

DISPOSAL AREA MONITORING SYSTEM

PROGRESS REPORT

MARCH 15 - MAY 15, 1980

DAMOS CONTRIBUTION #13

**science applications, inc.**

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## 1.0 INTRODUCTION

Because of funding and program definition requirements the FY80 DAMOS program was delayed until March 24, 1980. At that time the initial winter surveys were undertaken starting with the New London and Central Long Island Sound Disposal Sites from March 24 to April 2, 1980 and the Portland Disposal Site from April 8 - 11, 1980. The Portland survey was conducted in conjunction with Innerstate Electronics Corporation to assist in the development of an Environmental Impact Statement for designation of the site as a regional disposal site by EPA.

This progress report will discuss the preliminary results of the March and April surveys, the overall progress that has been made on major portions of the program during the months prior to FY80 operations and future plans and schedules through the remainder of the year.

## 2.0 FIELD OPERATIONS

### New London, CT      April 24-26, 1980

- Conducted calibration of Loran-C 9960 chain
- Conducted bathymetric survey of disposal site (Figure 2.1)
  - results indicate disposal of material toward east margin of disposal area, therefore, recommended new buoy location:  
 $41^{\circ}16.2'N$ ,  $72^{\circ}04.35'W$ ; L/C 14711.9, 26133.4, 43975.2,  
60118.0; Trisponder 5345, 8608
- Sample Benthic Reference Station  
 $41^{\circ}16.66'N$   $72^{\circ}02'W$ ; Trisponder Ranges 6441, 11411,  
Sample Labels NLR #1-10, Heavy Metals & Grain Size.

### Central Long Island Sound Disposal Site

- Deployed Norwalk Buoy  
 $41^{\circ}08.93'N$ ,  $72^{\circ}53.48'W$ ; L/C 15047.5, 26549.7, 43998.9,  
60083.0; Trisponder 11164, 17825
- Conducted Survey of Norwalk Disposal Site - centered on buoy, 35 lanes, 700 m long, oriented E/W 25 m spacing; covers area of SP buoy permit dumping as well (Figure 2.2)
- Sampled 9 station grid and south reference station

- Conducted surveys of STHN-N and STNH-S disposal sites (Figures 2.3, 2.4). Both sites are as expected, no major change in North site, south site has maintained flat upper surface and shows evidence of additional disposal on east margin and 250 meters west of the disposal site where disposal under Loran-C control has taken place (see DAMOS contribution #12).

- Sampled Benthic stations on STNH-N mound

- Calibrated Loran-C, 9960 chain

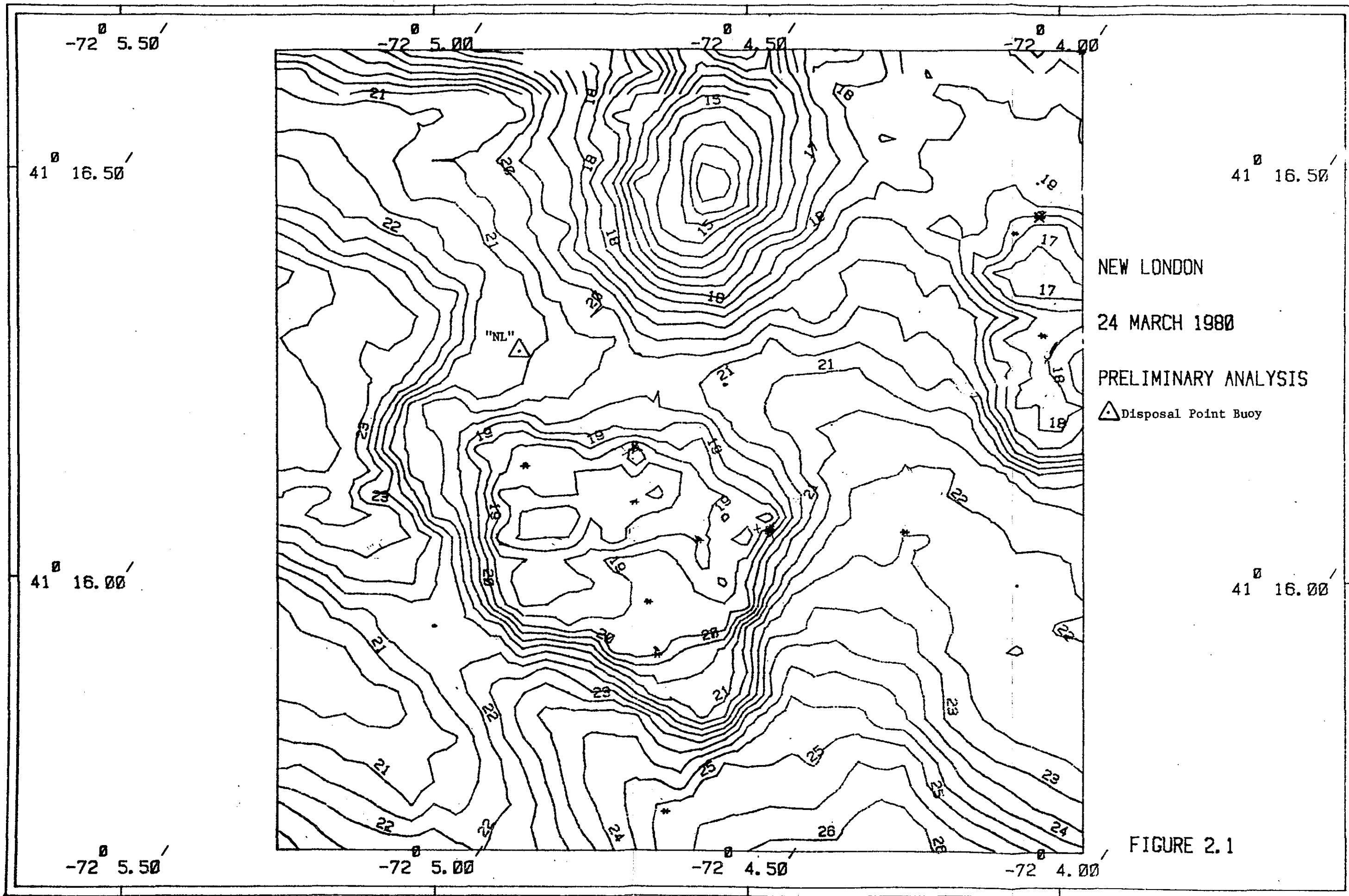
Portland, Maine                          April 8-11, 1980

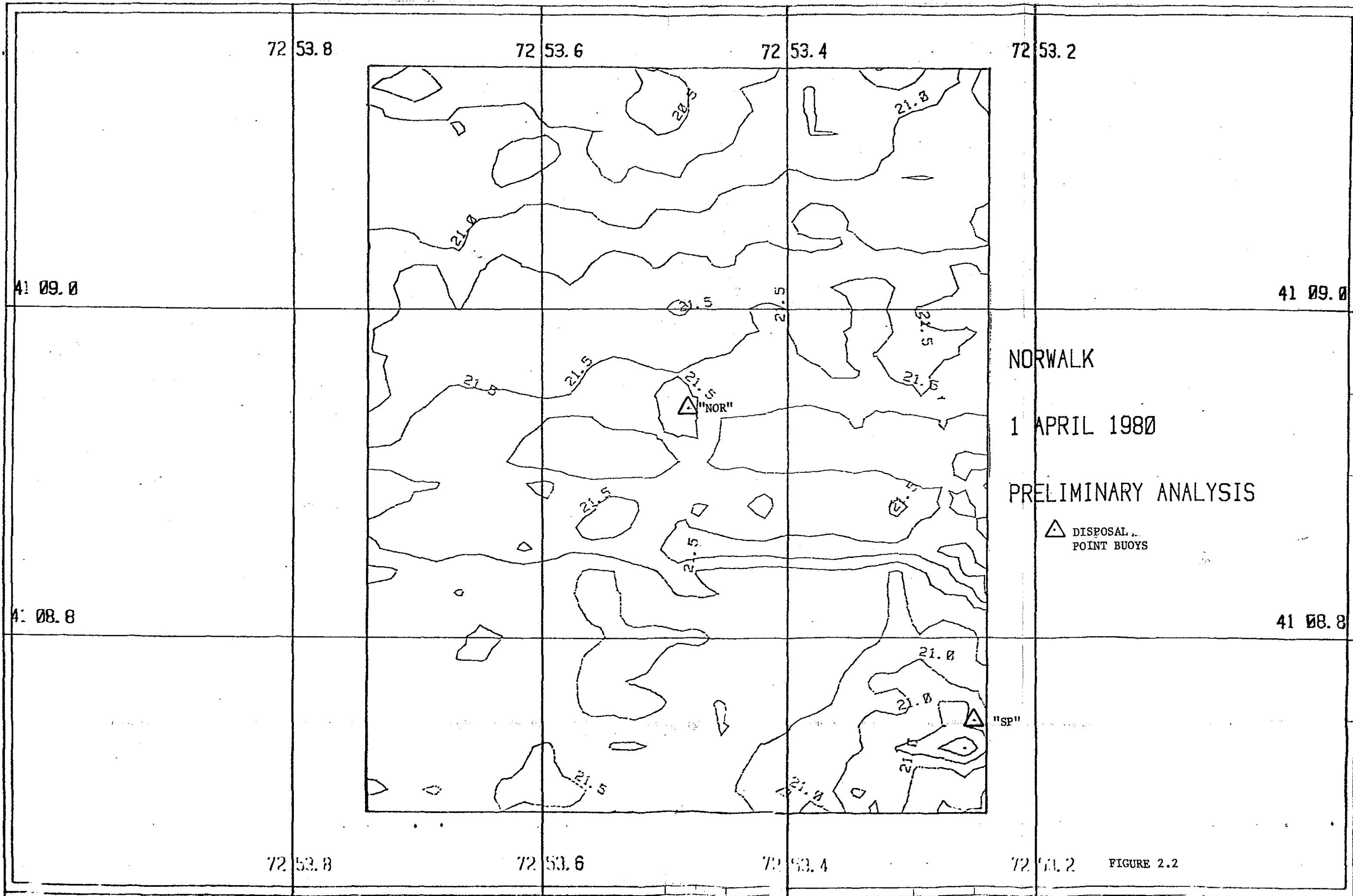
- Check position of disposal buoy; on site within ten meters
- Sample Benthic Reference Station and IEC Reference Station
- Conduct Bathymetric survey (Figure 2.5), indicates shoaling of basin area but not distinct mound present
- Calibrate Loran-C, 9960 chain
- Sample chemistry station grid
- Collect mussels from reference station & deploy mussel cage at disposal site approximately 100 m North of buoy
- Obtain underwater TV and photographs at 11 station grid established by IEC including pictures at the disposal point.

Future plans include condition surveys at New London and Central Long Island Sound Disposal Sites during the week of June 9, 1980 and summer cruises scheduled for August. Monthly sampling of mussel cages has been initiated and the May samples were obtained.

### 3.0        BATHYMETRY (Dr. R.W. Morton)

Final plots and profiles of surveys made during the March-April cruises are being developed. The Norwalk and STNH-N surveys are straight forward and do not present problems. At New London and STNH-S, additional distance was added to each lane to cover disposal at new points, therefore, additional programming is required to develop contour difference plots and volume determinations. At Portland, errors resulted from measurements during a disposal operation, consequently additional lanes were run and must be integrated with the overall survey data.





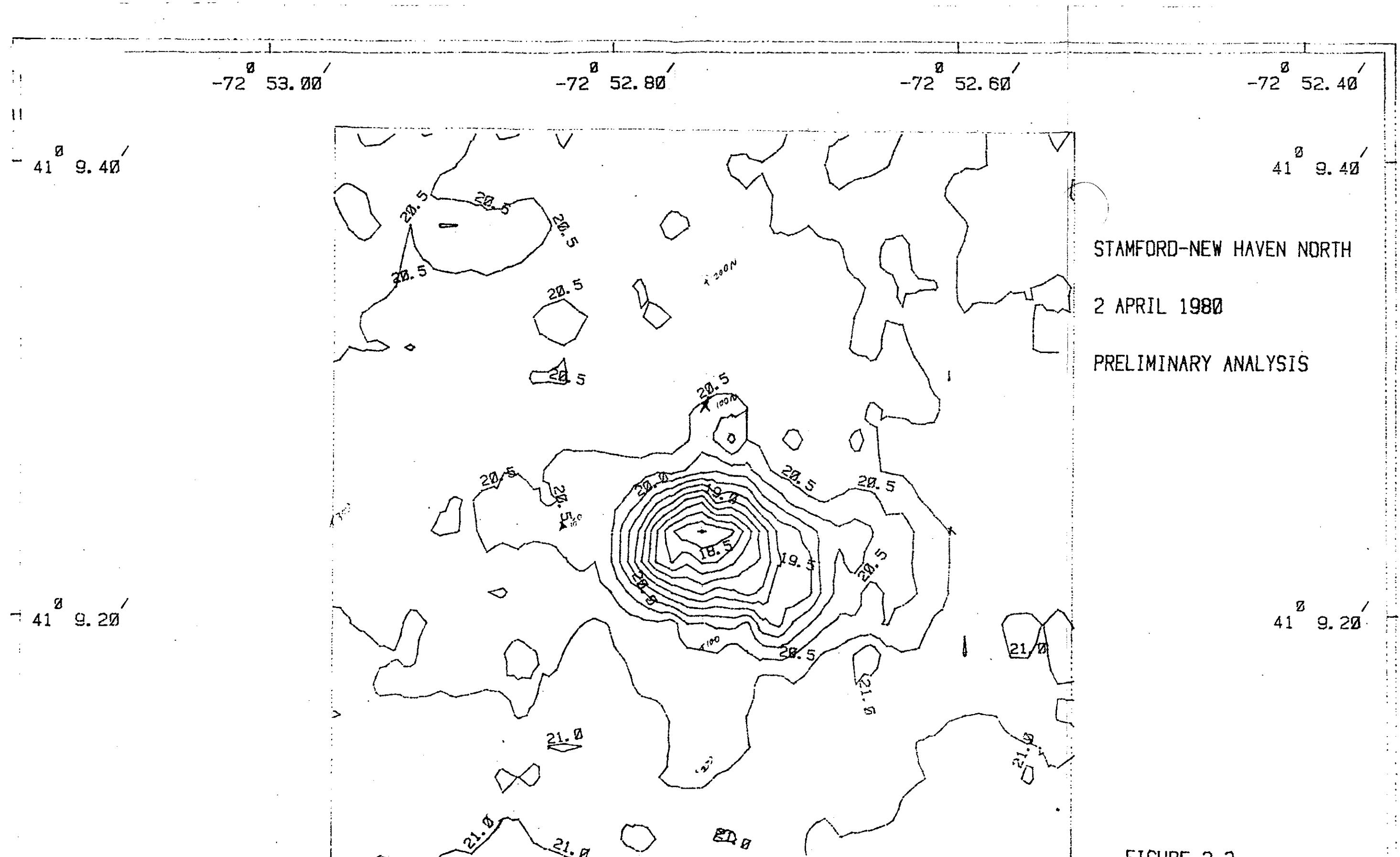


FIGURE 2.3

-72° 53.00'

-72° 52.80'

-72° 52.60'

-72° 52.40'

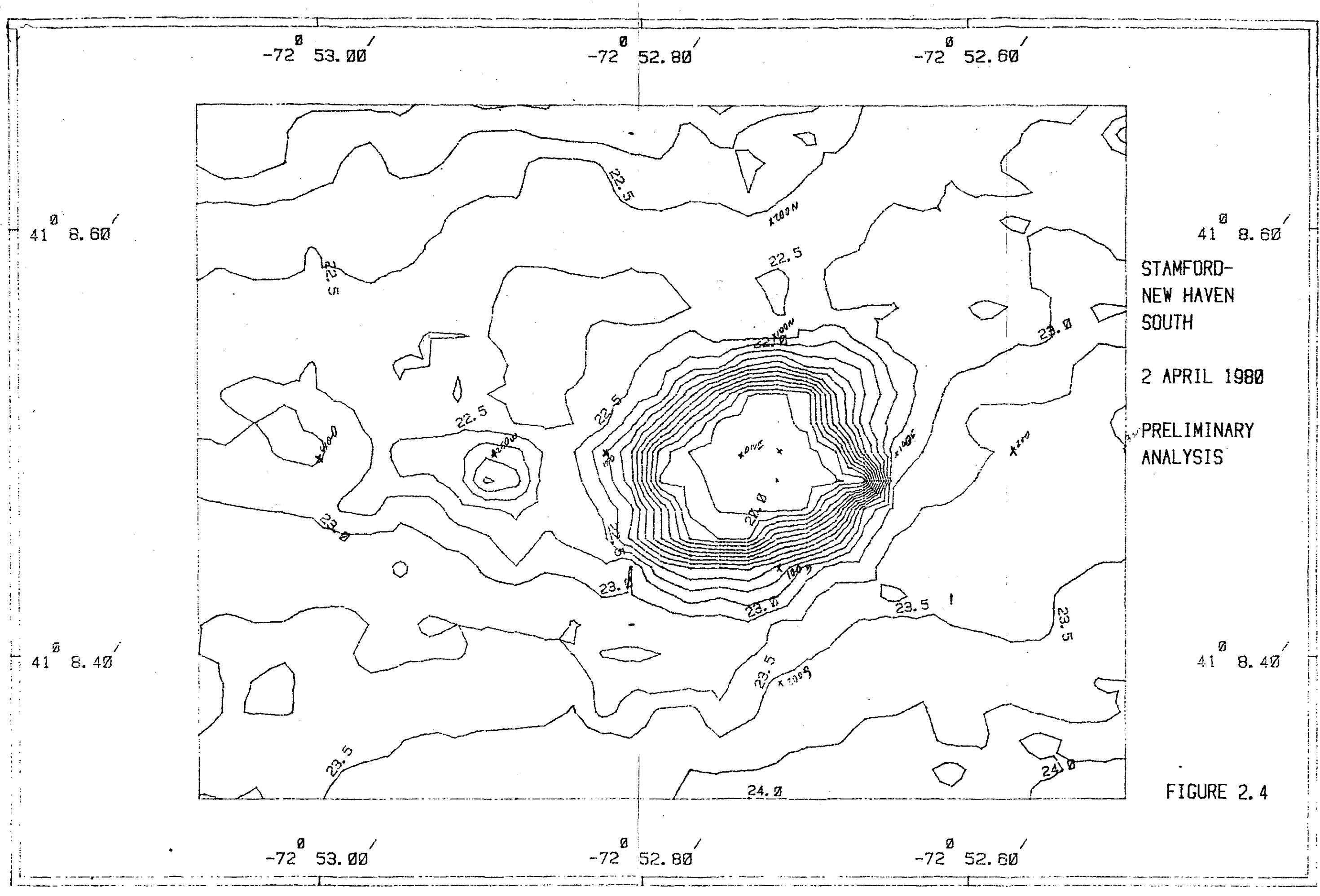


FIGURE 2.4

70 02.4

70 02.2

70 02.0

70 01.8

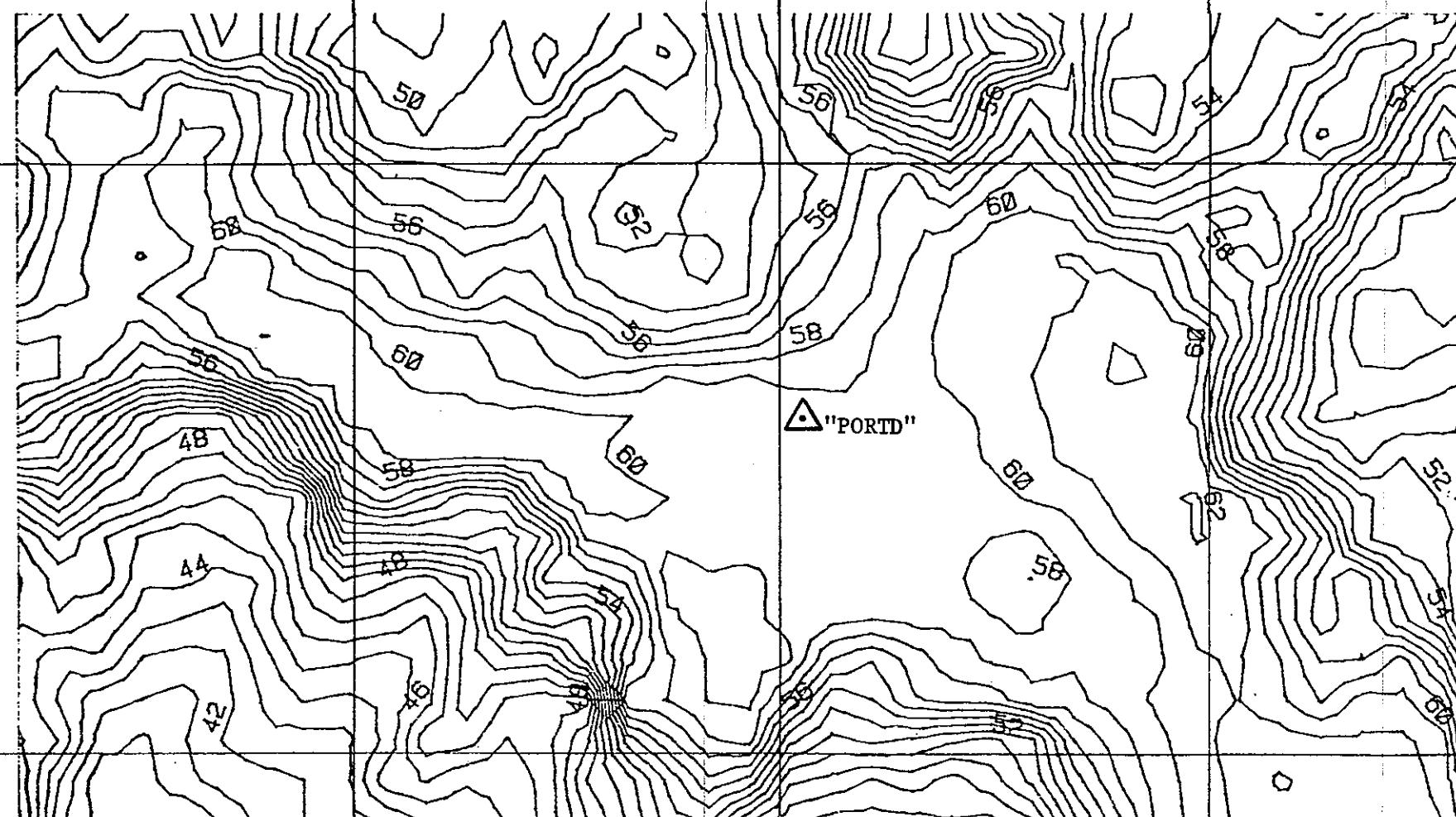
70 01.6

43 34.2

43 34.2

43 34.0

43 34.0



Preliminary Analysis  
Contour Interval: 1 m  
Datum: MLW

70 02.4

70 02.2

70 02.0

70 01.8

70 01.6

Additional work is being accomplished to increase the resolution of the analysis technique through use of different computers and hardware utilizing disk data storage. Final plots and volume determination should be completed shortly.

#### 4.0      BOUNDARY LAYER TURBULENCE SYSTEM (Dr. J. Ianiello)

Since funding of this portion of the program was not available until May, primary emphasis has been placed on planning for the remainder of the year with emphasis on recording turbulence parameters in association with the nephelometer and suspended sediment instrumentation.

#### 4.1      Principal Goals for Summer 1980

- make simultaneous measurements of the turbulent velocity field and the suspended material concentrations using BOLT in conjunction with simultaneously recording nephelometers provided by F. Bohlen. Experiments will be conducted at New London or possibly New Haven. The purpose is to find in-situ relationships between turbulent stress levels and erosive capability.
- Conduct an intensive study of the turbulent flow over the New London dumpsite. Measurements will be taken at 3 stations on a transect up one face of the mound. Data will be taken continuously over a tidal cycle at each station using the unidirectional triad. The meters will be retrieved to change the tape cassettes; meanwhile divers will re-orient the meters for the next half tidal cycle. The experiment will require three days, one at each station. The nephelometers will be used during this experiment. The purpose of this test is to characterize the spatial and temporal variability of the turbulence on a rough mound.

#### 4.2      Milestones

June 1980	develop method of reading BOLT cassettes to replace J. Roklan's services
	initial 3 day deployment and checkout of nephelometers/BOLT (New London site preferred)
July 1980	intensive study of turbulence at New London. Nephelometers also deployed
August 1980	Additional BOLT/Nephelometer measurements as necessary
	begin data analysis

Sept 1980

complete data analysis

begin report

5.0

SUSPENDED SEDIMENT (Dr. W.F. Bohlen)

During the first year of this investigation an instrumentation array designed to provide quantitative, in situ observations of sediment movement in the vicinity of selected dredge spoil disposal areas was designed and constructed. This array, shown schematically in Figure 5.1, contains a variety of instruments and is intended to monitor both long term average conditions and short term, storm induced events. Primary control is provided by the data logger (Sea Data Model 651-8) which also supplies power and serves to record the output signals from the nephelometers forming the optical array, the current meter and a complementary pair of temperature and salinity sensors. The system also serves to synchronize the photographic sequence provided by the 8mm lapsed time camera. The pump and associated filtration unit is designed to function independently providing a single daily sample at a rate controlled by a separate internal clock. No effort is made to synchronize this clock with that contained within the data logger.

Testing, calibration and assembly of the instrumentation array was completed during early December 1979. All units tested satisfactorily with the exception of the pump-filtration unit which displayed several weaknesses including aberrant timing, leaks within the suction system and an inability to document the sample volume passing through the filter. Although those faults, remaining despite the manufacturer's efforts, effectively limited the utility of my samples, it was decided to include the pump unit in the initial deployment so as to give it the benefit of a test under field conditions.

The initial field test of the array commenced on January 4, 1980 (Figure 5.2) with the unit placed at a location along the western limit of the New London dumpsite in approximately 60 ft of water. The control unit was programmed to activate and scale all sensors every 15 minutes. The pump-filtration unit was adjusted to provide

Suspended Sediment Monitoring System

Block Diagram - Major subsystems

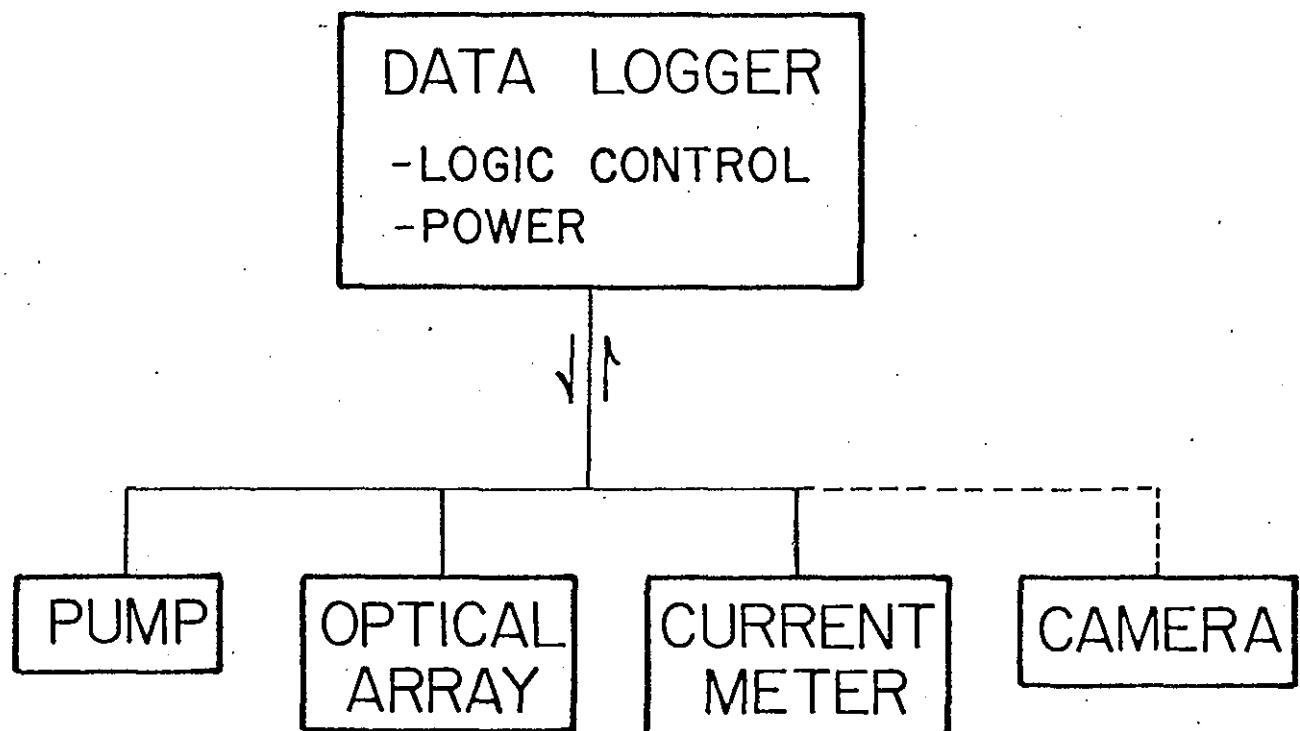
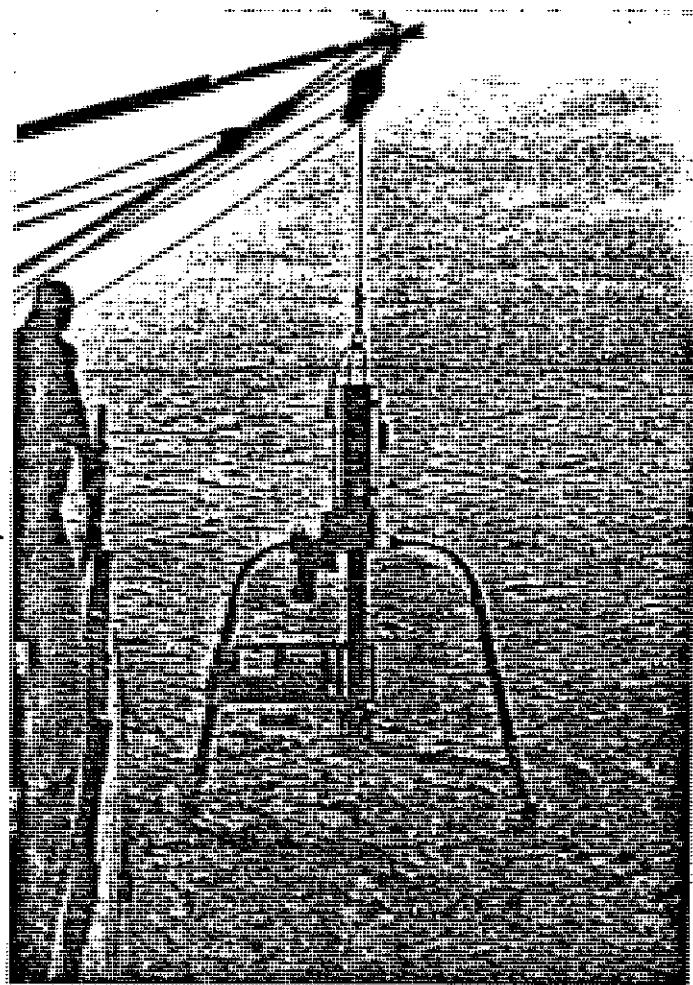


FIGURE 5.1



Sediment Array  
Deployment No. 1  
January, 1980

FIGURE 5.2

one sample of ambient suspended material concentrations each day. Approximately 700 ml of filtrate was passed through an individual filter providing an integrated sample of the suspended load over a 24-hour period. Twenty-five (25) Nuclepore (47 mm dia.; 0.4  $\mu$ pore size) filters were inserted sufficient to provide an excess of three weeks of continuous sampling. In addition, selected filter units contained KV metro-discs to permit testing of their compatibility within the pump-filtration system and utility as a means to sample in-situ heavy metal concentrations.

The first deployment was terminated on January 17, 1980. The array was recovered and returned to Avery Point. Each of the component units was disassembled, inspected and, if appropriate, recalibrated. Films and magnetic tape records were processed and the resultant data reviewed. The examination indicated that all of the primary electronic components functioned properly. Minor mechanical problems affected one temperature probe, causing flooding and aberrant excess power consumption limited the battery life of the camera to nine days. Of the major subsystems, only the pump-filtration unit appeared to function unsatisfactorily. In particular there were questions concerning the accuracy of the timing controlling the drive and sampling rate of this unit since on recovery piston excursion indicated a 16 day, rather than a 13 day deployment. Primary concern, however, centered on the accuracy of the suspended material samples. Comparison of the filters sampled during deployment with those presumably unsampled indicated that both contained similar masses of sediment. It was unclear, therefore, whether the samples are the result of diffusion, biological growth or the planned filtration. Given the sediment weights contained on the filtered samples, it was apparent that the filtration was at best inefficient. These results were communicated to the manufacturer and the unit was returned for redesign on January 23, 1980.

Following completion of the evaluation of the results of the test deployment, the instrumentation array was reassembled and readied for its first long-term deployment. This commenced on January 31, 1980. Again the system was placed on the western boundary

of the New London dumpsite ( $41^{\circ} 16.03'N$ ,  $72^{\circ} 04.63'W$ ) in approximately 55 ft. of water. The array deployed was identical to that used in the first deployment with the exception of the deletion of the pump-filtration unit which remained at the manufacturer's.

During the period of the second deployment primary emphasis was placed on the documentation of the array including operating instructions, schematic diagrams and calibration algorithms and on the development of the computer programs necessary to read the data tapes and analyze the results. The majority of these efforts were completed prior to March 1, 1980. A sample printout for the first deployment is shown in Table 5.1.

In addition to system and programming considerations, time was committed during the second deployment period to the redesign of the suspended sampling system. A simple spring-loaded suction unit similar in concept to a hypodermic syringe was constructed and tested. This unit functioned satisfactorily and it appears capable of providing accurate samples of both suspended material concentrations and concurrent heavy metal concentrations. Since it appears that the unit constructed by KV Associates will not be capable of doing either, despite redesign, funds for the construction of this new sampler have been solicited. There is little doubt that its addition will significantly extend the utility of the monitoring array.

The second deployment was terminated on March 3, 1980. Again the unit was recovered and returned to Avery Point. Following disassembly, inspection and analysis of the data tapes and films, all units were found to have functioned properly, providing approximately 32 days of data. Calibrations were checked and the array was reassembled and readied for deployment.

Deployment No. 3 commenced on March 17, 1980 with the unit placed in the same location occupied during Deployments 1 and 2. Primary emphasis during the deployment period was placed on the reduction and evaluation of data from the earlier deployments. Several programming problems were resolved and a regular reduction routine established.

Sample Data Printout  
Suspended Sediment Monitor  
January, 1980

CHAN.	TIME	FREQ CNT.	NEPH1	NEPH2	TEMP3	TEMP4	CHAN5	CUR METER
6	30.63	34382.40	3.421	1.296	7.586	7.110	1.434	2.009
6	30.88	34378.93	3.423	1.288	7.585	7.111	1.434	2.007
6	31.13	34376.33	3.418	1.339	7.588	7.113	1.434	1.667
6	31.38	34378.66	3.423	1.302	7.592	7.119	1.434	1.682
6	31.63	34389.66	3.410	1.339	7.606	7.128	1.435	1.606
6	31.88	34418.07	3.419	1.375	7.632	7.179	1.437	1.957
6	32.13	34432.07	3.400	1.301	7.640	7.190	1.438	1.999
6	32.38	34446.73	3.359	1.494	7.637	7.209	1.440	1.784
6	32.63	34453.46	3.408	1.301	7.641	7.221	1.442	1.713
6	32.88	34464.40	3.432	1.180	7.659	7.234	1.444	2.224
6	33.13	34467.33	3.427	1.204	7.654	7.234	1.445	2.122
6	33.38	34475.46	3.391	1.851	7.665	7.235	1.446	2.491
6	33.63	34475.66	3.409	1.254	7.670	7.235	1.446	2.911
6	33.88	34471.46	3.396	1.427	7.669	7.231	1.447	2.615

TABLE 5.1

The third deployment was terminated on April 18, 1980 with the array being recovered and returned to Avery Point. Again, all systems functioned as designed providing approximately 32 days of data. Since this recovery, primary emphasis has shifted to data reduction. All data from the first three deployments have been listed and reviewed. Several storm and/or disposal events have been identified and used to define required additional data including waves and meteorological records. A paper describing the monitoring system is in preparation, and we expect to present some of the preliminary results at the New England Estuarine Research Society meeting scheduled for May 1980.

As outlined in the revised project schedule submitted to SAI in early May 1980, the monitoring array will be redeployed during June 1980 in order to sample low energy conditions at the New London dumpsite. It is hoped that this deployment will include addition of a suspended material sampler within the monitoring array. As previously indicated, there is little doubt that the addition of this unit will significantly extend the utility of the monitoring array and simplify the correlation of data obtained by the array with those obtained using the fixed mussel platforms.

All chemical data except the most recent New Haven and Portland samples have been received and plotted showing trends in concentration as a function of distance from the center of the dump pile. Concentration changes as a function of time at particular stations have also been compiled. An example of these plots representing copper at the STNH-S spoil mound is presented in Figure 6.1. These data reflect the high values associated with Stamford material depressed to near background levels during June and August, followed by a return to higher levels when additional spoils were added to the site during clean-up operations in the fall of 1979. These data show excellent potential for use of sediment chemistry to evaluate the effectiveness of capping operations. Analysis of these data will be presented in future reports.

On April 28, 1980, a meeting was held at Barre Falls Dam to discuss potential future directions of the DAMOS chemistry program. Four topics were discussed including:

- Consideration of adding water column chemistry to DAMOS
- Consideration of adding ATP studies to the DAMOS chemistry program
- Clarification on how iron determinations are relevant to the existing bank of heavy metal data from the sediment work
- Consideration of adding ammonia (concentrations in the sediment) determinations to the DAMOS chemistry program

After some discussion dealing with the validity and necessity of performing water column sampling, heavy metal and PCB measurements, it was decided to gather existing pertinent information from the literature. E.N. Jones will provide water chemistry data from Phase I New London dump site work and contact Dr. Fitzgerald of UCONN at Avery Point as well as sources at WHOI. B. Condike will provide cost estimates for the performance of heavy metal and PCB analysis of water samples. The DAMOS chemists will consider the information gathered and present their views to the COE steering committee.

The possibility of incorporating ATP work into DAMOS was considered with ATP regard to its relevance and applicability. It was

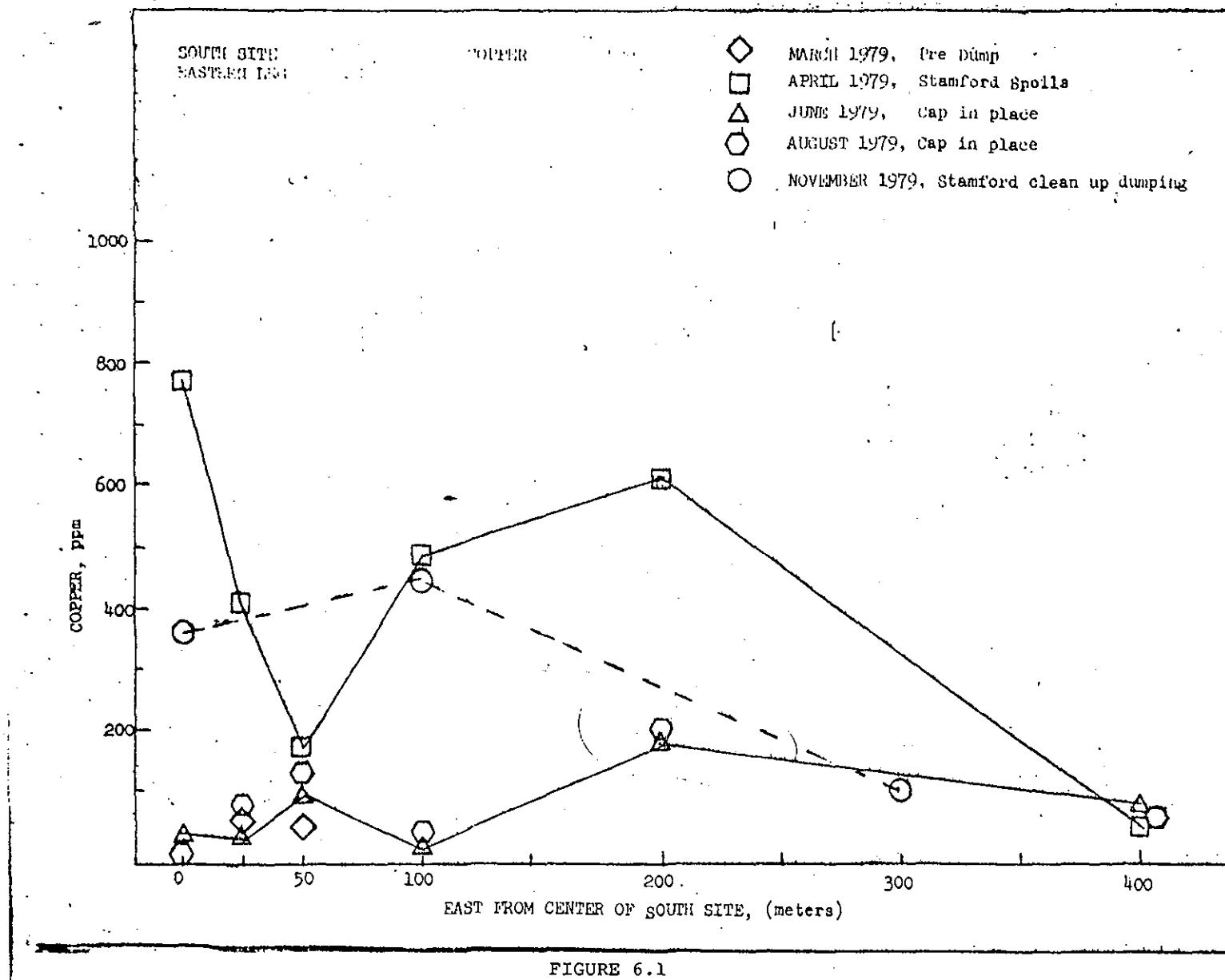


FIGURE 6.1

thought that although relating ATP to biomass had certain potentials, biological speciation and community statistics were more desirable (Dr. Brooks has designed his program to answer the latter). However, a literature search was initiated, which would include some of the work of Dr. Yengst of Yale and Dr. Callibrize. Other insights might be available from Dr. Feng of UCONN.

Dr. Jones explained the use of iron in the DAMOS chemistry program. He has found that plots of Fe vs. other heavy metals can be useful in separating natural and spoil regions. F. Knowles showed a preference for COD vs. other metal plots. All agreed that since both Fe and COD will now be determined routinely, both types of plots would be generated. The iron determination was thought to be worth continuing.

Ammonia concentration in the sediment and water column associated with the dumping of spoils was discussed. B. Condike reported on a direct NH<sub>3</sub> determination using a specific ion/component electrode in slurries of sediment. Problems of such measurement were discussed related to the fact that the NH<sub>3</sub> released to the water column on dumping would have a very short residence time at the dump site and NH<sub>3</sub> remaining within the lump aggregate sediments would in all likelihood continue to stay in the sediment as long as the aggregates did not erode. Thus using ammonia as an indicator of spoil stability was questionable, since at the fringes of the spoil pile one does not expect lump aggregate spoil.

Further meetings are planned to discuss the results of the literature surveys and to develop specific approaches toward sampling and analysis of these parameters as required.

#### 7.0 BENTHIC ECOLOGY (Dr. A. Brooks)

Although there has been no opportunity for benthic sampling during the months prior to March 1980, continued analysis of previous data has been underway.

Table 7.1 lists all DAMOS benthos sampling sites occupied with dates of sampling since the inception of the DAMOS program. The number of samples collected during each sampling date is shown in

SITE	WINTER SPRING 77-78	SPRING SUMMER 1978	WINTER 1978-79	SPRING 1979	SUMMER 1979	SPRING 1980
1.Rockland D.S.	12/12/77(3)	5/11/78(3)	11/16/78(3)	6/13/79(5)		
2.Rockland Canyon			11/16/78(3)			
3.Portland D.S.	12/15/77(3)	5/18/78(3)	11/19/78(3)	6/10/79(5)		
4.Portland Reference						4/8/80(10)
5.Isle of Shoals	12/17/77(3)	5/20/78(3)	12/8/78(3)	6/8/79(5)		
6.Boston Foul Grd.	12/18/77(3)	5/23/78(3)	12/6/78(3)	6/6/79(5)		
7.Boston Lightship	12/18/77(3)	5/23/78(3)	12/6/78(3)	6/6/79(5)		
8.Brenton Reef D.S.	4/25/78(3)	8/3/78(3)	12/11/78(3)	5/30/79(5)		
9.Brenton Reef Reference	4/19/78(3)	8/3/78(3)	12/11/78(3)	5/30/79(5)		
10.New London, D.S.(c-6)	4/17/78(3)	8/2/78(3)	1/28/79(5)	5/12/79(5)		3/25/80(10)
11.New London Ref. #1(F-8)	4/17/78(3)	8/2/78(3)	1/28/79(5)	5/23/79(5)		
12.New London Ref. #2(A10-3)						3/25/80(10)
13.Cornfield Shoald D.S.	1/31/78(3)	7/31/78(3)	1/27/79(5)			
14.Cornfield Shoal Ref.	1/31/78(3)	7/31/78(3)	1/27/79(5)			
15.N.Haven D.S.	4/13/78(3)	7/29/78(3)	1/19/79(5)	5/21/79(5)		
16.N.Haven Ref(NW Control)	4/13/78(3)	7/29/78(3)	1/26/79(5)	5/21/79(5)		
17.N.Haven Ref. (Southern)						4/1/80(10)
18.STNH-N-Dump Pt.(S)				3/21/79(5)		
19.STHN-N-1-Dump Pt.						4/1/80(10)
20.STNH-N Inner Edge						4/2/80(10)
21.STNH-N Outer Edge						4/2/80(10)
22.STNH-S 1-Dump Pt.			1/26/79(5)			
23.STHN-S-6-1000M East			1/26/79(5)	5/21/79(5)	8/9/79(5)	
24.STNH-S-7-1000M West			1/26/79(5)	5/22/79(5)	8/9/79(5)	
25.N.Haven-Norwalk Dump Pt						4/1/80(10)
26.Cable & Anchor D.S.	4/11/78(3)	7/27/78(3)	1/23/79(5)			
27.WLIS D.S.	4/12/78(3)	7/27/78(3)	1/23/79(5)			
28. CAR & WLIS REF.	4/12/78(3)	7/28/78(3)	1/23/79(5)			
29.Green's Ledge				1/23/79(5)	5/18/79(5)	

TOTAL DREDGES = 123

TOTAL GRABS = 235

DAMOS BENTHOS  
Sampling Sites and Dates of Sampling

TABLE 7.1

parenthesis. From December 1977 through 1978, samples were collected using an Anchor Dredge. From January 1979 to the present, samples for benthic analysis have been collected with a Smith-McIntyre grab sampler which collects a sample of bottom sediment with a  $0.1\text{ M}^2$  surface area. During the course of this program a total of 123 dredge and 235 grab samples have been obtained.

All benthic samples collected up through 1979 have been analyzed. The numbers of individuals counted and a listing of all species found have been tabulated. The total number of taxa identified from these samples is 655. The total number of individuals collected is 59,940.

Table 7.2 presents a computer printout of the master listing of all taxa identified up through 1979. Included in this listing are species which were found at the New London dredge disposal site during the New London Phase II studies which preceded the DAMOS program. The Table has not been annotated but the following description should prove self explanatory. Columns 1-12 contain the NODC code number for the listed species, or in cases where a complete code number has not yet been assigned by NODC an arbitrary number has been designated by the author. Columns 13,14 and 15 contain an x, z and y respectively which are simply "flags" for use in future computer manipulation that designate their respective taxa as incertae sedis, a generic designation and juveniles of the species in question, respectively. Columns 16 through 49 contain the scientific name of the organism. In columns 50, 52, 53 and 56 will be found 1,2,3 and 4 respectively. These latter numbers are code numbers which represent the four sampling periods during the New London Phase II studies, namely March 1977, September 1977, March 1978 and September 1978 respectively. The presence of one or more of these numbers opposite a given species indicates that the species in question was collected during New London Phase II studies on the date(s) corresponding to the code number(s) indicated. Columns 60,62,64 and 66 contain the code numbers 5,6,7 and 8 respectively, corresponding to DAMOS sampling dates of the Winter-Spring 1977-78, Spring-Summer 1978, Winter 1978-79 and Spring-Summer 1979 collections and indicate that the species in

TABLE 7.2 MASTER SPECIES LIST

PIP TI:=RUN.DAT							
PROTOZOA 34-3496							
344899	YFORAMINIFERA SP.		3	4	5	NL	N S
344898	YFORAMINIFERA SP. A			6		S	
344897	YFORAMINIFERA SP. B			6		S	
344896	YFORAMINIFERA SP. C			6		S	
PORIFERA 36-3669							
3666060199	X CLIONA SP.	1 2 3		6	NL		S
3666060104	CLIONA VASTIFICA						
3668040199	CRANIELLA GRAVIDA	1			NL		
3663020199	HALICLONA PALMATA		3		NL		
3663020198	X HALICLONA SP.	3 4	6		NL	R I S	
3665030102	HYMENIACITION HELIOPHILA	3 4		7 8	NL	S	
3664111002	IOPHON NIGRICANS	3	5		NL	N	
3607010199	X LEUCOSOLENIA SP.		5				S
3666040103	POLYMASTIA ROBUSTA			6		R I	
3699	YPORIFERA SP.		5 6				S
3608010201	SCYPHA CILIATA	2 3			NL		
CNIDARIA 37-3769							
HYDROZOA 3701-3729							
370199	X ACTINOTHOE SP.	1			NL		
370198	YANTENNULARIA SP.		3		NL		
3703010799	X BOUGAINVILLIA SP.	2	5		NL	S	
370197	CALYCELLA SYRINGA	1 3 4	5 6	8	NL	N S	
3704010199	CAMPANULARIA FLEXUOSA	3	5		NL	R I S	
3704010198	X CAMPANULARIA SP.	1 3 4	5 6		NL	N S	
3704010197	CAMPANULARIA VERTICELLATA	3	5 6		NL	R I S	
37040198	X CAMPANULARIO SP.	4	6	8	NL	R I S	
3704010599	CLYTIA CORONATA		4	6	NL	S	
3704010598	X CLYTIA SP.		4	6 7	NL	S	
3703030199	CORYMORPHA PENDULA		5	7 8		R I S	
3703030198	X CORYMORPHA SP.		7			S	
3704040299	X CUSPIDELLA SP.		4		NL		
37030109	DICORYNE FLEXUOSA			8	N		
3703010999	X DICORYNE SP.	2			NL		
3704050899	X DIPHASIA SP.	2			NL		
3703080199	X EUDENDRIUM SP.	2 3 4	5 6 7 8		NL	N R I S	
3703011199	GARVEIA GROENLANDICA			6 7 8		S	
3704010899	GONOTHYRAEA GRACILIS			6		S	
3704060199	HALECIMUM DIMINUTIVUM		4	6		NL	S
3704060198	X HALECIMUM SP.	2 3 4	5 6 7 8		NL	N R I S	
3703030401	HYBOCORION PROLIFER	3	7 8		NL	S	
3703010804	HYDRACTINIA ECHINATA		4		NL		
3703010898	X HYDRACTINIA SP.	2	5 6		NL	N S	
3704050901	HYDRALLMANIA FALCATA		4		NL		
370196	YHYDROZOAN SP			7		R I S	
3704020199	X LAFOEA SP.		4		NL		
3704110101	LOVENELLA GRACILIS			5 8		S	
3704010299	X OBELIA SP.		4		NL		
37030101	X PERIGONIMUS SP.			8		S	
3701	POIOCORYNE CARNEA			8		S	
370195	X SELAGINOPSIS SP.		4		NL		
3704050299	X SERTULARELLA SP.			7		S	
3704050399	X SERTULARIA SP.	2	5		NL	N	
3703180198	X STYLACTIS SP.			6		S	
3704050599	X THUIARIA SP.	1 2 3 4	5 6 7 8		NL	N R I S	
3703030299	X TUBULARIA SP.		4	7 8	NL	S	
370303	YTUBULARIA SP.	1 2 3	5 6		NL	S	
ANTHOZOA 3740-3769							
375999	X ACTINIARIAN SP.			5		R I S	
37599999	X ACTINIARIAN SP. A	1 2			NL		
374099	YANTHOZOAN SP.	2	5	8	NL	N	

3/43010199	YERIANI HANSON SP.	1 2 3 4	5 6 / 8	NL N RI S
3759010101	EDWARDIA ELEGANS	1 2 3 4	5 6 7 8	NL N RI S
3759010199 X	EDWARDIA SP.		7 8	N
3759040199	HALCAMPUS DUODECIMCIRRATA		6	N RI S
37590299 X	HALCAMPOIDES SP.	2 4	5 6	NL S
37590399	HALOCLAVA PRODUCTA		7 8	S
375903 X	HALOCLAVA SP.		8	S
3760060101	METRIDIUM SENILE	3 4	6 7	NL RI S
3760020101	STOMPHIA COCCINEA		8	N
	PLATYHELMINTHES 39-3976			
3906050599 X	NOTOPLANA SP.		7	S
3999 Y	PLATYHELMINTH SP.		5 6 7	N RI S
	RHYNCHOCOELA 43-430B			
4306050199 X	AMPHIFORUS SP.	1 2 3 4	5 6 7 8	NL N RI S
4303020299 X	CEREBRATULUS SP.	1 2 3 4	5 6 7 8	NL N RI S
4303020499 X	LINEUS SP.		5 6	N RI
4303020599 X	MICRURA SP.	1 2 3 4	5 6 7 8	NL N RI S
4399 Y	RHYNCHOCOEL SP.	2 3 4	5 6 7 8	NL N RI S
4302010104	TUBULANUS PELLUCIDUS		7	N S
4302010199 X	TUBULANUS SP.	2	5 6 7 8	NL N RI S
	NEMATOIA 47-4759			
4799 Y	NYEMATODE SP.	2 3 4	5 6 7	NL N RI S
4799 Y	NYEMATODE SP. (PARASITIC)		8	N
	MOLLUSCA 5085-5708			
	POLYPLACOPHORA 5303			
53030206	TONICELLA RUBER		8	N
	AFLACOPHORA 54-5402			
5402010101	CHAETODERMA NITIDULUM		5 6 7 8	N
5402010199 X	CHAETODERMA SP.		5	N
	SCAPHOPODA 56			
5600010105	DENTALIUM ENTALE		8	N
5600010106	DENTALIUM OCCIDENTALE		6	N
	GASTROPODA 51-5143			
5110040103	ACTEOCINA CANALICULATA		6 8	S
5105140101	ADMETE COUTHOYI		6	N
5103200199	ALVANIA PELAGICA		5 6 7 8	N
5105030399 X	ANACHIS LAFRESNAYI	1 2 3 4	5 6 7	NL N S
5105030398 X	ANACHIS SP.	1 3		NL
5105040145	BUCCINUM UNDATUS		6 8	S
5103760399 X	BULBUS SMITHII		6	N
5199 X	CAPELLINIA SP.	1		NL
5141030299	CATRIONA AURANTIA		7	S
5105050328	COLUS PYGMAEUS		5 8	N
5105050329	COLUS STIMPSONI		5	N
51410401 X	CORYPHELLA SP.		8	S
5103640205	CREPIIULA CONVEXA	1 2 3 4	6	NL N
5103640204	CREPIDULA FORNICATA		3 4 5 6 7 8	NL S
5103640207	CREPIDULA FLANA	2 3 4	5 6 7 8	NL N S
5103640299 X	CREPIDULA SP.	3 4		NL
5103640401	CRUCIBULUM STRIATUM	1 4		NL
5110040203	CYLICHNA ALBA		6	N
5110040299	CYLICHNA ORYZA		6 8	S
5105010601	EUPLEURA CAUDATA		4	NL
514201	FACELINA BOSTONIENSIS		8	S
5198	LUNATIA HEROS	1 3 4	5 6	N S
5197	LUNATIA PALLIDA		5	N
51 X	LUNATIA SP.		8	N
5196	LUNATIA TRISERIATA	1 2 3 4	5 6 8	S
5105030207	MITRELLA LUNATA	1 2 3 4	5 6 7 8	NL S
5105030299 X	MITRELLA SP.		5	RI
5105080103	NASSSARIUS TRIVITTATUS	1 2 3 4	5 6 7 8	NL N RI S
5103760299	NATICA FUSILLA		7	N
5110050199	PHILINE QUADRATA		5	N
5103760407	POLINICES DUPLICATUS		5 7 8	S
5103760408	POLINICES IMMACULATUS	2	-	NL

51060206YY	PRUMEBELA LUNULINNULA		5	6	N
5110130101	RETUSA OBTUSA		5	7	N
5110040302	SCAPHAUER PUNCTOSTRIATUS	1	5	6	NL N
5108010299	TURBONILLA NIVEA		4		NL
5108010298 X	TURBONILLA SP.	1	4	8	NL S
5105010301	UROSALPINX CINEREA		3	5	NL N
5195	YGASTROPOD EGGS		3		NL
5194	YGASTROPOD SP.		4		NL
	RIVALVIA	55-5520			
5506010201	ANADARA TRANSVERSA		4	5	NL S
5509090201	ANOMIA ACULEATA	1			NL
5509090202	ANOMIA SIMPLEX		2	6	NL N
5509090203	ANOMIA SQUAMULA			6	S
5515390101	ARCTICA ISLANDICA			5 6 7	N RI
5515190101	ASTARTE BOREALIS			6 7 8	N RI
5515190115	ASTARTE QUADRANS			8	RI
5515190199 X	ASTARTE SP.			7	N
5515190111	ASTARTE SURAEQUILATERA	2	5 6 7 8	NL N	S
5515190113	ASTARTE UNDATA	1 2 3 4	5 6 7 8	NL N RI S	
5515190113	ASTARTE UNIATA (A)			8	N RI
5515220601	CERASTOTERMA PINNULATUM	1 2 3 4	5 6 7 8	NL N RI S	
5599 X	CHIONE SP.	2 3			NL
5517020201	CORBULA CONTRACTA	1			NL
5517020299 X	CORBULA SP.			6	N
5507010201	CRENELLA DECUSSATA			6 8	N
5507010203	CRENELLA GLANDULA			5	N
5598	CUMINGIA TELLINOIDES			6	N
5520100299	CUSPIDARIA ORESA			5	N
5515170106	CYCLOCARDIA BOREALIS	1 2 3 4	5 6 7 8	NL N RI S	
5507010502	DACRYDIUM VITREUM	3 4	6 7	NL	S
5515090301	ENSIS DIRECTUS	1 2 3 4	6 7	NL	RI S
5517060201	HIALELLA ARCTICA			8	S
5515010202	LUCINOMA FILLOSA			8	RI
5520050201	LYONSIA ARENOSA			8	N
5520050206	LYONSIA HYALINA			6 8	S
5515310116	MACOMA BALTICA			7	N
5515310101	MACOMA CALCAREA			5 8	N
5515310199 X	MACOMA SP.			5 7	N S
5515310120	MACOMA TENTA	1	5 6 7 8	NL	S
5515471101	MERCENARIA MERCENARIA		4		NL
5507010601	MODIOLUS MODIOLUS	2 4	5 6	NL	S
5515250301	MULINIA LATERALIS	2	5 6 7 8	NL N	S
5507010402	MUSCULUS IISCORS	1	5		N
5507010401	MUSCULUS NIGER	1 2	5	NL N	S
5507010499 X	MUSCULUS SP.		4		NL
5517010201	MYA ARENARIA			7	RI S
5517010201 Z	MYA ARENARIA			8	N
5507010101	MYTILUS EDULIS	1 2 3 4	5 6 7 8	NL N RI S	
5502020206	NUCULA DELPHINODONTA	1		8	NL N RI
5502020204	NUCULA PROXIMA	1 2 3 4	5 6 7 8	NL N RI S	
5502020201	NUCULA TENUIS			5 6 7 8	N RI
5502040211	NUCULANA TENUISULCATA			5 6 7 8	N
5520020107	PANDORA GOULDIANA	2			NL
5520020199 X	PANDORA SP.			7	S
5597 X	PECTINIID SP.			5	N
5596	YPELECYPOD SP.			5	RI S
5595	YPELECYPOD SP. A			7 8	N
5520070102	PERIFLOMA FRAGILE			7	RI
5520070104	PERIPLOMA FAPYRATIUM	1	5 6 7 8	NL N RI S	
5515471201	PITAR MORRHUANA	1 2 3 4	5 6 7 8	NL N RI S	
5504010101	SOLEMYA VELUM	1 2 3 4	5 6	NL	S
5515290202	SOLEN VIRIDIS			6 8	S
55152999 X	SOLENID SP.		4		NL
5515250199	SPISULA SIMILIS	1			NL
5515250102	SPISULA SOLIDISSIMA	1 2	5 6	NL	RI

55153102	X	TELLINA SP.		5				
5515310299		TELLINA VERSICOLOR			NL	N RI	S	
55153199		YTELLINID SP.		8				
5520080209		THRACIA CONRADI	1	5	NL	N RI		
5520080299	X	THRACIA SP.		5		N		
5515020399		THYASIRA INSIGNIS		5	6	N	S	
5515020398	X	THYASIRA SP.		7		N	S	
5502040511		YOLDIA LIMATULA	2 3	5	6	NL	S	
5502040599		YOLDIA LUCIDA	3	5	6	NL	N	S
5502040513		YOLDIA SAFOTILLA		4	5	6	NL N RI	S
5502040507		YOLDIA THRACIAEFORMIS		5	6	7		N
		ANNELIDA	50-5016					
		POLYCHAETA	5001					
5001250304		AGLAOPHAMUS CIRCINATA		3	4	5	6	NL RI S
5001670208		AMPHARETE ACUTIFRONS			7	8		N RI S
5001670201		AMPHARETE ARCTICA	1 2	3	4	5	6	NL N RI S
50016799	X	AMPHARETID SP.			6	8		N RI
5001670303		AMPHICTEIS GUNNERI			5	6	7	N
50016801		AMPHITRITE AFFINIS				8		N
5001680101		AMPHITRITE CIRRATA			5	6	7	N
5001680104		AMPHITRITE JOHNSTONI			6			S
500199		YAMPHITRITINAE SP.				7		N
5001220104		ANCISTROSYLLIS GROENLANDICA			5	7	8	N S
5001220199	X	ANCISTROSYLLIS SP.			6			S
500101		ANTINOELLA SARSII				8		N
5001010104		APHRODITA HASTATA			5	6		N
5001420101		APISTOBANCHUS TULLBERGI				8		N
50013399		YARABELLIID SP.				7		S
5001020301		ARCTEOBIA ANTICOSTIENSIS				8		N
5001410211		ARICIDEA CERRUTI				7		S
5001410210		ARICIDEA NEOSUECICA			5	7		S
50014102		ARICIDEA QUADRILOBATA				8		N
5001670802		ASABELLIDES OCULATA		4		7	8	NL RI S
5001630199		ASYCHIS ELONGATA	1	3	4	5	6	NL N RI S
5001230104		AUTOLYTUS PROLIFERA	2	3	4	6	8	NL S
5001230199	X	AUTOLYTUS SP.			5	7		S
5001540199		BRADA GRANOSA	1	2		5		NL N
5001540102		BRADA VILLOSA		2		5	8	NL N RI S
5001600101		CAPITELLA CAPITATA	1	2	3	4	6	NL N S
5001500299		CAULLERIELLA FILARIENSIS	2	3		5	7	NL RI S
5001240601		CERATOCEPHALE LOVENI				8		N
5001500401		CHAETOZONE SETOSA		2		5	6	NL N
5001700102		CHONE INFUNDIBULIFORMIS				5	6	N RI
50015099	X	CIRRATULID SP.	1	2	3	4	5	NL N RI S
5001500699		CIRRIFORMIA GRANDIS	1	2	3	4	5	NL N RI S
5001500698	X	CIRRIFORMIA SP.				6		S
5001410601		CIRRIPHORUS LYRIFORMIS				8		RI
5001410699	X	CIRRIPHORUS SP.				7		S
5001630202		CLYMENELLA TORQUATA	1	2	3	4	5	NL N RI S
5001630203		CLYMENELLA ZONALIS	1	2	3	4	5	NL N S
50016302		CLYMENURA TENUIS				8		RI S
5001520101		COSSURA LONGOCIRRATA				8		N
5001290201		DIOPATRA CUPREA		2	3	4	8	NL N
5001540402		DIPLOCIRRUS HIRSUTUS				5	7	N S
5001500501		DORECACERIA CONCHARUM		3		6		NL S
500150050199	Z	DORECACERIA CONCHARUM		3				NL
5001330103		DRILONEREIS LONGA	1	2	3	4	6	NL N RI S
5001330105		DRILONEREIS MAGNA	1	2	4	5	6	NL N RI
5001330199	X	DRILONEREIS SP.		3	4		7	NL N S
5001022101		ENIPO GRACILIS				5	6	N
5001130204		ETEONE FLAVA		2		5		NL RI
5001130207		ETEONE HETEROPODA				7	8	N S
5001130208		ETEONE LACTEA		2		6	8	NL RI
5001130205		ETEONE LONGA		2	4	5	7	NL RI S
5001130209		ETEONE TRILINEATA				7		N

5001631102	EUCLYMENE CULLANIS	1 4 5 4	5 6 / 8	NL N	S
5001631199 X	EUCLYMENE SP.		5 6 7	N	RI
500192 X	EUCLYMENINAE SF.		4 5 6 7 8	NL	N RI S
5001130301	EULALIA VIRIDIS	1	6 7	NL	S
5001131101	EUMIDA SANGUINEA	1 3 4		NL	
5001131199 X	EUMIDA SP.	2		NL	
5001230701	EXOGONE DISPAR		8	RI	
500196 X	FABRICIINAE SF.		6	RI	
5001540202	FLABELLIGERA AFFINIS		8	RI	S
5001020601	GATTYANA AMONDISONI	2	6	NL	N
5001020603	GATTYANA CIRROSA		5	N	
5001270104	GLYCERA AMERICANA	1 2 3 4	5 6 7 8	NL	RI S
5001270101	GLYCERA CAPITATA	1 2 3	8	NL	RI
5001270105	GLYCERA DIBRANCHIATA	1	6	NL	RI
5001270106	GLYCERA ROBUSTA	4		NL	
5001280202	GONIAIA MACULATA		5 6 7 8	N	RI
5001210103	GYPTIS VITTATA		8	N	
5001020803	HARMOTHOE EXTENUATA	1 2 3 4	6 7 8	NL	N RI S
5001020806	HARMOTHOE IMBRICATA	2 3 4	5 6 7 8	NL	N RI S
5001022001	HARTMANIA MOOREI	2	5 6 7 8	NL	N S
50012199 X	HESIONID SP.	5		N	
5001600201	HETEROMASTUS FILIFORMIS		5 6 7 8	N	
5001730999	HYDROIDES UNCINATA	2 3 4		NL	
5001430201	LAONICE CIRRATA	2	5 6 7 8	NL	N RI
5001701401	LAONOME KROYERI		5	N	RI
5001021103	LEPIDONOTUS SQUAMATUS	1 2 3 4	7 8	NL	S
5001021104	LEPIDONOTUS SURLEVIS		7	N	
5001682001	LOIMIA MEDUSA		5 7 8	N	
5001631599	LUMBRICLYMENE CYLINDRICAUDATA		5 6 7 8	N	RI
5001631598 X	LUMBRICLYMENE SP.	2		NL	
5001310102	LUMBRINERIS FRAGILIS	1 2 3 4	5 6 7 8	NL	N RI S
5001310115	LUMBRINERIS IMPATIENS		8	N	RI S
5001310113	LUMBRINERIS TENUIS	1 2 3 4	5 6 7 8	NL	N RI S
5001630301	MALDANE SARSI	2	5 6 7 8	NL	N RI S
50016399 X	MALDANID SP.	3 4	5 6 7 8	NL	N RI S
5001300202	MARPHYSA BELLII	1 2 3 4	7 8	NL	S
5001600401	MEDIOMASTUS AMBISETA	1 3 4	6 7 8	NL	S
5001670501	MELINNA CRISTATA		5 6 7 8	N	S
5001210202	MICROPHTHALMUS ABERRANS		5	N	
5001640201	MYRIOCHELE HEERI		5 6 7 8	N	S
5001250114	NEPHTYS BUCERA	1 2	6 8	NL	RI S
5001250103	NEPHTYS CAECA	4	6	NL	RI S
5001250102	NEPHTYS CILIATA		5 6 7 8	N	
5001250115	NEPHTYS INCISA	1 2 3 4	5 6 7 8	NL	N RI S
5001250110	NEPHTYS PARADOXA		5 6 7 8	N	
5001250117	NEPHTYS PICTA	1 2 3 4	5 6	NL	N RI S
5001250199 X	NEPHTYS SP.	4	5	NL	RI
5001250118	NEPHTYS SQUAMOSA		8	N	
5001240499	NEREIS ACCUMINATA	1 2 3 4	7	NL	RI S
5001240411	NEREIS IIVERSICOLOR	2		NL	
5001240409	NEREIS GRAYI	2 4	6 7 8	NL	N RI S
5001240410	NEREIS SUCCINEA	3 4	5 7 8	NL	N RI S
5001240406	NEREIS ZONATA	3 4	5 7	NL	RI S
5001680602	NICOLEA VENUSTULA	2 3		NL	
5001630501	NICOMACHE LUMBRICALIS		5 6 7 8	N	
5001310204	NINOE NIGRIPES	1 2 3 4	5 6 7 8	NL	N RI S
5001330301	NOTOCIRRUS SPINIFERUS	1 2 3 4	5 6 7 8	NL	N RI S
5001600306	NOTOMASTUS LATERICEUS	1 2	6	NL	N
5001600305	NOTOMASTUS LURIDUS	1 2 3 4	7	NL	S
5001231304	OINTOSYLLIS FULGURANS	4		NL	
5001290101	ONUFHIS CONCHYLEGA		8	N	
5001580303	OPHELIA BICORNIS	1	7	NL	S
500195	OPHELINA ACCUMINATA	2	5 6 7 8	N	RI S
5001280401	OPHIOLYCERA GIGANTEA	1 2 3 4	5 6 7 8	NL	N RI S
5001640102	OWENIA FUSIFORMIS	1 2 3 4	5 6 7 8	NL	N RI S

5001130801	PAKANALIS SPECIOSA	3	8	RI	S
5001410301	PARAONIS GRACILIS	5	6	N	RI S
50014199 X	PARAONID SP.	3		NL	
5001660302	PECTINARIA GOULDII	2	4	5	6 7 8
5001660303	PECTINARIA GRANULATA			6	7
5001630701	PETALOPROCTUS TENUIS			5	8
5001540304	PHERUSA AFFINIS	1	2	3	4
5001540302	PHERUSA FLUMOSA			5	6 7
5001540399 X	PHERUSA SP.			5	
5001060101	PHOLOE MINUTA	1	2	3	4
5001130108	PHYLLODOCE ARENAE	1		5	6 7
5001130198	PHYLLODOCE MACULATA	3	4	6	7 8
5001130197	PHYLLODOCE MUCOSA			6	
5001130196 X	PHYLLODOCE SP.			4	
5001680701	PISTA CRISTATA	1	2	3	4
500194	YPOLYCHAETE SP.			3	4
5001680804	POLYCIRRUS EXIMIUS	1		4	7
5001680802	POLYCIRRUS MEDUSA			3	7
5001680898 X	POLYCIRRUS SP.	2	3	4	6
50016808 X	POLYCIRRUS SP.				8
5001430414	POLYDORA CONCHARUM				8
5001430411	POLYDORA LIGNI	1	2	4	7
5001430402	POLYDORA SOCIALIS				8
5001430499 X	POLYDORA SP. A	2	3	4	5 6
5001430498 X	POLYDORA SP. B	1	2	3	6
5001430497 X	POLYDORA SP. C			3	4
5001570401	POLYPHYSIA CRASSA				5
5001700601	POTAMILLA NEGLECTA	3	4	6	7
5001700699	POTAMILLA RENIFORMIS	1	2	3	4
5001630901	PRAXILLELLA GRACILIS			5	6 7 8
5001630902	PRAXILLELLA FRAETERMISSA			5	8
5001631899	PRAXILLURA ORNATA				7
5001430501	PRIONOSPIO MALMGRENI	2	3	4	6
5001430599 X	PRIONOSPIO SP.				6
500193	PROCERAEA CORNUTUS	1	2	4	5 6
500192	PROCERAEA FASCIATUS			1	
50020201 X	PROTOIRILUS SP.				8
5001631003	RHODINE LOVENI			5	6 7 8
5001700801	SABELLA CRASSICORNIS	2	3	6	8
5001700899	SABELLA SP.				5
5001650202	SABELLARIA VULGARIS	1	2	3	4
50017099 X	SABELLID SP.			3	4
5001570101	SCALIBREGMA INFLATUM	1	2	3	4
5001432099 X	SCOLELEPIS SP.	1			7
5001432001	SCOLELEPIS SQUAMATUS			1	7
5001430699 X	SCOECOLEPIDES SP.			2	
5001430602	SCOECOLEPIDES VIRIDIS			3	6
5001400305	SCOLOPLOS ACUTUS	1	2	3	4
5001400301	SCOLOPLOS ARMIGER				5
5001400303	SCOLOPLOS FRAGILIS	1	2	3	5
5001400304	SCOLOPLOS ROBUSTUS			1	4
5001400399 X	SCOLOPLOS SP.				5
5001220201	SIGAMBRA TENTACULATA			4	7
5001430701	SPIO FILICORNIS	2	4	5	6 7 8
5001430701	SPIO FILICORNIS (A)				8
5001430704	SPIO SETOSA				6
5001490302	SPIOCHAETOPTERUS OCULATUS	1			8
5001490399	SPIOCHAETOPTERUS VARIOFEDATUS			3	
50014399 X	SPIONID SP.			4	7
5001431001	SPIOFHANES BOMBYX	1	2		5 6 8
5001431099 X	SPIOFHANES SP. A				5
5001431005	SPIOFHANES WIGLEYI				8
5001590101	STERNASPIS SCUTATA			5	6 7 8
5001060302	STHENELAIS BOA	2	3	4	5 6 8
5001060303	STHENELAIS LIMICOLA	1	2	3	6 7 8

5001431801	STREBLUSPIUS BENEDICTI		3	4	5	6	NL	S
50012399 X	SYLLID SP.		3				NL	
5001231503	SYLLIDES LONGOCIRRATA		4	5	7	8	NL	S
5001230306	SYLLIS CORNUTA		2	3	6	8	NL	S
5001230302	SYLLIS GRACILIS		1	2		8	NL	S
5001682202	TEREBELLA LAPIDARIA		3	4	5	6	NL	S
50016899 X	TEREBELLID SP.		5	6	7	8	N	RI
5001690101	TEREBELLIDES STROEMI		5	6	7	8	N	RI
5001500305	THARYX ACUTUS		5	7	8		N	RI
5001500306	THARYX ANNULOSUS		6				R	I
5001500399 X	THARYX SP.	5002	2	3	4	5	6	NRIS
5001681003	THELEFFUS CINCINNATUS		5	6	7	8	N	RI
5001690201	TRICHOBRANCHUS GLACIALIS		5	6	7	8	N	
500145	TROCHOCHAETA MULTISETOSA		8				N	
50014599	TROCHOCHAETA WATSONI		5	7	8		N	
500299 X	ARCHIANNELIDA	5002	1		7		NL	S
	OLIGOCHAETA	5004-5010	3				NL	
500499 X	OLIGOCHAETE SP.		4		8		NL	
50090299 X	TURIFICID SP.	5012	2	3	5	6	NL	S
5012 X	HIRUDINEA		4		8		N	
72000201 X	FLATYBDELLA SP.		72				N	
	SIFUNCULA		72				N	
7200020199 X	GOLFINGIA MINUTA		2				NL	
7200020401	PHASCOLION STROMBI		2	3	5	6	NL	S
7200010501	PHASCOLOFSIS GOULDII		4				NL	
72000199 X	YSIPUNCULID SP.		4		8		NL	N
	ECHIURA	73-7303						
7301020201	ECHIURUS ECHIURUS		4	5	8		NL	S
	CHAETOGNATHA	83						
8300000399 X	SAGITTA SP.		1		7		NL	N
	ARTHROPODA	58-7102						
	CRUSTACEA	61-6191						
6199	YCRUSTACEAN EGGS		3				NL	
	CLADOCERA	6109						
6109050199 X	EVADNE SP.		6				S	
	OSTRACODA	6110						
6111030101	CYLINDROLEBERIS MARIAE		8				N	
6110999999	PSEUDOCYTHERETTA EDWARDISII		5				S	
611098	YOSTRACON SP.		6				S	
	COPEPODA	6117-6127						
611799	YCOPEPOD SP.		2				NL	
611899	YCALANOID SP.		2				NL	
6118010299 X	CALANUS SP.		2	4	5	6	NL	RI S
6118170199 X	CENTROPAGES SP.		6				RI	
612099	YCYCLOPODID SP.		2		5		NL	S
611999	YHARFACTICOID SP.		3	4	5		NL	S
6119100199 X	HARFACTICUS SP.		3				NL	
	CIRRIFEDIA	6130-6142						
6134020112	BALANUS AMPHITRITE		4				NL	
6134020102	BALANUS BALANUS		5		8		N	
6134020104	BALANUS CRENAUTUS		5				N	
6134020114	BALANUS IMPROVISUS		2				NL	
6134020199 XZ	BALANUS SP.		2				NL	
6134010102	CHTHAMALUS FRAGILIS		8				S	
	MYSIDACEA	6151-6153						
6153012301	ERYTHROPS ERYTHROPHTHALMA		8				N	
6153010802	HETEROMYSIS FORMOSA		2	4	7	8	NL	S
6153012102	MYSIDOPSIS BIGELOWI		7				S	
6153011508	NEOMYSIS AMERICANA		4		7	8	NL	RI S
	CUMACEA	6154						
6154050121	DIASTYLIS POLITA		3		8		NL	N RI
6154050126	DIASTYLIS QUADRISPINOSA		5	6	7	8	N	RI S
6154050127	DIASTYLIS SCULPTA		1	3	5	6	NL	RI S

6154040201	EUDORELLA EMARGINATA	5	7	8	N RI						
6154040211	EUDORELLA FUSILLA			8	N RI						
6154040204	EUDORELLA TRUNCATULA		6	8	RI						
6154040299 X	EUDORELLA SP.			6	RI						
6154090301	LEPTOCUMA MINOR			6	8	N RI					
6154050404	LEPTOSTYLIS LONGIMANA			8	N						
6154050801	OXYUROSTYLISTIS SMITHI	3			NL						
6154060101	PETALOSARSIA DECLIVIS			8	N						
	ISOPODA	6158-6167									
6162010301	CALATHURA BRANCHIATA		5	6	N						
6162020504	CHIRIDOTEA ARENICOLA			8	RI						
6162020505	CHIRIDOTEA NIGRESCENS			8	RI						
6162020599 X	CHIRIDOTEA SP.			7	8	RI S					
6162020503	CHIRIDOTEA TUFTSI			8	RI						
6161010105	CIROLANA POLITA	1	5	6	7	8	NL N RI				
6162020701	EDOTEA MONTOSA	4		7	8	NL	RI				
6162020602	ERICHSONIELLA FILIFORMIS	3			NL						
6159010199	GNATHIA CERINA		5		N						
6162020309	IDOTEA PHOSPHOREA		5		S						
6160010301	PTILANTHURA TENUIS	3	4	7	8	NL	RI S				
	AMPHIPODA	6168-6172									
6169220602	ACANTHOHAUSTORIUS MILLSSI			7	8	RI	S				
61693701 X	ACANTHOSTEPHIA SP.			8		N					
61693702 X	ACEROIDES SP.			8		N					
6171010899 X	AEGININA SP.	2	5	6	NL	RI	S				
6171010801	AEGININA LONGICORNIS	3	4	5	6	7	8	NL N RI S			
6169020108	AMPELISCA ABDITA	2	3	4	5	6	7	8	NL N RI S		
6169020111	AMPELISCA AGASSIZI	1	3	5	6	7	8	NL	RI S		
6169020101	AMPELISCA MACROCEPHALA	2		5	6	8		NL	N RI		
6169020109	AMPELISCA VADOURUM	1	2	3	4	5	6	7	8	NL	RI S
6169020110	AMPELISCA VERRILLI	1	2	3	4		8		NL	S	
6169340303	ANONYX LILJEBORGII	3				NL					
6169340314	ANONYX SARSI			7	8		N RI				
6169070101	ARGISSA HAMATIPES				8		N RI				
6169370402	ARRHIS PHYLLONYX				8		N				
6169020203	BYBLIS SERRATA	1	2	3	4	5	6	7	8	NL	N RI
6169120201	CALLIOPIUS LAEVIUSCULUS	1		6		NL	N				
6171010703	CAFRELLA LINEARIS	1			8	NL	S				
61710199	YCAFRELLIA SP			7		S					
6169211601	CASCO BIGELOWI		5	6	7	8		N RI			
6169150102	CERAFUS TUBULARIS	3			NL						
6169150201	COROPHIUM ACHERUSICUM				8		S				
6169150202	COROPHIUM BONELLI				8		S				
6169150203	COROPHIUM CRASSICORNE			5	8		RI	S			
6169150211	COROPHIUM INSIDIOSUM				7	8		S			
6169150299 X	COROPHIUM SP.	1			NL						
6169170401	DEXAMINE THEA			8		S					
616999	DYOPEDIOS MONACANTHUS	3		8	NL	S					
616998	DYOPEDIOS PORRECTUS			7	8	N RI	S				
616997 X	DYOPEDIOS SP.	1			NL						
6169150302	ERICHTHONIUS BRASILIENSIS	2			NL						
6169150306	ERICHTHONIUS RUBRICORNIS		5	6	7	8	N RI	S			
6169210710	GAMMARUS ANNULATUS	3	4	6	7	NL	S				
6169210713	GAMMARUS LAWRENCIANUS			7		S					
6169210799 X	GAMMARUS SP.	1	2	3		NL					
6169020305	HAPLOOPS SETOSA	1			NL						
6169020301	HAPLOOPS TUBICOLA		5	6	7	8	N				
6169420116	HARPINIA PROFINQUA		5	6	7	8	N RI	S			
6169420115	HARPINIA TRUNCATA			7		RI					
6169341405	HIPPOMEDON PROFINQUUS		5	6	7	8	N RI				
6169341408	HIPPOMEDON SERRATUS	1		5	6	7	8	NL	N RI		
6169270202	ISCHYROCERUS ANGUIPES	1	3		8	NL	S				
6169270302	JASSA FALCATA				7	8	S				
6169060303	LEMBOS SMITHI	3			NL						
6169060399	LEMBOS WEBSTERI	1	2		8	NL	S				

6169330301	LISIRIELLA BARNARDI	1	2	3	4	5	6	7	8	NL	S
6169210801	MAERA DANAE					5	7	8		N RI	
6169211003	MELITA DENTATA										
61694815 X	METOPA SP.								8	N	
616997	MONOCULOIDES EDWARDSII	1								NL	
6169370817	MONOCULODES INTERMEDIUS								8	N	
6169370810	MONOCULODES PACKARDI								8	N	
6169370821	MONOCULODES TESSELATUS								8	N	
61693708 X	MONOCULODES SP.								8	N	
6169060401	MICRODEUTOPUS GRYLLOTALPA	1								NL	
6169371699 X	OEDICEROS SP.					5				RI	
6169342904	ORCHOMENE PINGUIS								8	RI	
6169345202	ORCHOMENELLA GROENLANDICA						7			RI	
6169345201	ORCHOMENELLA MINUTA					5	8			N RI	
6169221101	FARAHASTORIUS ATTENUATUS							7		S	
6169221102	PARAHAUSTORIUS HOLMESI						6	7		S	
6169221103	PARAHAUSTORIUS LONGIMERUS	1								NL	
6169480702	PARAMETOPELLA CYPRIS					5				S	
6169420928	PARAFHXOXUS SPINOSUS					6				RI	
6170011006	PARATHEMISTO GAURICHAUDI						8			N	
6169371202	PAROEDICEROS LYNCAEUS					8				N	
6169260207	PHOTIS DENTATA					5	6	8		RI S	
6169260208	PHOTIS MACROCOXA						7	8		N RI	
6169260202	PHOTIS REINHARII	1	2					8	NL	RI	
6169420702	PHOXOCEPHALUS HOLBOLLI	1	2	3	4	5	6	7	8	NL	RI S
6169430503	PLEUSYMTES GLAKER								8		S
6169201203	PONTOGENEIA INERMIS							7			S
6169221201	PROTOHAUSTORIUS DEICHMANNAE						7				S
6169221202	PROTOHAUSTORIUS WIGLEYI						6	7	8	RI S	
6169150801	PSEUDUNCIOLA ORLIQUA							8		RI	
6169060899	RUDILEMBROIDES NAGLEYI	1								NL	
6169150699 X	SIPHONODECTES SP.						7			S	
6169430609	STENOPLLEUSTES GRACILIS		3	5	7	8	NL			S	
6169430610	STENOPLLEUSTES INERMIS						8			N	
6169481002	STENOTHOE MINUTA					5				S	
6169500501	TIRON SPINIFERUM						8			N	
6169421001	TRICHOPHXUS EPISTOMUS		3	5	6	7	8	NL	RI S		
6169150702	UNCIOLA INERMIS	1				6	8	NL	N RI		
6169150703	UNCIOLA IRRORATA	1	2	3	4	5	6	7	8	NL	N RI S
6169150704	UNCIOLA SERRATA					4				NL	
6169371599 X	WESTWOODILLA SP.						6			N	
DECAPODA 6175-6189											
6183020399	AXIUS SERRATUS	2	4			6	8	NL	RI S		
6183040205	CALLIANASSA ATLANTICA		3			7	8	NL		S	
6188030107	CANCER BOREALIS					6	7	8		RI	
6188030108	CANCER IRRORATUS	1	2	3	4	5	6	7	8	NL	RI S
6179220103	CRANGON SEPTEMSPINOSA	1	2	3	4	6	8	NL	RI	S	
6179180301	DICHELOPANDALUS LEPTOCERAS						7			S	
6179160408	EUALUS FUSIOLUS	2	4			7	8	NL	N	S	
6189020501	EURYPANOPEUS DEPRESSUS		4			5	6	NL	N	S	
6187011101	EUPROGNATHA RASTELLIFERA					3				NL	
6187011201	HETEROCRYPTA GRANULATA					4				NL	
6187010202	HYAS COARCTATUS					4				NL	
6187010901	LIBINIA DUBIA	1	2	3	4	6				NL	S
6187010902	LIBINIA EMARGINATA	1	2	3	4	5	8	NL		S	
61870199 X	MAJID SP.					4		8	NL		S
6189010502	OVALIFES OCELLATUS					4		8	NL		S
6183060226	PAGURUS ACAIJANUS		2	4						NL	
6183060233	PAGURUS ARCUATUS							8		N	
6183060230	PAGURUS LONGICARPUS	1	3	4		5	6	7	8	NL	N S
6183060232	PAGURUS POLLICARIS	1	2	3	4	5	7			NL	S
6183060299 X	PAGARUS SP.					3	4		8	NL	S
6189020801	PANOPEUS HERBSTII							5	7	8	S
6187011301	PELIA MUTICA	1	2							NL	
6189060405	PINNIXA CHAETOPTERANA	1	2	3	4	5	7	8	NL	S	
	PARVIMIXA CAVANA							7	8		S

6189060201	FINNOTHERES MACULATUS		7	S
6189060202	FINNOTHERES OSTREUM	2	7	NL S
61890699	X FINNOTHERID SP.	4		NL
6183040102	UPOGEORIA AFFINIS	4	5 7 8	NL S
618499	X BRACHYURAN SP.	4		NL
6184	X BRACHYURAN SP. (ZOEA)		8	RI
	ARACHNIDA	59-5933		
5930010499	X HALACARUS SP.	3 4	5 6	NL S
	PYCGNOGONIDA	60-6001		
6001060204	ANOPLODACTYLUS LENTUS	1		NL
	BRACHIOPODA	80-8006		
8005070103	TEREBRATULINA SEPTENTRIONALIS		5 6 7	N
	ENTOPOCTA	79-7903		
7902010202	BARENTSIA LAXA	3		NL
7902010299	X BARENTSIA SP.	3 4	6	NL S
	ECTOPOCTA	70-7817		
7815010199	X AETEA SP.	2 3 4	5 7	NL S
7806010101	AEVERRILLIA ARMATA	2 3 4	5 6 7	NL S
7806010199	AEVERRILLIA SETIGERA	3 4	6 7 8	NL S
7806010198	X AEVERRILLIA SP.	4		NL
7815080202	AMPHIBIESTRUM FLEMINGII	1 2 3 4	5	NL S
7815260299	BICELLARIELLA CILIATA	1 2 3 4	5 6 7 8	NL S
7815260298	X BICELLARIELLA SP.		6	S
7805010201	BOWERBANKIA GRACILIS	2	4	NL
7805010202	BOWERBANKIA IMBRICATA		4	S
7805010299	X BOWERBANKIA SP.	2	4	5 6 NL N S
7815250199	BUGULA SIMPLEX		6	S
7815250101	BUGULA TURRITA	2	4	6 7 8 NL S
7815250198	X BUGULA SP.	2 3	6	NL S
7815080101	CALLOPOORA AURITA	2 3 4	5 6 7	NL N S
7815080102	CALLOPOORA CRATICULA	3 4	5 6 7	NL S
78150899	X CALLOPORID SP.	4		NL
7815070299	X CAULORAMPHUS SP.		5	S
7815070201	CAULORAMPHUS CYMRAEFORMIS	2	4	NL
781599	CLEIOCHASMA CONTRACTUM	3		NL S
7815300102	CRIBRILINA PUNCTATA	1 2 3 4	6 7	NL S
7809010101	CRISEA EBURNEA	1	3 4	NL
7809010199	X CRISEA SP.	4		NL
7816170101	CRYPTOSULA FALLASIANA	1 2 3 4	7 8	NL S
7816170199	X CRYPTOSULA SP.	2		NL
7816060101	CYLINDROPORELLA TUBULOSA	3 4		NL
7815250201	DENDROBEANIA MURRAYANA		7	RI
7815050103	ELECTRA PILOSA	2 3 4		NL
7815050198	X ELECTRA SP.	1 3 4	7	NL S
7815020101	EUCRATEA LORICATA	3		NL
7816090101	HIPPOPORELLA HIPPOPUS	3		NL
7819090199	X HIPPOPORELLA SP.	2 3 4		NL
78160999	X HIPPOPORINA SP.	2 3 4	5 6 7 8	NL RI S
7816020101	HIPPOTHOA HYALINA	1 2 4	5 6 7 8	NL N S
7816020199	X HIPPOTHOA SP.	3		NL
7815040199	X MEMBRANIPORA SP.	3		NL S
7815040103	MEMBRANIPORA TENUIS	2 3 4	5 6 7 8	NL N S
7815040104	MEMBRANIPORA TUBERCULATA		7	S
7806110101	MICROPORELLA CILIATA	2 3 4	6 8	NL S
7816110199	X MICROPORELLA SP.	2 3		NL
7816130399	X FARASMITTINA SP.		4	6 7 NL S
7816080401	SCHIZOMAVELLA AURICULATA	2	4	NL
7816080499	X SCHIZOMAVELLA SP.	3		NL
7816080199	SCHIZOPORELLA BIAPERTA		4	NL
7816080101	SCHIZOPORELLA UNICORNIS	1 2 3 4	5 8	NL S
7816080198	X SCHIZOPORELLA SP.	2		NL
7815020399	SCRUPARIA CHELATA	3 4	6	NL S
78150299	X SCRUPARIID SP.		5	S
7815280101	SCRUFUCELLARIA SCABRA	2		NL
781699	X SMITTINIID SP.	3 4		NL
7815000000	TERPIDIUM AFRICANUM			

/8150000000	A	TEGELLA SP.		5	6	NL	S					
7806040199	X	TRITICELLA SP.		2	3	4	NL					
7810020198	X	TURULIFORA SP.		3			NL					
7899		YBRYOZOAN SP. A		2	4		NL					
		PHORONIDA	77									
7700010203		PHORONIS ARCHITECTA		1	2	3	4	5	7	8	NL	N RI S
		ECHINODERMATA	81-8179									
		STELLEROIDEA		8101-8103								
810199	X	OPHIOPHRAGMA SP.		1	2							NL
		ASTEROIDEA	8104-8118									
8117030202		ASTERIAS FORBESII		1	4	5	6	7	8			S
8117030204		ASTERIAS VULGARIS							8			S
8107020101		CTENODISCUS CRISPATUS						5	6	7	8	N
8114040111		HENRICIA SANGUINOLENTA		3								NL
8117031499		PEDICELLASTER TYPICUS		1	2			6	7			NL N
		OPIHIROIDEA	8120-8129									
8129030202		AMPHIPHOLIS SQUAMATA		1	2	3	4	5	6	7	8	NL N S
8128010105		OPIHOCANTHA BIDENTATA						5	6	8		N
8129020101		OPIHOPHOLIS ACULEATA						5	7	8		N RI
8127010611		OPIHURA ROBUSTA						5	6	8		N
8127010610		OPIHURA SARSI		2				5	6	8		NL N
8127010699	XZ	OPIHURA SP.						6				N
8120	X	OPIHIROID SP.							8			N
		ECHINOIDEA	8136-8165									
8147010101		ARABACIA FUNCTULATA		1								NL
8155020101		ECHINARACHNIUS FARMA						5	6	8		N RI S
813699		YECHINOID SP.		2								NL
8149030201		STRONGYLOCENTRATUS BROEBACHIENSIS						6				N
		HOLOTHOIROIDEA	8170-8179									
817099	X	AFODIIDA SP.						5				RI S
8179020102		CAUDINA ARENATA		1	2	3	4	7				S
81790201	X	CAUDINA SP.						8				S
8172060104		CUCUMARIA FRONIOSA						6				N
8172040201		HAVELOCKIA SCABRA						7	8			N
8170		YHOLOTHUROID SP.						8				S
8179010102		MOLPADIA OOLITICA						5	6	7	8	N
8172060399	X	PENTAMERA SP.						6	7	8		N
		HEMICORDATA	82-8205									
8201010302		SACCOGLOSSUS KOWALEVSKII						7	8			S
8201010299		STEREOBALANUS CANADIENSIS						6				N
		URDCHORDATA	84-8413									
8499999999		BOSTRICHOBANCHUS FILULARIS						5	6	7		N
8498	X	BOSTRICHOBANCHUS SP.						5				RI
8406010799		BOTRYLLUS SP.			2							NL
8404030301		PEROPHORA VIRIDIS						8				RI
		GNATHOSTOMATA I	87-8794									
8791031501		ENCHELYOPUS CIMBRIUS						4				NL
8793011601		MACROZOARCES AMERICANUS						8				N
		GNATHOSTOMATA II	88-8861									
8845010102		AMMODYTES AMERICANUS						6				S
8839010201		TAUTOGOLABRUS ADSPERUS						7				S

question were collected on the date(s) corresponding to the code number(s) indicated. Columns 71-72, 74, 76-77 and 79 contain the letters NL, N, RI and S corresponding to the station(s) from which the species in question was collected, namely New London, Northern Stations (i.e. all stations north of Cape Cod), Rhode Island Sound and Southern Stations (i.e. all stations located in Long Island Sound).

Detailed reports of the analyses of the Winter-Spring 1977-1978 and the Spring-Summer, 1978 collections have already been submitted to the New England Division, Army Corps of Engineers. Collation, statistical analysis and application of various numerical classification techniques on the data resulting from the Winter 1978-79 and Spring-Summer 1979 sample collections are currently nearing completion and will be reported in ensuing monthly reports.

Beginning in 1980, a new sampling methodology was adopted which follows that recommended in a study reported by Walker, Saila and Anderson (1979). This technique searches for patterns among the physical variates (in this case, median grain size, concentration in the sediments of: chromium, copper, nickel, lead, zinc, oil and grease, and percent of volatile solids and organic matter) and then searches for related patterns among the biological variates. One of the advantages inherent in this approach is that the data from each grab can be worked up in two steps: data on the chemical and physical variates which are not as expensive to obtain are determined first. Results of these analyses are then used to allocate the more expensive effort of obtaining species abundances and composition in a manner which should result in the examination of fewer benthic samples thereby lowering analytical costs. Judicious stratification of microhabitat variability on the basis of the physical characteristics of each grab sample should also allow much more precise estimates of species abundance. It is anticipated that this technique will allow detection of a 50% change in population abundance at the 90% confidence level.

Adoption of the foregoing methodology has resulted in a sampling plan which has considerably modified previous DAMOS benthic

sampling procedures. Sampling stations have been reduced to five dredge disposal sites, namely, Portland, ME, New London, CT, Stamford-New Haven North pile, Stamford-New Haven South pile and the Norwalk-New Haven site. Additional work of the same type has been proposed for the Fall River-Brenton Reef areas but has not yet been finalized. The basic sampling plan is to obtain 40 Smith-McIntyre grab samples of bottom sediment at each site. Wherever scheduling and funding allow, ten grabs will be obtained at the approximate dump point center prior to disposal. After cessation of dumping, ten grabs each would be collected from the center of the pile, the inner edge of the "skirt" of the pile, the outer edge (i.e. just outside the "skirt" of the pile) and at a reference station which would reasonably be considered beyond the influence of deleterious effects of spoil material on the indigenous fauna. At the New Haven sites, which are in close proximity to one another, a single reference station has been selected as representative of the resident community adjacent to the three disposal sites. Sampling at these five sites will be conducted twice per year.

As mentioned previously, a digest of the results of the analysis of the benthos in samples collected during the Winter 1978-79 and Spring-Summer 1979 DAMOS curises, is nearing completion. For the present, however, it seems judicious to withhold any interpretation of the data until the analysis is finalized. Because of this the remainder of this report will be limited to selected tabulations of the above mentioned data. Tables 7.3 through 7.9 present a digest of data from the DAMOS winter 1978-79 collections and Tables 7.10 through 7.17 present a corresponding digest of the DAMOS Spring-Summer 1979 collections.

#### 8.0        DIVER OBSERVATIONS (Dr. Lance Stewart)

Visual observations of dredge material at the New London, Central Long Island Sound and Portland Disposal Sites were made during the recent survey operations. Summaries of the dives and observations noted are presented in this report. Additional interpretation and discussion will be presented in future reports after film has been developed.

## DATA SUMMARY - GULF OF MAINE - WINTER 1978-79 COLLECTION

Total No. Phyla : 10  
 Total No. Species : 114  
 Total No. Individuals : 2028+

<u>Species</u>	<u>Phylum</u>	<u>Feeding Type</u>	<u>Predominant Species List</u>			<u>Cumul.</u>
			<u>Occurrence/ 18 Samples</u>	<u>Total No. Individuals</u>	<u>Total</u>	
Nucula proxima	M	DF	7	752	37.1	37.1
Sternaspis scutata	A	DF	13	180	8.9	46.0
Ampharete arctica	A	SDF	16	94	4.6	50.6
Ninoe nigripes	A	P	15	87	4.3	54.9
Yoldia sapotilla	M	DF	12	86	4.2	59.1
Nephtys incisa	A	DF	15	71	3.5	62.6
Lumbrineris fragilis	A	P	14	67	3.3	65.9
Traxilicilia gracilis	A	DF	9	64	3.2	69.1

A: Annelida

M: Mollusca

DF: Deposit Feeder

SDF: Surface Deposit Feeder

P: Predator

TABLE 7:3

DATA SUMMARY (TOTAL DISTRIBUTION) : GULF OF MAINE  
WINTER 1978-79 COLLECTION

	Rockland Canyon			Rockland Dump			Portland Dump		
	1	2	3	1	2	3	1	2	3
No. Species/Sample	22	9	18	13	16	15	11	32	35
No. Individuals/Sample	542	69	170+	41	71	114	18	59	89
No. Phyla/Station		5			6			9	
No. Species/Station		30			27			57	
No. Individuals/Station		781+			226			166	

	Isle of Shoals Dump			Boston Lightship			Boston Foul Ground		
	1	2	3	1	2	3	1	2	3
No. Species/Sample	24	27	34	26	23	25	22	17	20
No. Individuals/Sample	106	108	144	79	88+	120	90+	58	62
No. Phyla/Station		7			8			6	
No. Species/Station		47			43			35	
No. Individuals/Station		358			287+			210+	

TABLE 7.4

DATA SUMMARY - RHODE ISLAND SIGHT  
DECEMBER 1978 COLLECTION

No. Phyla : 6  
No. Species : 63  
No. Individuals: 6831+

BRENTON REEF REFERENCE

<u>Predominant Species List</u>						
<u>Species</u>	<u>Phylum</u>	<u>Feeding Type</u>	<u>Occurrence/ 3 Samples</u>	<u>No. of Individuals</u>	<u>% of Total</u>	<u>Cumul. %</u>
<i>Ampelisca agassizi</i>	Ar	SF	3	5798	84.9	84.9
<i>Nineo nigripes</i>	A	P	3	240	3.5	88.4
<i>Ampharetæ arctica</i>	A	SDF	3	188	2.8	91.2
<i>Unciola irrorata</i>	Ar	DF	3	154	2.3	93.5

No. Phyla : 5  
No. Species : 24  
No. Individuals: 111

BRENTON REEF DUMPSITE  
Predominant Species List

<u>Species</u>	<u>Phylum</u>	<u>Feeding Type</u>	<u>Occurrence/ 3 Samples</u>	<u>No. of Individuals</u>	<u>% of Total</u>	<u>Cumul. %</u>
<i>Unciola irrorata</i>	Ar	DF	3	50	45.0	45.0
<i>Scalibregma inflatum</i>	A	DF	3	13	11.7	56.7

None of the 22 remaining species present at this site contributed significantly to the total number of individuals.

A: Annelida  
Ar: Arthropoda

DF: Deposit Feeder  
SF: Suspension Feeder

SDF: Surface Deposit Feeder

TABLE 7.5

DATA SUMMARY (TOTAL DISTRIBUTION) : RHODE ISLAND BIGHT  
 DECEMBER 1978 COLLECTION

	Brenton Reef Reference			Brenton Reef Dumpsite		
	1	2	3	1	2	3
#Species/Sample	39	38	33	11	15	11
#Individuals/Sample	2699	1316+	2816+	32	36	43
#Phyla/Station			6			5
#Species/Station			63			24
#Individuals/Station			6831+			111

TABLE 7.6

DATA SUMMARY - LONG ISLAND SOUND - WINTER 1978-79 COLLECTION

Total No. Phyla : 14  
 Total No. Species : 183  
 Total No. Individuals : 4296+

Predominant Species List

<u>Species</u>	<u>Phylum</u>	<u>Feeding Type</u>	<u>Occurrence/ 65 Samples</u>	<u>Total No. Individuals</u>	<u>% Total</u>	<u>Cumul. %</u>
<i>Caullieriella fillariensis</i>	A	SF	7	696	16.2	16.2
<i>Mytilus edulis</i>	M	SF	5	594	13.8	30.0
<i>Nephtys incisa</i>	A	DF	53	557	13.0	43.0
<i>Polydora ligni</i>	A	SDF	15	260	6.1	49.0
<i>Euclymene collaris</i>	A	DF	18	154	3.6	52.6
<i>Ampharete arctica</i>	A	SDF	22	117	2.7	55.4
<i>Melinna cristata</i>	A	SDF	21	117	2.7	58.1
<i>Ampelisca vadorum</i>	Ar	SF	9	112	2.6	60.7
<i>Phoxocephalus holbolli</i>	Ar	SF	5	101	2.4	63.0
<i>Phoronis archiecta</i>	P	SF	28	89	2.1	65.1
<i>Cerianthus (borealis)</i>	C	SF	29	88	2.0	67.2

A: Annelida

DF: Deposit Feeder

C: Cnidaria

SDF: Surface Deposit Feeder

M: Mollusca

SF: Suspension Feeder

P: Phoronida

TABLE 7.7

DATA SUMMARY (TOTAL DISTRIBUTION) : LONG ISLAND SOUND  
WINTER 1978-79 COLLECTION

	Cornfield Shoals Reference					Cornfield Shoals Dumpsite					New London Reference (F-8)					New London Dumpsite (C-6)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Species/Sample	5	6	6	6	8	5	2	4	5	3	41	28	37	36	36	25	8	21	12	20
Individuals/Sample	12+	6+	11	16+	12+	6	3	6	6	6	361+	231+	519+	235+	598+	88+	31	76+	65	130+
Phyla/Station			6					3					9						8	
Species/Station			18					16					76						48	
Individuals/Station			57+					27					1944+						390+	
	CAR-WLIS Reference					CAR Dumpsite					Greens Ledge Dumpsite									
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Species/Sample		15	12	5	6	7	12	15	10	13	11	2	3	10	5	3				
Individuals/Sample		59+	23+	12+	28	15	28	49+	30	44	26	15	9	20+	19	10				
Phyla/Station				5					8					6						
Species/Station				25					33					15						
Individuals/Station				137+				177+						73+						

Continued ....

TABLE 7.8

DATA SUMMARY (TOTAL DISTRIBUTION) : LONG ISLAND SOUND  
WINTER 1978-79 COLLECTION, Continued

	New Haven Reference					New Haven Dumpsite					Stamford-New Haven North				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
#Species/Sample	5	6	7	7	4	19	21	28	28	24	10	8	9	8	5
#Individuals/Sample	15	25	20	24	21	104	148+	120+	193+	108+	44	17	41	30	16
#Phyla/Station			5					10						6	
#Species/Station			17					52						20	
#Individuals/Station			105					673+						148	
 Stamford-New Haven - 1															
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
#Species/Sample	17	11	7	6	9	10	7	7	11	10	12	13	14	10	9
#Individuals/Sample	47+	41+	44	39+	53	36	18	24	51	42+	42+	36	41	23	28+
#Phyla/Station			7					6						9	
#Species/Station			26					24						32	
#Individuals/Station			224+					174+						170+	
 Stamford-New Haven - 6															
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
 Stamford-New Haven - 7															
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

TABLE 7.9

## DATA SUMMARY : GULF OF MAINE

SUMMER 1979 COLLECTION

Total No. Phyla : 9  
 Total No. Species : 184  
 Total No. Individuals : 5945+

<u>Predominant Species List</u>						
	<u>Phylum</u>	<u>Feeding Type</u>	<u>Occurrence/ 25 Samples</u>	<u>Total No. Individuals</u>	<u>% Total</u>	<u>Cumul. %</u>
1.	<i>Spio filicornis</i> (A)	A	SDF	17	2758	46.4
2.	<i>Ampharete arctica</i>	A	SDF	23	506	8.5
3.	<i>Sternaspis scutata</i>	A	DF	23	407	6.8
4.	<i>Haploops tubicola</i>	Ar	SF	14	217	3.6
5.	<i>Maldane sarsi</i>	A	DF	13	211	3.5
6.	<i>Nucula proxima</i>	M	DF	5	139	2.3
7.	<i>Thyasira insignis</i>	M	SF	18	88	1.5
8.	<i>Myriochele heeri</i>	A	DF	19	73	1.2
9.	<i>Astarte undata</i> (A)	M	SF	9	66	1.1
10.	<i>Ninoë nigripes</i>	A	P,DF	22	66	1.1
11.	<i>Scoloplos acutus</i>	A	DF	12	65	1.1
12.	<i>Nephtys incisa</i>	A	DF	21	64	1.1

A : Annelida

DF : Deposit Feeder

Ar : Arthropoda

SDF : Surface Deposit Feeder

M : Mollusca

SF : Suspension Feeder

R : Rhynchocoela

P : Predator

TABLE 7.10

DATA SUMMARY (TOTAL DISTRIBUTION) : GULF OF MAINE  
SUMMER 1979 COLLECTION

	Rockland Dumpsite					Portland Dumpsite					Isle of Shoals				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
No. Species/Sample	15	23	28	16	15	49	49	56	56	49	35	42	26	37	29
No. Individuals/Sample	72	106	194+	114	54	156	235	180+	211	141	360	313+	239	569	247
No. Phyla/Station			7					7					7		
No. Species/Station			46					107					78		
No. Individuals/Station			540+					923+					1728+		
	Boston Lightship					Boston Foul Ground									
	1	2	3	4	5	1	2	3	4	5					
No. Species/Sample	38	31	35	36	30	22	22	28	29	26					
No. Individuals/Sample	425	472	602	375	263	80	105	110	138	202					
No. Phyla/Station			7					6							
No. Species/Station			72					59							
No. Individuals/Station			2119					635							

TABLE 7.11

DATA SUMMARY : RHODE ISLAND BIGHT .  
SUMMER 1979 COLLECTION

No. Phyla : 6  
No. Species : 87  
No. Individuals : 6788

BRENTON REEF REFERENCE

<u>Species</u>	<u>Phylum</u>	<u>Feeding Type</u>	<u>Occurrence/ 5 Samples</u>	<u>No. of Individuals</u>	<u>% Total</u>	<u>Cumul. %</u>
<i>Ampelisca agassizi</i>	Ar	SF	5	5424	79.9	79.9
<i>Unciola irrorata</i>	Ar	DF	5	190	2.8	82.7
<i>Leptocheirus pinguis</i>	Ar	DF	5	184	2.7	85.4
<i>Ninoe nigripes</i>	A	P	5	123	1.8	87.2
<i>Eudorella pusilla</i>	Ar	SF	5	122	1.8	89.0
<i>Periploma papyratium</i>	M	SF	5	102	1.5	90.5

No. Phyla : 6  
No. Species : 47  
No. Individuals : 319+

BRENTON REEF DUMPSITE

<i>Cirolana polita</i>	Ar	DF	3	100	31.3	31.3
<i>Scalibregma inflatum</i>	A	DF	4	48	15.0	46.4
<i>Pseudunciola obliqua</i>	Ar	DF	2	28	8.8	55.2
<i>Lumbrineris fragilis</i>	A	P	4	21	6.6	61.8

No other species present at this site contributed significantly to the total number of individuals.

A : Annelida  
Ar: Arthropoda  
M : Mollusca  
DF: Deposit Feeder  
SF: Suspension Feeder

TABLE 7.12

DATA SUMMARY (TOTAL DISTRIBUTION): RHODE ISLAND BIGHT  
SUMMER 1979 COLLECTION

	Brenton Reef Reference					Brenton Reef Dumpsite				
	1	2	3	4	5	1	2	3	4	5
# Species/Sample	40	45	46	45	53	14	17/8	15	16	12
# Individuals/Sample	856	1270	1540	1593	1529	41+	71+	132	34+	41
# Phyla/Station			6			6				
# Species/Station			87			47				
# Individuals/Station			6788			319+				

TABLE 7:13

DATA SUMMARY : LONG ISLAND SOUND  
SUMMER 1979 COLLECTION

\* Total No. Phyla : 11  
 Total No. Species : 148  
 Total No. Individuals : 3416+

<u>Predominant Species List</u>						
<u>Species</u>	<u>Phylum</u>	<u>Feeding Type</u>	<u>Occurrence/ 30 Samples</u>	<u>Total No. Individuals</u>	<u>% Total</u>	<u>Cumul. Total</u>
1. <i>Mytilus edulis</i>	M	DF	8	789	23.1	23.1
2. <i>Nucula proxima</i>	M	DF	18	458	13.4	36.5
3. <i>Leptocheirus pinguis</i>	Ar	DF	10	238	7.0	43.5
4. <i>Nephtys incisa</i>	A	DF	27	237	7.0	50.5
5. <i>Ampelisca vadorum</i>	Ar	SF	11	175	5.1	55.6
6. <i>Ampharete arctica</i>	A	SDF	16	156	4.6	60.2
7. <i>Unciola irrorata</i>	Ar	DF	11	92	2.7	62.9
8. <i>Yoldia limatula</i>	M	DF	6	83	2.4	65.3
9. <i>Phoronis architecta</i>	P	SF	14	77	2.2	67.5
10. <i>Corymorpha pendula</i>	C	SF	12	66	1.9	69.4

A : Annelida  
 Ar : Arthropoda  
 C : Cnidaria  
 M : Mollusca

P : Phoronida  
 DF : Deposit Feeder  
 SDF: Surface Deposit Feeder  
 SF : Suspension Feeder

TABLE 7.14

DATA SUMMARY (TOTAL DISTRIBUTION) : LONG ISLAND SOUND  
SUMMER 1979 COLLECTION

	New London Reference (F-8)					New London Dumpsite (C-6)					New Haven Reference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
No. Species/Sample	33	41	31	36	38	19	21	17	31	29	6	4	11	16	17
No. Individuals/Sample	145+	341+	317+	242+	269+	93+	109+	134+	206+	132+	29+	27	260+	118+	114+
No. Phyla/Station			8					8					6		
No. Species/Station			69					61					30		
No. Individuals/Station			1314+					674+					548+		
	New Haven Dumpsite					Western Long Island Sound #3					Green's Ledge				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
No. Species/Sample	14	26	30	35	30	6	3	4	5	5	11	4	8	10	5
No. Individuals/Sample	42+	74+	86+	184+	114+	63+	36	63	41	28	36+	10	32	20+	51
No. Phyla/Station			9					4					7		
No. Species/Station			65					7					19		
No. Individuals/Station			500+					231+					149+		

TABLE 7.15

## DATA SUMMARY : STAMFORD-NEW HAVEN

Tot. No. Phyla : 10  
 Tot. No. Species : .69  
 Tot. No. Individuals : 1688+

<u>Species</u>	<u>Phylum</u>	<u>Feeding Type</u>	<u>Occurrence/ 25 Samples</u>	<u>Total No. Individuals</u>	<u>% Total</u>	<u>Cumul. %</u>
Mulinia lateralis	M	DF	14	652	38.6	-
Nephtys incisa	A	DF	25	314	18.6	57.2
Yoldia limatula	M	DF	12	188	11.1	68.3
Melinna cristata	A	SDF	19	124	7.3	75.6

A : Annelida  
 M : Mollusca  
 DF : Deposit Feeder  
 SDF : Surface Deposit Feeder

TABLE 7.16

DATA SUMMARY (TOTAL DISTRIBUTION) : STAMFORD-NEW HAVEN  
SUMMER 1979 COLLECTION

	STNH S-6					STNH S-7				
	1000 M East May 1979					1000 M West May 1979				
	1	2	3	4	5	1	2	3	4	5
No. Species/Sample	9	7	9	17	10	12	15	10	10	10
No. Individuals/Sample	36	32+	35+	65+	36+	43	39	37+	30	25+
No. Phyla/Station			7					7		
No. Species/Station			24					31		
No. Individuals/Station			204+					174+		
	STNH S-6					STNH S-7				
	1000 M East August 1979					1000 M West August 1979				
	1	2	3	4	5	1	2	3	4	5
No. Species/Sample	14	9	11	19	10	21	13	14	13	12
No. Individuals/Sample	165	37	58	107+	124	225+	132	145	138+	145+
No. Phyla Station			8					8		
No. Species/Station			30					33		
No. Individuals/Station			491+					785+		
	STHH Dump Point					August 1979				
	1	2	3	4	5	1	2	3	4	5
No. Species/Sample			7	5	7	7	5	3	3	3
No. Individuals/Sample			9	7	9	9	5	5	4	4
No. Phyla/Station						5				
No. Species/Station						15				
No. Individuals/Station						34				

TABLE 7.17

## 8.1

New London Disposal Site Survey

25 March 80 - Survey of northeast site corner for new discharge of spoil at recently repositioned dump buoy; circumnavigation of northeast and southeast spoil border attempted with DPV; free course transect to east from new dump buoy to note topographic features and record new spoil pile dynamics.

Stewart, DeGoursey, Auster aboard R/V East Passage.

Dive #1

Stewart in at temporary dumpsite buoy. Used DPV to survey perimeter of spoil pile. A transect was run approximately 250 m to the NE. The transect did not circumscribe a circle as expected but continued to the NE toward New London Harbor.

Dive #2.

DeGoursey in at SE corner of new pile. Ran DPV in NE direction along perimeter but did not cover much distance because course was into current.

New spoil was easily discerned. Material was soft and cohesive, already flattening out (apron - no clumps).

Dive #3 Stewart/Auster

In at temporary dumpsite buoy. Transect to east. Clay clumps on surface of spoil (20-70 cm dia/longest length). Clumps 70-100 cm apart at base of buoy. Actual direct measurement of clay mounds undertaken with meter stick along transect path. 20 meters to east, size and frequency of clumps diminished. (Clumps 200 cm apart, 20-60 cm dia. eroded and fragmenting). 70 meters to east, large boulder-size clumps (70-90 cm height 70-120 cm length). Many adjacent clumps.

Fracture lines observed through spoil (4-5 m long). sediment surface "pulsing" with surface swell. Other fracture boundaries moving vertically against each other (3-4 cm). No horizontal movement was discerned. Importance of this mechanism to spoil compaction is noteworthy; on future surveys this process will be recorded in cinema.

When meter stick or arm was inserted into spoil, adjacent spoil to 100 cm exhibited wave pattern. Spoil material exhibited cohesive, plastic qualities statically but behave as a semi-fluid under conditions (post-storm) with apparent long frequency (50-90 m) and estimate (1 m) amplitude.

No organisms were observed on spoil. Epibenthic 20 yds east of buoy. 35 mm photo taken during transect observations.

Dive #4 DeGoursey/Auster  
In at SE perimeter station area. No surface buoy up.  
Located station with sonic receiver (6 gpps). Secured  
new station marker buoys with pipe anchor. All lines,  
stakes, etc. in place.

New London (25 March 80)

Species (observed incidentally)

Naticid snails 23  
Cancer borealis 11  
Cancer irroratus 13  
Pagurus pollicaris

26 March 80 -- DeGoursey/Auster aboard R/V East Passage

Dive #1

In at SE perimeter station. Visibility 8-10 ft.  
Current  $\frac{1}{2}$  kt. E., Temp 15°C- 17.0 ft. depth. No evidence  
of recent dumping in this area. All available substrate  
colonized by epifauna.

Amphipod tubes 11000+  
Boulder sat SE 36 Coryphella esp. -- 11  
Tubularia esp. -- 11  
Pagurus longicarpus -- very dense at SE 34  $440/m^2$   
Pagurus pollicaris -- 20 -- many still burrowed, others  
active on sediment surface  
Cancer irroratus -- 4 -- active  
Lunatia -- 3 -- burrowing into sediment  
Asterias Forbesi -- 11  
Calibrated stake at SE 35 330 cm exposed below "0"  
mark. Scouring or disturbed? (no other evidence of  
scouring).  
Photo at stations at SE 110 and SE 11  
DeGoursey epibenthic SSE/O to N  
Auster epibenthic SSE 1 to S

Dive #2 Auster/DeGoursey

In at temporary dump buoy. Current  $\frac{1}{2}$  kt. East.  
Visibility 8-10 ft.

60 ft. depth

DeGoursey to E. Auster to W.  
Large clay clumps 70-120 cm length, 11.5 cm apart.  
Mytilus edulis embedded in sediment and clumps. Most  
individuals alive. One clump of Mytilus with 7  
Metridium senile attached.  
All with stalks extended. (transplanted from harbor.)  
No other macrobenthic fauna observed. Leaf debris and  
drifting macroalgae. No spoil "pulsing" observed on  
previous days dive. Swell diminished. Less fracturing  
in clumps than on previous days dive. Evidence of  
recent disposal operations. Greater frequency of  
clumps closer (7.5 cm diameter) to dump buoy. Further

than 75 m showed more signs of flattening and smoothing of clumps (older spoil?) Noted some degree of sorting of larger grained, coarse sediment at base of clay clumps.

## 8.2 New Haven Disposal Site Survey

2 April 80 - Determine baseline conditions at designated Norwalk disposal site (fig. 1 relative position). 35 mm photography, S8 mm cinema, density counts, natural sediment features obtained reconnaissance over the presently active S site to survey degree of sediment surface irregularity (mound topography measure) and biological repopulation (35mm photography). Third objective to transect the N site to relocate transect line, read elevation stakes, epibenthic samples, sediment and biological conditions since final capping in June 79.

Stewart, DeGoursey, Auster aboard R/V East Passage.

Dive #1 - Stewart/DeGoursey. Pre-disposal survey. In at Norwalk Site Buoy. Swam SE transect 75 m from buoy. Flat, featureless topography, soft .25m penetration accomplished easily by diver. Bottom typical unconsolidated floc in flow with E tidal current. Corymorpha was dominant epifaunal organism. Pseudopleuronectes americanus and Cancer irroratus also active and very abundant. C. irroratus females berried.

Also observed Syngnathus fuscus (1)

Crangon septemspinosa

Pagurus pollicaris

Asterias forbesi

Axius (?) burrows (10+)

De Goursey - photos underwater, Canon F-1.

Dive #2 South site

Stewart/Auster in 200 m west of buoy

Stewart swam to NE and surfaced 20 m N of buoy  
(15034.7/26543.2)

Auster swam to SE and surfaced 50 m SW of buoy  
Traversed area of recent disposal operation  
Topographic relief on order of 2 meters. Large clumps up to 1 meter height showing beginning of erosion and fracturing processes. Bottom cohesive clay/silt type. Cancer irroratus burrowing in spoil and excavating clay clumps. Peaks and valleys along bottom probably represent individual dumps.

Libinia - burrowed

Crangon septemspinosa - ubiquitous over  
and in bottom.

Pagurus logicarpus active on spoil pile

Nassarius trivittatus on pile (transplanted?)  
Burrows 5-6 cm dia. from Axius serratus (?)  
Larger burrows 8-10 cm (Cancer or Homarus?)  
Cymorpha delineate periphery.  
Epibenthic 50 m SW of buoy.

New Haven Disposal Site Survey

Dive #3. North Site. DeGoursey/Auster  
Temporary buoy deployed at coordinates of missing north site buoy. Descended and traversed 20 m to south to attempt to locate transect line. Line was not located. Went to north 100 m. Shell debris over hard packed sand with thin silt veneer. Cancer irroratus abundant (~ 25). Some still burrowed. Many berried females. Thigmotactic response to larger shell debris in area. 2-5/m<sup>2</sup> density.

Pagurus pollicaris excavating spoil.  
Pagurus longicarpus traversing spoil surface.  
Juvenile P. americanus 2/m<sup>2</sup>.  
Metridium senile on shell.  
Several Libinia emarginata burrowed in sediment.  
No Axius type burros.  
No Corymorph until periphery - low density.  
No clay clumps. Barnacle set on shell debris.  
Surface featureless except for several mound-like peaks c/m relief.  
Epibenthic on spoil 100 m N of buoy - Auster.

Dive #4

Stewart in transect filming (S 8 mm) over N site W-E, located transect line and subsurface buoy on North Site. The transect line deployed 21 June 79 had been lost since November 79. Station relocation and stake reading will provide a nine month term evaluation of surface conditions. (DeGoursey dove to put pinger (lpps) on transect line). Stewart attached floats to subsurface buoy for site relocation and more accurate description of transect line stations and elevation stakes.

3 April 80 - Dive #1. Stewart, DeGoursey, Auster. Norwalk Site.

Marker .5 m side (.25 m<sup>2</sup>) quadrant and counted.

Corymorph density during transect to North.

Stewart 36/4 m<sup>2</sup>

DeGoursey 23

Auster 17, 18, 22, 25, 28

Cancer irroratus sparse over site - no berried

Nassarius trivittatus on surface - sparse.

Pagurus longicarpus on surface - sparse

Dive #2. North Site. Auster/DeGoursey. Vis. 6 ft.  
Total coverage of buoy mooring chain with epibenthic  
organisms (Mytilus, Balanus, Metridium, Asterias,  
Tubularia, macroalgae).

Cancer irroratus dense (4-6/m<sup>2</sup>) in some areas of pile  
north of buoy.

Libinia emerginata - large individuals, 10-12 cm  
carapace width.

Pagurus longicarpus and Pagurus pollicaris abundant. 50+  
transect lines and stakes fouled with barnacles.

Photos with Nikonos and 28 mm lens.

Pleurobranchia in water column.

#### New Haven Disposal Site Survey

Dive #3. Auster/Stewart.

South Site - at disposal buoy. Just dumped barge.  
Visibility 0-2 ft. Spoil very soft, partially cohesive.

Crassostrea shell debris

Mercenaria (1)

Cancer irroratus on clay clump.

Clay clumps already eroding and fracturing.

Relief off bottom on order of 2-3 meters. Anchor  
chain heavily fouled by common epiphytes cited on  
previous dive. 35 mm photos taken in SE traverse.

#### General notes

Heavy load of flocculant material (absorbed organics)  
in water column. Typical for the season.

Pleurobranchia and Cyanea cited in water column.

No withdrawal response observed in any Corymorphida.

Cancer irroratus that are observed with black and  
partially eroded carapace will be collected and  
retained for laboratory analysis of necrosis or  
pathogens. Often decopod crustacea in this region  
of L.I.S. undergo staining of the carapace during  
overwintering, and the cause must be distinguished  
as natural or spoil sediment induced.

#### 8.3 PORTLAND, ME - DISPOSAL SITE SURVEY

9-11 April 1980- Equipment and personnel on scene to : sample  
Bulwark Shoals reference station and stock Modiolus  
platform with individual bagged samples; characteristic  
fauna collection from shallow site for identification  
and community structure extrapolation to disposal  
site vicinity. Lobster traps (4) refurbished, baited,  
and set on site in attempts to obtain H. americanus  
samples for EPA Assist with bathymetric, benthic  
samples and sea parameter data routine. Review  
remote TV videotape sequences at selected stations  
adjacent to dump site, also obtain 35 mm b & w photos  
from deployed TV/35 mm tripod array.

Stewart, DeGoursey, Auster, SAI personnel aboard  
R/V Edgerton.

10 April 80 Weathered out. Trial of ENDECO remote TV/still camera system at USCG dock. Inquiries on individuals fishing disposal grounds made at piers and local chandleries.

11 April 80 Stewart, Degoursey, Auster.  
Dove at Bulwark Shoals to collect Modiolus to stock metals platform and for baseline analysis. Visibility 30 ft. Depth 40 ft. Bottom predominantly bedrock with heavy cover of mussels (~70%).  
Observed brittlestars Ophiopholis.  
Stalked Ascidians Boltenia.  
Dog whelk Buccinum undatum.  
Spider crab Hyas.  
green urchins Strongylecentrotus.  
No Homarus observed. Two vacant burrows.  
Collected 5 bags of mussels.  
1 Siphonophore in water column.  
on platform deployed.

Video Survey -

Several major problems were encountered while using the Endeco camera system.  
Eleven of the predetermined 18 stations were occupied:

Station 2 Photos 1-4 Top  
Stone cobble, spioiges,  
\*Floodlight impacted and broken - replaced with Ikelite superlight.  
Station 5 Photos 5-16 Top  
Boltenia (stalked Ascidian), brachiopods.  
Gravel/cobble with heavy silt overlay.  
Station 8 Photos 17-18 Top  
Cerianthids, heavy silt.  
Station 7 Photos 30-36 Slope  
Heavy silt, worm tubes.

Portland, ME - Disposal Site Survey

Station 4 Photos 39-49 Slope  
Heavy silt, some cobble  
Brachiopods, anenome or sponge as at Stn. 2.  
Worm tubes (?)

Station 1 Photos 51-62 Slope  
Brachiopods, some sponges, Ascidians (Boltenia)  
Some cobble with heavy silt overlay.

Station 9 Photos 65-82  
Areas of cobble, mostly silt  
Asteriod  
Sponges as in Stn. 2

Station 6 Photos 84-89  
Silt, no cobble  
No apparent macrofauna.

Station 11 Photos 91-94  
Station 13 96-99 No Video-no light on camera  
Station 3 100-103 Still photos only

Stills with Nikon. 24 mm lens f/5.6 on Plus-X ASA 125 film. Electronic flash (2) - Vivitar 283 with diffuser - one manual one auto - RCA Video Camera, Panasonic VTR, Digital Depth Recorder.

#### 9.0 MUSSEL WATCH (Dr. Sung Feng)

Delays have also had significant effects on the initiation of the mussel watch program and although continuity has been maintained at New London, there has been a significant hiatus in sampling at other sites. Consequently, additional baseline samples have been obtained and the program has been restructured to provide more frequent sampling from fewer stations.

During the period since initiation of the 1980 DAMOS program, the following work has been accomplished:

- Purchased materials needed to construct PVC mussel platforms
- Six PVC mussel platforms were fabricated. One used for the Portland site and four for the Central Long Island site.
- Sampled New London dumpsite stations (D1) and two reference sites: Latimer's Light and South of Fishers Island. D3 was not located. Monthly sampling of this site has been carried on since last December (1979).
- Processed baseline samples of Modiolus modiolus from Portland and monthly samples of Mytilus edulis from New London.

- Collected 3,000 *Mytilus edulis* from Latimer's Light for deployment at the four Central Long Island Sound Stations. 500 mussels were measured. All mussels were then bagged. Rigged the platforms for deployment.
- Spent two days (April 23 and 24 in Central Long Island Sound to deploy the four platforms. The locations of these platforms in terms of Loran-C coordinates and Latitude and Longitude are present in Table 9.1.

Norwalk	15037.3 43999.6	41°09.21' 72°52.17'
STNH North	15042.2 33000.7	41°09.23' 71°08.68'
STNH Sounth	15033.4 43994.5	41°08.74' 72°71.42'
Reference	15035.1 44005.1	41°09.88' 72°52.08'

TABLE 9.1

- Processed baseline samples of *mytilus edulis* for the Central Long Island Sound site.
- Commenced the 6th round of Internation Council for the Exploration of the Sea sponsored interlaboratory calibration exercise on lead and cadmium for quality assurance.
- Located and sampled D3 at the New London Site.

#### 10.0 FISHERIES COMMUNICATION (Mr. S. Pratt)

At the present time no funding has been made available for this section of the program. However, arrangements have been made for sampling of lobsters in the vicinity of the Portland and Central Long Island Sound Disposal Sites. Definition of the program plan for this portion of the program will be completed during June 1980.

#### 11.0 SPECIAL PROJECTS (Dr. R. W. Morton)

Several special projects have been accomplished during the period covered by this progress report involving both field operations and presentation of data. Maintenance of disposal buoys has been

a continuous problem, particularly at the New London disposal site where the buoy has been replaced twice and damaged by ship traffic once. In addition to replacement of the New London Buoy, periodic maintenance of the radar reflector and light source at the STNH-S buoy has occurred.

During final dredging and capping operations at the STHN-S site a prototype Loran-C navigation system was used to control the disposal of material at specified points. Using this system which consisted of a Northstar 6000 Loran-C and 6700 interface, an Apple II microcomputer and a video monitor, thirty-five disposal operations were conducted with a precision of approximately 50 meters at three designated disposal points. By application of this technique additional capping material was spread over the southern margin of the disposal mound, and Stamford material that was exposed as a result of an errant dump was covered with New Haven sediment. A full report of this operation has been presented as DAMOS Contribution #12 entitled Precision Disposal of Dredge Material Utilizing Enhanced Loran-C Navigation Control

Three papers were presented by DAMOS investigators at the 2nd Annual International Ocean Dumping Symposium held at Woods Hole Oceanographic Institute during April 1980. These were titled:

- Use of Precision Bathymetric Surveying Techniques to Manage and Monitor the Disposal of Dredge Spoils in Central Long Island Sound, by Dr. Robert W. Morton, DAMOS Contribution #8.
- Chronological Records on In-Situ Physical and Biological Conditions Obtained by Diver Survey at New London and New Haven, CT Dredge Disposal Sites, By Dr. Lance Stewart DAMOS Contribution #9
- Changes in Levels of PCB's in Mytilus edulis.



Associated with Dredge Spoil Disposal by Dr. S. Feng, J.K. Watson, R. Arimato, R. Grillo, J. Lanier and T. Ouellette, DAMOS Contribution #10.

Dr. Morton was also requested to testify for the Committee on Merchant Marine and Fisheries of the House of Representatives on May 21, 1980 regarding the results of capping procedures at the Central Long Island Sound Disposal Site. The statement presented at

that hearing entitled "'Capping' Procedures as an Alternative Technique to Isolate Contaminated Dredge Material in the Marine Environment" has been submitted as DAMOS Contribution #11.

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