THE CENTER FOR MARINE RESOURCES AND ENVIRONMENTAL TECHNOLOGY

PROPOSAL FOR FY2006 FUNDING

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April 2005

THE CENTER FOR MARINE RESOURCES
AND ENVIRONMENTAL TECHNOLOGY

MMS 2005 Budget Proposal

	Program Management	Pre-Deployment	Deployment	Post-Deployment	Total Project
SALARIES					
Director (10%, 10%)	11,500	2,875	4,025	4,600	23,000
Associate Director (10%, 10%)	4,823		1,929	2,894	9,646
Manager of Project Resources (10%)	3,952				3,952
Geophysicist (15%)				11,250	11,250
Post-Doc Graduate (100%)				30,000	30,000
Sr. Mechanical Engineer (6.56%)		684	1,109	1,119	2,912
Mechanical Engineer (8.39%)		642	1,328	837	2,807
Mechanical Engineer (5.91%)		516	626	837	1,979
Electronics Technician (9.34%)		2,704			2,704
Port Captain (8.04%)		2,500			2,500
TOTAL SALARIES	20,275	9,921	9,017	51,537	90,750
FRINGE (25.89%)	5,250	2,569	2,334	13,343	23,496
TOTAL SALARIES and FRINGE	25,525	12,490	11,351	64,880	114,246
TRAVEL					
Test monitoring station systems and components - Domestic Travel			2,000	2,000	4,000
Attend professional meetings - Domestic Travel	3,600				3,600
Attend professional meetings - Foreign Travel	4,500		1,500		6,000
TOTAL TRAVEL	8,100	-	3,500	2,000	13,600
SUPPLIES					
Materials for Multipurpose Sled modification		4,184			4,184
Floats for Data Recovery System (DRS), "Big M":					
2 - steel 36" @ $3,800 each		7,600			7,600
2 - glass 18" @ $600 each		1,200			1,200
Materials for Rigging "Big M"		9,000			9,000
Materials for DRS Fiber optic cable laying reel system		1,500			1,500
Materials for Sea Floor Probe (SFP) sensor module replacements		1,200			1,200
TOTAL SUPPLIES	-	24,684	-	-	24,684
EQUIPMENT					
Acoustic Release for Telemetry Buoy (Benthos)		7,000			7,000
TOTAL EQUIPMENT	-	7,000	-	-	7,000
CONTRACTUAL					
Lease of R/V Pelican - 25 days @ $5,500/day			33,000	104,500	137,500
Lease of pair Deep Rovers (1000 m manned submersibles) and support vessel - 12 days @ $15,000/day			180,000		180,000
Support for Specialty Devices, Inc., support team to accompany CMRET technical team on cruise operations - 29 days @ $1,600/day		6,400	19,200	20,800	46,400
Support for modification of Specialty Devices designed Station Service Device computer to serve as a firing control/synchronization system for the S-wave energy source guns on the multipurpose sled. Also included are certain modifications to the source gun solenoids to enable deep sea operations.		40,000			40,000
Polygonal Faulting Workshop Fees	5,450				5,450
TOTAL CONTRACTUAL	5,450	46,400	232,200	125,300	409,350
OTHER					
Subcontracts:					
University of Victoria-support for two graduate students involved in VLA data processing, using non-conventional and conventional energy sources				60,000 *	60,000
University of South Carolina-support for one grad student and use of novel processing techniques developed by NASA				45,152 *	45,152
University of Southern Mississippi-geological assessment of proposed monitoring station site and core analysis		23,000 *			23,000
TOTAL OTHER	-	23,000	-	105,152	128,152
TOTAL DIRECT COSTS	39,075	113,574	247,051	297,332	697,032
INDIRECT COSTS (26% of Modified Total Direct Costs)	10,160	21,729	64,234	49,967	146,090
TOTAL PROJECT COSTS	49,235	135,303	311,285	347,299	843,122

NOTE: Indirect (F&A) Costs are charged on the first $25,000 of all NEW subcontracts. Subcontractors receiving awards in Year 3 (indicated by '' on list) are not subject to University of Mississippi Indirect Costs in Year 4.

PROGRAM MANAGEMENT
J. Robert Woolsey, Director

Continuation Proposal from
Cooperative Agreement 1435-01-02-CA-85273
Task Order No. 85345
March 2005

INTRODUCTION

The Center for Marine Resources and Environmental Technology (CMRET) is administered from the offices of the Mississippi Mineral Resources Institute (MMRI) on the campus of the University of Mississippi in Oxford. Office space is provided by the University of Mississippi. The MMRI provides shop space in Oxford and dock facilities for the R/V *Kit Jones* in Biloxi, Mississippi. The shop in Oxford is used primarily for the construction and maintenance of CMRET scientific and technical equipment and also for the maintenance of vehicles and logistical equipment used during all CMRET and MMRI projects.

PROGRAM MANAGEMENT ACTIVITIES AND FUNDING NEEDS

The "Program Management Task Order" provides for the administrative activities of the CMRET by providing partial support for the Director, who oversees all CMRET activities. The Director is ultimately responsible for the research plan of the CMRET and is intimately involved in equipment design, development and deployment. In addition, the Director is primarily responsible for interacting with other federal agencies on behalf of the CMRET, and will be assisted in all spheres by the Associate Director for Research Programs.

The Associate Director for Research Programs and the Geophysicist will assist the Director in carrying out the research plan, particularly with regards to geophysical programs. The Manager of Project Resources is responsible for record-keeping, including reporting requirements, and budget management. This individual is also responsible for non-technical aspects of reporting and interfacing with the program's Contracting Officer. Interfacing with the Contracting Officer's Technical Representative for the Minerals Management Service will be done by the Director. The Manager of Project Resources is supervised by the Director and is supported, partially, by the individual CMRET programs.

The Program Management budget for miscellaneous offices supplies, telephone and utilities at the Oxford shop will be covered from funds generated from indirect costs. Funds are requested for travel, to meet with the MMS in Herndon, VA, and to take part in other professional meetings. Indirect Costs for the CMRET have been negotiated with the University of Mississippi. The approved rate for on-campus research is 44%. However, because the CMRET and MMRI maintain off-campus facilities (Oxford shop and Biloxi dock), the University has agreed to the off-campus rate of 26%.

WORKSHOP ON MARINE GELS AND POLYGONAL FAULT SYSTEMS

The MMRI/CMRET proposes hosting a workshop to examine development of polygonal fault systems and their possible relationship to gas hydrate formation including service as reservoirs. The expectation that gas hydrates require coarse-grained host rock derives partly from observations outside the Gulf of Mexico and partly from traditional hydrocarbon recovery from reservoirs of sand/sandstone. Observations of the materials in which Gulf of Mexico gas hydrates have been found, however, indicate that the host sediments are, almost exclusively, fine-grained (Sassen and Roberts, 2004). High resolution seismic data, examined and analyzed by MMRI/CMRET geophysicists and geologists (McGee et al.), reveal structures in the shallow subsurface that appear to be the same as structures observed and described by Wattrus, et al. (2003) from environments dominated by polygonal faulting. The sequence of events and/or processes that involves polygonal fault systems, begins with marine gels being deposited on the sea floor, proceeds through polygonal faulting in fine-grained, unconsolidated sediments at, or shallowly below, the sea floor and finishes with hydrocarbons and other fluids occupying fracture porosity in shale. Interest in the sequence is piqued by the possibility that it provides the mechanism by which significant quantities of natural gas hydrates can be hosted in fine-grained sediment.

Plans are for the workshop to be held July 11-13, 2005, on Vancouver Island, B.C., at the Dunsmuir Lodge of the University of Victoria. This location was chosen to facilitate access for preeminent researchers in polygonal fault systems, several of whom have agreed to attend. A registration fee will offset part of the expense of the meeting. Additional funds are requested to complete payment for the facility (including some meals and other refreshments throughout the working sessions) and for payment of travel expenses for the MMRI/CMRET staff who will attend/run the workshop. Travel expenses for the key speakers will be paid from the MMRI/CMRET MMS overhead account. It is expected that the proceedings from this meeting will be published although the format is not yet decided.

REFERENCES:

McGee, T. M., C. B. Lutken, R. E. Rogers, C. A. Brunner, J. S. Dearman, F. L. Lynch and J. R. Woolsey, 2004, *Can Fractures in Soft Sediments Host Significant Quantities of Gas Hydrates?* Poster presentation at the 2004 Hedberg Conference entitled, Gas Hydrates: Energy Resource Potential and Associated Geologic Hazards, Vancouver, B.C.

Sassen, Roger, and Harry H. Roberts, 2004, *Site Selection and Characterization of Vent Gas, Gas Hydrate and Associated Sediments*, Report to DOE, Award #DE-FC26-00NT40920.

Wattrus, N. J., Rausch, D. E., Cartwright, J., 2003: *Soft-sediment deformation in Lake Superior: evidence for an immature Polygonal Fault System?* ***Subsurface Sediment Mobilization***, Van Rensbergen, Hillis, Maltman and Morley (eds), Geological Society of London Special Publication 216, pp 323-334.

PROGRAM MANAGEMENT
J. Robert Woolsey, Director

Continuation Proposal from
Cooperative Agreement 1435-01-02-CA-85273
Task Order No. 85345
March 2005

SALARIES	
Director (10%)	11,500
Associate Director (10%)	4,823
Manager of Project Resources (10%)	3,952
FRINGE	
Staff @ 25.89%	5,250
TRAVEL	
Attend professional meetings – Domestic Travel	3,600
Attend Polygonal Faulting Workshop – Foreign Travel	4,500
CONTRACTUAL	
Polygonal Faulting Workshop Fees	5,450
TOTAL DIRECT COSTS	39,075
INDIRECT COSTS (26% of MTDC)	10,160
TOTAL PROGRAM MANAGEMENT COSTS	49,235

GAS HYDRATES MONITORING STATION PROJECT
A Remote Station to Monitor the Gas Hydrate Stability Zone in the Northern Gulf of Mexico
Principle Investigators: J. Robert Woolsey, Thomas M. McGee and Carol B. Lutken

Continuation Proposal from
Cooperative Agreement 1435-01-02-CA-85273
Task Order No. 85349
March 2005

INTRODUCTION

The FY2006 request for funding for the CMRET includes support for the following tasks in addition to funds to continue ongoing tasks. New tasks address installation of the first components of the Monitoring Station/Sea Floor Observatory (MS/SFO) and the external factors affecting design as well as deployment of the monitoring station. These factors are:

1) The move to a new site location in Mississippi Canyon Block 118 (MC118), approved by the MMS, provides access to the eastern-most known occurrence of outcropping gas hydrates in the Gulf of Mexico, as well as to numerous gas vents and related biological communities. The new location requires both surface and subsurface reconnaissance, bathymetric and geologic, prior to station systems installation. This study is currently in progress, with the assistance of MMS and will be complete in time for the late summer/fall cruise schedule.

2) The optic-fiber link that was intended to transmit data from the station to a shore facility in near-to-real time will not be ready for station deployment in FY2005.

3) Use of the R/V *Ocean Quest* and its two Deep Rovers (manned submersibles) has become a possibility due to the fact that the ship, which has recently been acquired by Deep Ocean Expeditions and whose home base is Aukland, New Zealand**,** has been brought into the Gulf (Gulfport, MS) for a major overhaul. Use of this vessel and submersibles will enable the Consortium to deploy major components of the sea floor observatory in 2005, with the advantage of "on site operators" rather than relying solely on the Station Service Device (SSD) a custom-built remotely operated vehicle (ROV), funded by NOAA/NURP and scheduled for completion in 2006.

4) The permanent installation of the bore-hole array (BHA) at one of the holes drilled by the DOE/JIP consortium has been delayed. The change of JIP vessels from the Fugro *Explorer* to the *Uncle John* did not accommodate the borehole drilling so this integral part of the sea floor observatory will have to be rescheduled to a date when time on an appropriate vessel can be secured.

5) With the delay of the borehole array deployment, alternative plans have reverted back to the use of the Sea Floor Probe (SFP) in which geophysical, seismic and thermistor arrays, as well as geochemical, pore-fluid chemistry, and pressure sensor arrays are emplaced using the MMS gravity-driven Sea Floor Probe funded in previous years.

MONITORING STATION SYSTEMS STATUS SUMMARY

Geophysical Sensor Systems

The geophysical sensor systems concept has evolved since its original conception, as has been described in earlier proposals and reports, primarily in response to changing circumstance and advancements in geophysical technology. Briefly, the original plan for a net of five 200m water-column vertical line arrays (VLAs) or acoustic line arrays (ALA) gave way to a plan for a single ALA located in close proximity to four horizontal arrays (HLAs) laid out in a cross pattern on the seabed. The advantages include better location of noise-generating ships of opportunity providing P-wave energy for the hydrophones of the ALA and HLAs. Also, the latter can be fitted with accelerometers providing a 4-C capability. Further, the cross pattern of the HLAs could be used in experimental work with natural surface noise, such as wind-driven waves, as a seismic energy source.

Plans for access to one or more boreholes for the installation of at least one bore-hole vertical line array (BLA) thus far have proven elusive. Beginning in the spring of 2003, communications with the DOE/JIP gave hope to accessing a site in Atwater Valley. Regrettably, the 1300m water depth at the site proved too great a challenge for the various sensor technologies currently available to the Consortium, as well as funds available for the project. More recently, plans to core, log and emplace down-hole arrays at the newly assigned project site, MC118, were aborted when a change in drilling vessels available to the JIP forced cancellation of planned operations at MC118. Plans are currently being pursued to engage the JOIDES Resolution in early 2006, or the Fugro Explorer (The original JIP contract vessel) following its return to the Gulf, to conduct the planned drilling. Yet another possibility to be investigated will be access to the contract vessel expected to conduct site evaluation coring and logging operations for the new production lease holders of MC118.

In the meantime, the original concept of utilizing Sea Floor Probes (SFP) to emplace 4-C seismic arrays has been revisited. In spring ‘05 a gravity driven version of the SFP will be utilized to emplace a 10m geophysical line array (GLA). The GLA, funded by DOE, will at first operate autonomously, but once the NURP funded, integrated data/powered unit (IDP) is installed on the seabed in late Summer/Fall ’05, the GLA will be connected to it. The GLA will serve as a good test instrument until such time as it can be replaced with the larger (150m) DOE funded BLA, at some future date.

The HLAs are yet to be incorporated into the funding schedule, but are high on the DOE priority list.

Geochemical Sensor Systems

Evolution of geochemical sensor systems has also taken place for many of the same reasons as in the case of the geophysical systems. Early on, a 200m water-column oceanographic line array (OLA) was planned to monitor hydrocarbon pore fluids venting from the surficial sediments in the vicinity of hydrate mounds and transiting the lower column. As experience and an improved understanding of the hydrocarbon system have emerged, a more comprehensive approach has been developed.

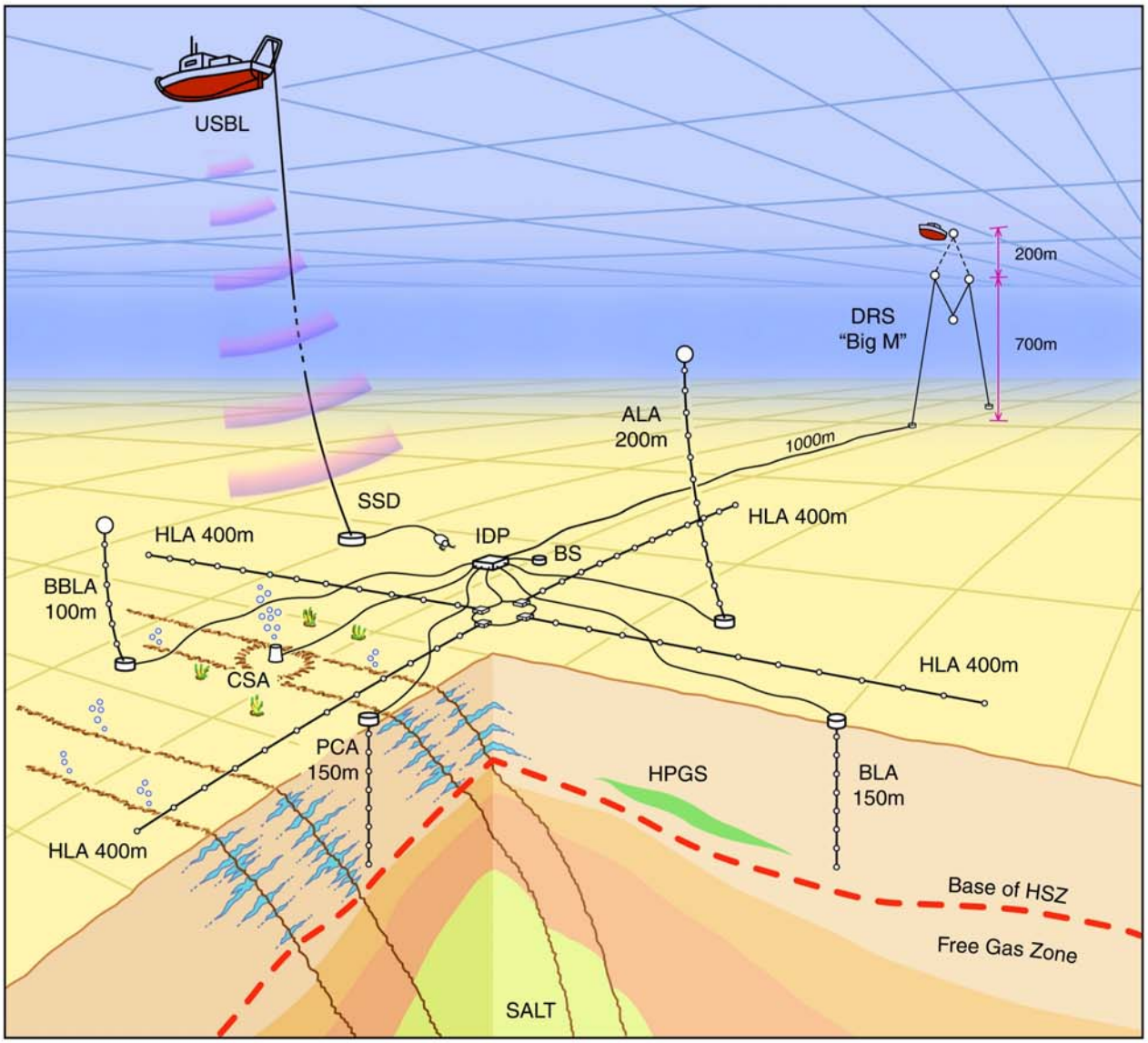
Presently small barrel-like, chimney sampler arrays (CSA), outfitted with sensors, are being fabricated for test in a NURP, Spring/Summer ’05 test period with deployment of at least one such unit planned for the Late Summer/Fall period ’05. The DOE/NURP, OLA has been modified to a 100m

length and designed to serve as a means of monitoring the benthic boundary layer and has been so designated (BBLA). Further, a pore-fluid sampling array (PFA), funded by DOE, has been designed to sample and analyze the pore-fluid chemistry of the shallow, near-seabed Hydrate Stability Zone (HSZ). This will first be accomplished using a 10m SFP in much the same way as the GLA will be emplaced. Later it is hoped that it too may be replaced by a longer (150m) array, the pore-fluid circulation array (PCA), should the opportunity of utilizing deeper bore-holes become a reality.

Station Support Systems

Several Station Support Systems (SSS) have been and continue to be developed for the installation, operation, and maintenance of the station. These are:

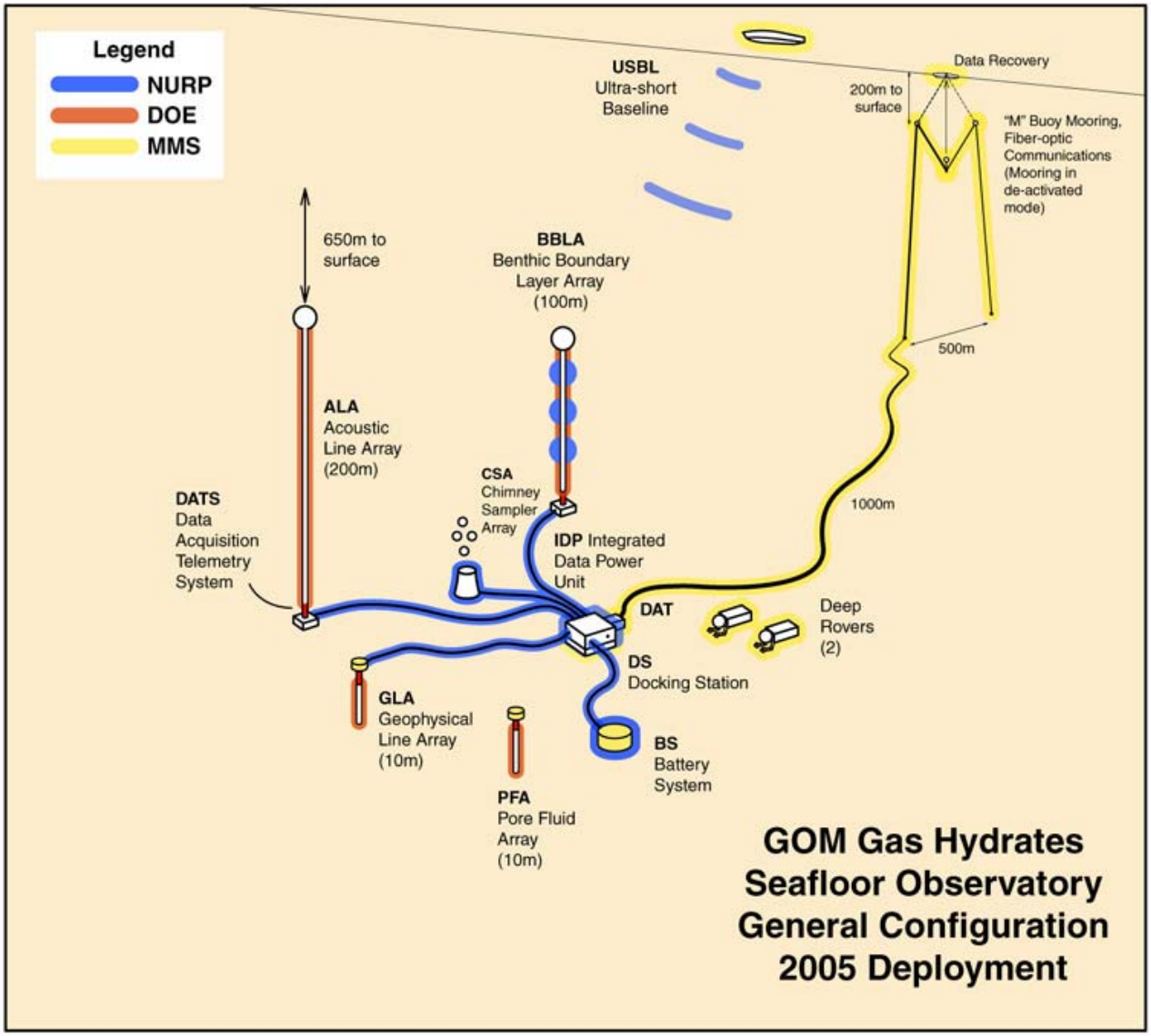
a) Integrated Data/Power unit (IDP), NURP; This unit will serve as the master station data-logger, and provide power via the battery system.
b) Salt-Water Battery System (SWBS), MMS/NURP; This system has evolved from a more conventional pressure compensated unit requiring change-out every six months to a recent technological breakthrough in salt-water battery technology. This new technology holds promise to supply station power needs for up to two years. In operations, the salt-water battery supplies a trickle charge to a conventional NIMH battery sealed in a pressure vessel. The latter unit assumes the actual load of the station, regulated through the IDP.
c) Data Recovery System -"Big M", MMS; As previously noted, the station is designed for real time operation, hooked-up to a mainland base of operations via commercial fiber optic cable. Until such time that the hook up can be made, data will be retrieved by periodic downloading of the IDP at approximate six-month intervals. This will be carried out by means of a buoy arrangement in the configuration of a capital letter "M" connected to the IDP by fiber optic cable. The center point of the "M" is fitted with a buoy and an acoustically releasable weight. On retrieval of the communications buoy on command, the system can be hooked-up on the surface and downloaded. On completion of the task, another weight is attached and the communicating buoy is lowered safely below the wave base.
d) Telemetry Buoy, NURP; The communication buoy is designed to include a telemetry system, the purpose of which is to provide a means of synchronizing the various dedicated seismic energy source pulses, both P and S-wave, with the appropriate receiving systems during a given dedicated-source seismic operation.
e) Station Service Device, NURP/MMS; The station service device (SSD) is a specially designed ROV-like system for use on level-two-equipped dynamically positioned vessels (available at a much lower day rate than a level one) for the purpose of hooking up wet-mateable connectors of the various sensors and support systems. Battery change-out and general maintenance are also among the SSD tasks. Basically the system differs from conventional ROVs in that, instead of suspended in the usual deployment, it works off a clump-weight/pressure compensated battery, lowered to the sea floor. A small, specially designed ROV is maneuvered from the clump-weight platform, powered by the battery and controlled via an umbilical, within a limited working radius, but sufficient to carry out the required task of the station.

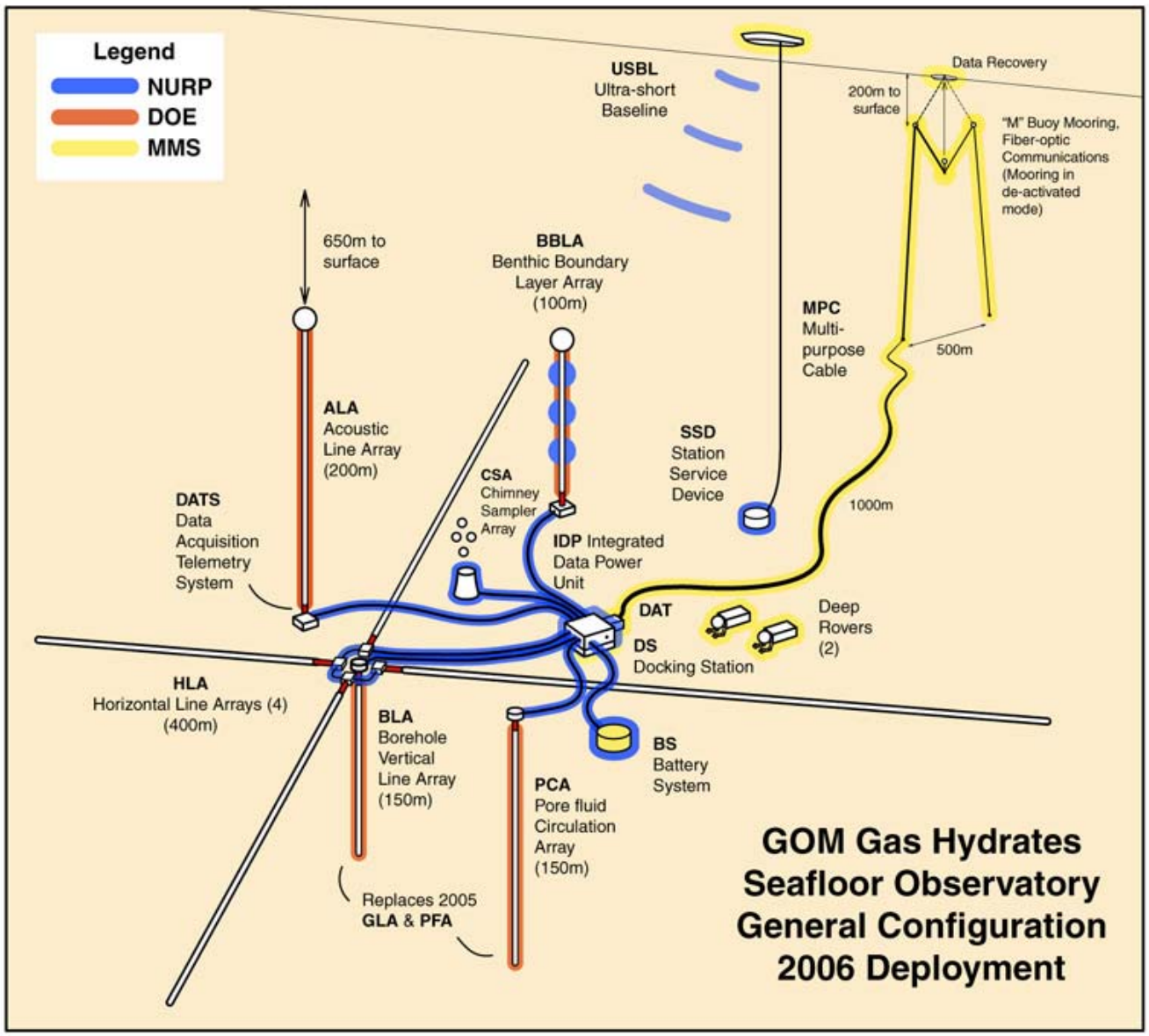


Hemipelagic Mud (thickness unknown)
Base of Hydrate Stability Zone (BHSZ)
Known Hydrate Mound with Gas Vents
High Pressure Gas Sand
Hydrates
Fault Zone

ALA	Acoustic Line Array
BBLA	Benthic Boundary Layer Array
BLA	Borehole Line Array
BS	Battery System
CSA	Chimney Sampler Array
DRS	Data Recovery System
HLA	Horizontal Line Array
IDP	Integrated Data Power Unit
PCA	Pore-fluid Circulation Array
SSD	Station Service Device
USBL	Ultra-short Baseline

Gas Hydrate Sea Floor Observatory
Mississippi Canyon Block 118


Legend
NURP
DOE
MMS
USBL
Ultra-short
Baseline
Data Recovery
200m to
surface
"M" Buoy Mooring,
Fiber-optic
Communications
(Mooring in
de-activated
mode)
650m to
surface
BBLA
Benthic Boundary
Layer Array
(100m)
500m
ALA
Acoustic
Line Array
(200m)
CSA
Chimney
Sampler
Array
DATS
Data
Acquisition
Telemetry
System
1000m
IDP Integrated
Data Power
Unit
DAT
Deep
Rovers
(2)
DS
Docking Station
GLA
Geophysical
Line Array
(10m)
BS
Battery
System
PFA
Pore Fluid
Array
(10m)
GOM Gas Hydrates
Seafloor Observatory
General Configuration
2005 Deployment



MONITORING STATION PROJECTS

The projects for which the CMRET requests funding involve the three stages of deployment of the sea floor monitoring station in FY2005-6: pre-deployment, deployment and post-deployment. The pre-deployment projects include efforts to improve the scientific understanding of the geology and environment of MC118, completion and refining of tools to be used in the deployment phase, and testing/preliminary deployment of some sensors. The deployment projects include emplacement on the sea floor of many station components and effecting the connections between components. The post-deployment projects are designed to evaluate how the station is functioning and how to utilize/interpret the data being produced by the station.

I. PRE-DEPLOYMENT TASKS

Completion or modifications of some systems/components of the station prior to their incorporation into the station comprise this set of tasks:

Project A: Preparing, Transporting, And Testing Equipment

The MMRI/CMRET shop team together with assistance from the technical team will prepare, transport, deploy, and test pertinent MS/SFO equipment and systems for which MMS is directly responsible. In the predeployment phase, these will include the following tasks:

1. Data Recovery System (DRS) or "Big M"

Assemble, and fabricate where necessary, components of the DRS, including the floats, rigging, mooring, and fiber-optic communications with counterweight(s) with acoustic release

2. Cable Reel

Fabricate cable reel for laying the data recovery system (DRS), fiber-optic bottom cable which connects the IDP with the "Big M". The reel design will have input from the Deep Rover submersible engineers. The deep rover team, together with SDI, is scheduled to deploy the cable along a predetermined route on the sea bed of MC118 during the August-September cruise.

3. Battery System

Portions of the battery system that will power the observatory will be purchased with funds provided by MMS.

4. Multipurpose Sled

Modify the existing MMS Multipurpose Sled to accommodate the SSD, to include, making the necessary electrical and pneumatic connections.

5. Maintaining the Research Vessel Kit Jones

The engineering team and shop facilities are also called upon to assist in the operation and maintenance of the *Kit Jones* from time to time. The R/V *Kit Jones* is used to field-test sensor systems and related equipment developed by the engineering team.

Project B. Site Characterization – Mississippi Canyon 118

The selection of the MS/SFO site, MC118, was made only one year ago and the Consortium is not in possession of much data from this area. In an effort to correct this deficiency, cores from the block were recovered in January, 2005 and more are scheduled to be recovered in May, 2005, during the *Pelican* cruise to deploy the sea floor probes.

1. Pre-deployment Cruise to Mississippi Canyon 118

The next cruise, May 13-16, 2005 (covered with current MMS funds), aboard the R/V *Pelican* is currently scheduled to perform the following tasks:

a. Deploy probes – 10m each - MMS-funded 04-05
   Osmosampler + accessories - DOE-funded: FSU, SDI – 04-05

Geophysical: SDI taken from JIP downhole spare parts+available DOE/MMS for probes: accelerometers, hydrophones, magnetometers, transponders (water-depth), or responders (1-way travel), data-logger

b. Recover cores ~10m – MMS-funded 04-05

This cruise will be completed during the current fiscal year and will be funded with current MMS funds. The tasks accomplished on this cruise will lead into the subsequent tasks.

2. Log, photograph, describe, subsample, and transport cores retrieved from MC118, the MS/SFO site

The cores will be evaluated by means of electric logging at the Navy Oceanographic Office at Stennis Space Center, and then transported to MMRI/CMRET shop facilities where they will be split, cleaned, photographed, logged, then subsampled. Samples will be provided to Consortium members for evaluation. One such recipient, Dr. Charlotte Brunner, is funded as an MMS subcontractor.

3. Biostratigraphic and Sedimentological History of MC118 based upon core samples and chirp sonar data

This study will be conducted at the University of Southern Mississippi under the direction of Dr. Charlotte Brunner, whose proposal is included as an appendix to this proposal.

MMS 2005 Budget Proposal: Pre-Deployment

	Total Project
SALARIES	
Director (2.5%)	2,875
Sr. Mechanical Engineer (1.54%)	684
Mechanical Engineer (1.92%)	642
Mechanical Engineer (1.54%)	516
Electronics Technician (9.34%)	2,704
Port Captain (8.04%)	2,500
TOTAL SALARIES	9,921
FRINGE (25.89%)	2,569
TOTAL SALARIES and FRINGE	12,490
SUPPLIES	
Materials for Multipurpose Sled modification	4,184
Floats for Data Recovery System (DRS), "Big M":	
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2 - glass 18" @ $600 each	1,200
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TOTAL SUPPLIES	24,684
EQUIPMENT	
Acoustic Release for Telemetry Buoy (Benthos)	7,000
TOTAL EQUIPMENT	7,000
CONTRACTUAL	
Support for Specialty Devices, Inc., support team to accompany CMRET technical team on cruise operations - 4 days @ $1,600/day	6,400
Support for modification of Specialty Devices designed Station Service Device computer to serve as a firing control/synchronization system for the S-wave energy source guns on the multipurpose sled. Also included are certain modifications to the source gun solenoids to enable deep sea operations.	40,000
TOTAL CONTRACTUAL	46,400
OTHER	
Subcontracts:	
University of Southern Mississippi-geological assessment of proposed monitoring station site and core analysis	23,000
TOTAL OTHER	23,000
TOTAL DIRECT COSTS	113,574
INDIRECT COSTS (26% of Modified Total Direct Costs)	21,729
TOTAL PROJECT COSTS	135,303

*NOTE: Indirect (F&A) Costs are charged on the first $25,000 of all NEW subcontracts. Subcontractors receiving awards in Year 3 (indicated by * on list) are not subject to University of Mississippi Indirect Costs in Year 4.

II. DEPLOYMENT TASKS

These tasks include deploying and operating all SFO components at sea. MMS-funded components include the Battery System, the fiber optic DRS cable via Deep Rover (with CMRET reel), and the modified Multipurpose Sled with the adapted SSD obstacle avoidance system and s-wave energy source firing control. These tasks will be carried out on a series of cruises:

1) 26 August – 6 September, 2005
2) October 15-23, 2005
3) January-February, 2006
4) May, 2006

MMS is requested to fund the ship-time for these cruises as well as partial coverage of personnel who will need to be involved: MMRI/CMRET engineers and scientists as well as the SDI team who is responsible for designing and constructing many of the systems that comprise the station and for effecting the underwater connections of component parts. The SDI team has been an integral part of the Consortium since its inception six years ago. They have been involved in design and testing of many of the major components of the station as well as the electrical connections between components. Participation by the SDI team in the cruises to deploy components of MS/SFO is vital to the success of the project.

Project A. Lease of the R/V *Ocean Quest*

The use of this unique system – 185ft-long vessel with two submersibles – will enable the Consortium to deploy station components that are ready for installation on the sea floor in 2005. It will also be possible to make the connections of components on the sea floor, a job that will be taken up by the Station Service Device (SSD) once it is completed in 2006. Use of submersibles and support vessel will be used for the following tasks:

1. Visual Survey MC118
A visual survey of the block is necessary prior to the deployment of sea floor observatory components, to ensure that site selection within the block is appropriate with respect to the mound, chemosynthetic communities, vents, etc.

2. Connect components of the MS/SFO
Submersibles will be used to make the connections between station components once they have been laid

3. Lay the fiber optic cable from the IDP to the DRS "BIG M"
Submersibles will facilitate and greatly simplify the job of laying hundreds of meters of cable on the sea floor

4. Recover and replace pore-fluid probes
The Pore-fluid probes deployed during the May cruise will be recovered using the rovers, so that the samples they have collected can be analyzed for various geochemical parameters. Replacement probes will be deployed using the same probe-deployment system as was used in May, by the *Pelican*,

5. Deploy the battery system that will power the MS/SFO
The rovers will again be used to tie the battery system that is to power the station in to the station.

6. Deploy components of the SFO that require wet-mateable plug-ins
Components that require wet mateable plug-ins will be deployed and tied-in using the submersibles. The submersibles will also be used for other tasks that require involved manipulations of instruments on the sea floor.

Precise scheduling of the *Ocean Quest* is not yet firm but Mike McDowell, Director of Operations, has given assurance that after the ship's refit is complete, priority will be given to Consortium work in MC118.

Project B. Lease of the R/V *Pelican*

The R/V *Pelican* has been reserved for Consortium use August 26-September 6. These dates are somewhat flexible and may change slightly depending upon the availability of the *Ocean Quest* which will be used in concert with the *Pelican* for a portion of the deployment schedule. Funds are requested to support use of the *Pelican* for six days and for the accompanying MMRI/CMRET and SDI personnel required to complete the following deployments of MS/SFO components on the sea floor in MC118:

1. Data Recovery System (DRS) or "Big M," (CMRET/SDI, MMS-funded)
The DRS is the means whereby data will be retrieved from the station and involves the mooring of a cable/floatation system in the configuration of a capital "M" (see the Figure) that supports the data-logger,

2. Acoustic Line Array or ALA (a water-column array), (CMRET/SDI, DOE-funded)
This bottom-founded, water column acoustic array has been tested and data collected. It will provide the vertical component of the three mutually orthogonal acoustic arrays that will allow precise locations to be determined at the station,

3. Benthic Boundary Layer Array or BBLA (a water-column array), (CMRET/SDI/WHOI, DOE/NURP-funded)
The Benthic Boundary Layer (BBLA) (formerly Oceanographic Line Array (OLA)) is also located in the water column and will provide water-column geochemical information to Consortium researchers,

4. Integrated Data Power Unit (ID/P), CMRET/SDI, NURP-funded
The ID/P is the master data transmission device to which all electronic components of the station must be connected

5. Bubble-counter, DOE-NURP-funded.
The bubble-counter, tested in shallow water, will track the volume of gas emanating from the sea floor in close proximity it.

Use of the two research vessels together will greatly simplify the deployment and connecting of systems, particularly the hook-ups to the IDP. Deployment of systems may change from one vessel to the other, or involve both, thus the need for the two to be on-site at MC118 simultaneously for a portion of the deployment schedule.

MMS 2005 Budget Proposal: Deployment

	Total Project
SALARIES	
Director (3.5%)	4,025
Associate Director (4.0%)	1,929
Sr. Mechanical Engineer (2.5%)	1,109
Mechanical Engineer (3.97%)	1,328
Mechanical Engineer (1.87%)	626
TOTAL SALARIES	9,017
FRINGE (25.89%)	2,334
TOTAL SALARIES and FRINGE	11,351
TRAVEL	
Test monitoring station systems and components - Domestic Travel	2,000
Attend professional meetings - Foreign Travel	1,500
TOTAL TRAVEL	3,500
CONTRACTUAL	
Lease of R/V Pelican - 6 days @ $5,500/day	33,000
Lease of pair Deep Rovers (1000 m manned submersibles) and support vessel - 12 days @ $15,000/day	180,000
Support for Specialty Devices, Inc., support team to accompany CMRET technical team on cruise operations - 12 days @ $1,600/day	19,200
TOTAL CONTRACTUAL	232,200
TOTAL DIRECT COSTS	247,051
INDIRECT COSTS (26% of Modified Total Direct Costs)	64,234
TOTAL PROJECT COSTS	311,285

*NOTE: Indirect (F&A) Costs are charged on the first $25,000 of all NEW subcontracts. Subcontractors receiving awards in Year 3 (indicated by * on list) are not subject to University of Mississippi Indirect Costs in Year 4.

III. POST-DEPLOYMENT TASKS

Post-deployment work will begin immediately following the deployment of the station components on the sea floor. These tasks are designed to test the station to determine if the systems are operating properly and to make appropriate adjustments.

Project A. Lease of the R/V *Pelican*

The *Pelican* will be required to test the MS/SFO systems following deployment. In addition to tests of the functioning of the electronics, a seismic survey will be run to test the ALA, and additional components added to the MS/SFO. The MMS is requested to fund ship time as well as partial support of personnel for these cruises.

1. August-September, 2005, 6 days

a. A seismic survey will be run using the Shallow Source/Deep Receiver system developed by CMRET - MMS-funded - shooting into the ALA. Data will be recorded on shipboard as well as on the station's data logging devices. The latter will be collected and the two sets of results compared, assuming all systems function as expected,
b. Adjustments to the station will be made,
c. Data-loggers will be collected, where appropriate.

2. October, 2005 ~ 5 days

a. Adjustments to the station will be made during this cruise,
b. Data-loggers will be collected, where appropriate,
c. Additional MS/SFO components will be deployed, including the Chimney Sampler Array (CSA), NURP-funded.

3. January-February, 2006 ~ 3 days

a. Data-loggers will be collected, where appropriate,
b. Further adjustments will be made, as appropriate,
c. Modified Multipurpose Sled with installed SSD for test of the towed seabed s-wave energy source system and recording of 4-C seismic data via the GLA will be deployed,
d. SSD in ROV mode will be tested,
e. Other systems ready for installation will be deployed.

4. May, 2006 ~5 days

a. Data-loggers will be collected, where appropriate,
b. Further adjustments will be made, as appropriate,
c. The SSD will be deployed and used to make adjustments,
c. The first horizontal line arrays will be deployed and tied into the station.

Project B. Modification of the NOAA Station Service Device (SSD) for use on MMS multipurpose sled

The Station Service Device (SSD) is a tethered Remotely Operated Vehicle (ROV), designed by SDI, to assist in deployment and in effecting electrical connection of station components. The FY 2005 Budget included an equipment item (100k) for a data-logger and fire control system for use on

the MMS Multipurpose Sled to enable its use as a shear-wave energy source platform. The original plan was to use a mechanical cable to tow the sled on the seabed. With no means of communication (via cable) with the sled, a costly apparatus was designed to do the job. With the NURP purchase of a multipurpose, mechanical/communications cable and commission for the SDI designed Station Service Device (SSD), an improved concept was envisioned that would include the added advantage of a 60% cost saving (from 100k to 40k).

The plan for which funds are requested of MMS, is to modify the existing Sled and SSD for tow and communication by multipurpose cable, enabling the installation of the modified SSD fire control system on the Sled. In this configuration it will serve as a firing control/synchronization system for the s-wave energy source guns and 4-component receivers, as well as utilize the existing SSD scanning sonar and video to facilitate navigation and obstacle avoidance during seabed towing operations.

Funds are requested from MMS to modify this device, funded originally by STRC:

1. To provide the MMS Sled with a video capability,

2. To provide the MMS Sled with a sonar obstacle avoidance capability,

3. To design and develop a firing control/synchronization system for the s-wave energy source guns and 4-C receivers.

Project C. Continuation of the support of graduate students doing research with VLA test data

During FY2006, three graduate students will enter their third year doing research with the data acquired during deep-water testing of the prototype VLA (now ALA) and a postdoctoral student will begin processing and interpreting processed ALA data at the University of Mississippi. The purpose of this research is to identify analytical techniques that effectively model geological structures within the hydrate stability zone. The students at the University of Victoria, BC, are focused on using Matched Field Processing (MFP), and in the use of ships' noise as a sound-source in collecting seismic data and processing techniques developed by the offshore oil industry. The student at the University of South Carolina is exploring the use of novel processing techniques originally developed by NASA scientists. Students requiring funding for these efforts are:

1. At the University of South Carolina
using novel processing approaches developed at Stennis Naval Research Laboratory,

2. At the University of Victoria, B.C.
using conventional and non-conventional energy sources,

3. At the University of Mississippi
to process and interpret MF/SFO data.

ADDITIONAL FUNDING NEEDS

The CMRET Director and Geophysicist are primarily responsible for planning and implementing the research component of this project. The Associate Director for Research Programs and Manager of Project Resources, with input from the University's Office of Research in the way of

management assistance, are responsible for ensuring that consulting and subcontracting arrangements are carried forth, and for tracking and monitoring compliance.

The requested funds are for travel expenses to various GOM ports for vessel mobilization/demobilization and systems deployment cruises.

Supply funds are requested for: floats, rigging and other materials for the “Big M”; materials for replacement sensor modules for the Sea Floor Probe; materials for modifications to the Multipurpose Sled consisting of structural steel; high pressure pneumatic tubing, valves, regulators and batteries; to accommodate the modified Station Service Device; and, materials for fabrication of fiber optic cable reel for the Deep Rover DRS deployment.

Equipment funds are requested for purchase of a Benthos Acoustic Release for use on the DRS Big M.

Indirect Costs for the CMRET have been negotiated with the University of Mississippi. The approved rate for on-campus research is 44%. However, because the CMRET and MMRI maintain off-campus facilities (Oxford shop, Biloxi dock and research vessel), the University has agreed to the off-campus rate of 26%.

MMS 2005 Budget Proposal: Post-Deployment

	Total Project
SALARIES	
Director (4.0%)	4,600
Associate Director (6.0%)	2,894
Geophysicist (15%)	11,250
Post-Doc Graduate (100%)	30,000
Sr. Mechanical Engineer (2.52%)	1,119
Mechanical Engineer (2.5%)	837
Mechanical Engineer (2.5%)	837
TOTAL SALARIES	51,537
FRINGE (25.89%)	13,343
TOTAL SALARIES and FRINGE	64,880
TRAVEL	
Test monitoring station systems and components - Domestic Travel	2,000
TOTAL TRAVEL	2,000
CONTRACTUAL	
Lease of R/V Pelican - 19 days @ $5,500/day	104,500
Support for Specialty Devices, Inc., support team to accompany CMRET technical team on cruise operations - 13 days @ $1,600/day	20,800
TOTAL CONTRACTUAL	125,300
OTHER	
Subcontracts:	
University of Victoria-support for two graduate students involved in VLA data processing, using non-conventional and conventional energy sources	60,000
University of South Carolina-support for one grad student and use of novel processing techniques developed by NASA	45,152
TOTAL OTHER	105,152
TOTAL DIRECT COSTS	297,332
INDIRECT COSTS (26% of Modified Total Direct Costs)	49,967
TOTAL PROJECT COSTS	347,299

*NOTE: Indirect (F&A) Costs are charged on the first $25,000 of all NEW subcontracts. Subcontractors receiving awards in Year 3 (indicated by * on list) are not subject to University of Mississippi Indirect Costs in Year 4.

GAS HYDRATES MONITORING STATION PROJECT
A Remote Station to Monitor the Gas Hydrate Stability Zone in the Northern Gulf of Mexico
Principal Investigators: J. Robert Woolsey, Thomas M. McGee and Carol B. Lutken

Continuation Proposal from
Cooperative Agreement 1435-01-02-CA-85273
Task Order No. 85349
April 2005

SALARIES	
Director (10%)	11,500
Associate Director (10%)	4,823
Geophysicist (15%)	11,250
Post-Doc Graduate (100%)	30,000
Sr. Mechanical Engineer (6.56%)	2,912
Mechanical Engineer (8.39%)	2,807
Mechanical Engineer (5.91%)	1,979
Electronics Technician (9.34%)	2,704
Port Captain (8.04%)	2,500
FRINGE	
Staff @ (25.89%)	18,246
TRAVEL	
Test monitoring station systems and components	4,000
Attend Polygonal Faulting Workshop – Foreign Travel	1,500
SUPPLIES	
Materials for Multipurpose Sled modification	3,410
Floats for Data Recovery System (DRS), "Big M":	
2 – Steel 36" @ $3,800	7,600
2 – Glass 18" @ $600	1,200
Materials for Rigging "Big M"	9,000
Materials for DRS Fiber optic cable laying reel system	1,500
Materials for Sea Floor Probe (SFP) sensor module replacements	1,200
EQUIPMENT	
Acoustic Release for Telemetry Buoy (Benthos)	7,000
CONTRACTUAL	
Lease of R/V *Pelican* – 25 days @ $5,500/day	137,500
Lease of pair Deep Rovers (1000m manned submersibles) and Support vessel – 12 days @ $15,000/day	180,000
Support for Specialty Devices, Inc., support team to accompany CMRET technical team on cruise operations – 37 days @ $1,600/day	59,200

CONTRACTUAL (cont'd)	
Support for modification of Specialty Devices designed Station Service Device computer to serve as a firing control/synchronization system for the S-wave energy source guns on the multipurpose sled. Also included are certain modifications to the source gun solenoids to enable deep sea operations.	40,000
SUBCONTRACTS	
Support for two graduate students involved in VLA data processing using non-conventional and conventional energy sources, University of Victoria, BC	60,000*
Support for one graduate student and use of novel processing techniques developed by NASA, University of South Carolina	30,000*
Geologic assessment of proposed monitoring station site and core analysis, University of Southern Mississippi	23,000*
TOTAL DIRECT COSTS	654,831
TOTAL INDIRECT COSTS (26% of MTDC)	139,056
TOTAL MONITORING STATION COSTS	793,887

NOTE: Indirect (F&A) Costs are charged on the first $25,000 of all NEW subcontracts. Subcontractors receiving awards in Year 3 (indicated by '' on list) are not subject to University of Mississippi Indirect Costs in Year 4.