

FINAL CRUISE PLAN

Deepwater Program: Exploration and Research of Northern Gulf of Mexico Deepwater Natural and Artificial Hard Bottom Habitats with Emphasis on Coral Communities: Reefs, Rigs and Wrecks

Cruise 1 – Leg 1

14 August, 2008

NOAA Ship NANCY FOSTER

Cruise Number:

Project:

Deepwater Program: Exploration and Research of Northern Gulf of Mexico Deepwater Natural and Artificial Hard Bottom Habitats with Emphasis on Coral Communities: Reefs, Rigs, and Wrecks

Cruise dates:

5 September – 17 September 2008 (Cruise may end on 15 Sep.)

Chief Scientist:

Robert A. Church

Senior Marine Archaeologist

C & C Technologies, Inc.

Working Area:

The northern Gulf of Mexico continental slope

Itinerary:

Depart: Galveston, TX

Arrive: Gulfport, MS

Endorsements:

RADM Richard R. Behn, NOAA,
Director, Marine and Aviation Operations Centers
Marine Operations Center, Atlantic
Norfolk, VA 23510-1145

Chief Scientist

Robert A. Church

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730 E. Kaliste Saloom Rd.

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I. CRUISE DESCRIPTION AND OBJECTIVES

A. Cruise Summary

The Sea Eye Falcon DR ROV will be used to investigate approximately eight shipwreck sites and possible a few exploratory sites in less than 1000 m water depth the Green Canyon, Mississippi Canyon, and Viosca knoll Areas in the Gulf of Mexico. First, the R/V *Nancy Foster* will transit to the Ewing Banks Wreck site in EW1008 (25-26 hrs run), where we will work about 1-1.5 days (6-7 Sep), depending upon the time of arrival and significance of the site. Although the EW Wreck site is not the closest site to Galveston, it will be the site for the dive. The closest site, the Green Lantern site (approximately 2 hours closer) is near the operating depth of the ROV. Starting at the EW Wreck will allow us to start at a shallower depth and then work out way to more complex and deeper sites. Next, we will move east to the *Gulfpenn* site in MC497 (8 Sep) and make a 12 hr. dive. The *Gulfpenn* site is a complex site, but we are familiar with this site and it should provide a good learning dive for the ROV operators before moving on to other complex unexplored sites. We will then move southwest to the potential *Gulfoil* site in MC796 (9 Sep.) for a 12 hr. dive. We anticipate the *Gulfoil* site to be similar to the *Gulfpenn* site. We will continue southwest to the Green Lantern site in GC245 (10 Sep.) for an 8 to 12 hr. dive. If we finish the dive early, we will move east-southeast the *Holly Ann Viser* site and attempt a dive the same day because it is only a two-hour transit from the Green Lantern site. Otherwise, we will dive the *Holly Ann* site on the following day (11 Sep). If this site turns out to be the modern wreck, *Holly Ann*, we will make only a short reconnaissance dive of about one to two hours. We will then move northeast to the "Oval Shaped Target" in MC539 (12 Sep). This site also may be a short dive depending on what is found. We will then move approximately 13 nautical miles east to the "Steel Hull" Site in MC588 (13 Sep) and plan to make a 12 hr. dive. We will then head east to the VK Wreck Site in VK786 (14 Sep) and plan a 12 hr. dive. Depending on downtime/weather and additional investigations (see page 6), we could return to port on 15 Sep, but not later than 17 Sep. We will try to conduct most transits at night to maximize our ROV dive time.

B. Station locations

The following is the list of known sites that will be visited during this project (Figure 1). The exact coordinate will be provided by the Chief Scientist once on board the NANCY FOSTER.

- 1 - EW1008, EW Wreck (near Lat 27° 59.5'N, Lon 90° 04.9'W)
- 2 - MC497, *Gulfpenn* (near Lat 28° 28.7'N, Lon 89° 20.7'W)
- 3 - MC796, Possible *Gulfoil* (near Lat 28° 10.2'N, Lon 89° 46.9'W)
- 4 - GC245, Green Lantern (near Lat 27° 44.6'N, Lon 90° 43.5'W)
- 5 - GC297, Possible *Holly Ann* (near Lat 27° 41.5'N, Lon 90° 20.1'W)
- 6 - MC539, Oval Target (near Lat 28° 26.2'N, Lon 89° 26.6'W)
- 7 - MC588, Steel Hull (near Lat 28° 23.9'N, Lon 89° 11.8'W)
- 8 - VK786, VK Wreck (near Lat 29° 14.5'N, Lon 87° 49.4'W)

Alternate sites:

- MC0195, Wreck formerly known as Western Empire
- MC74, Mica Wreck
- MC929, Multibeam site
- MC539, Multibeam site
- MC588, Multibeam site

C. Participating Organizations

C & C Technologies, Inc. (C & C)
PAST Foundation (PAST)
Penn State University (PSU)
Texas A&M University at Corpus Christi (TAMUCC)
METRO High School (METRO)
US Geological Survey (USGS)
TDI BROOKS INTERNATIONAL (TDI-BROOKS)
Minerals Management Service (MMS)
NOAA Office of Ocean Exploration and Research (NOAA OER)
SeaVision Marine Services LLC (SeaVision)

D. Personnel (Chief Scientist and participants)

This is a preliminary list and subject to minor changes. The final draft of the cruise plan will include a breakdown of expected participation.

| NAME | AFFIL. | SEX | NAT. | POSITION |
|------------------------------|-----------|-----|-----------|-------------------------------|
| Robert Church | C & C | M | US | Chief scientist |
| Robert Westrick | C & C | M | US | Marine Archaeologist |
| Ann Corscadden | PAST | F | UK | Co-P.I., Marine Archaeologist |
| Keene Haywood | PAST | M | US | Archaeologist/Oceanographer |
| Stephanie Anne Lessard-Pilon | PSU | F | US | Biologist |
| Arunima Sen | PSU | F | India | Biologist |
| Kaitlin Kovacs | USGS | F | US | Scientist, Core Specialist |
| Andy Bruening | METRO | M | US | Geophysics teacher |
| Jack Irion | MMS | M | US | Marine Archaeologist |
| John Broadwater | NOAA OER | M | US | Observer |
| Jeffrey Snyder | SeaVision | M | US | ROV crew |
| Matthew Cook | SeaVision | M | US | ROV crew |
| Geoffrey Cook | SeaVision | M | Australia | ROV crew |
| Craig Bussel | SeaVision | M | US | ROV crew |

E. Affiliation Addresses

| | |
|-----------|---|
| C & C | 730 E. Kaliste Saloom Rd, Lafayette, LA 70508 |
| PAST | 1929 Kenny Road, Columbus, Ohio 43210 |
| METRO | Metro High School 1929 Kenny Road Columbus, OH 43210 |
| PSU | Dept. of Biology, State College, PA 16802 |
| TAMUCC | Physical and Life Sciences Dept., Corpus Christi, TX 78412-5774 |
| USGS | US Geological Survey, Florida Integrated Science Center, St. Petersburg, FL 33701 |
| BOOKS TDI | College Station, TX 77845 |
| MMS | Gulf of Mexico OCS Region and Atlantic Activities New Orleans, LA 70123-2394 |
| NOAA OER | NOAA Office of Ocean Exploration and Research, Silver Spring, MD 20910 |
| SeaVision | 302 Maple Hill Road, Naugatuck, CT 06770 |

F. Administrative:

Point of Contact:

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Other POC's

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II. OPERATIONS

A. Data Collections

The primary data to be collected using the ROV include high-resolution digital video and still photographic imagery, CTD data including conductivity, temperature, depth, dissolved oxygen concentration, pH, fluorometry, and turbidity, and physical samples of corals, sediment cores. Other data streams from the ROV, such as vehicle attitude, acoustic data, and sonar imagery will be recorded. Navigational data for both the ship and ROV systems will also be recorded. While in transit to and from the site, and during times when the ROV is not deployed, Seabeam multibeam bathymetric data will be collected.

B. Staging plan

All of the equipment for this expedition will be loaded and installed onboard the NOAA Ship NANCY FOSTER at a TBD pier in Galveston, TX 4 September, 2008. The science party is awaiting information from the ship regarding pier support and crane capabilities.

The assistance of the bosun and deck personnel will be required during the mobilization to crane on the ROV, winch, and possibly science gear housed in small shipping containers.

C. Cruise plan

SCIENCE OBJECTIVES:

- 1) Determine the archaeological and biological significance of each site for potential additional study during the next phase of the project.
- 2) To determine the extent and condition of the artifact assemblage on each vessel and the presence of diagnostic artifacts. Target material for potential recovery during the next phase of the project.
- 3) Preliminary assessment of the stability of each site. Place long-term microbial experiments at select sites for assessing deterioration rates. Re-assess the Mark II platform placed at *Gulfpenn* in 2004.
- 4) Replicate push-cores close to and away from wrecks to examine a "reef-effect" on meiofauna. Our ability to do this will depend on the ROVs capability about which we should know more very shortly.
- 5) Carefully image, with scale, *Lophelia* (and other colonial cnidarians) on wrecks in order to estimate growth rates on substrates of known age. At previously visited and well documented wrecks (like the

Gulfpenn), we want to revisit colonies imaged previously in order to estimate growth rates in intervening years.

- 6) Document the cnidarian coverage on new wrecks (species and relative amounts) in a preliminary fashion in order to plan future work.
- 7) Attempt to determine the extent of each site.
- 8) Collect preliminary video mosaic data over the wreck site.

TYPICAL ROV INVESTIGATION PROCEDURE

Each ROV dive is scheduled for 12 hours, 0800-2000 hr, although this is subject to change. We will typically plan for an hour deployment and an hour recovery of the ROV allowing 10 hrs of bottom time per dive. We will always try to have an archaeologist and biologist on duty during each ROV investigation. The lead scientist will control the dive activities and guide the ROV operations. We will need the ROV's position tracked and recorded continually and as accurately as possible throughout the dives. The video camera(s) with scaling lasers will be used in every dive.

Science logs will be kept (in addition to ROV logs) for each dive. The Chief Scientist will assign a science team member to this task at the beginning of each shift. The science logs entries should be clear and concise and will be typed up at the end of each dive.

The priority and procedure will differ for sites that have been previously investigated (*Gulfpenn*, Green Lantern, and Viosca Knoll Wreck). The main priority for this cruise is to assess the archaeological and biological significance of each site and determine which sites will be included for additional study during this project. The ROV survey will begin with a thorough reconnaissance of the wreck site. During this inspection, pertinent features of the vessel will be recorded for analysis. This will allow the science team to become familiar with the orientation of the site and select areas for detailed inspection. Following the reconnaissance of the site, specific areas of biological and archaeological interest will be investigated. These areas may include but not be limited to areas with substantial *Lophelia* (and other colonial cnidarians), and areas of specific ship structure and significant artifact assemblages. Next, we will attempt to collect overlapping footage of the wreck site (plan view and possible profiles) for photo mosaic purposes.

Video Mosaic Procedure: The HD video camera will be turned to a downward looking position (90°). A series of parallel lines will be run lengthwise over the main hull at a constant altitude (approximately 2 m, but may vary depending on conditions). Line spacing will be set to achieve 50% overlap between lines (depending on the camera's field of vision). It is important that each line runs straight on a constant heading and does not deviate with the curvature of the hull or other site/seafloor features. For profile mosaic lines, the HD video camera will be put in a forward-looking position (0° plain). A series of lines will be run lengthwise along the side of the main hull. The ROV will start near the mud line (at the lowest altitude if the seafloor slopes) and increase the attitude for each line while maintaining approximately 50% overlap between lines. It is important that the ROV keeps a constant altitude during individual lines and does not rise or fall with the seafloor, lines of the shipwreck, or other visual features.

We will plan to set microbial experiments (at the applicable sites) after the visual inspection and mosaic procedures are completed of the main hull. After the visual inspection of the main structure, a series of survey lines maybe run of the area around the structure to determine the extent of the site's boundaries. The length of this survey will depend mainly on available time. The last procedure will be to take sediment push cores near and far from the site. After the push cores are secure, the ROV will be recovered. After the ROV is recovered, the sediment cores will be processed and stored for further analysis.

NIGHTTIME PROCEDURE

The primary operation at night will be to transit to the next shipwreck site. Multibeam sonar survey will be conducted as time allows. Gear must be secured and vessel should be at next dive site by 0730.

4 Sep - Science crew arrives at Galveston, TX (by noon) to load the R/V *Nancy Foster* and be ready to depart by the next day.

5 Sep - Transit to first shipwreck site (Ewing Banks Wreck) may take 26-27 hrs @ 10 knots. Science crew organizes/stows gear on the way. First crew & PI meetings on board will be "soon" after we are underway.

6 Sep - We anticipate arriving on station possibly by mid-day at EW1008, which should allow time for a short dive on the Unidentified Ewing Banks Wreck (Digital Still Camera – 90° downward looking). A short dive will provide the opportunity to checkout the ROV systems and get a preliminary look at the wreck site. The information gathered during this dive will be important in refining the dive plan for the next day. If the wreck is potentially historic or of biological interest, we will proceed with the planned investigation procedure. During the night, we will conduct the night hours procedures near the area. If the site is not of archaeological or biological interest, we will recover the ROV and transit to next location.

7 Sep - First full ops day. EW1008. Unidentified wreck site (Digital Still Camera – 90° downward looking). Resume site investigation procedure for unidentified wreck sites. After dive is completed, transit to next site (*Gulfpenn*). Approximate transit time of 5 hrs. @ 10 knots. Conduct night procedures as time allows.

8 Sep – MC497. *Gulfpenn* site (Digital Still Camera – 0° forward looking). General recon of site. Carefully image, with scale, *Lophelia* (and other colonial cnidarians) on the wreck in order to estimate growth rates. Revisit colonies imaged previously in order to estimate growth rates in intervening years. Image the Mark II microbial platform placed at *Gulfpenn* in 2004. Assess specific sections of debris (dislodged stern section) for archaeological analysis. After dive is completed, transit to next site (potential *Gulfoil*). Approximate transit time of 3 hrs. @ 10 knots. Conduct night procedures as time allows.

During transit, possible multibeam site in MC929, Location to be provided.

9 Sep – MC796. Unexplored wreck site, tentatively identified as the *Gulfoil* (Digital Still Camera – 0° forward looking). Commence site investigation procedure for unidentified wreck sites. We anticipate a site similar to *Gulfpenn*. After dive is completed, transit to next site (Green Lantern). Approximate transit time of 6 hrs. @ 10 knots. Conduct night procedures as time allows.

10 Sep – GC245. Green Lantern Wreck (Digital Still Camera – 90° downward looking). Recon to assess current condition. Carefully image, with scale, *Lophelia* (and other colonial cnidarians) on the wreck in order to estimate growth rates. Assess visible artifacts for possible recovery later (sheave, bell, etc.). Set microbial experiments. Collect sediment cores. After dive is completed, transit to next site (tentative *Holly Ann Visier*). Approximate transit time of 2 hrs. @ 10 knots. Conduct night procedures as time allows.

11 Sep – MC297. Unexplored wreck site, tentatively identified as *Holly Ann Visier* (Digital Still Camera – 90° downward looking). Commence site investigation procedure for unidentified wreck sites. If the shipwreck is the modern vessel *Holly Ann Visier*, we will discontinue the investigation after the initial recon, pending the biological significance of the site. After dive is completed, transit to next site (Oval Shaped Target). Approximate transit time of 7 hrs. @ 10 knots. Conduct night procedures as time allows.

12 Sep – MC539. Oval Shaped Target (Digital Still Camera – 90° downward looking). Commence site investigation procedure for unidentified wreck sites. We may need to probe the mud for this target. If a viable target cannot be located, we will discontinue the investigation after the initial recon, pending the biological significance of the site. If a viable wreck site is located, we will continue with the investigation procedure. After dive is completed, transit to next site (Steel Hull). Approximate transit time of 2 hrs. @ 10 knots. Conduct night procedures as necessary.

13 Sep – MC588. Unexplored wreck site, Steel Hull (Digital Still Camera – 90° downward looking). Commence site investigation procedure for unidentified wreck sites. If the shipwreck is a modern vessel, we will discontinue the investigation after the initial recon (pending identification), pending the biological significance of the site. If the site is potentially historic, we will continue the investigation procedure. After dive is completed, transit to next site (VK Wreck). Approximate transit time of 9 hrs. @ 10 knots. Conduct night procedures if time allows.

We have three to four weather days built in to the schedule. After completing the Steel Hull investigation in MC588 we plan to proceed to VK786 and investigate the VK wreck site before transiting to Gulfport, MS. If we have had four or more days of weather/down time, we will proceed directly to Gulfport (approximately a 16 to 18 hrs. transit). If we have not used our allotted down time we may utilize the additional days in one of the following ways 1) return to one or more of the previously investigated sites for additional investigation, if warranted; 2) make brief investigation of one or two alternative sites along the transit from MC588 to VK786 (Site formerly known as *Western Empire* and/or the Mica Wreck); 3) proceed to the VK wreck site and then return to port for an early completion.

14 - 16 Sep – VK786. Viosca Knoll Wreck site (Digital Still Camera – 90° downward looking). General Recon to assess current condition. Carefully image, with scale, *Lophelia* (and other colonial cnidarians) on the wreck in order to estimate growth rates. Assess visible artifacts for possible recovery later (sheathing, rigging, etc.). Collect Sediment cores. After dive is completed, transit to Gulfport, MS. Approximate transit time of 10 hrs. @ 10 knots.

15, 16, or 17 Sep – Gulfport, MS. Disembark the R/V *Nancy Foster*.

Table 1. Distance between sites and ports

| Straight Line Distance in Nautical Miles | | | | | | | | | |
|--|---------------|--------------|---------------|-----------|----------|----------|-----------|-------------|------------|
| | Galveston, TX | Gulfport, MS | GC245 | GC297 | EW1008 | MC796 | MC497 | MC539 | MC588 |
| Galveston, TX | 0 | | Green Lantern | Holly Ann | EW Wreck | Gulf Oil | Gulf Penn | Oval Target | Steel Hull |
| Gulfport, MS | - | 0 | | | | | | | |
| GC245, Green Lantern | 237.7 | - | 0 | | | | | | |
| GC297, Possible Holly Ann | 257.7 | - | 20.9 | 0 | | | | | |
| EW1008, EW Wreck | 263.3 | - | 37.5 | 22.3 | 0 | | | | |
| MC796, Possible Gulf Oil | 276.5 | - | 57.3 | 42.3 | 20.4 | 0 | | | |
| MC497, Gulf Penn | 294.7 | - | 85.8 | 70.3 | 49.7 | 28.6 | 0 | | |
| MC539, Oval Target | 290.2 | - | 80.8 | 65.5 | 44.2 | 23.4 | 5.4 | 0 | |
| MC588, Steel Hull | 303.4 | - | 90.8 | 74.2 | 53.7 | 33.3 | 8.7 | 13.2 | 0 |
| VK786, VK Wreck | - | 97.6 | 179.7 | 164.2 | 142.8 | 122.7 | 94.2 | 99.3 | 89.3 |

D. Multibeam Operations:

The shipboard bathymetric sonar system is required for this cruise. Multibeam data already exists for much of the region. During vehicle down times, we intend to increase the coverage by surveying in specific regions of interest near or in transit to the project wreck sites. We anticipate that raw multibeam data and geo-referenced images of the bathymetry will be needed following this leg for the second leg of the cruise if available. The scientific party will provide areas and coverage parameters..

E. Remotely Operated Vehicle Operations

The operations will consist of ROV dives between 300 and 1000 meters. The ship's FOO and bosun will meet with the ROV crew, Chief Scientist, and watch leaders prior to operations to ensure clarity of ROV launch, dive and recovery procedures and to hold a safety briefing. Once on location, the ship and IFE crew will determine the deployment site in order to maximize the probability of reaching the seafloor at the predetermined location. The ROV will be launched at approximately 8AM and will be in the water for up to 12 hours. The vessel will need to hold position on site according to communication with the ROV crew. The ROV crew will provide communications equipment for temporary installation onboard the R/V Nancy Foster so that positive communications can be established between the ROV crew, deck personnel, bridge personnel, and survey/dry lab.

F. Navigation

Ship's navigational information will be recorded on the Marine Operations Abstract (MOA) by the bridge watch. In addition to recording ROV dive events as they occur, various courses and speeds may be logged when on station. In the event of an SCS failure, the bridge watch will record hourly GPS positions in the MOA.

ROV navigation will be by an Applied Acoustics Easytrak USBL system on the ship with 2 Kongsberg MST 342 transponders on the vehicle and garage. SeaVision will install a USBL transducer on the port-side over-the-side mount aft of the J-Frame Deck. Ship GPS positioning, heading, and heave from the Ship's onboard POS/MV will be integrated with the USBL system by SeaVision to provide geographic positioning of the ROV and deployment garage during all in-water operations. SeaVision will also provide local GPS positioning and heading control on the pole mount which may be primary positioning and heading control for the USBL (to be determined).

Positions from the USBL system will be transmitted as NMEA-0183 strings for the ROV and launch garage to the Ship's Survey team for recording and display in the ship's Hypack navigation/survey system. SeaVision will coordinate with the Ship's Survey Team at the beginning of the preceding cruise to establish communication protocols between the ROV survey system and the ship's system.

During ROV operations, the ROV team will coordinate with the science party and the bridge watch team in order to investigate targets of interest. It is anticipated that the bridge will have access to the Hypack Navigation display, and that the bridge watch teams can utilize the onboard dynamic positioning system to position and orient the ship in support of the ROV team. SeaVision has worked with this vessel previously to perform similar operations for both transect dives and investigation dives. Similar strategies for vessel handling with the vessel's DP system are anticipated.

G. Waypoints

Most of the time the NOAA Ship NANCY FOSTER will be holding station at a to be determined location at each site. More waypoints will be added for the Seabeam surveys and as necessary for alterations to the ROV dive plans.

H. Station Operations

The initial launch at each site may be several hundred meters down current of the first dive target. It will take half an hour to an hour for the ROV to reach the bottom. After arriving at the seafloor, the scanning sonar and vehicle tracking system will be used to navigate the ROV. During the ROV dives, frequent communication between the ROV pilots and the bridge will be required to position the ship as necessary. The change in ship's position will reposition the counter-weight vehicle, and the pilots will maneuver the ROV accordingly on its 50 m tether. The ROV Navigator will maintain communication between the ROV operators in the control van and the officers on the bridge during the entire dive operation.

I. Underway Operations

Multibeam bathymetric data using the Seabeam system will be collected during the night hours. There is also the potential for a drift camera system to be operated at 1-2 kts in the event of weather/mechanical issues.

J. Applicable Restrictions

The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not: (1) jeopardize the safety of personnel on the ship; (2) exceed the time allotted for the cruise; (3) result in undue additional expense; or (4) change the general intent of the cruise.

K. Small Boat Operations

Small boat operations are weather dependent and at the Command's discretion. We may request to use a small boat to film a launch or recovery of the vehicles. Small boat operations are not normally required for ROV operations, but may be requested if recovery difficulty arises.

L. Education and Outreach

We will be participating in the PAST Foundation Teacher at Sea Program. In addition, ROV video footage and film footage may be provided to NOAA OE for inclusion in a lead up to the second leg of the cruise.

M. De-staging plan

All science equipment and personnel will be removed from the ship in Gulfport, MS. We anticipate that de-staging will begin 15 or 16 September and end on 16 or 17 September. The science party is awaiting information from the NANCY FOSTER regarding pier and carnage details.

III. FACILITIES

A. Equipment and capabilities provided by ship

1. Seabeam or equivalent multibeam bathymetric mapping sonar
2. XBT for speed of sound calibration
3. Differential GPS navigation and serial data output
4. Heading and water depth instruments with serial data output
5. A-frame for launching ROV (see below)

6. Power to the winch and vans (see below)
7. Dynamic positioning system for vessel station-keeping
8. INMARSAT satellite telephone service for voice and data (email)
9. Networked computer printers
10. Narrow band Acoustic Doppler Current Profiling (ADCP) system
11. Laboratory and storage space
12. PC based SCS workstations
13. Zodiac, or equivalent, and motor for ROV contingencies, and video and still photo acquisition
14. Crane support for all equipment during mobilization in Galveston and demobilization in Gulfport.
15. Access to and use of the moon pool and transducer

Requirements for ROV operations: Port-side J-crane to assist with launch and recovery and to hold sheave wheel in position during dives. Provide suitable landing point for 20' x 8' control container or provide dark, dry and air conditioned workspace for surface electronics. Power: 220 VAC at 3 kW, 115 VAC at 1 kW. Two (2) RS-232 cables from Vessel Survey Laboratory to ROV Control Container. Video feed cable for displaying ROV video in Survey Lab and/or Wet Lab. It would be preferred to have broadband/Ethernet to van.

Additionally sufficient consumables, backup units, and on-site spares and technical support must be in place to assure that operational interruptions are minimal. All measurement instruments are expected to have current calibrations, and all pertinent calibration information shall be included in the data package. The ship is requested to provide technical expertise and assistance if unexpected problems arise.

B. Equipment and capabilities provided by science party

The scientific party will provide the following items and will be responsible for their maintenance:

1. All biological sampling equipment and supplies including backup still camera system, and sampling gear.
2. Navigational transponders associated w/ ROV operations
3. ROV winch system
4. Control van

IV. COMMUNICATIONS

The NOAA Ship NANCY FOSTER will communicate daily with the NOAA Marine Operations Center-Atlantic.

Inmarsat (Voice): 874-600-864-932

Inmarsat (Fax): 808-434-5653

The Chief Scientist, his designee, or the ROV Operations Manager may request the use of the ship's radio to communicate with other research or commercial vessels in the operating area.

Communication Equipment *Nancy Foster*

INMARSAT-B and C
HF SSB/DSC Transceiver
Cellular Telephone
Land lines in port

Iridium
VHF Bridge to Bridge radio
VHF Hand-held radios for ship-to-launch and deck communications
E-mail address is: CO.Nancy.Foster@noaa.gov

V. DISPOSITION OF DATA AND REPORTS

A. Data responsibilities

The Chief Scientist is responsible for the disposition, feedback on data quality, and archiving of data and specimens collected on board the ship for the primary project. The Chief Scientist is also responsible for the dissemination of copies of these data to Co-PI's in a timely manner. The ship may assist in copying data and reports insofar as facilities allow.

1. The Chief Scientist will receive all original data gathered by the ship for the primary project. This data transfer will be documented on NOAA form 61-29 "Letter Transmitting Data."
2. The Commanding Officer is responsible for all data collected for ancillary projects until those data have been transferred to the Projects' principal investigators or their designees. Data transfers will be documented on NOAA Form 61-29. Copies of ancillary project data will be provided to the Chief Scientist when requested. Reporting and sending copies of ancillary project data to NESDIS (ROSCOP form) is the responsibility of the program office sponsoring those projects.
3. NOAA OE: To ensure proper archive of metadata, and to ensure that all metadata meets FGDC compliance, OE will see that NESDIS receives the following (all metadata information will be generated from the EIS).
 - a. The NOAA Central Library will receive all metadata associated with video, and will also receive a copy of the highlight video for archive.
 - b. NODC will receive all metadata associated with oceanographic data sets.
 - c. NGDC will receive all geophysical metadata such as Seabeam, side scan, etc.
 - d. NCDCC will receive all shipboard digital data (such as CTD, fathometer, and ship track information), ROV navigational data, and additional metadata, to develop future products in collaboration with PI's. For this requirement, OE requests copies of shipboard digital data and ROV navigational data on CD or DVD at the end of the cruise.
5. The science party will be responsible for the collection and organization of all data (other than shipboard digital data and ROV data) relative to meeting the goals and objectives of their projects. This includes working with the appropriate ship's personnel to obtain relevant data collected by the Scientific Computer System (SCS), and compilation of metadata records associated with physical samples.

B. Data Requirements

The following data products will be included in the cruise data package:

1. Marine Operations Abstracts
2. CTD data (on CD's) and CTD data notebook including CTD cast logs

3. Salinity sample analysis floppy
4. ADCP digital recordings
5. Multibeam digital data on CD or DVD
6. Marine weather observation logs
7. Hard copy, large format maps of multibeam surveys
8. Calibration information for ship's salinometer and thermosalinograph
9. SCS data tapes
10. Cruise operations spreadsheet w/ actual speed/dates made good along trackline

C. Marine Observation Log (Deck Logs)

A Marine Operations Abstract (MOA) form will be maintained by the ship's officers during the cruise. The critical information to record at each station is:

1. GMT date
2. GMT time
3. Position
4. Station number
5. Bottom depth

At present, a paper form (hard copy) MOA is the most secure method for ensuring that these data are recorded and preserved. However, a secure electronic version could be used to replace the paper MOA.

D. Records and Reports

1. The ship's officers will maintain the Marine Operations Abstract (MOA) during the cruise and will provide the Chief Scientist with a copy at the end of the cruise.
2. The Chief Scientist will complete the ship's Operations Evaluation Form and forward a copy to the Director, NOAA Marine Operations Center and to the OER representative. The ship's Field Operations Officer will provide the Chief Scientist with this form.
3. The Chief Scientist is required to provide NOAA OER with the following.
 - a. A quick look report (QLR) focused on accomplishments of the cruise. OER will provide a general outline for the QLR, and it should be submitted no later than 10-12 days post-cruise, but ideally, before disembarking.
 - b. An OER cruise summary for the Web site with images, as specified in the Web Production Plan. This should be submitted no later than 30 days post-cruise, and is designed to build on the accomplishments described in the QLR.
5. Media products that may be developed by OER in collaboration with PI's include the following (if requested).
 - a. Select ROV video will be used to develop a highlights video that will be provided to news media at the end of the cruise. An annotation file will be developed that will describe the contents of the video, and will include proper credit and contact information.
 - b. Select high-resolution still images (10-20) will be used to develop a CD that will be provided to print media at the end of the cruise. A file of captions will be developed that will describe each still image, and will include proper credit and contact information.

E. Pre- and post-cruise meetings

Meetings will be arranged and conducted at the discretion of the Chief Scientist. During transit to the site and periodically throughout the cruise science meetings will be held in the ship's lounge or the main science lab.

F. Ship operation evaluation report

A Ship Operations Evaluation Report will be completed by the Chief Scientist and forwarded to NC3.

VII. HAZARDOUS MATERIALS

A. Policy/compliance

The NANCY FOSTER will operate in full compliance with all environmental compliance requirements imposed by NOAA. All hazardous materials and substances needed to carry out the objectives of the embarked science mission, including ancillary tasks, are the direct responsibility of the embarked designated Chief Scientist, whether or not that Chief Scientist is using them directly. The NANCY FOSTER Environmental Compliance Officer will work with the Chief Scientist to ensure that this management policy is properly executed, and that any problems are brought promptly to the attention of the Commanding Officer.

In accordance with NC Instruction 6280B, the Chief Scientist will provide an inventory of all hazardous material, including Material Safety Data Sheets (MSDS) and quantities, to the Commanding Officer at least two weeks prior to sailing. The inventory shall be updated at departure, accounting for the amount of material being removed, as well as the amount consumed in science operations and the amount being removed in the form of waste. The Chief Scientist shall have copies of each MSDS available when the hazardous materials are loaded aboard. Hazardous material for which the MSDS is not provided will not be loaded aboard. Compressed gas storage cylinders (including those containing air) will also be included in the inventory with the date of the last hydrostatic certification.

B. Hazardous Materials

This is a preliminary list, some chemicals may be removed and some may be added.

| Hazardous Material | amount | concentration | neutralizer buffer absorbent | MSDS |
|---|--------|---------------|---------------------------------|------|
| Ethanol 200 proof | 20L | 100% | water | YES |
| Formaldehyde | 250ml | 37% | spill absorbant | YES |
| DMSO | 500ml | | water | YES |
| RNALater | 1L | | water | |
| contains: 20mM EDTA, 25mM Sodium Citrate, 700g Ammonium Sulfate | | | | YES |

The ship's dedicated HAZMAT Locker contains two 45-gallon capacity flam cabinets and one 22-gallon capacity flam cabinet, plus some available storage on deck. All HAZMAT, except small amounts for ready use, must be stored in the HAZMAT Locker. If science party requirements exceed ship's storage capacity, excess HAZMAT must be stored in dedicated lockers meeting OSH/NFPA standards to be provided by the science party. Scientific groups requiring Hazmat storage should compute volume of storage required prior to the cruise and ensure adequacy onboard.

The scientific party, under supervision of the Chief Scientist, shall be prepared to respond fully to emergencies involving spills of any mission HAZMAT. This includes providing properly trained personnel for response, as well as the necessary neutralizing chemicals and clean-up materials. The ship's Environmental Compliance Officer will review the onboard inventory of MSDS's and will advise Chief Scientist if ship already has compounds listed in Appendices. Ship's personnel are not first responders and will act in a support role only in the event of a spill. The Chief Scientist shall provide a list of science party members that are properly trained to respond in the event of hazmat spills.

The Chief Scientist is directly responsible for the handling, both administrative and physical, of all scientific party hazardous wastes. No liquid wastes shall be introduced into the ship's drainage system. No solid waste material shall be placed in the ship's garbage.

The oncoming Chief Scientist will work with the departing Chief Scientist and the ship's environmental Compliance Officer to ensure proper tracking of inherited hazardous materials.

VIII. RADIOACTIVE ISOTOPES

There will be no radioactive isotopes in use during the cruise.

IX. MISCELLANEOUS

A. Scientific Berthing

The Chief Scientist is responsible for assigning berthing for scientific party within the spaces designated as scientific berthing. The Chief Scientist is responsible for returning the scientific berthing spaces back over to the ship in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys, which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the cruise and its conclusion prior to departing the ship.

In accordance with NC Instruction 5355.0, Controlled Substances Aboard NOAA Vessels dated 06 August 1985; all persons boarding NOAA vessels give implied consent to conform to all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ) must be completed in advance by each participating scientist. Scientists are required to be medically approved by NOAA Marine Operations Center Atlantic prior to sailing should reach the ship no later than 1 week prior to the cruise. This will allow time to medically clear the individual and to request more information if needed. All personnel must also provide results of PPD (TB) test taken within 12 months of sailing. We ask that all personnel bring any prescription medication they may need and any over-the-counter medicine that is taken routinely (e.g. an aspirin per day, etc.). The ship maintains a stock of medications aboard, but supplies are limited and chances to restock are few.

Contact for NHSQ's:
LT Michael Futch
mike.futch@noaa.gov
Voice: (757)441-6320
FAX: 757-441-3760

Prior to departure, the Chief Scientist will provide a listing of emergency contacts to the Executive Officer, RHB for all members of the scientific party, with the following information: name, name of contact, address of contact, relationship to member, and contact telephone number. Protocol for entering and exiting port areas will vary. In US ports, you must have a government ID to enter. All others (visitors and scientists outside of the government) may (depending on port security) require an escort to and from the ship. All personnel, including crew, are still checked against lists supplied to port security. A passport is recommended for all personnel embarking aboard the RHB.

C. Shipboard Safety

Safety of operations is of utmost importance. Scientists will attend all safety briefings as required by the vessel Command. Wearing open-toed footwear of any kind outside of private berthing areas (i.e. to and from showers) is not permitted onboard this ship. This shipboard safety regulation is included in the Commanding Officer's Standing Orders, and will be enforced. All members of the scientific party should be aware of this regulation before embarking.

D. Wage marine working hours and rest periods

The Chief Scientist shall be cognizant of the reduced capability of the NOAA Ship NANCY FOSTER operating crew to support 24-hour mission activities with a high tempo of deck operations at all hours. Wage marine employees are subject to negotiated work rules contained in the applicable collective bargaining agreement. Dayworkers' hours of duty are a continuous eight-hour period, beginning no earlier than 0600 and ending no later than 1800. It is not permissible to separate such an employee's workday into several short work periods with interspersed non-work periods. Dayworkers called out to work between the hours of 0000 and 0600 are entitled to a rest period of one hour for each such hour worked. Such rest periods begin at 0800 and will result in no dayworkers being available to support science operations until the rest period has been observed. All wage marine employees are supervised and assigned work only by the Commanding Officer or designee. The Chief Scientist and the Commanding Officer shall consult regularly to ensure that the shipboard resources available to support the embarked mission are utilized safely, efficiently and with due economy.

E. Drug and alcohol policy

In accordance with NMAO Drug and Alcohol Policy (NMAO #3, dated May 7, 1999), which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels, all persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time.

F. Shipping Information

Master

NOAA Ship NANCY FOSTER

▣ IN PORT

- Home Port (Charleston, SC):
 - 843-529-0731,0855 (Voice)
 - 843-991-6326 (Fax)
- Cellular:
 - 843-991-6326 (Ship)
 - 843-697-0584 (CO)
 - 843-697-0901 (OOD)

▣ AT SEA

- Fleet 77:
 - 011-874-764677298 (Phone)
 - 011-874-600864932 (Phone)
 - 011-874-600864933 (Fax)
 - 011-874-600864934 (MPDS)
 - 011-874-600864930 (High Speed)
 - 011-874-600864931 (Low Speed)
- Inmarsat B: ¹
 - 011-874-336-991-211 (Voice)
 - 011-874-336-991-212 (Data)
 - 011-874-336-991-213 (Telex)
 - 011-874-391-031-069 (HSD)
- Iridium: ³
 - 011-8816-7632-5653 (Iridium-Iridium): ³
 - 808-434-5653 (Land-Iridium)
- Fax-At-Sea:
 - 874-600-864-933