UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS
FLEET IMPROVEMENT
COMMITTEE

MEETING REPORT

October 7-8, 1991
Alton Jones Campus, University of Rhode Island
West Greenwich, Rhode Island

Meeting Report
UNOLS FLEET IMPROVEMENT COMMITTEE
October 7-8, 1991
Alton Jones Campus, URI, Rhode Island

The UNOLS Fleet Improvement Committee and a representative from NSF met at the Alton Jones Campus of the University of Rhode Island on October 7 and 8, 1991. The meeting was called to order by Marcus Langseth, FIC Chair, at 9:00 a.m. Items on the Agenda (Appendix I) were called in the order reported herein.

ATTENDANTS:

FIC Members:
Marcus Langseth, FIC Chair
Peter Betzer
Teresa Chereskin
Ken Johnson
Charlie Miller
Tom Royer
Don Wright

Participants:
Dick West, NSF
Jack Bash, UNOLS
Annette DeSilva, UNOLS
Mary D'Andrea, UNOLS

APPROVAL OF MINUTES:

The minutes for the 8-10 April 1991 meeting in New Orleans were approved with one minor typographical correction.

UNOLS COUNCIL REPORT (JULY MEETING):

Peter Betzer gave a summary report of the activities of the July UNOLS Council meeting in Seattle, WA. He reported that Bill Barbee received a "National Public Service Award" from the National Science Foundation that was presented by Grant Gross.

Peter reviewed the status of KNORR and MELVILLE reporting that KNORR was now underway from the shipyard enroute to WHOI and that MELVILLE will receive additional work to complete the ship for delivery in February 1992. He reported that the PALMER hull is now in the water and the superstructure section has been mounted in place. Tom Royer added that sea trials are planned for January 1992 and delivery is expected at Punta Arenas on 15 March. Chouest does not receive the charter rate until delivery so that each delay day results in a $23,000 loss of income. SEABEAM 2000 is to be purchased but will not be installed until the first dry docking which is expected in two years. It was suggested that Al Sutherland be invited to the next FIC meeting to provide a more complete report on PALMER status. The RFP for technician support of PALMER is out. The committee expressed some concern as to who will check out the scientific capabilities. Scientists should be involved in the sea trials.

Peter reported on the VICKERS status and its relationship with NOAA based on the report of Don Keach and Chris Andreasen. Dick West reported that VICKERS was inspected by the NSF Inspection Team during the week of 30 September. The team did not complete its inspection since the ship was not totally ready. The inspection team is prepared to go back in six months. An agreement between NOAA and USC has been signed providing for a demised charter with VICKERS being a "public vessel" when at sea under the manning of a NOAA crew. The ship is awaiting USCG and Loan Line Certification.

Further reporting from the Council meeting included the Council agreeing to a Submersible Science Committee, a review of UNOLS, a review of the NSF inspection process, revised cruise assessment forms and a Modes of Operation study. Finally, a report of Grant Gross' charge to UNOLS and the FIC to look into the condition of laboratories aboard UNOLS vessels, to evaluate their condition and how these labs compare with foreign research vessels and further to examine habitability aboard UNOLS ships.

AGENCY REPORTS:

ONR: No ONR report was given since neither Keith Kaulum nor June Keller could attend.

NOAA: No report from NOAA was given because Dave Yeager had to cancel at the last minute.

NSF: Dick West provided the NSF report. This included a summary of congressional action on the FY 1992 NSF budget request. His report anticipates an 11.8% overall increase over 1991 for NSF and a 9.9% increase for OCE. Appendix II is the complete summary. He further reported that a $6.5 million shortfall is presently projected as the difference between funded science needs and ship funding availability. In the past, a formula of 2/3 funds for science and 1/3 funds for ships was used to estimate costs. It appears that this may need to be re-evaluated.

In other NSF areas, Dick reported that Larry Clark has left NSF for nine months on a "Council on Environmental Quality Fellowship". Lisa Rom is expected to return to OCE as Assistant Program Director under Don Heinrichs. Dick reported that EWING's ice class has been approved as ABS-1A. The 1A class can operate August through September in Arctic offshore ice and March through April in the Antarctic with an escort. Dick provided a handout, Appendix III, on the NSF Ship Inspection Program. It provides a summary of past inspection activities as well as the 1991 schedule.

COASTAL OCEANOGRAPHY SHIP NEEDS:

Don Wright reported on the Coastal Oceanography subcommittee of FIC. The committee includes D. Wright, Chair; P. Betzer, C. Nittrouer, T. Malone, R. Dinsmore, C. Simonstad, J. Bash (ex-officio) and M. Langseth (ex-officio). This subcommittee (Nittrouer absent) met on 23 September in Washington D.C. to discuss the scope of the task and the plans to proceed. It was decided to request input from the coastal ocean community via a message on the telemail bulletin boards

OCEAN and COASTAL.NEWS as to their facility needs in coastal oceanography. A copy of this questionnaire has been produced and is included as Appendix IV. This request has been posted and some responses have already been received.

A "town meeting" will be scheduled for the AGU meeting in San Francisco, probably Tuesday evening, 10 December, to provide an open forum for discussion of coastal ocean facility needs. Considerable discussion followed concerning how to handle this information and whether or not to have workshops. It was concluded that workshops were not needed at this juncture but that Scientific Mission Requirements (SMR) would be developed for three regions and presented as a strawman at the December AGU town meeting. These SMR's would be developed for the Eastern Region (Georgia to New England), Gulf Region and West Coast Region. The Eastern Region will coordinate their information with MARCO. Action for the Gulf Region and West Coast Region will be drafted by P. Betzer and (yet to be named); and C. Miller and K. Johnson respectfully.

Don further reported that MARCO had submitted a proposal for mission requirements and concept design for a coastal research vessel with signatures from T. Malone, U of MD; L. Atkinson, ODU; M. Bowman, Stony Brook; R. Garvine, U of DE; F. Grassle, Rutgers; W. Owen, U of DE; D. Wright, VIMS and Q. Lewis, Duke. FIC views this proposal favorably since if funded it will initiate concrete action toward study of coastal ocean designs, and will follow developments with interest.

ARCTIC RESEARCH SHIP CONCEPTUAL DESIGN STUDY:

Tom Royer reported on the status and progress in the Arctic Research Ship Conceptual Design Study. He has received numerous comments on the completed study. A summary of these comments is contained in Appendix V. Tom presented literature and two video tapes ("KAPITAN SOROKIN in Model Tests" and "Revolution in Ice") on the Thyssen/Waas icebreaking hull form. The tapes provided an impressive demonstration of the capabilities of this hull. Unless serious unforeseen problems are discovered the Thyssen/Waas hull design will be the preferred hull form. Attached as Appendix VI is a press release describing the new polar vessel design. Appendix VII provides ice class information. In the preliminary design phase the new arctic vessel is expected to have Ice Class A-4. Tom would like to have an open forum at the fall AGU meeting to further refine the ship's design plans. Follow on action for the FIC's Small Ice-Capable Ship Subcommittee are: 1) Develop new mission requirements for the arctic research vessel, 2) Plan a fact-finding trip aboard the Russian vessel SOROKIN to gain first hand information concerning the Thyssen/Waas hull, and 3) Prepare a preliminary design proposal for the arctic research vessel.

THOMAS THOMPSON IMPROVEMENT SUGGESTIONS:

Charlie Miller provided a handout on "Ideas for THOMPSON Improvement" (Appendix VIII). The comments were generated from an actual cruise on THOMPSON.

MID-LIFE REFIT OF INTERMEDIATE-SIZED SHIPS:

Jack Bash provided a summary of the mid-life refit planning for the intermediate sized ships. Jack reported that the Oceanus class vessels are planned for refit with NSF funding scheduled for FY92, 93 & 94. To date a feasibility study has been completed on the design changes considered. An Engineering Design Proposal has recently been funded to develop the engineering plans for the refit of all three Oceanus class ships. Approximately $2 million is planned for each refit. The major refit item for all three vessels is to raise the bridge and move it forward, remove the stacks and replace them with a single stack aft of the bridge. A new mast is planned in the reconfiguration. ENDEAVOR is expected to be the first ship in the yard which is scheduled for October 1992. All three ships plan to complete the refit prior to July 1994 when the new USCG admeasurement rules come into affect.

SOONS REPORT:

Marcus Langseth reported that he will contact Robert Pinkel, author of the report titled *"Scientific Opportunities Offered by Nuclear Submarines"*, to request that he complete the report. Marcus will present the report to Eric Hartwig, ONR, prior to distribution.

REVIEW OF SHIPBOARD LABORATORY FACILITIES AND ACCOMMODATIONS:

FIC has been tasked by the UNOLS Council to review the state of shipboard laboratory conditions and accommodations. The charge for this task is:

(1) Review the laboratory conditions aboard UNOLS ships and recommend improvements as deemed appropriate and compare to the laboratories of other research fleets.

(2) Review the habitability standards and conditions aboard ships of the UNOLS fleet and compare to those of other research fleets.

A list of laboratory and accommodation areas items which should be assessed in this review was generated by the committee.

Tasking Approach:

Marcus Langseth and Teresa Chereskin will direct the review. Marcus will assess laboratory conditions and Teresa will investigate the state of shipboard accommodations. Charlie Miller offered to provide Teri with applicable information regarding habitability. Both Marcus and Teresa will consult with Bob Dinsmore who has performed shipboard inspections of laboratories and accommodations on most UNOLS vessels. As a starting point, the inspection reports generated by Dinsmore, which review each UNOLS vessel, will be examined. Dick West indicated that a file of all of Bob's reports are available at NSF. It was also suggested that the user manuals for each ship should be referenced.

The first step will be a pilot review that will make a comparison between selected ships in UNOLS, NOAA and non-US fleets. Vessels which were suggested as good candidates for this review include:

Foreign Nations	NOAA
DARWIN (UK)	BALDRIDGE
HAKUHO MARU (Japan)	SURVEYOR
METEOR II (German)	MILLER FREEMAN
ATALANTE (French)	DISCO

Marcus will request brochures from the foreign research fleets. To supplement the operators it was suggested that a telemail request for information could be sent to the OMNET bulletin boards, OCEAN and UNOLS, soliciting input from chief scientists who have traveled on vessels of other research fleets.

The output of this tasking will be two official Fleet Improvement Committee reports; one will address laboratory conditions and the other will review shipboard accommodations. The recommended format will consist of a short summary of the good and bad features of shipboard laboratories and accommodations. The summary will include the comparison of the comparable ships of the other research fleets. Following the summary, a section will be devoted to suggested recommendations to improve the present and future shipboard conditions. An extensive appendix will be included in each report providing the individual inspections of each ship reviewed. It was suggested that each report be divided to address large ships and intermediate ships separately.

FIC Committee Nominations

Bob Dinsmore's term expires October 1991. It was recommended that either the University of Hawaii or the University of Rhode Island be represented on the committee. Three candidates were suggested: Chris Winn (microbiology), Univ. of Hawaii; Eric Firing (physical oceanography), Univ. of Hawaii; and Margaret Leinen (geology), URI. Marcus will check with the candidates to confirm their willingness to serve. One candidate from each of the Universities will be submitted to Garry Brass at the Fall Council Meeting.

Other Business

Marcus Langseth presented maps generated using Hydro-sweep on the EWING to demonstrate the quality of the output. Alberto Malinverno from LDGO and John Goff from WHOI are proposing to perform a quantitative analysis of multibeam systems. Three multibeam systems would be considered: Hydro-sweep, SEABEAM 2000, and SIMRAD. The analysis would consider hull forms and desired outcomes. Representative existing data from each system would be collected from comparable seafloor environments would be used in the study.

Marcus Langseth will invite Alberto Malinverno to the next FIC meeting to discuss his proposed evaluation techniques and provide an outline of what his study would entail.

1992 BUDGET REVIEW:

Anticipated costs associated with upcoming FIC Subcommittee meetings, proposals, and reports were identified.

- Funds will be required for Marcus and Teresa to travel to Washington D.C. to review Bob Dinsmore's reports.

- Tom Royer indicated that he anticipates the need for travel funds to cover the cost of an Ice-Breaker Meeting to be held in Seattle. Approximately six people will attend the meeting.

- Funds will be needed to cover the costs associated with printing and distribution of the SOONS report.

Jack Bash indicated that he will include the travel costs in his 1992 budget request to NSF. He will check to see if existing UNOLS funds are available for printing and distribution of the SOONS report.

UPCOMING MEETING DATE:

The target date for the next FIC meeting is April 20, 1992. It will be held at a Washington D.C. location.

The meeting was adjourned at 12:15 p.m., October 8, 1991.

Tentative Agenda
UNOLS Fleet Improvement Committee
October 7 & 8
Alton Jones Center, Rhode Island

Convene at 9:00 am

1. Greetings and meeting logistics - Mark Langseth/Jack Bash
2. Approval of minutes of the April meeting and meeting agenda.
3. UNOLS council report (July meeting) - Peter Betzer
4. Agency Reports
   ONR - June Keller
   NSF - Dick West
   NOAA - David Yeager
5. Coastal Oceanography ship needs - Don Wright
   Report on Sept. 23 meeting
   Nature of report and FIC tasks

Lunch

6. Compendium of small research vessels: Bob Dinsmore
7. Arctic Research Ship conceptual design study - Tom Royer
   Report on latest developments
   Feedback on conceptual design study
   Preliminary design study

Oct. 8 9:00 am

8. Mid-life refit of intermediate-sized ships - Jack Bash/Dick West
9. ~~Long-term oceanographic platforms-Charles Miller~~
10. SOONS- (Scientific Opportunities Offered by Nuclear Submarines) report
    Mark Langseth
11. Review of shipboard laboratory facilities and accommodations - Mark Langseth/Dick West
    We have been asked by the UNOLS council to carry out a review of laboratory facilities and accommodations on the UNOLS fleet and compare them with other
    fleets in the US and abroad.

Lunch

12. 1992 Budget review:
    Preliminary design study for Arctic Research Ship - (proposal)
    Coastal oceanography subcommittee - activities
    SOONS report, Swath Primer and Submersible Support Ship.
13. Other business/ next meeting adjournment.

Summary of Congressional Action
on the FY 1992 NSF Budget Request
$M

NSF

Program	FY 1991	Request	% Inc	House	Senate	Conf	% Inc
Research	1,694.2	1,963.5	15.9%	1,960.5	1,926.0	1,879.0	10.9%
Education	322.4	390.0	21.0%	435.0	465.0	465.0	44.2%
Inst/Facil	20.0	50.0	150.0%	20.0	46.0	33.0	65.0%
Antarctica *	175.0	193.0	10.3%	193.0	88.0	88.0	-49.7%
Salaries/Exp	101.0	122.0	20.8%	109.0	117.0	109.0	7.9%
Inspec Gen	3.0	3.5	16.7%	3.3	3.5	3.5	16.7%
Total NSF	2,316.1	2,722.0	17.5%	2,720.8	2,645.5	2,577.5	11.3%

* An additional $105M is pending in the DOD appropriation bill

OCE

Program	FY 1991	Request	% Inc	Inc	----- Estimated ** -----		
					Inc	Conf	% Inc
Research	82.08	97.67	19.0%	15.59	10.70	92.78	13.0%
Facilities	47.74	54.45	14.1%	6.71	4.60	52.34	9.6%
Drilling	34.98	36.38	4.0%	1.4	0.96	35.94	2.7%
Total OCE	164.80	188.50	14.4%	23.7	16.26	181.06	9.9%

** Applies 10.9%/15.9% ratio to requested increase

R. West
10/91

Encl 1

NSF SHIP INSPECTION PROGRAM

R.West 6/91

INITIATED 1980 by NSF, Oceanographic Facilities Section

PURPOSE To assure that the seaworthiness and safety of research vessels supported by NSF meet or exceed the standards set forth by the UNOLS Safety Standards and applicable requirements of the American Bureau of Shipping, Code of Federal Regulations and the U.S. Coast Guard. To ensure that NSF-owned ships as capital assets, are being adequately maintained. To assure that science capabilities are in accordance with accepted community standards and expectations.

MECHANISM 1980 Interagency Agreement with MarAd subcontract to ABSTECH (MarAd had survey experience, access to surveyors, and ship repair cost expertise)
1991 NSF contract to ABS Americas (Ex ABSTECH)

INSPECTION
- Safety and Damage Control
- Scientific Laboratories and Equipment
- Navigation and Communication Systems
- Crew Training
- Hull, Tanks and Decks
- Propulsion Machinery
- Auxiliary Electrical and Machinery Systems
- Pollution Control
- Habitability

1980	2 ships; 2 surveyors, 1 day at the dock
1981	7 ships; Completed first inspection of NSF ships
1983	10 ships; 3 surveyors; 2 days; sea trials; 2 year cycle initiated
1984	10 ships; Extended inspections to institutional ships
1985	8 ships; All NSF
1986	12 ships; Published *Guidelines for NSF/MARAD Material Condition Review of Research Vessels*
1987	10 ships; Published *NSF/MARAD Ship Condition Form* to combine and replace *UNOLS Ship Characteristics Form* and *Material Condition Review Part 1* Published revised 2nd edition of Guidelines
1988-89	8 ships; Each year
1990	12 ships; S.JOHNSON, E.LINK & M.EWING inspected as condition for designation as UNOLS vessel
1991	9 ships; Published revised 2nd edition of Ship Condition Form and revised 3rd edition of Guidelines

1980-1991 96 INSPECTIONS OF 30 DIFFERENT SHIPS

TENTATIVE SCHEDULE
CY 1991
NSF/ABS Americas
Ship Inspections

R.West
03-Oct-91

	SHIP	LOCATION	DATE
1	POLAR DUKE	Punta Arenas, Chile	1- 2 May
2	NEW HORIZON	San Diego, CA	30-31 May
3	PELICAN	Cocodrie, LA	19-20 Jun
4	CAPE HATTERAS	Beaufort, NC	14-15 Aug
5	VICKERS	Long Beach, CA	30 Sep-1 Oct
6	ALPHA HELIX	Seward, AK	15-16 Oct
7	CALANUS	Miami, FL	22-23 Oct
8	POINT SUR	Moss Landing, CA	4- 5 Dec
9	OCEANUS	Woods Hole, MA	17-18 Dec
1	ISELIN	Miami, FL	7- 8 Jan

SHIP INSPECTION HISTORY

03-Oct-91 R.West

#	Ship	Operator	Built	LOA	Class	Disp	Crw	Sci	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
	NSF SHIPS								**SOCC**										**NSF SHIP INSPECTION PROGRAM**											
1	ALPHA HELIX	ALASKA	1966	133	IV	564	9	15					FEB						DEC			AUG			APR			JUN		oct
2	ATLANTIS II	W H O I	1963	210	II	2300	35	15						JUN						FEB			JAN			JAN			MAR	
3	BARNES	WASH	1966	65	V	66	2	6														Acq'd	NOV		DEC		JUL		AUG	
4	CALANUS	MIAMI	1970	68	IV	111	2	6	Built							JUN				FEB		MAY		DEC		SEP		NOV		oct
5	CAPE FLORIDA	MIAMI	1981	135	IV	539	9	12												Built		MAY		DEC	x					
6	CAPE HATTERAS	DUKE U	1981	135	IV	539	10	12												Built		MAR		NOV		DEC		DEC		AUG
7	CAYUSE	M L M L	1968	80	V	173	7	8						APR				JAN		JAN		JUN		AUG		x				
8	ENDEAVOR	U R I	1976	177	III	972	12	16							Built		DEC			JUL		APR		JUN		DEC			MAR	
9	ISELIN	MIAMI	1972	170	III	830	12	24		Built	JUN					JUN				FEB		MAY			FEB	SEP		NOV		
10	MAURICE EWING	L D G O	1983	239	II	2577	20	30														Built						Acq'd	DEC	
11	OCEANUS	W H O I	1975	177	III	960	12	12						Built			SEP			JAN		JUN		JUN		DEC		SEP		dec
12	POINT SUR	M L M L	1981	135	IV	539	9	12												Built					Acq'd	AUG		DEC		dec
13	WARFIELD	J H U	1967	106	IV	162	7	10				JUN		MAR				MAY		JAN		JUL		OCT		OCT		OCT		
14	WECOMA	O S U	1975	177	III	1015	12	16						Built				JAN	DEC			JUN		AUG		OCT			APR	
	INSTITUTION SHIPS								**SOCC**										**NSF SHIP INSPECTION PROGRAM**											
1	BLUE FIN	SKIDAWAY	1972	72	V	86	4	8			Built			Acq'd		JUN							JUN		APR		MAY		NOV	
2	CAPE HENLOPEN	DELAWARE	1975	120	IV	178	6	12						Built									MAY		OCT		AUG			
3	EASTWARD	DUKE U	1964	118	IV	610	15	15		JUN				APR			MAY		x											
4	EDWIN LINK	H B O I	1982	171	III	1327	18	14													Built					Acq'd			NOV	
5	FRED MOORE	TEXAS	1967	167	III	1202	10	23																	FEB					
6	KANA KEOKI	HAWAII	1967	156	III	900	12	16			JUN			JUN				DEC						x						
7	LAURENTIAN	MICHIGAN	1974	80	V	180	7	7					Built										SEP		JUL		APR		MAY	
8	LONGHORN	TEXAS	1971	103	IV	200	4	11	Built						SEP								APR		NOV		NOV		SEP	
9	N HORIZON	SCRIPPS	1978	170	III	1080	12	13									Built						MAR		DEC		DEC			MAY
10	PELICAN	LUMCON	1985	105	IV	253	5	15																Built				FEB		JUN
11	POLAR DUKE	CARINO	1983	219	II	1800	14	28														Built		Acq'd		APR				MAY
12	SCRIPPS	SCRIPPS	1965	95	V	267	5	8															MAR	x						
13	SEWARD JOHNSON	H B O I	1984	176	III	1174	9	20						AUG									Built						MAY	
14	SPROUL	SCRIPPS	1981	125	IV	500	5	12												Built			Acq'd		APR		DEC		AUG	
15	SUNCOASTER	F I O	1982	110	IV	250	6	12													Acq'd				NOV					
16	VELERO IV	SO CALIF	1948	110	IV	650	11	12						SEP			JUL						MAR	x						
17	VICKERS	SO CALIF	1973	220				25																						SEP
18	WEATHERBIRD	B B S	1970	65	V	100	2	4	Built												Acq'd		JUL		JUL		SEP			
19	WEATHERBIRD II	B B S	1982	115	IV	250	6	10													Built							Acq'd	APR	
	NAVY SHIPS								**SOCC**										**INSURV**											
1	CONRAD	L-D G O	1962	209	II	1425	22	21						OCT			NOV	NOV *				OCT				DEC		x		
2	GYRE	T A M U	1973	182	III	960	10	20				Built			SEP							APR				JAN			AUG	
3	HOH	WASH	1943	65	V	91	2	6		MAY					FEB							x								
4	KNORR	W H O I	1969	245	II	1915	25	24					MAY						FEB				SEP			OCT				
5	MELVILLE	SCRIPPS	1969	245	II	2075	23	29	Built							AUG						AUG			JUN					
6	MOANA WAVE	HAWAII	1973	213	II	1435	13	19				Built			NOV										APR					
7	ONAR	WASH	1954	65	V	95	2	6		MAY						FEB						x								
8	THOMPSON	WASH	1965	209	II	1302	22	22					MAY			MAY							MAR				x			
9	WASHINGTON	SCRIPPS	1965	209	II	1362	23	22					APR			AUG							FEB						AUG	

Acq'd: Acquired
* Special review in cooperation w/MarAd

SOCC = Ship Operators Coodinating Council

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
	SOCC										**NSF INSPECTION PROGRAM**											
Per Year	0	3	2	1	4	8	4	7	5	4	2	7	0	10	10	8	12	10	8	8	12	9
Sum Total	0	3	5	6	10	18	22	29	34	38	2	9	9	19	29	37	49	59	67	75	87	96
											INSURV											
Per Year											1	0	0	3	3	0	1	3	0	0	2	
Sum Total											1	1	1	4	7	7	8	11	11	11	13	

Posted: Wed, Oct 2, 1991 8:13 AM PDT Msg: IGJB-4937-8145
From: D.WRIGHT.VIMS
To: ocean, coastal.news, nearshore
CC: g.brass, unols.fic, cosc.list, d.heinrichs, m.reeve, t.spence, b.haq, t.kinder
Subj: UNOLS Coastal Vessels

RESEARCH PLATFORM NEEDS FOR COASTAL OCEANOGRAPHY

Foreseeing long-term increases in interest and activity in coastal marine science, the UNOLS Fleet Improvement Committee (FIC) has accepted the task of evaluating the future research vessel and facility requirements for coastal ocean research programs by the U.S. academic community. To begin the evaluation and planning process, the FIC has established a subcommittee. Your input is required to enable this subcommittee to carry out its charge in a way that adequately represents the needs of the community.

The National Science Foundation has recently initiated multidisciplinary research programs in coastal oceanography such as: Land-Margin Ecosystem Research (LMER), Global Ocean Ecosystems Dynamics (GLOBEC), and Coastal Ocean Processes (CoOP). In addition to the NSF programs, recent NOAA initiatives include a major Coastal Ocean Program (COP) while the Ecological Research Division of the Department of Energy is supporting interdisciplinary studies of the Dynamics of Continental Margins. Additional coastal research activities are in progress or planned by ONR, EPA, USGS, MMS, NASA, and the U.S. Army Corps of Engineers.

Given the projected level of coastal oceanographic research, it seems clear that a new generation of research vessels and other research platforms (e.g. moorings, aircraft, drilling rigs, etc.) capable of working effectively in the coastal realm and of accommodating the needs of relatively large interdisciplinary scientific teams will be required. We also recognize that, with a few exceptions, the existing vessels that are available for coastal studies are inadequate. The notion that ships are primarily the tools of "blue-water" oceanographers and that coastal oceanographers are best served by small, shallow draft boats is, for the most part, obsolete. The coastal community needs modern and sophisticated vessels with adequate accommodation and lab space for large teams.

Over the coming year, our subcommittee must assess the needs of the coastal oceanography community, define scientific mission requirements, and draft a report summarizing the outcome of our survey and offering recommendations for addressing the identified needs. Because coastal ocean problems and environments vary geographically, we envision that whereas some mission requirements may be universal, others are likely to be regionally specific. We thus expect our report to embody regional considerations; however, we would hope that our report would assist in the design of a vessel or vessels, capable of operating in the widest possible range of coastal environments, including regions outside of U.S. waters. It is important to note here that at least one regional consortium, the Middle Atlantic Research Consortium for Oceanography (MARCO) has been formed and is well along in assessing the vessel requirements of oceanographers operating in the coastal waters of the Middle Atlantic region. Our subcommittee has a direct liaison with MARCO and expects to benefit from the experience attained by MARCO.

At this stage, we are offering two mechanisms for obtaining your thoughts and suggestions: (1) direct reply via e-mail or mail to this request; and (2) a "town meeting" at the forthcoming AGU Fall Meeting in San Francisco in December, probably in conjunction with the planned Coastal Ocean Processes (CoOp) town meeting. You will be notified in the near future (on these bulletin boards) of the time and place of the joint meeting once it has been scheduled. In addition, we hope to be able to hold a number of workshops as part of the FIC study.

All of your thoughts and suggestions on this subject will be welcomed. For starters, however, you might consider some of the following questions in formulating your responses.

(1) What is the nature of and source of support for your ongoing and anticipated coastal ocean research?

(2) How large are the teams involved and to what extent are they interdisciplinary?

(3) What platforms (ships, boats, COE Field Research Facility, moorings, aircraft) are you currently using?

(4) Do you have access to existing platforms and are they adequate for your research needs?

(5) What are the most significant deficiencies of the platforms available to you?

(6) What, in rough order of priority, would you consider to be the most important attributes of a coastal research vessel capable of meeting the research needs of the 21st century ?

We also invite your input as to more explicit mission requirements of a new generation coastal research vessel. To provide you with a "straw" example illustrating the kind of information required, the UNOLS "Scientific Mission Requirements for Small General-Purpose Oceanographic Research Ships" drafted July, 1988 is available on request. Please note that this set of mission requirements is provided solely for the purpose of indicating the criteria that must be considered; they are not the proposed set of requirements for the future vessel. Edit, change as you see fit.

The subcommittee membership is as follows: D. Wright (Subcommittee Chair), P. Betzer, R. Dinsmore, T. Malone, C. Nittrouer, C. Simenstad, M. Langseth (UNOLS FIC Chair), J. Bash (UNOLS Executive Secretary).

Please communicate your responses to Don Wright.

OMNET: D.WRIGHT.VIMS
FAX: 804/642-7250
PHONE: 804/642-7267
MAIL: Virginia Institute of Marine Science
College of William and Mary
Gloucester Point, Virginia 23062

Alternatively, you may give your contributions directly to any of the other members of the subcommittee.

United States Senate

COMMITTEE ON APPROPRIATIONS
WASHINGTON, DC 20510-6025

February 8, 1991

Vera Alexander
Dean, School of Fisheries
and Ocean Sciences
Director, Institute of Marine Science
University of Alaska Fairbanks
Fairbanks, Alaska 99775-1080

Dear Vera:

Thanks for your letter regarding the status of UAA's efforts to obtain an Arctic research vessel. I appreciate your keeping me updated.

I agree that the Alaska vessel is unique -- to use the same type of leasing option that is in place for an Antarctic research vessel would not be in the best interest of the program.

On your behalf, I have contacted the National Science Foundation and asked that they support the University of Alaska Fairbanks' proposal concerning construction and leasing of an Arctic research vessel.

With best wishes,

Cordially,

TED STEVENS

The following are a condensation of the comments received to this date on the Conceptual Design of the Ice Capable Ship (26 August 1991). T Royer

Habitability is important along with seakeeping.

In Newfoundland, they have been doing a similar exercise and have come to much the same conclusions regarding the design features.

The ship is too large for a Helix replacement. Even so the ship is small and underpowered at this point. Needs to bigger and tougher (more ice capability.)

Underdesigned as an icebreaker and overdesigned as an ice-capable. In Antarctic, the ice is almost all annual ice as opposed to the Arctic which is mostly multi-year. In Arctic the ice is affected by winds and currents and forms ridges that are impassable with nearly any icebreaker. Make the ship highly ice capable but do not make it an icebreaker. Important that the ship be designed to withstand besetting in the ice. Helicopter pad should be aft of the bridge. Beef up the bow area. Aloft conning tower is important. Wants more open bridge and doesn't like the heated deck concept.

Ship should be as ice worthy as possible. Favors Thyssen/Waas hull (if it proves to be superior) and heated decks. Is A frame large enough? Can it get 100 meter cores?

Should address noise isolation during station keeping. Look into sound insolation within the ship's bulkheads.

Well thought out design. Impressive.

It is a good plan. Must be prepared to do microbiology and molecular biology.

Doesn't like the location of the helicopter landing pad. Has high windage. Stern appears to be cluttered with little storage room. No good area for boarding rigid inflatables. Noise could be a problem. Number of crew seems excessive. Concerned about snappy rolling motion. Feels that the cost will be closer to $20k/day.

Underpowered and undersized for the Arctic and unable to conduct the research goals in the coming decades.

Underpowered and undersized.

There were model tests last year of the Thyssen/Waas hull in Canada of a 231 foot hull with 2413 ton displacement and shaft horsepower of 4250.

Concerned about the distance that an instrument can be deployed from the ship.

Reasonable platform for intended use. Possibly use a hydraulically extend transducer array s extra space in the transducer well.

Hull mounted transducers for ROV and AUV work. Have an ice free area or

3 June 1991

TO: Vera Alexander, Robert Elsner, Thomas Royer

FROM: Willy Weeks

SUBJECT: Science Requirements for an Arctic Ice Capable Research Vessel

Dear Lady and Gents

I have broused through the most recent version of the ship design document and thought about it a bit from the point of view of someone who studies ice. There would appear to be one glaring deficiency. NO COLD ROOM SPACE!! Admittedly there is science freezer storage space but, at present, the space allotted for such purposes would not appear to be sufficient if there was a party aboard that was studying almost any aspect of the sea ice cover. One also has to consider the fact that on many cruises such studies would not occur and during such periods assigning permanent space to a cold room would be a waste.

Therefore I suggest the following as a solution to this problem. In the design, consideration should be given to placing a portable cold room on board during cruises when such capabilities are required. This cold room should have its own cooling system that can operate off the ships power supply. In the ship design, the size and powering requirements of commercially available cold room units should be considered so that installing or removing the unit is simple. By using existing systems the cost of the cold room can be minimized. During cruises when the cold room is installed, the permanent freezer would only be used for storage with all the processing occurring in the portable unit. The portable freezer should be placed at a location where the chances of damage during storms would be minimized during periods of transit to and from pack ice areas. If possible, the cold room should also be placed so that there is ready access to the storage freezer.

I would suggest that the Thyssen/Waas hull has significant advantages for the general hull geometry that is being considered. However I would stay with powering that is similar to that suggested by Wartsilla in that the calculation of powering estimates is far from an exact science. I would rather err by breaking more ice than required, than not enough.

In that the Thyssen/Waas hull produces a relatively clear channel, the design should be certain to include capabilities for readily placing science parties onto the ice at a distance of at least 5 or more meters from the ice edge. I have wasted a lot of time in the past because I could not readily be placed onto the ice.

In general I find the design to be very interesting. I hope that it is finally built.

Willy

Willy

Tom

1921 Congress Circle #B
Anchorage, AK 99507
June 5, 1991

Dr. Robert Elsner
Institute of Marine Science
School of Fisheries & Ocean Sciences
University of Alaska Fairbanks
Fairbanks, AK 99775-1080

Dear Bob:

Thank you for sending a copy of the document entitled Concept Design of an Arctic Research Vessel. I will share it with my wife so she may acquire background information in preparation for discussions with you sometime in July or August.

I am also taking the opportunity to forward two comments relative to the proposed conceptual design. Before addressing those items, I must offer a disclaimer. Although I serve as consultant to several organizations in Alaska and elsewhere and work on a part time basis for the U.S. Arctic Research Commission via the Geophysical Institute, University of Alaska Fairbanks, my comments are solely my own. My statements do not necessarily reflect the views of any of my clients, the Geophysical Institute, or the U.S. Arctic Research Commission.

Comments and questions related to the conceptual design described in the reference document are listed below:

- **Access**. One of the conditions implied in conceptual designs such as Glosten Associates provided is that the equipment that may be installed and the facilities that may be provided are accessible and may be used for their intended purposes. I would suggest that particular attention be focused on: 1) the cranes and 2) the maintenance capabilities of the vessel. Sometimes cranes are provided that cannot be operated in a coordinated manner because they are too close or the reach of one does not accommodate operation of the other. Because the "Hold Plan" in the conceptual design does not provide details I cannot determine if there will be ready access to the machine shop for equipment/materials that may require modifications or repairs. If you believe my point is valid, I believe, it can be supported properly at this stage by merely adding a paragraph to the text of the report calling for adequate access for proper usage of equipment and facilities.

- **Vessel Maintenance**. Corrosion of superstructures play a leading role in the appearance of all ships and sometimes affects safety and operating equipment. Repainting and repairs consequently become significant maintenance costs. Although these effects cannot be avoided completely, the use of anti-corrosion design principles can reduce those maintenance costs by a much as 20 to 30% per year.

One of the primary methods of controlling these costs is by limiting the amount of superstructure surface area. Some European and Japanese yards employ these principles routinely in the design and construction of ships.

There is another benefit of focusing on surface area limitations. By doing so, spray icing effects can also be limited. If you support this point, it can be handled by adding a paragraph to the text of the conceptual design report.

I have enclosed a copy of an article I coauthored that discusses the general elements of what is included in corrosion control/anticorrosion design. If additional information on the use of this technique is needed, please contact me.

If you see Larry Glosten of Glosten Associates please give him my regards. Larry and I were members of a Washington State-UNESCAP trade mission to Southeast Asia in 1975.

I hope my comments will be useful.

Sincerely,

Lyle D. Perrigo

Lyle D. Perrigo

cc: Vera Alexander
file

William W. Kellogg
445 College Avenue
Boulder, Colorado 80302

6 June 1991

Dr. Thomas Royer
School of Fisheries and Ocean Sciences
University of Alaska
Fairbanks

Dear Tom:

Thanks for sending me a copy of the conceptual design of your research dream boat. When it finally meets the sea it will be real beauty, I'm sure.

You must realize that I am not enough of an authority on ice-capable vessels to give you any useful advice, and I will not try to. But I wanted you to know that I'm pulling for you and your colleagues. Perhaps I'll have chance to come aboard one day.

With best regards,

Will

P.S. Just received another batch of fellowship applications to review. Seems there's no letting up!

69

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   C:69                    P03 L04 C01 Insert Align
L----!----!----!----!----!----!----!----!----!----!----!----!------------------R
                                                                                <
Posted: Sun, Jun  9, 1991   8:50 PM EDT                 Msg: GGJB-4774-1119     <
From:    M.JOHNSON                                                              <
To:      t.royer                                                                <
CC:      m.johnson                                                              <
Subj:    Arctic Ship                                                            <
                                                                                J
--------------------------------------------------------------------------------P
                                                                                <
Tom:  I just got a message from Sharon Smith responding to the new              <
ship design.  Her contention is that it is badly underpowered, among            <
other things.  When I arrive in Fairbanks in July (1st or so) I'd like          <
to sit down with you and hear your thoughts on this ship.   Seems that          <
alot of thought and effort has been spent on thinking this through, and        <
these recent comments may be just noise, but I'd like to hear from you.         <
See you soon.                                                                   <
Cheers, Mark                                                                    <
                                                                                <
--------------------------------------------------------------------------------P
Posted: Sun, Jun  9, 1991   9:07 PM EDT                 Msg: EGJB-4774-1159     <
From:    R.CARNEY                                                               <
To:      T.ROYER                                                                <
Subj:    RE: Arctic                                                             <
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SCHOOL OF FISHERIES & OCEAN SCIENCES

UNIVERSITY OF ALASKA FAIRBANKS

FAIRBANKS, ALASKA 99775-1080

10 June 1991

Dear Arctic Colleague:

The conceptual design of an Arctic Ice Capable Research Vessel is enclosed for your comments. The design was developed using the UNOLS Science Mission Requirements for an Intermediate Ice Capable Research Vessel, with some modifications, as the basic science capability goal. The specific design is by the Glosten Associates, Inc. in conjunction with a UNOLS Fleet Improvement Committee oversight subcommittee. That subcommittee consists of K. Aagaard (PMEL), V. Alexander (UAF), E.R. Dieter (NSF), R. Dinsmore (WHOI), R. Elsner (UAF), M. Langseth (LDGO), T. Royer (UAF), and J. Van Leer (RSMAS). The committee is excited about the capabilities of the conceptual vessel. We like the inherent stability and roomy arrangement achieved by its broad beam in a ship of relatively modest length. Please refer to Table 2.2 for a comparison of the principal characteristics of this design with those of several other research vessels. The study also compares the anticipated ice capabilities of a conventional ice hull with a Thyssen/Waas hull. Detailed examination and comparative model testing of the two designs is planned for the preliminary design phase.

The proposed science missions include:

- ability to work in seasonal ice zones,
- ability to work in the periphery of the multiyear ice zone,
- general purpose research in both water column and seafloor research,
- operations in both open ocean and ice covered regions.

We need you to closely examine the design features included in the conceptual design to ensure that the research ship will serve Arctic ocean sciences for the next 20-30 years. The design is not fixed at this time. The next step prior to beginning construction is a preliminary design that will include improvements identified by the review process.

We encourage those of you who are sea-going scientists to carefully review the laboratory arrangements, over-the-side handling, scientific storage, ice capability, and berthing. We encourage those with ship operations experience to review the hull, ice capability, power, fuel, storage and overall layout of the design. Comments on any aspect of the ship are welcome from all.

We propose to use the best possible technology for the design and construction of an arctic research vessel with optimum cost effectiveness in operation. We wish to maintain sufficient flexibility at this stage to accommodate those requirements that can be incorporated in the vessel to make it a national resource for Arctic research.

Sincerely,

Vera Alexander
(907)474-7531
Telemail: V.ALEXANDER

Robert Elsner
(907)474-7795

Thomas Royer
(907)474-7835
Telemail: T.ROYER

Institute of Marine Science
School of Fisheries & Ocean Sciences
University of Alaska Fairbanks
Fairbanks, AK 99775-1080

Enclosure

Tom — This is an impressive conceptual design. It is well thought out and described. I have no substant-

Posted: Tue, Jun 11, 1991   8:42 AM EDT   Msg: FGJB-4776-2010
From: W.SMITH
To: t.royer, v.alexander
CC: ARCSS.STEERING.JOI, T.DELACA, E.DIETER, P.PENHALE,
B.LETTAU,
NEWATER
Subj: ship

June 11, 1991

Dr. Tom Royer
Institute of Marine Sciences
University of Alaska
Fairbanks, AK 99775

Dear Tom:

Thank you for sending me the "Concept Design of an Arctic Research Vessel". I applaud your committee's efforts in this, and have in general agree completely with the laboratory design and berthing arrangements. However, one aspect of the design greatly troubles me, and that is that it is greatly underpowered and perhaps undersized to work in the Arctic Ocean Basin, where ice conditions are much more extreme than one would encounter in the annual pack ice on the Alaskan shelf. Because I strongly believe that in the coming thirty years a large amount of work will be done throughout the year in the Basin itself, I cannot accept the rationale for building a vessel with the proposed power and size constraints. Simply put, the proposed ship will not be able to conduct the research goals of a large body of Arctic research that will be addressed in the coming decades. I might also add that a similar conclusion was reached by a large body of Arctic scientists who met to define the objectives of the NSF Arctic System Science Initiative, and suggest that this group's recommendations be carefully considered.

Where are these suggest

Again, thank you for sending me the document, and on behalf of the Arctic oceanographic community, thank you for your efforts.

Sincerely,

Walker O. Smith, Jr.
Professor
Botany Department and
Graduate Program in Ecology

Posted: Tue, Jun 11, 1991   11:56 AM EDT   Msg: HGJB-4776-6184
From: G.ROWE
To: T.ROYER
CC: S.SMITH.SHARON, W.SMITH
Subj: ICE AND ARCTIC RES. VESS.

Tom:

I agree with Sharon and Walker. Gig em!

Gil

Command? a 17
Text:
Walker,
Thank you for your comments on the conceptual design of the Arctic ship. Your concerns about the underpower and undersized aspects of the design should be addressed with the engineering studies associated with the preliminary design. The use of the Thyssen/Waas hull form allows less power than a more conventional hull so that the machinery and machinery spaces can be scaled down. This scaling is nonlinear so that if we do indeed need more icebreaking capability than is afforded by this design we will require a considerably larger vessel...and more costly to build and operate. If the Thyssen/Waas hull does work, the advantages associated with having an ice clear path astern are also promising. Thanks again for your comments and rest assured that they will be addressed. Regards, Tom
Send? y

Msg posted Jun 12, 1991 5:20 PM EDT MSG: AGJB-4779-4295

Command? a 19
Text:
Walker,
Thank you for your comments on the conceptual design of the Arctic ship. Your concerns about the underpower and undersized aspects of the design should be addressed with the engineering studies associated with the preliminary design. The use of the Thyssen/Waas hull form allows less power than a more conventional hull so that the machinery and machinery spaces can be scaled down. This scaling is nonlinear so that if we do indeed need more icebreaking capability than is afforded by this design we will require a considerably larger vessel...and more costly to build and operate. If the Thyssen/Waas hull does work, the advantages associated with having an ice clear path astern are also promising. Thanks again for your comments and rest assured that they will be addressed. Regards, Tom

Gig em!
Send? y

Msg posted Jun 12, 1991 5:21 PM EDT MSG: GGJB-4779-4301

Posted: Wed, Jun 12, 1991 10:23 PM EDT Msg: CGJB-4779-6467
From: W.SMITH
To: t.royer
Subj: for you

Tom, Jody sent this to me by mistake and asked me to forward it to you. wos

Forwarded message:

Posted: Tue, Jun 11, 1991 2:18 PM EDT Msg: CGJB-4777-1179
From: J.DEMING
To: W.SMITH
Subj: RE: ship

As a research oceanographer with future plans to work in the Arctic and member of the ARCSS working group that met last year to define Arctic research goals, I wish to register my full agreement with Walker Smith's comments regarding capabilities of the new vessel being planned. It is essential that the scientific community have access to an appropriately powered vessel in order to address critical problems of global magnitude in the Arctic in the coming decades. Please take a second look at the NSF Arctic goals and reconsider the design now on the table.

Sincerely,

Jody W. Deming
Associate Professor
School of Oceanography, WB-10
University of Washington
Seattle, WA 98195

Posted: Fri, Jun 14, 1991 9:57 AM EDT Msg: CGJB-4782-3087
From: STC.ICE
To: T.ROYER(RECEIPT)
CC: E.DIETER, H.KENNEDY, NSF.DPP.OCEANOPS
Subj: Concept Design of an Arctic Research Vessel

Dear Tom,

Thank you for sending me a copy of the subject report. It was received earlier this week and we have had only a brief opportunity to review it. I am impressed with conceptual design report as it is very professionally done.

If possible, I would appreciate receiving Appendices D, E, F and G so that we can incorporate them in our review of the design. Thanks.

We are aware of some model tests that were performed in Canada during the last year that compared the Thyssen Waas bow form to a traditional icebreaking bow form. The model tests were done in open water (calm water resistance and seakeeping) as well as in ice (level ice and pressure ridges). The model that was tested was a Canadian "Medium Icebreaker/NavAids Tender" with the following characteristics:

Length Overall	231.1 ft
Beam (waterline)	49.0 ft
Draft	16.0 ft
Displacement	2413 LT
Shaft Horsepower	4250

I am currently checking into the availability of the report for your use.

Regards,
Dick

12 June 1991

University of Alaska Fairbanks
Institute of Marine Science
School of Fisheries and Ocean Science
Fairbanks, Alaska 99775-1080

Dear Dr. Alexander

Thank you for the opportunity to comment on the conceptual design of an Arctic Ice Capable Research Vessel.

While I do not have an expertise in ship design, I do possess some pertinent background. I have spent several weeks aboard the Polar Star in the Beaufort Sea; I have worked in seven ice camps; and I have been to sea on a number of oceanographic ships in which I have been responsible for specific equipment installations.

Therefore, I would like to offer the following comments:

Tie-downs for deck-mounted portable vans must be extremely strong. We have often welded such vans to the deck, in anticipation of severe sea states. If welding is not to be considered an option, I urge that the strongest possible tie-down eyes be provided.

The capability of installing deck-to-ceiling racks for temporary equipment should be included by providing tie points (capable of being bolted to) in the lab spaces, both on the deck and on the ceiling.

Laboratory spaces, as well as berthing spaces, should have the capability of supporting personal computers. I would even recommend video tape facilities; perhaps even wire all berthing spaces with cable and monitors, with access to video tape players. Editing and mixing of video tapes should be provided to enable production of quality at-sea video reports, especially in the documenting of field work.

Facsimile receive and transmission capability (probably via satellite link) should be part of the ship's equipment.

Several GPS (Global Positioning Systems) should be part of the ship's equipment; portable systems should be available for field parties that may leave the ship, either on helicopters, on boats over the side, or on trips over the ice.

The ship should be capable of copying weather reports and pictures as well as ice reconaissance photos from satellites.

The capability to store, launch and retrieve snowmobiles should be included.

The ability of protecting, to some extent, any helicopter that must land aboard the ship and shut down its engines should be provided. Primarily, this includes a powerful heater, such as a Herman-Nelson, to preheat parts of the aircraft prior to starting engines. If such a device is not available, the ability to shunt hot air to the helo pad should be provided.

The ability to mount and connect RF antennas to the highest points on the mast of the ship should be accommodated. Pre-installed RF coaxial cables and power cables (for rotatable antennas) should be permanently routed in protected ducts as high up to the mast as possible.

In many experiments in which I have been involved, requiring the receipt of RF signals from over the side equipment (such as Sonobuoys), we greatly improved the RF range by using a balloon-borne tethered antenna. The ability to launch and retrieve a large balloon from the upper deck should be provided. This means the installation of a powered winch at this upper deck site. This can be especially useful for remote data collection, when the presence of the ship would in some way contaminate the data being sought.

In general, the ship's plan looks good. I recognize that no one ship can do everything, but I did want to offer some of these suggestions; their priorities would have to be assigned to fit within the budget and the primary missions.

Good luck with this worthwhile effort.

Arthur Horbach

Arthur Horbach
Code 5031
Naval Air Development Center
Warminster, Pennsylvania 18974

Copy - Royer
Elsner

UNITED STATES DEPARTMENT OF THE INTERIOR

Geological Survey
Branch of Pacific Marine Geology
345 Middlefield Road, MS 999
Menlo Park, California 94025

June 12, 1991

To: UNOLS Sub-Committee on Ice Capable Research Vessel
From: Peter Barnes Peter W. Barnes
Subject: Review of Concept Design of Arctic Research Vessel by Glosten

My perspective comes from arctic experience in the US and Canadian Beaufort sea on Coast Guard Icebreakers, Chukchi and Beaufort operations on NOAA ships Discoverer and Surveyor, Canadian Beaufort Sea Operations, and 10 plus years as operator of USGS coastal vessel KARLUK in ice in the northern Bering, Chukchi, and in the US and Canadian Beaufort Seas.

I am impressed and pleased with the breadth and quality of the work shown in this document. Never-the-less, I will add my comments.

P. 3, Deck Working Area

I did not locate a section discussing the needs and specifications for handling equipment on deck, and over the side/stern. From a geological point of view different corers, weight stands and instrument packages etc. will have to be moved about the deck and into and out of short and long term storage during a cruise and handling equipment including forklifts, or cranes with good control of load need to be considered. What about A-frames, or J-frames and required vertical and horizontal clearances for different equipment? They are on the drawing but their specifications are not shown. X yes.

The working deck area of 1800 sq ft (Table 2.1) is small for any cruise with multiple sampling needs and/or deck storage. A box corers, bottom instrument package, and a side scan would use up all space. As designed, deck work is restricted to the last 40 ft of a 200 ft vessel and a portion of that is not accessible to a crane. Ideally more vessel length should be working open deck with lab space moved below or above the main deck (eg. computer, analytical and climate control labs, in design drawings). Accommodations for 30 scientists seems generous, perhaps consider using some of this space for labs and cutting accommodations to about 25. yes

The starboard A-frame should be moved further forward to allow for working with long coring devices. Ideally this should be located about 80' from the end of the core working area (At the front edge of the starboard open deck shown on the drawing).

Many studies require access to the ice surface. Consideration should be given to allow access via ramp, ladder, hull door, or ?? without resorting to use of helicopter or crane baskets.

P. 4 Ice Capability; also Resistance and Propulsion p. 10
The requirement to maintain a speed of 3kts in 3ft of continuous ice and to transit (?) 7ft ridges seems misleading. I do not think these ice conditions will be encountered; except very rarely or if the vessel works in the antarctic. I believe arctic ice is more irregular in thickness and distribution, except in protected embayments. The power requirements to operate in 8 to 9/10 ice with a broad range of thicknesses that may "average" to 3ft seems appropriate, but I would not select a vessel designed to operate efficiently at an "average" that it will rarely encounter. I think the Thyssen/Waas hull may be such an inappropriate design (better for the flat ice of the Baltic, and lakes and rivers). In the scattered ice common in the arctic, the Thyssen/Waas hull might be dis-advantageous as the broad bow captures ice that otherwise would be pushed aside. I guess you would say that I do not think that this hull design would be appropriate for the proposed research vessel. Further in this regard, the comparison of vessel characteristics in open water and in 3ft of level ice (the "average") is unrealistic for the kind of ice that will generally be encountered in the arctic. A more realistic scenario would be scattered ice blocks of various concentrations and various sizes.

P. 6, Philosophy
I applaud the goal of concentrating efforts on a hull design in the area of open water sea-keeping. I think the vessel will spend much time in open water both in transit and doing work in and around ice margins.

P. 21, Propulsion and Auxiliary Machinery
The acoustic properties and signature of the vessel will be extremely important in determining its usefulness for any geophysical, biological, or physical studies based on acoustic sensors, acoustic navigation, and acoustic telemtry or acoustic releases. Acoustic quieting should be considered in the selection of engine mounts, bearings, and propellers to maximize the usefulness of the vessel. For example, the ship should be quiet from about 5kHz to 14kHz for bottom transponders and acoustic navigation 5-15 kHz for ROV's. The operating frequencies of the SeaBeam system should be quiet as should the frequencies of side scan sonars and any planned seismic systems. I do not think this is an expensive item to add at this stage.

Thank you for providing me with the opportunity to comment. I would be glad to provide further explanation if desired.

ANDREAS B. RECHNITZER, Ph.D.
1345 Lomita Road
El Cajon, CA 92020
619 588 0961

14 June 1991

Vera Alexander, Ph.D.
Institute of Marine Science
School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
Fairbanks, AK 99775-1080

Dear Dr. Alexander:

Thank you for the opportunity to review the conceptual design of an Arctic Ice Capable Research Vessel.

I have considered its features on the basis of facilities and configuration suitable for the support of Low Cost Remotely Operated Vehicles (ROV), Autonomous Underwater Vehicles (AUV) and SCUBA diving. Provisions for outfitting the vessel with a portable recompression chamber and its support equipment should not be difficult considering the planned spaces for scientific equipment of equal or greater size. Provision for installation of hull mounted transducers for underwater navigation support aids for the ROV and AUV facilities should be considered in the final design. Consideration should be given to a mechanical device that will create an ice free "pool" at the stern and athwartship where instruments, equipment, and personnel will be lowered and retrieved from the water. Such pools now exist on certain cruise ships for swimming purposes.

It appears to be a good design and hopefully it will be transformed into the real thing soon.

Sincerely,

ABRechnitzer

Tracor Applied Sciences

Tracor Applied Sciences, Inc
a subsidiary of Tracor, Inc.
9150 Chesapeake Drive
San Diego, California 92123
Telephone 619: 268 9777

June 16, 1991

Dr. Vera Alexander
Institute of Marine Science
School of Fisheries and Ocean Sciences
University of Alaska at Fairbanks
Fairbanks, AK 99775-1080

Dear Vera:

Thanks for the opportunity to comment on the Arctic Ice Capable Research Vessel preliminary study. Overall, the study appears to have resulted in a reasonable platform for the intended use. My comments are pretty minimal, but I thought that I would pass them on anyway.

The success of the acoustic experiments attempted from this ship will be greatly influenced by the positioning of the acoustic transducer well in a place that is least impacted by bubble sweepdown. That position will depend largely on the exact shape of the hull and some degree of luck. I suggest that consideration be explicitly recognized in the specification. This applies to the ADCP as well as to the 3 and 12 kHz units. Jim Traynor at NMFS Seattle and several Norwegian scientists have had very good success in the Bering Sea and in the North Atlantic with a rig that hydraulically extends the transducer a couple of feet below the hull during open water survey operations and retracts into the hull when necessary or when it is not in use. I assume that such an arrangement could be protected as well as a conventional installation when in ice. I suggest someone contact Jim for details of his rig.

An extra blank hole or holes in the acoustic transducer well for a system as yet unspecified would be nice. The choice of 3 and 12 kHz seem to be pretty much driven by geology. Based on a recent acoustics workshop, bioacousticians, such as those that support programs like GLOBEC and ARCSS would probably like to see one or more "standard" blank holes in the transducer well to take grouped sets of between two and 8 additional acoustic transducers. Those transducers would probably be much smaller than the 12 Khz system and could possibly all be mounted simultaneously in one or two holes the same size or smaller than the hole for the 12 kHz transducer. Things can usually be arranged so that crosstalk could be minimized. Give me a call if you need more detail.

The transducer well, the computer room and the other science lab areas should be provided with relatively easy access for connecting electronic cables. Placement of weatherproof access ports for reasonably direct routing of electronic cables from the computer room and other lab spaces to the fantail and to possible transient antennas mounted on the mast would also nice. Four to six inch diameter ports (or larger) through bulkheads have the advantage of allowing the stringing of transient cables with electrical connectors already installed and checked out. Some of my connectors are cylinders that are two and one half inches in diameter and six inches long. These connectors carry 25 - 40 conductors and should be able to pass through appropriate ports without requiring disassembly and reassembly. For reasons related to electrical interference, it would be better if electronic cables did not have to be routed alongside or on top of heavy power cables.

Finally, I can conceive of situations in which it would really be convenient to have direct access between the electronics shop and the computer room. That should be relatively simple with the current placement of those two facilities.

I hope that these relatively minor comments are useful. I also hope that the acquisition process will be sufficiently rapid that we can use the vessel before we retire!

Sincerely yours,

Van

D.V. Holliday
Director of Research
Analysis and Applied Research Division

dvh/hs

Copy -
Royer
Elsner

Posted: Sat, Jun 22, 1991 3:02 PM EDT Msg: WJJB-1653-3176/20
From: (O:NASA,SN:MAIL,FN:INTERNET, SITE:NASAMAIL)
To: r.spinrad/omnet, v.alexander/omnet
Subj: [From: <ray%ucmbo@hub.ucsb.edu>] Arctic Research Vessel
Internet mail from the Ames NASAmail Gateway follows:
Send the following line as the first line of the text of your reply:
To: <ray%ucmbo@hub.ucsb.edu>
Contact admin/arc (Lilly Compton) for details.
Received: Sat, 22 Jun 91 11:38:04 -0700 from hub.ucsb.edu by gemini.arc.nasa.gov (5.65b/1.2) with SMTP
Received: from ucmbo.ucsb.edu by hub.ucsb.edu; id AA28418
sendmail 4.0/UCSB-2.0-sun
Sat, 22 Jun 91 11:26:16 PDT for v.alexander@omnet.nasa.gov
Received: by ucmbo.ucsb.edu (4.1/CRSEO-main-1989/12/07)
id AA03813; Sat, 22 Jun 91 11:25:11 PDT
From: ray%ucmbo@hub.ucsb.edu (Ray Smith)
Message-Id: <9106221825.AA03813@ucmbo.ucsb.edu>
To: v.alexander@omnet.nasa.gov
Cc: ray@ucmbo.ucsb.edu, karen@ucmbo.ucsb.edu, r.spinrad@omnet.nasa.gov
Subject: Arctic Research Vessel
Date: Sat, 22 Jun 91 11:25:10 PDT

Vera,
With respect to the design of the new Arctic Ice Capable Research Vessel I would like to add a few comments from the "bio-optics" community: those researchers that deploy bio-optical profiling systems (BOPS, Smith et al, Applied Optics 23, 2791-2797) for the study of the processes linking radiant energy and photosynthesis. The growth of this field can be appreciated by noting that the past AGU meeting had several complete sections devoted to papers on bio-optics. I take this as evidence that the number of investigators likely to be concerned with the "optical capabilities" of a research vessel is increasing.

There are two key issues with respect to a ships optical capability, the distance an instrument can be deployed from the ship and the availability of an obstruction free mounting location for above water sensors.

A BOPS is roughly the size of a normal CTD and can be deployed like a CTD. However, to optomize the data quality of the optics data, it is important to deploy the instrument on the "sun side" (or at least the side where the sun would be if not for clouds) of the ship and as far away from the ship as possible (preferably from the stern to minimize ship perturbation effects to the light field). Typically we jury-rig cranes, davids or whatever to accomplish this end. A better solution would be to design the A-frame to accomodate an extension, so that optical sensors could be at least 5 and preferably 10 meters away from the stern of the ship when deployed. I suggest a preplanned extension, so that it can be stored when not needed but easily used when the need arises.

Second, because of the need to correct for atmospheric variability (primarily cloud cover and sun angle changes) it is necessary to monitor above surface irradiance. This apparently simple task is notoriously difficult since most ships have stacks, antennas, guywires, etc. that make placement of instruments "above it all" somewhere between impracticable to impossible. Once again, preplanning of a platform capable of accomodating sensors (say several the size of coffee cans) above the superstructure of the ship would vastly improve the data quality from optical sensors.

If you have further questions I would be happy to act as an unofficial spokesperson for the optics community.

Ray Smith
r.smith.ucsb

June 24, 1991

Maryland
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Dr. Vera Alexander
Dr. Robert Elsner
Dr. Thomas Royer
Institute of Marine Science
School of Fisheries & Ocean Sciences
University of Alaska Fairbanks
Fairbanks, AK 99775-1080

Dear Drs. Alexander, Elsner, and Royer:

Thank you very much for your letter of 28 May 1991, enclosing a copy of, "Concept Design of an Arctic Research Vessel." It is a good plan. However, you must be prepared to do microbiology and molecular biology. The future of marine biology is decidedly molecular.*

Best wishes to all of you,

Sincerely yours,

Rita R. Colwell, Ph.D., D.Sc.
President
Maryland Biotechnology Institute
and Professor of Microbiology

RRC/ms0624

*Has the ship's design accommodated molecular biology capability?

HOTEL RESIDENCE

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TRASMISSIONE DOCUMENTI IN FACSIMILE

Data, ora 24 JUNE 1991

Da BOB ELSNER

A TOM ROYER + VERA ALEXANDER
FAX: 907-474-7204 (U.S.A.)

OGGETTO ARCTIC SHIP - MEETINGS IN GERMANY

COMUNICAZIONI:

Very positive meetings in EMDEN (Thyssen Nordseewerke) and HAMBURG (HSVA). I am convinced we are on the right track - more than ever - and that the CHOUEST CONNECTION is totally wrong for us -

Regards -

Bob Elsner

Also - have invitation to sail aboard Soviet icebreaker with T/W hull next spring -

Numero Telefono 085/83699

Numero Fax 085/8369859

Numero Pagine trasmesse (compresa la presente) 1

UNIVERSITY OF HAWAII
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June 26, 1991

Dr. Thomas Royer
Institute of Marine Science
School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
Fairbanks, Alaska 99775-1080

Dear Tom:

Thank you for sending me a copy of the Concept Design Of An Arctic Research Vessel. I read it with great interest and have many comments (probably more than you want) for you to use as you see fit.

My background has been on Coast Guard Icebreakers, windclass and GLACIER, a total of six years. I've made five trips to the Arctic, East and West Coast, and a similar number of trips to the Antarctic. My first impression is that the ship is under designed as an icebreaker and over designed as an ice-capable ship.

My second impression is that it is more tailored for the Antarctic rather than the Arctic. In the Antarctic, unless you go deep into the pack late in the season, it's almost all annual ice. Generally speaking, there are fields of ice of fairly even thickness and, for the most part, loosely packed. In the Arctic, on the other hand, most of the ice is multi-year, non-homogenous and, when packed, hummocked throughout. You can find first-year ice in the winter (while operating in total darkness), but it's hard to find during the summer months unless you go into a bay or inlet. In these latter cases, the ice is landlocked and will not yield. I recall backing and ramming into Harmon and Thule AFB's through relatively thin field ice with nowhere to go. The shear cracks which propagate forward of the oncoming ship (Page 12) just won't happen.

In the Arctic region, particularly off the West Coast of Alaska, large chunks of ice are affected by winds and currents (the latter not a factor in the Antarctic). Because of gyres this ice ridges on itself through the years and, when packed, is impassable regardless of whose icebreaker is operating. I've stood at the edge between grounded and current driven ice off of Point Barrow when the noise resembled a freight train intermittently firing a small cannon. The secret to maneuvering in the Arctic is to pick and choose your leads and to be patient enough to sit tight when beset. The Russians have reached the North Pole and I'm certain our vessels will also in 1992, but only by following paths of least resistance as they occur. This, of course, requires excellent aerial reconnaissance. When you can't fly, you can't move.

My recommendation would be to concentrate on a vessel which is highly ice-capable and back away from an icebreaker concept. The design could remain practically the same, but expectations would change. I would design for a ship that is capable of maneuvering through seven to eight-tenths pack ice. The forward third of the vessel should be stoutly constructed in terms of hull thickness and frame spacing to permit pushing and ricocheting off of bergy bits and larger. The screws and rudder will have to be protected and capable of handling some ice strikes. Also, I think that it's imperative that the vessel be designed to withstand forces associated with a beset situation. If the ship goes into the ice field, eventually it will close down on her due primarily to shifting winds and currents. While beset, sea chests, sanitary systems, etc., must continue to function.

My specific thoughts on the vessel design are attached. Although my comments will seem generally negative, they are presented as constructive criticism. I support the concept of an ice-capable Arctic Research Vessel and would be more than happy to assist if I could be of help. I'm pretty sure that I have more ice experience than any other person in the UNOLS Community and I would welcome the opportunity to become involved in initial testing and/or operations of this vessel when constructed.

Very truly yours,

James W. Coste
Marine Superintendent

Take this guy up on his offer - does he know what science is to be done?

ICEBREAKER DESIGN

I'm not at all familiar with the Thyssen/Waas hull form, but the estimate presented on page 12 is too neat. It could only occur with model ice under model conditions. To predict, for instance, that ice slabs will neatly break in two and fold back under the field is wishful thinking. Again, this ship will be operating in packed ice, already broken and churned up, which will close in behind the vessel immediately. Having seen the Coast Guard's Polar Class breakers operate, I'm convinced that their hull form is optimal for homogenous field ice. The ship slides over the top of the ice, pressing it down under the superstructure area (maximum weight), with particularly no sideways pressure. The drawback is that this ice must be milled through the screws so that the track is immediately filled with brash.

For an icebreaker, with this particular hull design, it seems to me that the weight is too far aft. I'd prefer for the bridge to be further forward, with the helicopter deck abaft the bridge.

I'd like to see the aloft conning station separated from the stack to avoid stack gases and the dirty windows caused by those gases.

The aloft conning station should be has high as possible and, if serious ice penetration is considered, a helicopter or other aerial surveillance must be available. I'd use a single rudder, midships, to protect it from damage. Also, the rudder should be further forward and the stern configured to allow the vessel some slight icebreaking capability going astern or to at least move astern through the broken pack. In its present configuration, I believe the rudder could be easily struck by ice when the ship backs down.

In selecting the drive, consideration should be given to what happens when the propeller suddenly becomes jammed by ice. This is particularly true with the relatively shallow draft.

For some reason, I can't buy into the idea of propeller nozzles on an icebreaker. I believe that these nozzles will be damaged or destroyed over time.

I seriously doubt that packages can be towed astern using conventional methods unless the vessel is in very light ice or in model ice under ideal conditions. I'd recommend the ability to work with packages through the stern A-frame because prop wash can be used to clear ice from the skin of the ship.

I'm against the proposed bubbler system because it will be very infrequently used, if ever. Again, you need absolutely ideal ice conditions which are rarely encountered in the Arctic. To assume that this vessel will find an area where she can steam continuously at about 3 knots for any period of time with the aid of a bubbler system is just not reality. Also, when the ship gets stuck the bubbler system will be next to useless. I think that the money to design and install such a system could be much better placed elsewhere, perhaps in what follows.

The ship is designed to break ice, withstand a beset situation and be seakindly. I believe that the first two are in conflict with the latter. There's no mention of a flume tank, which I think should be considered.

ICE-CAPABLE VESSEL

As designed, this vessel appears to be ice-capable. I would back off on some of the icebreaking design, particularly the idea that it will carve an open path through field ice and the bubbler system, but it wouldn't hurt to have some icebreaker characteristics to use when the ship finds itself in a closed ice pack. I would emphasis protecting the screws and rudder when backing down. This is the most vulnerable maneuver in ice, but will be absolutely essential at the most critical of times.

As mentioned in my basic letter, I would beef up and strengthen the bow area (forward third) to approximately four feet above the waterline. In the Arctic particularly, the vessel will be sliding from floe to floe and, at times, strike into hard, large pieces of multi-year ice. It's unavoidable.

As on an icebreaker, an aloft conning station as high as possible will be needed. Even more so if the vessel is seeking leads and open water. If the aloft conn is properly located, there should be no need for an after conning station.

I'm against closed in bridges and would recommend open wings and a cat walk forward. With a heated aloft con, there's no need to operate the ship from the wings in cold weather. Control stands should be on the port and starboard wings for maneuvering along side.

Make sure that you either have good window washers or the ability to wash the windows by hand, particularly in the aloft conning station. The combination of snow and saltwater on a heated window obscures visibility.

I don't buy into a heated deck. I think it's a large expense in terms of both installation and upkeep and would be useful on very rare occasions. Proper decking material, footwear, scrappers, etc., are more effective.

Institute of Marine Science
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UNIVERSITY OF ALASKA FAIRBANKS

School of Fisheries and Ocean Sciences
Box 730, Seward, Alaska 99664

TO : Dr. ~~T.~~ Royer, ~~Chairman~~ Ship Committee
FROM: ~~Tom~~ Smith, Acting Asst. Director for Coastal & Marine Operations
DATE: 26 June 1991
RE : Comments Concerning Arctic Research Vessel Concept Design

I like the overall design of the ship. It is well laid out to conduct science but, I feel, less so for the day to day ship operations. I also realize no ship is perfect but rather a compromise between competing demands for space. Keep this in mind when reviewing my comments.

The forward boom should be capable of offloading the helicopter. Helicopters do break frequently and may be unable to fly off the ship. Having a boom capable of lifting one off and onto a dock would be very convenient. which helicopter When.

I do not like the location of the helicopter landing pad. Any accident will wipe out the bridge. The location is also very exposed to spray and icing. I also question whether a van could be carried on the forecastle.

Lack of bridge wings means there is no way to take bearings unless a periscope is installed, a costly alternative. I personally prefer bridge wings for docking. With a large, beamy ship, docking is easier to perform from an exposed bridge wing.

The vessel's sides and superstructure are very high and its draft relatively shallow. This vessel will be a good downwind sailer. These high sides will also allow icing in areas that are not accessible for ice removal.

The stern appears cluttered. The small boat's position on the port side takes up a lot of valuable work area and would make side trawling with the boom difficult or impossible. I also feel there is little room on the stern to store equipment where it would not interfere with ongoing operations.

The rigid hull inflatables are located very high, so they will be subjected to a large pendulum motion when launching or recovering. I also see no good area for passengers or crew to board the boats from the vessel. The RHI's should be designed to allow rising and lowering with no one in the boats. All passengers and crew should embark and disembark while the boats are in the water.

No soft patch locations are shown that would allow access to the machinery spaces for removing/placing large pieces of equipment. Cutting holes in the sides to accomplish this is costly.

A retractable pit log should be included to allow speed input into radars. Most other speed sources, LORAN, GPS, etc. do not provide the proper pulse for speed input into a radar, yet a speed source is needed for today's automated, collision avoidance radars.

All icebreakers are noisy and subject to severe vibrations. I suspect a sheer icebreaker is worse than an ice bending, crushing type. Shock mounts for sensitive scientific and electronic equipment should be considered.

Access to the food freezer is by the dry store - chill box - freezer. This is very inconvenient. Also, loading 90 days of store to these areas will be a real task due to their poor access to a weather deck.

I feel a hospital is a waste of space. A stateroom or an office, that converts to a hospital when one is needed should be designed.

A 22 man crew seems excessive for this size vessel.

Bubbler systems are very effective in reducing ice resistance. The Coast Guard has some ice breaking tugs with a bubbler system that is very effective.

All hull mounted transducers should be capable of being removed while the vessel is in the water.

The ability to land and refuel a helicopter greatly complicates crew fire fighting training and fuel recordkeeping.

The statement on p. 19 that a short natural roll period will be experienced would indicate a rapid rolling motion. I also expect the metacenter of this vessel is high; a major factor in developing snap rolls. My experience is that while vertical acceleration is uncomfortable, a snappy rolling motion will cause seasickness.

Coming home through ice with a 600HP thruster driving a 2400 ton vessel is very questionable. Main engine redundancy is, however, adequate.

I question the $14 to $16K per day cost cited on p. 26. With a crew of 22 people and all overhead item included (shipyard, routine maintenance, etc), I suspect $19 - $21K per day is more realistic for a 180 day season.

Posted: Thu, Jul 25, 1991 3:21 AM EDT Msg: EGJB-4837-6941
From: R.SCHLITZ
To: T.ROYER
Subj: Comments: Concept Design

Tom,

I have reviewed the Conceptual Design of an Arctic Research Vessel and found it interesting but perhaps not complete from my perspective. This is mainly because I am not psychic and cannot see missions out 20-30 years in oceanography. Much effort was placed in determining options for hull form and propulsion in ice breaking situations. How much of the time will be spent in ice? Are the proposed combinations suitable for only occasional forays into the ice but much work in open water? The report seems slanted toward an ice breaker (equal to the Palmer as a minimum) rather than ice capable even though seakeeping is mentioned early on and some coefficients indicate a potentially seakindly vessel. Am I missing something here?

I also worry about the design if the missions change and this hull becomes a general use vessel operating outside the Arctic, worldwide where sea and swell are quite different. My experience also says that the environmental conditions must be (and can be at this stage) made suitable for a wide range of conditions. These are not at all described for the living accommodations. Individual temperature and, much more importantly, humidity control must be reliably available to the cabins for ocean and air temperatures ranging between about 0 to 30 degrees C. This should be separate from the laboratory system, suitably filtered and refreshed.

I may have quibbles about some of the arrangements for laboratories but they are not important and the plans seem generally sensible. On the other hand my experience would lead to a crew lounge and mess, especially for a large ship of extended duration, but the additional requirements 1/4/91 seem to forbid these. Perhaps it could be rethought since the needs/wants of the crew and science are quite different.

You can dismiss these as ranting of someone newly out of DC overwhelmed by a normal oxygen content in the air. But who could have seen the changes for the A II over the years or the Alpha Helix presently? Also the only times that I (and many others also) have been sick other than mal de mer on research vessels were related to the lack of controls on the environmental conditions, particularly critical in winter.

If any of this is confusing let me know and I will try to better express my opinions.

Cheers, Ron

Posted: Fri, Jun 28, 1991 2:43 PM EDT Msg: LGJB-4802-3126
From: D.WALLACE
To: T.ROYER
CC: S.SMITH.SHARON
Subj: Arctic Research Vessel

Dear Dr. Royer,

I have some comments re: the conceptual design of the "Arctic Research Vessel" which I hope you will find helpful. Many of the features of the vessel are well thought out in my opinion, however I have some significant concerns:

1. "Arctic" is normally defined as being north of the Arctic circle. Hence the vessel's title suggests a platform which should be capable of operating north of Bering Strait, in the Chukchi, Canadian Arctic, Baffin Bay, Greenland/Iceland/Norwegian (GIN) Seas, eventually the Soviet shelves, and the central Arctic. I would argue that a CENTRAL Arctic platform is a very special beast, and therefore a separate endeavour, however the US urgently needs a vessel capable of working YEAR-ROUND in the areas listed above. In particular, the vessel should be capable of getting through the Northwest Passage so that it can work in both the Chukchi and Eastern Arctic without having to steam through the Panama Canal (Canada willing, of course).

Where will it operate.

2. Despite its title, I am not sure that the vessel as currently considered is designed to work in these "Arctic" areas. Rather it appears to be designed to work in largely ice-free areas of the Bering Sea and the GIN seas. This is reflected in its minimal ice-breaking capability, limited power, shallow draft, and design considerations which emphasise rough-weather capability rather than ice-handling.

3. Of most concern is the power question: 5000 HP seems very low, and I wonder what her capability with ice ridges will be? Has the efficiency of the hull w.r.t. ridges been assessed? I think an Arctic Research Vessel should not have to depend on icebreaker support for the areas listed in 1: this would be very limiting, and make NSF's ARCSS initiative require an additional vessel.

4. While the ship is small, it does seem to be well thought out. Specific comments are:
(a) Some of the computer lab. should be made "general purpose": except for G+G work, such a large computer room is probably unnecessary these days. Especially as there is a Science Office for plotting etc. On the Polarstern and Meteor such labs are often underutilised relative to other areas, in my experience.
(b) The mess and galley at the bow seems to be inviting problems re: noise and motion.
(c) There should be a compressed gas storage area in the main lab. adaptable for other storage requirements.
(d) The conference room could be made adaptable to other functions (e.g. Science Office). While necessary for long cruises, this space

is also often under-utilised on Meteor and Polarstern!

I hope the above is of some help....

Regards,

Doug Wallace
Oceanographic and Atmospheric Sciences Division
Brookhaven National Laboratory

Posted: Fri, Jun 28, 1991 10:11 AM EDT Msg: GGJB-4801-6967
From: S.SMITH.SHARON
To: t.royer
CC: s.smith.sharon
Subj: Arctic Ship

Tom, the next telemail has my response to the ship design. I want to be sure you understand I am grateful and appreciative of your work on this. It cannot be a pleasurable task, especially now that so much has gotten politicized. I tried to articulate my reservations and my hope that "your" design can be made more in line with needs (N. Palmer) but not a clone which opens up so many troubles. I was glad to see Dinsmore raise questions about Palmer. I will continue to argue for a larger, more capable ship that could do interdisciplinary work on Arctic shelves, all Arctic shelves, in winter and some work in the central basin. I hope you do not take this personally, because it is certainly not that! I am motivated by things I believe need doing in the Arcc, and my limited experience on German and Norwegian vessels. Thanks, Sharon

Posted: Fri, Jun 28, 1991 10:12 AM EDT Msg: GGJB-4801-6987
From: S.SMITH.SHARON
To: t.royer
CC: s.smith.sharon
Subj: Arctic Ship

Dr. Thomas Royer
Institute of Marine Science
University of Alaska
Fairbanks, Alaska 99775

Dear Tom,

I hope the feedback you are getting on the Arctic ship is meeting your expectations and needs. We, who hope one day to conduct Arctic oceanographic research from a U.S. research vessel, are grateful for the time and energy and persistence you have given to the design so far. It has generated much discussion, and that is excellent. The letters you have gotten from Walker Smith and Bob Dinsmore expressed many of my concerns. The idea that the emerging Arctic System Science program's projected needs be incorporated into the debate was a good one.

The features of the Glosten/UAF design that strike me as troublesome are:

- It is too small; the vessel needs to be on the order 260 feet.

- It has too little power; even the 20,000hp Polarstern does not win a battle with a pressure ridge.

- It has too few berths; Arctic programs are likely to be interdisciplinary and require that persons deploying moorings be on the vessel with others doing various physical, biological, chemical and geological observational programs.

- The draft is too shallow.

- The aft working deck is much too small for many operations such as mooring deployment, coring, large nets.

- The bow does not look as if it would break much ice.

The design before me does not convince me that the concerns I raised earlier to the Fleet Improvement Committee have been addressed adequately. Right now it seems we need vigorous, complete debate of exactly what the U.S. oceanographic capability in the Arctic should be, and what questions and logistical needs can be foreseen now. In that sense, defining an Arctic research vessel as a replacement for the Alpha Helix is an enormous mistake. (The Alpha Helix cannot be considered a useful Arctic research vessel.) N.S.F. is developing its Arctic program, and the needs of that program must be incorporated into the design of a new vessel. In that light, a clone of the Nathaniel Palmer would meet anticipated needs more fully than would the conceptual design of Glosten/UAF.

Once again, I am grateful to you for your work on the behalf of the community in this Arctic ship design. You have done a laudable job getting us this far; I appreciate the opportunity to comment on the design. I hope the Glosten/UAF design can be modified so that the vessel will be able to meet the anticipated needs of Arctic oceanographic research over the next three decades.

With best wishes,

Sharon L. Smith

Oceanographic and Atmospheric Sciences Division
Brookhaven National Laboratory
Upton, New York 11973

DEPARTMENT OF THE NAVY
NAVAL OCEANOGRAPHIC AND ATMOSPHERIC
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IN REPLY REFER TO
3903
Ser 332/71
3 July 1991

Mr. Thomas Royer
Institute of Marine Sciences
School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
Fairbanks, AK 99775-1080

Dear Mr. Royer:

The proposed design of the Arctic Research Vessel put forth by the University of Alaska and Glosten Associates is impressive. I routed the design package to appropriate branch personnel for comments and suggestions. What follows is a brief summary of our collective thoughts.

From our perspective acoustics remains a focus point for Navy funded arctic research. We all recognize that platforms such as the proposed design can be utilized as single point noise sources or single point listening stations. When utilized in this fashion, minimizing the platform self noise is important. Since the design is still in the formative stage our suggestion is to address noise isolation of significant components that are likely to be operating during station keeping type of operations. This type of design feature is economical and obviously best accomplished during the initial design phase. I have done a fair bit of this in the past and would be more than willing to provide assistance.

In addition, we are suggesting the use of noise attenuation or sound isolation tiles on internal bulkheads and internal hull surfaces. Past experience implies that this may be beyond budget constraints. If we can provide any assistance please feel free to contact us at the Polar Oceanography Branch of the Naval Oceanographic and Atmospheric Research Laboratory in Hanover, NH at (603) 646-4593 or Fax (603) 646-4320.

Sincerely,

James H. Clark

JAMES H. CLARK
Head, Polar Oceanography
Branch Office

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M.P. Robinson

July 11, 1991

Ms. Vera Alexander,
Institute of Marine Science,
School of Fisheries & Ocean Sciences
University of Alaska Fairbanks,
Fairbanks, AK 99775-1080

Dear Vera,

It was good to hear from you again. Thank you for the plans for the "Arctic Ice Capable Research Vessel". It seems a very fine initiative.

I will make the plans available to interested people here.

All the best in your endeavour,

Best regards,

Marianne Sten

Marianne Stenbaek,
President

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL RESEARCH
ARLINGTON, VIRGINIA 22217-5000

IN REPLY REFER TO

Dr. Tom Royer
Institute of Marine Science
University of Alaska
Fairbanks, Alaska 99775-1080

Dear Tom,

Thank you for the opportunity to comment on the Arctic Research vessel.

I am convinced that the scientific community will want to work deeper and deeper into the Arctic: therefore I would like to see the vessel as ice worthy as possible. For example, it would be a good partner with the Coast Guard ice breakers conducting two ship scientific operations.

The Thyssen/Waas hull will get a good test this summer aboard ODEN. If it proves superior I favor that plus an injected bubble system and warmed decks. This would finally give to the U.S. scientific community a UNOLS vessel useful in high latitudes.

I note the A frame has a 15 ton capacity -- is this enough? Rock dredging can approach 12 tons, and this is a capability the scientists will require.

Have you considered a shallow drilling capability for 100 meter cores on the continental shelves?

Congratulations on your effort. Please let me know if I can help further.

Thank You,

G.L. Johnson
Director Geophysical Sciences

Institute of Marine Science

UNIVERSITY OF ALASKA FAIRBANKS

Fairbanks, Alaska 99775-1080

July 17, 1991

Dr. G.L. Johnson
Office of the Chief of Naval Research
Department of the Navy
Arlington, VA 22217

Dear Dr. Johnson,

Thank you for your letter regarding the Arctic Research Vessel design. Your desire for a very ice capable (breaker??) is echoed by others and we will emphasize that in the next design stage. We expect to add some length to the vessel to allow long cores. I question as to whether we will be able to accommodate 100 meter cores but we will consider it. As for the Thyssen/Waas design, it should be noted that ODEN does NOT have a Thyssen/Waas hull, contrary to information that has been circulated. I am enclosing a copy of a recent letter from Bob Elsner to Bob Dinsmore outlining the latest discussion of the Thyssen/Waas hulls.

Once again, thank you for your comments and interest. We will keep in touch as the design and construction progresses.

Regards,

Tom

Thomas C. Royer
Professor of Marine Science

UNIVERSITY OF MIAMI

Dr. Thomas C. Royer
Institute of Marine Science
University of Alaska Fairbanks
Fairbanks, Alaska 99775-1080

18 July 1991

Dear Tom,

I have had a long look at your conceptual design for an arctic research vessel and I am encouraged by your efforts to move the design in directions which may not have been your original intention. I have, however, come to the conclusion that this design is too big and too small at the same time. The vessel described in this study is overly large for the kind of mission which was the focus of the work by Alpha Helix, i.e., inshore work on the very shallow Bering Shelf and studies, particularly marine biological studies, around the edge of the pack ice. The result of attempting to keep this category of mission requirement in the design has lead, I fear, to design compromises, particularly in beam and draft, which do not appear to me to lead toward a successful vessel. On the other hand, this ship remains on the small and probably underpowered side of what I would hope for in the nation's flagship for work in the Arctic Ocean. The endurance of the vessel and its capabilities to handle significant levels of ice are on the low side for the kinds of research that I, as a Marine Geologist, would like to see the US capable of doing in the Arctic.

I encourage you to continue to work toward the goal of a useful capability for arctic research. Perhaps it is time to reconsider this effort and move in the direction of two arctic vessels, one a capable intermediate class vessel which would represent an evolution of the capabilities of Alpha Helix, and a second larger and tougher ship to give the community a truly capable science platform in the Arctic Ocean proper. I realise that these may be discouraging views but I hope that the needs of the community will eventually be met and I believe that your efforts to date have been the only path for us to follow. I will follow future developments with great interest.

It is, perhaps, worth noting that these are my private views and don't represent any other group or institution, especially UNOLS.

Sincerely,

Garry

Garrett W. Brass
Professor
Marine Geology and Geophysics

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Do they have a report. —

July 25, 1991

Dr. Vera Alexander
Institute of Marine Science
School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
Fairbanks, Alaska 99775-1080

Dear Dr. Alexander:

I received with great pleasure the booklet dealing with the conceptual design for an arctic ice-capable research vessel. As I am sure you are aware, the matter of getting a proper modern vessel for work in the arctic is one which has been of particular concern to us in Newfoundland. We have gone through quite a similar exercise, although not quite so formally presented as yours, and have come to much the same conclusions regarding design features.

Despite several years at this, the matter remains in the talking stage for us, my one consolation being that it is still a live issue. It is nice to see that others are pushing for such a vessel as well.

Sincerely yours,

R.L. Haedrich
Director, OSC.

RLH/hr

Alaska Sea Grant
College Program

news release

UNIVERSITY OF ALASKA FAIRBANKS

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Alaska Sea Grant Press Release Number PR0081
For Immediate Release October 1, 1991
Contact Dr. Thomas Royer, oceanographer, University of Alaska Fairbanks, Institute of Marine Science, and chair of the National Science Foundation ice-capable ship subcommittee, Fairbanks, Alaska 99775, (907) 474-7835.
Other sources listed at end of article.

Scientists plan nation's first Arctic research vessel

By Douglas Schneider, Science Writer, Alaska Sea Grant College Program, University of Alaska Fairbanks

FAIRBANKS, Alaska—Scientists for the last 30 years have lobbied their colleagues and congressmen for money to build a research ship for the Arctic. But until recently, other scientific and budgetary priorities have torpedoed the effort.

Now, with the need to study the effects on the Arctic caused by global climate change and development of the region's oil and fisheries resources, the National Science Foundation (NSF) has placed construction of the ship high on its wish list.

On the drawing boards is the nation's first polar research ship for the Arctic. Charged with designing the ship is a team of scientists led by the University of Alaska Fairbanks (UAF) working with engineers with The Glosten Associates, a marine engineering and naval architecture firm based in Seattle, Washington. The team recently completed a conceptual design of the ship with a $60,000 grant from the NSF.

Conceptual plans call for a 218-foot ship. The ship would carry up to 30 scientists and a 22-person crew. Scientific expeditions aboard the ship could last up to three months and cover some 15,000 miles.

Icebreaker

Scientists say a ship able to break ice would permit them to begin their research season in early spring, before ice in the Bering Sea and Arctic Ocean completely recedes. The ship also would allow researchers to continue their studies as the Arctic icecap expands each fall. The arctic research ship being planned would have the ability to travel through up to three feet of ice. The ship also is being designed to penetrate seven-foot pressure ridges that form when ice floes collide. In the event the vessel encounters ice too thick to break, the vessel would be able to withstand being beset in ice, designers said.

"We're not building an icebreaker in the traditional sense," said Dr. Don Heinrichs, a marine geophysicist and head of NSF Oceanographic Centers and Facilities in Washington, D.C. "We're trying to build a ship that can operate in the leading edge of the Arctic ice pack. It won't be going to the North Pole, unless it's behind a bigger icebreaker."

Hull design

Wartsila Marine, a Vancouver, British Columbia, consulting firm with experience in icebreaking vessels, developed the conventional hull form for the conceptual design study. This configuration has been used for years in icebreakers around the world. Engineers also are considering a radical new hull configuration that capitalizes on finesse rather than brute strength to break ice. Both hull forms will undergo further scrutiny for cost, power, and fuel consumption during the second phase of design, scheduled to start in early 1992.

While engineers prefer to wait until the results of the second round of hull studies, initial findings seem to favor the new hull form, called the Thyssen/Waas (pronounced *thisen vas*). The Thyssen/Waas hull takes advantage of the low shear strength of ice. The hull uses two knife-like ridges on the outboard edges of a bluntly-shaped bow to fracture the ice, and specially flared forward sides and bottom to laterally push the ice out of the way. Input into the Thyssen/Waas hull form was provided to the Glosten Associates by Dr. V.R. Milano, an expert on icebreaking technology.

In contrast, conventional icebreakers employ immense engines to power a heavy, rounded bow onto the ice. The weight of the vessel then crushes the ice to open a sea lane. The hull has been used on dozens of polar icebreakers and has proven to be a durable icebreaking form.

But according to Dirk Kristensen, naval architect for The Glosten Associates, the conventional design has several disadvantages. One drawback is fuel consumption. The conventional hull may require substantially more power and therefore more fuel than a similar sized Thyssen/Waas hull, according to Glosten's preliminary assessment of the two hulls.

The conventional design also allows broken ice to pass beneath the hull where it can damage propellers and scientific equipment deployed behind the ship. In contrast, proponents of the Thyssen/Waas hull claim the hull's angled port and starboard bow sides direct broken ice beneath the surrounding ice edge. The result is a nearly ice-free sea lane in which scientists can work.

Still, the Thyssen/Waas design has not been around long. The ship building company Thyssen Nordseewerke of Emden, Germany, has converted three ships to Thyssen/Waas icebreakers for the Soviet Ministry of Transport. The *Mudyug* was done in 1986. Another icebreaker of the *Kapitan Sorokin*-class was converted in 1989-1990.

Reports indicate the Soviet ships are reliable, efficient, and cost effective. The *Mudyug* hull has realized a 60 percent reduction in fuel consumption and has increased the effective range of the ship by 185 percent, according to a promotional video produced by Thyssen Nordseewerke.

To see for themselves, a group of UAF scientists, NSF officials, and Glosten engineers propose to cruise aboard the *Kapitan Sorokin*-class icebreaker equipped with the Thyssen/Waas hull in March. The icebreaker will demonstrate its abilities in the Kara Sea, located in the Soviet Union's Arctic Ocean east of Murmansk.

Stability and Seakeeping

When not at work in the ice edge, the Arctic research ship would conduct research in the open waters of the Arctic Ocean and Bering Sea. Engineering a ship that performs well in both ice and open water is not easy, according to Dr. Thomas Royer, oceanographer at the University of Alaska Fairbanks and chair of the NSF ice-capable ship subcommittee.

"Traditional icebreakers are good at breaking ice but they have a tendency to roll in open seas," Royer said. "This ship is going to be used in the open Bering Sea and it has to be capable of working in rough water. Getting an ice-capable ship to do both can be a difficult proposition."

To meet stability and seakeeping requirements, Glosten engineers opted for a wide, beamy, shallow draft hull that is stable in open water, but strong enough to meet ice breaking requirements. The conceptual study found that the full waterplane Thyssen/Waas hull may be particularly suited to both ice-breaking and open water stability needs.

Range and Endurance

Range and endurance are functions of speed, sea and weather conditions, and the displacement and power of the vessel. Engineers have been asked to design a vessel capable of journeys of up to 90 days with a full compliment of 30 scientists and 22 crew members. The maximum range of the ship is to be 15,000 nautical miles.

Science Spaces

The NSF ice-capable ship subcommittee recommended that scientific work areas be located to minimize disturbances caused by ice-breaking. Additional modifications to the specifications and layout of scientific work areas will be made following the second phase of design. Science spaces include:

- 3,000 square feet of wet, dry, and climate controlled laboratory space. Additional space can be provided by placing laboratory vans in the aft enclosed deck area.

- An enclosed heated sampling deck served by a Baltic door located amidships on the starboard side. The space has 15 feet of overhead clearance and access to the aft side deck through a watertight roller door.

- Space for remotely operated vehicles (ROV's) with openings onto the fantail, side working deck, and laboratories.

- Convenient access from the science labs to the science storage areas.

Working Decks

Plentiful deck space is envisioned for researchers aboard the ship. Approximately 2,340 square feet of work deck space on the fantail and 350 square feet of side work deck space would be available. Side space would be unobstructed to allow for core sampling.

Additional work deck space includes 1,200 square feet of space on the forward number one deck and 2,000 square feet of space on the upper decks. All working decks would have one-inch diameter tie-down sockets arranged on a two-foot-square grid.

Several cranes would assist in the movement of heavy objects on the decks. The aft work area would be served by a 15-ton stern A-frame located at the side door to the ROV hanger. A 10-ton extending boom crane and a 5-ton knuckle boom crane are also planned for the aft deck. Access to holds below deck would be possible through a flush deck hatch large enough to accommodate 20-foot containers.

To aid in the safety and comfort of scientists and crew, designers also are considering heating aft work decks to keep the area free of ice. Wood decks may also be installed to provide safer footing in icy conditions.

Storage and Public Spaces

Plans call for the ship to have two science holds totalling 15,000 cubic feet, a library/conference room, darkroom, exercise room, office space, and a medical clinic.

The forward portion of the number two deck would provide landing, refueling, and temporary storage facilities for a helicopter.

Accommodations

The ship's eight officers would be housed in single staterooms, crew members in double staterooms. Scientists would share 15 double staterooms.

Ship's Control/Visibility

The bridge and other above-hull structures are being designed to minimize icing and to allow a wide field of view. A crow's nest located 58 feet above the water line would be used for conning in ice.

The aft control room used for operating cranes and winches would have excellent visibility to the side and aft work decks.

Propulsion and Positioning

Naval architects opt for a twin-screw, semi-diesel/electric system. In the case of the conventional hull, two propulsion engines would be arranged father-son for each shaft system. An 1800 BHP and a 900 BHP diesel engine operating at 1800 RPM would be connected to a combining reduction gear. An 810 BHP A-C motor would be connected to the aft side of the reduction gear through a pneumatic clutch. One engine-generator can power both port and starboard motors for increased efficiency and quietness in low speed operations. Any or all power sources may be connected to the drive train at any time. This will provide the flexibility to use only the amount of power required for each operating condition.

In the case of the Thyssen/Waas hull, power requirements would be less due to the lower ice resistance of the hull. The engine arrangement would be similar, but the 1800 BHP diesel used in the father-son arrangement would be replaced with another 900 BHP diesel.

Two 9.5 foot diameter, controllable pitch, ice-strengthened propellers would be installed. Twin independent rudders would be mounted aft of the propellers, and would be protected by a substantial ice horn while the ship is in reverse.

In addition, a 600 horsepower bow thruster and a 300 horsepower stern thruster are planned for the vessel to make turning and docking easier.

Auxiliary Machinery

Electrical power to ship's operations would be supplied by three 350 kW diesel generators with one standby unit available at all times. Emergency power would come from a 480 VAC generator that would provide 18 hours of full power electricity.

Economic Analysis

Cost to build the ship is expected to approach $47.5 million, according to Heinrichs of the NSF.

The NSF is discussing two options to finance the vessel. The first is to ask the U.S. Congress to appropriate the money in the NSF budget. Another plan is to lease the vessel from a private ship builder. Such an arrangement was recently made with the Louisiana-based shipbuilder Edison Chouest Offshore. Edison Chouest built and now leases the 308-foot conventional icebreaker *Nathaniel B. Palmer* to NSF's Antarctic research programs for about $10 million each year.

The preliminary design phase for the Arctic research ship is expected to be funded by the NSF in early 1992. If all goes according to plan, the ship would undergo construction beginning in 1993 and sea trials in 1995.

When built, the ship would join the NSF-funded University National Oceanographic Laboratory System (UNOLS) fleet and likely would be stationed in Alaska and operated by the University of Alaska Fairbanks. Once on station, scientists plan to study ocean circulation, ice formation and movement, global climate change and cold water ecosystems, including fisheries. Scientists also hope to use the ship to collect core samples from the sea floor that may yield clues to a time when the region was a vast arid grassland steppe.

"Researchers from throughout the world will have an opportunity to work on this vessel," said Heinrichs of the NSF. "A high priority will be looking at global heat exchange. We are also interested in the sediments on the bottom of these polar seas. Since the region was once ice-free, studying sediments is key to understanding the geological and geophysical history of the region."

Given the importance of U.S. science objectives in the Arctic, scientists are optimistic that this latest attempt to build an Arctic research ship will succeed. "We've been at this for 30 years," said the University of Alaska Fairbanks' Royer. "I think this is our best shot yet."

Douglas Schneider is the science writer at the Alaska Sea Grant College Program, University of Alaska Fairbanks. The Alaska Sea Grant College Program is a marine research, education, and advisory service headquartered at the University of Alaska Fairbanks, School of Fisheries and Ocean Sciences. It is funded primarily by the National Oceanic and Atmospheric Administration, in partnership with the State of Alaska, and private industry.

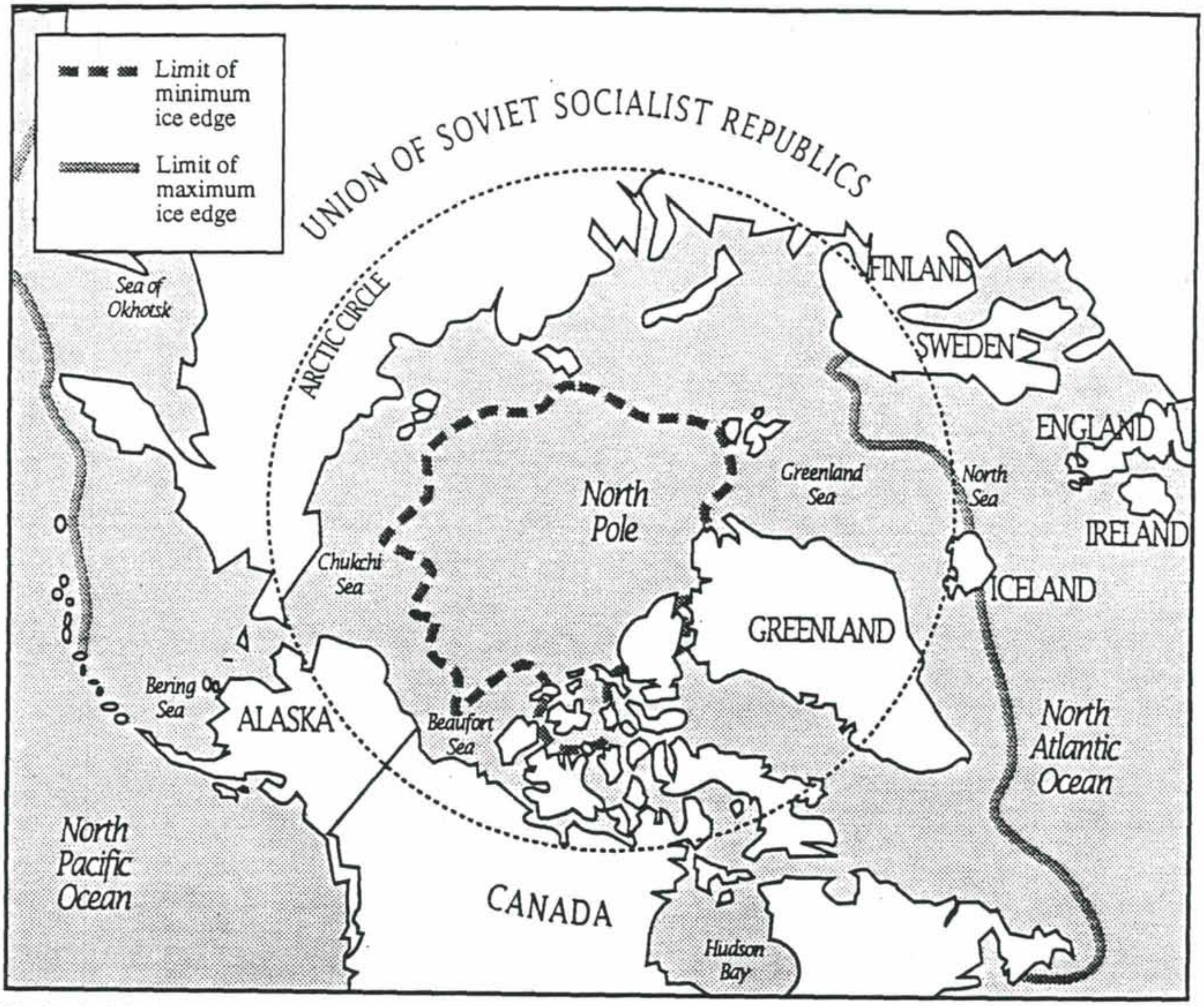
END

Sources used to prepare this article

Dr. Vera Alexander, Dean, University of Alaska Fairbanks, School of Fisheries and Ocean Sciences, (907) 474-7532.

Dr. Don Heinrichs, Head, Oceanographic Centers and Facilities, National Science Foundation, Washington, D.C., (202) 357-7837.

Dirk Kristensen, P.E., Project Manager, The Glosten Associates, Seattle, Washington, (206) 624-7850.



Limit of minimum ice edge represents the region covered by ice 100% of the time. Limit of maximum ice edge indicates approximate extent of ice 1 to 50% of the time. Adapted from the *National Atlas of Canada*, 5th Edition, National Atlas Information Service, Canada Centre for Mapping.

THE GLOSTEN ASSOCIATES, inc.
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26 June 1991
File No. 9078

FACSIMILE COVER SHEET

TO: University Of Alaska Fairbanks, Institute Of Marine Science	
ATTN: Dr. Tom Royer	**FAX NO:** (907) 474 7204
FROM: Dirk Kristensen	**FAX NO:** (206) 682-9117
SUBJECT: Ice Classification Information	

Dear Tom:

Per your recent telephone conversation with Duane, I have attached the following items for your information:

- Description of available ice classifications from ABS (1991).
- Correspondence to E.R. Dieter of 13 October, 1989, in which ice classes from various regulatory bodies are compared.
- Article on NATHANIEL B. PALMER from Harbour & Shipping, June 1991.
- Article on NATHANIEL B. PALMER from Sea Technology, June, 1991.

If we can be of any further help please do not hesitate to call.

With best regards.

Dirk

Dirk

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If you have difficulty in receiving this transmission, please call (206) 624-7850.

Naval Architecture • Marine Engineering • Ocean Engineering
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TABLE 29A.1
Regions and Periods for Navigation in Ice for Selecting Ice Class

ABS '91 Steel Vessel Rules

Ice Class	Navigating independently or when escorted by a vessel of the following ice classes	Polar Waters with Multi-year Ice: Central Arctic basin[1]	Artic offshore shelf[2]	Antarctic ice covered waters	Year around navigation in water with first-year ice with the ice conditions given in Table 29A.2
A5	Independently	Year around	Year around	Year around	Extreme
A4,A3	Escorted by A5 Class Vessel	Year around	Year around	Year around	Extreme
A4	Independently	July through November	Year around	Year around	Extreme
A3,A2	Escorted by A4 or Higher Ice Class Vessel	July through November	Year around	Year around	Extreme
A3	Independently	Short term, short distance entries during July through September	July through December	February through May	Extreme
A2,A1	Escorted by A3 or Higher Ice Class Vessel	Short term, short distance entries during July through September	July through December	February through May	Extreme
A2	Independently	—	August through October	March through April	Extreme
A1,A0	Escorted by A2 or Higher Ice Class Vessel	—	August through October	March through April	Extreme
A1	Independently	—	August through September	—	Very Severe
B0	Escorted by A3 or Higher Ice Class Vessel	—	August through October	March through April	Extreme
A0,B0,C0	Escorted by A1 or Higher Ice Class Vessel	—	August through September	—	Very Severe
A0	Independently	—	—	—	Severe
B0	Independently	—	—	—	Medium
C0	Independently	—	—	—	Light
D0	Independently	—	—	—	Very Light

Notes

1 "Central Arctic Basin" means all the multi-year ice covered waters of the Arctic Ocean and Arctic seas to the north from the boundary of the stable Arctic pack ice zone.

2 "Arctic Offshore Shelf" means Arctic waters within landfast and shear ice zones off the shores of continents, archipelagoes, and Greenland.

TABLE 29A.2
:e Conditions of First-Year Ice Versus :oncentration and Thickness of Ice Cover

ickness of First-Year :e Cover in M (Ft)	Concentration of Ice[1]: Very Close and Consolidated Ice, Fast Ice (from 10/10 to 9/10 or from 8/8 to 7/8)	Close Ice (from 9/10 to 6/10 or from 7/8 to 5/8)	Open Ice (from 6/10 to 3/10 or from 5/8 to 22/8 and Fresh Channel[2] in fast Ice (more than 6/10 or 5/8)	Very Open Ice (less than 3/10 or 2/8), Fresh Channel[2] in Fast Ice (6/10 or 5/8 and less) and Brash Ice
1.0(3.3) and above	Extreme	Extreme	Very severe	Severe
:an 0.6(2) to 1.0(3.3)	Extreme	Very severe	Severe	Medium
:om 0.3(1) to 0.6(2)	Very severe	Severe	Medium	Light
less than 0.3(1)	Severe	Medium	Light	Very light

tes

These ratios of mean area density of Ice in a given area are from the "World Meteorological Organization Sea Ice Nomenclature", Appendix 1.7 and give the ratio of area of Ice concentration to the total area of sea surface within some large georgraphic locale.

Provided the channel is wider than the ship

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13 October 1989
File No. 89208

Ms. E. R. Dieter
Oceanographic Center Facilities Section
National Science Foundation
1800 "G" Street Northwest, Room 609
Washington, D.C. 20550

Re: Ice Class Regulations

Dear Dolly:

Duane has asked me to look into current classification levels for ice classed vessels. The table shown below summarizes and compares classes among ABS, Lloyds, Det Norske Veritas (DNV) and Canadian regulatory agencies for vessels intended to operate in an ice environment. Note that ABS has three ice classifications available: regular ice class as described in Section 29 of the steel vessel rules ; Baltic ice class conforming to the Finnish-Swedish Ice Class Rules; and ABS "Guide" classification. Similarly, Lloyds rules contain both regular ice service and Baltic ice service classifications. For similar ice environments, the three classifications have roughly equivalent hull structure requirements but vary in the definition of longitudinal and vertical extent of the ice belt.

Description of First Year Ice		ABS Reg.	ABS Baltic	ABS Guide	Lloyds Reg.	Lloyds Baltic	DNV	Canada CASPPR
Light Ice	.4 M	C	1C	C0	3	1C	1C	Type D
Medium Ice	.6 M	B	1B	B0	2	1B	1B	Type C
Severe Ice	.8 M	A	1A	A0	1	1A	1A	Type B
Extreme Ice	1.0 M	AA	1AA	A0	1*	1AS	1A*	Type A

In addition to these requirements, both ABS and the Canadian Arctic Shipping Pollution Prevention Regulations (CASPPR) have additional requirements for vessels intended for more severe ice environments.

The CASPPR rules are based on a location/time matrix that assumes that for any geographical area, the ice conditions will vary according to the time of year. A map designating the various Canadian Ice Zones and an associated table showing the required Arctic class requirement versus zone and time of year are attached. The ice class is categorized by the thickness of the ice thought to be in that area; the implication being that the vessel will make continuous progress through level first-year ice of that thickness. For example, a CASPPR Arctic Class 4 vessel will be able to make continuous progress through 4 feet of level, first year ice. The ice classes above Arctic Class 6 take into account multi-year ice characteristics:

Class	Continuous Operation in:
Arctic Class 1	1 foot of level ice
Arctic Class 2	2 feet of level ice
Arctic Class 3	3 feet of level ice
Arctic Class 4	4 feet of level ice
Arctic Class 5	5 feet of level ice
Arctic Class 6	6 feet of level ice
Arctic Class 7	7 feet of level ice (includes multi-year ice)
Arctic Class 8	8 feet of level ice (includes multi-year ice)
Arctic Class 9	9 feet of level ice (includes multi-year ice)
Arctic Class 10	10 feet of level ice (includes multi-year ice)

The ABS requirements for vessels intended to operate in more severe ice conditions are contained in the publication "Guide for Building and Classing Steel Vessels Intended to Navigate in Ice". These requirements are also based on geographical region, time of year and whether or not the vessel will be escorted by other ice worthy vessels. A table summarizing ABS ice classifications is attached.

We hope this answers the questions you had regarding regulatory requirements. As always, should you should have any questions on the enclosed material, or if you have additional questions on this subject, please do not hesitate to contact us.

Yours very truly,

THE GLOSTEN ASSOCIATES, INC.

Dirk

DIRK H. KRISTENSEN, P.E.

DHK:ap

Enclosures

IDEAS FOR THOMPSON IMPROVEMENT 30 September 1991

This list is prepared to assist in the further outfitting of the Thompson. At the onset, we should say that the Captain, officers, crew, and ship performed admirably and effectively at carrying out its first scientific mission. The cruise was very productive and enjoyable.

1) Install overhead gantry in high bay area for picking up and moving gear to doors or to work on.

2) Install AC (120 V) power hook-in in high bay area.

3) Install another remote TV camera on the A-Frame so that one can see operations taking place on the fan-tail.

4) Provide ships navigation, meteorological, and echo-sounder depth information to all labs, not just the computer lab, along with a means down-loading this information to micro-computers doing scientific data acquisition.

5) A-frame needs some cleats inside between the stanchions for making fast tag lines attached to gear going over the side or coming inboard.

6) Need better position for control of the A-frame. Now it is impossible for operator to see all areas of operation between A-frame.

7) The block on the A-frame is not well designed. The wire is prone to jumping the groove when the wire angles to port or starboard. A block with 2-way swivel and higher cheeks are needed to correct problem.

8) It would be useful to have a standing platform halfway up the outside of the A-frame so that a person could watch an operation and control tag lines from that position.

9) Need better communication equipment between deck, especially A-frame area and the lab and bridge. Hand-held radio communicators were not ideal and in some cases where equipment failed led to situations that were dangerous. There were also times when, after a day of heavy use, most of the hand-held were not charged sufficiently and could not be used.

10) Need better communication with the outside world. Telemail, fax capability, and a cellular phone would be essential additions to the capability now on hand.

11) High Bay area could use a drain and so could several other deck areas. The wet-lab drain is positioned to insure that the wet-lab remains wet. It could be reposition to work more effectively.

12) Get rid of the horrific smells of sewage from main lab and starboard deck area.

13) The ship is incredibly noisy in most of the labs and in the main deck working areas, except the fantail. One cannot hear what is being said on the intercom system in most of the interior areas because of the fan noise. Something should be done to make these areas quiet. The same can be said about the scientific quarters; fan noise is excessive.

14) In addition to the J-frame, we could have effectively used a boom or crane on the starboard aft portion of the main deck from which to tow instruments. A boom, similar to that on the aft port side of the vessel, located forward of the large crane would be a good start

15) Scientific cabins come with 4-file drawers but no desk space to work or write on. The file drawer space could be converted to pull out deck tops.

16) It would be desirable to have an adjustable alarm on the winch controls which the winch operator could set to go off when a particular wire out or wire in was reached.

17) Also needed is a winch control station somewhere on the aft deck, perhaps atop the high bay work area.

18) – the roll tanks are valuable – do not remove.