CRUISE REPORT FOR MMS CRUISE CAMP 1-1 of the CALIFORNIA OCS PHASE II MONITORING PROGRAM

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

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by

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for

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CRUISE REPORT
FOR
MMS CRUISE CAMP 1-1

1.0 Introduction

Cruise CAMP 1-1 is the first of three cruises scheduled for year one 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 the 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 1-1 is to provide critical pre-drilling baseline data to help make these kinds of correlations and inferences.

Cruise CAMP 1-1 consisted of two legs. Leg 1 was devoted to photographic surveys at hard-bottom sites; deployment of animal traps (for hydrocarbon and trace-metal tissue analysis) at hard-bottom sites; deployment of sediment traps at both hard-bottom and soft-bottom sites; and water-quality profiles and bottle casts at both hard-bottom and soft-bottom sites. Leg 2 was devoted to animal-trap deployments (for tissue analysis) at soft-bottom sites; and bottom sampling with box cores (for various biology, chemistry, and sedimentology parameters) at soft-bottom sites.

The support vessel for both legs was the M/V Aloha, owned and operated by International Underwater Contractors (IUC). The Aloha was equipped with a ROV to use during hard-bottom photographic surveys, and an A-Frame with hydraulic winches to accommodate box-coring needs for soft-bottom benthic surveys. Mobilization and demobilization both occurred out of Ventura Harbor, California, at the site of the Battelle Ventura facility. Mobilization for Leg 1 started on October 15, 1986; Leg 2 demobilization ended on November 13, 1986.

Reports of the cruise objectives, personnel, and activities for each of the two legs are provided in the sections below.

2.0 Navigation

The firm of Land & Sea Surveys, Inc. provided navigation services on both legs. Station positions were determined using a Motorola Miniranger system coupled to a 9826 Hewlett Packard Computer, which was linked to three color monitors. Output was to a Thinkjet printer and a 7475A Hewlett Packard plotter. Loran time delays were obtained at each station by the bridge officers. Detailed navigational information will be provided under separate cover by Land & Sea Surveys, Inc.

3.0 Leg 1 Report

3.1 Objectives

A. Perform reconnaissance of rock features near Platform Hidalgo to select and sample eight low-relief and three high-relief sites.

B. Deploy sediment traps at Platform Hidalgo sampling sites (total of nine low-relief and/or high-relief sites), at selected Platform Julius sites (PJ1, PJ7, PJ9, PJ10 and PJ11), at all soft-bottom regional stations (R1 through R7), and at a single Platform Harvest station.

C. Collect sediment grab samples from Platform Hidalgo sites for chemistry (hydrocarbon and trace-metals) and sedimentology analysis.

D. Collect animal tissue samples for chemistry body-burden analysis, from three locations at varying distances from Platform Hidalgo.

E. Collect STD profiles and water-quality samples from two sites in each study area (700 m and 4000 m down current from each platform site).

3.2 Participating Personnel

- Gary Brewer and Mary Elaine Warhurst (MMS) ..... observers
- James Campbell (Battelle) ..... field support
- Robert Dellaert (Land and Sea) ..... navigation
- Dane Hardin (Kinnetic Laboratories) ..... Chief Scientist
- Janet Kennedy (Battelle) ..... sediment and animal chemistry
- Raymond Lindquist (Land and Sea) ..... navigation
- Mark Mertz (Kinnetic Labortories) ..... sediment traps, water quality
- Terry Parr (Kinnetic Labortories) ..... video and photo sampling
- Mark Savoie (Kinnetic Laboratories) ..... sediment traps, water quality
- Robert Spies (Kinnetic Laboratories) ..... video and photo sampling
- 10 vessel crew members (IUC) ..... ship, ROV operations, equipment support

3.3 Activities

The following account summarizes scientific activities on Leg 1 of MMS Cruise CAMP 1-1:

10/15/86 Arrive Ventura Marina 1645 hours. Initial mobilization was completed and one truck was unloaded.

10/16/86 Second truck was unloaded and gear stowed. Sediment traps were loaded aboard at 2400 hours.

10/17/86 Departed Ventura Harbor at 0200 hours. Pt. Conception astern at 0800 hours. Arrived at Platform Julius at 1230 hours. Deployed sediment traps for station PJ1; had to cut loop of line below pelican hook to get array down at 1730 hours. Encountered six- to eight-foot seas and 25-30 knot winds. Went to Pt. San Luis to hide from the seas and discuss improvements in our deployment technique. Decided to let the sediment-trap arrays free fall.

10/18/86 Departed for Platform Julius at 0500 hours. Arrived at 0700 hours. Deployed sediment traps for stations PJ7 and PJ9. ROV dove from 1013 hours to approximately 1100 hours, searching for PJ1 sediment traps. Mesotech detected some posssible targets which could not be found by the ROV. STD and bottle casts were conducted at station PJ1. Deployed sediment traps at station PJ11. Attempted to set sediment traps at PJ10, but ship's fathometer was not working. Had after-dinner meeting to discuss progress of work. Decided to begin ROV work at Hidalgo with 24-hour operations--Hardin: 1200-2400; Parr: 2400-1200; Spies and Kennedy to split 0600-0600. Set up ROV lasers and 70 mm camera. Wind speed was 25-30 knots, seas were 6-8 feet.

10/19/86 Began first dive at Hidalgo at 0815 hours at station I, at 900 m NE from platform. Encountered high and low relief. Took photos of possible high relief at station I before going to station J. Caged ROV for trip to station J. Deployed animal traps at stations PHA-1, PHA-2, and PHA-3. Continued dive at station J exploring areas closer to platform, but no high relief found. Took low-relief photos at station J. Wind speed was 25 knots, Seas were 6-8 feet.

10/20/86 Continued Dive 8 at station I, taking low-relief photos. Deployed sediment traps at Platform Harvest. Began dive 9 at 1500 hours, staying in water until 0340 on 10/21. Surveyed stations E, D, and C. Station E is similar to station I (tall boulder pile). Shot low relief at station E. No rock found at station D. Station C had very low rocks with many Metridium, some Parastichopus.

10/21/86 Continued dive 9 at stations B and A. Some possible low-relief sites, but ROV kept getting pulled off site by surface ship. Dive 10 conducted at station K; good high-relief area sampled; rock collected. Low-relief very marginal due to abrupt nature of relief (±2 m = 520-532 feet). Picked up replacement for ship's fathometer from Platform Harvest. Attempted to dive at station N, but dive aborted due to ground fault in port thruster. Pulled up PHA-1 animal traps (limited catch; however, obtained Pleurobranchaea and Rathbunaster with 2 octopuses). Took STD and bottle cast at station Hydro 1 (700 m from Platform Hidalgo). Could not find traps at station PHA-2. Floats for station PHA-3 traps tangled in ship's wheels and probably sank. Took STD and bottle cast at station Hydro 2 (4000 m from Hidalgo).

10/22/86 Dove at stations F and U, shot low relief and collected a rock at each station. Dove at station W looking for high relief; initially very scattered pinnacles at a point 1/3 down feature. Found excellent high relief near upper end (30 feet with 6-foot pinnacles). Camera inoperative due to low battery, so no photos taken.

10/23/86 Surveyed stations H, S, and P. Station H is a possible station for low and high relief; station S is low; and station P is low with marginal (scattered) high relief. Mary Elaine Warhurst on board about 1100 hours. Took STD and bottle casts at stations Hydro 1 and Hydro 2. ROV tether brought out for maintenance. Redeployed animal traps at station PHA-3. Dove at station R for high and low-relief photos.

10/24/86 Shot high and low-relief photos at station W. Discovered that camera ran out of film after 30 photos at station R, and camera was loaded incorrectly for station W. Mary Elaine Warhurst off at 1400. Took grabs at stations R, N, and K. Dove at K to redo high-relief photos. Dive aborted at approximately 0045 hours due to wind.

10/25/86 Had discussion with "Bonnie Marietta" concerning sampling around station R; moved to station W until the boat left the area. Dove at station W for low and high-relief photos in morning. Took grabs and set sediment traps at station W. Dove at station R to get low-relief photos. Retrieved animal traps at station PHA-3. ROV was down during afternoon while tether was being fixed. Anchored near Pt. Arguello for the night.

10/26/86 Arrived at station R at 0700 hours to set sediment traps and was confronted again by "Bonnie Marietta." Decided not to set traps at station R until after post-cruise meeting with fishermen. Took grabs and set sediment traps at stations J and I; set traps at stations K and N; took grabs and set traps at sites E, F, and U. Anchored near Pt. Sal for the night.

10/27/86 Set sediment traps at station PJ10. Conducted STD and bottle casts at stations PJ11 and PJ13a. Set sediment traps at station R1 and dove with ROV to observe. Aborted dive due to poor visibility. Ship was down for 3 hours due to inability to retrieve ROV. Set sediment traps at stations R2 and R3.

10/28/86 Set sediment traps at station R7. Release wire may have been broken, because floats did not sink. Searched and found floats about 0030 hours but could not get on board. Search aborted at 0130 hours due to 4-6 foot seas and darkness, plus 500 m radius of anchor line at surface. Perhaps Leg 2 can retrieve and redeploy. Set traps at station R6. Departed study area at 0415 hours; arrived at Ventura Harbor 1430 hours. Demobilized.

10/29/86 Departed for Santa Cruz at 1300 hours.

A summary of the cruise tracks for Leg 1 of MMS Cruise CAMP 1-1 is provided in Figure 1. Additional navigational information and real-time plots showing ROV tracks are included in the Navigation Report to be provided under separate cover by Land & Sea Surveys, Inc.

Photo-reconnaissance techniques were successful in establishing eight low-relief (i.e., less than one-meter high) hard-bottom sites and three high-relief, hard-bottom sites. Two of the three low-relief sites also serve as high-relief sites. Characteristics of these hard-bottom stations are as follows: PH-K (high relief only); PH-W (high and low); PH-R (high and low); PH-N (low only); PH-J (low only); PH-I (low only); PH-F (low only); PH-U (low only); and PH-E (low only). Sediment traps were deployed, or will be deployed (in the case of station PH-R) at each of these nine stations. A summary of the locations of hard-bottom stations is provided in Figure 2.

As indicated above in the cruise account for Leg 1, sediment-trap arrays were not deployed at stations R-4, R-5 or PH-R. These trap arrays will be deployed on a separate, shorter cruise with a smaller fishing vessel. Also, after Leg 1 was completed, a lay barge performing subsea monitoring in the vicinity of Platform Hidalgo encountered our sediment-trap array deployed at station PH-J, and caused the traps to surface. The operator of the barge returned the traps, with the accoustic release still attached. This trap array will be re-deployed at station PH-J on a subsequent shorter cruise, once the lay barge is removed from the sampling area. Moored instruments for physical oceanography purposes (current meters, temperature and conductivity sensors, and pressure recorders), recording transmissionmeters for measurements of resuspension, and the time-lapse moored camera for bed-form measurements (at Platform Julius only) also will be deployed on a separate short cruise with a smaller vessel.

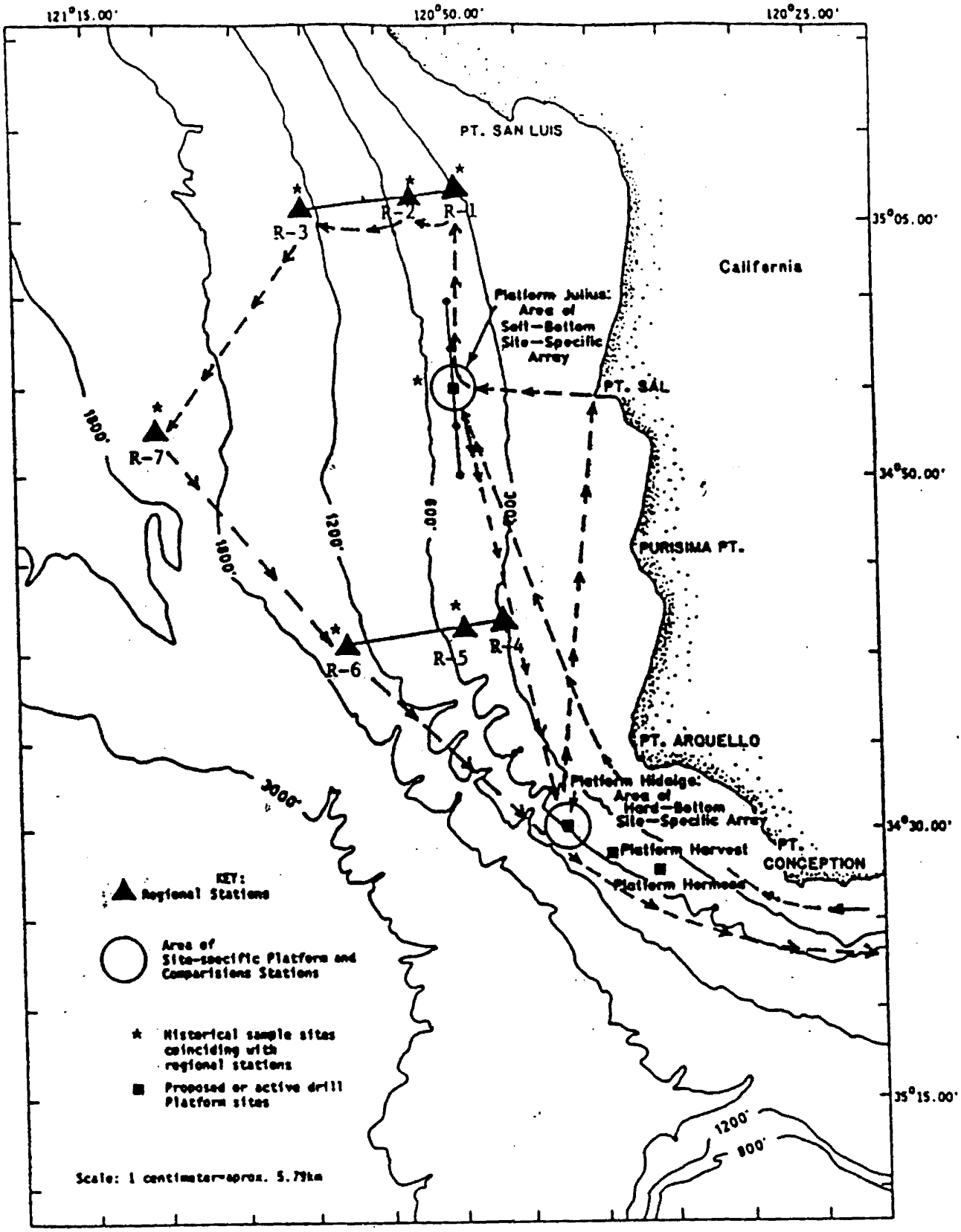

Figure 1. Cruise track for Leg 1 of MMS Cruise CAMP 1-1.

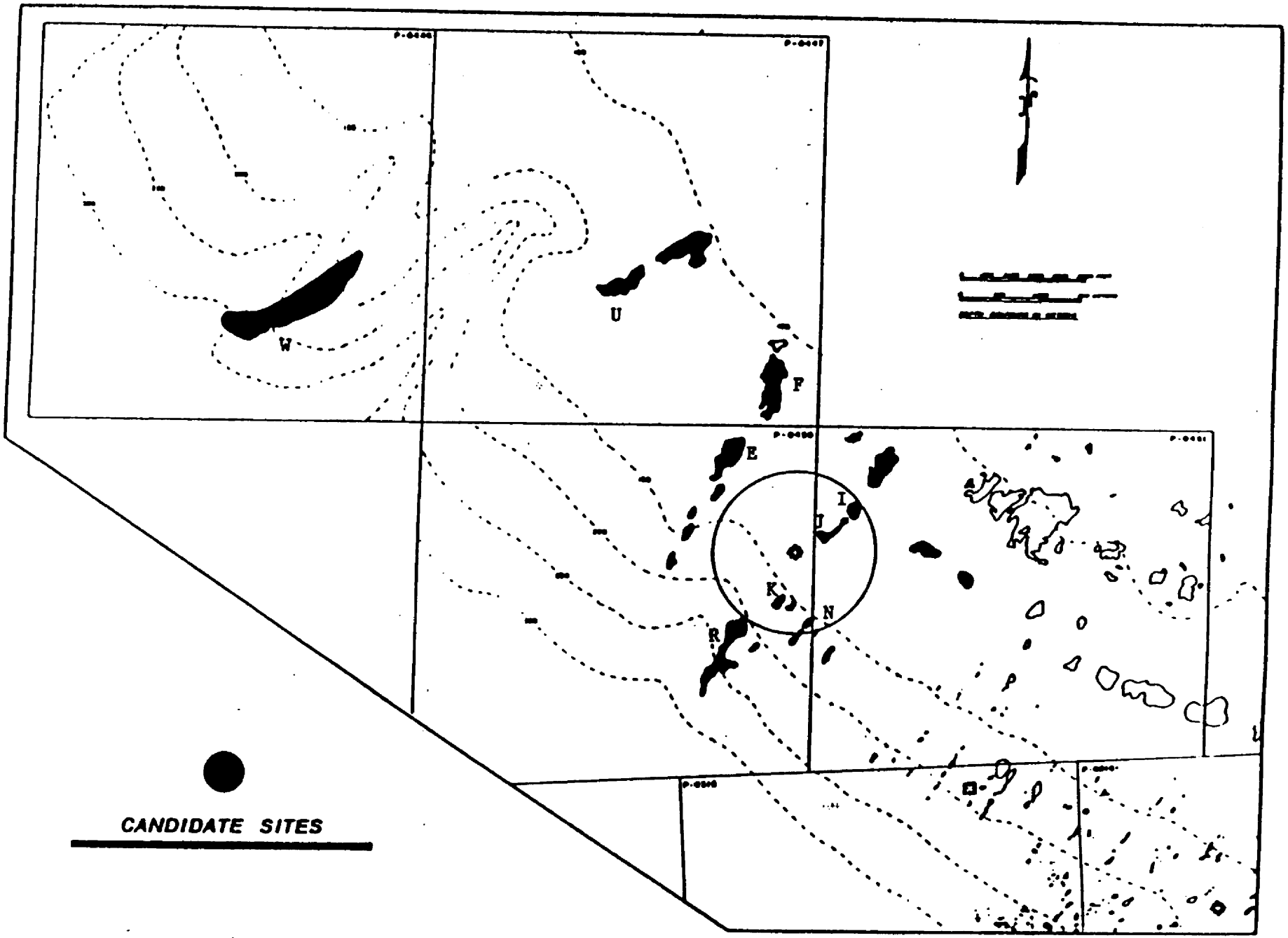

Figure 2. Hard-bottom sampling stations for site-specific monitoring near Platform Hidalgo.

4.0 Leg 2 Report

4.1 Objectives

A. Deploy and retrieve baited animal traps at soft-bottom sites (R-2, PJ-1, and PJ-11) to collect tissue samples for hydrocarbon and trace-metal body-burden analyses.

B. Collect replicate bottom sediments at soft-bottom sites (R-1 through R-7, and PJ-1 through PJ-21) to obtain samples for analysis of various biology, chemistry, and sedimentology parameters.

Bottom sediments, referred to under Objective B above, were to be collected with a 0.25 m^2 Sandia box core. Each of three replicate box cores from each station was to be divided into a series of subcores for the analysis of benthic macrofauna, benthic meiofauna, trace-metal chemistry, hydrocarbon chemistry, sediment grain size, total organic carbon and carbonate analysis, mineralogy, sediment cohesiveness, sediment temperature, sediment pH, and sediment EH. In addition, subsamples from box cores at two stations (PJ-1 and PJ-11) were to be removed for Pb/Th determination. Also, a specially designed subcore was to be used for core radiography (X-Ray) at several selected stations. Separate boxcores were to be collected at four stations (PJ-1, PJ-8, PJ-10, and PJ-11) for pore-water chemistry determination.

In addition, one sediment-trap array deployed at station R-7 during Leg 1, and left floating on the sea surface, was to be recovered and redeployed if possible.

4.2 Participating Personnel

- James Blake (Battelle) . . . . . .Chief Scientist
- James Campbell (Battelle). . . . . .Watch Leader/Box Coring
- Janet Kennedy (Battelle) . . . . . .Watch Leader/Box Coring
- Eugene Ruff (Battelle) . . . . . .Box Coring
- Lisa Remington (Battelle). . . . . .Box Coring
- Jeff Waugh (Battelle). . . . . .Chemistry Sediment/Tissue Samples
- Jim Bauer (Kinnetic Laboratories). . . . . .Box Coring
- Gary Gillingham (Kinnetic Laboratories). . . . .Box Coring
- Leslie Watling U. of Maine). . . . . .Core Radiography
- Paul Montagna (U. of Texas at Austin). . . . . .Meiofauna
- Raymond Lindquist (Land & Sea) . . . . . .Navigation
- Robert Dellaert (Land & Sea) . . . . . .Navigation
- 10 vessel crewmembers (IUC). . . . . .Ship Operations/Equipment Support

4.3 Activities

Mobilization for Leg 2 occurred between the afternoon of October 28, 1986, and the evening of October 31, 1986. Most of the time for mobilization prior to Leg 2 was spent replacing the motor on the main trawl winch.

Leg 2 was initiated when the Aloha departed Ventura Harbor at 2200 hours on the evening of October 31, 1986. Leg 2 ended with the ship returning to Ventura Harbor at 2200 hours on the evening of November 12, 1986. Demobilization occurred on the following day, November 13, 1986. The cruise track for Leg 2 is shown in Figure 3.

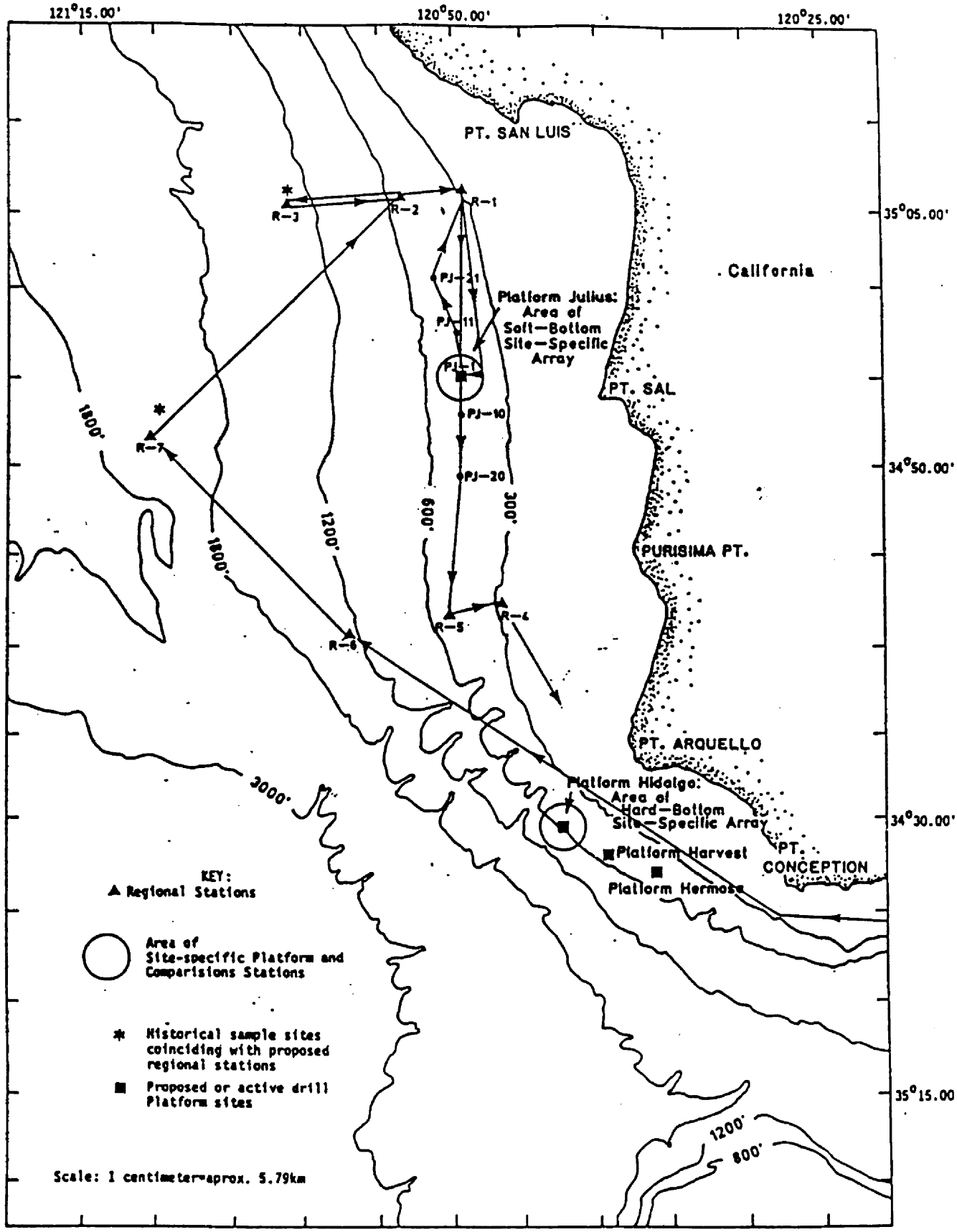

Figure 3. Cruise track for Leg 2 of MMS Cruise CAMP 1-1.

Figures 4 and 5 show the locations of stations sampled during Leg 2. Three replicate 0.25 m^2 box-core samples were collected at each of seven regional stations (R-1 through R-7) and 21 site-specific stations (PJ-1 through PJ-21) located in the vicinity of the future site for Platform Julius. Animal tissue samples for trace-metal and hydrocarbon body-burden analysis were collected from a subset of these stations (R-2, PJ-1, and PJ-11).

The Platform Julius array consists of a series of nearfield stations arranged in concentric rings extending out to two kilometers from the proposed platform site, and four additional farfield stations (PJ-10, PJ-11, PJ-20, and PJ-21) located on the longshelf axis, four and 10 kilometers to the north and south of the platform site. Regional stations and the four farfield Platform Julius stations are shown in Figure 4; nearfield Platform Julius stations are shown in Figure 5. A summary of all soft-bottom station positions, defined by the location of replicate box-core samples, is provided in Table 1. Actual visual plots of each replicate box core are included in the Navigation Report to be provided under separate cover by Land & Sea Surveys, Inc.

Regional station R-1, the shallowest station along with the northern transect, was moved from the original targeted depth of 59 meters (refer to cruise Plan for CAMP1-1, dated October 13, 1986) to 91 meters to compensate for the hard-bottom and compacted substrates encountered during the deployment of box cores and bottom grabs at the original R-1 site. Station R-4, located along the southern regional transect, also was moved to a depth of 92 meters to match the depth of station R-1.

The Platform Julius array consists of 11 primary site-specific stations, (PJ-1 through PJ-11) and 10 secondary site-specific stations ((PJ-12 through PJ-21). Samples from primary stations will be analyzed for all proposed parameters (i.e., macrofauna, meiofauna, trace metal and hydrocarbon chemistry, and various sedimentology properties). Samples from secondary stations will be archived and analyzed at a later date if warrented; however, portions of each sample will be analyzed for barium (as a potential tracer for drilling-related contamination).

Excellent weather conditions were present for all but two afternoons and evenings, during which work was stopped. Because of the favorable weather, especially during the last four days of the cruise, all major objectives for Leg 2 were accomplished within the allotted time-frame (except for the three unexpected days of down-time for scientific staff prior to Leg 2, during which the main winch was being repaired).

A summary of the samples collected on Leg 2 is provided in Table 2.

4.3.1 Box-core Sampling

A Hessler-Sandia, Mk-III 0.25-m^2 box core was used to collect sediment samples (Figure 6). Each box was divided into a series of subcores by the vegematic partitioning device (Figure 7) which allows one to make synoptic measurements of a variety of parameters on a single replicate sample. Three replicate samples were taken successfully at each of the seven regional and 21-site specific stations for a total of 84 samples. This number is believed to be the most boxcores of this type ever taken with this type of sampling device on a single cruise. In addition, five independent box cores were taken for the analysis of pore-water chemistry, for a grand total of 89 successful box-core samples. Four of the pore-water box cores were taken with the open box, while the fifth was taken with a vegematic box.

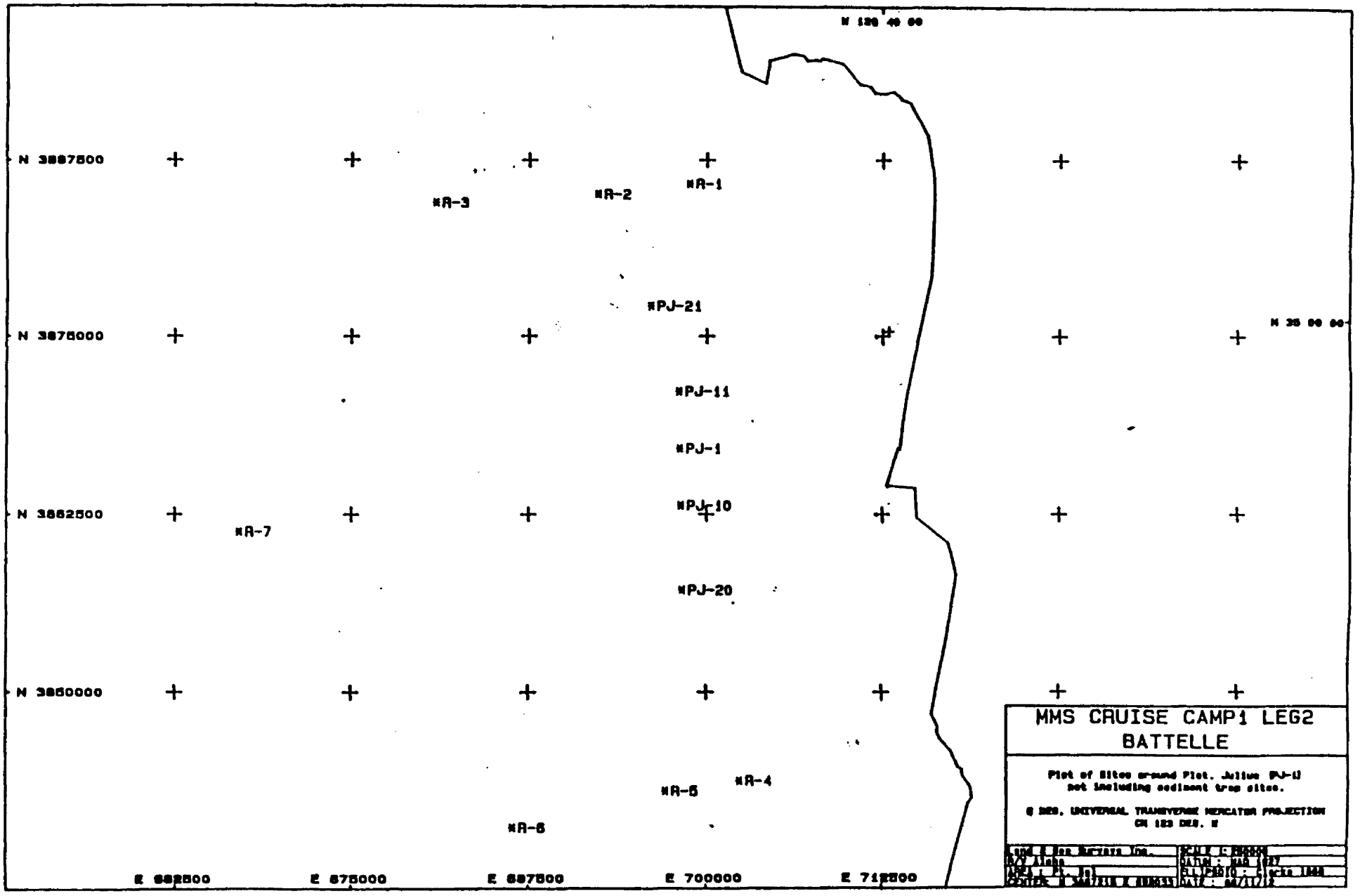

Figure 4. Plot of Regional Stations and Farfield Site Specific Stations Surveyed and Sampled During Camp1, Leg 2.

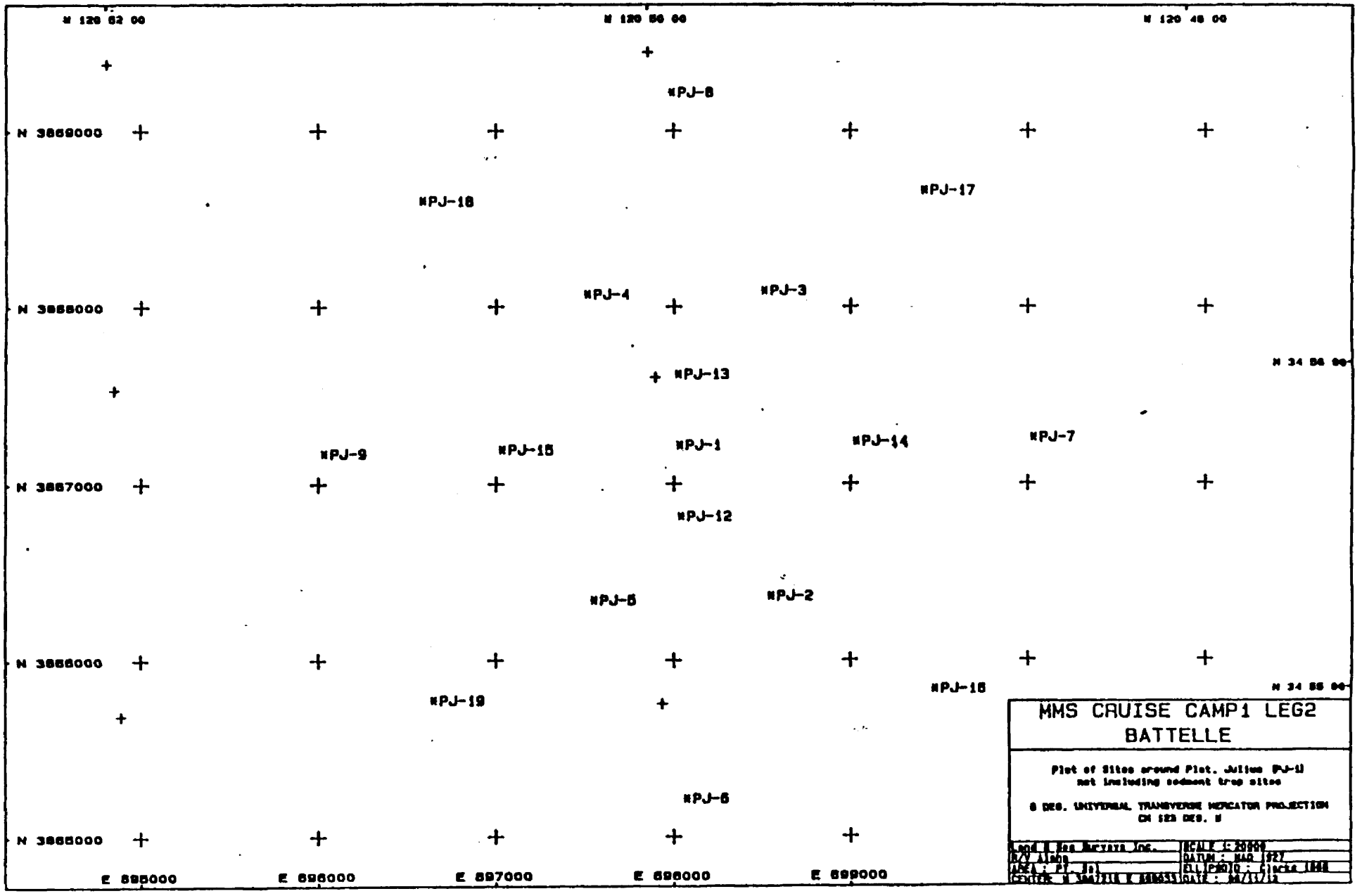

Figure 5. Plot of Nearfield Site Specific Stations Surveyed and Sampled During Campl, Leg 2.

TABLE 1. SUMMARY OF SOFT BOTTOM SAMPLE POSITIONS ON MMS CALIFORNIA PLATFORM MONITORING PROGRAM (CAMP 1, LEG 2).

Station	Date and Time (EDT)	Sample	Latitude/ Longitude	UTM Coordinates	Depth (m)	Comments
R-1	10 Nov 86 08:38	Box Core 1	35°05.83'N 120°49.16'W	N3885792.0 E698771.0	91	Fine green silt, hard packed; shallow penetrations of the box core.
R-1	10 Nov 86 09:59	Box Core 2	35°05.83'N 120°49.17'W	N3885788.0 E698758.0	91	
R-1	10 Nov 86 11:08	Box Core 3	35°05.82'N 120°49.15'W	N3885776.0 E698788.0	91	
R-2	03 Nov 86 16:52	Box Core 1	35°05.50'N 120°53'40'W	N3885054.0 E692342.0	161	Fine, soft green mud; normal penetrations of box core.
R-2	03 Nov 86 18:55	Box Core 2	35°05.50'N 120°53.40'W	N3885050.0 E692339.0	163	
R-2	03 Nov 86 20:32	Box Core 3	35°05.40'N 120°53.40'W	N3885040.0 E692347.0	163	
R-3	03 Nov 86 08:34	Box Core 1	35°05.30'N 121°00.90'W	N3884447.0 E680949.0	409	Very soft green mud; box core penetrated too deep, needed to set for shallow penetration.
R-3	03 Nov 86 09:54	Box Core 2	35°05.30'N 121°00.90'W	N3884443.0 E680958.0	410	
R-3	03 Nov 86 13:09	Box Core 3	35°05.29'N 121°00.89'W	N3884419.0 E680975.0	409	
R-4	12 Nov 86 11:43	Box Core 1	34°43.01'N 120°47.38'W	N3843668.0 E702410.0	92	Soft mud overlying a hard pavement. Numerous organisms present, very dense fauna.
R-4	12 Nov 86 12:37	Box Core 2	34°43.01'N 120°47.39'W	N3843678.0 E702394.0	92	
R-4	12 Nov 86 13:35	Box Core 3	34°43.01'N 120°47.39'W	N3843669.0 E702393.0	92	

TABLE 1. (Continued).

Station	Date and Time (EDT)	Sample	Latitude/ Longitude	UTM Coordinates	Depth (m)	Comments
R-5	12 Nov 86 08:04	Box Core 1	34°42.63'N 120°50.83'W	N3842848.0 E697154.0	154.5	Soft upper layer of sediment overlays a layer of scallop shells comprising a death assemblage (? fossil). Shallow penetration of box core.
R-5	12 Nov 86 09:08	Box Core 2	34°42.69'N 120°50.83'W	N3842964.0 E697156.0	156.0	
R-5	12 Nov 86 10:14	Box Core 3	34°42.68'N 120°50.85'W	N3842953.0 E697134.0	156.0	
R-6	01 Nov 86 17:05	Box Core 1	34°41.34'N 120°57.90'W	N3840244.0 E686418.0	407	Fine green silt, hard packed; shallow penetration of box core.
R-6	01 Nov 86 20:31	Box Core 2	34°41.34'N 120°57.91'W	N3840248.0 E686402.0	404	
R-6	01 Nov 86 22:22	Box Core 3	34°41.34'N 120°57.90'W	N3840253.0 E686417.0	408	
R-7	02 Nov 86 12:22	Box Core 1	34°52.90'N 121°10.31'W	N3861260.0 E667076.0	565	Soft green mud; deep penetration of box core.
R-7	02 Nov 86 14:43	Box Core 2	34°52.91'N 121°10.31'W	N3861262.0 E667083.0	567	
R-7	02 Nov 86 15:33	Box Core 3	34°52.90'N 121°10.30'W	N3861254.0 E667082.0	568	
PJ-1	04 Nov 86 14:54	Box Core 1	34°55.79'N 120°49.91'W	N3867217.0 E698034.0	145	Green mud, typical of most Platform Julius Stations. Numerous brittle stars.
PJ-1	04 Nov 86 16:13	Box Core 2	34°55.80'N 120°49.92'W	N3867221.0 E698031.0	145	
PJ-1	04 Nov 86 16:45	Box Core 3	34°55.79'N 120°49.91'W	N3867215.0 E698035.0	145	

TABLE 1. (Continued).

Station	Date and Time (EDT)	Sample	Latitude/ Longitude	UTM Coordinates	Depth (m)	Comments
PJ-1	04 Nov 86 14:15	Pore Water Box Core 1	34°55.81'N 120°49.91'W	N3867245.0 E698035.0	145	entered as REPS 4 and 5, respectively mel 1/26/88
PJ-1	10 Nov 86 13:59	Pore Water Box Core 2	34°55.79'N 120°49.91'W	N3867216.0 E698031.0	145	
PJ-2	06 Nov 86 12:01	Box Core 1	34°55.33'N 120°49.58'W	N3866363.0 E698562.0	142	
PJ-2	06 Nov 86 13:47	Box Core 2	34°55.32'N 120°49.58'W	N3866356.0 E698555.0	142	
PJ-2	07 Nov 86 08:58	Box Core 3	34°55.32'N 120°49.59'W	N3866352.0 E698550.0	142	
PJ-3	07 Nov 86 10:09	Box Core 1	34°56.26'N 120°49.58'W	N3868090.0 E698525.0	138	
PJ-3	07 Nov 86 11:16	Box Core 2	34°56.26'N 120°49.59'W	N3868087.0 E698510.0	138	
PJ-3	07 Nov 86 11:31	Box Core 3	34°56.24'N 120°49.57'W	N3868060.0 E698546.0	138	
PJ-4	08 Nov 86 06:49	Box Core 1	34°56.26'N 120°50.24'W	N3868066.0 E697518.0	149.5	
PJ-4	08 Nov 86 07:46	Box Core 2	34°56.2'N 120°50.2'W	?	150	Mini ranger crashed during deployment. Position of hit approximate.
PJ-4	08 Nov 86 09:23	Box Core 3	34°56.2'N 120°50.2'W	?	150	Positioned with Loran time delays.
PJ-5	08 Nov 86 10:41	Box Core 1	34°55.32'N 120°50.27'W	N3866337.0 E697511.0	153	
PJ-5	08 Nov 86 11:55	Box Core 2	34°55.32'N 120°50.24'W	N3866332.0 E697550.0	152	

TABLE 1. (Continued).

Station	Date and Time (EDT)	Sample	Latitude/ Longitude	UTM Coordinates	Depth (m)	Comments
PJ-5	08 Nov 86 12:16	Box Core 3	34°55.32'N 120°50.23'W	N3866333.0 E697568.0	154	
PJ-6	04 Nov 86 21:22	Box Core 1	34°54.71'N 120°49.91'W	N3865212.0 E698079.0	148	
PJ-6	04 Nov 86 22:12	Box Core 2	34°54.71'N 120°49.91'W	N3865218.0 E698081.0	148	
PJ-6	04 Nov 86 22:38	Box Core 3	34°54.71'N 120°49.91'W	N3865210.0 E698075.0	148	
PJ-7	06 Nov 86 08:34	Box Core 1	34°55.79'N 120°48.60'W	N3867259.0 E700036.0	123	
PJ-7	06 Nov 86 09:41	Box Core 2	34°55.79'N 120°48.60'W	N3867255.0 E700033.0	123	
PJ-7	06 Nov 86 10:54	Box Core 3	34°55.79'N 120°48.60'W	N3867257.0 E700030.0	123	
PJ-8	05 Nov 86 19:16	Box Core 1	34°56.88'N 120°49.91'W	N3869225.0 E697989.0	150	
PJ-8	05 Nov 86 20:39	Box Core 2	34°56.88'N 120°49.91'W	N3869218.0 E697992.0	152	
PJ-8	05 Nov 86 22:06	Box Core 3	34°56.88'N 120°49.91'W	N3869217.0 E697997.0	151	
PJ-8	09 Nov 86 19:11	Box Core 4	34°56.88'N 120°49.91'W	N3869220.0 E697990.0	152	
PJ-8	05 Nov 86 22:41	Pore Water Box Core 1	34°56.88'N 120°56.91'W	N3869225.0 E697989.0	150	
PJ-9	05 Nov 86 14:09	Box Core 1	34°55.79'N 120°51.22'W	N3867175.0 E696039.0	173	
PJ-9	05 Nov 86 15:31	Box Core 2	34°55.79'N 120°51.22'W	N3867171.0 E696037.0	173	

TABLE 1. (Continued).

Station	Date and Time (EDT)	Sample	Latitude/ Longitude	UTM Coordinates	Depth (m)	Comments
PJ-9	05 Nov 86 17:00	Box Core 3	34°55.79'N 120°51.23'W	N3867169.0 E696028.0	173	
PJ-10	05 Nov 86 07:52	Box Core 1	34°53.63'N 120°49.91'W	N3863219.0 E698122.0	147	
PJ-10	05 Nov 86 09:07	Box Core 2	34°53.63'N 120°49.91'W	N3863216.0 E698118.0	147	
PJ-10	05 Nov 86 10:42	Box Core 3	34°53.63'N 120°49.91'W	N3863215.0 E698120.0	147	
PJ-10	05 Nov 86 12:58	Pore Water Box Core 1	34°53.63'N 120°49.92'W	N3863221.0 E698114.0	147	
PJ-11	08 Nov 86 14:16	Box Core 1	34°57.95'N 120°49.92'W	N3871210.0 E697940.0	136	
PJ-11	08 Nov 86 14:56	Box Core 2	34°57.95'N 120°49.91'W	N3871207.0 E697956.0	138	
PJ-11	08 Nov 86 16:00	Box Core 3	34°57.95'N 120°49.92'W	N3871204.0 E697939.0	138	
PJ-11	08 Nov 86 07:36	Pore Water Box Core 1	34°57.95'N 120°49.91'W	N3871212.0 E697952.0	138	
PJ-12	09 Nov 86 11:58	Box Core 1	34°55.57'N 120°49.91'W	N3866811.0 E698046.0	145	
PJ-12	09 Nov 86 13:28	Box Core 2	34°55.58'N 120°49.91'W	N3866815.0 E698043.0	145	
PJ-12	09 Nov 86 14:28	Box Core 3	34°55.57'N 120°49.91'W	N3866812.0 E698049.0	145	
PJ-13	09 Nov 86 15:42	Box Core 1	34°56.01'N 120°49.91'W	N3867616.0 E698024.0	144	

TABLE 1. (Continued).

Station	Date and Time (EDT)	Sample	Latitude/ Longitude	UTM Coordinates	Depth (m)	Comments
PJ-13	09 Nov 86 16:51	Box Core 2	34°56.01'N 120°49.91'W	N3867610.0 E698030.0	145	
PJ-13	09 Nov 86 17:13	Box Core 3	34°56.01'N 120°49.91'W	N3867614.0 E698023.0	145	
PJ-14	10 Nov 86 15:01	Box Core 1	34°55.79'N 120°49.26'W	N3867240.0 E699034.0	134	
PJ-14	10 Nov 86 15:52	Box Core 2	34°55.80'N 120°49.26'W	N3867243.0 E699030.0	134	
PJ-14	10 Nov 86 16:50	Box Core 3	34°55.79'N 120°49.26'W	N3867238.0 E699028.0	134	
PJ-15	10 Nov 86 18:01	Box Core 1	34°55.79'N 120°50.57'W	N3867194.0 E697040.0	155	
PJ-15	10 Nov 86 19:24	Box Core 2	34°55.79'N 120°50.57'W	N3867196.0 E697034.0	155	
PJ-15	10 Nov 86 20:33	Box Core 3	34°55.79'N 120°50.57'W	N3867191.0 E697032.0	156	
PJ-16	11 Nov 86 08:33	Box Core 1	34°55.02'N 120°48.99'W	N3865823.0 E699458.0	130	
PJ-16	11 Nov 86 09:19	Box Core 2	34°55.03'N 120°48.99'W	N3865837.0 E699474.0	130	
PJ-16	11 Nov 86 10:39	Box Core 3	34°55.02'N 120°48.98'W	N3865826.0 E699487.0	130	

TABLE 1. (Continued).

Station	Date and Time (EDT)	Sample	Latitude/ Longitude	UTM Coordinates	Depth (m)	Comments
PJ-17	11 Nov 86 11:25	Box Core 1	34°56.56'N 120°48.99'W	N3868663.0 E699412.0	125.5	
PJ-17	11 Nov 86 12:10	Box Core 2	34°56.55'N 120°48.97'W	N3868638.0 E699440.0	126	
PJ-17	11 Nov 86 13:35	Box Core 3	34°56.56'N 120°48.98'W	N3868661.0 E699416.0	126	
PJ-18	10 Nov 86 21:32	Box Core 1	34°56.56'N 120°50.84'W	N3868601.0 E696589.0	158	
PJ-18	10 Nov 86 22:36	Box Core 2	34°56.56'N 120°50.84'W	N3868598.0 E696591.0	158	
PJ-18	10 Nov 86 23:04	Box Core 3	34°56.56'N 120°50.85'W	N3868600.0 E696581.0	158	
PJ-19	11 Nov 86 14:46	Box Core 1	34°55.03'N 120°50.84'W	N3865772.0 E696654.0	167	
PJ-19	11 Nov 86 15:53	Box Core 2	34°55.03'N 120°50.84'W	N3865768.0 E696650.0	167	
PJ-19	11 Nov 86 17:02	Box Core 3	34°55.03'N 120°50.84'W	N3865773.0 E696655.0	167	
PJ-20	11 Nov 86 19:31	Box Core 1	34°50.38'N 120°49.91'W	N3857208.0 E698249.0	147.5	
PJ-20	11 Nov 86 20:35	Box Core 2	34°50.39'N 120°49.91'W	N3857221.0 E698254.0	147.5	
PJ-20	11 Nov 86 21:45	Box Core 3	34°50.39'N 120°49.91'W	N3857223.0 E698250.0	147.5	
PJ-21	09 Nov 86 08:38	Box Core 1	35°01.23'N 120°51.15'W	N3877231.0 E695940.0	143	

TABLE 1. (Continued).

Station	Date and Time (EDT)	Sample	Latitude/ Longitude	UTM Coordinates	Depth (m)	Comments
PJ-21	09 Nov 86 09:47	Box Core 2	35°01.23'N 120°51.15'W	N3877231.0 E695940.0	144	
PJ-21	09 Nov 86 21:13	Box Core 3	35°01.23'N 120°51.16'W	N3877230.0 E695922.0	145	

TABLE 2. SUMMARY OF SAMPLES COLLECTED ON MMS CRUISE CAMP1-LEG 2.

Sample Type	Number of Stations	Number of Replicates per Station	Total Number Collected on Cruise	Custody of Samples or Data
Infaunal Box Core	28	3	84	Battelle
Meiofauna	28	3(x2)[1]	84(x2)[1]	Univ.Texas
X-Ray	11	2(x2)[2]	22(x2)[2]	Univ. Maine
Sediment Trace Metals	28	3	84	Battelle
Sediment Hydrocarbons	28	3	84	Battelle
Sediment Grain-size	28	3	84	Kinnetics
Sediment TOC	28	3	84	Kinnetics
Sediment Carbonate	28	3	84	Kinnetics
Sediment Mineralogy	28	3	84	Kinnetics
Sediment Pore water	28	3	84	Kinnetics
Sediment EH	28	3	84	Kinnetics
Sediment pH	28	3	84	Kinnetics
Sediment Temperature	28	3	84	Kinnetics
Pore Water Chemistry	4	1(+1 at PJ-1)	5	Battelle
Animal Tissue Chemistry	3	1	3	Battelle

[1]. Two meiofaunal subcores were removed for each replicate. These were each sliced at 2 cm intervals for each 10 cm core.

[2]. Two separate 30 cm wide sections, approximately 2.5 cm thick were taken from each 10 x 30 cm subcore.

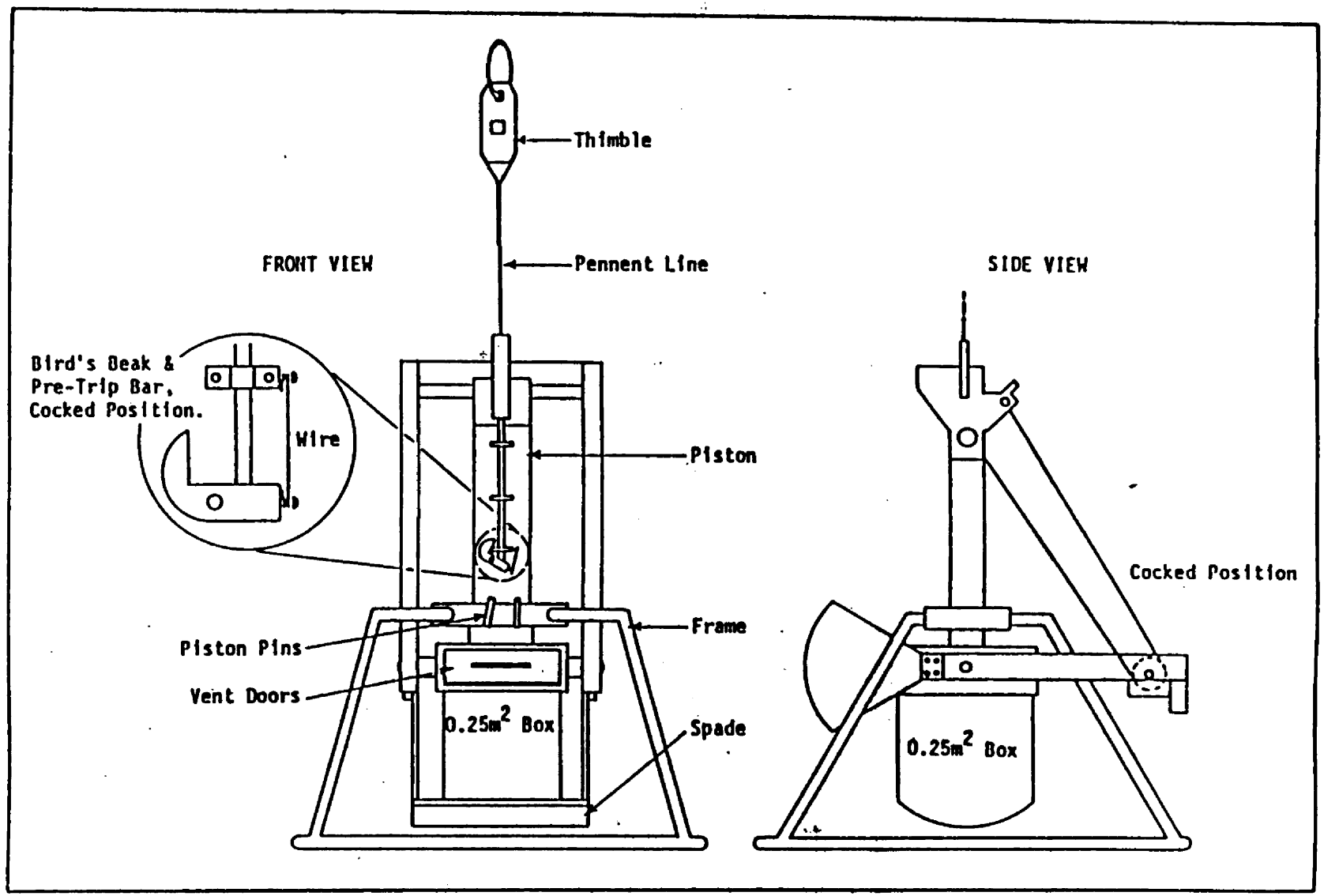

Figure 6. The MK-III Box Core: Front View With Spade in Closed Position; Side Views With Spade in Cocked Position.

TOP VIEW

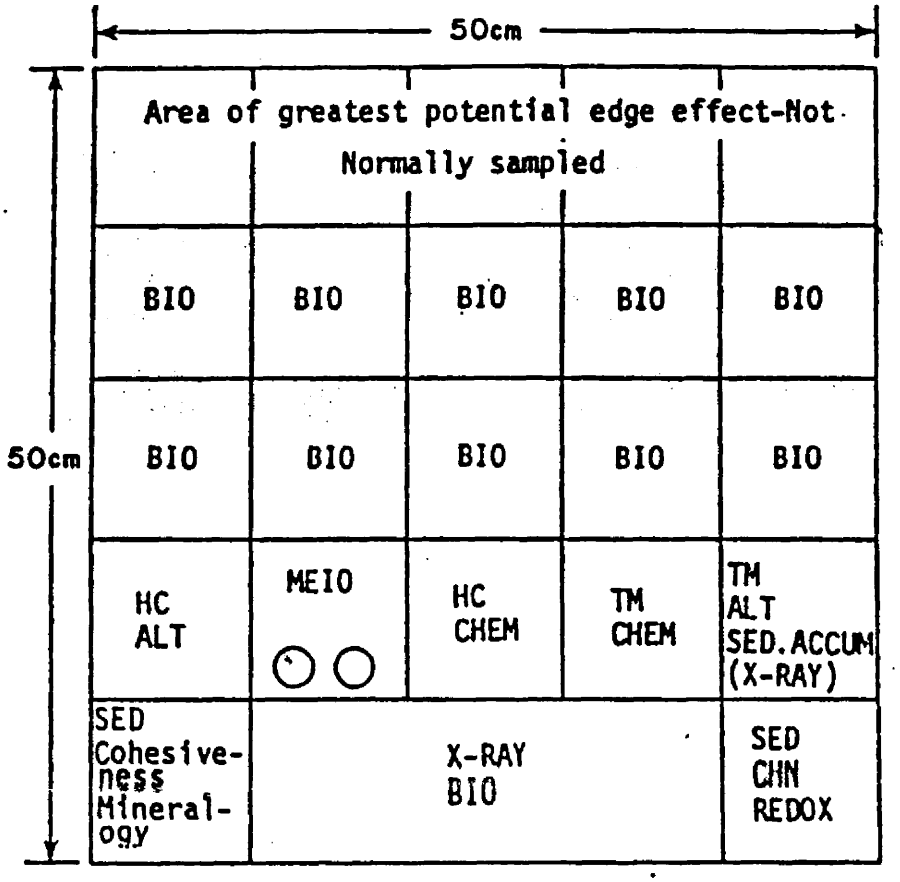

Figure 7. "Vegematic" Partitioning of 0.25m^2 Box Core for MMS California Monitoring Cruise Campl, Leg 2.

With the exception of four stations, a normal pattern of removal and utilization of the subcores from the vegematic box was followed (Figure 5). At stations R-1, R-5, R-6 and PJ-20, however, it was necessary to use the alternate chemistry subcores to obtain a successful sample for biology, because of excessive disturbance from edge effects along the back of the box. Also, at stations R-3 and R-7, very soft mud was encountered, which required modification of the box core to obtain shallower penetration so that mud would not be forced through the top of the box. Regardless of these modifications, the following kinds of subcores were always obtained: ten for infaunal analysis, one for meiofauna (with two, 2-cm subcores attached), two for hydrocarbon and trace metal chemistry, two for sedimentology, and three (enclosed in a single 10 x 30 cm subcore) for radiography (Figure 5).

The ten infaunal subcores were extruded to 10 cm and sieved through a 0.3-mm screen. The sediment remaining below 10 cm was sieved through a 1.0-mm screen. Both fractions were preserved in 10-percent buffered formalin. Back in the laboratory, the 0-10 cm sections are to be re-sieved with a 0.3 and 0.5-mm screen. The 0.5-mm fractions will be analyzed from all stations; the 0.3-mm fractions will be analyzed in reference to life-history parameters from a subset of 10 selected "life-history" stations (i.e., regional stations R-1 through R-7; and site-specific stations PJ-1, PJ-10, and PJ-11). The deeper (less than 10 cm) sediment sections that are roughed-sieved with a 1.0-mm sieve are to be analyzed from all regional stations (R-1 through R-7) and from station PJ-1, to investigate the presence and numerical importance of deep-burrowing organisms.

Two meiofauna subcores were extruded from each boxcore. Each subcore was extruded to 10 cm, with each 2-mm interval being sliced and preserved separately.

Sediment trace-metal and hydrocarbon samples were removed with special Teflon-coated scoops, placed in jars, and frozen. Trace-metal subcores also were Teflon-coated.

Sedimentology samples were taken from two subcores. Samples for grain size, TOC, carbonate, mineralogy, and pore-water content were frozen. Measurements for sediment EH, temperature, pH, and cohesiveness were taken on board ship and recorded. Temperatures were taken at 0, 2, 5, and 8-cm depths. EH, pH, and temperature were read directly with a Corning 105 hand-held meter. Shear stress of sediments (cohesiveness) was determined using a vane shear.

Two replicate boxcores from stations R-1 through R-7, and stations PJ-1, PJ-10, and PJ-11 were utilized for x-ray analysis. Each of these samples consisted of two one-inch thick sections removed from the 10 x 30 cm subcore. Samples were x-rayed on board. The film was developed immediately and the results assessed.

Pb/Th samples were taken from one replicate at stations PJ-1 and PJ-11.

As mentioned above, five separate box cores were collected for chemistry pore-water analysis. One replicate boxcore was collected from each of the four designated pore-water stations (i.e., PJ-1, PJ-8, PJ-10, and PJ-11); an additional replicate was taken at station PJ-1. Problems with the techniques for collection and extraction of pore-water samples prevented us from having enough time to collect additional replicates at these stations, as we originally targeted for (i.e., 3 replicates at each of 4 stations, totaling 12 samples).

4.3.2 Animal Traps

At stations R-2, PJ-11, and PJ-1, baited animal traps were deployed to collect benthic epifauna for analysis of whole body-burden metals and hydrocarbons.

Traps were made of polyethylene and were weighted with 44 lbs of lead. Three traps were tied in an array and secured to a mooring buoy with polypropylene line. A 10 ft. high flyer with flags and a radar reflector were attached to the buoy for relocation purposes. The traps were baited with cut fish or cat food.

Traps were deployed for a minimum of 48 hours. Each trap captured crabs (Cancer sp.) and large opisthobranch molluscs (Pleurobranchaea californica). An inventory of tissue samples available for analysis is being prepared at present.

4.3.3 Sediment-Trap Retrieval

A sediment-trap array deployed on Leg 1 of Camp 1-1, at Station R-1 had been set improperly and needed to be recovered and redeployed. The floats were observed on the surface upon the completion of box-core sampling at this particular station. The array was hauled on board, reconfigured, and redeployed successfully.