3.06
	S.D.	0.05	0.81	0.04	0.51	16.32	0.003	0.25	9.08	0.12
	n	3	3	3	3	3	3	3	3	3
5/14/80	$\bar{X}$	1.27	3.36	0.17	8.63	160.78	0.132	2.09	98.90	1.53
	S.D.	0.03	0.31	0.05	0.52	22.72	0.006	0.33	9.00	0.16
	n	3	3	3	3	3	3	3	3	3

C. *Mytilus edulis* deployed at D1

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
4/17/80	$\bar{X}$	1.53	3.36	0.38	10.42	316.59	0.160	2.99	145.79	3.42
	S.D.	0.18	0.41	0.06	0.52	21.69	0.013	0.37	23.92	0.26
	n	3	3	3	3	3	3	3	3	3
5/14/80	$\bar{X}$	1.74	6.85	0.36	9.22	272.67	0.158	4.17	124.94	1.33
	S.D.	0.24	1.69	0.01	0.52	19.06	0.003	0.99	15.68	0.18
	n	3	3	3	3	3	3	3	3	3

D. *Mytilus edulis* deployed at D3

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
5/2/80*	$\bar{X}$	1.65	2.82	0.70	10.10	272.67	0.143	5.14	145.60	2.38
	S.D.	0.18	1.97	0.53	0.52	43.83	0.003	3.58	32.48	0.10
	n	3	3	3	3	3	3	3	3	3
5/14/80	$\bar{X}$	2.01	7.64	0.46	9.51	298.72	0.150	5.13	130.09	1.66
	S.D.	0.12	1.38	0.05	0.51	37.62	0.013	0.96	8.99	0.15
	n	3	3	3	3	3	3	3	3	3

*The platform was not located during April 17, 1980 sampling trip; however, it was retrieved on May 2, 1980.

III. Central Long Island Sound disposal site.

Four stations: reference, north pile, south pile and Norwalk were established at this study site on April 24, 1980 using Mytilus edulis from Latimers Light.

A. Baseline data of Mytilus edulis collected from Latimers Light.

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
4/24/80	$\bar{X}$	1.52	3.41	0.34	9.37	200.82	0.161	3.15	136.66	2.55
	S.D.	0.30	1.88	0.12	0.48	21.76	0.014	1.37	24.73	0.25
	n	8	8	8	8	8	8	8	8	8

B. New Haven Reference Station.

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
5/29/80	$\bar{X}$	1.66	2.62	0.56	10.71	246.06	0.203	3.96	166.54	0.73
	S.D.	0.08	0.91	0.06	0.89	27.34	0.008	0.32	18.05	0.06
	n	3	3	3	3	3	3	3	3	3

C. New Haven North Pile Station.

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
5/29/80	$\bar{X}$	2.39	4.01	0.60	11.92	272.92	0.185	14.97	229.19	0.74
	S.D.	1.15	1.25	0.07	2.08	26.00	0.015	12.99	99.18	0.09
	n	3	3	3	3	3	3	3	3	3

D. New Haven South Pile Station.

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
5/29/80	$\bar{X}$	1.48	3.17	0.59	10.72	255.26	0.192	4.41	177.03	0.84
	S.D.	0.11	0.51	0.02	0.90	18.40	0.015	0.52	23.89	0.09
	n	3	3	3	3	3	3	3	3	3

E. New Haven Norwalk Station

Sampling Date		Cd	Cr	Co	Cu	Fe	Hg	Ni	Zn	V
5/29/80	$\bar{X}$	1.63	3.81	0.51	11.61	229.89	0.158	4.80	161.40	0.60
	S.D.	0.16	0.35	0.07	0.02	18.36	0.010	0.06	18.07	0.05
	n	3	3	3	3	3	3	3	3	3

10.0 SPECIAL PROJECTS (Dr. R.W. Morton)

The loss of the Portland Disposal Buoy required rapid replacment to insure continued accurate disposal operations. Consequently, SAI installed the New London Buoy, which had been removed for maintenance during the summer, at the Portland site on July 1, 1980. The new buoy was installed at exactly the same location (within accuracy limits of the Navigation system) two days after loss of the buoy was reported.

Although the taut-wire moored buoys have proven effective in controlling disposal, they have shown weakness in resisting damage from scows or vessel traffic and in long term durability. The primary reason for this may be the decision to use less expensive, lighter buoys with correspondingly lighter mooring gear. Further consideration should be given to the cost effectiveness of heavier, more expensive buoys.

In addition to this field operation, DAMOS personnel attended two meetings dealing with Dredge Spoil Disposal. Dr. Robert Morton attended the State of the Sound Conference, sponsored by the Oceanic Society at Stony Brook University on June 7, 1980 and the symposium entitled "Impact of Marine Polution on Society" held at the University of Rhode Island on June 24, 1980. At the latter meeting an overview of the DAMOS program was presented by Dr. David Shonting Of NUSC, and Dr. Lance Stewart presented results of biological observations of the Stamford-New Haven capping procedures at the Central Long Island Sound Disposal Site. Papers resulting from these presentations will be included as DAMOS contributions #15 and #16 respectively.

References

Bohlen, W.F., 1974. Continuous monitoring systems in Long Island Sound: Description and Evaluation. Proc. of IEEE Int'l Conf. on Engineering in the Ocean Environment. Halifax, Nova Scotia, Aug. 1974, Vol. 2:61-69.