

UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

**EAST COAST SHIP SCHEDULING GROUP
WEST COAST SHIP SCHEDULING GROUP
Report of Joint Meeting
JULY 11, 1988**

**Board Room
American Institute of Architects
1735 New York Avenue N.W.
Washington, D.C.**



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East and West Regional Ship Scheduling Groups met at 8:30 a.m., July 11, 1988 in the Board Room, American Institute of Architects, Washington, D.C. The meeting was co-chaired by Michael Rawson and George Shor, chairs for the East and West Groups. George Shor presided during much of the meeting. Seventeen of eighteen operating institutions were represented (see Appendix I).

Notification of the meeting, agenda and requests for scheduling, operating and cost information were by UNOLS Office letter dated June 30, 1988 (Appendix II) and a series of requests on electronic mail addressed to SCHEDULERS.EAST.GULF and SCHEDULERS.WEST. Most of the meeting was focused on 1989 tentative schedules, funding status of the science projects and schedules, projected operating costs compared to projected available funding.

Information on ship days of operation and projected costs for both 1988 and 1989 had been gathered in advance from all operating institutions. Summaries of the cost and days' operation information are Appendix III. (The Summary herein, date July 29, includes revisions developed during the meeting.)

Before hearing presentations from individual institutions on 1989 costs and schedules, George Shor noted several problems apparent from preliminary examination of the Summaries:

1. Summaries indicate that ONR/Navy will fund only about \$2.3 million and 300 days' ship operations in 1989, even though as much as \$8.5 million and 800 days might be available.
2. NSF funding available for 1989 ship operations will be substantially less than was provided in 1988. (An explanation for this reduction was provided by Don Heinrichs, NSF, later during the meeting.)
3. Solid funding information has been provided only for those NSF science proposals submitted to the February 1, 1988 target date. Panels will not be held for June 1 submissions until late August-September.

In combination those three problems suggest that even though the total funding sought for 1989 fleet operations is reasonable -- \$35.3 million versus \$39.9 million in 1988 -- unless greater participation can be gained from ONR and other sources, the oversubscription in NSF projects will result in inadequate fleet funding and reduced fleet operation.

Keith Kaulum noted that his information was that ONR would fund about \$4.5 million in 1989 rather than the \$2.3 million in the Summary. Even so, he noted that there were fewer science proposals to ONR for 1989 than for 1988.

Fleet Schedules and Costs for 1989. Brief presentations were made of individual ship tentative schedules for 1989, science funding status, estimated costs and days operated. Ship time requests not accommodated were listed. (Reports were not in the order shown below.)

ALPHA HELIX. Schedule projected for 219 days, Gulf of Alaska, Bering Sea, southeast Alaska, again Bering Sea and Gulf of Alaska. 77-90 days are funded.

ATLANTIS II. 268 day schedule includes JGOFS (non-ALVIN) in north Atlantic, March-July, refit for ALVIN, then ALVIN support in north Atlantic, southeast Pacific and end year in northeast Pacific. Funding sure for about 30 days.

BARNES. Regional Puget Sound schedule of 120 days. Additional time available throughout the year.

BLUE FIN. Scheduled for 92 days in coastal waters off southeast coast. About 60 percent funding from other sources.

CALANUS. Projected regional schedule of 209 days, straits of Florida, Caribbean island, etc. 65 days funded.

CAPE HATTERAS. Scheduled for 199 days, on shelf off southeastern U.S., Blake Outer Ridge/Plateau, Caribbean, Gulf of Mexico, Sargasso Sea, Chesapeake Bay and Bahamas. 168 days funded, 31 pending.

CAPE HENLOPEN. Scheduled for 186 days, Chesapeake Bay, Long Island/Long Island Sound and Gulf of Maine. 20 days funded, other pending.

CONRAD. Full-year schedule advanced for 240 days. One option mostly Atlantic, second mostly Pacific. Few funded projects. If BERNIER acquired, CONRAD would be taken out of service during 1989, and BERNIER carry out essentially the same schedule.

ENDEAVOR. Tight schedule of 248 days, all north Atlantic, from Azores to Greenland Sea. 202 days funded, 80% NSF sponsored.

GYRE. Schedule advanced for 199 days, 65 funded. Work mostly Gulf of Mexico, one eastern Caribbean project. Sponsorship split between NSF and Texas. (Negotiations continue with ONR to arrange title transfer to TAMU/Texas. Interim arrangements have been reached to allow TAMU to schedule and operate the ship for the short term.

ISELIN. Scheduled 230 days, Atlantic subtropical convergence, Bahamas, Gulf of Mexico, Gulf Stream, Amazon, Windward Islands, Sargasso Sea and shelf off DELMARVA. 164 days funded. Schedule 78 percent NSF.

KNORR. In shipyard renovation through September. 100 day schedule advanced for work out of Jacksonville. All NSF-sponsored, none funded.

LAURENTIAN. 70 day schedule, April through June. 20 of 50 NSF days funded, 20 days State sponsored.

MELVILLE. Scheduled 185 days prior to July 8 entry into shipyard renovation. Work in South Atlantic (SAVE) through February, physical oceanography in northwest Atlantic re-entry experiments and benthic biology. All funded. Additional work could be accommodated in equatorial Atlantic and Florida area if shipyard entry is delayed.

MOANA WAVE. Schedule for 302 days begins with biology in Hawaiian Islands, SEA MARC II projects in Line Islands, Juan Fernandez Microplate, Galapagos, Caribbean Plate and Columbian Margin. Physical oceanography transect at 10N, ending year in Guam. All work would be NSF sponsored, 163 days are funded.

FRED H. MOORE. No schedule and zero sponsor costs were advanced for 1989. Presently completing maintenance and repair, and available for operations in July, 1989 although no funded projects are pending.

NEW HORIZON. Moderate schedule, 217 days, all northeast Pacific out of San Diego. Overhaul, March-May. Funding secure for 115 days. NSF share 58%.

OCEANUS. Strenuous 276 day schedule, 247 funded. Work begins in equatorial Atlantic, most of year in northwest Atlantic. All NSF-sponsored.

OSPREY. Operational in mid 1989. Hold requests for 56 days, 14 funded. Anticipate funding for about 12 days sea trials and modest scientific shakedown, all northeast Pacific.

POINT SUR. Scheduled for 202 days, all off California coast. About 150 days funded. Sponsors are NSF 42%, CNOC 42%, ONR 8%, other 8%. One double booking with WECOMA (10 days) was noted.

ROBERT G. SPROUL. Scheduled for 114 days, southern California regional. 84 days funded. NSF would sponsor 74%. Schedule traditionally enhances by short local cruises with short lead time.

THOMAS G. THOMPSON. No schedule for 1989, zero sponsored costs. Ship would be turned back to Navy, October, 1988.

RIDGELY WARFIELD. Scheduled for 128 days, all in Chesapeake Bay. 108 days funded; all would be NSF-sponsored.

THOMAS WASHINGTON. 278 days scheduled, solid in western equatorial Pacific through may. After overhaul (May-July) several eastern Pacific (mostly EPR) options. 186 funded days. NSF sponsors 86%.

WECOMA. Solidly scheduled, 279 days. All work in northeast Pacific. 194 funded days. NSF would sponsor 80%, ONR 20%.

Additionally, NSF had indicated that WEATHERBIRD would be funded for station/regional surveys and sampling for GOFS, near Bermuda. Estimates are for more than 200 days, all sponsored by NSF.

Other Business. Several items were addressed before recessing for lunch.

George Shor introduced **Lisa Lynch** to attendees. Ms. Lynch has been hired recently as a ship operations specialist in NSF/OCFS. She will be working directly with institutions concerning ship operations and scheduling. Don Heinrichs - announced that **Larry Clark** would be acting manager, ship operations program, pending a permanent replacement in the job. Don estimated that Mr. Clark would assume ship operations duties in addition to his regular responsibilities for instrumentation and marine technicians at least until October.

Jack Bash, University of Rhode Island announced progress on URI's motion compensated (dynamic response winch) development. All system components (e.g. accelerometers-motion sensors, "slack wire accumulator," software, motor controls) have been fabricated, tested and perform well. The integrated system has not yet been tested.

Both Scripps and RSMAS announced that they had developed and were employing motion compensators.

A general discussion was held concerning the recent seizure of **ATLANTIS II** in connection with the **Coast Guard/Customs zero tolerance policy**. Woods Hole representatives noted that the ship was seized on the basis of finding minute quantities of drugs in the personal effects of a single crewman. The **ATLANTIS II** remains in Customs custody, allowed to operate under **Constructive Seizure Agreement**. Such an agreement was reached (in part) because Woods Hole had a clear, unequivocal policy prohibiting drugs, could credibly posture themselves as innocent victims, and have been forthright and cooperative. Other institutions noted their efforts to assure drug free ships: formal education programs for drugs, searches, etc., to assure no drugs aboard and a clear, announced policy prohibiting drugs. NSF representatives noted that all institutions receiving agency funding would be well advised to take similar steps. Shor noted that lawyers for state universities look askance at such steps, and are unresponsive to suggestions from our level. It would be very helpful if NSF could present this same information to NASULGC, which is attended by university presidents.

U.S.-U.K. Ship Exchange, 1989. Dr. Leonard M. Skinner, Director, Natural Environmental Research Council, Research Vessel Services discussed exchange arrangements between the U.S. and U.K. He also mentioned developments concerning a broader forum for exchange of ship time.

Schedules were presented for 1988/89 for the **DARWIN**, **DISCOVERY** and **CHALLENGER**. Although **DARWIN** and **CHALLENGER** are heavily booked, there would be the possibility of an exchange onto the **DISCOVERY** in the north Atlantic in early 1989.

A U.K. scientist may have **ALVIN** time in mid 1989, and one is scheduled for use of **WECOMA** in early 1989, as a part of the U.S.-U.K. exchange.

Broader arrangements for ship exchange were discussed at an eight-nation meeting (including both U.S. and U.K.) held during November, 1987. The consensus from that meeting was that use of other-nation research vessels should be paid for (rather than pursuing the U.S.-U.K. style exchanges).

Information from Funding Agencies. Don Heinrichs, NSF/OCFS began by reviewing NSF support of ship operations for 1987, 1988 and 1989, to show how the current funding situation arose.

Although NSF's budget request for 1989 would have resulted in \$41.3 million for Oceanographic Facilities, deficit-reduction measures have resulted in only \$37.26 million. This is virtually no increase over 1988. NSF funds recently available for ship operations:

	1987	1988	1989
OFS, Ship Ops	\$26.0 M	\$25.8 M	\$27.2 M
ODP	1.5 M	1.3 M	1.2 M
	<u>\$27.5 M</u>	<u>\$27.1 M</u>	<u>\$28.4 M</u>
1989 Funds used in 1988		3.3 M	- 3.3 M
		<u>30.4 M</u>	<u>\$25.1 M</u>
1989 Funds used in 1989			<u>1.7 M</u>
Available for 1989 Ship Ops			<u>\$26.8 M</u>

The decision to use \$3.3 Million in FY-1989 funds to support 1988 ship operations was reached because of two main factors: The reduction in 1988 funds came late, and both science and facilities managers felt constrained to honor commitments already made. Also, because of out-of-service status of both MELVILLE and KNORR, and impending retirement of THOMPSON, reduced fleet costs were expected for 1989. If the level of 1989 requests to NSF remains as high as shown today (about \$30.7 million) additional lay ups will be necessary.

Current forecasts are that in 1990 the budget for ship operations will show no increase in purchase power over 1989.

Because of these budget circumstances and several substantial changes to the fleet, NSF/OCFS in March asked the UNOLS Advisory Council to examine the match of expected funds and fleet costs in 1989, 1990 and 1991. Changes to the fleet to be considered are:

THOMPSON retired	GYRE to TAMU
MELVILLE refit	OSPREY operational late 1988
KNORR refit	BERNIER* may be acquired
	AGOR-23 in 1991(?).

*L-DGO, Columbia University has submitted an option-bid for the BERNIER at \$6.5 million.

Larry Clark informed operators that OCFS was considering delaying the submission date for Ship Operations and Marine Technician Proposals until 1 November 1988 (from 1 October). Operators saw no problems, so long as information on awards was communicated promptly.

Keith Kaulum, ONR, was pleased to announce that the three year, \$3 million contract for renovation of KNORR and MELVILLE had been approved. The first \$15 million (FY-1988 funds) are in hand; \$5 million has been transferred to

W.H.O.I., who are beginning procurement of major long leadtime items.

A contract to design and construct the AGOR-23 was signed in June. The contract, with Halter Marine was for \$6 million less than the cap price. ONR is negotiating with NAVSEA to use the \$6 million for augmented scientific capability (e.g., a sweep-sounding system, other high ticket ship instrumentation and equipment). The prospective operator, University of Washington, has submitted a wish list. U.W. personnel are participating with NAVSEA and the contractor in design and construction conferences.

All ONR contractors and grantees should be aware that there has been for six weeks a moratorium on Navy R&D contracts. It was lifted on July 1, but rumor has that it may be reimposed. Procurement personnel in institutions should be aware of this situation, and that only brief windows may be open for executing contracts, etc.

ONR in 1988 was successful in expending their \$5 million of new operational money. A total of \$6.3 million FY-1988 funds went to ships in the UNOLS fleet. (The summary here shows \$5.83 million, but should be augmented by about \$500 K for UNOLS' ship operations in the last quarter, 1987, financed with FY-1988 ONR funds.) Another approximately \$2 million was spent on non-UNOLS ship (especially for Arctic research on the POLAR CIRCLE).

In 1989, ONR anticipates about \$4.3 million for UNOLS ship operation. Although this is an increase over the \$2.3 in summaries here, it is disappointing in light of the excellent 1988 picture.

Both Don Heinrichs and Keith Kaulum noted that their efforts toward **Interagency Fleet Management Plans** were still active and that progress since the first of the year had not been substantive.

Keith Kaulum reported that he had implemented a policy at ONR wherein ONR-sponsored projects must provide for appropriate transit time and that on expeditions on which support was shared among agencies, ONR would assume their fair share of transit. Procedures have been developed this year with Scripps, with transit costs assigned to specific ONR research projects.

Mr. Kaulum expressed his concern that this and earlier UNOLS scheduling meetings placed high emphasis on achieving workable schedules for most individual ships within the funding available. He asked that consideration be given as well to schedule modifications that would enhance the economy, efficiency and effectiveness of the integrated fleet schedule.

1989 Schedule Improvement. Mike Rawson listed "orphan" ship requests held by various institutions, but not accommodated on any schedule.

Northeast Pacific		North Atlantic	
P.I.	Days	P.I.	Days
VAST (NORDA?)	30	MARRA	21 (funded)
Berelson	10	Grassle	5
Berelson	30	Weller	4
Highsmith	?	Hogg	23 (funded)
Wing (NOAA)	21	Wiebe	?
Karlin/Johnson	24	Owens	17 (funded)
Carpenter	15	Katz	24
Murray	32	Snyder	?
Western Pacific		Lee	?
Johnson	30		

Shiptime for all of these projects has been addressed, and solutions have been suggested but are not yet fully developed.

Problems with 1989 Schedule and Costs. Don Heinrichs presented an analysis of the schedules and costs presented. His analysis considered all ships Class IV and larger, was based on cost, operating and science funding information available on July 8 (prior to the meeting), and used RVOC criteria for candidate lay ups as well as criteria modified for special circumstances. **Based on his analysis all ships are candidates for lay up except:**

MELVILLE (good for part year prior to refit),
 WASHINGTON (made it by one day),
 ENDEAVOR,
 OCEANUS,
 WECOMA,
 POINT SUR (because of outside funding commitments),
 WARFIELD (because of mode of operation).

In addition, MOANA WAVE might have special circumstances that would dictate operation. Several ships become lay up candidates because incomplete information had been provided: ATLANTIS II, CONRAD, GYRE, ISELIN, CAPE HATTERAS.

NSF will be unable to support Ship Operations Proposals as summarized here. Profiles of ship operations funding

cycles, 1988 and a Summary of 1989 Cost Projections are Appendix IV.

Chairman's Summary: Clearly, there are too many ship days requested from NSF and too few from ONR. Members should point this out to principal investigators, and encourage joint funding proposals. There is clearly a communications gap.

ATTENDEES

Mr. Neil Anderson, NSF, (202) 357-7910
Cpt. William D. Barbee, UNOLS, (206) 543-2203
Mr. Jack Bash, University of Rhode Island, (401) 792-6203
Mr. D.C. Biggs, Texas A&M, (409) 845-3423
Ms. Ann Burns, Lamont-Doherty Geological Observatory, (914) 359-2900
Mr. Larry Clark, NSF, (202) 357-7837
Cpt. Joe Coburn, Woods Hole Oceanographic Institution, (508) 548-1400
Mr. Bruce Cornwall, Johns Hopkins University, (301) 867-7550
Cpt. Bill Coste, University of Hawaii, (808) 847-2661
Ms. Dolly Dieter, University of Alaska, (907) 224-5261
Cpt. John R. Dudley, Lamont-Doherty Geo. Observ., (914) 359-2900, x245
Mr. Jim Griffin, University of Rhode Island, (401) 792-6110
Mr. Grant Gross, NSF/OCE, (202) 357-9639
Mr. Don Heinrichs, NSF, (202) 357-7837
Mr. Ron Hutchinson, University of Miami, (305) 361-2549
Cpt. K. William Jeffers, University of Washington, (206) 543-5062
Mr. Keith Kaulum, ONR, (202) 696-4531
Mr. Dick Lambert, NSF, (202) 357-9614
Cpt. Dean Letzring, Texas A&M, (409) 740-4469
Ms. Lisa Lynch, NSF, (202) 357-9639
Ms. Barbara Martinneau, Woods Hole Ocean. Inst., (508) 548-1400, x2450
Mr. William H. Mitchell, Univ. of Texas at Galveston, (409) 761-2276
Mr. Don Newman, University of Southern California, (213) 830-4570
Dr. Wadsworth Owen, University of Delaware, (302) 645-4320
Cpt. Ken Palfrey, Oregon State University, (503) 867-3011, x224
Mr. Mike Prince, Moss Landing Marine Laboratory, (408) 633-3534
Dr. Michael Rawson, Lamont-Doherty Geo. Observ., (914) 359-2900
Mr. Mike Reeve, NSF, (914) 359-9600
Dr. Gilbert T. Rowe, Texas A&M, (409) 845-7211
Dr. George Shor, Scripps Inst. of Oceanography, (619) 534-2853
Mr. Leonard Skinner, NERC/RVS, 44-446-737451
Dr. Gene Stoermer, University of Michigan, (313) 764-5238
Mr. Al Sutherland, NSF, (202) 357-7372
Dr. Joe Ustach, Duke University, (919) 728-2111
Mr. Richard West, NSF, (202) 357-7837
Cpt. Jim Williams, Scripps Inst. of Oceanography, (619) 534-1643

UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

AGENDA

East and West Coast Ship Scheduling Meeting
Board Room
American Institute of Architects
1735 New York Avenue NW
Washington, D.C.

8:30 a.m.
Monday, July 11, 1988

The Scheduling Groups will be called into session by Chairmen Rawson and Shor. Emphasis during the meeting will be on projecting funding, costs, ship requirements and schedules for 1989.

Projection of Fleet Schedules and Costs for 1989. George Shor/Mike Rawson. Based 1989 cost and operating day information provided earlier through Schedulers Group telemail and schedules from SHIP.SCHED89 fleet costs day operation and schedules will be presented. Potential problems will be identified. Any funding/scheduling problems remaining for 1988 will be noted and, hopefully, resolved.

Information from Funding Agency Representatives. From NSF, ONR and other agencies as desired, on funding available for 1989, total ship days required, science funding decisions as available. Recap of 1988 schedule/funding problems as necessary.

Schedules for 1989. Individual presentations by institutions of their tentative schedules for 1989 (should be as on SHIP.SCHED89). Identify problems: unfunded projects, multiple bookings, schedule inefficiencies, etc.) Explicit list of unfilled 1988 ship request held. Recap of 1988 problems as necessary. (Institution representatives will not need to bring multiple copies of their schedules and cost projections but may want to bring vu-graphs to help their presentations.)

LUNCH.

U.S.-U.K. Ship Exchange 1989. Frank Verdon/NSF. Information on exchanges tentatively arranged or that might have effect on UNOLS ship schedules.

Interagency Fleet Management Plans - Mid-term Projections. Eric Hartwig, ONR and Don Heinrichs, NSF.

1989 Schedule Improvement. Chairmen Rawson and Shor will provide direction and moderate discussion addressing schedule problems identified earlier (eliminate double bookings, suggest ships for projects not accommodated, address funding mismatches, improve schedules).

Recommendations. Discussion and adoption, if any indicated. (For agencies, through UNOLS).



SHIP/CLASS	PROPOSED FUNDING							
	NSF		ONR		OTHER		TOTAL	
	Days	Dollars	Days	Dollars	Days	Dollars	Days	Dollars
MELVILLE	147	1,874	61	778	10	128	218	2,780
KNORR	277	3,163	16	183	0	0	293	3,346
ATLANTIS II	257	2,955	51	587	38	437	346	3,979
CONRAD	244	3,124	73	935	4	47	321	4,106
T.G. THOMPSON	122	1,445	0	0	0	0	122	1,445
T. WASHINGTON	269	2,806	59	615	3	31	331	3,452
MOANA WAVE	277	2,267	0	0	19	155	296	2,422
CLASS II TOTAL	1,593	17,634	260	3,098	74	798	1,927	21,530
AVE:								
ENDEAVOR	143	1,280	30	221	49	361	222	1,862
OCEANUS	147	1,022	85	591	0	0	232	1,613
GYRE	10	60 ^a	0	99	209 ^a	794 ^a	219	953
ISELIN	164	1,394	55	468	0	0	219	1,862
NEW HORIZON	107	824	13	100	98	755	218	1,679
FRED MOORE	32	150	0	0	0	163	32	313
OSPREY	20	200	0	0	0	750	20	950
WECOMA	173	1,419	58	476	0	0	231	1,895
CLASS III TOTAL	796	6,349	241	1,955	356	2,823	1,393	11,127
AVE:								
POINT SUR	39	246	85 ^b	536 ^b	20	126	144 ^b	908 ^b
CAPE HATTERAS	137	900	44	289	21	138	202	1,327
ALPHA HELIX	196	1,436	0	0	1	7	197	1,444
R. SPROUL	123	502	27	110	15	61	165	673
CAPE HENLOPEN	79	484	18	110	19	116	116	711
R. WARFIELD	130	517	0	0	0	0	130	517
CLASS IV TOTAL	704	4,085	174	1,045	76	448	954	5,580
AVE:								
BLUE FIN	57	98	0	0	30	52	87	150
LAURENTIAN	40	160	0	0	10	40	50	200
BARNES	83	193	0	0	15	35	98	228
CALANUS	122	269	15	33	6	13	143	316
WEATHERBIRD	250	320	0	0	0	0	250	320
< CLASS IV TOTAL	552	1,040	15	33	61	140	628	1,214
AVE:								
FLEET TOAL:	3,645	29,108 ^c	690	6,131	567	4,209	4,902	39,451

a. 60K carry over from 1987.
 b. Includes 70 days, 441K, CNOG.
 c. Exceeds D. Heinrichs' June 8 estimates by 938K.

SHIP/CLASS

PROPOSED FUNDING

	NSF		ONR		OTHER		TOTAL	
	Days	Dollars	Days	Dollars	Days	Dollars	Days	Dollars
MELVILLE	145	1,752	43	520	0	0	188	2,272 ^c
KNORR	100	1,300	0	0	0	0	100	1,300
ATLANTIS II	251	3,137	8	100	9	113	268	3,350
CONRAD	240	3,000	30	375	0	0	270	3,375
T.G. THOMPSON	0	0	0	0	0	0	0	0 ^b
T. WASHINGTON	238	2,835	40	476	0	0	278	3,311
MOANA WAVE	302	2,501	0	0	0	0	302	2,501
CLASS II TOTAL	1,276	14,525	121	1,471	9	113	1,406	16,109
AVE:								
ENDEAVOR	203	1,616	17	135	26	207	246	1,958
OCEANUS	276	2,100	0	0	0	0	276	2,100
GYRE	90	501	0	0	35	211	125	711
ISELIN	180	1,440	50	400	0	0	230	1,840
NEW HORIZON	127	1,022	4	32	86	692	217	1,746
FRED MOORE	0	0	0	0	0	0	0	0
OSPREY	56	560	0	0	0	0	56	560
WECOMA	223	1,918	54	482	0	0	277	2,400
CLASS III TOTAL	1,155	9,157	125	1,049	147	1,110	1,427	11,315
AVE:								
POINT SUR	86	503	101 ^a	590 ^a	15	88	202	1,181
CAPE HATTERAS	188	1,300	0	0	11	76	199	1,376
ALPHA HELIX	200	1,500	0	0	1	8	201	1,508
R. SPROUL	96	450	7	33	25	117	128	600
CAPE HENLOPEN	118	590	52	260	16	80	186	930
R. WARFIELD	122	549	0	0	0	0	122	549
CLASS IV TOTAL	810	4,892	160	883	68	369	1,038	6,144
AVE:								
BLUE FIN	39	69	0	0	53	93	92	162
LAURENTIAN	20	80	0	0	20	80	40	160
BARNES	104	220	0	0	16	40	120	260
CALANUS	144	288	20	40	45	90	209	418
WEATHERBIRD	250	320	0	0	0	0	250	320
< CLASS IV TOTAL	557	977	20	40	134	303	711	1,320
AVE:								
FLEET TOTALS	3,798	29,551	426	3,443	358	1,895	4,582	34,888

a. Includes 84 days, 491K from CNOC.

b. Based on THOMPSON deactivation 10/1/88.

c. MELVILLE to shipyard July 1989.

PROFILES OF FUNDING CYCLES \$ MILLION

	OP DAYS	NSF	ONR	OTHER	TOTAL	SHORT FALL
1986	4,259	25.7	4.4	3.4	33.5	
1987	4,763	28.0	5.7	4.0	37.8	
1988 Cost Projections						
July 1987 (anticipated)	5,540	35.6 (30.4)	5.4 (8.5)	2.9 (2.9)	43.9 (41.4)	(1.6)
October 1987 (anticipated)	5,406	32.3 28.4	5.2 5.2	4.5 4.5	41.9 38.1	(3.8)
January 1988 (anticipated)	5,015	29.1 (28.4)	4.7 (4.7)	4.0 (4.0)	37.9 (36.7)	(1.2)
July 1988 (anticipated)	4,902	29.1 (30.4)	6.1 (6.1)	4.2 (4.2)	39.4 (40.7)	

SUMMARY OF 1989 PROJECTIONS
\$ MILLION

	NSF		ONR		OTHER		TOTAL	
	Days	\$	Days	\$	Days	\$	Days	\$
July 1988 (Anticipated)	3,798	29.55	426	3.44	358	1.90	4,582	34.89
Projected Shortfall		26.8		4.3		1.9		33.4
		(2.7)		0.9		-		(1.8)