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**CRUISE REPORT BLM M-4
R/V CAPE HENLOPEN: 10 MAY-18 MAY 1982
FOR
GEORGES BANK
BENTHIC INFAUNA MONITORING PROGRAM**

Performed for

**UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Washington, D.C. 20240**

Under Contract No. AA851-CT2-7

June 07, 1982

REPORT NO. 15139

by

BATTELLE
New England Marine Research Laboratory
397 Washington Street
Duxbury, MA 02332

and

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, MA 02543

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Objective:

Cruise BLM M-4 was the fourth in the series of seasonal benthic sampling cruises performed as part of the Georges Bank Lease Sale No. 42 environmental monitoring program. The major emphasis of the program is to determine the extent of deposition and accumulation of potentially toxic materials as a result of oil drilling activities and any subsequent effects on the benthic biota. Sediment samples were collected for analysis of benthic infauna and epifauna, trace metal and hydrocarbon analysis, CHN and sediment grain-size analyses; and camera stations were occupied to record microtopography and visible macrofauna.

Sampling Program:

The sampling plan is based on recommendations by the Biological Task Force, the U.S. Geological Survey, and the Bureau of Land Management. Eighteen regional stations were established to include cross-shelf transects upcurrent of the lease sale tracts, through the lease tracts, and downstream of the drilling sites. Additional stations are located at the head of

Lydonia Canyon (Sta. 7 and 8), the head of Oceanographer Canyon (Sta. 9), in the Gulf of Maine (Sta. 14) and in the shallow part of the Bank (Sta. 15). An additional 3 stations are located at Block 410, where drilling commenced July, 1981. Station 13 is located in the "mudpatch", an area of potential deposition; however, preliminary results of sediment analyses showed that the sediments at Station 13 were not as fine as expected. A new regional station, designated 13A, was therefore established during Cruise M-4. This station is located west of the original Station 13. Grab samples for chemical analysis were collected and will be analyzed; grab samples for biological analysis were collected, but will be archived for the present time.

A site-specific array of 29 stations around an exploratory rig in Block 312 are sampled in order to examine on a fine scale the effects of discharges from a single drilling rig. Nineteen stations are designated "primary" and 10 are "secondary". Site-specific Station 5-1 is also a regional station.

Samples collected during Cruise BLM M-4 (spring), in conjunction with those collected during Cruises M-1 (summer), M-2 (autumn) and M-3 (winter) will provide seasonal data on the spatial and temporal variation in infaunal benthic communities and associated sediments across a broad area of the Bank, as well as in the closely spaced site-specific array.

Cruise Report:

BLM M-4, aboard the University of Delaware's R/V CAPE HENLOPEN, departed Woods Hole at 1345, 10 May 1982 and returned at 2000, 18 May 1982. Poor weather conditions at the start of the cruise precluded doing camera work at Stations 14, 15, 1, 2, 3, 16, 17, and 18 when these stations were first occupied. Later in the cruise, when all regional stations except 13 and 13A had been completed, and almost all of the secondary site-specific stations were completed, the decision was made to return to Stations 1, 2, 3, 16, 17, and 18 for camera work. When that had been accomplished, both fuel and freshwater supplies were very low, and it was necessary to return to Woods Hole without camera work at Stations 14 and 15. Secondary Stations 5-15 and 5-17 were not occupied, and Station 5-13 was only partly completed.

The majority of samples collected were 0.1m² and 0.04m² Van Veen grab samples for biological and/or chemical analyses. At each regional station, six 0.1m² and six 0.04m² biology grab samples and three 0.1m² geology/chemistry grab samples are required. Bottom

water samples for dissolved oxygen and salinity, surface water samples for salinity, and XBT casts were made at each regional station. Epibenthic trawls were made at Regional Stations 7, 10, 13 and Site-Specific Stations 5-1, 5-18, and 5-28. Trawls were made using either an epibenthic sled or otter trawl.

Navigation:

LORAN Northstar 6000 was used for navigation. Average time delays from BLM M-1 were used for station location (Tables 1 and 2).

Grab Samples:

All of the 0.04m² biology grab samples were successfully obtained. At Regional Station 4, the sediment was fine but hard-packed, and the grab was consistently 3/4 full. Because of difficult weather conditions, the 0.1m² grab often pretripped at Stations 1, 14, and 15; as a result only 5, 3, and 4 large grabs were collected at these stations, respectively. The large grab sampled poorly at Station 4, with all samples only half-full.

The 0.04m² grabs were subsampled for CHN and grain size samples; the remainder of the sample was then partially sieved prior to adding buffered formalin as a fixative. The subsamples were labeled and frozen. The 0.1m² grabs were labelled, stored individually in 3.5-gallon buckets, with buffered formalin added as a fixative. Chemistry samples were labelled and frozen. When large *Arctica* were present in the chemistry grabs, these were removed and frozen for tissue analysis. Several extra chemistry grabs were collected at the request of the hydrocarbon chemists.

Camera:

A Benthos[®] Model 372 and strobe unit triggered by a bottom contact switch was used for the camera work. Test strips of film were developed in order to monitor the functioning of the camera. As mentioned earlier, because of rough sea conditions, camera work was not done at Stations 1, 2, 3, 14, 15, 16, 17 and 18 when those stations were first occupied. Time and fuel allowed a return to Stations 1, 2, 3, 16, 17, and 18 for camera work, but we could not return to Stations 14 and 15.

TABLE 1. REGIONAL STATIONS. CRUISE BLM H-4 (R/V CAPE HENLOPEW)

Sta. No.	Date and Time (GMT)	BLM M-1 Position	BLM M-1 Ave. T.D.	Closest M-4 LORAN-C Lat./Long.	M-4 Ave. T.D.	Depth (m)	0.1m ²		0.01m ²		XBT	Camera	Dredge	Comments
							BIO	CHEM	BIO	CHEM				
14R	10-11 May '82 1536-0851	41°34.2'N 68°58.9'W	13553.5 43834.5	41°34.2'N 68°58.9'W	13553.5 43834.6	40.5	3	3	6	6	1	No	No	
15R	11 May 1982 1436-1723	41°27.5'N 68°00.7'W	13302.0 43735.2	41°27.5'N 68°00.7'W	13302.0 43735.4	40	4	3	6	6	1	No	No	-Gravel & rock.
1R	11-12 May '82 2157-0111	41°13.0'N 67°15.3'W	13172.3 43615.2	41°12.4'N 67°14.5'W	13172.3 43614.9	58	5	3	6	6	1	Yes	No	
2R	12 May 1982 0338-0805	40°59.0'N 66°55.8'W	13156.5 43532.0	40°59.1'N 66°55.9'W	13156.7 43532.1	66	6	6	6	6	1	Yes	No	-21 grab casts, shells.
3R	12 May 1982 0935-1356	40°53.7'N 66°46.5'W	13144.2 43496.7	40°53.7'N 66°46.5'W	13144.5 43496.5	90	6	3	6	6	1	Yes	No	-Shells.
17R	12 May 1982 1700-2005	40°35.0'N 67°11.7'W	13320.5 43409.5	40°35.0'N 67°11.3'W	13320.6 43409.6	130	6	3	6	6	1	Yes	No	-21 grab casts
16R	12-13 May '82 2118-0112	40°34.2'N 67°12.3'W	13328.3 43406.8	40°34.3'N 67°12.4'W	13328.5 43406.7	140	6	5	6	6	1	Yes	No	-16 grab casts
18R	13 May 1982 0136-0511	40°33.5'N 67°13.7'W	13335.8 43402.6	40°33.5'N 67°13.6'W	13336.0 43402.6	150	6	3	6	6	1	Yes	No	
8R	13 May 1982 0735-1155	40°27.1'N 67°37.4'W	13459.8 43379.1	40°27.1'N 67°37.2'W	13459.9 43379.1	140	6	3	6	6	1	Yes	No	-17 grab casts
7R	13 May 1982 1303-2009	40°28.8'N 67°43.2'W	13477.9 43391.1	40°28.8'N 67°43.2'W	13478.6 43391.5	130	6	4	6	6	1	Yes	Yes	-Epibenthic sled used twice. -Lobster pots, poor maneuverability.
6R	13 May 1982 2107-2347	40°34.3'N 67°45.3'W	13465.9 43425.5	40°34.4'N 67°45.3'W	13465.9 43425.4	103	6	3	6	6	1	Yes	No	
4R	15-16 May '82 0304-0449	40°50.7'N 68°00.2'W	13464.5 43529.2	40°50.7'N 68°00.2'W	13464.5 43529.1	70	6	3	6	6	1	Yes	No	-Shells
9R	16 May 1982 0728-1152	40°26.7'N 68°09.8'W	13604.1 43394.2	40°26.7'N 68°09.8'W	13604.1 43394.2	144	6	3	6	6	1	Yes	No	
12R	16 May 1982 1410-1625	40°22.2'N 68°30.2'W	13712.9 43378.0	40°22.2'N 68°29.9'W	13713.0 43377.9	110	6	3	6	6	1	Yes	No	
11R	16 May 1982 1726-2012	40°39.8'N 68°33.7'W	13693.0 43433.5	40°39.8'N 68°33.7'W	13693.1 43433.6	83	6	3	6	6	1	Yes	No	
10R	16 May 1982 2145-2510	40°42.0'N 68°35.3'W	13661.8 43502.7	40°42.0'N 68°35.2'W	13661.7 43502.8	62	6	3	6	6	1	Yes	Yes	-Otter trawl South, flounder, hake
13R	18 May 1982 1302-1525	40°29.5'N 70°12.6'W	14201.9 43496.1	40°29.3'N 70°12.5'W	14201.9 43496.1	70	6	4	6	6	1	Yes	Yes	-Otter trawl E to W, diverse sample.
13AR	18 May 1982	-	-	40°30.0'N 70°00.5'W	14464.0 43544.0	83	-	5	6	6	1	Yes	No	

TABLE 2. SITE-SPECIFIC STATIONS. CRUISE BLM M-4 (R/V CAPE HENLOREN)

Sta. No.	Date and Time (GMT)	BTF Position	BLM M-1 Ave. T.D.	Closest M-4 LORAN-C Lat./Long.	M-4 Ave. T.D.	Depth (m)	0.1m ² BIO	0.1m ² CHEM	0.04m ² BIO	Camera	Dredge	Comments
Note: Following are Primary Site-Specific Stations:												
5-2	14 May 1982 0114-0244	40°39.6'N 67°45.8'W	13446.0 43455.2	40°39.6'N 67°45.7'W	13446.6 43455.0	81	-	6	6	Yes	No	-Done on East side of rig due to drift.
5-6	14 May 1982 0300-0419	40°39.5'N 67°45.4'W	13444.7 43454.6	40°39.5'N 67°45.2'W	13444.8 43454.5	110	-	3	6	Yes	No	
5-8	14 May 1982 0443-0610	40°40.1'N 67°46.1'W	13445.3 43458.3	40°40.1'N 67°46.0'W	13445.2 43458.4	81	-	3	6	Yes	No	
5-9	14 May 1982 0629-0928	40°39.9'N 67°46.7'W	13448.6 43457.7	40°39.9'N 67°46.5'W	13448.5 43457.7	65	-	3	6	Yes	No	
5-10	14 May 1982 0854-1054	40°39.4'N 67°46.9'W	13451.4 43455.4	40°39.5'N 67°46.7'W	13451.3 43455.2	71	-	3	6	Yes	No	
5-4	14 May 1982 1131-1301	40°39.5'N 67°46.5'W	13449.3 43455.3	40°39.5'N 67°46.3'W	13449.4 43455.1	80	-	3	6	Yes	No	
5-1	14 May 1982 1318-1513	40°39.5'N 67°46.2'W	13447.8 43454.9	40°39.5'N 67°45.9'W	13447.4 43455.0	80	6	5	6	Yes	Yes	-Drill cuttings (?) in sediment.
5-3	14 May 1982 1523-1635	40°39.8'N 67°46.1'W	13446.4 43456.9	40°39.9'N 67°45.9'W	13446.3 43457.0	84	-	3	6	Yes	No	
5-5	14 May 1982 1651-1815	40°39.3'N 67°46.2'W	13449.8 43453.6	40°39.3'N 67°45.9'W	13449.8 43453.6	70	-	3	6	Yes	No	
5-11	14 May 1982 1851-2013	40°39.2'N 67°46.6'N	13451.3 43453.4	40°39.2'N 67°46.4'W	13451.1 43453.4	78	-	3	6	Yes	No	
5-12	14 May 1982 2049-2229	40°39.0'N 67°46.1'W	13449.7 43452.2	40°39.0'N 67°45.9'W	13449.7 43452.3	80	-	3	6	Yes	No	-Clam from Bio. for chem.
5-14	14-15 May '82 2257-0029	40°39.5'N 67°44.7'W	13441.6 43454.2	40°39.5'N 67°44.5'W	13441.6 43454.0	90	-	3	6	Yes	No	
5-16	15 May 1982 0055-0225	40°40.6'N 67°46.1'W	13443.3 43461.1	40°40.6'N 67°46.1'W	13443.3 43461.2	70	-	3	6	Yes	No	
5-18	15 May 1982 0247-0413	40°39.6'N 67°47.6'W	13453.8 43456.2	40°39.6'N 67°47.5'W	13454.0 43456.2	70	-	4	6	Yes	Yes	
5-2 ^c	15 May 1982 0433-0607	40°39.5'N 67°49.0'W	13459.7 43457.1	40°39.5'N 67°48.8'W	13459.9 43457.1	88	-	3	6	Yes	No	-Shells
5-29	15 May 1982 0631-0741	40°39.5'N 67°50.4'W	13466.5 43459.1	40°39.7'N 67°50.4'W	13466.6 43459.0	85	-	3	6	Yes	No	
5-20	15 May 1982 0946-0944	40°38.5'N 67°46.1'N	13452.0 43448.4	40°38.4'N 67°45.9'W	13452.0 43448.5	82	-	3	6	Yes	No	
5-22	15 May 1982 1021-1121	40°39.5'N 67°43.3'W	13435.9 43453.5	40°39.5'N 67°43.3'W	13436.0 43453.3	81	-	3	6	Yes	No	
5-28	15 May 1982 1213-1359	40°39.5'N 67°41.9'W	13429.6 43452.4	40°39.5'N 67°41.8'W	13429.9 43452.1	77	-	4	6	Yes	Yes	
Note: Following are Secondary Site-Specific Stations:												
5-23	17 May 1982 0529-0637	40°41.7'N 67°46.1'W	13439.8 43467.5	40°41.7'N 67°45.9'W	13438.7 43467.5	80	-	3	6	No	No	
5-24	17 May 1982 0704-0810	40°41.1'N 67°48.1'W	13449.9 43465.3	40°41.1'N 67°47.9'W	13449.9 43465.3	82	-	3	6	No	No	
5-17	17 May 1982 0940-0948	40°40.3'N 67°47.1'W	13448.3 43460.0	40°40.3'N 67°46.8'W	13448.3 43459.9	81	-	3	6	No	No	
5-19	17 May 1982 1025-1131	40°38.8'N 67°47.2'W	13455.2 43451.4	40°38.8'N 67°46.9'W	13455.0 43451.3	82	-	3	6	No	No	
5-26	17 May 1982 1145-1227	40°38.0'N 67°48.1'W	13462.5 43447.7	40°38.0'N 67°47.9'W	13462.3 43447.6	84	-	3	6	No	No	
5-27	17 May 1982 1241-1318	40°37.4'N 67°46.1'W	13456.4 43442.8	40°37.4'N 67°45.9'W	13456.4 43442.6	86	-	3	6	No	No	
5-21	17 May 1982 1334-1410	40°38.8'N 67°45.1'W	13446.3 43450.3	40°38.8'N 67°45.0'W	13446.5 43450.2	80	-	3	6	No	No	
5-13	17 May 1982 1419-1439	40°39.2'N 67°45.6'W	13447.1 43452.7	40°39.2'N 67°45.4'W	13447.2 43452.7	80	-	3	2	No	No	-Terminated to complete camera stations.

Dredge Samples:

On previous cruises, trawling with the Blake trawl, Day dredge and epibenthic sled did not result in satisfactory samples. On Cruise M-4, we used a 40' otter trawl at 5 of the 6 trawl stations and an epibenthic sled at 1 of the 6.

The epibenthic sled was used at Station 7 in Lydonia Canyon because of the concern over the possibility of snagging and tearing the otter trawl net. Two tows at this station resulted in a meager catch and provided only a small amount of tissue for hydrocarbon analysis (3 Cancer crabs, 4 starfish, juvenile Arctica and Astarte).

The otter trawl was used at all other stations. No trawl was made at Station 2 because the hydrocarbon chemists preferred to trawl at a shallower station closer to the top of the Bank. A trawl was therefore made at Station 10. One trawl resulted in a sufficient amount of tissue collected, with the majority of the catch being composed of demersal fish.

Use of the otter trawl at Station 13 resulted in a tremendous catch, again mostly of demersal fish species.

Trawls at Site-Specific Stations 5-1 and 5-28 again resulted in a large collection of demersal fish, but 3 attempts at Station 5-18 yielded a total of only 2 fish and 1 crab.

Participating Scientific Personnel:

W.H.O.I.: George Hampson, Chief Scientist
Rosemarie Petrecca

BATTELLE: Connie Delano
Holly Groelle
Bill Johnson
Paul Perra

U.S.G.S.: Dan Blackwood
Larry Poppe
Rick Rendigs
Bill Strahle

S.A.I.: Robin Robinson
Rusty Sims

SUMMARY OF SAMPLES COLLECTED

<u>Sample Type</u>	<u>Sample Designation</u>	<u>Total Number Collected</u>	<u>Comments</u>
0.1m ² Bio	A-F	108	
0.1m ² Chem	G-I, extras	154	Extras collected
0.04m ² Bio	J-P	272	No "0" Designation
CHN	Sta/grab	272	Subsample from 0.04m ² Bio grabs
Grain Size	Sta/grab	272	
D.O.	Sta. No.	19	Regional Stations only, bottom.
Salinity	Sta. No.	38	Regional Stations only, surface & bottom
XBT	Sta. No.	19	Regional Stations only
Camera	Sta. No.	36	20 Frames/Station
Dredge	Sta. No.	6	

Sample Locations:

All biological samples, CHN, plus D.O., salinity, and XBT-data and film footage at Battelle, Duxbury; sediment grain size samples at W.H.O.I.; chemistry samples at U.S.G.S., Woods Hole (trace metal samples) and S.A.I., La Jolla, CA (hydrocarbon samples).

