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Subj: APPROVED TOP LEVEL REQUIREMENTS (TLR) FOR AN OCEANOGRAPHIC RESEARCH SHIP (AGOR 23)

Encl: (1) Oceanographic Research Ship (AGOR 23) Top Level Requirements

1. Purpose. To issue the approved Top Level Requirements for the Oceanographic Research Ship (AGOR 23) Class.

2. Applicability. These Top Level Requirements are applicable to the Oceanographic Research Ship (AGOR 23) Class.

3. Discussion. A rigid cost constraint of \$33M applies to this ship program. Therefore, changes to these Top Level Requirements must be kept to a minimum, and any change which would result in a costly or time consuming impact on the ship's construction must be fully justified. Proposed changes to the characteristics of this ship shall be submitted to the Chief of Naval Operations (OP-006).

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OCEANOGRAPHIC RESEARCH SHIP, AGOR 23

TOP LEVEL REQUIREMENTS

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1. OVERVIEW

1.1 Objectives and Scope

a. This document specifies the Top Level Requirements (TLR) for an Oceanographic Research Ship (AGOR 23), procurement of which is planned for FY 87. Included are the ship's mission, operational requirements, major configuration constraints, the plan for use, the maintenance concepts, the supply support concepts and minimum operational standards.

b. The objective of the AGOR 23 Ship Acquisition Program is to acquire an oceanographic research ship to meet worldwide ocean research and data collection requirements.

c. The format of this TLR has been developed in accordance with the requirements of OPNAVINST 9010.300A. The TLR documents ship requirements as they are developed and refined throughout the design phases of a ship acquisition program. After this TLR is issued, serialized changes will be made to issue any changes to these requirements.

1.2 Constraints

a. An Initial Operational Capability (IOC) of FY 91 or earlier is required. A program cost cap of \$33M for one ship was established.

b. The provisions of the body of this document are to be regarded as objectives. Appendix A of this TLR provides a comparison between these desired objectives and a set of minimum requirements which may meet the cost budgeted constraint. These minimum requirements will be set forth in the Circular of Requirements as the minimum acceptable performance. The Contractor's ability to enhance ship performance features will improve his or her competitive position.

c. If the provisions of this TLR cannot be met, the Commander Naval SEA Systems Command will so advise the Chief of Naval Operations (OP-006).

1.3 Design Guidance

The AGOR 23 is to be built to commercial standards and shall comply with all the applicable laws of the United States and the requirements of the regulatory bodies, American Bureau of Shipping (ABS), 46 CFR Subchapter U (Oceanographic Ships), Public Health Service and Federal Communications Commission, in force at the time of delivery. The ship shall be classified by ABS to (MALTESE CROSS) A1 E(CIRCLED), (MALTESE CROSS) AMS, (MALTESE CROSS) ACCU, and Class C ice strengthening.

Design shall include emphasis on economy of operation. Because of limitations of potential operating institutions' berthing facilities, the ship shall not exceed a draft of 17 feet and a length overall of 275 feet. Compliance with the General Specifications for Ships of the U.S. Navy, NAVSEA Technical Manuals, or other military requirements, is not required except as noted here.

2. MISSION STATEMENT

2.1 Mission

The mission of the Oceanographic Research Ship (AGOR 23) is to provide general purpose oceanographic research capabilities in coastal and deep ocean areas. Typical scientific missions will include:

- Physical, Chemical and Biological Oceanography
- Multi-discipline Environmental Investigations
- Ocean Engineering and Marine Acoustics
- Marine Geology and Geophysics

In addition to these scientific roles, the AGOR 23 will also be called upon to perform survey tasks (bathymetry, gravimetry, and magnetometry) in deep ocean and coastal areas.

2.2 Primary Tasks

To carry out the mission, the AGOR 23 shall be capable of performing the following tasks:

a. Oceanographic sampling and data collection of surface, midwater and sea floor parameters using state-of-the-art scientific instrumentation.

b. Launch, recovery and towing of scientific packages, both tethered and autonomous, including the handling, monitoring and servicing of remotely operated vehicles.

c. Shipboard data processing and sample analyses in modern well-equipped scientific laboratories.

d. Precise navigation and station keeping and track-line maneuvering to support deep sea and coastal surveys.

2.3 Secondary Tasks

The AGOR 23 has no wartime mission.

3. TOTAL SHIP REQUIREMENTS AND CHARACTERISTICS

3.1 Command, Control and Communications

Facilities shall be adequate for scientific and survey operations and shall include:

a. Ship handling and maneuverability to permit dynamic positioning, station keeping and the launch and recovery of large scientific packages and vehicles.

b. Manual and automatic steering control, tracking and position-keeping.

c. A pilot house location at or near amidships, including an aft-facing secondary ship control station with unobstructed view of the working deck areas aft. Bridge wings shall include gyro repeaters, rudder angle indicators and shaft RPM indicators. Satisfactory visibility from pilot house forward, from bridge wings forward and aft, and from the secondary control station aft, are required. Bridge wings shall be enclosed from beam to beam, as integral parts of the pilot house. The functions, communications, and layout of ship control must allow the close interaction of ship and science operations.

d. Communication, navigation, and IC systems as listed in Appendix B.

3.2 Acoustic Characteristics

a. The choice of shipboard hull and machinery systems, their location and their installation shall minimize interference with the operation of shipboard scientific acoustic systems. Echo Sounding systems shall be operated at frequencies of 3.5 and 12 KHz. Multi-beam hydrographic sonar will be operated at 12 and 36 KHz. The acoustic doppler current profiler will operate at 75, 150, or 300 KHz. The towed sidescan sonar systems will operate at 50 - 500 KHz. All sonars will operate at speeds up to 12 knots in SS4.

b. Airborne noise levels shall meet OSHA and USCG requirements. In addition, for the main weatherdeck (except when deck machinery is operating), speech communication must be possible over moderate distances without deck machinery in operation. Laboratories and interior scientific working spaces shall be sound insulated to maximize communication within these spaces.

3.3 Survivability, Including Passive Protection

a. Survivability provisions shall be in accordance with regulatory body requirements. The ship shall meet the stability requirements and criteria of the USN Design Data Sheet DDS 079-1 - Stability and Buoyancy of U.S. Naval Surface Ships. In lieu of the two compartment flooding requirements in DDS 079-1, for this size ship, a one compartment flooding requirement shall apply for damage stability calculations.

b. All radiators and receptors of electromagnetic energy and related electronics on the AGOR 23 shall be designed and installed to ensure electromagnetic compatibility (EMC) and to avoid hazards of electromagnetic radiation to personnel (HERP) and fuels (HERF). Automated control systems shall not respond spuriously to electromagnetic interference (EMI) from radiating sources or to transients on power lines.

c. The ship shall meet all applicable safety requirements of the regulatory bodies.

3.4 Mobility

A sustained operational speed of 15 knots is required. The ship shall be capable of 8,000 nm at 15 knots plus 29 days at 3 knots. A 10 percent fuel reserve shall be provided based on total fuel required.

3.5 Operating Environment

The AGOR 23 shall operate as required in unrestricted worldwide service, and perform its mission under a range of weather conditions from tropic to subarctic.

3.5.1 Temperature and Humidity. Habitability areas and mission essential spaces shall be air conditioned and shall be designed for a maximum external air temperature of 95 degrees Fahrenheit dry bulb, 82 degrees Fahrenheit wet bulb, with a maximum sea water temperature of 95 degrees

Fahrenheit, and a minimum external air temperature of 0 degrees Fahrenheit with a minimum seawater temperature of 28 degrees Fahrenheit. Heating and air conditioning for all laboratory spaces and interior scientific operations spaces shall be designed to provide 68-71 degrees Fahrenheit with maximum humidity of 55 percent. Other payload compartments, including scientific storage compartments, shall be designed to maintain 70-80 degree Fahrenheit dry bulb with maximum humidity of 55 percent.

3.5.2 Wind and Sea Conditions

a. Safe transit of the AGOR 23 at a sustained speed of 15 knots on all headings in seas up to 8.2 feet significant wave height (through Sea State 4), and at 6-10 knots on best heading in seas up to 19.7 ft. significant wave height (through Sea State 6), is required.

b. The ability to launch and recover scientific equipment while holding position, at best heading, in seas up to 13.4 ft. significant wave height (through Sea State 5), is required.

c. Provision for routine oceanographic operations to 13.4 ft. significant wave height (through Sea State 5) at best heading, and limited operations through 19.7 ft. significant wave height (through Sea State 6) are required.

3.6 Ship Utilization

The AGOR 23 will have an irregular deployment cycle. The AGOR 23 is expected to average 250 days per year at sea. Mission duration is 50-60 days.

3.7 Maintenance, Overhaul and Supply Support Concepts

Logistic Support

a. The AGOR 23 shall be capable of self-sufficiency for regular preventive maintenance.

b. The AGOR 23 shall be capable of limited emergency repair of hull structure and engineering casualties. Repair task areas include:

- (1) Limited repair of above-water hull structure.
- (2) Minor steering system and/or shafting repair.
- (3) Minor propulsion, auxiliaries and electrical repairs.
- (4) Substantial repair of scientific deck machinery and electronics.

c. Day-only, hover-only helicopter capability by commercial helicopters shall be provided for emergency medical and humanitarian evacuation.

d. The maintenance and overhaul concept for the AGOR 23 shall be consistent with post-delivery logistic support by an academic institution using U.S. commercial sources of supply.

e. Supply Support

(1) The AGOR 23 shall carry consumables for accommodation of 60 as follows:

Dry Stores	90 days
Frozen	90 days
Chilled	30 days
Medical	120 days

(2) Separate stowage spaces shall be provided for deck, engine, and steward stores.

3.8 Manning and Habitability

3.8.1 Manning. Manning shall be constrained to the accommodations stated here.

3.8.2 Accommodations. - The total berthing accommodations are as follows:

Single SR: 8 Officer (4 with private T/S)
 2 Scientist (private T/S)
 10 Staterooms

Double SR: 6 Crew (Semi-private T/S)
 14 Scientist/Technician (Semi-private T/S)
 20 Staterooms

The ship shall be capable of accommodating 10 additional scientists in deck vans. A public T/S (toilet/shower) shall be suitably located for van accommodations of 10 additional people.

3.8.3 Habitability Standards

Quarters for scientific personnel shall be comparable to those provided for ship's personnel. The common messing facility for all officers, crew and scientists shall include space for lounge, recreation and training. A hospital space and self-service laundry facilities are required.

3.9 Flexibility for Change, Including Space and Weight Reservations

a. Design and outfitting shall provide for rapid scientific payload changes and for ship turnarounds and redeployments. This includes optimum access to work and storage areas, and laboratory facilities to permit changeout of electronics and other laboratory internal equipment.

b. Service life allowance of five percent of full load displacement and 0.5 foot of KG shall be provided.

4. SUBSYSTEM REQUIREMENTS AND CHARACTERISTICS

4.1 Hull Form and Structure. The following specific capabilities and characteristics are required:

a. The ship shall comply with ABS Class C ice strengthening.

b. The ship shall have a hull shape to minimize hull induced flow noise and bubble sweep down effect on hull mounted acoustic systems.

4.2 Propulsion System. The following specific capabilities and characteristics are required:

a. The prime movers shall be diesel engines, using marine diesel fuel.

b. Thrusters of sufficient size to meet the station keeping requirement shall be provided.

c. The machinery plant shall be capable of continuously variable ship speed control (0-15 knots) without switching systems.

d. Economy of operation shall be considered during the design.

e. The machinery spaces shall be designed for unattended operation. An air conditioned central machinery control space shall be provided for operation and monitoring of propulsion and auxiliary machinery and systems.

f. Pilot house ship control system shall permit control of main engine speed and direction and control of thrusters.

g. An integrated electric drive is desirable.

4.3 Electric Plant

Scientific power demand shall include:

a. Clean power bus for laboratories, 40 va per sq.ft., not to exceed 100kW total,

b. Winches (300 hp maximum operation at any time)

c. Cranes (100 hp)

e. Seismic air compressors (600 hp)(operated in tow mode only)

f. A-frames (25 hp)

g. Echo sounding systems (10 kW)

4.4 Command, Surveillance, and Scientific Mission Requirements

a. Appendix C provides a list of Mission Sponsor Equipment Sources. As indicated, certain of the scientific equipment will be procured and installed by the operating institution under ONR contract. A list of possible specific manufacturers and models will be provided for use of the offeror in providing for space and electric power.

b. A dynamic positioning and track following system will be provided.

c. The following scientific facilities shall be provided and, where practical, are to be located contiguous to one another in the area of the ship which experiences the least motion in a seaway.

(1) Deck - Working Area: 3500 sq ft minimum total fantail working deck area including a minimum 12 feet x 100 feet contiguous deck edge area on one side. In addition, area on main deck or upper level for up to four 8 ft by 20 ft ISO standard laboratory or berthing vans with direct access to the ship's interior shall be provided. Non-standard vans covering 600 sq ft shall be accommodated. Working deck unit loading shall be 1500 lb/ft². Working deck shall be 6 feet to 10 feet above the water line. Two exceptions to this are unique two-working deck monohull designs and SWATH designs with centerwells. Both of these designs may have working deck heights above these limits. All hatches on the working deck shall be flush type hatches. A disposable load of 100 tons shall be accommodated. SWATH design must include a centerwell 30 feet long by 15 feet wide.

(2) Laboratories: Approximately 2,700 sq ft of laboratory space for the main laboratory, Hydro laboratory and Wet laboratory shall be located contiguous to sampling areas. An enclosed experiment staging bay with 10' wide access and 15' clear headroom shall constitute part of this space and shall be provided adjacent to the working deck and Hydro laboratory. An additional 1300 square feet of deck space shall be provided for a bio-chemical analytical laboratory, an electronics/computer laboratory, a darkroom, a climate-controlled chamber (8' x 8' x 10') and a freezer (8' x 8' x 10'). Provisions for handling and storage of hazardous material shall be included adjacent to laboratory areas. Chemical laboratory hoods will be provided in the wet laboratory and bio-chemical laboratory.

Rapid rearrangement and flexibility will be maximized by laboratories being equipped with flush-deck bolt-down fittings on two foot centers and through the use of unistruts on overheads and bulkheads. Laboratory cleanliness is a major objective. Materials which permit

achievement of this objective will be used in the construction of these spaces. Furnishings, HVAC, doors, hatches, cable runs, and fitting will also be planned for maximum lab cleanliness. These spaces should have 9 to 11 air changes per hour and a filtered air supply provided to the Analytical Laboratory. Laboratories will be furnished with 110 and 220 volt AC power. Uncontaminated sea water and fresh water, and clean-oil free compressed air supplies with appropriate drains will be provided in each lab space.

(3) Scientific Storage: Two to four storage compartments with a combined total of 15,000 cu ft (135 tons) accessible to laboratories.

(4) Other Scientific Spaces: A library/conference room is required. A separate science office is also required.

(5) Overside Handling. Handling gear to accommodate overside operations shall include the capability to carry, launch, and recover over-size equipment on one side from midships to stern, including a 100-ft core sampler.

(6) Deck Equipment. A suite of modern cranes, winches, stern A-frame and other deck gear shall be provided to permit loading and unloading the ship without assistance and to support a variety of oceanographic operations at sea, such as coring, water sampling, equipment implantation, and array and trawl towing. These equipments will be located throughout the working deck areas during the ship's life. Electric power shall be provided to the deck machinery alternative locations.

d. A dynamic positioning and precision track-line system will be installed. This system consists of two Global Positioning System (GPS) receivers (primary and spare), a precision time-keeping capability and deep ocean transponders. Dynamic positioning and precision track-line system will continuously maintain position within 300' radius at best heading with

2 knot current, 27 knot wind and Sea State 5. The track-line shall be maintained within plus or minus 300 feet at 2-1/2 knots with a 10,000 lb towing force, over any bearing (heading may vary), in the same environment.

e. Ship shall be capable of continuous tow of large scientific packages up to 10,000 lb tension at 5 knots, and 20,000 lbs at 2.5 knots.

f. Flush deck boltdown fittings shall be provided in a uniform grid pattern on 2-foot centers over the entire area of the working deck staging area and van tie-down area.

4.5 Auxiliary Systems

a. The following specific capabilities and characteristics are required:

(1) Fresh water making capacity shall consist of a minimum of two units, each capable of providing in excess of 60 gallons per day per accommodation. Stowage for not less than 120 gallons of potable water per person shall be provided. An additional 10 percent capacity and storage shall be provided for lab use.

(2) A clean ballast system will be provided. Dirty ballast shall not be permitted in any loading condition. Liquid ballast operations shall avoid partially full tanks in any hydrophone area.

(3) All overboard discharges shall be configured to restrict discharge to one side of the ship.

(4) An uncontaminated seawater system shall be provided on the alternate side of the ship. Material for this system shall not contribute to biological or chemical contamination.

b. The pollution emanating from the ship shall be limited. A shipboard sewage system, including transfer system, marine sanitation devices, and holding tanks with 24 hour capacity shall be installed. Oily waste separation equipment shall be provided.

c. A workshop shall be provided for both ship and scientific use equipped with industrial sized equipment including lathe, drill press, grinder, milling machine and welders electric and gas.

d. The stack shall be arranged to minimize airborne pollution of the shipboard environment.

e. Laboratories, working deck stations, and van installation sites shall be provided with appropriate services.

4.6 Outfit and Furnishings. Shall follow USCG requirements, and commercial standards.

4.7 Armament. Not Applicable.

4.8 Other. SWATH design shall provide a minimum 15 foot by 30 foot center well.

APPENDIX A

AGOR-23 REQUIREMENTS - MINIMUM AND PRIORITY ENHANCEMENTS

<u>Priority of Characteristics</u>	<u>Minimum Requirement</u>	<u>Enhanced Requirement</u>
1. Sea Keeping (On Station)	<ul style="list-style-type: none"> 0 kts/SWH 12'/B.H. 	<ul style="list-style-type: none"> Same
2. Sea Keeping (Slow Speed)	<ul style="list-style-type: none"> 6 kts/SWH 12'/B.H. 	<ul style="list-style-type: none"> 6-10 kts/SS6(SWH 20')/B.H.
3. Acoustic Characteristics and Systems	<ul style="list-style-type: none"> No interference with operation of hull mounted systems at 3.5, 12 and 36, and 50-300 KHz up to 12 kts at SS4(SWH 8'). 	<ul style="list-style-type: none"> Same
4. Station Keeping	<ul style="list-style-type: none"> 300 ft Radius/B.H./wind 27 kts/current 2 kts/SS5(SWH 12'). 	<ul style="list-style-type: none"> Same Trackline within 300' at 2.5 kts/B.H./wind 27 kts/current 2 kts/SS5(SWH 12').
5. Sea Keeping (Transit)	<ul style="list-style-type: none"> 12 kts SWH/8' 	<ul style="list-style-type: none"> 15 kts/SS4(SWH 8')/A.H.
6. Sustained Speed (Calm Water)	<ul style="list-style-type: none"> 12 kts 	<ul style="list-style-type: none"> 15 kts
7. Laboratory Area	<ul style="list-style-type: none"> 3,200 FT² total. 2,000 FT² (3 labs) contiguous to work deck. 	<ul style="list-style-type: none"> 4,000 FT² total. 3 Lab areas (2700 FT² total) contiguous to working decks.

Symbols: A.H. = All Headings
 B.H. = Best Headings
 SWH = Significant Wave Height

APPENDIX A
(Continued)

AGOR-23 REQUIREMENTS - MINIMUM AND PRIORITY ENHANCEMENTS

Priority of Characteristics	Minimum Requirement		Enhanced Requirement
	Minimum Requirement	Enhanced Requirement	
8. Accommodations	<ul style="list-style-type: none"> ● 30 scientific ● 20 crew (min) ● 10 single and remainder double staterooms ● 10 additional in 2 deck vans. ● Library/Conference Room ● Science Office. ● Mess/Lounge Area 	<ul style="list-style-type: none"> ● Same 	
9. Ship Control	<ul style="list-style-type: none"> ● Good visibility of working deck areas from bridge control station. 	<ul style="list-style-type: none"> ● Same 	
10. Integrated Electric Drive	<ul style="list-style-type: none"> ● Continuously variable 0-6 knots (electric) 5-12 knots (diesel) 	<ul style="list-style-type: none"> ● Continuously variable speed 0-15 knots. (No system switch) 	
	<ul style="list-style-type: none"> ● Permitted 	<ul style="list-style-type: none"> ● Required 	
11. Scientific Storage	<ul style="list-style-type: none"> ● 13,000 FT³ total in 3 locations. 35 tons total. 	<ul style="list-style-type: none"> ● 15,000 FT³ total in 2-4 locations. 135 tons total. 	
	<ul style="list-style-type: none"> ● 8,000 nm at 12 kts plus 29 days at 3 kts on station with 10 percent reserve 	<ul style="list-style-type: none"> ● 8,000 to 12,000 nm at 12 kts plus 29 days at 3 kts with 10 percent reserve 	
12. Endurance	<ul style="list-style-type: none"> ● 8,000 nm at 12 kts plus 29 days at 3 kts on station with 10 percent reserve 	<ul style="list-style-type: none"> ● 8,000 to 12,000 nm at 12 kts plus 29 days at 3 kts with 10 percent reserve 	

APPENDIX A
(Continued)

AGOR-23 REQUIREMENTS - MINIMUM AND PRIORITY ENHANCEMENTS

Priority of Characteristics	Minimum Requirement	Enhanced Requirement
13. Working Area Deck	<ul style="list-style-type: none"> ● Total fantail working area of 3400 FT² including a minimum 12' X 100' contiguous area on one side. 	<ul style="list-style-type: none"> ● 3500 FT² total fantail working deck area including a minimum 12' x 100' contiguous area on one side. ● Deck area for 4 vans (8'x20') on main upper deck with direct access to ship interior. ● Same ● Centerwell 15'x30' (SWATH only).
14. Towing Capability	<ul style="list-style-type: none"> ● 10,000 lbs at 5 kts ● 20,000 lbs at 2.5 kts 	<ul style="list-style-type: none"> ● Same
15. Marine Geology & Geophysical Mission	None	<ul style="list-style-type: none"> ● Electric power for 600 HP compressor
16. Electronic I.C. System	None	<ul style="list-style-type: none"> ● Serving all operating spaces, labs, public spaces, working deck stations and van stations.

APPENDIX B

SHIP'S COMMUNICATION, NAVIGATION AND IC SYSTEMS

1. Infrared Facilities

None

2. Transmitting/Transceiving Facilities

- a. (1) 1.6-30 MHz LSB, USB, AME, A3A, CW, FSK (125W PEP)
- b. (1) 2-23 MHz, AM, USB, CW, RTTY, 1 KW
- c. (2) 156-158 MHz F3 (25W)
- d. (1) 1.5-1.6 GHz INMARSAT (MCS 9100)

3. Receiving Facilities

- a. (1) 10 KHz - 30 MHz All Emissions

4. Terminal Facilities

None

5. Radar Facilities

- a. (1) 10 CM Surface Search Radar
- b. (1) 3 CM Surface Search Radar
- c. (1) Collision Avoidance System

6. Sonar Facilities

- a. (1) Deep Echo Depth Sounder with Record Capability (Navigation)
- b. (1) Shallow Depth Echo Sounder with Flasher (Navigation)
- c. (1) Doppler Speed Log (Dual Axis)

7. Countermeasure Facilities

None

8. Navigational Facilities

- a. (2) Gyrocompass (MK 37)
- b. (1) SATNAV (GPS Capability with Remote) 4 Channel
- c. (1) Loran C (with Remote and Plot)
- d. (1) Automatic Radio Direction Finder
- e. (1) Dynamic Positioning System

9. Radiac Facilities

None

10. Remote Station Facilities

- a. Wheel House
 - (1) Radar Display/Control of 10 CM Radar (16 inch)
 - (1) Radar Display/Control of 3 CM Radar (16 inch)
 - (1) Control of Collision Avoidance System
 - (1) Echo Depth Sounder Display
 - (1) Remote Display from Scientific Lab Loran C
 - (1) Control of Dynamic Positioning System
 - (1) Anemometer Readout

- b. Chart Room/Communication Room
 - (1) Display/Control of Echo Depth Sounder
 - (1) Display/Control of Doppler Speed Log
 - (1) Display/Control of Automatic Radio Direction Finder
 - (1) Control/Display of Weather Facsimile
 - (1) Control/Display of Loran C
 - (1) Control/Display of SATNAV
 - (1) Control of Radio Facilities
 - (1) INMARSAT Terminal
 - (1) Anemometer Readout
 - (1) Display from Scientific Lab Loran C

- c. Scientific Laboratory (Main Lab)
 - (1) Remote Display from Ship's Echo Depth Sounder
 - (1) Remote Display from Ship's Doppler Speed Log
 - (1) Remote Display from Ship's Loran C
 - (1) Remote Display from Ship's SATNAV
 - (1) Gyro Repeater
 - (1) Remote Control System Dynamic Positioning System
 - (1) Loran C
 - (1) Anemometer Readout
 - (1) Remote from INMARSAT

11. Meteorological Facilities

- a. (1) Weather Facsimile Converter/Recorder
- b. (2) Wind Direction Equipment (Anemometers) with Readouts (Wheel House, Chart Room, Main Laboratory)

12. Supplementary Facilities

Not Applicable

13. Special Facilities

- a. (1) Lifeboat Radio
- b. (2) EPIRB
- c. (1) SOLAS Emergency Watch Receiver (2182 KHz)

14. IC Facilities

- a. Electronic IC System serving all operating spaces, labs, public spaces and working deck stations, and four van stations.

APPENDIX C

AGOR-23 MISSION SPONSOR EQUIPMENT SOURCES (DRAFT)

<u>Item</u>	<u>COR¹</u>	<u>GFE²</u>	<u>TRANSFER OR FUTURE³</u>
1. Two Large Deck Cranes	X	---	---
2. Two HIAB Articulated Cranes or Equivalent	---	X	---
3. Stern A-frame (large)	---	X	---
4. Side AT-frame or U-frame	---	X	---
5. One Hydro Winch	---	X	X (one)
6. One Trawl/Coring Winch	---	X	---
7. One Deep Tow Winch	---	---	X
8. Sea Beam System	---	---	X
9. One 12 KHz 3.6 KHz Depth System	---	X	---
10. Doppler Profiling System	---	---	X
11. Dynamic Positioning System (Honeywell or Equivalent)	---	X	---
12. Two Vans	---	X	---
13. Cabinetry for Labs, 200 ft.	X	---	---
14. Lab Hoods, Two	X	---	---
15. Uncontaminated Sea Water System	X	---	---
16. Refrigerated and Climate Chambers	X	---	---
17. Data Communication System	---	---	X
18. SATNAV and Two GPS Systems	X	---	---
19. VAX 11/750 Computer System	---	---	X
20. SAIL System	---	---	X
21. Wire and Cable (one each, 3 sizes)	---	X	---
22. Diving Locker Outfit	---	---	X
23. Two Inflatable Boats	---	X	---
24. Clean Power System, (100 kw)	X	---	---
25. Photo Lab Outfit	---	X	---

NOTES:

- 1 Equipment specified in the Circular of Requirements which will be installed during construction.
- 2 Government Furnished Equipment which will be procured during construction and installed after construction.
- 3 Equipment which will be refurbished and installed after construction.

(For Equipment to be installed after construction technical data (Form, Fit, Function) will be provided by Office of Chief of Naval Research.)