OCS STUDY
MMS 85-0089

PROCEEDINGS
SUMMER TERNARY
GULF OF MEXICO STUDIES MEETING
July 1985

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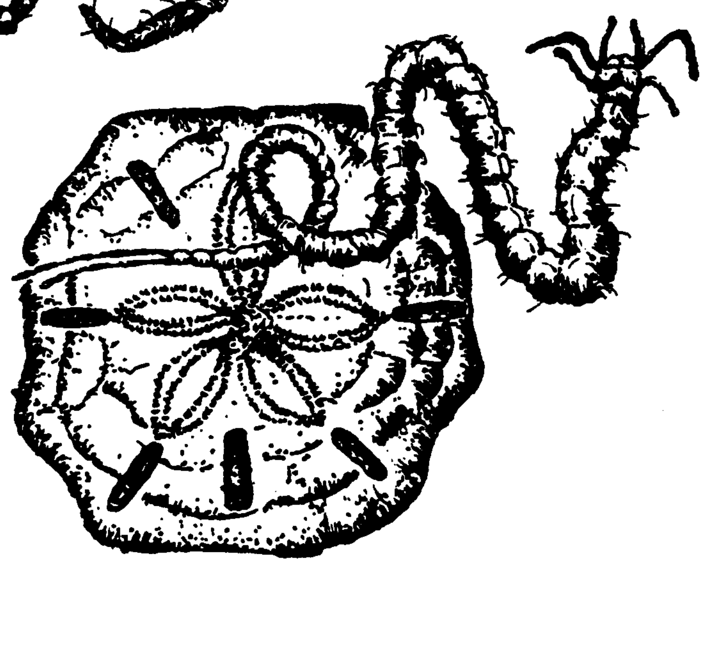

U.S. DEPARTMENT OF THE INTERIOR/MINERALS MANAGEMENT SERVICE

This report has not been edited for conformity with MMS editorial standards.

OCS STUDY
MMS 85-0089

PROCEEDINGS
SUMMER TERNARY
GULF OF MEXICO STUDIES MEETING
July 1985

held
July 24, 1985
at
Gulf of Mexico OCS Regional Office
Minerals Management Service
Department of the Interior
Metairie, Louisiana

Prepared under Contract 14-12-0001-29158
by

Science Applications International Corporation
4900 Water's Edge Drive, Suite 255
Raleigh, North Carolina 27606

submitted to

Minerals Management Service
Gulf of Mexico OCS Regional Office
Metairie, Louisiana 70010

October 1985

U.S. DEPARTMENT OF THE INTERIOR/MINERALS MANAGEMENT SERVICE

REPORT AVAILABILITY

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Gulf of Mexico OCS Regional Office
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DISCLAIMER

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MEETING SUMMARY

JULY, 1985 TERNARY MEETING

1.0 INTRODUCTION:

On July 24, the Environmental Studies Group, of the MMS, Gulf Regional Office convened the second Ternary Meeting of 1985. These public meetings are held as a forum for information exchange between interested and involved parties. This generally include MMS personnel, representatives of various MMS funded programs, state representatives, public interest groups, other federal agencies, and invited investigators working on problems similar to or supportive of those of the MMS.

The meeting consists of a representative from most of the MMS funded programs and other invited speakers making a presentation variously defining the program goals, schedule, methodology, present status and any important or relevant insights recently developed. The meeting schedule is such that there is ample opportunity for exchange between the speakers and audience. In addition, sufficient "unallocated" time is usually available for discussion between those in attendance.

2.0 MEETING ABSTRACTS:

At the meeting each speaker provides an abstract of material to be discussed prior to the scheduled talks so that others have an opportunity to become familiar with what is to be presented. This also allows question formulation without trying to simultaneously listen to an ongoing presentation. These abstracts form the basis for this Meeting Summary Report.

Abstracts included in this volume are copies of those provided by each speaker. No adjustments have been made to the form and substance of these submissions.

This report contains the following meeting material:

- Agenda
- Presentation Abstracts
- List of Attendees

These are Items 1, 2 and 3 and follow immediately.

Any questions regarding presented material should be directed to the appropriate speaker. General questions regarding the Ternary Meeting should be directed to the Environmental Studies Group in the MMS, Gulf Regional Office.

ITEM 1

AGENDA

Agenda

MINERALS MANAGEMENT SERVICE

ENVIRONMENTAL STUDIES TERNARY MEETING

July 24, 1985

Metairie, LA

Time	Topic	Speaker
9:00	Physical Oceanography Field Measurements Program	Dr. Van Waddell Science Applications International Corp.
9:30	Meteorology Data Base Study	Mr. Jerry Ford Florida A&M University
10:30	Circulation Modeling Program	Dr. Alan Wallcraft Jaycor
11:00	Socioeconomic Indicators Study	Mr. Gary Brown Centaur Associates
11:30	Big Bend Seagrass Habitat Study	Mr. John Thompson Continental Shelf Associates
12:00	LUNCH	
1:30	Barrier Island Concerns in the State of Texas	Dr. Jerry Wermund Texas Bureau of Geology
2:00	Continental Slope Study	Dr. Benny Gallaway LGL Ecological Associates
2:45	S. W. Florida Shelf Study	Dr. George Lewbel LGL Ecological Research Associates
3:15	ADJOURN	

ITEM 2

EXTENDED ABSTRACTS

ABSTRACT
for
Physical Oceanography
Program

Ternary Meeting
Metairie, La.
July 24, 1985

Submitted to:
Minerals Management Service
Metairie, Louisiana

Submitted by:
Science Applications International Corp.
Raleigh, North Carloina

In October, 1982, the Minerals Management Service initiated a multi-year, physical oceanographic field study of the Gulf of Mexico with a goal of establishing a better understanding of circulation patterns and processes and developing a data base which supports a concurrent and coordinated numerical circulation modeling program. The regional program emphasis has resulted in two complete years of observations in the eastern Gulf(Figure1) with a third year presently in progress. Coincident with this ongoing final eastern Gulf year, measurements in the western Gulf have been initiated. A progress report describing activities during and results of the first two years of eastern Gulf measurements is being prepared and should be submitted to MMS this fall. At the completion of the final year of eastern Gulf observations, another report will be produced which expands on prior work and includes new insights developed during the ongoing program year.

Program Years 1 and 2 had five major technical areas which are being combined to develope a better understanding of eastern Gulf and Loop Current related circulation. These include:

- Subsurface currents, temperatures and pressure along and across the shelf, on the slope and in and beneath the Loop Current(Figure 2).

- Hydrographic surveys to document temperature, salinity, density and nutrient fields on a regional or synoptic scale and as produced by important dynamic processes, e.g. Loop Current boundary filaments along the west Florida shelf.

- Satellite thermal imagery to describe diagnostic and characteristic sea-surface temperature patterns. These can provide an independent verification and description of evolutionary circulatory patterns.

- Lagrangian drifter trajectories which represent the cumulative influence of all local and time-dependent processes acting on the buoy. This is an important and different perspective than is provided by in situ current measurements.

- Ship-of-Opportunity(SOOP, Figure 3) XBT data that provides valuable and cost-effective documentation of the important and at times diagnostic temperature field.

Except for hydrography, the above measurements will continue during the third eastern Gulf year. All these measurements will also be made in the western Gulf.

In June, 1985 subsurface current moorings were deployed on the slope and rise offshore of south Texas and northern Mexico(Figure 4). The horizontal and vertical instrument placement is designed to provide information regarding current patterns

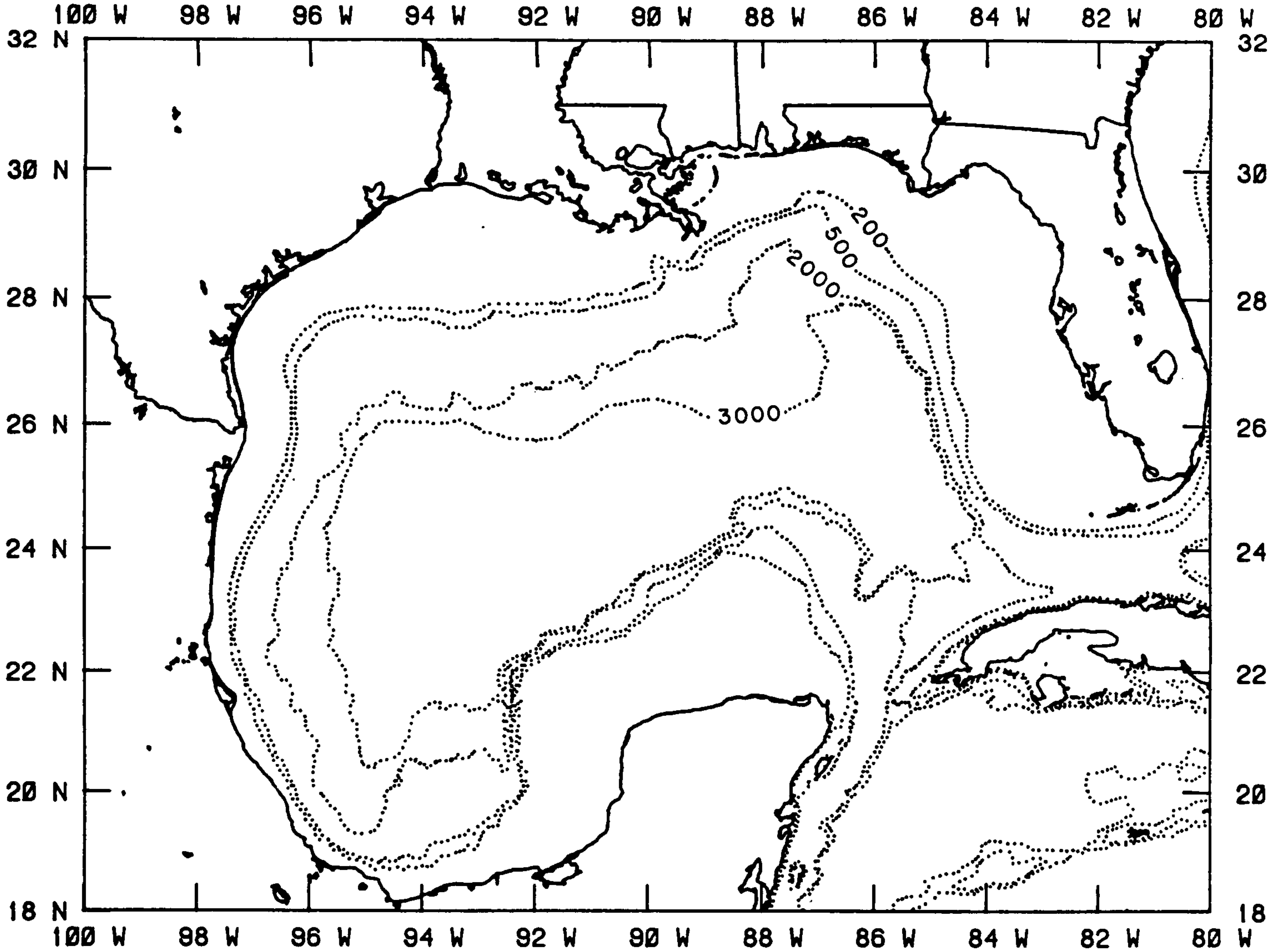

Figure 1. Gulf of Mexico reference map. Note that the eastern or Loop Current studies (Years 1, 2 and 4) look at conditions east of 90°W. Year 3 emphasize the central western Gulf (i.e. west of 90°W). In both situations measurements tend to focus on slope/shelf circulation and interaction.

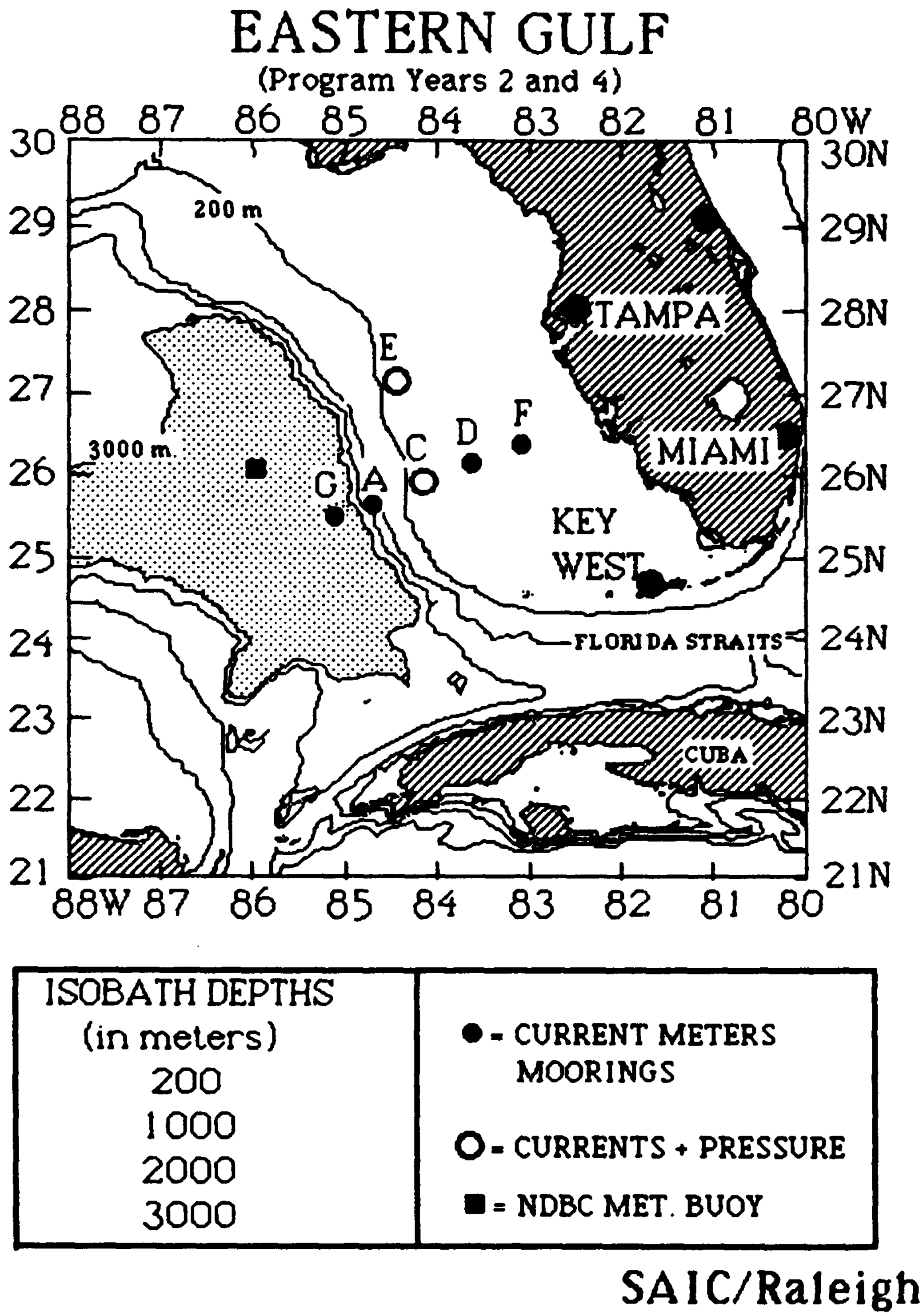

Figure 2. Eastern Gulf mooring placement during Program Years 2 and 4. Recently a NSF/FSU mooring was placed at the shelf break about 100 (1.6°) miles north of Mooring E.

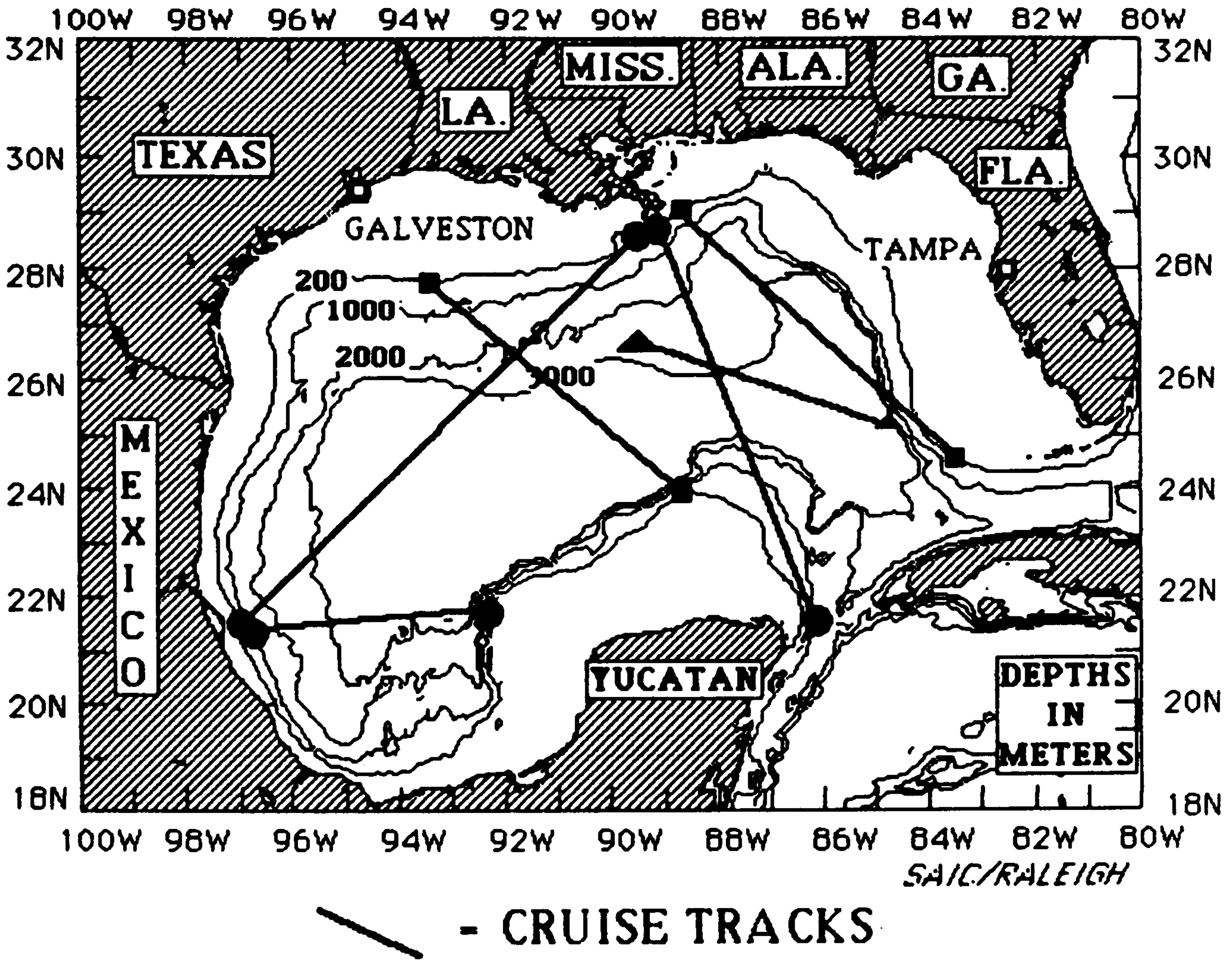

Figure 3. Various SOOP transects presently being made to support Physical Oceanography Program. The repeat period varies from 10 to 45 days.

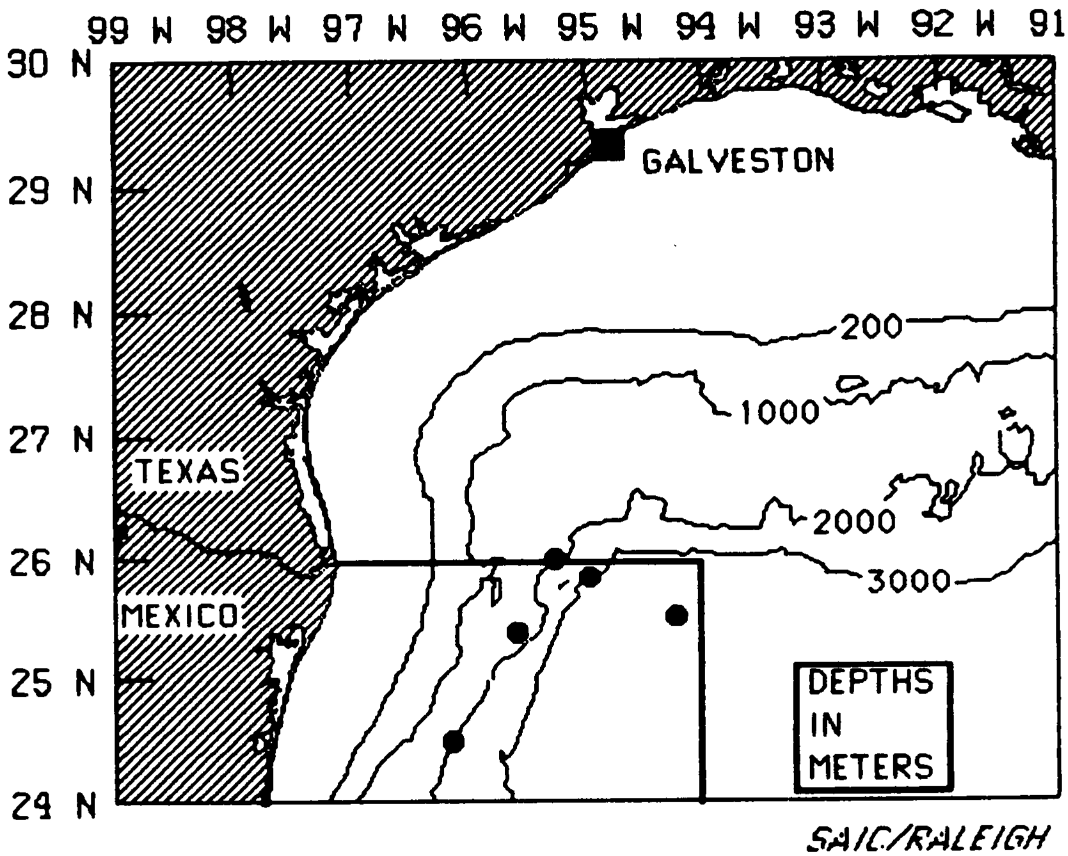

Figure 4. Approximate positions of Year 3 western Gulf moorings which support nineteen current/temperature sensors. Vertical placement emphasizes the upper 1000 m of the water column.

resulting from and associated with Loop Current eddies as they approach, interact with, and dissipate on the adjacent slope. For further documention, hydrographic surveys will be made in and through these important features as they move across the central and western Gulf. In addition, every effort will be made to place drifting buoys in break-off eddies so that important dynamical processes can be resolved. Such drifting buoys also provide essential information about eddy position during summer and early fall(late June through early October) when the sea-surface temperatures are uniform, and hence, satellite thermal imagery can not resolve eddy positons or geometry.

At present, indications are that a large Loop Current eddy has in the past several weeks seperated and has begun migrating westward. Using images of weak residual sea-surface temperature gradients, SOOP transects and other XBT data, the break-off has been documented and a drifting buoy released in the feature(See Figures 5 and 6). This buoy placement will provide valuable information for planning addtional cruises to study and better understand the evolution and decay of these features which are such an important source of energy and heat in the western Gulf. The timing of the break-off is fortuitous. It has been more than 14 months since the last eddy seperated. The recently deployed MMS funded western-Gulf moorings should be in an excellent position to record conditions prior to, during and following interaction of the ring with the western Gulf continential slope.

Not only has a buoy been placed in a ring, but one is also in the Loop Current just south of the break-off position. This drifter trajectory, shown in Figure 7, indicates that the buoy was originally placed in that region of the Loop Current that eventually seperated. However, between deployment and subsequent recirculated northern movement, the present ring seperated. The time-dependent character of the flow field is illustrated by the trajectory crossing itself at almost right angles.

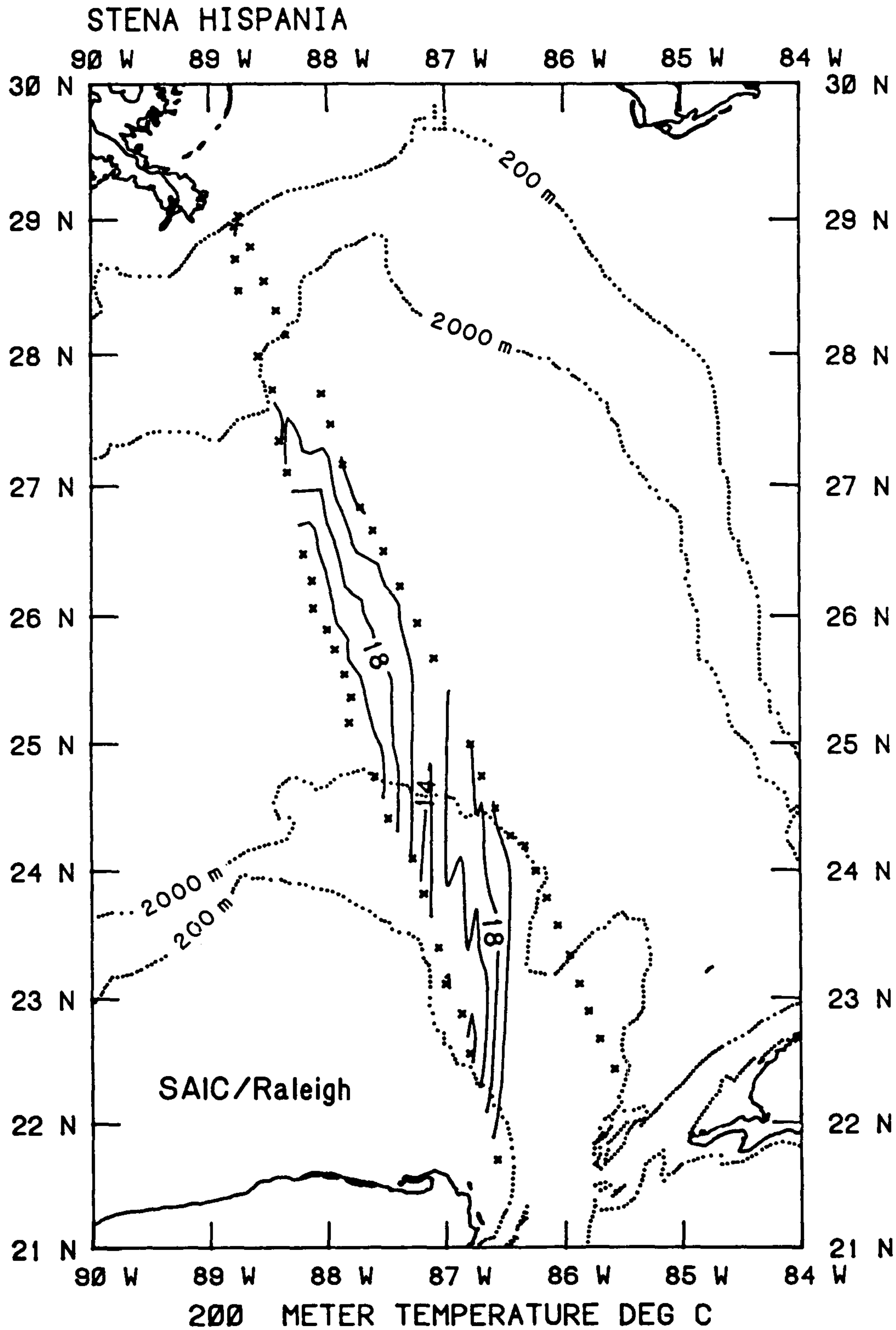

Figure 5. Horizontal contours of temperatures at 200 m. Data from CCT/SOOP vessel.

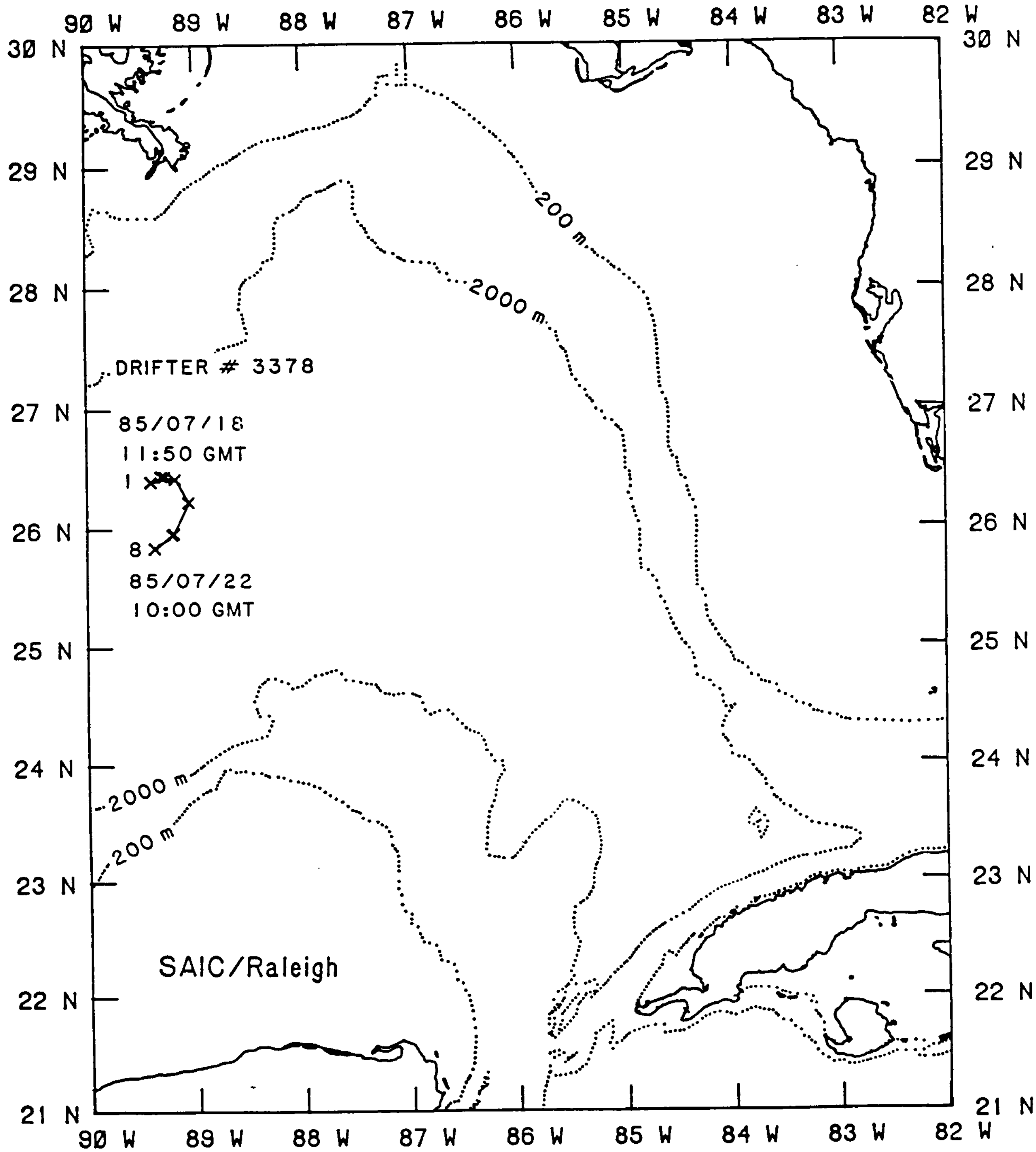

Figure 6. Initial trajectory of buoy placed in break-off eddy. Buoy deployed on July 18, 1985.

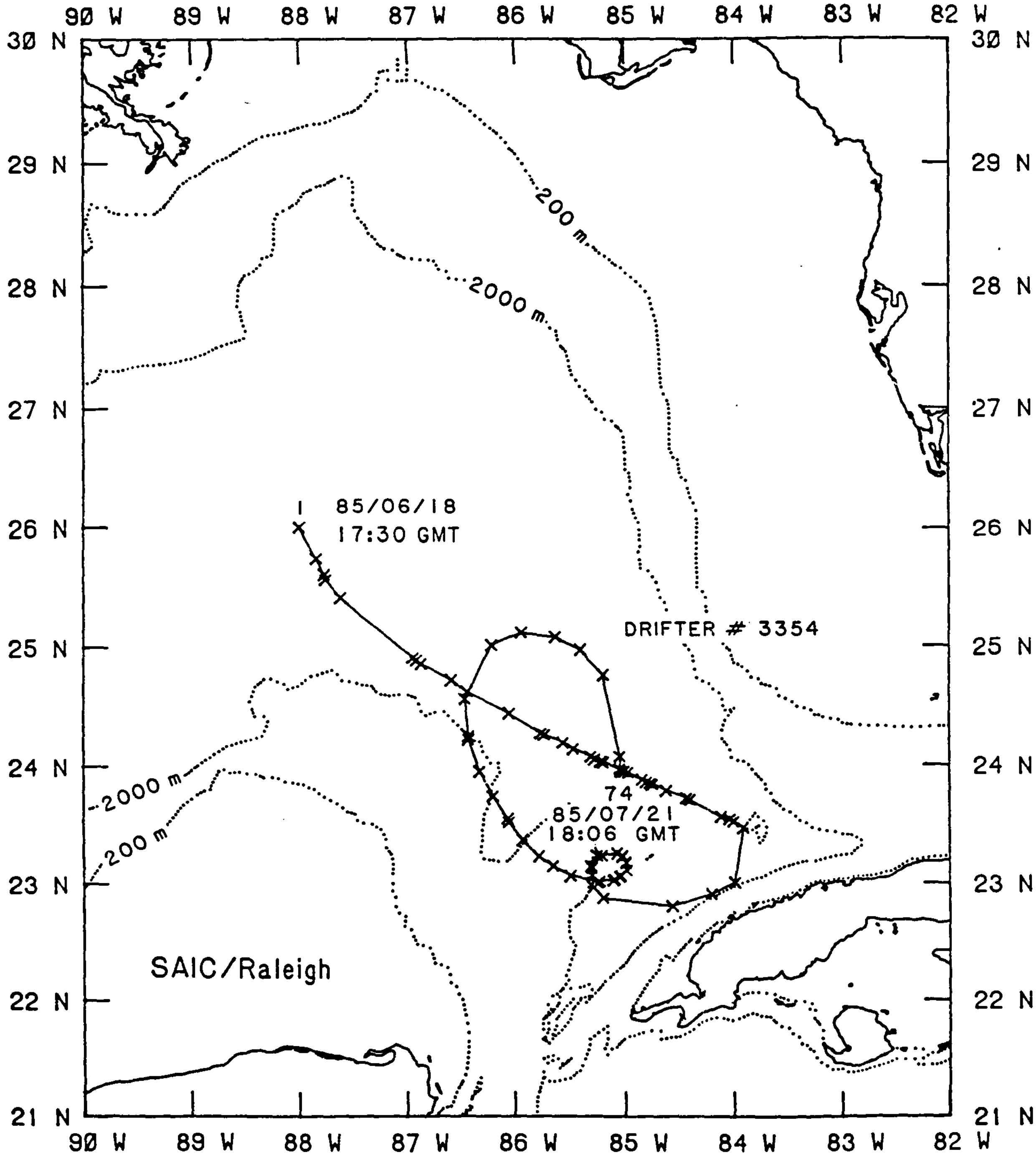

Figure 7. Trajectory of buoy placed in Loop Current just prior to eddy break-off.

ABSTRACT
FOR
COMPILATION OF THE GULF OF MEXICO METEOROLOGICAL DATA SET

MMS Ternary Meeting
July 24, 1985
Metairie, LA.

Submitted to: Environmental Studies Group
Gulf Regional Office
Minerals Management Service
Metairie, LA.

Submitted by: Jerry W. Ford
Florida A & M University
Tallahassee, FL 32307

ABSTRACT

The 19 month Gulf of Mexico meteorological study is divided into three phases:

. Collection

. Formatting

. Analysis/Summary

Having collected the digitized meteorological data available for the Gulf, the formatting phase is now underway and will continue through October of this year.

As part of the formatting phase of this project, FAMU now has the two data sets are now residing on the Harris computer´s 300MB disk pack. The first set of data is from the National Climactic Data Center (NCDC) in the TD-1129 format. This data set contains over 600,000 150-character records for MARSDEN SQUARES 80 and 81.

The second set of data was received from the National Oceanographic Data Center (NODC) in the NODC 191 format. This data set contains readings from 24 buoys. Original buoy locations along with the volume of data from each buoy is provides. There are over 800,000 120-character records in this data set. The NODC data set has been sorted by buoy, date, time and record type.

Programs are now being written to identify breaks in service for the 24 buoys in the NODC data. These programs will also identify changes in the location of the buoys. The information from these programs will be used to create an index of available data for the NODC data set. The index will be available in raw

form or formatted into DBASE II, DBASE III or RBASE 4000.

The TD-1129 format for the NODC data is attached while the 191 format for the NODC data is available in the NODC User´s Guide.

An additional source of meteorological data are the Ocean Data Gathering Program (ODGP) and the Ocean Current Measuring Program (OCMP) FM analog tapes. FAMU has proposed to subcontract EVANS-HAMILTON to digitize the meteorological data from these two studies and to include this additional data in the final summary. There are approximately three hundred seventy (370) analog tapes of which over half are ODGP tapes.

Inclusion of this additional body of data promises to allow FAMU to produce a much more complete pictures of the Gulf of Mexico meteorological environment.

NODC BUOY DATA SET
GULF OF MEXICO

NUMBER	FIRST DATE	LAST DATE	RECORDS	ORIGINAL LOCATION LAT	LONG
EB02	73/03/21	73/09/29	1,660	27.5N	88.0W
EB04	75/08/13	77/12/29	20,288	26.0N	90.0W
EB10	73/01/01	76/01/20	9,667	27.5N	88.0W
EB12	73/06/22	75/03/07	7,741	26.0N	94.0W
EB31	73/03/08	73/05/22	415	27.0N	86.0W
EB32	73/01/28	75/01/08	971	27.5N	88.1W
EB36	73/03/09	73/04/16	89	26.1N	84.6W
EB44	76/11/20	77/12/31	9,212	26.0N	86.0W
EB52	73/02/28	73/04/25	340	26.0N	83.8W
EB53	73/03/07	73/03/31	92	29.8N	88.3W
EB61	73/02/21	77/05/08	3,232	26.9N	84.6W
EB62	74/11/08	75/01/06	365	29.0N	85.6W
EB71	76/09/19	77/12/09	21,567	29.0N	85.4W
42001	78/04/01	83/12/31	187,445	26.0N	90.0W
42002	78/01/21	83/12/31	202,376	26.0N	93.5W
42003	78/01/01	83/12/31	182,881	26.0N	86.0W
42004	78/12/23	79/02/11	341	27.5N	85.5W
42005	78/12/13	80/05/13	8,764	30.0N	85.9W
42006	79/08/25	80/03/23	27,800	26.5N	96.0W
42008	80/10/01	83/12/31	36,362	28.7N	95.3W
42009	80/10/01	83/08/10	63,682	29.3N	87.5W
42010	81/04/01	82/03/29	7,878	29.7N	93.4W
42011	81/09/16	83/12/31	23,252	29.6N	93.5W
42012	83/08/10	83/12/31	8,472	29.9N	87.1W

TD 1129 Format

(for 70's Decade and Data Processed Beginning in 1982)

Tape Field Number	Tape Position	Element
001	01-03	Source Deck Number
002	04-06	Marsden 10° Square
003	07-08	Marsden 1° Square
004	09	Quadrant (1-4)
005	10-12	Latitude (Degrees N, S)
006	13-16	Longitude (Degrees E, W)
007	17-20	Year - GMT
008	21-22	Month - GMT
009	23-24	Day - GMT
010	25-26	Hour - GMT
011	27	Wind Direction Indicator
011	28-29	Wind Direction (Code)
012	30	Wind Speed Indicator
012	31-33	Wind Speed (Knots)
013	34	Visibility Indicator
013	35-36	Visibility (Code)
014	37-38	Present Weather (Code)
015	39	Past Weather (Code)
016	40-44	Sea Level Pressure (mb)
017	45	Temperature Indicator
017	46-49	Dry-Bulb Temp (°C)
018	50-53	Wet-Bulb Temp (°C)
019	54-57	Dew Point Temp (°C)
020	58-61	Sea Surface Temp (°C)
021	62	Total Cloud Amount (Oktas)
021	63	Low or Middle Cloud Amount
021	64	Type of Low Cloud
021	65	Cloud Height Indicator
021	66	Lowest Cloud Height
021	67	Type of Middle Cloud
021	68	Type of High Cloud
022	69-70	Director of Waves (Code)
023	71	Period of Waves (Code)
024	72-73	Height of Waves (1/2 Meters)
025	74-75	Direction of Swell (Code)
026	76	Period of Swell (Code)
027	77-78	Height of Swell (1/2 Meters)
028	79-80	Country Code
029	81	Ship Direction (Code)
030	82	Ship Speed (Code)
031	83	Barometric Tendency (Code)
032	84-86	Amount of Pressure Change (mb)
033	87	Type of Ice Accretion of Ship (Code)
034	88-89	Thickness of Ice on Ship (cm)
035	90	Rate of Ice Accretion (Code)
036	91-97	Ship, OSV, or Buoy Call Sign

037	98	Original Wind Speed Units Indicator
038	99	Original Temperature Units Indicator
039	100	Sea Temp. Measurement Method Indicator
040	101-102	Wind Wave Period (Seconds)
041	103-104	Swell Wave Period (Seconds)
042	105	Concentration of Ice (New Code 1982)
		Description of Ice Type (Code)
		Stage of Ice Development (New Code 1982)
042	106	Effect of Ice on Navigation (Code)
042	107	Bearing of Principal Ice Edge (Code)
		Ice of Land Origin (New Code 1982)
042	108	Distance to Ice Edge from Ship (Code)
		Situation and Trend (New Code 1982)
042	109	Orientation of Ice Edge (Code)
043	110-111	Amount of Precipitation (Code)
043	112-113	Time Period for Precip. Amount (Code)
044	114	Significant Cloud Amount (Code)
045	115	Significant Cloud Type (Code)
046	116-117	Significant Cloud Height (Code)
047	118	Second Past Weather (Code)
048	119-120	Second Swell Direction (Code)
049	121-122	Second Swell Period (Seconds)
050	123-124	Second Swell Height (1/2 Meters)
051	125	Ship Position - Flag
052	126	Wind - Flag
052	127	Visibility - Flag
052	128	Present Weather - Flag
052	129	Past Weather - Flag
052	130	Pressure - Flag
052	131	Dry-Bulb - Flag
052	132	Wet-Bulb - Flag
052	133	Dew Point - Flag
052	134	Sea Temp. - Flag
052	135	Clouds - Flag
052	136	Waves - Flag
052	137	Swells - Flag
052	138	Pressure Change - Flag
053	139-140	Quality Code
054	141-142	QC - Year
054	143-143	QC - Month
055	145-148	Blank

FLORIDA A&M UNIVERSITY
RESOURCE LIST FOR MMS METEO PROJECT

RFP NO.	3191	DURATION: 19 MONTHS
CONTRACT NO.	14-12-0001-30191	OCT 1, 84 - APR 1, 86

DATA FORMAT: 1600 BPI/9 TRACK/ASCII/UNLABELED/BLOCKED/
SPECIFY BLOCKING FACTOR

HARRIS 800: SUPER MINI COMPUTER (1328 MB ON LINE DISK STORAGE)
1.5 MB PRIMARY MEMORY WITH VERTUAL MEMORY MANAGEMENT
3 FIXED HARD DISK:
  A. 1-80 MB HARD DISK
  B. 2-474 MB HARD DISK
1 REMOVEABLE PACK HARD DISK DRIVE
  A. 300 MB HARD DISK

NAME/ADDRESS	RESOURSE FOR
Mrs. Francis Sullivan U.S. Department of the Interior Minerals Management Service Procurement Operations Branch B Mail Stop 635 12203 Sunrise Valley Drive Reston, Virginia 22091 (703) 435-6415	MMS Contracting Officer
Dr. Murray Brown U.S. Department of the Interior Minerals Management Service Gulf of Mexico OCS Region 3301 N. Causeway Boulevard Metairie, Louisiana 70010 (504) 838-0901	MMS Project Officer Approves Spending
Dr. Evans Waddell Science Applications, Inc. 4900 Water´s Edge Drive Suite 255 Raleigh, N.C. 27606 (919) 851-8356	Subcontracted to FAMU
Mr. Harold Kilpatric Department of Meteorology Love Building Florida State University Tallahassee, FL 30308 (904) 644-6205	General Meteo. Information
Dr. Jordan FSU Meteorology Library (904) 644-3222	Reference Books

RESOURCE LIST FOR MMS METEO PROJECT

NAME/ADDRESS	RESOURSE FOR
Dr. Shu National Meteorological Center Louisiana State University (504) 388-2395/2396	Oil Co. Wind Data
Dr. Dana Thompson NORDA (Code 324) NSTL, Mississippi 39529	Gulf Buoy Data
Mr. Ben Davis National Climactic Data Center Federal Building Asheville, N.C. 28801-2696 (704) 259-0682	General Wx Data MARSDEN SQUARE Data
Mr. Bob Lobel Acting Chief Branch of Environmental Modeling MMS 644 12201 Sunrise Valley Drive Reston, VA 22091 (703) 860-6730	Reference Literature
Pennsylvania State University Department of Meteorology University Park, PA 16802	Reference Material
Mr. Mike McDermit U.S. Naval Postgraduate School Department of Meteorology Monterey, CA 93940 (408) 646-2516	Reference Material Possible Data Set
Ms. Pat Kirk National Oceanographic Data Center NOAA/NESDIS E/OC21 2001 Wisconsin Avenue, NW Washington, DC 20235 (202) 634-7500	NODC Data Base
Mr. Bob Stein NODC/D 742 2001 Wisconsin Avenue, NW Washington, D.C. 20235 (202) 634-7505	Oil Company Data (CONOCO)
Mr. Al Bargeski NODC (202) 634-7500	Gulf Oil Rig Data

RESOURCE LIST FOR MMS METEO PROJECT

NAME/ADDRESS	RESOURSE FOR
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John W. Wolfe, Jr., PE Director-Enviornmental Affairs North American Production CONOCO INC. 600 N. Dairy Ashford Rd. P.O. Box 2197 Houston, TX 77252 (713) 293-2646	At Ternary meeting, N.O. (Source for next 2)
David Peters CONOCO	Meteorologist
John Burgbacher SHELL, N.O.	Meteorologist
Ken Schaudt Oceanographer Marathon Oil Co. P.O. Box 3128 Houston, TX 77253 (713) 629-6600	Meteorologist (Source for following 6 names)
John Heideman EXXON Production Research (713) 940-3711	Chief Meteorologist
Thomas Mitchell ARCO Oil Co. Dallas, TX	Chief Meteorologist
Gene Berek AMICO Oil Co. (918) 660-3000	Chief Meteorologist
Tony Fallon CHEVRON Oil Co. (213) 694-7787	Chief Meteorologist
Mike Spalane GULF Oil Co. (713) 754-0321	Chief Meteorologist
George Forestall SHELL Oil Co. (713) 663-2404	Chief Meteorologist

RESOURCE LIST FOR MMS METEO PROJECT

NAME/ADDRESS	RESOURSE FOR
Bob Hamilton Evans/Hamilton Houston, TX (713) 495-0883	Digitize ODGP & OCMP FM analog tapes
Bob Quayle Bob Brines NCDC	Marine WX

GULF OF MEXICO CIRCULATION MODELING STUDY

ALAN J. WALLCRAFT

JAYCOR

SUMMER TERNARY STUDIES MEETING

July 1985

INTRODUCTION

The Gulf of Mexico Circulation Modeling Study was started by MMS in October 1983 as an "extremely modest effort building on existing/ongoing modeling efforts in the Gulf of Mexico". The initial requirement was for an existing circulation model with capabilities approaching those required and the ability to deliver an "early simulation run". At the end of the four year program the requirement was for a circulation model of the entire Gulf with horizontal resolution approaching 10km, and vertical resolution (initially less important) approaching:

mixed layer:	1 - 10 m
thermocline:	10 m
deep layer:	100 m

with realistic bottom topography, coastline, and wind forcing, which must exhibit loop-current eddy shedding, and other known regional circulation features.

THE EXISTING NORDA/JAYCOR MODEL (OCTOBER 1983)

This is a two layer, non-linear, hydrodynamic, free surface, semi- implicit, primitive equation ocean circulation model on a beta plane, with realistic coastline, and full scale bottom topography confined to the lower layer. Horizontal grid resolution is 0.2 degrees (20 by 22 km), with a upper layer rest depth of 200 m. The model is driven by inflow through the Yucatan Strait compensated by outflow through the Florida Strait, and/or by winds.

PROBLEMS WITH THE EXISTING MODEL

1) Only 0.2 degree horizontal grid resolution - need 0.1 degree.
2) Model is hydrodynamic - thermohaline circulation particularly important during fall and winter, and over shelf areas.
3) Crude representation of the vertical density profile - need mixed-layer physics.
4) Model has full scale bottom topography (which is essential for a good simulation), but the layer interface(s) must not intersect the bottom. Shallowest topography in model is at 500m.

MODEL DEVELOPMENT PLAN

YEAR 1

Use existing 2-layer 0.2 degree Gulf of Mexico model. Find "best" representation of coastline and bottom topography.

Initially use seasonal wind forcing and constant inflow, later simulations will use winds based on 12 hourly FNOC surface pressure analysis and time varying inflow.

Products:

Early delivery of a Gulf simulation without wind forcing. Wind data set based on FNOC's 12 hourly global surface pressure analysis (1966 - 1982), processing funded by NORDA. Gulf simulation surface current data set selected as the "best" available simulation to date (October 1984), will be forced by "FNOC" winds. Not all model experiments will be delivered. Gulf data set will be every 3 days for many eddy cycles (ten years or more) to capture the full Gulf circulation variability.

YEAR 2

Use 2-layer model, but on a 0.1 degree grid, and with lower eddy viscosity. Expect richer flow field, including wind induced flow instabilities. Some experiments will use 1-layer (reduced gravity) model, but all delivered simulations will have 2-layers.

Products:

One or more Gulf simulation surface current data sets, selected as the "best" available simulation to date (not all model experiments will be delivered). Data sets will be every 3 days for many eddy cycles (ten years or more) to capture the full Gulf circulation variability.

YEAR 3

Develop 3-layer model with bulk thermodynamics. Densities in the upper two layers will be allowed to change locally with time, under control of the equation of state and temperature equation added to model. Initially 0.2 degree simulations, later 0.1 degree grid will be used.

Expect to see thermohaline circulation and improved representation of permanent thermocline. Three layers also better resolve "hydrodynamic" circulation, and thinner upper layer increases accuracy of surface velocities.

Products:

One or more Gulf simulation surface current data sets, selected as the "best" available simulation to date (not all model experiments will be delivered). Data sets will be every 3 days for many eddy cycles (ten years or more) to capture the full Gulf circulation variability. At least one data set will also include sub-surface currents.

YEAR 4

Complete 0.1 degree 3-layer simulations. Then couple circulation model results to a mixed layer model (TOPS). TOPS is the Navy's operational mixed layer forecast model. Simplest version of TOPS is one dimensional, with 15+ fixed vertical levels covering upper 500m. It can accept geostrophic currents from any suitable source, the 3-layer model is suitable but the 2-layer (hydrodynamic) is not. Can use coarser grid for TOPS (0.2 or 0.4 degrees), possibly with finer coverage of selected regions (TOPS is 1-dimensional). It is applied only after spin-up of the circulation model.

This final coupled model will give detailed vertical density profiles, and greatly improve the simulation accuracy in shelf regions.

Products:

One or more Gulf simulation surface and sub-surface current data sets, selected as the "best" available simulation to date (not all model experiments will be delivered). Data sets will be every 3 days for many eddy cycles (ten years or more) to capture the full Gulf circulation variability. At the end of the final year a fully documented FORTRAN code and user guide for the final model versions will be delivered. No earlier codes will be delivered, since they may not be in a suitable form for distribution.

PROGRESS

YEAR 1

All tasks in year one are complete and a final report has been accepted by MMS. The final surface currents delivered to MMS consisted of 10.3 years sampled every three days on a 0.2 degree grid from Experiment 68. This experiment was forced by both (time invarient) inflow through the Yucatan Straits and by winds from the Navy Corrected Geostrophic Wind data set. Representitive surface current plots are shown in Figs 1 to 3.

YEAR 2

The 0.1 degree Gulf of Mexico bottom topography field has been prepared from the SYNBAPS data set. The raw topography is shown in figure 4, as usual all depths shallower than 500m are set to 500m. The coastline shown does not necessarily follow the model boundary, which lies approximately on the original 10m depth contor. This topography must be smoothed before it can be used in the model, figure 5 shows the topography after two passes of a nine point real smoother. It will be the topography used for the initial two layer finite depth experiments, but model results may indicate modifications. A new 0.2 degree topography has also been prepared by sub-sampling the raw 0.1 degree field. This will simplify comparisons between model runs at the different resolutions, although the smoothed 0.2 degree topography will not be an exact subset of the smoothed 0.1 degree version.

Several experiments have been performed with one active layer reduced gravity models, which contain no topography since the "second" layer is, by definition, infinitely deep and at rest. Figure 6 is a snapshot of free surface deviation after 2160 model days for a 0.1 degree experiment with 18 Sv inflow and no wind forcing. As was expected the Loop Current eddy is larger than that from a corresponding two layer model with topography. and in the absence of topographic steering the eddy takes a more northerly path across the Gulf. These experiments are not considered "realistic", and were only performed to inexpensively check out the model set up.

The next stage is to repeat the successful two layer experiments with topography from the first year of the study on the new 0.2 degree and the 0.1 degree grids. Then similar experiments will be performed on the 0.1 degree grid only, using a higher eddy viscosity than is possible on the 0.2 degree grid.

INSTITUTE FOR NAVAL OCEANOGRAPHY

The Navy has recently announced the creation of an "Institute for Naval Oceanography" at NSTL, Bay St. Louis, MS. Its primary goal a global ocean forecasting capability by 1985 that is sufficiently accurate to support world-wide battle fleet operations (i.e. ASW, etc.). However it will also support long term basic satellite and modeling research, and will to have very close ties with university researchers. Expected to become a center for excellence in the use of satellites for oceanic studies and in numerical ocean modeling.

The institute will be created as a independent organization but will have close ties to NORDA, which is resposible for the production of oceanic prediction products for the fleet. It will have access to NORDA's real time satellite recieving and processing system, for example. Many NORDA scientists will hold joint appointments at the institute. In order to achieve its goal the Navy has plans to purchase and install (in mid-1988) at NSTL a Class VII supercomputer. This will be dedicated to Navy environmental R&D (ocean, atmosphere, ice). A large fraction of this machines workload will come from the institute.

The major ocean prediction product will be a 0.125 degree, three layer, finite depth, free surface, primitive equation, thermodynamic, layered ocean circulation model of the entire world ocean, coupled to TOPS (the navy's existing mixed layer model). The reason for modeling the entire world is that this removes the major problems associated with open boundaries in smaller ocean regions. However it does require massive ammounts of computer power, and it is expected that this single project will account for 30% of the total supercomputer workload. The model used will be essentially identical to that to be used by JAYCOR in the final year of the Gulf of Mexico project, except for a slight difference in resolution (0.1 vs 0.125 degrees) and a change in coordinates (beta plane vs the surface of a shpere).

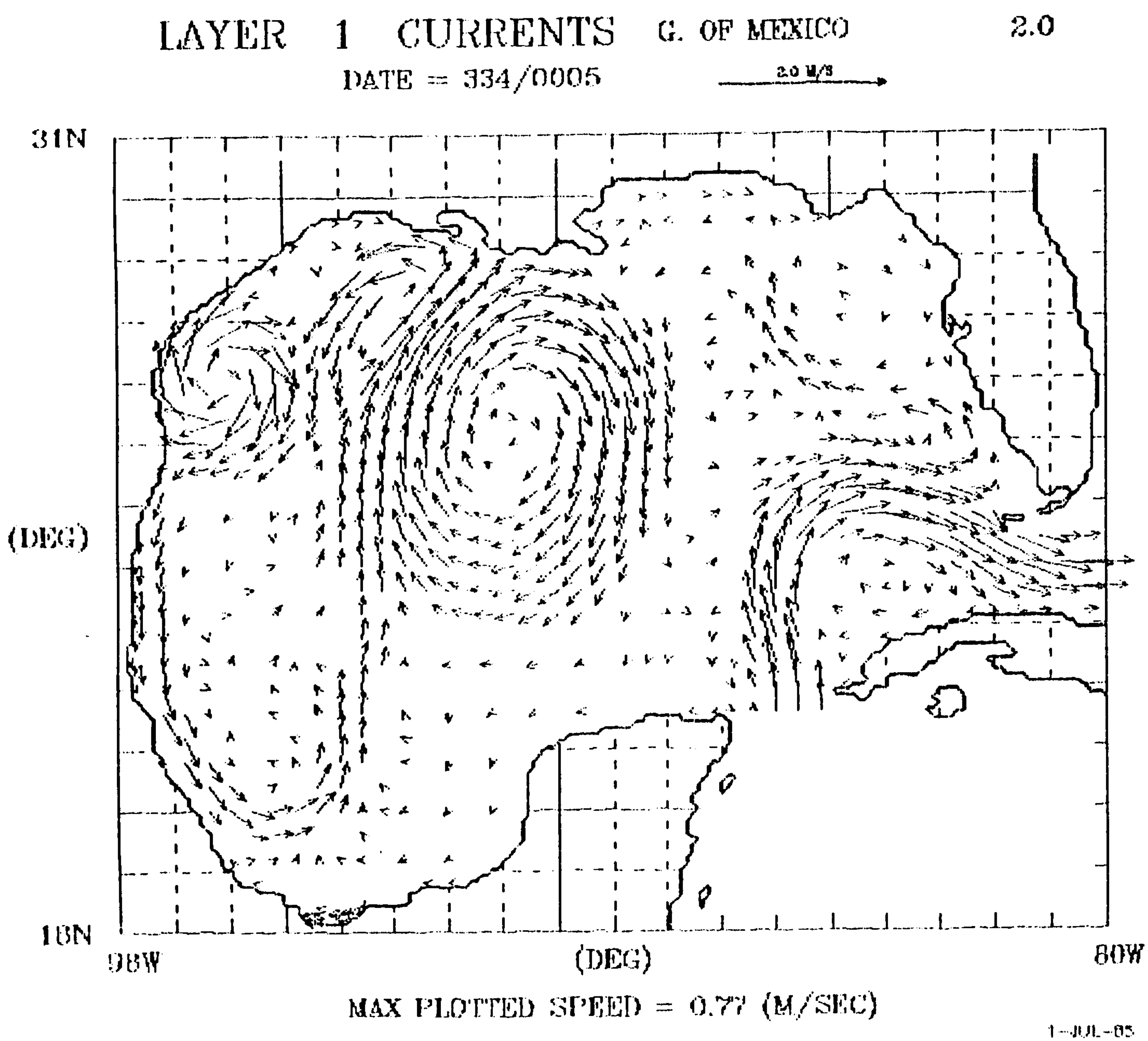
In the 1989 to 1991 time frame long term SIMULATIONS of world ocean circulation will become available from the institute. In the Gulf they are likely to be slightly more realistic than previous (JAYCOR) simulations, because the flow through the Yucatan Straits will be accurately modeled (the JAYCOR model must prescribe inflow values at this open boundary). These simulations are probably even more useful to MMS in the Atlantic and Pacific oceans, where present generation models have far more severe problems with open boundaries. Simulation accuracy should improve throughout the 1990's as high resolution satellite data becomes available for verification (and for incorporation into atmospheric forcing functions).

Possibly as early as 1991 the Navy will be using the 0.125 degree model in nowcasting and prediction mode, using NROSS satellite data. This product will be capable of providing real time trajectory predictions of actual oil spills as they occur.

Figures 1, 2 and 3: Representitive surface current plots from experiment 68 which was forced by both winds and flow through the Yucatan Straits. The model was two layer, with bottom topography, on an 0.2 degree grid.

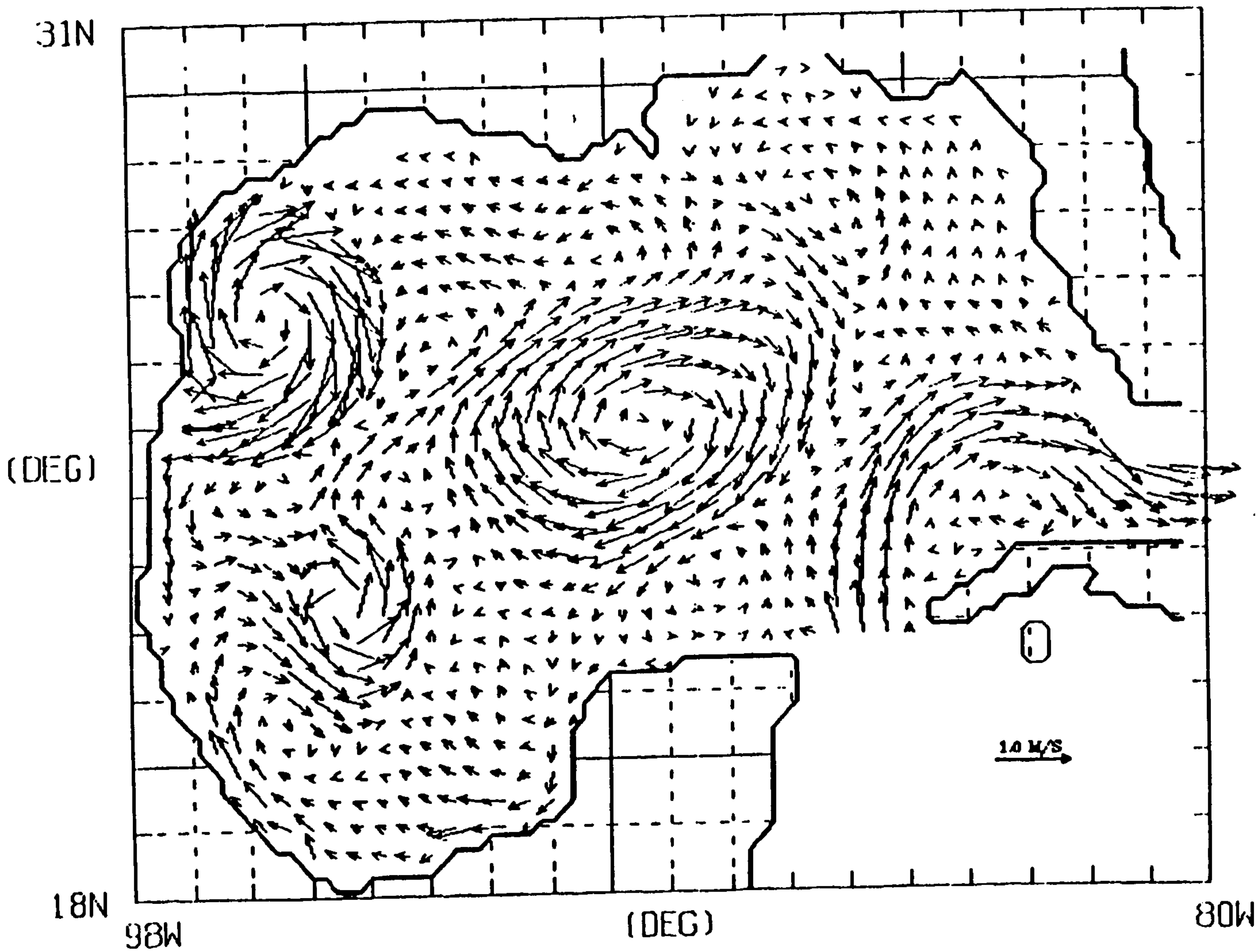
Figures 4 and 5: Gulf of Mexico bottom topography on a 0.1 degree grid, figure 5 is after two passes of a nine point real smoother.

Figure 6: Surface currents every 0.4 degrees from an 0.1 degree one active layer reduced gravity model of the Gulf forced by 18 Sv transport through the Yucatan Straits (no winds).

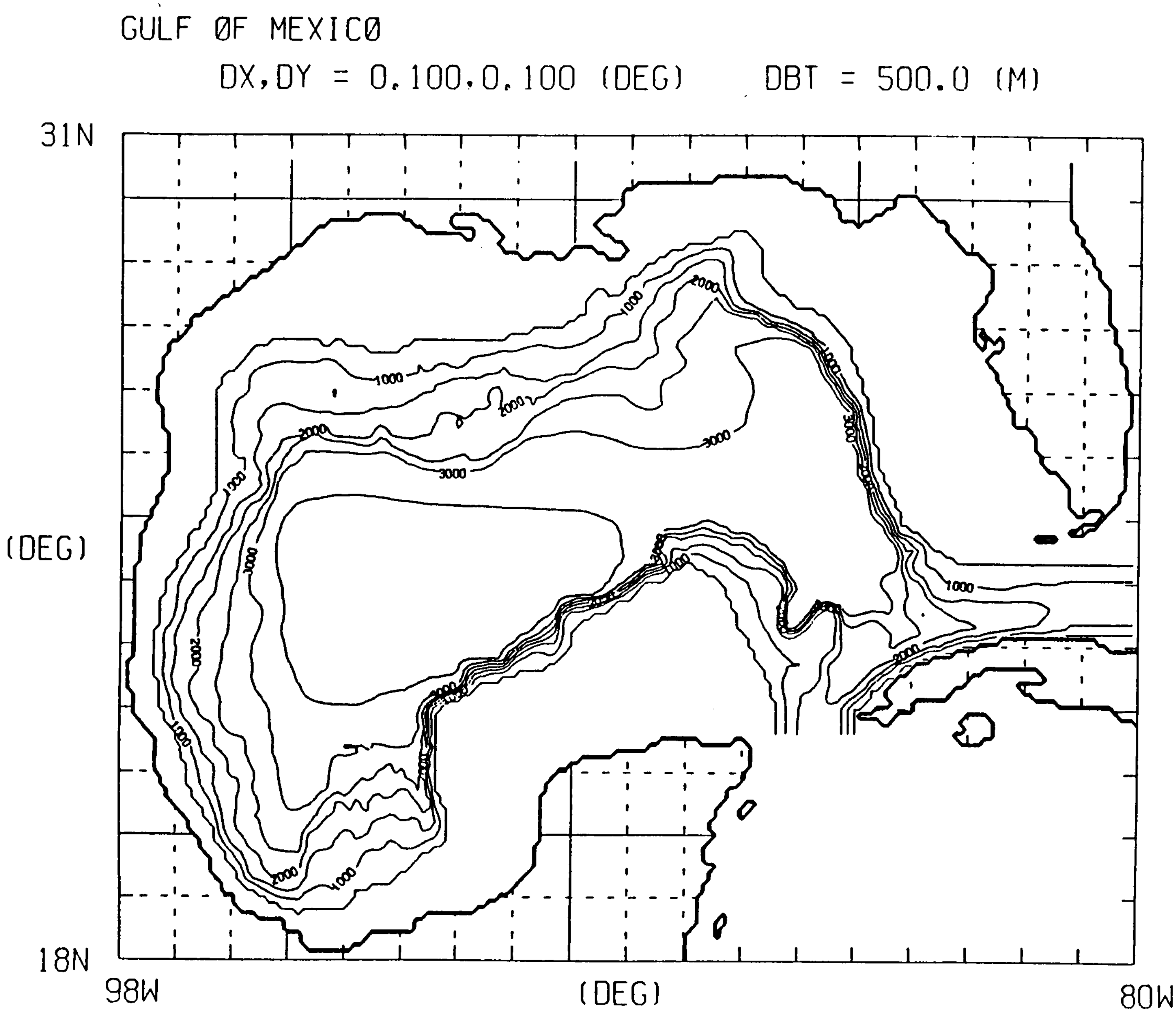

LAYER 1 CURRENTS G. OF MEXICO 2.0
DATE = 334/0005
2.0 M/S
31N
18N
(DEG)
98W
(DEG)
80W
MAX PLOTTED SPEED = 0.77 (M/SEC)
1-JUL-85

GEØSTR. CURRENTS G. ØF MEXICØ O. 68

MØDEL DAY = 3978 WIND DAY = 1967/359

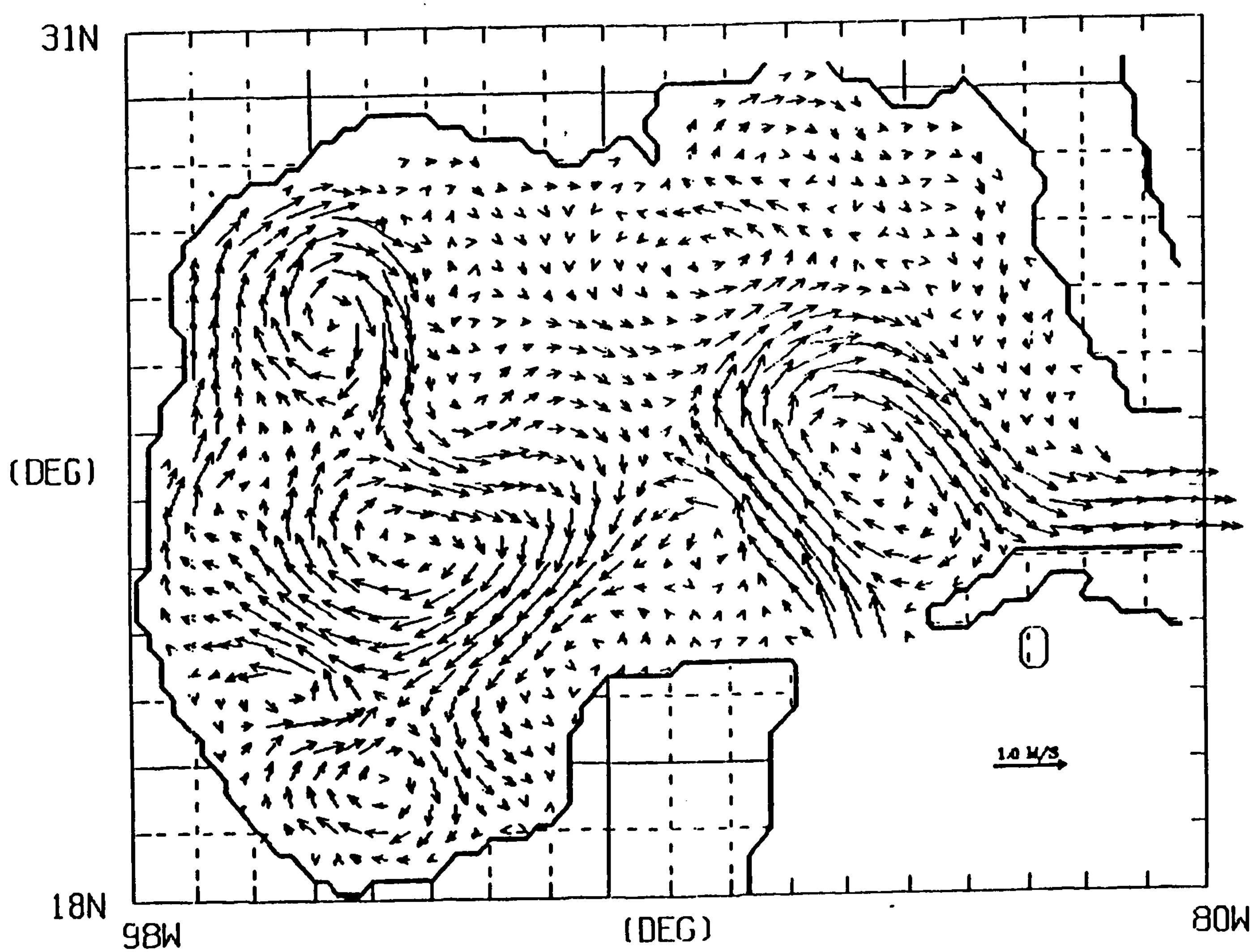


MAX PLØTED VECTØR = 1.39 (M/SEC)

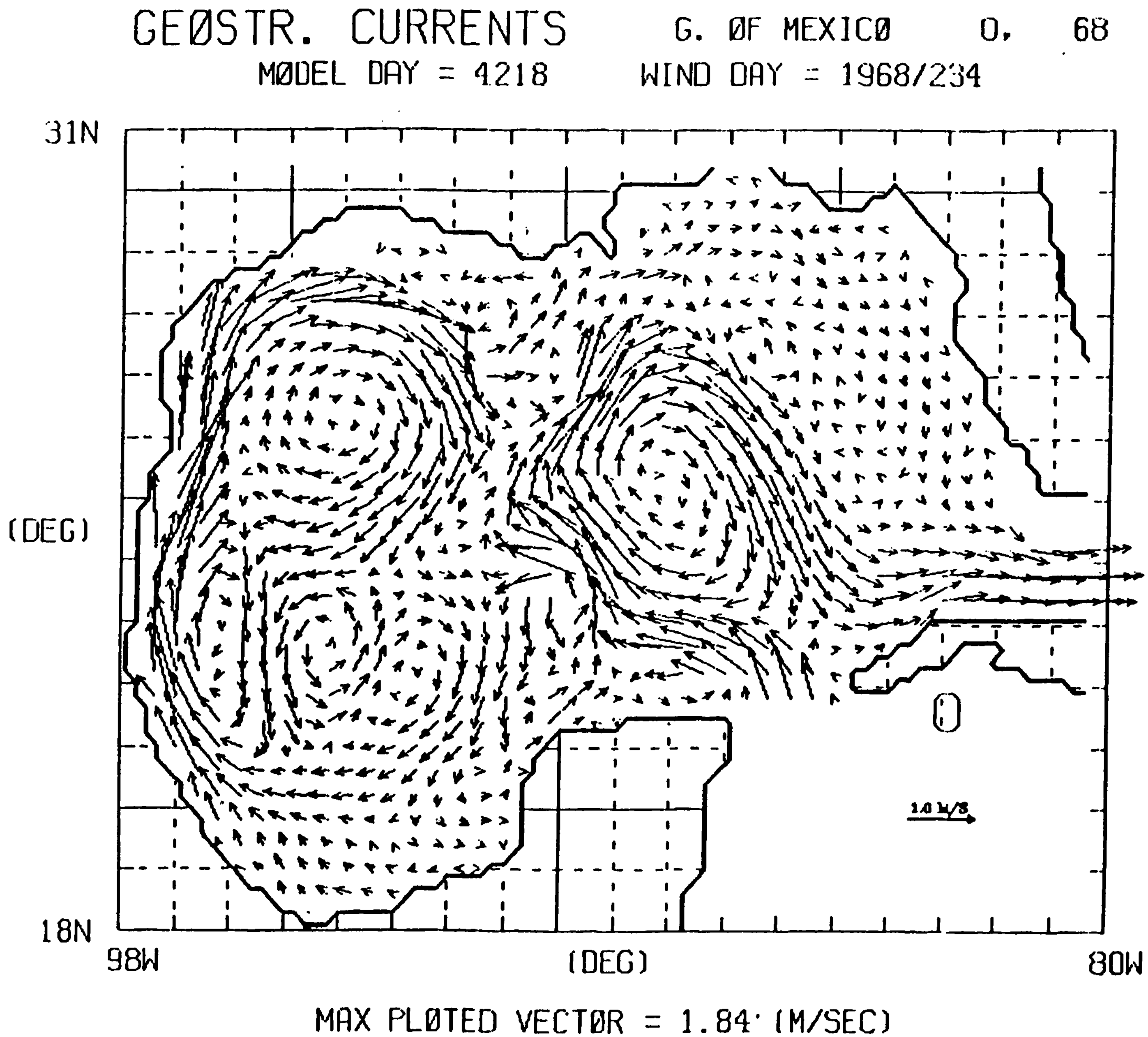

GULF ØF MEXICØ
DX,DY = 0.100,0.100 (DEG)   DBT = 500.0 (M)
31N
(DEG)
18N
98W
(DEG)
80W
1000
2000
3000

GEØSTR. CURRENTS G. ØF MEXICØ 0, 68

MØDEL DAY = 4128 WIND DAY = 1968/144

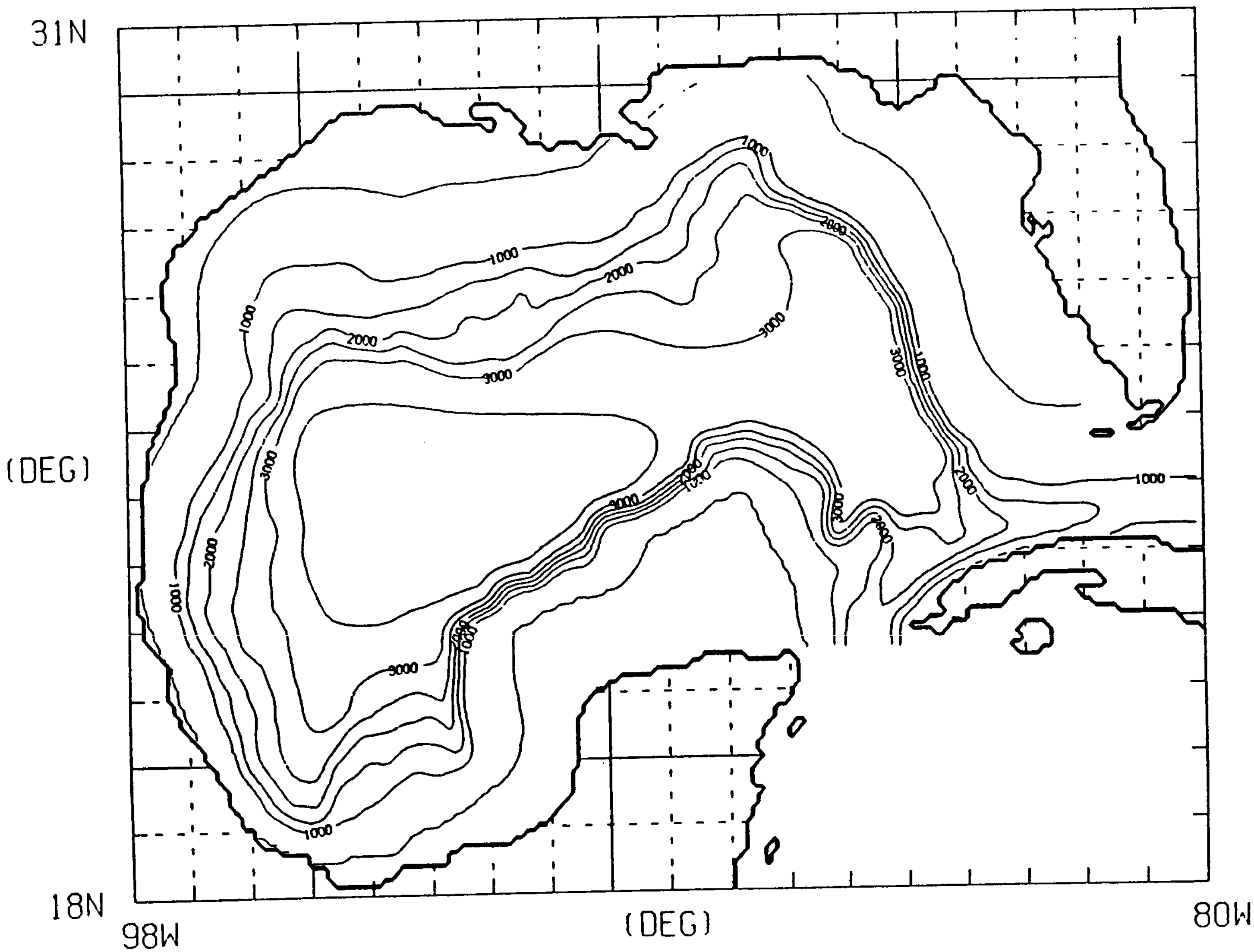


MAX PLØTED VECTØR = 1.00 (M/SEC)


GEØSTR. CURRENTS
G. ØF MEXICØ
O, 68
MØDEL DAY = 4218
WIND DAY = 1968/234
31N
(DEG)
18N
98W
(DEG)
80W
1.0 M/S
MAX PLØTED VECTØR = 1.84 (M/SEC)

GULF ØF MEXICØ (201C, SMØØTH=2).

DX,DY = 0.100,0.100 (DEG)   DBT = 500.0 (M)



PRELIMINARY RESULTS FOR AN

ANALYSIS OF INDICATORS FOR SOCIOECONOMIC IMPACTS DUE TO OIL AND GAS DEVELOPMENT IN THE GULF OF MEXICO

PREPARED FOR
THE MINERALS MANAGEMENT SERVICE
GULF OF MEXICO REGION

PREPARED UNDER CONTRACT NO.14-12-0001-30178

JULY 26, 1985

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PURPOSE OF PRELIMINARY RESULTS

The following preliminary results were developed for presentation at the mid-July MMS Ternary Meeting and for briefing the Offshore Operator's Socioeconomic Subcommittee Membership. The results presented in this document are preliminary and represent the study findings after completing approximately half of the data analysis which is scheduled to be undertaken. These preliminary study results and the format of this document are designed primarily to communicate to MMS and the Offshore Operators Committee (OOC) the types of information which will be available in the Project Report and those areas of analysis which are currently being pursued. The study methodology has been previously presented and discussed at both MMS and OOC meetings and is not a major focus of this document. Separate documents on the data collection procedures and analytical methodology have been produced and are available.

At the regional level the following results are expected to vary only slightly. Within categories however, significant reallocations of employment, wages/salaries and expenditures are anticipated. For example direct offshore producer employment has only been scaled using a Gulf-wide ratio to account for the sampling procedures employed. More precise scaling procedures are currently being implemented which will take into account the percent of the universe captured for 60 offshore lease areas. These procedures will not significantly alter estimates of total producer employment but can be expected to affect the results at the county/parish and staging area level.

The draft study results are scheduled for delivery to MMS in October of 1985 and a final, publicly available report will be available by December 31, 1985.

This document follows the following format: (1) Study Objectives, (2) Primary Data Sources, (3) Methodology, (4) Direct Producer Impacts, (5) Producer Expenditure Impacts, (6) Physical Activity Models, (7) Highlights of Findings and (8) Future Areas Of Investigation.

STUDY OBJECTIVES

The study was designed by MMS, the OOC and Centaur Associates to document the direct economic impacts of Gulf of Mexico offshore oil and gas activity in 1984 and estimate impacts per unit of activity, for use in Environmental Impact Assessment process. The study objectives are to:

- Measure the direct economic impact of offshore oil and gas exploration, development and production in 1984. Measures of economic activity used are:
  - employment
  - income (wages, salaries and bonuses)
  - non-wage capital and operating expenditures
- Measure the immediate economic impact of contract, service and other purchases made by offshore oil and gas exploration and production companies. These measures of activity are consistent with those being developed for producers and are employment, income, and expenditures.

- Determine the geographic distribution of the direct producer impacts of offshore oil and gas activity. Geographic levels of analysis are: county/parish, staging location and offshore lease area (i.e., Main Pass, Main Pass-State Waters, Main Pass-East Addition).

- Develop a framework and set of procedures for determining the direct economic impacts per unit of activity for future offshore development activities.

PRIMARY DATA SOURCES

The primary data collected under this contract were supplied by an the members of the Socioeconomic Subcommittee of the OOC. The firms whoses cooperation facilitated this socioeconomic assessment were:

- AMOCO
- CHEVRON
- CONOCO
- EXXON
- GULF
- MOBIL
- ODECO
- SHELL
- TEXACO

These firms each provided invaluable guidance in the development of a viable methodology and subsequently supplied extensive amounts of data at a significant cost to their respective firms. Without their guidance and assistance this project could not have been undertaken.

These nine companies represented over 50 percent of total offshore energy production in the Gulf of Mexico. Exhibit 1 summarizes the percent of oil, gas (including casing head gas), total energy produced and wells drilled in 1984 and wells operated by the nine major offshore producers contributing to the project. These data were based on 1984 data for each offshore well in Louisiana State, Texas State and Federal Waters. These data have been developed for each of approximately 60 offshore areas and are being used to scale the study results to account for the sampling procedure.

Four types of data were assembled as part of this effort. They were:

- Producer employment records for 1984. Approximately 12,500 employment records were obtained from the offshore producers in our sample. The data elements contained in each employee record were: 1984 wages/salary, job description or classification, residence zip code, work site (on shore or offshore), staging area (if applicable) and work schedule.

- Producer expenditure records for 1984. Detailed expenditure records were provided by each of the offshore producers in our sample. this data consisted of all expenditures for goods and services by activity type (i.e., air transport, geophysical exploration, platform fabrication etc.).

- Activity expense records for specific projects or activities undertaken in 1984. The activities for which budget data was obtained were: geophysical exploration, exploratory drilling, platform fabrication and installation, development drilling, pipeline installation and production/operations/maintenance. Physical characteristics of these

EXHIBIT 1

PERCENT OF OFFSHORE ACTIVITY IN 1984
ASSOCIATED WITH OOC PARTICIPANT COMPANIES

MEASURE OF ACTIVITY	STATE WATERS		FEDERAL OCS		TOTAL	
	OOC SAMPLE	OTHER	OOC SAMPLE	OTHER	OOC SAMPLE	OTHER
OIL PRODUCTION (VOLUME)	39.02%	60.98%	63.88%	36.12%	61.32%	38.68%
GAS+CASING GAS PRODUCTION (VOLUME)	47.71%	52.29%	44.14%	55.86%	44.34%	55.66%
NUMBER OF PRODUCING WELLS OPERATED	59.41%	40.59%	57.21%	42.79%	57.59%	42.41%
WELLS DRILLED (EXPLOR AND PROD)	-	-	40.00%	60.00%	-	-
FEET DRILLED (EXPLOR AND PROD)	-	-	47.00%	53.00%	-	-
ENERGY EQUIVALENT (VOLUME)	44.03%	55.97%	50.80%	49.20%	50.33%	49.67%

activities were also provided so that expenditures could be calibrated to the physical measures used in the Environmental Impact Statement process.

o Economic Impact ratios for the offshore contract and support industries. Economic data was supplied by 50 firms supporting the offshore producers. This data was supplemented by data from secondary sources (i.e., Census and Duns data). Impact ratios derived include payroll to revenues, employment to revenues, average wages and salary, location of employees (offshore/on shore) and expenditures to revenues.

METHODOLOGY

Producer employment and wages at the county/parish level have been generated directly from the data base of producer personnel records. In these preliminary results records were scaled by the percent of 1984 offshore energy production associated with the OOC study participants. Subsequent analysis will scaling results at the lease area level.

Primary employment and economic activity resulting from the purchases of goods and services are derived by applying key business ratios for each of 18 major service industries to total expenditures by producers within that industry.

Expenditure data was used to generate simple models relating key physical measures to anticipated expenditures. These expenditures can then be converted to economic impacts using the relationships established in the prior two stages.

Exhibit 2 is a schematic representation of the data manipulations and overall methodology.

DIRECT PRODUCER IMPACTS

All data contained in this section are based on an analysis of the personnel records of the major offshore producers on December 31, 1984.

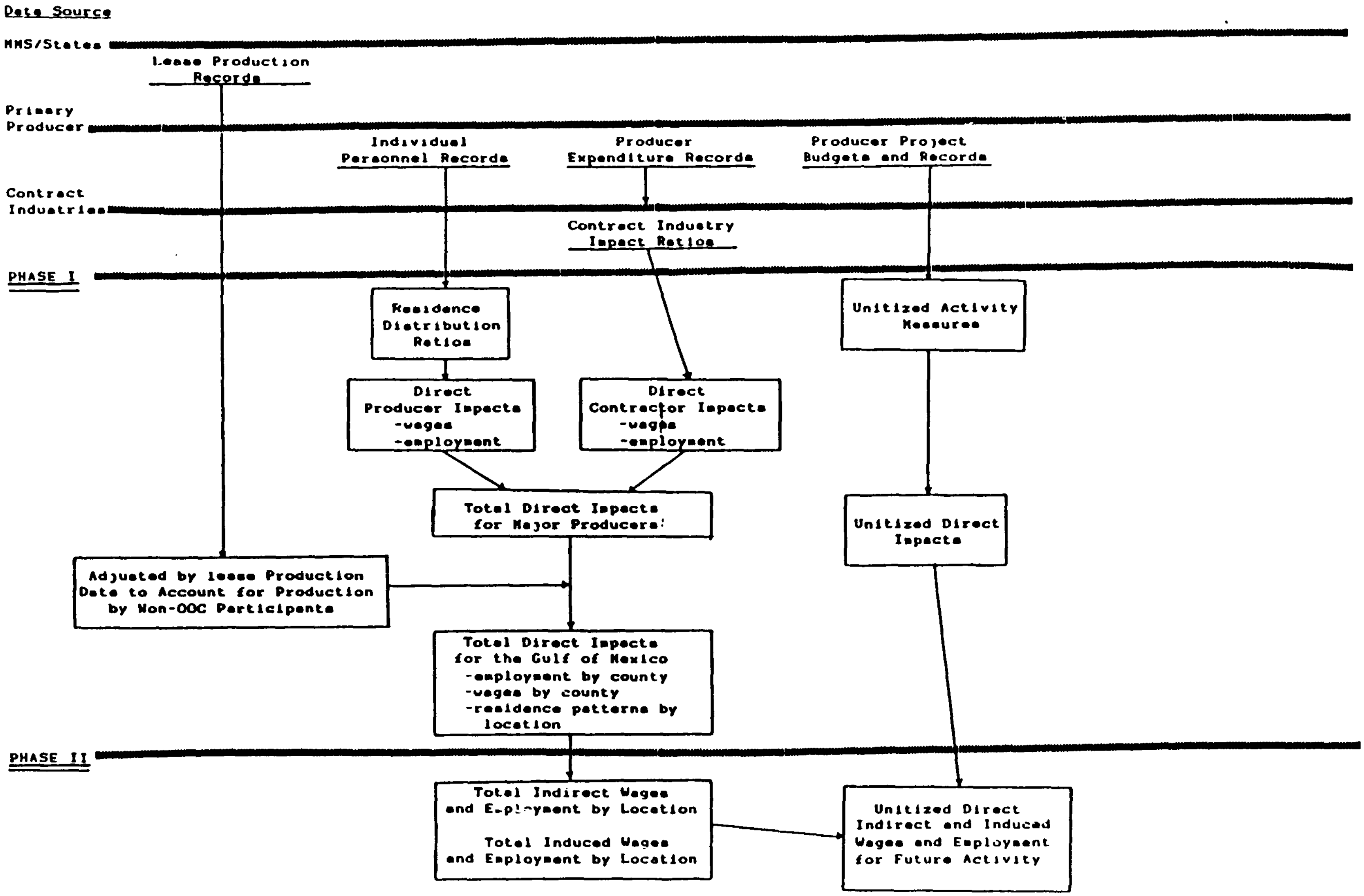
Direct Producer Positions

An estimated 24,000 thousand full-time equivalent jobs at production companies were directly the result of offshore oil and gas leasing in the Gulf of Mexico. Almost ten thousand of these positions are located offshore and with 15,000 positions being located on shore. A significant number of the on shore positions spend some time offshore as part of their normal working month. The designated off shore positions are only those individuals working exclusively "offshore".

The State of Louisiana alone had an estimated 8,200 offshore producer company positions and 15,000 on shore producer company positions located at work sites within the state. Texas has an estimated 612 offshore producer company jobs and 488 on shore producer positions located at work sites within the state. Mississippi, Alabama and Florida all had an insignificant number of

Exhibit 2

Methodology



producer company positions with full-time work sites within those states. This may be because most of the current exploration and development activity in these areas is being done by contractors and is being supervised by staff positions located in the New Orleans area.

Locations in Louisiana with more that 50 total producer positions are: Abbyville, Baton Rouge, Buras, Cameron, Grand Chenr, Grand Isle, Houma, Lafayette, Lake Charles, Leeville, Morgan City, New Orleans and Venice. Within Texas, Fourchon, Freeport, Galveston, Houston and Sabine Pass all had a significant number of positions. A much higher proportion of the positions in Texas are located offshore since many of the administrative functions for activity in the state are handled in New Orleans or Lafayette. Exhibit 3 presents the number of offshore and on shore positions at producing companies in the Gulf of Mexico.

It should be noted that all data presented in this document is expressed in person-years of annual employment or equivalent full time positions. This was necessary since some individuals had on shore or non-Gulf of Mexico responsibilities. Data represent only activity for offshore areas in both state and Federal waters in the Gulf of Mexico. Offshore activity in other areas have specifically been excluded.

Exhibit 4 breaks out the producer positions found at each work location by position type. For example in New Orleans 54.9 percent of positions were professional, 28.1 percent were skilled technical, 14.1 percent were clerical and 2.6 percent were skilled or unskilled labor, supervisory or undetermined. At Morgan City, a major staging site, the position profiles were as follows: 27.3 percent unskilled labor, 36.5 percent skilled labor, 9.7 percent supervisory, 1.8 percent clerical, 12.5 percent skilled technical and 12.3 percent professional. A similar profile is available for all work sites.

The classifications of positions used for this project were: unskilled labor, skilled labor, supervisory personnel, clerical, skilled technical and professional. These job descriptions were developed out of necessity since over 1,000 unique job titles and descriptions were encountered in the 12,500 personnel records which were analyzed. The job descriptions used for this analysis and the corresponding salary information are believed to contain most of the relevant information necessary for socioeconomic impact assessments. An Appendix is being developed to project the precise type of jobs falling under each of the categories and provide an insight into the how individual positions were classified in this project. For example data is being developed to document the precise job types falling under the heading of "headquarters administrative clerical staff", "unskilled offshore production worker" or "skilled offshore production worker". The information is being based only on data from those firms having detailed descriptive job titles. Many producers provided personnel data using the more general categories used in our analysis.

Employment By Residence Location

The previous exhibits presented employment by work location. Most employment related economic impacts however occur in the communities in which the employees actually reside. Exhibit 5 presents the number of person-years of employment by the county/parish of employee home residence. These data break

EXHIBIT #3
Summary of Producer Employment by Work Location
(Number of Person-Years)

WORK LOCATION	OFF SHORE EMPLOYMENT	ON SHORE EMPLOYMENT	TOTAL EMPLOYMENT
** STATE: AL			
MOBILE AREA	4	4	8
** Subtotal **			
	4	4	8
** STATE: CA			
LA HABRA	0	2	2
** Subtotal **			
	0	2	2
** STATE: FL			
PENSACOLA	0	6	6
** Subtotal **			
	0	6	6
** STATE: LA			
ABBYVILLE	0	98	98
AMELIA	0	6	6
BATON ROUGE	2	94	96
BURAS	118	26	144
CAMERON	560	88	648
COCODRIE	0	14	14
DULAC	0	18	18
EMPIRE	38	0	38
GRAND CHENR	92	2	94
GRAND ISLE	1054	116	1170
HOUMA	392	30	422
INTRA. CITY	626	20	646
LAFAYETTE	28	1262	1290
LAKE CHRLES	50	148	198
LEEVILLE	518	218	736
MORGAN CITY	2340	836	3176
MSY	0	300	300
NEW ORLEANS	20	9940	9960
SULPHUR	0	4	4
VENICE	2400	372	2772
** Subtotal **			
	8238	13592	21830
** STATE: MS			
BILOXI	0	6	6
** Subtotal **			
	0	6	6
** STATE: TX			
BAYTOWN	0	30	30
CORPUS CHRS	2	14	16

EXHIBIT #3
Summary of Producer Employment by Work Location
(Number of Person-Years)

WORK LOCATION	OFF SHORE EMPLOYMENT	ON SHORE EMPLOYMENT	TOTAL EMPLOYMENT
DALLAS	0	2	2
FOURCHON	266	0	266
FREEPORT	228	0	228
GALVESTON	108	40	148
HOUSTON	0	302	302
RODESSA	0	18	18
SABINE PASS	0	82	82
SAN ANTONIO	8	0	8
** Subtotal **			
	612	488	1100
** STATE: XX			
VARIOUS	1008	0	1008
** Subtotal **			
	1008	0	1008
*** Total ***			
	9862	14098	23960

EXHIBIT #4
Position Type Profile of Producer Employment by Work Location
(Percent of Total Positions at Work Location)

WORK LOCATION	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERICAL	SKILLED TECHNICAL	PRO-FESSIONAL	UN-DETERMINED	TOTAL EMPLOYMENT
ABBYVILLE	18.4	49.0	6.1	6.1	8.2	12.2	0.0	100
AMELIA	17.9	7.1	17.9	0.0	0.0	7.1	42.9	100
BATON ROUGE	18.8	27.1	8.3	6.2	27.1	12.5	0.0	100
BAYTOWN	0.0	20.0	20.0	26.7	13.3	20.0	0.0	100
BILOXI	0.0	0.0	33.3	0.0	33.3	33.3	0.0	100
BURAS	15.3	62.5	9.7	0.0	6.9	5.6	0.0	100
CAMERON	25.6	47.8	12.0	0.6	10.8	3.1	0.0	100
COCODRIE	0.0	14.3	0.0	0.0	85.7	0.0	0.0	100
CORPUS CHRS	25.0	62.5	12.5	0.0	0.0	0.0	0.0	100
DALLAS	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100
DULAC	55.6	0.0	0.0	0.0	44.4	0.0	0.0	100
EMPIRE	26.3	52.6	15.8	0.0	5.3	0.0	0.0	100
FOURCHON	20.3	60.2	12.0	3.8	3.8	0.0	0.0	100
FREEPORT	28.9	52.6	14.9	2.6	0.9	0.0	0.0	100
GALVESTON	12.2	23.0	9.5	4.1	40.5	10.8	0.0	100
GRAND CHENR	21.3	42.6	17.0	0.0	19.1	0.0	0.0	100
GRAND ISLE	0.0	20.5	62.2	0.0	4.1	13.2	0.0	100
HOUMA	26.5	13.3	2.4	0.0	57.3	0.0	0.5	100
HOUSTON	0.0	0.0	0.0	12.6	21.2	66.2	0.0	100
INTRA. CITY	2.5	19.5	62.2	0.6	4.0	11.1	0.0	100
LA HABRA	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100
LAFAYETTE	0.9	0.5	7.0	10.7	30.1	50.9	0.0	100
LAKE CHRLES	18.2	36.4	10.1	2.0	11.1	22.2	0.0	100
LEEVILLE	19.0	54.9	9.5	0.3	9.2	7.1	0.0	100
MOBILE AREA	0.0	0.0	50.0	0.0	0.0	50.0	0.0	100
MORGAN CITY	27.3	36.5	9.7	1.8	12.5	12.3	0.0	100
MSY	4.0	30.0	12.7	2.0	5.3	46.0	0.0	100
NEW ORLEANS	0.1	0.3	2.1	14.1	28.1	54.9	0.2	100
PENSACOLA	0.0	0.0	0.0	0.0	33.3	66.7	0.0	100
RODESSA	44.4	33.3	11.1	0.0	0.0	11.1	0.0	100
SABINE PASS	26.8	53.7	9.8	0.0	9.8	0.0	0.0	100
SAN ANTONIO	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100
SULPHUR	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100
VARIOUS	15.7	8.9	25.2	1.0	19.0	30.2	0.0	100
VENICE	22.7	54.6	9.6	0.4	9.7	3.0	0.0	100

out the total positions by county/parish into the broad staff classifications of unskilled labor, skilled labor, supervisory, clerks/ secretaries, skilled technical and professional/manager.

These preliminary data indicated that over 300 counties have at least one resident employed with an the offshore producer in the Gulf. Of the 24,000 employees with the offshore producers almost 20,000 reside in Louisiana. Every parish in the state has at lease several person-years of employment with an offshore producer. An estimated 3,700 producer employees reside in Jefferson Parish, 1,500 in Lafayette, 1,000 in Lafourche, 4,500 in Orleans and 1,500 in St. Tammany. Louisiana parishes with 200 to 1,000 employees with an offshore producer are: Calcasieu, Cameron, East Baton Rouge, Iberia, Livingston, Plaquemines, St. Bernard, St. Mary, Tangipahoa, Terrebonne and Vermilion.

Approximately 2,000 persons employed by the offshore production companies reside in Mississippi. Residents of Mississippi finding employment with the offshore production companies came from a wide geographic range with virtually all counties having some employment with the offshore producers. Most of these persons lived in counties adjacent to the two major highways feeding the coastal areas of Louisiana.

An estimated 1,300 Texas residents were employed by the offshore Gulf of Mexico production companies. With the exception of Marion and Harrison counties employees were from a broad geographic range within the state.

Over 500 persons employed by the offshore production companies reside in Alabama. Half of the personnel reside in the coastal counties of Baldwin or Mobile the other half are found in the interior counties adjacent to the coastal areas of the Florida Panhandle.

Approximately 200 producer employees resided in Florida. Most of these persons were from the coastal counties of Escambia, Okaloosa and Santa Rosa.

Small numbers of employees with the offshore production companies were also found to be from the states of Arizona, Arkansas, California, Connecticut, Georgia, Indiana, Maine, Maryland, Massachusetts, Michigan, Montana, New Jersey, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Washington, and Wyoming.

Similar county level data has been developed indicating the number of person years of employment by location type (i.e., headquarters, staging area, platform and non-site specific offshore). These data can be used to determine the number of positions in a specific county which are offshore in nature. As one would expect persons residing in states other than Louisiana are employed primarily in positions which use an offshore work schedule.

Payroll by Residence Location

In addition to measuring direct producer impacts in terms of employment, data was developed on the wages and salaries paid by the offshore producers. These data were necessary since it is actually the wages and salaries received by

EXHIBIT #5

Producer Employment by County and Staff Classification

(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** STATE: XX								
UNKNOWN	0	0	2	0	2	26	0	30
** Subtotal **	0	0	2	0	2	26	0	30
** STATE: AL								
AUTAUGA	0	2	0	0	0	0	0	2
BALDWIN	20	36	24	0	2	4	0	86
BARBOUR	1	0	2	0	2	0	0	5
CALHOUN	4	0	0	0	0	0	0	4
CHOCTAW	6	2	0	0	0	0	0	9
CLARKE	0	0	0	0	2	0	0	2
COFFEE	22	30	8	0	8	0	2	70
CONECUH	0	3	0	0	0	0	0	4
COVINGTON	17	43	8	0	8	0	0	76
CRENSHAW	2	1	0	0	0	0	0	4
CULLMAN	0	2	0	0	0	0	0	2
DALE	4	2	2	0	0	0	0	8
DALLAS	2	4	2	0	0	0	0	8
ESCAMBIA	2	9	7	0	0	0	0	19
GENEVA	0	3	0	0	0	0	0	3
HOUSTON	4	6	0	0	0	0	0	10
JEFFERSON	2	2	2	0	2	0	0	8
LAUDERDALE	0	2	0	0	0	0	0	2
LAWRENCE	0	0	1	0	0	0	0	1
MADISON	2	0	0	0	0	0	0	2
MARION	2	0	0	0	0	0	0	2
MOBILE	55	70	22	0	19	12	0	178
MONROE	4	0	0	0	2	0	0	6
MONTGOMERY	0	2	0	0	0	0	0	2
PIKE	0	4	0	0	4	0	0	7
RANDOLPH	0	0	2	0	0	0	0	2
ST CLAIR	2	0	0	0	0	0	0	2
SHELBY	0	2	0	0	0	0	0	2
TUSCALOOSA	0	0	4	0	0	0	0	4
WALKER	0	2	0	0	0	0	0	2
WASHINGTON	3	6	8	0	2	0	0	20
WILCOX	0	0	2	0	0	0	0	2
** Subtotal **	153	233	95	0	52	16	2	551
** STATE: AZ								
MARICOPA	0	2	0	0	0	0	0	2
PIMA	0	2	0	0	0	0	0	2

EXHIBIT #5
Producer Employment by County and Staff Classification
(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **								
	0	4	0	0	0	0	0	4
** STATE: AR								
ASHLEY	0	2	0	0	0	0	0	2
BOONE	0	0	0	0	2	0	0	2
COLUMBIA	0	0	2	0	0	0	0	2
CRAWFORD	0	2	0	0	0	0	0	2
FULTON	2	0	0	0	0	0	0	2
HEMPSTEAD	0	2	0	0	0	0	0	2
IZARD	2	2	0	0	0	0	0	4
JACKSON	0	2	1	0	0	0	0	2
JEFFERSON	0	2	0	0	0	0	0	2
OUACHITA	0	0	6	0	2	0	0	7
POPE	0	0	3	0	0	0	0	3
PULASKI	4	0	0	0	0	0	0	4
SEVIER	0	0	2	0	0	0	0	2
STONE	0	4	0	0	0	0	0	4
UNION	0	0	2	0	2	0	0	4
VAN BUREN	0	2	0	0	0	0	0	2
WHITE	0	4	1	0	0	0	0	5
** Subtotal **								
	8	22	17	0	6	0	0	53
** STATE: CA								
DEL NORTE	2	0	0	0	0	0	0	2
ORANGE	0	0	0	0	2	2	0	4
SAN MATEO	0	0	0	0	0	1	0	1
** Subtotal **								
	2	0	0	0	2	3	0	7
** STATE: CT								
NEW LONDON	0	2	0	0	0	0	0	2
** Subtotal **								
	0	2	0	0	0	0	0	2
** STATE: FL								
BAY	2	2	0	0	2	0	0	6
CALHOUN	2	0	0	0	0	0	0	2
CITRUS	0	0	2	0	0	0	0	2
ESCAMBIA	31	34	7	0	14	8	0	94
GULF	2	2	0	0	0	0	0	4
JACKSON	0	4	0	0	0	0	0	4
LAKE	0	2	0	0	0	0	0	2
OKALOOSA	4	20	5	0	4	0	0	33
PALM BEACH	0	0	0	0	2	0	0	2
SANTA ROSA	11	13	26	0	6	3	0	59

EXHIBIT #5
Producer Employment by County and Staff Classification
(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
WALTON	5	4	0	0	2	2	0	13
WASHINGTON	0	4	0	0	0	0	0	4
** Subtotal **	57	85	40	0	30	13	0	225
** STATE: GA								
BULLOCH	0	0	0	0	0	2	0	2
COBB	0	2	2	0	0	0	0	4
EFFINGHAM	2	0	0	0	0	0	0	2
EMANUEL	0	2	0	0	0	0	0	2
GLYNN	0	2	0	0	0	0	0	2
GREENE	0	0	2	0	0	0	0	2
JEFFERSON	0	2	0	0	0	0	0	2
COLUMBUS	2	0	0	0	0	0	0	2
SCREVEN	0	2	0	0	0	0	0	2
** Subtotal **	4	10	4	0	0	2	0	19
** STATE: IN								
PORTER	0	0	0	0	2	0	0	2
** Subtotal **	0	0	0	0	2	0	0	2
** STATE: LA								
ACADIA	13	51	29	4	34	20	0	151
ALLEN	5	10	5	0	2	4	0	26
ASCENSION	12	26	12	4	10	5	0	70
ASSUMPTION	23	33	17	6	25	10	0	114
AVOYELLES	14	39	12	0	10	0	0	75
BEAUREGARD	4	8	17	0	2	4	0	35
BIENVILLE	1	3	4	0	4	0	0	12
BOSSIER	2	8	2	0	2	0	0	14
CADDO	12	20	8	0	8	6	0	53
CALCASIEU	52	142	66	14	59	74	0	407
CALDWELL	0	8	4	0	2	0	0	14
CAMERON	64	93	37	2	8	5	0	208
CATAHOULA	7	11	4	0	0	2	0	25
CLAIBORNE	2	5	1	0	4	4	0	16
CONCORDIA	8	45	5	0	4	4	0	67
DE SOTO	2	2	4	0	0	0	0	8
EAST BATON ROUGE	46	74	38	0	53	25	0	236
EAST FELICIANA	0	2	2	0	0	0	0	4
EVANGELINE	12	76	22	2	16	2	0	132
FRANKLIN	2	16	9	0	2	0	0	29
GRANT	0	14	12	0	0	0	0	26
IBERIA	85	191	157	6	57	72	0	568
IBERVILLE	6	16	12	0	4	4	0	41

EXHIBIT #5
Producer Employment by County and Staff Classification
(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
JACKSON	2	6	4	0	0	0	0	12
JEFFERSON	126	229	187	418	1122	1642	0	3725
JEFFERSON DAVIS	23	56	32	0	16	5	0	132
LAFAYETTE	68	139	182	113	336	629	0	1466
LAFOURCHE	193	409	193	12	130	159	0	1096
LA SALLE	4	8	6	0	0	2	0	20
LINCOLN	2	13	4	0	2	2	0	23
LIVINGSTON	21	37	38	30	34	212	0	372
MADISON	2	0	1	0	0	0	0	3
MOREHOUSE	4	6	0	0	2	2	0	14
NATCHITOCHES	10	15	13	0	8	0	0	46
ORLEANS	120	194	176	733	1084	2250	22	4579
OUACHITA	9	13	8	0	8	4	0	43
PLAQUEMINES	112	318	72	12	103	34	0	652
POINTE COUPEE	2	2	4	0	4	2	0	14
RAPIDES	15	76	13	0	28	10	0	142
RED RIVER	0	8	2	0	2	0	0	12
RICHLAND	2	16	3	0	2	0	0	23
SABINE	2	28	14	0	8	4	0	56
ST BERNARD	12	18	10	72	88	43	0	242
ST CHARLES	28	12	15	67	123	227	0	473
ST HELENA	1	2	7	2	2	5	0	19
ST JAMES	4	8	2	2	2	0	0	18
ST JOHN THE BAPTIST	2	4	4	20	49	32	0	111
ST LANDRY	15	76	29	2	17	22	0	163
ST MARTIN	38	55	27	6	16	23	0	164
ST MARY	144	146	94	51	174	238	2	850
ST TAMMANY	42	126	90	48	278	908	0	1492
TANGIPAHOA	38	53	51	4	40	42	0	228
TENSAS	4	10	6	0	2	2	0	24
TERREBONNE	90	134	77	6	65	47	0	420
UNION	5	12	9	0	2	0	0	28
VERMILION	83	174	81	11	73	55	0	478
VERNON	5	19	10	0	6	2	0	42
WASHINGTON	40	32	28	0	16	18	0	134
WEBSTER	5	6	2	0	5	0	0	18
WEST BATON ROUGE	4	0	0	0	0	2	0	6
WEST CARROLL	2	4	2	0	0	0	0	8
WEST FELICIANA	0	0	2	0	0	0	0	2
WINN	0	8	5	0	2	0	0	15
** Subtotal **								
	1653	3367	1983	1647	4156	6864	25	19694
** STATE: ME								
KNOX	0	2	0	0	0	2	0	4

EXHIBIT #5
Producer Employment by County and Staff Classification
(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **	0	2	0	0	0	2	0	4
** STATE: MD								
TALBOT	0	0	0	0	0	2	0	2
** Subtotal **	0	0	0	0	0	2	0	2
** STATE: MA								
BRISTOL	2	0	0	0	0	0	0	2
** Subtotal **	2	0	0	0	0	0	0	2
** STATE: MI								
WAYNE	2	0	0	0	0	0	0	2
** Subtotal **	2	0	0	0	0	0	0	2
** STATE: MS								
ADAMS	11	12	4	0	8	0	0	35
AMITE	9	17	2	0	5	0	0	33
ATTALA	0	1	0	0	0	0	0	1
CARROLL	0	4	0	0	0	0	0	4
CLAIBORNE	2	0	0	0	0	0	0	2
CLARKE	19	39	9	0	16	2	0	66
COPIAH	4	14	0	0	3	0	0	20
COVINGTON	3	9	12	0	2	0	0	26
FORREST	25	56	30	0	23	10	0	144
FRANKLIN	14	31	3	0	2	0	0	50
GEORGE	8	5	0	0	3	0	0	16
GREENE	7	8	0	0	1	0	0	16
HANCOCK	20	29	5	2	21	21	0	98
HARRISON	30	44	17	0	23	22	0	137
HINDS	8	15	8	0	10	6	0	46
HOLMES	0	0	2	0	2	0	0	4
JACKSON	8	16	10	0	9	6	0	49
JASPER	8	9	3	0	2	0	0	22
JEFFERSON	2	3	2	0	2	0	0	8
JEFFERSON DAVIS	6	5	6	0	6	4	0	28
JONES	21	28	19	0	6	6	0	79
LAMAR	14	24	11	0	12	2	0	62
LAUDERDALE	12	25	3	0	6	2	0	48
LAWRENCE	12	12	7	0	4	6	0	40
LEAKE	0	8	0	0	2	0	0	10
LINCOLN	35	88	25	0	18	8	0	174
LOWNDES	0	2	0	0	1	0	0	3
MADISON	2	3	0	0	4	0	0	10

EXHIBIT #5
Producer Employment by County and Staff Classification
(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
MARION	34	49	57	0	7	31	0	179
MONROE	2	0	0	0	2	0	0	4
NESHOBA	0	2	0	0	0	1	0	3
NEWTON	2	2	0	0	0	1	0	5
OKTIBBEHA	0	0	0	0	2	0	0	2
PEARL RIVER	26	61	29	6	51	55	0	228
PERRY	0	5	1	0	3	0	0	11
PIKE	18	45	13	0	9	6	0	91
RANKIN	8	12	10	0	2	0	0	32
SCOTT	3	6	0	0	0	0	0	9
SIMPSON	6	8	10	0	0	0	0	23
SMITH	4	10	4	0	0	0	0	19
STONE	4	0	0	0	0	4	0	8
SUNFLOWER	0	2	0	0	0	0	0	2
TIPPAH	0	2	0	0	0	0	0	2
WALTHALL	2	12	21	0	5	2	0	42
WARREN	0	2	0	0	0	0	0	2
WAYNE	18	7	12	0	1	2	0	41
WEBSTER	0	2	0	0	0	0	0	2
WILKINSON	11	10	0	0	0	0	0	22
WINSTON	2	1	0	0	2	2	0	7
YAZOO	0	0	4	0	0	0	0	4
** Subtotal **								
	422	745	337	8	277	198	0	1987
** STATE: MO								
BOLLINGER	0	4	0	0	0	0	0	4
JACKSON	2	0	0	0	0	0	0	2
** Subtotal **								
	2	4	0	0	0	0	0	6
** STATE: NJ								
HUDSON	0	0	0	0	0	2	0	2
MORRIS	0	0	0	0	0	2	0	2
** Subtotal **								
	0	0	0	0	0	4	0	4
** STATE: NM								
SANDOVAL	1	0	0	0	0	0	0	1
** Subtotal **								
	1	0	0	0	0	0	0	1
** STATE: NY								
SUFFOLK	0	0	0	0	2	0	0	2

EXHIBIT #5
Producer Employment by County and Staff Classification
(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **	0	0	0	0	2	0	0	2
** STATE: NC								
MECKLENBURG	0	0	0	0	1	1	0	2
** Subtotal **	0	0	0	0	1	1	0	2
** STATE: OH								
CUYAHOGA	0	0	0	0	0	2	0	2
GEAUGA	0	0	0	0	0	2	0	2
GUERNSEY	0	0	0	0	2	0	0	2
** Subtotal **	0	0	0	0	2	4	0	6
** STATE: OK								
CLEVELAND	0	0	0	0	0	2	0	2
KAY	0	0	0	0	0	2	0	2
LATIMER	2	0	0	0	0	0	0	2
MUSKOGEE	0	2	0	0	0	0	0	2
** Subtotal **	2	2	0	0	0	4	0	8
** STATE: PA								
ALLEGHENY	0	0	0	0	2	0	0	2
SOMERSET	0	0	0	0	0	2	0	2
** Subtotal **	0	0	0	0	2	2	0	4
** STATE: RI								
WASHINGTON	2	0	0	0	0	0	0	2
** Subtotal **	2	0	0	0	0	0	0	2
** STATE: TN								
DAVIDSON	0	0	0	0	0	2	0	2
HAMILTON	0	2	0	0	0	0	0	2
HARDIN	0	0	2	0	0	0	0	2
MCNAIRY	2	0	0	0	0	0	0	2
MARION	0	0	2	0	0	0	0	2
MONROE	0	0	2	0	0	0	0	2
SHELBY	0	2	4	0	0	1	0	7
SULLIVAN	2	0	0	0	0	0	0	2
SUMNER	0	0	0	0	2	0	0	2
WHITE	0	0	2	0	0	0	0	2

EXHIBIT #5

Producer Employment by County and Staff Classification

(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **	4	4	12	0	2	3	0	25
** STATE: TX								
ANDERSON	0	2	4	0	0	0	0	6
ANGELINA	2	4	0	0	4	0	0	10
ATASCOSA	0	2	2	0	0	0	0	4
BASTROP	0	0	0	0	0	2	0	2
BEE	0	3	0	0	0	0	0	3
BELL	0	0	0	0	2	0	0	2
BEXAR	0	2	0	0	0	0	0	2
BRAZORIA	8	14	6	2	14	4	0	47
BROOKS	0	4	0	0	0	0	0	4
CALDWELL	0	4	0	0	0	0	0	4
CAMERON	0	2	0	0	0	0	0	2
CASS	0	0	0	0	0	2	0	2
CHAMBERS	0	4	4	2	0	0	0	11
CHEROKEE	0	4	0	0	3	2	0	9
COLLIN	0	0	0	0	0	4	0	4
COLORADO	4	0	0	0	0	0	0	4
COMAL	0	2	0	0	0	0	0	2
DALLAS	4	2	0	0	2	2	0	10
DENTON	0	0	0	0	0	2	0	2
DUVAL	4	4	0	0	0	0	0	8
ECTOR	0	2	0	0	0	2	0	4
FORT BEND	3	2	2	2	2	21	0	32
GALVESTON	2	6	14	4	16	5	0	47
GILLESPIE	0	0	0	0	0	2	0	2
GOLIAD	0	2	0	0	2	0	0	4
GREGG	2	9	3	0	6	0	0	21
GRIMES	0	2	0	0	2	2	0	6
HARDIN	2	4	4	0	0	2	0	12
HARRIS	23	34	14	49	87	219	0	426
HARRISON	0	2	4	0	0	0	0	7
HENDERSON	0	2	0	0	0	0	0	2
HOUSTON	2	2	0	0	0	0	0	4
JASPER	4	0	1	0	0	0	0	6
JEFFERSON	12	10	10	0	2	2	0	36
JIM WELLS	0	0	2	0	0	0	0	2
KARNES	0	14	0	0	0	0	0	14
KAUFMAN	0	0	0	0	4	0	0	4
LAVACA	0	4	0	0	0	0	0	4
LEE	0	0	1	0	0	0	0	1
LEON	0	0	0	0	0	1	0	1
LIBERTY	0	2	2	0	2	4	0	10
LIVE OAK	0	2	0	0	0	0	0	2
LUBBOCK	0	0	0	0	0	2	0	2

EXHIBIT #5
Producer Employment by County and Staff Classification
(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
MCMULLEN	0	2	0	0	0	0	0	2
MARION	8	8	14	10	34	179	0	273
MATAGORDA	0	2	4	0	0	2	0	8
MEDINA	0	2	2	0	0	0	0	4
MIDLAND	0	0	0	2	0	2	0	4
MONTGOMERY	2	2	2	0	6	16	0	29
NACOGDOCHES	0	2	0	0	4	0	0	6
NAVARRO	0	2	0	0	2	4	0	8
NUECES	2	10	2	0	0	0	0	14
ORANGE	2	10	16	0	2	0	0	30
PALO PINTO	0	0	0	0	2	0	0	2
PANOLA	0	0	2	0	0	0	0	2
PARKER	0	0	0	0	2	0	0	2
POLK	6	0	0	0	2	6	0	14
RUSK	0	1	4	0	1	0	0	6
SABINE	0	6	1	0	0	0	0	7
SAN AUGUSTINE	0	4	0	0	0	0	0	4
SAN PATRICIO	4	0	0	0	0	0	0	4
SHELBY	2	7	4	0	0	0	0	13
SMITH	4	4	2	0	1	2	0	14
TARRANT	0	0	0	0	2	2	0	4
TRAVIS	4	0	2	0	3	3	0	12
TRINITY	0	2	0	0	2	0	0	4
TYLER	0	4	0	0	0	8	0	12
VAN ZANDT	0	0	2	0	2	0	0	4
VICTORIA	2	6	0	0	4	0	0	12
WALKER	2	0	0	0	0	0	0	2
WASHINGTON	0	0	0	0	2	0	0	2
WHARTON	0	0	2	0	0	0	0	2
WILLIAMSON	0	0	0	0	1	1	0	2
WILSON	0	3	0	0	0	0	0	3
WINKLER	0	0	2	0	0	0	0	2
WOOD	0	0	0	0	2	0	0	2
ZAPATA	2	2	0	0	0	0	0	4
** Subtotal **	112	231	135	72	243	506	0	1299
** STATE: WA								
KING	0	2	0	0	0	0	0	2
** Subtotal **	0	2	0	0	0	0	0	2
** STATE: WY								
NIOBRARA	0	0	0	0	0	2	0	2

EXHIBIT #5

Producer Employment by County and Staff Classification

(Person-Years of Employment)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **	0	0	0	0	0	2	0	2
*** Total ***	2425	4712	2625	1727	4779	7653	27	23947

employees and subsequently spent which drive the local economies. Exhibit 6 presents total payroll by county and staff classification (i.e., skilled labor, supervisory, etc). Total wages and salaries received by producer employees totaled $855 million in 1984.

Total wages and salaries received by producer employees in Louisiana was estimated at $710 million. The breakdown of wages and salaries received by staff classification for Louisiana is as follows: unskilled labor $44.5 million, skilled labor $101.8 million, supervisory personnel $83.6 million, clerical $27.8, skilled technical $117.1 and professionals $334.7. Only $250,000 in wages and salaries could not be tied to a corresponding job classification.

An example of the information presented in Exhibit 6 is that in Plaquemines Parish employees of the offshore producers receive approximately $20 million in wages and salaries. Forty-six percent of this income or $9.15 million goes to skilled laborers, and fifteen percent of total payroll is paid to unskilled laborers, supervisors and technical employees. Nine percent of producer paid salaries in this parish results form the income of professionals or managerial staff.

Total wages and salaries paid by the offshore producers to residents of other states were, Alabama $17.4 million, Mississippi $66.0 million, Texas $48.0 million, and Florida $7.3 million. Producer wages and salaries is presented in Exhibit 6 for each of these states.

Frequency Distribution of Wages and Salaries

The personnel data files are also being analyzed to determine the distribution and ranges of salaries by work location and job type. For example Exhibit 7 presents the frequency distribution of salary by location type (e.i., headquarters, staging area, etc.).

Exhibit 8 summarizes minimum, maximum and average salary by job classification. Total payroll by producers is also provided by job classification. Examples of information contained in Exhibit 8 are: the average salary for a skilled technical employee working at headquarters was $25,824, the average salary for a skilled technical employee working at various offshore sites was $35,666 and a skilled technical employee working on a platform received $33,292 in 1984. Similar data is being developed with data broken out by location (i.e. staging area), functional division (i.e. exploration) and job type (i.e. unskilled labor).

Employment, Salary and Payroll by Offshore Area and Staging Site

Employment and payroll data have also been analyzed using an additional dimension, the offshore work location. All platform locations have been standardized to one of sixty lease areas. Examples of the lease areas being used for this analysis are: South Pass and High Island-State Waters. Individual platforms or fields required standardization to make subsequent analysis of the data meaningful and to protect the confidentiality of individual firms.

Exhibit 9 presents employment, average salary and total 1984 producer payroll by staging location. Data in this exhibit include all employees working on

EXHIBIT #6

Producer Payroll by County of Residence and Staff Classification, 1984
(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** STATE: XX								
UNKNOWN	0	0	68000	0	29200	1279200	0	1376400
** Subtotal **	0	0	68000	0	29200	1279200	0	1376400
** STATE: AL								
AUTAUGA	331	59786	408	0	0	0	0	60526
BALDWIN	542400	1105683	1052564	0	36264	183064	0	2919974
BARBOUR	14628	0	68000	0	59400	0	0	142028
CALHOUN	103219	0	0	0	0	0	0	103219
CHOCTAW	177101	74201	12620	0	1283	1000	0	266205
CLARKE	0	0	0	0	63218	0	0	63218
COFFEE	588105	935562	298498	0	246264	0	60938	2129416
CONECUH	10747	83474	15873	0	0	0	0	110095
COVINGTON	439623	1314793	278510	0	293199	0	0	2326125
CRENSHAW	52688	41707	2609	0	2800	0	0	99892
CULLMAN	0	54400	0	0	0	0	0	54400
DALE	102776	64176	73305	0	0	0	5812	246068
DALLAS	53930	116458	66436	0	0	0	0	236325
ESCAMBIA	40981	283259	302815	0	144	336	0	627536
GENEVA	1233	80791	0	0	0	0	0	82024
HOUSTON	105023	179518	2516	0	0	0	0	287057
JEFFERSON	55200	57600	68000	0	63600	0	0	244400
LAUDERDALE	0	59857	340	0	382	0	0	60579
LAWRENCE	0	0	35700	0	0	0	0	35700
MADISON	49400	0	0	0	0	0	0	49400
MARION	53600	0	0	0	0	0	0	53600
MOBILE	1370042	2116283	839645	0	651538	527000	0	5512508
MONROE	111039	1850	0	0	68800	0	0	221753
MONTGOMERY	0	61648	0	0	0	0	0	61648
PIKE	0	112114	0	0	116148	0	0	228262
RANDOLPH	0	0	68000	0	0	0	0	68000
ST CLAIR	53600	0	0	0	0	0	0	53600
SHELBY	0	59400	0	0	0	0	0	59400
TUSCALOOSA	0	0	152000	0	0	0	0	152000
WALKER	0	50893	0	0	0	0	0	50893
WASHINGTON	94825	174973	309200	0	101915	0	0	680913
WILCOX	0	0	93800	0	0	0	0	93800
** Subtotal **	4029351	7088508	3740839	0	1724961	711400	66800	17361860
** STATE: AZ								
MARICOPA	0	59400	0	0	0	0	0	59400
PIMA	0	84800	0	0	0	0	0	84800

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Producer Payroll by County of Residence and Staff Classification, 1984
(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPERVISORY	CLERKS/ SECRETARIES	SKILLED TECHNICAL	PROF./ MGR.	UNDETERMINED	TOTAL
** Subtotal **	0	144200	0	0	0	0	0	144200
** STATE: AR								
ASHLEY	0	59400	0	0	0	0	0	59400
BOONE	0	0	0	0	81600	0	0	81600
COLUMBIA	373	499	81712	0	1404	0	0	83989
CRAWFORD	0	57078	0	0	0	0	0	57078
FULTON	43704	0	0	0	0	0	0	43704
HEMPSTEAD	0	63137	0	0	0	0	0	63137
IZARD	49202	61719	0	0	0	0	0	110921
JACKSON	0	48698	32136	0	0	0	0	80834
JEFFERSON	0	55744	0	0	0	0	0	55744
OUACHITA	0	0	248536	0	60512	0	0	309048
POPE	0	0	132445	0	0	0	0	132445
PULASKI	97213	0	0	0	0	0	0	972.3
SEVIER	0	0	88200	0	0	0	0	88200
STONE	0	120960	0	0	0	0	0	120960
UNION	0	0	81884	0	67800	0	0	149684
VAN BUREN	0	54528	0	0	0	0	0	54528
WHITE	0	119037	40014	0	0	0	0	159051
** Subtotal **	190492	640800	704927	0	211316	0	0	1747536
** STATE: CA								
DEL NORTE	43000	0	0	0	0	0	0	43000
ORANGE	0	0	0	0	55200	92000	0	147200
SAN MATEO	0	0	0	0	0	34776	0	34776
** Subtotal **	43000	0	0	0	55200	126776	0	224976
** STATE: CT								
NEW LONDON	0	65000	0	0	0	0	0	65000
** Subtotal **	0	65000	0	0	0	0	0	65000
** STATE: FL								
BAY	53600	65170	0	0	52099	0	0	170869
CALHOUN	43859	475	0	0	0	0	0	44334
CITRUS	0	0	74000	0	0	0	0	74000
ESCAMBIA	792085	1013444	255194	0	551178	325588	0	2937489
GULF	45400	59444	0	0	0	0	0	104844
JACKSON	0	114825	0	0	0	0	0	114825
LAKE	0	57024	0	0	0	0	0	57024
OKALOOSA	98336	583369	172788	0	128328	0	0	982821
PALM BEACH	0	0	0	0	65000	0	0	65000
SANTA ROSA	279792	395959	953877	0	180622	1298.2	0	1940062

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Producer Payroll by County of Residence and Staff Classification, 1984
(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
WALTON	126262	123075	16048	0	66773	84000	0	4.6557
WASHINGTON	0	123486	0	0	0	0	0	123486
** Subtotal **	1439334	2537071	1471907	0	1044000	539400	0	7031712
** STATE: GA								
BULLOCH	0	0	0	0	0	168000	0	168000
COBB	0	62400	60588	0	0	0	0	122968
EFFINGHAM	42559	0	0	0	0	0	0	42559
EMANUEL	0	63516	0	0	0	0	0	635.6
GLYNN	0	62400	0	0	0	0	0	62400
GREENE	0	0	73400	0	0	0	0	73400
JEFFERSON	0	62758	0	0	0	0	0	62758
COLUMBUS	46600	0	0	0	0	0	0	46600
SCREVEN	0	63200	0	0	0	0	0	63200
** Subtotal **	89159	314274	133988	0	0	168000	0	705421
** STATE: IN								
PORTER	0	0	0	0	47600	0	0	47600
** Subtotal **	0	0	0	0	47600	0	0	47600
** STATE: LA								
ACADIA	396943	1572283	1261114	63445	1010853	930897	0	5231536
ALLEN	136684	307565	206085	0	67145	179486	0	896964
ASCENSION	303005	763936	577603	96000	335492	235896	0	2361992
ASSUMPTION	643954	990920	653831	98062	783720	465841	0	3636329
AVOYELLES	379800	1186556	518000	0	319020	0	0	2403376
BEAUREGARD	109142	237242	797661	0	98369	180576	0	1422990
BIENVILLE	18819	88143	152478	0	126718	0	0	386157
BOSSIER	45580	244339	71846	0	61024	3648	0	426436
CADDO	306074	571264	313789	0	236189	303188	0	1730504
CALCASIEU	1373903	4165235	2870399	280344	2100029	3623657	0	14421567
CALDWELL	1546	234189	136447	0	61567	0	0	433748
CAMERON	1625972	2711838	1454279	57056	249271	273890	0	6373106
CATAHOULA	220876	336055	164409	0	0	83412	0	804752
CLAIBORNE	46988	142497	34471	0	107130	192000	0	523087
CONCORDIA	212675	1354272	215506	0	131464	178000	0	2091916
DE SOTO	55200	69783	180401	0	0	0	0	305384
EAST BATON ROUGE	1250763	2238221	1559277	0	1817845	1086592	0	7952698
EAST FELICIANA	662	64993	67888	0	1424	0	0	134967
EVANGELINE	329591	2320843	921067	58885	513585	82302	0	4226273
FRANKLIN	56261	485518	397952	0	72600	588	0	1012919
GRANT	1454	426314	463110	0	8674	1778	0	901330
IBERIA	2415132	5990790	6525016	156904	1826977	3499473	0	20422293
IBERVILLE	151149	478383	610028	0	150142	163997	0	1553699

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Producer Payroll by County of Residence and Staff Classification, 1984
(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
JACKSON	60833	184659	183784	0	2488	2448	0	434212
JEFFERSON	3164335	6943878	7958847	7063089	30265669	76664491	0	132060308
JEFFERSON DAVIS	612140	1736478	1466711	0	562026	251090	0	4628445
LAFAYETTE	1847347	4195936	7848874	1936393	9740653	29574556	0	55143759
LAFOURCHE	5275651	12199912	8042254	213259	4308258	7293490	0	37332825
LA SALLE	115236	243099	272360	0	829	103000	0	734525
LINCOLN	59364	388741	185722	0	66578	79152	0	779557
LIVINGSTON	526864	1114300	1531549	488000	982531	10956851	0	15600095
MADISON	53186	0	19092	0	0	0	0	72278
MOREHOUSE	115174	186941	0	0	50648	80558	0	433321
NATCHITOCHES	274234	461469	504729	0	261477	0	0	1501909
ORLEANS	3067678	5715520	7114330	12122631	27263047	114582060	178250	170043317
OUACHITA	239953	395655	326992	0	255152	191442	0	1409194
PLAQUEMINES	2931204	9152563	2929730	246750	3022744	1742369	0	20025360
POINTE COUPEE	56200	60400	156000	0	118800	66200	0	458400
RAPIDES	381549	2324020	561271	0	985042	434734	0	4686616
RED RIVER	0	242402	82570	0	71709	0	0	396680
RICHLAND	44370	485637	104040	0	62400	0	0	696447
SABINE	55374	867154	566556	0	292336	182102	0	1963522
ST BERNARD	297396	531437	389070	1083450	2104856	1815231	0	6221440
ST CHARLES	648729	345141	669234	1109283	3518049	10510554	0	16800990
ST HELENA	32557	75919	306196	31418	52419	239871	0	738381
ST JAMES	107942	220102	99928	25258	78400	1747	0	533378
ST JOHN THE BAPTIST	45217	125704	154957	355268	1313438	1252242	0	3246827
ST LANDRY	446370	2371758	1288962	40480	528804	1110396	0	5766770
ST MARTIN	1116822	1743351	1215657	98416	505349	978454	2075	5660123
ST MARY	3833587	4443111	3912431	968274	5307685	10742741	52525	29260354
ST TAMMANY	1106895	3999998	3673378	807487	8312804	46605183	0	64505746
TANGIPAHOA	1032908	1602685	2078229	72495	1252473	1821247	0	7860037
TENSAS	99564	304837	278680	0	63985	113400	0	860467
TERREBONNE	2745019	4258208	3425166	146632	2191000	2204233	0	14970258
UNION	120689	379947	416945	0	71200	0	0	968781
VERMILION	2330814	5347897	3635139	207819	2485034	2472316	0	16479019
VERNON	143793	598824	456833	0	185531	119322	0	1504363
WASHINGTON	1118077	991800	1127369	0	535355	830997	0	4603598
WEBSTER	148164	196121	78966	0	179348	0	0	602599
WEST BATON ROUGE	110069	2142	1274	0	1058	105483	0	220026
WEST CARROLL	55470	125013	81692	0	0	0	0	262175
WEST FELICIANA	0	0	127000	0	0	0	0	127000
WINN	2760	237472	193147	0	75244	0	0	508623
** Subtotal **	44505710	101789471	83619119	27841900	117153718	334713181	232650	709855749
** STATE: ME								
KNOX	0	85484	0	0	0	85484	0	170968

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Producer Payroll by County of Residence and Staff Classification, 1984

(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **	0	85484	0	0	0	85484	0	170968
** STATE: MD								
TALBOT	0	0	0	0	0	77200	0	77200
** Subtotal **	0	0	0	0	0	77200	0	77200
** STATE: MA								
BRISTOL	43000	0	0	0	0	0	0	43000
** Subtotal **	43000	0	0	0	0	0	0	43000
** STATE: MI								
WAYNE	36000	0	0	0	0	0	0	36000
** Subtotal **	36000	0	0	0	0	0	0	36000
** STATE: MS								
ADAMS	285384	389845	148808	0	243771	0	0	1067808
AMITE	239369	540891	64780	0	159353	:0805	0	.016399
ATTALA	0	32078	0	0	741	0	0	32820
CARROLL	0	123200	2262	0	0	0	0	125462
CLAIBORNE	42757	125	0	0	0	0	0	42082
CLARKE	529347	1211841	428355	0	518019	82200	0	2769763
COPIAH	102643	413224	5122	0	81032	0	0	602021
COVINGTON	77632	290665	510022	0	67914	1036	0	947270
FORREST	683821	1687701	1137:43	88	790709	5:4810	0	40:4271
FRANKLIN	389685	939676	141831	0	49923	3546	0	:524661
GEORGE	207291	138511	0	0	104850	0	0	450652
GREENE	180707	241529	2347	0	45153	0	0	469736
HANCOCK	540411	878490	207628	26276	556582	837221	0	3106608
HARRISON	781702	1360975	680266	0	796431	1045105	0	4664479
HINDS	188275	461485	288216	0	306242	285305	0	1529524
HOLMES	0	0	75422	0	81000	0	0	156422
JACKSON	205708	505848	374758	0	294370	270496	0	1651180
JASPER	214655	282922	122170	0	58379	808	0	678934
JEFFERSON	52717	88003	59466	0	53555	0	0	253742
JEFFERSON DAV:S	161006	170507	260336	0	186846	192639	0	971333
JONES	575540	867643	789116	0	2:8995	297949	0	2749243
LAMAR	381808	720290	442666	0	352699	110946	0	20004:0
LAUDERDALE	312972	733856	136917	0	197825	92308	0	1473878
LAWRENCE	319753	372306	305689	0	144939	2796.6	0	:422303
LEAKE	0	242572	0	0	65680	352	0	3086:2
LINCOLN	933959	2674098	1038788	0	589989	330962	0	5567796
LOWNDES	0	49450	0	0	41149	0	0	90599
MADISON	61200	108592	0	0	124333	:8494	0	3:2620

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(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
MARION	943469	1475294	2175298	0	255518	1500689	0	6358268
MONROE	49400	0	0	0	87736	0	0	137136
NESHOBA	2912	64140	0	0	1224	39213	0	107488
NEWTON	60012	55377	0	0	1691	30554	0	147623
OKTIBBEHA	0	50	0	0	67416	0	0	67466
PEARL RIVER	683423	1868552	1263732	86836	1663295	2470826	0	8036665
PERRY	11524	166805	58143	0	107966	15748	0	360187
PIKE	501736	1361550	488036	0	303888	266346	0	2921555
RANKIN	215753	355745	429238	0	77564	193	0	1078493
SCOTT	73747	178747	0	0	0	70	0	252565
SIMPSON	156361	245357	426628	0	79	0	0	828425
SMITH	114808	319824	130183	0	9261	0	0	574077
STONE	102510	11700	11544	0	2132	156384	0	284270
SUNFLOWER	0	62947	0	0	0	0	0	62947
TIPPAH	0	55087	0	0	0	0	0	55087
WALTHALL	62027	372561	812300	0	159801	97657	0	1504345
WARREN	0	62213	148	0	0	0	0	62361
WAYNE	478120	225437	438454	0	45532	113613	0	1301156
WEBSTER	0	55563	0	0	0	0	0	55563
WILKINSON	290876	315956	0	0	2502	0	0	609334
WINSTON	41888	14158	0	0	71741	113800	0	241586
YAZOO	0	0	146984	0	0	0	0	146984
** Subtotal **	11257510	22793387	13602797	113200	8988423	9247692	0	66003008
** STATE: MO								
BOLLINGER	0	105349	0	0	0	0	0	105349
JACKSON	45309	0	0	0	0	0	0	45309
** Subtotal **	45309	105349	0	0	0	0	0	150658
** STATE: NJ								
HUDSON	0	0	0	0	0	83800	0	83800
MORRIS	0	0	0	0	0	87600	0	87600
** Subtotal **	0	0	0	0	0	171400	0	171400
** STATE: NM								
SANDOVAL	23134	0	0	0	0	0	0	23134
** Subtotal **	23134	0	0	0	0	0	0	23134
** STATE: NY								
SUFFOLK	0	0	0	0	55200	0	0	55200

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(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **								
	0	0	0	0	55200	0	0	55200
** STATE: NC								
MECKLENBURG	0	0	0	0	26400	86400	0	112800
** Subtotal **								
	0	0	0	0	26400	86400	0	112800
** STATE: OH								
CUYAHOGA	0	0	0	0	0	59276	0	59276
GEAUGA	0	0	0	0	0	86724	0	86724
GUERNSEY	0	0	0	0	57800	0	0	57800
** Subtotal **								
	0	0	0	0	57800	146000	0	203800
** STATE: OK								
CLEVELAND	0	0	0	0	0	103272	0	103272
KAY	0	0	0	0	0	84614	0	84614
LATIMER	50200	0	0	0	0	0	0	50200
MUSKOGEE	0	60400	0	0	0	0	0	60400
** Subtotal **								
	50200	60400	0	0	0	187886	0	298486
** STATE: PA								
ALLEGHENY	0	0	0	0	61008	0	0	61008
SOMERSET	0	0	0	0	0	96207	0	96207
** Subtotal **								
	0	0	0	0	61008	96207	0	157215
** STATE: RI								
WASHINGTON	42957	0	0	0	0	0	0	42957
** Subtotal **								
	42957	0	0	0	0	0	0	42957
** STATE: TN								
DAVIDSON	0	0	0	0	0	104000	0	104000
HAMILTON	0	63200	0	0	0	0	0	63200
HARDIN	0	0	73200	0	0	0	0	73200
MCNAIRY	48000	0	0	0	0	0	0	48000
MARION	0	0	77400	0	0	0	0	77400
MONROE	0	0	58684	0	0	0	0	58684
SHELBY	0	63000	136000	0	0	74400	0	273400
SULLIVAN	58682	0	0	0	0	0	0	58682
SUMNER	0	0	0	0	78400	0	0	78400
WHITE	0	0	66028	0	0	0	0	66028

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Producer Payroll by County of Residence and Staff Classification, 1984
(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **								
	106682	126200	411312	0	78400	178400	0	900994
** STATE: TX								
ANDERSON	4085	61169	169207	0	0	0	0	234461
ANGELINA	52947	127073	0	0	124875	0	0	304895
ATASCOSA	0	63464	95520	0	0	0	0	158984
BASTROP	0	0	748	0	0	32803	0	33551
BEE	0	83530	0	0	0	0	0	83530
BELL	0	0	0	0	61876	0	0	61876
BEXAR	0	59721	96	0	0	0	0	59817
BRAZORIA	214252	414867	304830	27944	415372	156133	0	1533398
BROOKS	0	109168	0	0	0	0	0	109168
CALDWELL	0	115674	0	0	0	0	0	115674
CAMERON	0	59600	0	0	0	0	0	59600
CASS	1625	1869	0	0	0	97200	0	100694
CHAMBERS	0	137359	141873	37190	5032	16505	0	338013
CHEROKEE	0	123400	0	0	73124	99800	0	296324
COLLIN	0	0	0	0	0	193800	0	193800
COLORADO	94657	0	0	0	0	0	0	94657
COMAL	0	53971	0	0	0	0	0	53971
DALLAS	96600	62400	0	0	45618	69200	0	273818
DENTON	0	0	0	0	0	87400	0	87400
DUVAL	97703	119662	351	0	0	0	0	217716
ECTOR	0	61070	0	36	0	130400	0	191506
FORT BEND	64338	66325	78000	48518	66037	842580	0	1165798
GALVESTON	55642	171531	473000	64000	313640	218064	0	1295085
GILLESPIE	0	0	0	0	0	87337	0	87337
GOLIAD	212	62577	0	0	62800	0	0	125589
GREGG	49252	272697	155202	0	221550	0	0	698701
GRIMES	0	58406	0	0	59530	79200	0	197136
HARDIN	49400	108288	179741	0	8586	82590	0	420613
HARRIS	578161	1017837	514727	981338	2525431	10885455	0	16502949
HARRISON	1576	71831	158522	0	62	0	0	231991
HENDERSON	0	59031	1193	0	0	0	0	60224
HOUSTON	51115	59281	0	0	0	0	0	110396
JASPER	110967	1310	59692	0	0	0	0	171970
JEFFERSON	303372	294633	394755	0	90310	64735	0	1153805
JIM WELLS	0	2114	87449	0	0	0	0	89563
KARNES	0	447081	0	0	0	0	0	447081
KAUFMAN	0	0	0	0	153182	0	0	153182
LAVACA	7826	118518	0	0	0	0	0	126344
LEE	0	0	54366	0	0	0	0	54366
LEON	0	0	0	0	0	70179	0	70179
LIBERTY	0	63386	101000	0	55014	175331	0	394731
LIVE OAK	0	76769	0	0	0	0	0	76769
LUBBOCK	0	0	0	0	0	74000	0	74000

EXHIBIT #6
Producer Payroll by County of Residence and Staff Classification, 1984
(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER- VISORY	CLERKS/ SECRE- TARIES	SKILLED TECH- NICAL	PROF./ MGR.	UNDETER- MINED	TOTAL
MCMULLEN	88	61174	0	0	0	0	0	61262
MARION	200530	227231	576396	172000	1303963	8223564	0	10703684
MATAGORDA	106	60603	157570	56	380	105800	0	324515
MEDINA	0	58600	69864	0	0	0	0	128464
MIDLAND	0	930	0	35856	0	82000	0	118786
MONTGOMERY	64101	63884	64400	0	217640	1094466	0	1504491
NACOGDOCHES	0	65183	3436	0	174600	0	0	243219
NAVARRO	0	62000	0	0	62000	150000	0	274000
NUECES	50200	296342	87800	0	0	0	0	434342
ORANGE	63288	288887	642725	0	53489	0	0	1048389
PALO PINTO	0	0	0	0	63667	0	0	63667
PANOLA	0	12501	105597	0	0	0	0	118038
PARKER	0	0	0	0	66603	0	0	66603
POLK	146200	0	0	0	82000	335800	0	564000
RUSK	0	21923	174998	0	26314	0	0	223236
SABINE	0	177294	24682	0	0	0	0	201976
SAN AUGUSTINE	726	133920	1437	0	0	0	0	136083
SAN PATRICIO	103800	0	0	0	0	0	0	103800
SHELBY	44674	214453	168727	0	0	0	0	427854
SMITH	110400	120431	72540	0	46563	98200	0	448135
TARRANT	0	0	0	0	87600	94000	0	181600
TRAVIS	92600	0	67252	0	92167	130146	0	392165
TRINITY	53	58527	0	0	72725	0	0	131305
TYLER	0	146512	2059	0	0	321867	0	470438
VAN ZANDT	0	0	106000	0	63600	0	0	169600
VICTORIA	52788	161962	0	0	199200	0	0	413950
WALKER	53171	119	0	0	0	0	0	53290
WASHINGTON	0	0	0	0	77107	0	0	77107
WHARTON	0	0	77400	0	0	0	0	77400
WILLIAMSON	0	0	0	0	24433	77854	0	102287
WILSON	0	81903	480	0	0	0	0	82383
WINKLER	0	0	68000	0	0	0	0	68000
WOOD	0	0	0	0	62392	0	0	62392
ZAPATA	53600	57600	0	0	0	0	0	111200
** Subtotal **	2876055	6978392	5441635	1366938	7058550	24236498	0	47958069
** STATE: WA								
KING	0	43000	0	0	0	0	0	43000
** Subtotal **	0	43000	0	0	0	0	0	43000
** STATE: WY								
NIOBRARA	0	0	0	0	0	93894	0	93894

EXHIBIT #6

Producer Payroll by County of Residence and Staff Classification, 1984

(Dollars)

COUNTY OF RESIDENCE	UNSKILLED LABOR	SKILLED LABOR	SUPER-VISORY	CLERKS/ SECRE-TARIES	SKILLED TECH-NICAL	PROF./ MGR.	UNDETER-MINED	TOTAL
** Subtotal **	0	0	0	0	0	93894	0	93894
*** Total ***	64777895	142771536	109194524	29322038	136591777	372145017	299450	855102238

EXHIBIT #7
Frequency Distribution of Salary, by Work Location

SALARY	HEAD-QUARTERS STAFF	STAGING AREA STAFF	NON-SITE OFF SHORE STAFF	OCS PLATFORM STAFF	TOTAL STAFF
UNKNOWN	2	0	0	4	6
$ 1- 15	807	68	0	4	880
$ 16- 20	1087	299	38	12	1437
$ 21- 25	891	232	208	408	1739
$ 26- 30	824	999	70	2744	4637
$ 31- 35	1072	877	52	3926	5927
$ 36- 40	1131	530	88	898	2647
$ 41- 45	789	606	78	374	1847
$ 46- 50	830	588	90	392	1900
$ 51- 60	866	216	80	352	1514
$ 61- 70	500	90	4	96	690
$ 71- 80	360	42	0	6	408
$ 81- 90	151	6	0	0	157
$ 91-100	59	2	0	0	61
$100+	108	4	0	0	112
*** Total ***	9476	4560	708	9216	23960

EXHIBIT #8

Direct Producer OCS Employment and Salaries by Job Title

STAFF CLASSIFICATION	OCS-RELATED EMPLOY-MENT	MINIMUM SALARY	MAXIMUM SALARY	AVERAGE SALARY	PAYROLL
** LOCATION: CORPORATE HEADQUARTERS					
UNDETERMINED	22	9600	39600	7913	178050
UNSKILLED LABOR	8	26700	51000	18850	150800
SKILLED LABOR	26	27033	44560	17815	463200
SUPERVISORY	146	72500	130267	49755	7264410
CLERKS/SECRETARIES	1385	23650	84800	16654	23063150
SKILLED TECHNICAL	2576	24000	95800	25824	66519215
PROFESSIONAL/MGRS.	5313	34000	342292	49672	263922279
** Subtotal **					
	9476				361561104
** LOCATION: NON-SITE, OFF SHORE					
UNDETERMINED	2	66800	66800	33400	66800
UNSKILLED LABOR	198	37800	53600	22004	4356895
SKILLED LABOR	96	48029	97000	30109	2890383
SUPERVISORY	108	73200	127900	51215	5531200
SKILLED TECHNICAL	168	47050	110000	35666	5992183
PROFESSIONAL/MGRS.	136	69143	104500	42507	5780922
** Subtotal **					
	708				24618383
** LOCATION: OFF SHORE STRUCTURE					
UNSKILLED LABOR	1922	38400	72200	27492	52838691
SKILLED LABOR	3966	48650	84799	30468	120836303
SUPERVISORY	1932	59086	125667	40782	78791946
CLERKS/SECRETARIES	32	26000	59600	24113	771587
SKILLED TECHNICAL	912	39200	111000	33292	30362454
PROFESSIONAL/MGRS.	452	65314	150667	50423	22792568
** Subtotal **					
	9216				306393548
** LOCATION: ONSHORE STAGING AREA					
UNDETERMINED	2	29600	56000	21840	54600
UNSKILLED LABOR	299	34100	70200	25040	7487101
SKILLED LABOR	627	25200	93100	29802	18671319
SUPERVISORY	443	43800	124067	40059	17746433
CLERKS/SECRETARIES	310	27055	64067	17706	5488762
SKILLED TECHNICAL	1124	24000	108200	30033	33769517
PROFESSIONAL/MGRS.	1754	53000	220400	45462	79745140
** Subtotal **					
	4560				162962872
*** Total ***					
	23960				855535906

shore at that site and personnel using that location as an embarkation point to their offshore work site. The data presented in this exhibit can be used to determine the staging locations for offshore workers for any offshore region. For example operations located in the Main Pass-Southeast extension are supported by 20 persons out of Grand Isle and 45 persons out of Venice.

Exhibit 10 provides similar data organized by staging area. In this exhibit the total number of on shore producer employees is listed directly under the staging area. The number of employees using that location is listed by offshore work site. For example Fourchon supports 33 offshore workers in the Ship Shoal area, 17 going to South Timbalier, 35 in South Timbalier-State Waters and 47 in the West Delta blocks. These data are being used to derive matrices relating offshore structure location to the supporting staging locations.

Additional data are being developed which relate staging location to county or parish of residence. These data are rather lengthy and have been placed in an Appendix of the draft report. This Appendix provides frequency counts of the number of employees from each county or parish using the various staging sites. Thus for any given staging location it can be determined from which counties both the on shore and offshore employees were drawn in 1984. To address the question of where individuals working exclusively offshore are drawn from, a similar profile is being developed to relate exclusively the relationship between offshore workers and their place of residence.

Similar data has been developed by county or parish. These data will provide employee frequency counts, average salary and cumulative payroll data cut by county/parish and staging location. Thus for a given county it can be determined which staging locations and on shore work sites producer personnel are traveling to. For example these data indicate that Mobile County has 38 individuals commuting to Morgan City, 16 to Venice and 84 to New Orleans. Small numbers of offshore persons are also commuting to Fourchon, Grand Isle, Houma, Intracoastal City, and Leeville from Mobile County. Similar data has been generated based exclusively on records of persons working offshore but is not included in this preliminary document.

PRODUCER EXPENDITURE IMPACTS

Offshore producers have a major direct economic impact through their heavy use of contracting for offshore services, normal operating expenditures and extensive purchases of capital goods and equipment. The nine study participants were surveyed to determine their total 1984 expenditures. The data provided included all operating and capital expenditures made in 1984 excluding payroll benefits, taxes and OCS or state leasing costs and royalties.

Expenditures By Offshore Producers

The direct survey results are presented in Exhibit 11. These data were scaled to account for sampling based on the percent of offshore energy produced by the nine major offshore producers supplying data. Total expenditures by producers resulting from offshore oil and gas exploration, development and production in the Gulf of Mexico region were projected to have totaled $8.75 billion in 1984. Expenditures by the nine study participants alone totaled $4.4 billion.

EXHIBIT #9

Employment, Salary and Payroll by Platform and Staging Area

STAGING AREA	EMPLOYMENT	AVERAGE SALARY	PAYROLL
** PLATFORM BLOCK: BTS			
VENICE	6	38733	232400
** Subtotal **			
	6		232400
** PLATFORM BLOCK: BTSSW			
BURAS	46	30639	1409400
EMPIRE	38	29453	1119200
VARIOUS	5	38489	203213
** Subtotal **			
	89		2731813
** PLATFORM BLOCK: CW			
VARIOUS	14	42778	605750
** Subtotal **			
	14		605750
** PLATFORM BLOCK: EBRKS			
MORGAN CITY	8	48200	385600
** Subtotal **			
	8		385600
** PLATFORM BLOCK: EC			
CAMERON	72	30583	2210894
GRAND CHENR	7	30611	202013
INTRA. CITY	72	31883	2295600
LAKE CHRLES	3	32533	97600
MORGAN CITY	11	29773	327471
** Subtotal **			
	165		5133577
** PLATFORM BLOCK: ECS			
CAMERON	17	29586	508868
** Subtotal **			
	17		508868
** PLATFORM BLOCK: ECSA			
CAMERON	12	30117	361400
LAFAYETTE	1	45133	54160
** Subtotal **			
	13		415560
** PLATFORM BLOCK: ED			
VENICE	90	30704	2763458
** Subtotal **			
	90		2763458

EXHIBIT #9
Employment, Salary and Payroll by Platform and Staging Area

STAGING AREA	EMPLOYMENT	AVERAGE SALARY	PAYROLL
** PLATFORM BLOCK:			
ABBYVILLE	98	31000	3038000
AMELIA	6	25136	138250
BATON ROUGE	94	31149	2928000
BAYTOWN	30	29026	870731
BILOXI	6	45467	272800
BURAS	26	26361	685445
CAMERON	88	30398	2675066
COCODRIE	14	31557	441800
CORPUS CHRS	14	29900	418600
DALLAS	2	29800	59600
DULAC	18	19389	349000
GALVESTON	40	26730	1069200
GRAND CHENR	2	29200	58400
GRAND ISLE	116	38890	4511106
HOUMA	30	26013	780400
HOUSTON	302	38965	11773400
INTRA. CITY	20	39500	790000
LA HABRA	2	46000	92000
LAFAYETTE	1262	37641	47502916
LAKE CHRLES	148	36472	5397800
LEEVILLE	218	31467	6859858
MOBILE AREA	4	36000	144000
MORGAN CITY	836	36635	30627050
MSY	300	36668	11000400
NEW ORLEANS	9940	38092	378656504
PENSACOLA	6	41500	249000
RODESSA	18	29867	537600
SABINE PASS	82	29573	2425050
SULPHUR	4	16300	65200
VENICE	372	31494	11717134
** Subtotal **			
	14098		526134332
** PLATFORM BLOCK: BR			
FREEPORT	27	31868	866819
MORGAN CITY	86	32077	2745687
VARIOUS	14	42778	605750
** Subtotal **			
	127		4218257
** PLATFORM BLOCK: BRS			
FREEPORT	27	31868	866819
VARIOUS	14	42778	605750
** Subtotal **			
	41		1472569

EXHIBIT #9
Employment, Salary and Payroll by Platform and Staging Area

STAGING AREA	EMPLOYMENT	AVERAGE SALARY	PAYROLL
** PLATFORM BLOCK: EI			
GRAND CHENR	2	50700	101400
HOUMA	12	32450	389400
INTRA. CITY	144	33671	4848582
LAFAYETTE	2	44900	89800
MORGAN CITY	590	31525	18599904
VARIOUS	19	41613	808963
** Subtotal **			
	769		24838048
** PLATFORM BLOCK: EIS			
INTRA. CITY	108	38981	4210068
MORGAN CITY	253	33210	8402056
** Subtotal **			
	361		12612124
** PLATFORM BLOCK: GAL			
FREEPORT	27	31868	866819
MORGAN CITY	21	32077	686422
VARIOUS	31	42778	1312339
** Subtotal **			
	79		2865580
** PLATFORM BLOCK: GI			
GRAND ISLE	316	32156	10161555
LEEVILLE	26	32139	845099
NEW ORLEANS	18	34589	622600
VENICE	8	31675	253400
** Subtotal **			
	368		11892654
** PLATFORM BLOCK: GIS			
VENICE	61	31560	1916286
** Subtotal **			
	61		1916286
** PLATFORM BLOCK: GISW			
GRAND ISLE	130	38569	5014062
** Subtotal **			
	130		5014062
** PLATFORM BLOCK: HI			
CAMERON	12	30117	361400
FREEPORT	66	31512	2092438
GALVESTON	42	33519	1407730
LAFAYETTE	1	45133	54160
MORGAN CITY	115	32720	3775829
SAN ANTONIO	3	30200	96641

EXHIBIT #9

Employment, Salary and Payroll by Platform and Staging Area

STAGING AREA	EMPLOYMENT	AVERAGE SALARY	PAYROLL
VARIOUS	15	42778	656169
** Subtotal **			
	256		8444367
** PLATFORM BLOCK: HIE			
INTRA. CITY	6	37667	226000
** Subtotal **			
	6		226000
** PLATFORM BLOCK: HIES			
INTRA. CITY	56	39607	2218078
SAN ANTONIO	3	30200	96641
** Subtotal **			
	59		2314719
** PLATFORM BLOCK: HIS			
FREEPORT	80	31580	2526338
INTRA. CITY	38	36705	1394806
** Subtotal **			
	118		3921144
** PLATFORM BLOCK: M/V			
GALVESTON	66	33679	2222800
VARIOUS	14	49857	698000
** Subtotal **			
	80		2920800
** PLATFORM BLOCK: MI			
MORGAN CITY	6	48200	289200
SAN ANTONIO	2	30200	48320
** Subtotal **			
	8		337520
** PLATFORM BLOCK: MISCA			
GRAND ISLE	52	39769	2067996
VARIOUS	5	38488	177793
VENICE	97	32022	3112430
** Subtotal **			
	154		5358219
** PLATFORM BLOCK: MOBSW			
MOBILE AREA	4	51100	204400
** Subtotal **			
	4		204400
** PLATFORM BLOCK: MP			
BURAS	1	23000	28000
HOUMA	14	28915	404755

EXHIBIT #9

Employment, Salary and Payroll by Platform and Staging Area

STAGING AREA	EMPLOYMENT	AVERAGE SALARY	PAYROLL
LEEVILLE	1	29700	29700
MORGAN CITY	10	48200	482000
VARIOUS	5	38489	203213
VENICE	434	31417	13633919
** Subtotal **			
	465		14781587
** PLATFORM BLOCK: MPSE			
GRAND ISLE	40	38801	1552104
VENICE	89	29706	2652653
** Subtotal **			
	129		4204757
** PLATFORM BLOCK: MPSW			
VARIOUS	5	38488	177793
VENICE	124	31763	3938535
** Subtotal **			
	129		4116328
** PLATFORM BLOCK: SM			
LAFAYETTE	2	44900	89800
MORGAN CITY	64	30305	1939470
** Subtotal **			
	66		2029270
** PLATFORM BLOCK: SMI			
INTRA. CITY	8	37000	296000
MORGAN CITY	283	33801	9565588
** Subtotal **			
	291		9861588
** PLATFORM BLOCK: SMIS			
INTRA. CITY	68	36618	2489994
MORGAN CITY	10	29716	297153
VARIOUS	14	53429	748000
** Subtotal **			
	92		3535147
** PLATFORM BLOCK: SP			
CAMERON	43	32159	1382691
MORGAN CITY	33	30767	1015318
VARIOUS	5	38489	203213
VENICE	194	31767	6160352
** Subtotal **			
	275		8761573

EXHIBIT #9
Employment, Salary and Payroll by Platform and Staging Area

STAGING AREA	EMPLOYMENT	AVERAGE SALARY	PAYROLL
** PLATFORM BLOCK: SPASS			
BURAS	1	28000	28000
GRAND ISLE	2	36900	73800
LEEVILLE	1	29700	29700
NEW ORLEANS	1	38700	38700
VENICE	85	31507	2678131
** Subtotal **			
	90		2848331
** PLATFORM BLOCK: SPEL			
HOUMA	52	30519	1586887
LEEVILLE	18	30472	557499
** Subtotal **			
	70		2144386
** PLATFORM BLOCK: SPSE			
GRAND ISLE	50	38400	1920068
VARIOUS	5	38489	203213
VENICE	72	31937	2299554
** Subtotal **			
	127		4422835
** PLATFORM BLOCK: SPSW			
BURAS	2	30100	60200
VARIOUS	5	38489	203213
VENICE	524	31324	16414315
** Subtotal **			
	531		16677728
** PLATFORM BLOCK: SS			
CAMERON	2	43500	87000
FOURCHON	66	31576	2083940
HOUMA	266	29717	7904257
LAFAYETTE	6	46171	276932
MORGAN CITY	322	30580	9834588
VARIOUS	5	38488	177793
** Subtotal **			
	666		20364511
** PLATFORM BLOCK: SSS			
MORGAN CITY	56	29701	1657359
** Subtotal **			
	56		1657359
** PLATFORM BLOCK: SSSW			
MORGAN CITY	19	29701	552453

EXHIBIT #9
Employment, Salary and Payroll by Platform and Staging Area

STAGING AREA	EMPLOYMENT	AVERAGE SALARY	PAYROLL
** Subtotal **			
	19		552453
** PLATFORM BLOCK: ST			
FOURCHON	35	30948	1083110
GRAND ISLE	152	37697	5730234
HOUMA	24	29766	714261
LEEVILLE	328	31196	10232430
MORGAN CITY	10	46500	465000
VARIOUS	5	38489	203213
VENICE	2	29700	59400
** Subtotal **			
	556		18487648
** PLATFORM BLOCK: STS			
MORGAN CITY	48	31723	1522696
VARIOUS	5	38489	203213
** Subtotal **			
	53		1725909
** PLATFORM BLOCK: STSW			
FOURCHON	70	30948	2166455
LEEVILLE	143	29755	4266876
VARIOUS	5	38488	177793
** Subtotal **			
	218		6611124
** PLATFORM BLOCK: SW			
GRAND ISLE	2	36900	73800
NEW ORLEANS	1	38700	38700
VENICE	13	33231	432000
** Subtotal **			
	16		544500
** PLATFORM BLOCK: VM			
CAMERON	61	31021	1882776
GRAND CHENR	7	30611	208134
LAFAYETTE	1	45133	54160
MORGAN CITY	70	30939	2178157
** Subtotal **			
	139		4323228
** PLATFORM BLOCK: VMS			
CAMERON	27	30066	802576
INTRA. CITY	72	38000	2735864
LAFAYETTE	1	45133	54160
VARIOUS	2	47000	94000

EXHIBIT #10

Employment, Salary, and Payroll by Staging Area and Platform

PLATFORM BLOCK	EMPLOYMENT	AVERAGE SALARY	PAYROLL
** STAGING AREA: ABBYVILLE			
	98	31000	3038000
** Subtotal **			
	98		3038000
** STAGING AREA: AMELIA			
	6	25136	138250
** Subtotal **			
	6		138250
** STAGING AREA: BATON ROUGE			
	94	31149	2928000
** Subtotal **			
	94		2928000
** STAGING AREA: BAYTOWN			
	30	29026	870731
** Subtotal **			
	30		870731
** STAGING AREA: BILOXI			
	6	45467	272800
** Subtotal **			
	6		272800
** STAGING AREA: BURAS			
	26	26361	685445
BTSSW	46	30639	1409400
MP	1	28000	28000
SPASS	1	28000	28000
SPSW	2	30100	60200
WDSW	68	31538	2144600
** Subtotal **			
	144		4355645
** STAGING AREA: CAMERON			
	88	30398	2675088
EC	72	30583	2210894
ECS	17	29586	508868
ECSA	12	30117	361400
HI	12	30117	361400
SP	43	32159	1382691
SS	2	43500	87000
VM	61	31021	1862776
VMS	27	30066	802576
WC	271	31154	8445413
WCS	43	32159	1382691

EXHIBIT #10
Employment, Salary, and Payroll by Staging Area and Platform

PLATFORM BLOCK	EMPLOYMENT	AVERAGE SALARY	PAYROLL
** Subtotal **			
	648		20100796
** STAGING AREA: COCODRIE			
	14	31557	441800
** Subtotal **			
	14		441800
** STAGING AREA: CORPUS CHRS			
	14	29900	418600
** Subtotal **			
	14		418600
** STAGING AREA: DALLAS			
	2	29800	59600
** Subtotal **			
	2		59600
** STAGING AREA: DULAC			
	18	19389	349000
** Subtotal **			
	18		349000
** STAGING AREA: EMPIRE			
BTSSW	38	29453	1119200
** Subtotal **			
	38		1119200
** STAGING AREA: FOURCHON			
SS	66	31576	2083940
ST	35	30948	1083110
STSW	70	30948	2166455
WD	95	32427	3080453
** Subtotal **			
	266		8413959
** STAGING AREA: FREEPORT			
BR	27	31868	866819
BRS	27	31868	866819
GAL	27	31868	866819
HI	66	31512	2092438
HIS	80	31580	2526338
** Subtotal **			
	228		7219233
** STAGING AREA: GALVESTON			
	40	26730	1069200
HI	42	33519	1407730

EXHIBIT #10

Employment, Salary, and Payroll by Staging Area and Platform

PLATFORM BLOCK	EMPLOYMENT	AVERAGE SALARY	PAYROLL
M/V	66	33679	2222800
** Subtotal **			
	148		4699730
** STAGING AREA: GRAND CHENR			
	2	29200	58400
EC	7	30611	202013
EI	2	50700	101400
VM	7	30611	208134
VOS	2	41600	83200
WC	17	40794	709793
WCSW	57	30256	1730500
** Subtotal **			
	94		3093440
** STAGING AREA: GRAND ISLE			
	116	38890	4511106
GI	316	32156	10161555
GISW	130	38569	5014062
MISCA	52	39769	2067996
MPSE	40	38801	1552104
SPASS	2	36900	73800
SPSE	50	38400	1920068
ST	152	37697	5730234
SW	2	36900	73800
WD	152	38167	5801406
WDSW	158	39177	6190150
** Subtotal **			
	1170		43096281
** STAGING AREA: HOUMA			
	30	26013	780400
EI	12	32450	389400
MP	14	28915	404755
SPEL	52	30519	1586887
SS	266	29717	7904257
ST	24	29766	714261
VOS	24	30533	732800
** Subtotal **			
	422		12512760
** STAGING AREA: HOUSTON			
	302	38985	11773400
** Subtotal **			
	302		11773400

EXHIBIT #10

Employment, Salary, and Payroll by Staging Area and Platform

PLATFORM BLOCK	EMPLOYMENT	AVERAGE SALARY	PAYROLL
** STAGING AREA: INTRA. CITY			
	20	39500	790000
EC	72	31883	2295600
EI	144	33671	4848582
EIS	108	38981	4210068
HIE	6	37667	226000
HIES	56	39607	2218078
HIS	38	36705	1394806
SMI	8	37000	296000
SMIS	68	36618	2489994
VMS	72	38000	2735864
VOS	2	41600	83200
WCS	52	39423	2050000
** Subtotal **	646		23638192
** STAGING AREA: LA HABRA			
	2	46000	92000
** Subtotal **	2		92000
** STAGING AREA: LAFAYETTE			
	1262	37641	47502916
ECSA	1	45133	54160
EI	2	44900	89800
HI	1	45133	54160
SM	2	44900	89800
SS	6	46171	276932
VM	1	45133	54160
VMS	1	45133	54160
VOS	12	35633	427670
WC	1	45133	54160
** Subtotal **	1290		48657918
** STAGING AREA: LAKE CHRLES			
	148	36472	5397800
EC	3	32533	97600
WC	47	28808	1353937
** Subtotal **	198		6849336
** STAGING AREA: LEEVILLE			
	218	31467	6859858
GI	26	32139	845099
MP	1	29700	29700
SPASS	1	29700	29700
SPEL	18	30472	557499

EXHIBIT #10

Employment, Salary, and Payroll by Staging Area and Platform

PLATFORM BLOCK	EMPLOYMENT	AVERAGE SALARY	PAYROLL
ST	328	31196	10232430
STSW	143	29755	4266876
** Subtotal **			
	736		22821162
** STAGING AREA: MOBILE AREA			
	4	36000	144000
MOBSW	4	51100	204400
** Subtotal **			
	8		348400
** STAGING AREA: MORGAN CITY			
	836	36635	30627050
BR	86	32077	2745687
EBRKS	8	48200	385600
EC	11	29773	327471
EI	590	31525	18599904
EIS	253	33210	8402056
GAL	21	32077	686422
HI	115	32720	3775829
MI	6	48200	289200
MP	10	48200	482000
SM	64	30305	1939470
SMI	283	33801	9565568
SMIS	10	29716	297153
SP	33	30767	1015318
SS	322	30580	9834588
SSS	56	29701	1657359
SSSW	19	29701	552453
ST	10	46500	465000
STS	48	31723	1522696
VM	70	30939	2178157
VMSW	33	30767	1015318
VOS	152	30530	4640669
WC	27	36359	996191
WCSW	100	31770	3177000
WD	12	49283	591400
** Subtotal **			
	3175		105769580
** STAGING AREA: MSY			
	300	36668	11000400
** Subtotal **			
	300		11000400
** STAGING AREA: NEW ORLEANS			
	9940	38092	378656504
GI	18	34589	622600

EXHIBIT #10

Employment, Salary, and Payroll by Staging Area and Platform

PLATFORM BLOCK	EMPLOYMENT	AVERAGE SALARY	PAYROLL
SPASS	1	38700	38700
SW	1	38700	38700
** Subtotal **			
	9960		379356504
** STAGING AREA: PENSACOLA			
	6	41500	249000
** Subtotal **			
	6		249000
** STAGING AREA: RODESSA			
	18	29867	537600
** Subtotal **			
	18		537600
** STAGING AREA: SABINE PASS			
	82	29573	2425050
** Subtotal **			
	82		2425050
** STAGING AREA: SAN ANTONIO			
HI	3	30200	96641
HIES	3	30200	96641
MI	2	30200	48320
** Subtotal **			
	8		241601
** STAGING AREA: SULPHUR			
	4	16300	65200
** Subtotal **			
	4		65200
** STAGING AREA: VARIOUS			
BR	14	42778	605750
BRS	14	42778	605750
BTSSW	5	38489	203213
CW	14	42778	605750
EI	19	41613	808963
GAL	31	42778	1312339
HI	15	42778	656163
M/V	14	49857	698000
MISCA	5	38488	177793
MP	5	38489	203213
MPSW	5	38488	177793
SMIS	14	53429	748000
SP	5	38489	203213
SPSE	5	38489	203213
SPSW	5	38489	203213

EXHIBIT #10

Employment, Salary, and Payroll by Staging Area and Platform

PLATFORM BLOCK	EMPLOYMENT	AVERAGE SALARY	PAYROLL
SS	5	38488	177793
ST	5	38489	203213
STS	5	38489	203213
STSW	5	38468	177793
VMS	2	47000	94000
VOS	794	40742	32348918
WCSW	15	42779	656169
WD	5	38489	203213
** Subtotal **	1008		41476684
** STAGING AREA: VENICE			
	372	31494	11717134
BTS	6	38733	232400
ED	90	30704	2763458
GI	8	31675	253400
GIS	61	31560	1916286
MISCA	97	32022	3112430
MP	434	31417	13633919
MPSE	89	29706	2652653
MPSW	124	31763	3938535
SP	194	31787	6160352
SPASS	85	31507	2678131
SPSE	72	31937	2299554
SPSW	524	31324	16414315
ST	2	29700	59400
SW	13	33231	432000
VOS	182	30410	5534545
WD	357	31427	11223700
WDSW	62	31348	1943600
** Subtotal **	2772		86965813
*** Total ***	23955		855395666

Exhibit 11

PROJECTED 1984 EXPENDITURES AND CONTRACTS
BY PRODUCERS FOR GULF OF MEXICO OFFSHORE
DEVELOPMENT, BY EXPENDITURE CATAGORY

CONTRACT OR EXPENDITURE CATEGORY	TOTAL 1984 EXPENDITURES AND CONTRACTS BY OOC SAMPLE	PROJECTED TOTAL 1984 EXPENDITURES BY PRODUCERS FOR GULF OF MEXICO OFFSHORE DEVELOPMENT	AVERAGE PERCENTAGE OF OFFSHORE PRODUCER EXPENDITURES
AIR TRANSPORT	133,022,352	264,299,451	3.02%
BOAT,BARGE,MARINE EQ. & TRANSPORTATION.	254,738,787	506,135,401	5.79%
CATERING SERVICES	38,269,262	76,036,431	0.87%
CEMENT	89,641,181	178,106,270	2.04%
CONTRACT LABOR AND ENGINEERING SERVICES	669,550,850	1,330,317,193	15.21%
CONTRACT EXPLORATORY DRILLING	361,094,974	717,452,382	8.20%
CONTRACT DEVELOPMENT DRILLING	420,642,485	835,766,141	9.55%
DIVING	14,085,354	27,985,908	0.32%
DRILLING FLUIDS,MUD LOGGING, & CHEMICALS	195,724,889	388,881,867	4.45%
FUEL, UTILITIES	145,698,771	289,485,974	3.31%
PIPELINE & PIPELAYING CONTRACTING	95,422,810	189,593,673	2.17%
PLATFORM INSTALLATION	59,614,686	118,447,227	1.35%
PRODUCTION ENHANCEMENT	114,743,935	227,982,430	2.61%
PLATFORM & EQUIPMENT FABRICATION	246,314,544	489,397,441	5.59%
TUBULAR	316,544,641	628,936,216	7.19%
SEISMIC AND GEOPHYSICAL SERVICES	140,742,057	279,637,578	3.20%
WELL LOGGING,WIRELINE AND PERFORATION	240,816,954	478,474,390	5.47%
FIELD OPERATING EXPENSES, OTHER OIL FIELD SERVICES & TOOL RENTALS	536,071,280	1,065,109,305	12.17%
ALL OTHER	330,338,639	656,343,235	7.50%
TOTAL	4,403,078,411	8,748,388,433	

Examples of these expenditures made as part of producers offshore activities are: purchased air transportation services $264 million, boat and marine transportation fees $506 million, contract labor $1.3 billion, contract exploratory drilling $717 million, contract development drilling $420 million, platform fabricators $498 million. An additional $59.6 million was spent to position and install offshore structures.

The relative importance of the various expenditure categories is presented in Exhibit 12. For example, development drilling under contract represented 9.6 percent of total expenditures by offshore producers in the Gulf of Mexico, pipeline construction and repair contracts made up 2.2 percent of expenditures, fuel and utility costs represented 3.3 percent of expenditures and drilling fluids/mud logging/chemical purchases made up 4.4 percent of expenditures.

Expenditures by the various producers have been aggregated to provide the appropriate confidentiality to producer records. Exhibit 13 provides a relative range of the percent of individual company expenditures going into each of the 19 major expenditure categories. Exhibit 14 presents the same information graphically. Relatively large ranges in the percent of expenditures going to specific line items were experienced between the various producers. For example in the category of geophysical exploration, companies surveyed spent between zero and 7.6 percent of expenditures for this service. The industry average was 3.2 percent. These large ranges resulted primarily because of different operating characteristics among the various firms. For example one firm operated their own seismic vessels and another firm had a heavy demand for seismic work in 1984 since they had numerous unexplored lease blocks from bids in the early 1980's. In addition some of the extremely low or zero values resulted because some firms could not identify individual expense items and included them in the "all other" category.

Expenditure Impact Ratios

A mechanism was developed for translating expenditures by the primary offshore producers into employment and wages and salaries. This was done through the application of direct impact ratios to the data for producer expenditures. These ratios were developed with the cooperation of approximately 50 offshore contractors. The impact ratios developed were:

- Wages and salaries as a percent of revenues;
- Average revenues per employee;
- Average wages and salaries per employee;
- Percent of revenues purchasing outside goods; and
- Percent of employees working offshore.

Exhibit 15 presents the preliminary results of our discussions with numerous contract and service companies for each of the 19 contract or expenditure categories. For example firms providing catering services to offshore workers spent an average of 43 percent of their revenues on wages and salaries, paid an average wage of $17,200 in 1984, required $40,000 in revenues to support each employee and made outside purchases of goods and services of 41.8 percent. In addition 86 percent of their employees were located offshore on a regular

Exhibit 12

PERCENT OF PRODUCER EXPENDITURES

BY EXPENDITURE CATEGORY

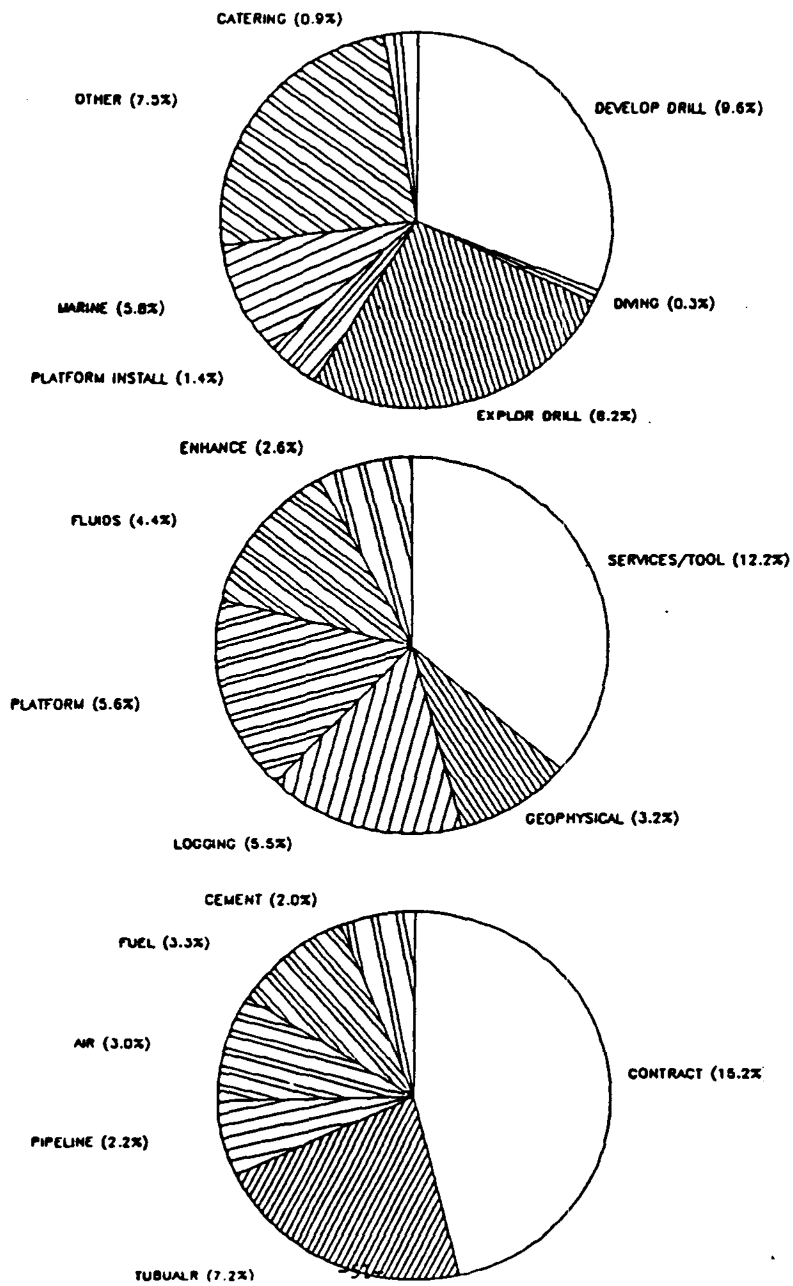
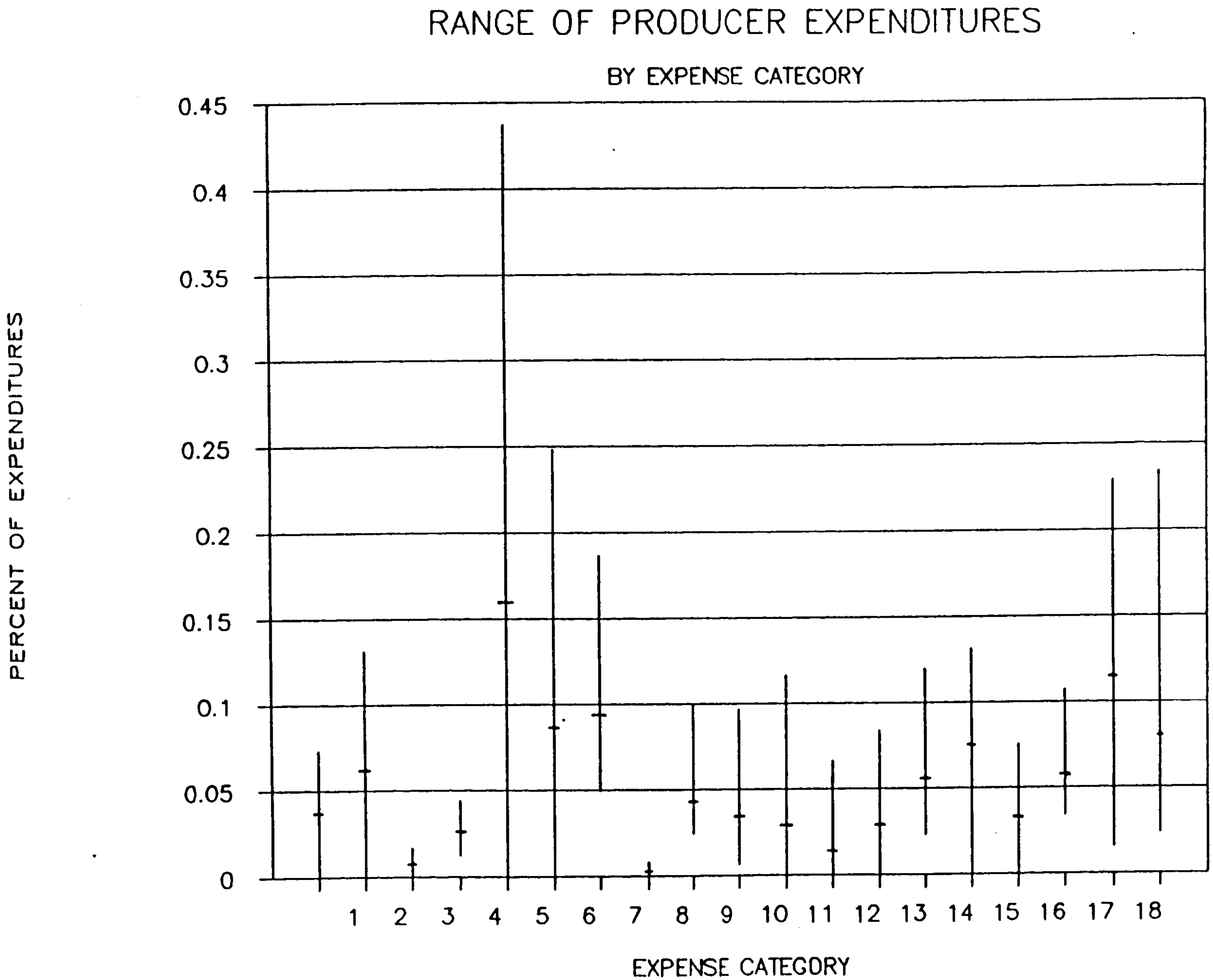


Exhibit 13

DISTRIBUTION OF OFFSHORE PRODUCERS
EXPENDITURES BY EXPENDITURE CATEGORY, 1984

ERENCE UMBER	CONTRACT OR EXPENDITURE CATEGORY	STANDARD DEVIATION OF PERCENTAGE OF EXPENDITURES GOING TO EXPENSE CATEGORY	MINIMUM PERCENTAGE OF INDIVIDUAL PRODUCERS EXPENDITURES	MAXIMUM PERCENTAGE OF INDIVIDUAL PRODUCERS EXPENDITURES	AVERAGE PERCENTAGE OF OFFSHORE PRODUCER EXPENDITURES
1	AIR TRANSPORT	1.91%	0.03%	7.36%	3.02%
2	BOAT,BARGE,MARINE EQ. & TRANSPORTATION.	3.71%	0.00%	13.18%	5.79%
3	CATERING SERVICES	0.49%	.00%	1.66%	0.87%
4	CEMENT	1.00%	1.24%	4.42%	2.04%
5	CONTRACT LABOR AND ENGINEERING SERVICES	13.08%	0.00%	43.73%	15.21%
6	CONTRACT EXPLORATORY DRILLING	6.56%	0.00%	24.79%	8.20%
7	CONTRACT DEVELOPMENT DRILLING	4.18%	4.94%	18.68%	9.55%
8	DIVING	0.23%	0.00%	0.82%	0.32%
9	DRILLING FLUIDS,MUD LOGGING, & CHEMICALS	2.13%	2.49%	9.98%	4.45%
10	FUEL, UTILITIES	2.47%	0.57%	9.72%	3.31%
11	PIPELINE & PIPELAYING CONTRACTING	3.40%	0.03%	11.70%	2.17%
12	PLATFORM INSTALLATION	1.96%	0.10%	6.70%	1.35%
13	PRODUCTION ENHANCEMENT	2.72%	0.00%	8.46%	2.61%
14	PLATFORM & EQUIPMENT FABRICATION	2.57%	2.29%	12.03%	5.59%
15	TUBULAR	4.33%	0.00%	13.13%	7.19%
16	SEISMIC AND GEOPHYSICAL SERVICES	2.76%	0.00%	7.61%	3.20%
17	WELL LOGGING,WIRELINE AND PERFORATION	2.93%	3.42%	10.79%	5.47%
18	FIELD OPERATING EXPENSES, OTHER OIL FIELD SERVICES & TOOL RENTALS	7.06%	1.56%	23.02%	12.17%
19	ALL OTHER	6.36%	2.38%	23.45%	7.50%
					100.00%

Exhibit 14



RANGE OF PRODUCER EXPENDITURES
BY EXPENSE CATEGORY
PERCENT OF EXPENDITURES
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
EXPENSE CATEGORY

Exhibit 15

ECONOMIC IMPACT RATIOS FOR PRIMARY OFFSHORE CONTRACT AND SERVICE INDUSTRIES

REFERENCE NUMBER	CONTRACT OR EXPENDITURE CATEGORY	WAGES AND SALARIES AS A PERCENT OF REVENUES	AVERAGE REVENUES PER EMPLOYEE (DOLLARS)	AVERAGE WAGES AND SALARY PER EMPLOYEE (DOLLARS)	PERCENT OR REVENUES PURCHASING OUTSIDE GOODS AND SERVICES	PRIMARY LOCATION OF EMPLOYEES		
						PERCENT OF EMPLOYMENT PRIMARILY OFFSHORE	PERCENT OF EMPLOYMENT OFFSHORE DAILY	PERCENT OF EMPLOYMENT PRIMARILY ONSHORE
1	AIR TRANSPORT	32.80%	66,000	21,648	37.0%	0%	40%	60%
2	BOAT,BARGE,MARINE EQ. & TRANSPORTATION.	23.70%	83,333	19,750	54.5%	0%	90%	10%
3	CATERING SERVICES	43.00%	40,000	17,200	41.8%	86%	0%	14%
4	CEMENT	26.56%	111,732	29,676	49.9%	6%	INCLUDED IN ONSHORE	94%
5	CONTRACT LABOR AND ENGINEERING SERVICES	36.00%	70,000	25,200	39.0%	30%	40%	30%
6	CONTRACT EXPLORATORY DRILLING	27.00%	90,909	24,545	41.0%	80%	INCLUDED IN ONSHORE	20%
7	CONTRACT DEVELOPMENT DRILLING	35.15%	103,093	36,237	27.0%	89%	INCLUDED IN ONSHORE	11%
8	DIVING	37.30%	44,444	16,578	29.0%	20%	60%	20%
9	DRILLING FLUIDS,MUD LOGGING, & CHEMICALS	18.70%	153,846	28,769	45.0%	7%	INCLUDED IN ONSHORE	93%
10	FUEL, UTILITIES	5.80%	526,000	30,508	56.2%	0%	0%	100%
11	PIPELINE & PIPELAYING CONTRACTING	27.56%	74,074	20,415	40.8%	33%	INCLUDED IN ONSHORE	67%
12	PLATFORM INSTALLATION	36.00%	83,333	30,000	38.0%	77%	INCLUDED IN ONSHORE	23%
13	PRODUCTION ENHANCEMENT	35.15%	103,093	36,237	27.8%	89%	INCLUDED IN ONSHORE	11%
14	PLATFORM & EQUIPMENT FABRICATION	40.52%	68,259	27,659	39.0%	0%	4%	96%
15	TUBULAR	14.80%	210,526	31,158	65.0%	0%	2%	98%
16	SEISMIC AND GEOPHYSICAL SERVICES	33.50%	88,496	29,646	45.0%	0%	80%	20%
17	WELL LOGGING, WIRELINE, PERFORATION ETC.	23.40%	125,000	29,250	49.1%	0%	50%	50%
18	FIELD OPERATING EXPENSES, OTHER OIL FIELD SERVICES & TOOL RENTALS	29.10%	77,994	22,696	40.9%	0%	76%	24%
19	ALL OTHER	21.70%	72,703	15,794	50.1%	0%	74%	26%

basis. Similar information was derived for all the major industries supporting the offshore oil and gas industry (see Exhibit 15).

The impact ratios for the various contract and service industries (Exhibit 15) were applied to the total estimated producer expenditures to yield the impacts associated with the expenditures made by the offshore producers. The expenditures by the offshore producers resulted in an estimated $2.48 billion in salaries and wages at contract and support companies and generated approximately 98,000 full-time equivalent positions. These expenditures by producers, in turn resulted in purchases by the contract and support firms of $3.79 billion. These expenditures included purchases of raw materials, operating expenses and subcontracts with other offshore support industries.

Exhibit 16 presents the estimated expenditure impacts by contract industry. For example it was estimated that expenditures by producers for exploratory drilling in the Gulf of Mexico translated into wages and salaries at the contract drilling companies of $194 million dollars and directly resulted in 7,892 jobs. These purchases of exploratory drilling services also resulted in additional outside expenditures by contract drillers of $294 million. Exhibit 17 summarized the relative distribution of the expenditure impacts among the major support industries. For example expenditures for contract development drilling resulted in 11.9 percent of the wage and salary impacts, produced 8.2 percent of the employment effects and resulted in only 5.9 percent of the total secondary purchases. Similar data are presented for each of the major expenditure types. Exhibit 18 presents the distribution of the expenditure impacts graphically.

Data was also obtained from the various service industries on the proportion of their employees working offshore (see Exhibit 15). These ratios were applied to the number of employees by industry category. Out of a total of 98,296 positions created by producer expenditures, an estimated 25,171 are located exclusively offshore, 36,888 have an offshore component and 36,237 are located on land. The 36,888 employees with both on shore and offshore responsibilities include: positions such as pilots and boat crews which return home daily, specialized workers which spend several days offshore as part of a specific assignment and then return to shore and individuals which may spend extended periods both on shore and then offshore (i.e., divers). Exhibit 19 summarizes the estimated number of contractor employees by primary work location.

PHYSICAL ACTIVITY MODELS

The nine OOC firms supplied examples of 1984 cost breakdowns of certain activities associated with offshore oil and gas. This data is currently being used to develop several models to estimate unit costs for these major types of activities. The measures and activities being analyzed are designed to be consistent with the physical measures of activity used by MMS in the environmental impact assessment process. The activity areas are: geophysical surveying, exploratory drilling, developmental drilling, platform fabrication and installation, pipeline construction, and production, operations and maintenance.

A more detailed discussion follows of the estimating techniques developed for geophysical exploration techniques as an example of the types of analysis being preformed. Summaries of the types of models being developed are also presented for the other five areas under investigation.

Exhibit 16

ESTIMATED EXPENDITURE IMPACTS ASSOCIATED WITH OFFSHORE OIL AND GAS DEVELOPMENT IN THE GULF OF MEXICO

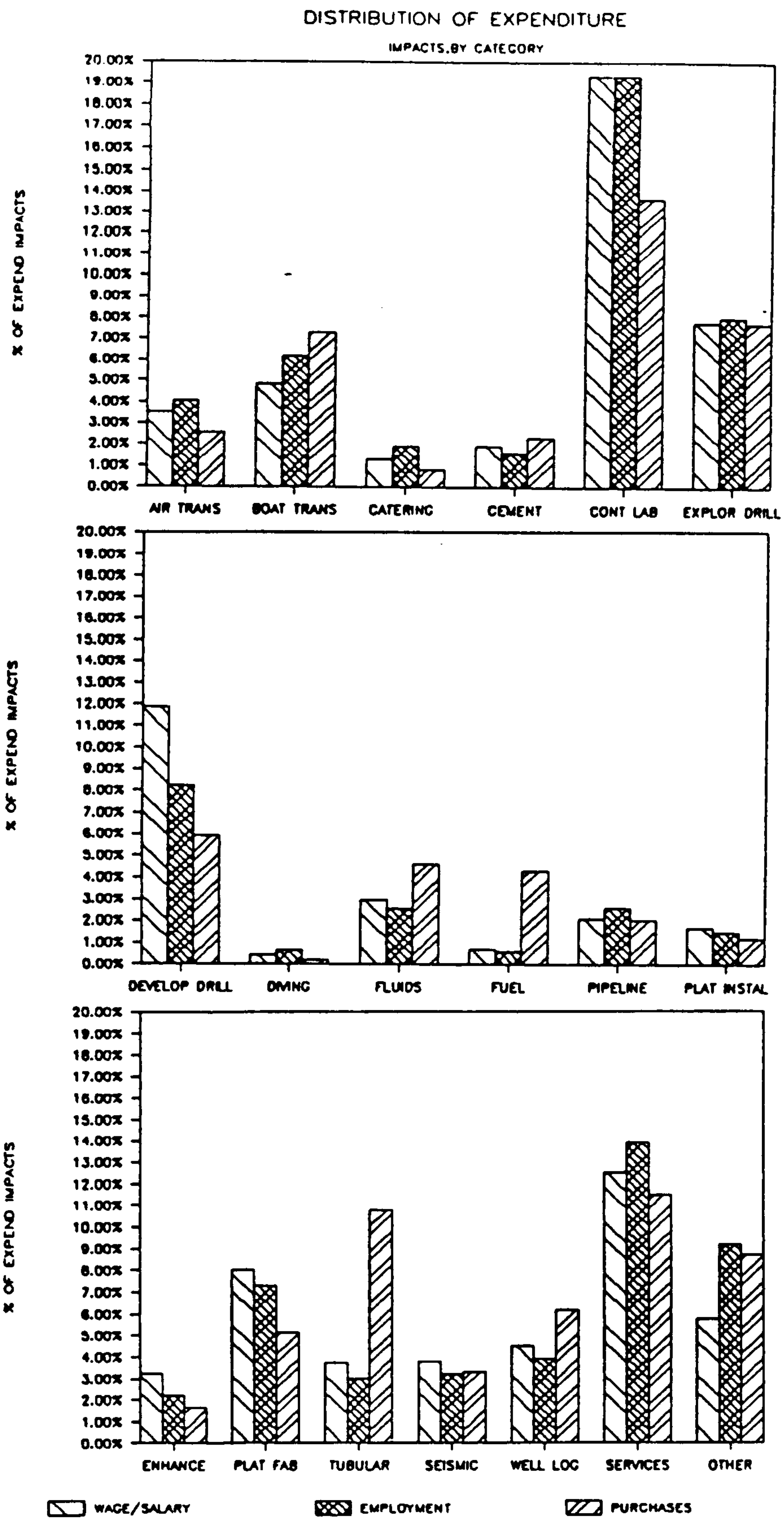
REFERENCE NUMBER	CONTRACT OR EXPENDITURE CATEGORY	ESTIMATED WAGES AND SALARIES GENERATED	ESTIMATED NUMBER OF EMPLOYEES	ESTIMATED PURCHASES OF OUTSIDE GOODS AND SERVICES
1	AIR TRANSPORT	86,690,220	4,005	97,790,797
2	BOAT,BARGE,MARINE EQ. & TRANSPORTATION.	119,954,090	6,074	275,843,794
3	CATERING SERVICES	32,695,665	1,901	31,783,228
4	CEMENT	47,305,025	1,594	88,875,029
5	CONTRACT LABOR AND ENGINEERING SERVICES	478,914,189	19,005	518,823,705
6	CONTRACT EXPLORATORY DRILLING	193,712,143	7,892	294,155,477
7	CONTRACT DEVELOPMENT DRILLING	293,771,798	8,107	225,656,858
8	DIVING	10,438,744	630	8,115,913
9	DRILLING FLUIDS,MUD LOGGING, & CHEMICALS	72,720,909	2,528	174,996,840
10	FUEL, UTILITIES	16,790,186	550	162,691,117
11	PIPELINE & PIPELAYING CONTRACTING	52,252,016	2,560	77,354,218
12	PLATFORM INSTALLATION	42,641,002	1,421	45,009,946
13	PRODUCTION ENHANCEMENT	80,135,824	2,211	63,379,115
14	PLATFORM & EQUIPMENT FABRICATION	198,303,843	7,170	194,780,182
15	TUBULAR	93,082,560	2,987	408,808,541
16	SEISMIC AND GEOPHYSICAL SERVICES	93,678,589	3,160	125,836,910
17	WELL LOGGING, WIRELINE, PERFORATION ETC.	111,963,007	3,828	234,930,925
18	FIELD OPERATING EXPENSES, OTHER OIL			0
	FIELD SERVICES & TOOL RENTALS	309,946,808	13,656	435,629,706
19	ALL OTHER	142,426,482	9,018	328,827,961
	TOTAL	2,477,423,102	98,296	3,793,290,263

Exhibit 17

DISTRIBUTION OF EXPENDITURE
RELATED IMPACTS, BY CATEGORY

REFERENCE NUMBER	CONTRACT OR EXPENDITURE CATEGORY	DISTRIBUTION OF EXPENDITURE RELATED WAGE AND SALARY IMPACTS, BY CATEGORY	DISTRIBUTION OF EXPENDITURE RELATED EMPLOYMENT IMPACTS, BY CATEGORY	DISTRIBUTION OF SECONDARY PURCHASES OF GOODS AND AND SERVICES, BY CATEGORY
1	AIR TRANSPORT	3.5%	4.1%	2.6%
2	BOAT,BARGE,MARINE EQ. & TRANSPORTATION.	4.8%	6.2%	7.3%
3	CATERING SERVICES	1.3%	1.9%	0.8%
4	CEMENT	1.9%	1.6%	2.3%
5	CONTRACT LABOR AND ENGINEERING SERVICES	19.3%	19.3%	13.7%
6	CONTRACT EXPLORATORY DRILLING	7.8%	8.0%	7.8%
7	CONTRACT DEVELOPMENT DRILLING	11.9%	8.2%	5.9%
8	DIVING	0.4%	0.6%	0.2%
9	DRILLING FLUIDS,MUD LOGGING, & CHEMICALS	2.9%	2.6%	4.6%
10	FUEL, UTILITIES	0.7%	0.6%	4.3%
11	PIPELINE & PIPELAYING CONTRACTING	2.1%	2.6%	2.0%
12	PLATFORM INSTALLATION	1.7%	1.4%	1.2%
13	PRODUCTION ENHANCEMENT	3.2%	2.2%	1.7%
14	PLATFORM & EQUIPMENT FABRICATION	8.0%	7.3%	5.1%
15	TUBULAR	3.8%	3.0%	10.8%
16	SEISMIC AND GEOPHYSICAL SERVICES	3.8%	3.2%	3.3%
17	WELL LOGGING, WIRELINE, PERFORATION ETC.	4.5%	3.9%	6.2%
18	FIELD OPERATING EXPENSES, OTHER OIL FIELD SERVICES & TOOL RENTALS	12.5%	13.9%	11.5%
19	ALL OTHER	5.7%	9.2%	8.7%
	TOTAL	100.0%	100.0%	100.0%

Exhibit 18



DISTRIBUTION OF EXPENDITURE
IMPACTS BY CATEGORY
% OF EXPEND IMPACTS
AIR TRANS
BOAT TRANS
CATERING
CEMENT
CONT LAB
EXPLOR DRILL
DEVELOP DRILL
DIVING
FLUIDS
FUEL
PIPELINE
PLAT INSTAL
ENHANCE
PLAT FAB
TUBULAR
SEISMIC
WELL LOG
SERVICES
OTHER
WAGE/SALARY
EMPLOYMENT
PURCHASES

Exhibit 19

Estimated Number of Contractor Employees By Primary Work Location

ACTOR
OCATION

REFERENCE NUMBER	CONTRACT OR EXPENDITURE CATEGORY	ESTIMATED NUMBER OF CONTRACT EMPLOYEES WORKING OFFSHORE	ESTIMATED NUMBER CONTRACT EMPLOYEES OFFSHORE DAILY	ESTIMATED NUMBER OF ONSHORE CONTRACT EMPLOYEES	ESTIMATED TOTAL CONTRACTOR EMPLOYEES
1	AIR TRANSPORT	0	1,602	2,403	4,005
2	BOAT,BARGE,MARINE EQ. & TRANSPORTATION.	0	5,466	607	6,074
3	CATERING SERVICES	1,635	0	266	1,901
4	CEMENT	96	0	1,498	1,594
5	CONTRACT LABOR AND ENGINEERING SERVICES	5,701	7,602	5,701	19,005
6	CONTRACT EXPLORATORY DRILLING	6,314	0	1,578	7,892
7	CONTRACT DEVELOPMENT DRILLING	7,215	0	892	8,107
8	DIVING	126	378	126	630
9	DRILLING FLUIDS,MUD LOGGING, & CHEMICALS	177	0	2,351	2,528
10	FUEL, UTILITIES	0	0	550	550
11	PIPELINE & PIPELAYING CONTRACTING	845	0	1,715	2,560
12	PLATFORM INSTALLATION	1,094	0	327	1,421
13	PRODUCTION ENHANCEMENT	1,968	0	243	2,211
14	PLATFORM & EQUIPMENT FABRICATION	0	287	6,883	7,170
15	TUBULAR	0	60	2,928	2,987
16	SEISMIC AND GEOPHYSICAL SERVICES	0	2,528	632	3,160
17	WELL LOGGING, WIRELINE, PERFORATION ETC.	0	1,914	1,914	3,828
18	FIELD OPERATING EXPENSES, OTHER OIL FIELD SERVICES & TOOL RENTALS	0	10,379	3,278	13,656
19	ALL OTHER	0	6,673	2,345	9,018
	TOTAL	25,171	36,888	36,237	98,296

Geophysical Surveying

As one would expect a statistically strong relationship exists between the total dollar cost of a seismic survey, miles covered in a survey, and the duration of the survey. Water depth did not have a significant effect on survey costs as the surveying procedures are virtually the same regardless of water depth.

A correlation coefficient of 0.993 exists between miles covered and project cost. This very strong relationship indicates that the two variables are almost perfectly related. The regression equation expressing this relationship is:

$$\text{Total Cost} = f(745.730X + 38{,}407.00)$$
$$\text{where } X = \text{miles covered}$$
$$\text{and } \$38{,}407 = \text{fixed costs}$$

Thus it is projected that seismic surveying has an average fixed cost of approximately $38,000 and a unit variable cost which averages $745.73 per mile. There may be some variance from the mean because of differences in type of seismic survey, quality of equipment, weather conditions, market conditions, and terms of the contract. The mean dollar cost per mile of seismic surveying is $961.335 with a standard deviation of $270.

There is also a strong correlation between the duration of the survey and the dollar cost of that survey. As the number of days increases, amount spent increased at a constant rate. This suggests that there are no significant economies of scale to longer surveys. The regression equation when using days of exploration time is:

$$\text{Total Cost} = f(-26{,}045.87 + 22{,}356.30X)$$
$$\text{where } X = \text{duration (days)}$$

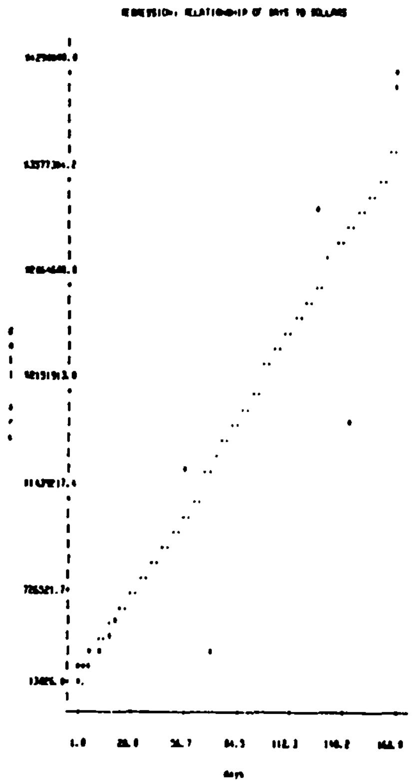
The fixed cost indicated by this model is negative and thus does not accurately capture start up costs and this model is only appropriate for surveys of a longer duration. The regression equation indicated that each additional day spent on a survey averages $22,356.30. Thus, while the results of the second model cannot predict costs of shorter survey trips (less than a day or two of seismic surveying), they are good estimates of longer survey costs. The mean dollar cost per day of surveying was $27,543 with a standard deviation of $12,459. Both these estimating techniques are applicable for determining seismic expenditures associated with alternative lease areas. The results of these analysis are summarized graphically in Exhibit 20 as an example of the types of analysis being conducted.

Exploratory Drilling

Dollar costs for exploratory drilling were found to vary considerably. Dollar cost per foot of drilling depth varied between $124.36/foot and $2,257.16/ft with a sample mean of $368.38. Dollar cost per day of drilling had a sample mean of $80,445/day with a range of $23,417/day to $302,859/day. Drilling depth, water depth, and duration of the exploratory drilling are all equally important in determining total cost figures. By regressing the depth of the water in which the drilling was done on the dollar cost per day of

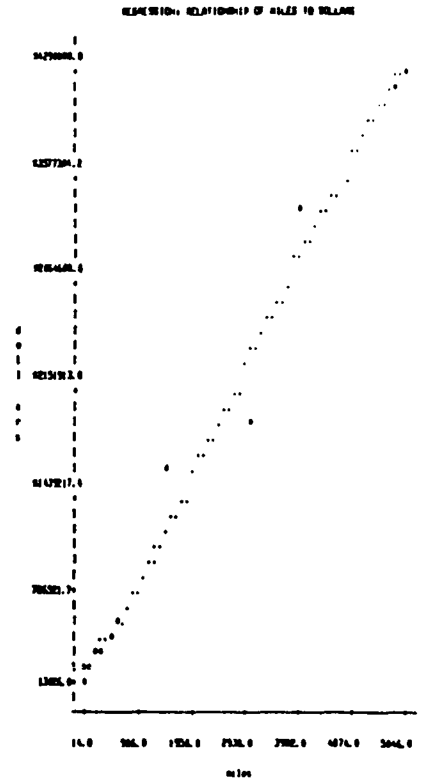
EXHIBIT 20

GEOPHYSICAL SERVICES ACTIVITY MODEL



Mean of X = 1055.27   Correlation coefficient = 0.993   Valid cases = 22
S.D. of X = 1782.86   Degrees of freedom = 20   Missing cases = 0
Mean of Y = 828533.75 Slope of regression line = 744.421   Response % = 100
S.D. of Y = 1336386.38 Y intercept = 42966.590

Regression equation : Y' = 744.421 X + 42966.590
Standard error of estimate for regression = 155766.297
t statistic for correlation coefficient = 38.185
Significance of correlation coefficient = 0.000



Mean of X = 38.00   Correlation coefficient = 0.945   Valid cases = 22
S.D. of X = 56.62   Degrees of freedom = 20   Missing cases = 0
Mean of Y = 828533.75 Slope of regression line = 22387.898 Response % = 100
S.D. of Y = 1336386.38 Y intercept = -19166.404

Regression equation : Y' = 22387.898 X - 19166.404
Standard error of estimate for regression = 436566.190
t statistic for correlation coefficient = 12.938
Significance of correlation coefficient = 0.000

drilling generated a correlation coefficient of 0.839 indicating that 83.9% of the variance in costs per day of drilling was explained by the water depth. The preliminary regression equation for this relationship is:

Cost per drilling day = f(31.57X + $57,836
where X = Water Depth
and $57,836 = Fixed Costs

This equation shows that fixed costs or start-up costs per day are equal to $57,836 and that $31.567 when multiplied by water depth (in feet) provided a good estimated daily cost figure for exploratory drilling.

Development Drilling

The cost associated with developmental drilling could also be predicted by a model with a high degree of accuracy. Duration of drilling is the most significant determinant of total costs, followed by drilling depth. Water depth, the presence of a dry hole, and the type of rig used also statistically affect total costs. The preliminary model for estimating expenditures for development drilling is: Total costs = f(.0254 water depth + 0.1592 drilling depth + 0 .7149 duration of drilling + 0.2298 rig type (dummy variable) + 0.2218 rig type (dummy variable) + .0572 rig type (dummy variable) + 0.1146 dry hole (dummy variable) - 3,801,761.69).

This regression has a corrected R-squared term of 0.9142 making it a significant model in predicting total costs of associated with developmental drilling.

Platform Fabrication and Installation

Platform fabrication and installation costs are a function of several variables. The most important statistical determinants of total costs were water depth, size of the platform (measured by number of well slots), and whether or not processing is done on the platform. The preliminary regression equation for predicting platform expenditures is: Total cost = f(-3,457,190 + 0.7079 x water depth + 0.1126 processing (dummy variable) + 0.2653 well slots).

The corrected R-squared term for this equation is 0.7413 indicating that this is a fair explanatory model of total platform fabrication and installation costs. Water depth is the single most significant indicator of total costs. Dollar cost per foot of water depth had a mean of $76,162.

Pipeline Construction

The length of a pipeline is obviously the most important determinant of the total dollar cost of that pipeline. For shorter length pipes, costs appear to be roughly the same regardless of actual length. Over the range of pipeline lengths, the regression equation between length and cost was:

Total Cost = f(78.111X + 94,373.133)
where X = pipeline length
and $94,373 = Fixed Costs

This equation has a correlation coefficient of 0.771 making it an acceptable explanatory and predictive model. For relatively long pipelines, the diameter of the pipe (used as a measure of size) become significant. Preliminary investigation indicated that the larger pipelines increase in cost at an increasing rate after a certain length, while smaller pipelines increase in cost at a decreasing rate after a certain length. The significance of diameter for shorter pipelines could not be shown by this model.

Production

Total cost determinants of production and field operations are not clear at this point given our limited sample size. It does appear that total costs and total production are not strongly correlated. Mean dollar cost per barrel equivalent of production was $8.329 with a range of $1.58 to $22.87. This may result from the fact that data was supplied by accounting unit and may not be a true cost of producing actual product for the accounting entity. Additional information is being sought and the existing data clarified to address this problem.

SUMMARY OF FINDINGS

Some of the major or unexpected preliminary findings of the upcoming report include the following:

- Twenty four thousand jobs at production companies were directly the result of offshore oil and gas leasing in the Gulf of Mexico.

- Almost 10,000 thousand positions with producing companies are positions are located offshore and 14,000 thousand positions are located on shore.

- Louisiana alone had an estimated 8,200 offshore producer company positions and 15,000 on shore producer company positions located at work sites within the state.

- Texas has an estimated 612 offshore jobs and 488 on shore positions located at work sites within the state.

- Of the 24,000 employees with the offshore producers almost 20,000 reside in Louisiana.

- Every parish in the state of Louisiana has at lease several person-years of employment at an offshore producer.

- An estimated 3,700 producer employees reside in Jefferson Parish, 1,500 in Lafayette Parish, 1,000 in Lafourche Parish, 4,500 in Orleans Parish and 1,500 in St. Tammany Parish.

- Approximately 2,000 persons employed by the offshore production companies live in Mississippi. Most of these persons were resided in counties adjacent to the two major highways feeding New Orleans and the coastal areas of Louisiana.

- An estimated 1,300 Texas residents were employed by the offshore Gulf of Mexico Production companies. Employees were from a broad geographic range.

- Over 500 persons employed by the offshore production companies reside in Alabama. Although half of the personnel reside in the coastal counties of Baldwin or Mobile. Many of the Alabama residents employed by producers may live in counties adjacent to the coastal areas of the Florida Panhandle.

- o Approximately 200 producer employees resided in Florida. Most of these persons were from the coastal counties of Escambia, Okaloosa and Santa Rosa.

- o Employees with the offshore production companies were also found to be from the states of Arizona, Arkansas, California, Connecticut, Georgia, Indiana, Maine, Maryland, Massachusetts, Michigan, Montana, New Jersey, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Washington, and Wyoming.

- o Total wages and salaries received by producer employees in Louisiana totaled $ 710 million.

- o Total wages and salaries paid by the offshore producers to residents of Alabama were $17.4 million, Mississippi $66.0 million, Texas $48.0 million, and Florida $7.3 million.

- o Total expenditures by producers resulting from offshore oil and gas exploration, development and production in the Gulf of Mexico region were projected to have totaled $8.75 billion in 1984.

- o Expenditures by the study participants alone totaled $4.4 billion.

- o The expenditures by the offshore producers resulted in an estimated $2.48 billion in salaries and wages at contract and support companies.

- o The expenditures by the offshore producers generated approximately 98,000 full-time equivalent positions.

- o These expenditures by producers, in turn resulted in purchases by the contract and support firms of $3.79 billion.

- o Out of a total of 98,296 positions created by producer expenditures, an estimated 25,171 are located exclusively offshore, 36,888 have some offshore component and 36,237 are located on land.

PHASE II AND FUTURE AREAS OF INVESTIGATION

The work previously outlined represents Phase I of a multi-stage project. MMS is planning an independent follow on effort. Areas of investigation which may be appropriate for further investigation are:

- o The indirect effects may require additional documentation. The first tier or indirect effects are the economic activity resulting from the purchases of goods and services by the primary producers. Although the magnitude of these expenditures has been documented as part of this effort the location of many of these expenditures can no be determined.

- The induced effects of offshore oil and gas exploration and development have not been documented at the county/parish level. The induced effects are those impacts resulting from the expenditure of wages and salaries individual households. This will require integrating county wages and salary information with national and regional economic models.

- The effects of deep water activity and the development of frontier areas may vary from the historic effects documented in this effort. The research undertaken to date used 1984 data for all Gulf of Mexico production and could not identify the effects of new technologies or those of frontier areas separately. A specialized a approach or engineered estimated may be necessary to address the issues.

- The various data bases and models used to determine the direct and subsequent efforts to document indirect and induced effects may require into an automated system for determining future impacts.

ABSTRACT FOR
FLORIDA BIG BEND SEAGRASS HABITAT STUDY

(CONTRACT NO. 14-12-0001-30188)

MMS TERNARY MEETING
24 JULY 1985
METAIRIE, LOUISIANA

SUBMITTED TO:

Environmental Studies Group
Gulf of Mexico Regional Office
Minerals Management Service
Metairie, Louisiana

SUBMITTED BY:

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St. Petersburg, Florida 33710

ABSTRACT

The combined remote sensing, mapping, and field ground truthing of the Florida Big Bend Seagrass Habitat Study (MMS Contract No. 14-12-0001-30188) has shown Florida's Big Bend shelf area to be a unified seagrass system composed of two separate assemblages or groups of seagrass species. Species zonation across this extended, shallow continental shelf is typical of seagrass zonation patterns seen in other areas of the Gulf of Mexico and Carribbean. There is a nearshore zone of fringing or pioneer species, a zone of major, bed forming species, and an offshore zone where fringing or pioneer species are again dominant. The unique aspect of Florida's western continental shelf, between Ochlockonee Bay and Tarpon Springs, is the extended nature of the seagrass beds forming this outer zone of fringing or pioneer species. Between the 10- and 20-m (30- to 66-ft) depth contours, there are millions of acres of a sparse seagrass and macro-algae assemblage, in which *Halophila engelmanni* and *H. decipiens* are the vascular plant species present. Seagrass and algal blade densities within this assemblage rarely exceed 30% coverage of the bottom as compared with the 100% bottom coverage seen in dense stands of the major nearshore bed forming species *Thalassia testudinum* and *Syringodium filiforme*.

The Florida Big Bend Seagrass Habitat Study encompassed a total of 1.5 million ha (3.7 million acres) (Figure 1). Within this area, 232,893 ha (575,479 acres) of the dense, nearshore assemblage composed of *T. testudinum*, *S. filiforme*, and *Halodule wrightii* were mapped. These beds were all located in water depths less than 10 m (30 ft) and

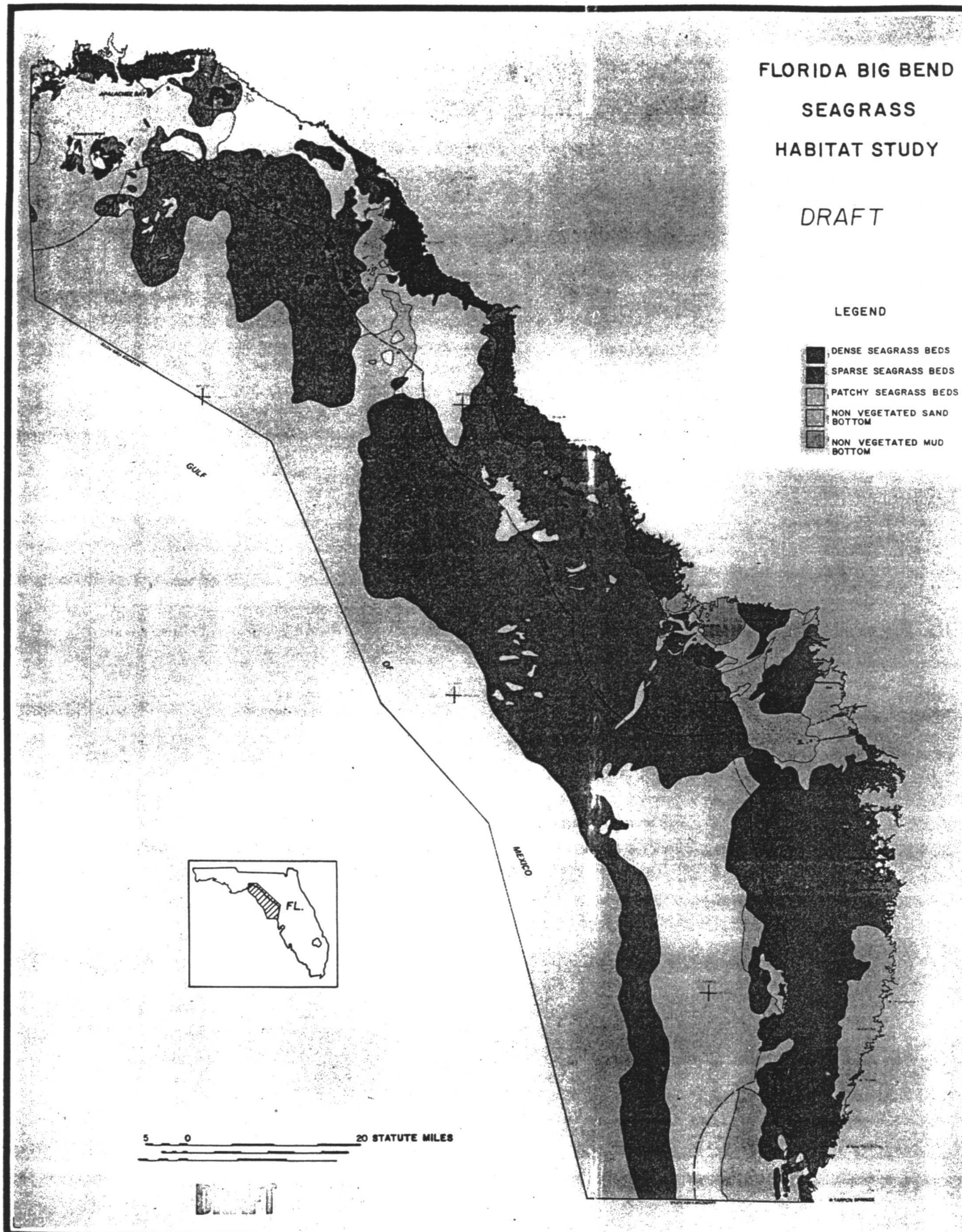

FIGURE 1. COMPOSITE MAP PRODUCED FROM REMOTE IMAGERY OF SEAGRASS DISTRIBUTION PATTERNS IN THE FLORIDA BIG BEND AREA.

virtually all were within State waters. Another 279,722 ha (691,195 acres) of patchy seagrass beds were delineated. In this area, all five seagrass species were occasionally found, but *Halophila decipiens* and *H. engelmanni* were the most common. Finally, combined remote sensing and ground truthing indicated a total of 498,034 ha (1.2 million acres) of a sparse seagrass-algal assemblage. Ground-truthing data suggest there may be as much as 219,135 ha (528,000 acres) of live bottom within the area mapped as sparse seagrass and algae. Live-bottom habitats were evenly dispersed throughout this portion of the study area and could not be segregated into distinct patterns or bands. Ground-truthing data also indicated that within sparse assemblages of seagrass and macroalgae, algal species account for approximately 12% of the blade densities recorded.

Seasonal data show a considerable reduction in seagrass blade densities across the entire shelf during winter. Within the outer seagrass and algal assemblages, this reduction in blade density ranged from 50 to 90%, with *H. decipiens* showing the most marked seasonal change.

Although light penetration within the water column is undoubtedly a major factor in determining seagrass distribution patterns across the west Florida shelf, the full range of environmental factors required by these extended, fringing seagrass and algae beds seen between the 10- and 20-m depth contours is unknown. In view of the extent of these communities, additional studies on the nature of their role within the west Florida shelf ecosystem seem appropriate.

CONCEPTUALIZED OCS IMPACTS ON BARRIER ISLANDS

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The University of Texas at Austin, Austin, Texas 78713

Conceptualized OCS impacts on barrier islands require understanding of interactive scenarios and variables. Four principal variables are offered and explained in terms of singular elements for each variable. One variable is labeled a "scenario," for which the singular elements are described as normal weather, northers, tropical storms and/or hurricanes, and wet and/or dry climates. The principal "impacts" are visualized as pipeline construction, onshore production and maintenance facilities, oil spills, and trash.

"Sensitive areas" are described in terms of high-profile and low-profile barriers. High-profile barrier islands have extensive and high foreland dunes immediately shoreward of a beach. Vegetated high foreland dunes may contain deflation basins in which wetlands occur; for this type of barrier widespread landward dune fields often develop. There are then generally narrow vegetated barrier flats, and the expanse of tidal flats varies along lagoonal shorelines. Low-profile barrier islands include beach, narrow belts of low dunes, abundant washovers, vegetated barrier flats, marshes, and small tidal flats (deltas). The shorefaces of both types of barrier island profiles can be either eroding or rarely accreting.

"Process variables" may be natural or strongly influenced by man. Natural-process elements are currents, waves, wind, and active faults, all of which are interdependent except for the latter. Man-influenced processes are removal of sand from a beach, salt water intrusion, and subsidence.

A worst case impact is conceptualized to be a hurricane coincidental with all four OCS impacts affecting a low-profile barrier island with maximum tides, winds, and waves occurring at a location having active faults related to subsidence. Any additional cases that are conceptualized for OCS impacts must recognize that the barrier elements are not only interdependent but also time-dependent as well.

SCENARIOS	IMPACTS	SENSITIVE AREAS	PROCESS/ VARIABLES	
Normal	Pipelines	Beach	Currents	
Norther	Support Facilities	Dunes	Waves	NATURAL
Tropical Storm	Oil Spills	Wetlands	Wind	
Climate	Trash	Vegetated Barrier Flats	Active Faults	
		Tidal Flats	Sand Removal	
		Marsh	Salt-Water Intrusion	
				HUMAN INFLUENCED
		Washovers	Subsidence	
		Accreting Shoreline		
		Eroding Shoreline		

ABSTRACT FOR TERNARY MEETING

JULY 24, 1985

CONTINENTAL SLOPE STUDY

(CONTRACT NO. 14-12-0001-30046)

submitted by

B.J. Gallaway, Ph.D.

LGL Ecological Research Associate, Inc.

and

M.C. Kennicutt II, Ph.D.

Texas A&M University

to

Environmental Studies Group

Gulf of Mexico Regional Office

Minerals Management Service

Metairie, Louisiana

The Northern Gulf of Mexico Continental Slope Study (Contract No. 14-12-0001-30046) is a multi-year program being jointly conducted by LGL Ecological Research Associates, Inc. (LGL) and Texas A&M University (TAMU). During Year I of the Slope study, sampling to determine water mass characteristics; sediment nature and quality, and biological characterics in terms of community composition, distribution and life history patterns was conducted along three transects in the northern Gulf of Mexico -- one each in the Eastern, Central and Western Lease Planning Areas (Fig. 1). Sampling depths along each transect ranged from about 350 m to 2800 m. Specific depths were chosen to correspond to Pequegnat's (1983) hypotheszed faunal zones for megafauna, namely the Shelf/Slope Transition (350 m); Archibenthal Horizon A (∿600 m); Archibenthal Horizon B (∿850 m); Upper Abyssal (∿1400 m) and Mesoabyssal (∿2500 m). The Year I study included two cruises; one to the Central Transect in Fall 1983, the other to all three transects in Spring 1984. The sampling design enabled comparisons, by depth, between the two seasons, and among the three areas. The Annual Report has been completed and is available from MMS.

During Year II, the present year, sampling was conducted at 12 stations in Fall 1984 along the Central Transect to better define zonation (Cruise III); at 16 stations in the Eastern Gulf to define lateral variation along selected depth contours (Spring/Summer 1985); and at 12 stations in the Wetern Gulf (Spring/Summer 1985) for the same purpose as well as to contrast known areas of oil and gas seepage to non-seep areas and habitats with topographic relief to bottoms with a more uniform relief. The seep comparisons became of more than passing interest due to TAMU's discovery in December 1984 of hydrothermal vent-type taxa at hydrocarbon seep areas.

Results of the water column sampling programs during Year I have shown the presence of distinctive water masses which, below the surface Gulf Water layer, vary little between seasons or among areas (Fig. 2). Our shallowest stations were located in Tropical Atlantic Central Water, stations in Horizons A and B of the Archibenthal Zone were in Antarctic Intermediate Water; and the stations in the Upper and Mesoabyssal Zones were in Gulf Deep Water. In future analytical efforts, the role of the distinctive properties associated with each water mass in influencing biological destributions will be evaluated.

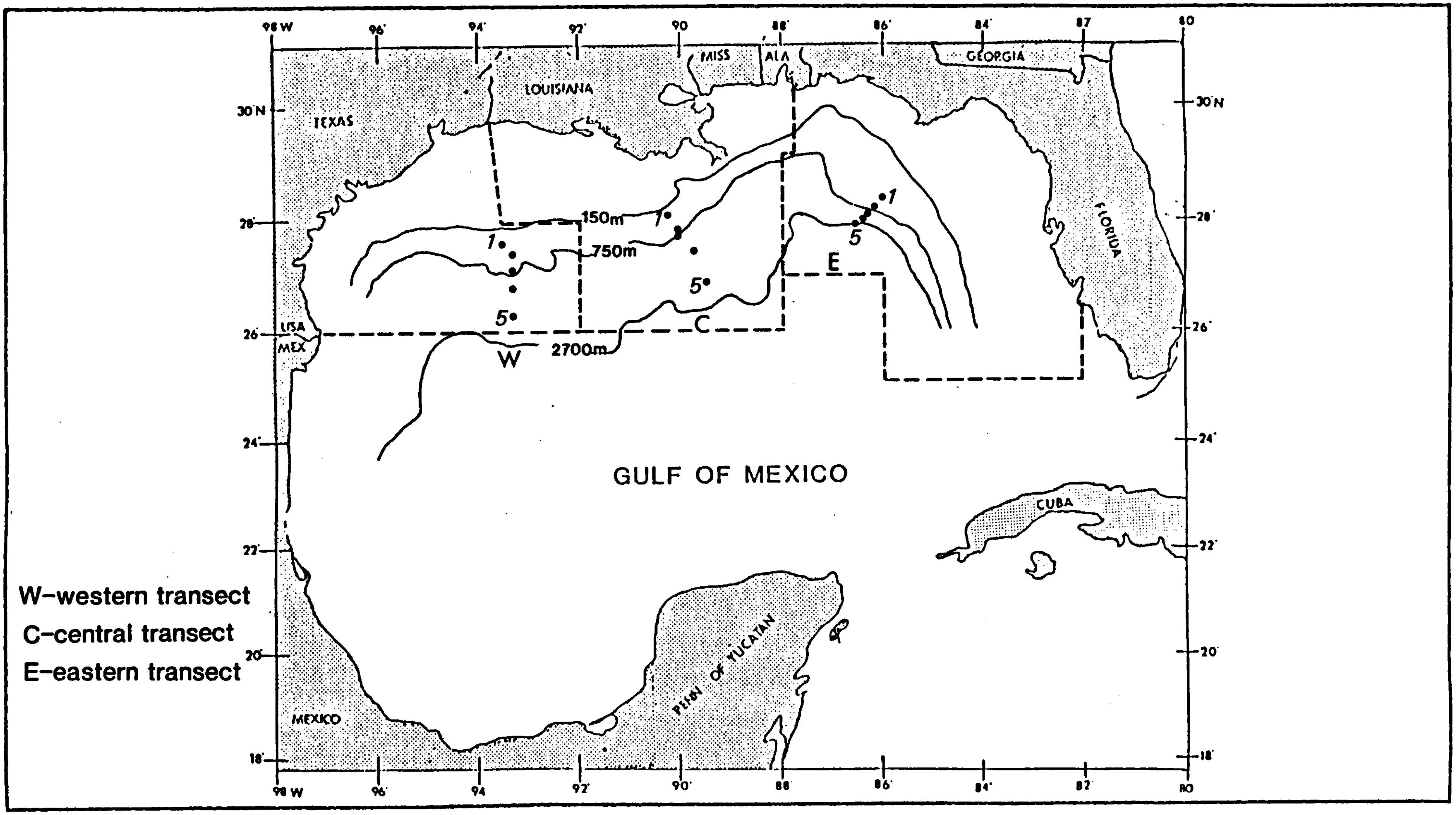

Figure 1. Location of transects and stations, within Western (W), Central (C) and Eastern (E) Gulf of Mexico Lease Planning Areas.

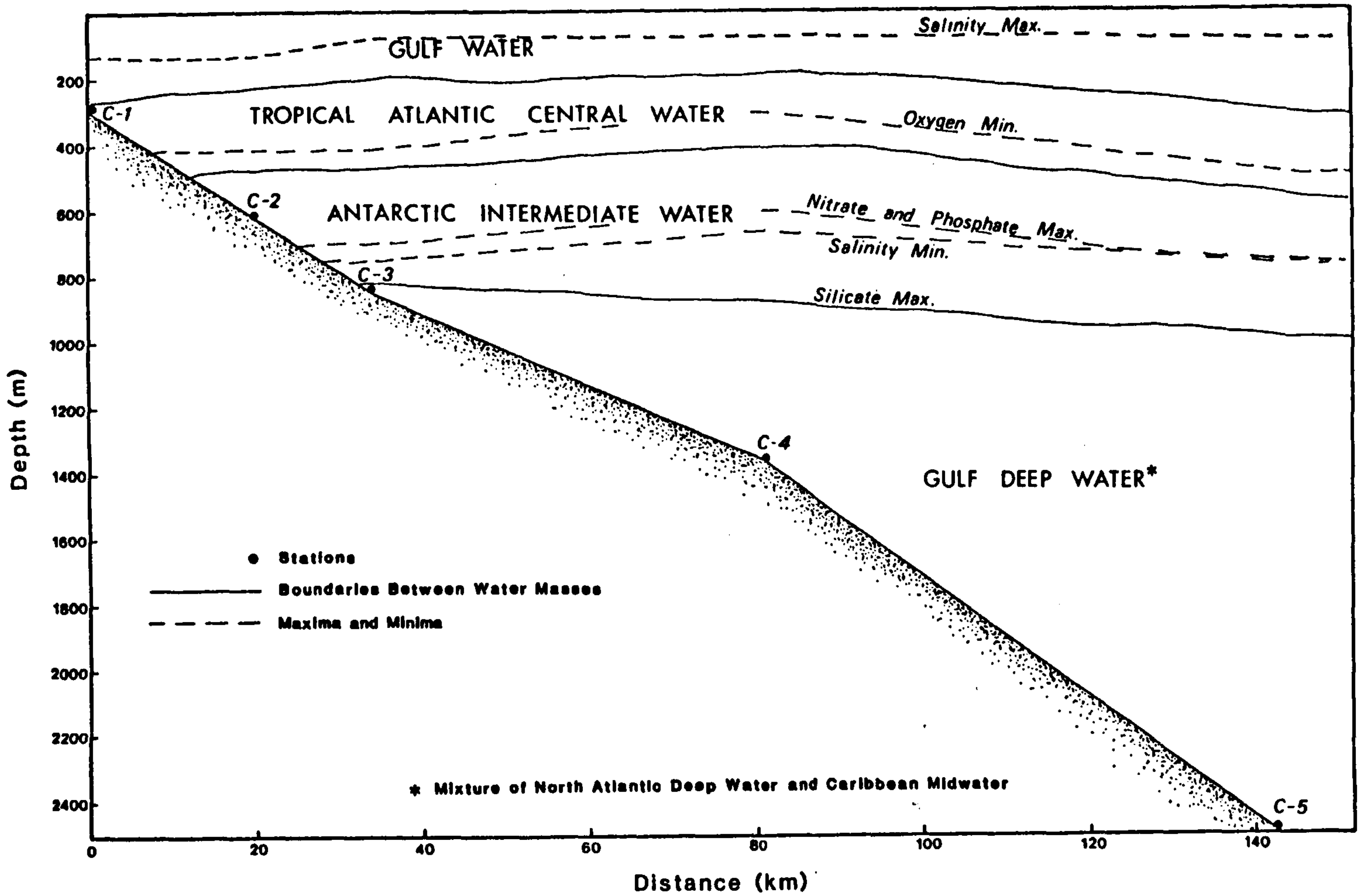

Figure 2. Water masses along the Central Transect during Cruise I. A similar distribution was observed for Cruise II.

Seasonal and spatial differences were observed in sedimentary characteristics during Year I. These changes were observed in grain size composition, total organic carbon, calcium carbonate and hydrocarbons. The grain size changes were subtle and are depicted using standard sediment triangle graphics (Fig. 3). In these triangles, sand, silt and clay sized particles are shown at the left, right and top angles of the triangle with the various mixtures shwon internally. A comparison of sediment grain size between Fall 1983 and Spring 1984 (Fig. 4) on the Central Transect shows that while the sediments were basically clay or clay mixtures there was indication of a shift from clay to silty clay at depths of 650 to 850 m. Clay predominated at 350-m depths during both seasons and silty clays were likewise prevalent during both seasons at the two deeper stations (1400 and 2500 m).

The most pronounced difference in sediment grain size among areas was that stations on the Eastern Transect were characterized by more equal mixtures of sand-silt-and-clay-sized particles than the other transects where sediments were predominately towards the clay end of the grain size scale (Fig. 5). The role of sediment grain size as it relates to biological distributions will also be evaluated in furture analytical efforts.

Levels of organic carbon increased at all depths on the Central Transect on Cruise II as compared to levels observed on Cruise I (Fig. 6). Organic carbon levels were higher on the Central Transect than on the Eastern and Western Transects, and generally higher on the Western Transect than on the Eastern -- except at the shallowest and deepest stations.

As observed for organic carbon, calcium carbonate levels likewise increased on the Central Transect in Spring as compared to Fall (Fig. 7). Calcium carbonate levels were decidedly highest at Stations on the Eastern Transect with levels and stations on the Central Transect being lower than levels on the Western Transect.

Sediments at all three transects sampled during Year I had a mixture of thermogenic, terrigenous and plantonic hydrocarbons. Results of seasonal samplings at the Central Transect suggested an influx of terrigenous material (bulk organic matter and plant biowaxes) between Fall 1983 and Spring 1984. The proportion of this material in the sediments

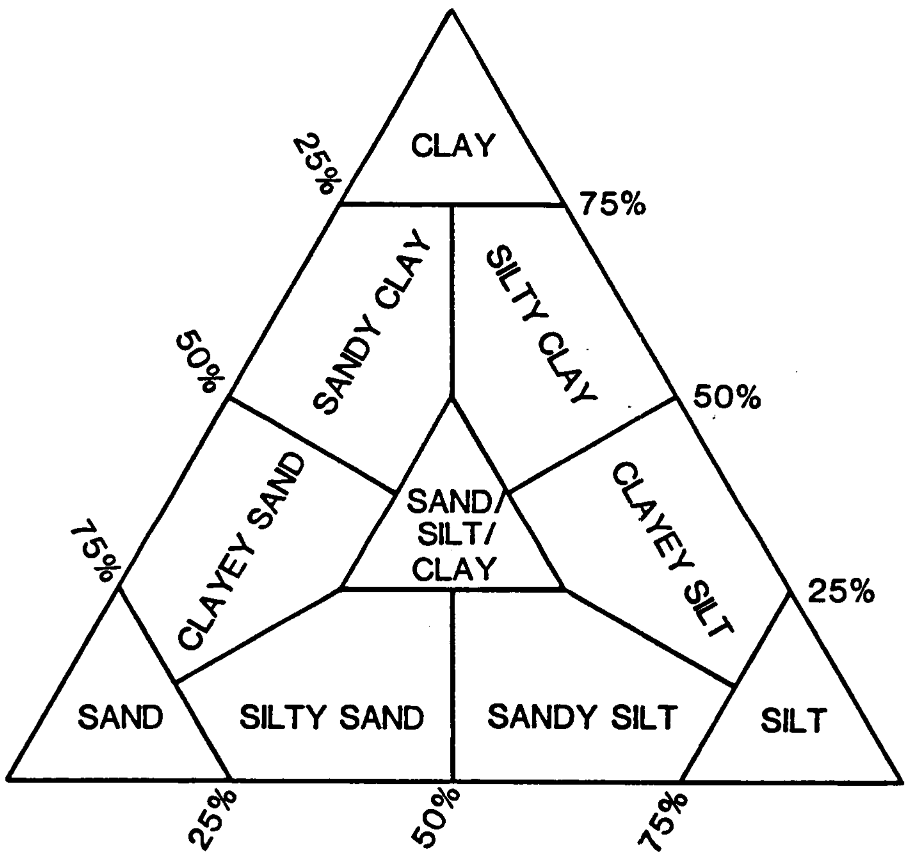

Figure 3. Standard Sediment Triangle.

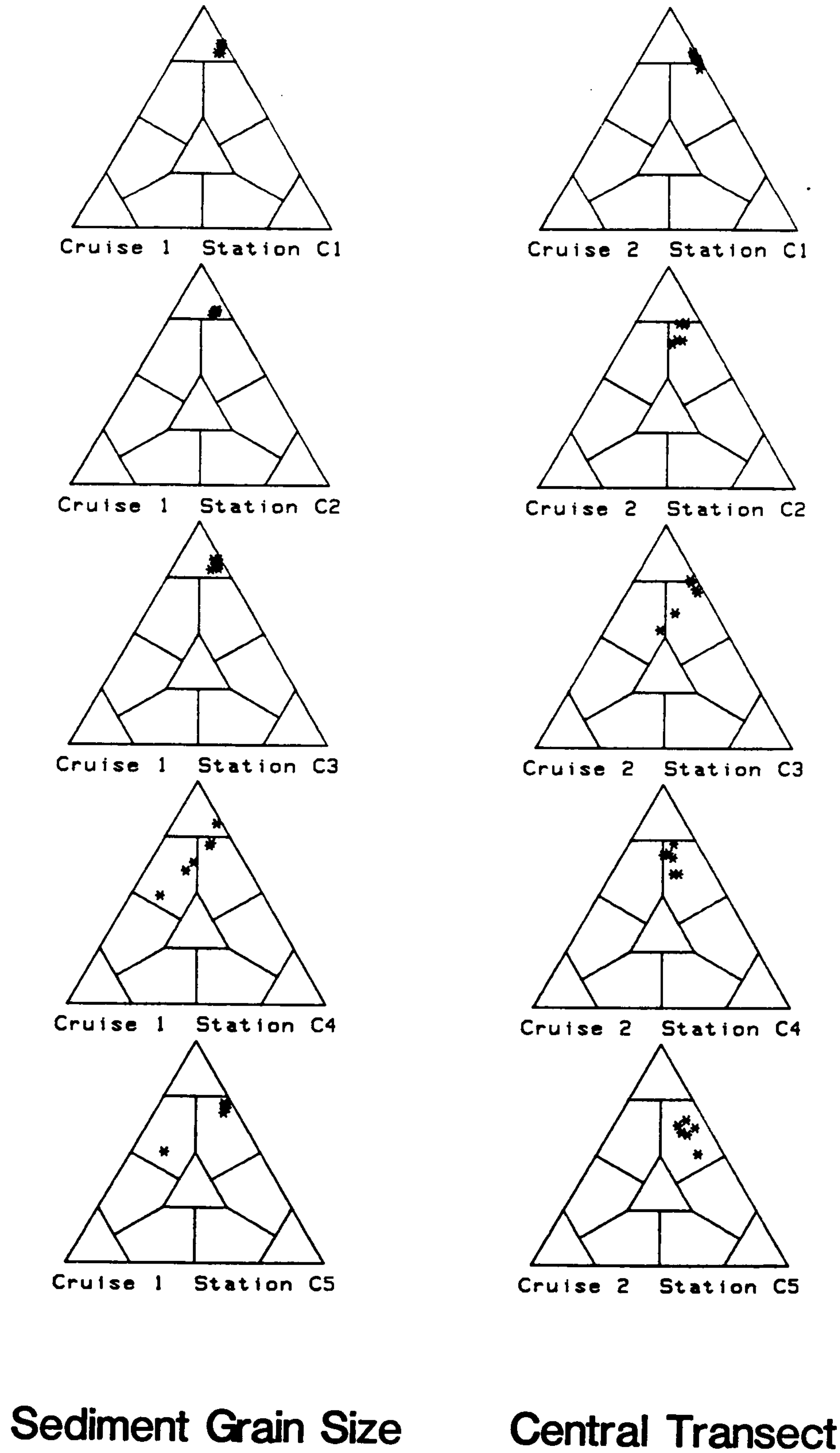

Figure 4. Changes in sediment grain size on the Central Transect between Cruise I (Feb. 1983) and Cruise II (Spring 1984).

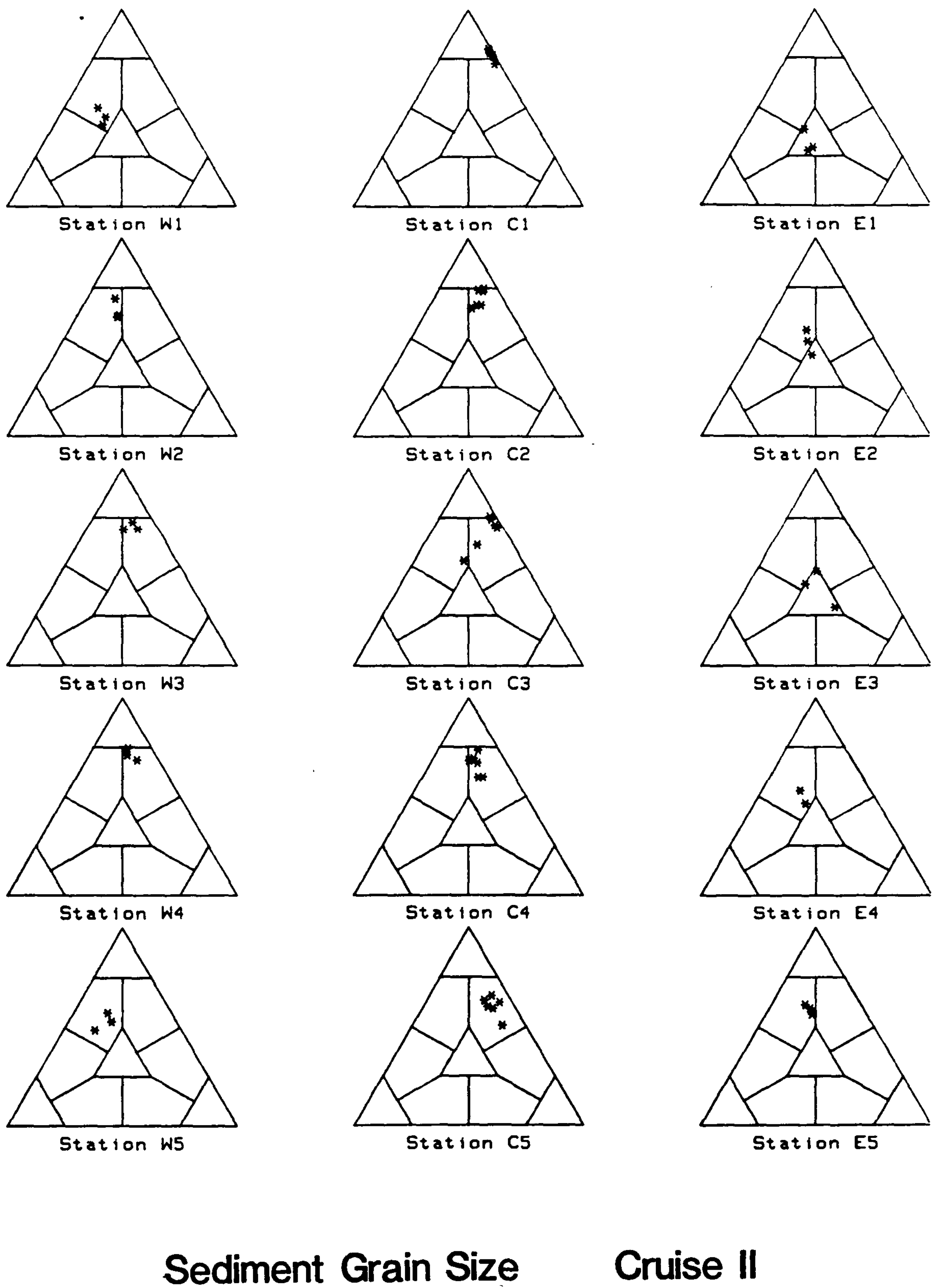

Figure 5. Sediment grain sizes observed among sampling stations on Cruise II (Spring 1984).

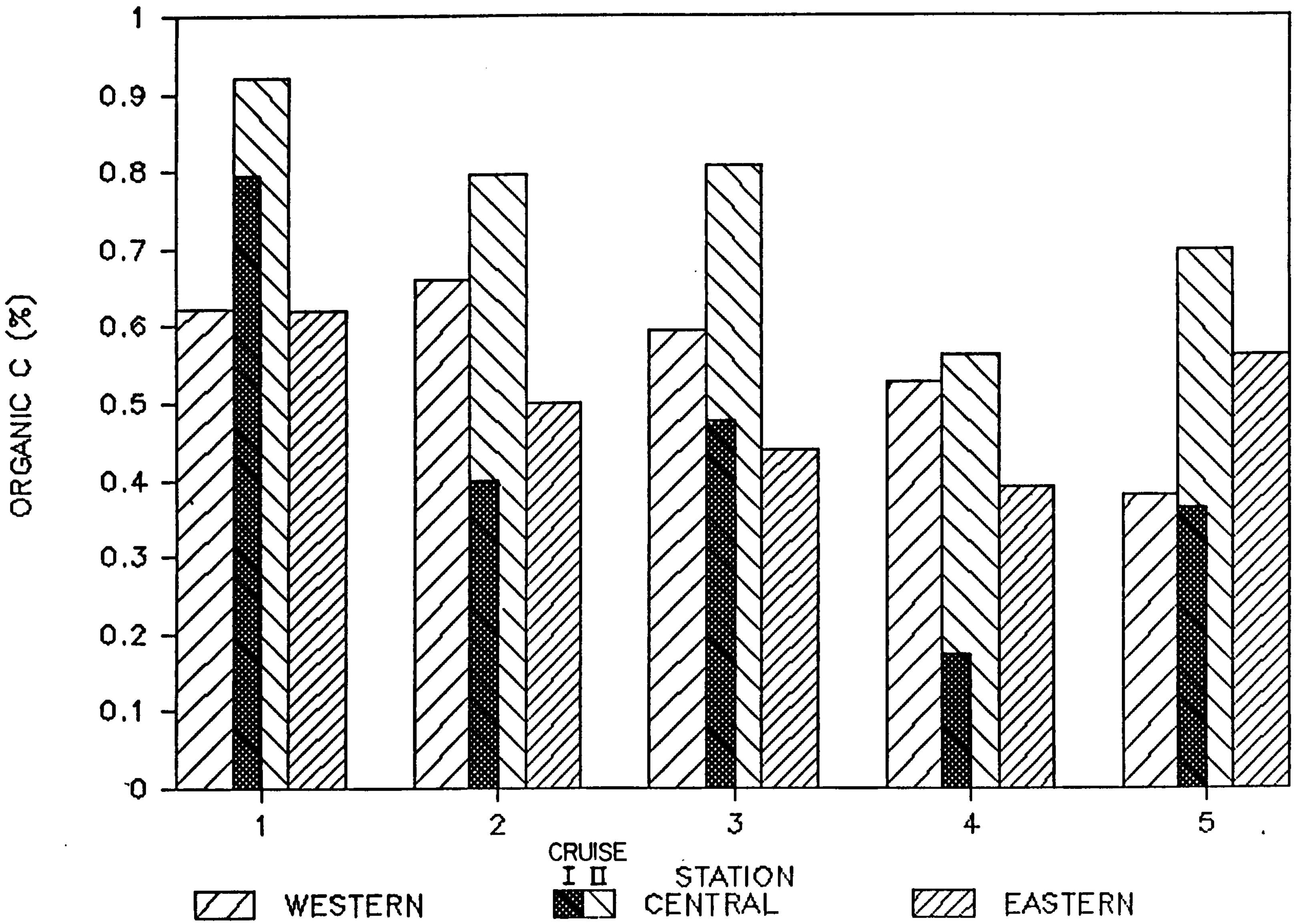

Figure 6. **Average percent organic carbon for stations along the West, Central, and East Transects, Cruises I and II.**

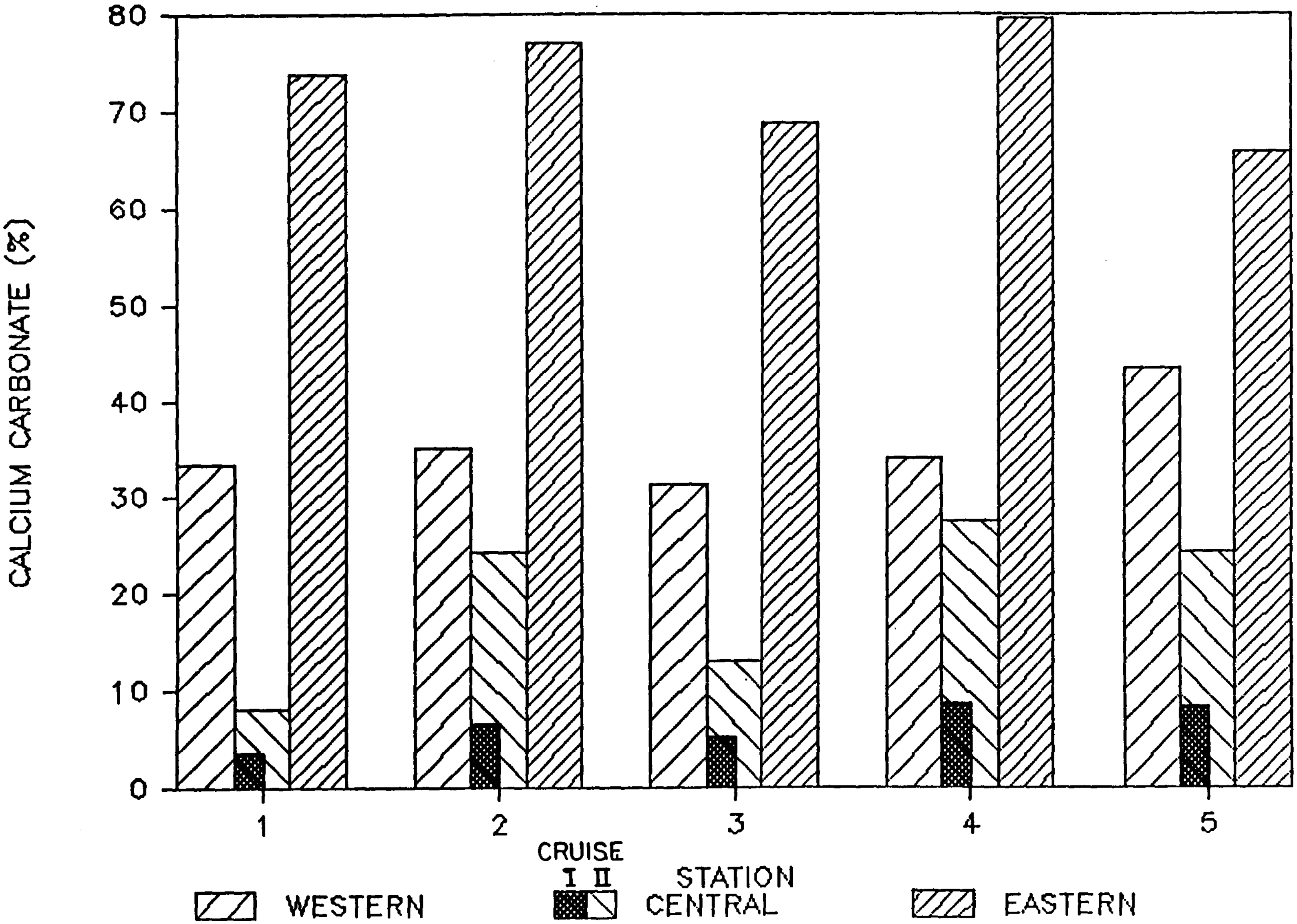

Figure 7. Average percent calcium carbonate for stations along the West, Central, and East Transects.

was highest on the Central transect, intermediate at stations on the Western Transect and lowest in sediments on the Eastern Transect. Results of carbon isotope analyses suggested terrestrial material provided an additional source of carbon to benthic crustaceans, whereas fish were supported almost entirely by marine algae. Thermogenic hydrocarbons outside of seep areas were present in low concentrations in the sediments being especially low on the Eastern Transect. Results of analyses of organisms for hydrocarbon contamination have proved negative for nearly all of the tests accomplished to date.

Biological changes were observed that corresponded to physical/chemical changes or differences between habitats. Both meio- and macroinfaunal densities increased at Stations on the Central Transect in Spring 1984 as compared to Fall 1983. The increases in meiofauna were mainly attributable to the increased abundance of Foraminifera (Fig. 8). The increases in macroinfauna were not so much influenced by any one group (Fig. 9). In both instances, the least amount of change was observed for the deepest station.

Meiofauna were decidedly more numerous at Stations on the Central Transect than at Stations in the other regions (Fig. 10), but such pronounced differences were not observed for the macroinfauna (Fig. 11). Of interest here, however, is the low abundance of macroinfauna at the 1400-m depth on the Western Transect compared to the abundance at the same depth on the other transects. It should be noted here that the macroinfauna of the Gulf are exceedingly diverse and a large proportion of the species collected in virtually all groups are new to science. It may be years before all the taxonomic work is completed.

Results of the megafauna sampling have basically confirmed Pequegnat's (1983) proposed zonation scheme. Since Year I, sampling has been dedicated to (1) defining distributional patterns over depths with higher resolution than heretofore achieved (Cruise III), (2) determining lateral variation along specific depth contours, and (3) making specific habitat contrasts (seep vs. non-seep) (Cruise IV, West Central Gulf; Cruise V, East Central Gulf)(Fig. 12).

The notable finding on the November 1984 Cruise III, designed to determine distributional patterns of biological communities over depth, was the photographic observations of a bed of large clams at 940 m in

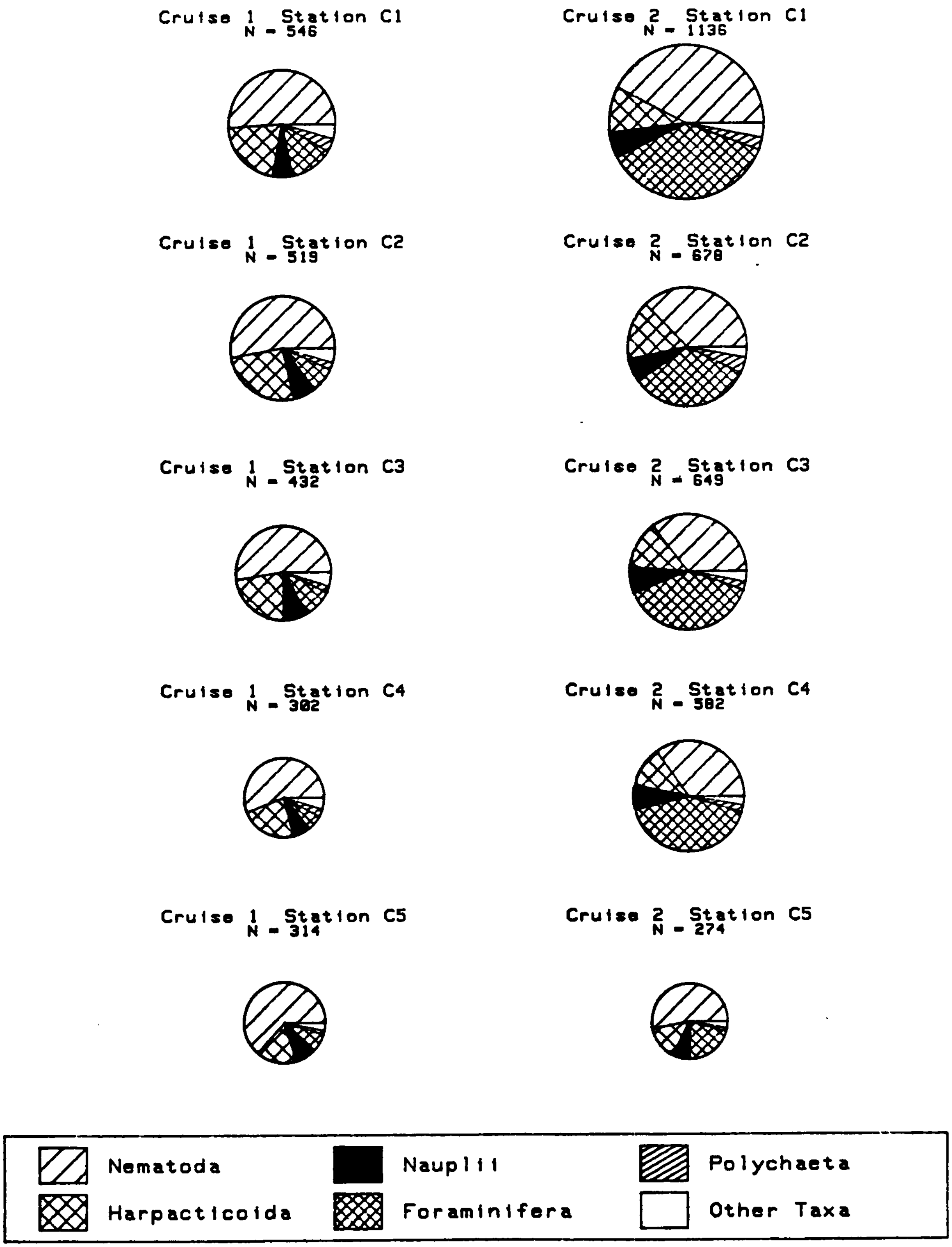

Figure 8. Comparison of meiofauna densities (no./10 cm^2) between Cruises I (November 1983) and II (April 1984). Note the large increase of forams in Cruise II diagrams. Comparisons can be made on both axes.

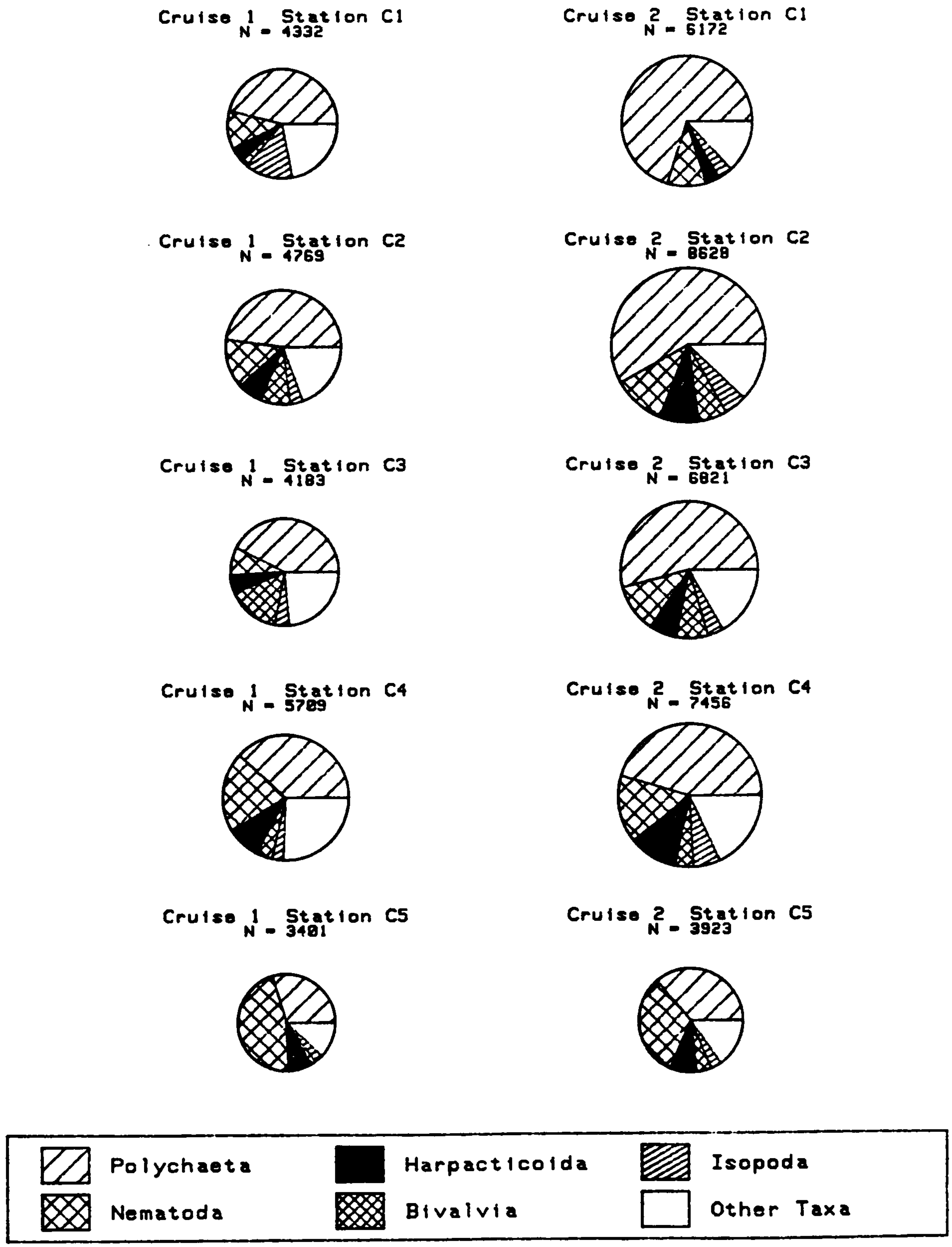

Figure 9. Comparison of macroinfauna densities (no/m^2) between Cruise I (November 1983) and Cruise II (April 1984) stations.

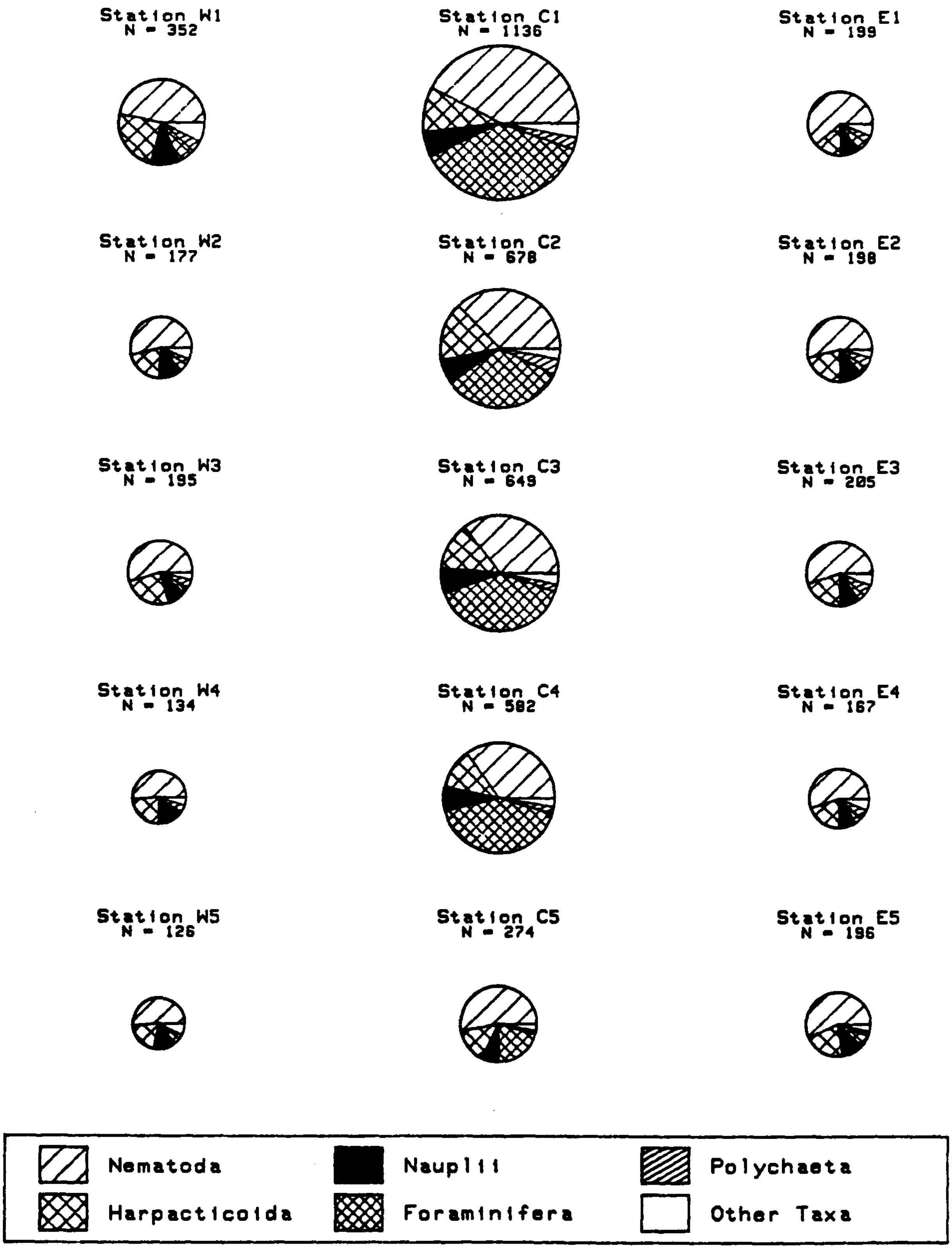

Figure 10. Comparison of meiofauna densities (no./cm^2) obtained during Cruise II (April 1984). Comparisons can be made on both axes.

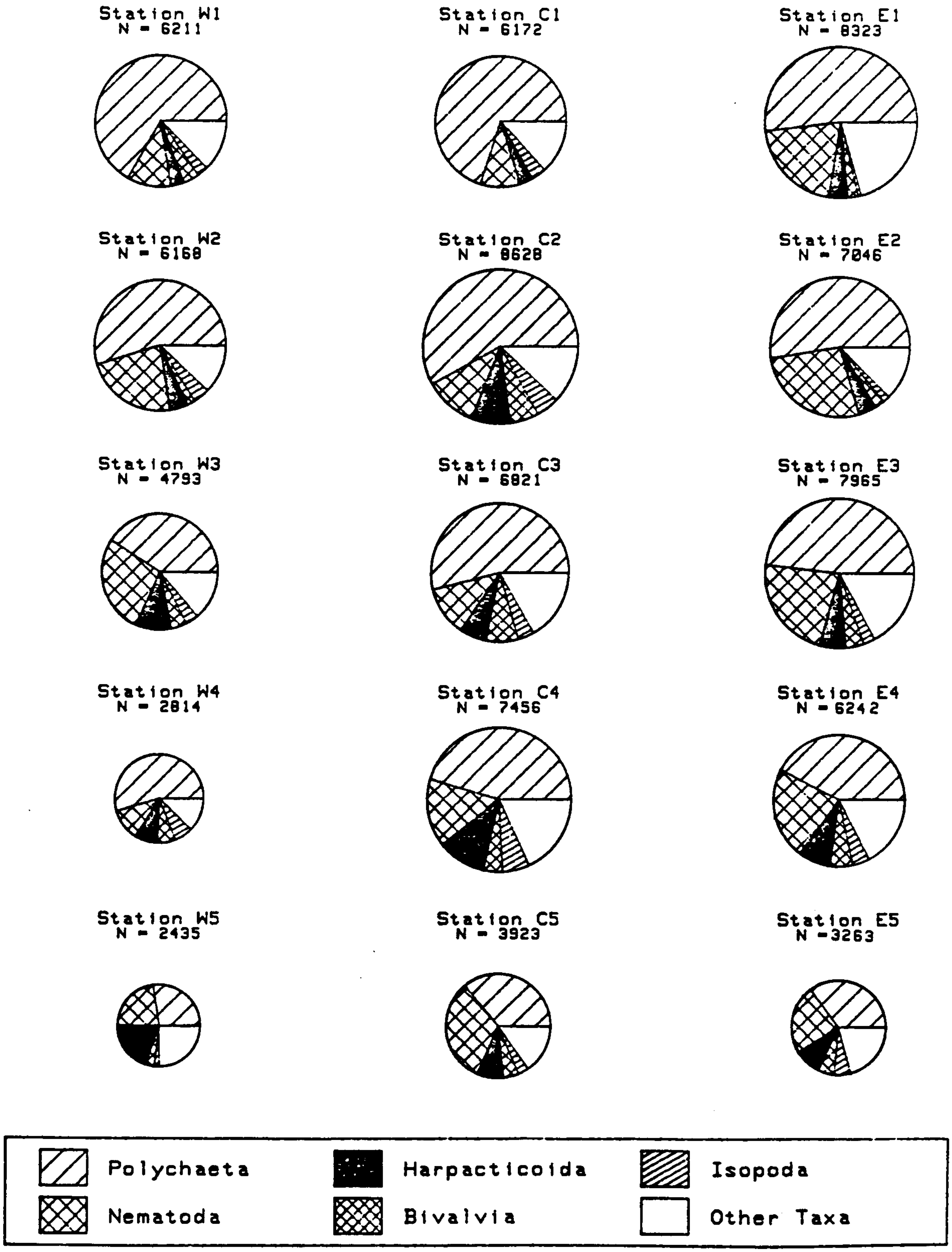

Figure 11. Comparison of macroinfaunal densities (no./m^2) obtained during Cruise II (April 1984).

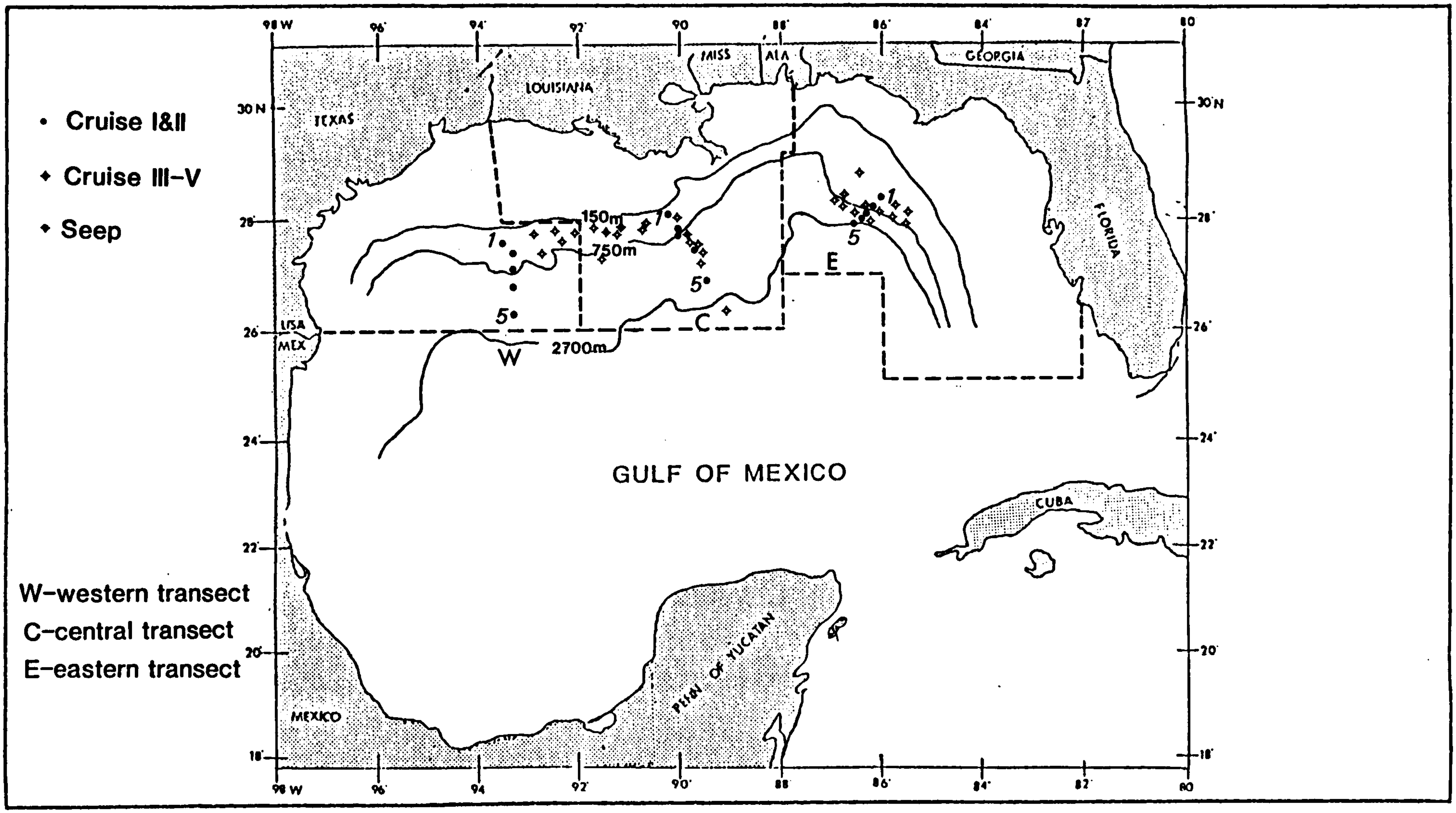

Figure 12. Location of transects and stations, within Western (W), Central (C) and Eastern (E) Gulf of Mexico Lease Planning Areas.

depth in Lease Block Green Canyon 215. These clams exhibited motility and comparisons of the photographs to specimens collected by Texas A&M at another seep locality indicate that they are representatives of the chemosynthetic *Clyptogena*, probably *Clyptogena ponderosa*. This species is a relative of *Clyptogena magnifica*, a motile giant white clam characteristic of hydrothermal vent communities in the Pacific Ocean. Actual specimens of cold water seep biota, analogous to the Pacific hydrothermal vent biota, had been discovered and collected at the base of the Florida escapement (3300 m) during a diving expedition with the submersible Alvin (Florida Cruise Participants 1984) and further west but also in the Green Canyon Lease area by Kennicutt et al. (in press).

Ballard (1984) provides a description and history of the discovery of the deep-sea hot spring and cold seep communities, up to and including the Florida cold seep discovery. Both types of communities are characterized by white bacterial mats, large dense beds of clams and mussels; numerous small gastopods, galatheid crabs, and, in the Pacific, dense patches of giant tube worms, *Riftia pachytila*. Chemosynthetic tube worms which have been collected from the Gulf of Mexico are closely-related forms, but fall into different families (either the Lamellibrachiidae or a new family being presently described M.L. Jones of the National Museum of Natural History, Smithsonian Institution).

Kennicutt et al. (in press) reported the location of seep communities for two areas in the Green Canyon Lease Area, two of which were later sampled as part of this program. While we did not collect any tube worms, clams or mussels at the one site (Station WC-6, Lease Blocks GC 271 and 272), large collections of deep-water stony corals were trawled and a photograph of an apparant tube worm was taken in GC Block 184.

At Station WC7 (Blocks GC 146, 189, 190 and 191) tube worms were collected (representatives of both Lamellebrachida and the new family) and numerous photographs of individual tubes were obtained. These photographs resemble some of those shown at the Florida Escarpment community, but we do not have any photographs showing dense clumps or tangles of worms or discrete assemblages of organisms with definable boundaries. Based upon the TAMU collections, however, this does not mean that such assemblages are not represented in the area.

Cold water seep communities are probably represented around seismic wipe-out and hydrocarbon seep zones across the slope of the northwestern Gulf between depths 400 and 1000 m, at least in the Green Canyon Area. Based upon data which are publically available at this time (Kennicutt et al. in press, this program), chemosynthetic organisms characteristic of seep communities have been documented to occur in Green Canyon Blocks 184, 189, 190, 215, 234, 235, and 272 (Fig. 13).

The TAMU collections suggest that most of the range of organisms which have been collected at the Pacific and Florida sites are probably also represented in the northwestern Gulf.

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Kennicutt II, M.C., J.M. Brooks, R.R. Bidegare, R.R. Fay, T.L. Wade and T.J. McDonald. 1985. Hydrothermal Vent Type Taxa in a Hydrocarbon Seep Region on the Louisiana Slope. Nature: in press.

Pequegnat, W.C. 1983. The ecological communities of the continental slope and adjacent regimes of the northern Gulf of Mexico, prepared by TerEco Corp. for Minerals Management Service. U.S. Dept. of Interior Contract AA851-CT1-12: 398 pp + appendices.

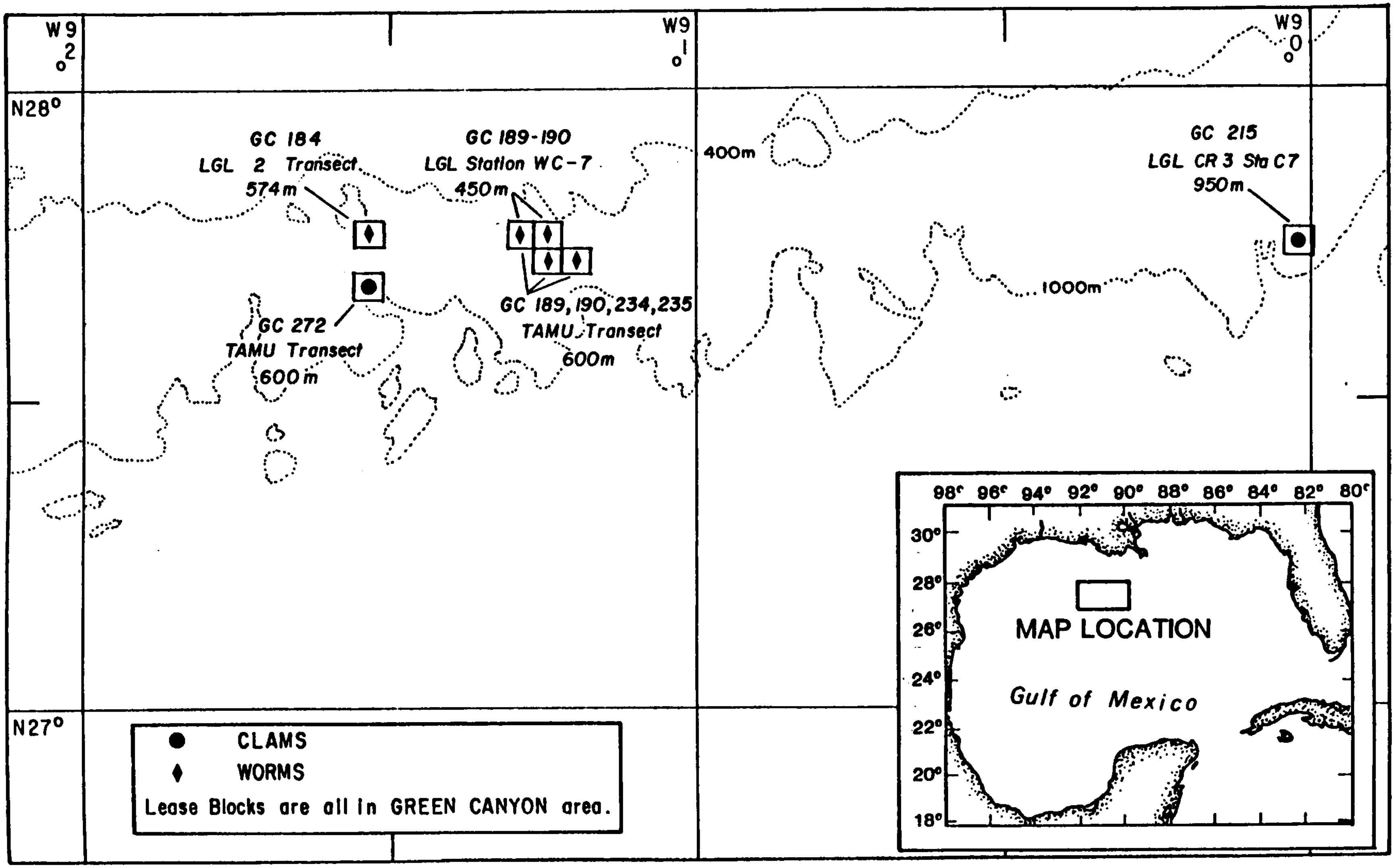

Figure 13. Possible seep communities.

ABSTRACT FOR TERNARY MEETING
JULY 24, 1985

SOUTHWEST FLORIDA SHELF BENTHIC COMMUNITIES STUDY
(CONTRACT NO. 14-12-0001-30071)

submitted by

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to

Environmental Studies Group
Gulf of Mexico Regional Office
Minerals Management Service
Metairie, Louisiana

The Southwest Florida Benthic Communities Study is now in its fifth year. Research during Years 1-3 was conducted by Woodward Clyde Consultants and Continental Shelf Associates, Inc. The prime contractor for Years 4 and 5 is Environmental Science and Engineering, Inc. (ESE). Major biological portions of the program are subcontracted by ESE to LGL Ecological Research Associates, Inc. (LGL). Since ESE's portions of the program have been described in previous ternary meetings, some highlights of LGL's findings from Year 4 (Cruises I-IV) are presented herein.

During Year 4, 15 stations were sampled off the Florida coast (Fig. 1). These included ten sites designated as Group I stations, which were sampled twice (December 1983 and May 1984) in order to complete seasonal studies begun during previous years. Group I stations included five live bottom and five soft bottom sites, in a line roughly parallel to shore within the 20-m depth contour. Five additional live bottom sites were designated Group II stations, and sampled quarterly in Year 4 (December 1983, and March, May and August 1984). Group II stations were placed along a transect perpendicular to shore, and ranged from 13-125 m in depth.

Sampling at Group I soft bottom stations included infaunal studies under ESE's direction. Sampling at all live bottom stations (Group I and II) included trawling for fishes, dredging for epifaunal invertebrates, and underwater television (UTV) surveys for fishes, invertebrates, and habitat characterization. In addition, Group II stations were sampled for settling organisms through the use of fouling plates attached to instrument arrays. At two Group II stations, a time-lapse camera (TLC) documented the movements of sediment and large organisms.

UTV surveys were extremely useful in describing benthic communities, mainly because a very large area could be sampled. During Year 4, between 13,000 and 45,000 m^2 were surveyed at every site. Taxonomic resolution of UTV data depended on the type of organisms seen. Invertebrates and plants often could not be identified beyond the family level, although large-area estimates of the abundance of such multi-species groupings were undoubtedly more reliable than those obtained through any other means. Fishes were relatively easy to identify to species. In seven out of ten sites, more fishes were identified with UTV than with trawling. Group I stations tended to be quite similar, matching the Inner Shelf Community described in previous studies. Group II stations spanned a wide depth range, and differed greatly from one another in flora and fauna. Most of the stations had wide areas of soft sediment with low-relief outcrops of coral or rock.

Trawl samples were most useful for facilitating the identification of fishes seen on UTV, for expanding the taxonomic checklist for each station, and for analysis of stomach contents and life history parameters. However, trawls were routinely shredded at live bottom stations, and missed many species seen with UTV. Trawl data were extremely variable between cruises and stations. Relatively few species were both held in common between stations and collected in substantial numbers from more than a few stations, precluding most statistical comparisons of density.

Although the dredge collected many epifaunal invertebrates, the samples were not quantitative despite attempts to standardize the time spent on the bottom. The dredge frequently clogged with large sponges or filled to overflowing. Since it was impossible to know when the dredge stopped sampling during the tow, sample abundance estimates could not be compared to one another. Consequently, dredged samples were analyzed using procedures designed for presence/absence data. These procedures are robust and have few statistical assumptions to violate; are economical and rapid to run; and are sufficiently powerful to describe the benthic communities. Dredged samples of epifaunal invertebrates showed distinct zonation of species by depth for many groups of organisms (Fig. 2). Community characterizations using constancy and fidelity analyses indicated major differences between stations for most large taxonomic groups.

Time lapse camera (TLC) samples provided long-term data for fishes that were attracted to arrays. The TLC records revealed relative species abundance and diurnal activity patterns, although it was impossible to separate multiple records of the same individuals from single sightings. There were pronounced differences in fish abundance from one day to the next (Fig. 3). Many species present around the arrays during the day and leaving (perhaps to forage) during the night. In some cases, mutual exclusion seemed to occur; for example, when jewfish (*Epinephelus itajara*) were present, smaller groupers (*Mycteroperca* spp.) tended to be absent. Both large fishes and turtles took up temporary residence under arrays, causing data loss by damaging equipment such as TLC electrical cables and fouling plates.

Fouling plates showed excellent replication (Fig. 4) for most major taxa. The longer the period of exposure was, the greater biomass of material present on ceramic tile plates. Large amounts of fouling material grew on plates at shallow stations, but plates from deeper stations were almost bare (Table 1). Steel plates were extremely difficult to analyze due to the formation of bubbles of rust, and subsequent flaking of attached organisms. We recommend against their use in future studies. Bags were used to enclose plates individually upon collection. Samples from these bags contained large numbers of motile invertebrates such as amphipods, underscoring the necessity for bagging plates upon retrieval.

During Year 5, Group I stations have been dropped from the program, except for one station that was "upgraded" to Group II status. Group II stations from Year 4 continue to be sampled during Year 5, along with two new Group II stations. We are no longer dredging at all live bottom stations, but only at the new Group II stations, since samples from Years 1-4 are considered adequate for taxonomic purposes at previously-surveyed stations. We are continuing to trawl and take UTV samples at all stations, and have arrays with TLC hardware and fouling plates at all stations.

At present, six cruises (four from Year 4 and two for Year 5) have been completed by ESE and LGL. Nearly all the trawl, dredge, UTV, fouling plate, and TLC samples from the first four cruises have been analyzed, and their data entered and verified. Formats for graphics and tables for the Year 5 Final Report are currently being refined, based on comments on the Year 4 Final Report, which was just submitted to MMS. Once these data summary tasks have been accomplished, we will begin statistical analysis of our data, integrating biological with geological and hydrographic information from ESE.

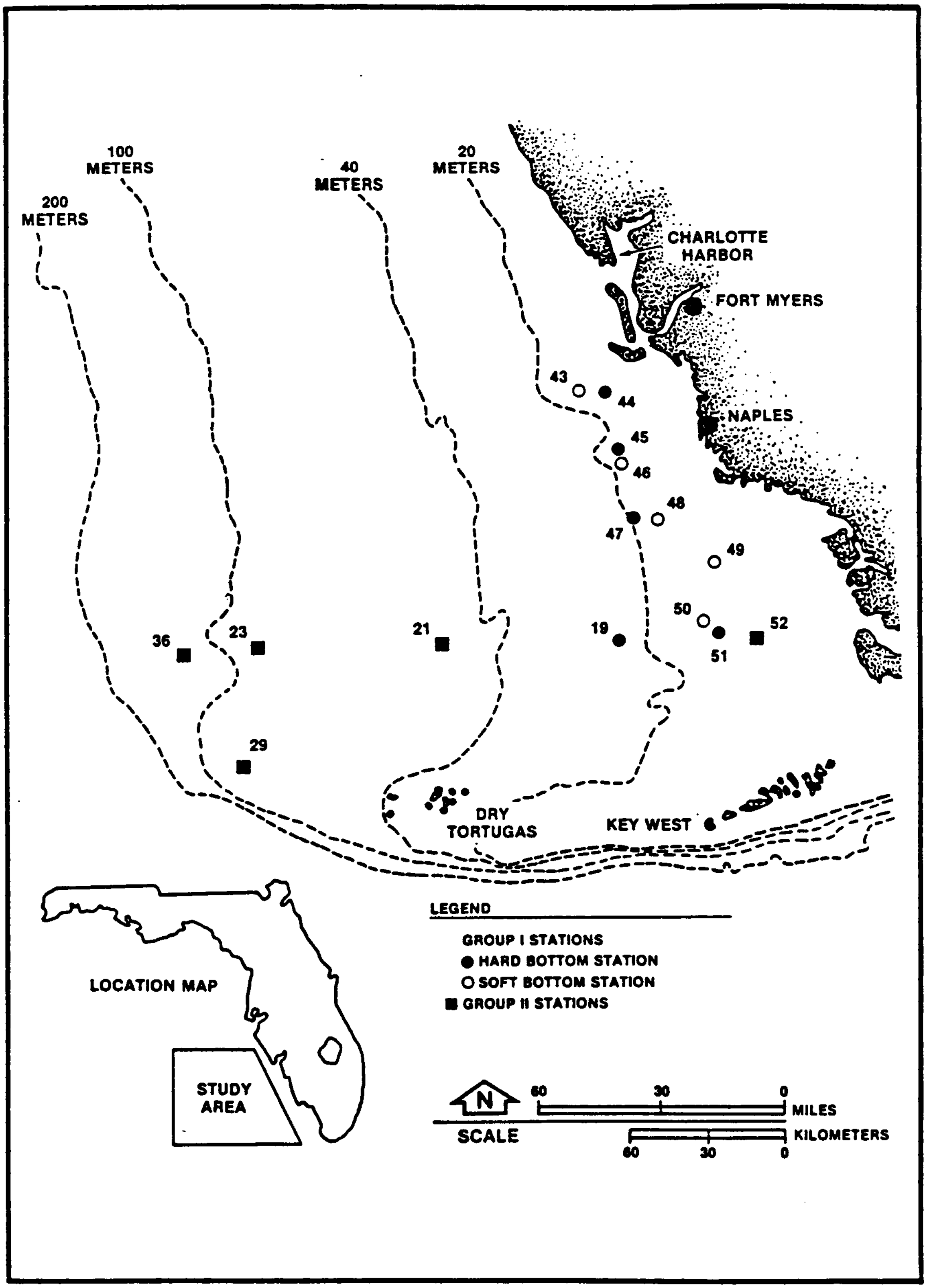

Figure 1. STATION LOCATIONS AND INSTRUMENT ARRAY LOCATIONS FOR YEAR 4

	STATION									
	52	44	51	45	47	19	21	29	23	36
	Inner Shelf						Middle Shelf			Outer Shelf
ASTEROIDEA										
ASTROPECTEN AMERICANUS			+							
ECHINASTER UNIDENT				+						
ECHINASTER SPINULOSUS	+	+	+	+		+				
ASTROPECTEN ARTICULATUS					+					
ASTROPECTEN COMPTUS					+	+				
ASTROPECTEN DUPLICATUS	+	+	+		+	+	+			
LUIDIA ALTERNATA			+		+		+			
ECHINASTER MODESTUS	+								+	
ASTROPECTEN NITIDUS							+			
OREASTER RETICULATUS							+			
PORANIELLA REGULARIS								+	+	
LUIDIA BARBADENSIS									+	
LINCKIA NODOSA									+	
NARCISSIA TRIGONARIA									+	
HENRICIA ANTILLARUM									+	
TOSIA PARVA									+	+
SCLERASTERIAS CONTORTA										+
ROSASTER ALEXANDRI										+
PECTINASTER GRACILIS										+
OPHIUROIDEA										
OPHIOSTIGMA ISACANTHUM	+									
AMPHIPHOLIS SQUAMATA			+							
OPHIOLEPIS ELEGANS					+					
ASTROCYCLUS CAECILIA					+	+				
OPHIOTHRIX LINEATA		+			+		+			
OPHIOTHRIX ANGULATA	+	+	+	+	+	+	+	+	+	
OPHIACTIS SAVIGNYI	+	+	+					+	+	
OPHIODERMA BREVISPINA		+					+	+	+	
OPHIODERMA RUBICUNDAM				+				+	+	
OPHIOPSILA UNIDENT								+		
OPHIOMYXIDAE								+		
OPHIONEREIS UNIDENT								+		
OPHIOCOMA UNIDENT								+		
OPHIONEREIS RETICULATA								+		
OPHIACTIS UNIDENT								+		
OPHIONEREIS OLIVACEA								+		
OPHIOMYXA FLACCIDA								+	+	
OPHIOTHRIX SUENSONII				+				+	+	+
OPHIODERMA UNIDENT									+	
MACROPHIOTHRIX UNIDENT									+	+
OPHIOZONA UNIDENT										+
ASTROPORPA ANNULATA										+
OPHIURA UNIDENT										+
ASTEROSCHEMA NUTTINGII										+
OPHIOPAEPALE UNIDENT										+
OPHURIDAE UNIDENT										+

Figure 2. PRESENCE (+) OF ASTEROIDS AND OPHIUROIDS IN DREDGED SAMPLES FOR CRUISES I-IV TOGETHER, BY STATION. SPECIES ARE ARRANGED IN ORDER OF INCREASING AVERAGE DEPTH OF COLLECTION.

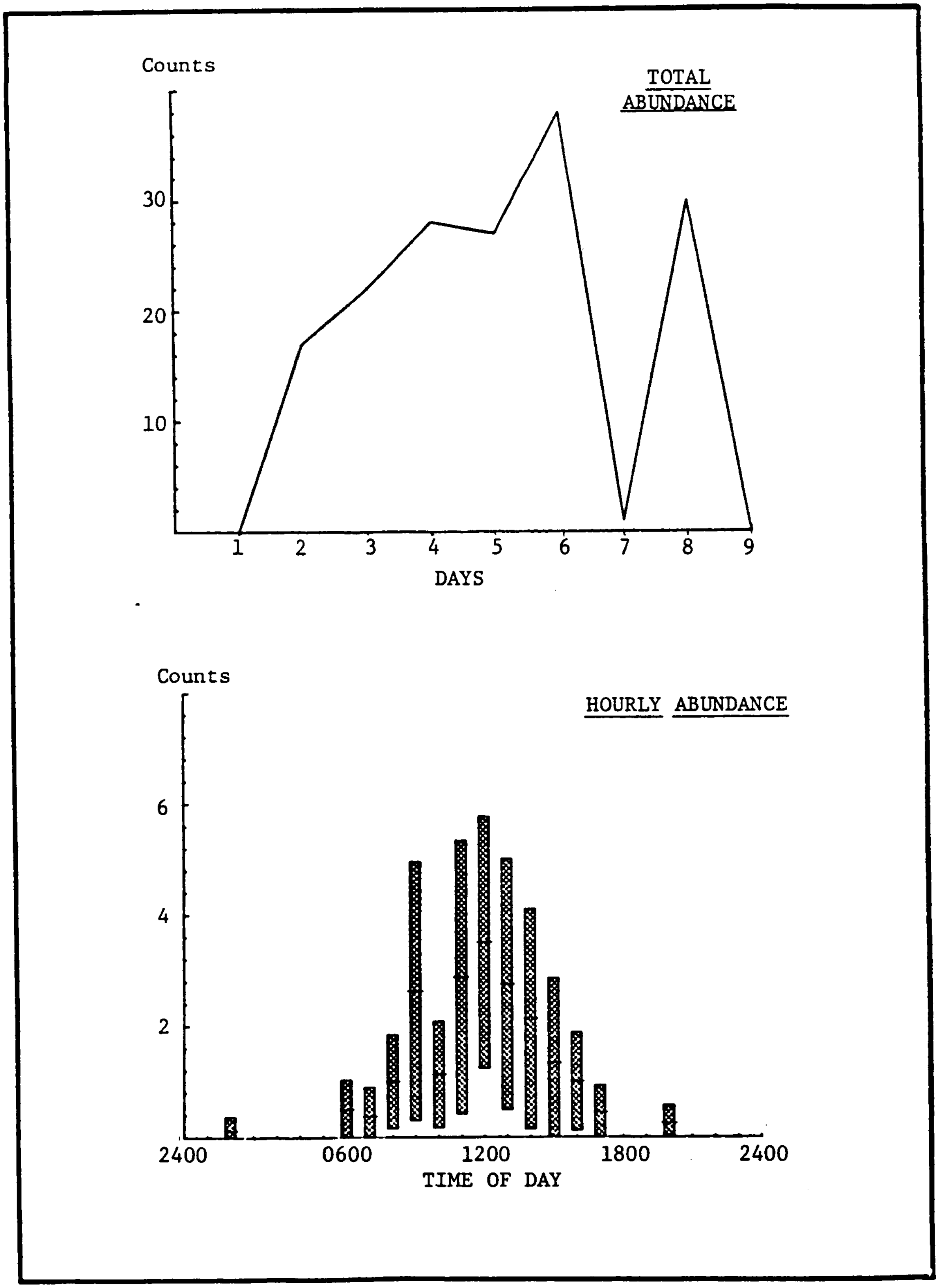

Figure 3. **TOTAL ABUNDANCE AND HOURLY ABUNDANCE FOR STATION 52, CRUISE II — LUTJANUS GRISEUS**

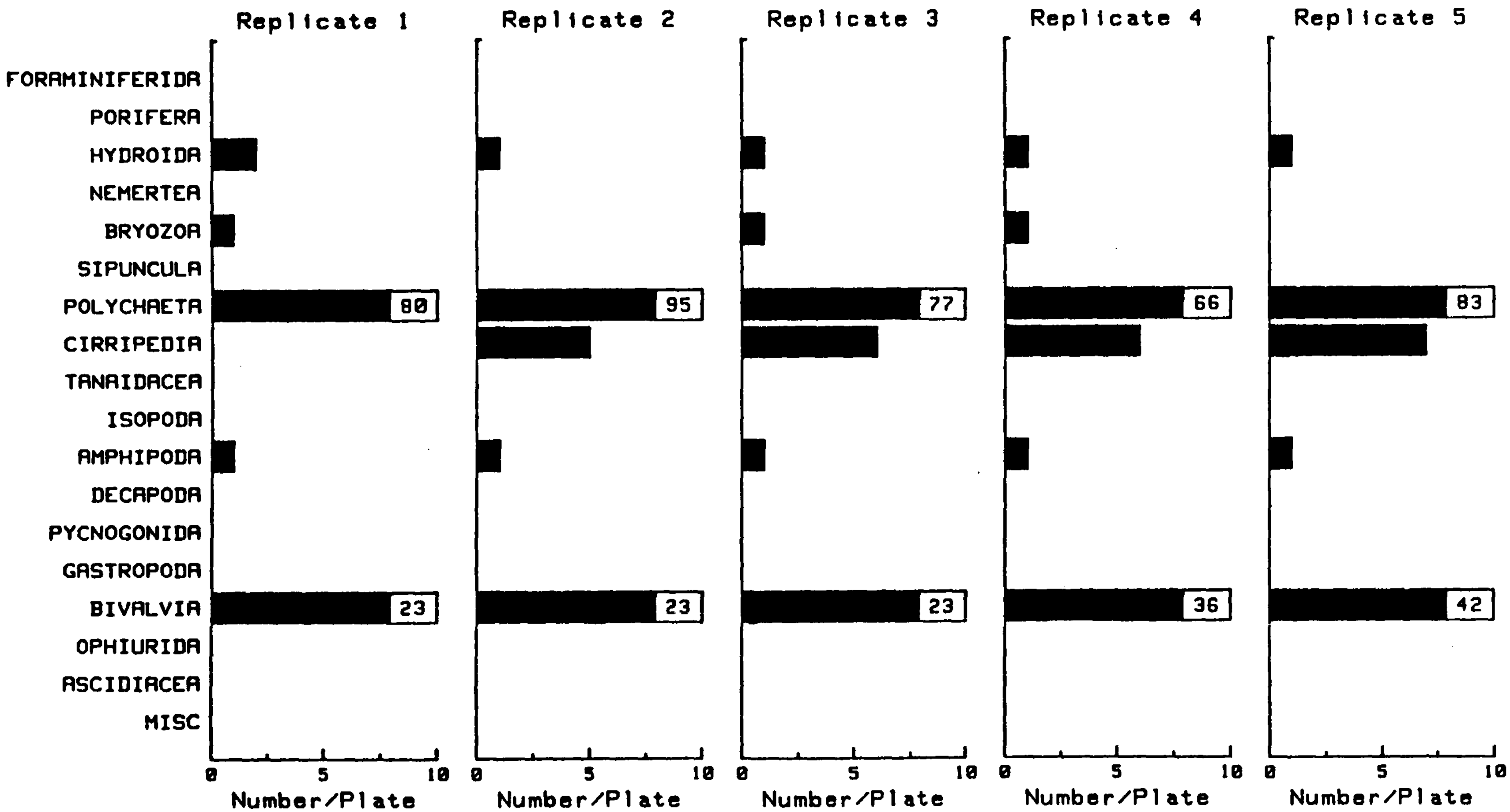

Figure 4. ABUNDANCE OF FOULING ORGANISMS ON REPLICATE TILE PLATES EXPOSED FOR 3 MONTHS AT STATION 52, COLLECTED ON CRUISE II

Table 1. Average biomass (g/plate) for major taxa of invertebrates on tile fouling plates, by station and exposure period. Exposure periods are shown separated by slashes (/) as follows: Cruise I-II (3 month exposure)/Cruise II-III (3-month exposure)/Cruise I-III (6-month exposure). Weights averaging less than 0.01 g/plate are shown by a plus (+). A minus (-) indicates zero values.

	STATION			
	52	29	23	36
TAXON				
FORAMINFERIDA	-/-/-	-/-/+	-/+/+	-/-/-
PORIFERA	-/-/-	-/-/.01	-/+/+	-/-/-
HYDROIDA	.49/-/.09	+/.02/.11	.04/.04/.10	-/-/.13
BRYOZOA	+/+/.02	+/+/.04	+/+/.02	-/-/-
POLYCHAETA	2.1/1.6/6.6	+/+/.03	.02/+/.17	-/-/+
CIRRIPEDIA	.10/9.6/10.3	-/+/+	+/_ /+	-/-/-
AMPHIPODA	.15/.50/.54	-/-/-	-/-/+	-/-/-
BIVALVIA	.12/.88/5.9	-/+/+	-/+/+	-/-/+
ASCIDIACEA	-/-/.39	-/-/.06	-/-/-	-/-/-

ITEM 3

LIST OF REGISTERED ATTENDEES

Minerals Management Services
Ternary Meeting
July, 1985

ATTENDEES

James Barkuloo, U.S. Fish & Wildlife Serv., Ecological Services Div.
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In addition, many local MMS personnel attended the presentation, but are not listed above.

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.