UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Deep Submergence Science Committee
Planning Meeting
December 6, 1992
Gold A Room Holiday Inn Civic Center

APPENDICES

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GENERAL: The Chair of the DEep Submergence Science Committee (DESSC), Jeff Fox, opened the meeting at 0830 in room Gold A at the Holiday Inn Civic Center, San Francisco, CA, on 6 December 1992. The agenda, **Appendix I**, was followed except as noted herein. Present were DESSC Committee members and members of the deep submergence science community, both academic and federal. **Appendix II** is the list of attendees.

Jeff introduced the DESSC Committee:

Jeff Fox, Chair
Dan Fornari
Hugh Milburn
Casey Moore
Mary Scranton
Gary Taghon (absent)
Karen VonDamm
Carl Wirsen
Dick Pittenger, Ex-Officio (absent)

Jeff's opening remarks outlined the objectives of the meeting which included WHOI's presentation of current ALVIN operations and the reorganization of their Deep Submergence Lab, a review of the DESSC fall workshop, equipment needs of ALVIN and finally, a review of Letters of Intent for ALVIN use for 1994 and beyond.

DEEP SUBMERGENCE OPERATIONS at WHOI: Rick Chandler, ALVIN Group Administrator, opened the Woods Hole presentation by reviewing briefly the ALVIN 1992 schedule, (**Appendix III**), and presenting a bar graph, **Appendix IV**, reflecting the 76 completed dives. One dive was lost due to mechanical failure in 1992. Rick then presented a view graph, **Appendix V**, of the 1993 tentative ALVIN schedule. The schedule starts in March 1993 after an ALVIN overhaul and certification. Five engineering dives are planned off Bermuda for testing improvements to the Stakes drill followed by science dives. Operations are planned along the Mid Atlantic Ridge before transiting to the Pacific for work in the Juan de Fuca and East Pacific Rise regions. Included in the schedule is a thirty day overhaul period for ATLANTIS II in October/November. This schedule includes 145 planned dives. Rick advised that most of this scheduled work is funded at this time.

Dudley Foster provided a review of the planned ALVIN upgrades for 1992. A summary of these upgrades is included as **Appendix VI**. The plans for increasing ALVIN's depth capability to 15,000 feet are still under evaluation by NAVSEA. By increasing the depth capability, ALVIN's safety factor would be reduced from 1.5 to the safety factor SEA CLIFF now operates to. NAVSEA may require additional testing before approving the requested depth increase. More discussions on this matter are underway.

Dudley also provided a summary of the 1993 planned ALVIN upgrades. These are summarized in **Appendix VII**. Most of these items will be completed during the ALVIN overhaul period and before commencing operations in March.

Barrie Walden followed by first discussing the Navy certification process. WHOI is planning to have the certification team provide a practice certification inspection that reflects new NAVSEA rules. The real certification will come in January when ALVIN is 95% complete in the overhaul process.

Barrie presented a view graph depicting the evolving organization of the Deep Submergence Group at Woods Hole (see **Appendix VIII**). The new organization will combine the ARGO/JASON operation with the ALVIN operation. Because the merger results in a reduction of people, independent operations of ALVIN and ARGO/JASON will only be possible with an augmentation of the group. The new organization should prove more cost effective but will cause complex scheduling problems. Andy Bowen continued explaining the merger and stated the full transition will take three years. It was discussed that the long term objective is to make ARGO/JASON available for movement to many UNOLS ships using the ship's winch and fiber optic cable but for the near term a WHOI portable winch will need to accompany this submersible. WHOI will compile a list of baseline ROV equipment to be available for scientific use. The list will be distributed to the community by the end of February.

The booklet of ALVIN 1992 statistics, **Appendix IX**, was made available to the assemblage.

AGENCY AND PROGRAM MANAGEMENT REPORTS

National Science Foundation: Mike Reeve presented a report from NSF. He encouraged the deep submergence community to investigate new expeditions taking ALVIN to areas it has not been in the past. Mike advised that the NSF Commission has recommended that nothing should change in the way NSF conducts basic research but that it should look for new ways to work with industry. He advised that the NSF 1993 budget is still not firm but the overall NSF budget will be slightly reduced. The Foundation will be operating under a 75% spending cap until the budget is firm. Planning continues for the 1994 budget, however, with a new administration the direction is likely to change. NSF is investigating an earlier deadline for ALVIN

proposals to facilitate the scheduling process. The earlier date will probably not come into effect until 1995.

Office of Naval Research: Keith Kaulum reported on ONR matters regarding deep submergence issues. The Memorandum of Agreement (MOA) has been drafted and reviewed by each of the supporting agencies: NSF, ONR and NOAA. After a few iterations, the agencies have come to agreement on the terms of the MOA. The MOA establishes a "Safety Net" level of support during the transition years. It integrates ROVs and ALVIN into a Deep Submergence Facility (DSF). During these transition years, WHOI and the agencies will be faced with a management challenge. Keith encourages all to contact Andy Bowen for a description of the ROV options and deliverables which will be available. NOAA funding for support of the MOA is still uncertain. If not resolved soon, the old MOA will most likely lapse into next year. This should not pose a problem.

Considerable discussion and concern evolved regarding the method in which scientists should propose use of the Deep Submergence Facility ROVs. Mike Reeves said NSF will put a notice on telemail in the near future instructing NSF scientists on how to submit their proposals.

Keith reported that ARGO/JASON will be operating in Guaymas vent area in March on a Jason Foundation Project. ONR will provide some funding for this program. The scientific community is invited to participate for one day.

The ONR budget is up from last year. The Chief of Naval Research (CNR) Office received a 15 percent increase. The Facilities group has not seen much of this increase, however. The 1993 budget is in place and the 1994 budget request looks okay.

As of 7 December, ONR will be reorganized. Navy's science and technology offices will be consolidated and integrated to fall under ONR. The major changes will occur in the applied research areas. Fred Saafield will no longer be the Technical Director. A new position for a "Super Deputy" has been created and a nationwide search will be performed to fill the position.

National Oceanic and Atmospheric Administration: NOAA was represented by Marsh Youngbluth. Marsh suggested there was a need for a national deep submergence organization which can oversee our nation's assets and coordinate international facilities.

NOAA has requested of the Congress permission to reprogram 1993 funds within the NURP budget to permit support of the ALVIN program. NOAA has signed a bilateral agreement with France to conduct deep submergence science including a Deep Ocean Observatory and a workshop for Upper Water Column Studies. NOAA has also entered into an agreement with Japan to work with SHINKAI 6500.

Marsh reported on the SEA CLIFF operation conducted this fall for the academic community. It was marked with both success and failure. SEA CLIFF's manipulators failed to work at depths in excess of 3000 meters. The AUV which accompanied SEA CLIFF failed early in the cruise but was repaired and used successfully in the latter portion of the operation. Of the 40 dives planned only 10 reached the planned depth and several of these were cut short. Several investigators, however, did complete their dives and considered the operation successful. NOAA provided $8000 per day for consumables with the Navy covering other costs. NOAA spent approximately $400,000 for this operation. **Appendix X** provided a summary of the SEA CLIFF operations.

DESSC Workshop Report: Jeff Fox provided a brief report on the DESSC Workshop conducted in Alexandria, VA, on 13 & 14 October. Jeff reported that about one hundred persons attended the workshop including 60 scientists and about 20 each from the engineering community and federal agencies. The workshop was divided into three parts: 1) What are the compelling deep submergence science problems confronting the community? 2) A review of current assets and 3) How do we address the science problems, including global coverage?

Jeff suggested a time line plan of action to 1996 then another beyond. The earlier time window covers the ALVIN overhaul cycle and ends about when KNORR is planned for conversion to the ALVIN support ship. The soon to be signed MOA also covers this period. Jeff indicated a need to energize the deep submergence community and to focus these energies to ensure that deep submergence assets are well utilized and that their assets have the best capabilities to serve science.

In this near term, DESSC must determine the technology improvements needed for ALVIN and work towards their attainment. DESSC must further act as a clearing house for determining the areas of the world where scientists need to study and provide a forum to generate the critical mass of proposals necessary to make these dives cost effective.

In the long term deep submergence vehicles need to be brought up to the state of the art. It will be necessary to develop new ways to handle data. The present funding paradigm must be overhauled and we must develop a way to share global assets.

The workshop report should be out by the end of January 1993.

Near Term Technology Improvements for ALVIN: Jeff provided a summary of the letters received recommending technology improvements for ALVIN. He divided the responses into three basic areas: 1) Imaging, 2) In hull systems and 3) Sampling (see **Appendix XI**). Considerable discussion followed. ALVIN's power limitations were of concern in all three of these categories. The 500 meter depth increase also received a full endorsement of the participants. Jeff concluded by suggesting the DESSC would

set up a subcommittee to address the technology improvement issue and encouraged the community to add to and expand upon their recommendations. It was also decided that the initial emphasis in equipment upgrades would be on imaging equipment.

The Development of an Outline for ALVIN Work in 1994/95: A total of 65 Letters of Interest were received. Several letters included multiple principal investigators and multi-disciplinary programs. About half of the dives proposed in the letters of intent were for the traditional areas of ALVIN activity with the other half representing non-traditional areas. These non-traditional locations were divided into three geographical regions: Tethyan Region, Eastern Pacific South of Equator and Far Pacific. The Tethyan Region was further divided in two sub areas; Mediterranean/Black Sea/Red Sea; and Arabian Sea/Indian Ocean. Coordinators for each of these regions, who had been previously identified, presented a summary of proposed dives for each of their respective areas of interest.

Kim Kastens provided the information on the interest in the Tethyan Region (Mediterranean, Black Sea and Red Sea). The work includes six programs in the Mediterranean by investigators Pickard, Ullman/Kastens et al, Cita/Camerlenghi/Mart et al, Druffel and McCoy. The Black Sea cruises include interest from Ryan and Arthur and the Red Sea, McCoy and Bonatti/Cochran. In all, over 100 dives are in the planning stages. Additional dives of interest from PI's McCoy and Lutz/Vrijenhock are under consideration for 1995 and '96. Kim suggested that an operating schedule coming west to east would be appropriate for many of the dives while a follow up on the return east to west would suit the remaining dives.

Karen Wishner followed with a summary of the Arabian Sea and Indian Ocean. Most of the Arabian Sea work was directly tied to JGOFS scheduled for 1994 and '95 in the Arabian Sea. These include PI's Wishner, Rowe/Morse, Levin/DeMaster, Wheatcroft and Madin. Other work of interest includes that of Lutz/Vrijenhock, Curray and Brooks/McDonald/Sassen.

The second region, Western Pacific, was presented by Patty Fryer. Fourteen letters of interest were discussed. These include additional work by Lutz/Vrijenhock and that of Sager/Johnson. In addition, Winterer (Western Pacific Seamounts, Garcia (Lolhl Seamount), Hawkings (Lau Basin), Stern (Heyashi Seamount), Bloomer (Southern Mariana Arc), Fryer (Mariana Forearc), Fryer (Mariana Backarc Basin), McMurtry (Northern Mariana Arc), Gill/Fryer (Northern Mariana Arc) and Cavanaugh (any seep and vent locale). International cooperative studies were Fujioka (Mariana Forearc) and Scott (Woodlark and Manus Basins). These programs, consisting of 100-200 dives, have been targeted for the 1994-1995 time frame. In addition, there was a strong response from Australian scientists that will be explored.

John Edmond presented a summary of those PI's indicating interest in the East Pacific Rise south of the Equator. Over two hundred dives are being considered for this area. These include interest from PI's Gee/Kent/Cande, Lutz/Vrijenhock,

Michael/Gormair/Perfit, Stakes/Vanco, Lilley, Embley, Laver, Mahoney, Palmer/Sparks, Collier et al, Lupton/Von Damm, Mullineaux/Wiebe and Naar. John suggested that two expeditions of 90-120 days each might satisfy those programs likely to be funded.

Dr. Tetsuro Urabe, of the Geological Survey of Japan, gave a presentation of the Japanese interest in deep submergence science. He informed the gathering of the Japanese interest in the Indian Ocean and also the Mid Atlantic Ridge. They are planning SHINKAI 6500 operations for the Mid Atlantic Ridge in 1993 and the East Pacific Rise (EPR) for 1994 and out years. Dr. Urabe updated the community on a possible cooperative effort on the EPR with ALVIN in '95 so that time series measurements could be conducted. (See **Appendix XII** for details.) SHINKAI 6500 will also be working on projects in the Western Pacific.

Jeff Fox summarized the expeditionary planning as well as anticipated projects in the more traditional areas. A copy of this summary is included as **Appendix XII.** A Summary Notice of Intent, Notice of Intent by Region and Map of Notice by Region are also appended as **Appendix XIII, XIV** and **XV** respectively.

The meeting was adjourned at 1730 hours, 6 December 1992.

An executive session of the DESSC convened shortly after the adjournment of the DESSC planning meeting.

At the session, a subcommittee of Hugh Milburn, Dan Fornari, Mark Olsson and Rich Lutz was constituted to address the technical enhancements needed for ALVIN to improve imaging capability. Their plan is to exchange ideas by telemail and produce a "shopping list". This will reviewed then by engineers and technicians to ascertain feasibility and costs. A prioritized list will then be developed for approval of the DESSC. This list would then be the body of a proposal to NSF and ONR for funding.

The DESSC agreed that an additional committee member, an engineer, was needed to better fulfill the committee tasking. It was further agreed that a third meeting per year was probably necessary to deal with the fast moving issues of deep submersible operations.

The committee adjourned at 1930.

APPENDIX I

DEEP SUBMERGENCE SCIENCE COMMITTEE PLANNING MEETING

SUNDAY, DECEMBER 6, 1992, 8:30 a.m. - 5:00 p.m.
ROOM: GOLD A - HOLIDAY INN CIVIC CENTER
SAN FRANCISCO, CA

0830 Meeting convenes, Welcome, Introductions and Meeting Goals (J. Fox, DESSC)

0845 Deep Submergence Operations at WHOI (B. Walden)
- a. The year in review
- b. The overhaul and planned upgrades
- c. The 1993 schedule

0915 Agency and Program Management Report: Review of Issues Pertinent to Deep Submergence Science (e.g. Status of Memorandum of Agreement, Programmatic Plans, NOAA/Navy SEA CLIFF operations)
- a. NSF (M. Reeve)
- b. ONR (K. Kaulum/S. Ramberg)
- c. NOAA (M. Youngbluth)

1000 Highlights of DESSC Sponsored Deep Submergence Science Workshop (J. Fox)
- a. Near and Long term planning issues critical to ALVIN
- b. The KNORR/ALVIN marriage and retirement of AII
- c. The best utilization of submersibles and ROV's

1015 Coffee Break

1030 Near Term Technology Improvements for ALVIN (J. Fox)
- a. A review of suggestions from DESSC workshop and letters
- b. Suggestions for improvements from the floor
- c. Identification of improvements of critical importance: A short list
- d. Strategy for acquisition and identification of proposal team

1200 - 1330 **Break for Lunch**

1330 The Development of An Outline for ALVIN Work in 1994 and 1995 (J. Fox)
- a. A review of letters of interest - areas of research and timing; comments and discussion
- b. A review of timeliness of global expeditions; heroines/heros will give assessment of programs (scientific maturity, critical mass, question of timing, etc.)
  1. Tethyan Region: Med.-Black Sea-Red Sea-Arabian Sea-Indian Ocean (K. Wishner & K. Kastens)
  2. Eastern Pacific Region South of Equator (J. Edmond)
  3. Far Pacific (P. Fryer)
- c. The creation of outline of ALVIN operations for 1994 and 1995

1500 Other Matters Arising

1530 DESSC Executive Session
- a. Review results of meeting
- b. Development of timetable and delegation of responsibilities
- c. DESSC Terms of reference
- d. Schedule for June meeting

APPENDIX II

APPENDIX II

ATTENDEES

Name	Institution
Jim Barry	MBARI
Jack Bash	UNOLS
H. Groschel Becker	University of Miami
Kier Becker	RSMAS/University of Miami
John Bender	University of North Carolina
Andy Bowen	WHOI
Garry Brass	RSMAS/University of Miami
Wilfred Bryan	WHOI
Joe Cann	University of Leeds, UK
Rick Chandler	WHOI
Jim Childress	University of California, SB
Larry Clark	NSF
Steve Cole	AGU
Keith Crook	HURL
John Delaney	University of Washington
Robert Detrick	WHOI
Annette DeSilva	ONR
Dolly Dieter	NSF
John Edmond	MIT
Robert Embley	NOAA/PMEL
Martin Fisk	Oregon State University
Dan Fornari	LDGO
Dudley Foster	WHOI
Jeff Fox	University of Rhode Island
Patty Fryer	University of Hawaii
Chris Harrold	MBARI
Rachael Haymon	University of California, SB
Hiroshi Hotta	Geological Survey of Japan
Richard Jahnke	Skidaway Institute of Oceanography
Lynn Johnson	Naval Research Laboratories
Paul Johnson	University of Washington
David Kadko	University of Miami
David Karl	University of Hawaii
Kim Kastens	LDGO
Keith Kaulum	ONR
Randy Koski	USGS
Lawrence A. Lawver	University of Texas, Austin
Brent Lewis	University of Delaware

Name	Institution
Marvin Lilley	University of Washington
John Lupton	NOAA/PMEL
Rich Lutz	Rutgers University
Peter Michael	University of Tulsa
Hugh Milburn	NOAA/PMEL
Billy Moore	University of South Carolina
Casey Moore	University of California, SC
Lauren Mullineaux	WHOI
LCDR. Sam Nichols	COMSUBDEVGRU ONE
Mark Olsson	Deep Sea Research Laboratories
Mike Perfit	University of Florida
Mike Reeve	NSF
Veronique Robigou	University of Washington
Bruce Robison	MBARI
Lisa Rom	NSF
Peter Rona	NOAA/AOML
Mary Scranton	SUNY, Stony Brook
Alexander Shor	University of Hawaii
Bob Shuster	University of Nebraska
Eli Silver	University of California, SC
Steve Skrabal	University of Delaware
Fred Spiess	SIO
Debra Stakes	MBARI
Jim Todd	NOAA
Tetsuro Urabe	Geological Survey of Japan
Cindy Van Dover	WHOI
David A. Vanko	Georgia State University
Karen Von Damm	University of New Hampshire
Waldo Wakefield	University of Alaska
Barrie Walden	WHOI
Geoff Wheat	University of New Hampshire
Carl Wirsen	WHOI
Karen Wishner	University of Rhode Island

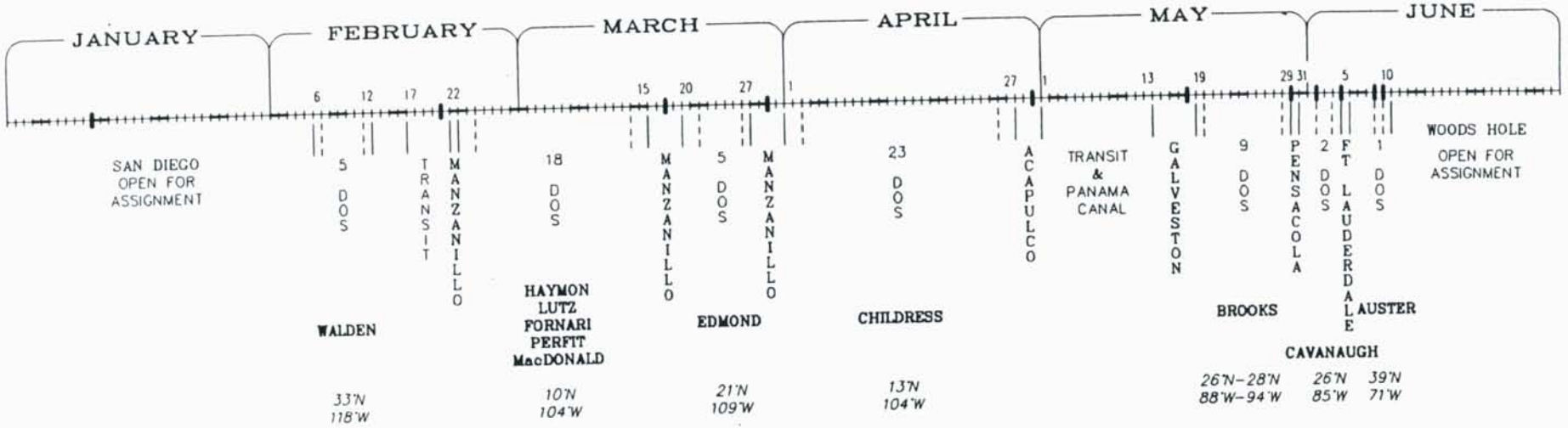
APPENDIX III

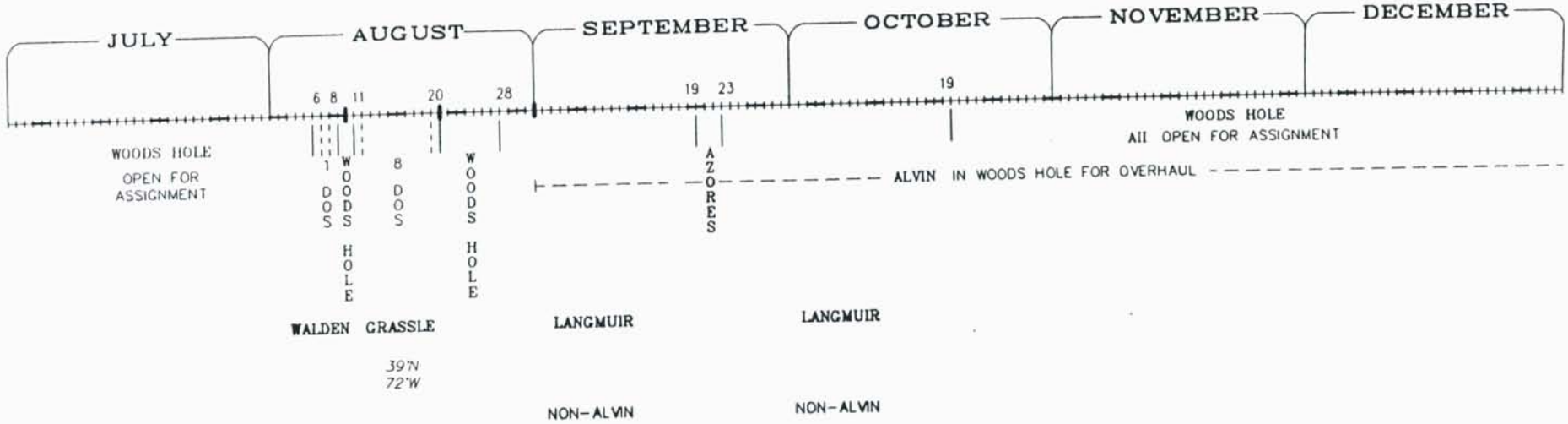
R/V ATLANTIS II & ALVIN OPERATIONS

13 SEP 92
~~14 MAY 92~~
~~27 FEB 92~~
~~28 JAN 92~~
~~9 JAN 92~~
~~4 DEC 91~~
~~16 OCT 91~~
~~25 SEP 91~~

1992

OPERATIONAL SCIENTIFIC SERVICES
WOODS HOLE OCEANOGRAPHIC INSTITUTION

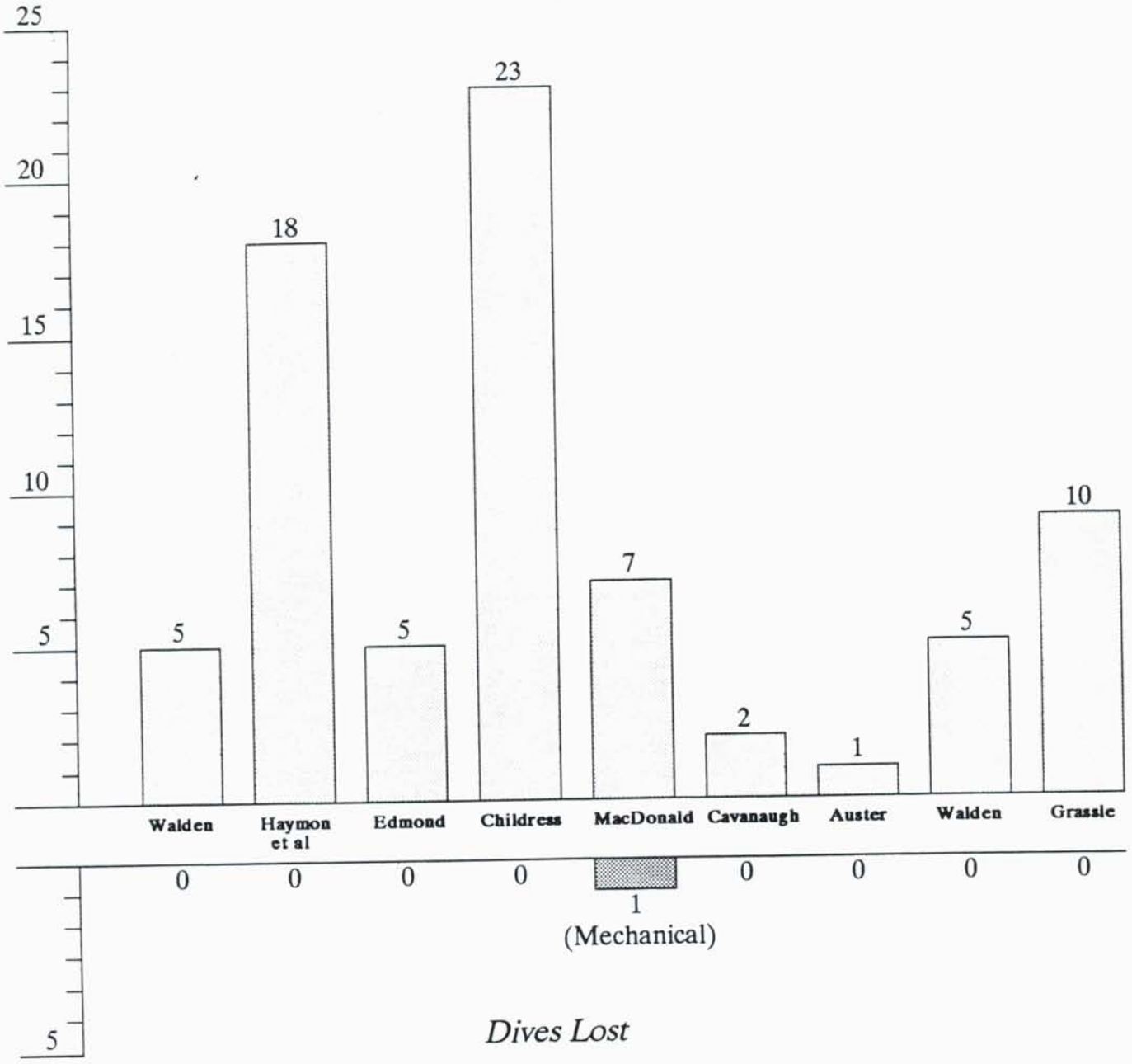




APPENDIX IV

1992 ALVIN Dives

71 Planned
76 Completed



Dives Lost

APPENDIX V

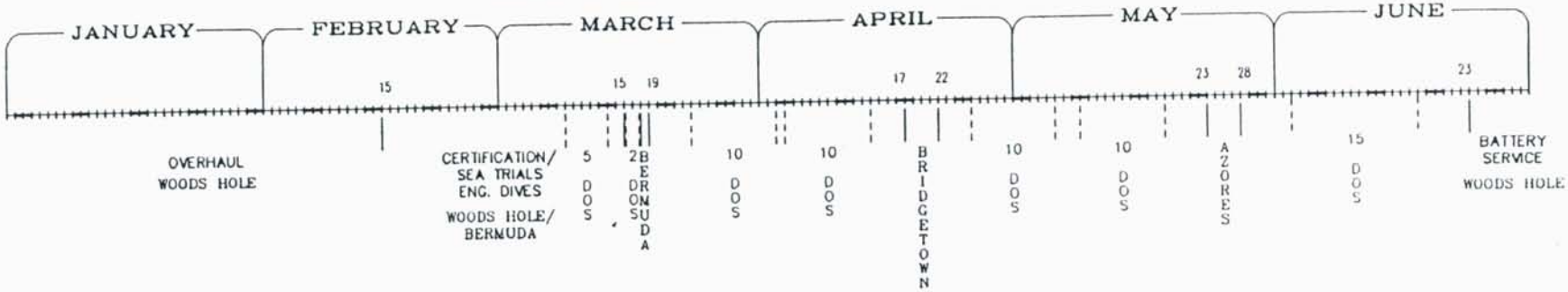
TENTATIVE *

R/V ATLANTIS II & ALVIN OPERATIONS

OPERATIONAL SCIENTIFIC SERVICES
WOODS HOLE OCEANOGRAPHIC INSTITUTION

1993

1 DEC 92
~~22 SEP 92~~

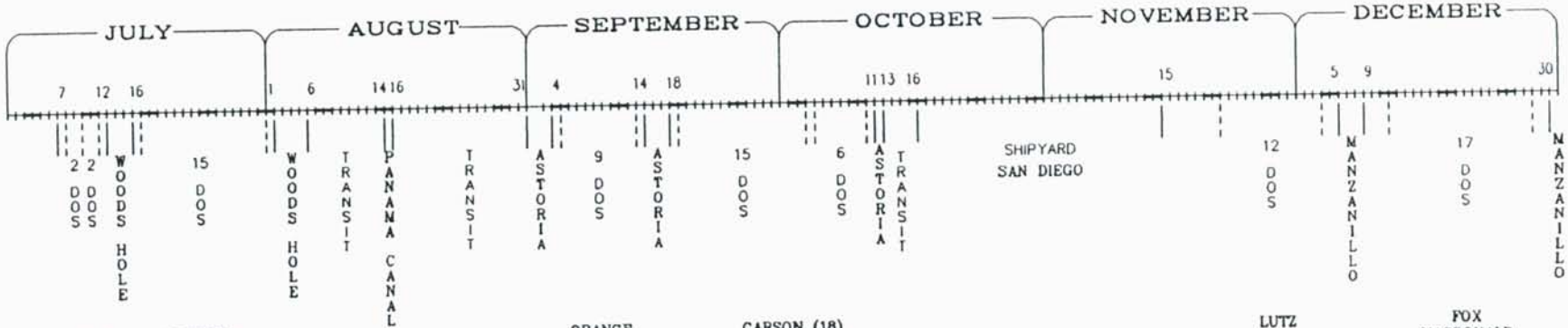


CALDER
32'N
64'W

KARSON
23'N
45'W

VON HERZEN (12)
RONA (8)
15'N
45'W
25'N
45'W

VAN DOVER (8)
JANNASCH (5)
CHAMBERLAIN (2)
25'N
45'W



KAPL
38'N 38'N
72'W 69'W

GRASSLE
KAPL
39'N
72'W

ORANGE
MOORE
45'N
125'W

CARSON (18)
BECKER (9)
45'N
125'W
49'N
127'W

LUTZ
9'N
104'W

FOX
MACDONALD
9'N
104'W

ALVIN Dives	
Science	135
Cert /Eng	10
Total	145

* Based upon requests for ALVIN time recieved by the UNOLS ALVIN Review Committee and therefore subject to revisions resulting from supporting agency funding decisions

APPENDIX VI

RESULTS of PLANNED ALVIN UPGRADES - 1992

* **Increased depth capability to 15,000 feet**
  Still being evaluated by NAVSEA

* **Renovation of surface controller station**
  Racks and monitor stations being ordered Dec 1992, install in 1993

* **Expansion of duplicating facility for Hi8 format**
  Four additional Hi8 decks purchased. Will now record in Hi8 and duplicate to Hi8 and/or VHS

* **Installation of laser ranging system**
  HBOI loaners are being replaced with ALVIN purchased units

* **New video monitors in ALVIN**
  Search continuing for suitable 5" color monitors

* **Upgrade ALVIN datalogger to 386 system**
  486 system being installed, running UNIX System V, with DOS application capability, "user friendly" menu interface, video monitors used for display

* **Gyro upgrade**
  Our three Sperry MK47 gyros are still operating. Development in laser ring gyros, fiber optic gyros, and hemispherical resonant gyros may make these a better heading reference replacement.

* **New titanium hydraulic manifolds**
  Under construction. Additional aluminum manifold acquired for basket use.

* **Redesign of ALVIN life support system**
  The replacement EBA's under consideration are not yet a production item. New operating procedures to reduce fire hazard may be implemented immediately.

* **ALVIN video-based terrain-following navigation system**
  Still working on this, but will require significant funding to implement

* **Extendable light deployment boom**
  Development deferred until 1993.

APPENDIX VII

PLANNED ALVIN UPGRADES - 1993

* **Purchase HMI lights in 200-500 watt range**
  Will provide more lumens/watt, better video color temperature

* **Modify Osprey 1363 color video camera for Y/C output**
  Improved video signal from the camera

*__Rebuild (2) hull penetrators with coax conductors__
  Will maximize signal quality from 1 or 3-chip CCD cameras to the recorder

* **Purchase newest generation color video camera**
  Higher resolution, more sensitivity, replace older Osprey 1361's

* **Purchase two new 37 khz pingers**
  Improve ease of locating bottom elevators and science equipment

* **Upgrade Trackpoint II video output, cabling and transducer**
  Allows distribution of Trackpoint display to remote locations, redundant "stand alone" tracking capability, improved sensitivity and accuracy

* **Replace toplab navigation computers with 486/33 mhz machines**
  Improved reliability, faster processing, expandable for future needs

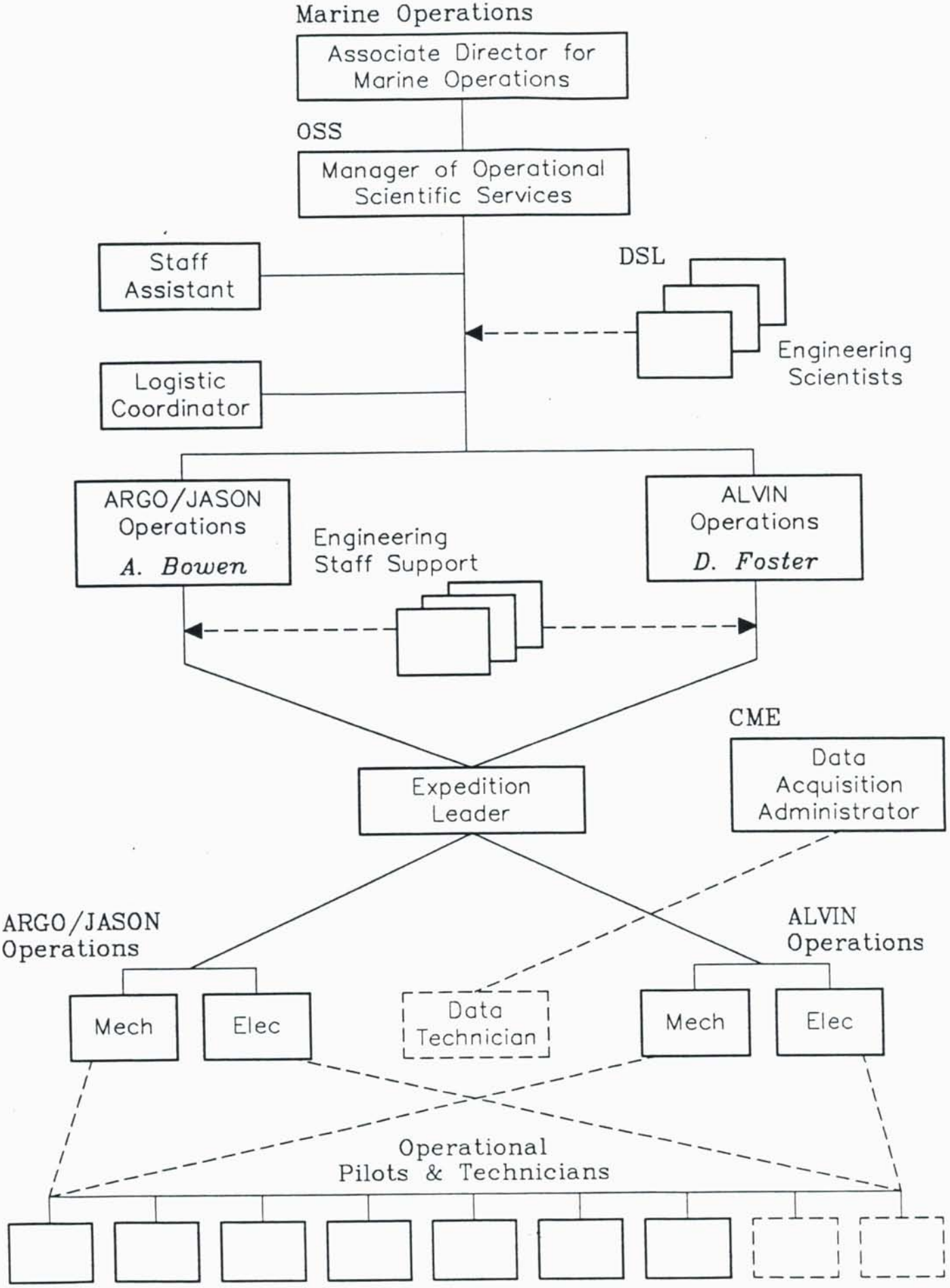
* **Replace aluminum starboard (ISE) manipulator components with titanium**
  Reduced maintenance, extend useful life of the manipulator

* **Improve altimeter data**
  Modify existing Benthos unit and experiment with modified consumer depth sounders

* **Move battery chargers and shore power supplies**
  Reduce failure of battery chargers and shore power supplies due to equipment corrosion

* **Replace ALVIN air conditioner**
  Further reduce ALVIN electronic problems due to condensation after dives

APPENDIX VIII

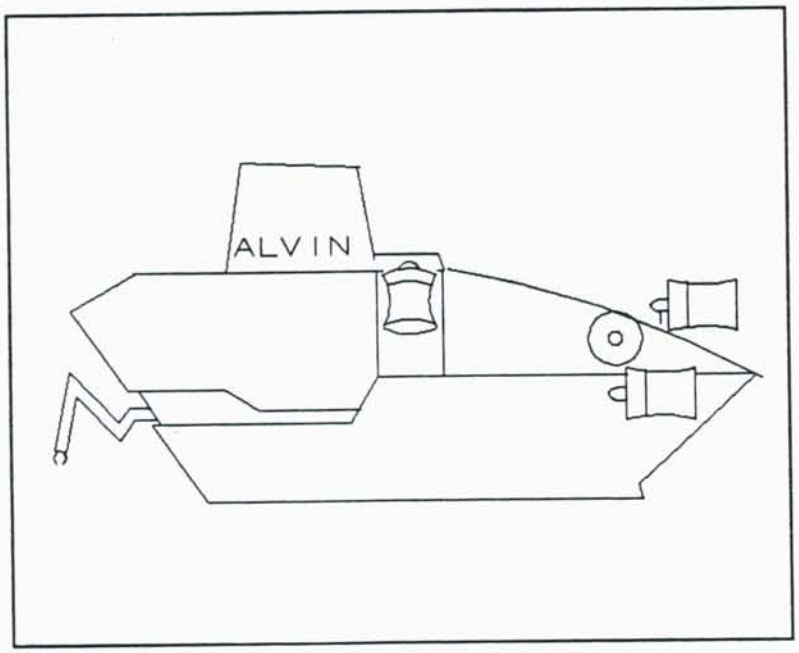

Marine Operations
Associate Director for Marine Operations
OSS
Manager of Operational Scientific Services
Staff Assistant
Logistic Coordinator
DSL
Engineering Scientists
ARGO/JASON Operations
A. Bowen
Engineering Staff Support
ALVIN Operations
D. Foster
CME
Data Acquisition Administrator
Expedition Leader
ARGO/JASON Operations
ALVIN Operations
Mech
Elec
Data Technician
Mech
Elec
Operational Pilots & Technicians

APPENDIX IX

STATISTICS

1992

Deep Submergence Vehicle ALVIN



Submersible Engineering and Operations Laboratory

Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

The first cruise of 1992 in early February gave the ALVIN Operations team a rare chance to conduct a series of engineering test dives off San Diego. Experts in the photographic, underwater video and acoustic fields were invited to participate in five shallow dives to recommend improvements in ALVIN's capabilities. Experiments included calibration of the still camera fields of view, evaluation of a new generation of video lighting and qualitative analysis of optimum light configurations, exposure tests for various cameras, application testing of a low-cost fathometer, and vehicle attitude/performance analysis. Extensive testing of the sub's hydraulic system resulted in corrective measures designed to bring performance up to advertised capability. Constructive external input from industry participants has already fostered interest in both real-time. 3-D graphical display of ALVIN's position in a navigated volume and the potential for "video inertial navigation" from computer processing of video images.

Scientific dives began on the East Pacific Rise in late February, where a multi-institutional team of investigators studied hydrothermal and geochemical processes in support of Ocean Drilling Program work. The rise area at 9°N had been found to be active during a late-1991 dive series, so experiments during this cruise provided an unusual temporal look at vent processes. Late in March, the Rise at 21°N was the site of geochemical sampling of hydrothermal fields, and in April scientists returned to the Rise at 10°N to complete experiments initiated with the French submersible NAUTILE in 1991.

Following a transit through the Panama Canal in early May, ALVIN and ATLANTIS II made a port call in Galveston before beginning studies of chemosynthetic ecosystems at two sites in the Gulf of Mexico. Two dives were made for specimen collection at the West Florida Escarpment cold seeps, and the final dive of Voyage 125 allowed a video transect of megafaunal habitats on the Continental Rise near Block Canyon. The ship and sub return to Woods Hole on June 10th after 575 days at sea, 367 dives and 894 days away from home port.

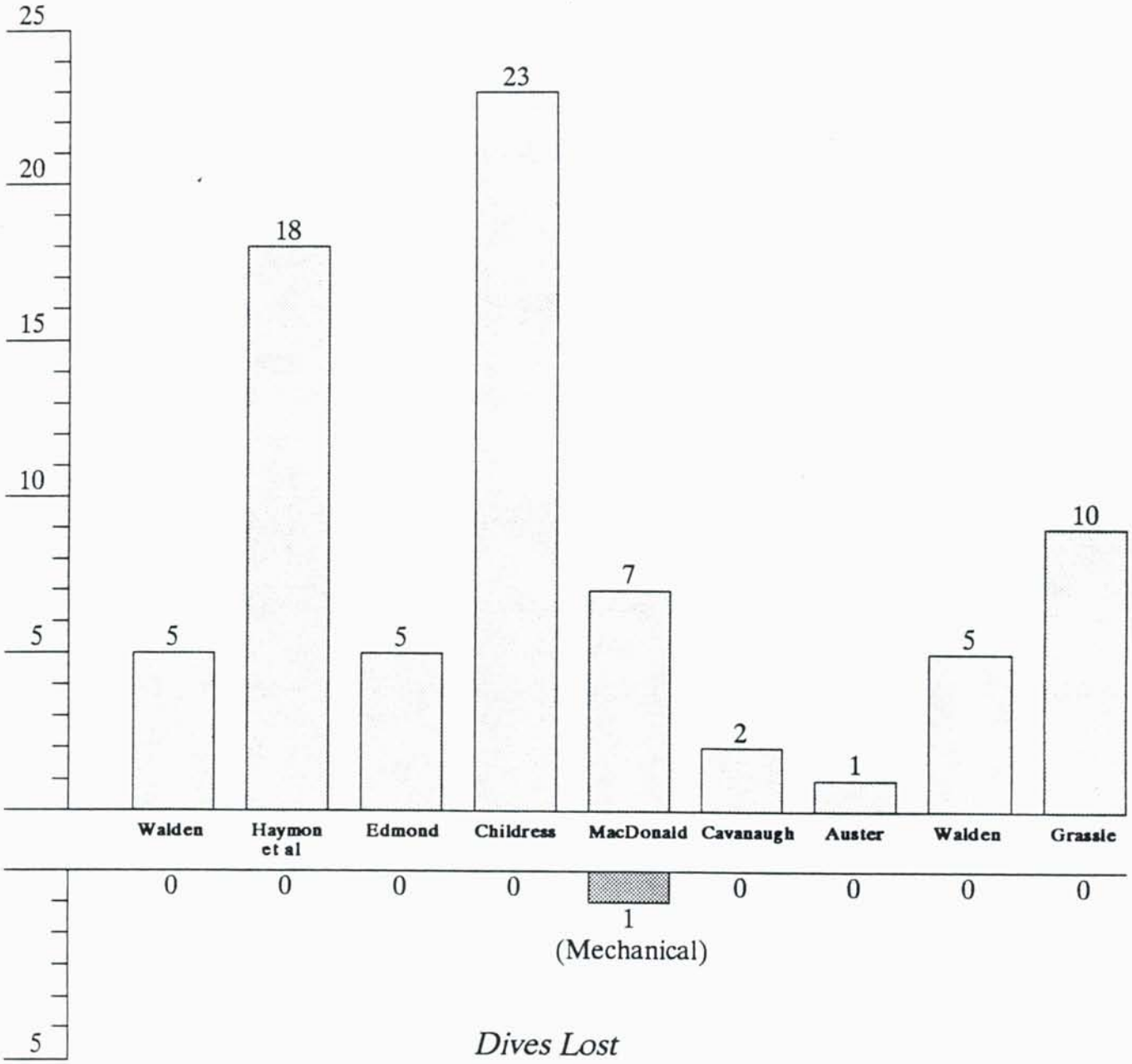
After a six-week layup the vessels departed WHOI in early August for studies of biological communities at Deepwater Dumpsite 106 off New York. Upon return to Woods Hole, ALVIN entered a major overhaul period, with diving scheduled to resume in March, 1993.

DSV-2 ALVIN DIVE STATISTICS

		1992
Total Dives		*76*
Total Depth (meters)		*171,323*
Average Depth per Dive (meters)		*2,254*
Total Time Submerged (hours)		*547*
Average Time Submerged per Dive (hours)		*7.2*
Total Persons Carried		*228*
Dives for	*Biology*	*43*
	Geology/Geophysics	*18*
	Engineering/Equipment Tests	*10*
	Geochemistry	*5*

1992 ALVIN Dives

71 Planned
76 Completed



Dives Lost

DSV ALVIN VOYAGE STATISTICS FOR 1992

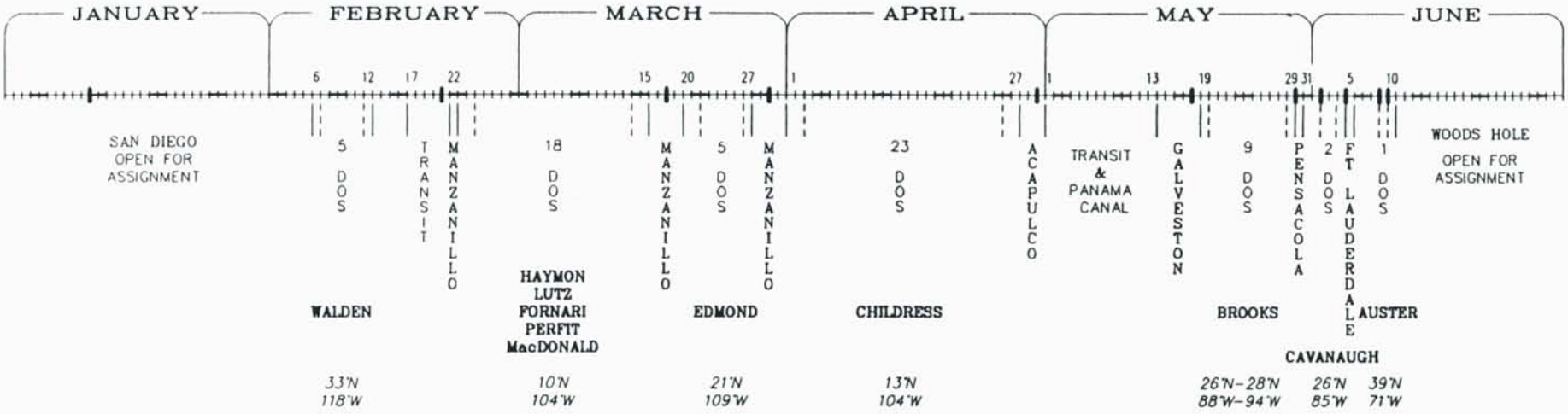
ATLANTIS II VOYAGE NO.	ON STATION	AREA OF OPERATION NUMBER OF DIVES	DISCIPLINE	CHIEF SCIENTIST(S)	DAYS AT SEA	ALVIN DIVE NUMBERS
125–XXXVI	7 Feb – 11 Feb	San Pedro Channel 5 dives	Engineering Tests	Barrie Walden – WHOI	7	2483–2487
125–XXXVII	17 Feb – 21 Feb	Transit to Manzanillo			5	
125–XXXVIII	24 Feb – 13 Mar	East Pacific Rise – 10N 18 dives	Geology	Rachel Haymon – UCSB Richard Lutz – Rutgers Danial Fornari – LDGO Michael Perfit – Florida Ken MacDonald – UCSB	22	2488–2505
125–XXXIX	22 Mar – 26 Mar	East Pacific Rise – 21N 5 dives	Geochemistry	John Edmond – MIT	8	2506–2510
125–XL	3 Apr – 25 Apr	East Pacific Rise – 12N 23 dives	Biology	James Childress – UCSB	27	2511–2533
125–XLI	1 May – 13 May	Transit to Galveston			13	
125–XLII	20 May – 28 May	Gulf of Mexico 7 dives	Biology	Ian MacDonald – TAMU	11	2534–2540
125–XLIII	2 Jun – 3 Jun	West Florida Escarpment 2 dives	Biology	Colleen Cavanaugh – Harvard	5	2541–2542
125–XLIV	9 Jun	Block Canyon 1 dive	Biology	Peter Auster – NOAA	5	2543
	5 Aug	Woods Hole Harbor 5 dives	Testing	Barrie Walden – WHOI	1	2544–2548
126	7 Aug 12 Aug – 19 Aug	Dumpsite 106 10 dives	Biology	Fred Grassle – Rutgers	11	2549–2558
					Total Days at Sea: 115	Dives: 76

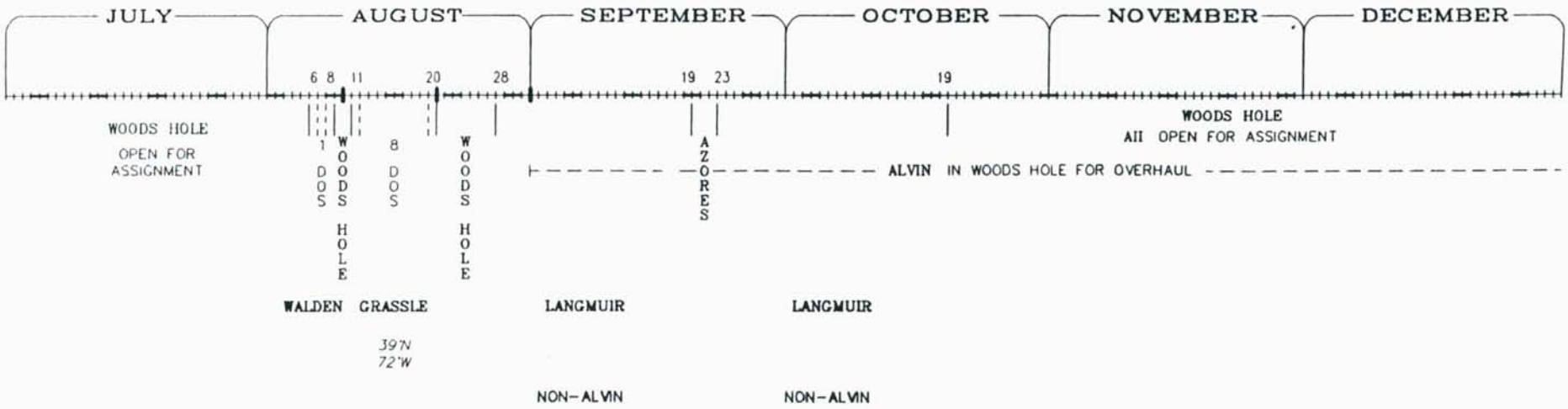
R/V ATLANTIS II & ALVIN OPERATIONS

13 SEP 92
~~14 MAY 92~~
~~27 FEB 92~~
~~28 JAN 92~~
~~9 JAN 92~~
~~4 DEC 91~~
~~16 OCT 91~~
~~25 SEP 91~~

1992

OPERATIONAL SCIENTIFIC SERVICES
WOODS HOLE OCEANOGRAPHIC INSTITUTION

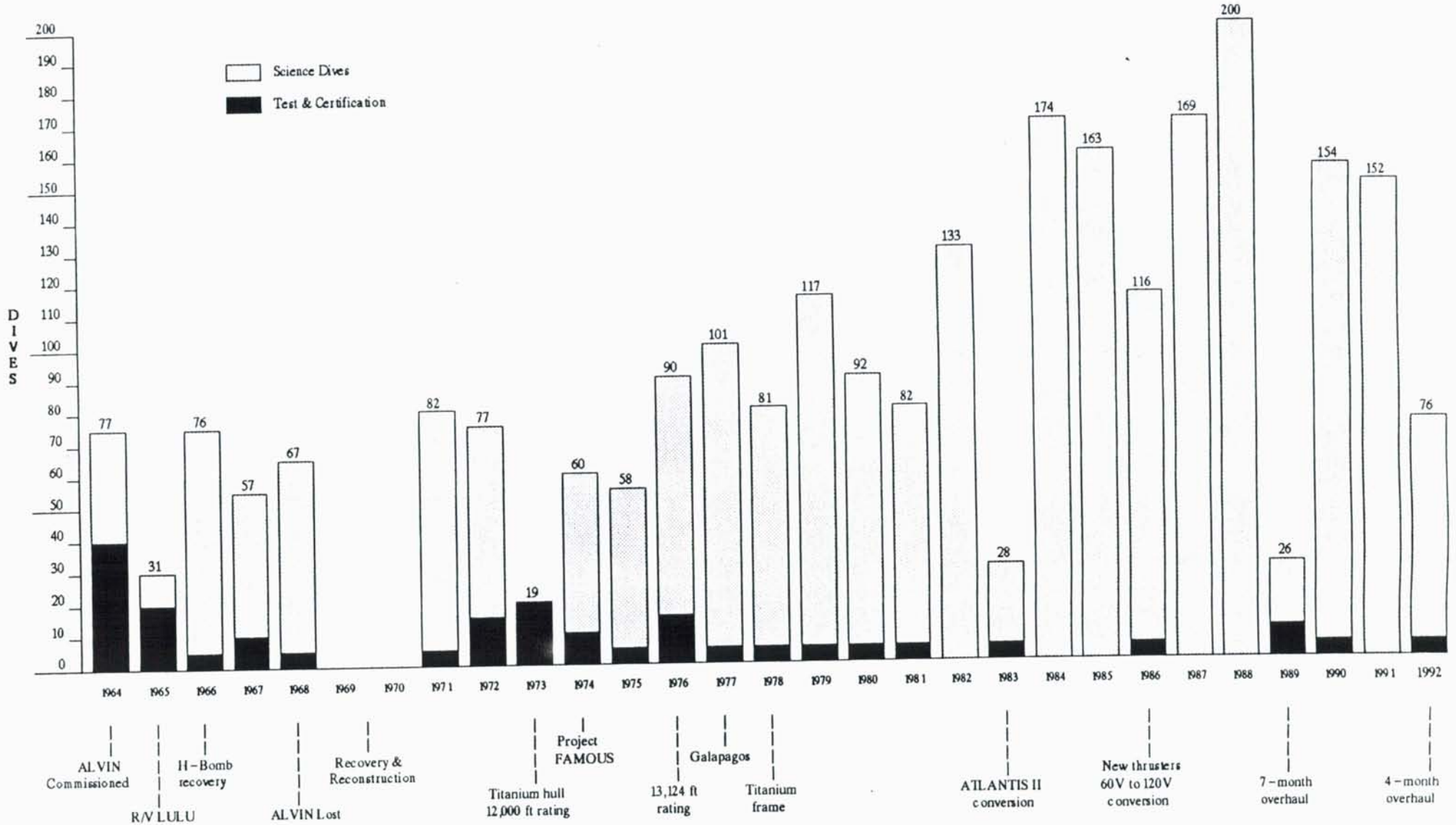




Dive	Date	Ops Area	Lat	Lon	Depth	Pilot	Observer 1	Observer 2
2483	02/07/92	SAN PEDRO CHANNEL	33-27.9N	118-20.0W	894	R. GRIEVE	DUDLEY FOSTER	EDWARD VERRY
2484	02/08/92	SAN PEDRO CHANNEL	33-28.1N	118-19.9W	894	D. FOSTER	CHARLES DANA	MARJORIE VAN STADE
2485	02/09/92	SAN PEDRO CHANNEL	33-27.9N	118-20.0W	894	T. CONNORS	WILLIAM BUNKER	BROCK ROSENTHAL
2486	02/10/92	SAN PEDRO CHANNEL	33-28.0N	118-20.1W	890	R. GRIEVE	RICHARD CHANDLER	HASSAN MOSTAFAVI
2487	02/11/92	SAN PEDRO CHANNEL	33-28.1N	118-19.9W	894	D. FOSTER	ROGER HUGHES	ALAN TRIMBLE
2488	02/25/92	EAST PACIFIC RISE	09-31.7N	104-14.5W	2674	T. CONNORS	MICHAEL PERFIT	DANIEL SCHEIRER
2489	02/26/92	EAST PACIFIC RISE	09-31.8N	104-13.4W	2859	R. GRIEVE	MICHAEL PERFIT	RODY BATIZA
2490	02/27/92	EAST PACIFIC RISE	09-31.7N	104-14.6W	2680	D. FOSTER	DANIEL FORNARI	MARGO EDWARDS
2491	02/28/92	EAST PACIFIC RISE	10-00.6N	104-19.6W	2590	T. CONNORS	KEN MACDONALD	MARVIN LILLEY
2492	02/29/92	EAST PACIFIC RISE	09-50.8N	104-17.6W	2525	R. GRIEVE	RACHEL HAYMON	PAT SHANKS
2493	03/01/92	EAST PACIFIC RISE	09-49.4N	104-14.9W	2556	D. FOSTER	RANDIL HINDERER	KAREN VON DAMM
2494	03/02/92	EAST PACIFIC RISE	09-33.9N	104-14.9W	2572	T. CONNORS	PAT SHANKS	KAREN VON DAMM
2495	03/03/92	EAST PACIFIC RISE	09-31.3N	104-13.9W	2834	R. GRIEVE	MICHAEL PERFIT	RODY BATIZA
2496	03/04/92	EAST PACIFIC RISE	09-50.7N	104-17.6W	2524	D. FOSTER	DANIEL FORNARI	RICHARD LUTZ
2497	03/05/92	EAST PACIFIC RISE	09-53.2N	104-17.6W	2570	T. CONNORS	MICHAEL PERFIT	KEN MACDONALD
2498	03/06/92	EAST PACIFIC RISE	09-50.5N	104-17.5W	2525	R. GRIEVE	RACHEL HAYMON	KEN MACDONALD
2499	03/07/92	EAST PACIFIC RISE	09-49.6N	104-17.4W	2516	D. FOSTER	DANIEL FORNARI	RICHARD LUTZ
2500	03/08/92	EAST PACIFIC RISE	09-46.6N	104-16.8W	2536	T. CONNORS	KAREN VON DAMM	DEBRA COLODNER
2501	03/09/92	EAST PACIFIC RISE	09-49.7N	104-17.2W	2525	R. GRIEVE	RICHARD LUTZ	DANIEL FORNARI
2502	03/10/92	EAST PACIFIC RISE	09-47.8N	104-16.8W	2537	D. FOSTER	RACHEL HAYMON	MICHAEL BLACK
2503	03/11/92	EAST PACIFIC RISE	09-31.0N	104-14.9W	2610	T. CONNORS	RANDIL HINDERER	DANIEL FORNARI
2504	03/12/92	EAST PACIFIC RISE	09-50.3N	104-17.6W	2525	R. GRIEVE	RACHEL HAYMON	MARVIN LILLEY
2505	03/13/92	EAST PACIFIC RISE	09-50.9N	104-17.4W	2519	D. FOSTER	RANDIL HINDERER	PAT SHANKS
2506	03/22/92	EAST PACIFIC RISE	20-49.9N	109-06.2W	2608	P. HICKEY	JOHN EDMOND	DOUG CROWE
2507	03/23/92	EAST PACIFIC RISE	20-50.2N	109-06.1W	2615	T. CONNORS	JUDY MINNICH	EDUARDO CAMARCO
2508	03/24/92	EAST PACIFIC RISE	20-47.0N	109-08.9W	2591	R. GRIEVE	JOHN EDMOND	MONIQUE LAWRENCE
2509	03/25/92	EAST PACIFIC RISE	20-50.0N	109-06.1W	2616	R. GRIEVE	ROGER HUGHES	VIVIANE SOLIS-WEISS
2510	03/26/92	EAST PACIFIC RISE	20-50.5N	109-05.7W	2612	T. CONNORS	SARA REDDING	JONATHAN BETTS
2511	04/03/92	EAST PACIFIC RISE	12-48.7N	103-56.3W	2636	P. HICKEY	JAMES CHILDRESS	BRIDGET LAUE
2512	04/04/92	EAST PACIFIC RISE	12-48.8N	103-56.3W	2630	T. CONNORS	DANIEL DESBRUYERES	AUDRE TOULMOND
2513	04/05/92	EAST PACIFIC RISE	12-48.9N	103-56.4W	2636	P. HICKEY	ALEXIZ KHRIPOUNOFF	MONIKA NEBELSICK
2514	04/06/92	EAST PACIFIC RISE	12-48.9N	103-56.2W	2636	T. CONNORS	JAMES CHILDRESS	RAY LEE
2515	04/07/92	EAST PACIFIC RISE	12-48.7N	103-56.3W	2635	P. HICKEY	ROGER HUGHES	PIERRE CHEVALDONNE
2516	04/08/92	EAST PACIFIC RISE	12-48.5N	103-56.0W	2636	T. CONNORS	CHUCK FISHER	JENNY VODENICHAR
2517	04/09/92	EAST PACIFIC RISE	12-48.2N	103-56.2W	2636	P. HICKEY	HORST FELBECK	PAT TURNER
2518	04/10/92	EAST PACIFIC RISE	12-48.0N	103-56.0W	175	T. CONNORS	DANIEL DESBRUYERES	PIERRE WATREMEZ
2519	04/11/92	EAST PACIFIC RISE	12-48.1N	103-56.3W	2631	P. HICKEY	DANIEL DESBRUYERES	PIERRE WATREMEZ
2520	04/12/92	EAST PACIFIC RISE	12-48.5N	103-56.3W	2636	T. CONNORS	JAMES CHILDRESS	BRUCE SHILLITO
2521	04/13/92	EAST PACIFIC RISE	12-48.5N	103-56.3W	2635	P. HICKEY	RANDIL HINDERER	CHUCK FISHER
2522	04/14/92	EAST PACIFIC RISE	12-48.5N	103-56.4W	2630	T. CONNORS	DANIEL DESBRUYERES	RICHARD COSSON
2523	04/15/92	EAST PACIFIC RISE	12-48.9N	103-56.3W	2636	P. HICKEY	CHUCK FISHER	KATIE SCOTT
2524	04/16/92	EAST PACIFIC RISE	12-48.5N	103-56.6W	2636	T. CONNORS	HORST FELBECK	SHERI LANGERMAN

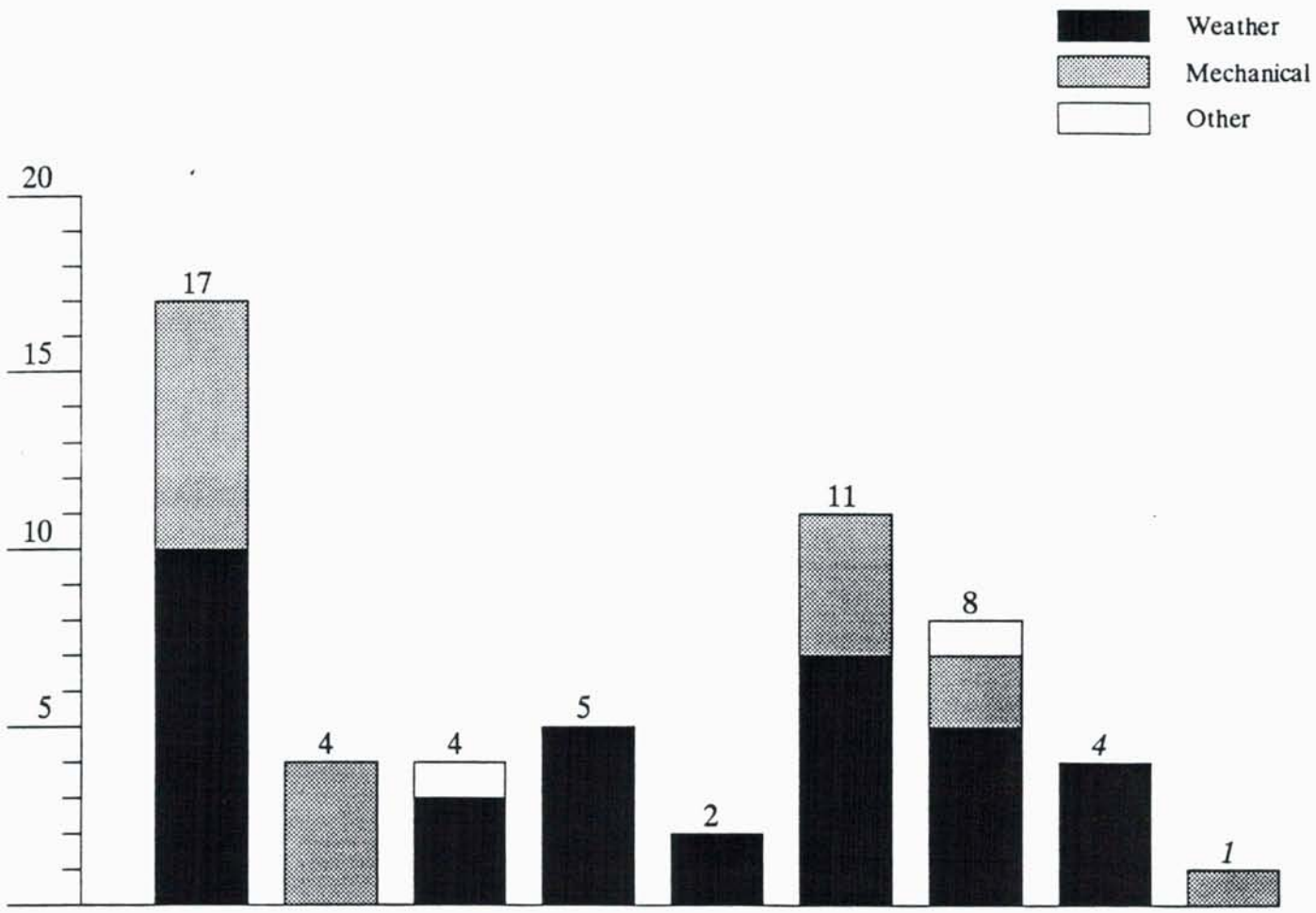
2525	04/17/92	EAST PACIFIC RISE	12-48.8N	103-56.5W	2640	P. HICKEY	ROGER HUGHES	DANIEL DESBRUYERES
2526	04/18/92	EAST PACIFIC RISE	12-48.8N	103-56.5W	2636	T. CONNORS	HORST FELBECK	PATRICK GEISTDOERFER
2527	04/19/92	EAST PACIFIC RISE	12-48.7N	103-56.6W	2629	P. HICKEY	DANIEL DESBRUYERES	JANINA JARCHOW
2528	04/20/92	EAST PACIFIC RISE	12-48.6N	103-56.7W	2637	T. CONNORS	CHUCK FISHER	CHRIS AIRRIESS
2529	04/21/92	EAST PACIFIC RISE	12-48.7N	103-56.5W	2636	P. HICKEY	JAMES CHILDRESS	DANIEL OROS
2530	04/22/92	EAST PACIFIC RISE	12-47.9N	103-56.2W	2626	T. CONNORS	RANDIL HINDERER	PIERRE CHEVALDONNE
2531	04/23/92	EAST PACIFIC RISE	12-48.2N	103-56.2W	2631	P. HICKEY	JAMES CHILDRESS	LAURA GORODEZKY
2532	04/24/92	EAST PACIFIC RISE	12-48.2N	103-56.3W	2635	T. CONNORS	NANCY SANDERS	ERIN MACK
2533	04/25/92	EAST PACIFIC RISE	12-48.1N	103-56.6W	2636	P. HICKEY	PHILLIPE CRASSOUS	DAVID TAPLEY
2534	05/20/92	ALAMINOS CANYON	26-21.2N	94-29.6W	2286	R. GRIEVE	IAN MACDONALD	WILL SCHROEDER
2535	05/22/92	ALAMINOS CANYON	26-21.1N	94-29.5W	2220	P. HICKEY	IAN MACDONALD	JULIE AMBLER
2536	05/23/92	ALAMINOS CANYON	26-21.3N	94-29.6W	2229	T. CONNORS	CHUCK FISHER	JILL ZANDE
2537	05/24/92	ALAMINOS CANYON	26-21.5N	94-29.6W	2245	R. GRIEVE	ROBERT CARNEY	ERICA NIX
2538	05/25/92	ALAMINOS CANYON	26-21.2N	94-29.7W	2223	P. HICKEY	ROGER HUGHES	CHUCK FISHER
2539	05/26/92	ALAMINOS CANYON	26-21.2N	94-29.8W	2221	T. CONNORS	CHUCK FISHER	STEVE GARDINER
2540	05/28/92	BLOWOUT CRATER	28-16.8N	88-07.7W	2224	R. GRIEVE	IAN MACDONALD	CHANG LEE
2541	06/02/92	WEST FLORIDA ESCARPMENT	26-01.9N	84-54.6W	2972	P. HICKEY	COLLEEN CAVANAUGH	DANA KRUEGER
2542	06/03/92	WEST FLORIDA ESCARPMENT	26-01.8N	84-54.6W	3313	T. CONNORS	COLLEEN CAVANAUGH	DAN DISTEL
2543	06/09/92	BLOCK CANYON	38-59.9N	70-59.9W	2833	R. GRIEVE	SUSAN LAROSA	CHRIS MICHALOPOULUS
2544	08/05/92	WOODS HOLE HARBOR	41-31.4N	70-40.3W	17	P. HICKEY	RICHARD PITTENGER	EMILY SIGSBEE
2545	08/05/92	WOODS HOLE HARBOR	41-31.4N	70-40.3W	20	T. CONNORS	PAT PASANEN	CHARLES CORWIN
2546	08/05/92	WOODS HOLE HARBOR	41-31.4N	70-40.3W	20	R. GRIEVE	PAUL MORRISSEY	JAY DUFUR
2547	08/05/92	WOODS HOLE HARBOR	41-31.4N	70-40.3W	23	R. GRIEVE	BETSEY DOHERTY	AL BOUCHARD
2548	08/05/92	WOODS HOLE HARBOR	41-31.4N	70-40.3W	23	R. GRIEVE	MICHAEL NOLIN	KATIE WILSON
2549	08/07/92	DEEP WATER DUMP SITES	39-20.0N	70-39.7W	2621	P. HICKEY	ROBERT WHITLATCH	STEVE SMITH
2550	08/12/92	DEEP WATER DUMP SITES	39-20.0N	70-40.1W	2627	R. GRIEVE	STEVE SMITH	PAUL SNELGROVE
2551	08/13/92	DEEP WATER DUMP SITES	38-49.1N	72-07.9W	2616	T. CONNORS	BARBARA HECKER	JOANNE GOODREAU
2552	08/14/92	DEEP WATER DUMP SITES	38-49.0N	72-07.7W	2615	D. FOSTER	CINDY VAN DOVER	RUSSELL HILL
2553	08/15/92	DEEP WATER DUMP SITES	38-34.3N	72-29.4W	90	P. HICKEY	ROGER HUGHES	MIKE BOTHNER
2554	08/15/92	DEEP WATER DUMP SITES	38-34.3N	72-29.4W	2643	P. HICKEY	ROGER HUGHES	MIKE BOTHNER
2555	08/16/92	DEEP WATER DUMP SITES	38-16.0N	72-52.7W	2637	R. GRIEVE	ROSEMARIE PETRECCA	RONALD ETTER
2556	08/17/92	DEEP WATER DUMP SITES	38-54.6N	72-07.7W	2833	T. CONNORS	FRED GRASSLE	BRUCE BROWNAWELL
2557	08/18/92	DEEP WATER DUMP SITES	38-19.7N	70-40.1W	2624	D. FOSTER	ROBERT WHITLATCH	DIANA COPPINGER
2558	08/19/92	DEEP WATER DUMP SITES	38-19.9N	70-39.5W	2833	P. HICKEY	CAROL PARMENTER	HOVEY CLIFFORD

DSV–2 ALVIN DIVE HISTORY



DSV ALVIN

Dives Lost



	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Dives:	174	163	116	169	200	26	154	152	76

APPENDIX X

SUMMARY

NOT AVAILABLE

AT TIME

OF PRINT

APPENDIX XI

SUMMARY OF RESPONSES TO ALVIN EQUIPMENT NOTICE

This list represents a compilation of responses from two sources. Fifteen letters were received in response to the notice posted in EOS and on the OMNET Ocean Sciences bulletin board regarding existing equipment and desired future equipment upgrades for ALVIN. Input was also gathered from more than 60 scientists who attended the DESSC Workshop in October, 1992. These responses were received from individuals in all branches of U. S. submersible science (i.e. biology, chemistry and geology). The summary below tabulates the received information.

EXISTING COMMUNITY-OWNED AND SHARED EQUIPMENT USED PREVIOUSLY WITH ALVIN

(numbers do not indicate priority ranking)

1. MARQUEST digital electronic still camera and strobe system. Rented from MARQUEST at ~$15,000-$20,000/month.

2. UW-CCD camera. Digital, electronic still camera used with ALVIN-group strobes. A proposal is pending for upgrade to hardware and software to increase strobe illumination, light sensitivity, rep. rate, and digital processing of images. Use is free of charge, but user needs to pay for shipping, insurance and pre- and post-cruise maintenance costs (approximately $2,000-3,000 depending largely on shipping costs). Contact M. H. Edwards, UH-SOEST, camera system equipment of M. Smith, U. Washington.

3. Stakes/Holloway rock drill. Used to drill hydrothermal, semi-consolidated deposits, and rock samples generally <30 cm long. Available at no charge but user generally pays for shipping and insurance costs (approximately $1,000-2,000 depending on shipping).

4. Equipment elevator with buoyancy/ballast system and acoustic release. Part of ALVIN group hardware, needs improvements (e.g. more reliable acoustic release, more than just one system).

5. Seabird CTD recorder (self-contained). Part of ALVIN group hardware, however not routinely used and users felt it should be routinely used and output should be part of digital datalogger database like altimeter, depth, time, heading, etc.

6. Eckman-style box corers. Equipment of L. Levin, SIO.

7. NOAA manifold sampler used to take *in situ*, uncontaminated hydrothermal water samples and record temperature data. Use is at no-charge but user must pay for shipping, insurance and pre- and post-cruise maintenance (approx. cost $5,000-10,000 depending on shipping). NOAA equipment, contact G. Massoth, PMEL

8. NOAA SUAVE chemical analyzer used to record various chemical and physical water properties. Use is at no-charge, but user must pay for shipping, insurance and pre- and post-cruise maintenance. NOAA equipment, contact G. Massoth, PMEL.

9. Slurp Gun Systems (large ~2 gallon; and small 0.5-1.0 gallon). Equipment of C. Wirsen, WHOI.

10. Large and small diameter corers (6-8" and 1.75"). Equipment of C. Wirsen, WHOI.

11. "One-Fiver" Filtration System. Stacked, parallel flow membranes in housing - used with Pelagic Electronic immersion pump to filter organic and inorganic particulates. Equipment of C. Wirsen, WHOI.

12. Physical/chemical parameters floating array. 50 m long instrument array floated above ALVIN - used for hydrothermal plume studies. Equipment of R. P. Von Herzen, WHOI; J. Dean, WHOI; and M. Mottl, UH-SOEST.

QUESTIONS TO ANSWER ABOUT EXISTING COMMUNITY-OWNED AND SHARED EQUIPMENT USED PREVIOUSLY WITH ALVIN

- What equipment that is presently distributed throughout the community is best left with individual researchers and what equipment should be incorporated into the ALVIN arsenal?

- What equipment needs upgrading (i.e. more efficient, easier for pilots and/or scientists to use)?

- Is there a need to standardize certain equipment that is presently widely distributed and have these capabilities reside with the ALVIN group (i.e. slurp guns, biology "coffins", corers?

- Is there specialized disciplinary equipment that could be best developed and utilized as a pooled resource serving a narrow community (e.g. physical/chemical floating array)?

NEW EQUIPMENT IDENTIFIED AS HIGH-PRIORITY ACQUISITION FOR ALVIN
(separated into requests made by disciplinary groups, numbers do not indicate priority ranking)

Biology/Chemistry Requests

1. Pan/tilt and zoom capability for new 3-chip, hi-resolution color video.
2. Close-up/zoom 35 mm photographic capability to match macro-views on hi-resolution color video.
3 CCD imaging system.
4. Laser scaling for ALL exterior cameras.
5. Optional manipulator arms for diverse science tasks.
6. Standard measurement and recording of CTD, DO (dissolved 0_2), and turbidity.
7 Box corers for sediment and animal collection, various sizes.
8. Thermal containers (Lutz-style "coffins") for biological samples.
9. Exact, high-resolution navigation system and in-sub. display.
10. HMI lighting system.
11. Rosette (lazy-susan)sample/slurp gun for organic and inorganic particulates.
12. Development of a compact multi-sampler geochemical/microbiological *in situ* filtration system for the sampling of buoyant hydrothermal plumes (under development C. German, IOS, U.K.)

Geology Requests

1. Laser scaling for ALL external cameras.
2. Rock drill.
   a. upgrading of Stakes/Holloway drill to drill oriented igneous rocks (~60 cm long cores).
   b. development of autonomous rock drill system for longer cores, sited and deployed by ALVIN and left to drill the rock and then acoustic release to surface.
3. Improved SIT black and white video system with pan and tilt capabilities.
4. Improved 3-chip color video with pan/tilt/zoom, observer controlled.
5. CCD imaging system for larger perspective digital mapping.
6. Improved overall lighting system, HMI or other.
7. In-sub. navigation and display system to overlay real-time sub. track over bathymetric or backscatter imagery of dive area.
8. Hi-frequency acoustic imaging system to place submersible-based observations within perspective of larger-scale backscatter imagery.
9. Reliable altimeter and data output to datalogger.
10. Laser line scan system for high-resolution swath mapping from a deep submergence platform (ROV or submersible).
11. Subbottom seismic system (shallow penetration of meters to a few hundred meters) for high-resolution seismic mapping from a deep submergence platform (ROV or submersible).
12. Hard-rock hammer.
13. Easy integration of sample location with in-hull navigation.

QUESTIONS TO ANSWER ABOUT NEW EQUIPMENT IDENTIFIED AS HIGH-PRIORITY ACQUISITION FOR ALVIN

- What types of new equipment are identified by all disciplines as being critical to enhance future science operations on ALVIN?

- What items identified above are already earmarked for upgrade or new purchase by ALVIN group? Do sufficient funds exist in current budget to permit best quality and latest technology?

- What is the vehicle (i.e. committee make-up and proposing body), and timetable on which we see the writing of the proposal for this equipment, and when do we estimate that its purchase and installation on ALVIN will take place? Are there funding agency deadlines? What agencies should be targeted?

APPENDIX XII

Memo

To: Deep Submergence Science Community
From: P. J. Fox for the DESSC
Subject: The Results of the 1992 DESSC Annual Meeting
Date: December 18, 1992

On December 6 in San Francisco the DESSC hosted an all day meeting for members of the deep submergence science community during which time a broad range of issues were discussed (see attached minutes for details). It is not my purpose to review the meeting; rather, I would like, on behalf of the DESSC, to highlight for the community decisions that were taken by the DESSC during the executive session following the day long deliberations of our community.

First, the headlines:

- The DESSC recommends that the majority of the 1994 and 1995 field programs be devoted to scientific programs located in relatively close proximity to the continental U.S.
- Because of agency interest and the importance of advancing cooperative international programs, the DESSC encourages those investigators with deep submergence research interests in the southeastern Pacific to design a modest field program for the end of 1995 (prior to the next major overhaul of ALVIN and conversion of KNORR as support ship for ALVIN; this work could carry over into 1996 and the length of the program will be determined by proposal pressure and logistical concerns).
- The DESSC recognizes the large community of investigators who would like to use ALVIN in the global arena and a commitment in principle is made to carry out a major global field program in the 1996-1997 time frame. By major we mean a 6 month or longer foray to distant work areas. The location and outline of such a program will be developed at the DESSC meeting in June and will be based on investigative portfolios prepared by the heroes and heroines for the global areas. These documents would contain two page summaries of each program to be proposed and these summaries would define the science to be done, the maturity of the scientific questions with respect to the use of ALVIN, and logistical characteristics (number of dives, location, etc.).
- **Please take note** that the scheduling framework outlined above in bullets 1-3 is a strategy based on an assessment of interest letters, many of which were hastily prepared and vague on important points. A more robust schedule for 1994 and 1995 will be developed during the DESSC meeting in June, 1993. For this meeting, the DESSC will request that investigators submit concise 2 page summaries of their proposed program. Such statements can stand alone or, if they are part of an integrated effort to a region or a specific area, the research statements can be included in an investigative portfolio. If, after an analysis of this material in June, the schedule outlined above seems flawed (i.e. the work in the traditional work areas is weak relative to more far ranging investigations), then DESSC will not hesitate to alter our plans. The bottom line is that we must do whatever we can to insure that ALVIN is well utilized and does the best science.
- At the urging of the Office of Naval Research (ONR), the ROV and submersible operational groups at WHOI are being merged and, starting in 1993, both assets will be part of the three agency (NOAA, NSF, ONR) memorandum of agreement. With this merger, the DESSC will work with the funding agencies, the WHOI team and the community of users to effectively utilize these assets. By late winter (March 1), WHOI

will prepare for the community a definition of the ROV operation (costs, system options and deliverables). Presently, it is not clear how the costs for the use of the ROV will appear on science proposals. For proposals sent to ONR for consideration, costs for ROV usage will be invisible (i.e. like ALVIN). For investigators submitting proposals to NSF, the guidelines have as yet not been established and it is recommended that the interested PI's call NSF for clarification.

- Based on letters received from the community and comments made during the December meeting, a DESSC sub-committee is preparing a plan to upgrade ALVIN's imaging capability. This plan will be finalized by the end of January and will serve as the core of a DESSC-endorsed equipment upgrade proposal to be submitted to NSF, ONR and NOAA. In addition, other high priority items of a simpler and less costly nature are being identified and will be included in an upgrade proposal.

Second, the background rationale:

Global Work Areas and Scheduling. For the 1994 and 1995 field season, over 500 dive days were proposed for ALVIN in non-traditional work areas that were positioned globally and located in both hemispheres. The scientific work proposed is diverse and is located across the spectrum of abyssal environments. Such an overwhelming response to a call for letters of interest is heartening and bodes well for full utilization of this superb asset, but it does necessitate a commitment to community-wide organization and a willingness to make hard decisions about what work areas to encourage proposal development for in the 94 and 95 time frame and what work areas will be slated for later scheduling. There was much discussion about whether or not one or more of the global work areas (Tethyan region, southern eastern Pacific, western Pacific) should be encouraged to generate proposals and compete in a major way for time in 94 and 95. From the scientific programs outlined in the many letters of interest and the presentations made by the heroines and heroes for the global areas, it was clear that there is a broad and diverse community of users who wish to use ALVIN to address important questions in the global abyss. It is in our interest as a community to define a process that allows these programs to mature, and we must devise a strategy so that global investigations can be coordinated with ongoing programs in the traditional ALVIN work areas. During discussions at the meeting, many investigators pointed out that to be competitive it was important that proposals for the use of ALVIN be scientifically mature. Many of the letters of interest were vague on this point, suggesting that some of the global programs would benefit from further observational refinement of programmatic definition. This is to say, each of the global regions had proposed programs that would benefit from a preparatory cruise to better constrain the problem for submersible work. Such preparatory cruises need time to be proposed, funded and carried out. We do not want to encourage a global program prematurely.

Based on these deliberations DESSC makes the following recommendations to the community. A commitment in principle is made to carry out a major global field program in the 1996-97 time frame. The location of the program will be openly competed between the different field areas and a decision about which area to schedule in the 1996-97 time frame will be based on the strongest **total** program (science, disciplinary balance). An initial assessment of the relative strengths of the global work areas will be made at the June DESSC meeting and will be based on an evaluation of investigative portfolios which will be a compilation of all the research programs proposed for a given work area. The heroines and heroes for each region are asked to put these portfolios together. Each program would be defined by a two-page pre-proposal that would state that scientific questions to be addressed, the diving parameters (number, timing, logistical demands), the preparedness of the program for ALVIN work, and the need for ALVIN as the deep

submergence asset. DESSC requests that the global area advocates begin to gather material and assemble the portfolios. A 1996-1997 time frame for a global expedition will alow investigators to assess the scientific maturity of their research program with respect to the use of ALVIN and investigators can propose pre-dive preparatory field work for 1994 and 1995, if such work is deemed necessary (see below as to how funding requests for ROV work are presently handled by different agencies). DESSC asks the deep submergence community that have worked in the familiar natural laboratories (i.e. Juan de Fuca, coast of California; northern EPR, Gulf of Mexico, central North Atlantic) to consider the implications of a global program in 1996-1997 on time series investigations; in particular, how can ROVs be profitably used to carry out certain tasks and what do we have to do now as a community to prepare for this situation.

ALVIN 94 and 95 Scheduling: DESSC believes that in 1994 and 1995 ALVIN should **largely** be committed to work in its familiar work areas proximal to the U.S. Strong proposals were received for these areas (> 600 dives), some work is already funded (70 dives in 94; 18 dives in 95), the science is very mature, and the need for ALVIN is clear. In addition, much of the proposed work is closely tied to time series studies in areas that are rapidly evolving with respect to key scientific questions and/or tied to a research initiative (RIDGE) that has committed programmatic resources to carrying out these time series studies and developing long-term monitoring experiments. In addition, there is excellent new work that is also proposed for areas proximal to the U.S. In order to effectively prepare for 1994-1995, DESSC requests that investigators supply DESSC with a copy of their proposals for work in 1994 and 1995 before the scheduled DESSC meeting in June, when DESSC will work with agency representatives and WHOI staff to develop a tentative schedule that most effectively utilizes deep submergence assets.

The DESSC wishes to insure the community of biologists, chemists and geologists who would like to use ALVIN in the sedimented regimes away from ridge crests that proposals for this work will be welcomed and are encouraged in order to broaden the user base that conducts deep ocean research with ALVIN and other ROVs. There is no hidden disciplinary agenda.

Although the focus for ALVIN in 1994 and 1995 will be largely devoted to the familiar work areas, the DESSC recommends that the community consider an investigative foray south of the equator in the eastern Pacific in late 1995. During the DESSC workshop held in October in Arlington, VA, Dr. Don Heinrichs of NSF mentioned that discussions had taken place with Japanese representatives about the possibility of a cooperative Japanese-U.S. submersible program on the southern EPR. Drs. Urabe and Hotta of Japan attended the December 6 DESSC meeting and Dr. Urabe gave a summary of the Japanese plans to bring Japanese deep submergence assets (SHINKAI 6500 and ROV) to the EPR for a ridge-axis centered program in 1994. Some of the work they propose would involve time series investigations that necessitate submersible work in calendar year 1995. It is proposed that ALVIN be available in the late 1995 time frame to work on the southern EPR as part of this cooperative endeavor. Such work does not have to be limited to the ridge crest, but can be located off axis in sedimented environments on ridge flanks or continental margins.

The DESSC recognizes the importance of a cooperative program with the Japanese; such a program could hopefully serve as a first step towards developing an effective way to share deep submergence assets in the global arena in the years to come. The DESSC also appreciates that at the agency level there is interest in seeing such a cooperative program take place. From an analysis of the letters of interest, the DESSC believes that there are a number of proposed programs on the southern EPR that are either ready for ALVIN-based

work or could become submersible-mature with ROV work during the Japanese-sponsored 1994 field program. Given these factors, DESSC recommends that a southern EPR foray be considered in the latter part of 1995, after the field season off the west coast of the U.S. In order to establish whether or not a robust investigative program can be developed in the late 1995 time frame, interested investigators are asked, if they have not already done so, to submit a two-page definition of their proposed program to Dr. John Edmond. Dr. Edmond, in consultation with proponents, will prepare an investigative prospectus. This prospectus will be presented to the DESSC at its June meeting. In addition, potential proponents for work south of the equator in 1995 are urged to get their proposals into the proposal process as early as possible (i.e. May 1993 for NSF).

WHOI ROV System (Jason, Medea) and Scheduling Issues: At the urging of the ONR, the ROV and submersible operational groups at WHOI have been merged to maximize efficiency and reduce costs. In the MOA that is waiting finalization by the three ALVIN sponsoring agencies (ONR, NOAA, NSF), the WHOI ROV system is included as part of the agreement. The effect that this arrangement has on how the charges for use of the ROV will appear in a proposal is not obvious. ONR will consider WHOI ROV charges invisible for the user (e.g. like ALVIN) on proposals to be submitted to that agency. It is not likely to be the case for the submission to NSF, although a final policy has yet to be defined. DESSC recommends that if you are considering using the WHOI ROV in 1994 to 1995 and planning to seek NSF support, you should call NSF first to clarify their position. Also, the Deep Submergence Laboratory at WHOI will publish and distribute an ROV prospectus that will define system characteristics/options,costs and deliverables for various operations. Since ALVIN and ROV operations are in the process of being combined, DESSC will need, for scheduling purposes, at its June meeting the same sort of material documenting proposed ROV use as is submitted for ALVIN use.

The DESSC echoes the comments made by many investigators at the open meeting and registers a concern that the new MOA agreement may make it more difficult for ROV operations located at other institutions to survive. The DESSC will work with agency representatives, ROV operators and the user community to develop a long-range plan that best serves the community's deep submergence needs.

Technology Upgrades for ALVIN: As a result of recommendations that came out of the DESSC workshop in San Francisco, DESSC has constituted an ad hoc sub-committee to prepare a short white paper that summarizes the user community scientific needs with respect to improvements in ALVIN's imaging capability. After this document is prepared (early January), DESSC members will meet with members of the ALVIN group and representatives from industry to design a forward-looking solution to the need for a more sophisticated imaging capability for ALVIN. A plan should be in hand by the end of February. Once this plan is in hand, DESSC will work with representatives from the community and WHOI to prepare a proposal for an upgrade in imaging capability. Also, included in this proposal will be less sophisticated equipment that the community has identified as high priority (e.g. sample chambers, rossette sampler) but of small cost.

Issues Related to the JGOFS Decision: The DESSC has decided not to encourage proponents who wished to take ALVIN into the Arabian Sea in late 94 and 95, largely because there did not seem to be strong JGOFS programmatic support for this new endeavor (i.e. commitment to expand the JGOFS program plan and to commit JGOFS resources). In addition, NSF agency representatives expressed strong reservations about the proposal from their programmatic/facilities perspective.

APPENDIX XIII

ALVIN/ATLANTIS II, Notification of Intent Summary 12/92

	Investigator	Associates	Area	Purpose	Sponsor	Date	Alternate	Dives	Remarks
1.	J.S. Gee, D.V. Kent, L-DGO S.C. Cande, SIO	S.P. Miller, UCSB	19.5 S, 113.5 W	Determine the source of short wavelength variations within the Central Magnetic anomaly at the East Pacific Rise	NSF	Jan 1994		20	
3. ***	M.O. Garcia, U. Hawaii	J. Mahoney, U. Hawaii M. Kurz, WHOI	Loihi Seamount, South of the island Hawaii	Collection of stratigraphic sequence of lavas from the deeply dissected east flank of the seamount to test models for the geochemical evolution of Hawaiian volcanoes and to evaluate the melting history of hotspot volcanoes.	NSF-OCE	July-Aug	Sept-Oct	7	
4.	K. Wishner, URI	J. Deming, UW M. Gowing, UCSC A. Hanson, URI D. Kester, URI L. Levin, SIO L. Mullineaux, WHOI C. Turley, PML (UK)	Volcano 7, 12 N, 102 W	OMZI- Effects of the Oxygen Minimum Zone on Pelagic and Benthic Communities, Processes, and Chemistry in the Eastern Tropical Pacific.	NSF	1994-5		leg 1: 28 leg 2: 14	3-6 month separation between legs
5.	C.L. Van Dover, WHOI	A.J. Williams, WHOI H. Truper, U Bonn J. F. Imhoff, U Bonn	48 N, 129 W Juan de Fuca	To study light and phototrophic bacteria at hydrothermal vents	NSF	Aug 1993 June/July 1994	Sept 1993 Aug 1994	3 3	
6.	K.L. Smith, SIO	A.F. Carlucci C.E. Reimers P.M. Williams E.R.M. Druffel J. Bauer, FSU	34 50'N, 123 W	Temporal variations in the deep-sea benthic boundary layer communites, long time series measurements.	NSF	Sept 1994 Nov 1994 Feb 1995		10 10 10	
7.	R. Batiza, U Hawaii	G.P.L. Walker S. Self, UH J. White, UCSB G. Parker, U Minn D. Bercovici, UH	Seamount 6 12 44' N 102 35'W 150 km east of EPR axis	Dynamics of Basalt Eruptions in the Deep Sea. A detailed study of eruptive hyaloclastite deposits will be studied to determine what the eruptions are like and to quantitatively interpret their origin.	NSF	March-June 1994	Jan-March 1994	10	
9.	H.W. Jannasch, WHOI	C. VanDover, WHOI C. Cavanaugh, Harvard R. Lutz, Rutgers K. Stetter, U. Regensburg	East Pacific Rise 9 -13 N	Microbial transformations at Deep-Sea Hydrothermal Vents	NSF	May-June 1994	July-Sept 1994	7	Part of the RIDGE program
10.	C.L. Van Dover J.R. Cann, WHOI		9 50' N, 104 17' W	Development of an in situ sulfide generator	NSF	early & late 1994		2 total	

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11.	R. Lutz, Rutgers	R. Hessler, SIO D. Fornari, LDGO R. Haymon, UCSB K. Von Damm M. Lilley, UW J. Stein, SIO H. Felbeck, SIO C. Smith, U Hawaii L. Mullineaux, WHOI J. Childress, UCSB C. Peterson, UNC C. Fisher, Penn. St.	10 N , along East Pacific Rise	Temporal changes in biological community structure and assoicated geological features at newly-formed hydrothermal vents along the East Pacific Rise.	NSF- RIDGE	May-94 May-95		35 35	
12.	C.R. Fisher, Penn. State	R. Lutz, Rutgers	A. 10 N , along East Pacific Rise B. Juan de Fuca Ridge	Ecological physiology of vestimentiferans and mussels at cold seeps and hydrothermal vents	NSF	July 1993 mid year 1994 mid year 1995 1994-5-6		3 3 3	Criuses need to be at least 9 months and no more than 2 years apart. 1 week each year
13.	C.R. Fisher, Penn. State		Alaminos Canyons seeps, 26 N 94 W	Ecological physiology of vestimentiferans and mussels at cold seeps and hydrothermal vents	NSF	Sum 1993 Sum 1994 Sum 1995		8 6 5	Criuses need to be at least 9 months and no more than 2 years apart.
15.	M.D. Lilley, UW	K.L. Von Damm, UNH	East Pacific Rise 9 N 104 17' W	Coupled temporal changes in biological community structure and water chemistry at newly-formed hydrothermal vents on the EPR Crest.		1993 1994 1995		4 4 4	Addtion to schedule of Lutz
16.	K.L. Von Damm, UNH	M.D. Lilly, UW R.M. Haymon, UW D.J. Fornari, LDGO M.R. Perfit, UF K.C. MacDonald, UCSB	9-10 N, 104 W East Pacific Rise	Temporal evolution of hydrothermal, volcanic, and geologic properties of the EPR 9-10 N.	NSF	mid 1993	late 1993	25	Avoid July-October as hurricane season
17. A	R.W. McCoy	G. Heiken S. Sparks T. Druitt E. McClevlland J. Huijsmans	Aegean Sea Eastern Mediterranean Sea	Stratigraphy and structure of Thira Volcano, Greece	NSF				
17. B	R.W. McCoy		Eastern Mediterranean Sea	Geological structure and sampling of Eratosthenes Seamount; Investigation of potential brine basins on the lower Nile Cone.	NSF BSF (Israel)				
18.	L.S. Mullineaux	E.T. Baker, PMEL-NOAA	Cleft section of Juan de Fuca	To study the dispersal and dynamics of planktonic organisms in hydrothermal vent plumes.	NSF-OCE	Aug 1994	July 1994	14	

ALVIN/ATLANTIS II, Notification of Intent Summary 12/92

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19.	K. Wishner, URI	M. Gowing, UCSC	Omani Coast, Arabian Sea	Effects of the oxygen minimum zone on the fate of organic matter in the Arabian Sea. This will be in conjunction with JGOFS cruises in the Arabian Sea.	NSF	May Sep-Oct. 1994 or 1995		11 11	The southwest monsoon season is June to August.
20.	R.A. Lutz, R.C. Vrijenhoek, Rutgers		17-22 S along EPR Guaymas Basins Juan de Fuca Ridge Oregon Subduction Zone Gorda Ridge Western Pacific, Tethyan Region Indian Ocean	Gene flow, dispersal, and systematics of deep-sea hydrothermal vent organisms	NSF	Jan 1994 mid 1994 July 1995 1995 1995 early 1996 1996 1996	Mar/Apr-94 Aug/Sept-95 late 1996 	14 5 6 6 6 8 4 4	All of the dives should be combined with proposed geological expeditions to any of all of the regions as part of an anticipated "world tour".
21. ***	P.J. Michael, U. Tulsa D. Gomari, LDGO M.R. Perfit, U. Florida		Near East Pacific Rise Crest, 8-10 S 108-109 W	To map and sample in detail a very large lava flow at 8-9 S on the EPR and parts of the adjacent Wilkes Nannoplate.	NSF	any		27	
22.	H.H. Roberts P. Aharon, LSU		Sigsbee Knolls, Gulf of Mexico	To explore the tops of the knolls for the presence of seeps, carbonate build-ups and chemosymbiotic fauna.	NSF NOAA			10-20	
23.	J.F. Bender, UNC C.H. Langmuir, LDGO	K. Kastens, LDGO J. Reynolds, LDGO	East Pacific Rise 12-12.5 N 8 37' N	Spatial vs. temporal variability on two contrasting ridge segments. This is to investigate the off-axis volcanism and the controls on the occurrence of exotic rock types such as transitional MORB and high SiO(2) lavas.	NSF-OCE	spring 1994 summer 1994		20	
24.	W.W. Sager, Texas A&M H.P. Johnson, UW		Emperor Seamount Chain	Determine the paleomagnetic directions for extrusive rocks at 3 sites along the Emperor Seamount Chain, between 45 to 75 My. This is to be a test for True Polar Wander vs. long-term, non-dipole field effects.	NSF			28	
25. ***	D.S. Stakes, USC W.S. Moore, USC	M. Tivey M. Hannington J. Todd P. Schiffman L. Bettison-Varga	9-11 N on the EPR	Collection of hydrothermal deposits, both solids and fluids, from the EPR for isotopic analyses. A companion project of the fluid chemistry at altered basalt stockworks is proposed.				15-20	
26. ***	D.S. Stakes, USC D. Vanko		Nazca Plate: Hess Deep, Juan Feman Microplate and Bauer Scarp	Drilling into crystalline rocks of the mid to lower ocean crust, to investigate the exposure that record the cumulative efforts of the construction of oceanic crust and the flow of hydrothermal fluid.					

	Investigator	Associates	Area	Purpose	Sponsor	Date	Alternate	Dives	Remarks
27.	M. Lilley, UW	C.G. Wheat, UH M.J. Mottl, UH J. Lupton, NOAA R. Zieron Borg, USGS J. Franklin, CGS K. Juniper, U. Quebec E. Davis, PGC K. Becker, U Miami	Juan De Fuca Ridge 48 28' N, 128 42'W	Chemical, thermal, geologic, and biologic studies at Middle Valley Vent Fields, Juan De Fuca Ridge.	NSF	July-Aug 1994		16	
28.	M. Mottl, SOEST	C.G. Wheat, UH K. Becker, U. Miami E. Davis, PGC K. Juniper, U. Quebec V. Tunnicliff, U. Victoria	Eastern flank of Juan de Fuca Ridge 47 42.7'N 127 47'	Study of a hydrothermal system on a ridge-flank basement outcrop: chemical, thermal, and biologic processes associated with 100 C fluids that flow from 3.5 Ma crust.	NSF	July-August 1994		15	
29.	F.J. Sansone, SOEST	C.I. Measures, UH C.G. Wheat, UH D. Karl, UH J. Lupton, NOAA R.A. Feely, NOAA G. Massoth, NOAA	Loihi Seamount 18 55'N, 155 15'W	Investigate the geochemical processes that influence the fate and transport of hydrothermal constitutents released from this volcanically active seamount, and to estimate the magnitude and temporal variation of chemical and thermal fluxes resulting from water-rock reactions and transport processes.	NSF	Mid Sep -Oct 1994		13	
30.	J.J. Childress, USCB H. Felbeck, SIO	C. Fisher, Penn St. R. Lutz, Rutgers J. Stein	9-10 N and 13 N East Pacific Rise	Studies on the physiological ecology of hydrothermal vent chemoautotrophic symbioses. Also studies of changes in environmental conditions over time and the coupling between environmental conditions and symbiotic primary production.		early-mid 1994 early-mid 1995		12 12	Coordinated with Lutz cruise
31.	J.J. Childress, UCSB	E.V. Thuesen R. Carney	100 miles off of Point Conception	To measure biomass and metabolism of near-bottom pelagic fauna, to quantify the role of zooplankton in the metabolism of carbon in the water column.	NSF-OCE	1994, anytime		12	
32.	J.J. Childress, UCSB	H. Felbeck C. Fisher D. Desbruyeres	13 N East Pacific Rise	Studies on the physiological ecology of hydrothermal vent chemoautorophic symbioses. Also studies of changes in environmental conditions over time and the coupling between environmental conditons and symbiotic primary production. Studies will be in collaboration with a French group from IFREMER.		Early 1995		18	The French will seek to bring Nautile to this site later in 1995 as part of this project.
33.	G. Rowe	J. Morse	Arabian Sea	Seasonal studies of the oxic-anoxic zone along the continental margin to relate heterotrophic metabolism of the entire benthic community biomass on a seasonal basis.					Planned in collaboration with the Arabian Sea JGOFS eff
34.	J.E. Eckman, SIO	D. Thistle	San Diego Trough 32 51'N 117 46'W	Impacts of predation by large motile epifauna on macrofauna and meiofauna in the deep-sea, to add to our understanding of predation as a factor in deep-sea community organization.	NSF	Jan-94 Jun-94 Dec-94		13 6 6	 4-8 months after 1st cruise 4-8 months after 2nd cruise

	Investigator	Associates	Area	Purpose	Sponsor	Date	Alternate	Dives	Remarks
35.	J.R. Curray, SIO		Northeastern Indian Ocean	To understand the topography, stucture, volcanic activity, faulting and/or reef growth by correlation from cores to geophysical data.	NSF	anytime			
36.	L. Levin, SIO	D.J. DeMaster, N.C. St. U.	Arabian Sea 17-19 N, 57-65 E	Control of bioturbation and carbon burial by oxygen gradients and seasonal organic matter input on the Arabian Sea floor.	NSF/JGOFS	May 1994 Sept/Oct 1994		11 11	Need to return to same sites after 2-6 months and avoid monsoon season.
37.	D.C. Nelson, UC-Davis	R. Lutz K. Von Damm	EPR 9 45-52'N	To study free living bacteria at newly formed hydrothermal vents. Productivity, impact on sulfide, succession and trophic interactions will be investigated.	NSF	1994 1995			Dives should be 12 months after 1993 dives and then 12 months after the 1994 dives.
38.	P. Lonsdale, SIO	P. Castillo, SIO L. Delgado, CICESE (Mexico)	100 km W of S. Baja California 27 N 116 W to 23 N 113 W	Geologic sampling and study of a string of EPR spreading segments that ceased spreading 12 Ma but keeps erupting.	NSF	1994		16	
39.	J.M. Brooks I.R. MacDonald R. Sassen		Offshore Saudi Arabia or offshore Oman	To investigate chemosynthetic fauna at hydrocarbon seeps in the Arabian Sea. Hydrocarbon geochemistry and benthic ecology will be explored.	Aramco, Saudi Arabia industry sources NSF			5	Piston coring during monsoon season, ALVIN dives during post monsoon leg.
40.	R. Wheatcroft, WHOI	C.A. Butman, WHOI I. Olmez, MIT P. Snelgrove, Rutgers	Oman Margin 18 N 58 E	To determine the mechanistic response of deep-sea benthos to episodic, but predictable carbon pulses.	NSF-JGOFS	Nov-94 May-94 Oct-94		17	Need three equal-spaced dive series spread over a one year period.
41.	M. Tivey, WHOI A.M. Bradley, WHOI		Cleft Segment, Juan de Fuca Ridge or any active vent	To develop an instrument package to monitor the temperature of hydrothermal vent fluids at intervals of minutes to hours over months to years. Also, to construct and test these packages as part of the RIDGE monitoring activities.	NSF RIDGE/ MG&G	June-Sept 1994		4	
42.	M.D. Lilley, UW	D. Butterfield	Southern East Pacific Rise	Chemical and geological characterization of hydrothermal vent fields, at this very fast spreading ridge.					
43.	R.W. Embly, NOAA	J. Lupton, NOAA R. Feely, NOAA E. Baker, NOAA B. Chadwick, OSU R. Koski, USGS I. Jonasson, GSC D. Butterfiled, JISAO	Southern Juan de Fuca Ridge	Geochemical and geological time series at the North Cleft Site	NOAA	July-Sept 1993		20	
44.	Laver, UT		Bransfield Straits	To study the geology, heat flow and hydrothermal activity				20	

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	Investigator	Associates	Area	Purpose	Sponsor	Date	Alternate	Dives	Remarks
45.	Mahoney, SOEST		Manihiki Plateau	Geology				20	
***									
46.	Palmer		20 S, EPR	Plume survey					
***	Sparks								
	Bristol, UK								
47.	Collier, et al, OSU		11-20 S, EPR	Plume Survey					
***									
48.	Haymon et al, UCSB		EPR near	ARGO survey					
***			14.5 -17.5 S						
49.	J. Lupton, NOAA	R. Embly, NOAA	S. EPR	Investigation of hydrothermal systems	NOAA	Oct-Mar		20	
		E. Baker, NOAA	13.5 -20 S, 112-113 W			1994-1995			
		G. Massoth, NOAA							
		R. Feely, NOAA							
		W. Chadwick, OSU							
		D. Butterfield, UW							
		M. Lilley, UW							
		R. Collier, OSU							
		G. Klinkhammer, OSU							
50.	K.L. Von Damm,	M. Lilley	S. EPR	To investigate the fast spreading, volcanically					
	UNH	R. Haymon	17 30'S	active portion of the ridge crest south of the Garrett					
				Fracture zone and north of the Easter Island microplate.					
51.	L.S. Mullineaux, WHOI		S. EPR	Mechanisms for dispersal of larval of vent invertebrates	NSF-RIDGE	1994 or 1995		15	
	P.H. Wiebe, WHOI			to be investigated by comparing the fluxes of larvae					
				in the lateral plume to the near bottom currents, investigating					
				larval accumulation in plume vortices and documenting far-field dispersal.					
52.	D.F. Naar, USF	R. Batiza, R. Ducan,	east of	Detailed geochemical, geological, and geophysical	NSF-MG&G	Spring 94-95		20	
		K. Fanning, R. Hay,	Easter Island	sampling and mapping of critical areas of the Easter					
		J. Francheteau,	27 S 80-113 W	Seamount Chain defined by several swath mapping					
		J. O'Connor, P. Stoffers,		and dredging cruises.					
		L. Parson, R. Poreda,							
		J-G. Schilling, R. Searle,							
53.	L.P. Madin, WHOI	J.E. Craddock, WH	Arabian Sea	The role of the meso- and bentho-pelagic fauna	NSF-JOGFS	Mar-Apr 94-5		6	During the transition periods
		S.M. Bollens, WHOI		in the transformation and vertical flux of organic matter.		Oct-Nov 94-5		6	after the NE and SW monsoons
		P. Kremer, USC		This will be in conjunction with JGOFS Arabian Sea research.					
54.	J. Delaney, UW		Cleft Segment of	The Ridge Seafloor Observatory	NSF	Summer 1994		50 +	
	et al.		Juan de Fuca Ridge		NOAA	Summer 1995		50 +	
55.	J. Delaney, UW	M. Lilley	Endeavour Ridge		NSF	1994		10 +	
		R. McDuff	Juan de Fuca						

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J. Edmond	W. Shanks, USGS J. Lupton, PMEL M. Lilley, UW	26 30 S, 110 W	Chemical sampling of hydrothermal fluids on the superfast segments of the EPR in the region of Easter Island.	NSF			15	
P. Berkman	J. Edmond	Southern Ocean	Study of Global Climate Change					
F. Muller-Karger	K. Fanning J. Torres K. Carder P. Coble	Cariaco Basin 10 35'N, 64 4'W	Biology, chemistry, physics and geology of the oxic/anoxic interface and bottom water column/sediment chemistry and geology.	NSF				
J. Eckman D. Thistle		San Diego Trough		NSF	Jun-94 Dec-94	12 9		
J. Edmond	W. Shanks, USGS W. Zierenberg	18-26 N, 38 E Red Sea	Chemical sampling of hydrothermal fluids associated with the seeps of the Red Sea.	NSF	Oct-March	5		
Y. Marti		Eastern Mediterranean	Sampling of the Eratosthenes Seamount to study details of continental collision.					
T. Urabe		Southern EPR	Monitor hydrothermal activity	Joint US/Japan				
R. Arculus		Woodlark Basin/ Manus Basin North Fiji Basin Macquarie Ridge Australia-Antarctica	Geology Discordance					
A. Droxler		Northern Nicaragua Rise	Sampling of the exposed cliffs of observed drowned banks					
Other Responses								
V. Tunnicliffe U. Victoria		Southern Ocean and Indian Ocean						
J. Rogers U. Cape Town		South Africa and Southern Mozambique						

*** Part of J.M. Edmond's group

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J. Edmond	W. Shanks, USGS J. Lupton, PMEL M. Lilley, UW	26 30 S, 110 W	Chemical sampling of hydrothermal fluids on the superfast segments of the EPR in the region of Easter Island.	NSF			15	
P. Berkman	J. Edmond	Southern Ocean	Study of Global Climate Change					
F. Muller-Karger	K. Fanning J. Torres K. Carder P. Coble	Cariaco Basin 10 35'N, 64 4'W	Biology, chemistry, physics and geology of the oxic/anoxic interface and bottom water column/sediment chemistry and geology.	NSF				
J. Eckman D. Thistle		San Diego Trough		NSF	Jun-94 Dec-94	12 9		
J. Edmond	W. Shanks, USGS W. Zierenberg	18-26 N, 38 E Red Sea	Chemical sampling of hydrothermal fluids associated with the seeps of the Red Sea.	NSF	Oct-March	5		
Y. Marti		Eastern Mediterranean	Sampling of the Eratosthemes Seamount to study details of continental collision.					
T. Urabe		Southern EPR	Monitor hydrothermal activity	Joint US/Japan				
R. Arculus		Woodlark Basin/ Manus Basin North Fiji Basin Macquarie Ridge Australia-Antarctica	Geology Discordance					
A. Droxler		Northern Nicaragua Rise	Sampling of the exposed cliffs of observed drowned banks					
Other Responses								
V. Tunnicliffe U. Victoria		Southern Ocean and Indian Ocean						
J. Rogers U. Cape Town		South Africa and Southern Mozambique						

*** Part of J.M. Edmond's group

APPENDIX XIV

NOTICES OF INTENT BY REGION FOR 1994

CENTRAL AND EAST PACIFIC

HAWAII

3.	Garcia	G&G	7	
29.	Sansone	G&G	13	
		subtotal	*20*	

EASTERN NORTH PACIFIC

6.	Smith	Biol.	30	(+10)
		subtotal	*30*	

JUAN DE FUCA RIDGE

5.	Van Dover	Biol	6	(-3)
12.	Fisher	Biol	15-20?	(+10)
18.	Mullineaux	Biol.	14	
20.	Lutz & Vrijenhoek	Biol.	6	(+6)
27.	Lilley	Multi-1	16	
28.	Mottl	Multi-1	15	
41.	Tivey & Bradley	G&G	4	
54.	Delaney - Cleft	Multi-1	100+	(+50)
55.	Delaney - Endeavour	Multi-1	10+	
		subtotal	*186*	

US COASTAL PACIFIC

20.	Lutz & Vrijenhoek	Biol.	12	(+12)
31.	Childress	Biol.	12	
34.	Eckman	Biol.	25	
38.	Lonsdale	G&G	16	
		subtotal	*65*	

EASTERN TROPICAL PACIFIC

4.	Wishner	Multi-2	42	
7.	Batiza	G&G	10	
		subtotal	*52*	
		TOTAL	**353**	

North EAST PACIFIC RISE (EPR)

9.	Jannasch	Biol.	7	
10.	Van Dover & Cann	Biol.	2	
11.	Lutz	Multi-4	70	(+35)
12.	Fisher	Biol	9	(-3, +3)
15.	Lilley	Multi-2	12	(-4, +4)
16.	Von Damm	G&G	25	(-25)
23.	Bender & Langmuir	G&G	20	
25.	Stakes & Moore	Multi-3	15-20	
30.	Childress	Biol	24	(+12)
32.	Childress	Biol.	18	
37.	Nelson	Biol	10	(+5)
		TOTAL	**212**	

South EAST PACIFIC RISE (EPR)

1.	Gee, Kent & Cande	G&G	20	
20.	Lutz & Vrijenhoek	Biol.	14	
21.	Michael, Gornair, Perfit	G&G	27	
26.	Stakes & Vanco	G&G	3-5?	
42.	Lilley	Multi-3	20-25	
43.	Embly	G&G	20	(-20)
44.	Laver	G&G	20	
45.	Mahoney	G&G	20	
46.	Palmer & Sparks	G&G		
47.	Collier, et al	G&G		
49.	Lupton	G&G	20	
50.	Von Damm	G&G		
51.	Mullineaux & Wiebe	Biol.	15	
52.	Naar	G&G	20	
		TOTAL	**199**	

***CENTRAL AND EAST PACIFIC TOTAL* 764**

GULF OF MEXICO

13.	Fisher	Biol.	19	(-8, +5)
20.	Lutz & Vrijenhoek	Biol.	5	
22.	Roberts & Aharon	Multi-4	10-20?	
		GULF OF MEXICO TOTAL	**34**	

ATLANTIC

Casey, Bryan, Meyer & Hekinian	G&G	23	
	ATLANTIC TOTAL	**23**	

GRAND TOTAL	**1033**
1994 TOTAL	**845**

Totals are the minimum # of proposed dives.

1 Multi = All disiplines
2 Multi = Biol. and Chem.
3 Multi = Chem. and Geol.
4 Multi = Geochem. and Biol.

? The # is an estimate.

(+) The number in (+) indicates the # of the total dives which are for 1995 and/or 1996.

(-) The number in (-) indicates the # of the total dives which are for 1993.

	WESTERN PACIFIC			
20.	Lutz & Vrijenhoek	Biol.	8	(+8)
24.	Sager & Johnson	G&G	28	
	Winterer	G&G		
	Garcia	G&G		
	Hawkins	G&G		
	Stern	G&G		
	Bloomer	G&G		
	Fryer	G&G		
	Fryer	G&G		
	McMurtry	G&G		
	Gill & Fryer	G&G		
	Cavanaugh	Biol.		
	Fujioka	G&G		
	Scott	G&G		
	WESTERN PACIFIC TOTAL		**36**	

	INDIAN OCEAN			
19.	Wishner	Biol.	22	
20.	Lutz & Vrijenhoek	Biol.	4	(+4)
33.	Rowe	Biol.	6-12?	
35.	Curray	G&G		
36.	Levin	Biol.	22	
39.	Brooks, MacDonald & Sassen	Multi-4	10-20?	
40.	Wheatcroft	Multi-1	17	
53.	Madin	Biol.	6	
	INDIAN TOTAL		**87**	

	TEYTHAN REGION			
	Rickard	Multi-4	6?	
	Ullman, Kasten, et al	G&G	12	
	Cita, Camerlanghi, & M	G&G	10	
	Druffel	G&G	4	
17.	McCoy	G&G	4?	(+4)
	Ryan	G&G	6?	
	Arthur, et al	Multi-3		
	Mart & McCoy	G&G	20	
	McCoy	G&G		
	Luther & Nuzzio	Chem.		
	Bonatti & Cochran	G&G	25	
20.	Lutz & Vrijenhoek	Biol.	4	(+4)
	TEYTHAN TOTAL		**85**	

APPENDIX XV

ALVIN PROPOSED DIVES BY REGION