UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS
DEEP SUBMERGENCE SCIENCE COMMITTEE MEETING

SUMMARY REPORT

July 16-18, 1997

Woods Hole Oceanographic Institution
Carriage House
Woods Hole, MA

Deep Submergence Science Committee
Carriage House, Woods Hole Oceanographic Institution
July 16-18, 1997

MEETING BEGINS AT 9:00 AM

I. Introductory Remarks - (Perfit)
1. Logistics, Agenda items
2. Accept minutes

II. Discussion of Summer/Fall 1997 Deep Submergence Ops. Schedule (Perfit - Overview)
1. Latest news on constraints and priorities for accommodating science on JDF - (Moller/Pittenger and Agency Reps.)
2. Status of ROV traction winch and launch/recovery facilities on Atlantis - problems and plans for resolving them - (Walden/ Pittenger)
3. Impact to Fall ALVIN Schedule and to 1998 Atlantis and DSOG scheduling - (Perfit/Moller/Pittenger)

III. National Facility Operators Report (Pittenger/WHOI Personnel)
1. ALVIN Overhaul and Recertification - Walden/Foster
   Results from first 2 science dives on MAR - (Fornari)
2. Jason and tethered vehicle Ops Summary - (Bowen)
   W. Pacific & Mediterranean
   Fryer cruise
   Derbyshire cruise
   Ballard cruise
3. Status of WHOI Deep Submergence Data Archiving Policy - (Fornari/Pittenger)

IV. Upgrades to National Facility Vehicles and Science Sensors
1. Status of Upgrade Proposal - (Walden/Fornari)
2. Plans for implementation of upgrades - (Walden/Fornari)
3. Questions to ONR and NOAA re: possible contributions to the upgrade effort- (Fornari)

V. Agency Reports
1. NSF - (P. Taylor, D. Elthon)
   Results from May panel - updating DESSC/UNOLS deep submergence funded programs listing
2. ONR - (S. Millick)
   Funded science programs
   Clarification on Navy deep submergence vehicle decommissioning
   3rd party tools
3. NOAA (G. Smith)
   Funded programs
   New NOAA funding paradigm
   Significance for Deep Submergence Facility support
   Interest in Navy assets
4. Status of interagency MOU

5. Other Deep Submergence Activities - (NURP, MBARI, ROPOS)

VI. 1998-1999 Deep Submergence Scheduling

1. Review of Planning Letters and Website postings - (Chandler/Moller)
2. Identification of funded programs, science/logistical constraints, different vehicle requests, and nature of time-series projects to achieve a workable schedule for PIs and funding agencies.
3. Additional Long Range Planning -
   Future global deep submergence initiatives: Western Pacific, Indian Ocean, S.EPR, Mediterranean, Polar Regions
   International collaboration initiatives (JAMSTEC/BRIDGE)
4. Discussion of traditional operating areas vs. expedition science.

VII. DESSC Sea Cliff Working Group Report (M. Perfit)

1. Results of survey
2. Meeting summary
3. Final report
4. Discussion of ATV retirement and request for DESSC input
   a. Scripps initiative - Sept. meeting
   b. Plans for new science ROV

VIII. DESSC Discussion of Integrated Facilities, Nested Survey Strategy and How to Better Educate the User Community on Conducting Field Programs With ALVIN, Jason, Argo-II and DSL-120 sonar - (Fornari/Orange/Fryer)

1. Jason letter , discussion and response

IX. DESSC White Paper Discussion-

1. Deep Submergence Science Initiatives- Beyond 2000
   a. New Science ROV- planning and funding
2. Assignment of written sections to DESSC members

Deep Submergence Science Committee Social
Wednesday, 16 July 1997
5:00-7:00 p.m. Clark Building, 5th Floor

Woods Hole Oceanographic Institution invites the DESSC Meeting Participants to join representatives from WHOI for a Social on Wednesday, 16 July, 5:00 p.m., 5th floor of the Clark Building located on the Quissett Campus of the Woods Hole Oceanographic Institution.

APPENDIX I

DEEP SUBMERGENCE SCIENCE COMMITTEE
JULY 16-18, 1997
Carriage House
Woods Hole Oceanographic Institution
Woods Hole, MA

MEETING REPORT SUMMARY

APPENDICES

I.	Meeting Agenda
II.	Attendance List
III.	ATLANTIS/ATLANTIS II/ALVIN Timeline 1996-1998
IV.	AGOR Z-Drive Information
V.	ATLANTIS Shakedown/ALVIN Post-Overhaul
VI.	DSOG Cruise Summary 11/96 - 7/97
VII.	1996/7/8 Ship and Vehicle Schedules and Requests
VIII.	1998 ATLANTIS Schedule Options
IX.	SEACLIFF Working Group Report Summary
X.	Mike Perfit letter dated July 21, 1997
XI.	DSF Upgrades
XII.	DSOG Data Rescue Project
XIII.	ALVIN/ROV Programs in 1999 and Beyond

WELCOME, INTRODUCTORY REMARKS: The summer meeting of the DEep Submergence Science Committee (DESSC) was held at the Carriage House, Woods Hole Oceanographic Institution on 16-18 July, 1997. The meeting was called to order at 0900 by the Chair, Mike Perfit. Mike welcomed DESSC and members of the WHOI Deep Submergence Group and reviewed the meeting agenda, ***Appendix I.*** The list of meeting participants is included as ***Appendix II.*** Mike congratulated WHOI for their efficient progress in bringing ATLANTIS on line and for their excellent public outreach efforts with the visits to New York City and Washington, DC.

ACCEPT MINUTES: The minutes of the December 14, 1996 meeting were approved as written.

NATIONAL FACILITIES OPERATOR'S REPORT:

ATLANTIS Operations/Issues - Dick Pittenger provided a viewgraph of the time line reflecting the events during the transition from retirement of ATLANTIS II to the start of ATLANTIS operations, (***Appendix III***). He thanked Karen Von Damm and her subcommittee for their assistance in the conversion plans. The ALVIN overhaul went smoothly and ALVIN was integrated with ATLANTIS on schedule. Certification dives off Bermuda in June went well. Following certification, ATLANTIS and ALVIN began science operations in the Atlantic. Considerable cooperation by all involved with the delivery, outfitting and shakedown provided a smooth and on-time effort. The August issue of *Popular Science* magazine includes an article,

"Science at Sea" by Marietta DiChristina, which features ATLANTIS. Dick explained that the NAVSEA ship construction funding will end 31 May 1998 at which time all warranty issues and the Post Shakedown Availability (PSA) must be completed.

Dick continued with a history of the AGOR Z-drive problems in the oceanographic fleet which include failures on THOMPSON, MELVILLE and KNORR, ***Appendix IV***. At least two of the problems were traced to bad metallurgy and gear design specifications in that the gears were not properly hardened and had insufficient contact area. Metallurgic analyses will be performed on the THOMPSON and KNORR gears which recently failed. The Navy and NSF will be funding a study by The Glosten Associates to analyze the AGOR Z-drive failures. A major problem associated with the Z-drive failures is the long lead time required to manufacture replacement parts. The Navy has procured spare lower Z-drive units for ATLANTIS, BROWN, REVELLE and THOMPSON in case of failure.

Dick reported that noise in the bow thruster of ATLANTIS appears to be a cavitation problem. The problem can most likely be corrected and they will try in January to fix it and mitigate the noise problem.

ALVIN Overhaul and Recertification - Barrie Walden discussed the ATLANTIS shakedown, outfitting/loading and ALVIN overhaul processes and post overhaul engineering testing and shakedown efforts including NAVSEA certification, ***Appendix V***. After delivery of ATLANTIS in February, a great deal of work still remained for WHOI to complete before science operations could begin. A lot was accomplished during the post-yard outfitting period in Mississippi, including wiring of the ship's Science Information System (SIS). The delivery trip from Mississippi to WHOI was conducted in three legs: 1) Mississippi to Fort Lauderdale, FL; 2) Fort Lauderdale to Norfolk, VA; and 3) Norfolk to Woods Hole. Underway testing went very well. Vendor representatives were aboard to witness the testing. SeaBeam testing was conducted during a survey of Hudson Canyon. The 2100 SeaBeam system on ATLANTIS is similar to the KNORR's but the ATLANTIS' hydrophone arrays are smaller. In January/February 1998 during the PSA period, the ATLANTIS system will be upgraded. The hardware required for this upgrade has already been ordered.

Ship Outfitting and loading continued after the ship reached home port at Woods Hole. After some adjustment to the ship's sled tracks, ALVIN was successfully loaded onto the railways. ATLANTIS' battery lift and A-frame both worked fine and integration with ALVIN went smoothly. Three tethered trim dives were conducted at Woods Hole. Before beginning science operations, ATLANTIS sailed to Bermuda and conducted 14 dives for certification and engineering. Following recertification, ATLANTIS and ALVIN began work on the Mid-Atlantic Ridge. At the time of the DESSC meeting, nine dives had been successfully completed with an average of 4.6 hours bottom time per dive.

Results from the first two science programs on MAR - Dan Fornari reported on the first two dives following ALVIN's certification. Two dives were conducted during the transit from Bermuda to the Azores and included filming by the British Broadcasting Corp. Everything went well and the group walked off the ship with all their data on CDs. The only problem experienced was with SeaBeam which was not functioning during the cruise because of a problem with its uninterrupted power supply and associated hardware/software issues. The system was fixed for

the subsequent cruise but real-time hard copy plotting of the swath data was not able to be done which initially hampered the science program. Deficiencies in the multibeam system remain unsolved by SeaBeam. The science laboratories layout is very flexible and a major improvement over what was available on A-II. The science information system is very capable and includes extensive wiring throughout the ship and a video monitoring system. Dan reported that night time dredges were successfully conducted but suggested that it is essential that a PDR be added to aid in dredging operations and camera towing operations where detailed resolution of pinger traces are critical to the successful conduct of the towing operations. The ALVIN navigation and datalogger works as well as before the overhaul. Efforts are underway to transition the ALVIN and ROV vehicle navigation to the new Nautronix system provided with the ship and to take advantage of the new Winfrog navigation software. This is being done incrementally to ensure successful navigation on all cruises and full testing and verification that the new navigation hardware and software are fully operational before switching over.

Dudley Foster continued by reporting on operations on ALVIN's second dive program to the MAR which was headed by Bob Vrijenhoek (Rutgers U.) in cooperation with the U.K. BRIDGE scientists. This cruise also coincided with operations the French were conducting using NAUTILE. The French had scheduled three legs to the Rainbow site where they will work for a few months. Since their scheduled operations coincided with those of ALVIN, a dive was coordinated for a photo shoot opportunity with both vehicles on the bottom. Highlights of the ALVIN cruise were documented by a reporter from the New York Times who participated in the cruise (see http://www.nytimes.com/library/cyber/week/ 071497dive.html).

Jason and tethered vehicle Operations Summary - Andy Bowen gave a summary of the four DSOG cruises during the period of November 1996 through June 1997, ***Appendix VI***. The first of these cruises was with Haymond/MacDonald aboard MELVILLE to the Southern EPR using DSL 120, ARGO II and Medea. This proved to be a very successful cruise with 80 km of ridge crest surveyed. Next was Patty Fryer's cruise in the Marianas Forearc using Jason/Medea aboard THOMPSON. Weather, equipment and personnel problems were experienced on this cruise limiting the success of the ROV operations, especially the sampling program. However, many cruise objectives were met through creative work-arounds. A more comprehensive report is included later in the minutes. The third cruise was a forensic study on the wreck of the DERBYSHIRE in the Philippine Sea. The vehicles DSL 120, ARGO II and JASON/Medea were all used from THOMPSON. The ship's dynamic positioning system and the P-code GPS were instrumental in the program. This extensive operation was highly successful. Andy presented some of the ARGO images taken of the wreckage. Jason/Medea was then shipped to the Mediterranean for work with Bob Ballard aboard SSV CAROLYN CHOUEST. This was a joint operation with the Navy's nuclear submarine, NR-1. ONR funded a great deal of the engineering development required for Ballard's cruise. These improvements will also benefit future science applications (and have recently been put to good use on the Delaney/Fisher cruise on the Juan de Fuca Ridge). The cruise proved highly successful in imaging of Roman wrecks and recovering artifacts.

DISCUSSION OF SUMMER/FALL 1997 DEEP SUBMERGENCE OPERATIONS SCHEDULE: Mike Perfit and Don Moller lead the discussion on scheduling of ATLANTIS and the DSOG vehicles [tools] for late 1997 and 1998. There are a number of issues complicating the scheduling process. To begin, there is a backlog of ALVIN programs waiting to go to sea. This

is a result of ALVIN's lay-up for overhaul and also the transition period for ATLANTIS-II to ATLANTIS. THOMPSON had an upper gear failure to the starboard Z-drive requiring the cancellation of a series of Jason/Medea cruises on Juan de Fuca with THOMPSON in the summer and fall of 1997. Don Moller has been working to accommodate as many of the PI requirements as possible. The decision had been made that ATLANTIS would abandon its planned schedule and pick up the Juan de Fuca work in late 1997 and it appears that most of THOMPSON's work was able to be rescheduled. Because of the large number of funded programs from Juan de Fuca to the southern EPR, it was not possible to schedule each with the number of dives needed and the time requested while working around the PSA. The 1997 rescheduling of Juan de Fuca programs was reached through the compromises of many of the scientists and involved working closely with the various funding agencies and the operators. The other scheduling issue is the need for ATLANTIS to have its Post Shakedown Availability (PSA) before May 1998. Mike reported that this year's scheduling process has been a logistics headache because of the number of funded cruises in many different sections of the ocean and as a result of a new time-series project. DESSC requested greater communication and guidance from the funding agencies to help with the scheduling process in the future. More discussion was held on the 1998 ATLANTIS schedule later in the meeting.

Don Moller then presented the 1996 and 1997 Jason/Argo/DSL-120 schedule and the 1997 ATLANTIS schedule, see ***Appendix VII***. ATLANTIS' schedule is very full for the remainder of the year. A potential conflict may exist between ATLANTIS and EWING operations on the Northern EPR. (NOTE: as of this writing the conflict has been resolved by L-DEO and WHOI ship schedulers.) EWING is requiring a 40 mile radius free of other ship operations. Don noted that 38 percent of all the large ship scheduled operations is for deep submergence work.

Review of Planning Letters and Website Postings - Don Moller presented two lists of funded ALVIN and ROV programs. One lists the programs by vehicle requested and the other lists the requests by location, see ***Appendix VII***. In 1998, there is a total of 329 days on station requested. This equates to over 500 ship days. The greatest number of requested days is for work at the Southern EPR. However, Don also pointed out that the work at Juan de Fuca involves time series programs. Don presented a map showing the areas with funded work. All areas are in the Pacific, and include Juan de Fuca, Northern EPR, California Coast, Southern EPR, Guaymas, Hess Deep, and Hawaii. Next Don showed a time line with the 1998 tethered vehicle work. The weather windows were highlighted.

DESSC addressed the 1997/1998 scheduling issues in detail later in the meeting.

AGENCY REPORTS:

Office of Naval Research (ONR) - Sujata Millick provided the report for ONR. There are no planned ALVIN programs funded by ONR for 1998. In 1997, ONR provided funding for Jason engineering improvements to prepare for Bob Ballard's cruise to the Mediterranean. In 1998, ONR will fund one Jason program for Ballard. The Navy plans to decommission TURTLE, SEA CLIFF and the ATV over the next two years. Sujata queried the DESSC as to whether the U.S. should try to establish a cooperative relationship with the international community for coordination of deep submergence assets. She questioned whether the federal agencies should establish MOUs with international partners. Some advantages of a cooperative relationship might

include increased access to remote geographic areas for deep submergence research using international assets. It was noted that there are already a number of informal and formal partnerships in existence. Gene Smith reported that NOAA holds many agreements with international partners. These include cooperative arrangements with Japan and France. As an example, NURP has been working and meeting with JAMSTEC in a program to promote the preservation of natural resources. After discussion, the Committee agreed that international partnerships in theory are a good idea and can be beneficial to the future of deep submergence science, however, it was noted that in practice these agreements do not result in significant deep submergence opportunities for U.S. scientists so their potential in terms of access to other vehicle assets is very limited.

National Oceanic and Atmospheric Administration (NOAA)/ National Undersea Research Program (NURP) - The NOAA/NURP report was provided by Gene Smith. The reinvention of the NURP continues to progress. The six undersea research centers and national Headquarters are implementing the operational elements of their program which includes new elements of competition and the addition of a National Level Advisory Council. The FY 1998 NURP budget will be comprised primarily of core funding to support Center programs and a competitive fund to be allocated among centers based upon the advice of a national level panel that considers national, NOAA, and regional priorities. All proposals for research will be reviewed by each Center's review panel to ensure that proposals recommended for funding reflect high scientific standards. Proposals may be supported from Center core funding or from funds made available from the competitively-allocated fund. NOAA expects to fund ALVIN/ROV science programs at about the $500 K level/year.

Beginning this year all investigators seeking NURP support for ALVIN projects are to submit proposals through one of the six NURP centers. Proposals for NURP funded ALVIN dives will be competitively reviewed and dive time will be allocated on the basis of available funding and recommendations of a national level review panel. Center schedules for proposal submittal deadlines were included in individual announcements sent out by the centers. Submission is open to the public and is not exclusive to NOAA scientists.

Gene commented that the NURP National Office provided funding for part of the ALVIN overhaul.

Gene concluded his report with comments regarding the Navy's deep submergence assets. NURP has continued to give scientists access to Navy assets. Plans for the decommissioning of SEACLIFF, TURTLE and ATV has given the community an opportunity to evaluate its future deep submergence facility needs. It was pointed out that there may be interest by the U.S. Coast Guard in acquiring ATV for search and rescue operations. In the past, they had relied on the Navy to provide vehicles for these types of operations. With the Navy retiring their assets, the Coast Guard will need to look elsewhere for facilities. Gene noted that NOAA has been the only agency to support the science use of ATV. They have an interest in the vehicle, but would like to hear from the community. Gene requested that DESSC determine the Community's interest in ATV as a deep submergence tool. If possible, he suggested using the SEACLIFF survey results to respond to this question.

National Science Foundation (NSF) - Phil Taylor provided the report for NSF. He thanked the community for working to try to accommodate everyone's deep submergence needs in 1997 in light of the difficulties presented by THOMPSON's gear failure. He noted that the 1998 deep submergence facility schedule is still unsettled due to the difficulties in establishing scheduling priorities. The main conflict is between the need to continue time series work and the need to embark on expeditionary programs. Phil reported that the 1998 NSF budget is working its way through Congress. Although there is a chance for an increase in the overall NSF budget of up to 6% the fleet budget will most likely remain flat. Negotiations for updating the MOA between NSF, ONR and NOAA for support of the deep submergence facility should be resuming in the near future. Once an agency draft is prepared they will pass it to DESSC for comment.

Phil reported that the latest revision of the Third Party Tool statement has been reviewed at NSF and is acceptable. He also indicated that it would be acceptable for DESSC to attach their guidelines to the policy, but that the agency statement should remain intact.

In conclusion, Phil remarked that the DESSC should be responsive to the opportunity to take advantage of the Navy's decommissioning of SEACLIFF.

1998-1999 DEEP SUBMERGENCE SCHEDULING: Don Moller presented two 1998 "strawman" schedules for ATLANTIS, see ***Appendix VIII***. Schedule (1) included work at the Southern East Pacific Rise (SEPR) and excluded the work at Juan de Fuca. In schedule (2) ATLANTIS remains north of the equator for the entire year. These provided a basis for discussion. After pondering the various cruises, priorities and cruise requirements the two schedule options were compared. The pros and cons for each schedule were identified:

Schedule (1) - Southern EPR Option (no Juan de Fuca)

PROS

1. Maximizes non-NSF dollars.
2. Accomplishes all SEPR work in 1998.
3. Satisfies international collaborations.
4. Meets long range DESSC/NSF objective.

CONS

1. No JDF work with ALVIN until fall 1999.
2. Larger shipping bill for ROVs
3. Stakes work may be compromised.
4. No time series start (except Manahan)
5. Fisher experiment jeopardized or compromised.
6. Austral winter port call at Easter Island.

Schedule (2) - Juan de Fuca Option

PROS

1. Time series accommodates.
2. Accommodates two more PIs
3. More efficient weather window use.
4. Both LEXEN cruises.
5. More cost efficient for scheduling.

CONS

1. No SEPR work.
2. No NURP funding.
3. No Japanese collaboration.
4. Stuck in the Yo-yo

The DESSC then considered hybrid schedules which combined features of each of the two options. They felt it was important to keep non-NSF programs and international collaborations if possible. They also felt it was important to accommodate the Juan de Fuca programs. A conceptual schedule was worked out and a consensus reached, see ***Appendix VIII*** (Note - subsequent to these deliberations additional information has been received causing still more changes. However at press time, WHOI in collaboration with NSF and DESSC has posted a finalized 1998 schedule). DESSC and WHOI agreed to forward the conceptual schedule to the funding agencies as a recommended plan of operation. Mike Perfit reported that he will prepare a cover letter endorsing the recommended schedule. He will also address the scheduling problems encountered this year and propose that the agencies establish a committee to keep the community informed of funded programs and priorities.

PRESENTATION BY ADMIRAL BRAD MOONEY: Admiral Brad Mooney (USN Ret.) discussed with the committee the recently published Marine Board study titled, "*Undersea Vehicles and National Needs.*" The study was chaired by Admiral Mooney with six of the 12 members being scientists. Briefly, the report concluded that the nation should have a long range plan for undersea research and that there should be enhanced access to vehicle assets by: (1) using and improving on present vehicle access processes, (2) providing a strategic plan to deal with future needs, and (3) providing stable multi-year funding.

Brad suggested that emergency and security applications will be the driver for future underwater efforts. The downing of TWA 800 caused those agencies involved in rescue and salvage to re-evaluate their ability to recover wreckage in deep water. As a result, the Marine Board is being tasked to prepare a strategic plan to address this issue. The Board has been asked to: 1) define a standing group of experts; 2) review agency missions; 3) review the adequacy of existing technical capabilities; 4) review the adequacy of existing funding; 5) review methods of funding; 6) determine the annual cost to maintain and improve undersea facilities; and 7) recommend sources of this funding. One concept for funding additional assets is to place a tax on each airline ticket purchased. The collected taxes would be used to support the vehicles needed for search and rescue operations.

Discussion followed concerning the role of science in any planning for deep submergence access. The DESSC felt strongly that the science community should have an active role in any new facilities or capabilities planning. The model of ALVIN was sighted as one that works and could be followed. ALVIN is Navy owned, academically operated and available for Navy emergency requirements. By operating ALVIN on a daily basis it is maintained in superb condition while providing a world class scientific tool. It was pointed out that it is essential for science tools to be dependable and functional. Also, it is important to have scientists involved in the planning stages from the start. It was noted that with an increase of assets, there must also be the associated increase in funding for science research. DESSC will address this larger issue later in the meeting. DESSC applauded the efforts being made by Brad to get more assets available for science. Brad assured the Committee that the scientific community would be involved in the planning process.

PRESENTATION BY BOB BALLARD: Bob Ballard provided the Committee with an update on the Jason project. The project now has 30 down-link stations enabling it to reach 600,000

students and 15,000 teachers. In both Florida and Connecticut schools, the Jason project has been directly linked to the classroom, significantly expanding student involvement. A complete year-round program is planned for 1998 including a tie-in with the United Nation's "Year of the Ocean." The field program for next year will feature the coral reefs of Bermuda "Descending the Ocean Ladder," the kelp forests in Monterey Bay, and cold water seeps and hot vents of the ocean bottom. By taking Jason to Guaymas Basin, they will be able to revisit previously explored sights. The Jason Project can be reached on the Internet at <http://jason.project.org>.

DESSC SEACLIFF WORKING GROUP REPORT: Mike Perfit presented a summary of the SEACLIFF Working Group Report including a series of viewgraphs depicting the community's response to a questionnaire, ***Appendix IX***. The initial tasking to the DESSC by ONR Technical Director, Fred Saalfeld, included eight options concerning the disposition of SEACLIFF. These ranged from deactivating SEACLIFF (option 1) to modifying ALVIN using SEACLIFF's sphere and equipment (option 8). The group only considered the last four options. WHOI offered two additional options, 8a) Improve ALVIN with SEACLIFF components, excluding its sphere, keeping the sphere for future upgrade; and 9) Redesign of a new submersible using ALVIN and SEACLIFF equipment. The Working Group concluded that: a) Options 8 and 8A are the most appealing; b) WHOI's technical evaluation of the options is needed and requires ONR funding; c) The deep submergence community has identified numerous scientific objectives to be met in the deep ocean and on the seafloor that require HOVs, ROVs and AUVs; d) A new science ROV must be designed and built; e) There is a critical need to maintain the excellent HOV capability which now exists in ALVIN to 4500m; and f) Deep submergence science should be highlighted as a key initiative for 21st century exploration and discovery of Inner Space.

Mike reported that the community's response indicates there is strong support for HOV depth capability to 6000m, and to 9000m for ROVs, to allow for research over a wide range of tectonic, sedimentologic and geographic environments. The Group acknowledged the continued need for an HOV at abyssal depths and in general, supported the concept of engineering an HOV using some combination of ALVIN and SEACLIFF equipment to create a 6000m HOV. However, the Group could not rank or seriously consider any of the more viable options for utilizing SEACLIFF because costs in time and money for the conversion were not available at the time of the meeting, and a detailed technical feasibility study has not yet been done, nor have any commitments for increased funding for the National Facility to accommodate conversion/utilization of SEACLIFF been made.

The Working Group agreed that WHOI and DESSC must work together with the Navy to gather more specific information regarding the costs that options 7, 8, 8A, and 9 represent, and what the science capabilities of a merged vehicle are expected to be. A proposed ONR funded engineering study by WHOI of these options was recommended.

Mike continued by reporting on the results of the SEACLIFF survey. A questionnaire was distributed by mail and via electronic mail in February 1997 to over 400 members of the research community. The greatest number of responses came from marine geologists and biologists followed by chemists and geophysicists. The most frequently listed research areas were the mid-ocean ridge and continental shelf/slope regions. The survey showed that while eighteen different

remotely operated vehicles (ROVs) had been used, the most extensively used deep water vehicles were Jason, the Canadian ROPOS, and the Navy's ATV. ALVIN was by far the most frequently used HOV, and represented over 50% of the total use of those responding to the survey.

The survey also showed that there is a good deal of interest in having access to a maximum depth range of 6000m by deep submergence vehicles for the next twenty years. Most respondents indicated that HOVs were very important to critical for depths to 4500m (85%) and many (56%) thought there would be an HOV need to 6000m. Individual comments by respondents stressed that there is no substitute for human presence in the deep ocean and there are important needs for HOVs up to 4500m particularly at sites in the ocean where long term, time-series experiments of a multi- and inter-disciplinary nature are occurring. Work in the Western Pacific will require an HOV with a deeper depth capability than 4500m.

When asked to what extent current and future science objectives could be met at depths >4500m, most indicated that between 50% and 100% of their work could be done by either HOVs or ROVs. Fifty-one percent indicated that HOVs could accomplish greater than 75% of their objectives at depths greater than 4500m in comparison to 47% who felt that ROVs could do it. Smaller payload capabilities of many ROVs compared to HOVs was a common concern (although development of new strategies for elevators is helping to mitigate the ROV payload problem), whereas limited bottom time was a problem noted for HOVs. Some respondents indicated that both HOVs and ROVs are needed as deep submergence tools. It was also noted that at greater depths bottom time of HOVs is much more limited compared to ROVs. Many felt that less than 10% of their work could be accomplished by AUVs, and voiced concern about their limited payload capabilities. The lack of popularity of the AUVs was largely due to the admitted unfamiliarity with AUVs and the fact that many of these vehicles have not yet been proven as mature science tools.

Category B of the questionnaire focused on options available for SEACLIFF upon retirement from the Navy. Many responded to the questions posed by answering "unsure" because they were unfamiliar with SEACLIFF's capabilities or they were concerned with the financial implications of the option and felt they could not answer with confidence.

The majority of responses indicated that SEACLIFF should NOT replace ALVIN, citing SEACLIFF's poor track record and ALVIN's proven capabilities. They did not want to compromise ALVIN's performance for increased depth capability. Responses were very positive (59% YES, 14% NO, 27% UNSURE) for transferring SEACLIFF's equipment to WHOI for use in enhancing ALVIN and preserving the titanium sphere for later use. Most found this to be the best alternative and most cost-effective option. Those opposed to this idea suggested building a new class of 6000m HOV or keeping SEACLIFF available if funding could be found.

Mike Perfit agreed to prepare a cover letter to the Working Group Report which provides a brief summary of the recommendations of the report and states that the community is interested in

acquiring SEACLIFF. (Following the meeting, Mike prepared the cover letter and it is included as *Appendix X*.)

UPGRADES TO NATIONAL FACILITY VEHICLES AND SCIENCE SENSORS, AND RELATED ISSUES:

Status of Recent Upgrade Proposal - Dudley Foster started the report by providing the status of ALVIN's imaging upgrades, ***Appendix XI***. His presentation included a listing of completed tasks. The entire list is provided in Appendix XI. Dudley noted that the scope of the imaging proposal is complete. Next Dudley reviewed the status of the DSF science sensor upgrades. The upgrades will be implemented over two years. NSF funded the program completely at $425K. Many of the upgrades apply to both ALVIN and Jason. WHOI cost shared approximately $50k in costs associated with the upgrade proposal. $26k was targeted for acquisition of a ring laser gyro to improve vehicle heading information, and ~$25k will be spent on developing a prototype of a steerable elevator. The complete list of science sensor upgrades is also included in Appendix XI.

Status of WHOI Deep Submergence Data Archiving Policy - Dick Pittenger presented a report by Cathy Norton, Library Director, titled "DSOG Data Rescue Project" and is included as ***Appendix XII***. The goal of the WHOI archive preservation program is to preserve and digitize DSOG media and make electronic retrieval of the information useful to the scientific community. The projects include digitizing and repairing media collected by ALVIN and the WHOI ROVs. ALVIN media includes bulk film rolls, video imagery, and 16 mm film. WHOI has identified ALVIN data rescue as top priority and has funded personnel, equipment and supplies for the effort. During the period from January 1997 to July, ALVIN film at risk has been identified. Dives 1-1,000 were examined with 100 rolls cleaned and duplicated. The process is ongoing and will continue with the same process for dives 1,001 through 2,500 (years 1980-1995). Additionally during this period, a working committee of DSOG, graphics and library personnel was established; an FTP site for data log information transfer was set up as well as a template for on-board dive data entry. The full list of activities since the start of the year is included in Appendix XII. Dick reviewed the big issues still facing the archive project; such as, future services, locational servers, international problems in accessing data and integration services. A goal of the DSOG archive project is to make data retrieval more user friendly. This will be a two year effort.

Dan Fornari continued by reviewing his draft guidelines for deep submergence data acquisition, archiving and commercial use. The draft provides information on the present archiving policies for the National DSF, data distribution, custodial responsibilities of WHOI for distribution of imagery collected by the National facility vehicles, and guidelines for use of imagery taken from the National vehicles. At present, no data is archived from Jason, Argo-II or DSL-120. DESSC raised a number of issues regarding the draft guidelines and remarked that additional information is needed before finalization of the guidelines. It was pointed out that there is a lot of information being collected that the community would like to have access to. DESSC raised a number of questions:

- What is the effort required for archiving the ROV vehicle data?
- What does the gross data (size/weight) look like for a 24 hour period for each vehicle?

- How can the data to be archived be reduced (cost/size/effort) but still provide a reasonable representation of the cruise information for future investigators?

It was recommended that other archiving models be examined, such as those used by NASA. The DESSC agreed that they would like as much data as possible archived including the best video which has not always been WHOI's property. The federal agencies recommended that DESSC work with the operator in drafting a new archive policy. The following tasking was assigned:

1) Determine ROV data archiving cost and volume - Andy Bowen.
2) Determine the cost of a second master video tape for each ALVIN dive so that information from two cameras can be recorded and archived - Barrie Walden.
3) Establish a Data Archiving Subcommittee to review the present policy and provide recommendations at the December DESSC meeting - Cindy Van Dover and Carl Wirsen.

WHOI indicated that it too was establishing an internal, institution wide data handling and archiving committee which would review current policies and make recommendations-- deep submergence data would be an important facet of the committee's deliberations.

Third Party Tools - The Third Party Tool Policy was briefly discussed. Mike Perfit reported that the policy has undergone a number of revisions by the agency representatives. After a few minor changes, the policy will be ready for distribution to the community. The first half of the policy will provide the tool policy and the second half will provide guidelines. DESSC is waiting for final agency approval of the policy.

DESSC DISCUSSION OF INTEGRATED FACILITIES, NESTED SURVEY STRATEGY AND HOW TO BETTER EDUCATE THE USER COMMUNITY ON CONDUCTING FIELD PROGRAMS: Both Patty Fryer and Dan Orange provided written critiques of their experiences using the DSF ROV vehicles. These were used as a starting point for the Committee's discussion. Patty and Dan had a cruise in the Western Pacific using the ROVs off THOMPSON. Problems encountered during the ROV operations were related to staffing; communications with DSOG; and perceived vehicle weaknesses in payload, manipulators, surveying and sampling capabilities. The criticisms were constructive in nature and were intended to be used to help advance the systems for future operations. The DESSC felt that it was imperative that the community be educated on the capabilities and limitations of the ROVs. WHOI will prepare a formal response to the critiques provided by Patty Fryer and Dan Orange for DESSC's review. The response will then be sent to the agencies. It was recommended that a white paper for community distribution be prepared that would provide guidance on how the vehicles should most effectively be planned and used. The paper should address the lessons learned through past operations and also highlight the vehicles' successes. The paper could eventually be used as a kick off for a proposal to improve the vehicles in areas in which they need improvement.

The areas of concern identified by Patty and Dan were then discussed in more detail by the Committee beginning with the personnel issue; use of contract technical and engineering personnel by WHOI to support ROV operations. It was pointed out that in the case of Patty's

cruise there were not enough qualified people to properly handle the cruise. Additionally, Jason does not have the on-hand reference material such as user manuals available as exists for ALVIN. It was recommended that the ratio of contract technical and engineering personnel support people should be kept as low as possible and that a more aggressive orientation program be implemented. WHOI noted that they are trying the establish a core group of experts with specialties in the ROV systems. It was recommended that an EOS article be written highlighting the capabilities and limitations of the ROVs along with guidelines on how to most effectively utilize the vehicles in a new survey strategy. (Note: since the meeting an article by D. Fornari, S. Humphris, and M. Perfit, "*Deep Submergence Science Takes a New Approach*," EOS, Vol 78, No. 38, Sept 23, 1997, page 402 was published.) Mike Perfit indicated that he will contact NSF regarding the ROV operational problems and DESSC's plan of action.

ADVANCED TETHERED VEHICLE (ATV) - The Navy has announced in a letter from Admiral Krul that they plan to retire ATV. Scripps has indicated they are interested in operating it. At the June UNOLS Council Meeting, the agencies tasked DESSC to investigate the community's interest in using ATV as a science tool. They suggested that the DESSC use the results of the SEACLIFF survey in providing their input. Bob Knox (SIO) is organizing a meeting to be held in September to address the future of ATV. Cindy Van Dover noted that she has used ATV with some success. The manipulators are very responsive and can easily be functioned. Bob Collier noted that he has also had successes with the Navy vehicles. DESSC raised a number of questions regarding ATV including its cost of operation, past uses, and technical capabilities.

Gene Smith remarked that DESSC should let the agencies know that the community might be interested in ATV. Mike Perfit will write a letter to the agencies indicating that the community is interested in ATV. The letter will also request information on the technical capabilities of the vehicle.

Admiral Mooney Discussion - Admiral Mooney returned to the DESSC meeting to wrap up his discussion and thoughts from his earlier presentation. He vowed to include the DESSC Chair and representatives from NSF, ONR and NOAA in the group which will be addressing the future of deep sea access. He indicated that he would not be able to support a proposal for an airline ticket tax for deep sea science support; however, a proposal for a tax to support the deep sea facility assets would be appropriate. Brad emphasized that is important that he and DESSC maintain an honest, open dialog.

ATLANTIS Modifications - Dick Pittenger stated that if the community was interested, WHOI will submit a proposal to increase the berthing capacity on ATLANTIS by six. The berthing modifications may be able to be made in January when the ship enters its PSA. There would be some trade-offs associated with the increased berthing. The additional berthing could compromise some science van storage, main lab space and limit endurance (food). Dick needs to know if these are major tradeoffs that would seriously impact the science capabilities of the ship. If the community desires the added berthing, WHOI will need an endorsement letter from DESSC. Mike Perfit has requested an increase of six additional berths on ATLANTIS but it

appears that funding for this will not be available until at least the summer of 1998 at which time a more detailed plan will be developed.

LONG RANGE PLANNING: The Committee reviewed the list of programs (from the electronic requests) which have been funded or proposed for 1999, see ***Appendix XIII***. Dan Fornari and Cindy Von Dover have funded work in the Indian Ocean in 1999. It was suggested that a message be sent to the community indicating where the funded work is located in 1999. The Committee discussed methods in which to educate the community on how to request assets for their research. There are two issues: (1) How to get vehicles committed for multi-year time series work, and (2) How to plan expeditionary research (when ROVs may be the only available facilities). DESSC has asked the funding agencies to provide the operators with more guidance regarding multi-year scheduling and they have agreed to provide it. It was suggested that Mike Perfit address this issue of planning in his next UNOLS Newsletter Article. It was recommended to further address this issue at the DESSC fall meeting in December.

Science Initiatives beyond 2000 - Mike Perfit requested that each Committee member send him a page highlighting their directions and facility needs for future deep submergence science. Mike will use these inputs to establish a white paper outline. Once the outline is in place, he will assign writing tasks to DESSC.

Public Outreach Programs - The meeting concluded with a discussion on ways in which to publicize deep submergence science achievements. It was recommended that a proposal be submitted to NSF's Education Division to support a Deep Submergence Science Lecture Program. The program would select guest speakers to discuss exciting topics in their field. The proposal would include support for the speakers, program development and brochure printing.

The meeting was adjourned at 1:00 p.m.

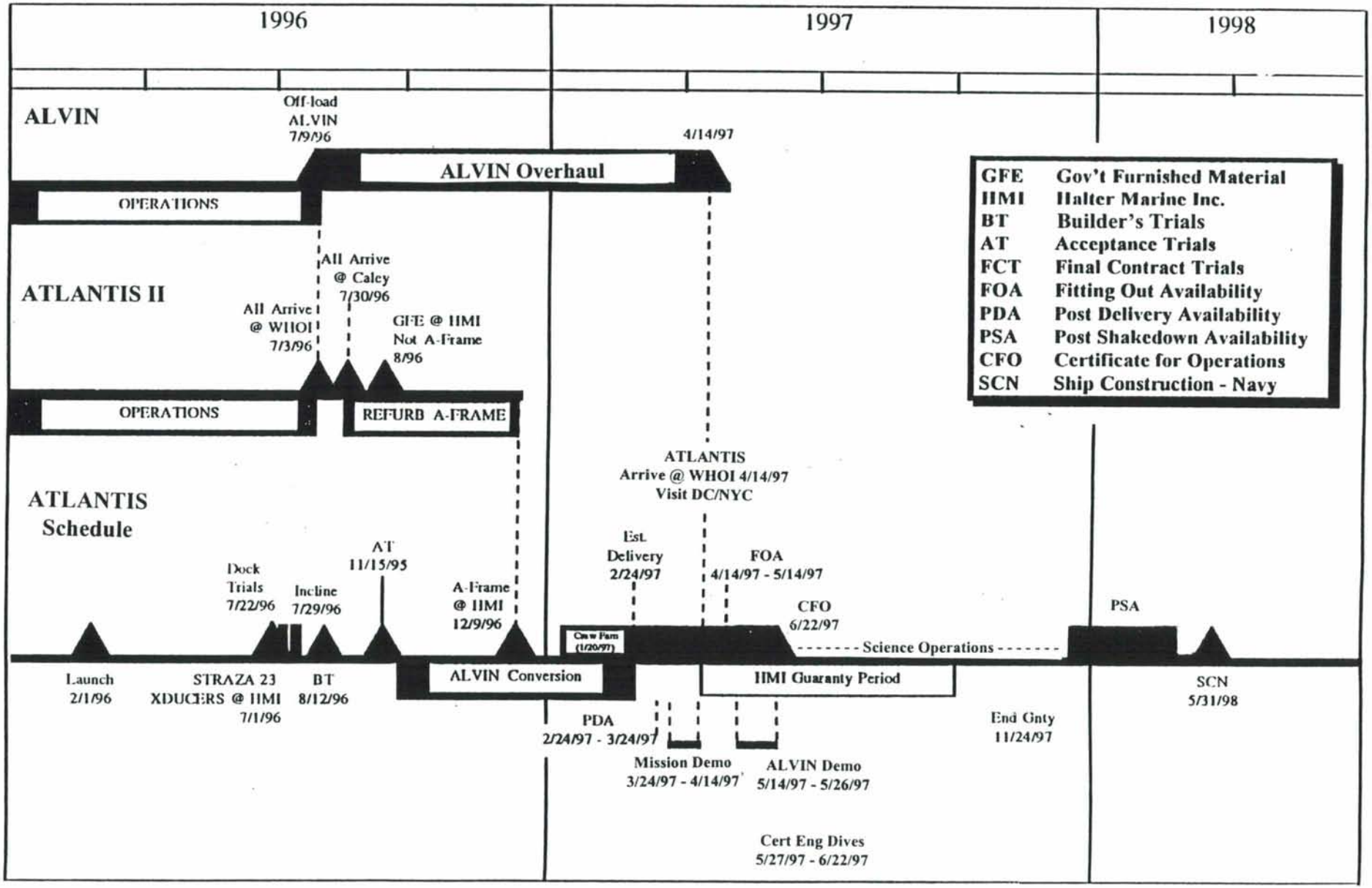
APPENDIX II

DESSC Meeting - July 16-18, 1997

NAME	Affiliation	Phone #	Fax#	E-mail
John Bash	UNOLS	(401) 874-6825	(401) 874-6167	unols@gso.uri.edu
Jim Bellingham	MIT	(617) 253-7136	(617) 258-5730	belling@mit.edu
Andy Bowen	WHOI	(508) 289-2643	(508) 457-2191	abowen@whoi.edu
Rick Chandler	WHOI	(508) 289-2272	(508) 457-2107	rchandler@whoi.edu
Robert Collier	OSU	(541) 737-4367	(541) 737-2064	collier@oce.orst.edu
Annette DeSilva	UNOLS	(401) 874-6825	(401) 874-6167	unols@gso.uri.edu
Dan Fornari	WHOI	(508) 289-2857	(508) 457-2187	fornari@tone.whoi.edu
Dudley Foster	WHOI	(508) 289-2273	(508) 457-2107	dfoster@whoi.edu
Patty Fryer	U of Hawaii	(808) 956-3146	(808) 956-6322	pfryer@soest.hawaii.edu
Marv Lilley	U of Washington	(206) 543-0859	(206) 543-0275	lilley@ocean.washington.edu
Brad Mooney	Independent Consultant	(703) 415-4535	(703) 415-4535	bmooney@snap.org
Sujata Millick	ONR	(703) 696-4530	(703) 696-2007	millics@onr.navy.mil
Don Moller	WHOI	(508) 289-2277	(508) 457-2185	dmoller@whoi.edu
Dan Orange	MBARI	(408) 775-1761	(408) 775-1645	dano@mbari.org
Mike Perfit	U of Florida	(352) 392-2128	(352) 392-9294	perf@geology.ufl.edu
Dick Pittenger	WHOI	(508) 289-2597	(508) 457-2185	rpittenger@whoi.edu
Gene Smith	NOAA	(301) 713-2427 x164	(301) 713-1967	genesmith@noaa.gov
Phil Taylor	NSF	(703) 306-1587	(703) 306-0390	prtaylor@nsf.gov
Cindy Van Dover	NURP/U of Alaska	(907) 474-5870	(907) 474-5804	vandover@ims.alaska.edu
Barry Walden	WHOI	(508) 289-2407		bwalden@whoi.edu
Carl Wirsen	WHOI	(508) 289-2307	(508) 457-2169	cwirsen@whoi.edu

APPENDIX III

ATLANTIS/ATLANTIS II/ALVIN Schedule



▲ - MILESTONES ▲ - TESTS & TRIALS/OPERATIONS ▬ - YARD PERIODS

APPENDIX IV

Z-Drive Population in the U.S. Oceanographic Fleet

Knorr, Melville	**3 each**
Thompson, Revelle, Atlantis, Brown	**2 each**
TAGS 60, 61, 62, 63, 64, 65	**3 each**

Failures to Date

	Probable Cause
Thompson **- lower units (Port and Starboard)**	**Manufacture/Grounding**
Melville **- lower unit**	**Manufacture**
Knorr **- lower - Port (Derated to 70% torque by ABS)**	**Unknown**
Thompson **- upper gear box**	**Unknown**

Plan of Action

- **Analysis of failures to date.**
  - ◊ **NAVSEA funding.**
  - ◊ **Scripps (Tom Althouse) lead; WHOI, UW assist.**
  - ◊ **Team to witness removal of *Thompson* and *Knorr* gears, conduct metallurgic analysis.**

- **Possible Outcome**
  - ◊ **Design problem (worst case) - seek Navy/NAVSEA assist in resolution.**
  - ◊ **One off manufacturing defects - pursue recourse with LIPS with ONR and NAVSEA backing.**
  - ◊ **No common cause/failure mode - review sparing provisions**

APPENDIX V

ATLANTIS SHAKEDOWN

- **SeaBeam underway testing**
  Hudson Canyon survey
- **Gravity coring**
- **Mooring deployment**

SHIP OUTFITTING & LOADING

Six weeks total

- **ALVIN shops and storage areas constructed**
- **Sled tracks modified**
- **Stores and supplies loaded**

ALVIN POST-OVERHAUL

- **3 tethered trim dives in Woods Hole**
- **14 certification/engineering dives off Bermuda**
  increasing depths from 10 to 4,500m
- **Science equipment tested:**

35mm stereo cameras	*datalogger*	*navigation*
external video cameras	*all lights*	*video recorders*
manipulators	*temp probes*	*science strobes*
shipboard video editing	*lasers*	*pan & tilt*

- **9 science dives so far on Mid-Atlantic Ridge**

All systems working well

Average bottom time: 4.6 hrs.

APPENDIX VI

DSOG Cruise Summary 11/96 7/97

Sojourn II

PI:	Haymon/McDonald
Agency:	NSF
Date:	10/27/96 - 12/11/96
Vessel:	RV Melville
Location:	EPR (17-18 South)
Ports:	Valpariso to Valpariso
Vehicles:	DSL 120, ARGO II, Medea

Statistics:		
	DSL-120	2 lowerings, 57 hours bottom time
	ARGO II	7 lowerings, 396 hours bottom time
	Medea	2 lowerings, 4 hours bottom time

High Lights:
- 80 KM of Ridge Crest surveyed with DSL 120 and ArgoII
- 92,000 electronic images recorded
- 2 ocean bottom seismometers recovered

Marianas

PI:	Fryer
Agency:	NSF
Date:	1/31/97 - 3/3/97
Vessel:	TV TG Thompson
Location:	Marianas Forearc
Ports:	Yokohama to Guam
Vehicles:	Jason/Medea

Statistics:		
	Jason/Medea	6 lowerings, 32 hours bottom time

High Lights: - None

DSOG Cruise Summary 11/96 7/97

Derbyshire

PI: Williams
Agency: MOT/EU
Date: 3/9/97-5/1/97
Vessel: RV TG Thompson
Location: Philippine Sea
Ports: Guam to Yokohama

Vehicles: DSL 120, ARGO II, Jason/Medea

Statistics:
DSL-120 1 lowering, 45 hours bottom time
ARGO II 7 lowerings, 518 hours bottom time
Jason/Medea 3 lowerings, 206 hours bottom time

High Lights:
- First use of new DSL 120 surface display/processing system
- 120,000 electronic still images taken
- HiDef video from both Argo and Jason
- HiRes color 3 chip with digital recording

MEDOPS'97

PI: Ballard
Agency: ONR/Private
Date: 6/5/97-6/30/97
Vessel: SSV Carolyn Chouest
Location: Skerki Bank
Ports: Naples to Naples

Vehicles: Jason/Medea

Statistics: Jason/Medea 20 lowerings, approx. 180 hours bottom time

High Lights:
- 5 ancient Roman wrecks mapped
- 50,000 electronic images recorded
- HiRes color 3 chip camera
- Exact navigation with closed loop Jason control
- Doppler sonar used for vehicle navigation and control
- Approx. 120 artifacts recovered
- Joint ops with NR-1

APPENDIX VII

1998

FUNDED *Alvin* & ROV DIVE PROGRAMS

Program	Agency	Vehicle(s)		Days on Sta.	
		Southern EPR			
Ballard	ONR	Alvin & Jason		7	
Lilley	NSF	Alvin		27	
Lupton	NURP	Alvin & Jason		20	(1)
Hey	NSF	DSL-120		29	
Sinton	NSF	Alvin & DSL-120		25	
Urabe	Japan	Alvin		7	(2)
Vrijenhoek	NSF	Alvin		14	
			Total	129	
		9 North. EPR			
Cary	NSF	Alvin		4	(3, 4)
Lutz	NSF	Alvin & Jason		23	
Manahan	NSF	Alvin		8	(3, 4)
Mullineaux	NSF	Alvin		14	
			Total	49	
		California Coast			
Eckman	NSF	Alvin		12	
Eng'r Dives	3 agency	Alvin & Jason		6	
			Total	18	
		Juan de Fuca			
Becker	NSF	Alvin		8	
Carson,B	NSF	Alvin or Jason		4	
Chave	NSF	Alvin		6	
Chadwick	NSF	Jason		5	
Cowen	NSF	Jason		17	
Delaney	NSF	Jason		20	(5)
Fisher	NSF	Alvin		10	
Stakes,D	MBARI	DSL-120		5	
			Total	75	
		Other Regions			
Jannasch	NSF	Alvin		8	(Guaymas)
Chave	NSF	Jason		14	(H_2O)
Karson	NSF	Alvin & Jason		20	(Hess Deep)
Smith,D	NSF	DSL-120 & Argo		36	(Puna)
			Total	78	
			Grand Total	~~349~~	

(1) Lupton funding limited to $500K.
(2) Urabe w/ Lupton.
(3) Manahan + Cary require a total of 15 days on station
(4) Manahan + Cary time series, possible 2 cruises in 1998
(5) Delaney recovery of 1997 experiment + education

7/15/97 - DAM

1998

FUNDED *Alvin* & ROV DIVE PROGRAMS

Program	Agency	Vehicle(s)	Region	Days on Sta.	
		***Alvin* Only**			
Becker	NSF	Alvin	J de Fuca	8	
Chave	NSF	Alvin	J de Fuca	6	
Cowen	NSF	Alvin	J de Fuca	17	
Fisher	NSF	Alvin	J de Fuca	10	
Eckman	NSF	Alvin	San Diego	12	
Cary	NSF	Alvin	9N,EPR	4	(3, 4)
Manahan	NSF	Alvin	9N,EPR	8	(3, 4)
Mullineaux	NSF	Alvin	9N,EPR	14	
Jannasch	NSF	Alvin	Guaymas	8	
Lilley	NSF	Alvin	So.EPR	27	
Urabe	Japan	Alvin	So.EPR	7	(2)
Vrijenhoek	NSF	Alvin	So.EPR	14	
			Total	135	
		***Alvin* & Jason / DSL-120**			
Carson,B	NSF	Alvin or Jason	J de Fuca	4	
Eng'r Dives	3 agency	Alvin & Jason	San Diego	6	
Lutz	NSF	Alvin & Jason	9N,EPR	23	
Karson	NSF	Alvin & Jason	Hess Deep	20	
Lupton	NURP	Alvin & Jason	So.EPR	20	(1)
Ballard	ONR	Alvin & Jason	So.EPR	7	
Sinton	NSF	Alvin & DSL-120	So.EPR	25	
			Total	105	
		Jason / DSL-120 / ARGO II			
Chave	NSF	Jason	No.Pac	14	
Smith,D	NSF	DSL-120 & Argo	Hawaii	36	
Chadwick	NSF	Jason	J de Fuca	5	
Delaney	Private	Jason	J de Fuca	20	(5)
Stakes,D	MBARI	DSL-120	J de Fuca	5	
Hey	NSF	DSL-120	So.EPR	29	
			Total	109	
			Grand Total	349	

(1) Lupton funding limited to $500K.
(2) Urabe w/ Lupton.
(3) Manahan + Cary require a total of 15 days on station
(4) Manahan + Cary time series, possible 2 cruises in 1998
(5) Delaney recovery of 1997 experiment + education

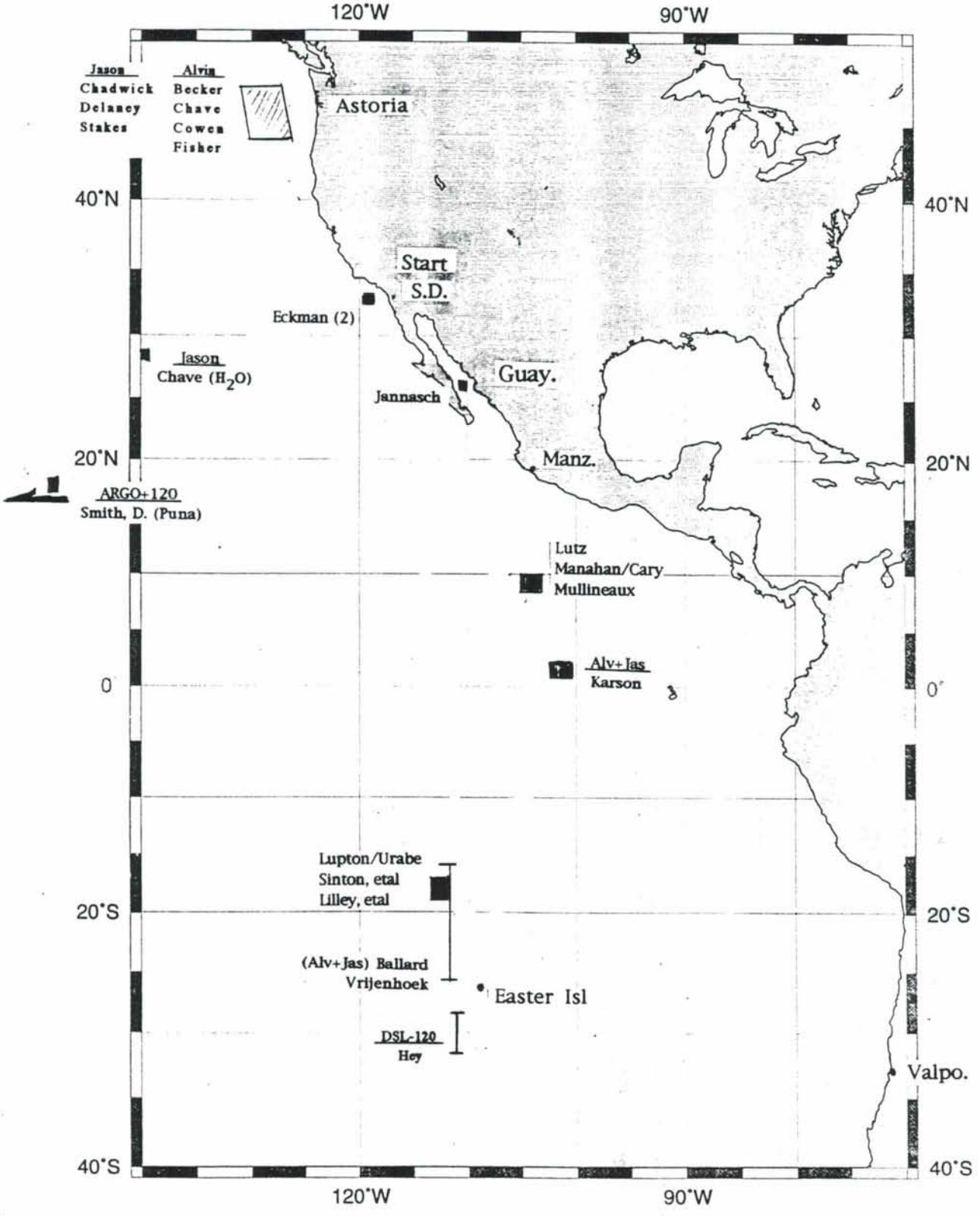
7/15/97 - DAM

- - 1998 - -

DEEP SUBMERGENCE VEHICLES

(*Alvin*, Jason, ARGO-II, DSL-120)

Funded Programs To Be Run

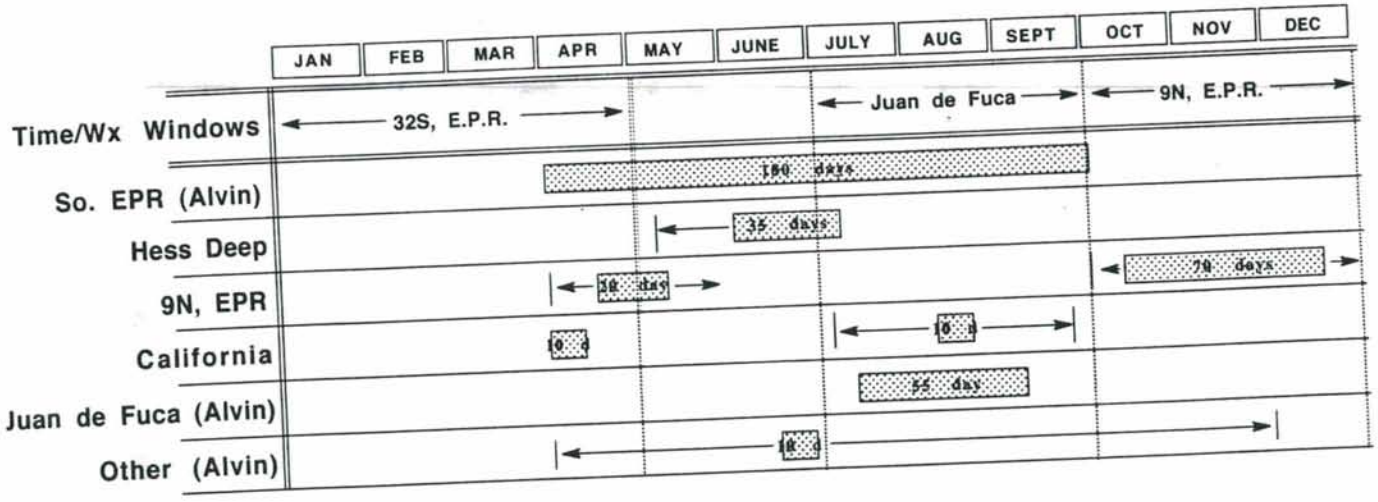


MOC11: Equato[illegible] Pacific Ocean

WHOI / Molle[illegible]

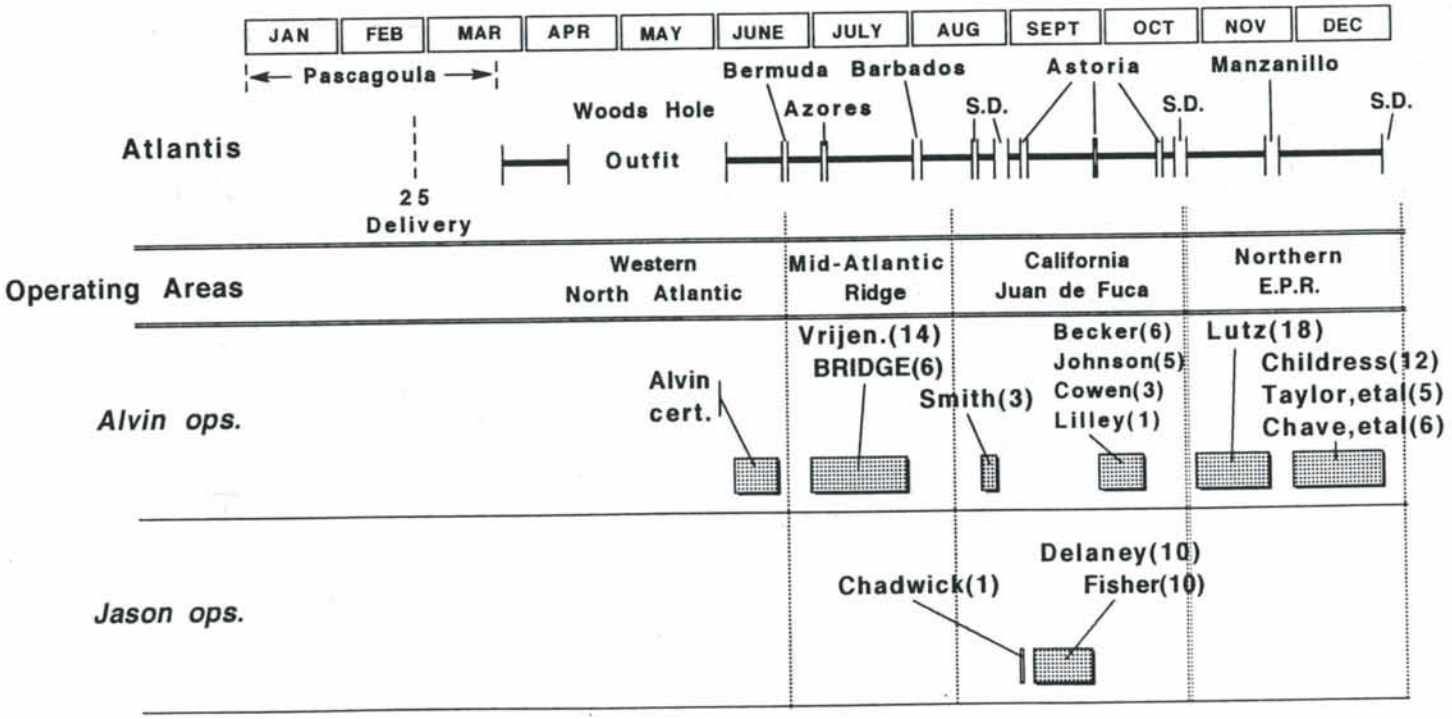
1998 R/V ATLANTIS 1998

Total days to complete Funded Alvin Programs



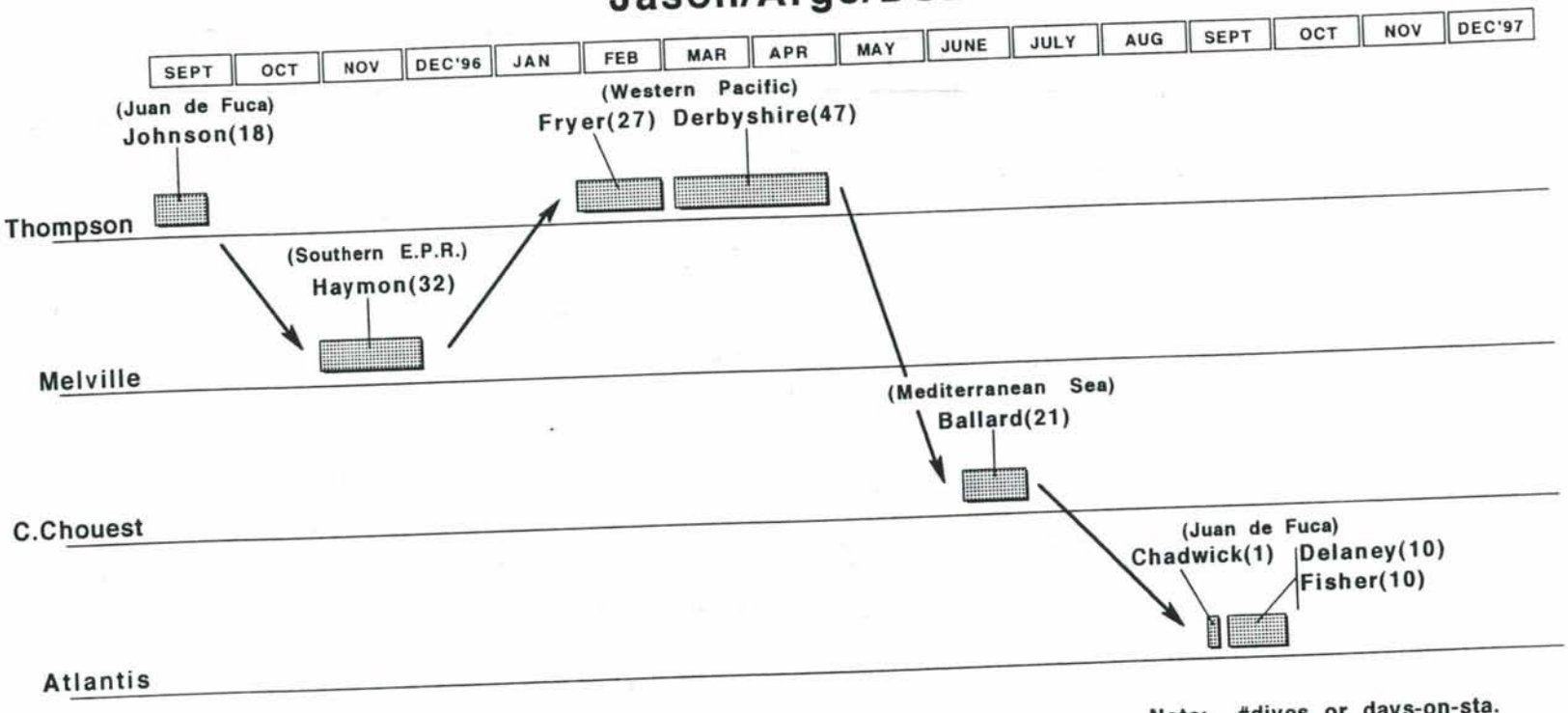
DAM-7/16/97

1997 R/V ATLANTIS 1997
Ship Schedule



DAM-7/16/97

1996 & 1997
Jason/Argo/DSL-120

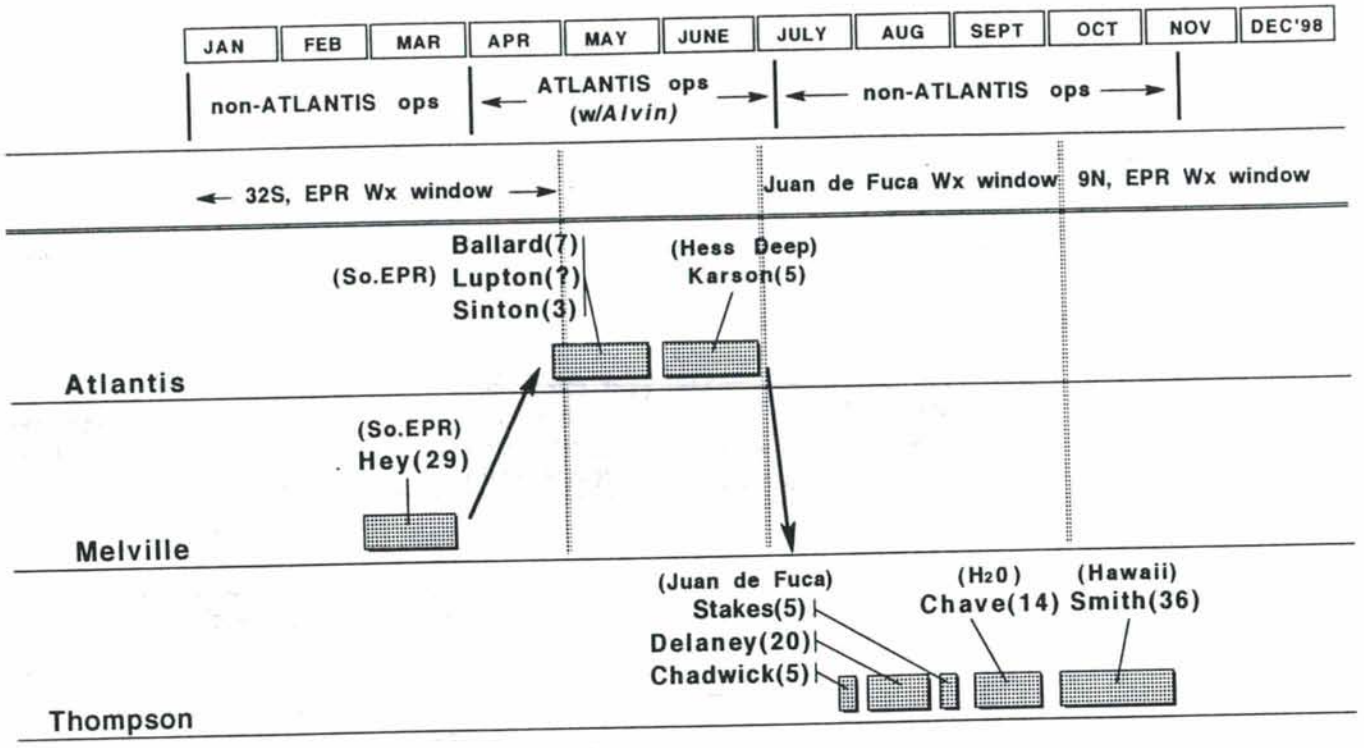


Note: #dives or days-on-sta. are noted in parenthesis

DAM-7/16/97

- - 1998 - -

Jason/Argo/DSL-120

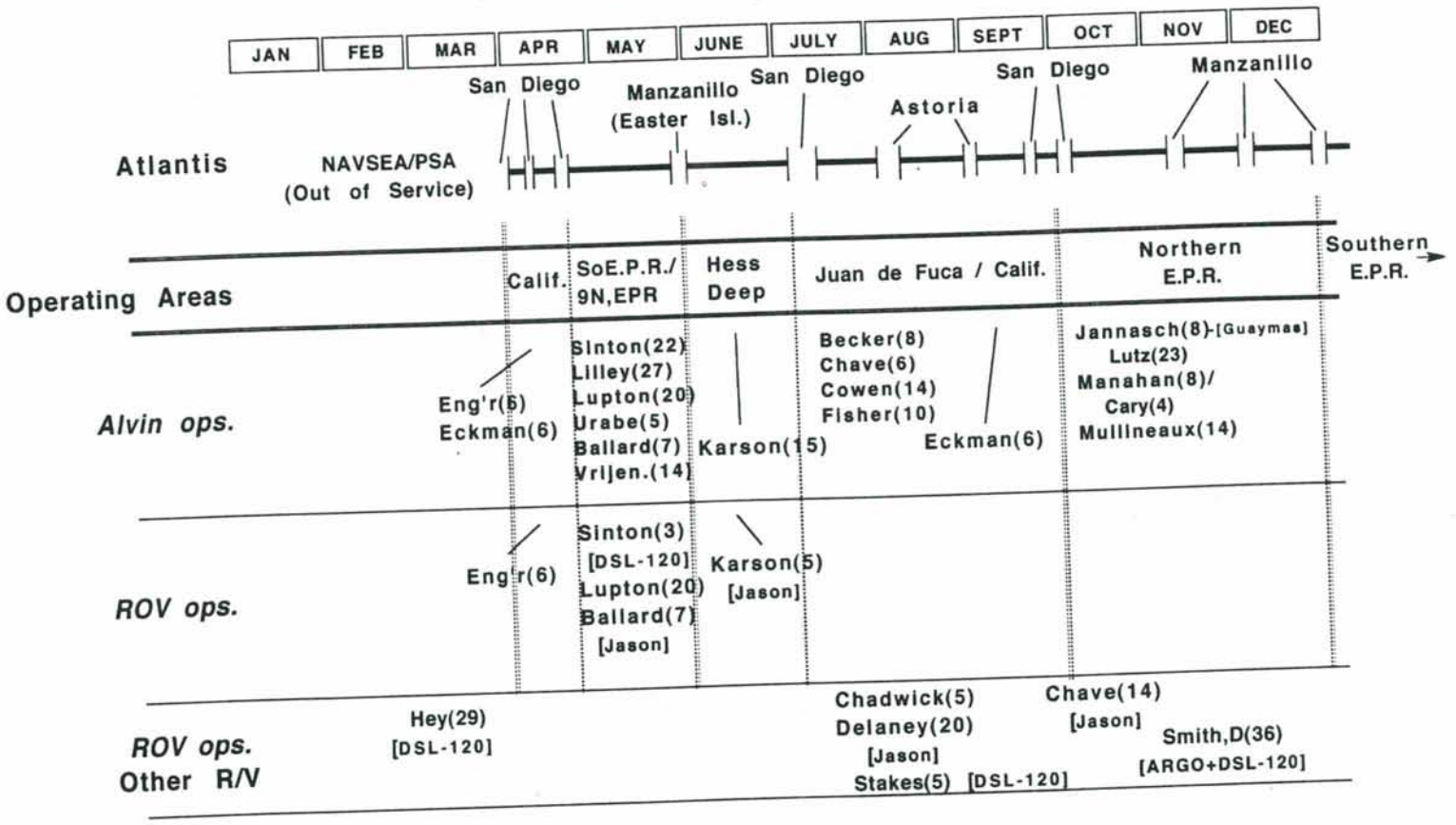


Note: #dives or days-on-sta. are noted in parenthesis

DAM-7/16/97

1998 R/V ATLANTIS 1998

Potential Ship Schedule



DAM-7/16/97

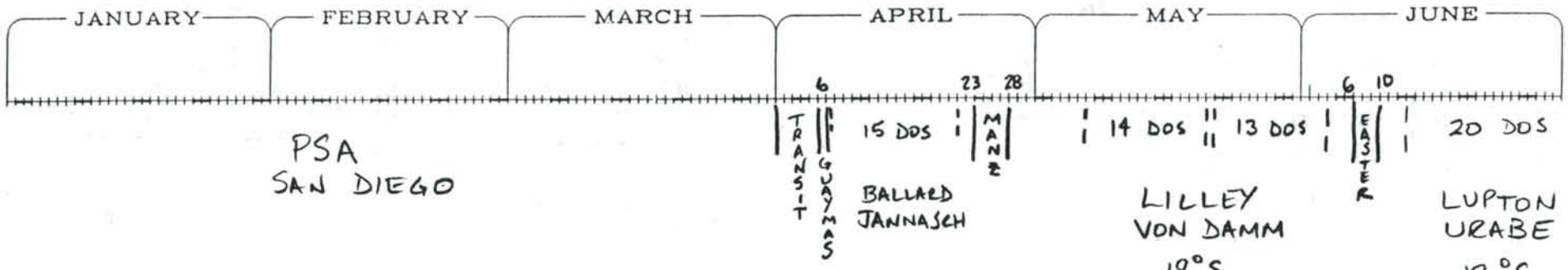
APPENDIX VIII

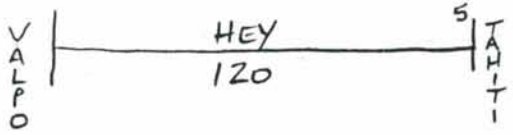
(1)

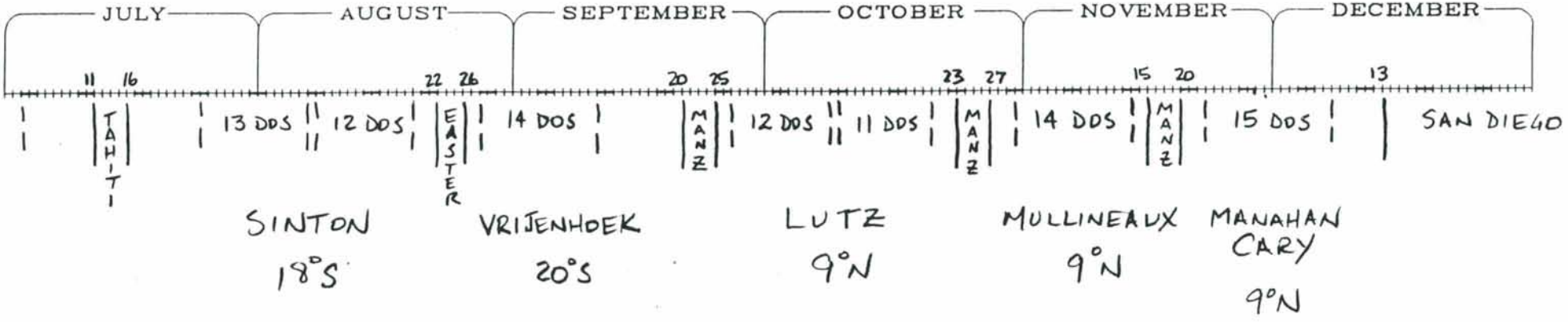
R/V ATLANTIS & ALVIN OPERATIONS

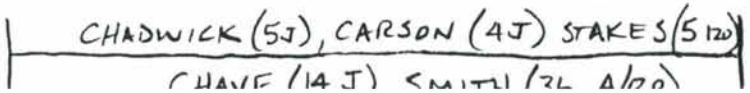
1998

OPERATIONAL SCIENTIFIC SERVICES
WOODS HOLE OCEANOGRAPHIC INSTITUTION







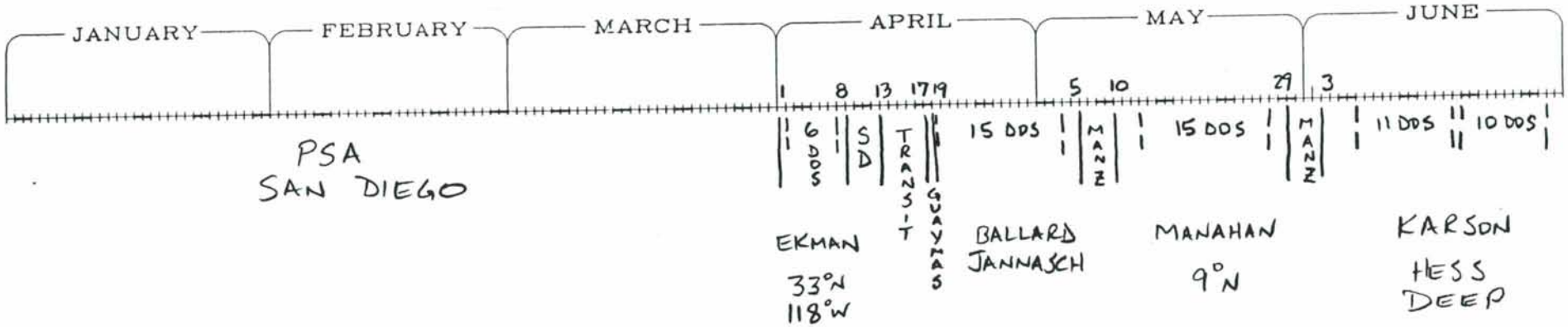


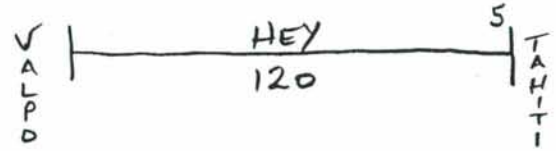
(2)

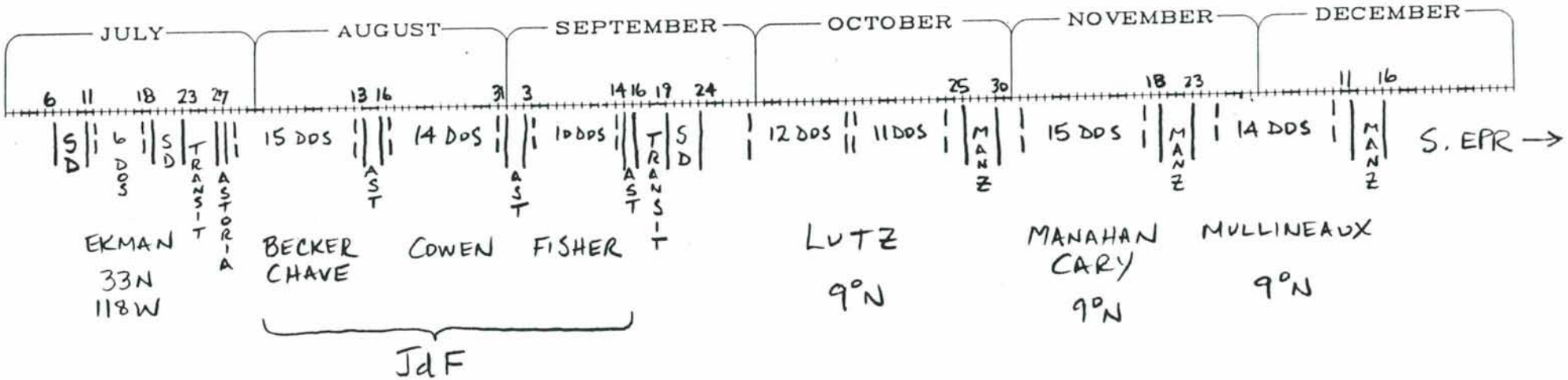
R/V ATLANTIS & ALVIN OPERATIONS

1998

OPERATIONAL SCIENTIFIC SERVICES
WOODS HOLE OCEANOGRAPHIC INSTITUTION







CHADWICK (5J), CARSON (4J) STAKES (5 120)
CHAVE (14J), SMITH (36 A/120)

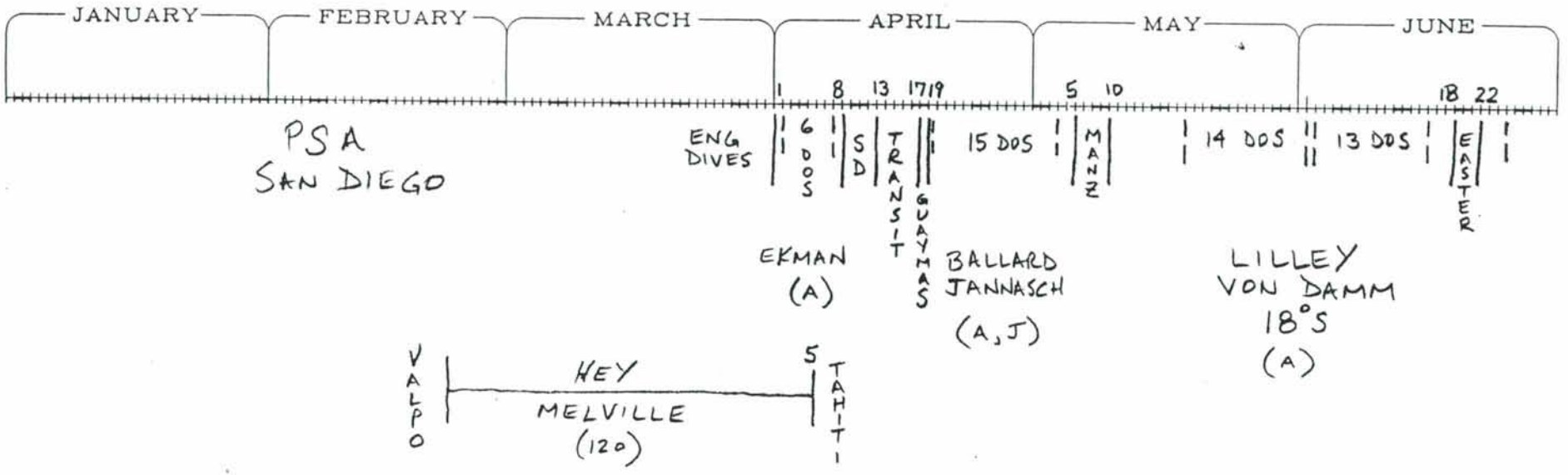
17 JULY 97

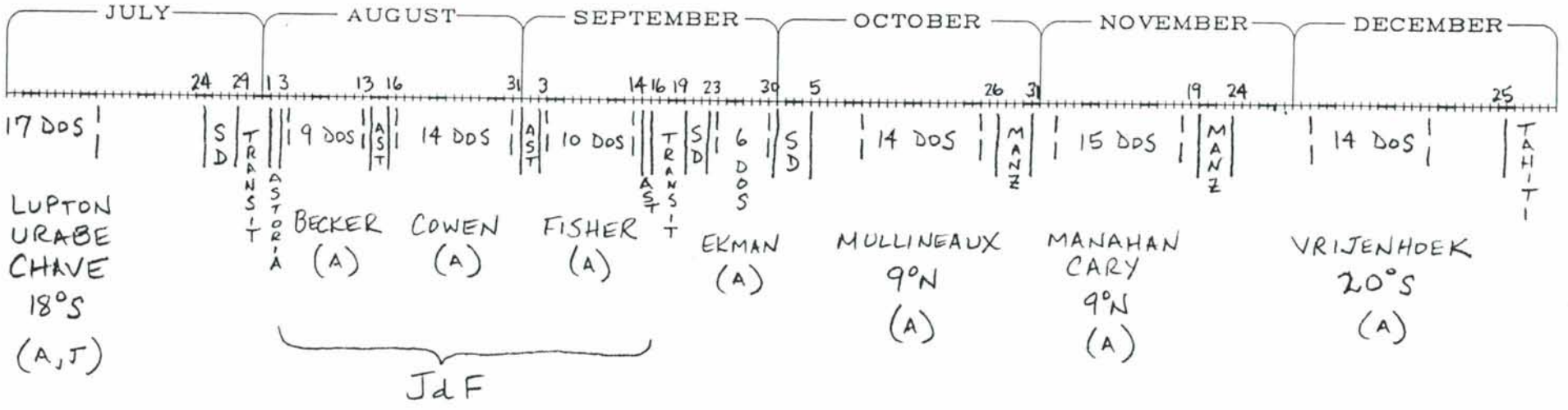
— CONCEPTUAL —

R/V ATLANTIS, ROV & ALVIN OPERATIONS

1998

OPERATIONAL SCIENTIFIC SERVICES
WOODS HOLE OCEANOGRAPHIC INSTITUTION





CHADWICK (J) CARSON (J) SMITH (ARGO, 120)
STAKES (120) CHAVE (J)

APPENDIX IX

DSV SEACLIFF & TURTLE BACKGROUND

- Navy (N873) intends to de-activate DSV TURTLE at the end of FY 97 and DSV SEACLIFF at the end of FY 98.

- The FOFCC FOCUS group convened in Sept 96 and decided to focus primarily on whether DSV SEACLIFF should be incorporated into the current capability.

- List of 8 possible options was generated by the Co-ordination Board.

- The Board requested UNOLS to evaluate the scientific need for such an asset, and WHOI (current ALVIN operator) to evaluate the technical feasibility of the options.

OPTIONS DISCUSSED

OPTION	ORGANIZATION	DECISION	OPTIONS	IMPACT/COST
1.	N873	Deactivate	scrap long-term storage museum (Navy)	N873
2.	N873	Transfer	FOFCC commercial (U.S.) foreign MARAD Other Fed agency civil sector (museum)	unknown
3.	Federal Agencies	Decline SEACLIFF	N873 retain	deactivate/transfer to others
4.	Federal Agencies	Accept SEACLIFF	retire ALVIN	1 for 1 replacement
5.	Federal Agencies	Accept SEACLIFF	retain ALVIN	operational costs for addn'l DSV (platform, shore facility, crew costs)
6.	Federal Agencies	Accept SEACLIFF	operate ALVIN on interim basis	Costs for maintaining 2 half-time vehicles
7.	Federal Agencies	Accept SEACLIFF	modify SEACLIFF using ALVIN equipment	alteration costs
8.	Federal Agencies	Accept SEACLIFF	Modify ALVIN using SEACLIFF sphere & equipment	alteration costs

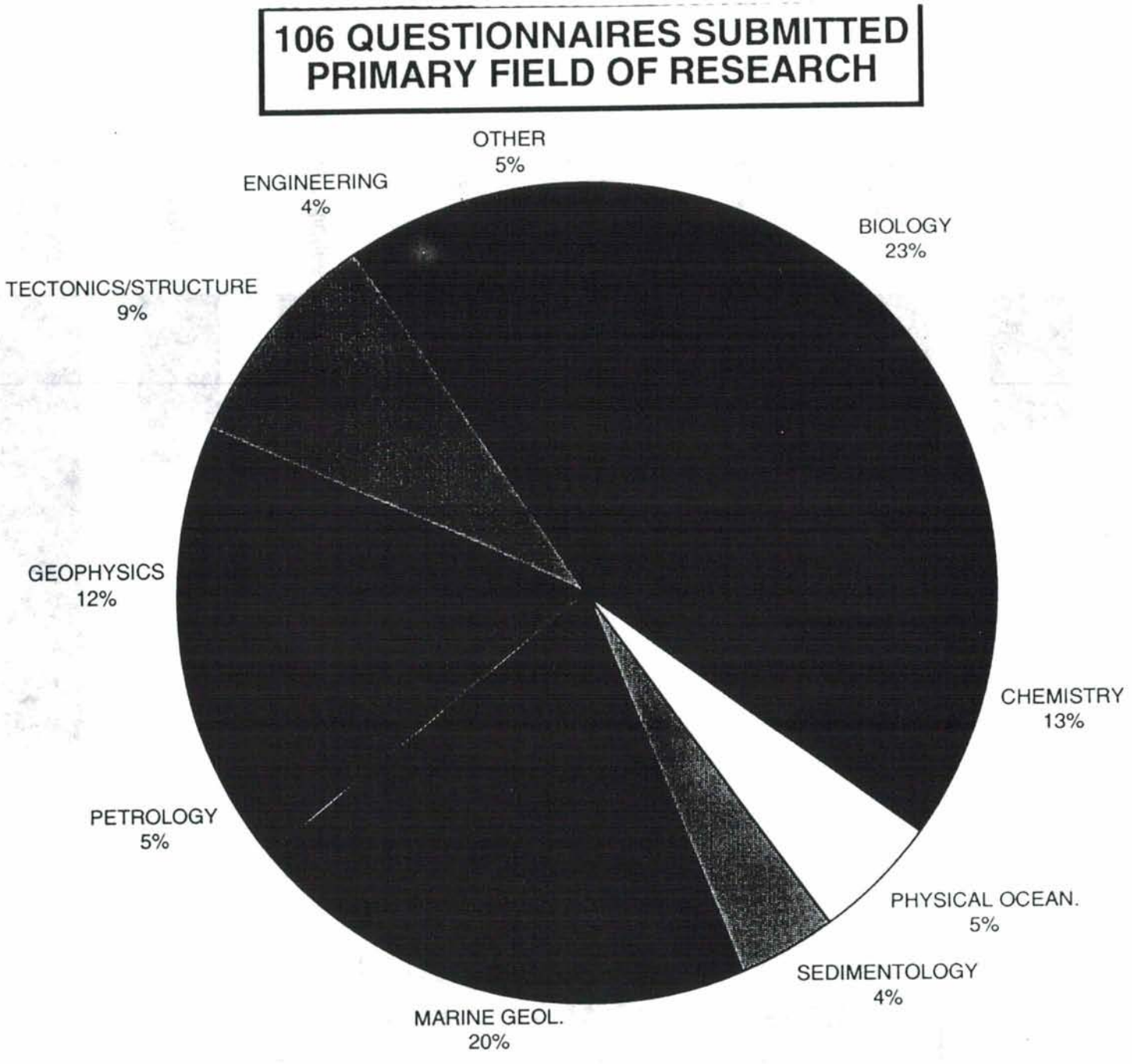

106 QUESTIONNAIRES SUBMITTED
PRIMARY FIELD OF RESEARCH
OTHER
5%
ENGINEERING
4%
BIOLOGY
23%
TECTONICS/STRUCTURE
9%
GEOPHYSICS
12%
CHEMISTRY
13%
PETROLOGY
5%
PHYSICAL OCEAN.
5%
SEDIMENTOLOGY
4%
MARINE GEOL.
20%

FIGURE 1

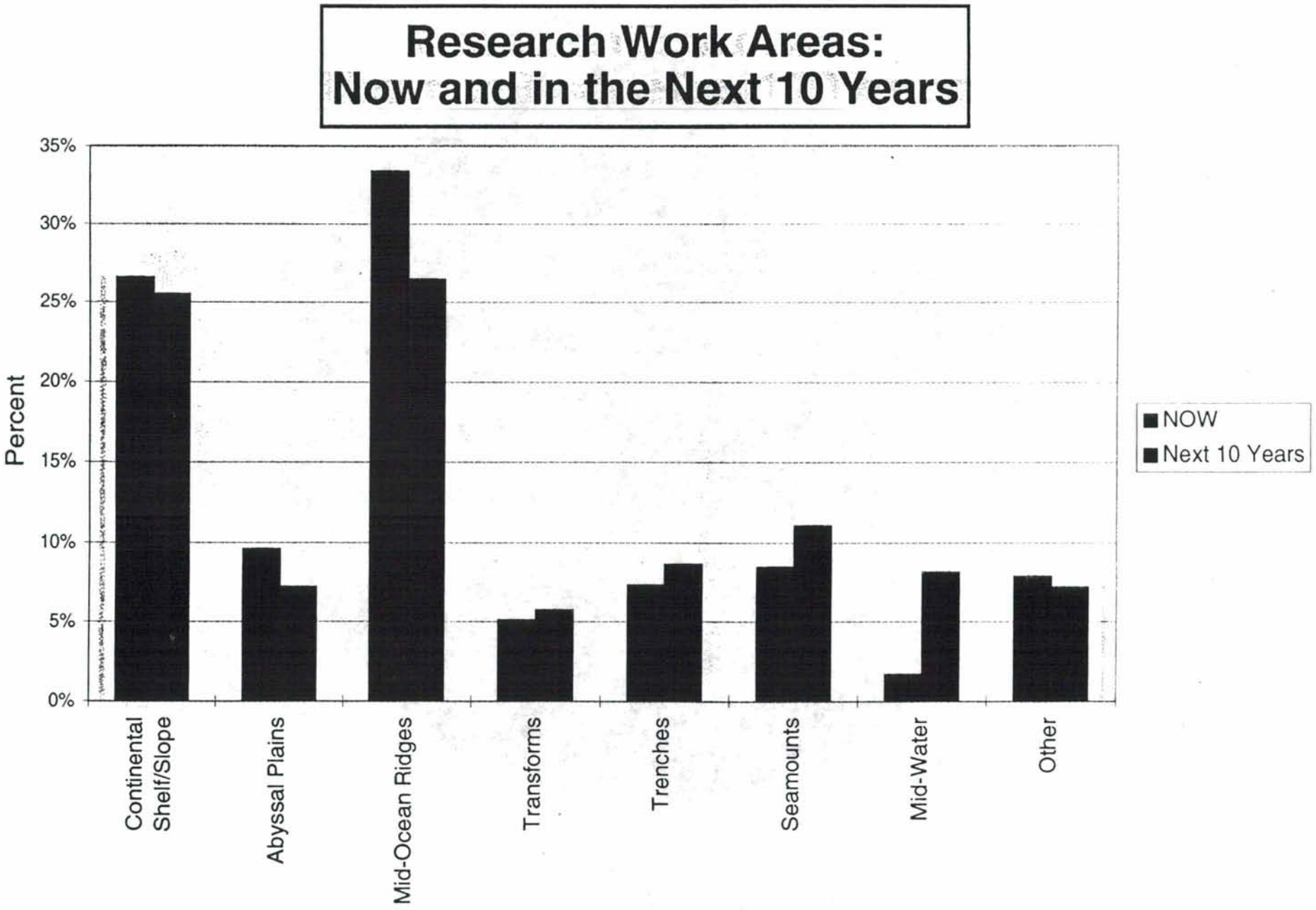

Research Work Areas:
Now and in the Next 10 Years
Percent
35%
30%
25%
20%
15%
10%
5%
0%
Continental Shelf/Slope
Abyssal Plains
Mid-Ocean Ridges
Transforms
Trenches
Seamounts
Mid-Water
Other
NOW
Next 10 Years

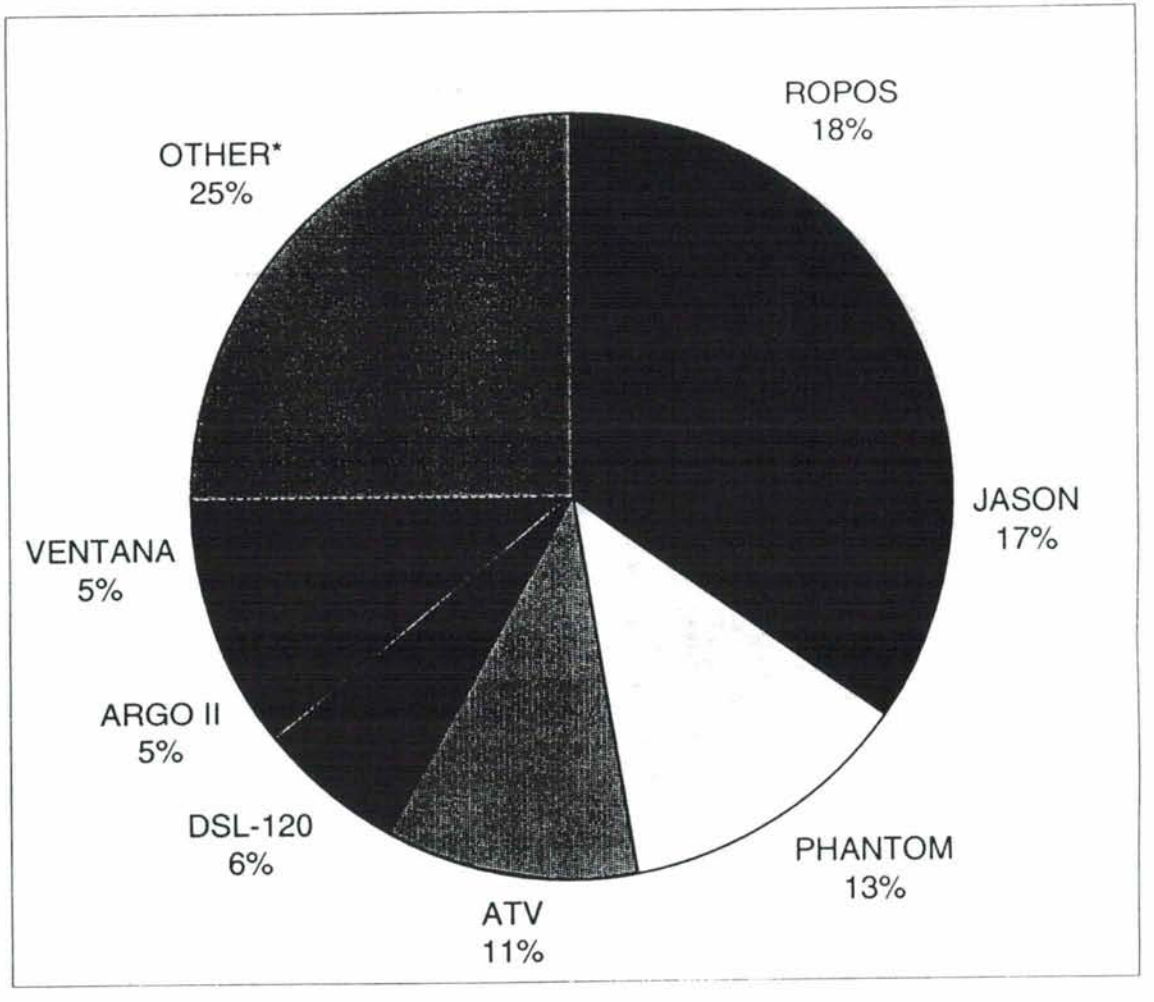
FIGURE 2

ROV/TETHERED VEHICLE USE

VEHICLE	CRUISES
ROPOS	20
JASON	19
PHANTOM	14
ATV	12
DSL-120	7
ARGO II	6
VENTANA	6
OTHER*	28
TOTAL	**112**

* Twelve other vehicles were listed as being used.

51% of those responding to the survey had not used an ROV



HUMAN OCCUPIED VEHICLE USE

VEHICLE	CRUISES
ALVIN	115
SEA LINK	38
TURTLE	14
PISCES V	13
NAUTILE	12
SEACLIFF	11
SHINKAI 650	10
OTHER*	27
TOTAL	240

* Six other HOVs were listed as being used.

22% of those responding to the survey had not used an HOV.

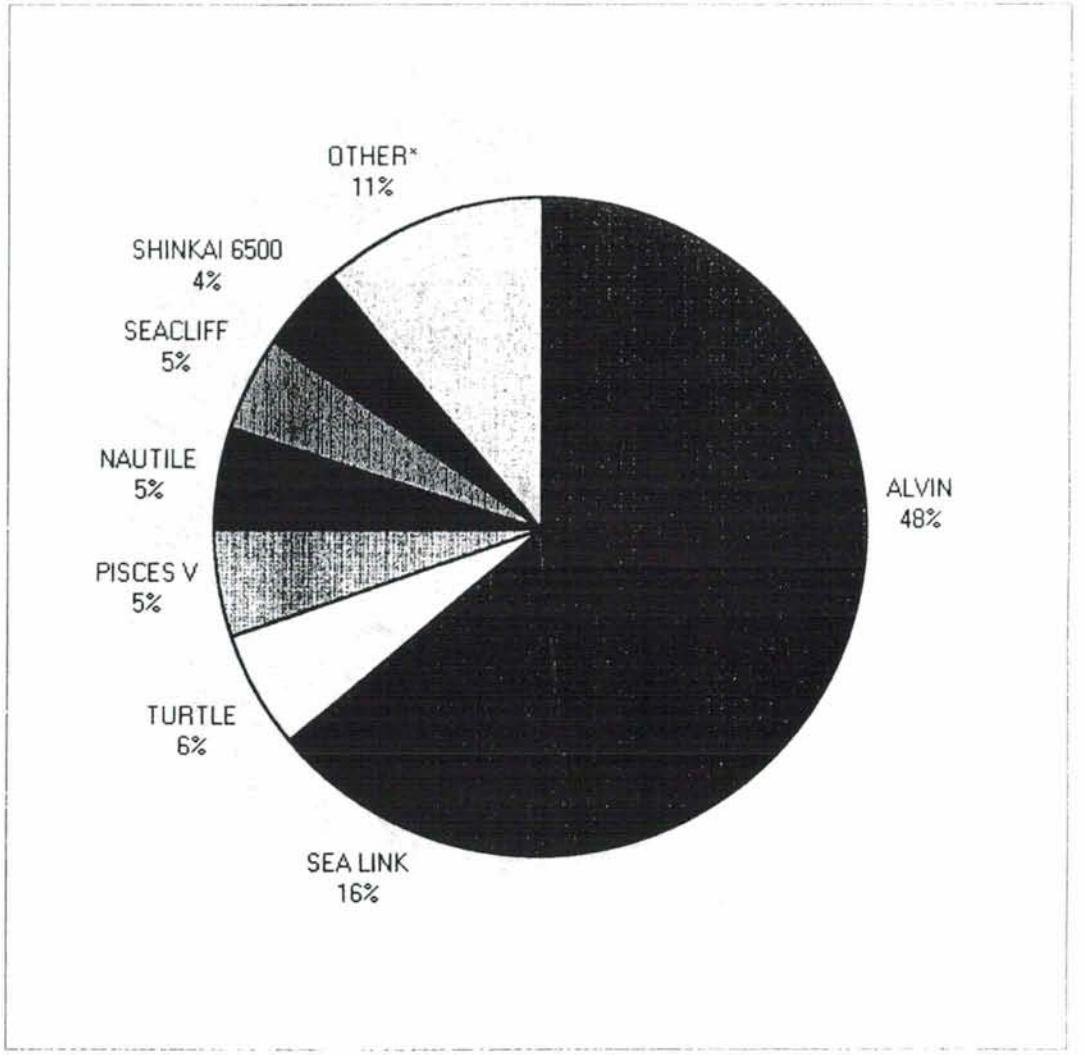


FIGURE 4

MAXIMUM DEPTH RANGE THAT DEEP SUBMERSIBLE VEHICLES SHOULD HAVE IN TERMS OF FUTURE SCIENCE REQUIREMENTS

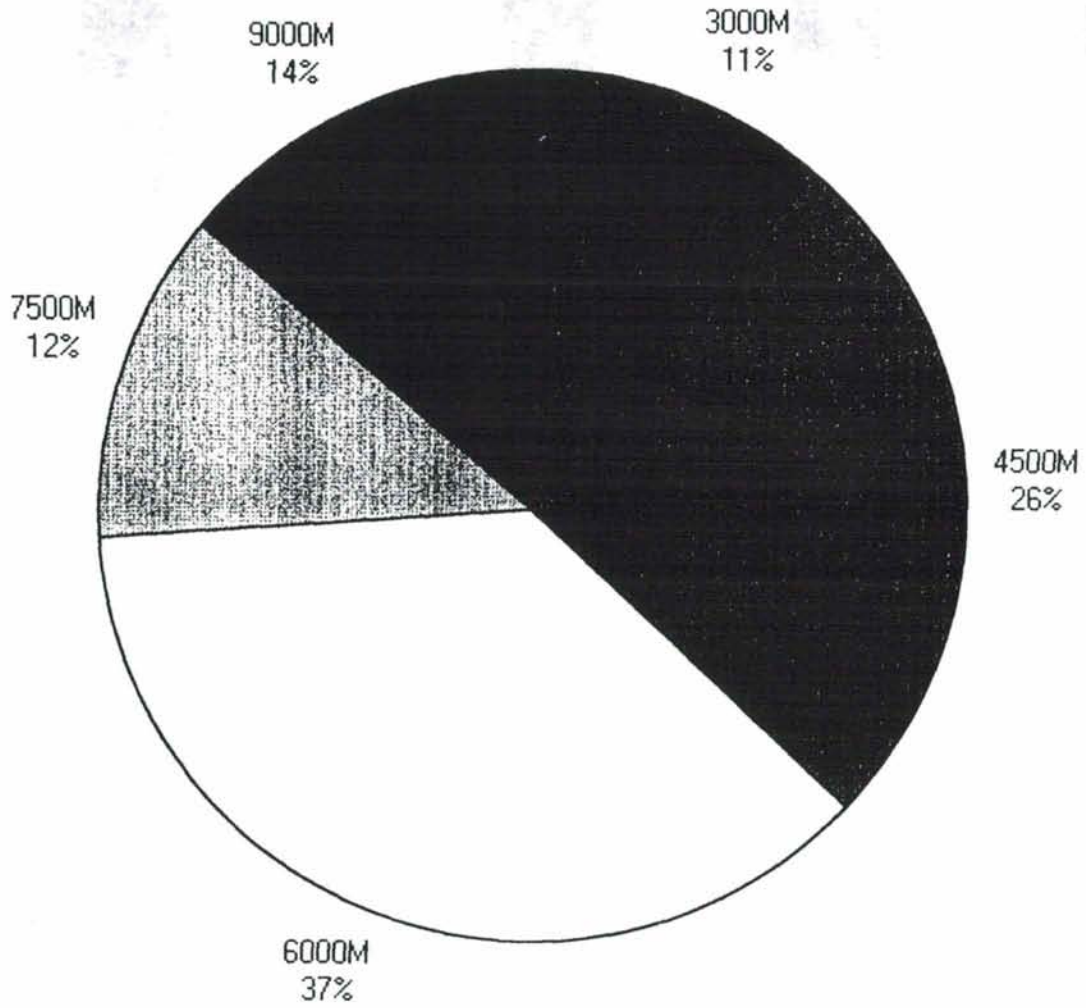


FIGURE 5

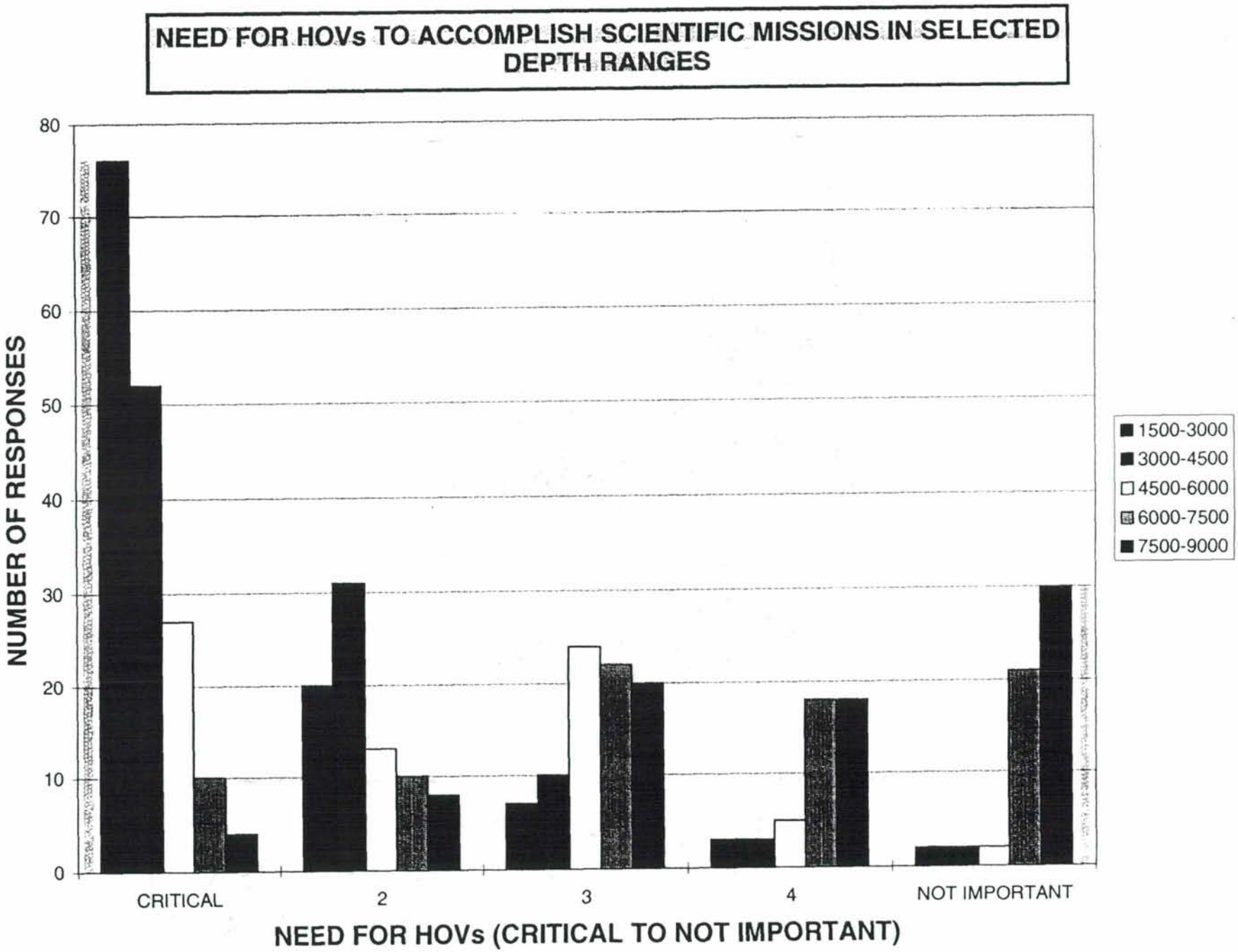

NEED FOR HOVs TO ACCOMPLISH SCIENTIFIC MISSIONS IN SELECTED DEPTH RANGES
NUMBER OF RESPONSES
80
70
60
50
40
30
20
10
0
CRITICAL
2
3
4
NOT IMPORTANT
NEED FOR HOVs (CRITICAL TO NOT IMPORTANT)
1500-3000
3000-4500
4500-6000
6000-7500
7500-9000

FIGURE 6

DEGREE OF IMPORTANCE TO HAVE AN HOV CAPABLE OF WORKING BETWEEN THE DEPTHS OF 4500 AND 6000(+)m (CRITICAL TO NOT IMPORTANT)

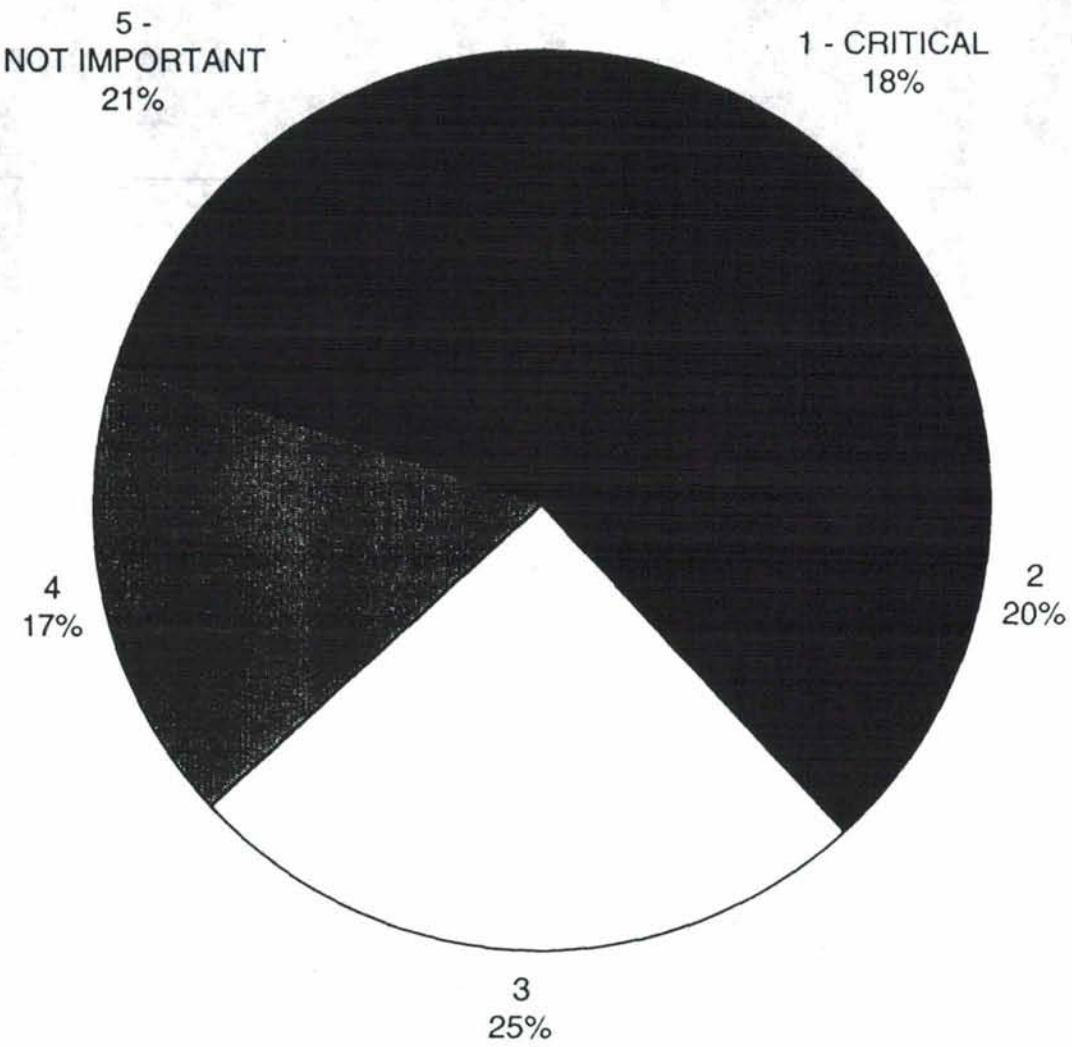


FIGURE 7

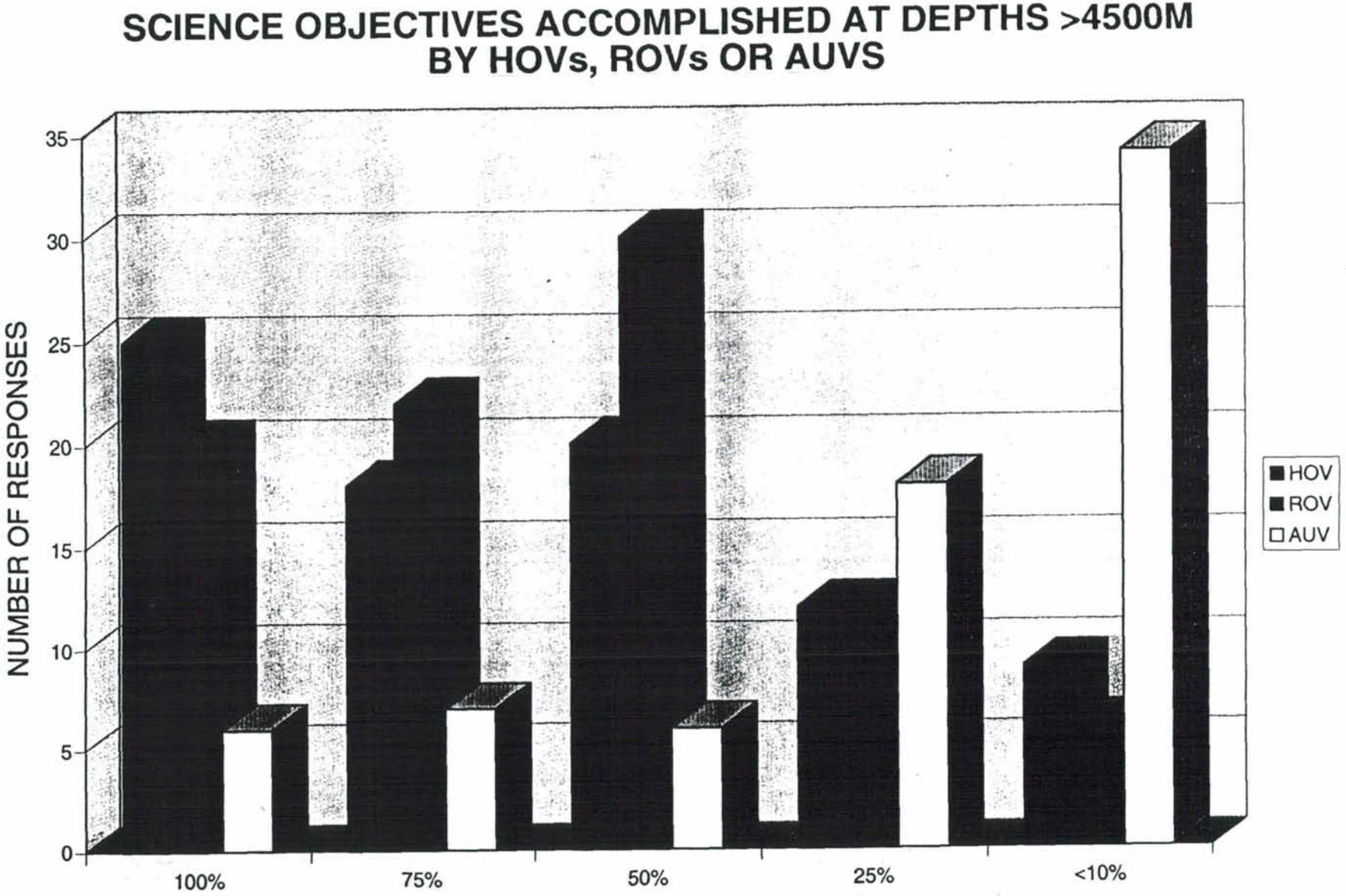

SCIENCE OBJECTIVES ACCOMPLISHED AT DEPTHS >4500M
BY HOVs, ROVs OR AUVS
NUMBER OF RESPONSES
0
5
10
15
20
25
30
35
100%
75%
50%
25%
<10%
HOV
ROV
AUV

FIGURE 8

SURVEY RESULTS OF CATEGORY B

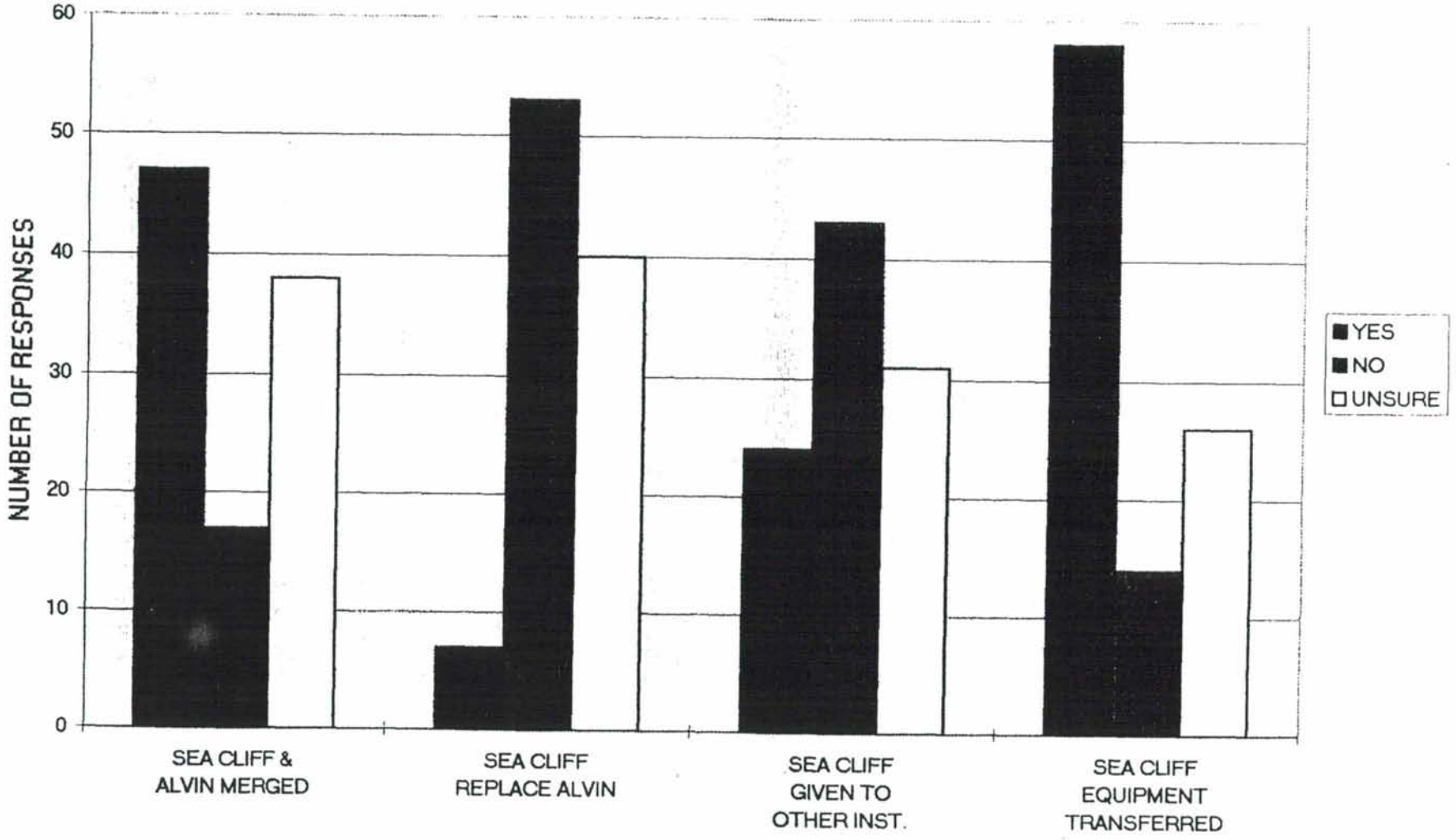


FIGURE 9

APPENDIX X

UNIVERSITY-NATIONAL OCEANOGRAPHIC
LABORATORY SYSTEM

An association of institutions for the coordination and support of university oceanographic facilities.

MEMORANDUM

To: Dr. Fred. E. Saafeld, ONR Technical Director and
Federal Oceanographic Fleet Coordination Council Chair

From: Dr. Michael Perfit, Deep Submergence Science Committee Chair

Date: July 21, 1997

SUBJECT: SEACLIFF WORKING GROUP REPORT

Enclosed you will find a report from the DEep Submergence Science Committee (DESSC) drafted by a specially convened Working Group which was tasked to answer the questions posed in your letter of October 7, 1996. Those questions concerned the effective utilization of the US Navy's submersible SEACLIFF and the facility needs of the US academic, deep submergence community. A preliminary response to these issues was provided to you in a memo dated December 5, 1996. Subsequent discussion by members of the DESSC and the SEACLIFF Working Group, and analysis of responses by scientists who completed a DESSC questionnaire regarding the future of deep submergence science provide a clear consensus which is summarized in the following points:

- There is significant interest in having a human occupied vehicle (HOV) capable of reaching 6000m available for use by the academic science community on a regular basis.
- There are many important science questions to be answered and objectives to be met at depths greater than 4500m.
- The Navy should transfer SEACLIFF to WHOI, the National Deep Submergence Facility Operator, and use it to improve HOV facilities available to the U.S. academic community.
- The excellent HOV capabilities which now exist in ALVIN must be retained.
- The development of a remotely operated vehicle (ROV) designed for science, with at least a 6000m depth capability should begin immediately.

The SEACLIFF Working Group and DESSC strongly recommend that ONR fund an engineering study to be carried out by WHOI so that well-constrained estimates of costs for the effective utilization of SEACLIFF for academic science can been made within the next 12-18 months.

Copy To: DESSC and SEACLIFF Working Group
NOAA
NSF
ONR
N096
N873
WHOI

P.O. Box 392
Saunderstown, RI 02874

Phone: (401) 874-6825
Fax: (401) 874-6167
E-mail: unols@gso.uri.edu

APPENDIX XI

ALVIN IMAGING UPGRADES

Completed Tasks

- Mac, PC and printer facilities for onboard science data analysis
- LBL navigation upgrade study (WinFrog)
- EXACT compatibility on ALVIN
- Single chip video cameras (Insite Orion/Sony EVI-310)
- Pan/Tilt mechanism (ROS)
- 3-chip camera upgrade (Ballard development & fiberoptic interface)
- Science replay monitor
- Additional in-hull Hi8 recorders and Hi8/SVHS duping decks
- Science video replay/duping recorders
- HMI lights, ballasts, spares
- Scaling lasers
- Spare relay can switching assembly

DEEP SUBMERGENCE FACILITY SCIENCE SENSOR UPGRADES

Items Funded by NSF -- 2 Year Effort

- Data logger hardware and software upgrades, including links to navigation upgrades ***(ALVIN, Jason)***
- Ring laser gyroscope
- Inductively-coupled data transmission link, plus hardware and temperature measurement probes
- "Major" hot water sampling bottles (3 new and refurbishment of existing samplers)
- Slurp pumps for biological/chemical sampling
- Scanning altimetric and lateral sonar ***(ALVIN, Jason)***
- Video upgrades and image acquisition infrastructure ***(ALVIN, Jason)***
- ALVIN syntactic foam (8 cubic feet)
- ROV syntactic foam (3 cubic feet)
- Virtual ALVIN model/power management
- 2 digital snapshot cameras ***(ALVIN)***
- Steerable elevator ***(ALVIN, Jason)*** - funded by WHOI

APPENDIX XII

WHOI Archives

DSOG DATA RESCUE PROJECT

Cathy Norton
Library Director
7/15/97

WHOI Archives

Preservation Program

Goal: Preserve and digitize DSOG media and make electronic retrieval of the information useful to the scientific community

Projects:

Digitize and repair media collected by:

ALVIN	1964 - present -----	(begin Jan. 1, 1997)
ANGUS	1972 -1987 -----	future
ARGO	1984 - present -----	future
JASON	1988 - present -----	future

WHOI Archives

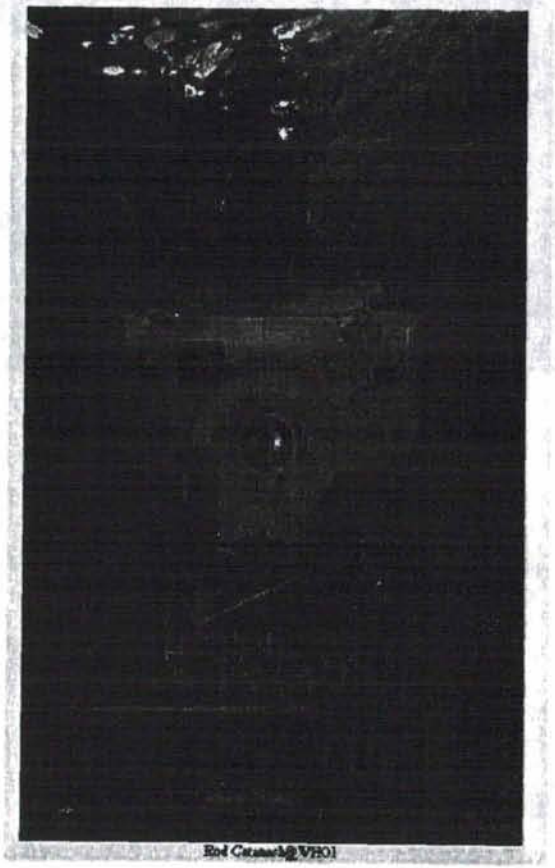
ALVIN

BULK FILM ROLLS

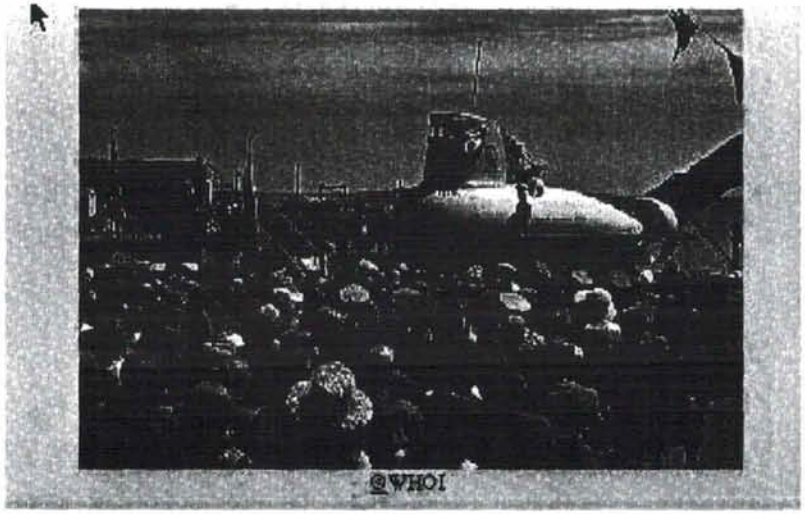
Pre - 1980 Dives - 994
(820 Reels)
Post - 1980 Dives 2,103
(3,340 Reels)

VIDEO IMAGERY

Pre - 1988 Dives -1,951
(1,822 Tapes)
Post - 1988 Dives - 1146
(3,411 Tapes)



WHOI Archives



Alvin Launch 1964

16mm Film
110,000 Feet

WHOI Archives

Project- Alvin Archives

Repair Pre - 1980 Media

bulk rolls film, 35 mm still imagery and slides

Digitize and Index

Index film

Index photos using Library image server software

Retrieval

Mount on Institutional Server for Representative Retrieval of Information via WWW

Test Pattern recognition software for better retrieval hits.

Same process for Post - 1980 Media

WHOI Archives

PROGRESS

Jan -July 97

WHOI identified ALVIN data rescue as top priority and funded personnel , equipment and supplies for the effort.

1) Identified ALVIN film at risk -
   Examined Dives 1-1000 -
   years 1967-1979
   Cleaned and Duplicated 100 rolls
   On-Going
   Same process for Dives 1001-2500
   years 1980-1995

WHOI Archives

2) Data Log File Migration

Years	Format	Number	(Zip Dr)
1993-96	3 1/2 - 5 1/4	702	30
		(140)	
1991-92	3 12 - 5 /14	(182)	
1980-90	3 1/2 singled sided	(950)	

Volunteers doing 91-96

Disk Interchange Service 1980-90

WHOI Archives

Jan- July 97

Established:

3) Working Committee of DSOG, Graphics and Library personnel
4) FTP site for data log information transfer
5) Template for on-board Dive Data Entry
6) Discussed MARC and FGDC (Federal Geographic Data Committee) Standard for Metadata

WHOI Archives

Established:

7) Library responsible for updating
the Alvin Bibliography -

8) Transferred 3000 Dive Records
1968- 1996 dbase to MARC library catalog
searchable via WWW.
(1964-1968 - Handwritten logs -
need to be transcribed)

9) Identifying "top hits" photos for CD production
Vol 1- 300 photographs
(Vol II in process)
Library Image Server will serve these photos

10) (Indentifying film digitizing equipment)

WHOI Archives

BIG ISSUES

- Future Services
- Locational Servers- could all be at WHOI or in participating labs globally
  - FGCD and Z39.50
  - Aquisition Services - HTTP - goes out and gets services on other machines
  - Translation and Conversion Services
    - each lab has own format so need "wrappers" to connect - API

WHOI Archives

BIG ISSUES

- Integration Services ..and " a miracle occurs" -
- this is where the DSOG archive gets information from various data sets and then serves them up in an integrated fashion

APPENDIX XIII

ALVIN/ROV PROGRAMS 1999 AND BEYOND

Atlantic

Blackman	14 ALVIN and 10 Jason	Funded

Gulf of Mexico

MacDonald	10 ALVIN and 10 Jason	Funded

Juan de Fuca

Carson	7 Jason	Funded
Chadwick	1 Jason	Funded
Torres	24 ALVIN	Pending
Cowen	10 ALVIN or Jason	Funding

Off California

C. Smith	7 ALVIN	Pending

North East Pacific Rise

Lutz	11 ALVIN and 12 Jason	Funded
Manahan	8 ALVIN	Funded
Mullineaux	10 ALVIN	Funded
Luther/LEXEN		

Indian Ocean

Fornari/VanDover	11 Jason and 6 Argo	Funded