Section 1: Welcome Aboard

In order to make your stay aboard more enjoyable and productive scientifically, you are requested to observe the following guidelines:

1. The Coast Guard requires that Fire and Abandon Ship drills be conducted every week at sea. During these drills and in the event of an actual emergency you are to wear your life jacket, hard-soled shoes, long-sleeved shirt, long pants, and some form of head covering. This is for your protection. Your muster and duty stations are found on the station card attached to your bunk. Drills are taken seriously. Listen carefully to the deck officers' instructions.

2. Safety is of the utmost importance. Please wear a work vest, hard hat, and work suit as appropriate when working on deck with gear over the side. Wear adequate foot protection on deck. The deck officer will point out any unsafe practices, but don't hesitate to act if you see an unsafe condition. Do not go out on deck at night alone, or in bad weather, without first notifying the bridge. Request permission from the bridge before turning on deck lights.

3. The possession of drugs or alcohol is strictly forbidden by University regulations.

4. Conserve fresh water at all times; we do not have a limitless supply. Do a full load of laundry rather than a partial one. Take short showers.

5. Meals are cafeteria style. Watch standers have priority in line. Bus your dishes and silverware to the scullery. Cups and glasses are numbered and correspond to your bunk number. There will usually be more than one sitting to feed all aboard; please vacate the mess hall once you have finished to make room for others. Meal times and other information are posted. Shirt and shoes are required at meals.

6. Clean linens are available in the laundry room on the 2nd platform.

7. If you wish to visit the bridge or engine room, please request permission from the watch officer. These are busy places, so you may be asked to come back another time, depending on the current operation.

If you have any questions, please don't hesitate to ask. We are here solely for the purpose of accomplishing the scientific mission. This requires the cooperation of all personnel aboard.

Thank you.

T.J. Desjardins
Captain, R/V *Roger Revelle*

History of R/V *Roger Revelle*

R/V *Roger Revelle* (AGOR 24) is the second of three new-generation AGOR oceanographic ships built by the U.S. Navy for operation by American oceanographic institutions. The first vessel, R/V *Thomas Thompson* (AGOR 23) was delivered to the University of Washington in 1991. Institutions wishing to operate AGOR 24 or 25 submitted competitive proposals to the Office of Naval Research in early 1991. These proposals were rated on the basis of scientific merit, ship operating expertise, institutional cost sharing, and other measures of merit. The Scripps Institution of Oceanography of UCSD, in collaboration with the Marine Science Institute at UCSB and the Institute of Marine Sciences at UCSC, won this competition, with SIO as the designated operating institution. The announcement of the award was made by the Navy on the very day (July 19, 1991) of the SIO memorial service for Roger Revelle, at which event SIO stated its desire to have the vessel named for him. That request was subsequently approved by the Secretary of the Navy. The third vessel (*Atlantis,* AGOR 25) was awarded to the Woods Hole Oceanographic Institution in the same competition. R/V *Roger Revelle* began construction at Halter Marine, Inc. in Moss Point, Mississippi, in early 1993, was launched in April of 1995, and sailed on her maiden voyage from Mississippi to San Diego in July, 1996.

Roger R. D. Revelle (1909-1991) was one of the twentieth century's most eminent statesmen of science. He was a distinguished university researcher and professor, the officer in charge of the oceanographic section of the Bureau of Ships

(now Naval Sea Systems Command), a creator of the Office of Naval Research and head of its Geophysics Section, director of the Scripps Institution of Oceanography, founder of the University of California at San Diego, a leader of international science organizations and research programs, a high-level advisor to governments, initiator and director of the Center for Population Studies at Harvard, and one of the first persons to recognize, study, and interpret to the public the issues of carbon dioxide emissions, the greenhouse effect, and global warming. His major awards and prizes were numerous. One of them, his Agassiz Medal from the National Academy of Sciences, is displayed in the ship's conference room, along with his naval officer's dress sword. Both are gifts to the ship from Mrs. Rollin P. Eckis, Roger Revelle's wife from 1931 until his death, and the christening sponsor of the ship.

Roger Revelle made landmark scientific contributions to subjects ranging from seafloor heat flow to the capacity of the ocean to absorb atmospheric carbon dioxide. In the words of a colleague, he recognized "no seams" or arbitrary disciplinary boundaries in his thinking. He had an extraordinary breadth of imagination and inquiry, coupled with a deep conviction that science at its best was science in the service of humankind.

Of seagoing research and his years at Scripps he once said, "What I did was to send the institution out to sea, to make it a worldwide institution instead of just a local California institution. The farthest we ever went before the war was the Gulf of California… By the time I left we had a Navy that ranked with that of Costa Rica and had sailed literally millions of miles everywhere in the world." R/V *Roger Revelle* continues this legacy of voyaging to observe our watery planet, so that people may comprehend how it works and how best to live in harmony with it.

Preface

INTRODUCTION - The purpose of this handbook is to acquaint personnel with the characteristics and capabilities of R/V *Roger Revelle*. It provides a good review of what can and cannot be done on the ship, and lists sources of more detailed information. It directs your attention to a number of important safety matters. We hope that by reading it well in advance of your cruise, you will spot problems in time to seek out satisfactory solutions, see how to prepare more smoothly and efficiently, and perhaps discover new or better ways to accomplish a certain task.

REVISIONS - The handbook is subject to ongoing revisions. We want it to represent the best information available from the experience of personnel at sea, and so we welcome comments or corrections, suggestions for better arrangement of material, additions, etc. Please send any such input directly to the Ship Scheduling Office.

A CAUTIONARY NOTE ON ACCURACY - While reasonable efforts are made to update the handbook as needed and to issue new versions in the wake of significant changes on the ship, it is impossible to assure complete accuracy at all times. In all cases, make your particular research equipment needs known on the Ship Time Request Form and contact relevant technical support groups to ensure that critical gear is ready for your work.

OTHER SOURCES OF INFORMATION - Please refer to the Scripps Cruise Planning Portal for more information. In addition, please review the UNOLS *RVOC Safety Training Manual, Research Party Supplement*:
http://www.unols.org/document/rvoc-safety-training-manual-chapter-1-research-party-supplement

and the UNOLS *Research Vessel Safety Standards:*
http://www.unols.org/document/research-vessel-safety-standards-rvss-2009

Schedules, ship layouts and other ship related information are available via the SOMTS web pages.

Most scientific cruises will wish to make use of the technical support, equipment, or advice of one or more of the technician groups at SIO. In all cases, a timely and clear explanation of your needs is to your advantage. The principal groups are listed in the next section. Most of these groups perform recharge activities.

Section 2: Specifications

NAVIGATION CAPABILITIES: Furuno GP-150 x 2, DGPS as primary navigation and inputs to dynamic positioning, Furuno Doppler speed log. Furuno 3 and 10 cm radars, Kongsberg dynamic positioning system, Ashtech ADU GPS attitude-sensing system, Simrad Taiyo ADF, Nautronix RS916 combined short- and long-baseline acoustic positioning system, and 2 Sperry gyros.

WINCHES: Markey DUTW-9-11 traction-drum winch with dual storage drums. Normally 15,000 m of 9/16" 3 x 19 trawl wire is on one storage drum and 10,000 m of 0.680" electromechanical cable on the other. Wires over the side lead to A-frame or main deck crane. Capable of fiber optic cable through A-frame.

(One) Markey DESH 5 hydrographic winch, one with 10,000 m of 1/4" 3 x 19 hydrographic wire, one with OR 10,000 m of 0.322" three-conductor electromechanical CTD cable on Lebus grooving. Wire drums are interchangeable; one is stowed while the other is in use. Wires lead over starboard side via retractable hydroboom.

CAST-6/Allied Crane CTD Handling System with 10,000 m of 0.322” three-conductor electromechanical CTD cable on Lebus grooving. Wire leads over starboard side via Allied crane articulating boom.

Assorted portable winch and wire combinations available for cruise-specific requirements.

SUPPORT EQUIPMENT: Main cranes (North American) on starboard quarter, main deck, and on port side, 02 level. Smaller Morgan (HIAB), Marine cranes (2) normally carried on foredeck and fantail. Other locations possible to suit mission. Fritz-Culver A-frame at stern, retractable hydroboom on starboard side forward of staging bay door. DMG 1200 Extension crane on starboard 01 level aft of rescue boat davit.

Extensive (~3,000) bolt-down fittings for securing removable equipment on all decks and inside laboratories (2' X 2' pattern). 1” sockets outside, 1/2” sockets inside.

Uncontaminated seawater supply to all labs.

Through-hull instrument well in staging bay, nominal 24" diam. tube.

Two installed Price A300 compressors provide 1850 psi air for seismic work.

PERMANENT AND REMOVABLE SCIENTIFIC EQUIPMENT: 12 kHz Kongsberg EM122 multibeam echosounder that can record depths up to 12,000 meters; providing bathymetry, and sidescan imagery. Knudsen Engineering 3260 and 320B 3.5/12 kHz singlebeam echosounder sub-bottom profiler. Turo Quoll XBT system used with Sippican Fast Deep XBTs. Currents are measured by RDI 75 and 150 kHz broadband/narrowband ADCP, and 50 and 140 kHz HDSS (High resolution Doppler Sonar System). A comprehensive MET system has several sensors on the forward and main masts for meteorological data, and sensors in the bow thruster room and hydro lab for underway seawater data. (See more in the COMPUTER SYSTEMS section.)

Wired and wireless ethernet as well as a point-to-point serial network (SIS - Science Information System) exists. Ethernet and serial feeds are available in the science laboratory spaces.

For computer capabilities, see COMPUTER SYSTEMS.

The ship has a fine-adjust temperature-controlled laboratory to facilitate chemical analyses, also freezer and temperature-controlled walk-in chambers for sample storage/preparation.

Use of isotopes is prohibited in ship's laboratories. Isotope isolation vans are available by request.

An extensive inventory of instrumentation and technical services is available, e.g., dredges, coring equipment, plankton nets, trawls, CTD/rosette systems, MOCNESS systems, single and multichannel seismic systems, submersible strobes and transmitters, etc. A user fee to recover expenses for operating supplies, calibration, maintenance and repair is typically charged for each of these.

VANS: Numerous vans can be carried, on main deck (with access to hydro lab), 01 level port side, forward on 02 deck (for

storage).

COMMUNICATIONS: HiSeasNet C-band satellite system, FleetBroadBand back-up system, VHF, HF radio, SSB voice, teletype, GMDSS. Please see our contacts web page for current phone numbers.

HiSeasnet and FleetBroadBand systems provide limited bandwidth Internet to the ship. Everyone has Internet access, but is limited by a quota system. There are also public terminals for both science party members and crew members to access the Internet. Some websites and high bandwidth functionality is disabled to maximize the usefulness of the connection. Limited VoIP is available on the ship's office phone (dependent on availability of HiSeasNet bandwidth). FleetBroadBand also provides a satellite phone service, though a calling card must be purchased before the cruise.

Section 3: Vessel Layout Description

VESSEL LAYOUT DESCRIPTION
This section is intended as an abbreviated tour of important spaces and equipment, in conjunction with ship arrangement diagrams. Most spaces and equipment of interest to scientists have fuller descriptions in Sections IV - VI.

04 Deck (Bridge)

BRIDGE OR PILOTHOUSE - This is the nerve center of a ship. From this area, the ship is navigated, conned, maneuvered, and otherwise operated in such a manner as to accomplish the goals of the cruise safely and effectively. Additionally, operational aspects of the engineering department and the scientific party are monitored by the bridge watch officer. The watch officer maintains a log which records the date, time, and position of all scientific events. A copy of this log is given to chief scientists and others who request it at the end of the cruise. Visitors to the bridge are generally welcome. There will be times, though, such as when entering or leaving a harbor, when visitors are not permitted; check with the officer of the watch. Equipment, controls, and instruments on the bridge are operated only by the crew. Communication with the bridge is by ship's interior-dial sound-power telephone systems and airphone intercom.

CHART/RADIO ROOM - The chart room is located aft of the pilot house. The progress of the ship is plotted on charts in this room. It is also where the ship's inventory of charts and navigational publications are stowed and maintained. Some important texts on navigation, seamanship, meteorology, and nautical information in general are stowed here. Check with the mate on watch before borrowing any of these items. (See also LABORATORY SPACES in Section 4.)

Communications equipment is located in the chart room; the mate on watch will operate it and/or assist you to do so. R/V *Roger Revelle* is capable of voice, data, and fax communications through various modes. Persons wishing to use the Inmarsat system must be aware that this is a commercial system and that they are responsible for charges incurred.

AFT CONTROL STATION - A secondary control station with winch controls and ship maneuvering controls is located aft on this level. The usual site for ship control is in the pilot house, and the usual sites for control of the winches are on the 03 level for the hydrographic and CTD winches, and above the fantail for the trawl winch.

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03 Deck

CHIEF SCIENTIST'S STATEROOM - The chief scientist's room has one bunk plus ample bookshelf, file, and desk space to serve as an office. The room has computer network connections and a shipboard telephone.

CAPTAIN'S STATEROOM - Adjacent to the chief scientist's room is the captain's room, which also serves as the captain's office.

SCIENTIFIC STATEROOMS - There are four scientific staterooms on this level, each with two bunks. Rooms are small with no desks, but are the quietest aboard.

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02 Deck

CRANE - Two North American MCT-1565 cranes are permanently mounted on the ship, one on the port side 02 level and one on the main deck starboard quarter.

DECK - The 02 deck has space available on the forward deck for four standard vans, and for additional items forward of these vans, provided the items are not tall enough to block the line of sight from the pilot house to the bow.

HOSPITAL - There are 5 bunks and various medical supplies. (See Section VII for more on medical matters.)

HYDROBOOM - The hydroboom is used for launching and recovering oceanographic equipment and fairleading wire from the hydrographic winches. Controlled from the forward Winch Control Station. Various block/sheave combinations are available.

HYDROGRAPHIC WINCHES - One Markey DESH 5 winch equipped with either hydrographic wire or 0.322" CTD cable, is located on the 02 level forward of the staging bay. Wire is led over the starboard side via blocks on the end of a retractable boom at the level of the top of the staging bay. Check your wire requirements.

One CAST-6/ Allied Crane CTD Handling System equipped with 0.322” CTD cable Is located just above the hangar, with boom head directly over the starboard hangar door when stowed.

INSTRUMENT WELL HATCH - This is a hatch aligned with the 24-inch diameter through-hull instrument well that opens in the deck of the staging bay 20 ft below. (See INSTRUMENT WELL in Section 4.)

LIFE RAFTS - All eight of the ship's life rafts are located on the 02 level forward.

STATEROOMS - There are four staterooms for ship's officers and one scientific stateroom on this level. This latter stateroom has one bunk plus a pullman berth, and has a private head. (See Section IX for specifics.)

WINCH CONTROL - Primary site for control of CTD and hydro winches is on the 03 level, with good view of both winches and the starboard-side water entry point.

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01 Deck

INCINERATOR ROOM - The ship normally burns plastic trash once a day, to keep ahead of the accumulation. If your science operations will be compromised by trash burning, please consult with the resident technicians well in advance of your cruise. Depending on the amount of interference and the amounts of trash generated it may prove necessary to carry an extra van to hold trash until it can be burned or otherwise disposed. No trash is thrown overboard in accordance with international regulations.

CONFERENCE ROOM/LIBRARY - This area is designated as a quiet space on the ship for reading or studying. It is

separated from the mess deck by a folding door. Good place for meetings. It contains a public terminal PC and one of the ship's copy machines (another is in the science office, main deck). Food and drink are not allowed in this space, to keep carpeting and upholstery clean.

CRANE - On the foredeck, starboard side, is a Morgan Marine 18,000 portable deck crane. It cannot be moved with out shore assistance. DMG 1200 extension crane located aft of rescue boat on 01 level stbd side.

(D)AMAGE (C)ONTROL LOCKERS - DC lockers are located amidships, starboard, aft of the galley and main deck forward in port side of scientific cargo hold. (See also DC LOCKER under MAIN DECK, this section.)

GALLEY & CAFETERIA - The mess hall is located amidships. For safety and public health reasons only the cooks and other authorized crew members are permitted in the galley food preparation area. Food is served cafeteria style. (See Section 8 for more details on mess hall hours and practices.)

SHIP'S LOUNGE - Located forward of the galley on the starboard side is the lounge. This space contains a TV, VCR, and AM/FM stereo system.

STATEROOMS - Eight crew staterooms are on the 01 level.

RESCUE BOAT - The ship's rescue boat, a semi-rigid type, is located on the 01 level, starboard.

WORK BOAT - Depending on how many vans are carried, and in what locations, the ship's Hurricane work boat in its relocatable cradle may be situated on the 01 level aft, port side. The cradle is difficult to relocate at sea. Please pre-plan. (See BOATS in Section 4.)

Main Deck

A-FRAME - Located at the stern. A principal means of overboard handling or towing of instruments. Capacity 18,000 lbs dynamic.

ANALYTICAL/BIOCHEMICAL LAB - On the port side forward of the electronics/computer lab, it has its own air conditioning and ventilation system to maintain more constant climate conditions for sensitive instrumentation. A public terminal PC is available.

BOATSWAIN LOCKER - The ship's boatswain locker is located all the way forward on the main deck.

CAPSTAN - The ship normally carries a portable capstan on the main deck, principally used for mooring lines, available for other line-hauling tasks. Specifics available upon request. It can be situated to mesh with other space constraints and operational requirements.

CLIMATE CONTROL CHAMBER - There are two walk-in temperature-controlled chambers.

CRANE - A North American telescoping boom crane is permanently on the starboard quarter. A Morgan Marine 18,000 folding boom crane is normally carried on the port quarter deck. It can be relocated in port. (See CRANES in Section 4.)

DARKROOM - The darkroom is located on the port side forward of the analytical/biochemical lab.

(D)AMAGE (C)ONTROL LOCKERS - Two DC lockers, one in the forward port corner of the forward scientific storeroom, the second midships on 01 level, contain emergency and fire fighting equipment. This equipment is for emergency use only and should never be removed.

DECK - There is approximately 3,500 sq ft of open deck space. This includes a clear lay-down area of 11 ft x 60 ft on the starboard side. The open starboard rail extends for 104 ft. Space between the rail and the permanent crane on the starboard quarter is narrow but usable, see deck plan.

All weather deck areas are fitted with a standard 2' x 2', 1" NC thread bolt-down pattern.

ELECTRICAL/ELECTRONICS SHOP - Opposite the electronics/computer lab is a shop and tool/parts storage area for the

ship's electrician. Space and equipment is available for science electronics workshop tasks.

ELECTRONICS/COMPUTER LAB - On the port side, opposite the main lab, is the site of the deck electronics, ship servers, satellite control, acquisition computers, and display array for the ship scientific data, nav, and satellite info.

Generally, where science parties set up their watch station spaces.

FREEZER (SCIENCE) - This is a walk-in freezer for scientific samples.

SCIENTIFIC STOREROOM (FORWARD) - The forward scientific storeroom is at the forward end of the main deck passageway. It is served by a hatch that opens on the 01 deck forward and accessible internally via double doors and widened passageway. All labs are accessible to this storeroom at sea or in port.

STAGING BAY - A high-overhead sheltered (not weatherproof) work space with roll-down doors starboard and aft, and deck hatches to the lower scientific storeroom and the instrument well.

1st Platform

ENGINEERING SPACES AND SERVICES - These are off-limits to scientific party members except by permission of the chief engineer or the duty engineer, especially when cruising. They can be dangerous at any time, due to the possible hazard of noise, oil, grease, or lubricants underfoot.

All questions of an engineering nature and requests for services or help should go to the chief engineer or engineer on watch in port; at sea requests for assistance should go via the bridge. Engineers are helpful and knowledgeable, but they can assist scientists only after completion of their regular duties.

MACHINERY CONTROL ROOM - Propulsion machinery and electrical plant controls.

MACHINE SHOP - Forward of the machinery control room, and on the port side. The shop has a lathe, drill press, etc. By permission of the chief engineer, science party members who demonstrate the requisite experience and ability may use these tools.

PROPULSION MOTOR ROOM - Propulsion machinery. This area is in the aftermost part of the ship. It is an unmanned space. Access by nonessential personnel is restricted, due to the hazards of the high-power electrical equipment here.

SCIENCE STOREROOM (LOWER) - Located aft of the upper engine room and switchboard room, and forward of the winch room, this is a second scientific storage area. A portion of the port side of this room is devoted to engineering stores. Access at sea is limited to what can be hand carried up the ladder. In port, flush deck hatches can be opened.

STATEROOMS - There are berths for 30 persons, 24 scientists and 6 crew, on the first platform. (See Section 9: Scientific Berthing Plan for specifics.)

TRAWL WINCH ROOM - This room contains the Markey two-drum main traction winch system, and fairleads by which wires can be led to the A-frame or the heavy crane on the starboard quarter.

Section 4: Ship's and Scientific Equipment Description

ACOUSTIC DOPPLER CURRENT PROFILER (ADCP) - *Roger Revelle* has an RD Instruments 75 narrowband and 150 kHz narrowband/broadband ADCP installed which provides vertical profiles of ocean current speed and direction. The system

utilizes the doppler effect to measure currents in the water column. Current profiles can be produced in as many as 128 depth cells, each cell being variable from 1 to 32 meters to a maximum depth of 700 meters. When the bottom is within range, an earth-referenced vessel velocity can be obtained which allows for the measurement of absolute currents. Data are processed and current profiles are displayed in real-time on a color monitor. Data processing and recording are done on a Linux (Ubuntu) system using UHDAS software. The system takes inputs from the ship's motion reference systems and GPSes. Heading corrections are derived from the ship's motion reference systems and the Ashtech differential GPS array -- these corrections are applied to the data in real-time.

A-FRAME - The A-frame is located at the stern. It is rated above the breaking strength of 9/16" wire (32,500 lbs) in its braced position, and has a safe working load of 18,000 lbs when in motion (hydraulically driven). It is one of two means (the other is the starboard quarter crane) to lead trawl wire or 0.680" EM wire overboard, and is the only route for fiber optic cable.

AIR, COMPRESSED - (See COMPRESSED AIR in this section.)

AIR CONDITIONING AND HEATING - The ship's air conditioning system is extensive and complex, with zone-by-zone and even room-by-room control. If the ventilation or air conditioning in your room or working space seems not to be operating correctly or not to be controlled properly by the pertinent thermostat, please ask the engineer on watch for help. Do not resort to system-defeating measures like blocking vents, etc.

BOATS - A 23-ft Hurricane semi-rigid inflatable boat (SRIB) is normally carried by *Roger Revelle* as a work boat. Specific requests should be made to the marine superintendent prior to departure of the ship from San Diego to insure that a boat meeting your requirements is available. At sea the crew controls launching, operation and recovery of boats.

BOATSWAIN LOCKER - The primary boatswain's locker for rigging and deck supplies used by the crew is located at the extreme forward end of the main deck. Auxiliary lockers are located at other places on the weather decks. They also contain rigging/securing items, such as cleats and eyebolts, for use with the 2' deck bolt-down pattern. The resident technician or a crew member will assist you in their use if necessary.

BULWARKS - Bulwarks on the main deck aft are capable of being removed in sections, to permit loading and handling of large and/or heavy objects. Requirements for the removal of bulwark sections should be discussed in advance with the marine superintendent or the captain. Bulwarks are personnel safety devices their removal is not treated lightly. They are not normally removed or installed at sea.

CABLE RACEWAYS - Raceways and cable pass-throughs run between labs, from labs to bow, from the labs to the fantail and staging bay, and up to the pilot house and mast. The unistrut network throughout the labs affords additional ways to route and secure scientific cables. As a consequence, it should almost never be necessary to route scientific cables in the overheads, and use of the overheads for this purpose is discouraged. If you do not see immediately how to route your cable outside the overheads where you want it to go, consult any STS technician. Do not disturb existing wiring and remember to remove yours at the end of your cruise.

CAPSTANS - There is normally a large capstan on the fantail. (See MAIN DECK in Section 3.)

CHEMICALS - Use care in storage, handling, and disposal of toxic chemicals, particularly inside laboratories. All chemicals brought on board should be accompanied by a Material Safety Data Sheet (MSDS) provided by the chemical manufacturer. Plastic bottles are safer at sea and should be used unless specific chemicals must be stored in glass. Disposal of chemicals is regulated by University policy and international laws. Verify with resident technicians before dumping chemicals into ship plumbing. The ship's captain must know what chemicals you are carrying. A chemical storage locker is available and is the only safe way to carry most chemicals aboard ship. Please make arrangements with the resident technicians in advance for proper stowage and for appropriate disposal at the end of your cruise.

Working supplies of hazardous chemicals may be kept beneath fume hoods. Stocks/reserve supplies are to be kept in the appropriate storage.

CLEAN POWER - (See ELECTRICAL SYSTEM in this section.)

COMPUTER SYSTEMS, ACQUISITION, IT, PRINTERS - Shipboard computer systems consists of a cluster of Linux (CentOS) servers with 10 Terabytes of available and expandable storage in RAID6 configuration. The cluster provides

email, intranet, NAS, DHCP, SAMBA, Active Directory, data processing, and data procurement services; using HiSeasNet, shore cellular network (3G, 4G/LTE), and/or FleetBroadBand for Internet. In addition to the cluster, there's a wide array of data acquisition computers connected to a display array in the electronics/computer lab. These provide live feedback of the ship's underway data, where it can all be viewed in the electronics/computer lab. There are repeating displays in the main lab and hydro lab that show MET and navigation data.

The various Windows, Linux, and Mac acquisition machines perform a standard set of data acquisition, archiving and processing functions on many of the permanently installed data collection systems. All data is archived in 15-minute intervals in our redundant CentOS NAS. All acquisition computers have redundant machines in an event of a system failure. All systems in the electronics/computer lab are powered through a heavy-duty UPS. Some of the permanently installed data acquisition systems include (see also separate entries for these items):

- RD Instruments 75 & 150 kHz broadband acoustic doppler current profiler (ADCP), running University of Hawaii's UHDAS software.
- UCSD Ocean Physics Group 50 and 140 kHz High-resolution Hydrographic Doppler Sonar System (HDSS), using OPG's HDSS software.
- Turo Quoll XBT system, used with Sippican Fast Deep probes
- Kongsberg EM122 bathymetric mapping system
- Knudsen Engineering 3260 and 320B/R 3.5 & 12 kHz singlebeam echosounder sub-bottom survey system
- iXBlue Hydrins, and Phins-III are the main MRU's for our acquisition systems.
- Trimble SPS351, Furuno GP-150, and Ashtech ADU3 GPSes provide time, position, heading, and attitude information at various frequencies for the science equipment. Feeds from these instruments feeds can be accessed through the science repeater boxes in the labs, and through the SIS boxes throughout the vessel.
- Trimble GPS and End Run time servers that provides NTP GPS-derived time, IRG-B and 1 PPS synchronization along with other time measurements
- MET meteorological system that provides wind speed/direction, relative humidity, barometric pressure, long and shortwave radiation, air temperature, sea surface temperature, and precipitation.

There are three Windows-based terminals for anyone with a ship account to use the Internet, and to access local ship scientific data. Scanners, copy machines, printers, and a large-format plotter are available to use. There is Wi-Fi access in the public areas of the ship where anyone can connect to view the ship's intranet, data, and cameras. Cruise data will be accessible and updated at regular intervals from a central NAS server, from any computer aboard. Serial feeds (DB9) or UDP feeds of navigation, MET, and MRU data are available in all labs, and can be configured by the Computer Resources technician.

A computer technician from Computing Resources operates and maintains the computer equipment and the standard data acquisition equipment. He or she will be able to assist in ship account creation, general IT services, science equipment repair, interfacing with the acquisition machine, data downloading, and limited data processing. At the end of a cruise, he or she will provide the entire cruise data set that was collected all systems to the chief scientist.

Due to the nature of Internet at sea (see also SATELLITE COMMUNICATIONS), Internet will be slow. Everyone has Internet access, but is limited by a quota system.

It is recommended that necessary printer drivers are loaded on all computers being brought aboard ahead of time -- trying to download the large files over the Internet during the cruise will not be possible:

- HP Color LaserJet CP2025dn (main lab): http://h20565.www2.hp.com/hpsc/swd/public/readIndex?sp4ts.oid=3673587&lang=en&cc=us
- HP Color LaserJet CP6015dn (electronics/computer lab): http://h20566.www2.hp.com/hpsc/swd/public/readIndex?sp4ts.oid=3463673&lang=en&cc=us
- HP DesignJet 1055cm plus (main lab) -- this is a large-format plotter: http://h20566.www2.hp.com/hpsc/swd/public/readIndex?sp4ts.oid=12609

Specialized real-time data acquisition can be arranged by prior arrangement with the Computing Resources Group.

COMPRESSED AIR - Ship's service air is 100 psi at 12 cfm. The upper limit cannot be used continuously. It is suitable for running pneumatic tools, but may not be dry or clean enough for laboratory use. Users should plan to supply their own filters if the air is intended for any lab use. There are numerous outlets in the labs.

High-pressure compressed air (1875 psi) for airgun seismic reflection operations is provided by two Price air compressors in the engine room.

If scuba air is needed a small supply is carried in tanks. For larger amounts, make arrangements before the cruise to carry a special portable compressor for diving air.

CRANES - Permission to operate cranes is strictly limited to authorized personnel. These cranes are operated at sea only by permission of the captain.

Two large No. American MCT-1565 cranes are permanently mounted on the ship, one on the port side 02 level and one on the main deck starboard quarter. These cranes have a dynamic range capability of 10 to 65 ft and a dynamic load capability of 21,000 to 1,700 lbs. These dynamic load conditions are good up to sea state 5. In port, at sea state 0, these cranes can lift 42,000 to 3,400 lbs. with a 10 to 65 ft reach. These cranes can only be operated by qualified crew members or the resident technician.

On the foredeck, starboard side, is a Morgan Marine 18,000 portable deck crane. Crane capacity is 14,000 lbs at 6 ft to 3,000 lbs at 46 ft. Crane winch is rated at 4,000 lbs pulling strength. The crane base is designed to interface with the working deck bolt-down system to provide flexibility. The crane serves the forward scientific storeroom via a hatch that opens in the foredeck. The hatch may not be opened at sea. This crane is operated by the resident technician or qualified crew members only.

A second, identical Morgan crane is available, normally carried on the main deck.

DMG 12000ET2 articulating crane is carried stbd side 01 level aft of the rescue boat. This crane services the stbd side midships. Boom 2'to 27' capacity 0-2900 lbs. Operated by ships crew and restech.

CUSTOMS - Shipping equipment to and from foreign ports requires the scientist to deal with two sets of customs officers and rules, theirs and ours. Register your items with U.S. Customs (Form 4455) first. Check with the consulate or embassy of the foreign country next. Document and make lists of everything. List the value of each item. Etch or mark serial numbers on each item. Further information and help about customs matters relating to scientific equipment may be obtained from STS. (D. Long)

Commercial container shipments are made to and from R/V *Roger Revelle* as needed during the course of an expedition. (See SHIPPING, this section.)

DECK LOADING - In addition to the main deck, equipment may be loaded on the 02 level forward, the 01 level aft on the port side, and (limited) on the foredeck. The approximate loading limit is 0.5 ton/sq ft.

Ship stability is ultimately the responsibility of the captain. The responsibility of scientists is to consult the Nimitz Marine Facility or the resident technician early to describe loading plans and requirements so that any necessary adjustments can be made. The more complex and heavy your equipment the more advance notice is needed. Our goal is to resolve loading problems and incompatibilities well before sailing day, so that it will not be necessary to leave scientific gear on the dock in order to assure a safe ship.

DECK TIE-DOWNS - No welding is permitted directly to any deck. All installations must use the 2 ft x 2 ft grid of tie-downs (welding may be done to “ears” or plates, which in turn are bolted to the deck). Bolt holes are 1" NC thread on weather decks, 1/2" NC thread in labs and storerooms. Bolt holes in equipment should be made oversize, to allow for deck grid irregularities.

DEPTH RECORDING - (See ECHOSOUNDING in this section.)

DISTILLED WATER - (See FRESH WATER in this section.)

DOPPLER LOG - An Furuno doppler speed log is installed in the chart room for ship speed measurements; its output is available on a repeater in the lab. (Also see ACOUSTIC DOPPLER CURRENT PROFILER in this section.)

DRAINS - (See also CHEMICALS in this section.) Main lab sinks drain directly overboard, or into the sewage holding tanks. Ship's engineers control the drain routing and should be consulted in **advance** about any dangerous or corrosive chemicals you plan to put into any drains.

The under-sink areas in the lab should (1) be carefully inspected before using the sinks to insure that connections are in fact connected and open, (2) be kept clear of stored items capable of damaging PVC pipes or blocking drains, and (3) be kept clear of lab trash and debris.

ECHOSOUNDING - There is an array of 12 TR-109 transducers which operate at 3.5 kHz, and two 12 kHz transducers which are operated individually. These can be accessible by portable deck units behind the forward server racks in the electronics/computer lab. These are normally used by the Knudsen 3260 deck unit (primary), or the 320B/R (backup) for sub-bottom profiling and/or singlebeam depth sounding. The data is digitized and may be stored in SEG-Y format. Data is graphically displayed on a the display array and optionally on paper.

There is also a Kongsberg EM122 12 kHz multibeam for bathymetry data. The main power and transceiver units are in the dry stores room, two decks down from the main deck.

ELECTRICAL SYSTEM - The permanently-installed lab power systems include 120, 208, and 240 volt receptacles. 120 volt vital systems utilize the 15 kVA uninterrupted power source. The UPS provides 15 minutes of power at its rated load should a power failure occur. The ship has the following power plant elements:

- 3 ship service diesel generators (SSDG), 600VAC @ 1,500 kW dedicated for propulsion
- 3 SSDG, 600VAC @ 700 kW for propulsion or ship service power
- 2 1,500 kVA transformers 600vac to 480vac
- 2 150 kW m.g. sets for clean power, providing 90 kVA of 120VAC power to the various labs on the main deck
- 10 kVA @ 240VAC single phase clean power in labs
- 9 kVA@ 220VAC single phase clean power in labs
- 3 100 amp 480VAC deck receptacles, two at the aft end of the staging bay, one at the bow, 01 deck
- 1 30 amp 480VAC deck receptacle in the staging bay
- 2 30 amp 480VAC deck receptacles on weather deck aft end of staging bay
- 4 30 amp 208VAC deck receptacles and 4-30 amp 120vac 3-phase clean power deck receptacles, two of each kind aft of the hydro lab for main deck vans, and aft on the 02 deck for 01-level vans

ELECTRO-OPTICAL TOW CABLES - See the cable specifications.

EMAIL/INTERNET - (See also COMPUTER SYSTEMS, and SATELLITE COMMUNICATIONS) Internet access is available to all users, but is limited by a quota system. All scientists are required to sign up for ship accounts. This account allows access to the internet, the ship's public terminal Windows PCs, samba-share mount points (for ship's science/underway data, data sharing, and own home directory), and ship email. The shipboard email account is the same as the username (username@rv-revelle.ucsd.edu). This account is temporary for each scientist and crew and will be removed at the conclusion of each project. Be sure to forward any important email to a personal email address. Use of the ship's SMTP server is recommended for sending out email, in-lieu of your personal SMTPS/IMAP service. This guarantees that your email will be sent, as our services were designed with the satellite system in mind.

There are public terminals on Roger Revelle. Due to the very limited bandwidth of the satellite service, we highly stress that you be mindful of other users in the ship. Be sensible in browsing content in the internet, and ask the Computing Resources technician if you are required to handle large files over the Internet.

FLOOD LIGHTS - Working lights on deck are controlled by the bridge. Consider the night vision of the crew and use only the lights you need, turning them off when finished.

Hand lamps, flashlights, etc. can be obtained through the resident technician. Supply is limited; large scientific parties should provide their own units.

FREEZER - (See REFRIGERATION AND FREEZING in this section.)

FRESH WATER - Fresh water generation capacity is about 4,000 gals/day. The ship also has 2 evaporation distillers which put out very pure water that can be used to fill carboys. Potable water tank capacity is about 12,000 gals. A nanopure ion exchange filter is installed in the analytical lab to provide pure water for lab use.

Fresh water should not be used for wash down purposes, except if necessary and then by consultation with the resident technicians. In personal use, conserve. Take short showers; do only full laundry loads. (See Section 8: SHIP ORGANIZATION.)

GASES - (See STORAGE in this section.) These are the responsibility of the individual requiring gases for shipboard use. Any gas under pressure is dangerous; consult the captain or the resident technician for safe stowage methods and locations.

GASOLINE - Inspected vessels are severely limited by law in the amount of gasoline they can carry, unless they have approved built-in tanks, which R/V *Roger Revelle* does not. Small amounts of gasoline for outboard motor use at sea are carried in USCG-approved containers. If larger amounts of gasoline are needed, a special "portable" tank can be placed aboard--but it must be requested in advance from the resident technician.

GENERATORS - (See ELECTRICAL SYSTEM in this section.)

GEOLOGICAL SAMPLING EQUIPMENT - Gravity coring equipment, a box corer, a multicorer, a glass corer, and rock dredges are maintained by the Resident Marine Technician Group. A researcher planning use of any of the above equipment during an expedition should make this need known during the pre-cruise conference or before. The size and weight of geologic sampling gear make it expensive or impossible to ship commercially.

Liners of clear butyrate tubing are used with both gravity and piston corers. This liner deteriorates during long storage. Each researcher should determine his needs. The Resident Marine Technician Group can buy a liner, on a recharge basis, gauge it for size and load it on board before an expedition.

Detailed plans for projected use should be submitted with the longest possible lead time to allow for assured supply of critical items, such as pipe liner for core barrels, and dredging supplies. (See "Sampling Equipment maintained by Resident Marine Technicians" in Section 5.)

GEOPHYSICAL SAMPLING GEAR - (See ECHOSOUNDING, MAGNETOMETER, and MULTIBEAM in this section; plus "Shipboard Geophysical Group" in Section V.)

GYRO - iXBlue Hydrins, and a Phins Gen. III are the two main MRU's used for the various scientific sensors aboard the vessel. The ship's gyro has a repeater in the electronics/computer lab. MRU and gyro data are available in the lab.

HATCHES - Hatches and watertight doors are heavy and dangerous if not secured correctly. Careful use of all doors and hatches, especially at sea, is very important. Carelessness could easily lead to severe injury. All doors and hatches should be positively latched either open or closed at all times, never left to swing free.

HIGH-RESOLUTION HYDROGRAPHIC DOPPLER SONAR SYSTEM (HDSS) - The High-resolution Hydrographic Doppler Sonar System, developed by UCSD's Ocean Physics Group, have two sets of sonars installed on the R/V *Roger Revelle*. One set is a 50 kHz unit and the second set is 140 kHz, each consisting of 4 beams. The sonars measure ocean velocities and shears with very high precision. The data collected by the sonars is usually available post-cruise in a binary format. A MatLab routine is used to read the binary data and process it into usable scientific data, and displayed on the display array, and on the ship's website.

HOLD - (See description of forward and lower scientific storerooms under LABORATORY SPACES in this section.)

HOODS - There are four fume hoods, one each in the analytical lab, the hydro lab, the main lab and the wet lab.

HYDRAULIC SYSTEM - (See also A-FRAME, CRANES, and HYDROBOOM in this section.) The A-frame and hydroboom are hydraulically operated, as are all cranes. Operating controls for the frame are located on the starboard side of the frame. The hydroboom control is located in the hydro winch control booth.

Questions regarding user applications of excess hydraulic capacity should be directed to Nimitz Marine Facility (the marine

superintendent, the port engineer, or the chief engineer of *Roger Revelle*) well in advance.

HYDROBOOM - The hydroboom located on the 02 level starboard side is a McElroy model 15000. The hydroboom is used for launching and recovering oceanographic equipment and fairleading wire from the DESH-5 hydrographic winch. It is designed for a safe working load of 15,000 lbs perpendicular to the ship's deck. The total length of the hydroboom fully extended is 43 ft. The extension boom is 18 ft long and reaches over the starboard side by 10 ft when fully extended. The distance from the bottom of the sheave, on the end of the boom, to the deck is 20 ft. The hydraulic control for the boom is located in the forward Winch Control Station. This boom is operated by the winch operator.

HYDROWINCH - (See WINCHES in this section.)

INS - (This section still under construction. Contact Woody Sutherland for information.)

INSTRUMENT WELL - (This section still under construction. Contact Woody Sutherland for information.)

ISOTOPES - (See RADIOACTIVE MATERIAL in this section.)

INTERCOM - (See INTERNAL COMMUNICATIONS, Section 6.)

LABORATORY SPACES - Please refer to the deck plans for dimensions and layout of the laboratories and other science spaces. Virtually all scientific spaces are on the main deck. The approximate sizes of the labs and other science spaces are as follows. These are the areas that are clear and unencumbered by such uses as passageways through the space, ship equipment, etc. They therefore may not correspond to areas of the spaces shown on general arrangement drawings.

All labs and storerooms are fitted with the standard 2' x 2' 1/2" NC bolt-down pattern on deck, accepting bolts which are 1/2" deep. Unistrut mounting channels are on the bulkheads and overheads. An inventory of Unistrut hardware and fasteners is maintained on board by the resident technician.

In sequence from bow to stern and main deck to 1st platform, these spaces are:

- **Forward science storeroom 358 sq. ft.**
  This storeroom is at the forward end of the main deck passageway. It is served by a hatch that opens on the 01 deck forward. A network of deck tiedowns and Unistrut fixtures permits flexible securing arrangements. Standard pallet-sized loads can be craned into this storeroom through the hatch. All labs served via pallet jack down passageway.
- **Science Office 65 sq. ft.**
  For general office functions as needed by the science party.
- **Darkroom 76 sq. ft.**
  This space contains no installed photographic facilities, but does have a sink and cabinetry. Photographic supplies and equipment are the responsibility of the scientific party.
- **Main Lab 1,745 sq. ft.**
  This is largely flexible general lab space, with extensive utility connections and Unistrut capability, configurable to suit the onboard project(s). It has a fume hood and refrigerator.
- **Analytical/Biochemical Lab 330 sq. ft.**
  This lab has its own air conditioning and ventilation system, for fine control of ambient conditions needed by some analytical work. There is a fume hood and a refrigerator.
- **Science freezer 63 sq. ft.**
  A walk-in freezer for science samples. It can hold a temperature of minus 18 C.
- **Climate control chamber 63 sq. ft.**
  A walk-in chamber; the temperature may be controlled from 4 to 40 C, with sensitivity of 0.1 C and uniformity within the chamber of 0.5 C.
- **Electronics/Computer Lab 610 sq. ft.**
  This is the location of most of the deck electronics and display hardware for quasi-permanent scientific electronics - multibeam, 3.5/12 kHz system, ADCP/HDSS, etc. The primary work site for the Computer Resources Group technician is here, as are the hubs of the data and video networks and science information system. The lab has a secondary control station for lab control of winches and ship maneuvering.

- **Hydro Lab 693 sq. ft.**
  Has access aft to two vans, plus general lab outfitting. Van access can be fully enclosed if van door arrangements are suitable.
- **Wet Lab 230 sq. ft.**
  With direct access to the staging bay aft, this lab is the site for wet work, wet sample preservation, etc. The lab has a fume hood.
- **Staging bay 330 sq. ft.**
  A sheltered workspace. Clearance from overhead to deck is 18 ft. It has a telephone and outlets for compressed air and electricity. Roll down doors, starboard and aft, offer limited protection against weather. Padeye lifting points in the overhead exist. Overhead hoists are installed; 5,000 lb capacity each.
- **Aft science storeroom 635 sq. ft.**
  This is the other major science storeroom, forward of the winch room on the 1st platform. Some of this space (port side) is used for ship's engineering spares storage. A pallet-sized hatch to the storeroom opens to the main deck just outboard of the starboard rollup door of the staging bay.

MAGNETOMETER - R/V *Roger Revelle* is equipped with a Marine Magnetics magnetometer. The system consists of the towfish, tow cable, winch, deck lead, deck box, power/data lead-in, and power supply. The main electronics of the system is in the deck box, which is located in the entry area from the fantail to the central passageway, high up on the bulkhead. The connection to the system is made in either starboard or port side deck-boxes; each of which includes a plug for either the magnetometer or the XBT. The data stream leaving the deck box is digital (RS-232), and therefore much less susceptible to noise than older systems. Data is logged to the ship's echosounder PC system and aggregated in a NAS, along with most other data streams such as multibeam, MET, GPS/MRU feeds, etc. The data is displayed in real-time on the display array. The tuning of the magnetometer, as well as the logging of the data, is done automatically when the system is turned on.

MASTS - *Roger Revelle* has a mainmast, and a jackstaff. The main mast, above the pilot house, carries radar antennas, navigation lights, various antennas, the ship's anemometers, and flag halyards.

A suite of scientific meteorological sensors (see MET in this section) is on the bow of the ship, on a science mast.

MET - The Shipboard Meteorological Acquisition System (MetAcq) acquires, filters, averages, corrects, displays and distributes meteorological sensor data from a wide variety of sensor types and data input devices.

Meteorological sensors such as ones made by RM Young, Vaisala, Alden, Coastal Environmental Systems, Seabird, FSI, Omega and most sensors that have an RS485, RS422, RS232 digital interface or any analog sensor that can output a voltage, frequency or 4-20ma current can be accommodated.

A typical system measures air temperature, barometric pressure, wind speed/direction, relative humidity, shortwave radiation, longwave radiation, seawater temperature, and seawater conductivity. Sensor information is combined with time and GPS position information and displayed on the local video display or web server and written to data files. The main acquisition device is a Windows-based computer that has at least two serial ports. Data can be acquired simultaneously on all enabled ports. One or more ports can be configured to support RS485 communications through RS232 to RS485 converters. Sensors that have analog outputs are first connected to signal conditioning modules that are physically located near the sensor. These modules then convert the analog signal to RS485 that is then routed to the lab. Collected data is stored on data files at user-selected intervals. This interval is typically once every 30 seconds. Acquired data that has been collected from the sensors (uncalibrated) is stored in an uncorrected data file. Data that has been corrected by applying the most recent pre-cruise calibration data is stored in a corrected data file.

Atmospheric meteorological sensors are generally located on either the forward part of the ship on the MET mast and/or above the ship's upper bridge deck. Sensors that measure seawater properties are generally located near the uncontaminated seawater intake area or in one of the ship's laboratories that has a connection to the uncontaminated seawater line.
At least once a year all sensors are removed from the vessel, refurbished, and calibrated at an appropriate shore based maintenance/calibration facility. Calibration data for each sensor is kept onboard each vessel and entered into the shipboard acquisition/setup file that is used by the acquisition program to correct sensor data for display and storage.

MULTIBEAM -

- Kongsberg EM122 12 kHz, 191-beam, 150 degree swath mapping system
- Beams map 6-7 times the water depth (25 km swaths in deep water)
- Turo Devil Expendable Bathythermograph System (XBT) (one probe per day, or as needed)
- Computing hardware: Two custom twin quad-core AMD processor servers, four 4TB disk drives each, discrete nVidia graphics, 8 GB RAM, Windows 7 Professional
- Software: Kongsberg SIS acquisition system, University of Hawaii MOSAIC real-time display, and a variety of post-processing software packages including MB-System, GMT, and CARIS (upon request).

PROPULSION - *Roger Revelle* is equipped with twin "Z" drive propellers aft, trainable 360 degrees. Propeller speed is variable from 0 rpm to full. A White-Gill azimuthing water-pump bow thruster is used for precision maneuvering, dynamic positioning, station-keeping, etc. Thrusters can be controlled independently or integrated through a Kingsberg dynamic positioning/maneuvering system. Dynamic positioning is driven by inputs from GPS or a seafloor acoustic transponder net (Nautronix 916). *Roger Revelle* is capable of accurate station holding, positioning and track line following in most wind and sea conditions. For fuller details of handling and maneuvering characteristics, consult the captain.

RADIOACTIVE MATERIAL - The use of radioisotopes, or other isotopes in concentrations not found in nature, is strictly controlled aboard *Roger Revelle*. Permission to use radioisotopes must be obtained from the SIO Ship Scheduling Office in writing, following written application (which is reviewed by the Radioisotope Committee) describing aims of the work and the isotopes, quantities, and procedures to be employed. Such usage must be consistent with strict precautions for safety and to prevent contamination of the ship. All handling of isotopes must be done within a designated portable isolation van. Vans are available upon request to the resident technicians. Cleanup costs of any isotope spills will be charged to the persons responsible.

REFRIGERATION AND FREEZING - (See also "Science Freezer" and "Climate Control Chamber" under LABORATORY SPACES in this section.) There are three lab refrigerators on the ship. The ship's cold food storage is NOT available for scientific use. Portable chest-type freezers are available upon request.

SCIENCE INFORMATION SYSTEM (SIS) - The various labs and other parts of the ship are connected by a scientific closed circuit 9-channel TV system and by fiber optic cables. Both systems originate in the electronics/computer lab. All labs have 10Base-T (UTP, twisted pair) and thin wire (RG-58 coax) connections which are connected to the ship's ethernet network via fiber optics.

SCUBA DIVING - All diving from SIO vessels is controlled by the diving officer. Each diver must have a valid University of California Certified Diver Card or have been approved by the diving officer prior to every diving operation. Please obtain a Diving Form from the SIO Ship Scheduling Office. Your dive plan, submitted on this form, must be received and reviewed for approval well in advance of the voyage.

There is no decompression chamber on R/V *Roger Revelle*. Arrangements can be made with STS to have a portable scuba air compressor, tanks and weights put on board.

R/V *Roger Revelle* carries a buddy pair set of scuba gear for emergency work or hull inspection. Researchers should bring their own gear. Not all resident technicians at SIO are divers, but those that are certified are usually eager to dive.

SEAWATER - There are multiple bibs for seawater wash down on the weather decks. Checking with the deck watch officer is appropriate before hooking up and using any hoses. Sea water for incubation purposes is available. For quantity, flow rate, etc., check with the engineer.

SEISMIC REFLECTION - (See Section 5.)

SHEAVES & BLOCKS - Use of various winches and wires implies use of certain combinations of sheaves and blocks. In addition, your scientific operation may have particular requirements for fair-leading wires to certain locations. Be sure to check with the resident technician well in advance to explain all your wire rigging ideas and needs. Technicians will know how to best accomplish your task. Never use a sheave that is too small in diameter for the wire.

SHIPPING - Limited stowage on board R/V *Roger Revelle* often necessitates shipping equipment and samples. Commercial containers are arranged by the Resident Technician Group. Shipments can be made to the ship's agent in ports other than

San Diego; contact the Nimitz Marine Facility for the agent's addresses. Agents charge for every service they provide. Please try to consolidate dealings with the agent through either the captain or the resident technician. Agents should be advised by telegram of waybill numbers so they can arrange for transportation, storage and customs. (See also CUSTOMS in this section.)

STORAGE - (See entries under LABORATORY SPACES in this section for forward and lower scientific storerooms, GASES for storage of gas cylinders, and CHEMICALS for storage and use of lab chemicals and hazardous materials.)

SUPPLIES AND EQUIPMENT - On board R/V *Roger Revelle* the resident technician maintains a tool box from which the scientific party can borrow tools. Return of all tools is a must. In addition, the resident technicians maintain a stock of office supplies from which scientific parties can draw. Both the tool collection and the office supply stock are modest and limited to commonly used items.

It is not possible to stock everything anyone might conceivably wish to have at sea. Researchers anticipating the use of, for example, an extensive inventory of chemical lab equipment, should consult with the resident technician and plan to supply most of their own needs. Stocking of the ship prior to the beginning of an expedition is done with the expectation of more or less steady use of the items stocked and, it is hoped, in sufficient quantity to forestall the need to re-equip in overseas ports - an unsatisfactory experience in almost every instance.

A list of inventoried supplies is available from the resident technician upon request. Local purchase of extra quantities of particular items can be arranged through him and should be done as far in advance of departure as possible. Supplies purchased will be recharged to the account of the requestor.

The ship does not carry a standard suite of analytical or special-use equipment. The planned use of equipment such as water sampling bottles, reversing thermometers, box corers, bottom trawls, centrifuges or ovens should be indicated on the Ship Time Request Form, and should be checked in consultation with the resident technician well in advance. (See also Section 5.)

UNCONTAMINATED SEAWATER - Uncontaminated seawater is provided via a pump in the bow thruster room at 50 gal/minute, and from a pump from the engine room and or a pump forward near the bow thruster, the pumps are connected to the hydro lab. Distribution to various labs via plastic piping. Please check with duty engineer for hookups of supply and drainage.

VANS - *Roger Revelle* can carry multiple laboratory, refrigeration, and storage vans. Two vans can be sited aft of the hydro lab and can have enclosed access to that lab if the van door arrangements are suitable. Two more van sites are on the 01 level, port side. The 02 deck forward of the house has space for 4 full vans. (Decks have special cam-loc fittings in these locations.) Other deck space ia available for vans as necessary.

Plans to use any vans should be indicated on the Ship Time Request Form and details should be discussed with the resident technician well in advance of departure.

WINCHES - The Markey DUTW-9-11 traction winch is located in the winch room on the 1st platform level. Two stowage drums can carry up to 15,000 m of 9/16" wire on one drum and either 10,000 m of 0.680" electromechanical wire or 10,000 m of fiber optic cable. The unit is driven by a 150 hp electro-hydraulic power pack. Wire is led over the side through the A-frame aft or through the trawl crane on the starboard side aft. Fiber optic cable can also be used, led to the stern A-frame. Trawl crane may require use of boom crutch. Check with resident technicians.

The primary Hydo winch is a Markey DESH 5 (75 hp AC-SCR/DC drive). It is located on the 02 level aft of the house, and holds up to 10,000 meters of 0.322" conducting wire or 0.250" mechanical wire. Wires can be led over the side via the hydroboom boom. This winch can be configured for either CTD or hydroboom operations.

The primary CTD winch is a Markey CAST 6 (75 hp AC-SCR/DC drive) integrated with an Allied articulating load-handling system. The winch holds up to 10,000 meters of 0.322" conducting wire, which can be led overboard using either the Allied load handling boom or the hydroboom. The winch includes rend-and-recover and heave compensation modes.

A towed magnetometer with winch is normally carried on the fantail.

WIND & SPEED DIRECTION INDICATORS - (See MASTS in this section.)

WIRE - A log is maintained by the chief engineer documenting the actual wire on each winch at any given time. The working end of every wire is occasionally cut off and the termination replaced, and this can sometimes amount to 100 meters or more, if damage has been sustained by the wire.

It is important that expected water depths of planned operations be made known to the resident technicians and the marine superintendent as far in advance of these operations as possible, to ensure that adequate wire is available. Lead times on the purchase of new wires can amount to a year.

XBT - A Turo Quoll XBT system used with Sippican Fast Deep probes is permanently installed. It is available for general use, but stocks of XBT probes beyond the one per day budgeted for calibration of the multibeam system must be user-supplied.

Section 5: Technical Services and Special Equipment

Shipboard Technical Support (STS)

STS provides science support services and general use equipment for the Scripps research vessels. Levels of services and facilities depend on the mission, capabilities and requirements of each cruise and are negotiated with the manager of STS in advance. The specific capabilities and services of the 5 groups within STS are as follows:

Resident Marine Technicians Group (ResTechs)

The primary job of the RMTG is liaison between research vessels of SIO and the scientists and research groups using those vessels. The resident technician who is assigned to R/V *Roger Revelle* for a particular cruise contacts the chief scientist during the planning stage of the cruise to provide ship-specific information and to determine the needs of the scientific party. During this first contact the resident technician offers the ship's handbook, drawings, and inventory of shared-use equipment and describes features and equipment of the ship. Also, the technician explains the group's function and responsibilities as they relate to the scientific party's requirements to launch and recover over-the-side equipment.

The RMTG is the point-of-contact for scientific logistics. They plan with the scientists and research groups for the shipping and receiving of equipment and supplies. These technicians plan the deck load and laboratory setup. They operate forklifts on docks and the cranes on all ships, and supervise loading and unloading of scientific equipment and supplies. They report the load plan with weights of large items to the ship's captain for stability calculations. During expeditions the resident technicians make consolidated container shipments of scientific supplies, equipment and samples to and from foreign ports. The safe stowage of explosives, chemicals and isotopes are all provided for by designated portable vans or containers maintained by the RMTG.

Resident technicians provide liaison with government agencies, ship agents, scientists, and ship officers in such areas as permits for hazardous material, customs clearance, shipping, scheduling and loading plans. They serve as safety officers on deck, familiarize and train oncoming scientific parties, operate small boats, and most are qualified SCUBA divers.

Sampling Equipment maintained by Resident Technicians:

- giant gravity corer
- rock glass corer
- IKMT mid-water trawl
- portable labs
- inflatable boats & motors
- chest freezer

- bench crimpers
- meter plankton net
- neuston net
- multicorer
- box corer
- lab refrigerator
- isotope isolation

BIOLOGICAL SAMPLING - A limited suite of biological sampling equipment can be provided on board *Roger Revelle*. This includes an Isaacs-Kidd midwater trawl (10' mouth), a 1 m plankton net, a 1 m neuston net, a 10' Otter trawl, and assorted dip nets. Contact the resident technicians regarding this equipment.

Sample storage bottles, labels, preservatives, sorting apparatus, microscopes, etc. are not stocked, and are the responsibility of interested investigators.

Shipboard Technical Support – Computing Resources (STS-CR)

During normal operations at sea, members of Computing Resources on R/V *Roger Revelle* perform maintenance, repair, and calibration on the installed computer systems and the peripheral equipment attached to the computers. The various terminals, displays, and plotters are scattered in several work areas over at least three labs and on the bridge. They also perform the same functions on all scientific electronics and instrumentation interfaced to the computer systems. This includes such items as the magnetometer, CTD, gyrocompass, meteorological sensors, satellite navigation receivers, XBT, 3.5 kHz and 12 kHz echosounder systems, EM122 multibeam, and HDSS and RDI Acoustic Doppler Current Profiler.

Other tasks performed at sea are the setup of leg-specific hardware and software applications and the continuing work on development, improvement, and expansion of the hardware and software systems. Members of Computing Resources also monitor data collection systems to verify accuracy of data, display data in real time, instruct the scientific party and ship's crew in the use of computer-generated navigational aids, and in the use of the computer itself. They develop and maintain display systems on LCD, and hard copy devices for the various data streams, archive data files to USB disk drives and make them available to appropriate members of the scientific party, and for return to San Diego for further data processing and storage. On transit legs, this group has the sole responsibility for acquiring and archiving underway scientific data. This includes all the usual navigation, magnetometer, meteorological, bathymetry, currents, and sub-bottom echosounder data. (See also COMPUTER S, Section 4.)

Shipboard Geophysical Group (SGG)

The Shipboard Geophysical Group maintains a large and diversified pool of seismic reflection and refraction equipment. The principal demand for the refraction equipment is for the shot-break recording system which is normally sent to sea without a technician. The various reflection profiling systems are more complex and require at least one engineer to operate and maintain them at sea. These services are provided at a recharge rate.

Geophysical equipment (available on request)

SEISMIC REFRACTION EQUIPMENT

- shot-break streamers and amplifiers (2)
- Fairfield sonobuoy receiver system (1)

SEISMIC REFLECTION EQUIPMENT

- SSI mica T-80 water guns (3)

- Bolt PAR600B air guns (6)
- Bolt PAR1900CT air guns (4)
- Bolt PAR1500LL air guns (6)
- GI air gun
- Teledyne single channel streamers (2)
- Streamer power reels (3)
- Davits with hydraulic winches (4)
- SEC 4-channel streamer depth readout
- I/O AG-7 4-gun firing synchronizer (2)
- Sparc 10 Digital Seismic Acquisition system
- 2 sets of seismic amplifiers
- 2 sets of Master clock/gun firing systems
- Krohnhite bandpass filters (4)
- Single channel A/D modules (2)
- EPC 3211S graphic recorders (4)
- Multichannel streamer power reel
- Six gun digital firing control synchronizer system
- AMG single channel streamer
- 12-channel streamer reel
- hydraulic power pack

Oceanographic Data Facility (ODF)

The Scripps Oceanographic Data Facility supports expeditions of SIO and other institutions' scientists with CTD, rosette, and bottle sampling (2-250 liter); measurements of salinity, dissolved oxygen, and nutrients; thermometry; calibration; and full data processing and merging services. ODF is unique among STS groups in that a significant portion of its activity is in support of investigations on non-SIO vessels. Hence ODF is in part an SIO facility (and wholly an SIO facility in a business sense), but also in part a *de facto* national facility.

ODF resources include a chemistry laboratory, an electronics shop, a CTD laboratory, and a data processing and computer facility which supports both shipboard and shore-based processing, including real-time processing of CTD data. Electronics design work for many different applications is a routine activity. ODF has full access to the facilities of the Scripps laboratories and shops, including the Hydraulics Laboratory and the Scripps Marine Science Development Facility, where we have constructed numerous 12- 48-place rosette frames and sample bottles from 2 to 10 liter capacity.

Major pieces of equipment and equipment systems are:

- 1 Sea-Bird 6,000m CTD
- Multiple rosette systems, from 6 to 36 sampling bottles
- 185 1.7- to 30-liter sampling bottles
- 2 C-Star transmissometers
- 1 Seapoint fluorometer
- 2 shore-based data processing and archiving systems
- 4 automated oxygen titration systems
- 3 AA3 4-channel nutrient analyzers for PO4, SiO3, NO2, NO3
- 1 MOCNESS sampling system with single 1m square square frames
- Full ocean depth electronic package and spares

- Shore-based laboratories, shop, and calibration facilities

While in transit, it is usual for the ship to maintain an underway watch to collect bathymetry and other underway data that does not interfere with the main science program(s). The u/w watch is usually under the general direction of the resident technician who provides log forms, training, and a manual that details watchstanding procedures and conventions for data logging and record annotation. The head of GDC will contact the chief scientist at or before the cruise conference to work out details of data handling. The data center can also provide specialized bathymetric charts, data indexes, and other aids for cruise planning. Normally, the data are returned to the GDC as soon as possible after each cruise leg, where the records are indexed and microfilmed; navigation edited; digital depth and magnetics processed; and an informal inventory of cruise data and activities produced, usually within a month or two. A general multidisciplinary index of samples and data (SIO Sample Index) is also generated and distributed by GDC and the resident technicians.

The GDC Steering Committee, composed of geological staff, monitors the GDC operations and has formulated the following policies (1) u/w data collected on SIO vessels are the property of the institution and are accessed from the GDC for on-campus use only, except where prior arrangements have been made, and (2) data are accessed with the understanding that ultimately GDC will retain them for permanent archiving. A chief scientist, whether or not from SIO, may place a two year proprietary hold restricting access to the data; otherwise the data are available to any SIO student or staff member during this period, following which copies of the data will be sent to the appropriate national data center. Exceptions to these procedures, especially those involving non-SIO chief scientists, should be cleared prior to the cruise with the GDC Steering Committee via the u/w curator, who can also provide a detailed policy statement.

Section 6: Navigation and Communications Capability

Roger Revelle is equipped with an extensive suite of navigation and communications instruments and devices. This equipment allows precise navigation and control of the ship and worldwide communications in voice, data and facsimile. A number of the more prominent systems and devices are listed below and described.

CELLULAR TELEPHONE - The captain is equipped with a cellular telephone, but R/V *Roger Revelle* normally operates beyond the range of cellular networks. While in port, the Computing Resources technician will explore options to provide 3G/4G LTE for the ship to use as the main source of internet.

DATA COMMUNICATIONS - (See SATELLITE COMMUNICATIONS.)

DEPTH RECORDING - There is a fathometer on the bridge. Maximum reliable soundings are ~300 meters

Deep sea soundings are accomplished with the EM122 Multibeam, or the 3.5/12 kHz echosounder system.
(See ECHOSOUNDING in Section 4.)

DIRECTION FINDING EQUIPMENT - A Simrad Taiyo medium frequency RDF is installed in the chartroom for navigational purposes. A VHF direction finder is scheduled for installation in the pilot house. This RDF will operate in the 110-170 MHz range. It is primarily used for locating autonomous vehicles at sea. Transmitters for use with this system are provided by the scientific group or arrangements for the appropriate equipment can be made with the Resident Marine Technicians Group.

GYRO COMPASS - *Roger Revelle* carries two Sperry Mark 37 gyro compasses. In addition to these, the science acquisition primarily uses iXBlue Hydrins and a Phins Gen. III MRUs. A number of electronic devices, including navigation systems and the shipboard computer system, have inputs from the gyro compass.

INTERNAL COMMUNICATIONS - Three installed systems facilitate internal communications around the ship - a household-type dial telephone, a sound-powered phone system and a mission announcement system. The directory for the dial phone system is posted next to each phone. The sound-powered phone has no external power supply. A list of stations is posted on each phone. To call using the sound-powered phone select the desired station. Crank the handle two or three times to ring the phone, press the button on the handset and talk. The button on the handset must be pressed both to talk and to listen. A public address system is operated from the bridge. It is used to make urgent pages and for emergencies.

Instructions are posted by the various units.

NAVIGATION EQUIPMENT - *Roger Revelle* navigates primarily by Furuno GP-150 GPS. A doppler log is utilized for speeds. A full set of traditional navigation equipment is maintained onboard.

RADAR - Two Furuno marine radar are carried; an S band (10 cm) and an X band (3 cm). Radar consoles are located on the bridge. Do not touch this equipment without permission of the mate on watch. One Furuno X-band science radar is located in the electronics/computer lab for ocean waves data collection.

HAND-HELD RADIOS - The ship normally carries portable VHF and UHF marine radios. They are used for internal communications and small boat operations.

HF/SSB COMMUNICATIONS - GMDSS radio suite carried aboard.

SATELLITE COMMUNICATIONS - HiSeasnet C-Band is the primary satellite communications system on board. In the best-case scenario, it is capable of 512kbps download, and 96kbps upload. This pipe is shared with other UNOLS vessels in the same ocean basin. Inmarsat FleetBroadBand L-Band satellite system is our backup. Coverage for FleetBroadBand is worldwide, whereas HiSeasNet is regional, dependent on satellite switchovers in coordination with the HiSeasNet staff on shore. Both systems are used primarily for internet, and can be used for VoIP. Additional bandwidth can be purchased, but must be arranged months before a cruise, usually requested during the pre-cruise meeting. If one wants to use the dedicated satellite phone service (FleetBroadBand calling cards), they can be purchased prior to a cruise. Contact World-Link (crewcall@wlnet.com) if you wish to purchase a card/PIN, and for pricing and instructions. The rates as of November 24, 2014 were as follows: Crew cards for FBB = USD $24 for 31.25 minutes (USD $0.77 per minute). Please contact World-Link for further conditions and restrictions.

This ship has Internet, but it's not like the Internet you have at home. We make our Internet connection using multiple satellite and cellular systems, none of which are as fast as you're used to. We're making every effort to provide the best Internet experience possible for everyone aboard sharing our connection.

We've implemented the following measures to make Internet usage equitable for everyone on the ship:

- Each user on the ship receives a network account with a daily data quota.
- The username associated with the account is the same as your email address up to the @ symbol.
- To access the Internet, log in to a captive portal webpage.
- You can also check your daily data usage from a webpage.
- Connect to the Internet on one device at a time. Log out from the device before logging in with another.
- Log out from the Internet when you aren't using it to reduce unintentional background usage.

Additionally, there are some public-use computers with unlimited data usage.

Certain websites and services that use a lot of bandwidth aren't available:

- Streaming audio/video (e.g., YouTube, Vimeo, Pandora)
- VoIP applications (Skype): The ship provides VoIP capability.
- Cloud-based services (iCloud, DropBox, GoogleDrive, Microsoft OneDrive)
- Software auto-updating (Windows Update, Apple Software Update)

You're welcome to use off-ship POP or IMAP mail servers to read mail (careful with large attachments)

We recommend that you do the following before you reach the ship:

- Download and bring with you large files (manuals, software, drivers), particularly drivers for shipboard printers.
- Install and test critical software on the computers you're bringing to the ship, ahead of time.
- Ensure that your applications do not require a persistent Internet connection (Office 365, some MatLab licenses).
- Sync your email archives to your local device, and limit the size of messages to download.
- Download a web browser plug-in that allows you to turn off images when they're not necessary.

When you're aboard the ship:

- Ensure that your devices do not auto-update or auto-backup to off-ship servers.
- Use low-bandwidth mobile websites instead of the full sites.
- Use shipboard email, which won't count against your daily data allocation.

Don't worry if you don't know how to do this; we can help: sts-cr@ucsd.edu .

SEARCH LIGHTS - There are two installed search lights to facilitate certain operations at night.

SPEED LOG - (See DOPPLER LOG in Section IV.)

VHF COMMUNICATIONS - (See HAND-HELD RADIOS in this section.)

Section 7: Safety

BOATS AND LIFERAFTS - The ship carries eight automatic-release, self-inflating liferafts. They are in cradles on the 02 deck forward, four on each side. The forward-most carries 16 people while the after three carry 25 persons each. The rafts are numbered 1-8 with the even numbers on the port side and the odd on the starboard. All personnel aboard are assigned to one of the liferafts (see station card attached to your bunk for raft assignment).

There is a rescue boat located on the starboard side. This boat can be quickly deployed and would be used by the Rescue Squad in an emergency, such as "man overboard". Please do not tamper with this or any other safety equipment. If you have questions about any of the equipment ask a crew member.

EMERGENCY DRILLS - A fire and abandon ship drill must be held within 24 hours of leaving port and once every seven days thereafter, by Coast Guard regulation. Fire and abandon ship station bills are posted throughout the ship. Individual billet numbers and responsibilities are posted on small cards near each bunk. For convenience individual billet numbers also correspond to cup and glass numbers. There are two U.S. Coast Guard-approved "personal flotation devices" (lifejackets) in each stateroom for the occupants. Additional lifejackets are stored in the labs. Upon room assignment, all scientists should familiarize themselves with their fire and boat stations, memorize their billet numbers, and learn where their lifejackets are stored and how to wear them properly. Lifejackets are to be worn during all drills.

With the captain's permission, the chief scientist may assign a "skeleton watch" to remain in the lab during fire and boat drills. Proper dress (i.e., long pants, hats, shoes, shirt, etc.) is required at all drills. Bare feet, flip-flops, and shower shoes are unsafe on deck.

Life rafts are for emergency use only. *Roger Revelle* carries 64 cold water survival suits, which are in the staterooms.

MEDICAL MATTERS - The ability of the ship to handle medical emergencies is limited. There are first aid kits, a stocked sick bay, officers have limited first aid training and help can be summoned by Internet. The best course of action is to prevent emergencies.

To this end:

- Do not try to disguise or pass over any abnormal conditions you may have, especially any which might erupt suddenly and require treatment.
- Prevent injuries by thinking safety all the time. Watch for dangerous situations - fix them or bring them to the attention of someone who can.

Roger Revelle currently has Medical Advisory Systems contracted to provide medical assistance via Internet.

PERSONAL FLOTATION DEVICES - You will find your lifejacket in your assigned room. It should be equipped with a whistle on a lanyard and a waterproof light. All lifejackets also have reflective patches attached front and back near the shoulders. Lifejackets are important safety devices; they should not be left about the ship, used as cushions or pillows, etc. If there is a problem with your lifejacket or it is missing notify the mate on watch who will make arrangements to take care of the problem. Work vests are provided by the ship and are located in a locker in the aft section of the main lab. These vests

must be worn when the safety lines are down or if you are involved in over-the-side handling of equipment.

A limited number of "mustang" cold-weather work suits/PFDs is available, as is a limited supply of foul weather gear.

SHIPBOARD SAFETY - Seagoing operations are by nature hazardous. Strict compliance with safety at-sea precautions is necessary to prevent injury to personnel and damage to the ship.

There should be someone in the lab whenever deck evolutions are being conducted to maintain the communications link between the lab, work site on deck, and bridge. Deck evolutions should be discussed well in advance whenever possible with safety and efficiency foremost. The bridge should be informed of all deployments before anything is put over the side and then deployed only from the designated place. At night or during heavy weather no one should go out on the working deck without informing the bridge. Permission must be obtained from the bridge prior to turning on any deck lights or operating any equipment on deck. Work vests shall be worn by everyone on the working deck whenever the lifelines are down. Safety is everyone's business.

Hard hats are required for any over head operations (e.g., crane lifts, over-the-side deployments, etc.).

Due to vessel motion in heavy seas, the scientific party members should insure that all of their equipment is securely lashed down and properly stowed. It is the chief scientist's responsibility to insure that this task has been accomplished. If you see any items not secured properly and are in doubt as to how to stow or lash it down, ask the resident technician or any crew member for assistance.

A shipboard fire is the most dangerous and most prevalent hazard encountered at sea. It is also a hazard that can be easily prevented by common sense and simple precautions. Careless smoking habits are responsible for the majority of shipboard fires. Remember: while at sea, you can't run away from a burning ship.

Keep all doors and hatches secure at all times. Either latch it open with the hook supplied or close it tight. Never allow doors or hatches to swing freely with the roll of the ship. Be aware of air conditioning boundaries and leave these doors shut at all times. When opening and closing doors, be courteous to sleeping shipmates and do not let the door slam shut.

Stand clear of all wires, ropes and blocks which are under stress. Do not handle any moving wire or rope.

Pick up, clean up, and securely stow all loose gear after each use. Do not walk away from any piece of loose equipment--even if it is not yours, tie it down.

Wear proper shoes when working on deck. Sandals or other flip-flop type of footwear which cannot be securely fastened to one's feet are unsafe and will not be tolerated for deck work.

MAN OVERBOARD - If someone has the misfortune to fall overboard, first pass the word to the bridge, "MAN OVERBOARD," designating which side if possible. Next throw one of the strategically located life rings over the side to mark the spot and provide flotation. At all times, you should keep your eyes on the person;it helps if you point to the victim. This assists the bridge and other watchers in keeping the person in sight. If underway, the bridge watch will maneuver to keep the props clear and recover the person, or if circumstances permit, launch the rescue boat. The sound signals for MAN OVERBOARD are 3 long blasts on the general alarm and ship's whistle.

Section 8: Ship Organization

HOUSEKEEPING - Clean towels and linen are available at the beginning of the voyage. At the end of the cruise, bunks should be stripped and soiled linen taken to the place designated.

Bunks should be made up daily. Public heads and passageways are cleaned by the crew. The scientific party is responsible for cleaning science staterooms and heads and the laboratories. The responsibility of regularly sweeping out the laboratories is assigned by the chief scientist. All laboratories and scientific party rooms should be thoroughly cleaned before departing the vessel at cruise end. Cleaning gear is available throughout the vessel in cleaning gear lockers; if you can't find it, ask. Common courtesy calls for the scientific party members to pick up after themselves. Good shipmates leave their quarters or work areas cleaner than they found them.

Fresh water is a precious commodity at sea and must not be wasted. In ports, foul harbor water may prevent operation of desalinators, and the local fresh water may be unsafe to take aboard. Conservation of freshwater is therefore a must. Salt water should be used on deck when possible. "Navy" showers (i.e., rinse-soap-rinse, turning off water between times) should be practiced. Full washer loads make best use of water.

Washing machines, laundry soap, bleach, and dryers are available. They are used on a first-come-first-served basis. The only request is for users to do full loads of laundry so as to conserve fresh water. Laundry detergent is provided. A laundry sack is stationed in this area to collect soiled sheets and towels from the ship's supply. An iron is available.

The ship's sanitary system cannot handle cigar and cigarette butts, sanitary napkins, etc. Please dispose of such items properly.

Although there is no standard for dress aboard, mature judgement and decorum are expected.

MESS HALL - The mess deck has seating for 30. This is only half of the full ship's complement, so personnel should not loiter during or immediately after meals. Watchstanders are customarily served first. Meal hours must be respected. Shirts and foot coverings are required at all times in the mess hall.

Meal hours at sea are:

- Breakfast: 0730-0815
- Lunch: 1130-1215
- Dinner: 1700-1800

The mess hall is cleared 45 minutes prior to and after meal hours to allow for setup and cleanup. Messing is cafeteria style. It is most important that all persons bus their own dishes and clean up after themselves. When stores arrive at the ship, all hands help load.

Except in extraordinary circumstances, meals are to be eaten in the mess, not in labs. If it is necessary to bring food into labs for important science operational reasons, bus the dirty dishes and scraps back to the mess area afterward; do not use the lab trash containers.

Cups and glasses disappear at sea. Therefore, everyone is assigned a coffee cup and a drinking glass, marked with their berth number. Use your own, only. If yours disappears, please look for it before asking for a replacement; there may not be one. The chief scientist should work out with the captain any special eating schedules for scientific watchstanders and station times.

SHIP'S CREW - The complement of 21 is the captain, 3 mates, the boatswain, 3 able seamen, 1 ordinary seaman, the chief engineer, 3 assistant engineers, 1 electrician, 4 oilers, 1 wipers, and 2 cooks.

The mates are the officers of the watch. The duty station for all operations, including station work, is the bridge, since fantail and other weather decks may be monitored from the bridge wings.

The assistant engineers and the electrician, if necessary, man the watch in the engine room. When winches are required for station work, call the bridge to arrange for a winch operator.

The electrician is primarily a "day-worker," unless included in the engine room watch rotation.

The boatswain also is a "day-worker," responsible for general ship upkeep. The able seaman on watch assists him or the officer of the watch, as required, and the A.B.'s and ordinary seaman are primarily responsible for daily cleaning of the ship.

The boatswain will operate the ship's heavy cranes if requested. Otherwise, the resident technician performs this task. Smaller cranes (Morgan) are normally operated by members of the scientific party, but only after training by the resident technician.

If assistance from any crew member is needed by the scientific party, it is recommended that such requests be routed through the officer of the watch. Requests for a winch operator should always go to the bridge.

It should be kept in mind that requests for after-hours work by any of the crew are treated as overtime, and should not be placed unless urgently needed, and then through the captain or chief engineer as appropriate.

Section 9: Scientific Berthing Plan

BERTHING - The scientific berthing is 37. This assumes 1 person in the chief scientist room, and 2 people in each of the remaining 18 rooms. One of the bunks in room 02-42-6 has a fold-down pullman berth. Rooms 2-40-2 and 2-40-1 are permanently assigned to the computer technician and resident technician, respectively. Except where indicated, all rooms share an adjoining head.