Advisory Council Meeting
July 14, 15, 1988
Carriage House, Quissett Campus
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts

Advisory Council members, representatives from ONR, NOAA, and NSF and observers/presenters from JOI, Inc., Lamont-Doherty Geological Observatory, University of Texas, Austin, W.H.O.I. and Texas A&M University met at the Woods Hole Oceanographic Institution. The meeting was called at 8:00 a.m. by Art Maxwell, Chair. Items of business were addressed in the order reported herein, somewhat modified from the order in the advanced Agenda (Appendix I).

Attendees:

Advisory Council

Art Maxwell, Chair
Robertson Dinsmore
Tom Johnson
James Kennett
Robert Knox
Tom Malone
John Martin
Charles Yentsch
George Keller, UNOLS Chair

UNOLS Office

William Barbee

Observers

Keith Kaulum, ONR
Elizabeth White, NOAA
Larry Clark, NSF
Don Heinrichs, NSF
Lee Stevens, JOI, Inc.
John Dudley, L-DGO
Dennis Hayes, L-DGO
Paul Stoffa, UTIG
Richard Carlson, TAMU
Tom Hilde, TAMU
George Grice, WHOI

George Grice, W.H.O.I. welcomed the Advisory Council to Woods Hole, extended the Institution's hospitality and extended invitations to two social functions.

The Advisory Council accepted the minutes for the March 3, 4, 1988 Council Meeting, and directed that they be distributed to UNOLS members and funding agencies.

Fleet Management. Bob Knox, Chair of the subcommittee to review and recommend on program needs for research vessels during the period 1989-1991 reported on the status of his review and recommendations.

The charge to the subcommittee (see D. Heinrichs' letter to Knox dated May 26, 1988, Appendix II) and the Knox subcommittee's draft report had already been furnished to the Council. The draft report:

- examines funding expected for UNOLS ships in 1989, 1990 and 1991,

- gauges the match (or mismatch) between the anticipated funding and the cost of full fleet operation,

- makes general recommendations on mismatches.

Don Heinrichs, in messages to the subcommittee and later at the July 11 UNOLS Ship Scheduling meeting, had projected NSF funding for ship operations.

	1987	1988	1989
OFS, Ship Ops	$26.0M	$25.8M	$27.2M
ODP	1.5M	1.3M	1.2M
	$27.5M	$27.1M	$28.4M
1989 Funds used in 1988		3.3M	- 3.3M
		$30.4M	$25.1M
1990 Funds available for 1989			1.7M
Available for Ship Ops	**$27.5M**	**$30.4M**	**$26.8M**

It was noted that the $3.3 million from the FY1989 appropriation used to fund late CY-1988 operations was significantly more of such use of new fiscal year funds than had been necessary in past years. Circumstances leading to the 1988 situation were that deficit-reduction cuts to the ship operations budget came so late that both science and facilities programs had made commitments (to P.I.'s and operators) that had to be met. Further, retirement of the THOMPSON together with renovation of KNORR and MELVILLE had been expected to reduce 1989 fleet costs. **Don Heinrichs noted, however, that the amount of such "forward financing"**

would be reduced in 1989. (Hence only half as much 1989 use of 1990 funds is noted.) **In summary, much less NSF funding will be available for 1989 ship operations than was available in 1988. For 1990 and 1991, NSF expects appropriations about equal to those in 1989.**

The subcommittee's draft report provides a gloomy outlook. Funding shortfalls should be expected in both 1989 and 1991; 1990 would about balance. Best case scenarios for the three year period would result in a total deficit of about $1 million; even limiting the deficit to that amount would require a larger ONR program and more ship operations funding them in any recent year. **The draft concludes with recommendations that work should begin now to identify lay up candidates for 1990 and 1991. UNOLS and the funding agencies should be cautious about adding new capacity to the fleet, and should insist that new ships should be replacements, not additions. Unless additional fleet funding is found, scientific programs will have to adjust to the current fleet size (or less).**

The Advisory Council discussed the draft report and instructed that a smooth draft be developed and forwarded to Don Heinrichs and Keith Kaulum without delay. The Council also noted that in 1989 ONR ship ops funding is less than expected (and less than available). This is because 1989 science proposals to ONR have been much less extensive than expected.

Don Heinrichs noted that despite delays in funding WOCE, GOFS and other large programs, NSF still expects that Global Geosciences will result in high demand and enhanced levels of ship operations (during the 1990's).

Briefings on facilities for MCS investigations. Briefings had been arranged by representatives from L-DGO to describe their efforts to acquire the ship BERNIER for multi-channel seismic, marine geology and geophysics and general purpose oceanography, and by representatives from UTIG and TAMU on a proposal to establish an MCS and SeaMARC facility based on leasing state-of-the-art MCS ships.

Dennis Hayes and John Dudley began by reporting that Columbia University/Lamont-Doherty Geological Observatory had bought an option to purchase the ship BERNIER. L-DGO will submit a proposal to NSF for funds to acquire the ship and to modify it to provide general purpose oceanographic capabilities. Funding to buy would be spread over several years. Conversion for general purpose use would meet UNOLS science mission requirements, etc. If their proposal to NSF is successful, they would buy the BERNIER in late 1988, renovate/convert in mid-1989 and bring the ship on line in late 1989, as replacement for the CONRAD. Cross-decking of equipment as well as efforts to limit costs would dictate an

operational gap between CONRAD and BERNIER (length not yet determined).

L-DGO has a loan arranged by Columbia University to buy the BERNIER but needs the endorsement of the scientific community and a refinancing scheme to proceed. Acquisition costs would be about $10 million, $6.5 million to buy and $3.5 million to re-flag, modify and equip.

BERNIER is 240 ft. LOA, 42 ft. beam, 23 ft. draft, 2665 tons displacement, and 3150 HP. The ship is 4 years old, in excellent condition and well constructed. It would come with much valuable equipment for MCS and would be equipped using CONRAD's streamers, guns, etc. The ship is roomy, has high endurance, and has done extensive MCS work in harsh environments. BERNIER is ice classed at about the equivalent of ABS 1B.

L-DGO would propose to operate on a mission profile similar to CONRAD'S: about 60% MG&G, including up to 120 days/year MCS, the rest general oceanography.

Paul Stoffa, UTIG, Tom Hilde and Rick Carlson, both TAMU presented a concept for establishing a national facility for MCS (and other MG&G field investigations) based on leasing state-of-the-art ships from the commercial sector.

The leased ship would have general MG&G capabilities but would be primarily an MCS facility. Provision would be made for the TAMU SeaMARC system. Negotiations with at least two marine geophysical companies on the basis of about four months lease per year for five years suggest that the daily lease rate would be slightly higher than but competitive with BERNIER, CONRAD or even MOORE. (These comparisons included some data processing costs.) Presenters asserted that the slightly higher cost would be more than offset by the higher technology capabilities of leased ships, by flexibility of operation (lease would not be tied to a single ship) and by the commercial practice of guaranteed operational results. (You only pay if the system works.) The ships considered for leasing are about 270 ft. LOA, have tremendous compressor capacity, state-of-the-art arrays and data management/manipulation capability.

UTIG/TAMU will submit a proposal for a national multi-channel seismic facility as described. They would propose a management scheme analogous to that for ALVIN (ALVIN Review Committee, etc.).

Stoffa and colleagues suggested that the community could afford such a facility if the CONRAD and MOORE were retired and the BERNIER was not acquired. Dr Hayes stated that he did not make his presentation with the perspective of either BERNIER or a contract MCS facility.

The Council discussed both presentations with all of the L-DGO, UTIG and TAMU representatives and with funding agency representatives. The discussion ranged from earlier assessments of community MCS needs (e.g., NORPO recommendations) to NSF and ONR projections of MCS program requirements to effects of either proposal on other facilities. (Would acquisition of the BERNIER affect the Navy's AGOR-24? Unknown.)

Don Heinrichs announced that on receipt of either or both of the proposals NSF would request of UNOLS review and evaluation. These evaluations would be provided to NSF review panels called especially for these facilities proposals. The Advisory Council agreed in principle to the review process described, but cautioned that time was short and it would be difficult to secure on short notice people competent as reviewers.

George Keller had placed the issue of the RVOC policy paper on ship lay-ups on the agenda. The RVOC paper had laid out criteria for identifying individual ships as lay-up candidates and advanced a structure that might improve the efficiency of the lay-up process. Their paper had been circulated, received comments from the funding agencies and been partially adopted in the UNOLS scheduling process. (E.G., The formula for lay-up candidacy, based on 80% of a full operating schedule had been used at the last two scheduling meetings.) Agency comments had, however, rejected some parts of the suggested process as not achievable. It is necessary now to refine the suggested lay-up policy to something workable. After some discussion a group was formed to garner further suggestions and develop working procedures. The working group: Bob Dinsmore, Chair, Jack Bash, Tom Malone and George Shor.

George Keller and Art Maxwell presented a draft revision of the UNOLS Charter. Suggestions had been made at the October, 1987 UNOLS meeting to revise the Charter, and additional suggestions had been received from the main funding agencies based on earlier draft revisions (presented at the March, 1988 Council meeting). Brian Lewis, Art Maxwell, George Keller and Bill Barbee had then prepared a complete restructuring and redrafting of the Charter. This draft revision had earlier been distributed to the Council for their consideration. The Council reviewed the new draft in detail, offering changes, corrections and additions (some substantive, may editorial).

After agreeing on modifications the Advisory Council endorsed the UNOLS Charter, Draft Revision and directed that it be distributed to UNOLS members and presented for adoption at the October, 1988 UNOLS meeting.

Radioactive substance aboard UNOLS ships had again become an urgent issue for the Advisory Council at their August, 1987 meeting. Several recent cruises predicated on the use of radioactive substances had been jeopardized (although none were cancelled) because of difficulty in arranging for the use of radioactive materials on UNOLS ships. Tom Malone had agreed to investigate licensing and use of radioisotopes among UNOLS institutions and ships and to report back to the Council. His report (Appendix III) confirms that there is not sufficient uniformity among UNOLS institution policies, communication between user-P.I.'s and marine operators is sometimes not adequate and, in some instances, current procedures and policies are probably not adequate to assure safe use.

The report includes recommendations that UNOLS establish a committee of institution radiation safety officers, user-principal investigators and marine operators to devise a minimum set of standards, regulations and procedures for the transportation, use and disposal of radioisotopes among and on UNOLS vessels and institutions. These guidelines should include: procedures and guidelines for the transportation, storage, use and disposal of radioisotopes when operating both out of U.S. and foreign ports, an outline of the minimum information that must be provided to operators by prospective P.I.'s and advice to UNOLS and funding agencies on the facilities and technical support needed to conduct research using radioisotopes on UNOLS vessels.

After discussing the Malone report and various candidates for the committee the **Advisory Council accepted the recommendations and directed that Tom Malone prepare a charge for and form a subcommittee to prepare UNOLS standards and guidelines for the use of radioactive substances aboard UNOLS ships.** Dr. Malone agreed, noting that he would not be able to convene the group until early in 1989.

Funding agency reports.

Don Heinrichs, NSF/OCFS, reported that Larry Clark had been named Acting Manager for Ship Operations (in addition to his continuing responsibilities). Action has been initiated to fill the position permanently. He also noted that Lisa Lynch had recently been hired as Facilities Support Specialist in OCFS, the second professional position in Ship Operations.

Larry Clark provided from Ron La Count and Tom Forhan, both of NSF/DPP, a statement on the status of NSF/DPP efforts to acquire a research vessel with ice breaking capability. (The statement was included in UNOLS News, Volume 5, number 2, September, 1988. It is not appended here, because some critical changes have occurred.)

DPP hopes to have, under long term charter, a research vessel with icebreaking capability, available in 1990. Procurement specifications call for a vessel of about 300 ft. LOA, capable of breaking 3 ft. of ice at 3 knots. (This is similar to wind class USCG icebreakers.) DPP aims to arrange at least a six year charter, for an estimated $10 million per year. (Subsequent to the NSF/DPP statement, language in Congressional appropriations resulted in constraints concerning U.S. versus foreign construction.)

Don Heinrichs noted that UNOLS Ship Scheduling Groups were notified at their July 11, 1988 meeting **that proposals for 1989 Ship Operations would be due November 1, 1988 (a change from the earlier October 1 due date).** This schedule change was to accommodate later dates for science program panels. It is accompanied by OCFS assurance that proposals will be turned around promptly.

He also noted that appropriation language from both houses of Congress would protect both astronomy and ocean sciences programs for 1989, Ocean sciences would thereby receive an 8.2% increase to $146.52 million.

Although there has been no formal announcement, reviews have been completed of proposals to establish and operate an accelerator mass spectrometer center. The W.H.O.I. proposal ranked first. No award has been made because of budget stricture. The proposal advances (and these will be established) an AMS Advisory (or review) Committee (an analog to ARC).

Keith Kaulum, noted that ONR's funding and management of ships for academic ocean research is based on their plan for 5 ships in the UNOLS fleet. In 1992 the Navy will own five UNOLS ship: MOANA WAVE, KNORR, MELVILLE, AGOR-23 AND AGOR-24. (An outline of ONR's Fleet Status Projection together with other aspects of ONR fleet management is Appendix IV.) ONR/USN capitalization and modernization of the (UNOLS) oceanographic research fleet, 1987 through 1990, totalled $100.5 million. In addition amortization of investments (typically renovation or purchase of shipboard equipment/systems) for 1984 through 1991 totalled about $38 million (average 4.75M per year).

ONR also provided a breakdown of their 1988 funding for research vessel operations. They funded UNOLS ships for 583 days costing $6.33 million ($3.61 million from facilities funds, $2.72 million from science programs).

ONR was still trying to arrange to transfer title for the GYRE to TAMU. The THOMPSON was to go out of service in late October or November, 1988.

The contract for renovation of KNORR and MELVILLE was in place, and first funds (about $5 million) were transferred to W.H.O.I. during the first week in July. The contract had also been let for design and construction of AGOR-23, to Halter Marine for about $21 million. Hopefully, that contract level will leave about $6 million for enhanced scientific outfitting.

The Council was advised that NavSea will fund the University of Washington for participation in detailed design and construction oversight/inspection. However, to date they have resisted any and all UW suggestions for changes in arrangement and layout.

NavSea had terminated work on the SWATH-ocean design that had been proposed for AGOR-24. ONR's money for an AGOR-24 remained in the Navy's 1990 budget, and ONR had requested (so far, successfully) that this second ship be built to the Halter design (i.e., similar to AGOR-23) for the $38 million.

A summary of the proposal for overhaul and refit of AGOR-14 and -15 is Appendix V. The new KNORR and MELVILLE will be remarkably similar in size and appearance and mode of propulsion to AGOR-23.

LT. Elizabeth White, NOAA, announced that since Paul Wolf's short-notice resignation, John Carey was Acting Assistant Administrator for NOAA's National Ocean Service. That change together with the recent confirmation of the appointment of William Evans as Department of Commerce Undersecretary for Oceans and Atmospheres and Administrator, NOAA had resulted in real but manageable transition problems.

A Fleet Allocation Council has been reestablished in NOAA, and again has responsibility for assigning NOAA ships among programs (i.e., fisheries, charting and mapping, EEZ, research). During 1988, NOAA's Office of Marine Operations has been trying to reprogram to operate the class II ships FAIRWEATHER and RAINIER. Plans for 1989 are not yet final.

A bill has been introduced in the House of Representatives to extend and modernize the NOAA fleet. (The bill is related to a larger effort for revitalizing private U.S. shipyards.) The bill would expand the fleet to 30 ships by extending and upgrading 19, replacing 4 others and constructing 7 new ships. The program would extend from 1990 through 1999 at a total cost of $613 million. NOAA has been directed to develop plans in line with the bill.

Lee Stevens, JOI, Inc., made an information report on clearances for research in foreign waters and discussed the possibility of representing UNOLS interests at a meeting at

The Hague. Ocean Drilling Program operations share many clearance problems with UNOLS ships. (Regional surveys preceding drilling are a direct leak.) JOI sees great benefits in exchanging information or experience with the clearance process. (E.G., Problem countries, useful foreign contacts, recent successes, failures.) Informal surveys suggest that the clearance problem is becoming more cumbersome, and unless improved could soon seriously disrupt research schedules. Lee will represent the drilling program at a meeting at The Hague to work on international exchange of information on clearances. **He proposed to also represent UNOLS institutions, after first visiting key institutions to discuss with them recent experience, problems, etc.**

He also suggested the need for a permanent office to maintain an information base on foreign clearances, expedite the clearance process and, where possible, act as an advocate.

The Council discussed with Mr. Stevens the need for such a center and asked what mechanisms might be employed. After discussion **the Council agreed that Mr. Stevens should visit key UNOLS institutions, canvas them concerning experience with clearances and represent UNOLS at the meeting in The Hague.** The Council deferred consideration on supporting or participating in any clearance center.

Ship Scheduling. Bill Barbee reported on the UNOLS Ship Scheduling meeting held July 11, 1988. Individual ship schedules and cost information for 1988 and 1989 were gathered prior to the meeting, by electronic mail. This was successful for a first time effort. Comparing Summaries of Cost estimates from the operating institutions revealed a serious shortfall for 1989. (This even though THOMPSON will be deactivated and KNORR/MELVILLE will be out of service for more than a year total.) **Although the total estimated fleet operations costs would exceed available funding by only about $1.8 million, the NSF cost-funding shortfall is closer to $3 million.** Problems noted were that too many ship days had been proposed for NSF and too few for ONR. The reduction of 1989 NSF ship operations funds (noted earlier) was critical. Although ONR could have available up to $8 million for ship operations, only 426 days at $3.44 million are proposed. Both funding agency and institution representatives note that there are no more science proposals to ONR. The complete report for the July 11, 1988 Ship Scheduling meeting is distributed separately.

Don Heinrichs, expressed NSF concern over results of the meeting. Based on information available at the beginning of

the meeting **all ships in the fleet are candidates for lay-up except:**

MELVILLE (part year, refit)
WASHINGTON
ENDEAVOR
OCEANUS
WECOMA
POINT SUR
WARFIELD
MOANA WAVE (maybe).

The analysis was based on the RVOC criteria, modified for special circumstances. One problem is that the second set of panels this year will not be until August-September, so that many funding decisions are still pending. Uncertainties notwithstanding, **NSF will not be able to fund 1989 ship operations at the level estimated on July 11.** Don also noted that some institutions did not furnish their tentative schedules and cost estimates on time. This made an overall analysis difficult.

The Advisory Council and agency representatives discussed the July 11 meeting and means of improving the scheduling process. Consensus was that the meetings (and the process) didn't go far enough. There seems to be no organized effort to assess the overall fleet and individual ship schedules to improve overall effectiveness. (E.G., Eliminate inefficient transits, best match of project to ship, smooth out overbooked and underbooked ships.) Further, the process to develop and advance substantive recommendations (to shift projects, for lay-ups, etc.) is not apparent. **The Council urged the UNOLS Office to take steps to garner tentative schedule and cost information from UNOLS institutions at least a week before scheduling meetings, to provide a basis for a more sensible assessment process.** George Keller, UNOLS Chair, agreed to contact Ship Scheduling Group Chairs and urge them to assess overall and fleet schedules during the meeting and to formulate and announce scheduling recommendations as appropriate.

Bill Barbee reported on the ALVIN Review Committee meeting of June 20-22, and ALVIN program development. A tentative ALVIN/ATLANTIS II schedule was developed for 1989, for the period after ALVIN refit (about July). Disappointingly few ALVIN dive requests were received for work in the Atlantic. **The ARC recommended that a request for non-ALVIN work on the ATLANTIS II be scheduled during the period March-June.** (This is a JGOFS project.) Circumstances were that ALVIN would not be available in the early part of the period and, upon availability, ALVIN is not oversubscribed.

The ARC was concerned that demand for ALVIN seemed lower than in most recent years. Recent planning workshops have

not had high interest, and information for planning is hard to gather.

The ARC endorsed organization of a 25th anniversary ALVIN symposium and workshop, to be held during the first half, 1989 in Woods Hole. The workshop would consolidate and celebrate scientific accomplishments from 25 years of ALVIN and would provide valuable scientific direction for future programs.

Bob Dinsmore reported on the Fleet Improvement Committee.

Science mission requirements developed through UNOLS (FRC and FIC) for a variety of ships were being updated, edited and were to be published in a loose leaf format. Additional science mission requirements are being developed for a small general purpose RV, for a small SWATH and for a submersible research vessel.

An intermediate SWATH concept has been developed and was presented to FIC at their July meeting. The concept is very promising, its major drawback being too much pitch while laying to in head seas. The next step is to refine the concept design (addressing problems) and perhaps to do tank tests.

The preliminary design for a large general purpose monohull (the Scripps/Glosten Associates concept) has progressed to tank tests, and looks promising. Some results from computer tests of sea keeping have, though, been disappointing.

Art Maxwell noted that the Advisory Council had discussed a comprehensive review of composition, distribution, and management of the UNOLS fleet. The Council had undertaken such a review in 1982, and reassessed the fleet in 1985. They had agreed on reviews about every three years. Should the Council go further than the Knox report in terms of advice on fleet management? **The Council agreed that the Knox report should be considered complete and need not be followed up. They decided that at their next meeting they should address the structure (and a process) for a Council review of the composition, distribution and management of the UNOLS fleet.**

Bob Dinsmore reported on cruise assessments and provided a profile of reports received for the period January-June 1988. (Appendix VI). Reports had been received for 60% of all cruises scheduled. Of these, 88% were reported as fully successful, 10% partially successful and 2% marginally successful. Weather problems were reported on 19% of cruises reported, problems with ship or personnel on 23% and with science party/equipment on 14%. Problems did not, in all cases, detract from the success of a cruise. Some problems were cited concerning marine technicians.

The Council discussed the summary results and cruise assessment forms. Response to the forms was higher than expected and more useful. It was agreed that safety of operation should be made a part of Cruise Assessment forms.

Bob Dinsmore reported that two ships, LAURENTIAN and MYSIS had been inspected under the NSF/ABSTECH program. CAPE HENLOPEN, ISELIN and NEW HORIZON were scheduled for later in the year.

One striking aspect of the program is the excellent attention operators give to earlier inspection reports. Problems are noted and addressed. General condition of ships in the UNOLS fleet is improving. Science equipment, especially wire and monitors is improving. Cruise manuals are generally good, and material condition is excellent.

The inspection team will continue to emphasize training and safety.

Tom Malone tentatively outlined contents of the next UNOLS News, and projected publication date as September.

Discussion concerning the October UNOLS meeting and a Nominating Committee were deferred.

The meeting was adjourned at 12 noon, July 15.

AGENDA
Advisory Council Meeting
8:30 a.m.
July 14, 15, 1988
Carriage House, Quissett Campus
Woods Hole Oceanographic Institution
Woods Hole, MA

Call the Meeting - Art Maxwell

Accept Minutes of March 3, 4, 1988 Meeting - Distributed in advance.

Council Action Items:

Fleet Management - Three items for Council discussion, action:

1. R. Knox will report on results of his subcommittee review of ship needs/management recommendations for 1989, 1990, 1991.

2. Council will review the RVOC policy paper on ship lay ups along with comments from Heinrichs, Kaulum and Maxwell. Discuss issues and form a course of action that will address problems with suggested policy and progress toward adoption of some policy.

3. Art Maxwell will introduce for discussion the issue of alternative (to agency acquisition) mechanisms for acquiring new/improved ships into the academic fleet. L-DGO will make a presentation on the status of their efforts to acquire the BERNIER, their plans to provide MG&G and general purpose oceanography support, and their operating plans for the ship. Paul Stoffa, UTIG, will report on costs of leasing a variety of ships for oceanographic research. Council will pursue ideas as agreed.

Unols Charter Revision - George Keller and Art Maxwell will present draft of Revised UNOLS Charter, with rationale for changes made. Council will endorse, modify or recommend against.

Radioactive Substances Aboard UNOLS Ships - Tom Malone will present results of his review of UNOLS institution policies, procedures and practices concerning licensing, use and disposal of radio-active substances aboard UNOLS ships. Council will consider and act on his recommendations. (Note: Tom will not be at all of the meeting. May have to adjust time of this item.)

Funding Agency Reports - Agency reps will provide information and request UNOLS action as appropriate. E.G., Reaction to the Knox study; ship scheduling concern.

Information Reports:

Ship Clearances - Lee Stevens, report at the Hague.

Ship Scheduling - July 11 meeting

ALVIN Review - June 20-22 meeting.

Fleet Improvement - July 7, 8 meeting and other activities.

Cruise Assessments - Bob Dinsmore

Vessel Inspection - Bob Dinsmore

UNOLS News - Last issue, next issue.

UNOLS Meeting in October - Discussion of potential speakers, subjects. Strategy regarding Charter, etc.

Nominations - Formation of nominating committee. Up for election: UNOLS Chairman and Vice Chairman (incumbents, Keller and no one) together with two Advisory Council (incumbents Martin, Yentsch).

Other Business - As appropriate.

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

DIVISION OF OCEAN SCIENCES
OCEANOGRAPHIC CENTERS AND FACILITIES SECTION

May 26, 1988

Dr. Robert A. Knox
UNOLS Advisory Council
Scripps Institution of
Oceanography
A-030/UCSD
La Jolla, CA 92093

Dear Bob:

I would like the Advisory Council to provide an analysis of potential impacts and effects from the ongoing changes in the academic research fleet. This analysis should assume ship operations support from NSF will remain at the 1988 level of effort through 1991. ONR will need to provide their estimate of support levels for a comprehensive analysis.

I do not expect the Council to make recommendations for ship-specific actions such as lay-ups, retirements, etc in this status review. I am concerned that a number of items are coming together at this time that have significant short-term (and long-term) impacts on overall operations of the academic research fleet. I have listed below a number of questions/concerns that should be addressed. The Council should feel free to add additional items as appropriate.

Fleet Status Review - 1988

Ship Operations

NSF does not expect to increase its support for ship operations significantly from present levels in 1989 or 1990. Modest reductions in overall support levels may occur. ONR projects a larger fraction of funding on UNOLS ships.

Query: What impacts will this have on UNOLS ship scheduling and operations? Are lay-ups an issue?

Research Fleet Changes

The number of "large ships" (over 200 ft) in the Pacific will decrease in 1989 to 1991 timeframe (THOMPSON retired; MELVILLE refit). The number of "intermediate/coastal ships" will increase with the availability of the OSPREY.

The "large ships" in the Atlantic will decrease in 1989 (KNORR refit). The "intermediate ships" will decrease with the sale of the FRED MOORE. The GYRE will change ownership from Navy to Texas A&M.

The ONR Fleet Status projection (5 Jan 1988, Code 1121SP) shows the CONRAD and WASHINGTON being retired or transferred to another agency in 1991 and 1992. The new AGOR-23 is scheduled to come on-line in 1991 or 1992.

The University of Texas and Lamont are preparing a joint proposal to submit an "option bid" for the BERNIER -- a multichannel seismic ship owned by Petro Canada. The results of the bid procedure will not be known until June 21. If acquired, the BERNIER would be a replacement for the FRED MOORE, the CONRAD, or both. General comments on these possibilities are requested only. If a successful bid is made, NSF will request review by UNOLS and a NSF Panel based on the specific acquisition and operational proposal(s).

Query: Can projected research needs be met with available research ships in 1989-1991?

Is a short-term re-alignment of the research ships needed?

Will ONR five ship plan cause major problems?
Impact of timing of AGOR-3 retirements beyond THOMPSON?

What impacts will "revitalized" KNORR and MELVILLE coupled with AGOR-23 have on fleet planning and scheduling?

I apologize for this late follow-up to my February request to the Council. A brief report by the July scheduling and Council meetings will be useful.

Sincerely yours,

Donald F. Heinrichs,
Head

cc: G. Keller, UNOLS
W. Barbee, UNOLS
T. Johnson, Duke
R. Dinsmore, WHOI
K. Kaulum, ONR

THE USE OF RADIOACTIVITY ON UNOLS VESSELS

Prepared for the UNOLS Advisory Council Meeting, 14-15 July, 1988

T.C. Malone

Background

Radioisotopes are essential tools for the study of many biological and chemical processes in the marine environment, and research requiring their use has increased rapidly over the last decade. The frequency of use, the amount of activity used, and the number of different isotopes taken to sea has increased and will probably continue to do so. Given the importance of radioisotopes as tracers of biological, chemical and physical processes and the unique problems associated with the use of isotopes at sea, it is important that UNOLS establish minimum requirements for their use and that these requirements be communicated to users by the operating institutions as early in the ship scheduling process as possible.

Current regulations and procedures are given by UNOLS in "Research Vessel Safety Standards" published in May, 1985. In essence, this document states (1) that the amount of activity taken to sea shall not exceed that authorized by the operating institution's NRC license (or equivalent) which is monitored by that institution's Radiation Safety Office (or equivalent); (2) that UNOLS institutions may restrict the use of radioisotopes to van-labs designed for this purpose; and (3) that the operators "must insure that scientists are familiar not only with the usual regulations and procedures, but also with the special shipboard practices." It further states that "shipboard procedures and regulations should be in the ship's Cruise Handbook and discussed with the scientists well in advance of the cruise so that all hands will be alerted."

These guidelines are fine as far as they go. However, they are vague and the extent to which they are followed by all PIs and operating institutions is not clear. How far must an operating institution go in insuring that scientists are familiar with and conform to the regulations and procedures established by the NRC and the institutions Radiation Safety Office? If isotope use is to be restricted to vans, is it the responsibility of the operator to provide such facilities? If not, should restricted areas be established which are appropriately equipped for the use of radioisotopes? Should a member of the ship's complement (e.g. an officer or a technician) be trained in radiation safety to insure that PIs comply with regulations for the transport, storage, use, and disposal of isotopes?

Current Practices

As a first step in trying to answer some of these questions, Bill Barbee requested each operating institution provide information on their procedures and regulations for the use and disposal of radioisotopes. Responses were receieved from WHOI, URI, CBI, Skidaway, Texas A&M, SIO, OSU, Moss Landing, and UW. The information provided varied in detail and content with WHOI, URI and SIO providing the most information to PIs and having the most stringent regulations.

In general, PIs must apply to the operating institution's Radiation Safety Office (or equivalent) for authorization to transfer radioisotopes to their license and to use radioisotopes aboard ship. Applications typically must be submitted 2-4 months prior to the beginning of a cruise and require proof that the PI is authorized by his/her home institution's RSO to use isotopes, an outline of the experimental protocol, how work areas should be monitored, and how spills will be cleaned up and reported. Most operators require that wastes be returned to the home institution for disposal. However, there are important exceptions to each of these and in many cases it is not clear when a PI is notified by the operator of the their particular requirements. Some institutions have forms which must be completed and submitted by a certain deadline. Some do not. Some work closely with their RSO and some do not. Not all institutions require proof that a PI is an authorized user and some institutions will allow isotopes to be disposed of at sea. SIO and WHOI require that all isotope work be conducted in vans and WHOI provides guidelines as to how these vans should be constructed. Most other institutions do not require vans and do not require that restricted areas be established for isotope use. In many cases, laboratories are not properly equipped for isotope use (e.g. hoods which vent to the outside). SIO requires a deposit of $1000 for post-cruise clean-up if necessary. URI provides an emergency spill kit and a probe for monitoring in addition to swab tests, but most institutions do not. URI is also making special provisions for the storage of radioisotope wastes and is also unique in that their technicians have received training from their RSO so that they are able to work with the PIs to insure the successful completion and proper conduct of experiments at sea. These are only a few of the inconsitencies faced by the user community. In short, there are as many exceptions as there are rules; some institutions are very strict and some are lax; some are "hostile" and some provide important services which make using isotopes both safe and relatively free of unnecessary complications. Furthermore, in many cases it appears that proper storage and laboratory facilities are not available.

Recommendations

In my opinion, the lack of a minimum set of standards, regulations and procedures for the transportation, use and disposal of radioisotopes on UNOLS vessels creates a situation which could lead to serious accidents and violations. I recommend that an ad hoc committee be formed to develop such a set of guidelines and that this committee consist of radiation safety officers and of representatives from both ship operations and the user community. Such guidelines would not be intended to replace existing guidelines but to insure that the operators and users confrom to a minimum set of procedures and practices which are consistent with NRC regulations and common sense. I do not foresee that this will be a difficult process and the committee should be able to complete its work in one meeting. Specifically, the committee should do the following:

(1) establish procedures and guidelines for the transportation, storage, use, and disposal of radioisotopes when operating out of both US and foreign ports (should UNOLS apply to the NRC for its own license?);

(2) determine the minimum amount of information which must be provided to the operating institution by PIs;

(3) advise UNOLS and the NSF of the facilities and technical support needed to conduct research requiring radioisotopes (e.g. restricted work areas, storage containers, monitoring and safety equipment) on UNOLS vessels.

The intent of this process should be to insure the orderly and safe use of radioisotopes at sea and to provide guidelines which will allow PIs to conform to regulations in a timely, efficient and cost-effective manor. PIs must be informed of the steps they must take if they plan to use isotopes at sea as early as possible. I believe that this should involve guidelines which are communicated separately from the standard cruise guidelines provided by the operators and that the "Research Vessel Safety Standards" should be updated upon completion of the above process. It is also very important that the RSOs of the operating and home institutions work together to insure the proper transfer of isotopes between licenses and disposal of wastes.

ONR 1121SP
4/29/88

STATUS (FY-88)
R/V OPERATIONS FUNDING

	UNOLS SHIPS	NON-UNOLS SHIPS	TOTAL	
USE DAYS	583	343	926	
FUNDING ($K)				
• 1121SP	3611	1415	5026	(58%)
• SCIENCE PROGRAMS	2719	896	3615	(42%)
• TOTAL	6330*	2311	8641	
% TOTAL	72	28	100	

* INCLUDES $404K FROM 1121SP AND $365K from NRL for 59 DAY PROGRAM ON R/V CONRAD

Appendix IV

22 MARCH 1988
CODE 1121SP

ONR FLEET STATUS PROJECTION

YEAR	GYRE	THOMPSON	CONRAD	WASHINGTON	MOANA WAVE	AGOR-14 CLASS (KNORR)	AGOR-14 CLASS (MELVILLE)	AGOR-23	AGOR(X)	# SHIPS OPERATING
87	PL	0	0	0	0	0/PL	0	DP	-	6
88	R/T	0/R	0	0	0	0/DP/C	0/DP	DP	DP	6
89	-	-	0*	0	0	C/0	0/C	C	DP	5
90	-	-	0	0	0	0	C/0	C/0	C	6
91	-	-	R/T	0	0	0	0	0	C	5
92	-	-	-	R/T	0	0	0	0	0	5
93	-	-	-	-	0	0	0	0	0	5

PL = Partial Year Lay-up
0 = Operate
R = Retire or Reserve Status
T = Transfer
C = Construction or Overhaul
DP = Design & Planning

NOTES:
* CONRAD COULD BE RETIRED IF NSF AGREES TO BUY R/V BIERNIER FOR LDGO

ONR CODE 1121NF
12 JULY 1988

ONR/USN CAPITALIZATION & MODERNIZATION OF THE OCEANOGRAPHIC RESEARCH FLEET

ACTUAL/PLANNED NEAR TERM INVESTMENTS*

	87	88	89	90	TOTAL
CAPITALIZATION	33.0			38	71.0
MODERNIZATION		14.8	14.7		29.5
					100.5

TYPICAL AMORTIZATION** OF INVESTMENTS

	84	85	86	87	88	89	90	91
CAPITALIZATION	1.30	1.30	1.30	1.30	2.47	2.13	3.73	3.56
MODERNIZATION	2.13	1.52	1.16	1.08	4.01	3.74	3.74	3.51
TOTAL	3.43	2.82	2.46	2.38	6.48	5.87	7.47	7.07

*BY FISCAL YEAR
DOLLARS IN MILLIONS

**ASSUMES: SHIP LIFE OF 25 YEARS
MAJOR REFIT (>$1M) ADDS 10 YRS
NO CORRECTION FOR INFLATION

SUMMARY
OF
PROPOSAL
FOR
OVERHAUL & REFIT
OF
R/V MELVILLE (AGOR-14)
AND
R/V KNORR (AGOR-15)

WOODS HOLE OCEANOGRAPHIC INSTITUTION

JUNE 1, 1988

AGOR 14/15 OVERHAUL AND REFIT

1. SUMMARY

The Woods Hole Oceanographic Institution in cooperation with the Scripps Institution of Oceanography proposes to undertake an overhaul and refit program for the research vessels MELVILLE (AGOR-14) and KNORR (AGOR-15). The program includes replacement of the existing engines, shaft drives, and cycloidal propulsion by an integrated electric drive system with azimuthing thrusters. It further includes lengthening the hull (jumboizing) thereby providing more scientific working space, berthing, endurance, and restoring the ship to its designed waterline.

The need for this refit is brought about by the unacceptably high casualty rate experienced since the ships were placed in service in 1970. In addition, the cycloid propulsors and associated shafting result in excessive hydroacoustical noise which render the ships' scientific sonars ineffectual. The refit also will allow a general upgrading to meet ongoing and projected global scientific requirements, for which the U.S. is committed and for which no U.S. research ship is either suited or available.

Feasibility studies were carried out in 1986 and a preliminary design was completed in 1987. Contract design is now underway to produce the final design and specifications. Plans include: (1) the removal of the existing main and auxiliary engines and shaft driven cycloid propulsors; (2) fairing the bow shape to eliminate turbulence and bubble sweepdown; (3) installing a modern central power plant; (4) installing twin 1,500 HP azimuthing thrusters for main propulsion; (5) installing a 900 HP retractable bow thruster to retain the existing exceptional maneuverability and provide for dynamic positioning; and (6) upgrade the scientific capability to increase laboratory size from 2,400 to 4,000 square feet and science berthing from 25 to 34 persons. Cruising speed will be increased from 10 to 12 knots, and range from 10,000 to 12,000 miles. A modern, energy efficient plant will reduce fuel consumption and crew size thereby holding down operating costs.

It is proposed that the refits proceed as a two-ship program with major equipment procured jointly on a competitive basis, and with a single shipyard award. Such a procedure will assure maximum cost savings. The shipyard for the major conversion will be selected by competitive bid procedures from qualified shipyards. The proposed schedule calls for completion of contract design by August 1988 and contract award in October 1988. The yard periods are planned for November 1988-August 1989 for the R/V KNORR and July 1989 to April 1990 for R/V MELVILLE.

The program is planned as a joint effort in cooperation with the Scripps Institution of Oceanography. Drs. George D. Grice and George G. Shor, Associate Directors of WHOI and SIO respectively, will be Co-Program Directors. Captain Robertson P. Dinsmore of WHOI will be Program Manager, and Captain James G. Williams of SIO will be Deputy Program Manager. Review and oversight will be by a joint WHOI, SIO, and ONR committee.

2. BACKGROUND

The AGOR-14 class was conceived in 1965 as a new design of research vessel over its predecessors AGORs 3 to 13. Those ships all were variations of the basic AGOR 3 design; each sub class modified to meet new and changing requirements. Finally, the list of proposed modifications became so great that the AGOR 3 design could not be changed sufficiently to accommodate them. Accordingly, it was decided to make the AGOR 14 the lead ship of an entirely new class. The basic requirements were centered around five areas. These were:

- o basic arrangements
- o maneuverability and position keeping
- o speed and endurance
- o propulsion plant and basic auxiliaries
- o acoustic quieting

Open deck space and flexibility for accommodating scientific outfitting were the chief forces in the basic arrangements. That this requirement has been successfully met can be attested to by the sole use of these ships in seagoing programs where they and no others can fulfill the needs.

Maneuverability and position keeping were defined as maintaining position against a 40 knot beam wind and a one knot beam current (35,000 lb. force). Almost alone this requirement drove the selection of the propulsion system resulting in the use of two Voith-Schneider cycloidal propellers, one aft-2,000 HP and one forward-1,000 HP. As a precaution against untested experimental systems, it was stated at the time that the system must be simple — "off the shelf" and "debugged". Under no conditions were the designers to pass on trouble-shooting problems and high maintenance costs to the operator. Operational experience has demonstrated that the ships do possess exceptional maneuverability, probably unsurpassed among all research ships; however, high casualty rates and accompanying maintenance costs have led to ambivalence by the operators and users.

The speed and endurance requirement was set at 12 knots and 10,000 miles respectively. Under normal operating conditions, 12 knots has not been fully achievable as a regular cruising (or even full) speed.

Other than to meet the maneuverability criteria, the requirement for the main propulsion plant was simplicity. This resulted in a single, large, low speed diesel engine to drive both aft and forward cycloids. The machinery arrangement is shown in Figure 1. The lengthy shafting, clutches, couplings, and other novel arrangements make questionable whether simplicity actually has been achieved.

Quiet ship requirements have not been met in the AGOR 14 class. Quite the contrary, these ships have a reputation for noisiness. Scientific echo sounding from the hull is virtually impossible. The noise problem has appeared to be so related to the propulsion system that no serious effort has been mounted to identify or correct it.

Description of AGOR-15 (AGOR-14 similar but not identical)

The Research Vessel KNORR was designed and built under the direction of the Supervisor of Shipbuilding, Naval Ship Systems Command by the Defoe Shipbuilding Corporation of Bay City, Michigan. The vessel was launched in 1968 and delivered to Woods Hole Oceanographic Institution on April 15, 1970. The ship was designed as a general purpose oceanographic research vessel. A summary of current data is:

Built:	1969
Length:	245' LOA (75 m)
Beam:	46' (14 m)
Draft:	16' (4.8 m)
Gross Tonnage:	1,806 tons
Displacement:	1,915 L tons
Crew:	24
Scientific Personnel:	24
Main Engine:	One Enterprise DMR diesel engine; 2,500 HP
Propulsion:	Cycloidal propellers forward and aft (J. M. Voith Model 32G and 24E)

Ownership:
Title held by U S Navy; operated under contract with ONR by WHOI

Speed:
- Cruising - 10.0 knots
- Full - 12.0 knots
- Minimum - Dead Slow

Endurance: 45 Days
Range: 10,000 miles
Fuel Capacity: 110,100 gals.
Laboratories:
- Wet - 400 sq. ft.
- Dry (3) - 3,000 sq. ft.

Ships Service Generators:
Two 300 KVA, Enterprise diesel DSM-36 generators

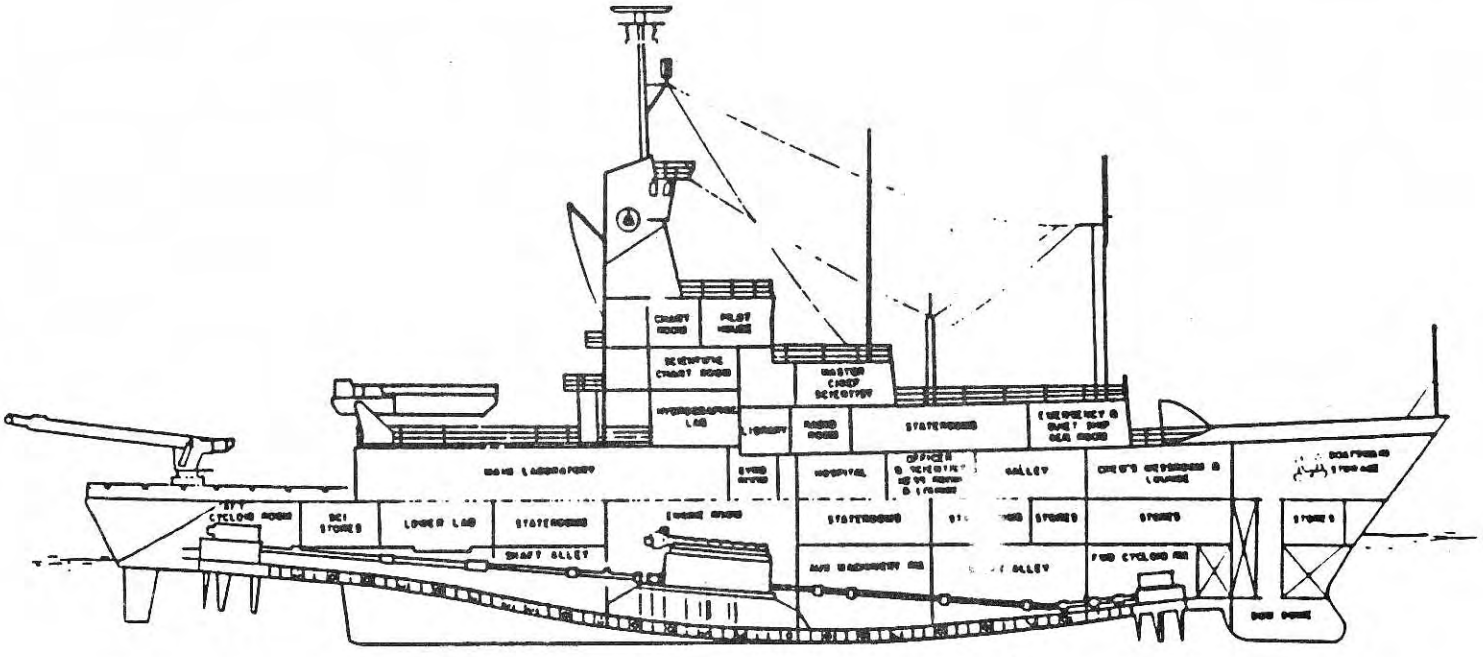


Fig.1 - KNORR - Inboard Profile

MELVILLE (AGOR 14) and KNORR (AGOR 15) were completed in 1969 and 1970 respectively. They are sister ships but not twins. Their differences reflect certain preferences or "options" on the part of the operating institutions. These options were an intended feature of the individual ships' designs. In other aspects, particularly propulsion machinery, their construction trials and subsequent operating histories have been so alike that a problem evident on one is certain to be followed by the same problem on the other.

From the outset, the ships were beset with maintenance problems chiefly associated with the drive train and propulsion system. These ranged from vibrations, alignments, gears, seals, and more recently, a massive failure in the aft cycloid itself. A failure in one ship would soon be followed by a duplicate failure in the other. The high maintenance costs and time lost are a matter of record. The ships are now 18 years old and have demonstrated that the problems encountered are beyond the "debugging" stage. If full service life is to be expected, a major engineering refit is required.

In 1985, with support from ONR, an engineering feasibility study was commenced. Its purpose was to examine the problems with the existing propulsion system, to redefine the mission requirements, and to investigate the alternatives for modifying and/or replacing the propulsion system. The engineering phase of the study was accomplished under contract to the J.J. Henry Co., Inc. Guidance and oversight was by a Steering Committee made up with representatives from Woods Hole, Scripps Institution and ONR. Results of the study showed:

1. That the average mean time between failures is 10 months and shows no indication of lessening;

2. Underwater radiated noise is from cycloid cavitation and the mechanical shafting, and precludes any reasonable attempt to meet scientific acoustical requirements; and

3. Refits to correct the deficiencies are possible.

The study examined three alternative propulsion systems: refitted cycloids, azimuthing thrusters (Z-drive), and conventional screw propellers; and two alternative power systems: geared diesel drive, and electric drive. The study recommended:

1. Use of an integrated electric power system (AC-DC) to replace the existing direct diesel drive.

2. Use of azimuthing Z-drive thrusters over cycloid or conventional screw propellers.

3. Fairing the existing hull shape to remove the bow dome and cycloid cavity in order to alleviate flow turbulence and bubble sweepdown.

Scientific upgrading as a part of a possible refit emerged early during the feasibility stage. The need to plan for new, more capable research ships to carry out scientific programs at sea has become virtually self evident.

Numerous studies have amply demonstrated that our ships, mostly constructed in the 1960s are becoming obsolete in their capability to support oceanography for the 1990s and beyond. A 1985 study by the University National Oceanographic Laboratory System (UNOLS) and supported by ONR and NSF found that "much scientific equipment ... has increased in weight, bulk, and complexity, therefore requiring deployment from large, stable ships. Increasing complexity of electronic sensors and shipboard computers often result in an increase in the number of technicians who must go to sea, rather than a reduction in their number. The nature of new interdisciplinary ocean science research projects requires that several scientists from different disciplines be able to work on the same ship at the same time. This increases the demand for laboratory, storage, and other working spaces aboard ship. Large high performance overside handling arrangements and modern state-of-the-art shipboard laboratories will be needed to support major ongoing ocean programs. In addition, a high quality working and living environment is essential in order to attract competent seagoing personnel."

The AGOR-14 class, unlike its predecessors the AGOR-3 class, has many excellent attractions for work at sea. It was, and still is, a ship for the future. It is argued that by including science upgrading as part of a class refit a modern ship meeting most ongoing requirements will result. Scientific upgrading was defined as acoustic quieting, improved laboratory space, increased accommodations and storage, greater range, and improved roll suppression. Examples of major ship requirements to which the U.S. is committed and for which no suitable ship presently exists are the World Ocean Circulation Experiment (WOCE) and the Global Ocean Flux Studies (GOFS).

In 1986 the engineering studies were expanded to include the feasibility for jumboizing (stretching) the hull. Until then only a cursory look had deemed it as a feasible or desirable measure. The chief attraction is to return the ship to its design draft and reduce drag resistance and transom immersion. Additional benefits include increased laboratory and accommodation space, greater payload capacity, and increased speed and range. The results of that study indicated, that in order to meet any repropulsion design along with science requirements for laboratory space, personnel, cruising endurance and storage, hull lengthening of between 30-36 feet was necessary.

Additional studies included acoustic evaluations of alternative installations in order to make an impact assessment on sonar systems, and a dynamic positioning study to assess maneuvering.

In late 1986, under ONR support, a survey team visited operating and maintenance facilities in the North Sea area where most of the modern propulsion systems under consideration were in use. A total of six ships and five maintenance activities were visited to gather information on the performance and reliability of candidate propulsion systems. In addition, four manufacturing facilities were inspected. Findings from this tour indicated that either cycloid or Z-drive propulsors would provide highly suitable performance from the standpoint of maneuverability and reliability. Integrated electric drive emerged as a near solitary choice thereby making controllable pitch propellers an unnecessary consideration.

In early 1987, results from the acoustic studies by BBN Laboratories, Inc., and information from the Naval Sea Systems Command showed that cycloid propulsors, even modern designs, would exceed the design target for underwater radiated noise. Further, the lesser relative thrust per horsepower by cycloids indicated a marginal weight and size consideration. A meeting of the Steering Committee on 2-3 March 1987 examined all available reports and alternatives under consideration. It directed that future planning be based on an integrated AC-DC power system with twin azimuthing Z-drive main propulsors and a retractable Z-drive bow thruster. Arrangements would be on a jumboized hull lengthened amidships by 34 feet.

From March-October 1987, Technical Studies were carried out as the next step in planning for the overhaul and refit program. These studies were supported by ONR and the naval architecture and marine engineering contractor was The Glosten Associates, Inc. A preliminary design resulted in accordance with preliminary operational requirements approved March 1987.

A meeting of the Steering Committee on 25 October 1987 reviewed and approved the Preliminary Design. Operational requirements applicable to the Final and Contract Design Stage were approved.

With ONR Support, a Contract Design was commenced on 1 February 1988. This is a seven month project in order to produce the Contract Plans, Specifications, and documents leading to a contract award for the refit and overhaul of the two vessels.

3. PROPOSAL

The Woods Hole Oceanographic Institution in cooperation with the Scripps Institution of Oceanography proposes to carry out a major overhaul and refit program for the research vessels MELVILLE (AGOR-14) and KNORR (AGOR-15). It is proposed that this program be pursuant to and in conformance with the Feasibility Study (1986) and the Preliminary Design (1987).

The proposed overhaul and refit has three major objectives:

1. to eliminate the present mechanical and engineering problems associated with the propulsion system;

2. to correct the present unsuitable acoustical characteristics for underwater radiated noise;

3. to upgrade the ships to meet ongoing and projected scientific requirements (e.g. World Ocean Circulation Experiment [WOCE] and the Global Ocean Flux Study [GOFS] for which the U.S. is committed and for which no U.S. research ship is suited.

The overhaul and refit would proceed in conformance with the Contract Design Phase currently underway. The goals of the contract design are to produce engineering studies, design drawings and specifications in support of the program. The Contract Design started on 1 February 1988 and is scheduled for completion in September 1988.

Scope of Effort

The proposed overhaul and refit includes the following task elements hereinafter designated as projects:

1. Program Management - overall management and coordination, support of review and oversight functions, and reporting. Scheduled for May 1988 start and completion in September 1990.

2. Long Lead Time Equipment Procurement - selection and procurement of machinery and other long lead time outfit on an early schedule so that shipyard and work programs can proceed on a timely basis when contracted. Scheduled for May-June 1988 procurement and delivery in November 1988 through early 1989.

3. Engineering and Design - guidance, plan approval, quality control, and inspections by contract naval architecture firm and marine engineering personnel.

4. Shipyard Conversion - RFP preparation, selection of shipyard, contracting procedures and actual shipyard work. Scheduled for November 1988 award and completion of second ship in April 1990. Actual shipyard work is described in Figure 2. In terms of level of effort and cost, this project is the dominant part of the program.

5. Science Upgrading - This is the replacement or new procurement of scientific equipment where required, chiefly in the areas of winches, cranes, echo sounders, data acquisition, and laboratory acquisition.

6. Outfit - This is supplementary outfitting of a non-scientific nature, chiefly in the areas of safety, communications, deck and engineering, and stewards outfit.

7. Lead Ship - R/V KNORR (AGOR-15) is planned as the first ship to undergo overhaul and refit. Yard overhaul period is scheduled for 15 November 1988 to 15 August 1989, followed by trials and "Ready for Sea" (RFS) date of 15 September 1989. This project includes support for delivery, demobilization, yard caretaker crew, owners' representative, mobilization, trials and redelivery.

8. Second Ship - R/V MELVILLE (AGOR-14) is scheduled for shipyard period from 15 July 1989 to 15 April 1990, and RFS date 1 June 1990.

Mission Requirements

The mission requirements are defined by the AGOR 14/15 Overhaul and Refit Program Operational Requirements, November 1987. These requirements were originally set by a joint Woods Hole/Scripps Institution team in July 1985. Based on inputs by the UNOLS Fleet Improvement Committee and other groups from the science community, revisions were executed in June 1986, January 1987, and November 1987.

The requirements are summarized by the following table:

1. Speed: Maximum 14 knots, Cruising 12 knots

2. Endurance: 10,000 miles at 12 knots cruising;
   15,000 miles range at 10 knots cruising

3. Stationkeeping and Maneuverability: Equal to or better than existing Dynamic Positioning capability.

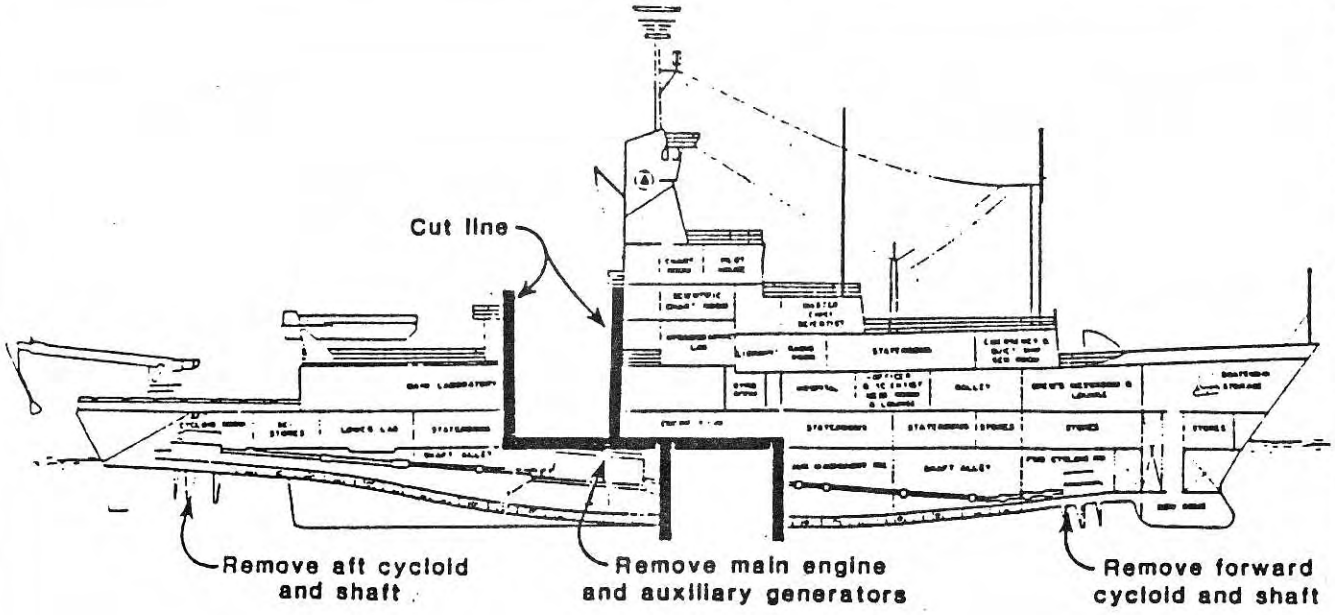
4. Acoustics: Design target precision echo sounding 3.5-12 kHz; and doppler profiling 50-300 kHz; at 10 knots speed, sea state 4.

5. Accommodations: Science 34 persons, Crew 24 persons

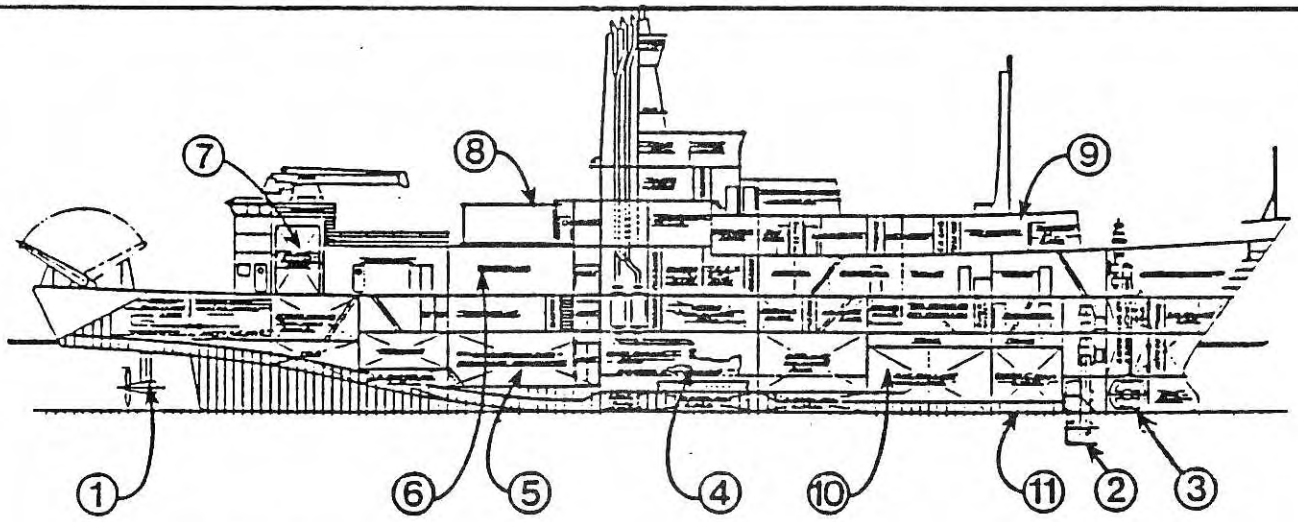
6. Science Arrangements: Increased laboratory area, increased storage area, improved van, crane and winch capabilities.

7. Engineering: Integrated electric plant, unattended engine room, 50% greater auxiliary electric power, improved HVAC (distribution, air changes and noise).

8. General: Improved roll suppression, Class C ice strengthening.



"Cut Line" and Removals



1. Twin 1500 HP 360° "Z" drive propulsors.
2. 900 HP bow thruster, retractable drive with hull fairing installed on bottom.
3. 350 HP tunnel thruster, rotatable 90° with hull closure fairing.
4. Engine room in new 34 ft. space. Integrated electric plant is three 1000 KW AC generators to a 600 volt bus.
5. Former engine room becomes new science storeroom. Hoistway access to laboratory spaces above.
6. Main laboratory area is lengthened by 34 ft. and refurbished.
7. Hangar/staging areas on port side aft and starboard side midships.
8. Provision for two laboratory vans on 01 Deck with direct access to interior of ship. New heavier crane to handle vans.
9. Former machinery space converted to staterooms.
10. New semi-active roll stabilizing tank.
11. New faired-in bow.

Fig. 2 - Refit Summary

Based on the preliminary design, a comparison of the existing vessel to the design as proposed is summarized by the following:

	Existing	Proposed
Length overall	245 feet	279 feet
Beam	46 feet	46 feet
Draft	16 feet	15 feet
Full load displacement	2,415 tons	2,670 tons
Gross tonnage	1,806 tons	2,100 tons
Propulsion horsepower	2,800 HP	3,000 HP
Cruising speed	10 knots	12 knots
Maximum speed	12 knots	14 knots
Cruising range	10,000 miles	12,000 miles
Fuel capacity	110,000 gallons	121,000 gallons
Crew	24	24
Scientists	25	34
Lab space	2,400 sq. ft.	3,680 sq. ft.
Science storage	842 sq. ft.	1,324 sq. ft.
Main deck working area	3,424 sq. ft.	3,764 sq. ft.
clear length	96 feet	126 feet

A more detailed description of the characteristics and capabilities of the proposed design is given in Section 1 of the Preliminary Design Report (Appendix H).

Work Description

In order to meet the mission requirements as set forth in the proposed design characteristics, the following shipyard conversion jobs are proposed:

(Refer to Figure 2)

1. Lengthen (jumboize) the ship 34 feet by cutting the hull amidships (frame 50) and aft of the upper deckhouse (frame 70) and inserting structural sections.

2. Remove main engine, auxiliary generators, cycloid propulsors, and shafting.

3. Remove the forward cycloid hull recess and install a new faired-in bow section.

4. Install a new AC/DC integrated electric power plant comprising three 1000 KW and one 500 KW diesel generators to a common 600 volt bus. Engine room in new hull section.

5. Install twin 1500 HP 360 degree azimuthing "Z" drive propulsors aft, each driven by a DC electric motor.

6. Former engine room becomes new science storeroom. New hull sections provide additional stateroom accommodations and laboratory space.

7. Refurbish lab spaces and provide hangar/staging areas to improve deck working arrangements.

8. Two new lab vans on 01 deck with inside access to improved 01 deck lab space. New heavier crane to handle vans.

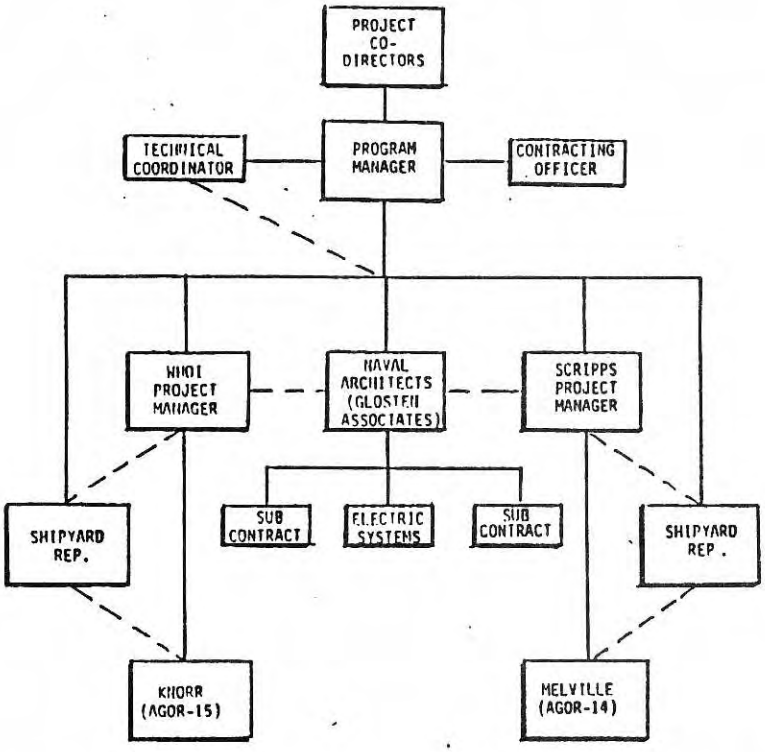
9. Install modern semi-active roll stabilizing tank.

10. Install new heating and air conditioning systems.

4. MANAGEMENT PLAN

Mangement of the proposed program will be by the Woods Hole Oceanographic Institution in cooperation with the Scripps Institution of Oceanography pursuant to the Memorandum of Understanding between the two Institutions

Overall program direction shall be vested in Project Co-Directors, one appointed each from WHOI and SIO. It is proposed that George G. Shor, Jr., Associate Director of Scripps Institution of Oceanography and George D. Grice, Associate Director of Woods Hole Oceanographic Institution be the Project Co-Directors. It is further proposed that Robertson P. Dinsmore of WHOI be the Program Manager, and that James G. Williams of SIO be Deputy Program Manager. The management structure for the program is set forth below.



Management Plan Structure

BUDGET

At the Feasibility Study phase of the refit planning, a target cost of $16M emerged for each ship. During the Preliminary Design phase frequent checks were taken to control the budget at this level. Allowing for differences between ships, the results of the Preliminary Design (September 1987) showed the following estimated costs:

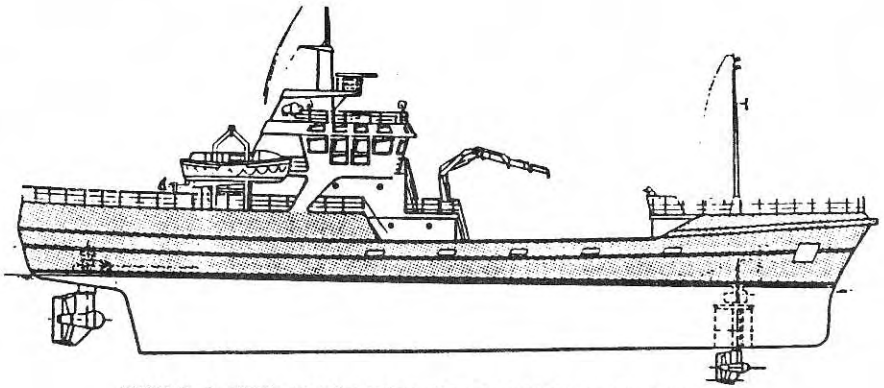
	AGOR-14	AGOR-15	TOTAL
Subtotal	$14.529M	$14.209M	$28.738M
Contingency (5%)	.871	.852	1.723
Reserve	1.500	1.500	3.000
TOTAL	$16.900M	$16.561M	$33.461M

This is presented in more detail in the Preliminary Design (Appendix H).

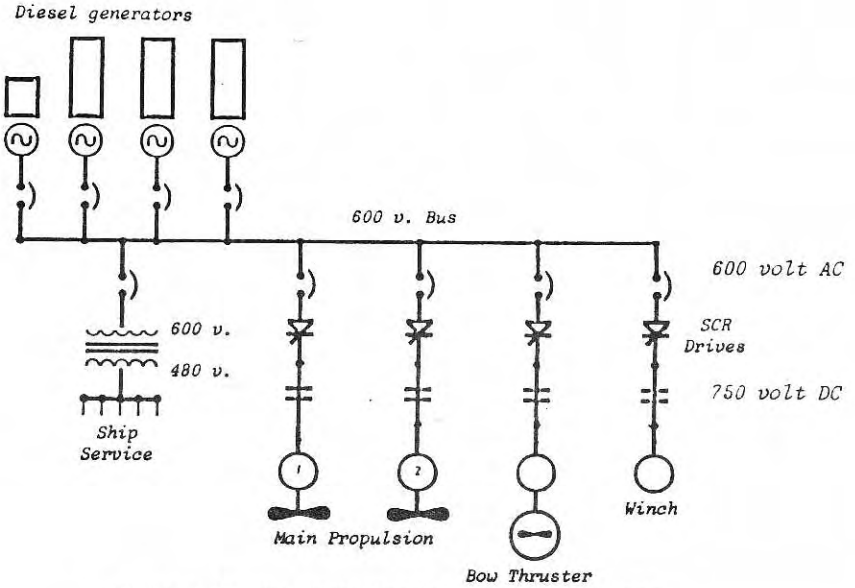
Design development during the current Contract Design phase has identified additional items within the scope of effort. Several of these have the effect of increased estimated costs. In order to remain within the budget set for this program, it will be necessary to establish a list of prioritized options which can be selectively deleted or deferred. This is an ongoing function of the Contract Design (ONR Grant N00014-88-J-1088).

The budget presented in this proposal is developed along project lines described in Section 3. The total including all direct costs, indirect costs, and fees is $32,535,643. Averaging this between the two ships shows a per ship cost as follows:

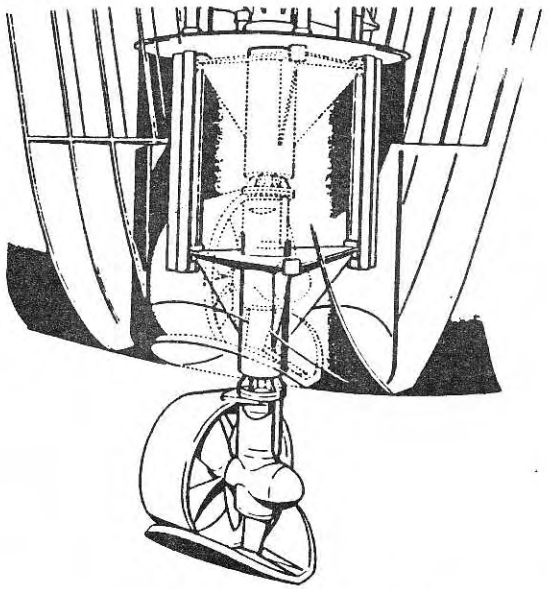
Program Management	$ 222,409
Long Lead Time Machinery	3,240,000
Engineering and Design	137,500
Shipyard Conversion	10,512,500
Science Upgrading	1,500,000
Shipkeeping, delivery, trials, etc.	509,193
Management Fee	146,218
TOTAL	$16,267,822



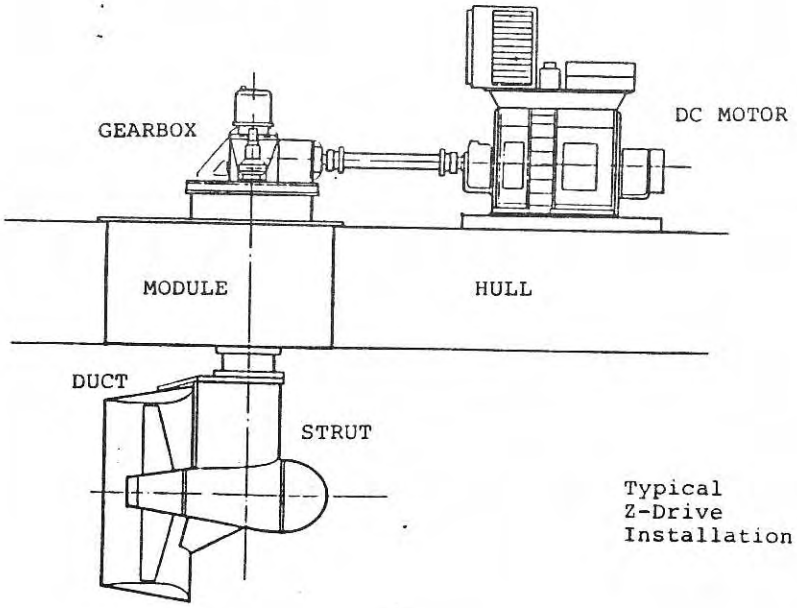
TYPICAL Z-DRIVE INSTALLATION WITH RETRACTABLE BOW THRUSTER



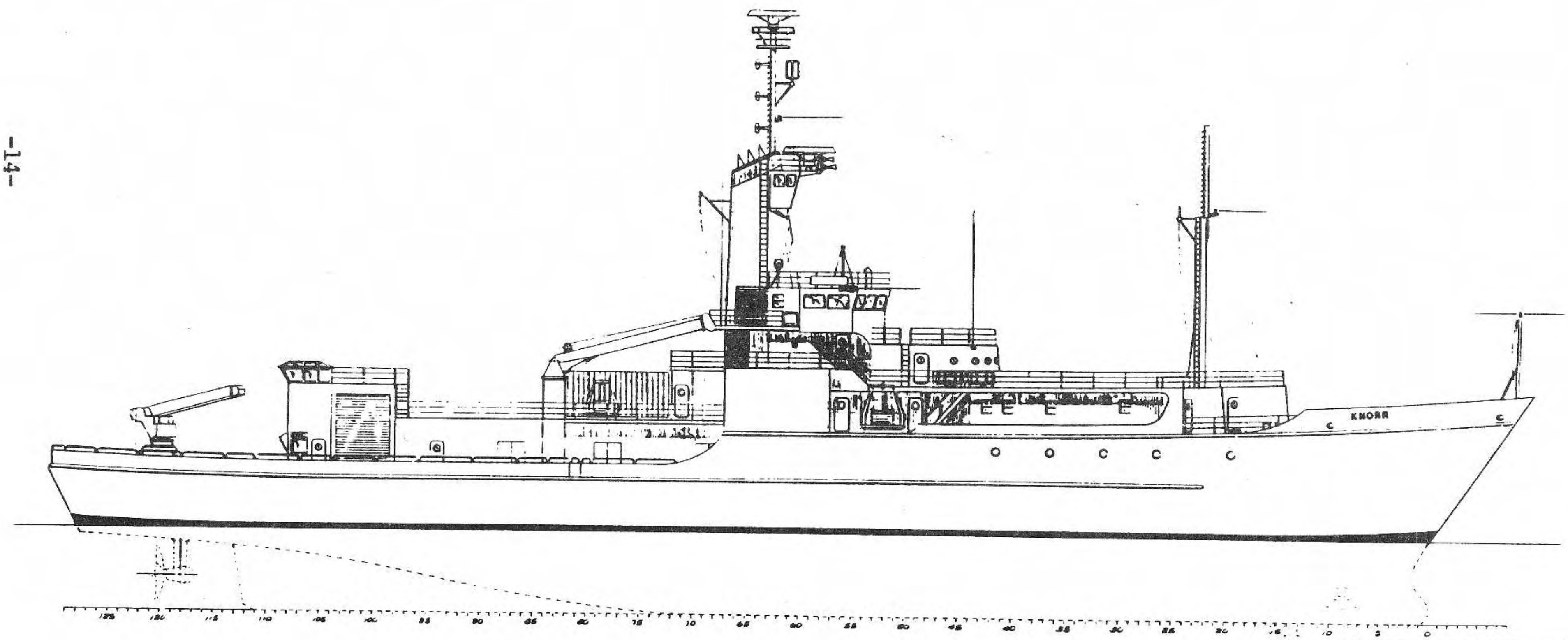
INTEGRATED ELECTRIC POWER SYSTEM (AC-DC) USING SILICON CONTROLLED RECTIFIER DRIVES (SCR)



Retractable Bow Thruster
with bottom fairing plate



Typical
Z-Drive
Installation



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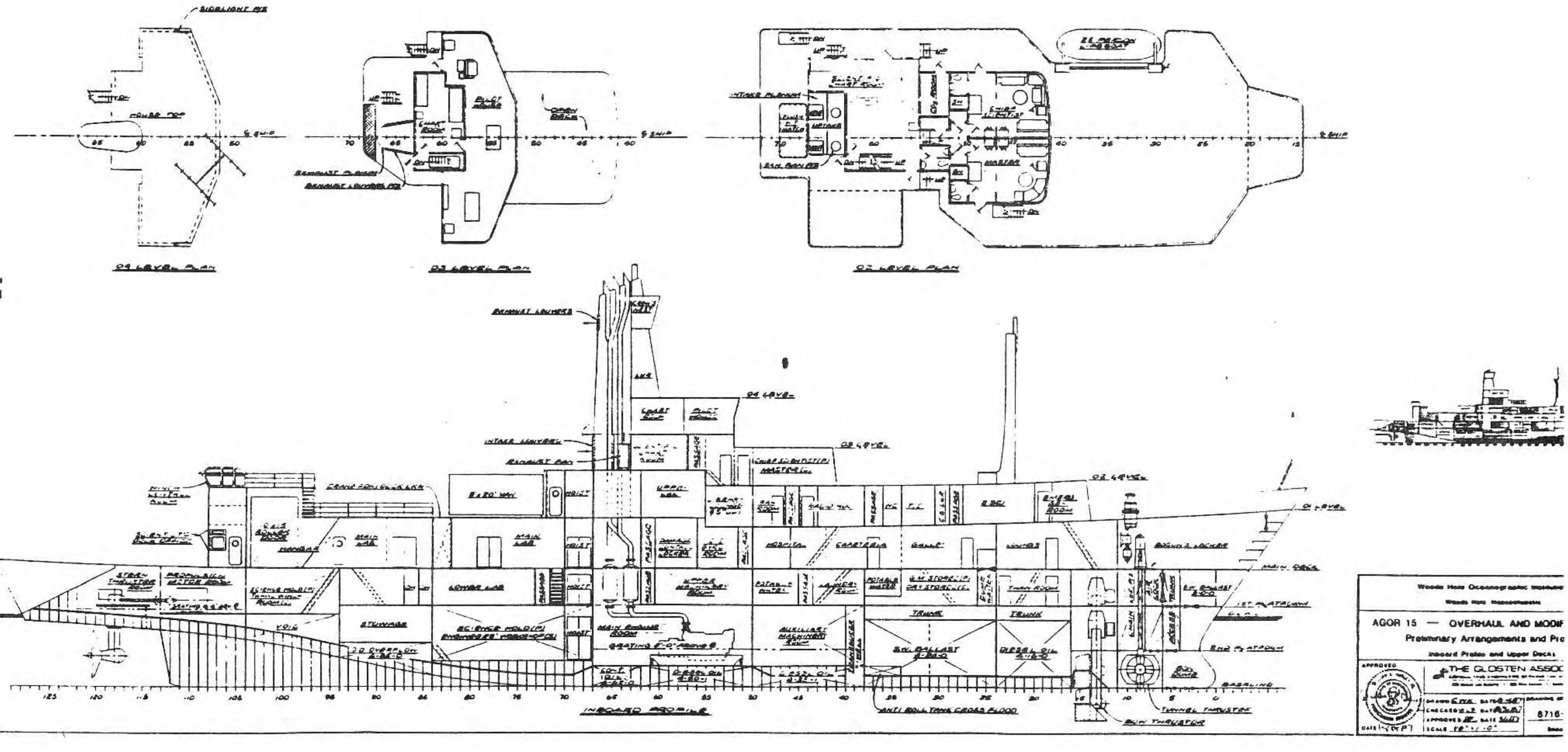
Woods Hole, Massachusetts

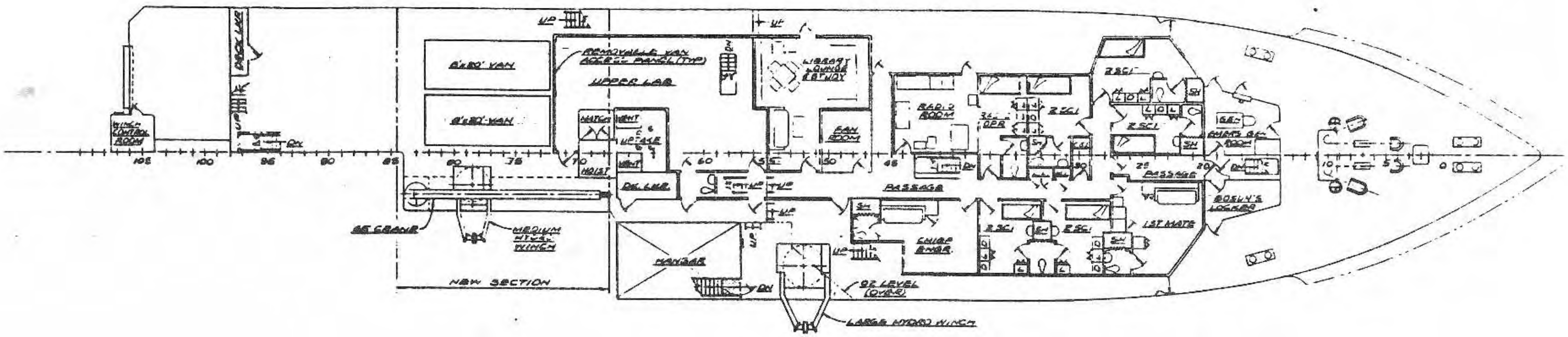
AGOR 15 —)VERHAUL AND MODIFICATIONS

Preliminary Outboard Profile

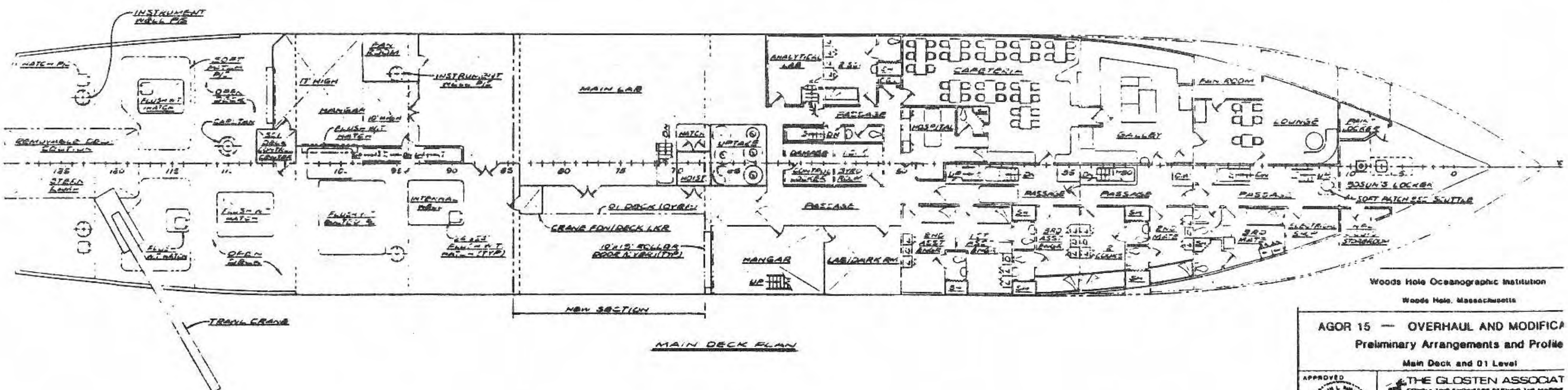
THE GLOSTEN ASSOCIATES, inc.

APPROVED	DRAWN	DRAWING NO	REV
	CHECKED	8716-3-15	
	APPROVED		
DATE 15 SEP 87	SCALE 1/8" = 1'-0"	Sheet 1 of 1	


04 LEVEL PLAN
03 LEVEL PLAN
02 LEVEL PLAN
PILOT HOUSE
OPEN DECK
MASTER
EXHAUST LOUVERS
INTAKE LOUVERS
04 LEVEL
03 LEVEL
02 LEVEL
01 LEVEL
8 x 20' VAN
HOIST
UPPER LAB
MAIN LAB
HANGAR
HOSPITAL
CAFETERIA
GALLEY
LOWER LAB
STOWAGE
MAIN ENGINE ROOM
AUXILIARY MACHINERY ROOM
TRUNK
S.W. BALLAST
DIESEL OIL
MAIN DECK
BASELINE
INBOARD PROFILE
ANTI ROLL TANK CROSS FLOOD
TUNNEL THRUSTER
BOW THRUSTER
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
AGOR 15 — OVERHAUL AND MODIF
Preliminary Arrangements and Pr
Inboard Profile and Upper Decks
THE GLOSTEN ASSOC



01 LEVEL PLAN



MAIN DECK PLAN

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Woods Hole, Massachusetts

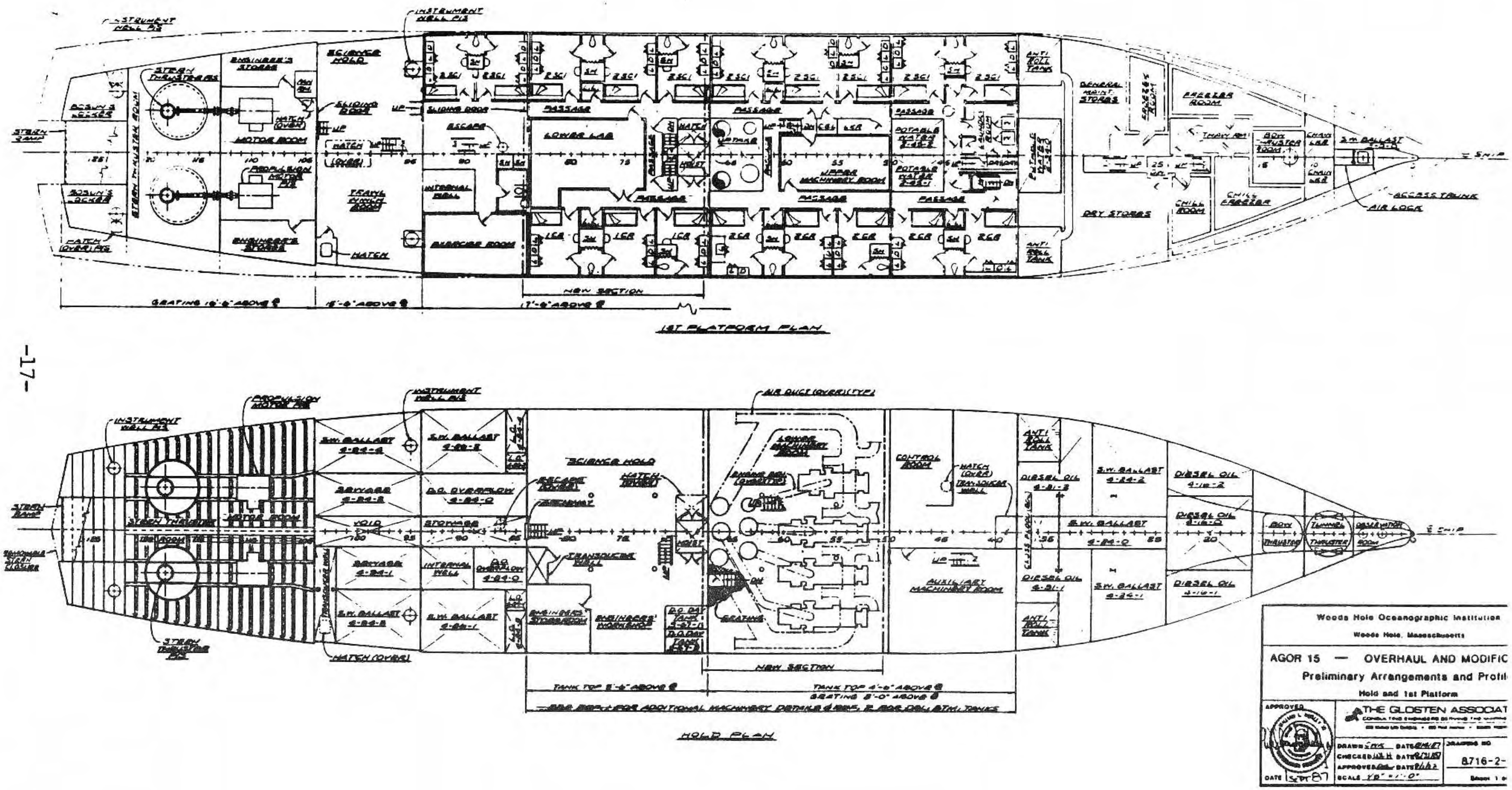
AGOR 15 — OVERHAUL AND MODIFICA

Preliminary Arrangements and Profile

Main Deck and 01 Level

THE GLOSTEN ASSOCIAT

APPROVED	DRAWN	DATE	DRAWING NO
	CHECKED	DATE	8716-2-
	APPROVED	DATE	
DATE	SCALE 1/8" = 1'-0"		Sheet 2


1ST PLATFORM PLAN
HOLD PLAN
NEW SECTION
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
AGOR 15 — OVERHAUL AND MODIFIC
Preliminary Arrangements and Profil
Hold and 1st Platform
THE GLOSTEN ASSOCIAT
8716-2-

7/11/88
R.P.Dins

PROFILE OF UNOLS CRUISE ASSESSMENT REPORTS - JAN-JUN 1988

Ship	Number of Cruises	Reports Submitted	Fully Successful	Partially Successful	Marginally Successful	Unsuccessful	Weather Problems	Problems with Ship or Personnel	Problems with Science Equipment	Problem Areas and Comments Numbers in () indicate frequency of occurrence.
ALPHA HELIX	n/a	1	1	0	0	0	1	1	1	Winch (1); Communications (1)
CAPE HENLOPEN	13	5	5	0	0	0		3		Vibration (3); Lab needs upgrading (3)
NEW HORIZON	6	4	3	1	0	0	1	1		Winch arrangements (1); Clearances (1)
OCEANUS	6	1	1	0	0	0				
ISELIN	5	4	4	0	0	0			1	(Unspecified)
T. WASHINGTON	5	2	2	0	0	0			1	(Unspecified); Good Food!
POINT SUR	10	8	7	0	1	0		1	1	Needs Capstan (1); Winch & Wire (1)
ATLANTIS II	9	4	3	1	0	0	1	1	1	ALVIN (1); Temp.Probe (1)
SPROUL	10	4	4	0	0	0	1			
KNORR	6	1	1	0	0	0		1	1	CTD cable (1); Trawl wire (1); Small Crane (1); Needs trash compactor
T.THOMPSON	2	1	1	0	0	0	1			
R. WARFIELD	24	16	16	0	0	0	1		1	CTD (1)
ENDEAVOR	8	5	3	1	1	0	2	1	1	CTD (1); Fax (1); Software (1); Accident
WECOMA	7	4	4	0	0	0	2	2		New Crane (2); Technician Probs.(1)
CALANUS	8	8	5	3	0	0	2	2		Maintenance (1); Loran (1); Needs Capstan
MELVILLE	4	2	2	0	0	0		2		Safety (1); Poor Food (1)
GYRE	6	3	2	1	0	0	1	2		Tech. not available; Elec. Power Fail. (1)
BLUE FIN	n/a	14	14	0	0	0	1			
MOANA WAVE	4	1	1	0	0	0	1	3	2	Too slow (1); Magnetometer (1); 3.5 kHz (1); Satnav (1); Poor speed control
CAPE HATTERAS	5	2	2	0	0	0	1		1	Rosette (1)
CONRAD	5	4	2	2	0	0	1	2	2	Compressor (1); Comms.(1); Lab Space (1); 12 kHz (1); Lost Array (!)
LAURENTIAN	9	0								
FRED MOORE	0	0								
Tot	154	94 60%	83 88%	9	2	0	17 19%	22 23%	13 14%	

Appendix VI