UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

RESEARCH VESSEL OPERATORS' COUNCIL

Report of the
1977 ANNUAL MEETING

Hosted by the
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
1-2 November 1977

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APPENDICES

NOVEMBER 1977

RESEARCH VESSEL OPERATORS' COUNCIL

AGENDA

for

1977 Annual Meeting, W.H.O.I., Woods Hole, Massachusetts
Redfield Auditorium, Water St., Woods Hole

Commencing 0830, Tuesday, November 1 & Concluding about Noon, Nov. 2

0830 - Registration — Coffee, Tea, Doughnuts

0900 - Meeting

1. Accept Report of 1976 Annual Meeting
2. Customs/Export Declarations
3. Foreign Clearance Procedure
4. Future Fleet Requirements
   (a) Status of Conceptual Designs for Coastal & Polar R/Vs
   (b) Replacement of Older Vessels
5. Navigation & Satellite Communication Developments (C.D. Tollios)
6. Safety Considerations for Non-Seagoing Personnel
7. OSHA Diving Standards - a W.H.O.I. View (D.M. Owen)
8. Fleet Manning Situation (E. Newhouse)
9. Maintenance Practices
10. Environmental Regulations: MSDs
11. Federal Support of UNOLS Fleet
12. Establish Sub-committee to Update Safety Standards
13. Miscellaneous:
    (a) Obtaining Excess Equipment
    (b) Joint Purchase of Equipment
    (c) Proposed SOLAS Regulations & IMCO Update
14. Election of Chairman and Secretary
15. Other

MINUTES OF THE ANNUAL MEETING

Agenda items were discussed in a different order than listed, due to some individual travel plans or other business interfering at meeting time. Items are reported on in the sequence in which they appear on the Agenda.

The 1977 Annual Meeting of the Research Vessel Operators' Council was called to order at 0915 by J. Leiby, Chairman, in the Redfield Auditorium of the Woods Hole Oceanographic Institution, November 1, 1977. He introduced Dr. John Steele, the Institution's new Director, who gave a welcoming address.

1. Report of 1976 Annual Meeting. Acceptance of the Report as written was voted.

2. Customs/Export Declarations. Some UNOLS members have recently experienced a tightening of regulations which have been enforced among other members, such as OSU and W.H.O.I., for some time. R. Edwards recounted Woods Hole's history in this connection and his attempts at relaxation with Boston Officials. The issue turns on the definition of 'cargo', which is anything carried by the vessel, other than fixed equipment, that does not fit the categories of sea or ship's stores. These latter are defined as necessary for the safe navigation and working of the vessel.

Strictly speaking, scientific gear is not necessary for safe navigation of a vessel but it is obvious that it is necessary for the carrying out of a research vessel's mission. Bottom and other samples are often obtained by means of this gear after a vessel has cleared foreign. Since we are not engaged in commerce and do not incur a tax liability in that connection, it seems reasonable to assume some relaxation of the rules might be sought. C. Cramer suggested a look at how nets on fishing vessels are treated. T. Stetson mentioned SIO vessels have been most recently subjected to the strict interpretation and that they were attempting locally to secure a more favorable treatment. W. Erb offered possible help from his office, if it was found to be a significant problem.

ACTION: R. Edwards and T. Stetson will attempt to gather some data on costs and related items and attempt to formulate a position paper presenting our case to the authorities. This will be circulated first to RVOC for general agreement, however.

3. Foreign Clearance Procedure & LOS. W. Erb spoke about increasing difficulties his office is encountering in obtaining foreign clearance. Not only is the required information more comprehensive, but it is being required earlier. It is very difficult to determine what percentage of requests are finally turned down. As the threshold of frustration rises, U. S. scientists have differing reactions which may utlimately result in their withdrawing the request.

The Informal Composite Negotiating Text (ICNT) resulting from the 6th Law of the Sea session, held recently in New York, was circulated to UNOLS members with comments by Mr. Erb on the articles which may effect our operations. To date only a few members have made comments on the ICNT and members of RVOC are encouraged to do so. Copies of the ICNT are available from the UNOLS Office.

One provision in the ICNT is that coastal states shall have the right to make any additional restrictions they may wish. If such is the case why have a treaty concerning itself with this aspect of marine affairs at all? The next LOS session will be held in Geneva, March 1978.

Before that time, a workshop will be held in January 1978 at which members of the Department of State (DOS), Ocean Science Board, and the Distant Water Operating Group (DWOG) of UNOLS will participate. Some aspects of these problems will be addressed. Meanwhile, DOS is exploring development of bilateral agreements with Canada and Mexico as well as a regional one in the Caribbean.

4. Future Fleet Requirements. Status of the conceptual designs for coastal and polar R/Vs was not discussed. A recent report is appended as Appendix I. Regarding new construction, it is noted AGASSIZ is being replaced by NEW HORIZON. She is a Matzer design and construction has begun in Florida. 170 ft. over all, she will be powered by two Caterpillar D398 diesels driving through a Fernholt & Girsten reduction gear two CP propellers. Projected cruising speed is 13.5 kts.

5. Navigation & Satellite Communication. Recent developments were described by C. Tollios, a member of the Information Processing Center at Woods Hole. A summary of his remarks are found in Appendix II.

6. Safety Considerations for Non-Seagoing Personnel. This item was dropped from discussion at large and was discussed personally with the person whom requested consideration of the item.

7. OSHA Diving Standards. D. M. Owen, W.H.O.I. Chief Diver gave a talk on the impact of the new regulations as they effect the diving program at Woods Hole. His remarks comprise Appendix III.

8. Fleet Manning Situation. E. Newhouse (L-DGO) had planned to give

his views on this subject but was unable to attend. The situation is approaching a crisis for operators. Prior to the meeting a study by the Maritime Administration (March 1977) entitled "Deck & Engine Officers in the U. S. Merchant Marine - Supply & Demand, 1976-1985" was circulated to RVOC. This study appears to indicate a worsening trend regarding availability in coming years of licensed personnel.

J. Lindon, Woods Hole Personnel Office, gave a rundown on problems he had encountered. So far in 1977 he had made about 2000 telephone calls in attempts to locate candidates. The Marine Dept. normally employs about 80 and there has been 150% turnover within the last year. The situation is most critical for inspected vessels, but is also serious for uninspected ones, as UNOLS operators often exceed USCG requirements, where safety is concerned.

He said the situation is as it is because there appears to be a lack of personnel in the industry and his inability to offer benefits and pay equal to competitors.

R. Dinsmore reported attempts had been made to channel recent graduates of the Academies directly into the fleet, but such personnel never stay long as they cannot upgrade their license due to low tonnage of our vessels.

9. Maintenance Practices. T. Stetson raised the question whether operators obtained better results when certain maintenance was performed on an opportunistic basis rather than by a yard at biennial overhaul. It is believed most operators have found it so, after developing a list of satisfactory contractors for their locality.

10. Environmental Regulations. Discussion centered on marine sanitation devices (MSDs). A number of operators discussed what they were doing to meet the new regulations. One problem confronting many is that the new products have no history of operation hence there is little basis for selection.

J. Dropp offered to ascertain the manufacturer of the anaerobic systems in use on MT. MITCHELL and WHITING, which appear to be functioning well.

11. Federal Support of Fleet. Miss Johrde displayed the figures below concerning fleet support with the observation that she will have some knowledge of funding by December. She noted various panels are studying the projected deficiency of $2.4M.

UNOLS Fleet Support

FY 77			FY 78		
%	M$	Agency	Requested M$	Projected M$	%
68	150	NSF	16.9	15.8	70
12	2.6	ONR	3.8	2.5 ?	11
9.5	2.1	BLM/USGS	1.8	1.8	8
	(.6	ERDA	1.0	1.0)	
8	(.8	OTHER NAVY*	.7	.7)	8+
	(.2	OTHER FED	.2	.2)	
2.5	.6	STATE/PRIVATE	.5	.5	2+
	21.9		24.9	22.5	
27.5 ships				28.5 ships	
				Shortfall = $2.4M	

*Navelex charter of MOANA WAVE

12. Establish Subcommittee to Update Safety Standards. Although not directly accomplished, the *ad hoc* Steering Committee will consider the possibility.

13. Miscellaneous.

(a) Excess Equipment. It was again suggested RVOC develop means to share oceanographic equipment and the expertise which resides at so many institutions relating to its use. This will be considered by the *ad hoc* Steering Committee.

(b) Joint Purchase of Equipment. A joint purchase of a preferred model of LORAN C will be attempted. T. Stetson announced he had firm requests for six at present. He made the point that the model chosen was not mandated and that those wishing to purchase other models may do so.

(c) SOLAS Regulations & IMCO Update. There being no substantial progress to report on, the Chairman deleted this item.

14. Election of Chairman & Secretary. R. Dinsmore proposed that the incumbents remain another year, and there was general agreement from those present.

15. Other.

(a) ALCOA SEAPROBE. A 20 min. film was shown exhibiting this vessel's capabilities. J. Donnelly, operations manager, answered questions about her operation.

(b) ANTON DOHRN. A tour was arranged for those present by Cdr. M. Fleming of NMFS at Woods Hole. This vessel is engaged in a joint fisheries research project and is operated by the German Scientific Commission for

Marine Research, Hamburg, Germany.

(c) Cdr. J. Dropp, Office of the Oceanographer of the Navy, reiterated his office's continuing need for the reports and timely notices of intent to conduct seismological work submitted by UNOLS members.

When questioned about the availability of the Navy's satcomm system for emergency use, he referred to Lt. Cdr.G. B. Green, Jr.,USN, Dir. of Communications, Military Sealift Command, Washington,D.C. 20390 (202) 282-2620/1, as being the proper contact.

(d) Steering Committee. A meeting of an *ad hoc* Steering Committee as proposed in J. Leiby's memo (3 Oct 1977) to RVOC was held at 1430, October 31, 1977, in Room 208, Redfield Building, W.H.O.I. This letter is included as Appendix IV. Those attending were: R. Dinsmore, Chairman, J. Gibbons, J. Leiby, T. Stetson, C. Tetzloff, B. Watkins (See item 4 below).

Addressing the points raised in J. Leiby's memo, the group remained in session until 1710. R. Dinsmore reported to the membership at large November 2 the following:

(1) It is important RVOC exists. It is a mechanism for interchange of information for those charged with getting the vessels to sea.

(2) Areas of concern include the following:

. Safety Standards

. Equipment

. Fleet Composition

. Regulations

. Cost and accounting

Miss Johrde encouraged RVOC to develop input on fleet replacement/composition to the Advisory Council. T. Stetson reported that the Advisory Council was currently working on recommendations regarding the fleet based on predictions of impact of projected science needs.

With the great body of knowledge that exists individually among operators, Miss Johrde would like to see RVOC work to tap this resource. The same applies to collective knowledge about what might constitute shared-use equipment for the fleet. T. Stetson suggested names be submitted to the Steering Committee so that a group willing to work on equipment problems could be formed. The suggestion did not prevail.

(3) Meetings. By letter, T. Treadwell suggested RVOC meet twice a year. Annually was deemed adequate by those present as well as by the Steering Committee. R. Redmond suggested a paid speaker might be an attraction. Suggestions for same should be sent to RVOC Chairman, or Executive Secretary, UNOLS.

W. Erb suggested RVOC might have regional meetings. R. Dinsmore commented he hoped there might have been some and that there was certainly no prohibition on so meeting.

(4) Steering Committee Composition. R. Dinsmore asked not to be considered for the Steering Committee. R. Edwards was proposed and accepted, the Committee now consists of: P. Branson, R. Edwards, S. Gerard, C. Tetzloff, T. Treadwell, and J. Leiby, J. Gibbons, T. Stetson, the last three being *ex-officio*.

The meeting adjourned for a tour of ALCOA SEAPROBE at 1030, November 2, 1977.

T. Stetson
Executive Secretary, UNOLS

APPENDIX I

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

DIVISION OF OCEAN SCIENCES
OFFICE FOR OCEANOGRAPHIC FACILITIES AND SUPPORT

MEMORANDUM

14 October 1977

TO : Distribution

FROM : Special Assistant to Head, OFS

SUBJECT: Minutes of Review of Polar Ship Design and Related Materials

Final minutes of the 7 September review meeting on the polar ship design are attached. Corrections and comments have been incorporated, and items questioned in the first draft have been checked out and either verified or amended, as necessary. For those who still have the draft, changes in this version are marked with brackets. Additional background materials are included as attachments.

Sandra D. Toye

Attachments

DISTRIBUTION:

Mr. Barber, NOAA
Mr. Cherrix, MARAD
Mr. Dietz, USCG
Mr. Nelson, OCEANAV
Dr. Elsner, Alaska (3)
Mr. Dermody, Alaska
Mr. Leiby, WHOI
Mr. Stetson, UNOLS
Dr. Slaughter, AD/AAEO
Mr. Hunt, DAD(O)/AAEO
Dr. Todd, DPP (2)
Mr. Betzel, DPP
Mr. Franko, DGC

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

Office for Oceanographic Facilities and Support

Minutes of Meeting of the
Interagency Committee on Ship Construction (ICSC)
7 September 1977, 1:00-5:00 p.m.
Room 628, National Science Foundation

14 September 1977 *

In Attendance

ICSC Members
Mr. Barber, NOAA
Mr. Cherrix, MARAD
Mr. Dietz, USCG

Polar Design Study Group
Dr. Elsner, U. of Alaska
Mr. Dermody, U. of Alaska
Mr. Leiby, Woods Hole
Mr. Gilbert, J. Gilbert Associates
Mr. Voelker, Arctec Inc.
Mr. Milne, German & Milne, Ltd.

NSF Staff

Dr. Todd, AD/AAEO and DPP
Mr. Hunt, DAD/AAEO
Mr. Betzel, DPP
Dr. Lettau, DPP
Mr. Lewis, DPP
Mr. Vigen, DPP
Mr. Bruning, DGC
Mr. Welch, DGC
Dr. Wall, OCE
Mr. Elder, OCE
Ms. Toye, OCE

The meeting was called for a review and evaluation of the conceptual design for polar research vessels produced by a team headed by the University of Alaska. The design team was represented by the three principals in the study and their major industrial consultants. Mr. Charles B. Cherrix of the Maritime Administration was discussion leader for the ICSC.

After introductions and brief general remarks by Sandra Toye, a brief description of projected research requirements in the Arctic and Antarctic was presented by Bernard Lettau, Division of Polar Programs, and Robert Elsner of the University of Alaska. (Atch A)

The meeting was then turned over to Mr. Cherrix. Questions and comments had been submitted to Mr. Cherrix in advance by members of the ICSC. These were collated and served as an outline for the remainder of the meeting. The questions and a summary statement of the responses agreed upon are attached (Atch B). These constitute the principal record of the technical discussions that occupied the remainder of the session. [Additional material submitted after the meeting constitutes Attachment C.]

Stated briefly, it is the view of the ICSC that the conceptual design is an interesting and competent product; that the resultant ship(s) is a unique vessel, not duplicated by existing ships; and that further development and testing is warranted. Major areas of uncertainty remain, however, and these

[* Reissued, with minor revisions, 14 October 1977] should be the focus of the next phase of design activity. Full stability calculations and curves, including damaged stability, must be carried out. Weights are crucial because of the heavy hull and machinery loading. Propulsion and steering systems must be carefully analyzed for reliability and safety in ice operations as well as open ocean conditions. Until a very full set of such calculations and model tests have been completed, choice of hull form, machinery, and many other elements must remain tentative.

Sandra D. Toye

Attachments

Projected Research Requirements - Antarctic Research Ship
Division of Polar Programs
National Science Foundation

Projected Antarctic Science Programs requiring research work at the pack ice edge and within the pack ice.

Antarctic Ocean Sciences

- o Weddell Gyre Program
- o Indian Ocean Sector Studies
- o Air/Sea/Ice Interaction Program
- o Carbon Dioxide Program
- o Marine Chemistry Program
- o Sedimentary Studies

Antarctic Meteorology

- o Weddell Gyre Program
- o GARP Polar Sub-program Studies

Antarctic Biology

- o BIOMASS (Biological Investigations of Marine Antarctic Systems and Stocks)
  - o Trophodynamics of the Antarctic Marine Ecosystem (Pack Ice Biome)
  - o Collection of Data for Conservation and the Rational Use of Fisheries Resources

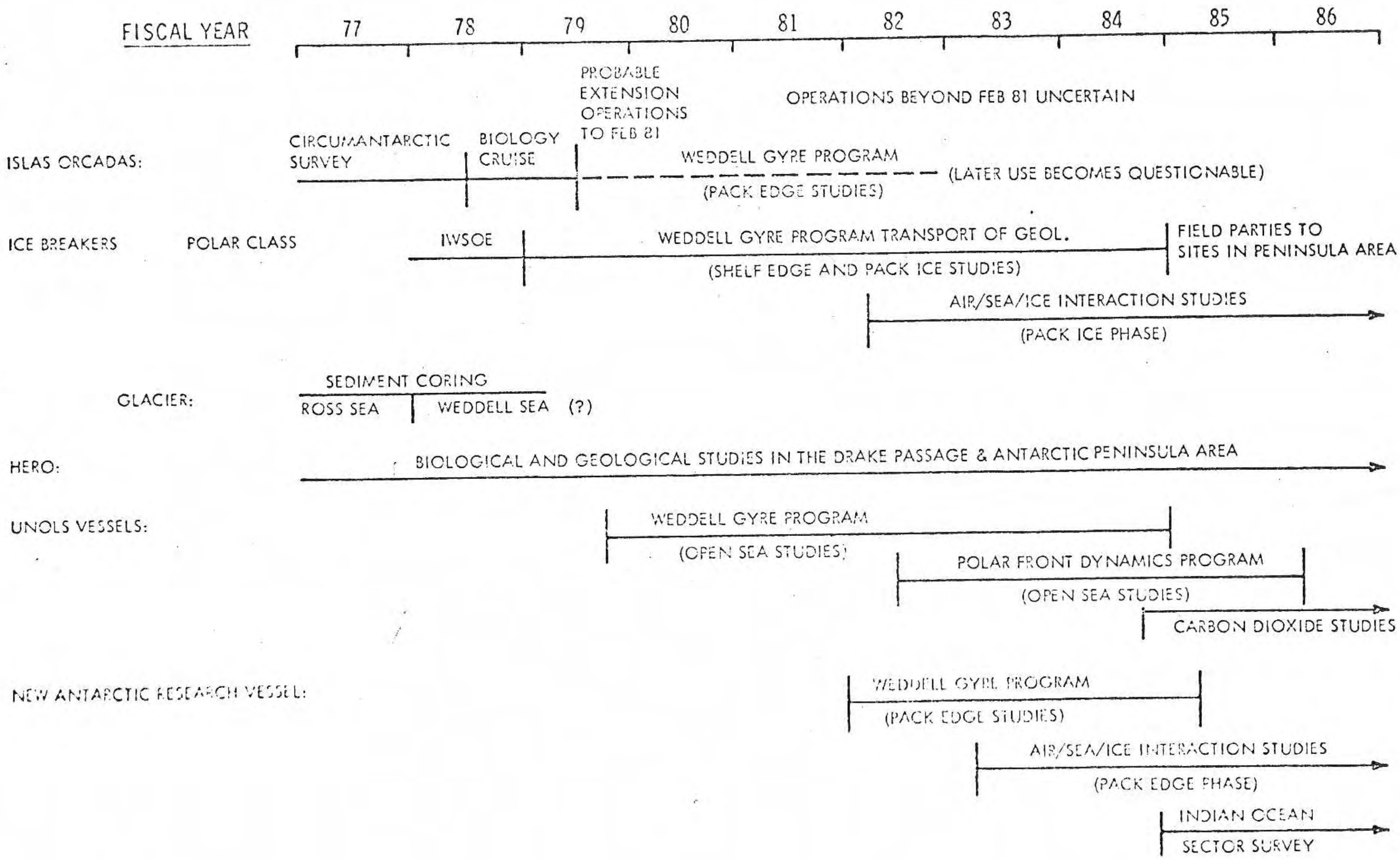
Antarctic Earth Sciences

- o Mineral Resource Potential Studies

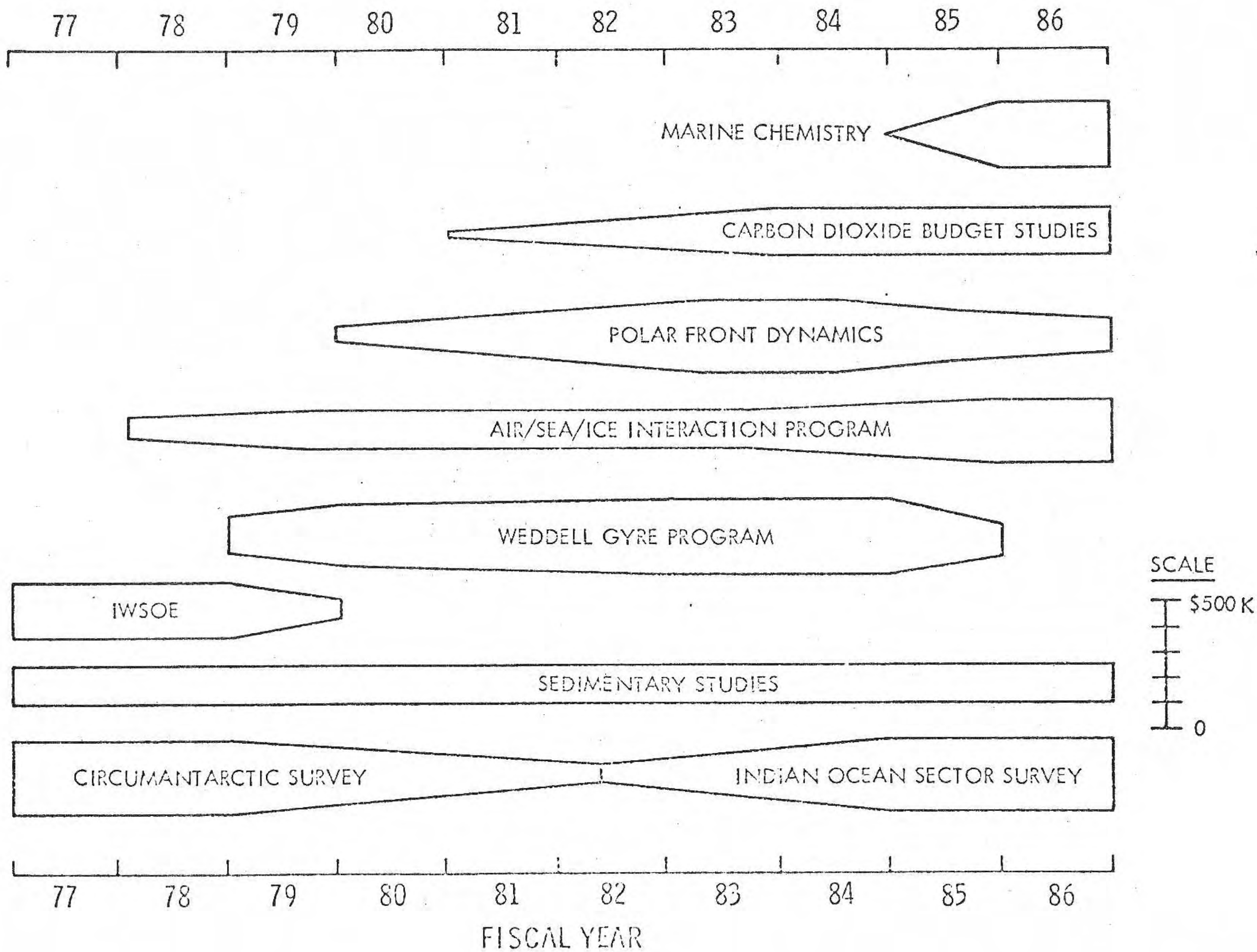
Required Ship Capabilities

- o 90 Days Endurance (Besetment Survival Capability)
- o Hull Strength equivalent to Icebreaker
- o Anti-roll Stabilization for Open Sea Work
- o Bow Thruster for Stationkeeping
- o Stern Trawling and Side Trawling Capability
- o Bottom Dredging
- o Sediment Coring
- o Hydrographic Casts (CTD, Water Samples)

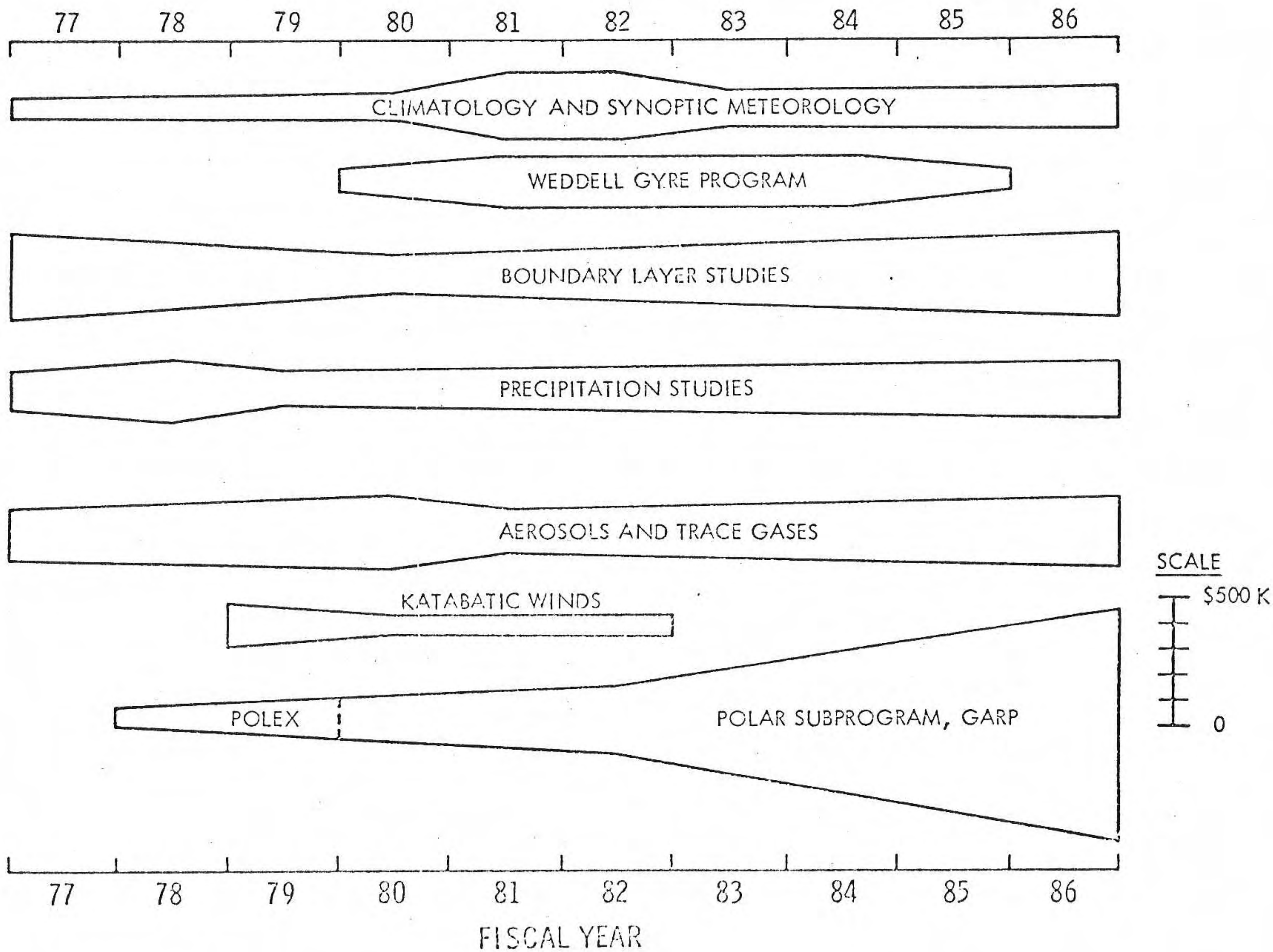
PROJECTED SHIP USE BY PROJECTS-ANTARCTIC OCEANOGRAPHY



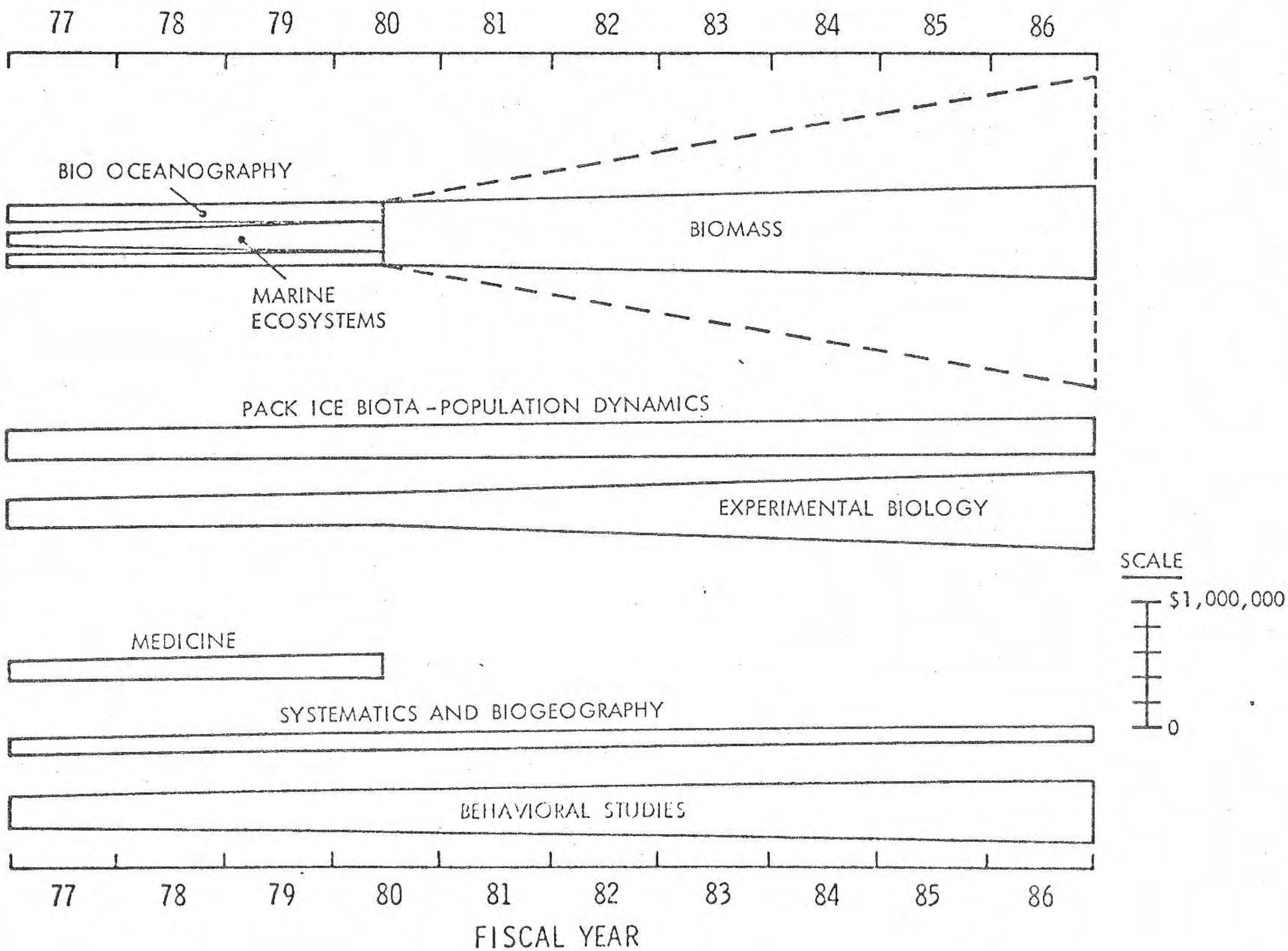
ANTARCTIC OCEAN SCIENCES



ANTARCTIC METEOROLOGY



ANTARCTIC BIOLOGY



ATTACHMENT
B

POLAR RESEARCH VESSEL

A Conceptual Design for the
National Science Foundation

TECHNICAL DISCUSSION -

Scope of Project

To produce a conceptual design of a vessel capable of working in geographical regions subject to moderately severe conditions of seasonal sea ice and in high latitude open ocean.

A Conceptual Design Is:

The first stage called concept design is an attempt to put the Owner's requests down on paper. This is basically a technical feasibility study to determine the basic characteristics of the proposed ship such as length, beam, depth, draft, speed, power, cargo cubic and deadweight. It will also include a preliminary weight estimate of light ship usually derived from curves, formulas and experience. The concept design is used as a talking paper for obtaining ball park construction costs, for presenting Owner's requirements to a shipyard or design agent. This study is used as an input for the next stage of design development, the Preliminary Design.

To put the vessels in perspective, the principal characteristics are:

	ARCTIC	ANTARCTIC
Length, Overall	190'-9"	226'-9"
Length, Waterline	175'-0"	211'-0"
Length, Between Perpendiculars	169'-9"	205'-9"
Beam	40'-0"	40'-0"
Depth	21'-0"	21'-0"
Draft (Normal)	15'-0"	15'-0"
Draft (Maximum)	16'-6"	16'-6"
Draft (Scantling)	18'-0"	
Displacement	1785 L. Tons	2371 L. Tons
Horsepower	3700 BHP	3700 BHP
No. of Propellers	2, Controllable Pitch	2, Controllable Pitch
No. of Rudders	2	2
Bow Thruster	1 Water Jet Type	1 Water Jet Type
Type of Propulsion	2 Diesel Engines with Reduction Gears	2 Diesel Engines with Reduction Gears
Range	13,250 Miles @ 13 Knots	20,000 Miles @ 13 Knots

	ARCTIC	ANTARCTIC
Endurance	60 days	90 days
Accommodations	16 crew (12 required plus 4)	19 Crew (12 required plus 7)
ABS Classification	1AA	1AA
Ice Strengthening	— Canadian Arctic Class 2 —	

In reviewing the concept design we have found it to be appropriate for the mission as stated under Scope of Project. However, we have many questions and suggestions which are listed below. Some can be answered today and some will require some extensive study.

We have left space after each comment/question for answering or modifying our statements. We realize that this is a concept design study to determine the characteristics and design goals of a new research vessel specifically designed and built for arctic oceanography, including both ice and open ocean operations, and have oriented our comments accordingly.

1. The report should have the vessel's characteristics and general description included in the first several pages. This helps the reader and fixes the vessel's description so that the rest of the report can be more easily understood.

   Editorial comment - noted and agreed.

2. Because of the conflicting hull requirements for open ocean and ice transit, model testing is essential before the hull form is selected. This could have a tremendous impact on the vessel's arrangement which should not be fixed too early, i.e., before the hull form is selected.

   Agreed. The initial conceptual design effort has not included model tests. Such tests would be a major part of the next phase of the effort, and their outcome would clearly affect selection of hull form and all that flows from it.

(A) 3. No mention is made of damage stability calculations being made. For a vessel of this type a two compartment standard should be required.
(B) The majority if not all of the fuel is located. This results in trim forward as fuel is used thus requiring ballasting. Carrying unnecessary ballast is expensive deadweight and should be avoided whenever possible.

(A) The intent is to meet two-compartment standard, though calculations have not yet been made.

(B) Manually-controlled compensation systems are widely and successfully used on academic fleet ships. No problem is anticipated in using a similar system to adjust trim and ballast on this ship.

4. The arrangement of the accommodations could be improved. The scientist and some crew are aft while their hotel service and officers are forward. Suggest moving the engine room aft one hold and putting the people forward. This would reduce shafting lengths especially in the lengthened version as well as help with operational trim problems by locating some of the fuel tanks forward. In addition the officers quarters would no longer be located over the engine room thus less noise. The two ladders located next to the main

lab on the main deck which are side by side should be over each other for space saving.

There is a conceptual difference here; the intent is to concentrate berthing areas and labs amidships to reduce effect of motion.

Nevertheless, arrangements are not fixed and other configurations will be considered.

5. The access to the reefer and dry stores could be improved. The hatch should be at least 4½' x 4½'. This could be done by locating it on the centerline in conjunction with the existing 4½' x 4½' hatch to the No. 1 hold. As shown, when open the access passage is blocked.

   Agreed.

6. The stack appears to be too low. As shown the after deck could be effected by stack gasses. Suggest stack flow tests be performed.

   Agreed. The stack should probably be taller.

7. The house front on the 01 level is too rounded. This will be more expensive to build and more difficult t outfit the interior spaces. Suggest developing a flatter house front.

   This has been designed in this fashion so that the house front will also serve as a breakwater. Scantlings are beefed up. No separate breakwater is planned.

8. The enclosed crow's nest has proven to be unsatisfactory on small oceanographic ships due to their rolling and pitching. Will be useful only in ice. The expense may not be worth its usefulness.

   The expectation is that the crow's nest will only be used in ice. In that environment, however, it is considered a necessity. It will be used only as a lookout, however, with minimal instrumentation; e.g., a gyrocompass, intercom to the bridge, and a heater.

9. The unsymmetrical arrangement must be carefully checked during the design to prevent an unwanted permanent list.

   True - this is a problem, but asymmetry is typical of research ship designs because of the long run of open deck required for coring.

10. The structural bulkheads in the hull and superstructure do not line up. Suggest aligning at least the major structure to prevent vibration problems and reduced scantlings.

    There is apparently some inconsistency in the drawings. No real problem here.

11. The number of lifeboats is questioned. The vessel should have at least two approved boats.

    Subchapter "U" calls for 200% rafts and only one boat. The intent would be to meet this requirement, with small scientific boat(s) available as backup. Rafts are universally preferred because of reliability.

12. As shown, the bow thruster penetrates a watertight bulkhead. This may be a problem if damaged since two compartments would be flooded.

    This aspect is not really developed yet. The thruster might have to be placed higher to avoid this problem.

13. The stabilization tank shown on the plans is located poorly from the standpoint of vision forward from the bridge. Effectiveness of the tank is questioned because of its shallow depth, which could permit saturation under relatively mild conditions. Assuming the tank geometry is satisfactory, one improvement would be to raise the bridge three or four feet to afford a better view of the bow. If the anti-rolling tank needs to be deeper to improve its effectiveness, more drastic arrangement changes would be necessary.

    This whole question calls for testing. Higher placement would be desirable if space and visibility problems can be resolved. "Phase senors" have been used on some Canadian ships to help in tuning, one of the classic problems with anti-roll tanks.

    Successful <u>Eltanin</u> tank design should be examined.

14. The somewhat "stubby" proportions of the arctic ship might cause pitching, rather than rolling, which is one of the major causes of crew discomfort.

This definitely needs attention during model testing and final hull form selection. It is true that the Arctic version approaches or exceeds the minimum acceptable ratios. Antarctic version is OK.

15. The proposed concept of a pivoted daggerboard stabilizer is similar to a sailboat centerboard and has merit. There should be two, one each P&S in the bilge area where the bilge keels are now shown, projecting normal to the hull in a similar manner to "bilgeboards" of some inland lake sailing craft. The bilgeboard trunks could be fitted in the P&S fuel tanks, with no loss in useable space inside the ship and negligible loss of fuel capacity in the affected tanks. Hydraulic activating gear and access to the pivot pin would be in the shaft alley.

The cost should be a fraction of that of activated fin stabilizers, although it would probably be greater than that of bilge keels. If the retractable bilgeboards were large enough, the permanent bilge keels could be omitted, for a savings in fuel consumption and construction cost.

The need for bilge keels or something of this sort is clear. The "bilgeboard" idea is interesting. Part of the issue is whether bilge keels should be so strong as to be unbreakable or deliberately designed to break off easily to prevent catching on ice.

16. The adapting of the arctic design to antarctic service by addition of a midbody would be satisfactory if certain investigations were made, and proved satisfactory, which do not appear in this report, i.e., model tests of the shorter and longer versions should be performed for resistance, propulsion and seakeeping. Comparisons should be made with similar icebreaking and research ships of both sizes. Stability and strength analyses should be made of the longer version. From past experience, we note that the stability picture generally improves in a jumboized design, but the analysis should be made anyway. Longitudinal strength should not be a problem in a jumboized design of this size, but scantlings of longitudinal members will increase, which would partially offset the cost-savings advantage of two-ship procurement.

Agreed. All of these comparisons and tests should be made during the next phase of design.

17. On Pages 41 and 42, there is a discussion of coatings on icebreaker hulls and the effects of ice abrasion on the coatings. The Canadian Coast Guard and U.S. Navy paint the hulls at the end of each winter season, assuming that the coating will be worn off the following winter, while the U.S. Coast Guard does not paint the icebreaker hulls at all. This office agrees with the Canadian and U.S. Navy practice of keeping paint on the icebreaker hulls as long as possible, during the warmer part of the year when corrosion would be the greatest.

Interesting experiments are going on now with low-friction coating materials. Academic ships are usually not dry docked annually. The warm water maximum for these ships would only be about 40°.

18. Despite statement on page 8, the vessel described is much more than an ice-strengthened vessel. It is, in fact, a limited capability icebreaker.

Semantics are a problem. Canadian rules cover ice breakers of 10 classes; this ship would be only Class II (next to lowest) on this scale, yet is similar to structural [capability] of U.S. Wind class breakers. "Ice-working" is probably the best term.

19. Stability grounded at step must be checked, as well as main deck immersion aft is same condition. Damage stability is also important and may be governing.

Agreed. Further tests and calculations are crucial. See also questions 2 and 3.

20. For weight estimating purposes, where has 150-ton scientific outfit weight been placed? What overall weight and KG margins have been/will be used? Free surface corrections must be included in loading conditions - one pair of slack tanks per system at least.

Outfit weight was placed 4 feet above main deck, 25 feet above baseline. Longitudial center was 25 feet aft of midships. KG margin is about 1/2 foot; light ship margin is 100 tons.

21. L/B of 4.45 is somewhat high for good maneuverability in ice and is more representative of icebreakers performing escort duty and requiring straight tracks. If amneuverability is as important as attention to thrusters indicates, good inherent maneuverability should be provided in hull dimensions. Lower L/B (say 4.0 to 4.25) could also permit shortening ship and reducing cost, although open-water motions would probably become worse.

[Agreed, this is a problem, but open-ocean performance is one of crucial design concerns.]

[Also See Question 14]

22. Outboard rudders on horns are high technical risks considering lack of experience this side of Atlantic, and are therefore inconsistent with high reliability. They have been used on some recent European designs but we have no data base. Finns include weak link at tiller-ram connection to avoid overstressing system. Do not disregard many successful applications of twin screw and centerline rudder combination. Maneuverability is obviously not optimum but perhaps thrusters can make up for deficiencies.

This issue has been much discussed throughout design effort so far and will require more study to resolve. There are trade-off's in all possible modes and combinations.

[See Also Attachment C]

23. Recommend extending stem downward further. Energy should be dissipated in lifting bow rather than edge-loading and crushing ice. Loading of step can also result in structural failures over a period of time. Perhaps ramming dynamics can be analyzed to determine stem length required to change forward [motion] to lifting of bow.

This was done deliberately to minimize ice-breaking capability and discourage ramming except as required. Even so, this should be tested to be sure that the ship will not be in danger of fetching up on the forefoot.

24. Some of the scientific options listed as load-on/load-off would require shipyard installation and are not consistent with fast turnaround. Although the ship could carry most of them, they would require considerable time and expense to install.

With the exception of the Greenland cruiser (see #25 below), the operators/designers do not agree. All these items are commonly handled modularly in the academic fleet without shipyard installation.

25. A greenland Cruiser carrying and handling ability on a ship this size appears unrealistic. Davits must be integral with ship structure - not bolt on/bolt off - and would interfere with scientific operations. Deck area available may not be adequate. Off-center weight of boats will present a problem.

General agreement that the 30-40 T load of a Greenland cruiser is too much for this ship.

26. What model or full-scale tests form the basis for the predictor equation for continuous icebreaking?

[An ARCTEC, Inc. report of ice model testing of a University of Michigan student design. (Reprints have been distributed to principals since the meeting)]

27. Access to main engines (especially in construction sections) is very tight. This should be examined closely, since major changes would be required if inadequate. Machinery space itself looks quite small.

This is unquestionably a tight engine room, and this must be watched closely during development. This is a two-level arrangement, however, which helps to some extent.

28. Humidifcation of air is a desirable feature and should be investigated.

Agreed. Will be included.

29. Availability of special steel (CG-537M) in small (one-ship) lots may be a problem. If so, use of proprietary A-537 steels would be acceptable for this application.

The concern is noted. This can be checked out.

30. Regarding stabilization - Good to see that this is getting attention and has some priority. The matter of heating the anti-roll tank is bothersome. How would this be done? Couldn't the tank be located under the pilothouse to reduce cooling surfaces. This would also improve visibility forward, since tank runs the full beam.

See question 13 also.

Some ships use glycol in anti-roll tanks. This or a similar biodegradable alcohol-type additive could be used.

Peirce and Whiting have successful systems with anti-roll tanks located under the pilothouse.

31. Recommend that bilge keels be eliminated. They will trap ice and increase ice resistance and probably come off eventually even though of heavy construction. NOAA Ship Miller Freeman has sliding daggerboard in trunk, a possible alternative. Plans available.

See also question 15. Mr. Gilbert would like to see plans.

32. Box beams and enclosed foundations will not only make ice removal easier, but will also reduce maintenance effort.

Agreed.

33. Corrosion allowance on shell plate thickness not mentioned. Should be considered if reliable anti-corrosion coating not found.

See also question 17.

34. Vessel needs a dedicated shop area and spare parts stowage area. Miscellaneous "make-do" areas are not adequate for self-sufficiency required. Good capability must be retained for repair of scientific gear as well as ship-related systems.

There is general agreement that space should be earmarked now. If this is left until late stages, other uses may have claimed all desirable spaces. Shops are especially important for self-sufficiency in polar operations.

35. In the future, include photo reduction scales on drawings so that they can be scaled regardless of reduction.

Editorial comment noted.

36. Forward mast now required for forward range light would probably preclude a helo platform forward.

Right. Some pilots strongly prefer helo pad aft. See also question 49.

37. Representative mission profiles would be useful in evaluating range capability.

Agreed. Can be provided.

38. Freeboard in ready-for-sea condition looks low. Any estimate of loadline or reserve buoyancy requirements?

Ready-for-sea free board is 4.3 ft; at mid-voyage loading, 5.5. In principle 5.0 ft at full load would be preferable, but present allowances are acceptable.

39. Does the exterior arrangement permit meeting current Rules of the Road requirements for navigation lights?

Probably not. Design did not reach this level of detail.

40. Rules of the Road require a vessel to maintain a proper lookout with respect to "sight and sound". How does the bridge arrangement permit this, particularly with respect to "sound"?

The bridge has side-sliding windows. Under poor conditions of visibility, however, operating practice is to station a lookout with a bridge-to-bridge telephone far forward.

41. What prompted the selection of twin angled rudders? What were the points considered and what were the tradeoffs? The angled rudders are necessary to position the rudder blades in the propeller outflow without using excessively long rudder supports. The propellers are located unusually far from the hull to provide good tip clearance.

The larger issue, i.e., choice of steering and propulsion system, is a matter requiring much more study. See also question 22 and Attachment C.

42. The engine room appears to be small for the equipment that will be required. During the conceptual design, was a feasibility study/arrangement performed to assure that all the identified equipment will fit? If so, please provide the results of the study.

See also question 27.

Only a block layout has been done at this point.

43. Why are the two ship service generators of different sizes? What is the electrical load in the different operating modes (e.g., polar steaming, tropical steaming, station keeping, etc.)? Can the larger of the two ship service generators go down and the normal steaming load be carried by the smaller ship service generator? What margin for future growth is available with the proposed generating capacity?

The smaller is adequate (margin of 33%) for the ship's load. The larger generator is required for the combination of ship's service and scientific load.

44. How will waste materials be held or disposed of? Specifically, what provisions have been or will be provided to handle oily bilges, sanitary wastes, and non-biodegradable materials (such as plastics, which can not be thrown overboard)? If the vessel is in a stationary position for a particular long term experiment, what means will be provided to prevent fouling the local area? How long will the vessel be able to maintain its non-fouling condition?

There are wing tanks forward of the engineroom for holding of sewage, wash water, and oily bilges.

The specifics of sewage and other waste-handling were not addressed in the conceptual study. These ships will fall under the purview of the new marine sanitation regulations.

Regardless of which criteria (marine sanitation regulations or scientific) is governing, the specific holding capacity of the ship needs to be expressed as an operational requirement; considering the intended mission of the ship, this requirement must be stated by the scientific community as a design requirement.

45. A geared diesel propulsion train with CPP propeller was selected. It is proposed to make a dynamic analysis of the propulsion system while operating in ice during contract design. What sources of experimental (model or full-scale) information will be used to define shaft torque and spindle torque variation during ice impact?

Canadian Arctic rules provide basic measures, but answers are not all available. USCG's Polar Star has suffered casualty already - perhaps results of analysis will improve the data base. Report should be requested from USCG.

46. The use of bronze bolts to couple one set of flanges in the line shaft has been proposed. For a quasi-static increasing load, this idea appears attractive. However, what problem does the designer see if, in fact, the engine is stalled? Qualification of the idea would appear to require the dynamic analysis.

Dynamic analysis is needed to determine whether this idea is sound.

47. What fresh water tank capacity has been provided? Accommodations have been provided for 36. Evaporator capacity is 3000 gpd or 83 gpd per person. This number seems high. What is the basis for sizing the evaporator?

Two tanks - a 7-day capacity. MARAD says 83 gpd per person is too low; USCG says it's high. A good part of the fresh water requirement is for scientific activity. Figures used are a comfortable level for research ships.

48. Watertight subdivision boundaries have not been identified on the drawings. Please provide results of any damaged stability studies that have been performed (e.g., floodable length, etc.).

See also questions 3, 16, & 21.

Two compartment standard will be used, but no studies have yet been conducted and only minimal calculations have been made.

49. Justification for the helicopter platform is needed. Why can't skid-mounted helicopter land on ice for any personnel transfer?
Skidlandings on the ice are possible under some conditions, but often cannot be done. The helicopter capability is viewed only as an occasional-use item, since ship is not equipped with systems or space needed for routine inclusion of a 'copter. NOAA has developed some portable helopads-Mr. Barber will inquire about plans.

50. What is the estimated roll period, with and without the flume tank system? Has noise generated by anti-roll tanks been considered in relationship to placement of adjacent staterooms?

Computations can be provided by Mr. Gilbert. See also questions 13 and 30. Refinement of anti-roll tank design, including sound attenuation, is needed.

51. How sensitive to an increase in displacement are the different operational performance characteristics and the survivability of the ship in the intact and damaged conditions? What margins have been provided on estimating the weight?

See also question 48.

The margin for estimating weights was 100 T. The critical area for calculations is the machinery compartment.

52. Many different correlations exist for predicting the ice breaking capabilities of a vessel. What is the basis for the correlation shown on page 30?

See also question 26.

53. Present Coast Guard rules allow the sizes of generators as indicated, e.g., one of 650 KW and the other unit of smaller capacity - 280 KW. However proposed Coast Guard rules are that the two generators (one on line and the second unit a standby) to be of the same capacities, two 650 KW units.

See also question 43.

ATTACHMENT C

Office Memorandum • WOODS HOLE OCEANOGRAPHIC INSTITUTION

TO : Distribution

DATE: 20 September 1977

FROM : Jonathan Leiby

SUBJECT: Polar Research Ship Design; 7 September Review Meeting Comments
Re: Twin Rudders

With reference to Comments #22 and #41 re Twin Rudders being high technical risks, I am enclosing a copy of the Data Sheet from Ship & Boat International, December 1976 on the Russian Harbor Icebreaker "Kapitan A. Rodzhabov," one of a series of three designed and built by Wartsila. These vessels are comparable to the size, displacement and power of the Polar Research Vessel design. Wartsila enjoys the highest reputation for icebreaker design construction so it is noteworthy that both twin screw and twin rudders were selected for this class. Perhaps the fact that these ships are to be used in relatively confined waters has dictated the twin rudder installation for greater manauverability. There can be no question that in such service they will have to back into the ice frequently.

Anyone who has a contact at the Wartsila yard might check upon the background of this design.

JL/kee
Enc.

Distribution:
- NSF - OCE (Ms. Toye)
- NSF - DPP (Mr. Betizel)
- Dr. Elsner
- Mr. Dermody
- Arctec, Inc. (Mr. Voelker)
- Gilbert Asso. (Mr. Gilbert)
- German & Milne (Mr. Milne)

SHIP & BOAT INTERNATIONAL

DATA SHEET

KAPITAN A. RADZHABOV

HARBOUR ICEBREAKER

(The picture is of a sister ship)

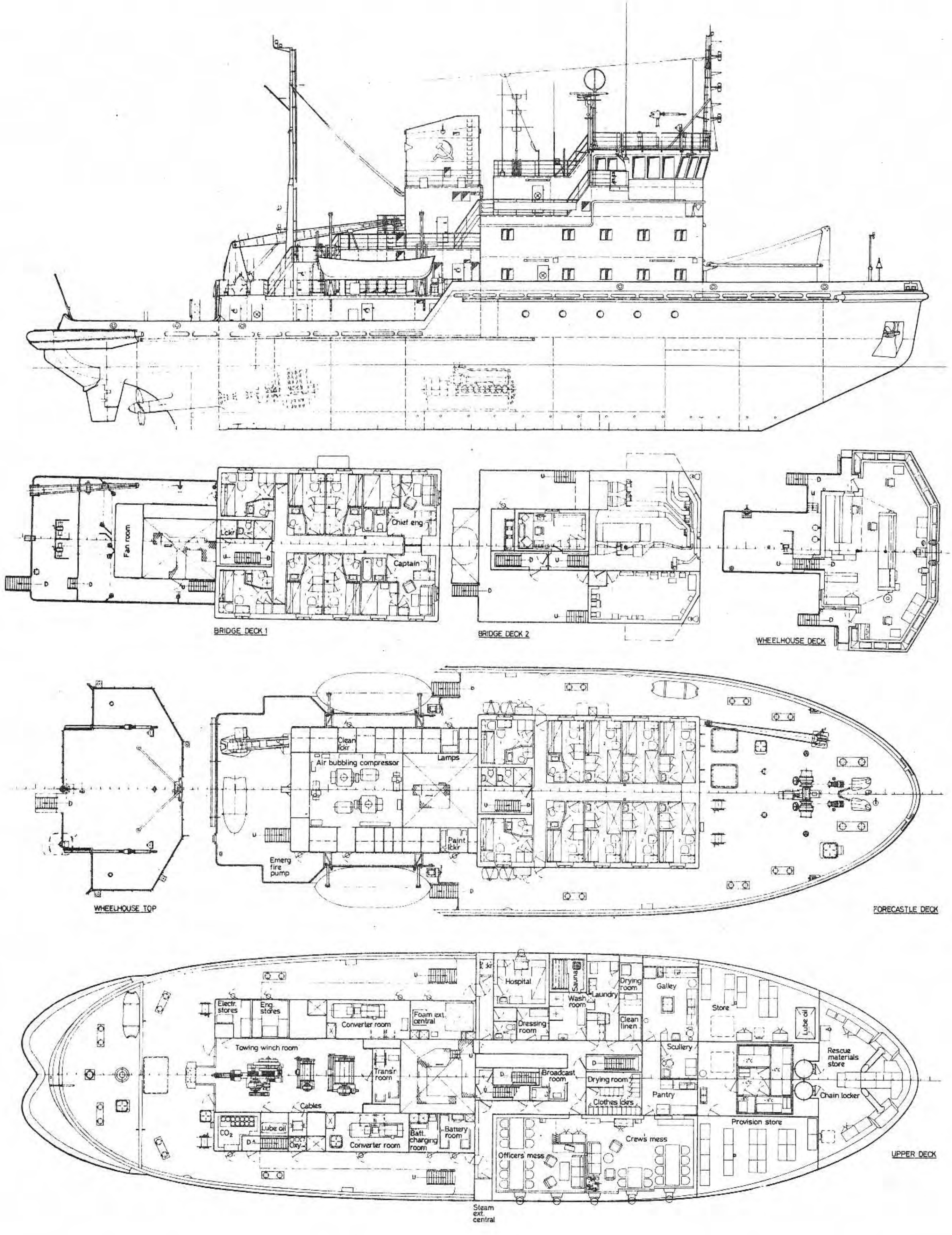
Length o.a.	**56.3 m**
Length b.p.	**52.2 m**
Breadth mld.	**16.0 m**
Draught	**4.2 m**
Gross tonnage	**1361**
Displacement	**2045 t**
Fuel capacity	**380 t**
Freshwater capacity	**76 t**
Foam capacity	**5 t**
Water ballast capacity	**380 t**
Windlass	**Sudoimport, elec., type B6**
Capstan	**Sudoimport, 3 t**
Steering gear	**Wärtsilä Kotka**
Winch (towing)	**Norwinch hydr., 30t**
Crane	**Kotka-Autronica**
Complement	**24**

Engines	**4 x Wärtsilä Vasa 824TS**
Bhp	**1340 bhp each**
Main generators	**4 x Strömberg, 1800 kVA ea**
Prop. motors	**Strömberg D.C., GTCUL**
Prop.output	**2 x 1550 kW at 240-350 rev/min**
Propeller	**Wärtsilä Dalsbruk**
Bollard pull	**35 t**
Service speed	**13 knots**
Auxiliaries (harbour)	**250 kVA Deutz diesel set**
E.r. pumps	**Imo; Kolmeks**
Fire	**2 x Iron 300 m³/h each**
Monitors	**Svenska Skumsläcknings AB**
Navigation Equipment	**Sudoimport; comprising MIUS radar, IEL log, NEL 10 sounder, AMUR gyro, RYB-KA rdf and full radio incg. VHF**

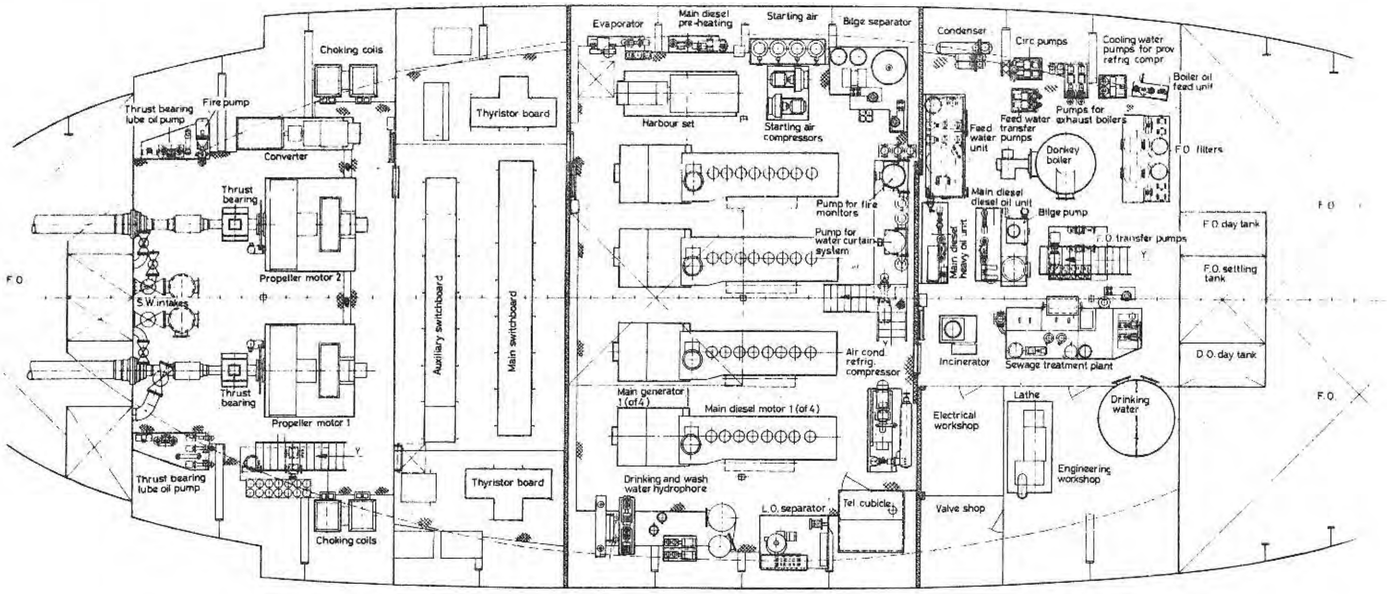
Builders	**Wärtsilä Helsinki Shipyard, Helsinki, Finland.**
Owners	**Caspian Sea Shipping Co., U.S.S.R.**
Classification	**USSR Register of Shipping KM ✱ I 1A1 "Ledokol" (= icebreaker)**

The *Kapitan A. Radzhabov,* delivered in October 1976, is the last in a series of three icebreakers designed to assist vessels in shallow waters and port areas, as well as to carry out rescue, firefighting and towage work in the Caspian, Black Sea and White Sea. The twin propellers are matched by twin rudders operated by separate electro-hydraulic steering machinery. To decrease friction between the hull and ice, the vessel is fitted with the Wärtsilä air bubbling system.

The machinery is arranged on the "power station" principle, whereby the main a.c. generators also supply auxiliary power. The d.c. propeller motors are fed via thyristor rectifiers making it possible to obtain constant power over a wide range of revolutions and high torques even at low rev/min. The advanced thyristor rectifying equipment was supplied, like the electrical machinery, by Oy Strömberg AB. Machinery is automated in conformance with the USSR Class A1 require-



General arrangement of the Kapitan A. Radzhabov



Above: Engine-room plan showing the arrangement of the diesel-electric machinery built on "power station" system.

ments for an unmanned machinery space. All manoeuvring and monitoring is carried out from the wheelhouse.

The auxiliary power system is separated from the main power system by three rotary converters to avoid disturbances that might otherwise occur in the power network.

Towing arrangements are based on a Norwinch hydraulic towing winch fitted with automatic wire length and tow hawser load control. The arrangements include two separate power-operated wire storage reels for 40 mm and 26 mm wire. Maximum tow hawser length is 700 m. The winch brake is designed for maximum holding power of 16 t.

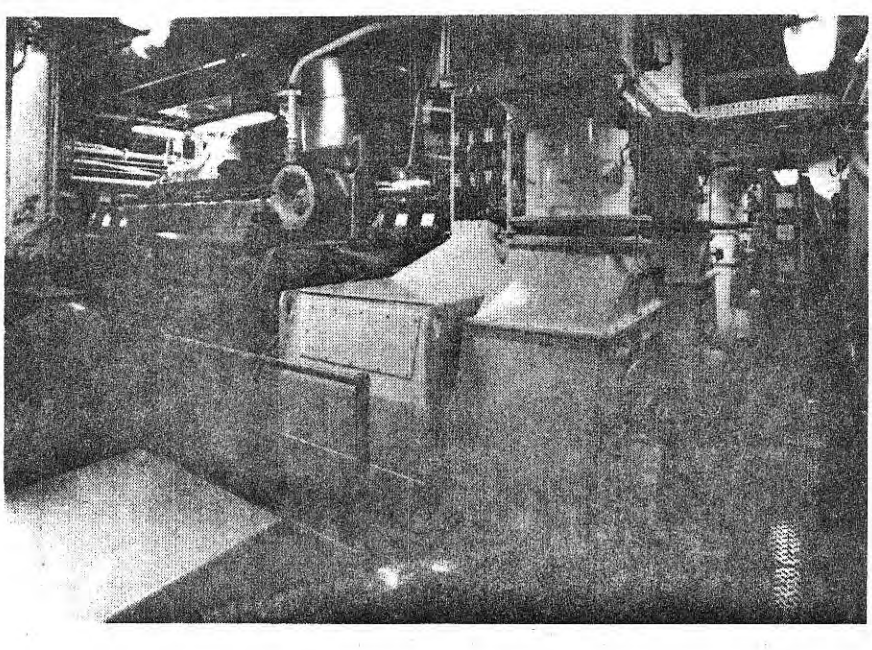
For firefighting, there are two remotely controlled monitors in addition to which foam can also be fed to the regular fire main. A high-pressure water curtain system is provided.

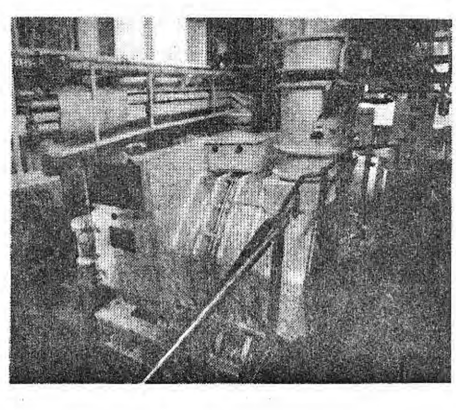
It is now recognized as essential that the accommodation in icebreakers should be of a high standard and the *Kapitan A. Radzhabov* is no exception. All officer's have individual wc/shower cubicles. No combustible materials are used, the accommodation bulkhead system being of Wärtsilä's own modular steel type.

The air-conditioning system (supplied by AB Svenska Fläktfabriken, Gothenburg) is capable of maintaining an interior temperature of +20°C with an exterior ambient temperature of −30°C. Under tropical conditions, a temperature difference of 5°C can be maintained in all living quarters and in the enclosed wheelhouse.

The vessel fulfills the requirements of the IMCO International Conference on Marine Pollution 1973 and is equipped with a Vacuum Sewage System of Wärtsilä make. This system is associated with a sewage treatment plant supplied by Salen Vattenvård AB, Stockholm, Sweden.

Right: Close-up of the bridge, fully enclosed yet giving 360° visibility. Below: The Wärtsilä Vasa main engines and Strömberg generators are seen in this general engine-room view. Bottom right: A view of one of the main propeller motors.





COMMUNICATIONS VIA SATELLITE FOR OCEANOGRAPHIC VESSELS

C. D. Tollios

The satellite communications systems presently being used by the oceanographic community on the research vessels employ the NASA ATS-III satellite (Application Technology Satellite). The system allows three channels in the VHF band for communications between ship and shore. The system is capable of supporting voice, facsimile copy, and low speed data transmission. Presently, time allocation is being controlled by NASA's Goddard Space Flight Center. A typical terminal requires a VHF-FM (2 meter) transceiver, a 100 watt power amplifier for transmit, a preamplifier for receive, a power supply to deliver 25 amps, and two sixteen element Yagi arrays (one for transmit and one for receive). Azimuth and elevation rotators should be used to position the antennae for best reception. For the shipboard terminals, an azimuth servo system slaved to the ship's gyro should be added to provide continuous automatic tracking while the ship is maneuvering.

The components for one terminal can be purchased for approximately $2,500. At present, oceanographic users arrange for their own time slots through Goddard Space Flight Center, but because of heavy usage, community members have agreed to allow Miami to regulate transmission periods for ship traffic. NASA will be allocating Miami a three-hour time block per day for oceanographic use. Each user will then be given a period of time upon their request to conduct their business.

For additional information on component or system requirements, contact Paul Eden at the University of Miami (Tel. 305-350-7274), or Gus Tollios at W.H.O.I. (Tel. 617-548-1400, ext. 276).

Basic content of speech presented at the 1977 Annual Meeting of the Research Vessel Operator's Council, at the W.H.O.I. Redfield Auditorium, November 1, 1977

"OSHA Diving Standards -- a W.H.O.I. View"

David M. Owen
Diving Supervisor, Woods Hole Oceanographic Institution

On October 20 the Department of Labor's Occupational Safety and Health Administration (otherwise known as OSHA) officially entered the diving scene, as its Standard for Commercial Diving Operations became effective. The Standard was published in the Federal Register of July 22, 1977.

I believe that some background information would be in order here. OSHA's new involvement had its beginnings in August of 1975, when a petition by the United Brotherhood of Carpenters and Joiners of America, AFL-CIO, was presented to the Secretary of Labor. The petition stated the belief that a situation of grave danger existed within the diving industry and urged that an emergency temporary standard be issued with respect to diving operations to protect exposed employees.

Following an informal fact-finding hearing convened by OSHA in November 1975, the Assistant Secretary of Labor, in June 1976, issued an Emergency Temporary Standard for Diving Operations. This Standard, hereafter referred to as the E.T.S., was to have become effective on July 15, 1976; instead it was stayed by the U. S. Court of Appeals, and later withdrawn. (The E.T.S., with which some of you may be familiar, was not enforced by OSHA.) However, a permanent OSHA standard had been designed, from the beginning, to ultimately replace the E.T.S. after a period. Public hearings on the new, final standard, the one that is now in effect, were held in New Orleans, La., in December 1976 and January 1977.

Be advised that the U. S. Coast Guard expects to publish its own rules and regulations on commercial diving by early next year; they will co-exist -- and are supposed to act in concert with -- the OSHA standard. (The contents of the proposed Coast Guard regulations may not yet be publicly known.)

Briefly, the scope of the OSHA standard includes every place of employment within the water of the U.S., or within any State, the various possessions and places under U.S. control, or within the Outer Continental Shelf lands -- as defined in the Outer Continental Shelf Lands Act -- where diving and related support activities are performed.

The standard applies to diving operations conducted in connection with all types of work and employments. There are some exceptions to this coverage, but diving for scientific and educational purposes -- as performed at this Institution -- is included under the OSHA standard. In the Summary and Explanation of the Standard, a section which is part of the OSHA "package", scientific and educational divers are included in the coverage "....because the record does not adequately support a conclusion that the work conditions and risk exposure of scientific divers differ measureably from those of commercial diving".

I have a professional concern, of course, with the nature and extent of the OSHA diving standard's impact on procedures already existing for the control of diving at this laboratory. This concern began last year with the approach of the E.T.S., which was withdrawn, as mentioned before; it was renewed with the development of the final standard which we have now. (Exclusion of our category of diving was to have been a qualified one in the E.T.S.; with regard to our possible inclusion in the final standard we did not know for sure until very late in the game, when we received the Federal Register of July 22, 1977. The uncertainties and changes -- between the E.T.S. and the final standard -- have accounted for considerable administrative time, money, and energy, plus a degree of confusion in the ranks !)

Our Scuba diving, as part of the research activity, began in 1952 though it was not formally recognized, and under internal regulations, until 1955. I have been involved with overseeing this activity here since its beginning -- some 25 years. To give an indication of our degree of activity, the Scuba diving statistics for 1976 show that 55 affiliated persons were actively diving on Institution-related business, and that some 1049 individual dives were logged (that is, 1049 man-dives), occurring on 150 calendar days.

To expound on all the individual requirements and ramifications of the OSHA standard would require much more time than we have available. Instead, I shall touch upon the basic areas in diving that the standard governs, going into details where thought to be of special interest -- with due attention given to vessel involvement. This will be followed with some commentary on the standard's impact on the diving scene at the Oceanographic. (Here I should emphasize that the impact of the OSHA standard is still "reverberating" in that the processes of interpretation, the reshaping of long established procedures, and the almost daily unfolding of new ramifications is not over. Perhaps some of you here today are relating to the same concerns.)

The OSHA personnel requirements, for example, show that each dive team member (including divers and support personnel) shall have current training in cardiopulmonary resuscitation (CPR) and in first aid. And the employer, or a designated employee, shall be at the dive location in charge of all aspects of the diving operation affecting the safety and health of dive team members.

Under Medical requirements, the employer must provide each dive team member who is, or is likely to be, exposed to hyperbaric conditions (that is, pressures greater than one atmosphere) with all medical examinations required by the standard -- at no cost to the employee. Extensive written reports are a part of this requirement.

Under General Operations Procedures, the employer shall develop and maintain a safe practices manual which shall be made available at the dive location to each dive team member. This manual covers each diving mode engaged in, with safety procedures and checklists, assignments and responsibilities, equipment procedures and checklists, and emergency procedures for fire, equipment failures, adverse environmental conditions and medical illness and injury.

Each dive site must have a list concerning emergency aid procedures, appropriate first aid supplies (approved by a physician), standard first aid handbook, and a bag-type manual resuscitator.

For a warning signal, when diving from surfaces other than vessels in areas capable of supporting marine traffic, a rigid replica of the international code flag "A" shall be displayed at the dive location.

Under Procedures during the dive, a means capable of supporting the diver shall be provided for entering and exiting the water; the means for exiting shall extend below the water surface. An operational, two-way communication system shall be available at the dive location to obtain emergency assistance. There are requirements governing the use of hand-held power tools and equipment, welding and burning, and explosives.

Scuba diving cannot be conducted at depths greater than 130 feet at all. And it cannot be conducted at depths greater than 100 feet or outside the no-decompression limits (that is, diving in which the need for decompression stops -- to avoid the bends -- has been incurred), unless a recompression chamber is ready for use at the dive location. Also, no Scuba diving against currents exceeding 1 knot, unless line-tended.

A standby diver, suited up, shall be available while a diver is in the water, and a diver shall be line-tended from the surface, or accompanied by another diver in the water in continuous visual contact. This is interpreted to mean that an operation involving a tether requires at least two divers on the site -- one in the water on the tether, plus the standby diver on the surface (who does not enter the water except in emergency). And the usual buddy-diving operation would require a minimum of three divers -- two in the water plus the standby diver on the surface. Beyond the diver part of the team, our best information thus far indicates a need for at least one additional person, on the surface; this person would be a tender who could handle the boat (or seek assistance/aid) in an emergency requiring the standby diver to enter the water. The tender could also be the OSHA-required designated person-in-charge.

For equipment requirements, each Scuba diver must carry a manual reserve (J valve) and a submersible tank pressure gauge. (The working interval of a dive shall be terminated when a diver begins to use diver-carried reserve breathing gas.)

The following diving modes have their own requirements in the OSHA standard: surface-supplied air diving, mixed-gas diving, and live-boating. (Live-boating is the practice of supporting a surface-supplied air or mixed-gas diver from a vessel which is underway. OSHA says this mode shall not be conducted in rough seas which significantly impede diver mobility or work function, or in other than daylight hours. In addition, the propellor of the vessel shall be stopped before the diver enters or exits the water, a device shall be used which minimizes the possibility of entanglement of the diver's hose in the propellor, and two-way voice communication shall be available between the person-in-charge and the person controlling the vessel, while the diver is in the water.)

Under Equipment, there are requirements concerning air compressor systems, breathing gas supply hoses, buoyancy control, compressed gas cylinders, recompression chambers, gauges and timekeeping devices, oxygen safety, and weights and harnesses.

Recordkeeping requirements apply to the recording and reporting of occupational injuries and illnesses, the availability and retentions of records, including the eventuality of the employer ceasing to do business.

The only grace period specifically allowed in the standard -- a maximum of six months -- applies to the requirements for a recompression chamber or diving bell, where such equipment is not yet available.

(As a point of conjecture, we interpret this section thus far to mean that a Scuba diver exceeding a depth of 100 feet or engaging in decompression diving -- without a recompression chamber at the site -- within the six months following October 20, could be in hot water with OSHA if he could not show convincingly that the required chamber is being actively sought -- as by a purchase order -- but not yet available for delivery.)

Now we arrive at a review of the more significant of the requirements in the OSHA commercial diving standard which have required modification or additions to our diving regulations or procedures.

1) Extra medical tests in the diver's physical examination.

2) The requirement for a recompression chamber at the dive site for all Scuba diving exceeding a depth of 100 feet, etc.

3) The number of persons required at the site. Especially in the case of the usual, non-tethered buddy-diving situation, which requires at least three suited-up divers and a tender (who can be the person-in-charge).

4) The requirement for all dive team members to maintain current/valid certifications in CPR and in first aid.

5) The equipment and other items required to be at the job site or part of the diver's equippage, including at least the following:

   A. List of sources of aid and transportation in case of medical emergency;

   B. Safe practices manual;

   C. First aid kit and standard first aid handbook;

   D. Bag-type manual resuscitator;

   E. Operable two-way communication system;

   F. Submersible tank pressure gauge, and manual reserve.

(Bear in mind that while a vessel may not pose any space problem in the keeping of these items together and protected from the elements, a small boat or skiff being considered as a diving platform could indeed cause real difficulties in this regard.)

6) Finally, No. 6 - the record-keeping requirements of OSHA, which in a number of areas of diving are more involved or formal than before.

It must be conceded that, apart from the necessary considerations of health, safety or protection of lives, the effect of all the preceding is bound to increase the costs of both time and money in -

1) the administering of a diving program;

2) the participating in a diving activity or project, and in

3) the equipping of the divers, along with such personnel requirements as the maintenance of certifications in CPR and first aid.

I have heard opinions, from various sources, that some of the scientific diving groups or activities around the country included under the OSHA standard may sharply curtail their diving or discontinue the activity, from lack of sufficient funds or manpower or from other related factors. Whether these predictions are accurate or not will remain for the listener to decide. And there are those in the scientific diving community in various places who point to what they say is their group's good safety record, on a percentage basis, as reason enough for exclusion from the standard; they say that the existing rates of diving fatalities and related occupational injuries, diseases, etc., are essentially the product of the commercial diving industry per se, not of the relatively tiny community of scientific and educational divers.

On the other hand, there are sources who would suggest that the overall safety record of the scientific and educational diving community is in fact something less favorable than depicted. But at this point I must stress that it is not my intention or place here to mount a soap-box for any faction; instead, I am merely conveying to you an inkling of some positions on the OSHA commercial diving standard which exist.

Be that as it may, I thank you all for staying with me on this trek "down the OSHA trail". I hope that you have found the talk informative in at least some areas, perhaps picking up an insight or two along the way.

If there are any questions I will be happy to answer as well as I can, considering the nature and the newness of the subject. Thank you again.

RESEARCH VESSEL OPERATORS' COUNCIL

October 3rd, 1977

TO: Research Vessel Operators' Council

FROM: Jonathan Leiby, Chairman

SUBJECT: R.V.O.C. Goals and Aspirations (Where are we, and where do we go from here?)

When the Research Vessel Operators' Council was founded in May of 1962 I became Chairman and have held that office until the present. During that period we as a group have accomplished several things, missed some oppurtunities, and became better educated.

Initially, the R.V.O.C. arose from the need to present a uniform voice in dealing with increased Coast Guard interest in the regulation of research vessels. It also became a forum for those involved in the management of research vessels, especially in areas of research vessel design, equipment and maintenance, and in personnel relations and recruitment.

In the formative years, while our need to present a united front to the Coast Guard was clear and the Council performed admirably in that area, there were debates on the general organization and broader goals of the Council. There were suggestions that ran the full range, from a promotional trade association or a technical society, such as was later developed by the M.T.S., to a relatively low-key representative group which the Council has in fact become. When the R.V.O.C. was organized there was little enthusiasm among the laboratories for a financial involvement or a paid staff. In fact, concern that the R.V.O.C. might develop too much authority in itself was partially responsible for the formation of the Council of Laboratory Directors which was the forerunner of UNOLS.

When UNOLS was formed in 1971 there was debate and concern about the relationship between the two organizations. It was voted that the two be "associated," but the relationship remains unclear.

With the foregoing as background I believe it timely at this point to consider the future goals and aspirations of the Council and to examine its interrelationship with organizations such as UNOLS, the Coast Guard, and others.

Some questions which come to mind are:

What is R.V.O.C. doing?
What should it be doing?
Should it meet annually?
Should it be disbanded or become a UNOLS committee?

Chairman: Jonathan Leiby, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
Secretary: James Gibbons, Rosenstiel School of Marine & Atmospheric Sciences, University of Miami, Miami, Florida 33149

Are sub-committees required for specific action in some areas?
Should there be an active Executive Committee?
Should the officers' positions be rotating?

In the capacity of Chairman, I would like to appoint the following to serve as an *ad-hoc* committee to consider the broad question of the future of the R.V.O.C.:

R. P. Dinsmore (Chairman)

P. Branson

R. D. Gerard

C. Tetzloff

T. K. Treadwell

Chairman and Secretary Ex-officio

I would like this committee to arrange to have its initial meeting the day prior to the Council's Annual Meeting. While it is not expected that their work can be completed in one meeting it is hoped that they will be able to elicit a discussion at the Council Meeting which can provide input for further consideration.

JL/sjw

ATTENDEES

1977 RVOC ANNUAL MEETING

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