UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
Marine Operations Center
439 W. York Street
Norfolk, VA 23510-1114

APR 26 2013

MEMORANDUM FOR: Captain Mark Pickett, NOAA
Commanding Officer, NOAA Ship *Ronald H. Brown*

FROM: Captain Anita L. Lopez, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for RB-13-03
Atlantic Deep-Water Canyons

Attached is the final Project Instruction for RB-13-03, Atlantic Deep-Water Canyons, which is scheduled aboard NOAA Ship *Ronald H. Brown* during the period of 30 April – 27 May, 2013. Acknowledge receipt of these instructions via e-mail to **OpsMgr.MOA@noaa.gov** at Marine Operations Center-Atlantic.

Attachment

cc:
MOA1

Final Cruise Instructions

RB-13-03-HBH, Deepwater Canyons

Date Submitted: 22 April 2013

APR 26 2013

Platform: NOAA ship *Ronald H. Brown*

Cruise Number: RB-13-03

Project Title: Atlantic Deep-Water Canyons

Cruise Dates: 30 April - 27 May 2013

Prepared by: _____ Dated: 22 April 2013

Dr. Steve W. Ross
Co-Chief Scientist
UNCW, Center for Marine Science, 5600 Marvin Moss Ln., Wilmington, NC 28409, 910-962-2346, email: rosss@uncw.edu

Prepared by: Sandra Brooke Dated: 22 April 2013

Dr. Sandra D. Brooke
Co-Chief Scientist
Florida State University, Coastal Marine Lab. 3618 Coastal Hwy., St. Teresa, FL 32358, 850-697-4093, email: sbrooke@fsu.edu

Approved by: _____ Dated: 26 April 2013

John D. Tomczuk, NOAA
Expedition Coordinator
Office of Ocean Exploration and Research

Approved by: _____ Dated: 26APR13

Captain Anita L. Lopez, NOAA
Commanding Officer
Marine Operations Center - Atlantic

I. **Overview**

A. Summary and Project Period

Submarine canyons are dominant features of the outer continental shelf and slope of the US East coast from Cape Hatteras to the Gulf of Maine, occurring at regular intervals along the shelf-slope interface (Fig. 1). Cutting deeply into the bottom and linking the shelf to the deep sea, these conduits funnel anthropogenic pollutants, organic carbon, and sediments from shallow to deeper waters. The geology of these features has been well studied; however, despite their high productivity, biological data are limited (particularly deeper than 200 m). Much of the biological data available for these canyons is represented by unpublished reports, unanalyzed data sets, and anecdotal observations. The canyons between Cape Hatteras and Cape Cod are the subject of potential oil exploration, intensive fisheries, and are possible National Marine Sanctuary candidates, and yet these are even less well known than those further north.

The first activity of this project was a multibeam sonar mapping and water column sampling cruise from Norfolk Canyon to Baltimore Canyon using the NOAA ship *Nancy Foster* (NF-11-04, 4-17 June 2011, Co-chief Scientists: S.W. Ross and S.D. Brooke, cruise report of 29 Aug 2011). Detailed bathymetric maps generated during the mapping cruise were used to guide sampling activities during the 2012 ROV cruise and will also be used during the 2013 cruise. The 2012 cruise using the *Nancy Foster* (NF-12-07, 15 Aug - 2 Oct 2012, cruise report of 29 Oct 2012) concentrated geology, biology, and oceanographic sampling during its first two legs in Baltimore Canyon with limited sampling in Norfolk Canyon. Leg three of the 2012 cruise conducted archaeological and biological sampling mostly around Norfolk Canyon.

The 2013 mission will originate and return to Charleston, SC. It will be broken into two legs, with an at-sea transfer of personnel and baggage offshore of Norfolk, VA. We will conduct 24 hour operations, and it is critical to our multi-objective project to have a fully staffed and operational deck department throughout the cruise as well as one Survey Technician available at all times. During the day we will use the ROV *Jason II* (Woods Hole Oceanographic Inst.) for ROV surveys and sampling. At night we will conduct non-ROV sampling including bottom trawling, box coring, retrieval and re-deployment of two benthic landers, multibeam mapping, and CTD and water sampling (using CTD with niskin rosette). Education and outreach activities will be incorporated into the cruise, through NOAA, NC Museum of Natural Sciences, USGS and other institutional websites.

This cruise is a collaborative effort between the Bureau of Ocean Energy Management (BOEM, the primary funding source), CSA Ocean Sciences, Inc. (CSA, the BOEM contractor) and academic partners, NOAA Office of Ocean Exploration and Research (OER, provider of ship and ROV time), and the US Geological Survey (USGS).

Cruise Period: 30 April - 27 May 2013 (Including transit and project days)

B. Service Level Agreements

Of the 28 Days At Sea (DAS) scheduled for this project, 17 DAS are base-funded by the Office of Marine and Aviation Operations and 11 DAS are funded by the NOAA Office of Ocean Exploration and Research. This project is estimated to exhibit a <u>High</u> Operational Tempo.

C. Operating Area (see Figure 1)

The study region encompasses areas off Virginia, Maryland, and Delaware, including Norfolk, Washington, Accomac, and Baltimore canyons and the areas surrounding them in water depths of approximately 100-2000 m. Cruise legs will concentrate on Baltimore and Norfolk canyons and surrounding areas, with an emphasis on Norfolk Canyon (Figs. 2, 3).

D. Summary of Objectives

1. Conduct daily (16 or 12 hr dives) ROV operations to survey target canyon habitats, fauna, and shipwrecks and collect samples in the depth range from 100-1600 m.
2. Retrieve two benthic landers in Baltimore Canyon, service them and redeploy in Baltimore Canyon (same locations) as soon as possible.
3. Conduct replicate bottom trawl (16 ft otter trawl) operations inside and outside of target canyons in the depth range of 100-1600 m.
4. Collect replicate benthic box core samples inside and outside of target canyons in the depth range 100-1600 m.
5. Conduct multibeam sonar mapping in selected parts of target mid-Atlantic canyons and surrounding areas. Appropriate sound velocity measurements in support of multibeam mapping will be taken using the ship's CTD.
6. Conduct vertical water column environmental casts, using the *Ron Brown*'s CTD, to generate hydrographic profiles. Niskin bottles on the rosette will be used to collect water samples for aragonite saturation, particulate organic matter (POM), and other water quality analyses. Water samples will not be collected on every CTD cast. A small coring device called a mono-core (Fig. 6) would be attached under the CTD, if possible, during some deployments to take a single sediment core. This piece of equipment was used successfully on the 2012 *Nancy Foster* cruise.
7. Keep live deep sea animals on board in a small recirculating system with chiller. This would be kept on deck and would need an external power supply.
8. Conduct other activities (e.g., sample or data processing) to support all objectives.
9. Conduct education/outreach activities (internet postings, essays, teacher-at-sea, videos).

Specific Archaeological Objectives

- Continue surveys of Billy Mitchell Fleet (Norfolk Canyon area)
- Search for and survey (if found) *San Demetrio* wreck (2500 m depth)
- Prehistoric Site Investigations (Norfolk Canyon)
- Search for and survey (if found) *Ocean Venture* wreck (Norfolk Canyon)
- Multibeam Survey (Washington Canyon)
- Search for and survey (if found) wreck of WWII Hellcat aircraft (Baltimore Canyon)

Jason II ROV objectives:

1. Conduct video transects and photo quadrats or photo-mosaics over areas of different natural habitat types and shipwrecks
2. During each dive, make collections of fauna from various taxonomic groups in different natural habitat types and shipwrecks as follows:
    a. Collect corals (and other invertebrates) from selected sites and transport to surface in insulated bioboxes to maintain alive on board ship in chilled deck tank;
    b. Make numerous discrete collections of invertebrates (particularly corals) and fishes from multiple sites for various biological studies;
    c. Collect large (~ 1 m tall) colonies of selected coral species for age, growth and paleoecology studies (dried and stored in boxes on board ship)
    d. Take images and collect voucher specimens of selected taxa from each location
3. Deploy site markers at sites as needed
4. Collect environmental data (depth, oxygen, temperature, salinity, pH) using ROV-mounted instrumentation
5. Collect near-bottom water samples using 6 L Niskin bottles mounted on the ROV
6. Collect video and still imagery of deployed benthic landers (lower priority)
7. Collect push cores for sediment sampling

E. Participating Institutions:

Bureau of Ocean Energy Management (BOEM)

NOAA Office of Ocean Exploration and Research (OER)
CSA Ocean Sciences, Inc. (CSA)
University of North Carolina at Wilmington (UNCW)
Florida State University (FSU)
US Geological Survey (USGS)
Oregon Institute of Marine Biology (OIMB)
NC Museum of Natural Sciences (NCMNS)
University of Rhode Island (URI)
Texas A&M University
Univ. of Louisiana at Lafayette
Bangor University (UK)
Netherlands Institute of Sea Research (NIOZ)
ArtWork, Inc.
Woods Hole Oceanographic Inst. (WHOI)

Personnel (Science Party)

Leg I (30 April - 19 May 2013)

Name (Last, First)	**Title**	**Date Board**	**Date Return**	**Gender**	**Affiliation**	**Nationality**
Ross, Steve	co-chief sci	30 Apr	19 May	M	UNCW	USA
Brooke, Sandra	co-chief sci	30 Apr	19 May	F	FSU	USA
Rhode, Mike	lead technician	30 Apr	27 May	M	UNCW	USA
Lavaleye, Marc	scientist	30 Apr	19 May	M	NIOZ	Netherlands
Robertson, Craig	grad student	30 Apr	19 May	M	Bangor U.	UK
Roark, Brendan	scientist	30 Apr	27 May	M	TX A&M	USA
Baird, Liz	educator	30 Apr	19 May	F	NCMNS	USA
Demopoulos, Amanda	scientist	30 Apr	27 May	F	USGS	USA
Coykendall, Katharine	scientist	30 Apr	19 May	F	USGS	USA
Morrison, Cheryl	scientist	30 Apr	19 May	F	USGS	USA
Prouty, Nancy	scientist	30 Apr	19 May	F	USGS	USA
Gray, Mike	scientist	30 Apr	19 May	M	USGS	USA
Bourque, Jill	technician	30 Apr	19 May	F	USGS	USA
McClain-Counts, Jennie	technician	30 Apr	27 May	F	USGS	USA
Saucier-Heestand, Esprit	grad student	30 Apr	19 May	F	Univ. LA	USA
Meyer, Kirstin	grad student	30 Apr	19 May	F	OIMB	USA
Connors, Jimmy	NOAA web	30 Apr	19 May	M	NOAA	USA
Tomczuk, John	NOAA rep	30 Apr	19 May	M	NOAA	USA
Heinz, Matt	ROV crew chief	30 Apr	27 May	M	WHOI	USA
Borden, Lisa	ROV crew	30 Apr	27 May	F	WHOI	USA
Denton, Frederick	ROV crew	30 Apr	27 May	M	WHOI	USA
Dow, Edward	ROV crew	30 Apr	27 May	M	WHOI	USA
Hutchinson, Baxter	ROV crew	30 Apr	27 May	M	WHOI	USA
Hansen, Scott	ROV crew	30 Apr	27 May	M	WHOI	USA
Hood, Jeffrey	ROV crew	30 Apr	27 May	M	WHOI	USA
Pelowski, James	ROV crew	30 Apr	27 May	M	WHOI	USA
Kevis-Stirling, Nile	ROV crew	30 Apr	27 May	M	WHOI	USA
Verhein, Korey	ROV crew	30 Apr	27 May	M	WHOI	USA

Leg II (19-27 May 2013)

Name (Last, First)	Title	Date Board	Date Return	Gender	Affiliation	Nationality
Mather, Rod	co-chief sci	19 May	27 May	M	URI	USA
Viada, Steve	co-chief sci	19 May	27 May	M	CSA	USA
Rhode, Mike	lead technician	30 Apr	27 May	M	UNCW	USA
Watts, Gordon	scientist	19 May	27 May	M	n/a	USA
Moore, James	scientist	19 May	27 May	M	BOEM	USA
Cantelas, Frank	scientist	19 May	27 May	M	NOAA	USA
Gurley, Walt	educator	19 May	27 May	M	NCMNS	USA
Demopoulos, Amanda	scientist	30 Apr	27 May	F	USGS	USA
McClain-Counts, Jennie	technician	30 Apr	27 May	F	USGS	USA
Casey, Alanna	grad student	19 May	27 May	F	URI	USA
Watts, Maya	scientist	19 May	27 May	F	OIMB	USA
Saucier-Heestand, Esprit	grad student	30 Apr	27 May	F	Univ. LA	USA
Roark, Brendan	scientist	30 Apr	27 May	M	TX A&M	USA
Howard, Art	photographer	19 May	27 May	M	NCMNS	USA
vanGraafeiland, Keith	data manager	19 May	27 May	M	CSA	USA
Cantwell, Kasey	NOAA rep	19 May	27 May	F	NOAA	USA
Collasuis, Tito	ROV crew chief	19 Apr	27 May	M	WHOI	USA
Borden, Lisa	ROV crew	30 Apr	27 May	F	WHOI	USA
Denton, Frederick	ROV crew	30 Apr	27 May	M	WHOI	USA
Dow, Edward	ROV crew	30 Apr	27 May	M	WHOI	USA
Hutchinson, Baxter	ROV crew	30 Apr	27 May	M	WHOI	USA
Hansen, Scott	ROV crew	30 Apr	27 May	M	WHOI	USA
Hood, Jeffrey	ROV crew	30 Apr	27 May	M	WHOI	USA
Pelowski, James	ROV crew	30 Apr	27 May	M	WHOI	USA
Kevis-Stirling, Nile	ROV crew	30 Apr	27 May	M	WHOI	USA
Verhein, Korey	ROV crew	30 Apr	27 May	M	WHOI	USA

DAILY SCHEDULE (Tentative)
Vessel meal times: Breakfast = 0700-0800, Lunch = 1100-1200, Dinner = 1700-1800

Proposed science crew watches:
Night watch: 2000-0800 hr (nets, box core, CTD/water sampling, specimen work up, multibeam and associated sound velocity measurements, lander deployment, data management)
"Day watch": see below (ROV ops, specimen work up, lander recovery, CTD transect)

The day 'watch' times will be less formal than the night watch as personnel are mostly associated with ROV operations, which will have variable hours depending on ROV logistics and sample processing. Considering that ROV samples come up in the evening, day watch scientists will need to stay up late to process these. Scientists can use their discretion to accommodate required rest time and will not be assigned a specific watch period. **The exception to this will be for those personnel assigned to the ROV van duties.** By 03:30 the three scientists on the first ROV shift need to be available to begin the ROV dive. Primary responsibilities of day personnel include shifts in the ROV van guiding dive objectives and recording data. Data will also be archived during the day, samples processed, and education/outreach needs addressed. We plan to make one 16 hr (surface to surface) ROV dive per day (deploy 04:00, retrieve 20:00), but on some days dives may be reduced to 12 hrs to accommodate non-ROV operations, specifically lander recovery and

CTD transects. If ROV ops are canceled due to weather or technical problems, the vessel will switch to one of the non-ROV operations – determined by weather and science priorities. **Even though the day watch is flexible, science personnel should be available as much as possible to assist with all activities and sample processing, if necessary, as operational needs change.** We will be short-handed, and we can only accomplish our heavy objective load if everyone helps wherever needed. Some meals may coincide with ROV launch or recovery, thus science crew should work meals around science needs. The galley may be able to save meals if necessary.

The "night" watch will be 12 hrs on (2000 to 0800), 12 hrs off, and their main responsibilities will be bottom trawling, box coring, multibeam mapping and associated sound velocity measurements, CTD surveys, water sampling, data management, lander deployment, and sample processing. Some night watch crew may also stand morning or afternoon ROV shifts. Some night hours may be used for steaming between stations, during which time the night watch will assist with multibeam mapping if needed and work up outstanding data/samples.

Night watch crew will include: Leg I - Mike Rhode (chief), Marc Lavaleye, Craig Robertson, Jill Bourque, Jennie McClain-Counts. Leg 2 - Mike Rhode (chief), Amanda Demopoulos, Jennie McClain-Counts, Brendan Roark.

SCIENTIST TEAMS FOR ROV OPERATIONS

There will be a daily pre-dive meeting in the lab in the afternoon (about 1600 hrs) to review dive objectives and target locations for the next day's dive. The proposed ROV dive plan will concentrate in Norfolk Canyon (Fig. 2). These three person teams are subject to change at-sea as other needs dictate. Each team will stand approximately 4 hr ROV watches, with four ROV watches per day. The **first person listed** will lead the dive, guiding the ROV pilot, running the science camera, and verbally annotating the video. A second team member will record notes on collections and enter data into the virtual van data logging system. The third person will help with note-taking and will be responsible for managing video recording. The co-Chief Scientists will monitor all dives and will have final say in dive decisions. Inclement weather and ROV or ship breakdowns will cause loss of dives and rotations will be reapportioned. All day watch personnel should be available in the evening when the ROV is recovered to assist with sample processing.

ROV schedule

An ROV science team shift schedule is in development and will be available by cruise departure. During a regular 16 hour dive, ROV science personnel will be divided into four shifts: 0400-0800, 0800-1200, 1200-1600 and 1600-2000. During shorter dives, the shifts will be changed accordingly but will maintain 4-hour blocks where possible. The first shift should be available 30 min prior to the ROV deployment to ensure the vehicle is fully prepared and to record deployment data. Three people will be required at all times throughout the dive: one to lead the dive, another to record data and a third to manage video copies. The shifts will be developed with the understanding that assigned shifts can be changed to accommodate personnel sample processing and rest requirements.

F. Administrative

1. Points of Contact:

Dr. Steve W. Ross, co-Chief Scientist, UNCW, Center for Marine Science, 5600 Marvin Moss Ln., Wilmington, NC 28409, office 910-962-2346, cell 910-620-0786, email: rosss@uncw.edu

Dr. Sandra D. Brooke, co-Chief Scientist, Florida State University, Coastal Marine Lab. 3618 Coastal Hwy., St. Teresa, FL 32358, office 850-697-4093, cell 425-449-1344, email: sbrooke@fsu.edu

2. Diplomatic Clearances – None required

3. Licenses and Permits – None required

II. **Operations**

A. Cruise Plan Itinerary

At the start of Leg I, we will transit directly from Charleston, SC to Norfolk Canyon, arriving during early morning (see below), and commencing ROV ops soon after. Shortly after clearing the harbor, a brief ROV test launch and recovery will be conducted. It is uncertain how this will impact the schedule below. Work in Leg I will emphasize Norfolk Canyon, with perhaps two days of sampling in Baltimore Canyon (including retrieval and redeployment of the two UNCW landers). Leg II will focus on archaeological targets in and around the Norfolk Canyon area. Due to the sensitive nature of cultural resources and the high potential for exploitation, we request that the NOAA Shiptracker system be turned off when in the vicinity of a potential shipwreck target. We request a 15 mile buffer where NOAA Shiptracker will not broadcast the position of NOAA Ship Ronald H. Brown. This will include the position of the ship whenever we are within this buffer zone, including for non-ROV operations. We also request that ROV dive locations be withheld from the public record for the second leg of the cruise. All work days will be 24 hr operations and transits will be minimized. A plan for each day will be provided to the ship's point of contact by 18:00 the previous night. Although we will attempt to keep to the schedule below, changes may be necessary due to weather, technical problems or changing priorities due to new science information. Schedule changes will be determined by the Commanding Officer in consultation with the co-Chief Scientists and other relevant members of the science party. As much lead time as possible will be provided in the event of such changes.

<u>Leg I (Biology)</u>

26 Apr ROV Mob. at FLETC facility, North Charleston, SC (see attached at end of document)

27 Apr ROV Mob.

28 Apr ROV Mob.

29 Apr Finish ROV Mob. Science crew assembles in North Charleston, SC and loads vessel with non-ROV science gear. Science crew has minimal needs of the ships crane (boxcore, and about 3-4 additional loads) as most gear can be hand carried. Any additional or alternative loading needs will be discussed with the ship well in advance. Scientists will meet with deck officers and watchstanders to brief on unfamiliar operations such as otter trawls and box coring.

30 Apr 10:00: depart dock and transit to Norfolk Canyon (~ 425 nmi, ~ 41 hrs). Science crew organizes/stows gear prior to departure. Ship's fire and safety drills, ROV test launch, science crew meeting and PI-ship's crew meeting will occur early during the transit.

1 May Transiting (Somewhere near Cape Lookout we may stop briefly to fill our holding tanks with clean Gulf Stream water but this may only take less than one hour.)

2 May 05:00: arrive Norfolk Canyon first dive site (approx. 37° 03.058' N, 74° 37.939' W, box B Fig. 2).
06:00-12:00: USBL test (ROV crew and ship)
12:00-20:00: ROV dive 1 (8 hrs) on the north wall at the *Desmophyllum/Lophelia* site
20:30-24:00: bottom trawling (multiple tows) in area T (see Fig. 2).

3 May 00:00-03:00: continue bottom trawling in area T
03:00-04:00: transit to ROV dive site (location TBD in box A, Fig. 2)
04:00-08:00: night watch will work up samples from trawls and help with ROV prep.
04:00-20:00: ROV dive 2 (16 hrs) at (location TBD in box A)
20:30-24:00: bottom trawling in area T

4 May 00:00-03:00: continue bottom trawling in area T
03:00-04:00: transit to ROV dive site (36° 52.3' N, 74° 28.6' W; 1400-1600 m, box S)
04:00-08:00: night watch will work up samples from trawls and help with ROV prep

04:00-20:00: ROV dive 3 (16 hrs) at potential new seep site (box S)
20:30-24:00: bottom trawling in area S

5 May 00:00-03:00: continue bottom trawling in area S
03:00-04:00: transit to ROV dive site (coordinates TBD box F or S)
04:00-08:00: night watch will work up samples from trawls and help with ROV prep
04:00-20:00: ROV dive 4 (16 hrs) in area TBD - possible further exploration of new seep site but may be elsewhere, depending on outcome of previous dive
20:30-24:00: Bottom trawling in area S (Fig. 2)

6 May 00:00-03:00: continue bottom trawling in area S
03:00-04:00: transit to ROV dive site (coordinates TBD in box E or F)
04:00-20:00: ROV dive 5 (16 hrs), box E or F
20:30-24:00: bottom trawling in area T

7 May 00:00-03:00: continue bottom trawling in area T
03:00-04:00: transit to ROV dive site (coordinates TBD in box C)
04:00-08:00: night watch will work up samples from trawls and help with ROV prep
04:00-20:00: ROV dive 6 (16 hrs) in location TBD, box C
20:30-24:00: bottom trawling in area T

8 May 00:00-03:00: continue bottom trawling in area T
03:00-04:00: transit to ROV dive site (coordinates TBD in box D)
04:00-08:00: night watch will work up samples from trawls and help with ROV prep
04:00-20:00: ROV dive 7 (16 hrs) in location TBD, box D
20:30-24:00: bottom trawling in area T

9 May 00:00-03:00: continue bottom trawling in area T
03:00-04:00: transit to ROV dive site (coordinates TBD in box A)
04:00-08:00: night watch will work up samples from trawls and help with ROV prep
04:00-20:00: ROV dive 8 (16 hrs) in location TBD, box A
20:30-24:00: box-coring at the head-middle of Norfolk Canyon (see Fig. 3 black squares and waypoint table)

10 May 00:00-03:00: continue box coring sites as marked in Fig. 3, working down the canyon to the mouth
03:00-04:00: transit to ROV dive site (coordinates TBD, box B)
04:00-08:00: night watch will work up samples from boxcore and help with ROV prep
04:00-20:00: ROV dive 9 (16 hrs) in location TBD, box B
20:30-24:00: box coring

11 May Same as 10 May, ROV dive 10 in box C

12 May Same as 10 May, ROV dive 11 in box B

13 May Same as 10 May, ROV dive 12 in box E or F

14 May 00:00-03:00: continue boxcoring
03:00-04:00: transit to ROV dive site (coordinates TBD in box A)
04:00-08:00: night watch will work up samples from boxcores and help with ROV prep
04:00-20:00: ROV dive 13 (16 hrs) in location TBD in box A
20:30-24:00: conduct along-axis CTD transect (Fig. 3, green dots and waypoint table). This will take approx. 10 hrs, which will delay the ROV dive on 16 May

15 May 00:00-07:00: continue CTD transect
07:00-08:00: transit to ROV dive site (coordinates TBD in box D)
08:00-20:00: ROV dive 14 (12 hrs) in area TBD in box D.
20:30-24:00: transit to head of Baltimore Canyon; approx.. 90 nmi or 8+ hrs.

16 May – 00:00-06:00: continue transit to shallow lander site (38° 09.024’ N, 73° 50.954’ W)
07:30-11:00: as soon as there is sufficient light, (0730/0800) begin lander recovery. Time needed for this is unpredictable but we are allowing 3.5 hrs.
11:00-12:00: transit to ROV dive site (38° 09.3’ N, 73° 50.4’W).
12:00-20:00: ROV dive 15 (8 hrs) at Baltimore Canyon *Lophelia* coral site

20:00-24:00: night watch refurbishes and services lander

17 May 00:00-04:00: redeploy lander at same shallow site, triangulate lander position
06:00-07:00: transit to deep lander site (38° 02.543' N, 73° 44.153' W)
07:30-11:00: as soon as there is sufficient light, (0730/0800) begin lander recovery.
11:00-12:00: transit to ROV dive site (38° 02.95' N, 73° 49.32' W; ~410-450m)
12:00-20:00: ROV dive 16 (8 hrs) at Baltimore Canyon seep area.
20:00-24:00: night watch refurbishes and services lander

18 May 00:00-03:00: redeploy lander at same deep site and triangulate lander position
03:00-12:00: transit (approx. 9 hrs) to Norfolk Canyon dive site (coordinates TBD in box A or B)
12:00-20:00: ROV dive 17 (8 hrs) at a location TBD in box A or B
20:00-24:00: CTD transect outside canyon (Fig. 3, yellow dots and waypoint table)

19 May 00:00-03:00: continue CTD transect
03:00: transit to the at-sea transfer site inshore of Norfolk Canyon, about 45 nmi (approx. 37° 00'N, 75° 40'W). Time of leaving station will be determined by weather and logistics.
07:00: meet Cape Henry Launch (http://capehenrylaunch.com/) vessel as early in the morning as feasible for at-sea transfer of personnel and small amount of gear. If weather prevents transfer at this site, vessels will determine a new rendezvous location. After transfer of personnel, vessel moves to first working site for Leg 2.

<u>Leg II (Shipwrecks and Biology)</u>

19 May 12:00-20:00 ROV dive 18 (8 hrs) at 37° 04.41' N, 74° 55.73' W (shipwreck).
20:30-24:00: CTDs

20 May 00:00-03:00: CTDs
03:30-04:00: Transit to location for ROV dive
04:00-20:00: ROV dive 19 (16 hrs) at 37° 09.37' N, 74° 34.56' W (shipwreck).
20:30-24:00: Multibeam survey of Area 8 (Fig. 4)

21 May 00:00-03:00: Multibeam survey of Area 8 (Fig. 4)
03:30-04:00: Transit to location for ROV dive
04:00-20:00: ROV dive 20 (16 hrs) at 37° 13.93' N, 74° 33.04' W (shipwreck).
20:30-24:00: Transit to San Demetrio

22 May 00:00-01:00: Transit to San Demetrio
01:00-03:30: Multibeam Survey of 1.5 km^2 centered on 37° 02.89' N, 73° 50.15' W.
04:00-20:00: ROV dive 21 (16 hrs) at ~37° 02.89' N, 73° 50.15' W (shipwreck).
20:30-24:00: Transit to location of ROV dive

23 May 00:00-04:00: Transit to location of ROV dive, multibeam survey or CTDs, time permitting
04:00-20:00: ROV dive 22 (16 hrs) at 37° 11.53' N, 74° 34.45' W or TBD (shipwreck or target from multibeam survey).
20:30-24:00: CTDs

24 May 00:00-03:00: CTDs
03:30-04:00: Transit to location for ROV Dive
4:00-20:00: ROV dive 23 (16 hrs) at 36° 54.78' N, 74° 42.35' W or 37° 09.91' N, 74° 45.35' W (1 of 2 shipwrecks).
20:30-24:00: Multibeam survey of Area 6 (Fig. 4)

25 May 00:00-03:00: Multibeam survey of Area 6 (Fig. 4)
03:30-04:00: Transit to location for ROV Dive
04:00-20:00: ROV dive 24 (12 hrs) at TBD (Paleo-Archaeological).

25 May – 21:00- ROV ops as long as possible, then depart area about 2100 hrs and transit to Charleston, SC (~425 nmi, ~41 hrs) to end the cruise.

26 May – transiting

27 May – transiting and arrive Charleston, SC about 12:00 hrs

B. Staging and destaging – Charleston, SC (staging: 26-29 Apr 2013 and destaging: 27-28 May 2013).

C. Operations to be conducted

Typical day

Bottom starting coordinates and details for each day's ROV dive will be provided to the ROV and ship's crews the night before the dive, recognizing that details may change during the dive.

04:00-20:00 - ROV dive (usually 16 hrs but will vary for a few dives – see schedule for details). Three scientists will stand 4 hr ROV dive watches to guide the dive, record data and manage videos. Day watch personnel that are not involved with the ROV will finish specimen and data work up from previous samples, help with outreach activities or help archive data. Once the ROV is on deck, science will crew help unload their samples and instruments from the ROV.

20:00-08:00 - Night watch: bottom trawl, box core, CTD/Niskin casts, multibeam sonar surveys. All non-ROV gear must be secured and vessel should be on or near the dive site in time for the ROV operations to begin at 04:00. Night operation periods include time required to change over from ROV ops to non-ROV gear.

Details of typical ROV dive:

Station conditions: Surface and upper water column currents over mid-Atlantic canyons may be variable but generally less than 2-3 kn. Variable and sometimes strong currents are expected in the lower water column and near the bottom, particularly near the canyon walls. Visibility may be reduced near bottom from both suspended particulates and dense zooplankton. Seafloor is mostly soft sediment with areas of consolidated sediments and some cobbles, rocks or pavement. Bottom will be uniform and flat in many places but in others there will be rugged steep walls or large boulders and pavement. Lost fishing gear is common in some areas.

ROV science gear (provided by the ROV crew or science party): Steve Ross will provide a SeaBird (SBE 19+, with accurate calibration) to be mounted on the ROV for every dive to measure time, depth, temperature, salinity (via conductivity), pH, dissolved oxygen, and turbidity. Mike Rhode (night watch chief) will download the SeaBird data at the end of each dive. Two, 6-L Niskin water collection bottles (provided by S. Ross) will be mounted on the ROV and rigged to be fired by the ROV pilot. The ROV HD video camera(s) with lasers and digital still camera(s) will be used during every dive. The video camera and digital still should be mounted on the pan and tilt bracket, except during photo-mosaics (Leg II) when a digital still camera will be required to take vertical downward looking images. All cameras should have appropriate lighting. The ROV should have the manipulator arms and suction sampler system available on every dive. We request that general purpose work baskets, sample quivers and coring tubes, and bioboxes be available, including at least two boxes with lids that can be secured in closed position to bring up samples at near-bottom temperatures. The ROV crew should have one elevator on hand in the event that can be used.

ROV procedures: Each dive will have multiple objectives, with some tasks given priority. Most ROV dives will follow a similar pattern, emphasizing bottom transecting, collecting and photographing specimens on or near the bottom. *Jason*'s position will be continuously recorded using a USBL tracking system, and we will need to know the ROV's position on the bottom as accurately as possible throughout the dives. Position data will be time-synchronized with all imagery and samples. We require live feeds from the ship's bridge GPS and depth sounder to our main lab computer. Most dives will utilize ROV equipment provided by the ROV crew.

There will be a lead scientist (one of the two co-chief scientists) and two assistants on watch with the ROV crew for each dive. The lead scientist will control the dive activities and guide the

ROV operators in the execution of all sampling. See Appendix I for additional guidelines. We would like to descend through the water column quickly and settle on the bottom. Most of the work will be done close to the seafloor. During descent we will take notes on distributions and behaviors of fauna together with depth and environmental conditions. Particularly interesting observations (e.g., swarms of mesopelagic nekton) will also be filmed. Specimen or sample collecting may occur at any time after the ROV lands on bottom and will be subject to fortuitous encounters as well as targeted objectives. Other samples such as sediment cores and water samples will also be taken. Digital still photography and video recording will be conducted throughout the dive, and every collection will be documented with video. Standardized video transects will occur any time the ROV moves from one location to another. During transects, the video camera will be moved to pre-determined pan/tilt positions, set on wide angle**,** and the ROV will run at slow speed close to the bottom (see video guidelines, Appendix I). Transects will be of variable lengths and some may be quite long to cover multiple habitats. Video transects will be taken on every dive since these are the primary means of visual habitat characterization, but the number of transects may vary per dive. Transect methods may need modifications in dense coral/rock areas, on steep walls or in heavy currents. Scientists in the control room will have hard copy data sheets to record dive data as well as audio recording to the video files.

If our benthic landers do not surface, we will attempt an ROV rescue. The landers weigh less than 2000 lbs in air and less than 600 lbs in water (weighted in-water buoyancy estimated at ~300 lb). The *Jason* has apparently retrieved similar types of gear in the past, and we request that they prepare for this contingency.

Ship procedures (non-ROV):

See Appendix 4 for gear lists and specs.

Apart from the lander operations, all other non-ROV activities will take place during the night watch, unless the ROV cannot dive for technical or weather issues. **In this event, the non-ROV operations will be done during the day**. Ship's crew that are trained to deploy the non-ROV gear should be available 24 hours.

Benthic lander and mooring deployments: Two UNCW landers (Fig. 5) will be recovered and redeployed from Baltimore Canyon. This is a relatively simple procedure as follows: ship remains stationary near the lander site and a hydrophone is lowered over the side. Once contact is established with the landers, the acoustic releases are triggered. By pinging the lander, we can determine if it is ascending. All hands stand by to look for lander surfacing. The ship moves into position to grapple the lander (there is a 75 ft line and buoy attached to the lander) and lift it aboard with either the crane or through the aft A-frame. If landers do not come up, we may have to effect an ROV rescue. After servicing (4-5 hours), these two landers will be redeployed in Baltimore Canyon in the same locations as previously. Deployments involve lifting the gear over the side (using the crane) or through the stern A-frame (main winch), floating the landers briefly at the surface and releasing them via Sea-Catch release as the ship remains stationary over the drop site. The three lander designs used are shown in Fig. 5. After the lander is on the bottom, the ship will move to three positions in a triangle around the lander drop site, and the range and location data for the lander will be taken at each position. The lead technician (M. Rhode) will provide these locations to the ship.

Box core: The box core (provided by NIOZ, Fig. 6) will be used only during Leg I unless weather or technical problems delay boxcoring operations. The core will sit on the back deck and be lifted through the A-frame by the main winch. It will be lowered to the bottom until bottom contact is determined (usually by winch tension meter) as the ship remains stationary on station, and then it will be returned to the surface. Sampling depths will range from 100 to 1500 m. Specifications of the box core are provided in Fig. 6 and the gear Appendix 4.

Trawls or other nets (plankton): We will conduct bottom trawling off the stern using the ship's main winch. We should have at least 5,000 m of 1/2" wire and a trawl block as well as metering ability to measure the quantity of deployed line. We generally average a 2.5:1 or 3:1 wire scope,

depending on depth. Bottom trawling off the stern with the 16' otter trawl will be emphasized in the depth range of about 100 to 1400 m. Upon reaching bottom or target depth, all trawls will be towed for 30 min at a 2 kn ground speed, usually against the surface current, then retrieved. This will be repeated as many times as possible during the watch. Target depths and starting locations will be given to the Operations Officer, Chief Boatswain and the winch operator well in advance. We may also deploy a small (1 m diameter) surface plankton net from the side of the ship for 15 min tows at irregular times during the cruise. If so, this small net is hand deployed and retrieved and tied to any available cleat during towing. It is understood that the science POC will check with the ship POC before putting any gear in the water.

CTD casts: These will be conducted as needed to support multibeam sonar mapping (for sound velocity) and for collection of hydrographic data and water samples (using 10L Niskin bottles). Water samples will not be collected on every CTD cast. On full water column casts the CTD will be lowered from the surface to as near the bottom as possible. We require a SeaBird (SBE 19+, or equivalent) that can measure time, depth, temperature, salinity (via conductivity), pH, dissolved oxygen, and turbidity, with accurate and up to date calibrations. As on the *Nancy Foster* cruise in 2012, we wish to hang a small mono-core (Fig. 6) on a 10 m line under the CTD for many of these casts to collect a single bottom core.

Multibeam sonar mapping: This will be conducted in specific locations during 3 or more of the cruise nights on Leg 2 (see Fig. 4). We may also conduct single beam sonar transects across canyons (lower priority).

General Specimen and Data Treatment:

All specimens collected will be used for science (or education) purposes. No specimens should be removed for personal use. Specimens will be processed as soon as practical after arriving on deck. Each specimen will be logged with station #, sample container (if collected with the ROV) field ID and any other pertinent metadata. It is imperative that all sample jars/bags be properly labeled. **Do not leave samples sitting unattended, unlabeled or untreated. Collaborators taking samples to their labs for analysis must provide the co-chief scientists with a list of samples taken before the end of the cruise.** Many of the fishes caught on this cruise will be small, and those will be preserved in 10% formalin/seawater soon (no more than 4 hrs) after capture. Fishes need to be preserved as soon as possible after capture to ensure stomach analysis integrity. For fish species that are easy to identify or too large to save, we may dissect stomachs from the specimens and take length, sex, and other data at sea. Co-chief scientist Dr. S. Brooke will manage the distribution of all invertebrate samples collected by ROV and trawl to ensure equitable dispersal. Most invertebrates will be preserved in 10% formalin/seawater, with perhaps a few going into 70% ethanol. Corals will be dried, frozen, preserved in ethanol, fixed in formalin, or maintained alive, depending on research objectives. Subsamples of selected species will be processed for stable isotope analysis. A section of white muscle from these will be dissected soon after capture, dried, and stored for further analysis. Specimens used for isotopes will be saved and marked separately. Subsamples (fresh) of selected species will be set aside for on board photography (unknown extent) or these may be labeled and frozen to be photographed later. M. Rhode assisted by others will organize and digitize data collected by each watch. Large amounts of data come from multiple instruments, for multiple purposes, thus data organization and tracking are very important. Some data will be available during or at the end of the cruise, but care should be taken not to move data sheets too far from the main computer work area. The type and quantity of these data will depend on time constraints. An original copy and a single back-up copy for CSA of ROV science camera video will be generated, and these copies will not be available during Leg 1. DVDs of ROV video may be available for review and copying, but PIs should bring their own blank DVDs if they wish to make copies. At the discretion of S. Viada and if time and personnel allow, the CSA ROV video copies may be available during Leg 2. All crew should familiarize themselves with the flow of data and samples. All data will be available to the science party from CSA after

the cruise. The co-Chief Scientists will ensure that all data needed for at sea sample processing are available to the science party.

D. Dive Plan – Not Applicable

E. Applicable Restrictions – Aside from unpredictable issues such as poor weather or equipment failure, no restrictions are anticipated. In cases of poor weather the ship can move to other stations, switch to operations that match the weather or discontinue operations if weather is severe. In cases of equipment failure, operations will switch to other types of gear or methods. In order to maximize flexibility we require a winch operator, technician (for CTD deployments, etc.) and sufficient deck crew available during each shift to deploy non-ROV gear, if necessary.

III. **Equipment**

A. Equipment and capabilities provided by the ship:

- Differential GPS navigation and serial data output, NMEA format
- Heading and water depth instruments with serial data output
- Dynamic positioning (mostly used during ROV and lander operations)
- Multibeam sonar (Kongsberg EM 122)
- Acoustic Doppler Current Profiler (ADCP)
- Hydro-winch and CTDs: SBE 9plus or equivalent with 12 bottle, 10 L 'rosette' water sampling system; includes temperature & conductivity sensors
- Additional CTD sensors required: SBE 43 (DO), SBE 18 (pH), WetLabs chlorophyll and turbidity sensor. Benthos altimeter (200 kHz, < 100 m)
- Freezer for water samples (normal temp range, not ultracold)
- Science refrigerators
- Walk-in cold room should have ability to change settings. Temperature should be set to 7-8° C (variance of +/- 1° C)
- Walk-in freezer (preferable setting at -20° C, or 4° F)
- Deionized or distilled water (from ship's engine room)
- Hydro-winch for CTD and rosette sampling system
- Winch capable of deep-sea operations over the stern for box coring and trawling to at least 1400 m (with line metering capability)
- Deck cranes
- Wet and dry lab spaces and storage space
- Use of all available science berths (30) for science & ROV crew
- Deck machinery for science gear deployment and recovery
- Stern-mounted articulating (hydraulic) A-frame with trawl block for launching Medea and other gear
- Power to the ROV winch and ROV vans
- INMARSAT satellite telephone service for voice and data (email)
- Networked computer printers and plotter
- Use of compressed air in staging bay
- Two air tuggers
- Email and internet services
- Networked computer printers and plotter, Scientific Computing System (SCS)
- PC based workstations
- Uncontaminated Seawater System: SBE 21 (TSG), Turner 10AU fluorometer
- At least one functioning laboratory hood
- RM Young weather suite (wind speed/direction, temperature, relative humidity and barometric pressure)

Wide-screen video monitor in starboard lab for presentations, navigation, or ROV video/data
Deck hoses with freshwater and saltwater

Also sufficient materials, 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 in the event of unexpected problems.

B. Equipment and capabilities provided by the scientists:
See Appendix 4 for a detailed list of science gear.
ROV *Jason* and all associated gear (WHOI ROV crew)
Elevator and associated weights (WHOI ROV crew)
Navigational transponders associated w/ ROV operations (WHOI ROV crew)
Dynacom winch system (WHOI ROV crew)
Control van, tool van, rigging, vehicle, and shipping vans (WHOI ROV crew)
Effer crane (WHOI ROV crew)
Seabird 19+ data logger with all probes
benthic landers and moorings with all instruments and gear (currently deployed)
All chemicals and containers
Any non-ship sampling devices, including box cores, bottom nets, with associated gear
Video copying equipment and hard drives
Insulated holding tanks and chiller (120 v) for maintenance of live corals in tanks
GIS and data computer, hard drives and docking stations
All software and computers associated with science data management

IV. **Hazardous Materials**

A. Policy and Compliance

The Chief Scientist is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, and/or absorbents in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and a chemical hygiene plan. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Correct procedures for handling and neutralizing (if needed) all chemicals were provided by the Univ. of NC at Wilmington Environmental Health and Safety Department. Ethanol, isopropyl, and formalin (all clear liquids) will be used for fixing/preserving fish and invertebrate samples. Materials will be stored in appropriate original manufacturer containers on deck or in lockers and until needed. When needed, these materials will be transferred to smaller plastic containers and diluted with either DI water or seawater. These transfers will be done on deck over containment (e.g., plastic trays) to minimize spills and contamination and wearing appropriate protective clothing if needed. Small spills can be wiped up with an absorbent material (vermiculite) and disposed of in a proper receptacle. Large spills can be diked to facilitate cleanup and can also be absorbed with vermiculite. For formalin, a Formalex Green kit can be used to neutralize large spills. Mercuric chloride spills will be handled with a portable mercury spill kit (Lab Safety Supply). After cleanup/absorption, the area of a spill will be flushed with water. These materials

are flammable and larger quantities will be stored in ship's fire-rated chemical locker or on other parts of the deck as directed by the ship. Smaller quantities (generally < 4 L) will be kept in Wet Lab available for ready use to the science party.

Safety goggles, gloves and protective clothing will be worn when handling the above listed materials. Appropriate protocols will be followed by all personnel handling these chemicals. The co-chief scientists (or designated staff) have the Material Safety Data Sheets for the above chemicals, and these will be provided to the ship before departure. They will be available to the Science Party during the cruise.

For all chemicals listed below the first aid procedures are as follows:
Eyes: Immediately flush eyes with plenty of water for at least 15 minutes.
Skin: Immediately flush skin with plenty of water for at least 15 minutes.
Ingestion: Seek medical attention.
Inhalation: Remove to fresh air.
Additional information is found on the MSDS for each chemical.

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory of hazardous material indicating all materials have been used or removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of scientific chemicals is not permitted during projects aboard NOAA ships.

B. Radioactive Isotopes – None Used

C. Inventory: Chemicals brought aboard and sufficient appropriate material to neutralize spills. See Appendix 4 (current estimates, subject to change)

Common Name	**Concentration**	**Amount**	**Notes**
Ethanol	95%	5 x 20-L drums	split between 2 legs
Ethanol	95%	25-L	
Ethanol	99.5% pure, 200 prf	3 L + 60 L	
Carboy of 70% ethanol	70%	5 gal	
Isopropanol	99.5%	1 x 20-L drum	
Formaldehyde solution	37%	4.5 x 20-L drums + 12L	split between 2 legs
Formalex Green	n/a	70 gal	formalin & other spills
Mercuric chloride	100%	5 g	in 5 g tubes, Leg 1 only
Portable Hg spill kit	n/a	1 kit	for Hg spills
Borax	100%	9 g + 4 lb	
Acetone	100%	250 ml	
Glutaraldehyde	2.5%	200 ml	
RNAlater	100%	3 L + 3 L	
Potassium chloride	100%	40 g + 250 ml	
Sodium citrate	100%	73.5 g	in 5-50 ml tubes
Sodium borate	100%	1.8 kg	
Paraformaldehyde	4%	6 ml	
Alizarin stain	100%	40 g	
Phosphate buffer	0.2 M	200 ml + 230 ml	
Carboy of DI water	n/a	5 gal.	

Alcanox	n/a	1 ½ gal bottle	cleaning solution
Liquid nitrogen	100%	10 L	

V. **Additional Projects**

A. Supplementary ("Piggyback") Projects - None

B. NOAA Fleet Ancillary Projects - None

VI. **Disposition of Data and Reports**

A. Data Responsibilities

Each scientist participating will provide the co-Chief Scientists with a list of collections made or data taken for their respective objectives by the end of the cruise. Video and still photo data will be archived by the co-Chief Scientists and CSA. UNCW and CSA will archive all original hard copy station data sheets with copies going to participating scientists as requested. Individual scientists will be responsible for their own sample analyses and reporting as required.

The Commanding Officer is responsible for all data collected for ancillary projects until those data have been transferred to the co-Chief Scientists. Data transfers will be documented on NOAA Form 61-29. Reporting and sending copies of ancillary project data to NESDIS (ROSCOP form) is the responsibility of the program office sponsoring those projects.

The science party is responsible for the collection and organization of all data (other than shipboard digital data) relative to meeting the goals and objectives of their projects. This includes working with the appropriate ship's personnel, under direction of the co-Chief Scientists, to obtain relevant data collected by the Scientific Computer System (SCS), and compilation of metadata records associated with physical samples.

The following data products will be included in the cruise data package (recorded on appropriate media) delivered to co-Chief Scientists:

- Marine Operations Abstracts
- CTD data (on CD's or DVD's) and CTD data notebook, including CTD cast logs
- Salinity sample analysis disks
- ADCP digital recordings
- All seismic sonar data on appropriate media
- Multibeam digital data (raw and processed), including bathymetry (x,y,z) data as well as backscatter (reflectivity) data on CD, DVD, or hard drive
- Marine weather observation logs
- Hard copy maps and digital geotifs of multibeam surveys
- Calibration information for ship's salinometer and thermosalinograph
- SCS data tapes or CDs
- Cruise operations spreadsheet w/ actual speed/dates made good along trackline

B. Pre and Post Cruise Meeting

Welcome Aboard Meeting: Soon after departure, this meeting is conducted by a ship's officer(s) for the science crew to orient them to the ship and normal at sea operations. Safety and vessel protocols (e.g., meals, watches, etiquette, etc.) will be presented by the ship's Operations Officer.

Science Crew Meeting: Soon after departure, the co-Chief Scientists will conduct a meeting of the scientific party to reiterate the cruise plan, to train them in cruise procedures and inform them of cruise objectives.

A daily safety meeting will be held (tentatively at 0800 hrs) to review any observed safety issues. The ship's officers, department heads, ROV dive master, NOAA OER rep, and at least one of the co-Chief Scientists will be in attendance.

A daily science meeting will be held (tentatively 1600 hrs) to discuss the ROV dive location and objectives for the following day

Post-Cruise Meeting: Upon completion of the cruise, a meeting will be held (unless prior alternate arrangements are made) and attended by the Commanding Officer, the Operations Officer, Department Heads, NOAA OER rep, and the co-Chief Scientists. What worked as needed as well as any concerns regarding safety, efficiency, and suggestions for improvements for future cruises should be discussed.

C. Ship Operation Evaluation Report

Within seven days of the completion of the cruise, a Ship Operation Evaluation form is to be completed by the co-Chief Scientists. The preferred method of transmittal of this form is via email to John Tomczuk (NOAA OER). If email is not an option, a hard copy may be forwarded to:

John Tomczuk
NOAA Office of Ocean Exploration and Research
1315 East-West Highway R/NURP RM 10311
Silver Spring, MD 20910

VII. **Miscellaneous**

A. Meals and Berthing

Meals and berthing are required for up to 30 scientists. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the cruise, and ending two hours after the termination of the cruise. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the survey.

At this date the only known dietary issues are as follows: one person is vegetarian, one person does not eat pork, one person is allergic to crustaceans and avoids nuts and strawberries.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the co-Chief Scientists. The co-Chief Scientists and Operations Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship's complement. The co-Chief Scientists are responsible for ensuring the scientific berthing spaces are left 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 co-Chief Scientists are also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the cruise and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non NOAA or non Federal scientists aboard also have proper orders, if required. It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

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. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 7, 1999 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

Required forms turned in to NOAA prior to cruise.

The NOAA Health Services Questionnaire (NHSQ, Revised: 02 Jan 2012) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website at http://www.omao.noaa.gov/medical/NHSQ_Final_wi_Instructions_fill.pdf. The completed form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan the form into an email using the contact information below. The NHSQ should reach the Health Services Office no later than 4 weeks prior to the cruise to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign and date the form, and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.
Contact information:

CDR Les Cruise, USPHS, Regional Director of Health Services
NOAA Marine Operations Center – Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone: 757.441.6320, Fax: 757.441.3760, E-mail: MOA.Health.Services@noaa.gov

Prior to departure, the co-Chief Scientists must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. The ship does not provide steel-toed boots. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. Hard hats are also required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

D. Communications

A progress report on operations prepared by the co-Chief Scientists may be relayed to the program office. Sometimes it is necessary for the co-Chief Scientists to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate these needs. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via e-mail and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at

increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required it must be arranged at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *NMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

1. Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
2. Installation of the latest critical operating system security patches.
3. No external public Internet Service Provider (ISP) connections.

Completion of these requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM De Bow's March 16, 2006 memo (http://deemedexports.noaa.gov). National Marine Fisheries Service personnel will use the Foreign National Registration System (FRNS) to submit requests for access to NOAA facilities and ships. The Departmental Sponsor/NOAA (DSN) is responsible for obtaining clearances and export licenses and for providing escorts required by the NAO. DSNs should consult with their designated NMFS Deemed Exports point of contact to assist with the process.

The following are basic requirements. Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the e-mail generated by the FRNS granting approval for the foreign national guest's visit. This e-mail will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
2. Escorts – NOAA has agreed to provide escorts from the *Ron Brown* crew (if needed) to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.
3. Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the servicing Regional Security Officer.
4. Export Control - *The NEFSC currently neither possesses nor utilizes technologies that are subject to Export Administration Regulations (EAR).*

The Commanding Officer and the Co-Chief Scientists will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Responsibilities of the Commanding Officer:

1. Ensure only those foreign nationals with DOC/OSY clearance are granted access.
2. Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written NMAO approval and compliance with export and sanction regulations.

3. Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.
4. Ensure receipt from the Chief Scientist or the DSN of the FRNS e-mail granting approval for the foreign national guest's visit.
5. Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.
6. Export Control - 8 weeks in advance of the cruise, provide the Chief Scientist with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Chief Scientist of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Chief Scientist can take steps to prevent unlicensed export of Program controlled technology. The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.
7. Ensure all OMAO personnel onboard receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the servicing Regional Security Officer.

Responsibilities of the Foreign National Sponsor:

1. Export Control - The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.
2. The DSN of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen, NOAA (or DOC) employee. According to DOC/OSY, this requirement cannot be altered.
3. Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National

Appendices

1. ROV ops details & guidelines
2. Figures (Figures 1-6)
3. Station/Waypoint List (Coordinates in Latitude, Longitude: degree-minutes)
4. Detailed gear lists and specs
5. ROV Mob/Demob plan

APPENDIX 1
ISSUES TO CONSIDER FOR ROV OPERATIONS (S.W. Ross)

Included here are observations (and requirements) for how we conduct dives, mostly related to audio and video data, derived from review of undersea vehicle video from past years and the way we handle operations. This is most relevant to the scientist in charge of a dive, but all scientists are responsible. Note, these are subject to modification as needed. Please review these.

The lead for science operations for a dive must be prepared to make decisions and understand the priorities of the dive as well as the mission overall. The second (or other) scientist is charged with tracking all activities and reminding the lead scientist of dive requirements as necessary. On some dives the second scientist may be as or more knowledgeable than the dive leader, and thus, may have equal or more input into the dive operations. When in doubt, communicate with the chief scientist.

Both divers must take copious notes (using audio recorders and hard copy forms) on all observations, regardless of whether they seem important. Both divers are responsible for learning how to operate all science gear in their charge. The lead scientist should be in charge and operate the science video and/or still cameras. Practice with the gear (cameras & recorders) to the extent possible before your dive.

We usually have a number of PIs and collaborators, and we also have a great deal of gear and objectives to deploy during the cruise. Therefore, priorities for each dive will be established before the dive and given to the science dive team. A few things like transects, digital still images, coral collecting, and general videography will be objectives for every dive. Other things, like sediment collecting and trapping, may be done more selectively. We need to make sure that the ROV takes positions for any major event, every gear deployment, every sample and any noteworthy bottom feature. From the past the verbal notes of some observers have been marginal in many ways and difficult to hear on recordings. Speak clearly and with some volume; your voice is potentially being recorded to several devices (cameras and an audio recorder). The audio recorder should be run through most, if not all, of the dive to obtain a complete record. Start any recording with date, time, dive number and your name. The main camera is usually turned on close to the bottom or in the water column depending on what is observed. More details on video are below.

<u>Video and audio operations</u>
Our massive video archive contains valuable data and some very good segments, but it often is not of the quality that it could be. A few simple things could improve these data significantly. Since the pilot runs most of the ROV gear, one of the main responsibilities of the lead scientist is the video camera. Suggestions below are based on the problems found in our past video data.

When collecting animals or any other sample, it is important to film what you are collecting, with all cameras when possible. Often in the past the camera is looking away and the verbal commentary is inadequate. Filming the specimen prior to and during collecting is critical for tracking samples, and a powerful way for us to be able to identify fauna from other tapes.

There are often too many close-ups (tight zooms) that are of poor quality (usually out of focus or moving too much) or are repetitious. While we do need some close-ups, we need to discuss as we go what is being filmed. Monitor both focus and camera movement. Anticipate the vehicle's movement and its effect on the camera view. In addition to the close-up problem, there is sometimes a general lack of quality control on focus and camera angle. Monitoring the cameras and knowing how to run them are vital. If you cannot focus the camera or detect lens fogging, discuss this with the pilot.

We have often ended up with a lot of "dead" footage - minutes of looking at the same thing while the ROV is doing something else. One problem with this is that the verbal commentary is so sparse or of poor quality, that we cannot later determine what was happening. Always be aware of what the cameras are doing (check them regularly) and make adjustments.

Use the zoom slowly and smoothly. Also, move the camera smoothly and slowly. If the ROV is moving too much or too fast, ask the pilot to adjust. At any time you can ask the pilot to help position the ROV more effectively.

If the video screen or other readouts display data overlays, we need to monitor and read out those values to the audio recorders frequently. As a back up and to make the audio records most useful, it is very important to record on the audio regular readouts of time, depth and temperature as seen on the video (or other) screen. **The most important things to record frequently are time and depth.** In general there has not been nearly enough audio commentary on the dive tapes. A viewer later has a very difficult time trying to determine what was going on. Why is the vehicle not moving? What activities are being done? Audio sometimes was barely picked up on the main video recorder. Speak clearly. Also, there has not been enough audio commentary on the wider area surrounding where the vehicle is working. Describe what you see in detail.

Try to understand what you are seeing in the context of data needs. Some species we see need more detailed video documentation, some less.

Often when the ROV is moving large distances, as when moving toward a reef, it is too far off the bottom and the external camera video quality is poor. Try to make all video count as much as possible. If video cannot be improved because of the way the vehicle needs to move, this is a time when accurate, detailed audio recordings are most needed.

When on transect runs, make sure to put the main camera pan & tilt into the pre-marked positions and put the lens on wide angle. Tell the pilot where to go before starting & how the run is supposed to go (either straight by a compass course-often hard on the reefs, or following a depth or the bottom contour). Keep the speed slow ($\leq$ 1 kn) and distance off bottom as small as practical. Make abundant audio notes, esp. of time, depth, & temperature. Note estimated lateral visibility. Request lat/long locations at beginning and end of transects. We will discuss transects aboard ship.

APPENDIX 2
FIGURES

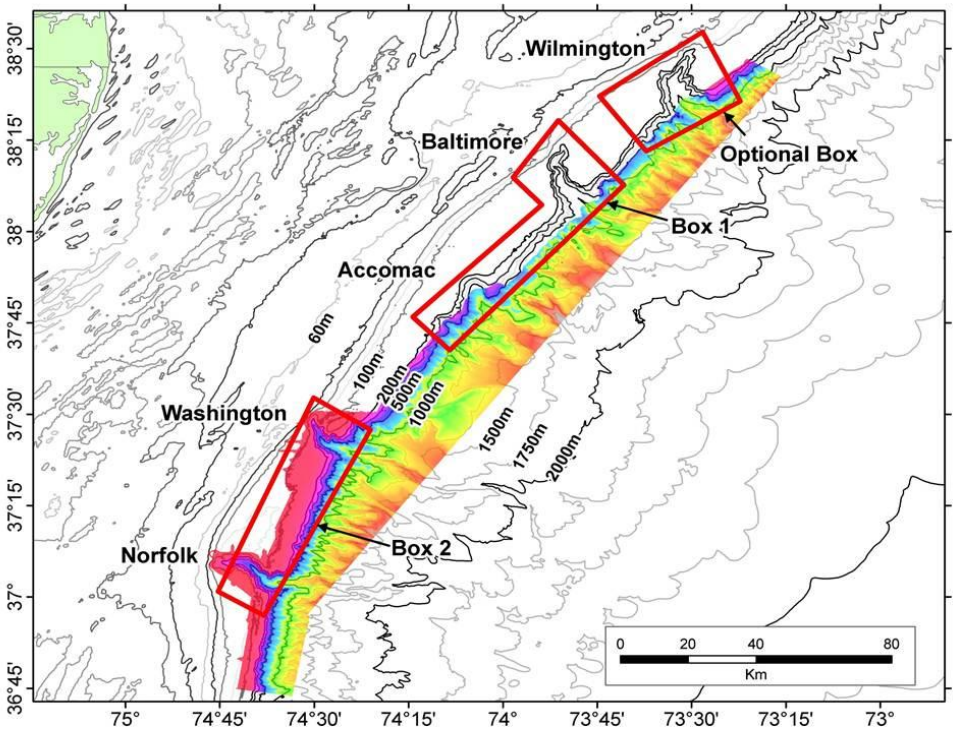

Figure 1. Major Mid-Atlantic Canyons. Target areas for this cruise are in and around Norfolk and Baltimore canyons with emphasis on Norfolk.

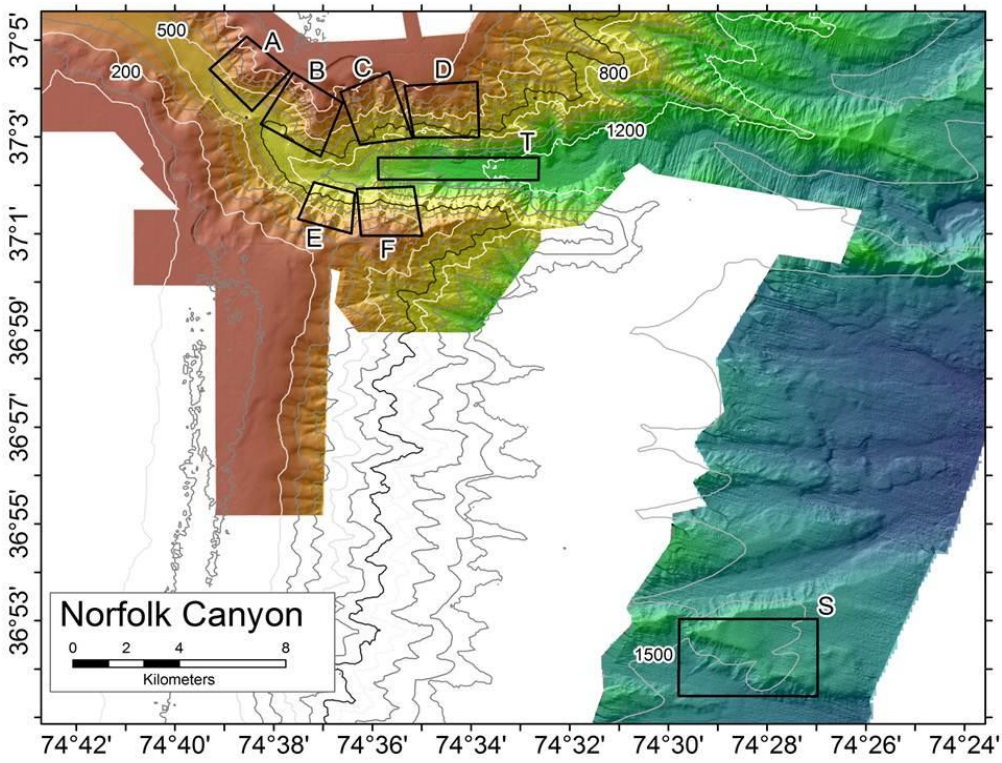

Figure 2. Proposed ROV dive areas (Boxes A-F and S) for Leg I in Norfolk Canyon. ROV starting points will be provided the day before each dive. Boxes S & T are areas of proposed bottom trawl operations. Trawl tow tracks are subject to change based on vessel traffic, weather, fishing gear, etc. and will be evaluated and discussed with the ship in advance of trawl operations.

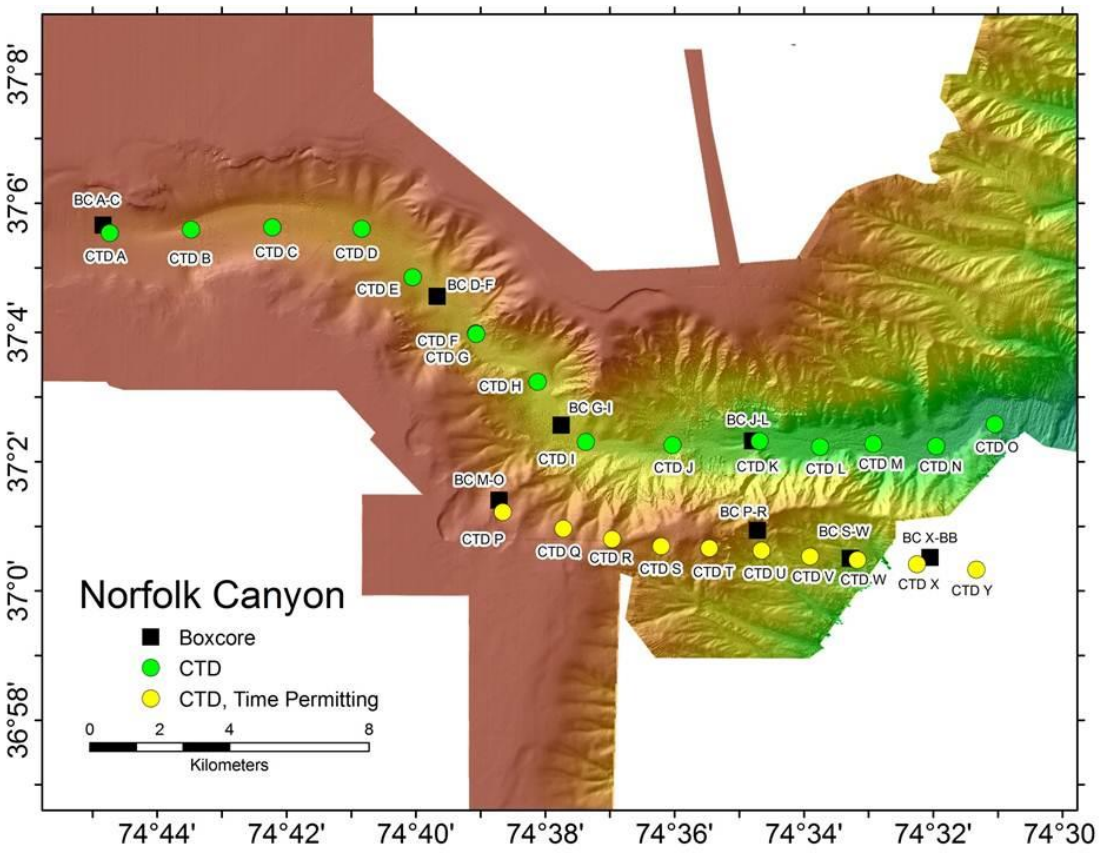

Figure 3. Box core and CTD sampling stations in Norfolk Canyon. Clusters of 3-5 box cores are all in the same place and only one symbol is plotted for multiple cores. See station & waypoint list in Appendix 3. Current letter station names will be replaced by chronological station numbers in order of sampling.

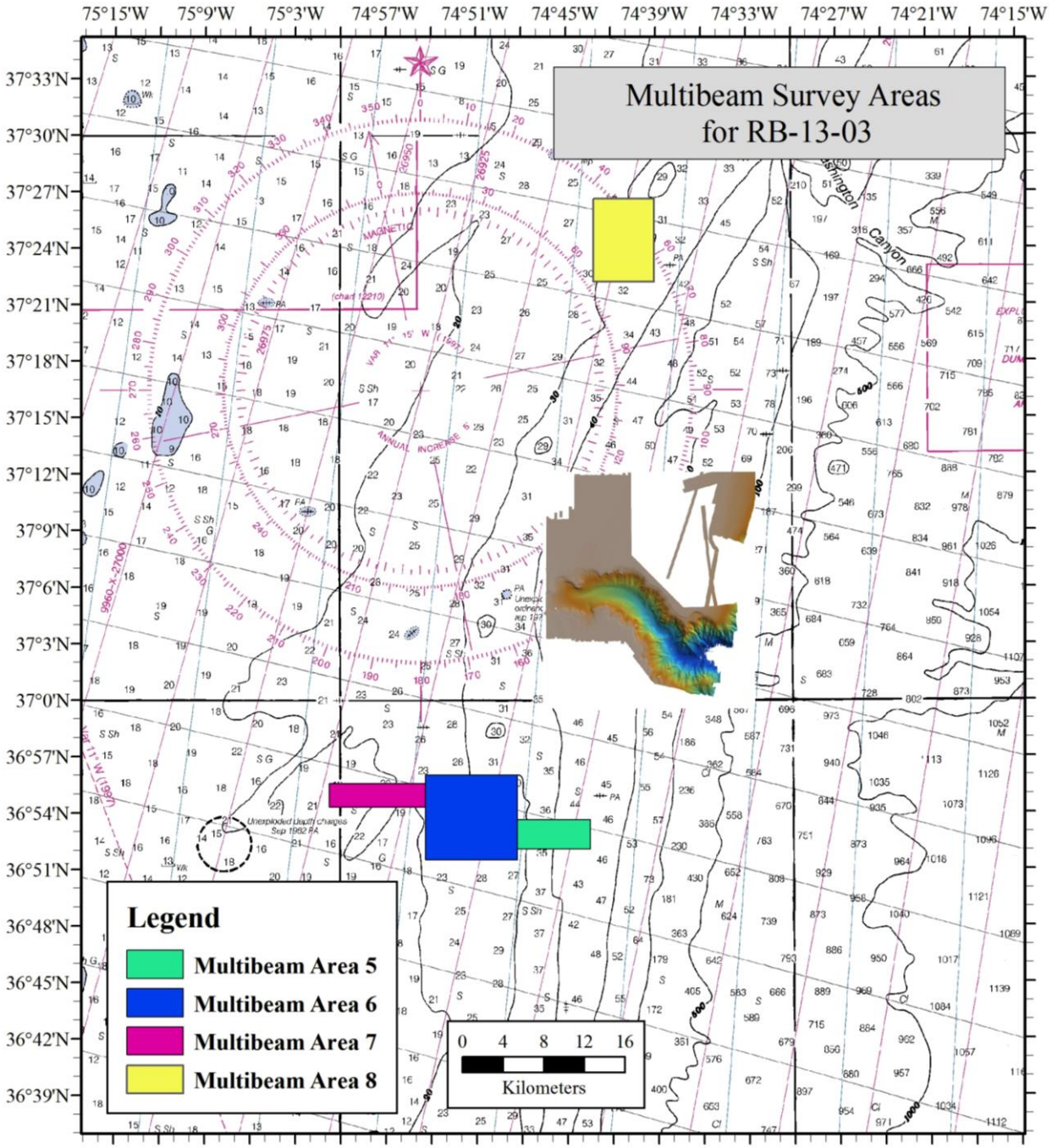

Figure 4. Polygons of areas proposed for multibeam sonar mapping near Norfolk Canyon for archaeological objectives.

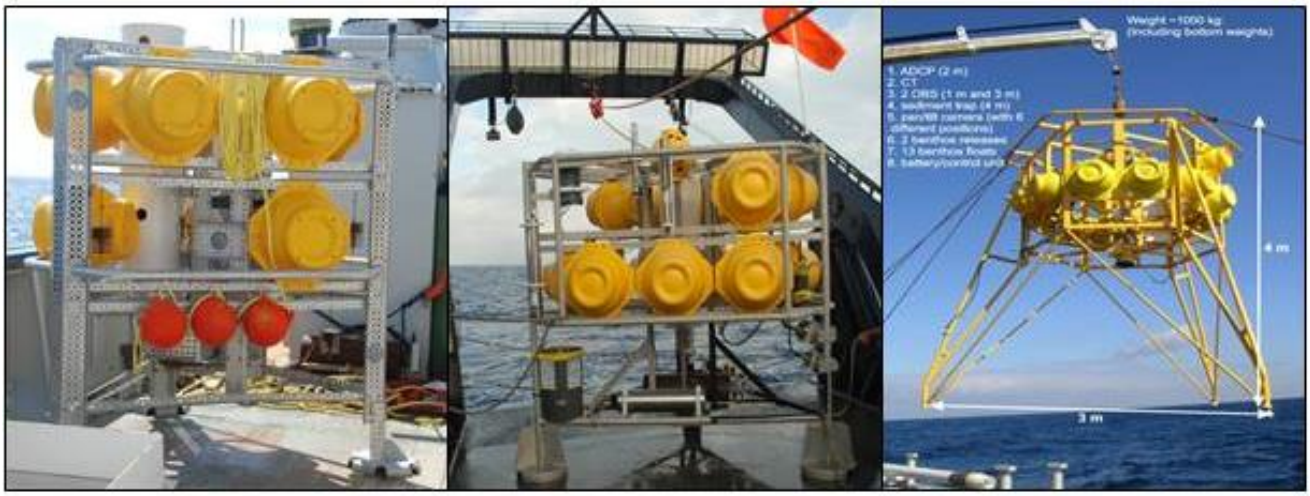

Figure 5. Left: UNCW benthic lander (in air weight ~ 1000 lb without drop weight and ~ 1700 lb with drop weight; dimensions about 6 ft per side). Middle: NIOZ ALBEX lander (~ 1200 kg [2646 lb] in air, 2.35 m wide and 2.25 m tall. Right: NIOZ BOBO lander - actually has shorter legs and smaller footprint than illustrated above.

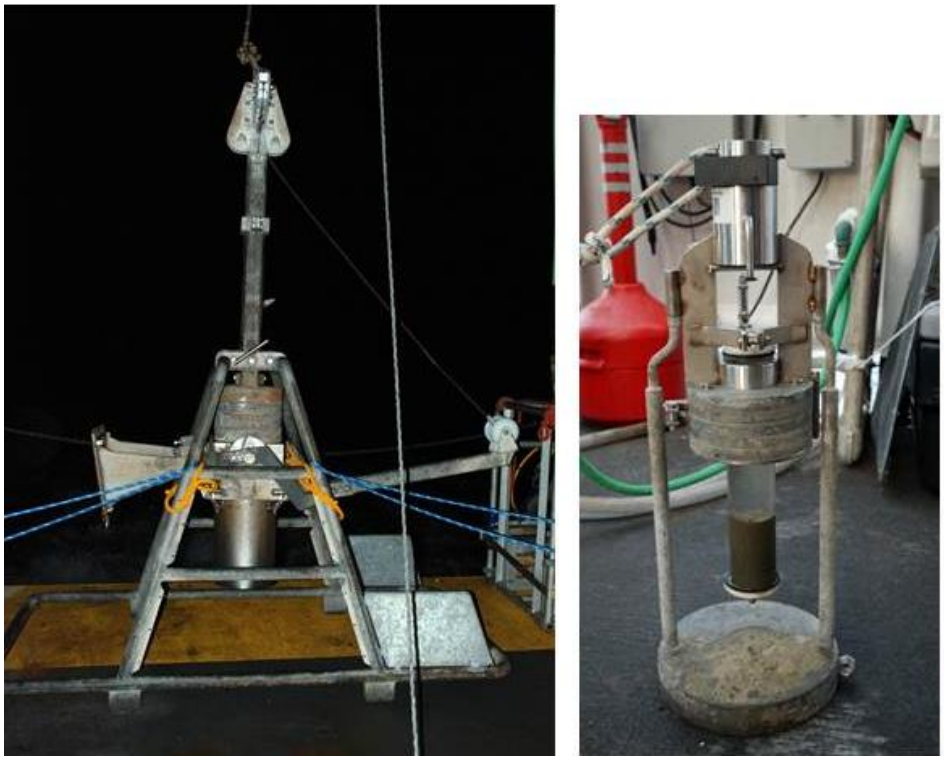

Figure 6. NIOZ box corer (left) and mono-corer (right). The box core weighs about 850 kg (1874 lb) with 250 kg (551 lb) of spare parts. The mono-core weighs about 40 kg and hangs under the CTD.

APPENDIX 3
STATION/WAYPOINT LIST

Norfolk Canyon Lander and mooring sites**:**
BOBO (deep, mouth): 37° 02.217’ N, 74° 32.020’ W; 1364 m
Mooring (mid-canyon): 37° 02.330’ N, 74° 37.158’ W; 917 m
ALBEX (shallow, head): 37° 03.876’ N, 74° 39.119’ W; 630 m

Baltimore Canyon Lander and mooring sites**:**
UNCW#1 (deep, mouth): 38° 02.543’ N, 73° 44.153’W; 1318 m
Mooring (mid-canyon): 38° 04.657’ N, 73° 46.957’ W; 1082 m
UNCW#2 (shallow, head): 38° 09.024’ N, 73° 50.954’ W; 603 m

Norfolk Canyon box core and CTD stations. As noted in Fig. 3, station names will change as stations are conducted chronologically. * represents first station in a series of replicates in same location. CTD stations P-Y are of second priority and depend on time available.

Gear	Longitude	Latitude	Longitude	Latitude	Station
Boxcore	-74 44.8360	37 05.6629	-74.747267	37.094383	BC A*
Boxcore	-74 44.8360	37 05.6629	-74.747267	37.094383	BC B
Boxcore	-74 44.8360	37 05.6629	-74.747267	37.094383	BC C
Boxcore	-74 39.6709	37 04.5600	-74.661183	37.076000	BC D*
Boxcore	-74 39.6709	37 04.5600	-74.661183	37.076000	BC E
Boxcore	-74 39.6709	37 04.5600	-74.661183	37.076000	BC F
Boxcore	-74 37.7520	37 02.5639	-74.629200	37.042733	BC G*
Boxcore	-74 37.7520	37 02.5639	-74.629200	37.042733	BC H
Boxcore	-74 37.7520	37 02.5639	-74.629200	37.042733	BC I
Boxcore	-74 34.7920	37 02.3220	-74.579867	37.038700	BC J*
Boxcore	-74 34.7920	37 02.3220	-74.579867	37.038700	BC K
Boxcore	-74 34.7920	37 02.3220	-74.579867	37.038700	BC L
Boxcore	-74 38.7139	37 01.4040	-74.645233	37.023400	BC M*
Boxcore	-74 38.7139	37 01.4040	-74.645233	37.023400	BC N
Boxcore	-74 38.7139	37 01.4040	-74.645233	37.023400	BC O
Boxcore	-74 34.7170	37 00.9370	-74.578617	37.015617	BC P*
Boxcore	-74 34.7170	37 00.9370	-74.578617	37.015617	BC Q
Boxcore	-74 34.7170	37 00.9370	-74.578617	37.015617	BC R
Boxcore	-74 33.2800	37 00.5028	-74.554667	37.008381	BC S*
Boxcore	-74 33.2800	37 00.5028	-74.554667	37.008381	BC T
Boxcore	-74 33.2800	37 00.5028	-74.554667	37.008381	BC U
Boxcore	-74 33.2800	37 00.5028	-74.554667	37.008381	BC V
Boxcore	-74 33.2800	37 00.5028	-74.554667	37.008381	BC W
Boxcore	-74 32.0482	37 00.5168	-74.534136	37.008614	BC X*
Boxcore	-74 32.0482	37 00.5168	-74.534136	37.008614	BC Y
Boxcore	-74 32.0482	37 00.5168	-74.534136	37.008614	BC Z
Boxcore	-74 32.0482	37 00.5168	-74.534136	37.008614	BC AA
Boxcore	-74 32.0482	37 00.5168	-74.534136	37.008614	BC BB
CTD	-74 44.7349	37 05.5369	-74.745583	37.092283	CTD A
CTD	-74 43.4779	37 05.5900	-74.724633	37.093167	CTD B
CTD	-74 42.2200	37 05.6239	-74.703667	37.093733	CTD C
CTD	-74 40.8400	37 05.6029	-74.680667	37.093383	CTD D

CTD	-74 40.0510	37 04.8540	-74.667517	37.080900	CTD E
CTD	-74 39.0679	37 03.9829	-74.651133	37.066383	CTD F
CTD	-74 39.0670	37 03.9769	-74.651117	37.066283	CTD G
CTD	-74 37.3720	37 02.3029	-74.622867	37.038383	CTD H
CTD	-74 38.1160	37 03.2359	-74.635267	37.053933	CTD I
CTD	-74 36.0289	37 02.2570	-74.600483	37.037617	CTD J
CTD	-74 34.6849	37 02.3179	-74.578083	37.038633	CTD K
CTD	-74 33.7491	37 02.2294	-74.562485	37.037157	CTD L
CTD	-74 32.9250	37 02.2719	-74.548750	37.037865	CTD M
CTD	-74 31.9545	37 02.2377	-74.532576	37.037296	CTD N
CTD	-74 31.0481	37 02.5757	-74.517469	37.042929	CTD O
CTD	-74 38.6542	37 01.2171	-74.644238	37.020286	CTD P
CTD	-74 37.7182	37 00.9637	-74.628637	37.016063	CTD Q
CTD	-74 36.9664	37 00.8019	-74.616107	37.013366	CTD R
CTD	-74 36.2049	37 00.6894	-74.603416	37.011490	CTD S
CTD	-74 35.4620	37 00.6565	-74.591034	37.010942	CTD T
CTD	-74 34.6528	37 00.6232	-74.577548	37.010388	CTD U
CTD	-74 33.9055	37 00.5295	-74.565093	37.008825	CTD V
CTD	-74 33.1722	37 00.4774	-74.552871	37.007957	CTD W
CTD	-74 32.2488	37 00.4131	-74.537480	37.006886	CTD X
CTD	-74 31.3311	37 00.3260	-74.522186	37.005434	CTD Y

Multibeam Survey Areas - Box Coordinates in Decimal Degrees			
Multibeam Area 5		Multibeam Area 6	
West:	-74.805073	West:	-74.906832
East:	-74.724631	East:	-74.80493
North:	36.894018	North:	36.933998
South:	36.868129	South:	36.858702
Multibeam Area 7		Multibeam Area 8	
West:	-75.012949	West:	-74.71978
East:	-74.906749	East:	-74.652167
North:	36.926467	North:	37.44381
South:	36.905241	South:	37.370234

APPENDIX 4
Gear Lists

Gear (most from UNCW)	Bringing	Total Wt (lbs)	Notes
UNCW Landers:		1970	Each lander weighs 985 lbs w/all instruments, no drop wt.
Frame	2		6'8" (triangle base) x 7' (h)
Coral mesocosm	3		on lander
Settlement plates columns	4		4 In-Deep stacks
Settlement plates columns	5		5 Ross/Brooke stacks
Acoustic transceiver deck unit	1		
Transducer	1		
Drop weight	2	1200	600 lbs each
Mooring/Trap (IF RETRIEVED)			
Wire cages of glass balls	4	2800	USGS bringing; 4' (l) x3'5" (w) x3' (h), 700 lbs each
Anchors	2	4600	USGS bringing; 3' (dia.) x 1'6" (h), 2300 lbs each
Honjo traps	2	600	USGS bringing; 3' (dia.) x 5' (h), 300 lbs each
Deck box	1	700	USGS bringing; 3'11" (l) x 2'6" (w) x 2'8" (h)
Fish box	1	500	USGS bringing; 4' (l) x 3'8" (w) x 2'7" (h)
Release box	1	150	USGS bringing; 4'2" (l) x 1' (w) x 1'1" (h)
Floats	2	72	USGS bringing; 4'2" (dia.)x4'7" (h), 36 lbs each
NIOZ Box Core	1	1874	plus 250 kg (551 lb) of spare parts
NIOZ Mono Core	1	88	
Misc. deck, fishing, repair gear:			
Large blue gear tub	2	100	3'8" (l) x 4' (w) x 3' (h), 50 lbs each
1m 505-µm mesh plankton net	1	25	
½m 335-µm mesh plankton net	1	10	
16’ Otter trawl gear set	2	345	
Seacatch toggle release	1		
Seacatch retrieving hook	1		
Crosby swivel	2		
Niskin bottle (6L)	2		
Duct tape	4		
Electrical tape	8		
Gorilla Tape	1		
Bungee cords	X		
Work gloves	X		1 small, 3 medium
Spare line	X		
Monofilament	X		
Band clamps	X		Various sizes
Cable ties (assorted sizes)	X		4"x100, 8"x322, 11"x74, 14"x53, 24"x28, 36"x20
Needles & nylon twine	X		13 nylon, 1 cotton, 1 jute, 6 needles
Mesh	X		Few sheets of various types
Wire cutters	3		Various sizes
WD-40	6		
Silicon spray	2		

Socket wrench and sockets	X		
Crimps	X		
Rubber mallet	1		
Screwdrivers	X		7 flat, 8 phillips, 3 star bit
Wrenches	X		Set of sockets, 1- adj. wrench
Loctite thread locker	X		
Allen wrenches	13		Various sizes
Utility knife & blades	X		w/5 blades
Pliers	10		Needle-nose, groove joint & slip joint
Tape measure	1		
Hack saw and blades	1		
Extension cord	2		
Power strip	2		
Sediment rinsing table	1	35	A. Demopolous
Safety gear:			
Foul weather gear	2		1 pr extra pants; Steve and Mike bring own
Hard hats	3		
Work vest (w/strobes)	3		Steve brings own
Plastic aprons	1		
Respirators	2		
Goggles	4		
Rubber gloves-heavy duty	2		
Rubber gloves-latex/nitrile	X		2 boxes L, 1 box M, 1 box S
Live coral containers and gear:			
Large blue insulated tub	2	88	3'9" (l) x 2'8" (w) x 2'6" (h)
Small blue insulated tub	1	56.5	2'8" (l) x 2' (w) x 2'1" (h)
Blue tarp	1		
Chiller (110v)	1	97	2'5" (l) x 1'4" (w) x 1'11" (h)
Tygon tubing and plumbing fixtures	X		Assorted lengths
Live buckets (5-Gallon)	4		
Live buckets (1-Gallon)	5		Only 3 have lids
Coral pots	X		Assorted sizes
Miscellaneous air & water pumps	X		In Sandra's box
Live only cooler	1		2'5" (l) x 1'4" (w) x 1'5" (h)
Aragonite sat. sampling:			
Glass jars w/glass stoppers	26		Sent from NOAA lab- Sandra to arrange
Set of field gear for sampling	1		grease, syringes, tips, filters, etc.
Small jars for nutrient water sample	30		have more
Chemicals/Chemical Clean-Up:			
Ethanol-95% (20 L drum)	5	225	S. Ross
Ethanol-95% (25 L)	1		A. Demopolous
Ethanol-99.5% pure 200 proof (3L)	1		C. Kellogg
Ethanol-99.5% pure 200 proof (60L)	1		A. Demopolous (and C. Morrison/ S. France)
Vermiculite	X		S. Ross; alcohol, RNAlater, and acetone clean up
Formaldehyde solution-37% (20 L drum)	4.5	250	S. Ross
Formaldehyde solution-37% (12 L drum)	1		A. Demopolous & C. Robertson

Formalex green (5gallon)	7		S. Ross; formaldehyde, paraformaldehyde, glutaraldehyde clean up
Mercuric chloride-100%	5g		S. Ross
Mercury (Hg) spill kit	1		S. Ross; mercury clean up
Borax-100%	9g + 4lb		S. Ross & A. Demopolous
Acetone-100%	250 ml		A. Demopolous
Glutaraldehyde-2.5%	200 ml		S. Brooke
RNAlater-100% (3 L)	1		C. Kellogg
RNAlater-100% (3 L)	1		C. Morrison
Potassium chloride-100% (250ml)	1		A. Demopolous
Potassium chloride-100%	40g		S. Brooke
Sodium borate-100%	1.8 kg		A. Demopolous
Paraformaldehyde-4%	6 ml		C. Kellogg
Alizarin stain-100%	40g		S. Brooke
Phosphate buffered saline-0.2 M	230 ml		C. Kellogg
Phosphate buffered saline-0.2 M	200 ml		S. Brooke
Liquid nitrogen-100%	10 L		C. Kellogg
Large carboy of 70% ethanol (5 gallon)	1		S. Ross
Large carboy of DI water (5 gallon)	1		S. Ross
Alcanox (1/2 gal bottle)	1		A. Demopolous
Containers:			
Large carboy for 10% formaldehyde (6 gallon)	1		
Nalgene-1 gallon	35		
Nalgene-½ gallon	23		
Nalgene-1000 ml	72		
Nalgene-500ml	72		
Nalgene-250 ml	22		
Nalgene-125 ml	88		
Squirt bottle	7		6-500 ml, 1-250 ml
Glass jar-16 oz	24		
Glass jar-8 & 9 oz	10		
Glass jar-4 oz	50		
Glass jar-2 oz	80		
Isotope tools:			
Drying oven	1		A. Demopoulos
Misc lab gear:			
Orange basket (1 bushel)	6		
Large cooler	1		3'3" (l) x 1'4" (w) x 1'6" (h), gear packed inside
Small cooler	1		2'1" (l) x 1'2" (w) x 1'3" (h), gear packed inside
Ice container (1/2 gallon plastic milk jugs)	4		
Large sorting tray	4		
Small plastic sorting tray	5		
Pyrex sorting tray	2		
Plastic colander	1		
Measuring board	2		
Scale	3		
Filet knife	3		

Syringes (10cc & 60cc)	X		3-60cc, 4-10cc, 13 needles
Cheesecloth	1 roll		Have more
Cloth cotton drawstring baggies	243		
Ziploc bags	X		111 gal, 150 quart, 144 sandwich, 38 snack, 525 small
Buckets w/gamma lids	27		not including gear buckets and live buckets
Sawtooth 5 gal buckets	10		
Measuring spoon	1		
Measuring cup	1		2 cup size
Funnels (assorted sizes)	3		
Cardboard	X		
Plastic wrap	X		
ID/reference books	X		In lab, packed in Action packer
Fish photo gear (lights, camera, pin-out gear)	X		In lab, packed in storm case
Dissecting microscope, light source, 2 spare bulbs	X		In lab, bring magnifying lenses
Very fine probe	5		
Large dissecting scissor	3		
Small dissecting scissor	3		
Small micro-forcep	5		
Needle w/birch handle	1		
Petri dishes	12		5 large, 6 medium, 1 small
Data/record keeping/office gear:			
Charts and maps			
Navigation gear			Steve brings
Pencils (regular and mechanical)			
Pencil sharpener, electric & manual			
Pens			
Sharpies			
Highlighters			
Forms/data sheets			
Labels			
Resist-all paper			
Xerox paper			
Paper clips			
Rubber bands			
Stapler & staples			
Scotch tape			
Erasers			
White out			
Calculator			
Clip boards	4		
3-ring binders			
3-hole punch			
Sticky pads			
Electronics:			
Pentium PC computer	1		In office
APC battery backup	1		
Maxtor external HD	1		

Flash drive	1		
Small color inkjet printer	1		In office
Ink cartridges (black & color)	2		Bring over 1.5 sets
Drivers for computer and printer	X		In office
Hard drives- 2TB & cases	15		For original copy
Hard drives- 2TB & cases	15		CSA copy, supplied by CSA
Voyager docking stations	2		
Pentium PC laptop	1		In office. For use with YSI
Keyspan (serial to USB)	2		1 with Seabird 39, 1 with Seabird 19
Seabird SBE 39	2	19	In lab
Seabird SBE 19+	1	103	In lab, packed in wooden crate
YSI 6600 data logger	3	33	In lab
Hobo data logger	2		
Instrument software	X		In office
Cannon digital camcorder & mini HDV tapes	1		Canon HDV HV30 camcorder, in pelican case
Digital still camera & lenses	1		Steve's Nikon SLR
Batteries:			
AAA	24		Have 60
AA	14		Have 18
C	24		Have 84
D	156		Have 348
9v	12		Have 17
Gear from S. Brooke Lab:			
Sticky labels	120		
Label sheets	10		
Waterproof paper	10		
Scissors	3		
Pencils	10		
Sharpies	10		
Jars	150		Some may come from UNCW
Nalgene bottles	30		
Falcon tubes	60		May come from UNCW
2 mL vials	20		
Scintillation vials	100		
Dissecting tray (small)	1		
Dissecting kit	1		
Quart ziplock bags	10		
Cooler	1		
Plastic jars-1 gallon	8		
Plastic jars-1/2 gallon	4		
Blue ice	8		
Nitex	2 sq m		
Pasteur pipettes	50		
Pipettes-20 mL	5		
Pipette bulbs	6		
Small culture dishes	6		
Hand filtration pump	1		
Rafter counting cells	2		

Microscope slides	1 box		
Small plastic bowls for live animals	6		
Rio pump for chiller system	2		
Air pump	2		
Airstones	2		
Tygon tubing	2 m		
Dremmel tool	1		
Pliers	2		
Box cutter	1		
Hooks and tie down line	10		
Electrical tape	1 roll		
Duck tape	1 roll		
Packing tape	1 roll		
Hazmat boxes	3		
Cable ties	1000		
Bungee cords	20		
Chemical waste bottle	1		

USGS (Demopoulos) gear list

Type	**Gear**	**Pack for RB**	Comments
Chemical	Brinkman	1	
Chemical	Brinkman adapter pieces	1	
Chemical	Carboy - ethanol	1	
Chemical	Carboy - ultrapure water	1	
Chemical	Chemical wrench	1	
Chemical	Container that fits brinkman	3	
Core	Black bins	2	
Core	Eckmann	5	
Core	eH probe	1	
Core	Extra hardware for Eckman	yes	
Core	Extra hardware for quivers/t-handles (toolbox)	yes	
Core	Extruder - Eckman	1	
Core	Extruder - push core	2	
Core	Extrunder heads - large	2	
Core	Fences - 2 cm	6	
Core	Fences - 3 cm	3	
Core	Fences - 5 cm	5	
Core	Fences - for Eckmann	all	
Core	mV meter with extra batteries	1	
Core	Nalgenes - 1000mL	50	
Core	Nalgenes - 250mL	160	
Core	Nalgenes - 500mL	80	
Core	HDPE bottles - 30 mL	144	
Core	Quivers	10	
Core	Refractometer	1	
Core	Ring clamps	1	
Core	Ring stand	1	

Core	Sieves - 300 um	2	12" and 8"
Core	Sieves - 45 um	1	
Core	Slicers	10	
Core	Spatulas - mud	10	
Core	Stoppers - black or green	20	
Core	Stoppers - black w/holes	10	
Core	Stoppers - large	2	
Core	Syringes - 10 cc w/filters	125	
Core	Syringes - 60 cc syringes	50	
Core	T-handles	15	
Core	Trowels	1	
Core	Tube cores	20	
Core	Tubing for top water	yes	
Core	Whirl paks	150	
Isotope	Combusted vials	8 boxes	144/box
Isotope	Cryovials	100	
Isotope	Forceps - regular	1	
Isotope	Oven	1	
Isotope	Scalpel blades	box	
Isotope	Scalpels	2	
Isotope	Scissors - lab	1	
Isotope	Tin foil	box	
Office	Binder	1	
Office	Camera- digital, batteries, charger, usb cord, bag	1	
Office	Camera to scope attachment	1	
Office	Data sheets	yes	
Office	Ethernet cables	1	
Office	Grip mats	yes	
Office	Hard drives w/cases	8	
Office	Hole puncher	1	
Office	Internal labels	250	
Office	Label maker	yes	
Office	Laptop	1	
Office	Memory card reader	1	
Office	Memory cards	2	
Office	Mouse	1	
Office	Mouse pad	1	
Office	MSDS	yes	
Office	Paper	2	
Office	Paper cutter	1	
Office	Pencil sharpener	1	
Office	Pens/pencils	1 box	
Office	Printer	1	
Office	Rubber bands	bag	
Office	Scanner	1	
Office	Scissors - office	1	

Office	Sharpies	yes	
Office	SOP’s	yes	
Office	Speakers	1	
Office	Stapler	1	
Office	Surge protector	1	
Office	USB cords	yes	
Office	USB hub w/multiple connectors	1	
Office	Video camera	yes	
Other	Action packers	5	
Other	Bottle brush	4	
Other	Bubble wrap	box	
Other	Buckets	6	
Other	Bungee cords	box	
Other	Carboard boxes	3	
Other	Chicken wire shelf	1	
Other	Clipboards	1	
Other	Coolers - large	1	
Other	Coolers - medium	1	
Other	Diapers/Newspaper	stack	
Other	Footlocker	1	
Other	Funnels	2	EtOH and formalin
Other	Garbage bags	box	
Other	Graduated cylinder	1	
Other	Hard hats	3	
Other	Ice packs	8	
Other	Jennie's MacBook Pro for Disk formatting	1	
Other	Kim wipes - large	2	
Other	Kim wipes - small	4	
Other	Lead fishing weights	25	Enough for 25 markers
Other	Lunch tray	1	
Other	Markers for sites	25	
Other	Mesh bags for styrofoam cups	Yes	
Other	Milk crates	3	
Other	Nitrile gloves - Large	1	
Other	Nitrile gloves - Medium	4	
Other	Nitrile gloves - Small	2	
Other	O-ring vials	50	1 bag
Other	Parafilm	1	
Other	PFDs	3	
Other	Pipettes - plastic	10	
Other	Rain gear - coats	3	
Other	Rain gear - pants	3	
Other	Satellite phone w/charger	1	
Other	Shop wipes	6	
Other	Squeeze bottles – DI	1	
Other	Squeeze bottles – EtOH	1	

Other	Squeeze bottles – filtered SW	3	
Other	Steel toe boots	3	
Other	Tape - Lab	4	
Other	Tape - Scotch	1	
Other	Tape dispener	1	
Other	Vial boxes	4	
POM	Automatic water pump	1	
POM	Combusted filters (solvent & non-solvent rinsed foil)	50	
POM	Filter flask tops	2	
POM	Filter flasks	2	
POM	Forceps - blunt	1	
POM	Hand pump	1	
POM	Tubing for POM	yes	
Sorting	Forceps - fine	1	
Sorting	Lens cleaner	1	
Sorting	Light source	1	
Sorting	Microscope	1	
Sorting	Microscope bulbs/fuses	2	
Sorting	Petri dishes - large	pack	
Sorting	Petri dishes - small	pack	
Tool	Allen wrench set - multi-tool	1	
Tool	Allen wrench set - seperated (SAE and metric)	1	
Tool	Calipers	1	
Tool	Carabineers	yes	
Tool	Caulk gun	1	
Tool	Combination wrenches - metric	yes	
Tool	Combination wrenches - SAE	yes	
Tool	Crescent wrench	2	
Tool	Drill bit set	1	
Tool	Extra wire (in toolbox with repair kit)	yes	
Tool	Flagging tape	yes	
Tool	Knife	yes	
Tool	Leatherman	yes	
Tool	Marine adhesive 5200	no	
Tool	Marine glue	yes	
Tool	Measuring tape - soft	yes	
Tool	Measuring tape - stiff	yes	
Tool	Needles	yes	
Tool	Nuts, lock nuts, washers, wing nuts, bolts	yes	
Tool	Phillips screwdriver	yes	
Tool	Pliers	yes	
Tool	Power drills - DeWalt with charger	1	
Tool	Power wrench w/charger (Black & Decker)	1	
Tool	Q-tips	yes	
Tool	Ratchet straps	3	
Tool	Ratcheting combination wrenches	yes	

Tool	Rubber mallet	yes	
Tool	Rulers - 6”	2	
Tool	Screwdriver - Flathead/Phillips combo	yes	
Tool	Si lubricant	yes	
Tool	Small flathead	yes	
Tool	Socket wrenches	yes	
Tool	Spare Line	yes	
Tool	Spoon	yes	
Tool	Tape - Duct	4	
Tool	Tape - Electrical	5	
Tool	Tape - Gorilla	1	
Tool	Tape - Packing	4	
Tool	Wire cutters	2	
Tools	Hose clamps- various sizes	yes	
Water	Extra line to secure wash table	yes	
Water	Hose fittings	yes	
Water	Hose nozzles	4	
Water	O-rings for water canisters	2	
Water	Short (4-6’)hoses with y-valve connection	yes	
Water	Wash table	yes	
Water	Wash table - hoses	yes	
Water	Wash table - legs	yes	
Water	Water filtration apparatus - canisters	2	
Water	Water filtration apparatus - coarse filters	2	
Water	Water filtration apparatus - connectors	yes	
Water	Water filtration apparatus - fine filters	2	
Water	Water filtration apparatus - hardware for wall attachment	yes	
Water	Water filtration apparatus - tops	2	
Water	Water filtration apparatus - wrench	1	
Water	Y connector hose pieces	yes	

WOODS HOLE OCEANOGRAPHIC INSTITUTION

Deep Submergence Lab

Mobilization (MOB) Plan for R/V Ron Brown (RB)
26 thru 29 April 2013
30 April departure

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This document describes details and the preferred order of loading Jason equipment to facilitate a rapid MOB. However, if the trucks are delayed or arrive in the wrong order we will change the order to keep the process moving. There will be concurrent ops, such as USBL system and deck plate installation that don't require the shore crane. If possible these will be accomplished with the ship crane while the shore crane is loading heavier items. When shore and ship crane operations are concurrent, the Jason EL will work with RB personnel to assure that safe operational procedures of two moving cranes are observed.

The Jason team requests that the shore crane be set up and RB personnel are ready to start operations by 0800 on day 1 of the MOB. Shore crane ops should be complete by 1700 of day 1. If there are delays in crane ops, we will request to work later on day 1 to avoid a 2nd day of shore crane charges and delays. In this event we request the RB Bosun or designee work late to assist. After crane operations are complete we request the ship's crew including deck personnel, Bosun, and ship electrician be available from 0800 until normal RB knockoff for the remainder of the MOB. As the MOB precedes the need for assistance from these personnel will decline.

Day 1 of the MOB is focused but not limited to shore crane operations. Below is the desired order for shore and ship crane ops.

1. Place the Dynacon portable winch on board as per attached drawing. These ops are accomplished with a coordinated effort of the RB Bosun (or designee), RB deck personnel, Jason team members, and directed by the winch tech. The deck plates can be placed with either the shore or RB crane. The winch components are placed with the shore crane due to their weight, in this order.

   Deck plates (ship or shore crane)
   Drum of wire
   Level Wind
   Traction Head
   HPU

When all the winch components are aboard, the winch tech will begin aligning and hooking up the winch in concert with continuing crane ops. The ship electrician will assist the winch tech to get power to the winch and get it energized. Usually winch installation is complete and operational by the end of day 1.

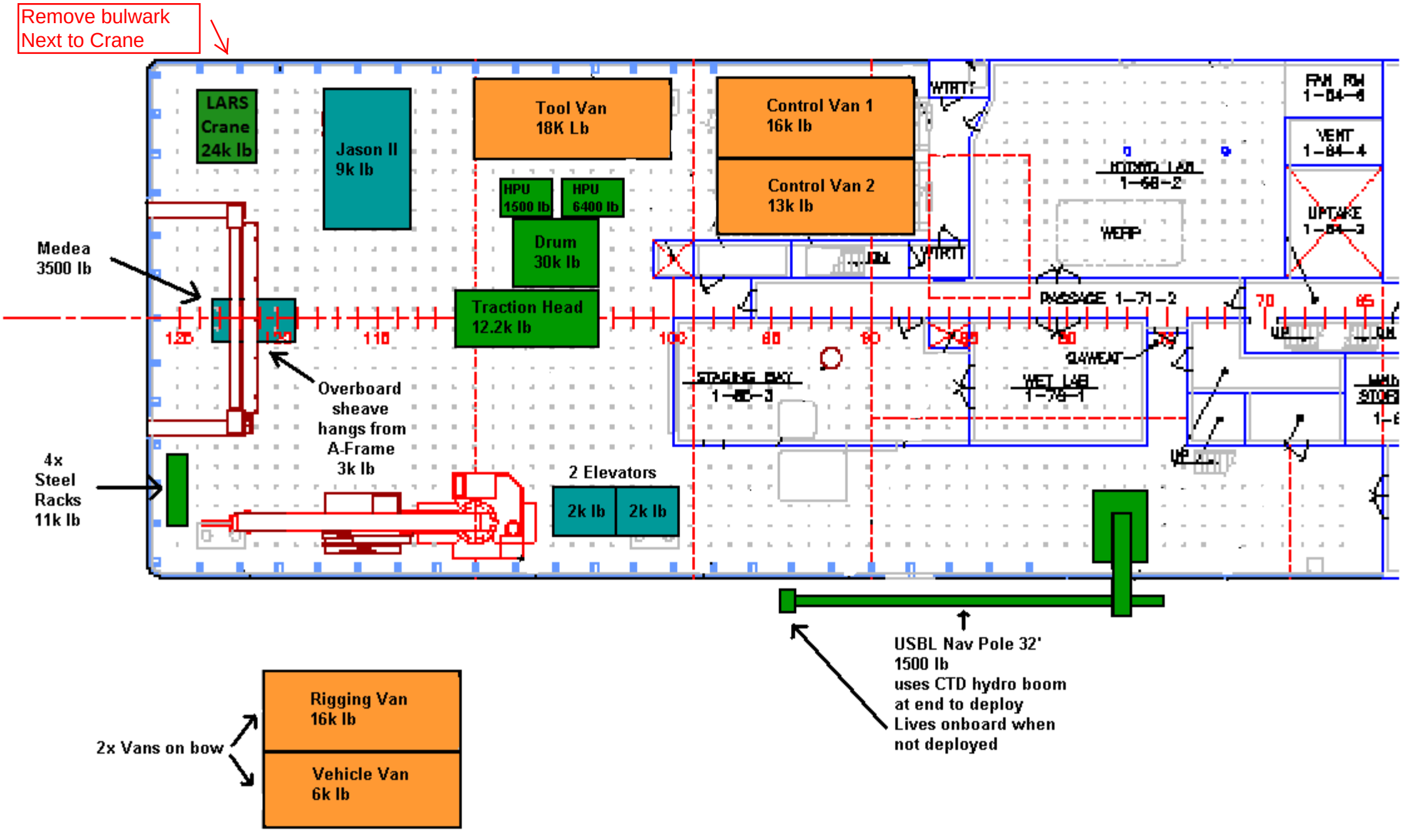
2. Remove port quarter bulwarks adjacent to crane base to allow the base to utilize those deck sockets. Place Jason LARS Crane in port quarter as per drawing. Jason team members will bolt down the crane. RB personnel install lifelines where bulwarks are removed.
3. Place LARS crane HPU as per drawing, or similar location. Jason team will connect hydraulics and with help from ship electrician connect power to crane HPU and get it running and moved to stow position while shore crane ops proceed.
4. Place Jason/Medea van on the dock out of the way with shore crane or fork truck. Jason personnel will remove Jason and Medea from van with fork truck, place close to ship and shore crane, while shore crane ops continue.
5. Place Control Van deck plates (depending if the vessel has ‘peck and hail’ hold downs or similar).
6. Place Control Van 2, inner van as per drawing.
7. Place Control Van 1 outer van. RB personnel secure vans to deck.
   Jason personnel clamp vans together and inflate seal.
8. Place Tool Van on ship as per drawing. RB personnel secure to deck.
9. Place Rigging Van on the dock, out of the way. Jason team will remove items from it to be placed on board with ship crane when available.
10. Place USBL pole base on board as per drawing.
    Place USBL pole components on board. Jason team will assemble.
    Place USBL stand on board. (Installation and assembly of the USBL system can be accomplished with the ship's crane as available, allowing shore crane ops to continue).
11. Place Jason and Medea on board as per drawing.
12. Place 2X elevators as per drawing, can be either ship or shore crane depending on availability.
13. Place steel racks on board, can be either ship or shore crane depending on availability.
14. Place rigging van on board where space is available, on bow. (Normally requires repositioning of the shore crane, therefore left for last)
15. Place empty vehicle van on board where space is available, on bow.

Concurrent to these crane operations there will be numerous items removed from the rigging and tool vans and placed on the deck and into labs. Please see deck layout and power requirement docs for weights and electrical details. Jason ops requests use of the entire Hydro Lab of the RB.

Any questions or concern please contact Matt Heintz, info above.

Please refer to Deck Layout Drawing and Power requirement document, included.

Jason II Deck Layout



WHOI DSL JASON II ROV SYSTEM POWER SUPPLY REQUIREMENTS

Last update: 14-Sep-11 CLT
Originally Compiled by Chris Taylor, Bob Elder, Robert Fuhrmann

Subsystem	Volts	Phase	Freq (Hz)	[3]Circuit Breaker (A)	Typical Operating Current (A)	No-Load Current (A)	[1]Start-up Inrush Current (A)	[2]KVA calc'd from Typical Operating Current	[6]KVA calc'd from Circuit Breaker Size
Van Jetway[5]	480	3	60	100	65			54	83
Van Hotel	480	3	60	60	45			37	50
Effer	480	3	60	100	90		287	75	83
Dynacon	480	3	60	300	228	68	700	190	249
							Subtotal KVA	356	466
							Safe operating marging (%)	30%	
							[4]Total required KVA	463	

[1]The startup inrush current is shown for those devices with large motors. No values indicate negligible inrush current. Further, any generator needs to be able to ride-through the inrush for the few milliseconds it lasts.

[2]The KVA calculation using Typical Operating Current. The calculation is V*I*sqrt(3)/1000.

[3]These are the typical circuit breaker values which most vessels use for our subsystems.

[4]If a stand alone generator is used, a circuit breaker panel needs to be provided with circuit breakers as shown above for each subsystem. Further, the panel needs to be able to accommodate the large input and output cables and should be watertight if located in any exposed environment.

[5]The Tool Van uses 480VAC single phase to power lights, outlets, and it's AC unit. This could be provided by the ship, but as designed, this comes off the Van Jetway feed.

[6]The KVA calculation using Circuit Breaker amperage. The calculation is V*I*sqrt(3)/1000.

Update History
26 Sep 2006 created to size out a 60Hz generator for the 50Hz German vessel R/V Merian
2006. new Effer power pack put into service, replacing the smaller original unit. Motor is 75HP
2008. new control vans built, redistributing some of the A/C load
20 March 2010 new Effer inrush is 287 amps, replacing the original 174 amps. C.Agee.
30 Jun 2011. no change in values, just some text cleanup. CLT
14 Sep 2011. no change in values, added KVA calcs based on circuit breaker size. CLT