Technical Services Information - R/V *Atlantis*

I. Vessel Operator Organizational Structure & Points of Contact

A. Organization Description

The Marine Operations Coordinator, Jonathan Alberts, is the WHOI ship scheduler and principal point of contact for all cruise related information. He is a member of the Marine Operations Department and reports to the Vice President for Marine Operations. He is responsible for determining the level of support required by shipboard science programs and recommends allocation of shared-use equipment, coordinates ship preparations and defines cruise technical support requirements. Once a cruise has been scheduled, the Marine Operations Coordinator supplies the Chief Scientist with ship specific information including a cruise planning manual and obtains science program requirements using written questionnaires and direct communications. He identifies and processes foreign clearance requests and conducts advanced science liaison with ship's agents. Cruise information obtained by the Marine Operations Coordinator is disseminated to the entire Marine Operations organization, including the technicians at sea. Selected information for each cruise is “published" on the WWW Marine Operations home page (http://www.marine.whoi.edu) where it can be reviewed by all parties interested in a prospective cruise.

Marine technical support services at WHOI are under the management and direction of the Operational Scientific Services (OSS) Manager, Barrie B. Walden who is accountable to Richard Pittenger, Vice President for Marine Operations. OSS consists of the Shipboard Scientific Services Group (SSSG) which contains the sea-going technicians; the Deep Submergence Group (DSG) which maintains and operates DSV *Alvin* and WHOI's ROVs as a National Oceanographic Facility; the Ocean Moorings Laboratory which provides and services deep sea moorings to scientific programs on a grant or contract basis; the Diving Office which maintains the Institution's SCUBA diving capability, and the Advanced Imaging and Visualization laboratory, which works to provide scientists with access to current undersea imaging technologies.

The Marine Technicians assigned to WHOI vessels are members of the Shipboard Scientific Services Group (SSSG) with direct supervision provided by the SSSG Technical Section Leader. The Technical Section Leader ensures that the SSSG is able to meet the support requirements for each cruise as determined by the Marine Operations Coordinator. As cruise planning progresses, he is available to provide prospective ship users with detailed technical information on the facilities available and advise on their utilization.

The majority of the SSSG group consists of the sea-going marine technicians and technical support personnel directly responsible for ensuring maximum utilization of ship capabilities in response to cruise requirements. They maintain, repair, and assist in the operation of the available general use research equipment and they are responsible for the arrangement and condition of the ship laboratory spaces. They provide direct assistance in cruise preparations, frequently serving as the interface between the ship's agent, crew, local contractors and the

science party. They will provide assistance with shipping and receiving of science equipment including the preparation of required manifest and customs documents. Deck operations aboard WHOI ships are the responsibility of the Chief Mate and under the direct supervision of the Boatswain; the ship's technicians provide the science party interface and assist the Boatswain and crew members as needed.

The ship technicians are not members of the science party and cannot be utilized in that manner. The normal expected workload associated with operation, maintenance and repair of ship-supplied equipment plus the necessity to be continuously available for unscheduled technical assistance precludes routine watch standing. However, the assigned technicians will augment the available science personnel in any way possible in helping to overcome unexpected problems, including repair and testing of science supplied equipment if necessary.

B. Facility Point(s) of Contact and Responsibilities

Cruise Scheduling & Planning:

Jon Alberts, Marine Operations Coordinator
WHOI MS37
Woods Hole, MA 02543
Tel (508) 289-2277
Fax (508) 457-2185
Email jalberts@whoi.edu

Vessel Operations:

Al Suchy, Ship Operations Manager
WHOI MS27
Woods Hole, MA 02543
Tel (508) 289-2624
Fax (508) 540-8675
Email asuchy@whoi.edu

Science Support:

Barrie Walden, Operational Scientific Services Manager
WHOI MS17
Woods Hole, MA 02543
Tel (508) 289-2407
Fax (508) 457-2107
Email bwalden@whoi.edu

Dock Master:

Allan Gordon
WHOI MS18
Woods Hole, MA 03543
Tel (508) 289-2484
Email agordon@whoi.edu

National Deep Submergence Facility Vehicles

ALVIN: Dudley Foster
WHOI MS17
Woods Hole, MA 02543
Tel (508) 289-2273
Fax (508) 457-2107
Email dfoster@whoi.edu

ROV: Andy Bowen
WHOI MS7
Woods Hole, MA 02543
Tel (508) 289-2643
Fax (508) 457-2191
Email abowen@whoi.edu

Special Problems or Concerns:

Richard Pittenger, Vice President for Marine Operations
WHOI MS37
Woods Hole, MA 02543
Tel (508) 289-2597
Fax (508) 457-2185
Email rpittenger@whoi.edu

II. Vessel Characteristics - (when available link to UNOLS database)

III. Research Equipment, Instrumentation, and Data Collection

A. Permanently installed science equipment and instrumentation - (link to UNOLS database when available)

B. Equipment available from the shared-use pool - (link to UNOLS database when available)

C. Procedures for requesting equipment

1. Filing a request

All requests for use of these assets must be made to the WHOI Marine Operations Coordinator, who is responsible for scheduling the available shared-use equipment in conjunction with equipment custodians. Principal Investigators requesting these assets must work closely with the Marine Operations Coordinator and the appropriate custodians to completely define the equipment and schedule requirements during the proposal process and submission of ship time requests. Equipment to be obtained from the shared use pool must be specified in the Cruise Synopsis.

2. **Deadlines for requests**
   Requests for shared use equipment should be provided to the Marine Operations Coordinator as part of the initial cruise planning process. The majority of such equipment is likely to be "normal and expected" and therefore the request can be handled in a straightforward fashion. However, insuring availability of some items requires considerable planning and commitment coordination, greatly facilitated by an advanced request. Additionally, costs associated with providing certain items can be included in the technical support budget but only if the requirement is known at the time the budget is prepared. The sooner a request is received, the more likely it is that the support budget will cover all costs associated with its availability – if it does not, the unexpected costs must be passed on to the science party. In all cases the Marine Operations Coordinator should receive equipment requests at least six (6) months prior to the start of the cruise. After that time, the availability of the equipment can become more of a problem as commitments to other programs become finalized.

3. **Equipment request response**
   The Marine Operations Coordinator will make every effort to confirm the availability of requested equipment immediately following receipt of the request. If an answer cannot be obtained easily, the requesting scientist will be apprised of the situation and the expected timing of a resolution. In cases where equipment is not available or its availability is doubtful, the Marine Operations Coordinator and the Manager of Operational Scientific Services will work with the science party in obtaining a solution, including attempting to borrow the required items from other UNOLS ship operators. In such cases, funding issues may develop requiring assistance or guidance from the science party.

4. **Last minute equipment requests**
   Equipment requests will be acted upon no matter when they are received and, if possible, the requested items will be made available for the normal costs if any. However, funding is unlikely to be available to support requests received after finalization of the technical support budget so, if large expenses are involved, special arrangements will need to be made. Examples are shipping costs for delivery of a van to a vessel in a distant port or charges associated with services necessary for installation of specialized instrumentation.

D. <u>Computer information</u> - (links if available to home institution inventory)

1. **Computing resources**
   The *Atlantis* has a sophisticated computer network with multiple computers available for use. All computers are networked using 10BaseT or 100BaseT Ethernet, and we employ standard internet protocols (TCP/IP). The core servers are two Pentium III 800MHz PCs running Linux (Red Hat Distribution - Version 6.2). One of these servers (named Linus) acts as the primary email and file server. The other (named ftp) hosts the ships web and ftp server (serving only the shipboard network.

   The number and type of general use computers is constantly changing, as is the available software. If the science program will depend heavily on general use computing resources,

this should be discussed with the Marine Operations Coordinator. If helpful, he will be able to provide a list of machines, operating systems and software expected to be available at the time of the cruise

As an alternative to complete dependence upon general use hardware, investigators should consider bringing their own laptop computers and requesting only a keyboard, mouse and monitor. This insures availability of the necessary computer capabilities and software while reducing dependency on unknown general use equipment. At the same time, it greatly simplifies shipping of science provided computing resources.

2. **Networking resources**
   The ship's 10BaseT Ethernet network extends throughout the labs and to all cabins. The core hub is a Fibronics Gigahub that allows up to 100Mb/sec network bandwidth. All the ship's 10BaseT wiring has been certified Cat-5, capable of 100Mb/sec rates as well. The Gigahub is configured as nine separate "collision domains" connected internally within the hub. This prevents the network traffic on one domain from colliding with traffic on the other domains, maximizing available network bandwidth. The Gigahub is located in the Computer/Electronics Lab and provides connections to the ship's network via a large patch panel which provides domain organizational flexibility.

   The *Atlantis* uses the TCP/IP protocol suite for networking and any computer that supports TCP/IP networking can be connected. An available DHCP server provides the simplest means for connecting to the ship's network. Also, multiple IP addresses have been set aside for hard assignment to computers brought by a science party if desired.

3. **Time server** – Two computers aboard *Atlantis* act as timeservers providing NTP broadcasts. These machines obtain the time from dedicated GPS clocks.

4. **Technical assistance**
   The marine technicians are available to help with Ethernet connection difficulties but the science party members are expected to do most of this work on their own. The process is normally straightforward and the technicians can provide detailed instructions.

5. **Procedures for use of shipboard computing resources**
   a. **Interfacing requirements and information**
      Computer network security concerns compel us to scan all computers for virus problems and operating system security holes. To the extent possible, the ship's technicians will have the necessary updates to correct problems but scientists should attempt to have their computers intended for use aboard ship scanned and updated before they leave home. If a problem is discovered or suspected that cannot be corrected and verified, the computer cannot be connected to the ship's network.

   b. **Computers on ship's network**
      If you want to bring a computer to use on the *Atlantis* network, you should install and test all drivers and interface cards on your own network prior to the cruise – the marine

technicians have limited time and resources for troubleshooting new and untested computers. If it works on your TCP/IP network, then we can most likely make it work on *Atlantis*. Our Class C network IP address is 199.92.161.0. The domain name is atlantis.whoi.edu, netmask is 255.255.255.0, and the gateway is 199.92.161.3. "Linus" (199.92.161.2) is the mailhost.

Your computer must support TCP/IP networking on Ethernet. Macintosh, DOS, and Windows95 all require add-on products to support this. The Macintosh uses MacTCP, and DOS and Windows95 have a large number of commercial products available that provide this capability. Windows 98, NT, 2000 and XP plus OS/2 and virtually all versions of Unix support TCP/IP without any third-party additions.

You will need a "telnet" program to connect to the ship's mail server. NCSA Telnet is a freeware possibility for either Windows or Macintosh computers. Commercial products include packages from PC/TCP and PC/NFS for DOS, and Ethertalk for Macintosh. However, most third-party packages that provide TCP/IP capability include a telnet utility. Use of email is discussed in detail under "Communications" below.

If a computer is preconfigured on shore, the user must be prepared to change the IP address upon arrival in case there is a conflict with another machine that may already have that address.

c. Instruments on the ship's network

Most of the ship's navigation instruments and permanently installed underway data sensors are interfaced to the science data collection and logging system. This allows the available data to be broadcast over the ship's Ethernet as UDP data packets, making it available to applications running on any computer connected to the network. Details are available from the Marine Operations Coordinator or the marine technicians during the cruise. Note that RS232 connections are available in the laboratories for many data items including heading and position.

E. <u>Data Collection</u> -

1. Installed system(s)

The R/V *Atlantis* performs routine data collection on most cruises, in addition to whatever specific data collection is requested. Data handling for the ship's standard instrumentation is accomplished by the Athena data collection, logging, display and distribution system. The capabilities of this system are extensive and it can be expanded to incorporate sensors provided by the science party. All laboratories and many potential sensor locations have cabling installed to facilitate expansion of this type. Data is logged on the main server (Linus), and is available via the ship's network.

The data collected by the Athena system installed in Alvin is downloaded to the Linus server after each dive. All data is logged into subdirectories under the master data directory "/files/linus/data".

This data can be accessed from accounts on Linus, or can be exported to allow mounting on other computers; access is read-only. Each specific data source has its own subdirectory under the master such as:

/files/linus/data/athena
/files/linus/data/adcp
/files/linus/data/gravity

2. Instrument specific data files

The Athena underway data collection system has a one second cycle time and therefore data is logged at a maximum rate of one Hertz. This is not rapid enough for some applications. Additionally, certain instruments utilize "built-in" data logging capabilities making use of the Athena system unnecessary.

The SSSG technicians have general-purpose data collection and logging software that can be used for obtaining and logging data faster than the normal Athena rate. This software creates independent time-stamped log files and also can be configured to broadcast received data as UDP network messages, thus providing a simple means for other applications on the ship to access the data if desired. The code required runs under Windows and the technicians can provide it for use on science party computers if necessary.

Two choices are available for instruments that log their own data: the instruments can run independently of the ship's normal data collection systems or the instrument's log file destination can be configured to result in the files being maintained in dedicated directories on the Linus computer using a networked dive assignment. In both cases, accurate time and basic underway data (i.e., heading, speed, position) can be provided to the instrument's computer via the ship time servers, RS232 connections, and/or Ethernet UDP messages.

3. Real-time data availability and formats

The ship has an extensive instrumentation-cabling network that can be used to connect instruments and computers throughout the ship. Standard copper TSP, coax, and Ethernet 10/100 cabling is available. The SSSG technicians can configure this system to provide most available real-time data to investigator applications if desired. NMEA formatted heading and position information is routinely distributed in this manner as RS232 serial data.

The Athena underway data collection system can be configured to broadcast UDP time stamped ASCII data messages. The format generally consists of an identifying header that begins with a "#" character, followed by a "hh:mm:ss" time stamp and the data itself. NMEA formatted data is an exception - it is broadcast without modification and therefore it starts with a "$" and does not always contain a time stamp. Normally the data content of

these messages is exactly what has been received from the underway sensor but the SSSG technicians have a reasonable degree of configuration flexibility and should be consulted if there are special requirements.

4. Special requirements

The ship's data collection, logging, distribution and display system has been designed for flexibility. If the normal configuration is not sufficient to meet investigator needs, it may be possible for the ship's technicians to make helpful changes. Advanced discussions with the Marine Operations Coordinator are advised if special data handling techniques may be required.

5. Interfacing user-supplied sensors and subsystems

The SSSG technicians will assist in interfacing user-supplied instrumentation to be ship's data logging facilities. Generally, this is expected to involve connecting sensors to the ship's science cabling, providing ancillary data to investigator-provided computers via RS232 or network UDP data broadcasts, and modifying the Athena data collection system's configuration to incorporate new sensors or change the way existing sensors are handled. The technicians will assist in connecting user-supplied computers to the ship's network but members of the science party are expected to make the required changes to their computers unless unexpected problems develop. The process is easy and detailed instructions are available from the technicians.

Investigators requiring assistance with the installation of a substantial amount of specialized instrumentation must confer with the Marine Operations Coordinator well in advance of the cruise. It is unlikely that the ship's normally assigned technicians will have time available for effort of this type and therefore additional personnel may be necessary for the port stop. Also, mounting, cabling, and power requirements need to be considered well in advance to allow time for special preparations if needed. For many cruises, the costs associated with efforts of this type can be covered by the technical support daily rate if the need is known in advance of the daily rate determination. However, in most cases, the science party must assume the expenses associated with requirements that materialize late in the cruise planning process.

6. Procedures for determining needs

7. Post-cruise data products

All data files collected during the cruise (underway files and any other vessel-supplied data systems) are provided to the Chief Scientist at the end of the cruise. The deliverable is a set (one or more) of CD-ROMs (ISO9660) or DVD disks. These are readable on most computer systems.

8. Policies and restrictions

Underway Data Policy - Woods Hole Oceanographic Institution’s research vessels routinely collect bathymetry, sea surface temperature, conductivity and meteorological data which are valuable for real time weather prediction applications as well as operational

planning and evaluation. These data items are collected during all periods at sea utilizing permanently installed sensors maintained by the Shipboard Scientific Support Group. The resulting data sets, along with ship position, heading and speed information are considered "operational" and not proprietary to the science party. Data sets generated during a cruise at the request of the science party will normally include these data items but they may also be available in nearly real time to persons not associated with the cruise. The Chief Scientist for any cruise may request information on how these data items are likely to be distributed and request an exception to this policy if deemed appropriate.

Multibeam Sonar System - WHOI attempts to operate its multibeam sonar systems on all cruises with the following exceptions:

- When operating within the restricted waters (generally, 200 nautical miles) of another country. Given sufficient lead time (eight to twelve months), arrangements can be made through WHOI to secure foreign clearances in order to operate in restricted waters.
- If operation of the sonar interferes with other science operations. For example, when other sonar systems are in use, operating at similar frequencies.
- When operation of the sonar interferes with other duties of the Shipboard Scientific Services Group (SSSG) Technicians.
- During periods when no useful information can be obtained. For example, during periods of prolonged station-keeping.

When the sonar system is operational, multibeam swath data is collected for the WHOI Bathymetric Data Archive, unless previous arrangements have been made for acquiring the data. However, center beam depth data is regularly made available on-board the vessel as part of the overall ship data collection system.

In order to balance the needs of the operator, scientific investigators, funding agencies, and the overall scientific community, WHOI has developed the following policy with regard to multibeam data:

- Prior to a cruise, if the Chief Scientist demonstrates a need for multibeam data, the data collected will be proprietary to the Chief Scientist for a period not to exceed two years post-cruise. The demonstration of such a need is normally documented in the funded proposal and by a Chief Scientist's original cruise proposal. Because the level of scientific interest for multibeam data is one factor that WHOI uses when allocating resources for shipboard support, interested users are strongly encouraged to demonstrate their needs to the Marine Operations Coordinator at the earliest possible opportunity.
- At the end of a cruise, all data will be returned to WHOI and put into the WHOI archive. If a prior agreement has been made with the Chief Scientist, this data will not be distributed and will remain proprietary to the Chief Scientist for a period of two years. If no such arrangement has been made, the data will be proprietary to WHOI for a period not to exceed two years. WHOI may distribute this data to interested investigators during this two year period.

- After two years post-cruise, WHOI will submit all multibeam data to the National Geophysical Data Center (NGDC) for permanent archiving and public dissemination. Users wishing to access this data should contact NGDC.
- No multibeam bathymetric data will be acquired within the 200-mile limit of foreign countries unless required clearances have been received. Principal investigators should contact the WHOI Marine Operations Coordinator at least eight months in advance of a cruise to arrange clearances. WHOI will not request foreign country clearance for multibeam data collection without a specific requirement on the part of one of the cruise Principal Investigators.

IV. Pre-Cruise Planning and Services

A. Scientific Party Point(s) of Contact and Responsibility

Each cruise will have a single Chief Scientist although there may be multiple Principal Investigators. The Chief Scientist must be aboard during the cruise and will be the primary liaison between science personnel and the vessel operators with responsibility for the organization and execution of the scientific program. The Chief Scientist is responsible for the safety of science party during the cruise. The Master and Chief Scientist will jointly consider decisions affecting safety and the science program. In general, they will choose a course of action by mutual agreement. In those situations where they do not agree, the Master's decision will take precedence.

Each Chief Scientist has his or her approach to leading a research cruise, depending upon personal experience and individual philosophy. However, there are certain basics expected of every Chief Scientist. In planning for the cruise, the Chief Scientist should make sure that the science complement aboard is adequate to accomplish the program. At sea it is the responsibility of the Chief Scientist to see that the scientific program runs safely and smoothly. Past experience has shown that if the program is disorganized and inefficiently run, the morale of everyone aboard is undermined. The Chief Scientist should be informed of any difficulty, whether of a scientific or a personal nature. Ship time is expensive, and it is an important part of the job to see that the allotted time is used efficiently. This is particularly true on multi-project or multi-discipline cruises where problems can develop easily. In all cases of such dispute, the Chief Scientist serves as the arbiter.

1. Pre-cruise

After the ship schedule has been determined (usually in October for the following year), the WHOI Marine Operations Coordinator will initiate contact with the principal investigator. At this point the principal investigator is required to complete and submit a Cruise Planning Questionnaire. Operational requirements for a cruise will be determined, and based on information derived from the questionnaire, communications with investigators, and known or historical records for similar cruises, a Cruise Synopsis (see examples) is generated. The purpose of the synopsis is to provide a single, concise document identifying all equipment, operational, technical support and logistical requirements for the cruise,

accessible via the web to all persons affected by the cruise. The synopsis attempts to identify potential problem areas, special needs, unresolved issues, the personnel responsible for providing equipment and services, the costs of services and logistic and administrative deadlines. An early return of the Cruise Planning Questionnaire is strongly requested in order to expedite the planning process.

Pre-cruise meetings with the ship's crew, technicians and scientists may be arranged prior to sailing to familiarize those involved with sampling procedures and special handling considerations.

2. Post-cruise

Scientists are expected to vacate their quarters and the labs by noon of the day following arrival. Before leaving the ship, return all books to the library and deposit soiled linen in the space identified by the Steward. Clean all occupied spaces, including heads and laboratory areas. Cleaning supplies are available from the Steward.

Notify the Master and ship's agent if equipment is to be shipped from a foreign port.

The following reports (forms available from the Master) should be completed and mailed to the Associate Director for Marine Operations, WHOI, WITHIN 30 DAYS of the voyage conclusion:

a. UNOLS Research Vessel Cruise Assessment

b. Ship Utilization Cruise Report with track chart

NOTE: Particular emphasis is placed on this requirement when foreign clearance has been obtained. The Marine Operations Office will then prepare the requisite reports to be submitted to UNOLS, NSF, ONR, and the Oceanographer of the Navy. The Chief Scientist will be required to prepare a summary Report to the Department of State for those cruises involving foreign clearances within 30 days. (See Notice to Research Vessel Operators #66 for format.) A copy of the transmittal letter should be sent to the Vice President for Marine Operations

B. <u>Schedule issues</u>

1. Schedule definitions

2. Departure and arrival decisions

3. Point of contact

C. <u>Diplomatic clearances</u>

1. **Required information**

As a general rule, a vessel may pass through territorial waters freely but actual research operations and most data collection requires advanced permission. Details on the current claims of the various coastal nations, and their vigor in enforcing them, are available from the Marine Operations Coordinator. As a matter of precaution, any operations within 200 miles of any land mass should be discussed with him, and the implications and requirements should be investigated. We also recommend reading the UNOLS Foreign Clearance Manual prior to any foreign operations.

It is the responsibility of the Chief Scientist to inform the Marine Operations Coordinator well in advance and in detail of:

- any plans to work within the 200 mile limit, and
- any desired port call in a foreign country

using the Foreign Clearance Cruise Prospectus form provided. WHOI will initiate requests for clearance and port calls and will follow up on their status.

The ship's Master is forbidden to carry out research in legally recognized territorial waters and Exclusive Economic Zones unless prior permission has been obtained and there is documentary evidence to that effect. Changes to cruises while underway, which would involve work not previously planned in territorial waters, will not normally be approved.

2. **Timing**

Clearance requests must be handled through the U.S. Department of State and the Foreign Office of the country concerned and may require 7 to 8 months to accomplish. U.S. Department of State Notice to Research Vessel Operators #68, Rev. 4 states the Advance Notice Requirements for Foreign Research Clearance Requests.

3. **Foreign observers**

There is an increasing tendency for countries to attach conditions to clearances. Official observers or scientific participants normally will have to be carried on board ship or be involved in the processing of the scientific results. Additional port calls may be necessary to accommodate foreign observers. The host nation may require sharing of samples and data; at a minimum they require copies of technical reports and papers.

Transportation and subsistence costs for foreign participation may have to be provided. These costs are the responsibility of the Chief Scientist. He/she should provide for these costs in the scientific program budget and make allowances for integrating foreign participants into the cruise. Additional costs associated with foreign ports, such as fees and expenses for embarking and debarking the scientific party, are the responsibility of the Chief Scientist.

4. **Post-cruise responsibilities**

As conditions for permitting work in their waters, foreign countries will require reports that need to be submitted to the host country through the U.S. Department of State. It is the responsibility of the Chief Scientist to prepare and submit the reports directly to the

Department of State, with copies to the Vice President for Marine Operations at WHOI. The Chief Scientist is responsible for meeting all post-cruise obligations as specified in the clearance approval document sent prior to the cruise. The host nations may also require sharing of samples and data. U.S. Department of State Notice to Research Vessel Operators #66 defines the Post- Cruise Obligations.

5. Failure to comply

It is most important that the terms of whatever conditions are imposed are clearly understood by both parties, and that the Chief Scientist be fully prepared to carry out the agreement. Failure to do so will make it much more difficult for other researchers to gain access to coastal waters and could result in the defaulting scientist not being granted ship time in the future. The Marine Operations Coordinator will inform scientists regarding information that is required in each instance.

D. <u>Shipping and Logistical Information</u>

1. Facility Shipping Information

2. Cruise Shipping Information

If you need to ship something to a foreign port, it may be done through the Institution's Distribution Department whose personnel will make all preparations and final arrangements for the shipment. Consult them well in advance. Shipping time for your cargo to reach its destination could be a few days or several weeks.

It is always better to load chemicals and gases aboard before the ship leaves U.S. waters. Planning that far in advance is worth the effort and may affect the success of your project.

If you are planning to ship scientific gear from the vessel while in a foreign port back to the United States, please provide all shipping documentation and pertinent information to the Master well in advance of the ship's arrival in port. The Marine Technicians will help with the necessary paperwork and arrangements.

Shipping equipment from Woods Hole following a cruise may be accomplished in one of two ways. National freight carriers may be contracted to pick up equipment at the Iselin Marine Facility, and investigators (or a designated representative) will be required to consign the equipment to the carrier in person. Scientists may also utilize the WHOI Shipping Department for outbound cargo, but all shipments must have appropriate documentation to be accepted. This normally includes 1) an International Shipment Summary for Scientific Equipment, listing all items, country of origin and value, and 2) a Security Certification (see example below). ***Items for shipment, accompanied by the requisite documents, must be consigned to a WHOI Shipping Department representative in person***. Equipment simply left on the pier by departing investigators **will not be shipped**.

Shipments to foreign ports are the responsibility of the investigator. Shipments should be made in a timely manner to avoid delays common in handling scientific equipment. All shipments of scientific equipment should be addressed to:

Master, R/V (name)
c/o Name of Agent
Address of Agent

Please identify the intended cruise (Chief Scientist), material's owner and institutional affiliation on each package.

Agent information is available on the WHOI web site. If in doubt, contact the Marine Operations Coordinator.

Shipments should contain a statement to the effect they are to be used on the high seas aboard the vessel and that they are not for import.

Sample Shipment Security Certification
(on company letterhead)

Dear Sirs:

I certify that this shipment does not contain any unauthorized explosives, destructive devices or hazardous materials. I consent to a search of this shipment. I am aware that this endorsement and original signature will be retained on file until the shipment, along with other shipping documents, is delivered.

The equipment and materials contained in this shipment are to be used on the high seas aboard a research vessel and that they are not for import.

Shipper's Signature:_____
Date:_____
Type of first personal identification reviewed:_____
Matching photo on ID? Yes/No
Number appearing on ID:_____
Type of second personal identification reviewed:_____
Matching photo on ID? Yes/No
Number appearing on ID:_____

3. Prior notification of incoming shipments

Always identify an individual at Woods Hole (such as the Dockmaster) to be responsible for shipments upon delivery. That individual should be informed when the shipment is to arrive so that arrangements can be made for handling and storage.

4. Shipment marking requirements

Scientific equipment shipped to Woods Hole for loading on board vessels should be well labeled to indicate ownership, the vessel upon which it is to be loaded and the cruise Chief Scientist, a Principal Investigator or some other cruise designation. As an added precaution, the cruise departure date can also be helpful.

5. Confirmation of arrival

Make arrangements with the selected point of contact for deliveries to obtain notification when a shipment has arrived in Woods Hole. Do not count on the addressee to determine when a shipping problem has occurred.

6. Hazardous Materials

7. Isotope regulations

8. Agents' Information

a. Arrangements

A "Ship's Agent" is hired by WHOI to act on behalf of the Master of the vessel in foreign ports and some U.S. ports. The agent provides logistical support for the vessel and acts as a liaison with local officials. All requests for assistance from the agent should be directed through the ship's Master. Chief Scientists may consult the list of current authorized WHOI agents for pertinent shipping addresses and contact information.

Shipments from the vessel in a foreign port should be arranged by the agent through the Master. Experience has shown that this is the most efficient manner in which to operate.

b. Costs

Shipping charges paid by WHOI are chargeable to the principal investigator with a 15% WHOI overhead assessment. It may be possible to avoid this overhead by making arrangements for direct billing by the agent but this must be done by communications between the PI and the agent. The Master should be informed of any such agreement.

Ship agents make their living by charging for services rendered. When a member of the science party asks the agent to provide assistance of any sort, there is almost always an associated cost, which will be identifiable in the agent's bill. These costs will be assigned to the science party unless special arrangements are made in advance through the Marine Operations Coordinator.

c. Other issues

9. Pre-cruise storage of scientists' equipment

a. Available storage area at the facility

Arrangements for storing equipment in Woods Hole prior to ship loading must be made in advance with the Marine Operations Coordinator. Special requirements must be carefully defined and it is helpful if these are clearly indicated on the shipping containers themselves.

WHOI has a facility on the dock that can be used for pre-cruise equipment staging and testing. Once again, prior arrangements must be made with the Marine Operations Coordinator.

b. Arrangements for storage in other ports

Usually scientific equipment is held in bond at the point of entry and delivered to the vessel on its arrival by the agent. It is advisable to notify the agent of shipping information and to request assistance in expediting delivery to the vessel. The Master should also be notified of any special handling requirements. This may be done through the Marine Operations Coordinator. In general, WHOI personnel will take responsibility for loading equipment and materials aboard the ship after its arrival at the dock provided the Master is aware and concurs with the scheduling. Setup or storage of science equipment aboard the vessel is the responsibility of the science party. The marine technicians and some crewmembers are usually available to provide assistance.

c. Procedure for determining storage needs

d. Costs

Costs associated with pre- and post-cruise equipment storage as well as delivery to the dock are the responsibility of the science party.

10. Deliveries to the vessel

Under normal circumstances the ship will be available to receive science equipment on the morning of the second full day in port. This is the day following departure of the previous science party. This does not apply for extended port periods in which case, if possible, deliveries should be planned for the last two full days in port prior to sailing. If the weight or size of the material to be loaded is such that extensive assistance from the crew will be required, scheduling with the Master is necessary. Note that the ship's crew rather than the marine technicians operate the deck cranes. Special circumstances will undoubtedly require special considerations and should be discussed with the Marine Operations Coordinator.

11. Other shore services available

Scientific investigators staging cruises in Woods Hole may use one of the most complete shop facilities available for oceanographic equipment fabrication in the United States. As part of our Marine Facility, we offer carpentry, mechanical, electrical, welding and machine shop services at dockside. Hangar bays may be used for indoor staging of large instruments; 5- and 25-ton bridge cranes facilitate heavy lifting. Outdoor vehicles on the premises include hydraulic cranes, forklifts and flatbed trucks. Our wire-winding machine

may be used for winch support, and we have sufficient dock space for loading and unloading containerized shipments. Assistance is available through our Distribution Department for local, domestic and international consignments.

There are no charges associated with the normal and expected cruise related use of these facilities however, the costs for extensive use must be charged to the science party. As an example, repair welding of a instrument mounting bracket would not incur a charge, but construction of the bracket by the machine shop would.

E. Marine Mammals and Acoustic Permitting

The vessel Marine Superintendent should be consulted regarding Seismic or other work requiring permits. UNOLS has compiled a list of web links that will hopefully aid PI's, schedulers and ship operators in determining what permits/permissions are needed and how to apply, <http://www.unols.org/ssc/permits/permits.html>

V. Cruise Planning Details -

A. Laboratory Spaces

1. **Location of utilities (power, water, air, etc.)**
2. **Bench arrangements**
3. **Equipment tie downs**
4. **Cold Storage (Refrigerators, Freezers)**

B. Deck Spaces

1. **Location of utilities**

2. **Van/container locations and weight limitations**
   http://www.whoi.edu/marops/research_vessels/atlantis/at_alldks.pdf

3. **Working areas (A-frames, cranes, winches)**
   http://www.whoi.edu/marops/research_vessels/atlantis/at_alldks.pdf

4. **Tie downs**

C. Determining Personnel Requirements

1. **Operation of shared-use equipment**

D. Berthing Spaces and Assignments

http://www.whoi.edu/marops/research_vessels/atlantis/at_sciberth.pdf

E. Ancillary Projects

Ship time is expensive, and it is important to use the allotted time efficiently. This is particularly true on multi-project or multi-discipline cruises where problems can develop easily. In all cases of dispute, the Chief Scientist serves as the arbiter. Where multi-leg cruises are involved, the

assignment of laboratory and deck spaces must be coordinated with the chief Scientists of future legs. In general, all projects scheduled to be on board during an extended voyage have a right to a portion of the scientific spaces, provided the requirements of other legs do not inhibit the performance of earlier scheduled programs. Laboratories are set up for current programs and storage space is assigned to later programs.

F. Access/use of small boats from ship

G. SCUBA diving from the ship

H. Access to transducer well, mast, etc.

VI. Cruise Loading and Setup

A. Vessel Availability

B. Loading

All gear and equipment to be loaded aboard, especially chemicals and hazmat, must be in compliance with the International Safety Management (ISM) Code. Contact the Marine Operations coordinator for details. Chief Scientists should contact the Marine Operations Coordinator to facilitate loading and lab setup for their cruises.

1. Moving gear from storage to dock

a. Responsibilities of shipboard techs, scientists, crew, facility personnel

The Institution's shore-based facilities and personnel and the ship's crew will assist in the preparation of the vessel for the cruise as necessary. A staging area for preparation of scientific equipment before loading can be provided near the dock area. Arrangements for use of these services should be made through the Marine Operations Coordinator.

b. Liaison with shore service providers (cranes, trucks, forklift)

When shore services are required to move gear from storage areas to the dock, the equipment owner assumes responsibility for making the required arrangements. This can be done through the Marine Operations Coordinator.

c. Costs

2. Moving gear from dock to deck

a. Responsibilities of shipboard techs, scientists, crew, facility personnel

Most equipment loading is done with the ship's main crane, operated by crew members only. Crew members and technicians are available to assist with rigging and landing loads, but scientific personnel should be prepared to assist with this task, as special

handling may be required. Loads placed on the dock for loading without instructions may not be loaded.

b. Liaison with shore service providers

When shore services are required to move gear from storage areas to the dock, the equipment owner assumes responsibility for making the required arrangements. This can be done through the Marine Operations Coordinator.

c. Costs

3. Moving gear from deck to labs - responsibilities of shipboard techs, scientists, crew, facility personnel

Ship's crew and technicians will assist with ferrying loads from the deck to lab spaces. Scientists should be on hand to assist, and to direct placement of boxes in the labs.

4. Loading equipment availability and requirements for use

C. Lab and Deck Setup

1. Laboratory configuration

With sufficient notice, lab layouts can be reconfigured for varying needs. Generally, minor reconfigurations can be accommodated on short notice. Major reconfiguration will require more notice, particularly if the ship is working out of foreign ports. On multi-leg deployments, some lab furniture may need to be stored onboard for later use.

2. Location of utilities, wireways, stuffing tubes, etc.

Maps of utility locations are available on the WHOI Marine Operations website. Projects anticipating mounting a large number of antennas or external sensor packages should consult with the Marine Operations Coordinator well in advance to discuss placement, cable runs, power requirements, etc.

3. Tie down/securing supplies

Some amount of tiedown supplies (screw eyes, unistrut nuts, eye bolts, line) is available onboard. However, it is always best to bring what you will need.

4. Interfacing science-provided equipment

5. Operation of shared-use equipment

In general, operation of onboard shared-use equipment is the responsibility of the scientific party. The Marine Technicians assigned to the cruise will provide training for those involved in each operation, and is always available to assist with problems.

The ship technicians are not members of the science party and cannot be utilized in that manner. Time at sea is spent servicing and assisting in the operation of supplied instrumentation and equipment, including science party training in its safe and effective use as

necessary. The Marine Technician is generally not available for routine scientific watchstanding; the Chief Scientists should plan to bring enough people to perform the work intended.

6. Vans and containers

All portable vans must meet certain criteria to be acceptable for use aboard UNOLS vessels. The UNOLS checklist can be found at:

http://www.gso.uri.edu/unols/saf_stand/contents.htm - _Toc38352677

Consult with the Marine Superintendent or ship cruise manual for weight limitations.

D. Lab/Deck Safety Requirements

1. General requirements

2. Hazmat

Hazardous Materials - see also UNOLS Safety Manual, Section 9, http://www.gso.uri.edu/unols/saf_stand/contents.htm#_Toc38352667.

Pre-Cruise - Chief Scientist will provide to WHOI:

A list of materials by chemical name, common name, type and classification using the Hazardous Material Inventory form.

A listing of the neutralizing agents, buffers and/or absorbents required for the materials in the event of a spill.

Upon Boarding - Chief Scientist will provide to Master:

An inventory of all hazardous materials brought aboard by science party.

MSDS for all hazardous material.

Upon Departure - Scientific Party will provide to Master:

An inventory of hazardous material showing all that has been depleted, removed ashore, or properly stored aboard for later removal.

Chemical Spill Response

The scientific party will be responsible for supplying neutralizing agents, buffers and/or absorbents in the amounts adequate to address spills of a size equal to the amount of any chemicals brought aboard. This spill response material must accompany the chemicals when they come aboard.

3. Isotopes

VII. Activities At Sea

A. Chief Scientist - General Responsibilities (as it relates to science operations)

B. Scientific Party - General Responsibilities (as it relates to science operations)

C. Shipboard technician(s) - Hours, Duties and responsibilities

Personnel affiliated with the Operational Scientific Services (OSS) group of the Woods Hole Oceanographic Institution provide technical scientific and operational services to all Institution ship users. These services include maintaining and facilitating the operation of shared-use research equipment provided in support of cruise specific scientific programs.

The Shipboard Scientific Services Group (SSSG) branch of OSS provides the seagoing scientific technical support. This group consists of the sea-going marine technicians and technical support personnel directly responsible for ensuring maximum utilization of ship capabilities in response to cruise requirements. They maintain, repair, and assist in the operation of the available general use research equipment including computer systems, ship installed sensors, portable vans, freezers, refrigerators, fume hoods, water sampling systems, corers and over-the-side instrumentation handling devices. They provide assistance with shipping and receiving of science equipment including the preparation of required manifest and customs documents. They are also responsible for the ship electronic mail system including hardware, software and bookkeeping issues. Deck operations aboard WHOI ships are the responsibility of the Chief Mate and under the direct supervision of the Boatswain; the ship's technicians provide the science party interface and assist the Boatswain and crew members as needed.

Atlantis normally carries two SSSG Marine Technicians and therefore minimal technical support can be available nearly 24 hours per day. Additional technicians are occasionally supplied for cruises for which special expertise is required or cruises for which the planned workload exceeds a reasonable level for the normally supplied personnel. Early in each cruise the technicians and Chief Scientist discuss and decide how the technician's working hours can be arranged to provide the most effective level of support.

The ship technicians are not members of the science party and cannot be utilized in that manner. Time at sea is spent servicing and assisting in the operation of supplied instrumentation and equipment, including science party training in its safe and effective use as necessary. In general, the purpose of the onboard technicians is to assist the scientific party rather than to undertake research operations directly; the technicians are not available for watchstanding duties except under unusual circumstances. The normal expected workload associated with calibration, maintenance and repair of ship-supplied equipment plus the necessity to be continuously available for unscheduled technical assistance precludes routine watchstanding. However, the assigned technicians will augment the available science personnel in any way possible in helping to overcome unexpected problems, including repair and testing of science-supplied equipment if necessary.

SSSG services are charged to users through a daily rate for each ship, which consists of the costs for ship-specific effort plus a pro-rated amount of the shared equipment maintenance and coordination effort, all based on total technician operating days. This rate includes the costs associated with reasonable use of WHOI owned shared-use equipment; for most science cruises there are no additional charges.

D. Ship's crew responsibilities

All winches and ship cranes are operated by crew members during equipment deployment and recovery operations. Crew members are available to assist with additional over-the-side operations as their other duties allow. The ship's crew is not responsible for operation of user-supplied handling equipment unless arrangements are made in advance.

E. Ancillary projects

An ancillary project is one accommodated by the Chief Scientist, but not central to the mission of the cruise. Ancillary or Piggyback projects are considered of lowest priority for support by the ship and Marine Technician(s). As such, requests for assistance or equipment will be accommodated after all other needs for the cruise have been met. Scientists participating in an ancillary status should make all requests for assistance or equipment through the Chief Scientist or principal scientific point of contact. It is incumbent on the Chief Scientist to maintain control and responsibility for ancillary project work schedules.

F. Science Operations (general descriptions for over-the-side ops)

1. Personnel responsibilities/qualifications/level of support

2. Procedure for requesting additional assistance from crew or technicians

In the event that the Chief Scientist determines that the work planned for the cruise exceeds what the science party can be expected to accomplish, the Chief Scientist may request additional technical assistance from the Shipboard Scientific Services Group. If needs are known far enough in advance, the Marine Technicians Program may request supplemental funding for additional technical assistance from the appropriate funding agency. Requests for additional assistance closer to the cruise date may be accommodated, but at a cost to the research project. If the need for addition technical support is anticipated, a request to the Marine Operations Coordinator should be made as soon as possible.

G. Data Availability and Distribution

H. Communications

1. Email information and costs

Scientists joining the ship are provided with an account name and password allowing general use of the ship's ethernet system and associated services, including electronic mail. Email transmissions are made via INMARSAT and some of the associated costs are billed directly to the users. Woods Hole must be provided with information on how billing is to be handled. The onboard SSSG Technician can take credit card information directly upon

your arrival on the ship, or you can contact Larry Flick, lflick@whoi.edu or (508) 289-2450 to make prior arrangements. Accounts will not be activated by the onboard technician until a method of payment is arranged. Email for inactive accounts is NOT transferred to or from the ship.

Account names are of the form "first initial last name@atlantis.whoi.edu". So, the shipboard address for Gomer Pyle would be: gpyle@atlantis.whoi.edu.

The ship email system maintains a log of the number and length of each message sent or received by each user. The number of bytes transmitted and/or received forms the basis for apportioning costs. Experience to date indicates that INMARSAT email runs approximately $.10 per kilobyte, but this may vary with available INMARSAT equipment and the operational area. The technician and ship's Communications Officer will attempt to ensure that individuals are informed when their usage appears abnormally high and may result in an unexpectedly high bill. In addition, simple software running on the mail server allows the user to check their bill at any time (mailbill, msgbill)

2. File transfer information and costs

Once an email account is activated, there is a size limitation of 10 kbytes per message. Any message less than 1 kbyte in length will always be sent, even if the user's account has not been activated. If the size limitation is a problem, the onboard technician can adjust this figure. No prior arrangements are needed.

3. Voice/fax information and costs

The vessel may be reached by direct dial telephone via the INMARSAT system. You must know where the vessel is in order to choose the appropriate number, although there is some overlap in satellite coverage.

Dialing Prefix & Area Codes:

Vessel In	Dial this prefix followed by a number from the list below
Atlantic Ocean Region East (AOR-E)	011-871-
Pacific Ocean Region (POR)	011-872-
Indian Ocean Region (IOR)	011-873-
Atlantic Ocean Region West (AOR-W)	011-874-

Shore to Ship Telephone Numbers

Saturn B1 Voice 1	336 724 120	(Science, Computer Lab)
Saturn B2 Voice 1	336 724 110	(Science, Computer Lab)

Saturn B1 Voice 2	336 724 121	(Ship business, Bridge)
Saturn B2 Voice 2	36 724 111	(Ship business, Bridge)

Shore to Ship Fax

Saturn B1 Fax 1	336 724 123	(Ship business)
Saturn B2 Fax 1	336 724 113	(Ship business)
Saturn B1 Fax 2	336 724 124	(Science, Computer Lab)
Saturn B2 Fax 2	336 724 114	(Science, Computer Lab)
Saturn B1 Fax 3	336 724 125	Alvin Operations)
Saturn B2 Fax 3	336 724 115	(Alvin Operations)

A few points related to the INMARSAT communication system:

The ship "monitors" the voice channel continuously. Persons ashore dial the ship as an international telephone call.
Fax messages make use of a voice channel. Both incoming and outgoing faxes are handled in the familiar manner used ashore.

4. Billing/payment procedures

All outgoing traffic is logged for record and billing purposes. All business traffic will be charged to the scientist's project. All personal traffic must be charged on a credit card or be made collect. Incoming traffic is paid by the originator. The ship's station will not accept collect or reverse charge calls.

Caution: communication via satellite can be expensive involving satellite use as well as land line charges. Telephone and fax rates can exceed several dollars per minute. These rates apply to messages originating ashore as well as aboard ship.

I. Safety Considerations

1. ISM regulations

2. Responsibilities of techs, crew, scientists

All scientists are urged to read the UNOLS-RVOC safety manual <http://www.gso.uri.edu/unols/safe_man.html> provided onboard every UNOLS vessel. Safety is our #1 priority, and takes precedence over scientific work. While we strive to maintain a safe environment, it is ultimately up to the individual to watch out for his/her own safety. Unsafe conditions should be brought to the attention of the Marine Tech or a crewmember immediately.

3. Safety equipment (ship and user provided gear)

4. Science party training and drills

5. Over-the-side operations

a. Facility-provided equipment

b. **User-provided equipment**

6. **Laboratory operations**
7. **Operations in lab/isotope vans**
8. **Safety, Hazmat and Radiation Safety Briefings**

J. Access/use of small boats from ship

K. SCUBA diving from the ship

VIII. Post-cruise activities

A. Data products and custody

1. **Deliverables**
2. **Archives**

B. Breakdown and offloading

1. **Ship availability**
2. **Lab and Stateroom cleanup**

C. Movement of equipment from deck to dock

D. Movement of equipment from dock to storage

E. Shipment of equipment

F. Storage of equipment or samples on board the vessel

G. Hazmat/radwaste procedures

H. Post-cruise reporting

If research operations were conducted in territorial waters, the Chief scientist is required to fulfill all post cruise obligations as required by the Department of State, Notice to Research Vessel Operators No. 66: <http://www.state.gov/www/global/oes/oceans/ntrvo66.html>.

The Chief Scientist is responsible for providing any research data to the National Oceanographic Data Center http://www.nodc.noaa.gov/ is also the responsibility of the Chief Scientist.

The Chief scientist, shipmaster, and marine technician are each responsible for completing a post cruise assessment report (form located on the UNOLS website: <http://www.gso.uri.edu/unols/pcarform.htm>.

The Marine Superintendent is responsible for submitting a Ship Utilization Data Cruise Report http://www.gso.uri.edu/unols/cruise_report/cruise_report.htm to the UNOLS Office.