Battelle

May 1, 1989

Dr. Gary Brewer
Minerals Management Service
Pacific OCS Office
1340 West Sixth Street
Los Angeles, CA 90017

Re: MMS Contract No. 14-12-0001-30262

Dear Gary:

Enclosed please find a copy of the Cruise Plan for MMS Cruise CAMP 3-4, Leg 1 and Leg 2. I have distributed copies of this document to Principal Investigators, Quality Review Board members, and oil company representatives.

Sincerely,

Eiji Imamura
Program Manager

Dr. Roy Kropp
Assistant Program Manager

EI/hms

Enclosure

c: Ms. Frances Sullivan, MMS Contracting Officer
(MS 635, Herndon, VA)

Dr. Donald Aurand, Chief of Environmental Studies Program
(MS 644, Washington, D.C.)

CRUISE PLAN

FOR

MMS CRUISE CAMP 3-4

LEG 1 AND LEG 2

May 3 - 24, 1989

California OCS Phase II Monitoring Program

(MMS Contract No. 14-12-0001-30262)

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1.0 INTRODUCTION

CRUISE PLAN
FOR
MMS CRUISE CAMP 3-4
May 3 - 24, 1989

1.0 INTRODUCTION

Cruise CAMP 3-4 is the last of four major cruises scheduled for Year Three of the MMS California Phase II Monitoring Program (MMS Contract No. 14-12-0001-30262). This program is designed to monitor potential environmental changes at a series of regional stations and at two arrays of site-specific stations near oil production platforms in the Western Santa Barbara Channel and Santa Maria Basin region of the Califonia OCS. Platform Hidalgo (Lease P-0450) off Point Arguello was selected for hard-bottom, site-specific monitoring, and Platform Julius (Lease P-0409) off Point Sal was selected for soft-bottom, site-specific monitoring. Specific objectives of the program are:

1. To detect and measure potential long-term (or short-term) changes in the marine environment adjacent to oil and gas platforms; and

2. To determine whether changes observed in the marine environment during the monitoring period are caused by drilling-related activities or are a product of natural processes.

To accomplish these objectives, we are looking closely for potential biological changes and concomitant chemical or physical changes that can be linked to specific drilling events. An overall objective of Cruise CAMP 3-4 is to provide environmental data to help make these kinds of correlations and inferences.

Cruise CAMP 3-4 will consist of two legs: Soft-Bottom Box Coring (Leg 1) and Physical Oceanography/Hard-Bottom Survey (Leg 2).

The M/V Aloha, which is owned and operated by International Underwater Contractors (I.U.C.), will be the support vessel for the cruise. The study area for MMS Cruise CAMP 3-4 is shown in Figure 1-1.

The Leg-1 Cruise Plan, written by James Campbell, is in Section 3.0; and the Leg-2 Cruise Plan, written by Dane Hardin, is in Section 4.0.

2.0 CRUISE SCHEDULE

2.0 CRUISE SCHEDULE

All cruise equipment will be mobilized and demobilized at the Ventura Harbor Marina adjacent to the Battelle Ventura Office.

Leg 1: Soft-Bottom Box Coring

Wednesday, May 3, 1989	0800	Mobilize in Ventura
Thursday, May 4, 1989	0000	Depart Ventura
Monday, May 8, 1989	2400	Arrive in Ventura
Tuesday, May 9, 1989	0800	Demobilize

Leg 2: Hard-Bottom Sediment-Trap Deployment/Water Quality

Friday, May 12, 1989	0800	Mobilize
Saturday, May 13, 1989	0000	Depart Ventura
Thursday, May 18, 1989	2200	Pt. San Luis Crew Change
Tuesday, May 23, 1989	2400	Arrive Ventura
Wednesday, May 24, 1989	0800	Demobilize

3.0 MMS CRUISE CAMP 3-4

LEG 1 PLAN

3.0 CRUISE PLAN
MMS CRUISE CAMP 3-4, LEG 1
Soft-Bottom Box Coring
3 - 9 May, 1989

3.1 Scope of Work

Mobilization for Leg 1 will occur on Wednesday, May 3, 1989 at 0800 at Ventura Harbor. The M/V Aloha has been chartered for a period of five days. Our need for ship time is based on the following formula:

Box Coring	10 stations - 4 stations/day	2.5 days
Hydrocasts	9 stations	0.5 day
Weather Contingency		1.0 day
Transit Time		1.0 day
	TOTAL TIME	5.0 days

Our soft-bottom sampling design has been revised in order to accommodate drilling schedule delays at Platform Julius. The revisions include the reduction of the number of site-specific stations at the Platform Julius site from 19 to 1. Under these revisions, PJ-1 is the only site-specific station which will continue to be sampled. These revisions have resulted from recommendations reached through discussions with the Minerals Management Service and the Quality Review Board.

Sampling on Cruise CAMP 3-4, Leg 1 will include taking three replicate box-core samples at each of the nine regional stations (R-1 through R-9) and the one site-specific station (PJ-1). An additional box core will be collected at stations R-7, R-8, R-9, and PJ-1 for small-scale grain-size analyses and bioturbation experiments. A single hydrocast (for near-bottom measurements of dissolved oxygen, salinity, and temperature) will be performed at each of the nine regional stations.

The intended cruise track for Cruise CAMP 3-4, Leg 1 will visit stations in the following order: R-7, R-3, R-2, R-1, R-8, PJ-1, R-9, R-6, R-5, and R-4. If adverse weather conditions should jeopardize completion of scheduled work, sampling priorities will be implemented and the intended cruise track may be altered. Hydrocasts would be given lowest priority.

A summary of samples to be collected is shown in Table 3-1. A sample replicate collection matrix is shown in Table 3-2.

3.2 Navigation

The Northstar 800 LORAN C receiver will be the primary navigational aid for Leg 1. A navigation software package developed by Mr. Andy Eliason of Eliason Data Services will be used to integrate an Apple IIe microcomputer and Epson printer with the LORAN-C.

To ensure navigational consistency, the Northstar 800 and the Northstar 7000 LORAN-C receivers will be operated simultaneously throughout the cruise. If offsets are observed between the coordinates of the two receivers, the Northstar 800 will be calibrated against Northstar 7000.

TABLE 3-2. SAMPLE REPLICATE COLLECTION MATRIX FOR MMS CRUISE CAMP 3-4, LEG-1

Station	Biology Macrofauna/ Meiofauna	Sediment Chemistry 0-2cm	Sediment Chemistry 2-10cm	Radiography	Pb-210 Dating	Fine-Scale Sediment Profiling	Hydrography
Regionals							
R-1	3	3		1			1
R-2	3	3		1			1
R-3	3	3		1			1
R-4	3	3		1			1
R-5	3	3		1			1
R-6	3	3		1			1
R-7	3	3	3	1	1	1	1
R-8	3	3	3	1	1	1	1
R-9	3	3	3	1	1	1	1
Primary Site-Specific							
PJ-1	3	3	3	1	1	1	

TABLE 3-3. REGIONAL AND SITE-SPECIFIC STATION REFERENCE COORDINATES FOR MMS CRUISE CAMP 3-4, LEG 1 OF THE MMS CALIFORNIA OCS PHASE II MONITORING PROGRAM

Station	Northstar 7000 Latitude Longitude	UTM Coordinates	LORAN Time Delays	Depth (m)
R-1	35°05.55'N 120°49.20'W	N3885790 E698776	27794.9 42044.9	91
R-2	35°05.13'N 120°53.40'W	N3885047 E692345	27780.8 42057.1	161
R-3	35°04.98'N 121°00.84'W	N3884443 E680956	27756.2 42081.0	409
R-4	34°43.18'N 120°47.28'W	N3843676 E702399	27800.3 41921.5	92
R-5	34°42.85'N 120°50.69'W	N3842964 E697156	27789.8 41932.0	154
R-6	34°41.43'N 120°57.78'W	N3840354 E686413	27768.0 41949.8	410
R-7	34°52.62'N 121°10.31'W	N3861248 E667092	27727.7 42047.7	565
R-8	34°55.24'N 120°45.80'W	N3866433 E704208	27805.6 41978.2	90
R-9	34°53.49'N 120°59.03'W	N3863016 E684098	27763.2 42014.9	410
PJ-1	34°55.65'N 120°49.87'W	N3867215 E698032	27792.5 41994.6	145

Revised 9/88

Latitude and Longitude from Northstar 7000 algorithm

At stations (PJ-1, R-7, R-8 and R-9), the upper 10 cm of Subcores No. 19 and No. 18 will be collected for TM and HC, respectively. These cores will be sectioned into 0 to 2-cm and 2 to 10-cm fractions. The deeper sediment-core sections will be analyzed to investigate the vertical extent of TM and HC penetration.

Several quality-assurance samples and blanks will be collected for chemistry analyses. These samples, which will be analyzed to detect any background contamination, are as follows:

1. Ship's hydraulic fluid samples for hydrocarbons and trace metals.
2. Air exposure samples for hydrocarbons and trace metals.
3. Ship's diesel fuel samples for hydrocarbons and trace metals.
4. Ship's seawater samples for hydrocarbons and trace metals.

3.6 Sedimentology

Samples will be collected from each of the three replicate box cores at each of the 10 stations in the Platform Julius study area (9 regional and 1 site-specific station) for the determination of sediment properties. Measurements and samples for TOC, carbonate, grain-size, and REDOX will be taken from Subcore No. 25. At all stations, sediment shear-strength measurements and mineralogy samples will be taken from Subcore No. 21.

3.7 Core Radiography

At the 10 stations, a specially designed 10 x 30-cm subcore (in place of Subcores No. 22, 23, and 24) will be removed from one of the box-core replicates for x-ray analysis (for evidence of bioturbation). Two plastic cartridges will be inserted into the subcore and surrounding mud will be washed away. Immediately following collection, the x-raying will take place in the ship's laboratory and the photos will be developed in the darkroom. The x-ray photos will be repeated if the first attempt is unsuccessful. The mud cartridges will be dismantled and notes will be taken as to the sample appearance. In addition, approximately 100 subsamples will be collected from one x-ray mud cartridge for the determination of percent-water content. These subsamples will be analyzed for the purpose of defining the various degrees of shading observed on the radiographs.

3.8 Fine-Scale Sediment Profiling

At each of four stations (R-7, R-8, R-9, and PJ-1), a fourth box core will be dedicated to the collection of samples for fine-scale vertical profiling of a number of sediment parameters and for evaluation of the food quality of sediments. Ten of the 25 subcores (nine from the inner area of the box) will be fitted with specially-designed 3.8-cm-diameter subcore tubes.

Three subcore tubes will be used for the collection of fine-scale (millimeters) vertical-variability in grain-size samples. The grain-size samples will be fractioned at 2-mm-intervals to a depth of 2 cm. The samples will be frozen following collection. At stations R-8 amd PJ-1, bioturbation experiments will be conducted on board using four of the 3.8-cm subcore tubes. The subcore tubes will be set in an ambient bottom-water cold bath and flourescent-marker particles will be introduced to the surface water of the samples. The vertical

4.0 MMS CRUISE CAMP 3-4

LEG 2 PLAN

4.0 CRUISE PLAN
MMS Cruise CAMP 3-4, LEG 2
Hard-Bottom Sediment-Trap/Physical Oceanography
12 - 24 May, 1989

4.1 Scope of Work

Mobilization for Leg 2 will occur on 12 May, 1989, in Ventura. The M/V Aloha will depart for Platform Hidalgo by 0001 on 13 May, 1989. The current meter mooring at Platform Hidalgo will be retrieved and the ship will then transit to Platform Julius to search for the current meters at that location. After the current meters have been retrieved, retrieval and redeployment of the sediment traps will begin near Platform Hidalgo. When all sediment traps have been redeployed, the current meter mooring at Platform Hidalgo will be redeployed and water quality sampling will be conducted. The M/V Aloha will then transit to Port San Luis to exchange the Physical Oceanography/Sediment Trap crew at approximately 2200 on 18 May, 1989. Photographic surveys and tissue sampling will then take place at hard-bottom stations near Platform Hidalgo. The M/V Aloha will return to Ventura by 2400 on 23 May, 1989. Demobilization will occur on 24 May, 1989. The approximate cruise track is shown in Figure 4-1.

4.2 Current Meters

At Platform Hidalgo, the current meters will be retrieved with an acoustic release on the secondary anchor. A line will be hooked into the lift ring on the surface buoy to bring it on board. After the secondary anchor has been brought on board, the groundline will be attached to the large winch and the main mooring anchor will be winched onboard. Then the current meter mooring cable will be hauled onboard by hand until all three current meters are on deck. A line from the hydrowinch will then be used to winch the subsurface and surface buoys onto the deck.

If the current meter mooring at the Platform Julius site cannot be located and retrieved with its acoustic release, a search will be performed with the ROV and Mesotech sonar.

Once the current meters are on board, the data will be dumped onto the field computer and checked before the meters are turned off for servicing. After the moorings have been refurbished and the system checks have verified that all components are operating properly, the current meters will be redeployed at the conclusion of sediment trap work. The ship will motor slowly trailing the buoys and meters behind it, slowing toward the drop point, and lowering the anchor with the ground line until the anchor reaches the bottom. Then the ground line will be pulled taut as the ship motors ahead or drifts at slow speed. The secondary anchor will then be lowered to the seabed.

The actual coordinates for the current-meter moorings are listed in Table 4-1.

4.3 Sediment Traps

Fifteen sediment-trap arrays were recovered and redeployed on Cruise CAMP 3-1, Leg 2 (October, 1988). One array was deployed at each of the nine hard-bottom stations (PH-E, PH-F, PH-I, PH-J, PH-K, PH-N, PH-R, PH-U, and PH-W), one at each

TABLE 4-1. ACTUAL COORDINATES OF CURRENT-METER MOORINGS DEPLOYED BY KINNETICS LABORATORIES, INC. FOR THE MMS CALIFORNIA OCS PHASE II MONITORING PROGRAM ON CRUISE CAMP 3-1, LEG 2, OCTOBER, 1988

Station	Latitude Longitude	UTM Coordinates	LORAN Time Delays	Depth (m)	Equipment
PJ-13A	34°56.20'N 120°49.94'W	N3867974 E697983	w=16496.0 x=27792.5 y=41844.3	140	Primary Current-meter Array
Hidalgo	34°30.27'N 120°43.07'W	N3820262 E709530	w=16511.1 x=27812.8 y=41844.3	132	Primary Current-meter Array

11/88

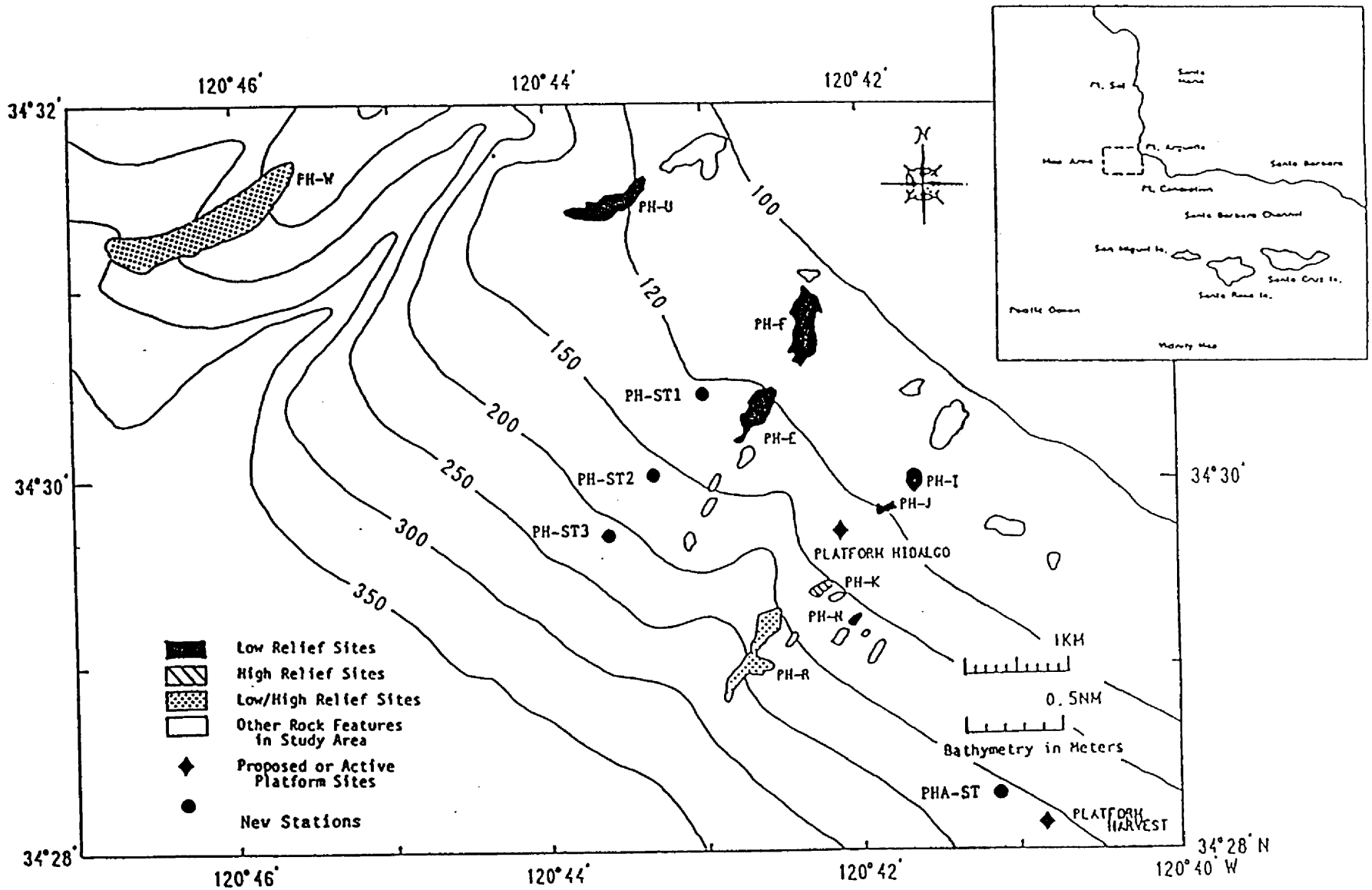

FIGURE 4-2. HARD BOTTOM FEATURES FOR SITE-SPECIFIC MONITORING NEAR PLATFORM HIDALGO

TABLE 4-3. WATER QUALITY PROFILES AND BOTTLE CASTS[1]

Station	Location	Depth	Parameters
Julius	Approx. 1 km north of Julius	145 m	• InterOcean 513D CSTD cast with pH, oxygen, and transmissivity. • Bottle casts (15m,65m, 139m) for oxygen pH, phosphate, silicate, nitrate and salinity.
Julius	Approx. 4 km north of Julius	145 m	Same as above.
Hidalgo	Approx. 1 km north of Hidalgo	132 m	• InterOcean 513D CSTD cast with pH, oxygen, and transmissivity. • Bottle casts (15m,65m, 126m) for oxygen, pH, silicate, phosphate, nitrate/nitrate and salinity.
Hidalgo	Approx. 4 km north of Hidalgo	132 m	Same as above

NOTE:

1. Water-quality profiles and bottle casts are scheduled to be collected throughout the five-year monitoring program, as part of the physical oceanography cruises.

TABLE 4-4. HARD-BOTTOM GRAB STATION REFERENCE COORDINATES FOR THE MMS CALIFORNIA OCS PHASE II MONITORING PROGRAM.

Station	Latitude Longitude	UTM Coordinates	Depth (m)
PH-E	34°30.19'N 120°42.68'W	N3820125 E710125	119
PH-F	34°30.79'N 120°42.52'W	N3821250 E710350	105
PH-I	34°29.96'N 120°41.72'W	N3819770 E711629	107
PH-J	34°29.83'N 120°41.86'W	N3819495 E711399	117
PH-K	34°29.41'N 120°42.29'W	N3818700 E710750	160
PH-N	34°29.24'N 120°42.10'W	N3818399 E711045	166
PH-R	34°29.18'N 120°42.45'W	N3818266 E710518	213
PH-U	34°31.41'N 120°43.47'W	N3822370 E708870	113
PH-W	34°31.58'N 120°45.68'W	N3822591 E705464	195

obtained with the ROV. The reference coordinates for the hard-bottom photosurvey sites are listed in Table 4-6.

4.9 Video Records

All video footage during photographic sampling will be recorded. An open microphone will be maintained and pertinent observations will be recorded in the video log by time (all watches will be synchronized) and transferred verbally on to the audio track. At the end of each dive, all video tapes will be spot-checked to verify proper functioning of the video recorders and screen information will be verified and updated as necessary.

4.10 Photographic Records

All photographic samples will be taken randomly except as noted in the photo log. The proper relationship between the camera and seabed will be determined with the lasers, which will be calibrated between dives.

Approximately 80 70-mm photos will be taken at each station. All photos will be recorded by time in the photo log.

When the ROV returns to the surface, the proper operation of the camera will be verified and the strobe will be prepared for the next dive. The camera and strobe will be removed from the ROV and taken into the lab. If more than 300 photos have been taken with the strobe, the battery will be exchanged for the charged spare. The film magazine will be removed from the camera and placed in the changing bag where the last few inches of exposed film will be removed from the take-up reel and developed. The remainder of the exposed film will be removed for on-land processing. The film magazine will then be reloaded as necessary and returned to the camera. The camera data chamber will then be set for the next dive; the camera and strobe will be reassembled and reinstalled on the ROV.

4.11 Voucher Specimens

Voucher specimens will be photographed in situ with 70-mm and 35-mm cameras on the ROV, collected with the special manipulator jaw, and brought to the surface. After being brought to the surface, vouch specimens will be photographed in detail with a 35-mm camera. The material will then be relaxed in hypotonic $MgCl_2$ and fixed in buffered 10% formalin. A sample label will accompany each voucher specimen through the entire shipboard procedures. Each specimen with a corresponding label will be placed in a sealed bucket and transported back to the laboratory.

4.12 Navigation

The firm of Land and Sea Surveys, Inc. will provide navigational services on the cruise. Station positions established on Cruise CAMP 1-1 will be revisited using a Motorola Miniranger System. The Miniranger System is interfaced to a 9826 Hewlett Packard Computer, which is linked to 2 color monitors to display the ship's position graphically. A Thinkjet printer and a 7475A Hewlett Packard plotter will provide hard copy printouts of Universal Transverse Mercator (UTM) coordinates and station plots. Land & Sea Surveys, Inc. will also provide the

Ferranti O.R.E. Trackpoint System which will enable the subsurface monitoring of IUC's Recon IV Remotely Operated Vehicle (ROV). Land & Sea's Mesotech Sonar will provide directional monitoring of the seafloor relief within a 100-meter radius of the ROV.

4.13 Cruise Participants

12 through 18 May - Physical Oceanography and Sediment Traps

Dane Hardin	Kinnetic Laboratories
Mark Mertz	Kinnetic Laboratories
Dan Beard	Kinnetic Laboratories
Peter Wilde	Kinnetic Laboratories
Paul Barter	Kinnetic Laboratories
Bob Dellaert	Land and Sea Surveys
TBA	Land and Sea Surveys

19 through 24 May - Hard Bottom Photosurvey, Grabs and Animal Traps

Dane Hardin	Kinnetic Laboratories
Terry Parr	Kinnetic Laboratories
Jay Shrake	Kinnetic Laboratories
Jim Campbell	Battelle
Bob Dellaert	Land and Sea Surveys
TBA	Land and Sea Surveys

Battelle
Ocean Sciences - Ventura Operations
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June 28, 1989

Dr. Gary Brewer
Minerals Management Service
Pacific OCS Office
1340 West Sixth Street
Los Angeles, CA 90017

Re: MMS Contract No. 14-12-0001-30262

Dear Gary:

Enclosed please find a copy of the Cruise Report for MMS Cruise CAMP 3-4, Leg 1 and Leg 2. I have distributed copies of this document to Principal Investigators, Quality Review Board members, and oil company representatives.

Sincerely,

Eiji Imamura
Program Manager

Dr. Roy K. Kropp
Assistant Program Manager

EI/hms

Enclosure

cc: Ms. Frances Sullivan, MMS Contracting Officer
(MS 635, Herndon, VA)

Dr. Donald Aurand, Chief of Environmental Studies Program
(MS 644, Washington, D.C.)

CRUISE REPORT

FOR

MMS CRUISE CAMP 3-4

LEG 1 and LEG 2

June 28, 1989

CALIFORNIA OCS PHASE II MONITORING PROGRAM

Performed for

U. S. Department of the Interior
MINERALS MANAGEMENT SERVICE
Pacific OCS Office

1340 West Sixth Street
Los Angeles, California 90017

by

Mr. James F. Campbell
BATTELLE
Ocean Sciences and Technology Department
Ventura Office
1431 Spinnaker Drive
Ventura, California 93001

Mr. Dane Hardin
KINNETIC LABORATORIES, INCORPORATED
Santa Cruz, California, 95061

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1.0 INTRODUCTION

CRUISE REPORT
FOR
MMS CRUISE CAMP 3-4
May 3 - June 5, 1989

1.0 INTRODUCTION

Cruise CAMP 3-4 was the last of four major cruises scheduled for Year Three of the MMS California Phase II Monitoring Program (MMS Contract No. 14-12-0001-30262). This program is designed to monitor potential environmental changes at a series of regional stations and at two arrays of site-specific stations near oil production platforms in the Western Santa Barbara Channel and Santa Maria Basin region of the California OCS. Platform Hidalgo (Lease P-0450) off Point Arguello was selected for hard-bottom, site-specific monitoring, and Platform Julius (Lease P-0409) off Point Sal was selected for soft-bottom, site-specific monitoring. Specific objectives of the program are:

1. To detect and measure potential long-term (or short-term) changes in the marine environment adjacent to oil and gas platforms; and

2. To determine whether changes observed in the marine environment during the monitoring period are caused by drilling-related activities or are a product of natural processes.

To accomplish these objectives, we are looking closely for potential biological changes and concomitant chemical or physical changes that can be linked to specific drilling events. An overall objective of Cruise CAMP 3-4 was to provide environmental data to help make these kinds of correlations and inferences.

Cruise CAMP 3-4 consisted of two legs: Soft-Bottom Box Coring (Leg 1); and Hard-Bottom Sediment-Trap/Physical Oceanography (Leg 2). The hard-bottom component of Leg 2 was performed in two segments (May 18-22 and June 1-5) because adverse weather conditions were encountered during the third week of May.

The M/V Aloha, which is owned and operated by International Underwater Contractors (I.U.C.), was the support vessel for the cruise. The study area for MMS Cruise CAMP 3-4 is shown in Figure 1-1.

The Leg-1 Cruise Report, written by James Campbell, is in Section 2.0, and the Leg-2 Cruise Report, written by Dane Hardin, is in Section 3.0.

2.0 MMS CRUISE CAMP 3-4

LEG 1 REPORT

2.0 CRUISE REPORT
MMS CRUISE CAMP 3-4, LEG 1
Soft-Bottom Box Coring
May 3-8, 1989

2.1 Objectives

The objectives of the Soft-Bottom Leg were to collect three replicate box cores at nine regional stations and Platform Julius Station PJ-1 for synoptic measurements of macroinfauna, meiofauna, hydrocarbons, trace metals, and various sedimentological properties. A single hydrocast was to be performed at each of the nine regional stations for near-bottom measurements of dissolved oxygen, salinity, and pH. An additional box core was to be collected at stations R-7, R-8, R-9, and PJ-1 for fine-scale grain-size analyses and bioturbation experiments.

2.2 Results

International Underwater Contractor's M/V Aloha was mobilized on Wednesday, 3 May, 1989. The ship departed Ventura Harbor on Thursday, 4 May at 0000 hours and returned a day ahead of schedule on Sunday, 7 May at 2400 hours.

Strong winds and high seas were encountered upon arrival in the study area at noon on Thursday and the commencement of sampling operations was delayed until 1900 hours when conditions became workable. Fair weather prevailed for the remainder of the cruise enabling the timely completion of the scheduled work.

In preparation for this cruise, IUC made some changes aboard the M/V Aloha which enhanced the safety of our offshore operations. IUC refurbished and modified one of their diving-bell winches to accommodate our box-coring operations. The new winch was a significant improvement over the leased winches used in the past. The winch had a manual level-wind unit attached to it which eliminated loose-wire wraps on the winch drum. In addition, IUC had removed the yoke structure on the A-frame and eliminated the yoke-control line which had been fairleaded across the deck area.

All the intended samples were collected successfully. The cruise track and study area are shown in Figure 2-1. A summary of samples collected is shown in Table 2-1.

2.3 Navigation

The Northstar 800 LORAN-C receiver was the primary navigational aid for Leg 1. A navigation software package developed by Mr. Andy Eliason of Eliason Data Services was used to integrate an Apple IIe microcomputer and Epson printer with the Northstar 800 LORAN-C receiver.

To ensure navigational accuracy, the Northstar 800 and the Northstar 7000 LORAN-C receivers were operated simultaneously throughout the cruise. The time delays were exactly the same at all times for both systems. However, due to algorithmic differences, there are minor variances of latitude/longitude and range/bearing readings between the systems. Station navigation will not be affected by these differences because the station locations are based on time delays.

TABLE 2-1. SUMMARY OF SAMPLES COLLECTED ON MMS CRUISE CAMP 3-4, LEG 1 OF THE MMS CALIFORNIA OCS PHASE II MONITORING PROGRAM.

Sample Type	Number of Stations	Number of Replicates/ Station	Total Number Collected on Cruise	Sample Custody
Infaunal Box Core	10	3	30	Battelle (Ventura)
Meiofauna	10	3	30	Univ. Texas
Core Radiography	10	1(x2)(1)	10(x2)	Univ. Maine
Surface Sediment (0-2cm): TM	10	3	30	Battelle (PNL)
Surface Sediment (0-2cm): HC	10	3	30	Battelle (Duxbury)
Subsurface Sediments (2-10cm): TM	4	3	12	Battelle (PNL)
Subsurface Sediments (2-10cm): HC	4	3	12	Battelle (Duxbury)
Pb-210 Dating(2) (0-20cm)	4	1	4	Battelle (PNL)
Sedimentology	10	3	30	Kinnetics (KLI)
Hydrography	9	1	9	Kinnetics (KLI)
Fine-Scale Sediment Profiling(2)	4	1	4	Woods Hole (WHOI)

1. One X-ray was taken of each of the two sediment cartridges collected from the 10 x 30-cm subcore.

2. Samples were collected from separate dedicated box core in support of the new Optional Study on vertical variability of grain-size and radioisotope dating.

TABLE 2-2. REGIONAL AND SITE-SPECIFIC STATION REFERENCE COORDINATES FOR MMS CRUISE CAMP 3-4, LEG 1 OF THE MMS CALIFORNIA OCS PHASE II MONITORING PROGRAM

Station	Northstar 7000 Latitude Longitude	UTM Coordinates	LORAN Time Delays	Depth (m)
R-1	35°05.55'N 120°49.20'W	N3885790 E698776	27794.9 42044.9	91
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R-9	34°53.49'N 120°59.03'W	N3863016 E684098	27763.2 42014.9	410
PJ-1	34°55.65'N 120°49.87'W	N3867215 E698032	27792.5 41994.6	145

Revised 9/88

Latitude and Longitude from Northstar 7000 algorithm

TABLE 2-3. SUMMARY OF SAMPLE POSITIONS ON MMS CRUISE CAMP 3-4, LEG 1 (M/V Aloha) (Continued)

Station	Date and Time (PDT)	Sample	Latitude Longitude	LORAN Time Delays	Depth (m)	Comments
R-3	Reference Coordinates		35°04.98'N 121°00.84'W	27756.2 42081.0	409	
R-3	06 May 89 0030	Box Core 1	35°04.93'N 121°00.84'W	27756.2 42080.9	409	Easy sieving. Diesel fumes very strong on deck.
R-3	06 May 89 0157	Box Core 2	35°04.94'N 121°00.85'W	27756.3 42081.0	409	Good sample with variable penetration.
R-3	06 May 89 0312	Box Core 3	35°04.97'N 121°00.87'W	27756.1 42081.1	409	Winds gusting to 25 kts. Piston pins secured. Extremely soft sediment.
R-3	05 May 89 2340	Hydrocast	35°05.02'N 121°00.78'W	27756.4 42081.2	409	Many loose wraps on winch, unsure of bottle depth due to delay of winch.
R-4	Reference Coordinates		34°43.18'N 120°47.28'W	27800.3 41921.5	92	
R-4	07 May 89 0914	Box Core 1	34°43.19'N 120°47.20'W	27800.6 41921.3	92	First attempt; no trip. Penetration to 15 cm, compacted lower layers.
R-4	07 May 89 1039	Box Core 2	34°43.17'N 120°47.23'W	27800.5 41921.4	92	Penetration to 15 cm. Much detritus and many "stick forams."
R-4	07 May 89 1208	Box Core 3	34°43.24'N 120°47.27'W	27800.3 41921.9	92	First attempt; no trip. Good sample.
R-4	07 May 89 1252	Hydrocast	34°43.16'N 120°47.27'W	27800.4 41921.4	92	

TABLE 2-3. SUMMARY OF SAMPLE POSITIONS ON MMS CRUISE CAMP 3-4, LEG 1 (M/V Aloha) (Continued)

Station	Date and Time (PDT)	Sample	Latitude Longitude	LORAN Time Delays	Depth (m)	Comments
R-7	Reference Coordinates		34°52.62'N 121°10.31'W	27727.7 42047.7	565	
R-7	05 May 89 1505	Box Core 1	34°52.55'N 121°10.31'W	27727.8 42047.4	565	Piston pins secured. Penetration to 25 cm. Winds 25 kts.
R-7	05 May 89 1640	Box Core 2	34°52.51'N 121°10.36'W	27727.5 42047.4	565	Extremely soft sediment. High silt content.
R-7	05 May 89 1804	Box Core 3	34°52.55'N 121°10.30'W	27727.8 42047.4	565	Penetration to 30 cm. Undisturbed sample.
R-7	05 May 89 1932	Box Core 4	34°52.58'N 121°10.33'W	27727.6 42047.6	565	Fine-scale sediment-profile box core. Good sample.
R-7	05 May 89 2048	Hydrocast	34°52.82'N 121°10.28'W	27727.8 42048.8	565	
R-8	Reference Coordinates		34°55.24'N 120°45.80'W	27805.6 41978.2	90	
R-8	04 May 89 1939	Box Core 1	34°55.24'N 120°45.90'W	27805.3 41978.5	90	Arrived on station at noon, sampling delayed due to rough-sea condition. Penetration to 12 cm.
R-8	04 May 89 2131	Box Core 2	34°55.27'N 120°45.92'W	27805.3 41978.7	90	Penetration to 14 cm. Much detritus and many ophiuroids in sample.
R-8	05 May 89 0126	Box Core 3	34°55.29'N 120°45.87'W	27805.4 41978.6	90	Undisturbed sample.
R-8	05 May 89 0036	Box Core 4	34°55.20'N 120°45.79'W	27805.6 41977.9	90	Fine-scale sediment-profile box core. Good sample.
R-8	05 May 89 0256	Hydrocast	34°55.30'N 120°45.87'W	27805.4 41978.7	90	

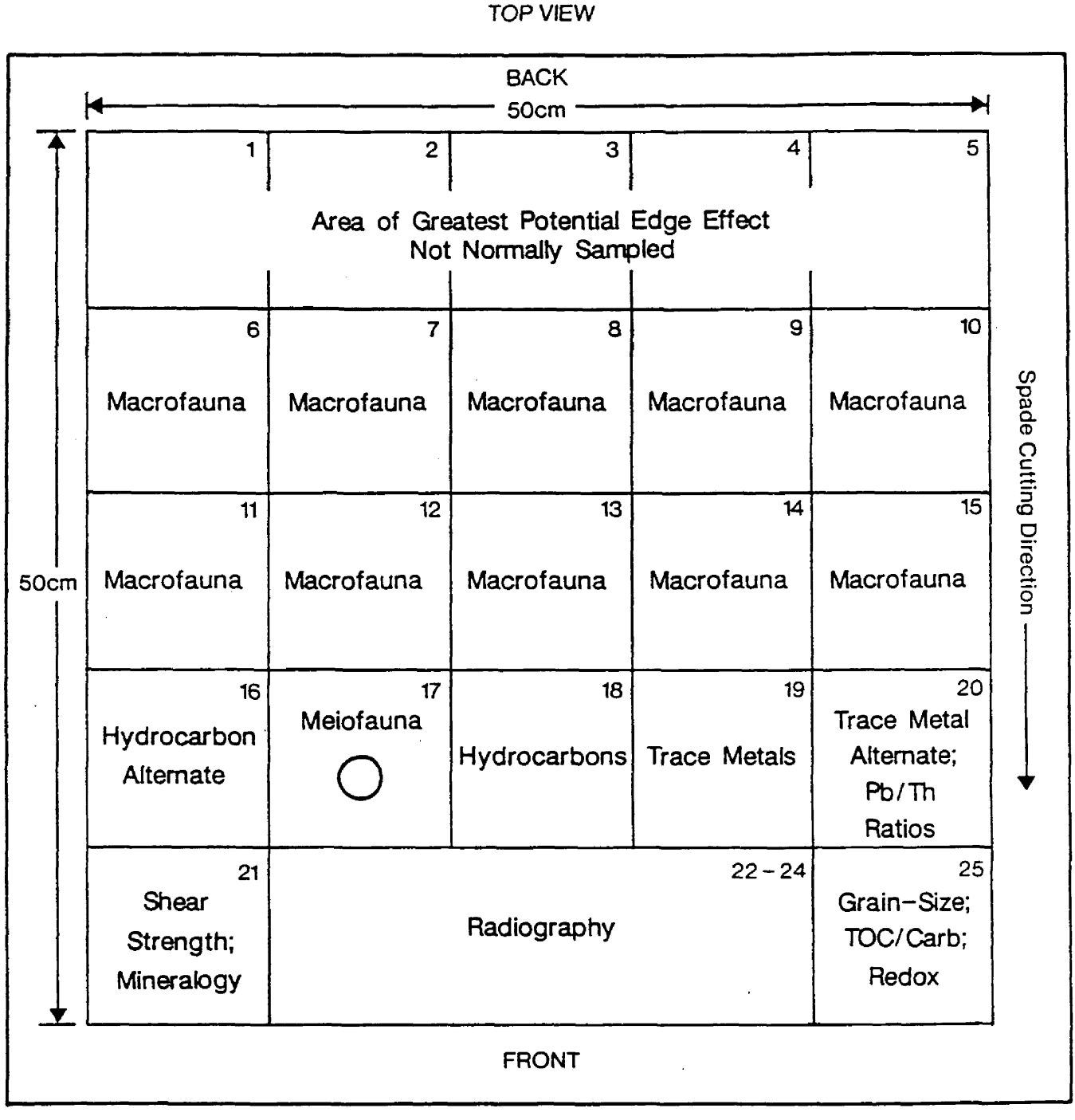

Figure 2-2 .Box core illustrating "vegematic" partitioning (top view).

were introduced to the surface of the samples. The vertical distribution of the fluorescent particles was observed and recorded at the end of a 24-hour period. Subsequently, the subcore tubes were fractioned at 2-mm intervals and the samples were fixed in formalin. A fourth subcore was collected for radioisotope (Pb-210) dating. This sample was fractioned at 1-cm intervals to a depth of 25-cm (bottom of the core). The samples were frozen following collection. In addition, three subcore tubes were collected and processed for phytoplankton-input samples to evaluate variability in the potential food quality of sediments.

2.10 Hydrography

A single Niskin bottle was deployed at each of the nine regional stations (R-1 through R-9), to collect samples for the determination of near-bottom dissolved oxygen, salinity, and pH. Dissolved oxygen was measured in triplicate on board using the Winkler titrimetric method. Salinity samples were measured using a Hanna H-18333 conductivity probe.

2.11 Cruise Participants

Participants on Cruise CAMP 3-1, Leg 1 and their affiliations were:

Battelle	Kinnetic Laboratories, Inc.
James Campbell, Chief Scientist	Gary Gillingham
Janet Kennedy, Second Scientist	Robin Gartman
Roy Kropp	Don Arnold
Christie Dolstra	Paul Barter
Valerie Eikelmann	Tony Zamora
University of Maine	**University of Texas**
Linda McCann	Richard Kalke
Woods Hole Oceanographic Institution	
Charlotte Fuller	
Vicki Starczak	

2.12 Acknowledgements

The Chief Scientist and Second Scientist wish to thank the scientific personnel for their untiring dedication and skilled performances which resulted in a very successful cruise and an early return to port. Special thanks is given to the crew of International Underwater Contractor's M/V Aloha for their skillful ship handling and their attention to details.

3.0 MMS CRUISE CAMP 3-4

LEG 2 REPORT

3.0 CRUISE REPORT
MMS CRUISE CAMP 3-4, LEG 2
Hard-Bottom Sediment-Trap/Physical Oceanography
12-22 May, 1-5 June 1989

3.1 Objectives

1. Retrieve, service and redeploy current meters at Platform Hidalgo; retrieve current meters at Platform Julius.

2. Retrieve, service and redeploy sediment traps at hard-bottom stations.

3. Obtain water quality profiles and bottle casts from two locations near Platform Hidalgo and two locations near Platform Julius.

4. Obtain photoquadrat samples from 11 hard-bottom sampling sites.

5. Obtain samples of surficial sediments from nine hard-bottom sampling sites.

6. Obtain specimens of target species for analysis of pollutant body burdens.

7. As time permits, obtain sediment cores from PH-I, PH-J, PH-K, PH-N, PH-R, and PH-W for analyses of Pb-210 and Ba with depth.

3.2 Scientific Personnel

Name	Affiliation	Responsibility
P. Barter	KLI	Sediment-Trap Servicing
D. Beard	KLI	Current-Meter Servicing
J. Campbell	Battelle	Tissue, Sediment, and Photoquadrat Sampling
J. Cooley	Land & Sea	Navigation
R. Dellaert	Land & Sea	Navigation
D. Hardin	KLI	Chief Scientist
T. Parr	KLI	Photoquadrat Sampling
R. Rideout	KLI	Sediment-Trap Servicing
J. Shrake	KLI	Photoquadrat Sampling
P. Wilde	KLI	Current-Meter Servicing

3.3 Activities

05/12/89	1600-1800	Mobilized M/V Aloha.
05/13/89	0010	Departed Ventura Harbor.
	0830-1230	Retrieved current meters at Platform Hidalgo.
	1230-1800	Cleaned and stowed current meter mooring from Platform Hidalgo and motored slowly toward Port San Luis.
	2000-2200	Prepared for hydrocasts.
05/14/89	0600-0830	Conducted hydrocasts at Platform Julius. Searched for current meter mooring at Platform Julius using ROV and Mesotech; mooring not found.

05/22/89	1330	Winds not decreased. Called for three-day weather forecast from Ray Strange which forecast deteriorating conditions. After consulting with other scientists and Eiji Imamura, decided to postpone remainder of cruise.
	1500	Departed for Ventura.
	2200	Arrived at Ventura.
06/01/89	0001	Departed Ventura for Platform Hidalgo.
	0730-1200	Retrieved and redeployed animal traps.
	1200-1630	Repairs made to starboard propellor shaft of M/V Aloha.
	1700-2330	Completed photoquadrats at PH-E, took photoquadrats at PH-I, PH-J, and PH-K.
06/02/89	0000-0100	Took photoquadrats at PH-N. Broken ROV cable required trip to Cojo anchorage.
	0700-2400	On site at Platform Hidalgo and collected sediment grabs from PH-R, PH-N, PH-K, PH-J, PH-I, PH-E, PH-F, and PH-U.
06/03/89	0000-0230	Completed sediment grabs at PH-U and collected sediment grabs from PH-W.
	0400-0600	Took photoquadrats at PH-R.
	0630-0915	Collected Parastichopus and Paracyathus from PH-U and Parastichopus from PH-J for tissue analyses.
	1000-1500	Conducted grappling attempts for gill net at PH-W; no recoveries.
	1530-1800	Took photoquadrats at PH-W; much gill net seen fouled on rocks.
	1800-1930	Retrieved animal traps.
	1945-2045	ROV dove at PH-J to collect Paracyathus for tissue analyses.
	2100-2400	Collected sediment cores from PH-J, PH-I, and PH-K. Coring attempts were unsuccessful at PH-N.
06/04/89	0000-0215	Attempted unsuccessfully to collect sediment cores at PH-R and PH-W. Departed for Ventura.
	1030-1145	Demobilized M/V Aloha.

3.4 Current Meters

The current meter mooring retrieval and redeployment at Platform Hidalgo went smoothly. Table 3-1 lists the location of the current meter mooring at Platform Hidalgo. Although the acoustic releases were not used due to electrical problems and a fouled release line, the technique of grappling for the ground line between the primary and secondary anchors worked well. Preliminary examination of the data from the three meters at Platform Hidalgo indicated that all had worked properly. Due to the length of the deployment, the memory had filled on all three meters resulting in a data gap of several weeks at the end of the deployment.

Unfortunately, the current meter mooring at Platform Julius could not be found. There was no signal heard from the pingers, nor did the ROV detect any trace of the mooring with the Mesotech sonar during a 4.5-hour search of approximately 165,000 square meters. We assume that the mooring was displaced at the time the

surface telemetry buoy became separated from the rest of the mooring, or afterwards. We will rely on the data which was stored in the telemetry datalogger up to the time the surface buoy was detached.

3.5 Sediment Traps

All sediment trap arrays were located and retrieved. One of the replicates of the large traps was lost during recovery, and one replicate was lost from Station PH-R due to a defect in the trap. The locations of sediment trap and hard-bottom sampling stations are shown in Figure 3-1. Sediment trap deployment coordinates are shown in Table 3-2.

The anoxic appearance of some samples noted during Cruise 3-1 was again seen during this cruise. As noted in the Cruise Report for Cruise 3-1, we suspect that the air-escape holes in the bottoms of the sodium azide containers may have become too large and allowed the preservative to diffuse into the water instead of into the sediment trap. New bottles with much smaller air-escape holes were used for the redeployments on Cruise 3-4.

As noted during the retrieval of sediment traps during Cruise 3-1, the amount of trapped material appeared very similar among the replicates on a given array. We suspect that the small variation, which was apparent, may be due to clogging of some cells of the trap baffles by anemones (probably Amphianthus californicus) and the presence of seastars on the openings of some sediment traps. We will begin making detailed observations of such potential disturbances during the recovery of sediment traps in fall 1989.

3.6 Water Quality

All water quality parameters were sampled successfully. However, the water samples collected for Station PJ-11 were obtained approximately 1 km from the reference coordinates due to a navigational error. It is not expected that this error will impact the water quality data. Other water-quality sampling was done at PJ-13A near Platform Julius and at Hydro 1 and Hydro 2 near Platform Hidalgo.

At each of the four stations, water-quality profiles were conducted using a CSTD which continuously recorded dissolved oxygen, salinity, temperature and suspended solids.

Water samples were collected at each of the four stations using a series of Niskin bottles situated for near-surface, mid-water, and near-bottom collections. Water samples were collected for the determination of salinity, dissolved oxygen, pH, total phosphate, nitrate/nitrite, and silicates. Dissolved and oxygen and pH samples were also used for CSTD calibrations.

3.7 Photoquadrats

The collection of the photoquadrats also was successful. The camera misfires, which became excessive during two dives, had been encountered on other cruises and were previously attributed to drained strobe batteries. On this cruise, the problem was traced to a faulty shutter in the camera. The camera shutter was replaced on the cruise with telephone assistance provided by a Photosea technical representative.

The problem of derelict gill nets at PH-W is recurrent and will be difficult to completely resolve. A gill net, which was not observed during the dive, fouled the ROV on 20 May 1989. When the ROV surfaced, part of the net with floats was draped over the vehicle and part of it was in the water and appeared to be tightly anchored to the seabed. Subsequently, the net broke loose from the vehicle and sank. There was much concern that the net was floating in the water column and would continue to be a hazard to the ROV unless it was recovered. When grappling attempts were unsuccessful in retrieving the net, it was decided to move the sampling location 75 meters northward.

After a search of the new location revealed only flat mud bottom, the ROV was directed southward toward the previously sampled area until rocks were encountered The photoquadrat sampling was restricted to the northern edge of the rock feature which comprises the previously sampled area of Station PH-W. Although we encountered good high-relief habitat, we did not observe any Lophelia californica.

Our observations indicate that a portion of PH-W is fouled with gill net. Some of the net continues to fish, as indicated by the sighting of fresh carcasses in the net entangled on the rocks as well as in the net which fouled on the ROV. Although we were able to collect the photoquadrat samples, there is understandable reluctance by IUC to endanger their equipment at this site in the future. It may be possible to remove the net which is fouled on the rocks with more grappling effort.

3.8 Sediment Samples

The collection of surficial sediment grab samples went smoothly, except that some difficulty was encountered in avoiding rocks at Station PH-I. Three replicate grab samples were collected at each of the nine Hidalgo sites for measurements of hydrocarbons, trace metals, and various sedimentological properties. A summary of grab sample positions is shown in Table 3-3.

3.9 Animal Collections for Body-Burden Analyses

A string of three animal traps was deployed at each of three hard-bottom stations (PHA-1, PHA-2, and PHA-3) for the collection of animal tissue samples for hydrocarbon and trace-metal body-burden analyses. The traps were deployed on two separate occasions at each of the three stations, thereby resulting in two replicate collections. The replicate-1 traps were set in the study area for a two-week period because a segment of the hard-bottom cruise was postponed due to adverse weather conditions. The traps could not be recovered in the high seas prior to the postponement of the cruise on 22 May.

Upon revisiting the study area on 4 June, the traps were recovered and the samples were collected and frozen. The traps were re-deployed at each of the three stations and recovered approximately 50 hours later in order to be consistent with the collections on previous cruises. The replicate-2 samples will be analyzed for pollutant body burdens and the replicate-1 samples will be archived. A summary of animal trap positions is shown in Table 3-4.

TABLE 3-3. SUMMARY OF GRAB SAMPLE POSITIONS ON MMS CRUISE CAMP 3-4, LEG 2 (M/V Aloha)

Station	Date and Time (PDT)	Sample	Latitude Longitude	UTM Coordinates	Comments
PH-E	Reference Coordinates		34°30.19'N 120°42.68'W	N3820125 E710125	Depth 119 m.
PH-E	02 June 89 1908	Grab 1	34°30.17'N 120°42.68'W	N3820098 E710127	Very silty sample.
PH-E	02 June 89 2002	Grab 2	34°30.19'N 120°42.70'W	N3820121 E710100	Undisturbed sample.
PH-E	02 June 89 2023	Grab 3	34°30.18'N 120°42.67'W	N3820120 E710138	Slightly disturbed sample; grab hit bottom at an angle.
PH-F	Reference Coordinates		34°30.79'N 120°42.52'W	N3821250 E710350	Depth 105 m.
PH-F	02 June 89 2112	Grab 1	34°30.79'N 120°42.52'W	N3821247 E710342	Slightly disturbed sample; sample barely in contact with grab door. Wind up to 20 kts.
PH-F	02 June 89 2134	Grab 2	34°30.76'N 120°42.52'W	N3821236 E710349	Sample barely in contact with grab door.
PH-F	02 June 89 2302	Grab 3	34°30.80'N 120°42.52'W	N3821267 E710351	Undisturbed sample.

TABLE 3-3. SUMMARY OF GRAB SAMPLE POSITIONS ON MMS CRUISE CAMP 3-4, LEG 2 (M/V Aloha) (Continued)

Station	Date and Time (PDT)	Sample	Latitude Longitude	UTM Coordinates	Comments
PH-K	Reference Coordinates		34°29.41'N 120°42.29'W	N3818700 E710750	Depth 160 m.
PH-K	02 June 89 1223	Grab 1	34°29.42'N 120°42.28'W	N3818713 E710770	Slightly coarser surface sediment than previous stations (i.e., R and N).
PH-K	02 June 89 1241	Grab 2	34°29.41'N 120°42.29'W	N3818707 E710749	Black grains on silty sample surface.
PH-K	02 June 89 1301	Grab 3	34°29.42'N 120°42.30'W	N3818711 E710741	Siphoned off overlying water.
PH-N	Reference Coordinates		34°29.24'N 120°42.10'W	N3818399 E711045	Depth 166 m.
PH-N	02 June 89 1039	Grab 1	34°29.24'N 120°42.10'W	N3818401 E711048	Black grains on surface of sample.
PH-N	02 June 89 1101	Grab 2	34°29.24'N 120°42.11'W	N3818394 E711040	Black grains on surface of sample.
PH-N	02 June 89 1121	Grab 3	34°29.24'N 120°42.11'W	N3818391 E711039	Siphoned off overlying water.

TABLE 3-3. SUMMARY OF GRAB SAMPLE POSITIONS ON MMS CRUISE CAMP 3-4, LEG 2 (M/V Aloha) (Continued)

Station	Date and Time (PDT)	Sample	Latitude Longitude	UTM Coordinates	Comments
PH-W	Reference Coordinates		34°31.58'N 120°45.68'W	N3822591 E705464	Depth 145 m.
PH-W	03 June 89 0104	Grab 1	34°31.58'N 120°45.69'W	N3822587 E705461	Undisturbed sample.
PH-W	03 June 89 0133	Grab 2	34°31.58'N 120°45.69'W	N3822599 E705457	Siphoned off overlying water. Some shell hash in sample.
PH-W	03 June 89 0218	Grab 3	34°31.58'N 120°45.69'W	N3822596 E705467	First attempt 1/4 grab n.g. Good sample; undisturbed.

TABLE 3-4. SUMMARY OF ANIMAL TRAP TISSUE COLLECTIONS ON MMS CRUISE CAMP 3-4, LEG 2 (M/V Aloha) (Continued)

Station	Date and Time (PDT)	Phase	Latitude Longitude	UTM Coordinates	Comments
PHA-1	Reference Coordinates		34°29.89'N 120°42.37'W	N3819592 E710611	
PHA-1 Replicate 2	01 June 89 0939	Animal Traps Deployed	34°29.93'N 120°42.39'W	N3819660 E710579	Bait: chicken, cat food, and fish scraps. 500 m NW of Platform Hidalgo.
PHA-1 Replicate 2	03 June 89 1941	Animal Traps Recovered	34°30.00'N 120°42.44'W	N3819785 E710498	Trap catches: 3 Cancer, 6 Asteroidea.
PHA-2	Reference Coordinates		34°30.08'N 120°42.60'W	N3819938 E710249	
PHA-2 Replicate 2	01 June 89 1002	Animal Traps Deployed	34°30.10'N 120°42.64'W	N3819966 E710196	1 km NW of Platform Hidalgo.
PHA-2 Replicate 2	03 June 89 1908	Animal Traps Recovered	34°30.20'N 120°42.67'W	N3820143 E710135	Trap catches: 5 Pleurobranchaea, 6 Asteroidea.
PHA-3	Reference Coordinates		34°31.23'N 120°43.99'W	N3822011 E708080	
PHA-3 Replicate 2	01 June 89 1201	Animal Traps Deployed	34°31.27'N 120°44.00'W	N3822076 E708085	4 km NW of Platform Hidalgo.
PHA-3 Replicate 2	03 June 89 1829	Animal Traps Recovered	34°31.36'N 120°44.00'W	N3822252 E708063	Trap catches: 2 Pleurobranchea, 1 Pandulus, 5 Asteroidea.

TABLE 3-5. SUMMARY OF ROV TISSUE COLLECTIONS ON MMS CRUISE CAMP 3-4, LEG 2 (M/V Aloha)

Station	Date and Time (PDT)	Collection
PH-J	03 June 89 0710	6 Parastichopus californicus Sea Cucumber
PH-J	03 June 89 2100	9 Paracyathus stearnsii Cup Coral
PH-U	03 June 89 0900	5 Parastichopus californicus 14 Paracyathus stearnsii

APPENDIX A

FORM APPROVED: OMB NO. 41-R2765 - EXPIRES : 12-31-79

NOAA FORM 24-23 (1-76)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE
NATIONAL OCEANOGRAPHIC DATA CENTER

A00 DATA CENTER

A40 REFERENCE NUMBER

OCEANOGRAPHY - GENERAL CRUISE INVENTORY
(ROSCOP - II)

A01 EXPEDITION/PROJECT
California OCS Phase II Monitoring Program

A11 CRUISE NUMBER OR NAME
CAMP 3-4, Legs 1 and 2

A02 SHIP OR PLATFORM
M/V Aloha

A12 PLATFORM TYPE
01

	YES	NO	PART
A91 Declared national program?	X		
A81 Exchange restricted?		X	
A92 Co-operative program?		X	A72 NAME
A82 Co-ordinated internationally?		X	A62 BY WHOM?

A03 COUNTRY: USA

A04 ORGANIZATION: Battelle Ocean Sciences
Kinnetic Laboratories, Inc.

A05 CHIEF SCIENTIST(S)
J. F. Campbell, Battelle
Dane Hardin, Kinnetic Laboratories, Inc.

A06 NAME AND ADDRESSES OF ORGANIZATIONS AND PERSONS WHOM TO QUERY	FINAL DISPOSITION OF DATA
A1 E. Imamura, Battelle, Ventura, CA	A2 E. Imamura
B1 M. Steinhauer, Battelle, Duxbury, MA	B2 Program Manager
C1 E. Crecelius, Battelle, Sequim, WA	C2 Battelle Ocean Sciences
D1 P. Kinney, Kinnetic Labs, Santa Cruz	D2 1431 Spinnaker Drive
E1 L. Watling, Univ. of Maine, Walpole, ME	E2 Ventura, CA 93001

DATE	DAY	MONTH	YEAR
A07 FROM	03	05	89
A17 TO	05	06	89

A08 GENERAL OCEAN AREAS
57A NE Pacific Ocean 121°W

A09 TYPE(S) OF MARINE ZONE(S)
07, 08

GEOGRAPHIC AREA
If all data were collected at a fixed station, fill in the co-ordinates

A10 LATITUDE ° ' '' N/S

A20 LONGITUDE ° ' '' E/W

A15 FEDERAL SUPPORT

A25 REMARKS
F1 - C. A. Butman - Woods Hole, MA
Sediment Collection: 10 stations sampled with 0.25m^2 box cores
9 stations sampled with 0.1m^2 grab
13 stations sampled with sediment-trap arrays

Measurements Underway: All photographs and motion pictures were taken by camera attached to a Remotely Operated Vehicle (ROV)

DISCIPLINE AND TYPE OF MEASUREMENTS	Index 10° x 10° Qc	L	G	G	INDEX 1° x 1°	DISCIPLINE AND TYPE OF MEASUREMENTS	Index 10° x 10° Qc	L	G	G	INDEX 1° x 1°
A GU, GS, D B	7	3	1	2		A B					
A HS, H(NSF) B	7	3	1	2		A B					
A HP, MC, P B	7	3	1	2		A B					
A B, BS B	7	3	1	2		A B					
A B						A B					
A B						A B					
A B						A B					

B – BIOLOGY

	NUMBER	i	l	FORMAT
B01 Primary productivity				
B02 Phytoplankton pigments				
B03 Seston				
B04 Particulate organic carbon				
B05 Particulate organic nitrogen				
B06 Dissolved organic matter				
B07 Bacterial and pelagic micro–organisms				
B08 Phytoplankton	4	F 1	A 2	9
B09 Zooplankton				
B10 Neuston				
B11 Nekton				
B12 Invertebrate nekton				
B13 Pelagic eggs and larvae				
B14 Pelagic fish				
B15 Amphibians				
B16 Benthic bacteria and micro–organisms				
B17 Phytobenthos				
B18 Zoobenthos	10	A 1	A 2	9
B19 Commercial demersal fish				
B20 Commercial benthic molluscs				
B21 Commercial benthic crustacean				
B22 Attached plants and algae				
B23 Intertidal organisms				
B24 Borers and foulers				
B25 Birds				
B26 Mammals and reptiles				
B27 Deep scattering layers				
B28 Acoustical reflections on marine organisms				
B29 Biologic sounds				
B30 Bioluminescence				

	NUMBER	i	l	FORM
B31 Vitamin concentrations				
B32 Amino acid concentration				
B33 Hydrocarbon concentrations				
B34 Lipid concentrations				
B35 ATP–ADP–AMP concentrations				
B36 DNA–RNA concentrations				
B37 Taggings				
B80 Other measurements				
Sediment X-Rays	10	E 1	A 2	8
B5 TYPES OF STUDIES				
B51 Identification	10	A 1	A 2	9
B52 Spatial and temporal distribution	10	A 1	A 2	9
B53 Monitoring and surveillance	10	A 1	A 2	9
B54 Biomass determination				
B55 Description of communities	10	A 1	A 2	9
B56 Food chains energy transfers				
B57 Population and environments	10	A 1	A 2	9
B58 Population structures	10	A 1	A 2	9
B59 Taxonomy, systematics, classification	10	A 1	A 2	9
B60 Physiology				
B61 Behaviour				
B62 Pathology, parasitology				
B63 Toxicology				
B64 Gear research				
B65 Exploratory fishing				
B66 Commercial fishing				
B67 Aquaculture				
B90 Other measurements				
Bioturbation Measurements	2	F 1	A 2	9

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