JOIDES PLANNING COMITTEE ANNUAL MEETING

28 NOVEMBER - 2 DECEMBER 1988
MIAMI, FLORIDA

AGENDA

Additional attachments

Accompanying Document

*Second full CEPAC prospectus ('blue edition')

Annual Reports

A set of the annual reports given at this meeting will be distributed with the draft PCOM minutes

JOIDES MEETING SCHEDULE

1989 Date	Place	Committee or Panel
16-18 January	Honolulu	DMP
mid-February	?	FPAP DPG
week of 27 Feb or of 6 March*	FRG or France	TECP
2-3 March*	Tokyo	PPSP
7-9 March	Seattle	BCOM
28-30 March*	Palisades	LITHP
17-19 April**	Honolulu	CEPAC
2-4 May	Oslo	PCOM
31 May-2 June	Palisades	EXCOM & ODP Council
27-24 July**	Hannover	CEPAC
22-24 August	Seattle	PCOM
2-4 October	Netherlands	EXCOM
26 November	Woods Hole ?	PCHM
27 Nov-1 Dec	Woods Hole ?	PCOM Annual Meeting

* Tentative meeting; not yet formally requested and approved.
** CEPAC meetings should be moved earlier.

It would be useful to PCOM if OHP, SGPP, and SMP had their initial meetings in March 1988

ODP OPERATIONS SCHEDULE

Leg	Objectives	Departs Port	Departs Date	Arrives Port	Arrives Date	Port Days	Days at Sea
121	SE Asia Basins	Singapore	11/06/88	Manila	1/04/88	1/04/89	59
124E	Engineering I	Manila	1/09/89	Guam	2/15/89	2/15-19	37
125	Bon/Mar	Guam	2/20/89	Tokyo	4/18/89	4/18-22	57
126	Bon 2	Tokyo	4/23/89	Yokohama	6/19/89	6/19-23	57
127	Japan Sea 1	Yokohama	6/24/89	Hakodate	8/20/89	8/20-24	57
128	Japan Sea 2	Hakodate	8/25/89	?	10/5/89		41
		---------- DRY DOCK (14 DAYS) ----------				10/5-18	
129	Nankai	?	10/19/89	?	12/18/89	12/18-22	60
129E	Engineering II	?	12/23/89	?	1/21/90	?	30

Rev. 5 Sept. 1988

Agenda Notes

Item **A**
Introduction

1. Welcome and logistics (K. Becker)
2. Introduction of PCOM members, panel chairmen, liaisons, and guests

Item **B**
Minutes of PCOM Oxford Meeting 23-25 August 1988 **p.013**

The attached revised draft minutes include corrections received at the JOIDES Office through 14 November.
Call for additional corrections or additions; call for approval.

Item **C**
Approval of Agenda

1. Comments about organization of agenda (R. Moberly)

The schedule of the meeting is aimed to:
1. Exchange information among the JOIDES panels and the several parts of the ODP organization (mainly Monday and Tuesday). The proposed order of reports is from the more general (EXCOM, NSF, etc. early). to those that are more specific for the main purpose of the meeting, namely to plan the drilling program for FY 1990 (thematic and Pacific panels last). Reporters should stress the points that bear on future planning, leaving details to be read in their minutes. The combined time for the oral report and its discussion should be about 30 minutes on Monday and 30 to 40 minutes on Tuesday. For the most part, PCOM will wait until Friday for action on such panel proposals as membership, resolutions, and other routine matters.

2. Prepare the next one-year drilling plan, for FY 1990, 1 October 1989 - 30 September 1990 (Wednesday). Panel chairmen and guests are urged to remain for this day, to be available as possible sources of information for the PCOM deliberations.

3. Learn of recent JOIDES Resolution operations and move towards long-range planning (Thursday).

4. Conduct routine PCOM affairs and clean up matters deferred from earlier in the week (Friday).

2. Call for additions or revisions; call for approval of agenda

Item **D**
ODP Status reports

1. EXCOM (N. Pisias)
The last EXCOM Meeting was held 13-15 September in Edinburgh, Scotland. Results of that meeting that are of interest to PCOM are summarized below.

- EXCOM reviewed the outline of the JOIDES Long-range Planning Document (to define the goals and objectives of post-1992 drilling), and in general agreed that its development should continue as planned. Among the points raised were how goals vs.

achievements should be measured, especially relative to COSOD I, which may have been too ambitious. More future attention should be given to visibility, public relations, and public education. There must be a close interface between ODP and other global research programs. It ismost important to build a sound science program first, then to decide on the specifics of implementing it.

- EXCOM reviewed the new advisory structure of JOIDES and the Terms of Reference for its components. All were approved, with modest revisions to the mandate for the Site Survey Panel (to make it clear that SSP does not evaluate the merit of proposals), the Terms of Reference of the Budget Committee (to separate BCOM from within the EXCOM terms), and the Terms of Reference of EXCOM (to remove obsolete language relative to the transition from IPOD/DSDP to ODP).

- Results of a number of reviews were reported to EXCOM. An Administrative Cost Review Panel performed cost analyses of TAMU and JOI (favorable). A Performance Evaluation Committee visited JOI and all subcontractors (preliminary report favorable; final report in April 1989). The National Science Board conducted a programatic review of ODP (overall, very positive; main areas of improvement needed in thematic publications, the level of engineering development, and in addressing highest-order objectives of COSOD I and II).

- EXCOM commended PCOM for its consistent approach to developing the thematically driven planning process, and approved strongly the four points of consensus of PCOM at its Oxford meeting of how to proceed. EXCOM thought, however, that the specific wording of the PCOM motion for implementation was inappropriate. EXCOM's motion was, *At the November 1989 Annual PCOM meeting, and at subsequent meetings, PCOM will examine thematicallly reviewed proposals in any ocean, in order to plan a general direction of the vessel in the period after 1991.* (15 for, 0 against, 1 absent).

- Some concern was expressed that the ship might not be returning to the Atlantic. It was pointed out that a return to the Atlantic was not precluded by the planning process, but until proposals addressing scientific objectives in the Atlantic are received the path of the ship cannot be directed there.

- EXCOM recommended that a Canada-Australia consortium for ocean drilling be accepted as a member of JOIDES, to supercede the Canadian membership when an appropriate MOU is signed with NSF.

- EXCOM reaffirmed its earlier resolution, and recommended that the U. S. government take steps to secure full ODP membership for the USSR.

2. NSF (B. Malfait)
3. JOI, Inc. (T. Pyle)
4. ODP Science Operator (L. Garrison)
5. ODP Wireline Logging Services (R. Anderson)

Item E
JOIDES Annual Reports
Regional Panels
1. Atlantic Regional Panel (J. Austin) p.177
2. Southern Oceans Panel (P. Barker)
3. Indian Ocean Panel (R. Schlich)

Service Panels
4. Site Survey Panel (G. Mountain)
5. Down-hole Measurements Panel (P. Worthington) p.093

6. Pollution Prevention and Safety Panel (M. Ball)
7. Information Handling Panel (T. Moore) p.055

Item F
JOIDES Annual Reports
Committees
1. Technology and Engineering Development Committee (C. Sparks)
2. Panel Chairmen Committee (R. Dietrick)

Thematic Panels
3. Tectonics Panel (I. Dalziel) p.085
4. Sediment and Ocean History Panel (L. Mayer) p.075
5. Lithosphere Panel (R. Dietrick) p. 137, 149

Item G
Reports for Pacific Planning
1. Status of engineering projects; planning of Engineering Legs
   124E; 129E; others (B. Harding; L. Garrison)
2. Working groups
   Fluid Processes in Accretionary Prisms (informal report by an attendee?)p.071
   Lau Basin (informal report R. Moberly) p.125
3. Western Pacific Panel (B. Taylor) p.131
4. Central and Eastern Pacific Panel (D. Rea) accompanying prospectus & p.119

Item H
Planning for FY 1990

By the end of this day PCOM must have selected legs for at least the one year commencing 1 October 1990, and put them into a general schedule. Actually, at present, a dry docking is scheduled for October 5 through 18, and legs 129, at Nankai for about 60 days, and 129E, an engineering leg for about 30 days, are tentatively in the schedule through about 21 January 1990. *p.004*

So that JOI can prepare the FY 1990 Program Plan, and in order to provide ourselves and the Science Operator with some leeway for an unexpected event, PCOM should
(a) make its decisions about legs 129 and 129E, and
(b) schedule an additional 6 legs (l30 through 135), with
   1) the legs before October firm and
   2) the ones after either firm or tentative, but at least identified so that the Science Operator, proponents, and panels can advance their planning.

Information received at the JOIDES Office through 9 November that bears on PCOM's decisions is summarized below. You will have heard additional comments on Tuesday. Refer to attached map.

Western Pacific Panel

WPAC continues to endorse the current program through Leg 128. For legs beyond 128, WPAC endorses two Nankai legs (fluids and deformation in accretionary prisms) separated by at least 6 months; and one leg each for geochemical reference sites relative to Mariana and Bonin subduction, Lau arc formation and back-arc spreading, Vanuatu collision tectonics, and carbonate environments and history of the northeast Australia margin. Total of 6 legs with 5 proposed for immediate scheduling. Although a few sites of these legs may need refinement, the legs as a whole are sufficiently mature to warrant PCOM consideration into the drilling program. Because WPAC has already examined many proposals and assigned its highest priorities to these legs (and those of

the current FY), and because of the priorities given these legs by the thematic panels, WPAC sets no further priorities among the 5 legs.

WPAC notes that the Lau Basin offers an excellent place for an engineering leg to drill young, glassy, presumably hot, basalts at a propagating tip (19°20"S), a hydrothermal zone at a differentiated spreading ridge (Valu Fa), and thinly sedimented back-arc crust. Other well-surveyed places for engineering tests in similar environments include the North Fiji, Woodlark, and Manus Basins and the Bonin Rifts.

Central and Eastern Pacific Panel

CEPAC has 14 programs in its most recently revised and updated prospectus. Three of them in the western Central Pacific are not completely mature but are sufficiently advanced that they warrant PCOM discussion: Old Pacific (with an additional cruise led by Lancelot in summer 1989), Atolls and Guyots (with good results from Schlanger's cruise), and Ontong-Java Plateau (with Mayer's cruise this winter to attempt to co-locate sites where both the Neogene and Paleogene-Mesozoic objectives can be met).

A principal concern of CEPAC is that Engineering Leg 124E is not designed to address any of the engineering problems specific to the CEPAC prospectus, and so CEPAC recommended for 124E that (a) an alternate to ENG 3 of 124E be drilled in reefal limestone at the seamount at 12.5 N, 148.0 E, and/or (b) that time at ENG 3 (thin soft sediment over chert) be put not into spudding attempts but into testing the use of a deeply suspended transducer to search for windows in the chert or for thicker sediment ponds above it. For 129E, CEPAC recommends that a leg be selected with sites where CEPAC drilling problems can be addressed, namely drilling and recovery of (1) interlayered chert and chalk, e.g., at Shatsky, (2) drowned reef limestones, e.g., at Menard Guyot, and (3) young, glassy and rubbly basalt crust, e.g., in the northern Mariana back-arc basin. p.173

Fluid Processes in Accretionary Prisms Working Group

Although its work is incomplete, FPAP WG made the following comments that bear on decisions about Nankai: deep holes through the toe as well as shallow holes landward are necessary for investigating the vertical and horizontal gradients of fluids and deformation in a prism; intensive sampling and logging are vital; a minimum of 3 legs are necessary for a typical wedge to accomodate that drilling and measurements; time should be left between legs to allow evaluations and any necessary modifications in drilling strategy. p.071

Lau Basin Working Group

The LB WG adjusted the Lau program in response to the new GLORIA data, while maintaining earlier requirements that holes be placed in old, intermediate, and young parts of the basin. Except for two southern sites which should have additional surveying and dredging to confirm that they straddle the ridge jump, the existing or impending surveys make this a mature program. p.125

Lithosphere Panel

For the Western Pacific, LITHP endorsed with high priority the Geochemical Reference and the Lau Basin programs. For the former, LITHP concluded that first-order information on the composition of the principal components being subducted at the Bonin and Mariana arcs can be obtained in a single leg of drilling, although the complete program as originally envisioned would require some drilling on a second leg (and commented that a realistic assessment would require additional holes later). LITHP has not met after the Lau Basin Working Group (which it proposed) met to consider the GLORIA data. Highest thematic priorities remain magmatic evolution and early history of the back-arc basin.

LITHP has continued to identify the Pacific as the area where its most important drilling objectives can be best addressed [see also item K]. Specifically, its four highest priority themes have eastern Pacific venues for drilling (504B, EPR, NE Pacific, and Loihi, requiring at least 6.5 legs). LITHP has also, however, endorsed TECP and SOHP drilling in the Old Pacific and Ontong-Java Plateau [and Hawaiian flexural moat], since these programs have some lithospheric objectives.

Tectonics Panel

For the Western Pacific, TECP agreed that any Nankai drilling should be carried out in a manner commensurate with the recommendations of the FPAP Working Group, including the sufficient time, observations, measurements, and deep drilling to make it a success. It placed itself on record as supporting drilling of a forearc site in the Lau-Tonga program. TECP previously endorsed the Vanuatu collision drilling.

TECP's principal thematic objectives in the CEPAC region are best addressed in areas east of any likelyhood of being included in FY 1990 planning (Hawaiian moat experiment, Chile Rise experiment, and convergent processes at Cascadia margin; possibly North Pacific and Bering Sea if those proposals continue to develop).

Sediment and Ocean History Panel

Although the minutes of the October SOHP meeting had not been received at the JOIDES Office by the time these agenda notes were being prepared, the SOHP liaison at the October WESPAC meeting reported that SOHP's highest thematic priority for drilling in the Western Pacific remains the northeast Australian margin. That priority is evident in minutes of earlier meetings. The earlier minutes also show that SOHP, when asked, gave little or no support to proposed Nankai or geochemical referenced drilling.

In the western part of the CEPAC region, SOHP had listed prioritized themes that would support drilling at Ontong-Java, Atolls and Guyots, and Old Pacific. [in Miami, SOHP chairman should modify or correct these impressions, to aid PCOM's decisions.]

In summary

1. there is a proposed Nankai two-leg program, with a delay between legs
2. an engineering leg aimed at following up on 124E and preparing for CEPAC drilling is proposed for early in the year
3. there is a proposed geochemical-reference leg, as well as proposed additional drilling
4. three CEPAC legs in the western Central Pacific have strong probability of gaining maturity in the next few months: Old Pacific, Guyots and Drowned Reefs, and Ontong-Java Plateau.
5. three WPAC legs in the southern West Pacific are mature: Lau, Vanuatu, and Northeast Australian Margin

other factors

1. probably one 1-month engineering leg per year for the next few years will be needed to develop the means to obtain major thematic objectives through drilling.
2. aside from the legs in the summary above, the main pull of mature and nearly mature proposals will be to the mid-Pacific and east Pacific for the next two years
3. a pull back to the northwest Pacific will depend on Nankai II, maturation of North Pacific and Bering proposals, engineering developments for Shatsky, and possibly on entry of the USSR into the program.
4. a pull to the southern ocean or south-central Pacific is not expected, based on present proposals.

Item I
Recent Drilling Results

1. Leg 120 (R. Schlich)
2. Leg 122 (U. von Rad)
3. Leg 123 (informal report L. Garrison)

Item J
Status of the JOIDES Long Range Planning Document (N. Pisias)

Item K
General track of vessel four years in advance of drilling

With only the information available at this time, the Planning Committee would have difficulty planning the general course of the vessel beyond the next two or three years. We have solicited proposals for drilling in any ocean, and many existing but undrilled proposals in the Pacific and elsewhere have high value. It will be several more months, however, before the thematic panels will have evaluated any new proposals for us, and will have the opportunity to compare them thematically with the proposals they now have in hand. Until then, PCOM will be unable to move with confidence into a "four-year" mode that is based on scientific considerations.

PCOM should be able to move to a three-year mode during our spring 1989 long-range planning meeting, and to the four-year mode during our spring 1990 long-range planning meeting. That is to say, in the spring of 1989 we can project the vessel's general location for spring 1992, based on existing programs with highly ranked thematic objectives in the Western, Central, and Eastern Pacific. By the spring of 1990, we should be able to project the vessel's general location for the spring of 1994.

PCOM might now devote about one-half day to a general discussion of this topic, with the overall purpose of preparing a list of questions and charges for its thematic panels, the JOIDES Office, the Science Operator, and others as necessary, in order to gather information that will help PCOM at its May Oslo meeting and at its spring 1990 meeting.

If the scientific justification for the Ocean Drilling Project is based on proposals that receive high thematic endorsement, it is interesting to read again some provocative comments our thematic panels made within the past year:

"...in response [to PCOM's tentative assignment of 18 months to CEPAC with 2 of 9 legs allocated to TECP thematic objectives] ... we strongly urge that PCOM plan a drilling program that addresses all of the following themes: [five are listed] ... Rather than follow {PCOM's] line of thinking, TECP prefers to restate the reasons for continuing to regard the above 5 themes as being of the highest tectonic priority for CEPAC drilling..." [TECT 15 - 18 March 1988 minutes]

"LITHP is deeply disturbed by efforts to limit CEPAC drilling to 9 legs, especially since this totally arbitrary time limit has no scientific justification, but appears to be motivated entirely by political considerations. LITHP, perhaps more than any other panel, has identified the Pacific as the area where our most important global drilling objectives can be best addressed. LITHP has patiently "waited its turn" while SOHP and TECP drilling at high latitudes and in the Western Pacific was completed. In our view it is now time for ODP to address the drilling objectives of the lithospheric community." [Detrick to Pisias and Rea, 12 July 88].

"While the [SOHP] Panel realizes that planning must be done within some sort of time frame, we are quite disappointed to see that POLITICS and not SCIENCE appears to be determining these time constraints. The Panel could find no scientific justification presented by PCOM for limiting CEPAC drilling to 18 months. In fact, the 18-month limit was imposed before any science was presented. It was our understanding that PCOM was responsible for SCIENTIFIC planning and not POLITICAL decisions (these should be made at EXCOM). These arbitrary time limits only serve to propagate the circumnavigation philosophy that has so frustrated us in the past. We implore the PCOM members to place national interests behind scientific merit in making their decisions and thus allow the planning process to function as it should." [SOHP 7-9 March 1988 minutes; emphasis as in original].

Item L
Other general planning information

1. New French vessel
2. Arctic drilling

Item M
Changes relative to new planning proceedure

1. Advisory panels
   staffing; proper liaisons

2. Detailed planning groups
   immediate needs (pre-Oslo); probable additional needs in the near future

3. Proposals p. 187 & 195
   revised guidelines, tracking proceedures, Databank, and site survey information

4. The JOIDES planning year p.207
   general sequence of planning and panel meetings during a year

Item N
PCOM membership

C. Helsley letter: balance and duration
Liaison to panels; to DPGs?

Item O
Personnel

1. Panel memberships
2. Co-chief Scientist nominations for legs in Program Plan

Item P
Communications

1. JOIDES Journal
   there are requests to return to a complete directory in every issue

2. Bulletin boards
   letter from Connie Sancetta (28 Oct 88) p.211
   separate e-mail - Omnet? expanded DRILLING?

3. HIG as Planning Office
   a range of methods: telephone (808) 948-793 Telemail JOIDES.HIG
   Telex 7238861/HIGCY HR FAX (808) 949-0243
   time zones (Hawaii Standard Time is +11)
   mail delays (JOIDES, 2525 Correa Rd, and zip 96822 are essential)

[4. US members of PCOM only: liaison with USSAC?]

Item Q
Tool-loss policy

There is a formal one now p.213

Item R
Schedule of future meetings ***p. 003***

In order to provide a framework for advanced scheduling of our panels, PCOM should schedule firmly three meetings in advance (one year), and tentatively five meetings in advance. In 1989 we have Oslo 2-4 May and Seattle 22-24 August, and a tentative invitation by Woods Hole for the Annual Meeting 27 November - 1 December. By rotation, France would be the venue for the August (or spring) 1990 non-USA meeting (EXCOM has a French invitation for September or October 1990). Each US JOIDES institution will have hosted one PCOM meeting since early 1985. Although it is almost essential for logistics to have the Annual Meeting at a JOIDES institution, the spring (or August) meeting could be wherever some modest help can be provided.

PCOM should: set the 1989 Annual Meeting, as well as entertain invitations and set dates for the three 1990 meetings. --

Item S
Other business

action on panel recommendations
new business
adjournment

JOIDES PLANNING COMMITTEE MEETING
23-25 August 1988
Oxford, England The United Kingdom

REVISED DRAFT MINUTES

Members:

N.Pisias (Chairman) - Oregon State University
G.Brass - University of Miami
J.P.Cadet - Univ. Pierre et Marie Curie, France
D.Cowan - University of Washington
W.Coulbourn - Hawaii Institute of Geophysics
O.Eldholm - Univ. of Oslo, ESF Consortium
J.Ewing - Woods Hole Oceanographic Institution
T.Francis - United Kingdom
S.Gartner - Texas A&M University
M.Kastner - Scripps Institution of Oceanography
M.Langseth - Lamont-Doherty Geological Observatory
M.Leinen - University of Rhode Island
J.Malpas - Memorial University, Canada
T.Shipley - University of Texas Institute for Geophysics
U.von Stackelberg - BGR, Federal Republic of Germany (for von Rad)
A.Taira - Ocean Research Institute, Japan

Liaisons:

B.Malfait - National Science Foundation
T.Pyle - Joint Oceanographic Institutions, Inc.
L.Garrison - Science Operator (ODP/TAMU)
R.Jarrard - Wireline Logging Services (ODP/LDGO)

Guests / Observers:

D.Falvey - BMR, Australia
B.Harding - ODP/TAMU Engineering
E.Kappel - JOI, Inc.
B.Larsen - Co-chief Leg 119
R.Moberly - Hawaii Institute of Geophysics
J.Weissel - Co-chief Leg 121

JOIDES Office:

S.Stambaugh
M.Wiedicke

Tuesday, 23 August 1988

724 INTRODUCTIONS AND WELCOME

Chairman N.Pisias called the summer PCOM meeting to order. Meeting host, T.Francis welcomed all to Oxford and explained logistics. Francis invited PCOM members to review the Darwin GLORIA data from Hawaii and the Lau Basin on display in the meeting room during the course of the meeting.

New PCOM members, M.Leinen (URI) and J.Malpas were introduced, as well as PCOM alternates, U.von Stackelberg (for U.von Rad, at sea on Leg 122) and J.Ewing (for B.Tucholke, WHOI). PCOM Chairman designate R.Moberly, from HIG, was introduced along with ODP Co-chiefs B.Larsen (Leg 119) and J.Weissel (Leg 121). Pisias relayed the regrets of R.Schlich (Leg 120) who could not attend. B.Harding, TAMU/ODP Engineering, and D.Falvey, an observer from the Australian Bureau of Mineral Resources, were introduced.

725 AGENDA AND PREVIOUS MINUTES

Pisias reviewed the key items of the agenda and the handouts to the meeting.

PCOM Motion:

> PCOM adopts the agenda for the 23-25 August 1988 meeting. (Motion Brass, second Langseth)
>
> Vote: 16 for, 0 against, 0 abstain

R.Jarrard asked that a consensus item in the minutes for the previous PCOM meeting be clarified as follows (change in bold, p.31 of minutes attached to agenda):

> For **all XCB** holes planned deeper than 750m, TAMU and LDGO will schedule time for two-stage logging. Logging at 750m will ensure logs for that interval. PCOM asks for a review of this procedure in 6-8 months.

PCOM Motion:

> PCOM approves the minutes of the 19-22 April 1988 PCOM meeting held in College Station, Texas. (Motion Brass, second Kastner)
>
> Vote: 16 for, 0 against, 0 abstain

726 NSF REPORT

B.Malfait represented the National Science Foundation; a written report is attached (Appendix A).

Status of the FY89 Budget

The $36M target for FY89 program funds was increased to $36.15 to partially cover an increase in ship dayrates. The increase is tied to the US Producer's Price Index (PPI) and future increases may occur.

In the overall NSF budget for FY89, ocean sciences and ODP were protected at the requested level. Ocean drilling will see an increase of about 4.6% or $1.4M next year.

Recommendations of EXCOM/ODP Council

At the May meeting, NSF announced its intent to increase individual ODP contributions by 10% ($2.75M for FY90). No strong arguments from the ODP Council against this increase were received.

EXCOM had requested that NSF reexamine the target budgets for FY91 and 92 to bring them more in accord with BCOM's recommendations. NSF is proceeding with this review.

Program reviews

Malfait summarized the process and results of the recent NSF panel and National Science Board (NSB) reviews of ODP (Appendix A). Key results were:

- Need for ODP to interface with other global programs.
- Presentation of thematic syntheses [as recommended by the Performance Evaluation Committee (PEC) as well].
- NSB approved the panel's recommendation for four years of funding at a level not to exceed $156M.
- The panel commended the program for the clarity of presentation in the Four-Year Program Plan.

Malfait explained that there would be flexibility in the $156M funding target depending on co-mingled ODP funds.

Membership

Malfait discussed the financial impact of an additional international partner in ODP. The recommended 10% increase would not necessarily be affected by a new seventh partner. NSF increased its contribution when the USSR did not join the program. Malfait reported no new developments regarding Soviet membership.

Malfait commented on the proposed Canadian/Australian consortium negotiations. A draft MOU is currently in review by the Australian Minister. D.Falvey added that the target date for signature of the MOU is 1 October 1988. The proposed 2:1 Canada/Australia contribution is based on each country's GNP.

727 JOI INC. REPORT

Program reviews

T.Pyle reported for JOI, Inc., beginning with a status report on the PEC review. The draft report from the PEC had recently arrived at JOI and its preliminary findings were expanded in the report. PEC reiterated the need for thematic publications and the remarked on the excessively slow rate for the appearance of Part A & B publications. PCOM advice on thematic publications is needed.

The recent favorable administrative cost review (ACR) at TAMU was followed by one for JOI. The JOI review was favorable for both staffing level and effort. The report recommended improvement in interactions with TAMU. Pyle added that some recommendations may require additional hiring at JOI.

Pyle remarked on the reasonableness of the budget figures recommended by the NSB and thanked PCOM for its input to the Program Plan that was reviewed by the panel and board.

TAMU is looking at ways to reduce publications costs by 5-10% and a draft of R.Merrill's report will be sent to PCOM for review. The Information Handling Panel, with input from Ian Gibson (Leg 121 participant) and others, is reviewing shipboard computers.

Program Plan addendum

Pyle reported that an addendum incorporating recommendations for ODP special operating expenses and budget adjustments (due to the PPI increase in ship dayrate) had been mailed to PCOM as information.

Arctic Drilling

Pyle attended a recent conference on Arctic Ocean Drilling in Ottawa, where he spoke on JOI/ODP involvement in this area. The chief results of the meeting were:

- Appointment of national representatives for Arctic research (Leonard Johnson from ONR will represent the US)
- Formation of scientific and technical committees
- Designation of Canada as venue of the executive secretariat (Mike Keen will coordinate this initially)

Pyle said that the group would like association with ODP, mainly as a source of peer review, and emphasized the potential of Arctic drilling to bring excitement to ODP in upcoming years. Although funding is limited, progress in and optimism for future Arctic efforts was expressed.

728 SCIENCE OPERATOR'S REPORT

Leg 122 Update

L.Garrison reported first on the progress on Leg 122 on the Exmouth Plateau. A major surprise has been the absence of Jurassic sediments recovered on the Wombat Plateau. For this reason, the co-chiefs asked to be allowed to drill EP9E (Site 761), scheduled for Leg 123, instead of EP2A, which could be drilled by the next leg. This was done but the EP9E site yielded no Jurassic core.

Garrison reviewed other operations and results of the leg, particularly the good recovery and negligible gas encountered at EP12 (Site 762). A logging tool was lost at this site, and because it carried a radioactive source, the Australian government was notified and the hole sealed.

A breakdown of the onboard Cyberex unit (which eliminates spikes in electricity flowing to the lab stack) caused problems with VAX, XRF, MASSCOMP and other data acquisition. The unit will be repaired at the Singapore port call and leg data stored on floppies will be downloaded to the VAX.

- Discussion

U.von Stackelberg remarked on the surprising lack of Jurassic rocks considering the Sonne previously had dredged them on the Wombat Plateau.

M.Kastner suggested that a future ODP thematic publication might look at how many times the geophysicists had been correct in estimating the ages of seismic reflectors (although other PCOM members thought the volume might be too slim).

Leg 123 Plans

THe priorities for Leg 123 are now AAP1B and EP2A. The Leg 123 co-chiefs were agreeable to switch EP9E with Leg 122 because Leg 123 will have a complement of petrologists to deal with EP2A.

Garrison reported that because of the new transit times, there is the potential of running short of time to complete both sites if basement at AAP1B is deeper than expected.

Ship ops schedule changes

To avoid arrival in Hakodate during a major Japanese holiday, the Leg 127 portcall was shifted five days later, and one day added to Leg 125 and two each to Legs 126 and 127 (See Appendix B, including subsequent handwritten changes to schedule).

Leg 119 Report

B.Larsen, co-chief with J.Barron on Leg 119 reported results from the N-S Kerguelen Ridge and the development of the E.Antarctic shelf in Prydz Bay. During the leg, the glacial sequence in Prydz Bay was drilled and dated, by pollen, as Eocene. Very little marine sediment was cored, although some diatoms and coccoliths are present in the till-like material for shore-based analysis. It appears that full-scale glaciation was in progress by late mid-Eocene and the whole section showed evidence of over-compaction suggesting that the Antarctic ice sheet extended much further north than its present position.

Site 738 was cored to basement and appears to be older than 90my with subsidence rates similar to those of aseismic ridges. A K/T boundary section of laminated sediments was recovered at this site. Although recovery was not high during the leg, logging was a powerful onboard tool (to see evidence of glacial outwash, e.g.)

Larsen concluded by thanking PCOM for its support for this risky leg. Thanks also to the cooperation from the ice picket boat, all prime sites were drilled and the results should be worth the time and support needed for this high-latitude leg.

Leg 121 Report

J.Weissel, co-chief with J.Peirce, reported on operations and results from Broken Ridge and the Ninetyeast Ridge. The main drilling objective was to test models of lithospheric extension and rift-initiation mechanisms. The evidence from drilling showed that there was no precursory uplift before the rifting of Broken Ridge, and uplift of about 2 km occurred during rifting. This suggests a passive, pull-apart style based on theoretical rifting models.

The Broken Ridge was found to be constructed by discrete volcanoes that were mostly subaerial. Deep water pillow basalts were marginal to these structures. The ridge is interpreted to have formed as newly created Indian Plate material passed over the Kerguelen Ninetyeast hotspot. Biostratigraphic ages increase from south to north along the ridge, from 38 Ma to 80 Ma, in close accord with predicted ages.

Navidrill testing at Site 757 was successful in basalt sills but not as good in ash/clay layers. A limestone/chert stringer was recovered at Site 754, but coring was slow.

Engineering Test Leg 124E

B.Harding, TAMU engineering, reported on plans for the upcoming ODP development leg; a prospectus for the cruise was finalized and mailed to PCOM in late July.

Harding reported on operations, staffing and logistics for the leg, including plans to transfer engineering equipment and staff after testing the diamond coring system (DCS) at ENG-1 has been completed to cut down costs. Most of the operations time for the leg has been scheduled for tests at ENG-1 (15.5 days).

THe platform for the DCS has been fabricated and is scheduled to arrive in Manila on 1 November. SEDCO had requested additional safety and dynamics testing for the platform system which will slightly increase its cost. TAMU also bought rather than leased drill rod for the system ($56K cost)

The 121 version of the XCB will be tested on the leg. The pressure core barrel and sampler, originally scheduled for the leg, has not yet gone into fabrication because Eastman-Christenson has decided not to enter into a development consortium with ODP/TAMU. TAMU will continue work on the E-C design and hopefully have it ready for Leg 124E.

- Discussion

Harding presented a "decision chart" for testing at ENG-1 (Appendix C); penetration rates and bit life will determine how much time is needed at the site to complete the engineering objectives.

R.Jarrard explained why a separate Site, ENG-2, was scheduled for logging operations testing. LDGO needed a hole to test circulation during logging, and the ENG-1 site was not suitable. LDGO's testing of a two-string logging tool has major implications for saving logging time in the upcoming Western Pacific program. [See Wireline Logging Services Report below for details of the logging program for Leg 124E.]

Several PCOM members supported Roger Larson's recommendations that additional time (up to 6 days) be devoted to drilling chert sequences at Site ENG-3 (near former DSDP Site 452). Harding explained that 2.3 days are scheduled at ENG-3 and the deepwater operations test site, ENG-4, scheduled for 1.5 days will only be attempted if time remains.

PCOM and the TAMU representatives discussed a extension of Leg 124E to ensure that ENG-3 chert tests have adequate time. Garrison pointed out that no major tool development beyond the redesigned XCB and NCB were available for chert and hard/soft layer drilling at ENG-3; modifications of drilling parameters with the current equipment is scheduled there. He proposed taking back some of the days randomly distributed to Legs 125, 126 and 127 as a result of the portcall change at Hakodate. This would extend Leg 124E to 37 days. Other suggestions were to omit the ENG-4 site and hope that flexibility with portcalls would make up some needed time for the test.

PCOM Motion

> PCOM accepts the proposal to add two extra days (for a total 37 days) to Leg 124E to fully test chert/chalk drilling configurations at ENG-3 and to ensure that the engineering objectives at ENG-3 are accomplished. (Motion Brass, second Leinen)
>
> Vote: 13 for, 3 against, 0 abstain

[Note: The Ship Ops schedule attached as Appendix B has handwritten notations reflecting this change.]

729 WIRELINE LOGGING SERVICES REPORT

R.Jarrard reported for the Borehole Research Group at LDGO. Chairman Pisias commended the wireline contractor for submitting a written report for the agenda book (Appendix D).

In his report, Jarrard briefed PCOM on:

1) A recap of results from Legs 119-121
2) Changes to the logging status of upcoming legs, and
3) A recent problem concerning logging tool loss.

Past Leg Results

During Legs 119 to 121, 9 of 23 sites were logged, VSP was tried unsuccessfully at one site and one BHTV run was completed. THe low rate of logging was due primarily to failure to penetrate to 400 mbsf. Logging highlights of these legs included:

- On Leg 119, 1600m of hole was logged, a near-record for ODP.
- Continuous correlation with logs between two Prydz Bay sites. Detection of over-compaction trend at Site 739.
- At Site 747 (Leg 120), logging aided interpretation of volcanogenic sediments near K/T boundary where core recovery was low.
- Excellent comparisons of core and log data on Leg 121; geochemical variations picked up by logs show volcanogenic sediments and ash layers.

Jarrard described the results of the borehole televiewer break out test at Site 758 on the Ninetyeast Ridge. The breakouts were poorly developed and did not confirm models that the area was undergoing intense intraplate stress. J.Weissel added that reinterpretation of plate boundaries may be needed.

Status of Logging for Leg 124E

The preparations for the leg are on track. The wireline packer will undergo a final field test in December. LDGO has decided not to include the formation microscanner (FMS) on the leg. Although initial landtests with the scaled-down version were successful, training of Schlumberger operators and landtesting with the accelerometer is still needed before the FMS can be deployed. He explained that another accelerometer is already onboard the Resolution for testing heave compensation on Leg 124E. About one-half day will be available to the leg by omitting the FMS test, but about five days are needed to complete all logging tests. One Leg 124E test is to run logs in a "warm" hole while circulating sea surface temperature water.

Other tool/technique developments

Jarrard reported that on Leg 122, pipe was pulled successfully while logging; this technique could be used for Legs 125 and 126. He discussed developments with the side-wall entry sub (SES). Jarrard added that the heave compensation tests on Leg 124E would be very important for successful FMS runs in the future.

LDGO is continuing its studies of the reliability of geochemical logs and presented results from the KTB hole. The aluminum (Al) log trend showed a poor comparison with core results suggesting that variability among holes may complicate generalizations concerning reliability of the instruments. He mentioned that Al is detected with a separate tool than used with the other geochemical logs and it is very sensitive to logging speed.

Logging tool loss

Jarrard described a recent trend of logging tool loss and resultant increases in tool insurance premiums (Appendix E). LDGO has attempted to get the TAMU Operations Supervisor to enforce fishing for lost tools (required by the terms of the insurance) but there are obvious conflicts with the Co-chiefs for fishing vs. lost science. Jarrard said that lost science must be weighed against long-term liability and efficiency in ODP. He added that increased insurance costs may eat into engineering development funds.

J.Weissel explained that his decision to fish for the seis/strat tool on Leg 122 was prompted by the advice from SEDCO/TAMU, plus the fact that the tool was needed on another hole. Jarrard said that spare tools are usually on board but specialty tools may take months to replace.

Jarrard advocated that JOIDES and JOI devise a standard policy which would anticipate cases where fishing would be possible and advised. The policy should clearly state which tool incidents will not be covered by insurance, and weigh lost tools against lost primary science. T.Pyle responded that it was JOI policy that all reasonable efforts will be made to fish for lost tools.

730 NEW JOIDES PANEL STRUCTURE

Response to the JOIDES Subcommittee

As a result of the recommendations of the JOIDES subcommittee for reviewing the JOIDES panel structure, the panel and committee mandates had to be revised. At the April 1988 PCOM meeting, PCOM members were assigned to review mandates for the current and proposed thematic panels and the new Shipboard Measurement Panel. The assignments were:

- Lithosphere Panel: J.Malpas and T.Francis
- Tectonics Panel: D.Cowan and B.Tucholke
- Ocean Paleoenvironment and Paleobiology : S.Gartner and G.Brass
- Diagenesis and Sediment Processes - M.Kastner and A.Taira
- Shipboard Measurements Panel - M.Langseth and M.Leinen, plus input from TAMU.

N.Pisias explained that those revisions received by the JOIDES Office were incorporated into a draft set of mandates for PCOM review. A full set of the original panel mandates was also available to PCOM. Written comments from tardy PCOM assignees were available at the meeting.

At its May meeting, EXCOM endorsed the suggested changes, namely the expansion of the thematic panels and deletion of regional panels. PCOM was to provide draft terms of reference and mandates for the panels as well as suggestions for chairmen of the new panels at the October EXCOM meeting.

To accomplish this task, Pisias asked that the original drafting committees plus panel liaisons form subgroups to review the revisions. In drafting the mandates, the JOIDES Office attempted to address the operations and reporting of the proposed Detailed Planning Groups (DPGs). The "leaky" advisory structure was also addressed, especially to properly channel advice from the service panels which may have budgetary impact for ODP.

Revisions to JOIDES Panel and Committee Mandates

PCOM subgroups reviewed and suggested changes to the mandates and the results were reviewed by the full PCOM. Issues which arose during this discussion were:

- Need to maintain balance of expertise and representation on the panels.
- The need for the shiptrack to be defined well in advance as ODP moves to a more thematic program.
- Recognition that the panel mandates guide but do not restrict the panels' science input

Results of PCOM's deliberations are attached as Appendix F: Draft Terms of Reference of the JOIDES Advisory Structure. Key items included in this draft are:

- Renaming the Ocean Paleoenvironment and Paleobiology Panel to **Ocean History Panel** (OHP)
- Changing name of the proposed Diagenesis and Sediment Process Panel to **Sedimentary and Geochemical Processes Panel** (SGPP).
- Recognition that the Shipboard Measurements Panel (SMP) should have enough members to cover pertinent disciplines, maintain close liaison with TAMU and other service panels, and meet only when major shipboard instrumentation issues arise.
- Inclusion of a draft mandate for the Budget Committee (BCOM) which was reviewed by Pisias and Brass, current BCOM members.

PCOM adjourned for the day, with first order of business the next day to continue review of the mandates and nominate members to the new panels.

Wednesday, 24 August 1988

731 NEW JOIDES PANEL MEMBERSHIP

Transition to New Panel Structure

During PCOM's further discussions of the panel mandates, issues and suggestions arose which are summarized below:

1) The current WPAC and CEPAC panels should operate like DPGs in their future planning.
2) Creation of the new panels and designation of chairmen are essential to keep on track for the long-range planning document.
3) Recognition that the non-US members needed to consult with their national organizations before final membership recommendations can be made.
4) CEPAC should report on its further planning to all thematic panels.

The status of the disbanding regional panels was discussed at length. PCOM favored an additional meeting of the Indian Ocean Panel as an important aspect of programmatic review (achievements vs. goals) and as input to the long-range planning document. The roles of workshops from these panels was also discussed.

PCOM agreed that at the Annual meeting, reports from the regional panel chairmen should clearly address the thematic opportunities which exist in their regions and whether existing ODP proposals address them. Pisias agreed to draft a letter to the Chairmen of ARP, SOP and IOP with instructions for these reports (Appendix G).

Finally, PCOM discussed how the need for DPGs would be determined, their duration and how they would report. Pisias pointed out that there would be no conflict of interest problems in including proponents on the DPGs and this would add a valuable element of geophysical and other regioanl data sets as background for planning.

Panel Membership

The following recommendations for panel membership were made:

- Sedimentary and Geochemical Processes Panel (SGPP):

Chairman: 1. Erwin Suess
2. H.Elderfield (now on LITH)

(Note: Suess has accepted Chairmanship. He will attend the next meeting of SOHP in October.)

Members:	(New nominations)	(SOHP transfers)
	Peter Swart (U. Miami)	R.Garrison
	Ray Siever (Harvard)	F.Froehlich *
	Dorick Stow (UK)	M.Goldhaber *
		B.Normark *

(Note: * Indicates that they have agreed to transfer to SGPP)

- Ocean History Panel (OHP)

Chairman: 1.W.Prell (Brown)
2. N.Shackleton (UK)
3. W.Ruddiman (LDGO)

Members: Peter Davies (Australia)
Ed Boyle (MIT)

SOHP needs to make additional nominations for this panel.

(Note: L.Mayer notified the JOIDES Office that he would like to step down as Chairman of SOHP. Shackleton has tentatively agreed to serve as OHP Chairman.)

- Shipboard Measurements Panel

Chairman: 1. Kate Moran (Atlantic Geo.Cen., Canada)
2. Joris Gieskes (SIO)

Members: John King (URI - paleomagnetics)
Mike Rhodes (U.Mass - XRF, instrumentation)
Ellen Thomas (Wesleyan - micropaleo, sediments)
Johanna Resig (HIG - micropaleo)
Roy Wilkins (HIG - now on DMP - phys. properties)
R.Larson (URI - geophysics)
J.Mutter (LDGO - now on LITH - geophysics)
Ian Gibson (U.Waterloo - now on IHP - computers)

(Note: Kate Moran has agreed to chair this panel.)

- Lithosphere Panel

Chairman: 1. C.Langmuir (now on LITH)
2. R.Batiza (now on LITH)

(Note: Bob Detrick notified the JOIDES Office that he will step down as LITHP chair after the September meeting, but will attend the PCOM Annual Meeting with the new chairman. Rodey Batiza has agreed to chair LITHP.)

Other Membership Issues

J.Malpas briefly discussed the representation to PCOM and other panels when the 2:1 Canada/Australia consortium is in effect. The consortium would like to arrange for a Canadian and Australian to share PCOM representation, but is aware of problems with continuity that may result.

732 EXCOM REPORT

N.Pisias attended the 25-26 May joint EXCOM/ODP Council meeting in Washington, DC and a written report appeared in the agenda book (p.5).

Issues of importance to PCOM were:

- EXCOM's additional input to instructions for the long-range planning document: 1) identification of practical "spin-offs" from ODP; 2) identification of science achieved with varying levels of effort (steady-state, 10% and 50% increases); 3) indication of earliest significant budget impact in the 1993 time frame; 4) identification of COSOD II goals achieved in ODP thus far; 5) discussion of needed technology, including use of alternate platforms.

- EXCOM's request to NSF to reexamine its target contributions to ODP in FY91 and 92 to achieve BCOM's recommended figures.

PCOM briefly discussed EXCOM's decision not to support a Lesser Developed Country fellowship ($50K/yr) at this time. Pisias said that EXCOM did not necessarily want the fellowships to be tied with clearances from coastal nations.

733 LONG-RANGE PLANNING DOCUMENT

N.Pisias presented a method for PCOM's initial input to the long-range planning document, a 10-year plan for ODP which will be submitted to NSF and used for the new MOUs past 1993.

PCOM split up into groups to review the White Papers and long-range planning input that resulted from the special summer meetings of the thematic panels. These groups were to:

1) Discuss the scientific priorities for the long-range plan, considering the input from COSOD II, thematic panels and other sources.
2) Develop a strategy for defining the technical/logistical requirements of the program(s).
3) Adapt the scientific priorities to several possible levels of effort to achieve these priorities, clearly indicating the trade-offs.

Summaries of the subgroups deliberations appear below:

TECTONICS OBJECTIVES

PCOM subgroup: D.Cowan (leader), J.P.Cadet, O.Eldholm, J.Ewing, T.Shipley, M.Wiedicke and D.Falvey

D.Cowan presented the results of the subgroup's discussions on tectonic themes in ODP long-range plans. The group reviewed the TECP white paper and tried to evaluate its general philosophy for long-range plans.

The group saw several major themes for this drilling:

- Investigations of GLOBAL SYSTEMS
  * stress measurements
  * in-situ seismometers

- Passive Margins
- Convergent margins

To address these themes, well-designed experiments answering specific questions must be formulated rather than "stamp-collecting."

The subgroup suggested ways to approach these themes:

- **Global systems**: Initially, make stress measurements and deploy seismometers in restricted and critical areas where the boundary conditions are known.

- **Convergent margins**: Building on DSDP/ODP results, the program must now focus on specific holes, including deep ones (up to 3 km), to measure stress and effective stress. Examples of these settings are fore-arcs and trench wedges. Evaluate the existing models, e.g. what are the effects of underplating versus subduction?

- **Divergent margins**: Need deep holes (2 km) to sample pre-breakup sections and a series of holes to explore seaward dipping reflectors.

In order to solve these questions, deeper holes with better recovery are needed. Deep holes at convergent margins should be maintainable for long-term monitoring. Before investing in riser drilling, the capabilities of the current drillship should be explored. One approach would be to attempt a deep hole (2 km+ ?) at a convergent margin as a test for feasibility and recovery.

Discussion

Cowan emphasized the engineering needs of hole stability and recovery in those tectonic settings where differential stress will be encountered. He said that Nankai will be a critical test for these capabilities. Pisias added that TAMU must be well informed of the types of problems that will arise in these settings so that they can develop drilling strategies (e.g casings, circulation systems, safety considerations). Eldholm emphasized that ultradeep holes would need a completely different strategy than 1-2 km holes, and would probably require riser drilling.

Other issues arising from PCOM's discussions included:

- What scientific objectives will be lost if ODP can only drill 1 km holes in the next 8-10 years?
- Better definition of the stress experiments are needed. Specific target areas mentioned were Nazca and Juan de Fuca plates.
- Coordination with on-going relative motion monitoring as suggested in COSOD II document; IRIS input.
- Leg 121 results - stress models do not always fit!

- Better utilization of SEABEAM and other imaging technology in conjunction with seismic images.

PCOM agreed that better experiments, focussed on three or four settings with 2 km holes, would be a reasonable approach for TECP. The major models and hypotheses for the settings should be listed, as well the type of drilling and hole conditions expected to address them. N.Pisias agreed to write a letter summarizing these discussions to send to TECP and liaisons (Appendix H).

LITHOSPHERE OBJECTIVES

PCOM subgroup: J.Malpas (leader), T.Francis, M.Langseth, M.Kastner

J.Malpas presented the results of the subgroup's discussions. Malpas said that LITHP has consistently provided clear priorities responsive to and consistent with both COSODs. Their two top priorities, however, depend heavily on successful technology developments. These are: 1) deep crustal penetration, and 2) investigations of magmatic processes at ridge crests.

LITHP's second-priority themes can largely be addressed with current technology. Examples of these are: old ocean crust, flexural moat, and hot spot drilling. Young hot spot drilling (Loihi, e.g.) was one White Paper topic not covered by COSOD II.

Malpas reviewed the implementation plan, with multi-phase drilling objectives out to the year 2000, as presented in the White Paper. Malpas said that LITHP should clarify the number of legs per year required for its objectives, especially those in the Phase II of the plan (begin deep crustal holes, start Mid-Atlantic Ridge drilling, establish seismic observatories). Malpas pointed out the seismic observatories and geochemical reference hole objectives could piggyback with other thematic drilling.

Technology which must be available to achieve these priorities includes:

- Penetration to 1500 m by 1992, to 3000 m by 1996 and to the Moho by 2000.
- Drilling to submagmatic temperature holes (up to 700°) by the mid-90s.
- Better recovery, stable hole conditions, especially in fractured rock, and development of logging tools capable of withstanding 300° as soon as possible.

Malpas concluded that LITHP must clarify how the first priority objectives can be achieved given LITHP's estimate that 2 legs/year would be available to implement their Phase I drilling.

Discussion

G.Brass asked that TAMU be informed as soon as possible on what temperature, corrosion and fluid control conditions will be expected for the deep crustal drilling.

Malpas summarized "level-of-effort" issues. With a 50% increase or second platform, it would be possible to carry out LITHP's entire program. With a 10% increase, the Moho objective would be lost, and more emphasis on "stamp-collecting" and developing the seismic stations would probably result. The intermediate depth holes and ridge crest drilling could be achieved. With a steady-state budget, the two highest priorities would be lost, with a default to the second priority objectives.

M.Langseth noted that the Phase I program might reconsider hot spot drilling along with the planned 504B and EPR objectives.

PCOM in general commended LITHP for its Phase I, II and III approach and recognized their long-range planning input as a model for the other thematic panels for expanding their White Papers.

M.Langseth added that PCOM might want to consider the overlap of LITHP's second-string objective, volcanism at initiating rifts, with TECP's divergent seaward-dipping reflector problem. Combining these might effectively "upgrade" their priority.

A letter to LITHP summarizing these discussions was drafted by N.Pisias (Appendix I).

SEDIMENTS AND OCEAN HISTORY OBJECTIVES

PCOM Subgroup: G.Brass (leader), B.Coulbourn, S.Gartner, M.Leinen, U.von Stackelberg, A.Taira

G.Brass presented the results of the subgroup's discussions. He reviewed the six drilling priorities listed in SOHP's draft White Paper, but noted that very little in the way of a plan for the drilling was presented. Three topics were referred back to SOHP:

1) The White Paper needs to address the COSOD II Working Group V themes on biological evolution. Although it is not straightforward how to operationally carry out this theme, there are opportunities to use ODP cores to answer important questions on evolution. SOHP should look at long-range plans for addressing this theme, designate where critical transects are needed and which environmental effects may have been important (isolation of water masses, e.g.)

2) SOHP needs to expand the paleo-upwelling and productivity theme and concentrate on specific processes such as carbon cycling.

3) SOHP's Theme #6, depositional manifestations of continental uplift and erosion should also be expanded - - reconstructions of tectonic effects on land, importance of bioturbation, etc. Splitting SOHP into the new panels may better focus for this topic in the future.

The PCOM subgroup recommended an interdisciplinary group to expand the White Paper on problems of fluid circulation and its importance to marine geology (as TECP is focussing on alteration of crust at geothermal systems, etc.). N.Pisias noted that the Fluid Processes Working Group to be chaired by Graham Westbrook is being formed to address this area and suggested that the EPR Working Group might be able to look at processes at ridgecrests. PCOM agreed that the fluid system studies crossed the boundaries of several panels and specific issues must be defined.

PCOM noted that fluid circulation at passive margins was not covered adequately in the current panel structure. PCOM agreed to proceed with the Fluids Working Group (25 September in Italy in conjunction with a NATO advanced research workshop on fluids in accretionary wedges). Their mandate, to establish criteria for evaluating proposals on fluid processes in prisms, was expanded to include a review of fluids drilling proposed in the SOHP White Paper. LITHP should also more clearly define which processes of fluid interaction with the lithosphere should be investigated.

A.Taira recommended that PCOM use the upcoming COMFAN meeting on deep-sea fans (September in Italy) as a resource for questions relating to sedimentary processes and how drilling can answer them. PCOM agreed that Bill Normark be asked to meet with a group after the COMFAM sessions to provide input to SOHP's White Paper. Taira added that this group might be potential members of the new Sedimentary and Geochemical Processes Panel. [Normark has agreed to have a

small group meet at COMFAN and expand the sedimentary processes section of the SOHP long-range input.]

Brass outlined the additional comments on SOHP's draft white paper:

- Specific drilling plans should be provided. LITHP's phased-in drilling approach was strongly encouraged.
- Interaction with global programs like WOCE should be emphasized.
- Outline ways to approach transform and transport mechanisms in the oceans.
- Investigations of sea level changes - how to use seismic stratigraphy, submerged continental margin studies, and the EDGE program studies.
- What is the status of deep stratigraphic tests listed as a previous SOHP priority?

A letter to SOHP summarizing these discussions was drafted by N.Pisias (Appendix J).

Long-Range Planning Document

PCOM agreed that a group consisting of N.Pisias and the three leaders of the white paper reviews (Brass, Cowan and Malpas) meet the third week of October 1988 in Corvallis to focus the PCOM and panel input for the long-range planning document. PCOM also suggested that an NSF representative attend.

734 INDIAN OCEAN PLANNING

Leg 123:

Sites AAP1B and EP2A are now scheduled for Leg 123. L.Garrison reviewed the changes in the Leg 123 due to the exchange of site EP10A with Leg 122. With these changes, Leg 123 may be about three days too short to complete all AAP1B objectives (drill 900 m sediment, 250 m basalt; packer, hydrofracture, BHTV, VSP, standard logging and magnetic susceptibility test).

PCOM discussed the importance of basement objectives at both sites; reaching basement is essential to address rifting mechanisms at EP2A, but AAP1B basement objectives are of higher overall importance.

PCOM Consensus

> The drillship should start and complete plans for Site AAP1B, as described in the Leg 123 Prospectus, before undertaking EP2A (and complete as many objectives as possible there).

735 WESTERN PACIFIC PLANNING

FY89 PROGRAMS

Leg 124:

PCOM reviewed the priorities of sites of Leg 124 as previously determined by PCOM: (BNDA-2, CS-1, SS-3, and Cagayan Ridge, equivalent to Sulu Sea 4). B.Taylor (WPAC Chairman) has asked that SCS-10 (moved east of SCS-9) not be dropped as a priority objective as it is an equivalent site to SCS-5, which could not be drilled due to lack of clearance. PCOM reviewed the tectonic

objectives of SCS-5 ("zipper" opening in basin), maps and paleomagnetics imaging in the basin, and Taylor's letter.

PCOM Consensus:

> The priorities for Leg 124 will not change from those previously determined by PCOM at the Annual Meeting. These are the three basin sites with basement penetration: Banda (BNDA-2), Celebes Sea (CS-1), and a Sulu Sea Site (SS-1, SS-2, or SS-3, all equivalent sites) and a Cagayan Ridge site proposed by SOHP, now numbered SS-5 in the Prospectus.

Logging plans for Leg 124 are listed in Appendix D.

Thursday, 25 August 1988

Leg 125:

There is no change in status from PCOM's previous recommendations on the leg. Garrison reported that a preliminary prospectus and most staffing is complete for the leg.

Leg 126:

PCOM reviewed the update on increased drilling depths for the leg provided by B.Taylor. Of major concern to PCOM are reports of high heat flow at proposed site BON-1 (estimated basement temperatures of up to 300^{o} C).

PCOM Consensus:

> WPAC, TECP and LITHP will be asked to provide a secondary site to BON-1 if the November safety review determines that the site can not be drilled safely.

M.Langseth suggested that the HPC heat flow device might be used during the drilling process and drilling stopped if a steep heat flow gradient is determined. Pisias added that PPSP might recommended additional drilling strategies. L.Garrison asked that BON-3 and BON-4, alternate sites for the leg, be prioritized.

Leg 127 and 128:

No further changes to these programs were made. L.Garrison reported that Ken Pisciotto will join Ken Tamaki as co-chief on Leg 127. Leg 129:

Pisias said that DMP was asked to evaluate the Nankai logging program. The Borehole Research Group had devised plans both with the GEOPROPS tool and without it as it may not be available for the leg in time. DMP had asked for a working group to review these plans.

PCOM agreed that, in conjunction with the DMP 6-7 October 1988 meeting, a DMP subgroup should review the Nankai logging plans. A few additional experts may be invited to attend, including a TAMU Operations representative and the Leg Co-chiefs. The group should outline 20 days of logging, and the scientific priorities for them, to be completed on Leg 129, and also note which scientific objectives could be gained if an additional leg were available in the future.

R.Jarrard noted that three tools of the eleven tools planned for the leg will not have been used by ODP before this leg ("vaporware"). Malfait added that the GEOPROPS proposal is still under review at NSF ("paperware").

Concerning proposals for fluid studies at Nankai, TECP has not yet responded to them but the fluids working group will look at them. An early safety review (potential gas problems) has been scheduled for November.

FY90 PROGRAMS

Geochemical Reference Holes:

PCOM discussed LITHP, TECP and CEPAC's recommendations for a geochemical reference hole leg, as well as G.Mountain's input on site surveys. PCOM agreed that the chert drilling results from Leg 124E would be important input on siting for the leg (especially MAR-4).

PCOM determined that the geochemical reference drilling can not be combined effectively with the Old Pacific crust objectives. The BON-8 site is a priority as a first look at the problem, and WPAC will be asked to develop one leg (to follow Nankai drilling) which would include BON-8 and MAR-4 and MAR-5. PCOM will review the program at its annual meeting in November. M.Kastner agreed to formulate questions on this program for LITHP's consideration.

NE Australia Margin

No changes were made to the existing program, but an early final safety review from PPSP is recommended. SOHP will be asked to prioritize and give alternates to sites in the transect (NEA 10 and 11 may be lower priority, e.g.).

Vanuatu

No changes to the previous six-site program were made.

Lau Basin

PCOM members reviewed the GLORIA data, displayed in the meeting room, which was collected during the recent Darwin cruise in the Lau Basin. The model suggested for the basin opening must be re-evaluated and the proposed sites relocated since they are in a complex area of spreading. WPAC will be asked to work with the proponents to provide new sites in light of the new data. No guidebases are planned for the leg.

736 CENTRAL PACIFIC PLANNING

Review of CEPAC Prospectus

PCOM had been provided with the July 1988 CEPAC prospectus in which 14 programs were outlined. PCOM noted that detailed site descriptions and a drilling plan are missing from the document.

Each of the CEPAC watchdogs gave an overview of their assigned CEPAC programs.
[Note: D.Cowan was assigned as future watchdog of the Cascadia Margin Drilling. M.Leinen and J.Malpas will serve as watchdog for the Early Hot Spot Volcanism theme.]

The attached memo (Appendix K), written to the thematic panels, CEPAC, and the two relevant working groups (EPR/Sedimented Ridges and Fluid Processes in Accretionary Prisms), summarizes PCOM's concerns with and instructions for further developing the CEPAC drilling plans.

[Note: As a proponent on the Equatorial Pacific and North Pacific Neogene programs, N.Pisias absented himself from discussions of these proposals. J.Malpas, who had recently raised the possibility of the JOIDES Office rotating to a non-US member, was appointed PCOM Chairman pro tem, and he served with distinction.]

Scheduling for CEPAC Programs.

The CEPAC programs were assigned probable number of legs for their completion and the following tally made:

Lithosphere Objectives

Program	Legs Needed	
504B	1.5	(inc.engineering)
EPR	2.5	(engineering; 5 guidebases)
Sedimented Ridge	2.0	
Loihi (young hot spot)	1.0	(2 guidebases)
	7.0	

Tectonics Objectives

Program	Legs Needed	
Chile Triple Junction	1	
Lith. flexure	1	
Accretionary Prism (M-series and Old Pacific Crust?)	1	(program not evaluated)
	3	

Sediments/Ocean History Objectives

Program	Legs Needed	
Shatsky Rise	1	(possibly .5)
Atolls and Guyots	1	
Eq.Pacific transect	2	
North Pacific Neogene	1	
	5	**TOTAL LEGS = 15**

PCOM discussed the possibilities of inserting mature CEPAC legs into the Western Pacific FY90 programs (Atoll/Ontong-Java Plateau drilling before Lau Basin, e.g). An obvious problem will be scheduling out the 504B and EPR drilling as they depend on "piecemeal" engineering (conditioning 504B, setting guidebases) and engineering developments (success of the diamond coring system, success of deep drilling and chert penetration/recovery).
N.Pisias suggested a timeline for scheduling in which all other legs work around these engineering-dependent legs.

PCOM had originally proposed a planning framework of 18 months of drilling in the Central Pacific, in obvious conflict with the number of programs developed in the prospectus.

G.Brass and M.Kastner moved that the planning framework for the Central Pacific be changed to 12 legs (motion withdrawn later in discussions). Various options of scheduling the drillship based on maturity of technology and mature proposals in other oceans were discussed. PCOM agreed that a mechanism for evaluating Atlantic Ocean proposals must be set up soon and the ocean drilling community notified of future plans for the drillship. J.Malpas reiterated LITHP's concern that its global priorities are best addressed in the Central Pacific.

N.Pisias noted the exciting science proposed in the LITHP white paper, with many years of well-justified lithosphere drilling possible in the Central Pacific. He suggested, however, that PCOM limit drilling there to 18 months, with the ship at the Panama Canal at the end of that time; the direction of the ship would then be determined by thematic priorities. Also, he suggested that 12 legs of priority science be identified so PCOM can effectively plan for 18 months of drilling to begin in FY92. PCOM agreed that this proposition would pressure proponents to submit mature proposals. B.Malfait added that lining up Atlantic Ocean site surveys must have sufficient lead time as well.

D.Cowan strongly disagreed with arbitrarily cutting three of the 15 CEPAC programs at this meeting. R.Moberly suggested that a statement in the JOIDES Journal, EOS and other resources be made to notify the community that thematically-mature proposals should be submitted for drilling as soon as FY91. He added that with so many technology-dependent legs scheduled in the next 24 months, good Atlantic proposals might impact scheduling even sooner.

Pisias proposed the following schedule, tied to PCOM Annual meetings, for review of upcoming drilling programs:

Nov. 89	Finalize 6 legs for FY91 in the Pacific
Nov. 90	Finalize 6 legs in the Pacific and elsewhere, depending on thematically reviewed drilling proposals submitted to JOIDES
Nov. 91	Finalize 6 legs for FY93

PCOM discussed the implications of this proposal in regards to PCOM's mandate to plan four years in advance of the drillship, the conclusion of the current MOUs in September of 1993, and the need for advance site surveys. Cowan recommended opening the last 12 months of the current MOUs up for "competition." The obvious hardships to TAMU for logistics and engineering planning were discussed.

W.Coulbourn, in consultation with R.Moberly, made the following proposal:

At the November 1989 Annual PCOM Meeting, and at subsequent meetings, PCOM will examine thematically-reviewed proposals in the central and eastern Pacific, Atlantic and elsewhere in order to plan a general direction of the vessel in the period after 1991.

PCOM did not vote on this motion. Instead, G.Brass, D.Cowan and R.Moberly were instructed by N.Pisias to hammer out a compromise statement during PCOM's already long-delayed afternoon tea break. Upon return, the following motion and instructions were finalized by PCOM:

PCOM Motion:

The Planning Committee solicits and will evaluate proposals for approximately 12-18 months of drilling, in all oceans, to be conducted in FY92 and FY93. This drilling will complete the present phase of the Ocean Drilling Program. (Motion Cowan, second Kastner)

Vote: 14 for, 0 against, 2 abstain

Based on the previous motion, PCOM formulated the following instructions:

PCOM Consensus:

In order to move the JOIDES Planning structure into the thematic mode, future planning will proceed in the following manner:

1. At the annual PCOM meeting in November, 1989, PCOM will choose a firm schedule for FY91, consisting of drilling in the Pacific.

2. At subsequent annual meetings, schedules will be chosen based upon the thematic values of the proposals which have reached the mature stage by that time. Modifications may be made in order to adapt the schedule to the logistical and technological capabilities of the Ocean Drilling Program.

3. PCOM will actively solicit proposals, responsive to the themes in the white papers, for drilling in all ocean basins.

4. Thematic panels will reconsider those proposals already submitted for drilling in regions outside of the central and eastern Pacific area.

G.Brass presented the consensus and also pointed out that the motion takes into account that ODP is in transition. Once mature proposals have been received from all oceans, PCOM can proceed with a realistic four-year planning cycle.

737 DOWNHOLE MEASUREMENT ISSUES

PCOM has not received the Downhole Measurements Panel's update to its draft policy on third-party tool development and no action was taken on this item.

M.Langseth, DMP liaison, alerted PCOM to upcoming problems for logging holes cored with the new diamond coring system (DCS). With a 4" diameter bore, some Schlumberger and most specialty logging tools will be excluded. Pisias said that the Borehole Research Group should do a cost comparison of slimming ODP logging tools versus increasing the hole diameter with the DCS. Jarrard said that such an analysis would require close work with TAMU engineers and many man-

months of calculations, and could not be done before the test run of the DCS on Leg 124E. T.Pyle requested that JOI, Inc. be notified as soon as possible of how the study will be conducted and of any budget impact.

PCOM agreed with DMP's recommendation #12 that a representative from the German deep continental drilling program (KTB) should be invited to give a presentation at an upcoming PCOM meeting.

738 INFORMATION HANDLING ISSUES

Several issues forwarded by the Information Handling Panel and their PCOM liaison, S.Gartner, are summarized in Appendix L, along with PCOM's recommendations on them.

739 FUTURE MEETING SCHEDULE

The schedule for the upcoming Annual PCOM Meeting will be as follows:

Sunday, 27 November 1988	Panel Chairman's Meeting
28 November - 2 December 1988	PCOM Annual Meeting

As G.Brass will be at sea, Keir Becker will host the meeting at RSMAS, University of Miami. A field trip (carbonates) is tentatively planned. PCOM nominated R.Detrick (LITHP) or T.Moore (IHP) to chair the Panel Chairmen's meeting. [Note: Detrick has accepted.]

The international meeting was moved forward so that outgoing PCOM member, Olav Eldholm, can host the meeting for ESF. The meeting will be held:

2-3-4 May 1989	ESF to host in Oslo, Norway

A field trip (which Olav says will cover all themes) is tentatively planned.

As a testament to PCOM's long-range planning, the following dates and locations were chosen tentatively for future meetings:

22-23-24 August 1989	U.Washington to host in Seattle
November 1989	Annual Meeting - Woods Hole ?

740 CONCLUSION OF MEETING

As outgoing PCOM Chairman, Nick Pisias thanked PCOM and the PCOM liaisons for their efforts during his two years at the helm. He wished all the best to the new JOIDES Office at HIG and to Chairman Ralph Moberly.

PCOM Toastmaster-general, Garry Brass, presented tokens of PCOM's appreciation to the OSU JOIDES Office staff (including a poster of the Titanic for Nick) and wished them well in future endeavors.

PCOM toasted meeting host, Tim Francis for his organization of the meeting at Oxford, and congratulated outgoing HIG PCOM representative, Bill Coulbourn, for all his efforts.

There being no further business to consider and lots of wine to drink, the PCOM meeting was adjourned at 6:00 PM.

JOIDES PCOM MEETING

23-25 August 1988

LIST OF APPENDIXES *

No.	Document Description
A	NSF Report
B	ODP Operations Schedule
C	ENG-1 Decision Points/Test Options Chart
D	Changes in Logging for Upcoming Legs
E	ODP Wireline Logging Tool Loss
F	Draft Terms of Reference of the JOIDES Advisory Structure
G	Letter to the Chairmen of ARP, SOP, and IOP, Re: Recommendations for Long-Range Planning
H	Letter to the Chairman of TECP, Re: Tectonics Panel White Paper
I	Letter to the Chairman of LITHP, Re: Lithosphere Panel White Paper
J	Letter to the Chairman of SOHP, Re: Sediments and Ocean History Panel White Paper
K	Memo to the Chairmen of LITHP, SOHP, and TECP, CEPAC/dpg, FPAP/dpg, Re: PCOM initial evaluation of CEPAC Prospectus
L	Letter to Chairman of IHP, Re: IHP Issues from the 23-25 August PCOM Meeting

*Attached to draft minutes of meeting

JOIDES Lithosphere Panel Panel Meeting
Corner Brook, Newfoundland
13-15 September 1988

EXECUTIVE SUMMARY

1.0 LITHP Long Range Planning Document

The LITHP Long Range Planning Document was discussed at some length. Some minor, but significant, changes in the document were recommended by the panel:

- The importance of sea floor seismic observations as a long-range ODP goal in the coming decade was reaffirmed, but the definition of these observatories was broadened to include other types of long-term instrumentation. LITHP is particularly interested in the establishment of these observatories in conjunction with the ridge crest drilling planned in the Atlantic and eastern Pacific.
- The fourth drilling goal identified in the report was modified to be selected "case studies" of well-documented, representative features (e.g. a near-axis seamount or a back-arc spreading ridge) that are directly or indirectly related to our panel's highest priority thematic objectives. One such "case study" was recommended every other year.
- In addition to the EPR DPG, the panel recommends DPG's be set up for "Drilling Deep Crust" and "Sea Floor Observatories".
- Drilling Loihi should be included under Phase 1 as a lithospheric "case study".

The panel also addressed the four specific questions raised by PCOM about the LITHP long-range planning document:

Are 2 legs/yr enough for LITHP's highest priority drilling objectives? No. All four long-range drilling goals outlined in the report need to be addressed in the ten year program. In terms of level of effort, we estimate this will require the equivalent of about 1 leg/yr for deep crustal drilling, 1 leg/yr for ridge crest drilling, and about 1 leg/yr for establishing sea floor seismic observatories and carrying out selected lithospheric drilling "case studies". LITHP's interest in observatories clearly overlaps that of TECP, and at least some of the other lithospheric drilling discussed in the planning document could be carried out in conjunction with TECP, OHP or SAGP drilling, so the amount of dedicated LITHP drilling is probably about 2 1/2 legs per year.

What is LITHP fallback if new drilling technology is not available? There are numerous options depending on the specific circumstances. For example, if problems with young crustal drilling at the EPR can't be solved, it may be feasible to address the same thematic objectives at sedimented ridge crests where the crust is likely to be significantly altered and sealed. If drilling deep (>1-2 km) holes is not technically feasible then more emphasis could be placed on drilling exposed lower crust and upper mantle sections near fracture zones. Finally, a higher priority could be assigned to drilling technically feasible, secondary LITHP drilling objectives until the required drilling systems are available.

How are fluid interactions addressed in the report? Although fluid interactions are not broken out as a separate thematic objective in this report, they are obviously a critical component of both ridge crest drilling and deep crustal drilling. For example, the main focus of drilling at sedimented ridge crests is to develop a three-dimensional characterization of the fluid flow within a sediment-sealed hydrothermal system and the associated geochemical fluxes. Deep crustal drill holes would help constrain the depth of

hydrothermal circulation in the crust and, if holes are drilled in older ocean basins, the time integrated effect of fluid circulation on crustal alteration. Although fluid circulation at passive and active margins are also important targets for future drilling, they were not considered a high priority for LITHP and thus were not part of our long-range plan.

What is the relationship to other global initiatives? LITHP long-range drilling objectives are closely linked to a number of international research initiatives, especially RIDGE, as described in the planning document.

2.0 WPAC Planning

2.1 Geochemical reference holes

LITHP considered the potential scientific value of a one leg reference hole program and concluded that first-order information on the composition of the principal components being subducted at the Bonin and Mariana arcs can be obtained in a single leg of drilling, although the complete program as originally envisioned would require some drilling on a second leg. A realistic assessment of the magnitude and scale of heterogeneity in these components will require additional holes that could be drilled at a later date.

In priority order we recommend BON-8, MAR-4 and MAR-5. BON-8 and MAR-4 could probably be done in a single leg; MAR-5 or, an equivalent site, could be done in conjunction with Old Pacific Crust drilling in the CEPAC program.

2.2 Lau Basin drilling

The panel reviewed new SeaBeam and GLORIA data from the Lau Basin and made the following recommendations:

- A Lau Basin Working Group should meet to reconsider the Lau Basin drilling program in light of new Sea Beam and GLORIA data. The main task of the WG should be to take the thematic priorities for Lau Basin drilling already approved by PCOM and decide, in light of the new data, whether or not any sites should be moved. If possible, the WG should meet before WPAC in late October.
- LITHP's highest thematic priority in the Lau Basin remains the magmatic evolution and early rifting history of the basin. Thus LG-6 is a lower priority to LITHP than LG-3 or the back-arc basin sites. LITHP still considers Valu Fa (LG-4) an immature drilling target and favors a re-entry hole on young crust (but not a bare-rock site) in the central Lau Basin.
- The Lau Basin WG should consider moving LG-2 and LG-7 to a transect across the Eastern Lau Spreading Center from the Lau to Tonga Ridges, and explore ways (e.g. the upcoming Hawkins cruise) of obtaining any necessary site survey data.

3.0 CEPAC Planning

LITHP believes a minimum lithospheric drilling program in the Pacific should consist of 7 legs (including two engineering half-legs) addressing four of our panel's highest priority global thematic objectives:

Structure of the lower oceanic crust Hole 504B 1 1/2 legs
Proposal 286/E (includes 1/2 leg to clean or divert hole)

Magmatic/hydrothermal processes at sediment-free ridge crests EPR 2 1/2 legs
EPR Working Group Report (includes 1/2 leg to set guide bases)

Magmatic/hydrothermal processes at sedimented ridge crests Middle Valley 2 legs
EPR Working Group Report (also 232/E, 224/E, 284/E, 275/E)

Early evolution of hot spot volcanoes Loihi (282/E) 1 leg

504B

LITHP favors deviating the present hole, as opposed to milling the junk in the hole or redrilling the hole, as the best option for deepening 504B. If this is not successful, then consideration should be given to drilling other sites (e.g. 417A), before an attempt is made

to re-drill 504B.

EPR

Final site selection for EPR drilling should be done after site survey work is completed on the EPR south of Clipperton. This work is tentatively planned for the first half of 1989.

Sedimented Ridge Crests

The preliminary report of the EPR Working Group on sedimented ridge crests was extensively discussed by the panel. The two main drilling objectives proposed by the working group were approved by the panel: 1) a three-dimensional characterization of the fluid flow within a sedimented-sealed hydrothermal system and the associated geochemical fluxes, and 2) a systematic investigation of the processes involved in sulfide mineralization. The Middle Valley hydrogeology experiment proposed by the WG was strongly endorsed by LITHP as a well-conceived, process-oriented experiment that will provide unique new information on submarine hydrothermal systems. However, the panel recommended that the WG refocus the proposed sulfide drilling on a single, actively-forming sulfide area, well-known hydrologically, instead of sampling deposits in a variety of geologic and tectonic settings.

In summary, LITHP endorses a two-leg program of drilling at sedimented ridge crests: one leg for the Middle Valley hydrogeology experiment, a second leg focussed on actively forming sediment-hosted sulfide deposits, also in the Middle Valley area. A single-leg program would not be adequate to carry out both investigations.

CEPAC Engineering Requirements

- Four hardrock guidebases will be required for the LITHP drilling program recommended for the next phase of CEPAC drilling (2 EPR, 2 Loihi).
- LITHP recommends that PCOM direct the LDGO Borehole Research Group and DMP to develop a detailed plan, including technical requirements and costs, for the development of high-temperature logging tools that will be compatible with the Diamond Coring System under development by TAMU

4.0 Other Matters

4.1 Panel Membership

LITHP recommends Don Forsyth (alternates Phipps Morgan or Marc Parmentier) to replace Marcia McNutt on the panel, and Guy Smith (alternatives Paul Johnson or Morris Tivey) as a paleomagnetist to replace N. Petersen.

4.2 Next Meeting

The next LITHP meeting is tentatively scheduled for 28-30 March, 1989 in Miami (Kier Becker as host).

JOIDES Lithosphere Panel Panel Meeting
Corner Brook, Newfoundland
13-15 September 1988

Members present:

R. Detrick (URI), Chairman
R. Batiza (Northwestern)
K. Becker (RSMAS)
L. Cathles (Cornell)
J. Erzinger (FRG)
J. Franklin (Canada)
T. Fujii (Japan)
S. Humphris (WHOI)
J. Mutter (L-DGO)
J. Pearce (UK)
M. Perfit (U. Florida)

In attendance:

J. Karson (ARP)
R. Duncan (IOP)
J. Natland (WPAC)
J. Malpas (PCOM)

Absent:

K. Bostrom (ESF)
H. Elderfield (UK)
E. Davis (CEPAC)
M. Fisk (SOP)
M. McNutt (MIT)
C. Mevel (France)
J. Orcutt (SIO)

Agenda

1. Liaison Reports
2. LITHP Long Range Planning Document
3. WPAC Planning
4. CEPAC Planning
5. Other Matters
   a. Panel membership/chairmanship
   b. Next meeting

MINUTES

The meeting began shortly after 9 am with the introduction of several new panel members (Joerg Erzinger, Jim Franklin and Sue Humphris) and some discussion of the logistics for the post-meeting field trip to the Bay of Islands ophiolite arranged by John Malpas. John Mutter noted that there will be a meeting of Working Group #4 of the International Lithosphere Program on "The Nature and Evolution of the Oceanic Lithosphere" in Corner Brook on Sept. 18th and invited any interested LITHP members to attend. The ILP Working Group has recently been reorganized after a period of inactivity and John would like to encourage closer co-operation between ODP and other major international lithosphere programs.

1.0 Liaison Reports

1.1 PCOM (J. Malpas)

John Malpas reviewed the results of the August PCOM meeting. The Planning Committee approved important changes to the panel advisory structure. A new thematic panel was established on "Sedimentary and Geochemical Processes" and SOHP has been renamed the "Ocean History Panel". The regional panels are being phased out (except for WPAC and CEPAC) and will be replaced by Detailed Planning Groups such as the East Pacific Rise Working Group. Minor changes to the mandate of LITHP were made to reflect these changes in the panel structure.

PCOM was generally pleased with the LITHP Long Range Planning Document, particularly the phased implementation plan. A few questions were raised about the document which LITHP should address, namely: (1) Are 2 legs/yr enough for the highest priority LITHP objectives?, (2) What is the LITHP fallback if new drilling technology is not available?, (3) How are fluid interactions addressed in the report?, and (4) What is the relationship to other global initiatives?

PCOM has raised further questions about drilling geochemical reference holes in the western Pacific. Specifically, they want to know what can be learned with only one leg of drilling and are concerned with the scale of possible geochemical heterogeneity within and between holes. PCOM reviewed the CEPAC prospectus and examined the maturity of each program (see Appendix A). The top priority LITHP programs (504B, EPR, Sedimented Ridge Crests, and Loihi) generally faired quite well, but some minor questions need to be addressed.

PCOM approved a carefully worded resolution that post-1992 drilling will be thematically driven, and proposals for drilling in any part of the world are being solicited. LITHP commends PCOM on this enlightened approach to long-range drilling planning.

Australia has joined ODP in a consortium with Canada. Panel membership will be based on a 2/3 (Canada), 1/3 (Australia) arrangement.

1.2 IOP (R. Duncan)

Bob Duncan briefly summarized drilling results from the Indian Ocean legs of interest to LITHP: Leg 115 (Mascarene Plateau/ Chagos-Laccadive Ridge), Leg 118 (Southwest Indian Ridge), Legs 119/120 (Kerguelen Plateau/Gaussberg Ridge), and Leg 121

(90E/Broken Ridge). The IOP will meet for the last time in October and prepare a report on the Indian Ocean drilling and its thematic significance.

1.3 WPAC (J. Natland)

The first leg of the two year WPAC program will begin in November with Leg 124. The second year of WPAC drilling is still in the planning stage and will be finalized at WPAC and PCOM meetings later this Fall. Programs under consideration for this second year of drilling include Nankai geotechnical leg, Great Barrier Reef, Vanuatu, Lau Basin, Geochemical reference holes, and South China Sea margin. Consideration will be given to integrating some CEPAC programs (e.g. Ontong-Java Plateau, Old Pacific Crust) into this drilling. Clearances may pose problems for drilling in the Banda and South China Sea. New data is available from the Lau Basin which LITHP should review.

1.4 CEPAC (R. Batiza)

CEPAC prepared a drilling prospectus at its meeting in July. It contains 14 programs, ranging in length from 30 to 120 days, that represent the highest priority effort of each of the three thematic panels. PCOM reviewed the "maturity" of the programs in this prospectus at its last meeting (Appendix A) and CEPAC will meet again in late October to address theses questions and revise the prospectus.

1.5 DMP (K. Becker)

Kier Becker reported that DMP did not endorse the LPHASE experiment for DSDP 418A, despite the previous endorsement LITHP gave this program. DMP felt the experiment posed too great a risk to this hole, and favored moving the experiment to another site.

DMP also objected to the 4" diameter hole size planned for the Diamond Coring System (DCS) now under development by ODP. This hole size would be too small for many existing tools including the geochemical logging tool, magnetometer, borehole gravimeter, sonic logs and wireline packer. Apparently 3 5/8" tools require at least a 5" diameter hole. KTB is using a 6" diameter hole with their DCS. A discussion of this issue followed. It was pointed out that the 4" diameter hole was constrained by the diameter of the present drillstring. A 6" diameter DCS would require a costly new drillstring. One of the primary motivations for going to smaller hole sizes is the evidence that this will significantly improve hole stability and drilling rates in basaltic crust. This advantage would be lost by going back to large diameter holes. Finally, it was noted that most logging tools will have to be modified for high-temperature drilling in the CEPAC program anyhow, and it might be possible to slimline them at the same time. **The panel consensus was that PCOM should direct the LDGO Borehole Research Group and DMP to develop a detailed plan, including technical requirements and costs, for the development of high-temperature logging tools that will be compatible with the DCS.**

1.6 USSAC (K. Becker/R. Duncan)

Kier Becker and Bob Duncan reported on several items of interest from the last USSAC meeting. USSAC discussed the possibility of sponsoring a Lau Basin workshop to

evaluate present drilling plans in light of newly collected data (especially the recent GLORIA survey). Discussion of this suggestion was deferred to later in the meeting.

USSAC decided not to support the establishment of a national VSP laboratory as was recommended by a USSAC-sponsored VSP Workshop held last year. The rationale behind this decision was the view that VSP's should be a routine type of downhole measurement that should be a JOIDES responsibility, not that of a national lab. However, USSAC was willing to support the acquisition of VSP equipment which would be given to the Borehole Research Group.

USSAC has sponsored a synthesis of all available Sea Beam bathymetry, Sea MARC I side scan sonar, magnetics, gravity, seismic reflection and petrologic data from the East Pacific Rise between 16°N and 20°S. R. Detrick reported that the synthesis is nearly complete and an example of the synthesis folio will be on display in a USSAC booth at AGU. Support will be sought to publish this folio next year.

Finally, it was noted that USSAC has sponsored the production of a CD ROM with a complete compilation of DSDP data. These data are already available on 9T magnetic tape from the NGDC in Boulder.

2.0 LITHP Long Range Planning Document

The LITHP Long Range Planning Document was discussed at some length. A draft of this report was prepared over the summer and circulated to panel members by mail for comments. This was, however, the first opportunity for a full panel discussion of the recommendations in the report, especially the implementation plan. Several questions raised by PCOM about the long-range plan were also discussed.

The report was quite favorably received by the panel members, and it was agreed that the scientific objectives and priorities outlined in the report reflect the consensus of the entire panel. There was, however, some debate over the four long-range drilling goals identified in the report, especially the sea floor seismic observatories and the 50-100 holes recommended for mapping mantle geochemistry, determining lithospheric stress, and investigating magmatic processes at seamounts, aseismic ridges, oceanic plateaus and convergent margins.

L. Cathles questioned the scientific objectives of the seismic observatories and their relevance to LITHP's highest priority drilling goals. Will the observatories only be useful in determining global earth structure (e.g. lower mantle anisotropy, structure of the inner core) or can they be used to address problems more closely related to drilling (oceanic crustal structure, ridge crest tectonics, upper mantle dynamics)? Can the observatories be equipped with other types of instrumentation other than broad-band seismometers? What sort of long-range commitment would be required to maintain and service the instruments?

It was pointed out that many of these questions were addressed at a USSAC-sponsored workshop at Woods Hole in April. The value of seismic observatories was defended by J. Mutter and R. Detrick. They argued that the observatories would also be extremely useful for investigating oceanic crustal structure and ridge crest tectonics through studies of earthquake source mechanisms. Servicing of the instruments would be done by wireline re-entry and would not require the drillship. R. Duncan noted that these observatories, supplemented by OBS, will be one of the few ways of studying mantle dynamics and addressing problems like melt migration beneath mid-ocean ridges. The consensus of the

panel after this discussion was that the establishment of 15-20 sea floor geophysical observatories equipped with broad-band seismometers and other instrumentation (tiltmeters, strainmeters etc.) is closely linked to LITHP's highest priority scientific objectives and should be an important goal of ODP in the coming decade. LITHP is particularly interested in the establishment of observatories in conjunction with the ridge crest "natural laboratories" planned in the Atlantic and eastern Pacific.

The fourth long-range drilling goal identified in the report was discussed next. Several panel members questioned the feasibility and scientific rationale of the "grid-like" mantle geochemical mapping proposed at COSOD II. There followed a lively debate on what is meant by the term "geochemical mapping", and the role that drilling of secondary objectives should play in our long range drilling program. From this discussion there emerged a consensus on two points:

First, it was agreed that it would be a mistake, both scientifically and politically, to concentrate all lithospheric drilling over the next decade on only our two highest scientific objectives (deep crustal drilling and ridge crests). There are important, mature scientific problems included within our secondary priorities that can and should be addressed. Many are closely related to our top priority scientific goals. For example, drilling a near-axis seamount would complement a ridge axis drilling program and provide additional constraints on the magmatic plumbing system along an accreting plate boundary. Understanding hot spot volcanism and the geochemical fluxes at convergent plate boundaries would likewise provide new insight into the origin of the regional isotopic anomalies observed along the global mid-ocean ridge system.

Second, the panel agreed that the best approach to this type of drilling would be through selected "case studies" of well-documented, representative features around which new models can be tested. In many instances the panel felt this type of drilling could be integrated with drilling programs proposed by other thematic panels by extending selected holes into basement, adding an additional basement re-entry hole or other similar, relatively minor modification to an existing program. In the opinion of the panel, one such "case study" should be carried out at least every other year.

The panel next reviewed the phased implementation plan presented in the report. The general outline of the plan was accepted by the panel, although some minor changes were suggested. Under Phase 1 the panel agreed that, in addition to the present EPR Working Group, DPG's should should also be set up for "Drilling Deep Crust" (probably after the USSAC-sponsored workshop next Spring), and "Sea Floor Observatories" (in conjunction with TECP). Other DPG's should be established as needed. The panel also recommended that in Phase 1 one leg of drilling should be devoted to Loihi as one of the lithospheric "case studies" discussed above. In Phase 2 the panel recommended 3 legs/yr for lithospheric drilling; 1 leg/yr for drilling deep crust, 1 leg/yr for ridge crest drilling, and the equivalent of 1 leg/yr for establishing sea floor observatories and drilling selected lithospheric "case studies". In Phase 3 the panel recommended the equivalent of 1 1/2 legs/yr be devoted to extending one deep crustal hole to Moho, 1/2 leg/yr to ridge crest drilling, and 1-2 legs/yr to establishing the full suite of sea floor seismic observatories and carrying out selected lithospheric "case studies".

Having completed its own review of the long-range planning document, LITHP next addressed the four specific questions raised by PCOM about this document:

Are 2 legs/yr enough for LITHP's highest priority drilling objectives? The answer is no. In order to achieve LITHP's highest priority, long-term thematic objectives, and have a balanced program of lithospheric drilling, **all** four long-range drilling goals outlined in the report need to be addressed. In the view of the panel, the sea floor seismic observatories and drilling selected lithospheric "case studies" (e.g. a near-axis seamount or a back-arc spreading center) are closely linked to LITHP's highest priority thematic objectives of determining the composition and structure of oceanic crust and characterizing the processes of magma generation, crustal construction and hydrothermal circulation associated with crustal formation. In terms of level of effort, we estimate the equivalent of about 2 legs/yr should be devoted to deep crustal and ridge crest drilling, with about 1 leg/yr to establishing sea floor seismic observatories and carrying out other lithospheric drilling. LITHP's interest in observatories clearly overlaps that of TECP, and at least some of the other lithospheric drilling discussed in the planning document could be carried out in conjunction with TECP, OHP or SAGP drilling, so the amount of dedicated LITHP drilling is probably only 2-2 1/2 legs per year.

What is LITHP fallback if new drilling technology is not available? There are numerous options depending on the specific circumstances. For example, if problems with young crustal drilling at the EPR can't be solved, it may be feasible to address the same thematic objectives at sedimented ridge crests where the crust is likely to be significantly altered and sealed. If drilling deep (>1-2 km) holes is not technically feasible then more emphasis could be placed on drilling exposed lower crust and upper mantle sections near fracture zones. Finally, a higher priority could be assigned to drilling technically feasible, secondary LITHP drilling objectives until the required drilling systems are available. The panel will discuss these various options more fully at its next meeting.

How are fluid interactions addressed in the report? Although fluid interactions are not broken out as a separate thematic objective in this report, they are obviously a critical component of both ridge crest drilling and deep crustal drilling. For example, the main focus of drilling at sedimented ridge crests is to develop a three-dimensional characterization of the fluid flow within a sediment-sealed hydrothermal system and the associated geochemical fluxes. Deep crustal drill holes would help constrain the depth of hydrothermal circulation in the crust and, if holes are drilled in older ocean basins, the time integrated effect of fluid circulation on crustal alteration. Although fluid circulation at passive and active margins is also an important target for future drilling, they were not considered a high priority for LITHP and thus were not part of our long-range plan.

What is the relationship to other global initiatives? LITHP long-range drilling objectives are closely linked to a number of international research initiatives, especially RIDGE, as was described on p. 22 of the original planning document.

3.0 WPAC Planning

Two main issues regarding WPAC planning were discussed: (1) Geochemical reference holes, and (2) Lau Basin drilling.

Geochemical reference holes - PCOM has asked LITHP what can be learned from a one leg reference hole program. Jim Natland, LITHP's WPAC liaison and a proponent,

summarized the situation. A viable reference hole program requires sampling the three major components being subducted: 1) a normal, marine pelagic sequence, 2) normal oceanic crust, and 3) ocean-island lavas and volcanogenic sediments. At present, little is known about any of these components seaward of the Bonin and Mariana trenches. The best drilling strategy involves a single re-entry site at BON-8 to recover a normal pelagic sequence seaward of the Bonins and to penetrate ~500 m into basement, and two holes (e.g. MAR-5 and MAR-4) to sample sediments and a seamount apron seaward of the Mariana. These three holes would sample each of the three main subducted components thought to be important, as well as establish the differences between the two arc inputs. A seamount summit hole (e.g. MAR-6) to sample the ocean-island lava component would be desirable, but this component may be obtainable by dredging.

There was some discussion by the panel of the program outlined by Natland. In response to a question it was pointed out that each component (sediment, volcanics, altered crust) have distinct isotopic signatures that could be fingerprinted in arc lavas. Alteration products in the upper crust (e.g. K, Rb, oxygen isotopes) would be sampled by a 500 m deep hole and would be particularly diagnostic. It was also noted that basement drilling was important for other reasons; few samples of Mesozoic Pacific crust have ever been obtained. The consensus emerging from this discussion was that we don't have data now to answer even first-order questions about geochemical fluxes at convergent margins (e.g. why are the Bonin and Marianas arc lavas compositionally different ?, why do the Lesser Antilles arc lavas have a strong continental signature but Pacific arcs don't ?). The geochemical reference holes proposed for WPAC will not answer all of these questions, but they be a first step toward obtaining the first-order data needed to understand these processes.

This basic 3-hole program requires about 1 1/2 legs of drilling, as LITHP originally recommended to PCOM. Obviously, with only one leg this entire program cannot be completed, and other questions such as the scale of geochemical heterogeneity for each component cannot begin to be addressed. Drilling BON-8, together with a complete logging program, may require half to two-thirds of a leg. The remainder of this leg could drill MAR-4, but it would probably be necessary to drill a seamount apron target on another leg. Hemler seamount near PIG-2 in the Pigafetta Basin is a potential target that could be picked up during the Old Pacific Crust drilling proposed by Lancelot et al. (Proposal 306/E) and would be a suitable replacement for MAR-5.

To summarize, first-order information on the composition of the principal components being subducted at the Bonin and Marianas arcs can be obtained in a single leg of drilling, although the complete program as originally envisioned would require some drilling on a second leg. A realistic assessment of the scale and magnitude of heterogeneity in these components will require additional holes that could be drilled at a later date.

Lau Basin drilling - Julian Pierce summarized for the panel recent GLORIA results from the Lau Basin. The GLORIA records show that the Central Lau Spreading Center does not extend south of 19°30'S, and an Eastern Lau Spreading Center, juxtaposed against the Tonga Ridge, connects to the Valu Fa Ridge to the south. The Peggy Ridge in

the northern Lau Basin appears to be part of the Central Lau Spreading Center. Tectonically, the Central Lau Spreading Center is propagating south at the expense of the Eastern Lau Spreading Center. South of 19°30'S an abandoned spreading ridge is found west of the Eastern Lau Spreading Center.

In terms of the proposed Lau Basin drilling sites, LG-2 and LG-7 would still sample the early phase of basin opening and can be well-sited with reflection data. At LG-3 on the Tonga Ridge, unconformity A was not well-imaged on reflection profiles, but the sedimentary sequences above the unconformity are relatively undisturbed. Site LG-6 is characterized by relatively little sediment, but basement is reachable. Site LG-1 is close to the tip of the southward propagating Central Lau Spreading Center and its location may not be ideal.

The panel had a free-ranging discussion on these new results and the proposed drilling program. Some interest was expressed in the possibility of moving LG-2 and LG-7 south along a transect west of the Easter Lau Spreading Center, however lack of site survey data may not make this option feasible. The relative priority of the the arc (LG-3) and fore-arc (LG-6) sites was also debated. **Based on these discussions the panel made the following recommendations:**

- **A Lau Basin Working Group should meet to reconsider the Lau Basin drilling program in light of new Sea Beam and GLORIA data. The main task of the WG should be to take the thematic priorities for Lau Basin drilling already approved by PCOM and decide, in light of the new data, whether or not any sites should be moved. If possible, the WG should meet before WPAC.** ***[Postscript: A one-time meeting of a Lau Basin WG was approved by Pisias and they will meet at IOS before the end of October].***
- **LITHP's highest thematic priority in the Lau Basin remains the magmatic evolution and early rifting history of the basin. Thus LG-6 is a lower priority to LITHP than LG-3 or the back-arc basin sites. LITHP still considers Valu Fa (LG-4) an immature drilling target and favors a re-entry hole on young crust (but not a bare-rock site) in the central Lau Basin.**
- **The Lau Basin WG should consider moving LG-2 and LG-7 to a transect across the Eastern Lau Spreading Center from the Lau to Tonga Ridges, and explore ways (e.g. the upcoming Hawkins cruise) of obtaining and necessary site survey data.**

4.0 CEPAC Planning

John Malpas summarized the results of PCOM's evaluation of the first CEPAC prospectus (Appendix A). The highest priority LITHP programs (504B, EPR, Sedimented Ridge Crests, Loihi) generally faired pretty well, although PCOM had a few questions.

504B - PCOM asked for LITHP input on the scientific advantages of "twinning" (i.e. redrilling) 504B rather than diverting the present hole. The main advantages of redrilling 504B would be the possibility of recoring undersampled intervals, the possibility of hole-to-hole experiments and the ability to use the new DCS. However, the scientific value of hole-to-hole experiments in this setting have yet to be demonstrated and recoring would

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significantly slow down drilling rates. To date, 125.5 total days of drilling and logging have been carried out at 504B, 79 days of drilling and 46 days of logging. In the most optimistic scenario, it will probably take 1-1 1/2 legs of drilling to reach the present depth of 504B with relatively little scientific gain. **LITHP thus favors deviating the present hole, as opposed to milling the junk or redrilling the hole as the best option for deepening 504B. If this is not successful, then consideration should be given to drilling other sites (e.g. 417A), before an attempt is made to re-drill 504B.**

EPR - PCOM requested a meeting of the EPR Working Group after Leg 124E to select specific drilling sites. However, additional site survey data on the EPR south of Clipperton is needed to make this decision. A proposal to carry out this work by Hamon, Fornari et al. has been funded and the field program will be carried out sometime in the first half of 1989. Final site selection should be deferred until after this cruise is completed.

The maximum temperatures that might be encountered during EPR drilling was discussed. It was agreed that 350-400°C remains a good estimate of the maximum temperatures that will be encountered within an active, axial hydrothermal system.

Sedimented Ridge Crests - The preliminary report of the EPR Working Group on sedimented ridge crest drilling was extensively discussed by the panel. The WG met July 26-28th at the Pacific Geoscience Center. The WG identified the two highest priority drilling objectives at sedimented ridge crests as:

- a three-dimensional characterization of the fluid flow within the hydrothermal system and the associated geochemical fluxes
- a systematic investigation of the processes involved in sulfide mineralization in a variety of geologic and tectonic settings

To address the first objective the WG proposed a hydrogeology experiment in Middle Valley on the Juan de Fuca Ridge consisting of a suite of six holes. The highest priority is a single basement re-entry hole which would have the objective of drilling into the high-temperature reaction zone of the active system. Complementing this hole is an array of five shallower holes to define the three-dimensional pattern of fluid flow over a 10 km x 20 km area. These holes are designed to penetrate into, but not substantially below, basement and would be located on areas of high and low heat flow within both active discharge and recharge zones.

To address the second objective the WG recommended a comparative drilling strategy to sample sulfide deposits in a variety of geologic and tectonic settings (e.g. Middle Valley, Escanaba Trough, and Guaymas Basin). In most areas, the WG proposed drilling 1-3 shallow, single-bit holes to depths of 200-300 m below the sea floor in the sulfide deposits.

The Middle Valley hydrogeology experiment proposed by the WG was strongly endorsed by LITHP. There was some discussion over the definition of a high-temperature reaction zone, but once this issue was clarified there was general agreement that this was a well-conceived, process-oriented experiment using the drillship that would provide unique new information on submarine hydrothermal systems. However, the panel had some

concerns over the sulfide drilling strategy proposed by the WG. L. Cathles, in particular, argued that it was extremely important to carry out studies of sulfide deposition in the context of a well-defined hydrogeological system. He thus felt that instead of drilling sulfides in a number of different areas, most with poorly characterized hydrothermal systems, it would be preferable to carry out the sulfide drilling one area, like Middle Valley, where the hydrogeology was well-known. Jim Franklin pointed out that the styles of sulfide mineralization vary from area to area, but conceded that the hydrogeology was essential to an understanding of sulfide genesis.

The panel thus agreed that the EPR WG should refocus the proposed sulfide drilling on a single, actively-forming sulfide area, well-known hydrogeologically, in order to completely document all aspects of the mineralization process. Later legs should be directed at obtaining similarly detailed data sets from at least one volcanic-hosted sulfide area, as well as other sediment-hosted deposits.

PCOM asked LITHP to consider the scientific objectives for both a one and two leg program at sedimented ridges. **Our recommendation is for a two-leg program: one leg for the Middle Valley hydrogeology experiment, a second leg focussed on actively forming sediment-hosted sulfide deposits, also in the Middle Valley area. A single-leg program would not be adequate to carry out both investigations.**

The panel also reviewed six new CEPAC drilling proposals received since the last LITHP meeting. The following is a brief summary of these discussions:

3/E Addendum Flexural moat drilling at Hawaii - This update to proposal 3/E to drill in the Hawaiian flexural moat summarizes the results of a number of recent surveys in this area. Evidence for recent volcanism has been found on the flexural arch surrounding the islands, and large-scale mass wasting has been shown to be a major input of sediments to the moat. LITHP's interest in a revised proposal broadening the drilling objectives to include these processes is solicited.

Some discussion followed on the geological significance of both the arch volcanism and the huge submarine landslides documented in these recent studies. The panel encourages a revised proposal and saw links between this program and drilling on Loihi.

222/E Ontong-Java Plateau - This proposal argues for making at least one of the holes drilled as part of the Ontong-Java depth transect (142/E Mayer and Berger) into a re-entry hole which is deepened at least 100 m into basement. This hole could provide information on the lithology, petrogenesis and age of the crust forming this plateau.

Some on the panel questioned how much information a 100-m basement hole would provide on the crustal structure of the plateau, however it was pointed out that just the basement age would be important in constraining some models for the origin of the plateau. A re-entry hole would also be available for deepening on later legs. The feasibility of this proposal could not be judged since the site survey for the paleodepth transect will not be collected until later this year (e.g. are there sites on this transect where basement can be reached, and where other site criteria can be met?). Final consideration of this proposal was therefore deferred to the next LITHP meeting.

050 *305/E Arctic Ocean Drilling* - This is a proposal for a multi-disciplinary drilling program in the Arctic Ocean. The objectives are primarily paleoceanographic and tectonic, but drilling on the Nansen-Gakkel Ridge, a slow spreading center, is also proposed.

The Nansen-Gakkel Ridge is of interest since it represents a slow spreading "end member" of crustal accretion. However, virtually nothing is known about the geological or geophysical structure of this ridge. This "end member" is better studied in the equatorial Atlantic or SWIR. The scientific rationale for an Arctic paleoceanographic drilling program is much stronger, but very little of the proposed drilling is practical with the *JOIDES Resolution*. It was pointed out that there will be a workshop next month on Arctic drilling and a separate Arctic drilling program may be proposed. This proposal would fall into Group 4 (Immature/serious deficiencies) of our CEPAC rankings.

306/E Old Pacific History - 1 2/3 drilling legs are proposed to recover Jurassic sediments and volcanic basement at six sites in the Pigafetta and East Mariana Basins of the western Pacific. These holes are designed to calibrate the geomagnetic time scale, sample mid-Cretaceous volcanic material, recover Late-Middle Jurassic age sediments and reach Jurassic basement.

For LITHP, the highest priority part of this program is reaching Jurassic basement and drilling at least to bit destruction into the crust. Jurassic-aged oceanic crust has never been recovered from the western Pacific and samples could provide key constraints on magmatic processes, mantle temperatures and composition in the Jurassic. This should be a re-entry hole to leave open the possibility of deepening it further at some later date. PIG-3 appears to be an ideal site based on data presented in the proposal. Sampling mid-Cretaceous volcanics is of lower priority; there is still much that can be learned about this volcanic event by dredging. The lowest priority for LITHP is dating the M-series anomalies.

As was previously noted in Detrick's memo of July 12 to Nick Pisias and Dave Rea, this drilling should not be viewed as "reference hole" drilling and therefore a substitute for the program proposed by Langmuir and Natland. However, if "reference hole" drilling is limited to one leg, there would be an opportunity to drill a volcanoclastic apron near site PIG-2 at Hemler or Dutton Seamounts. The proposal would fall into Group 2 of our CEPAC rankings (High, but with qualifications).

307/E Cross Seamount - The objectives of this proposal is to drill the carbonate cap and volcanics at Cross Seamount are twofold: 1) to study its subsidence and uplift history in relation to lithospheric flexure caused by the formation of the Hawaiian Islands, and 2) to determine the volcanic history and internal structure of a Cretaceous seamount.

A number of questions were raised about this proposal. Many centered around the flexure hypothesis proposed to explain the apparent uplift and recent subsidence of the island. Are the timing and magnitude of these vertical motions consistent with the Hawaiian flexural hypothesis? What about eustatic sea level changes? How would drilling at Cross Seamount help to refine or improve Hawaiian flexure models? Some simple flexural modeling could address these questions and is needed to justify the proposed drilling. LITHP felt the other objective, drilling to investigate the internal structure of a seamount, could be better addressed elsewhere. We would class this as a Group 4 proposal.

308/E Line Island drilling - This proposal is for drilling at several locations along the Line Islands to document reactiviation of volcanism along the chain, and to examine, in detail, the internal structure of a seamount.

In the view of the panel, reactivation of volcanism along the chain is a second order problem which does not rank as a high thematic priority for LITHP in the CEPAC area. The internal structure of a seamount is an important problem, but reactivation will complicate drilling in the Line Islands. It would be better to look at an individual seamount like Loihi or Seamount 6 first. The level of site documentation in this area was also inadequate. LITHP considers this an immature drilling proposal and would put it among our Group 4 proposals.

Summary

LITHP believes a minimum lithospheric drilling program in the Pacific should consist of 7 legs (including two engineering half-legs) addressing four of our panel's highest priority global thematic objectives:

Structure of the lower oceanic crust Hole 504B 11/2 legs
Proposal 286/E (includes 1/2 leg to clean or divert hole)

Magmatic/hydrothermal processes at sediment-free ridge crests EPR 2 1/2 legs
EPR Working Group Report (includes 1/2 leg to set guide bases)

Magmatic/hydrothermal processes at sedimented ridge crests Middle Valley 2 legs
EPR Working Group Report (also 232/E, 224/E, 284/E, 275/E)

Early evolution of hot spot volcanoes Loihi (282/E) 1 leg

5.0 Other Matters

Panel membership/chairmanship - Marcia McNutt has resigned from LITHP and a replacement with global geophysical interests in needed. Don Forsyth is the panel's first choice, with Phipps Morgan and Marc Parmentier as alternatives.

PCOM has also asked LITHP to nominate a paleomagnetist for the panel to replace N. Petersen. Our first choice is Guy Smith (Washington Univ.), with Paul Johnson and Morris Tivey as alternates.

R. Detrick has resigned as LITHP chairman, effective the end of this year. C. Langmuir and R. Batiza have been approved by PCOM as possible replacements. If neither of these candidates accept, the panel suggests Earl Davis, Dave Clague or Joe Cann as additional candidates. *[Rodey Batiza has agreed to take over the chairmanship of LITHP effective March, 1989].*

Next meeting - The next LITHP meeting was tentatively scheduled for 28-30 March, 1989 in Miami; Kier Becker will host. Tentative plans were also made to hold the Fall 1989 meeting in Europe to be hosted by ESF.

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The meeting offically adjourned at about 12:30 15 Sept. That afternoon, and on the following two days, John Malpas led the panel on a memorable field trip to the Bay of Islands ophiolite.

APPENDIX A.

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JOIDES Planning Office

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6 September 1988

To: Chairmen of LITHP, SOHP, and TECP, CEPAC/dpg, EPR/dpg, FPAP/dpg
From: Nick Pisias, PCOM Chairman
Subject: PCOM initial evaluation of CEPAC Prospectus

At the Oxford PCOM meeting the Planning Committee discussed the status of the programs presented in the CEPAC Prospectus. In our discussions we concentrated only on those aspects of the Prospectus which were ranked by the Thematic Panels. PCOM examined the deficiencies identified by CEPAC and other panels and examined the "maturity" of each program. In the view of PCOM, we can only drill mature proposals and any program considered to be immature will not be considered for drilling until deficiencies are corrected. Based on the PCOM discussions the following issues need to be addressed by your panels:

1. In general, CEPAC should focus the prospectus to emphasize only the programs put forward by PCOM and the Thematic Panels.

2. **Flexure of the Lithosphere** - This program is considered immature with two major deficiencies: a) the resolution with which the sediments need to be dated to test different models of lithospheric flexure needs to be more precisely defined and b) information as to the ability to date sediments collected in the Hawaiian moat must be determined. TECP is asked to provide to CEPAC and PCOM an evaluation of the models and determine the criteria by which they can be differentiated and to examine the validity of the assumption of the models with respect to the loading history of the lithosphere. The proponents must provide evidence on the nature of the sediments and the degree to which they potentially can be dated. Site selection for this program needs to be evaluated in light of the new Gloria survey data from the region. CEPAC should consider requesting an updated proposal from the Proponents.

3. **Chile Triple Junction** - This is an immature proposal. The PCOM recognizes the importance of examining the collisional processes represented by this region. The existing proposal does not adequately define the drilling strategy required to address these problems. PCOM asks TECP and CEPAC to contact proponents to encourage the submission of a mature drilling proposal.

4. **Cascadia Accretionary Prism** - This is a very highly ranked theme but at present the proposals are immature. Input from the Detailed Planning Group on Accretionary Prisms is needed.

5. **Old Pacific: M-series dating and Jurassic Crust** - It is viewed by PCOM that the objective of dating anomaly M-18 is of lowest priority. Significant data is available for dating this anomaly. PCOM accepts

OCEAN DRILLING PROGRAM

the advice of the panels that geochemical reference drilling cannot be adequately covered by Old Pacific Drilling. Given the maturity of proposals for drilling in the Old Pacific CEPAC is asked to formulate a one leg mature program with Jurassic Quiet Zone and M-37 drilling to be the highest priority.

6. **Sea Level and Subsidence: Atolls and Guyots** - This program was not discussed in detail as the PCOM watch-dog was absent from the meeting. Based on the written input this program is worthy of a leg and remains immature until site specific information is provided by proponents. Drilling in this environment is likely to be extremely difficult. It is possible that logging could greatly enhance the success of this program if sediment recovery remains low. SOHP is asked to provide input as to the value of this program if recovery can not be greatly improved.

7. **Ontong Java Plateau Depth Transect** - This program is recognized as high priority but still remains an immature proposal. Given the upcoming site survey cruises this deficiency is expected to be corrected and this leg may possible be inserted in the early part of CEPAC drilling. CEPAC is asked to focus the discussion of Ontong Java drilling to the depth transect. Tectonic objectives have not been highly ranked and upcoming site survey work will not be able to add new insights on tectonic objectives.

8. **Neogene Paleoceanography of the Eastern Equatorial Pacific** - This is a nearly mature program. Site survey data is needed for the WEQ-1 and WEQ-2 sites. Logging and drilling time need to be updated; logging times seem to be overestimated by a factor of 2. SOHP is asked to examine the impact on this program if WEQ-1 and WEQ-2 cannot be drilled.

9. **North Pacific Neogene** - The sites in the northwest Pacific and central gyre seem to be adequate to address problems in this region. It is not clear that the objectives in the northeast Pacific can be addressed by a single site. SOHP needs to better define the objectives of this drilling program and how they are addressed by the proposed sites.

10. **Bering Sea High Latitude Paleoceanography** - This program is not sufficiently supported by the Thematic Panels and should be removed from the Prospectus.

11. **Shatsky Rise Anoxic Events** - PCOM recognizes the importance of understanding the nature and cause of anoxia in the world's oceans during the Cenozoic, however this program is considered immature. A number of questions arise with respect to this programs ability to test models of anoxia and to document changes in the oxygen minimum zone. Specifically: a) the SHAT-1 site may not be in the correct position to determine the paleo-position of the top of the oxygen minimum zone; b) Insufficient site survey data are available to determine the regional context of the proposed sites and whether the correct sections are represented in both sites and; c) severe technically difficulty is expected in drilling the chert/chalk sequences of the Shatsky Rise. SOHP and CEPAC are asked to determine if shallower sites can be found on the Shatsky Rise which have sufficient site surveys to be drilled. Results from Leg 124E will provide important information on our ability to drill in the environments expected on the Shatsky Rise. It is possible that logging could greatly enhance the success of this program if sediment

recovery remains low. SOHP is asked to provide input as to the value of this program if recovery can not be greatly improved.

12. **Lower Crust: Penetration of Layer 3** - PCOM recognizes the high priority objectives of this program and accepts the outlined 1.5 legs needed to solve the "junk" problem at site 504B, and then to deepen the site. LITHP is asked to provide some input on scientific advantages of twinning 504B rather than diverting the present hole.

13. **East Pacific Rise Bare Rock Drilling** - PCOM again recognizes the high priority objectives of this program. A meeting of the EPR/dpg is requested after the completion of the engineering Leg 124E. At this meeting the planning group is also asked to begin site selection for drilling on EPR and to address the question of what temperatures will be expected during the drilling of this program. It is viewed by PCOM that 400 degree temperatures are an underestimate if deep drilling is successful.

    Together 504B and EPR drilling are expected to require on the order of 3.5 legs of drilling exclusive of the engineering developments needed for the mining-coring system.

14. **Hydrothermal Processes at Sedimented Spreading Centers** - The extensive drilling times outlined in the Prospectus were not clearly justified. For example no justifications for triple APC was given. LITHP is asked to examine the input from the sedimented ridge working group. LITHP is asked to provide two options: a) what are the scientific objectives that can be achieved with a single leg program and b) what is the optimal two leg program? Finally, LITHP is asked to comment on sedimented ridge drilling in the case that bare-rock drilling on the EPR cannot be completed because of technical problems - i.e. Sediment ridges as a backup to EPR.

15. **Early Stages of Hot Spot Volcanism: Loihi** - PCOM watchers of the dogs were named for this program (M. Leinen and J. Malpas) and a report is expected for the next PCOM meeting. PCOM notes that in the four year program plan funds for the additional guide bases for this program are not included in the long range budget figures. LITHP is asked to define the number of guide bases and bare-rock sites it expects to require prior to the end of FY1992. Finally, the success of drilling on Loihi is fully dependent on our ability to drill in very young, fractured, hot rock.

cc: J. Malpas
U. von Rad
O. Eldholm
W. Coulbourn
R. Moberly
M. Kastner
G. Brass
T. Shipley
M. Leinen

Information Handling Panel
19-21 September 1988

Executive Summary

A great deal of time was spent on discussion of shipboard computers and graphics software (see pages 6-7 and Attachment V). IHP applauds ODP's acquisition of four new Macintoshes and a laser printer for shipboard use.

IHP expresses its gratitude to USSAC, NGDC, and ODP for a joint project that will put the entire DSDP data base, with index, on a CD-ROM (see pages 11-12 and Recommendation 4 below).

IHP will review cases and forward to the PCOM chairman names of ODP participating scientists who have failed to live up to their obligations to provide papers for the Scientific Results volumes (see page 10 and Recommendation 2 below).

Recommendations

1. Noting that "guest investigators" on ODP legs are not now required to submit data collected on board to the ODP data base, or other public domain data bases, IHP recommends that the official sampling policy be changed to state that all data collected during ODP legs must be placed in a public domain data base (see page 10).

2. In hopes of encouraging ODP leg participants to live up to their commitments for publication and reporting on samples received, IHP recommends that ODP send a stern warning to participants (with copies to USSAC or appropriate secretariats) when it appears that the participant may not meet the deadline for submission of papers for inclusion in the Scientific Results volume. This letter should indicate that failure to comply with their commitments could preclude any further participation in the Program.

3. IHP recommends that ODP Editorial Review Boards elect a chairman to coordinate their activities (see page 9).

4. It is recommended that JOIDES fund the production of CD-ROM copies of the ODP data base on a biannual basis. These data-base copies would contain all data available from all legs completed at least 18 months prior to issuance of the CD-ROM copy (see page 12).

5. IHP recommends that ODP recover costs of producing the video disk of core photographs by charging $50 per copy (see page 12).

Information Handling Panel
Meeting Notes - 19-21 September 1988

Present: T. Moore, I. Gibson, J. Hertogen, R. Ingersoll, M. Jones, A. Loeblich, W. Rose, E. Kappel, M. Loughridge, E. Moussat, R. Merrill, C. Broglia, M. Hobart, J. Foster

A. Opening Comments by T. Moore

J. Nowak is not able to attend, but she sent a Telex for input.

M. Latremouille cannot attend and is planning to resign from the IHP.

B. Discussion of Action Items

1. Data-base format information has been forwarded to the IHP by P. Brown and R. Merrill.

2. Reviewers for Interstitial Water, Rock Eval, and Gas Chromatography data-base formats have yet to be selected. T. Moore has reviewed Carbon/Carbonate; J. Hertogen and I. Gibson will review the Hard Rock and XRF data bases.

3. Two models of title pages listing the Editorial Review Board members were submitted by N. Stewart and W. Rose. This topic will be discussed with other Publications topics.

4. R. Merrill and B. Bryant submitted the whole-round sample request policy to the IHP (Attachment I).

5. T. Moore reported on his discussions with T. Pyle and B. Riedel concerning the role of the IHP in the submission and review of Paleo Reference Center support. B. Riedel has projected submitting a proposal (tentatively in October 1988) to JOI for funding the collection and preparation of additional reference center samples.

6. The Smithsonian Institution has agreed to accept an eighth set of reference samples. (R. Merrill will check that the sample set has been shipped.)

7. C. Broglia will meet with M. Lovell next week at Lamont and subsequently report on their discussion on passing data requests by British scientists on to him. This delegation will avoid duplication of requests and generation of data.

8. M. Jones recommended that the approach to European non-performers for Scientific Results publications be to intervene early, as opposed to penalizing scientists afterward. R. Merrill supports this approach for the international committees, involving direct ODP notification to the scientist's country. This topic will be covered in depth in the discussion of "non-performers."

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9. C. Broglia noted that there was a continuing problem involving parity errors and the unreadability of some logging tapes. This delays data processing and distribution. M. Loughridge said that NGDC does not have a tape renewal program but is investigating archival procedures. Although the adoption of a new non-tape media should avoid problems of permanency, NGDC has not made a decision on whether transferred data should be cleaned up, which requires time and money.

C. Planning Committee Report

T. Moore read a letter from PCOM (dated 1 September 1988) with the following concerns:

Scientific community dissatisfaction with the shipboard computer graphics capabilities (PICSURE) and available printers.

PCOM approves ODP volume costing to recover full volume cost by charging prices based on $0.061 (U.S.) per Initial Reports page and $0.057 per Scientific Results page. Questions regarding this pricing are posed by PCOM and are answered in W. Rose's letter to N. Pisias (Attachment II).

E. Kappel reported on the PCOM meeting in Oxford:

Summary of the Performance Evaluation Committee meeting in March 1988: the PEC is worried that ODP publications are not sufficiently thematic and instead focus on a leg by leg approach. USSAC will be advancing seed money to help the scientific drilling community develop a thematic "Part C" publication, which would be published through established scientific journals instead of being an ODP responsibility. I. Gibson and J. Hertogen agreed that thematic concerns typically overrode the DSDP tie-in in considering where to publish hardrock papers. M. Loughridge estimated a two-year preplanning period for ODP to handle theme publishing; according to R. Merrill, Publications would be able to handle ad hoc, but not regular, volumes now. The IHP is in favor of theme volumes, despite the impracticalities involved, if they are privately published (cf. the AGU Ewing series).

Panel structure has been changed after a review. Panels will stay intact through the November 1988 PCOM meeting, with changes implemented in January 1989. The Sediments and Ocean History Panel will be split into the Sediment Processes and Diagenesis Panel and the Ocean History Panel. The new Shipboard Measurement Panel will be kept smaller than the usual panel size, with a prerequisite that panel members have sailed on the Resolution. The Western Pacific Regional Panel (WPAC) and Central & Eastern Pacific Regional Panel (CEPAC) will continue to function in an advisory capacity but will be downgraded from panel status. Toward the end of and after completion of CEPAC drilling, proposals will be accepted for all oceans, from which the best proposals will be entertained on scientific merit, regardless of political and logistical considerations.

The JOIDES office will move to Hawaii, starting with the new fiscal year in October 1988. R. Moberly is the new chair.

D. Lamont Logging Operator Report

M. Hobart discussed the Logging Operator report.

In regard to the Gibson report (Attachment V) and D. Rea's letter, the Lamont logging computer can be connected to the ship via Ethernet.

Apple Macintosh computers have been added to the shipboard downhole lab. Macs are being experimented with at Lamont to set up graphics procedures. For example, Cricket Graph supports files with up to 2700 rows by 40 columns but will be limited by the Mac memory.

Because PICSURE is limited to 5000 x-y points per graph, it is overwhelmed by the large amount of logging data (one data point every 0.5 ft).

A new Masscomp and uninterruptable power supply have been installed at the Borehole lab for much faster processing capabilities. A new Schlumberger Elite 1000 workstation based on a MicroVAX II is used for onshore processing of geochemical data for Initial Reports volumes.

The MicroVAX aboard ship will be linked by Ethernet (with the Carnegie Mellon program instead of Decnet) to handle the Schlumberger Formation MicroScanner (FMS) tool, to be introduced next year (Schlumberger is donating the software, which runs on VMS). The FMS drains computer time, with 100 m of hole generating 60 megabytes of data. The only FMS real-time processing done is for engineering corrections. Actual shipboard processing time is not known, with initial data reduction shown on the Versatec printer. Development of FMS processing (similar to borehole televiewer image analysis) on the Mac II will begin in early 1989.

R. Merrill wanted to know if gamma-ray spectrometry tool (GST) data reduction software would be able to run on the free time. M. Hobart responded that this would require a 600+ megabyte disk and a significant processing and training load. M. Hobart also noted that the "cool"-source GST under commercial development has a slower logging rate and much slower processing than the current GST tool.

Plans at LDGO for next year include developing a network graphics standard that implements x-windows. Another option is the use of remote log-in on the ship PCs to the log data (for availability prior to hard-copy issue) via Ethernet TCIP interfaces.

Although the use of the same scale for barrel sheets and log printouts was discarded by the Downhole Measurements Panel in 1986, calibration will be tried on Leg 124 with the usual shipboard logs produced. Log data spacing is 15 cm, but not all tool resolution is this close (up to 2 m); FMS shipboard processing would have a close resolution.

File movement between Mac SEs and Masscomp will be accomplished via Kermit. TERRALOG processing dumps data in ASCII columnar files for manipulation with Cricket and Excel on the Macs (for which the file size limits for graphics have not been explored yet; the limits mentioned in the

Cricket documentation are mentioned in the preceding). Lamont is also developing software to aid Mac access to perform data overlay.

E. Data Base Group Report

R. Merrill updated P. Brown's report (Attachment III) through 16 September 1988 as follows:

Personnel losses from the Visual Core Description (VCD) task force have prevented completion of the project. As of 30 September 1988, the fiscal support will end. Full-time support for K. Conner (as supervisor) and three student workers will continue for another six months.

VCD leg status is complete for Legs 101, 103 through 105, 110, 114, 117, and 118. Leg 112 data have been entered and edited, but corrections have not been input yet. Data for Legs 108, 113, and 115 have been entered but not edited. Legs 107, 111, 116, 119, and all subsequent legs are partially entered.

R. Merrill explained that the entire handwritten description on the VCD paper form is entered into the data base and that the data-base retrieval index is developed from selected key words in the description. In response to I. Gibson and T. Moore's queries about the future backlog and the role of shipboard automated VCD entries, R. Merrill noted that extra money is probably not available, especially with the increase in ship costs probably slicing the Program's budget.

I. Gibson wanted to know if the barrel sheet sediment description could be entered as a long text string into the data base. R. Merrill noted that the VCD is a prime data base that is not edited at the post-cruise meeting (whereas the barrel sheets are edited).

M. Loughridge wanted to know who the users of the VCD data base are. R. Merrill cited the production of the NGDC Pacific lithologic log publication and its use as a key-worded (primary) index for text data-base search. Statistics show that the VCD is the most commonly accessed data base because it is the one organized for key-word searches. I. Gibson noted that entry of the barrel sheet summary for timely data availability would incur a significant loss of information in comparison to the core section summaries of the VCD entries. T. Moore suggested that we need to make data capture more efficient and timely. R. Merrill explained that the use of guidelines for hardrock VCDs is an experiment that began on Leg 106. Scientists use these guidelines as a checklist, with additional room for comments. The free-form method of recording sedimentary VCDs slows the data entry procedure by having ODP personnel extract key words onshore. Automation of core description with a VCD station would aid investigators, with a secondary benefit being data entry facility. T. Moore will write a note to the future Sediment Processes and Diagenesis Panel for comments on the descriptive aspects of a system that follows the VCD data-base key words and is similar to the hardrock VCD system.

R. Merrill also updated the status of the paleo data sets, entry of which was postponed until the publication of the first Scientific Results (Leg 101). As of 12 September 1988, the data-set design was completed for use with

Checklist II software. Science Operations has arranged for the author of the program to tailor a version to meet ODP's needs. The IHP agreed that paleo data should be entered aboard ship, but not integrated into the data set until it has been reviewed and updated. The shipboard data would be the scientist's personal copy; s/he would bring a corrected version of it to the leg's post-cruise meeting.

R. Merrill also introduced an update as of 16 September 1988 by P. Brown on the status of the Paleo Reference Center sample index, which includes descriptions of our samples supplied to the Paleo Reference Centers through Leg 60. The paleo index was given to J. Saunders about two years ago, and he has found problems with incorrect and missing entries. The full extent of the problems and how these errors originated are not known, so there is not an accurate estimate of the work required for correction yet. R. Merrill added that although ODP/TAMU is supposed to support the Paleo Reference Centers, if someone else was able to obtain funding, then access would be granted to our data bases.

R. Merrill passed out copies of a preliminary version of the proposed Paleo Reference Center brochure. The IHP decided to formally title the brochure as "Micropaleontological Reference Centers," and R. Merrill solicited other corrections to the draft. Distribution is planned for the eight Paleo Reference Centers, headquarters of participating countries, and JOIDES offices.

In response to questions by J. Hertogen, J. Foster explained that ODP provides investigators with data in a standard ASCII text stream file, from which users can write their own load programs. J. Hertogen will investigate data-base accessibility. It was determined that data strings separated by commas could be output from the S1032 system. E. Moussat advocated remote access by scientists who would become familiar with the S1032 data base while aboard ship.

F. Computer Services Group Report

J. Foster reported (Attachment IV) that new equipment to be sent to the ship includes two Mac SEs, two Mac II color systems with 20-megabyte hard drives (making a total of five Macs aboard ship), and an Apple laserwriter printer. This Mac environment will be duplicated onshore. The new equipment is donated by Apple, based on R. Merrill's approach to both DEC and Apple to contribute to a showplace lab integrating the two systems on the ship. Installation is targeted for the port call at the end of Leg 124.

The VAX system will be upgraded with the addition of a MicroVAX 3500, which will greatly improve response time. Leg 124E will include a shakedown of the new local area VAX cluster arrangement. In addition, M. Benson will reinstall the latest software on the underway geophysics lab Masscomp.

J. Foster indicated that initially the shipboard Macs and the IBM PCs in the user room would be connected using Appletalk in order to permit access to the Apple laserwriter printer. During the next year, it is anticipated that the units on the Appletalk network will be bridged to the shipboard Ethernet cable, and Lisashare software will be added to the VAX to permit storage and

sharing of files from the Macs and PCs. An installation of this type will also be made on shore to gain experience and knowledge of the system. M. Hobart recommended the use of fiber optic cables on the ship for extending the Ethernet link to the downhole measurements lab, underway geophysics lab, and the Schlumberger logging van, based on their use between buildings at Lamont. SEDCO will install the cable as a regular maintenance function during a cruise.

In addressing the point raised by PCOM as to meeting the needs of graphics users, IHP notes that graphics needs will be temporarily satisfied by February 1989 (124E). In response to J. Hertogen's comments that PICSURE is inadequate and obsolete and that it is a resource hog that slows down the computer, R. Merrill agreed that PICSURE is not capable of handing the "freehand" art requirements of sedimentologists. These needs can now be met with the Mac systems to be installed. R. Merrill also noted that PICSURE is only a collection of user-friendly "canned" routines, admittedly of limited application, that have been tailored for our needs. PICSURE plots can tie up the system, especially when they access data in S1032.

It was decided that initial criteria (to be expanded upon) for a graphics system include (1) that it must be transferable onshore for editing (Initial Reports volumes), (2) that ODP conventions be employed, and (3) that the system use shipboard hardware, ideally with local plotting in the labs where the data is generated and collected. Scientists would be allowed to bring their own graphics programs to the ship, with the understanding that for inclusion in the Initial Reports these programs must be available for preparing the art for publication; otherwise the product is just a fancy "pencil drawing." (Scientists could send in samples to ODP for evaluation approximately two months pre-cruise, similar to the Scientific Reports routine.) R. Merrill named SIGMAplot graphics package from JANDEL Scientific as the most promising candidate for a PICSURE complement for the IBM PCs. PICSURE would not be abruptly discarded, but would be continued for the time invested in the tailored routines it features. New routines would be developed for whatever complementary graphics program is selected. The new graphics program would not be required to be redundant on the VAX and PCs, as word-processing and spreadsheet packages are, with a preference to decentralizing the graphics environment, thereby freeing the VAX.

Discussion of Items (not previously mentioned) from I. Gibson's Report (Attachment V)

Sampling Program: the sub-bottom depth facility requested is already in place (since Leg 113) as a daily update routine. J. Foster will investigate the procedure.

Sedimentology/Stratigraphy: entry and format have been discussed. J. Foster reiterated the intent to have SLIDES run not on the VAX but on a stand alone, if possible.

XRF/XRD Linkage: completion to Ethernet link is planned for the next port call.

Underway Geophysics and Downhole Logging: the Lamont MicroVAX 3200 to be installed will be linked with Ethernet. J. Foster will check into an Ethernet

link for the UG lab. In regard to a real-time navigation plotting system that would plot ship position with Loran, GPS, and DRs to data as an alternative to the costly Motorola setup, R. Merrill queried IHP members for possible packages. The current ODP system requires human intervention to edit points before autoplotting. Lamont has a prototype that ODP will be looking at that matches our hardware (PC clones with the Masscomp), and they would customize the connections, but this is about $60,000. IHP members submitted various sources for R. Merrill to investigate. T. Moore inquired as to the quality of seismic-reflection data after refit of the ship. R. Merrill replied that the problem is in the flat hull design of the ship and not easily rectifiable. He noted that the slow (6 kt) speed for quality data retrieval is now accepted as a given. Problems are in processing because of the incomplete state of M. Wiederspan's software, an upgrade of which has not been proposed yet by the responsible committee.

Staffing: increased support for computing services is needed. Regarding informing shipboard participants prior to the cruise as to the system facilities aboard the Resolution, R. Merrill reported that the information sent to the scientists precruise is up to date and that it is their responsibility to read through it and contact the CSG about their particular needs instead of waiting until they are on board. Reading the material en route to the ship is too late.

Applications Status Report - "Wish List"

Igneous/Metamorphic Thin Section Description: this project is assigned to the data-base assistant manager, a position with high turnover that hampers completion. C. Segade will assume this position 1 October 1988. The aim is to convert the paper form (as published in the Initial Reports) to a S1032 forms package with the screen image the same as the paper one. I. Gibson offered to review the data-base design.

J. Hertogen, I. Gibson, and J. Foster discussed the XRF/XRD data bases. XRD data cannot be moved onto the VAX, but this will be solved with Decnet (scheduled for the last port call, but was not completed). XRF data is currently keyboarded in but not directly loaded to S1032. R. Merrill prefers to load that data directly to a file first, which can be edited as necessary, before uploading to the VAX; this is similar to the Paleo data update to be loaded after the post-cruise meeting. Raw XRD data are not archived.

Comments on the Status of the Applications Completion Report

Graphics are noted as a big source of delay in the production of the Initial Reports volume (barrel sheets). This delay could be lessened with more shipboard preparation.

M. Loughridge voiced concern about the dilution of effort by the CSG by agreeing to do too much, especially in regard to CSG's required support of engineering and logistics departments, as mandated by JOIDES. R. Merrill explained that implementation priority is set at the managers meetings and stressed that CSG needs more manpower and equipment support.

J. Foster explained that although the CSG budget appears large, it includes money to support maintenance by CSG personnel for all of the

shorebased computing equipment and software throughout the ODP departments. In addition, during the year, departments requiring computer equipment transfer money to the CSG account for such purchases. CSG will normally evaluate and acquire equipment for various departments, assuming that it will conform to the ODP long-range computing plan. CSG personnel also service all IBM PCs as well as provide program-wide user support.

G. Publications Report

W. Rose provided the following updated information (Attachment VI) to the publications report:

Initial Reports: 113 is at the printer, to be distributed next week; 114 and 115 are being sent to the printer for distribution in November; and 116 will go to the printer in October for December distribution.

Scientific Results: 101 and 102 are at the printer, with distribution in November, and 103 is being paginated to be sent to the printer at the end of September for distribution in December.

The index for 101 and 102 has been received from subcontractor Richardson and is at the typesetter now.

An update of the Publications schedule was posted.

The following changes are recommended for the title page design to include the Editorial Review Board. There should be separate title credit for the co-chiefs, staff scientist, and participating scientists. The ODP editor of the volume should be included as a review board member. The volume editor should be listed at the bottom of the title page in the "prepared by..." section with the title "Managing Editor" so as to distinguish him/her from the scientific direction supplied by the co-chiefs for the volume. The listing of peer reviewers is approved as is.

Publications Time Table

Currently it takes about 20 months post-cruise to publish an Initial Report volume. This amount of time continues to be reduced. However, R. Merrill noted that there is an artificial lengthening in the time table because of printer-originated difficulties with Volume 108 and 110. He reported that R. Silk claims that the minimum production period will be 14 to 16 months as a result of timing of the post-cruise meeting and the 2.5 months required by the printer. Co-chief review of some galley proofs has not been possible, but this is not a mandatory part of the production cycle and is done when time permits. E. Kappel noted that USSAC provides extra money for the biostratigraphers to meet early at the post-cruise meetings, which R. Merrill commended as being critical to the timely conclusion of editing the hole summary. R. Merrill also noted that all co-chiefs should take their obligation to finish the book at the meeting seriously.

In regard to these points, the IHP supports the ODP publication policies for (1) co-chief review of the galley proofs as desirable, but optional; (2) timing of the post-cruise meeting as early as possible (related to the

accomplishments of each particular cruise); (3) use of USSAC money to allow the biostratigraphers to meet early; and (4) the co-chiefs to finish editing of the volume at the meeting.

IHP further recommends that Editorial Review Boards follow R. Merrill's suggestion in electing chairs to coordinate their activities.

An action item for R. Merrill is to investigate how the implementation of the Editorial Review Board has affected timing and costs of Scientific Results production, once more data is available.

H. Non-Performers - Legs 103, 104, and 105

R. Merrill distributed documents listing non-performers with summaries of their activities and supporting documentation. An action item for R. Merrill is to provide information as to the type of investigations (e.g., physical properties) of each non-performer to aid in IHP evaluation. It was decided that T. Moore would draft a letter to be sent to each non-performer by R. Moberly as chairman of PCOM. This first letter would explain the basis for the perception that the scientist has failed to meet the ODP publication and/or sample distribution requirements (samples to be returned if still in the scientist's possession) and would spell out that failure to live up to the agreed-upon duties and responsibilities of a participating scientist could preclude further participation in ODP activities. Copies of this first letter would be sent to either USSAC or the secretariat of the appropriate member country. This letter would be put in the Science Operations and Curatorial files, along with any response from the scientist.

It was decided that evaluation is not to be cut-and-dried at this early stage in the review of non-performers. Cases will be judged individually after a preliminary letter is used to query the author and inform him/her of possible repercussions by PCOM. An IHP subcommittee will be appointed to routinely process non-performer actions prior to IHP meetings.

J. Hertogen and M. Jones noted that setting up a procedure to catch non-performance early by notifying authors of missed deadlines should also serve to notify the funding agency/member country secretariat. M. Jones agreed that member countries would rather encourage participation than merely be informed of failures that are past possible correction. It was recommended that stern warning should be sent to participants and to USSAC or the appropriate secretariats when it appeared that the participant might not make the deadline for submission of papers for the Scientific Results volume.

It was noted that "guest investigators" are not now required to submit data collected on the Resolution to the ODP data base or to other public domain data bases. E. Kappel said that USSAC could require that data be released by guest investigators who are not publishing in the Scientific Results volumes. M. Loughridge explained that the policy at the NGDC and world data centers is that the funding organization owns the data generated but that the investigator owns the interpretation. He will provide E. Kappel with the wording of NGDC policy. Following R. Merrill's advocacy of investigators filing data with their national data centers, IHP decided to

recommend to JOIDES that the official sampling policy state that data belong in the public domain.

I. CD-ROM Project at NGDC for DSDP Data

USSAC has funded the development of software, quality control, mastering, and production and eventual distribution of 500 copies of the DSDP CD-ROM. The IHP recommended that E. Kappel query JOIDES members as to whether they are interested in receiving copies of the CD-ROM. Secondary possible distribution could be to libraries and concerned institutions.

C. Moore and C. Lambrecht reported on NGDC's project of developing a CD-ROM format for DSDP data, to serve as a companion to the DSDP Initial Reports volumes. The CD-ROM has been designed as a two volume (i.e., two disk) project: Volume I has sediment, hardrock, and reference (indexes and bibliography) files and Volume II has downhole logs (LIS format) and underway geophysics data. R. Merrill announced that he has the 25-megabyte DSDP cumulative index to hand over in tape copy for C. Moore to check. Index hard copy is also in the proofing stage. The DSDP data are in ASCII files, with extra spaces removed. Search software is designed for IBM PC to access two subdirectory structures: by location (maps) for leg and site/hole (nested, with indexes of information and help files) or by a certain parameter (data type).

E. Kappel inquired as to software for the Macintosh. M. Loughridge noted that this development will be costly, but that the ISO standard file structure is accessible to PC/Apple CD-ROM readers, with the accession software to be included on a floppy disk.

I. Gibson noted that the 600-character-line file size is too large for many programs to handle a direct dump.

In response to M. Jones' query, C. Moore allowed that the only graphics capability provided in the software will be for simple "wiggle" diagrams and range charts (simplicity of data format allowing for accessibility).

I. Gibson noted that a common search application is for a range of variant values, which C. Moore explained could not be indexed like distinct values; however, range values could be accessed within data-base programs to which data were loaded.

J. Foster praised the format of providing access to data extraction in ASCII, from which users could manipulate data in their own data bases. R. Merrill suggested including a sample of data manipulation on the accompanying software floppy.

E. Moussat wanted to know what the demand would be for DSDP data on the CD-ROM: just a one-shot deal for an investigator? R. Ingersoll noted that the CD-ROM will be available in libraries and scientific community facilities as well as for individual users. R. Merrill predicted that many other CD-ROM products would be released, emphasizing that this format has a standard already set with interfaces available for other systems.

Regarding the JOIDES Journal and JOI/USSAC Newsletter announcements of the DSDP CD-ROM, E. Moussat urged that additional information be provided on the technical aspects of CD-ROMs to interested European parties, since the industry standard is fixed. R. Merrill recommended MicroSoft Bookshelf as a hands-on introduction, which comes complete with floppy interfaces to the hardware of card, cable, and drive.

R. Merrill and M. Loughridge are considering two versions of the bibliography: one in ASCII, which is too large for easy download retrieval to a PC hard disk, and another in the Personal Librarian commercial software format. Searches could be performed in the cumulative index, with topics by page number (users can cross-reference to the bibliography).

C. Moore has data-use statistics of ODP-managed data supplied by P. Brown, but she noted that these numbers are too low for specific analysis beyond the popularity of certain data types. C. Moore and P. Brown have developed a plan for resolution of paleontology code errors and also for changing age and lith codes, in consultation with P. Woodbury.

I. Gibson queried R. Merrill as to ODP data in CD-ROM format. R. Merrill noted that the video disk of ODP core photos would be released in mid-October 1988 and that ODP could use C. Lambrecht's design with ODP additional fields for a CD-ROM. In response to an IHP request that R. Merrill look into the possibility of a CD-ROM, R. Merrill will send tapes of ODP data to NGDC as a reimbursable project (JOIDES money), which also fulfills legal requirements of data delivery to NGDC. The IHP will also send a recommendation to PCOM that costs be recovered for the video disk with a price set at approximately $50. The "cost recovery" money would be fed back into Publications.

ODP CD-ROM Data Base

The IHP recommends that ODP data issued in CD-ROM format be in a "diagonal" matrix (availability at present time, instead of full data base per leg). Based on Leg 101, it would take four years to have a complete data set for a leg, with the paleo data base not entered until it is finalized with publication of the Scientific Results volume. Inorganic geochemistry data also comes from the Scientific Results.

CD-ROM updates would be issued, repeating everything on the previous disk(s).

T. Moore will recommend CD-ROM issue as a JOIDES budget item, not including costs for distribution and recovery of nonrecovered expenses. Cost includes (1) production, mastering, and distribution and (2) ODP and Lamont's cost to provide data on tape in acceptable format for NGDC to produce. JOI has already underwritten the cost of accession software with the DSDP CD-ROM, and R. Merrill designated P. Brown to provide quality control of the data at ODP.

R. Merrill will coordinate cost estimates, based on formats to be provided by M. Loughridge. T. Moore will notify C. Broglia at Lamont as to the possibility of issuing a separate CD-ROM of well logs, which R. Merrill noted are "stable" data, not revised like the other data bases and thus not likely to require reissue updates.

R. Merrill noted that he is already planning for possible yearly issue of the core photo video disk and could envision another CD-ROM series released approximately 18 months post-cruise, concurrent with the publication of Initial Reports volumes. It was decided that the actual producer/distributor of the CD-ROM was not a significant item, because responsible parties would be credited.

J. Publications Budget Discussion

The philosophy of budget cuts was discussed. Savings already implemented by Publications include a commitment to purchasing a high-quality laser printer to produce type, working with CSG to improve the SLIDES program for barrel sheet text, and printing the list of panel members and sample distribution policy in smaller type to save pages. The IHP would not oppose dropping the inclusion of panel member listings and the sample distribution policy within each volume, and substituting inclusion in every fifth or sixth volume.

The current volume quality meets with IHP approval, with possible improvement being in the paper used (as affecting core photo quality) and control of figure duplication. The IHP consensus, as expressed by A. Loeblich, is that instead of cutting volume quality, it would be better to cut the (expletive deleted) of duplicated figures.

K. Repositories Report

T. Moore will mail a copy of the memorandum by R. Merrill and B. Bryant to IHP members for comment on how guidelines should be set up for the Curator in regards to whole rounds (currently tri-axial sample requests are routed through the IHP) (Attachment I). Unless there are major objections, he will present this at the November 1988 PCOM meeting.

R. Merrill noted that the memo delegated responsibility to the Curator, as previously recommended by IHP: maximum limits on tri-axial sampling would be six samples per site of 15 cm per sample, with one sample per lithologic unit or per 60 m of recovery, whichever is less. Requests exceeding these limits would be forwarded to the Panel.

R. Merrill discussed the Curatorial report, which is concentrated on sampling and core refrigeration. A question raised at the April PCOM meeting as to possible conflict of interest by the Curator was not pursued by PCOM with IHP. Gulf Coast Repository expansion is to begin, to be ready next year to receive Indian Ocean and Pacific cores. LDGO is ready to start expanded refrigerated storage construction in 1990-1991. Sampling rates are at predicted levels with personnel reductions in force.

An automated-color-measurement tool is being investigated by R. Merrill to replace the variability introduced by use of the Munsell Soil Color Charts. The tool uses international standards to determine color from programmed color charts or in terms of light wavelengths. It would probably be part of the automated description station. This instrument is not affected by the ambient lighting and sample moisture content.

J. Hertogen is concerned about the delay in publication of ODP leg articles in Nature. He will work up statistics in conjunction with R. Merrill to present to the publishers.

R. Merrill announced that the ODP/DSDP site map art is finished and was sent to NGDC last week (data are through Leg 120). M. Loughridge has developed a Mercator projection that shows all sites. This cooperative publication is funded by NGDC.

L. Next IHP Meeting

The next IHP meeting is planned for 8-10 (Wednesday through Friday) March 1989 at ODP.

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IHP Action Items

P. Brown will send a copy of igneous rock description procedures to T. Moore by Thanksgiving.

M. Loughridge will send the "data stuffing" routine deemed most appropriate for possible sediment VCD automation.

T. Moore will contact appropriate JOIDES panels for comments on a more automated approach to VCD.

When completed, J. Foster will send I. Gibson the Ign/Meta thin section data-base design for review.

R. Merrill will provide information as to the type of investigation promised by "non-performers" as an aid to IHP evaluation of each case.

R. Merrill will begin to gather data on how implementation of the Editorial Review Board has affected timing and cost of the Scientific Results volume production.

R. Merrill, C. Broglia, and M. Loughridge will provide cost estimates for production of ODP CD-ROMs (T. Moore will inform C. Broglia of this task).

T. Moore will investigate desire for companion volumes to Pacific Lithologic Data publication at next PCOM meeting.

J. Hertogen and R. Merrill will keep tabs on publication delay of ODP leg articles in Nature.

W. Rose and R. Merrill will provide society membership lists to T. Moore. These lists may serve to identify new panel members with publication/production experience.

ODP WORKING GROUP

DRILLING TO UNDERSTAND FLUIDS IN ACCRETIONARY WEDGES

Summary of Principal Points Discussed at the Meeting at Il Ciocco on 24 September 1988

1. Scientific Case, Problems and Interest

(Casey Moore to prepare on basis of workshop white paper)

2. Strategy for Drilling and Required Information and Measurements (G Westbrook to prepare)

A drilling programme in which location of sites is related to gradient of physical and structural change.

Deep holes through the toe of an accretionary wedge as deep as the oceanic igneous crust are required to characterise flow through this region, which may be from sources much further landward beneath the decollement or even laterally along along the sequence beneath the wedge. The toe region also shows the greatest rate of change of physical properties.

Shallower holes further landward would investigate the fluid regime of structures that are developed there, such as major out of sequence thrusts, and pervasive flow out of the surface of the wedge, following suitable surveys. These holes would also investigate the progressive deformation of the wedge in relation to fluid content and chemistry, and would study fluids from sources deep within or beneath the wedge released by such processes as dehydration reactions. The evidence for flow into the wedge from adjacent continental crust would also be an objective of more landward sites.

For a "typical" wedge it appears that a minimum of three drilling legs would be required, because of the penetration necessary for the sites at the toe of the wedge and the intensive sampling and logging of the sites. It is sensible to leave time between the legs devoted to deeper drilling to enable results to be evaluated and the drilling strategy modified, if necessary, with improvements in the technologies.

Investigation of at least two wedges is required to determine the effects of naturally varying quantities such as sediment thickness, sediment type, rate of accretion, age of subducting lithosphere.

For each site the following are essential for adequate characterisation of the effects of fluids:

As complete a delineation of structure as is possible using all methods pertinent to the situation investigated by the drill site
*Pore fluid pressure
*Permeability
*Temperature
Porosity

Pore fluid and gas chemistry, beyond the standard prescribed measurements
Lithology
Diagenetic history

For the starred quantities a significant advance on what has been done in the past is necessary.

Measurements of the in-situ stresses and mechanical properties are greatly to be desired.

Also of high priority is the calibration from in hole of measurements of properties of the wedge made with surveying techniques of seismic velocity, resistivity and density.

3. Surveys before drilling (R von Huene to prepare)

A two-stage strategy is appropriate.

Swath bathymetry, long to medium range sidescan sonar, and a grid of seismic reflection lines of spacing appropriate to the sizes of structures of interest have to be carried out before a leg could be adequately planned. For the deepest targets, multi channel seismic data are likely to be essential. Also, broadscale information on water outflow from heatflow and porewater geochemistry in piston cores.

Before each individual site can be finally located, high resolution information in the area of the site is required from the following:

High resolution sidescan sonar (this would usually be deep towed)
Heatflow
Porewater geochemistry
Mapping of vents using deepwater photography, submersibles or ROVs

All the high resolution studies are likely to require acoustic navigation from seabed beacons.

4. Requirements for Logging (R Hyndman to prepare with input from E Suess on geochemistry)

To be effective for drilling with fluids objectives, the suite of logging tools employed must have the capability to measure the following

temperature
seismic velocity
porosity
resistivity
density
interior borehole image
borehole ellipticity

In meeting this requirement, due note should be taken of a) need for long spacing sonic and electric logs to give better determination of the absolute values of the quantities measured, b) the sensitivity of shear waves to structurally related aspects of rocks such as crack orientation, the availability of the formation microscanner, c) the need for the bottom hole temperatures and several runs of the temperature log to establish the time dependent or behaviour of the thermal regime of the hole.

5. Requirements for sampling (D Karig & E Suess to prepare)

The current policy on taking whole round core samples for geochemistry and physical properties is too rigid. Higher density sampling is necessary where there are rapid changes in properties.

In-situ sampling ahead of the bit is essential. Packer sampling of fluids, sidewall sampling, and use of an improved pressure core-barrel are desirable.

6. Requirements for Downhole Measurements and Experiments (D Karig & E Suess to prepare)

Need for good measurements of pore pressure, permeability and temperature reemphasised.

Packer, Geoprops probe and WSTP are appropriate techniques for measurement.

Vertical Seismic Profiles (VSPs) including offset VSPs (sometimes called WASPs) are necessary to tie holes into surface seismic measurements. Use of shear-waves should be seriously considered. Large scale resistivity measurements should be made. Artificial tracers to measure flow rates in along channels of high hydraulic conductivity should be considered.

7. Laboratory Measurements (D Karig to prepare)

Beyond the normal suit of measurements the following are of value.

Permeability must be measured. Constant head measurements are necessary.
Mechanical properties
Effects on seismic velocity of pressure and temperature.
Improvements in measurements of thermal conductivity (use split cores).
Techniques for measuring the physical properties of gas hydrates.
Three dimensional fracture geometry from X-ray tomography.

8. Post-drilling Experiments (G Westbrook to prepare)

Long-term measurements in boreholes of strain (using tiltmeters), fluid pressure and temperature in association with monitoring of seismicity and surface strain, to investigate the periodic nature of stress build up and release in the wedge associated in fluid pressure and flow and the relationship with earthquake production in the deeper, seismogenic, parts of the subduction zone.

SOHP MEETING MILAN ITALY
3, 4, 5, OCTOBER 1988

DRAFT MINUTES

In attendance:

W. Berger - SIO
G. Brass - Miami (PCOM)
A. Droxler- Rice Univ
F. Froelich-LDGO
B. Garrison- UCSC
M. Goldhaber- USGS Denver
D. Kent - LDGO
L. Mayer - Canada (Chairman)
P. Meyers - Michigan
B. Normark USGS
I. Premoli-Silva - ESF
T. Saito - Japan
A. Schaaf - France
N. Shackleton - UK
W. Sliter - USGS (CEPAC)
R. Stein - Germany
E. Vincent - France
U. von Rad -Germany(PCOM)

Tuesday 3 October 1988:

1.0 Meeting was called to order at 0845.

The Chairman made introductions, and asked Isabella Premoli-Silva to detail logistical instructions. The Chairman explained the time constraints that PCOM (and thus this Panel) were under to produce a long-term plan. Because of the pressing nature of the long-term plan, and because of the large amount of work that the SOHP had to do to finish its contribution to the long-term plan, the Chairman outlined an agenda that called for completion of the PCOM report and discussion of WEPAC and CEPAC issues on the first day of the meeting and devotion of the following two days to white-paper and long-term plan discussion.

The absence of Erwin Suess, new chairman of the SGPP was noted with dismay. We all understood that he was to come to this meeting (Isabella received a Telex from the JOI Office confirming his reservations a few days before the meeting). Search parties were dispatched.

2.0 PCOM Report:

G. Brass reported on the Oxford PCOM meeting.

Budget:

The Panel was encouraged by the budget figures which appear to be slightly higher than the target values.

The SOHP applauds PCOM's decision to extend Leg 124 by two days for testing of drilling into chert/chalk sequences. The ability to recover material in sequences of alternating lithologies is critical to a number of upcoming high priority SOHP legs; these techniques must be well established before these legs begin.

New panel mandates:

The mandates for the new Ocean History Panel and the Sedimentary and Geochemical Processes Panel were read to the Panel. As has consistently been our policy, the SOHP is thrilled at this division of responsibility and believe that it will create a much more manageable program. We questioned, however, how come there had been no request for input into the new mandates from the existing Panel or especially from the new chairmen. An immediate concern raised was the apparent overlap in mandate between SGPP and several of the other panels. Our concern is that when more than one panel is mandated to cover a particular subject, the possibility arises that each Panel will think that the other will do it and it will `fall through the cracks' (as was the case with fluids in the past). G. Brass explained that the lack of consultations was simply a question of timing and that these were `living documents' (a term he must have picked up in Washington). He encouraged the new Panels to offer constructive criticism of their mandates.

The Panel also wondered if any scheme for inter-thematic liaisons had been established and suggested that this might be necessary -- especially between OHP and SGPP.

1990-1993 Planning Process:

The planning process adopted for 1990-1993 was described. The SOHP is encouraged by the sincere effort to see the program driven thematically and hopes that in adopting this approach PCOM does not forget the need for **long-term, global** planning.
Also, the need for a coherent approach to long-term planning of site surveys was discussed.

WEPAC

A brief report on the status of WEPAC was presented. Of greatest concern to SOHP is the status of the NEA Margin program. The remaining NEA issue seems to be the question of safety. The Chairman has spoken to Peter Davies and encouraged him to make a presentation to the safety panel as soon as possible (hopefully at their Hawaii meeting) so as to flag any potential problems.

Given PCOM's guidelines for scheduling only mature programs, the SOHP questions why a Nankai geotechnical leg has been scheduled.

The SOHP is pleased to see Leg 129E scheduled as another engineering leg. These dedicated engineering legs must continue if we are to see major technical improvements.

The SOHP recommends the following people as co-chiefs for upcoming WEPAC legs:

Lau Basin	-Ulrich von Steckleberg
	- Dave Cronan
	- Jim Hawkins
NEA Margin	- Peter Davies
	- Andre Droxler
	- Judy Mckenzie
	- Bob Ginsberg

For potential CEPAC legs that may be drilled in FY90 we make the following recommendations:

Old Crust	-Yves Lancelot
	- Roger Larson
	- Peter Vogt
Ontong Java	-Larry Mayer
	- Wolf Berger
	- Nick Shackleton
	- Judith Resig

G.Brass presented the PCOM reaction to the draft white paper produced at our two day Corvallis meeting.

The seven issues raised in the PCOM Chairman's August 30th letter to the SOHP were presented. The criticisms expressed by PCOM were of two kinds, those of content and those of form. The SOHP was somewhat taken aback by the criticisms of form (lack of prioritization, lack of phasing, requests for it to be in the format of the Lith long-term planning document, etc) inasmuch as we had been explicitly instructed NOT to prioritize, phase, etc. We had been told to write a white paper (a discussion of scientific objectives) at our Corvallis meeting, not a long-term plan (which we had been instructed to write at this meeting). Brass admitted that perhaps this fact had not been adequately transmitted to PCOM.

We will attempt to address the questions of content raised at PCOM in our second draft of the White Paper (and in the Long-term Planning document) but must point out that while PCOM consistently criticizes our objectives for lack of focus, their requests for changes in content only add to the broadening of our document (more on evolution, more on fluids, more on sedimentary processes). These requests are not

surprising, they merely reflect the ridiculously broad mandate that our panel has been saddled with. This mandate has finally been split, but inasmuch as we must still work under the old mandate in producing our White Paper and Long-term Plan, the expectation of a narrowly focussed document is ludicrous.

3.0 Report on Leg 122:

Ulrich von Rad gave a brief report on the highlights of Leg 122. Despite the disappointment in not recovering Jurassic, the leg was a paleoceanographic success with the recovery of excellent Cretaceous biostratigraphies, an almost complete Aptian to Recent section (762), a unique record of the early Tethys, and a good calibration of the seismostratigraphic record. Credit must be given to the co-chiefs and to PCOM for exhibiting the flexibility necessary to pull success out of the jaws of failure. The failure to recover Jurassic where the seismic interpretation implied it would be, emphasizes the critical importance of using the drill to ground truth the seismic record.

4.0. CEPAC

It is our normal procedure to systematically review each new proposal that has come in for a given region and see where it fits in our scheme of thematic priorities. Since our last meeting approximately 10 new CEPAC proposals have come in. These have been distributed to all members for review. Because of the pressing nature of Long-term Plan, and because PCOM has requested responses to questions about specific CEPAC programs, we decided to discuss the programs PCOM had questions about but defer the discussion of new proposal until the next meeting of the panels.

PCOM requested responses to several questions concerning the CEPAC prospectus. **Despite the specific request of the Panel, SOHP members were not sent copies of the CEPAC propectus. We wonder how we are expected to make informed decisions if we are not provided the necessary materials.**

ATOLLS AND GUYOTS:

Problems with the recovery of shallow water carbonates are well documented within the drilling program (Legs 115, 122). If recovery cannot be improved over present capabilities it would be difficult to justify this program (except on Ogasawara where recovery shouldn't be a problem). Because of the important objectives of Atoll and Guyot drilling (identified by both the SOHP and the COSOD II Report), we urge

PCOM to push for the technological developments necessary to resolve these problems. It is hoped that vibracore/percussion or mining systems may provide the solution and that these systems can be adequately tested in an appropriate environment on Legs 124E and 129E. We also suggest that the TAMU engineers speak with those responsible for the successful drilling of Eniwetak (S^3 of La Jolla, we believe) to find out what techniques were used there. Logging can help, but may not be useful if the holes are unstable. In addition, logging cannot provide ages which will be critical to meeting the objectives of this program.

The fundamental question is how much does the recovery need to be improved to make the program viable. The SOHP discussed this issue and concluded that it is most appropriately addressed by the proponents. A letter will be drafted to the proponents asking what sort of resolution/recovery is deemed necessary to meet their objectives.

THE SOHP NOTED THAT THEIR RECOMMENDATION FOR DRILLING ON THE APRON OF ENIWETAK WAS NOT INCLUDED IN THE CEPAC PROSPECTUS. ENIWETAK OFFERS THE BEST ATOLL-BASED CORE RECOVERY AT PRESENT AND A COMPLIMENTARY APRON SITE WOULD BE EXTREMELY USEFUL.

NEOGENE PALEOCEANOGRAPHY -- E. EQ. PACIFIC TRANSECT:

The SOHP unquestionably supports the viability of this program even if the western transect cannot be drilled, BUT finds it difficult to believe that the western sites cannot be drilled. First, we have faith that the site survey proposal will be funded. Second, while we are sure that the proponents have carefully examined existing profiles in the area and the flexibility in adjusting sites, we wonder if it is not possible to find even a 3.5 kHz record in an appropriate area that might suffice to select potential drill sites. Finally, we suggest that given our general knowledge of the sediments and geologic history of the region, and, the extensive seismic data base in the general region, that these sites may only require a pre-drilling site survey by the JOIDES RESOLUTION.

NORTH PACIFIC NEOGENE:

In order to meet the objectives of our highest priority themes (high-frequency and long-term paleoceanographic and paleoclimatic change), the SOHP has called for a global series of drilling transects across major oceanographic fronts and watermasses. Particularly critical to meeting these objectives are transects in the high latitudes that are most

sensitive to variations in insolation and have experienced more extreme climatic changes. The North Pacific is a key component in this
080 global climate/circulation system and yet we have remarkably little core data from the region. Questions as fundamental as the existence of a source of deep water in the N.W. Pacific remain unresolved.

Given our high level of interest in the region, the SOHP was pleased to see three proposals (not including Bering Sea) addressing high-frequency (Neogene) problems in the N. Pacific (199/E, 247/E, 259/E). Faced with the PCOM constraint of formulating a MINIMUM program for the CEPAC , the SOHP attempted to combine these proposals into a single program. In combining sites from the three proposals we sought to establish an E-W N. Pacific transect that would address the following questions:

1. Establish the presence or absence of N.P Deep Water -- if it existed what was its relationship to the N. Pacific sediment drifts (Meiji 1 and 2, PM1).

2. Establish the timing of the initiation of glaciation in the N.W. Pacific (Meiji 1 and 2, NW 1,3,4, PM 1).

3. Examine the spectral response of the earth's climate system in moderately high latitude (Meiji 1,2, NW 1,3,4, PM1).

4. Establish a high resolution biostratigraphic reference section for this region (Meiji 1,2, PM1).

5. Examine a major change in global biogeochemical cycles -- the rapid increase in siliceous sedimentation in the m. Miocene in the N. Pacific and restriction of siliceous deposition in the Atlantic (NW1,3,4).

6. Cenozoic history of eolian sedimentation and its relationship to aridity and atmospheric circulation (NW1,3,4,PM1)

7. The response of the N. Pacific to global oceanographic events and variations in the Subarctic Front (NW1,3,4, PM1).

8. Testing models of allopatric vs parapatric species evolution (NW1,3,4, PM1)

9. Evaluating variations in fertility, carbonate dissolution and nutrient supply during the Neogene (PM1).

The Panel was concerned that the easternmost site (PM-1) would not have carbonate contents sufficient to provide useful paleoceanographic

information. Recent analyses performed by Pederson et al, however, suggest that (at least for the last 150K years) there is enough carbonate for useful studies. Given the apparent viability of the PM site, the SOHP recommends that it be maintained in order to give a much broader extent to the transect.

A large amount of new survey data has recently been collected and is in various states of analysis. Given the clear importance of this region to SOHP objectives, the number of proponents involved, and the large amount of, as yet, unreported recent data, the **SOHP REQUESTS THAT A DETAILED PLANNING GROUP BE ESTABLISHED** to evaluate the latest data and determine the best drilling approach to addressing the objectives expressed above.

Recommended members of the DPG include:

C. Sancetta, L. Keigwin, B. Bornhold, D. Scholl, J. Morley, D. Kent (SOHP), M. Leinen, and D. Rea.

SHATSKY RISE:

Three issues were discussed relative to Shatsky rise drilling: 1) core recovery; 2) the position of Shat-1 and; 3) site survey data. The objectives of the Shatsky Rise program (cause of OAE's, timing and vertical extent of the events, chemistry of the ocean at these times) absolutely require better recovery than has previously been demonstrated in chert/chalk sequences. If there is no improvement in chert/chalk recovery, we cannot support this program. Logging can provide information on the vertical extent of the events but will not yield critical data on their timing. Because of the importance of the Shatsky Rise objectives we urge a concerted engineering effort to improve recovery in chert/chalk sequences. As part of this effort we recommend that Leg 129E spend some time testing new coring systems ON SHATSKY RISE. Engineering trials on Shatsky rise will directly address the key technical issues and, may provide an opportunity for additional site survey data (see below).

The SOHP agrees with PCOM that a shallower site might be somewhat better than Shat-1 in delineating the extent of the O_2 minimum zone, though we believe that Shat-1 is adequate if a shallower site cannot be found. We are unfamiliar with the existing survey data base and will contact Sy Schlanger to find out if a slightly shallower site can be located. We will also ask about the overall site survey data base and plans, if any, for further site survey work.

Tsuni Saito will also check on the availability of Japanese data and plans for future Japanese cruises in the area. While we believe that

further site survey data would improve the chances of meeting all drilling objectives, we do not consider the lack of additional site survey data serious enough to jeopardize the program in that a drilling strategy can be devised that would optimize the chances of recovering the appropriate sections.

ONTONG JAVA:

The SOHP is confident that the Ontong Java site surveys scheduled for December 1988 will clearly delineate appropriate drill sites and that the Ontong Java program will become `mature'. The SOHP emphasizes that our interests in the Plateau go beyond the Neogene and call for the inclusion of deeper drilling at AT LEAST one site on the plateau. The Ontong Java Plateau will provide the best opportunity for unraveling the physical and chemical history of the Pacific Ocean throughout the Cenozoic and much of the Mesozoic. Despite the diagenetic effect on some signals, the sites will contain excellent faunal sequences (including the K/T boundary); a potentially excellent magnetic record; the best possible Pacific ^{13}C record; an ^{18}O record that should span at least the whole Cenozoic; evidence for the oxidation state of the oceans during the Cretaceous (presence or absence of anoxic events is a key issue); a long history of ocean carbonate chemistry; and an ideal data set to study the relationships amongst water mass structure, benthic foraminiferal assemblages and ^{13}C. The relatively shallow depth of the Plateau also implies that material will be recovered that will be suitable for evaluating evolutionary trends in planktonic and benthic communities and their relationship to chemical and physical parameters.

BERING SEA:

The SOHP was quite disturbed to see the PCOM directive to remove the Bering Sea from the CEPAC prospectus. The Bering Sea program (particularly Sounder Ridge) has always been of very high priority to the SOHP. Our only concern about this program was the uncertainty in the age of Sounder Ridge and the sediments on it. This uncertainty added an element of risk to the program. When PCOM mandated the SOHP to provide a **MINIMUM** CEPAC program, we chose not to put forth Bering Sea because of this uncertainty. Given the planning directive (which as we understand should make CEPAC programs just as eligible as any others for 1992-1993 drilling), and particularly given the large amounts of new data and analyses that have recently taken place, we believe that it is inappropriate to dismiss the Bering Sea from future CEPAC drilling at this time.

The SOHP recommends that the DPG that we requested to address N. Pacific drilling also be asked to comment on the expected ages of the Sounder Ridge and its sediments and be asked to include the Bering Sea and SOHP's low-frequency, pre-Neogene objectives in formulating the N. Pacific plan.

5.0 OTHER ISSUES:

Erwin Suess was located in Kiel on Wednesday afternoon. Erwin had called the JOI Office to ask if he should attend the SOHP meeting and was informed that he was not on the attendance list and therefore shouldn't go. He had commitments for Thursday and could not make it to our meeting.

Recommendations for new members of SGPP and OHP:

SGPP	OHP
P. Swart	L. Peterson
D. Stow	E. Boyle or P. Delaney
R. Flood or A. Shor	W. Berggren
R. Karlin	P. Davies
L. Pratt	E. Baron or J. Parish
M. Underwood	P. Vail or T. Loutit
S. Brassel	J. Lipps
J. Mienert	R. Halley
D. Piper	
S. Dreiss	
F. Prahl	
A. Taira	

Next Meetings:

OHP - 4- 6 April Miami Fl., G. Brass, host
SGPP - 14 - 16 March Denver; Colo., M. Goldhaber; host

The rest of the meeting was devoted to work on the White Paper and the Long-term Planning Document. These reports are submitted separately.

JOIDES TECTONICS PANEL MEETING
Palisades, New York
5-7 October 1988

Executive Summary

The meeting was divided into two main parts — Long-Range Planning and WPAC/CEPAC drilling. Input to the TECP Long-Range Plan will be submitted for the Chairman to put together the next draft as soon as possible.

WPAC drilling proposals were discussed. The Panel's principal recommendations concern Nankai Trough drilling. Namely:

- Sufficient time needs to be taken to carry out a drilling program commensurate with the recommendations of the Working Group on fluid flow at convergent margins chaired by Graham Westbrook.
- Additional surface studies should precede final site selection.
- Pore pressure and permeability measurements are essential.
- Site NKT10 should be drilled to basement to obtain a complete picture of fluid flow at the toe of the prism.

The Panel's highest priority themes for CEPAC drilling were reviewed with presentations on the Hawaiian moat experiment and the Chile Rise triple junction. TECP is satisfied that sufficient progress is being made toward mature proposals in these two themes but retains reservations about both at the present time. Proponents were encouraged to supply the Panel with further information at the earliest possible opportunity. The Chile Rise triple junction will probably need two legs to satisfactorily address the problem. TECP believes that a proposal for the Vancouver Island margin and at least preliminary results of Nankai Trough drilling need to be in before final recommendations can be made for Cascadia convergent margin drilling. TECP was impressed by the new data bases available for the North Pacific and Bering Sea and urges PCOM not to drop drilling in that region from the CEPAC program. Highly significant tectonic themes identified in the Panel's long-range plan can be addressed there.

Finally TECP recognizes the need to draw to the attention of proponents of tectonic drilling that it foresees having to make hard choices regarding thematic programs in the CEPAC region during the next year.

Next Meeting: Europe (F.R.G. or France) tentatively during the week February 27 to March 3, 1989, or else the following week.

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DRAFT MINUTES

JOIDES TECTONICS PANEL MEETING
Palisades, New York
5-7 October 1988

Members Present:

I. Dalziel (U. Texas at Austin), Chairman
J. Behrman (F.R.G.)
J. Bourgois (France)
R. Buck (L-DGO)
D. Davis (SUNY, Stony Brook)
D. Engebretson (W. Washington U.)
K. Hsu (E.T.H.)
Y. Ogawa (Japan)
S. Srivastava (Canada)
T. Watts (L-DGO)
G. Westbrook (U.K.)

In Attendance:

L. Kroenke (CEPAC)
G. Moore (CEPAC)
P. Vogt (N.R.L.)

Absent:

K. Hinz (F.R.G.)

Agenda

Five principal topics were discussed at the meeting:

Long-range planning
WPAC drilling
CEPAC drilling
Nominations for WPAC co-chiefs and new US panel members
Next meeting

Long-range planning

There was extensive discussion of the TECP Long-range planning document as commented upon by PCOM. It was understood that further work was required to move the document ahead from being closer to a White Paper to being closer to a long-range plan. Some initial drafting was undertaken towards this end, but pressing WPAC and CEPAC matters

limited time spent on long-range planning to approximately one half of the three-day meeting. It was agreed that writing assignments should be in the Chairman's hands by October14.

WPAC Drilling

Nankai Trough (Proposal 314/D)

TECP had an extensive discussion of this proposal to study fluid flow and mechanical response across an accretionary prism. The discussion was carried out in the light of a report by Graham Westbrook of the deliberations of the Working Group on fluid flow at convergent margins. The Panel agreed that any drilling of the Nankai accretionary prism should be carried out in a manner commensurate with the recommendations of that Working Group. Accordingly, the following recommendations were agreed to:

1. Drilling should be planned and carried out in the light of detailed surface studies. Every effort should be made to coordinate the up-coming submersible studies with the proposed drilling program.
2. Pore pressure and permeability measurements are essential. The drilling should not be undertaken unless the appropriate instruments are available and working. Sufficient time must be devoted to acquiring the data needed to understand the fluid flow and mechanical response to deformation within the prism.
3. Time should be taken to drill the proposed Site NKT10 to basement in order to obtain a complete picture of fluid flow at the toe of the prism.
4. Drilling should be concentrated at the toe of the Nankai prism. Time needed to drill NKT10 to basement should, if necessary, be obtained by drilling fewer holes at up-slope sites.

A meeting of the Chairman, Graham Westbrook, and Shiri Srivastava with Chairman Paul Worthington and the Downhole Measurements Panel indicated that the necessary tools for Nankai drilling will indeed be on line, but confirmed TECP's concern that the time available in the current plan for downhole measurements is inadequate. TECP reiterates its belief that the

Nankai accretionary prism experiment needs to be done properly, and that means taking the necessary time for essential measurements.

Electrical Conductivity Structure of the Eastern Margin of the Japan Sea (Proposal 302/F)

While believing that electrical conductivity measurements such as those proposed can indeed contribute to understanding the deep structure of the lithosphere, TECP was concerned that the proposed experiment was of necessity confined to one point. This is in contrast to the array of instruments used in the recent conductivity traverse successfully carried out across the Vancouver Island convergent margin. Thus the Panel is reluctant to recommend that 55 hours of *JOIDES Resolution* time be assigned to this experiment.

Island Arc to Back Arc Basin Transition (Proposal 155/F)

TECP found this proposal of considerable tectonic interest (as it had done before, i.e., in March 1988). The goals fit into TECP's long-range plans for monitoring of tectonic activity at ODP sites and for local tectonic experiments using seismometers and stress observations. The Panel was disappointed, however, that the proponents had not followed-up on its earlier request for an assessment of the improvement in resolution of earthquake hypocenters that can be expected from the instrumentation. Thus TECP supports the proposal with reservations.

Zenisu Ridge (Proposal 163)

The proposal addresses a high priority tectonic theme, namely processes at convergent margins and specifically ophiolite obduction. The Panel did not, however, find the likely outcome of successful drilling in terms of the timing of the onset of deformation to be of sufficient interest to support this proposal strongly.

Scientific Drilling in the South China Sea (Revised Proposal 194/D)

TECP has a long-term thematic interest in South China Sea drilling from the point of view of the development of rifted margins of a small marginal ocean basin. The Panel wishes to encourage the Chinese Committee to acquire more seismic data to develop a mature proposal. The present proposal, however, does not make clear how drilling at the proposed

sites could indeed discriminate between different models of rifted margin formation. The Panel suggests that a more mature proposal be presented at a later date.

Lau Basin (Site LG6)

TECP wishes to go on record as supporting the drilling of a fore-arc site such as the proposed Site LG6 as part of the Lau Basin program. The scientific goal of such drilling being to relate in as far as possible the history of back-arc development with the history of arc volcanism. This is a major problem as back-arc basins in several parts of the world (e.g., Bransfield trough) develop independent of active arc volcanism. Hence the tectonic mechanisms are unclear. The site would also contribute to knowledge of the fore-arc basement and to understanding of the tectonic history of the Lau fore-arc.

Zero-offset Vertical Seismic Profiling at Bonin Sites Bon-1 and Bon-2 (Proposal 309F)

TECP strongly supports this proposal but urges the use of the highest resolution energy source giving the penetration needed. The Panel does not believe this will be achieved with the 1000 cu. in. source proposed.

CEPAC Drilling

TECP concentrated its attention on its highest priority themes for CEPAC, namely the Hawaiian lithospheric flexure, Chile Rise-Chile Trench ridge crest subduction processes, and the convergent processes at the Cascadia margin. It also reviewed the "Augmentations" furnished by David Scholl for the North Pacific and Bering Sea ,judged to be of pressing significance in the light of PCOM's directive to CEPAC to eliminate those areas due to lack of strong thematic interest.

Hawaiian Flexure (Revised Proposal 3/E)

Tony Watts provided an update on the proponents view of planning for this experiment in the light of the widespread concern that satisfactory age control could not be achieved, He presented magneto-stratigraphic data that had been received only the previous day from the University of Rhode Island. TECP regarded the new data as very encouraging despite the

absence of declinations and susceptibility measurements that left some room for additional concerns that should be eliminated later. The available data indicate that satisfactory magneto-stratigraphic control should be obtainable at least back to the Olduvai event. While the cores studied do not allow assessment of the "datability" of older strata in the region, and there is still lingering doubt as to whether the time-dependence of lithospheric flexure can indeed be determined from drilling , TECP had no hesitation in continuing to support this theme highly for CEPAC drilling at the present time. The primary goals are increasingly mature, and the secondary and tertiary goals regarding rim volcanicity and mass-wasting(particularly the former) strengthen the overall plan. Nonetheless the proponents were encouraged to develop a model for the flexure of the lithosphere using the MCS data and assumed deposition rates for consideration by the Panel at its next meeting.

Chile Rise Triple Junction

Steve Cande reviewed the results of his recent cruise for the Panel. This included "brute stacks" of the MCS data. The Panel was impressed by the data even in its present rough form, and feels confident that a mature proposal will emerge. The preliminary proposal distributed at the meeting concentrated on the immediate effects of ridge crest subduction, including subduction erosion and ridge crest volcanism in the toe of the accretionary wedge. There was significant feeling on the Panel that a mature proposal should also address the recovery of the margin after ridge crest subduction, the state of stress in the upper plate both before and after this phenemenon, and possibly ophiolite obduction on the Taitao Ridge, The latter is more problematical, however, and should perhaps be addressed as part of a related terrestrial study. It would be unfortunate not to take full advantage of any ODP drilling by thoroughly investigating the adjacent region on land. It is known ,for example, that there are young ophiolites emplaced on land along the coast at the triple junction, that there is anomalous near trench magmatism, and that there is increased deformation resulting in increased height of the mountains to the south of the collision zone. It is felt by TECP that a complete job of investigating the important phenemenon of ridge crest-trench collision at this unique locality is

likely to need two full drilling legs.It also needs to be borne in mind that significant transit time is going to be needed from any other CEPAC site to reach 47 degrees south along the Chile margin.

Cascadia Convergent Margin (Revised Proposal 233/E)

TECP found this an encouraging proposal although the actual number of holes may need to be reduced. A mature proposal will need to await the planned seismic and side-scan sonar surveys. The Panel noted with interest the letter sent by Dr Hyndman to Robin Riddihough concerning the well-studied Vancouver Island portion of the margin. A mature proposal will be studied with interest, and a final drilling plan will also need to be viewed in the light of the results from the Nankai accretionary prism..It should be borne in mind here that TECP believes that this latter program is going to need two full legs of drilling, and a final program has yet to be determined by PCOM.

North Pacific and Bering Sea "Augmentations" (Proposals 231/E, 182/E, and 225/E)

TECP is impressed by the new data base and the potential for addressing several themes judged to be of major importance in its emerging Long Range Plan, The Panel recalled that the original proposals for drilling in this region contained little, if any, tectonic interest. The Panel supports the suggestion of a small group being set up to develop a detailed plan to address both tectonic and ocean history goals in this region. The TECP Chairman is to discuss the matter with the other appropriate panel chaimen.

Conclusion.

TECP continues to support the proposals for drilling its highest priority themes for CEPAC, namely Hawaiian flexure, Chile Rise triple junction, and Cascadia margin. In addition the Panel believes that further consideration should be given to the North Pacific and Bering Sea areas from a tectonic perspective, TECP recognizes, however, that it will very likely be forced into making some hard choices in the not-too-far-distant future. The Panel needs to make it clear to proponents that the development of thoroughly mature proposals is now an urgent necessity. Identification of the above themes as being of the highest TECP

interest for CEPAC does not mean that one or more will not have to be dropped and left to compete at a later date with other proposals from the world"s oceans as a whole.

Nominations for Co-Chief and Panel Membership

The Panel was made aware that nominations for Co-chief Scientist on up-coming WPAC legs and for US Panel member to replace Peter Vogt and David Howell should be submitted as soon as possible.

Next Meeting

Europ (F.R.G. or France) during the week of February 27 to March 3, 1989, or else the following week.

MEETING OF JOIDES DOWNHOLE MEASUREMENTS PANEL

Lamont-Doherty Geological Observatory
Palisades, New York

6-7 October 1988

EXECUTIVE SUMMARY

1. Panel recommended that the Geoprops Probe be tested during Leg 126. If necessary, IP to be withdrawn to make time for this.
[Rec: 88/16]

2. Panel was unable to develop a 20-day logging programme at Nankai (Leg 129) sites NKT 1 and NKT 2 which satisfies the scientific objectives of the leg.

3. Panel recommended that the downhole-measurement programme needed to address properly the scientific objectives of the scheduled Leg 129 is 31.3 days. Serious data shortfalls will occur if this effort is reduced.
[Rec: 88/17]

4. Panel recommended that Nankai should be addressed through two separate legs. The first leg should comprise a single site at NKT 2 with adequate time being allowed for hole conditioning and two-stage logging. The second leg should comprise two/three additional sites to investigate horizontal gradients.
[Rec: 88/18]

5. Panel recommended with reluctance an abridged 20-day programme of downnole measurements for Nankai Leg 129, if it should be decided to drill only one Nankai leg. Considerable difficulty was experienced in formulating this recommendation, since the mis-match between the scientific objectives and the dedicated resources was unacceptably large. Panel felt very strongly that this 20-day programme is not adequate to address the scientific objectives of the accretionary prism study and offers it with reluctance. Panel wished to have the word "reluctance" fully emphasized.
[Rec: 88/19]

6. Panel will closely monitor the development of those tools scheduled for Nankai which are not yet field proven. These account for about 30% of the technically realistic downhole-measurement programme as per Recommendation 88/17. Should any of these tools fail to come up to expectations, alternatives will be proposed.

7. Panel reiterated its earlier position that VSP should be run only in response to scientific needs: zero offset VSP should not be a standard operation on board ship. Minimum tool acquisition for ODP use is three separate three-component VSP tools for adequate back-up. LDGO Borehole Geophysics Research Group would be the logical tool operator for tool maintenance, deployment and data archiving.

8. Four nominations were made for panel membership:

Roger Morin	(USGS)
Joris Gieskes	(Scripps)
Peter Lysne	(Sandia)
Mark Hutchinson	(Conoco)

9. Panel recommended that a two-day meeting of previous JOIDES logging scientists and contractor representativies be convened, with JOI support, to evaluate and pool experience of shipboard logging practices and to formulate recommentations for improvement. Target date early 1989. Co-convenors to be Wilkens and Worthington.

[Rec: 88/20]

10. Panel concurred that the digital borehole televiewer is DMP's highest priority new acquisition. Panel encourages earliest possible purchase.

11. Panel to meet next at University of Hawaii, Honolulu on 16-18 January 1989. Roy Wilkens to host the meeting.

[Rec: 88/21]

Paul F Worthington
26 October 1988

MEETING OF JOIDES DOWNHOLE MEASUREMENTS PANEL

Lamont-Doherty Geological Observatory
Palisades, New York

6 - 7 October 1988

MINUTES

Present

Chairman:	P F Worthington (UK)
Members:	S Bell (Canada) B Carson (USA) E Howell (USA) D Karig (USA) H Kinoshita (Japan) A Kristensen (ESF) J-P Pozzi (France) C Sondergeld (USA) R Traeger (USA) H Villinger (FRG) R Wilkens (USA)
Liaisons:	R Anderson (LDGO) K Becker (LITHP) X Golovchenko (LDGO) R Jarrard (LDGO) M Langseth (PCOM) T Pettigrew (ODP/TAMU)
Guests:	G Moore * (TECP) I Hill (Leg 129 Co-Chief)
Apologies	G Olhoeft (USA) R Stephen (USA)
Absent	R Porter (USA)

* attendance for agenda item 5 only

096 1. **Welcome and Introductory Remarks**

The meeting was called to order at 8.50 am. The Chairman welcomed DMP Members, Liaisons and Guests, especially the Co-Chief of Leg 129 (I Hill) and the ODP/TAMU representative (T Pettigrew).

Review of Agenda and Revisions

The Chairman explained that much of the meeting was to be dedicated to Agenda Item 5, the development of a programme of downhole measurements for Nankai. PCOM had not accepted DMP Recommendation 88/14 to refer this matter to a specialist working group, requiring instead that the entire panel reconsider the issue at this meeting. Consequently, much ongoing business has had to be deferred to the next DMP meeting in January 1989.

The usual Logging Contractor's report would be encompassed within the tour of LDGO facilities (Item 7).

Item 11, other business, to include:
(i) Meeting of JOIDES logging scientists:
(ii) Report on French wireline re-entry system (NADIA):
(iii) Acquisition of digital borehole televiewer:
(iv) Date of next meeting.

Subject to these modifications, the pre-circulated agenda was adopted as a working document for the meeting.

2. **Minutes of Previous DMP Meeting, Texas A 8 M University, June 9 - 10, 1988**

Modifications:

(i) p 5, para 1, lines 11/12

To read:
"Only the choice of 504B would have been worse from the standpoint of risk to a scientifically valuable hole."

(ii) p 5, para 2, line 1

To read:
"Hole 418A should not be put at risk if at all possible: DMP strongly supports the development of wireline re-entry technology."

(iii) p 18, Leg 126 - Bonin

Delete line 5: "(up to 600°C)."

With these modifications the minutes were adopted: the Chairman signed the master copy for ODP records.

Matters Arising

The principal matter arising concerns the liaison between DMP and the Continental Deep Drilling Programme (KTB) of FRG. Dr Hanel of KTB, who attended the previous DMP meeting, has communicated the following:

(i) KTB Project Management and Heads of the R & D Programme are very pleased to establish cooperation between DMP of ODP and the Rock Physics, Logging and Log Interpretation Working Group (ARGE 4) of KTB.

(ii) Dr H Villinger is the DMP representative on ARGE 4.

(iii) Prof H Burkhardt is proposed as the ARGE 4 representative on DMP: an alternative may be nominated when appropriate.

(iv) The ARGE 4 representative will only participate in DMP meetings if there are topics of interest to KTB.

(v) The DMP meeting in autumn 1989 and the subsequent joint DMP/ARGE 4 workshop are invited to take place at the KTB well site. Details should now be arranged with KTB Project Management.

Date of autumn 1989 DMP meeting to be around mid-September: H Villinger to arrange with Dr Hanel.

[ACTION : VILLINGER]

3. PCOM Report

Langseth reported on the PCOM meeting held on 23 -25 August 1988 and specifically reviewed PCOM response to DMP recommendations 88/9 - 88/15 formulated at the last DMP meeting.

Rec. No.	Description	PCOM Response
88/9	Shipboard Measurements Panel (SMP) and DMP reciprocal liaison be established	Accepted
88/10	Diamond coring system (DCS) be designed to permit logging	Approved LDGO/TAMU joint study of DCS with respect to slimholing tools and/or widening hole
88/11	Cost analysis be made of DCS and necessary slimholing of logging tools	
88/12	KTB staff be invited to give presentation on programme to PCOM & EXCOM	KTB representative to be invited to next PCOM meeting

88/13	Drill AAP1B first during Leg 123	Accepted
88/14	Working Group be convened to plan downhole measurements for Nankai	Not Accepted
88/15	Standard logging suite be run at SUL 4 during leg 124	Accepted

Other points reported by Langseth were:

(1) PCOM approved two-stage logging of holes deeper than 750m for a 6 - 8 month trial period.

(2) The Engineering Test Leg has been extended by two days to allow more time for testing drilling techniques in alternating hard and soft layers, eg cherts.

(3) PCOM is concerned about rising insurance costs for logging tools and will investigate formulating a policy on tool fishing.

(4) Long-range planning document (10 years) is to be produced. DMP will probably be asked for further inputs. EXCOM is looking for ODP "spin-offs" to include in the plan.

(5) Terms of reference for the new panel structure were developed at the last PCOM meeting. The new mandates for DMP and SMP are attached as Annexure 1.

4. WPAC Legs 124 -128

Jarrard reviewed the current logging programme.

Leg 124: Sulu and Celebes Seas

Site	Penetration	Comments	Logs
CS-1	1050	Celebes Sea stratigraphy	standard, BHTV
SS-3	1350	Sulu Sea stratigraphy	standard, BHTV
SS-5	400	Sulu Sea anoxia	standard (poss. only 2 strings)

Recent changes:

1) Sites renumbered but virtually unchanged from last DMP, despite subsequent debates.

2) Co-chiefs added BHTV originally recommended by DMP but dropped by WPAC because of time constraints; stress even more important than we anticipated.

3) PCOM and Co-chiefs accept DMP recomm. 88/15 to log SS-5 (formerly SULU-4); but entire site will be dropped if not enough time to do CS-1 and SS-3 thoroughly.

4) If too much time for CS-1 and SS-3 but not enough time for all three sites, co-chiefs want option of adding VSP and/or hydrofrac. (not recommended by DMP).

Panel queried usefulness of stress magnitudes from hydrofrac. in small plates and observed that zero-offset VSP might not provide additional useful information.

Leg 124E: Engineering Test Leg

Most plans unchanged: dedicated hole for logging, wireline heave compensator tests and improvement, test conversion from 3 to 2 standard strings, test wireline packer, evaluate using SES to cool hot holes.

Recent changes:

1) PCOM lengthened leg by 2 days (logging time not affected).

2) FMS will not be tested; tool development going well but better to use January for further land testing and training Schlumberger engineers.

3) Wireline packer tests slightly behind schedule but still probably okay for 124E.

Leg 125: Bonin/Mariana

Site	Penetration	Comments	Logs
MAR-3A	700	serp. diapir summit	standard, wireline packer, BHTV
MAR-3B	700	serp. diapir flank	standard, wireline packer
BON-6	1100	Bonin out-arc high	standard, BHTV, packer, mag/susc.
BON-7	500	diapir?	standard, wireline packer

Recent changes:

100

1) Confirmation that FMS will not be available

Leg 126: Bonin

Site	Penetration	Comments	Logs
BON-1	1050	active rift	standard, FMS, wireline packer, I.P.
BON-2	1200	rift-flank horst	standard,FMS,mag/susc, wireline packer
BON-5A	950	forearc	standard, FMS
BON-5B	950	forearc	standard, FMS

Recent changes:

1) BON-1 may be a very hot hole, too hot to log much even with SES cooling.

2) Still haven't found an I.P. tool for BON-1.

3) WPAC rejected DMP recommendation of wireline packer at BON-5A and BON-5B.

No I.P. tool identified as yet. ARCO tool has been made available but this will not resolve clay effects. Need a tool that is digital, reliable and sensitive. If no I.P. tool can be found, other options for investigating sulphur are GLT if hole is not too hot and SP log which responded in 504B.

Nankai Co-chief wishes to see Geoprops Probe tested before Leg 129. A five hour deployment of Geoprops Probe is possible during Leg 126.

DMP Recommendation 88/16

"Geoprops Probe be tested during Leg 126. If necessary, IP to be withdrawn to make time for this."

Legs 127 and 128: Japan Sea

Site	Penetration	Comments	Logs
127			
J1d	380	rifting history	standard,FMS,mag/susc.
J1e	880	rifting history	standard, FMS, BHTV, mag/susc.
J3a	730	obduction	standard, FMS, BHTV, mag/susc, hydrofrac
J1b	800	rifting history	standard, FMS, BHTV, mag/susc,hydrofrac,VSP
128			
J1b	return		geoelectrical, oblique seismic, seismometer
J2a	1390	metal. in failed rift	standard, FMS, VSP, packer, IP?
JS-2	600	paleoceanography	standard, FMS

Recent changes:

1) At J2a, DMP and WPAC had VSP and packer, but Tamaki WPAC prospectus had neither.

2) WPAC did not follow DMP recommendation to move J1b hydrofrac. from overcrowded Leg 127 to 128.

3) Renewed WPAC interest in mag/susc at J1d (an old DMP recommendation dropped by DMP in earlier compromise with WPAC).

5. Leg 129 - Nankai

The Chairman outlined the Panel's brief from PCOM, i.e. to develop a 20-day programme of logging and downhole experiments for the Nankai Leg 129 and to identify the additional scientific objectives that could be addressed if additional logging time would be available at some future date.

Karig described the principal scientific objectives of the Nankai Leg as an improved understanding of the mechanisms that govern mass- and fluid-flow at active plate margins. This objective is addressed through studies of gradients of fluid-flow, stress, structural and geochemical characteristics within the sediment and

fluid continuum that an accretionary prism provides. Detailed in-situ studies are required to understand the permeable sand-rich accretionary prism at Nankai which is likely to be markedly heterogenous.

Karig outlined some principal messages from the recent ODP Working Group on Accretionary Complexes:

(i) Study fewer prisms thoroughly rather than many superficially:

(ii) Dedicate two to three legs per prism, with time for appraisal and development between legs where appropriate:

(iii) undertake a technologically intensive programme at and away from the toe to study gradients in physico-chemical characteristics:

(iv) Very intensive pre-drilling surveys are required.

Leg 129 comprises two proposed sites:

NKT 2 - Deep hole (1300m) through the toe of the prism, decollement, plate boundary, and into sediments and perhaps oceanic crust beneath.

NKT 1 - Shallower hole (900m) away from the toe to characterize sediments before they are incorporated into the prism.

Panel noted that this drilling programme seems insufficient in the light of the messages from the Working Group on Accretionary Complexes.

The scientific objectives require an adequate data coverage of permeability, pore pressure and temperature, pore fluid chemistry, stress, velocity and rock chemistry.

After six hours' discussion, which partly included TECP Chairman and members, DMP was unable to develop a 20-day logging programme at NKT 1 and NKT 2 which satisfied the scientific objectives of the leg. A downhole-measurement programme which does address these scientific objectives would take 31.3 days. The trimming of this technically realistic programme to 20 days could not be done without omitting measurements essential to the study. As one panel member put it, "It is like trying to decide which of your children to shoot". A downhole-measurement programme of 31.3 days would be too long for a single Nankai leg and should be incorporated within a two-leg scheme. This would alleviate the severe pressure of time and allow provision to be made for adequate hole conditioning and two-stage logging.

DMP Recommendation 88/17

"The downhole-measurement programme needed to address properly the scientific objectives of the scheduled Leg 129 is 31.3 days. This programme is as follows:

Leg 129: Nankai Realistic Programme (31.3 days)

NKT-2 Pilot Hole to about 400m

# days	
1.0	8 LAST, 4 WSTP @ 30M, 6 geoprops
1.0	standard logging
0.3	FMS
0.2	dual laterolog
0.3	multichannel sonic (shear source)
2.8	

NKT-2 Main Hole (XCB then rotary to 1300m, with reentry cone and casing)

# days	
3.8	30 geoprops (if O.K.)
1.0	trip to release bit and insert rotatable packer
1.3	standard logging
0.3	FMS
0.4	hole conditioning
0.4	BHTV
0.3	dual laterolog
0.4	multichannel sonic (shear source)
1.0	4 packer
0.4	hole conditioning
1.9	6 wireline packer plus fluid tests
1.2	VSP
1.5	offset seismic experiment
1.0	trip to change to straddle packer
1.0	4 packer
2.5	deploy temperature string
18.4	

NKT-1 (XCB to 900m)

# days	
2.5	8 LAST, 4 WSTP + 18 geoprops (or 10 geoprops + 4 wireline packer)
1.6	wash hole for logging, or extra time for 2-stage logging
1.4	standard logging
0.4	FMS
0.4	BHTV
0.5	multichannel sonic (shear source)
0.3	sual laterolog
1.0	VSP
1.0	minicone and pipe trip for packer
1.0	4 packer
10.1	

Serious data shortfalls will occur if this effort is reduced."

DMP Recommendation 88/18

"Nankai should be addressed through two separate legs. The first leg should comprise a single site at NKT 2 with adequate time being allowed for hole conditioning and two-stage logging. The second leg should comprise two/three additional sites to investigate horizontal gradients."

DMP Recommendation 88/19

"If it is decided to drill only one Nankai leg, and to allow only 20 days for downhole measurements, the following programme should be adopted at NKT 1 and NKT 2:

Leg 129: Nankai Abridged Programme (20.7 days)

NKT-2 Pilot Hole to about 400m

# days	
0.5	8 LAST, 4 WSTP @ 30M, 2 geoprops
1.0	standard logging
0.3	FMS
0.3	multichannel sonic (shear source)
2.1	

NKT-2 Main Hole (XCB then rotary to 1300m, with reentry cone and casing)

# days	
2.3	18 geoprops (if O.K.)
1.0	trip to release bit and insert rotatable packer
1.3	standard logging
0.3	FMS
0.4	hole conditioning
0.4	BHTV
0.4	multichannel sonic (shear source)
1.0	4 packer
1.4	4 wireline packer plus fluid tests
0.4	hole conditioning
1.2	VSP
1.0	trip to change to straddle packer
1.0	4 packer
2.0	deploy temperature string
14.1	

NKT-1 (XCB to 900m)

# days	
1.8	8 LAST, 4 WSTP + 12 geoprops (or 6 wireline packer)
1.4	standard logging
0.4	FMS
0.4	BHTV
0.5	multichannel sonic (shear source)
4.5	

Panel feels very strongly that this programme is not adequate to address the scientific objectives of the accretionary prism study and offers it with reluctance."

DMP will closely monitor the development of those tools scheduled for Nankai which are not yet field proven. These account for about 30% of the technically realistic downhole-measurement programme as per Recommendation 88/17. Should any of these tools fail to come up to expectations, alternatives will be proposed.
[ACTION; KARIG/HOWELL]

6. WPAC Legs 130 et seq

Jarrard reported that a leg structure had not yet been firmed up. The DMP recommendations essentially remained unchanged from January 1988. The DMP recommendation of June 1988, that the logging programme at the geochemical reference sites be similar to that at site AAP1B of Leg 123, still stands. Summary sheets are attached as Annexure II. Panel will review as soon as leg structure is established.

7. Tour of LDGO Facilities

As part of an overview of LDGO activity Anderson presented an update on logging performance since last DMP.

Leg 120:

Two holes logged, one lost to Bottom Hole Assembly plugged by flapper valve (prevented open hole logging) and poor hole conditions that threatened drillstring (prevented through-pipe logging). One hole lost to death of Lamar Hayes. Only one string (SS) run in each hole because of weather (80 knot winds, 40 ft seas) and tool problems (Lithodensity tool failed downhole). 753 of possible 812m logged.

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Leg 121:

Three holes logged, one lost to medical emergency. 1280m of a possible 1468m logged successfully. Poor hole conditions, bridges and time caused two holes to be logged with only two strings. Seiemic Stratigraphy Tool lost because of broken centralizer. Fished successfully using minicone and drillstring overshot. Borehole televiewer run successfully in northern 90 east ridge site.

Leg 122:

Six holes logged, none lost. However, 1000m of loggable hole lost to bridging of sands (not clay swelling problem). When side-entry sub was finally allowed to be used, it worked spectacularly allowing 1425m of open hole to be logged. An additional 681m were logged through pipe using the Geochemical Logging Tool. Lithodensity Tool lost onto sea floor when weakpoint pulled off at rig floor during recovery of BHA: fishing unsuccessful. Hydraulic bit release failed at final hole.

Leg 123:

Hole 765 now proceeding in basement, cased with 932m of 11-3/4 in pipe. Deepest cased hole into oceanic crust. Terrible hole conditions for logging of pilot hole. Using SES (finally), following logs acquired:

0-181 mbsf (inside pipe) - Seisstrat. + Lithodensity
181-420 (open hole) - SS + LD
420-525 (inside pipe) - Natural Gamma Spectroscopy (NGT)
525-640 (open) - SS
640-660 (inside pipe) - NGT
660-742 (open hole) - SS

Turbidite sequence Aptian to Miocene shown by repeated fining upward sequences. Neutron and density logs correlate with carbonate profiles from core, then used to detect base of turbidites, especially in poorly recovered lower Miocene. Plan to run Geochemical Logging Tool through casing. Test of open hole vs through casing lost on this leg. Hydrofracture and borehole televiewer still in plan.

8. Vertical Seismic Profiling

Becker recounted a recent USSAC meeting at which a policy on VSP was sought. An earlier JOI-USSAC workshop on VSP had recommended:

(i) VSP should become an integral part of ODP science;

(ii) zero-offset VSP should be done at all ODP sites;

(iii) offset VSP should be done for specialized applications;

(iv) tool improvements are needed;

(v) a U.S. national VSP laboratory should be established.

USSAC did not accept (v), instead preferring integration with the JOIDES structure. USSAC sought guidance from DMP on items (i)-(iii) and in respect of USSAC responding to item (iv) by providing money for tool acquisition by LDGO or an appropriate subcontractor.

Panel noted that there is already a single component VSP tool on board ship. Three component tools would provide significantly improved data but processing to extract the extra information may be expensive and difficult. Anderson commented that three similar tools are needed for regular use in order to provide back-up and allow for breakdowns.

DMP Response

(1) VSP should be run only in response to scientific needs: zero offset VSP should not be a standard operation on board ship.

(This re-affirms earlier DMP position)

(2) Minimum tool acquisition for ODP use is three separate three-component VSP tools for adequate back-up.

(3) If such a three-component facility is provided, LDGO Borehole Geophysics Research Group is the logical tool operator for tool maintenance, deployment and data archiving.

(4) Availabilty of three separate three-component tools would simplify the logistics of offset VSP planning.

(5) Adequate funding is needed for tool acquisition, operation and data archiving.

(6) With these tools there is potential for considerable financial loss in terms of lost tools and lost hole.

(7) Rough cost estimates are at least $200,000 for the three tools and $50,000 per year for operation. Replacement of lost tools would be additional.

9. Monitoring of Third Party Tools

Deferred to next meeting.

10. Panel Membership

Four panel members are due to rotate off DMP: E Howell, G Olhoeft, R Stephen and R Traeger. The following are nominated for panel membership:

Roger Morin (USGS)
Joris Gieskes (Scripps)
Peter Lysne (Sandia)
Mark Hutchinson (Conoco)

E Howell has agreed to remain as a panel member for the time being so that he can monitor the development of the wireline packer and work with the Chairman in providing input to the workshop on geochemical logging, etc, planned for 1989. Both of these activities are DMP action items.

11. Other Business

(i) Meeting of JOIDES Logging Scientists

Wilkens reviewed the logging status quo on board ship on the basis of his experience as a logging scientist on Leg 122. He perceived several difficulties:

(1) conflicts of interest between TAMU and LDGO (eg mud programme vs use of SES):

(2) inadequate tool maintenance by Schlumberger due to remoteness from base:

(3) lack of communication between parties:

(4) telemetry and software problems:

(5) time allotted for logging is based on optimum conditions which never exist; have to beg for more time on board; could be solved by adding 15% to all logging time estimates.

Problems such as these could be addressed through a meeting of JOIDES logging scientists and contractor representatives (TAMU, LDGO, Schlumberger, SEDCO).

DMP Recommendation 88/20

"A two-day meeting of previous JOIDES logging scientists and contractor representatives be convened, with JOI support, to evaluate and pool experience of shipboard logging practices and to formulate recommendations for improvement. Target date early 1989. Co-convenors to be Wilkens and Worthington."

LDGO are asked to prepare a detailed record of logging contractor performance as an input to the meeting.

(ii) Wireline Re-entry of DSDP Hole 396B

Pozzi reported that in July 1988 IFREMER (Institut Francais de Recherche pour l'Exploitation de la Mer) carried out the first wireline re-entry of a borehole on the deep sea floor using the NADIA (Navette de Diagraphie) system at DSDP Site 396B near the mid-Atlantic Ridge and the Kane Fracture Zone. Water depth was 4455m. The project was called CAMPAGNE FARE (Faisabilite Re-entree). The NADIA system is a cone shaped aluminium frame emplaced on the re-entry cone by the deep sea submersible NAUTILE. NAUTILE also provides the hydraulic power and electric control signals to run the winch on NADIA which lowers logging tools into the borehole. Five logging runs were made:

(i) A Water sampler (outside diameter 100mm) was lowered to 173m into the hole which was cased to 170m;

(ii) a temperature probe (outside diameter 200mm) was lowered to 203m;

(iii) the water sampler was run again to a depth of 303m (130m into open hole in basalt);

(iv) a dummy probe (outside diameter 150mm) was lowered to 303m;

(v) the temperature probe was run a second time to 303m.

The total hole depth was originally 405m and it appears that the hole has filled in about 100m (all depths are quoted to plus or minus 5m) The temperature measurements indicate that bottom water is still flowing into the hole twelve years after drilling. Wireline re-entry is an exciting new technology development that will enable use of deep sea boreholes for geoscience experiments after the drillship leaves.

(iii) Acquisition of Digital Borehole Televiewer

Villinger raised the question of the purchase of a digital BHTV from WBK, Bochum, if JOI was agreeable. There appeared to be some doubt in JOI that the digital BHTV was seen as a high priority by DMP. Could the situation be clarified?

The Chairman referred to the previous DMP minutes which showed that the digital BHTV, originally scheduled for purchase in September 1989, had been deferred in the BCOM-approved budget until FY 92. The FY 90 budget makes no provision whatsoever for new tools. Quoting from the previous DMP minutes:

"A major item of concern is the deferral of the digital BHTV to FY 92... especially....in view of emphasis on stress measurements both by COSOD II and by DMP itself. In the light of its identified priorities, DMP notes that the LDGO budget status fails

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to make provision for adequate downhole-measurement support for the characterization of lithospheric stress on a global scale. The early acquisition of a digital televiewer would partly alleviate this shortfall."

Chairman reiterated that this view remained unchanged. With the FY 89 acquisitions now committed, the digital BHTV remains the highest priority acquisition.

DMP Consensus

The digital borehole televiewer is DMP's highest priority new acquisition. Panel encourages earliest possible purchase.

(iv) Date of next DMP Meeting

Three days are required because of deferral of so many items due to the Nankai problem. Panel accepted a gracious invitation from Roy Wilkens to meet in Hawaii, it being Panel policy to meet in JOIDES institutions as far as possible.

DMP Recommendation 88/21

"DMP to meet next at the University of Hawaii, Honolulu, on 16-18 January 1989."

Close of Meeting

The Chairman thanked Members, Liaisons and Guests for their kind hospitality and Dr R N Anderson for his gracious hosting. The meeting closed at 3.00 pm on Friday, 7th October 1988.

Paul F Worthington
26 October 1988

7.4 Downhole Measurements Panel: Mandate

7.4.1. The general purpose of the Downhole Measurements Panel is to advise JOIDES on methods and techniques for determining the physical state, chemical composition, and dynamic processes in ocean crust and its sediment cover from downhole measurements and experiments. Areas of responsibility include: routine logging (including industry standard and special tools widely used in ODP); routine data processing and interpretation; new and adapted logging tools, techniques, and data processing; downhole experiments and data acquisition (including downhole recording).

7.4.2 The Downhole Measurements Panel is mandated to:

(a) Report to and advise PCOM on logging and downhole measurement programs of ODP.

(b) Advise on and recommend to the ODP Wireline Service Contractor the required logging facilities.

(c) Advise PCOM on the scientific desirability, technical feasibility of proposed programs

(d) Advise the Science Operator on scheduling and operational requirements of proposed programs.

(e) Monitor progress reports, results, tools and techniques from U.S. and international downhole instrumentation development groups.

(f) Solicit and expedite new logging capabilities and experiments.

(g) Evaluate new technology and recommend future measurement directions.

7.4.3. Membership consists of a well-balanced representation, and approximately half being logging and other downhole technologists and half having scientific backgrounds and interests. The Wireline Services Operator and Science Operator of ODP shall each be represented by non-voting members on the Panel.

7.5 Shipboard Measurements Panel

The Shipboard Measurements Panel is concerned with the inventory, operation, and condition of scientific instrumentation on board the JOIDES RESOLUTION and data handling for on board measurements.

7.5.1 The objectives of the panel are:

(a) To provide expert advice and make recommendations to the Planning Committee regarding the inventory and utilization of scientific equipment on the drillship.

(b) To represent the interests of the ODP user community with respect to the scientific equipment on the RESOLUTION.

(c) To direct, via PCOM, panel activities toward acquiring and maintaining the best possible shipboard scientific capability within the constraints of the ODP budget.

7.5.2 Scope. The panel is concerned with general types of instrumentation and issues:

(a) Underway geophysical equipment

(b) Equipment for handling core samples

(c) Physical properties, paleomagnetics and geotechnical measurements

(d) Petrological, mineralogical, sedimentological, organic and inorganic geochemistry analysis and equipment for performing these measurements such as microscopes.

(e) Computers managing data from shipboard equipment (in consultation, if necessary, with the Information Handling Panel).

(f) Utilization of laboratory space on the RESOLUTION.

7.5.3 Membership. The panel will consist of members from U.S. institutions and from non-U.S.JOIDES members countries. Representation from all non-U.S members should be maintained, if possible. The number of members should not exceed 15 and these should be appointed so as to represent the range of disciplines within the scope of the panel's activities.

Ideally, a majority of those serving on the panel should have participated on a cruise of the RESOLUTION.

7.5.4 Liaison. The SMP must maintain continuing liaison with the Planning Committee, the Science Operations of ODP/TAMU (in consultation with ODP/TAMU marine technicians and engineers), the Information Handling Panel, and the Downhole Measurements Panel. Ex-officio liaison representatives of these panels and organizations should attend each meeting.

7.5.5 Scheduling. As the SMP will normally not deal with time-critical issues, two meetings per year should suffice. Meetings at ODP/TAMU in College Station at regular intervals is recommended and occasional meetings that include a visit to the RESOLUTION would be valuable.

Geochemical Reference Sites

General

This program, tentatively scheduled by PCOM as one leg, has not been considered yet by DMP. Sites are still uncertain but are likely to include one site with 200m basalt penetration and at least one with 50m basalt penetration. The program focus is on geochemistry of crust entering trenches, for study of the effect of slab composition on arc geochemistry. However, the program also encompasses the primary thematic objective of DMP: comparison of crustal alteration (e.g. permeability, fracture filling, magnetic properties) and physical properties (e.g. velocity structure) between old and young crust and between fast and slow spreading crustal origins. DSDP and ODP have already undertaken extensive downhole measurements of old slow (418A), young slow (395A), and young fast (504B) crust. This leg and Leg 123 will study the missing crustal type: old crust generated at a fast spreading rate. At the other sites, DMP has recommended the full armada of downhole experiments. As leg plans are refined, objectives beyond the reference site objectives are certain to be added to this leg.

Standard logging

Goals:

1) continuous geochemistry of sediments and basalt (continuous, representative geochemical records of much larger volumes than feasible from core analyses are essential for elements such as potassium, less so for isotopic ratios);
2) mineralogy, particularly amounts of alteration minerals;
3) upper crustal physical properties (P-wave and S-wave velocity, attenuation, density, porosity);
4) modern fluid flow (if any) from logs of temperature and calculated thermal conductivity.

FMS and/or Televiewer

Goals:

1) high resolution in sediments (FMS better);
2) structural dip (if any) of lowest sediments, for near-ridge crustal tilting (FMS better);
3) stress direction (Televiewer better);
4) basalt core orientation, for paleomagnetic studies of plate motion and for studies of crustal velocity anisotropy (Televiewer better);
4) imaging of fracturing (filled and open), flow morphology, and flow alteration.

Wireline packer/packer

Goals:

1) permeability, pore pressure, and fluid chemistry of old oceanic crust;
2) hydrofrac for stress measurement (BON8 is on flexural swell immediately seaward of the first(?) extensional breaking of crust entering the trench).

Magnetometer/susceptibility

Goals:

1) magnetic properties (e.g. magnetic alteration, relative importance of induced, remanent, and viscous magnetizations) of old crust generated at

fast spreading rate;
2) complexity of the magnetic record in an environment of well developed magnetic anomalies (e.g. thickness of magnetic units, presence of reversals, variations in remanent inclination).

Dual laterolog
Goals:
1) large-scale porosity structure;
2) relative amounts of vertical and horizontal fractures.

Vertical seismic profile
Goals:
1) large-scale velocity structure of the upper crust;
2) detection of seismic horizons below the bottom of the hole;
3) potential for later offset seismic experiments, for crustal structure and anisotropy.

Long-term experiments?

NE Australia Margin

Standard logging
Goals:
1) seismic stratigraphy (essential to the primary cruise objective of testing the Vail hypothesis);
2) mineralogy, for paleoclimate and paleoceanography;
3) fluid flow (uranium, temperature, and thermal conductivity logs);
4) high-resolution intersite correlation, in spite of lateral variation of sedimentary facies.

Comments:
1) whether sonic logging will yield an accurate depth/seismic link depends on extent of diagenetically caused lateral heterogeneity;
2) very shallow water results in very fast logging times;
3) sites changed somewhat since 8/87 DMP, and further site revision is likely; 12/87 SOHP and WPAC plans differ in sites, water depths, and penetrations, and WPAC plan used here;
4) 5 sites are less than 400m.

DMP/WPAC compromise: both panels recommend standard logging of all sites, including those less than 400m. SOHP did not recommend logging of two shallow sites.

FMS
Goals:
1) sedimentary facies (all sites);
2) high resolution (all sites);
3) imaging of type of porosity (all sites, especially reef carbonates).

Dual laterolog
Goal: characterization of vugular reef porosity, with log penetration deeper and more representative than standard logs.
Comments: DMP previously had inadequate information on the extent of reef carbonates in the sites. Instead of pervasive reef carbonates, they are confined to part of NEA10 and the bottoms of NEA6 and NEA8.
DMP/WPAC compromise: DMP recommended dual laterolog at NEA1,2,3,4,&5, but WPAC did not. Should DMP withdraw their recommendation?

Vertical Seismic Profile
Goal: seismic stratigraphy, for more reliable seismic/depth tie than is obtainable from standard logs.
Comment: another deep site may be added to drilling plans.
DMP/WPAC compromise: DMP recommended VSP at NEA5 (900m penetration), but WPAC did not. Check shots at several sites are another alternative.

Wireline packer
Goals: pore fluid sampling, for carbonate diagenesis, aquifer hydrodynamics, and possible Mississippi Valley Type mineralization.
Comments: conventional interstitial water sampling may be impossible in some lithologies because of core disturbance, and some lithologies may not pack off well enough for wireline packer.
DMP/WPAC compromise: not recommended yet by DMP or WPAC, but DMP was unaware of fluid-flow objective and WPAC is now considering wireline packer. DMP may need more information concerning sites at which wireline packer is scientifically most useful.

Vanuatu

This leg has serious time constraints, even with a modest logging program. If DMP feels strongly about a substantial logging program, they probably should endorse the WPAC view that one leg is not long enough for Vanuatu.

Standard logging

Goals:

1) continuous geochemistry, for composition of accretionary prisms (DEZ-2 and DEZ-4) and seamount (DEZ-5), for arc geochemical changes vs. time caused by arc polarity reversal (IAB-2a) or collision (IAB-1a and IAB-2a);
2) continuous mineralogy, for same purposes as #1;
3) seismic stratigraphy, for site/seismic match in accretionary prism (DEZ-2 and DEZ-4) and for identification of depths in sites IAB-1a and IAB-2a of seismic unconformities;
4) hydrology of accretionary prism (DEZ-2 and DEZ-4) from temperature log and log-based thermal conductivity;
5) porosity of sediments at DEZ-5, for decompaction and subsidence.

DMP/WPAC compromise: both DMP and WPAC recommended standard logging at all sites; DEZ-1 (ridge reference site) is only 300 m penetration (200 m sediments and 100 m basement) and goal is merely determination of rock type so that its components can be identified in the accretionary prism. Although logs would help the goal, cores might suffice.

FMS

Goals:

1) structural dip, folding, fracturing, foliation, and brecciation in the accretionary prism (DEZ-2 and DEZ-4);
2) changes in structural dip in the intra-arc basin caused by collision (IAB-1a and IAB-2a) or arc polarity reversal (IAB-2a);
3) stress direction from breakouts at all sites (possibly not enough overburden at DEZ-1), but particularly in accretionary prism;
4) sedimentary facies (slumps at prism sites DEZ-2 and DEZ-4; slumps and turbidites vs. airfall for volcanogenic sediments at IAB-1a and IAB-2a?).

Comments: FMS applications at reference sites DEZ-1 and DEZ-5 are probably not critical enough to cruise objectives to justify tool use.

Televiewer

Goals: same as FMS goals 1-3, plus flow imaging at DEZ-1, DEZ-2, and DEZ-5.

Comments: 360 degree image is more complete than FMS, but FMS handles wider range of borehole sizes and is faster.

DMP/WPAC compromise: DMP recommended televiewer for bottom portion of prism sites DEZ-2 and DEZ-4, but WPAC recommended televiewer at all sites (before they knew about FMS).

Packer/Wireline Packer

Goal: hydrology (permeability, pore pressure, water chemistry) of ~~accretionary~~ prisms undergoing collision (DEZ-2 and DEZ-4).

Comments:

1) hydrology of accretionary prisms is a DMP priority, but it is only a minor priority of this leg. The focus of this leg is collision-related deformation. However, can this deformation be analyzed without addressing

fluid flow, if recent studies are correct in indicating that pore pressure affects deformation style even in "simple" ~~accretionary~~ prisms?
2) packer would require a reentry cone, but WPAC has not specified whether one is planned at DEZ-2 or DEZ-4.

DMP/WPAC compromise: DMP recommended both packer and wireline packer at DEZ-2 and DEZ-4, with pressure meter (DMP should explain) at DEZ-2. WPAC did not recommend any hydrology experiments *because of time problems.*

Geoprops Probe

Goal: mechanical properties of accretionary prism sites DEZ-2 and DEZ-4.

Comments:

1) WPAC did not specify which holes are XCB holes;
2) plenty of time for tool development before this leg.

DMP/WPAC compromise: not previously considered by either panel for this leg.

Standard logging
Goals:
1) continuous geochemistry and mineralogy of sediments and basement (all sites), for temporal and lateral variation in arc and back-arc basin geochemistry and for accumulation rates of hydrothermal metals;
2) seismic stratigraphy of LG3, particularly for identification in core and dating of seismic unconformity "A" (a marker of initial rifting);
3) porosity, for decompaction and vertical tectonics of LG3 (other sites have similar goal but paleodepth resolution of the benthic forams will be less than the porosity correction);
4) temperature and thermal conductivity, for modern fluid flow.
Comments: Two sites are less than 400 m penetration: LG2 (350m incl. 50m basement) and either LG1 (220m incl. 120m basement) or LG7 (200m incl. 50m basement). Final decision on logging these sites should depend on tests of quality of through-pipe geochemical logs.

FMS
Goals:
1) structural dip variations (all sites, particularly forearc site LG3), for timing of rift-related tectonic activity;
2) basement fracturing.
Comments: stress direction not included, because stress pattern can be inferred and because penetrations may be too shallow for breakouts.

Televiewer
Goals: same as FMS, plus basement imaging.
Comments: short holes, large proportion of basement, and combinability of televiewer with magnetometer and susceptometer may make televiewer/mag more productive than FMS for these sites.
DMP/WPAC compromise: DMP recommended televiewer at all sites, but WPAC recommended only standard logging.

Magnetometer/susceptibility
Goal: magnetic properties of arc volcanics and of seafloor formed by back-arc spreading (e.g. are the poorly developed magnetic anomalies of back-arc crust due to greater structural complexity, more diffuse volcanism causing mixed polarity, or more alteration of magnetic minerals, in comparison to "normal" crust?).
DMP/WPAC compromise: DMP recommended magnetometer and susceptibility logging at all sites, but WPAC recommended none.

Wireline packer/packer
Goals: (1) pore water chemistry, for study of modern hydrothermal activity in a region (LG1 or LG7, LG2) with high accumulation rates of hydrothermal metals; (2) permeability of young backarc crust (LG1 or LG7).
DMP/WPAC compromise: DMP recommended wireline packer at all sites, but WPAC recommended none. Compromise could be to use the tool only on the two sites (LG1 or LG7, LG2) where hydrothermal activity is known and a cruise objective. Neither panel considered packer use yet.

CEPAC Minutes, Ann Arbor Meeting, October 17-19, 1988.

Executive summary:

CEPAC received reports from liaisons to PCOM, LITHP, TECP, SOHP, SSP, and from visitors representing the ODP Site Survey Data Bank and the TAMU ODP Engineering Group. Those reports indicated that the panels supported the materials in the First Full CEPAC Prospectus of July, 1988, suggested a few changes and additions, and insisted on retaining the North Pacific and Bering Sea programs.

Because of the departure of Riddihough and the elevation of Batiza to the chairperson of LITHP, CEPAC will need new liaisons from both TECP and LITHP.

CEPAC is concerned that Engineering Leg 124E does not address any of the engineering problems specific to our prospectus (chert test at ENG-3 is not in chert/chalk sequences), so the panel strongly urges PCOM to include the following tests in leg 129E, scheduled in early 1990: recovery of chert chalk intervals at Shatsky Rise, recovery of reefal limestone at Menard Guyot, and recovery of zero-age basalt from bare ridges at the Mariana back-arc.

Future meetings:
Honolulu, week of April 17, 1989
Hannover, week of July 24, 1989

Much of the meeting was devoted to revision of the prospectus. The fourteen programs remain essentially unchanged in title:

Flexure of the Lithosphere
Chile Triple Junction
Cascadia Accretionary Prism
Old Pacific: M-Series Dating and Jurassic Crust
Sea Level and Subsidence: Atolls and Guyots
Ontong-Java Plateau Depth Transect
Neogene Paleoceanography of the Eastern Equatorial Pacific
North Pacific Neogene
Bering Sea High Latitude Paleoceanography
Shatsky Rise Anoxic Events
Lower Crust: Penetration of Layer 3 at 504B
East Pacific Rise Bare Rock Drilling
Hydrothermal Processes at Sedimented Spreading Centers
Early Stages of Hot Spot Volcanism: Loihi

Introduction:

CEPAC met at the University of Michigan during the third week of October, 1988. Present were R. Batiza (LITHP liaison), H. Beiersdorf, C. Brenner (ODP Site Survey Data Bank), E. Davis, A. Droxler (SOHP liaison), M. Flower, P. Floyd, D. Huey (ODP Engineering), L. Kroenke, Y. Lancelot (alternate for J. Francheteau), M. Leinen (PCOM liaison), S. Lewis (SSP liaison), H. Okada, D. Rea, C. Sancetta, S. Schlanger, H. Schrader, and W. Sliter.

This meeting followed the format of our past few, roughly a day of reports and discussions followed by a day of revising the CEPAC prospectus. Monday morning began with the introduction of guests Brenner and Huey, designated alternate Lancelot, and CEPAC's new PCOM liaison Leinen. CEPAC thanks Bill Coulbourne for his efforts as our PCOM liaison over the past meetings.

Reports:

Leinen reported on the August Planning Committee meeting held in England. Items of interest to CEPAC included the review of the prospectus which was reported in the memo of Pisias to the panel chairpersons in September. Panel restructuring will become effective on the first of the new year when the Central and Eastern Pacific Regional Panel will become a detailed planning group with the same membership and responsibilities as now. PCOM also endorsed the formation of smaller ad-hoc working groups designed to focus on more specific problems and planning. The new (sic.) program planning policy of PCOM will be to "cast in stone" the drilling schedule for the next fiscal year at each annual meeting, ie. FY 1990 scheduled in November of 1988, etc. PCOM will devote FY 1990 and 1991 to WESTPAC and CEPAC drilling and open up FY 1992 and some of FY 1993 to fully mature, thematically-driven drilling proposals for any ocean that are on the table ready to go in November of 1990. The test of chert drilling problems scheduled for 124E was lengthened from 2.5 to 6.5 days. New panels and/or chairpersons are LITHP-Batiza, Ocean History-Shackleton, Sedimentary and Geochemical Processes-Suess, Shipboard Measurements-Moran.

Batiza reported on the September LITHP meeting held in Canada. LITHP's priorities in the Pacific remain unchanged: lower crust at 504B, sediment-free ridge crests at the EPR, sedimented ridges at Juan de Fuca Ridge, young hotspot volcanism at Loihi, and a full engineering leg in the East Pacific to be divided between 504B and the EPR. This drilling will total 7 legs. In other news, much of LITHP's time was devoted to formulation of their long-range planning document. LITHP endorses the concept of geochemical reference holes (although not at a priority equal to their four top programs) and suggests that such tests be conducted in pre/post subduction pairs vis a vis the Brassian cow.

Kroenke reported on the October TECP meeting held in the United States. TECP also spent much of their meeting working on a

long-range planning document. The Hawaii Flexure revised proposal was considered and questions of sediment dating and correlation and of actual model definition were discussed. The panel ended by noting some remaining uncertainties but recommending that CEPAC continue forward with the proposal as revised. TECP reviewed the first cuts of the MCS data collected in January at the Chile Triple Junction, liked what they saw, and recommended an additional leg in that region to approach newly-appreciated aspects of that region, such as obduction of very young ophiolites. Proposals on the Cascadia margin were reviewed. The Kulm et al proposal for the Oregon margin is nearly mature, and Hyndman is injecting new life into the Vancouver margin work. TECP eagerly awaits a revised proposal from the Vancouver group, although TECP notes that results from the Nankai drilling may bear on their intentions for the CEPAC prospectus. The panel considered the Scholl et al augmentations of the North Pacific and Bering Sea proposals which clarified the important tectonic objectives of drilling there. TECP then elevated the tectonic aspects of the North Pacific and Bering work to a high priority status, asked that it be seriously considered, and joined in the call for an ad-hoc working group to be established to refine drilling plans for this region. Present plans, Chile, Hawaii and Cascadia will involve 4 or 5 legs.

The rearrangement of panel representation occasioned by the Australo-Canadian partnership apparently has resulted in the removal of Riddihough from TECP. Riddihough was an especially valuable member of CEPAC and therefore our panel asks TECP to replace him with a liaison who is knowledgeable in matters of accretionary prisms.

Droxler and Sliter reported on the SOHP meeting held in October in Italy. SOHP spent a considerable amount of time revising their long-term planning document. In regards to CEPAC questions, SOHP reaffirmed their general commitment to previously stated objectives. In terms of specific projects, they noted that additional surveys are coming for the Old Pacific project in the summer of 1989. SOHP suggested Lancelot, Larson, and Vogt as potential co-chiefs for such a project and CEPAC is comfortable with that list. The discussion of atoll and guyot drilling raised two questions, that of recovery of reefal limestone which may be distressingly small, less than 10%, and whether one leg is enough the achieve all the objectives of the atoll and guyot projects. At the end of the last CEPAC meeting Rea was asked to query SOHP about their commitment to deeper, ie Paleogene and Mesozoic, objectives on Ontong-Java Plateau that could be accomplished in conjunction with the Neogene depth transect program. SOHP responded with a strong endorsement of those considerations and encouraged us to include them prominently in the prospectus. SOHP nominated several potential co-chiefs for an Ontong Java Plateau leg, Mayer, Berger, Shackleton, and Resig. CEPAC will add Kroenke to the list of nominations. The Eastern Equatorial transect program requires better seismic data to support sites WEQ-1 and-2, the others may be adequately defined by extant data. The loss of those two sites will not seriously affect the heart of that

program. SOHP also considered the augmentations presented by Scholl supporting high-latitude paleoceanograpic efforts in the Pacific and Bering Sea and strongly supported their inclusion in the CEPAC prospectus as two complete projects. They called for a working group to meet, consider the data, and combine the present plans into a coherent drilling program. SOHP nominated Sancetta, Keigwin, Leinen, Bornhold, Scholl, Kent, Morley, and Rea to this working group. CEPAC concurs with these nominations. SOHP had a few questions about the Shatsky Rise program, mostly matters of precise site location and of locating new (Japanese) data from that region. Drilling SOHP projects in the CEPAC region will require about 7 legs.

Lewis had little to report about the doings of SSP as they have as yet no CEPAC data packages.

Huey gave a long and very welcome presentation about the engineering aspects of ODP. He reviewed the several coring technologies both operational and developmental: standard rotary coring, advanced piston coring, the extended core barrel, the Navidrill, and the new diamond coring technology. Huey reviewed with the panel the prospectus for the Engineering leg, 124E. Lancelot noted that the chert penetration and recovery test at site ENG-3 is not in a region of chert/chalk interlayers, but in a region where chert lies within pelagic clays deposited well below the CCD. As such this site will not be a test of the conditions of most concern to CEPAC. Rea was asked to send a memo to Moberly outlining this concern (attached). CEPAC would like to continue this interaction with the TAMU/ODP Engineering Group, and requests at least one visit each year from the engineers.

Brenner outlined the nature and operations of the ODP Site Survey Data Bank. That group obtains all the geophysical data from the proponents and prepares packages for the co-chiefs and other panels such as the Site Survey Panel, the Safety and Pollution Prevention Panel, and the Operator. The data bank has access to all the LDGO data and (soon?) all the NGDC data. There are no CEPAC data packages ready to assemble yet.

<u>Longer term considerations:</u>

CEPAC was dismayed to find that Leg 124E will not address any of the difficult engineering problems specific to the CEPAC drilling: recovery of chert/chalk interlayers, recovery of reefal limestone; and recovery of zero-age, hot, rubbly, basalt at sediment-free ridges. To this end we suggest an alternate site for 124E, close to ENG-3, where reefal limestones could be encountered (S. Schlanger will provide details to Moberly). We also strongly request that engineering leg 129E, scheduled but with no detailed plans, drill test sites on Shatsky Rise, Menard Guyot, and in the Mariana back-arc to approach the drilling problems that will be specific to the Pacific. Rea was asked to send a memo to Moberly outlining this concern and proposed drilling operations (attached).

Kroenke volunteered to host the (late) winter CEPAC meeting in Hawaii during the week of April 17-21, 1989.

Beiersdorf volunteered to host the summer CEPAC meeting in Hannover during the week of July 24-28, 1989.

CEPAC Prospectus Programs:

Prior to completing revisions to the CEPAC First Full Prospectus, the panel watchdogs or alternates provided updates on each of the fourteen programs. As a matter of policy, CEPAC will update the prospectus with new information at each meeting but will put out a complete new document only once each year, in the fall, just prior to the annual meeting. We intend for the CEPAC Second Prospectus (CSP), due soon, to receive wide distribution.

Hawaii Flexure (Kroenke): Watts et al. have submitted a revised proposal (3E), the concepts of which were endorsed by TECP. CEPAC revised the CSP to include the new information.

Chile Triple Junction (Lewis): MCS data from the January cruise are becoming available. Cande and Lewis have revised their proposal (8E) to approach problems of collision, subsidence and erosion of the margin. TECP asked that obduction of very young ophiolites and questions of large accretionary prisms also be considered.

Cascadia Margin (Davis, for Riddihough): The Oregon margin proposal of Kulm (233E, revised) is nearly mature. CEPAC expects a substantial revision of the Vancouver margin proposal from Hyndman. MCS cruises are scheduled for the summer of 1989 in both areas.

Old Pacific (Floyd): This project is nearly ready to go. An additional cruise lead by Lancelot will occur in the summer of 1989.

Atolls and Guyots (Schlanger): Schlanger's cruise of 35 days in the Marshalls went well. During that time mid-Cretaceous materials were dredged from Sylvania Guyot, previously thought to be Eocene. Schlanger will revise the extant proposal (202E) and meld plans with other proponents in time for the next meeting.

Ontong-Java Plateau (Droxler): Mayer's cruise will go this winter. He will attempt to co-locate sites where both the Neogene and Paleogene-Mesozoic objectives can be met.

Eastern Equatorial Pacific (Beiersdorf): This project is adequately supported by data with the exception of sites WEQ-1 and -2. Nearby data or pre-drilling site surveys might be adequate.

North Pacific Neogene (Schrader): The Keigwin-Lonsdale

cruise to the region of Detroit Seamount in the late summer of 1988 was a success in terms of surveying and core recovery. Significant revision of this project awaits appointment of and action by the proposed North Pacific Bering Sea working group.

Bering Sea (Sancetta): The data and proposal augmentations concerning Bering Sea drilling resulted in both TECP and SOHP calling to retain this project in the prospectus. Significant revision of this project awaits appointment of and action by the proposed North Pacific Bering Sea working group.

Shatsky Rise anoxia (Sliter): New survey data would be welcome; there may be recently-collected Japanese data on Shatsky. Alternatively, pre-drilling surveys during either 129E or the eventual SR Anoxia leg may suffice.

Lower Crust at 504B (Flower): The condition of the casing in this hole may also be a problem in addition to the junk in the hole. The nature of the casing problem needs to be resolved before any attempt to deviate the hole.

EPR Bare Rock drilling (Davis, for Francheteau): No site selection will occur until completion of next spring's cruise.

Sedimented Ridges (Davis): The sedimented ridge working group recommended two projects, one to study the hydrogeology of these systems and one to study sediment-hosted hydrothermal sulfide deposits at several locations worldwide. LITHP liked the first portion and suggested that the ore formation aspect concentrate on the well defined deposits in Middle Valley.

Young Hotspots - Loihi (Batiza): Possible high geothermal gradients at Loihi may cause problems such as boiling.

Lau 1

Results of Lau Working Group Meeting 10/25-26/88

Gill

I Overview

1 Primary objectives remain the tectonic and petrologic history of the Lau Basin-Tonga Arc. These have been revised to accomodate new evidence of ridge jumps and propogations within the Basin.

2 The 5-hole strategy remains with 3 in the Basin, 2 in the arc.

3 Sites for holes 2,3,6,7 have been moved slightly in light of the Darwin cruise, and may move slightly again as the result of the SIO cruise and further processing of MCS lines. Holes 2 and 7 were not resited substantially to the south because there is too little information there.

4 Hole LG1 has been relocated some 150 km to the south and renumbered LG10. Both LG1 and 10 are on young crust (<1 Ma). Both now are recognized as having formed at a newly-jumped spreading center. LG10 is preferred because there is more sediment and because the timing of ridge-jump can be better constrained.

II Site summaries in priority order

A LG2

1 Goals

a. Initial age of basin formation
b. Hydrothermal history of basin
c. Subsidence history of basin margin
d. Time of resumption of Tonga arc volcanism
e. Petrologic diversity of initial basin volcanism

2 Requirements

a. Crust formed within first 0.5 Ma of basin history
b. Minimal arc clastics, esp. coarse clastics
c. Avoid recent off-axis volcanism imaged by GLORIA
d. Penetrate basin versus foundered-arc crust

3 Status

a. Crossing lines exist and satisfy SSP
b. SIO survey is necessary to establish regional context via magnetics and dredging
c. Alternate site needs seismic imaging which better meets requirements 2b and 2c than does the site presently imaged

B LG3

1 Goals

a. Subsidence history of basin
b. Age and petrology of resumption of Tonga arc volcanism
c. Correlation of Early Pliocene history of Tonga arc and Lau Ridge
d. No igneous basement is sought; is too deep.

2 Requirements

a. 100 m penetration below Horizon A is meet goal 1a
b. total of <800 m sediment to minimize drill time

3 Status

a. 2 MCS lines exist which satisfy SSP
b. Darwin added crossing lines for both which poorly imaged Horizon A but did add interesting detail of structure above it

C LG10*

1 Goals

a. Age of ridge jump

b. Petrology of young basin crust, including re-entry capability to support long-term studies of young backarc basin crust
c. Petrology of a new spreading center, recently jumped to a position near an arc; possible change from Backarc Basalt (BAB) to MORB.
d. Fluid geochem and physical props of young oceanic crust

2 Requirements
a. >60 m sediment
b. crust <1 Ma, formed at new spreading center

3 Status
a. Two possible sites were imaged by Darwin, but there are inconsistencies about their age as estimated from magnetics, sediment thickness, depth, and surface reflectivity.
b. Further surveys are necessary which include regional magnetics (from Valu Fa to 178W), dredging, and seismic.

D LG7*

1 Goals
a. Petrology of igenous basement diversity at a midpoint during basin history; BAB to MORB transition possible.
b. Hydrothermal history of basin
c. Test of tectonic interpretations
1) Axial spreading (Morton): basement >2 Ma
2) Failed Rift (Parsons): basement <1.5 Ma
d. If c2 above, then petrology of failed rift

2 Requirements
a. Sufficient sediment
b. Basement not foundered arc
c. Avoid young volcanism imaged by GLORIA

3 Status
a. Crossing seismic lines exist which satisfy SSP but they lie east of most desirable site
b. Age and tectonic history need clarification via magnetic survey and dredging

E LG6

1 Goals
a. Volcanic history of Tonga arc including times of backarc basin formation
b. Forearc basement characterization: petrology, paleomag, fluid geochem and physical props

2 Requirements
a. <500 m sediment above basement to minimize drill time
b. representative basement; avoid diapirs imaged by Darwin at depths >4500 m at 22S

3 Status
a. Two MCS lines exist. Suitable sites exist on both, but the lines need further processing to meet both requirement above
b. Darwin produced crossing lines for both

*relative priority of LG7 vs LG10 not specified

III Contingency Sites

1 LG3A is an alternative to LG3

2 LG6A could wash through sediments and penetate forearc basement at an additional site

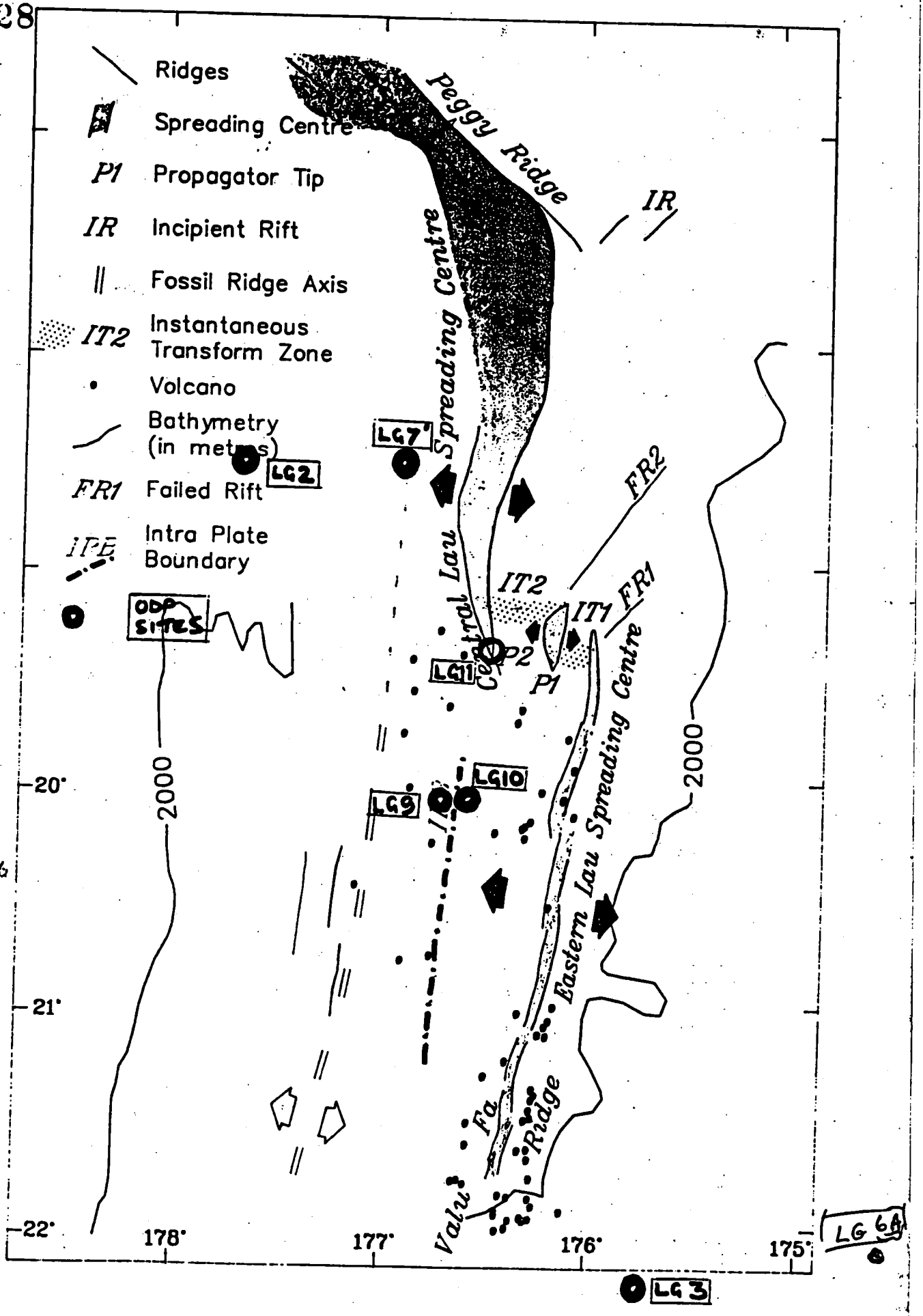
3 LG9 is intended to be analagous to LG2 but on the eastern side of the West Lau (Failed) Spreading Center. It directly complements LG10: the oldest crust of the older (LG9) and younger (LG10) spreading centers.

IV Engineering Leg

If pre-EPR bare-rock drilling should be done in the western Pacific rather than eastern Pacific for logistical reasons, then the Lau Basin offers two excellent sites at which useful scientific as well as engineering information can be obtained. There was not a consensus about their relative scientific merits. Excellent data sets including Seabeam bathymetry, sidescan images, extensive dredging and petrology exist for both.

1. Valu Fa (near old LG4). This could explore the igneous stratigraphy of a differentiated pillow ridge, the economic mineralization of a type example of on-land massive sulfide orebodies, and the hydrothermal geochemistry of a well-studied system which is not basalt-hosted. All of these can be achieved better at Valu Fa than at any other drilling target now.

2. Propogating tip at 19S (near old LG1). This could explore the stratigraphy and stress field of a propogating spreading center. The rock types closely approximate those expected at the EPR. It would be the only chance to drill a propogator in the foreseeable future.


Ridges
Spreading Centre
P1 Propagator Tip
IR Incipient Rift
Fossil Ridge Axis
IT2 Instantaneous Transform Zone
Volcano
Bathymetry (in metres)
FR1 Failed Rift
IPB Intra Plate Boundary
ODP SITES
Peggy Ridge
IR
Central Lau Spreading Centre
FR2
IT2
IT1
FR1
P2
P1
Eastern Lau Spreading Centre
LG1
LG2
LG3
LG4
LG6
LG7
LG9
LG10
2000
2000
20°
21°
22°
178°
177°
176°
175°
Valu Fa Ridge

use this one (after recalculations)

LAU BASIN

Priority	Site	Lat. Long.	Water Depth	Penetration Sed.	Penetration Bsmt.	Drill Days	Log Days	Total Days
3	LG10	20°05' 176°34'	1910	100	200	7.7-9.4*	2.1	9.8-11.5*
3	LG7	18°45' 177°10'	2400	100	50	2.8	1.5	4.3
1	LG2	18°45' 177°45'	2600	300	200	12.0	1.7	13.7
2	LG3	22°10' 175°42'	750	800	---	4.4	1.4	5.8
5	LG6A	23°20' 175°20'	4500	500	50	7.7	2.6	10.3
6	LG9	20°08' 176°43'	2550	300	50	4.4	1.7	6.1

*Additional casing may be necessary.

50.0 - 51.7

Alternate Sites

LG3A	22°40' 176°08'	1000	800	---	4.9	1.5	6.4
LG6	22°00' 174°30'	4500	>500	50	(to be determined)		

TOTAL DAYS		
Transit (Suva-Pago Pago)	3.0	
Operational	51.7	
Intra-site transit	2.0	
	56.7	

Drilling Plan

LG10, 2, 7: APC/XCB through sediment, re-entry RCB to T.D. @ 2 m/hr; 2 and 10 as re-entry sites.
LG3: APC to 150m
XCB to 500m
RCB to T.D. after mini-cone set
LG6: APC to 150m
XCB to 500m
RCB to T.D. after wash through 500m

Logging Plan

Std. Schlumberger runs at each site
FMS, wireline packer, and televiewer/mag susc. at all sites except LG3

Main Objectives

LG2, 7, 9, 10: rifting history in relation to adjacent areas; vertical tectonics; rift sedimentation, metal flux, and evolution of basalt type;
LG3: rifting history; arc volcanic history; vertical tectonics
LG6: arc volcanic history; forearc basement.

WESTERN PACIFIC REGIONAL PANEL
1988 EXECUTIVE SUMMARY

WPAC reviewed and revised the drilling and logging plans of Legs 124-129 and formulated a second year plan which includes the highest priorities of the thematic panels.

LEG 124: SE ASIA BASINS (C. Rangin & E. Silver) 59 days

The Celebes and Sulu basin sites may require the whole leg, given additional logging requested by the co-chiefs and approved by DMP to study the state of stress and the formation fluids. The Cagayan Ridge site may be problematical because new bottom sampling results suggest the necessity of spudding into hard limestone. It is now considered a secondary, time-available objective.

LEG 124E: ENGINEERING TESTS 37days

Mining technology slim-hole drilling will be tested on Batuan Ridge. Logging tests will be conducted at a repeat site 453. Drilling and recovering chert will be tested at a repeat site 452. Deep water drilling tests may be conducted in the Mariana Trench.

LEG 125: MARIANA-BONIN (P. Fryer & J. Pearce) 57 days

BON6 has been moved south and is now two holes, BON6A and BON6B. This change retains the stratigraphic objectives but allows additional basement penetration in the same time. A re-entry cone may be set at BON6A to allow FMS and VSP logging on the subsequent leg. The priority sites in drilling order are MAR3A, MAR3B, BON6A, BON6B and BON7.

LEG 126: BONIN (K. Fujioka & B. Taylor) 57 days

A transect of heat flow measurements at BON1 & 1A show values less than 100mW/m^2, indicating that this is not an area of active hydrothermal discharge and high temperatures.
BON4 replaces BON5A in priority. This change retains the stratigraphic objectives but adds the objectives of penetrating a major deep basin unconformity and basement. Prime sites are now BON2, BON1A, BON4 and BON5B.
Karig requests that the Geoprops tool be tested on Leg 126 in an APC/XCB hole. WPAC proposes the BON2 pilot hole for this purpose and assigns a maximum of 6 hours for the complete test. TAMU personnel will require training to operate the tool.
Cooper's proposal for VSP at BON1 & 2 is approved.

LEG 127: JAPAN SEA I (S. Pisciotto & K. Tamaki) 57 days

132 SSP has cleared all sites but is concerned that oceanic basement has not been properly recognized in the seismic records, particularly at site J3b-1. The upper part of what has been identified as basement appears to be stratified, and may consist of interlayered sills and sediments, overlying the true basement of sea-floor-spreading oceanic crust. WPAC concurs, and considers that J1b may have to be drilled to greater depths in order to reach true basement.
After seeing the new seismic records, WPAC expressed concern that the proposed site J3b-1 atop the Okushiri Ridge will not determine the time of thrusting, and that the section does not conform to the model presented for obduction. In view of this new seismic information, the interpretation of the tectonics at site J3b-1 is controversial. Also, in view of the known stratification in the upper level of basement elsewhere in the Japan Sea basin, WPAC puts site J3b-1 as the lowest priority of the four sites on Leg 127, and gives the co-chief scientists the latitude to deepen Hole J1b if true ocean crust is not penetrated within the planned drilling depth. J3b will be drilled on a time-available basis, with J1b-1, J1d-1 and J1e-1 as the highest priority sites.

LEG 128: JAPAN SEA II (J. Ingle & K. Suyehiro) 41 days

Proposed sites J2a and JS2, and experiments at J1b are unchanged.

LEG 129: NANKAI TROUGH (I. Hill & A. Taira) 60 days

As previously planned, this is a one leg program at sites NKT1 (10 drill + 7 log days) and NKT2 (21 drill + 16 log days). This would accomodate DMP's abridged program, including a maximum 2 days for deployment and testing of the ONDO temperature-measuring experiment.
However, DMP's time estimate for a "realistic program" of logging plus experiments is 31.3 days. Futhermore TECP gives high priority to the newly proposed sites NKT10a,b,c and proposes a 2 leg program to meet their objectives of determining both vertical and horizontal variations in physical properties and fluid flow/geochemistry (see WPAC minutes appendix 4 and Accretionary Prisms DPG report).
Therefore WPAC recommends a revised Nankai drilling program as follows:
Leg 1: NKT2 (21 drill + 21 log/expt. days)
NKT10a,b (6 drill + 3 log days) Total=57 days (with transit & cont.)
Leg 2: NKT10c (13.5 drill + 17.5 log/expt. days)
NKT1 (10 drill + 10 log/expt.) Total=61 days (with 8 transit+2 cont.)
At least 6 months should separate the two legs.

2nd ENGINEERING LEG

Plans will remain tentative, both as to timing and objectives, until after Leg 124E. WPAC notes that well-surveyed places to drill either young, glassy basalts; hydrothermal zones on differentiated lavas; or sedimented back-arc crust; exist in (from south to north) the Lau, North Fiji, Woodlark, and Manus basins, as well as the Bonin rifts.

GEOCHEMICAL REFERENCE SITES

LITHP's three primary sites, BON8 (with 200m basement penetration), MAR4 (DSDP 452, 100m basement), and MAR5 (500m into a seamount apron) have sufficient site survey information and could be drilled in one long leg between Japan and Guam totalling 63 days. Without MAR5 the leg would be 53 days. To concerns about whether such a leg would provide adequate information on sediment/crust variability, LITHP and WPAC respond that the three sites would sample all volumetrically significant **components** entering the trench, although proportions of components obviously would vary wihin holes and from place to place.

NE AUSTRALIA

SSP reviewed the full data set and approved the sites.
PCOM is advised that the program needs 55-61 operational days at the minimum 10 sites (SOHP's highest-priority sites NEA-1,2,3,4,5,6,8,9A,10A,11), and that this should not be compromised because of transit time. Another half of a leg would be required to drill all sites.

VANUATU

Primary sites DEZ-1,2,4,5 and IAB-1,2 remain unchanged and are passed by SSP. However SSP and WPAC consider current drilling time estimates at DEZ-2 to be minimal because of the likelihood of fractured hard rock in the section to be drilled. DMP wants to do more logging and fluid sampling at DEZ-2 than are proposed.
WPAC proposes that DEZ-2 be drilled first. WPAC recommends allocating 16 days maximum for DEZ-2 and DEZ-1, using all of it if necessary to reach the decollement at DEZ-2.

LAU-TONGA

The Lau Basin working group, convened by LITHP, adjusted the drilling program in response to the new GLORIA data. The revised program maintains earlier requirements that holes be placed in old, intermediate, and young parts of the basin, but sites have been moved and one site (LG1)

has been replaced (by LG10, 150 km further south). More survey data are needed to exactly locate the ridge jump boundary which sites LG10 and LG9 (our lowest priority site) are planned to straddle.
WPAC followed the TECP recommendation to retain the Tonga forearc site. However LG6 was replaced by LG6A as the prime forearc site because sediments are thinner at LG6A. Adjusted drilling times for LG2, 3, 7, 10, 6a, and 9 (in priority order) give 50-52 operational days and 57-59 total days for this leg, assuming a Suva-Pago Pago transit.

CO-CHIEF RECOMMENDATIONS

GEOCHEMICAL REFERENCE: C. Langmuir, J. Natland, A. Robertson, H.Staudigel, M. Leinen, M. Salisbury, F. Alberedi
NE AUSTRALIA: P. Davies, P. Symmonds, R. Sarg, A. Droxler, W. Schlager, J. McKenzie, A. Bosselini, R. Ginsburg, N. James
VANUATU: J-I. Collot, M. Fisher, H. G. Green, J. Recy, S. Bloomer
LAU-TONGA: J. Hawkins, J. Gill, U. von Stackelburg, L. Parsons, D. Cronan, H. Foucher, D. Scholl, S. Bloomer, A. Stevenson
NANKAI II: D. Karig, G. Moore, M. Kastner, J. Gieskes, Y. Ogawa, E. Suess, R. Wortel, R. Knipe, C. Moore, J. Boulegue, R. White

PROPOSED PROGRAM

WPAC notes that the following mature proposals are not in the program proposed to be drilled: 1) Zenisu; 2) South China margin; 3) Banda Sea and South China Sea basins; 4) Valu Fa; 5) Vanuatu backarc rifts.

WPAC emphasizes in as strong terms as possible that the WPAC drilling program, having been down-sized repeatedly by PCOM over the past three years, is now down to bone marrow and cannot be cut further without untolerable damage. The three SW Pacific legs in WPAC's program for FY90 respond directly to priority directives of the Thematic Panels. NE Australian Margin is SOHP's highest WPAC priority, Vanuatu is TECP's highest priority, and Lau-Tonga is a high priority of LITHP. WPAC will not further prioritize its program. WPAC notes that time in the Western Pacific is being lengthened by engineering legs and dry docking.

Following the first Nankai leg at the end of 1989, WPAC recommends that PCOM/TAMU consider the following drilling schedule: Geochemical Reference (Guam), Engineering II (Guam), CEPAC leg (Townsville), NE Australia (Noumea or Port Villa), Vanuatu (Suva), Lau-Tonga (Pago Pago). This would place the SW Pacific legs in the June-November window between the cyclone season. Nankai II would be drilled during CEPAC

Jim Gill is recommended to PCOM as the WPAC DPG chaiman.

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WESTERN PACIFIC PANEL MEETING
October 27-29, 1988
Lamont-Doherty Geological Observatory
Palisades, N. Y., USA

DRAFT MINUTES

Present:

Kent Brooks, ESF; Roger Buck, TECP; David Cronan, UK; Jim Eade, CCOP/SOPAC Member-at-Large; Bob Garrison, SOHP; Jim Gill, USA; Philippe Huchon, France; Roy Hyndman, PGC Member-at-Large; Rich Jarrard, LDGO; Hermann Kudrass, FRG; Audrey Meyer, TAMU; Ralph Moberly, PCOM; Greg Moore, USA; Jim Natland, USA; Lindsay Parson, IOS guest; Julian Pearce, LITHP; Steve Scott, Canada; Kensaku Tamaki, Japan; Brian Taylor, USA, Chairman.

1. Minutes of the April, 1988 meeting were approved without modification.

REPORTS

2. PCOM Report (Moberly)

The JOIDES office has moved to HIG for a two-year period beginning October, 1988.

Moberly reported on the new panel structure which emphasizes thematic panels, now four in number. The former SOHP panel is replaced by two panels, the Ocean History Panel (OHP, Chairman N. Shackleton, UK) and the Sediment Geochemistry and Sedimentary Processes Panel (SGPP, Chairman Irwin Suess, FRG). Proposals are <u>first</u> sent to all four thematic panels. New proposals are being sought on any theme, for any ocean, by any investigator for post-1992 drilling.

The next PCOM annual meeting (December, 1988 in Miami) will set the FY 1990 schedule and the approximate ship location for the subsequent three years.

3. LITHP Liaison report (Pearce)

LITHP endorsed the concept of geochemical reference holes and recommended a program as discussed later. They also requested that a meeting be held to develop plans for the Lau Basin based on new survey information.

The most recent LITHP meeting revised a draft of a long-range planning document which focuses strongly on ocean ridges. A concern was

expressed by WPAC members that the current strong focus on ridges will exclude important science in other settings.

The new LITHP chairman will be Rodey Batiza (US).

4. SOHP liaison report (Garrison)

NE Australian margin and Japan Sea remain top priorities for WPAC drilling. Some concerns were expressed about geochemical reference sites, reiterating statements at our April meeting.

5. TECP liaison report (Buck)

The EM experiment proposed for the Japan Sea is not supported because of doubt that a single point measurement is meaningful.

Zenisu Ridge proposal is not supported. The chosen sites have local complications and the proposal is not strong enough to displace other programs.

South China Sea drilling is not supported despite the new Chinese data.

Studies of the arc to backarc transition in the Japan Sea by means of downhole instrumentation is supported (Proposal 155F).

Lau Basin forearc drilling at Site LG-6 is supported.

Proposal 309F for vertical seismic profiling at BON1 & 2 is supported, but a larger than1000 cu. in. sound source should be considered.

Strong interest was expressed for the Nankai Trough, with pore pressure and permeability measurements seen to be critical. TECP recommends two legs in order to accomodate the program. Hole NKT-10 is endorsed and should go to basement for fluid-flow measurements.

A white paper for long-range planning is in its second draft. TECP has not included mid-ocean ridges in its mandate.

6. Logging Report (Jarrard)

The status of logging tools was summarized (see Appendix 1). Key items were the development of the Geoprops tool for testing on Leg 126, to be used later at Nankai, and planned leasing of high-temperature tools for the Lau Basin.

Concern was expressed about the adaptibility of the logging tools to the new slim-hole high-speed diamond drilling system. A gyroscope will be added to the University of Washington 3-component magnetometer/ susceptibility tool planned for use on Legs 125 and 126.

DMP passes the following information to WPAC:

Leg 124: Insufficient time to log all holes fully.

Leg 125: FMS not available. Televiewer is an alternative.

Leg 126: IP tool is not reliable. There will be a problem if BON-1 is very hot. Geoprops test requested.

Legs 127 and 128: DMP asks WPAC to move hole J1b hydrofrac experiment from Leg 127 to Leg 128 because of time pressure on Leg 127. WPAC recalculation of drilling times at this meeting showed that this is not necessary.

Geochemical Reference Sites: Deep crustal drilling at BON-8 requires a full basement logging program.

NE Australian Margin: The dual laterolog is withdrawn because vuggy carbonates are not expected to be commonly encountered.

Vanuatu: There is insufficient time to do all logs. Hydrology should be examined in two holes.

Lau Basin: All sites are generic so there are no changes in DMP planning.

7. TAMU report (A. Meyer)

The latest operation schedule was presented (up to Leg 129E).

Co-chief scientists for upcoming legs are as follows:

Leg 124: Silver, Rangin
Leg 125: Fryer, Pearce
Leg 126: Taylor, Fujioka
Leg 127: Tamaki, Pisciotto
Leg 128: Suyehiro, Ingle
Leg 129: Taira, Hill

Scientific Results (formerly Part B) of the Proceedings for Legs 101/102 will be published by December, and for Leg 103 in January.

A shipboard measurements panel (SMP) was created to advise TAMU on equipment for the ship. Changes have been made in laboratories and equipment. The paleontology lab has been enlarged. A new single-track, multi-channel, whole-round-core physical-properties logger is being installed on the ship. New AA and C-N-S machines will be installed during Leg 124E. Four new Macintosh computers and a laser-writer have been donated to TAMU for use on the ship.

DISCUSSION OF PLANS FOR LEGS

8. Leg 124

The Sulu and Celebes sites will take more time than planned because of co-chief scientists desire to increase emphasis on study of structure and fluids. The Cagayan Ridge site is problematical because of the necessity to spud into hard limestone, and is down-graded in priority. It is now considered a secondary, time-available objective. C. Rangin has replaced K. Hinz as one of the co-chief scientists.

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9. Leg 124E (Engineering)

Three or four sites will be drilled. The first, in shallow water, will test the mining system. The second, repeating DSDP Site 453, will test logging equipment. The third, at DSDP Site 452, will test the ability to core intervals of chert and soft sediments. The fourth, to be done if time is available, will test deep-water drilling capabilities in the Mariana Trench.

10. Second Engineering Leg

Plans will remain tentative, both as to timing and objectives, until after Leg 124.

11. Lau-Tonga

Parsons presented results of a recent GLORIA survey. It shows a S propagator at 19° 20' S overlapping the N end of the eastern Lau spreading center. A short spreading segment lies between the two. A failed spreading center lies 50 km W of the eastern Lau spreading center.

The Lau Basin working group, convened by LITHP, adjusted the drilling program in response to the new GLORIA data, and recommended additional survey information be obtained by J. Hawkins on an impending cruise. The revised program maintains earlier requirements that holes be placed in old, intermediate, and young parts of the basin, but sites have been moved and one site (LG1) has been replaced (by LG10, 150 km further south). More survey data are needed to exactly locate the ridge jump boundary which sites LG10 and LG9 (our lowest priority site) are planned to straddle.

WPAC followed the TECP recommendation to retain the Tonga forearc site. However LG6 was replaced by LG6A as the prime forearc site because sediments are thinner at LG6A. Adjusted drilling times for LG2, 3, 7, 10, 6a, and 9 (in priority order) give 50-52 operational days and 57-59 total days for this leg, assuming a Suva-Pago Pago transit.

WPAC notes that the Lau Basin offers an excellent place for an engineering leg to drill young, glassy basalts at a propagating tip (19°20'S), a hydrothermal zone at a differentiated spreading ridge (Valu Fa), and thin, sedimented backarc crust . Other well-surveyed places for engineering tests in similar environments include (from south to north) the North Fiji, Woodlark, and Manus Basins, as well as the Bonin rifts.

WPAC suggestions for Lau-Tonga co-chief scientists are Hawkins, Gill, Von Stackleberg, Parsons, Cronan, Foucher, Scholl, Bloomer, and Stevenson.

12. Vanuatu

DMP wants to do more logging experiments and fluid sampling experiments in hole DEZ2 than are proposed.

SSP accepts the proponents velocity estimates at DEZ2 but considers that the drilling conditions and depth of this site may require re-entry and therefore more time. {Note: On 3.5 kHz records, there appears to be only 20-25 m of soft sediments overlying hard material at DEZ2. This is brought to TAMU's attention as a potential limiting factor, requiring free-fall, rather than full, re-entry at DEZ2}. New estimates of drilling time for DEZ2 need to be made based on the assumption that there is fractured hard rock in much of the interval that we wish to core.

WPAC proposes that DEZ2 be drilled before DEZ1. WPAC recommends allocating 16 days total for DEZ1 and DEZ2, using all of it if necessary to reach the decollement at DEZ2. If there is no offscraped section in DEZ2, there is no reason to drill DEZ1. Sufficient time must be available to drill IAB1 and IAB2 no matter what happens at DEZ2.

WPAC's suggestions for co-chief scientists are Jean-Ives Collot, Mike Fisher, Gary Green, Jacques Recy, and Sherman Bloomer.

13. NE Australian Margin

SSP reviewed the full data set and approved the sites.

WPAC received a written status report from Davies and Symmonds which is attached as Appendix 2.

PCOM is advised that the program needs 47-55 operational days at the minimum 8 sites (SOHP's highest priorities), and that this should not be compromised because of transit time. Another half of a leg would be required to drill all sites.

WPAC suggests the following as co-chief scientists: P. Davies, W. Symonds, R. Sarg, A. Droxler, W. Schlager, J. McKenzie, A. Bosselini, R. Ginsburg, N. James.

14. Geochemical Reference Sites

LITHP endorsed a program of three principal targets, BON-8, MAR-4, and an apron site. To PCOM's query about what could be accomplished in a single leg, LITHP responded that the first two of these could be drilled, and that an apron site probably would require time on an additional leg. To concerns about whether this would provide adequate information on sediment/crust variability, LITHP considered that the three sites would sample all volumetrically significant components entering the trench/subduction systems, although proportions of components obviously would vary within holes and from place to place. Representative recovery

140 would be sufficient in cherty intervals, and will be augmented by geochemical and other logging.

Two days have been added to a forthcoming cruise to survey western Pacific guyots, in order to run a track over site A2-2, alternate to BON-8.

Drilling times in days are estimated as follows: BON8 (20.2 drill, 5.8 log, 26 total days) + MAR4 (15.6 drill, 3.0 log, 18.6 total days) = 52.6 total days, allowing for for 6 transit days (Tokyo-Guam) and 2 contingency days. To this could be added the apron site MAR5 (7.5 drill, 2.6 log, 10.1 total days) = 63 total days.

WPAC suggests the following co-chief scientist nominations: Langmuir, Natland, A. Robertson, Staudigel, Leinen, Salisbury, Albarede.

15. Japan Sea (Leg 127)

TECP is negative about the electrical conductivity proposal because it was confined to a single point. Tamaki explained that the proposed experiment uses a new method and that TECP probably did not understand it. WPAC recommends that this proposal be re-evaluated by DMP.

SSP has cleared all sites but is concerned that oceanic basement has not been properly recognized in the seismic records, particularly at site J3b-1. The upper part of what has been identified as basement appears to be stratified, and may consist of interlayered sills and sediments, overlying the true basement of sea-floor-spreading ocean crust. WPAC concurs, and considers that J1b may have to be drilled to greater depths in order to reach true basement.

After seeing the new seismic records, WPAC expressed concern that the proposed site J3b-1 atop the Okushiri Ridge will not determine the time of thrusting, and that the section does not conform to the model presented for obduction. In view of this new seismic information, the interpretation of the tectonics at site J3b-1 is controversial. Also, in view of the known stratification in the upper level of basement in the entire Japan Sea basin, WPAC puts site J3b-1 as the lowest priority of the four sites on Leg 127, and gives the co-chief scientists the latitude to deepen Hole J1b if true ocean crust is not penetrated within the planned drilling depth. J3b will be drilled on a time-available basis.

16. Japan Sea Leg 128

Proposed sites J2a and JS2 and experiments at J1b are unchanged.

17. Nankai Trough Leg 129 and perhaps more:

The ONDO temperature-measuring experiment was considered by TECP and DMP. The system is not likely to work as planned because of

sea-water circulation in the hole, but can be modified to prevent this problem. DMP recommended that 2.5 days be allotted for deployment and testing.

Logging plus experiment time estimates for NKT-1 and NKT-2 range from 19-31 days, depending on different scenarios (Appendix 3). DMP's "Realistic Program" is 31.3 days; their "Abridged Program" is 20.7 days.

A new proposal by Karig, Moore, and Kastner presents a four-hole program for Nankai to measure fluid flow and mechanical properties both in vertical sections AND across the accretionary prism. The importance of determining the horizontal gradients was emphasised at the recent Accretionary Prisms DPG meeting. TECP endorses the proposal, and recommends that 1) the upcoming Kaiko 2 submersible program and ODP be coordinated; 2) pore-pressure and permeability measurements are essential and drilling should not be undertaken unless tools are operational; 3) time should be taken to drill NKT-10, a new site, to basement in order to obtain a complete picture of fluid flow; 4) drilling should be concentrated at the toe of the prism, drilling fewer holes upslope, if necessary, in order to have sufficient drilling time to reach basement at NKT-10.

WPAC considered two drilling scenarios, involving one-leg and two-leg programs as follows: 1) NKT-2 pilot hole plus re-entry to basement (21 drill +16 log days) plus NKT-1 (10 drill + 7 log days), for a total of 60 days with contingency and transit; 2) Leg 1: NKT-2 (21 drill +21 log days) plus NKT-10a,b (6 drill + 3 log days), total = 57 days with transit and contingency; Leg 2: NKT-10c (13.5 drill + 17.5 log days) plus NKT-1 (10 drill +10 log days), total = 61 days with 8 transit and 2 contingency.

As documented in Appendix 4, the two leg program is much better, from both a thematic and operational view!

For the two-leg option, WPAC recommends that there be at least 6 months, and preferably 1 year, between the legs, in order that the results of the first leg can be evaluated and tools can be modified accordingly. Logistics dictate that the lapse time between legs will likely be of the order of either 6 or 18 months.

WPAC suggests the following as co-chief scientists for a second Nankai leg: Dan Karig, Greg Moore, Miriam Kastner, Joris Gieskes, Y. Ogawa, Erwin Suess, Rhinus Wortel, Rob Knipe, Casey Moore, Jacques Boulegue, Bob White.

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18. Bonin/Mariana (Leg 125) and Bonin (Leg 126)

Most BON and MAR sites are little changed from previous meetings except 1) BON-4 replaces BON-5a in priority; 2) BON-6 is moved further south and is now two holes, BON-6a and BON-6b. Leg 126 may return to Leg 125 site BON6A in order to log it with FMS and VSP (which will not be available on Leg 125).

Recent Geological Survey of Japan measurements show that heat flow at BON-1 and BON-1a is less than 100mW/m , thus there is little danger of encountering high-temperature fluids.

Karig requests that the Geoprops tool be tested on Leg 126 in an APC/XCB hole. WPAC proposes the pilot hole of BON-2 for this purpose. A technician will have to be trained to operate the tool on Leg 126.

VSP has been requested and approved for Leg 126. S. Swift and H. Hoskins were suggested as experienced persons capable of running it.

FUTURE OF OTHER MATURE PROPOSALS

19. PCOM requested that all mature, or nearly mature, proposals considered by WPAC, but which are not in the program, be identified. These are: 1) Zenisu; 2) South China margin; 3) Banda Sea and South China Sea basins; 4) Valu Fa; 5) Vanuatu backarc rifts.

20. WPAC emphasizes in as strong terms as possible that the WPAC drilling program, having been down-sized repeatedly by PCOM over the past three years, is now down to bone marrow and cannot be cut further without untolerable damage. The three SW Pacific legs in WPAC's program for FY90 respond directly to priority directives of the Thematic Panels. NE Australian Margin is SOHP's highest WPAC priority, Vanuatu is TECP's highest priority, and Lau-Tonga is a high priority of LITHP. WPAC will not further prioritize its program. WPAC notes that time in the Western Pacific is being lengthened by engineering legs and dry docking.

PRELIMINARY CRUISE TRACK FOR FY90 AND BEYOND

21. WPAC considered a possible preliminary cruise track following the first year of WPAC drilling.

			Japan
Jan 1990	1 mo.	Eng. II	
Feb-Mar	2 mo.	Geochem Reference	
			Guam
Apr-May	2 mo.	CEPAC*	
*** cyclone season starts in northern areas ***			Townsville
June-July	2 mo.	NE Australia	
			Nomea
Aug-Sept	2 mo.	Vanuatu	
			Fiji
Oct-Nov	2 mo.	Lau-Tonga	
*** cyclone season starts in southern areas ***			Samoa

* Ontong-Java Plateau transect
Old Pacific
Seamounts and Guyots

Nankai II is proposed to be done during CEPAC's Western Pacific drilling.

FUTURE OF WPAC

22. As of January 1, 1989, the new planning structure of PCOM comes into effect at which time WPAC becomes a Detailed Planning Group (DPG), together with CEPAC (which may be split into subgroups), accretionary margins, and ridges (sedimented and EPR). WPAC feels that it is premature to disband and should remain constituted to act at PCOM's pleasure.

23. Jim Gill is recommended to PCOM as the Western Pacific DPG's new chairman replacing Brian Taylor. Taylor is thanked profusely by the WPAC panel members for his enthusiastic and expert guidence over the past three years.

24. Adjourned 11:30, Saturday October 29.

Appendix 1

Logging Tool Status
10/26/88 Update for WPAC

Standard logs, conversion from 3 to 2 strings: field test on 124E planned. Chance of success: very good.

Televiewer: successful on latest 3 runs; more reliable tools to be purchased in 1990 or 1992.

Formation Microscanner: slightly ahead of schedule; field test successful; computer for on-board processing will be on ship Leg 125 or Leg 126; first FMS use planned for Leg 126. Chance of success: very good.

Temperature tool: now fully operational, requiring no ship time; successful several times on Leg 123.

Wireline packer: slightly behind schedule; first ODP test on 124E. Chance of success: fair-good.

Geoprops: construction underway; DMP recommended test on Leg 126.

Induced Polarization: have an analog tool of uncertain reliability and sensitivity; no luck finding a more reliable digital tool. Chance of success: fair-poor.

High temperature logging: maximum T 175°C for most tools, 60°C for temperature tool; test of cooling hole while logging planned for 124E; leasing of high-T tools planned for Lau.

Sidewall entry sub: repeated successful uses on Leg 122 permitted logging of poor holes.

Wireline heave compensator: working fine; improvements planned for 124E.

Appendix 2

Carl Brenner,
Bob Garisson,
Brian Taylor.

The Northeast Australia Data base
Position

1. All site survey seismic and navigation lines have been processed. Structure contour maps have been prepared for each site(up to 9 horizons). The seismic ties connecting all sites have been processed and displayed.
2. All seismic data and maps have been examined and accepted by the Site Survey panel at the October meeting in Swansea.
The resolution on the seismic data is good.
3. The position of all sites remain the same as indicated in Larry Mayer's December 1987 presentation to PCOM.
4. AT the SSP meeting in Swansea a suggestion was made that insufficient time had been allocated to the drilling because at site 6 the SSP considered that drilling to basement was a desirable objective. That objective was in fact part of the original proposal and the drilling time calculated accordingly.
5. We have been very conservative in our estimates of drilling times. Audrey Meyer can confirm this. We used the TAMU data as a guide only and then added a cushion.
6. Processing of the seismic data has made the scientific objectives even more exciting.
For example(1)at sites 1, 2 ,3 and 4 on the slope of the Great Barrier Reef we can now clearly differentiate high and low sealevel packages relating to two periods of shelf development i.e. prior to the mid Pliocene a pre shelf flooding phase of progradation and coastal onlap facies and post mid Pliocene after shelf flooding a series of outer shelf and slope aggradative and erosion phases. There is here an excellent high resolution sealevel story.
For example(2) at sites 13 and 14 on the Marion Plateau we can now define an absolute Late(?)Miocene eustatic sealevel change of 150m.
For example(3) at sites 8,9 and 10 on the Queensland Plateau the high resolution periplatform signal extends back to the mid Miocene with a boundary between temperate and tropical platform development in the early mid Miocene. There is here a thick and very high resolution paleoclimatic record. In addition, recent studies on Queensland Plateau cores by Andre Droxler showes an excellent climate-oceanographic record back to 125,000(the limit of the cores).
7. All our data has been tied to DSDP 209 on the northeast margin of the Queensland Plateau.
8. Cores from all the proposed sites are currently being processed in Australia.
9. Following a suggestion at SSP that the data quality merits publication as a seismic stratigraphic atlas, in conjunction with the drilling results, we are currently investigating Landmark analysis of data and presentation as three dimensional models.
10. We are continuing to process parts of the data set as suggested by SSP.

Peter J.Davies
Phillip Symonds

To: Brian Taylor, WPAC Chairman
From: Richard Jarrard, Borehole Research Group
Date: October 12, 1988
Re: Downhole-measurement times for Nankai

Last week, DMP looked in detail at downhole measurements for Nankai sites NKT-1 and NKT-2. I expect that you will receive a copy of their minutes just before the October meeting of WPAC. WPAC surely will be as surprised as DMP was to see that DMP is recommending 31.3 days of downhole measurement time rather than 20 days, in spite of virtually no changes in recommended tools. This letter is to clarify the scientific differences among the various logging time estimates that you now have for Nankai:

1. The 2/10/88 "Downhole Measurements for WPAC Programs" (Jarrard) which totals 11.2-12.6 days plus time for geoprops, OSE and temperature deployment;
2. The 4/13/88 Nankai strawman (Jarrard) which totals about 20 days;
3. The 9/2/88 Nankai proposal (Karig et al) which totals 22.0 days for NKT-1 and NKT-2;
4. The 10/6/88 "Realistic Program" (DMP) which totals 31.3 days; and
5. The 10/6/88 "Abridged Program" (DMP) which totals 20.7 days.

The following breakdown by categories shows the differences between the five plans:

	#1 2/10	#2 4/13 G	#2 4/13 noG	#3 9/2	#4 10/6 R	#5 10/6 A
Logging (standard, FMS, MCS)	4.6	5.6	5.6	8.2	5.9	5.9
Logging (BHTV, VSP, dual laterolog)	3.4	2.5	1.6	2.3	3.8	2.0
Meas. during coring (WSTP,geoprops)	+	5.0	.8	8.4	7.3	4.6
Fluid sampling & Permeability (wireline, rotatable, & straddle packers)	4.5	1.1	6.9	0	7.9	5.4
Temperature string & OSE	+	2.8	2.8	1.5	4.0	2.0
Extra hole cond. and/or washing hole	0	2.0	2.0	1.6	2.4	0.8
Total # days	12.6+	18.9	19.6	22.0	31.3	20.7
#WSTP & geoprops measurements	+	42	12	72	62	40
# wireline packer & packer meas.	10	4	16	0	18	12

Differences:

Logging (standard, FMS, MCS): logging pilot hole at NKT-2 in all plans except #1; apparent extra time in #3 may be actually for tools not listed in Karig proposal.

Logging (BHTV, VSP, dual laterolog): VSP at NKT-1 omitted from #2noG and #5; BHTV omitted from #2G, #2noG, and #3; dual laterolog omitted from #2G, #2noG, #3, and #5;

Meas. during coring: dramatic differences in number of geoprops measurements assumed (see totals above).

Fluid sampling & permeability: dramatic differences in number of measurements assumed (see totals above; note that #2G, #3, and #5 have none at NKT-1).

Temperature string & OSE: OSE included only in #3 and #4; temperature string in #2, #4, and #5 with differing contingency times.

Extra hole conditioning and/or washing hole: NKT-1 washed for logging in #2, #3, and #4; NKT-2 extra hole conditioning or washing #2, #4 and #5.

The most substantial differences are in number of fluid samples and measurements of permeability and pore pressure: my 4/13 strawman fit geoprops and no-geoprops options into 20 days, the Realistic Program of DMP includes both geoprops and other measurements, and the Karig proposal includes only geoprops and WSTP.

I can be at WPAC if desired, but only on Thursday and possibly on Friday A.M. I leave for Singapore (Leg 24) Friday P.M, and most of the other loggers leave for a Denver logging school Thursday or Friday.

Richard Jarrard

cc: Paul Worthington
(with attachments)

acronyms used:

FMS: formation microscanner
MCS: multichannel sonic (probably a shear-source tool for V_s measurement on Nankai)
BHTV: borehole televiewer
VSP: vertical seismic profile
OSE: oblique seismic experiment
WSTP: new Barnes water sampler
LAST: Moran lateral stress tool (in development now, assumed to require virtually no ship time)

Leg 129: Nankai Optimum Program (31.3 days)

NKT-2 Pilot Hole to about 400m

# days	
1.0	8 LAST, 4 WSTP @ 30M, 6 geoprops
1.0	standard logging
0.3	FMS
0.2	dual laterolog
0.3	multichannel sonic (shear source)
2.8	

NKT-2, Main Hole (XCB then rotary to 1300m, with reentry cone & casing)

# days	
3.8	30 geoprops (if O.K.)
1.0	trip to release bit and insert rotatable packer
1.3	standard logging
0.3	FMS
0.4	hole conditioning
0.4	BHTV
0.3	dual laterolog
0.4	multichannel sonic (shear source)
1.0	4 packer
0.4	hole conditioning
1.9	6 wireline packer plus fluid tests
1.2	VSP
1.5	offset seismic experiment
1.0	trip to change to straddle packer
1.0	4 packer
2.5	deploy temperature string
18.4	

NKT-1 (XCB to 900m)

# days	
2.5	8 LAST, 4 WSTP + 18 geoprops (or 10 geoprops + 4 wireline packer)
1.6	wash hole for logging, or extra time for 2-stage logging
1.4	standard logging
0.4	FMS
0.4	BHTV
0.5	multichannel sonic (shear source)
0.3	dual laterolog
1.0	VSP
1.0	minicone and pipe trip for packer
1.0	4 packer
10.1	

Leg 129: Nankai Abridged Program (20.7 days)

NKT-2 Pilot Hole to about 400m

# days	
0.5	8 LAST, 4 WSTP @ 30M, 2 geoprops
1.0	standard logging
0.3	FMS
0.3	multichannel sonic (shear source)
2.1	

NKT-2, Main Hole (XCB then rotary to 1300m, with reentry cone & casing)

# days	
2.3	18 geoprops (if O.K.)
1.0	trip to release bit and insert rotatable packer
1.3	standard logging
0.3	FMS
0.4	hole conditioning
0.4	BHTV
0.4	multichannel sonic (shear source)
1.0	4 packer
1.4	4 wireline packer plus fluid tests
0.4	hole conditioning
1.2	VSP
1.0	trip to change to straddle packer
1.0	4 packer
2.0	deploy temperature string
14.1	

NKT-1 (XCB to 900m)

# days	
1.8	8 LAST, 4 WSTP + 12 geoprops (or 6 wireline packer)
1.4	standard logging
0.4	FMS
0.4	BHTV
0.5	multichannel sonic (shear source)
4.5	

Note from Tectonics Panel: the top priority site should be NKT-2. NKT-10 should also be a high priority and that that site should be drilled to basement in order to obtain a complete picture of the fluid flow at the toe of the prism. To ensure adequate time for this site and for pore pressure measurements to be properly attempted at each hole, two legs are preferred, and the upslope holes should be given the lowest priority.

One Leg, 2 Holes

In this approach, two holes (NKT-2 near the deformation front, and NKT-1 the reference hole just seaward of the deformation front) are drilled to basement. There is a minimum logging and downhole measurement program. This is as in the original proposal.

These holes will provide information on the vertical variation in the critical parameters required to constrain accretion models i.e., pore pressure, permeability, mechanical properties etc. However, there is less assurance of meeting the objectives since the logging and downhole measurement time available is limited to about 23 days. 31 days was estimated by DMP to be required for a complete set. This timing also assumes no special difficulties in drilling, which is unlikely in this environment. The important seaward reference hole is drilled, but with the limited time, it may not be possible to complete both holes to basement as well as have adequate logging and measurements. This approach does provide limited horizontal fluid flow information, such as the fluid transport near the decollement seaward from the deformation front, but provides no information on horizontal deformation or physical property gradients.

Two Legs, 4 sites (up to 9 holes)

This senario is described in the Karig et al proposal.

This approach gives a reasonable definition of the horizontal as well as the vertical variations assuming that the variation occurs progressively and primarily over the region to be drilled. The proposed drilling of 9 holes at 4 sites probably does not allow time for an adequate program of logging and downhole measurements. A more reasonable program is drilling fewer holes at only 3 sites (NKT-1, NKT-2 and NKT-10 between 1 &2). This is in keeping with the Tectonics Panel recommendation that less time be spent on upper slope sites(NKT-3).

It is clear that two legs gives a much better chance of achieving the major objectives.

JOIDES Lithosphere Panel Long Range Planning Document

Executive Summary

The overall thematic objective of lithospheric drilling is to understand the origin and evolution of the oceanic crust and lithosphere, and associated magmatic, hydrothermal and metamorphic processes. Over the years, there has been a remarkable consensus within the lithospheric community on its drilling priorities. The two highest priorities have consistently been: (1) determining the structure, composition and alteration history of the oceanic crust, and (2) characterizing the processes of magma generation, crustal construction and hydrothermal circulation involved in the formation of oceanic crust. Drilling can also provide important insights into the magmatic processes associated with the onset of sea floor spreading, mid-plate volcanism, geochemical fluxes at convergent margins, the physical properties of the oceanic lithosphere, and the composition and dynamics of the mantle.

Addressing these problems during the coming decade will require a focussed, interdisciplinary drilling effort with the following four major goals:

- By 1996 drill three holes 2000-3000 m into the oceanic crust, with the prospect of extending one of these holes to Moho by the year 2000. One of these holes should be located on thin crust (e.g. proximal to a fracture zone), the others on crust formed at fast and slow spreading ridges

- Drill arrays of shallow (~300 m) and intermediate (1-1.5 km) depth holes in several locations along the mid-ocean ridge system, including fast, slow and sedimented ridge crests. One of these areas should be permanently instrumented to establish a sea floor "volcano observatory" by the year 2000.

- Complete select lithospheric "case studies" (5 over a 10-year period) of well-documented, representative features addressing magmatic and dynamic processes associated with intraplate volcanism, plate convergence and mantle evolution and heterogeneity.

- Establish a global network of sea floor geophysical stations throughout the major ocean basins in 100-200 m deep crustal holes equipped with short and long-period, broad-band seismometers and other appropriate long-term geophysical instrumentation.

Many of these objectives can be achieved using present drilling technology (shallow crustal sampling, deep drilling in exposed plutonic sections, *in situ* stress mapping). However, the long-term goals of deep crustal penetration, ridge crest drilling and sea floor observatories will require major new technological developments in drilling systems,

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logging equipment and long-term borehole instrumentation. In terms of drilling systems, three majof problems must be overcome: (1) penetration and sampling of young, highly fractured, extrusive basalts comprising the uppermost part of Layer 2, (2) low penetration rates, short bit life, hole instability and incomplete flushing of cuttings in deeper crustal holes, and (3) low recovery rates. Logging equipment and borehole instrumentation will need to be adapted for use in smaller diameter holes and under high-temperature (up to 400°C) conditions. Other important needs are for improved borehole sampling techniques (fluids and rock), improved utilization of drill holes for a variety of borehole experiments, and advances in data storage and retrieval techniques for long-term borehole instrumentation.

Although improved crustal drilling technology is essential to the achievement of the most important long-term drilling goals of the lithospheric community, a number of planning options exist if delays are experienced in developing this new technology. For example, if problems with young crustal drilling at the EPR can't be solved, it may be feasible to address the same thematic objectives at sedimented ridge crests where the crust is likely to be significantly altered and sealed. If drilling deep (>1-2 km) holes is not technically feasible, then more emphasis could be placed on drilling exposed lower crust and upper mantle sections near fracture zones. Finally, a higher priority could be assigned to drilling technically feasible, secondary LITHP drilling objectives until the required drilling systems are available.

The following implementation plan gives a rough estimate of the activities and level of effort that might be required to achieve these drilling objectives in coming decade:

Phase 1 (1989-1992)

- Establish detailed planning groups (DPGs) on "Drilling Deep Crust", "Ridge Crest Drilling", "Sea Floor Observatories", and others as appropriate
- Develop a long-term engineering development plan to improve crustal drilling technology, including cost estimates, manpower needs, and test-leg requirements
- Begin site survey work for at least 6 candidate sites for deep crustal drilling, 4 sites for ridge crest drilling, and 5-10 sea floor geophysical stations
- Complete 2 legs of deep crustal drilling at Hole 504B, or at another suitable deep crustal drill site
- Complete 4 legs of drilling on sedimented and unsedimented ridge crests of the eastern Pacific
- Complete one lithospheric "case study" on the nature of hot spot volcanism by drilling Loihi (one leg)
- Carry out recommended pilot experiments for the establishment of a sea floor seismic station, probably at a site near Hawaii

Phase 2 (1993-1996)

- Complete site survey work for deep crustal holes, ridge crest drilling and sea floor geophysical stations
- Complete three holes 2000-3000 m into the crust, including one hole in thin crust (1 leg/yr for four years)
- Begin first phase of Mid-Atlantic Ridge drilling; complete second phase of EPR program (1 leg/yr for four years)
- Establish 5 sea floor geophysical stations and carry out two lithospheric "case studies" (e.g. drilling a near-axis seamount and a back-arc spreading center) (1 leg/yr for four years)

Phase 3 (1997-2000)

- Extend one crustal hole to Moho (6 legs/yr over four years)
- Complete second phase of MAR drilling (2 legs)
- Establish a sea floor volcano observatory (in conjunction with RIDGE) on a volcanically active part of the mid-ocean ridge system
- Complete a global network of sea floor seismic stations and carry out two lithospheric "case studies" (e.g. a regional geochemical mapping program and an *in situ* stress experiment along an accretionary plate boundary) (1 leg/yr for four years)

In this scenario, approximately 3 legs of drilling would be required per year over the next decade to complete the four long-term drilling goals outlined above (the equivalent of about 1 leg/yr for deep crustal drilling; 1 leg/yr for ridge crest drilling; and 1 leg/yr for establishing sea floor geophysical stations and carrying out selected lithospheric "case studies"). However, LITHP's interest in sea floor seismic stations and *in situ* stress measurements clearly overlap that of TECP, and at least some other lithospheric drilling could be carried out in conjunction with the programs of other thematic panels. Thus the amount of dedicated LITHP drilling required to achieve these four goals is probably about 2 1/2 legs per year over ten years.

Although lithospheric drilling objectives exist in all the major ocean basins, most are concentrated in the central and eastern Pacific and Atlantic Oceans. Many of the highest priority objectives also require multiple drilling legs at single site or in the same area. Thus it is critical that the drillship be scheduled so that it can reoccupy drill sites at intervals of 9-12 months. All of these considerations suggest that the circumnavigation philosophy that has driven the first eight years of ODP planning is not the optimal strategy for lithospheric drilling. Instead, ship scheduling should be planned around long-term, thematically prioritized drilling goals like those outlined above.

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JOIDES Lithosphere Panel
Long Range Planning Document

I. Overview of Scientific Objectives of the First Phase of ODP

COSOD I - The COSOD I Report in 1981 identified a variety of problems related to the origin and evolution of the oceanic crust and lithosphere that can be addressed by drilling. The two highest priority ocean crustal problems agreed upon at this conference were:

- Processes of magma generation and crustal construction operating at mid-ocean ridges
- Processes of hydrothermal circulation in the ocean crust

In addition, the COSOD I Report also discussed a number of other important lithospheric problems that could be studied by drilling. These included: (1) the compositional heterogeneity of the mantle and mantle evolution, (2) the aging and evolution of the oceanic crust, (3) the formation of overly thick crust, (4) the role of transform faults, (5) processes operating in young ocean basins, and (6) island arcs and backarc basins. The need to drill at least one hole as deeply as possible into Layer 3 was specifically noted in the conference report.

At COSOD I the role of "natural laboratories" in future crustal drilling was emphasized. As defined in the conference report, the natural laboratory concept includes: "arrays, or clusters of holes, some deep, some relatively shallow, grouped together in fours or fives in particularly critical (active) parts of the ocean floor . . . . They would be used for the emplacement of sophisticated instruments, some during the drilling period, and others for long-term monitoring after the drilling had ceased. Within each each laboratory complex, one hole would be targeted for deep penetration to allow sampling from hitherto unreached levels in the ocean crust." The need for improved drilling technology was also recognized, including the development of techniques for drilling in areas with little or no sediment cover.

LITHP White Paper - The JOIDES Lithosphere Panel (LITHP), following on the recommendations contained in the COSOD I Report, prepared a White Paper in 1986-87 which outlined a series of specific recommendations on the drilling strategies, priorities and technical development required to address these broad thematic objectives. The panel identified as its two most important long-term drilling objectives the completion of one or more deep holes into the lower oceanic crust, and the establishment of a suite of drill holes to investigate magmatic and hydrothermal processes at both fast and slow spreading ridges. It was noted that neither of these objectives could be attained with existing ODP drilling systems, and a major, long-term effort to improve crustal drilling technology was urgently needed. However, the LITHP White Paper also identified other shorter-term drilling

objectives (e.g. drilling old oceanic crust, flexural moat drilling, and convergent margin drilling, including geochemical reference holes) that were feasible with present drilling technology. The White Paper suggested the most productive approach to lithospheric drilling was one which included these shorter-term objectives, coupled with a parallel engineering development effort to achieve the longer-term goals of the deep crustal and ridge crest drilling.

II. Scientific Achievements of ODP to Date

A. *Present status in achieving thematic objectives*

The progress to date in achieving the major lithospheric drilling objectives outlined above has been frustratingly little. This is attributable, in part, to the technical difficulties of drilling in young, highly fractured basaltic crust, and drilling into the deeper layers of the oceanic crust. Thus despite the successful establishment of the first "zero-age", "bare-rock" drill hole in the Mid-Atlantic Ridge rift valley on Leg 106, subsequent drilling at this site on Leg 109 was unable to extend this hole significantly into Layer 2. However, not much progress has been made in achieving even the more technically feasible lithospheric drilling objectives noted above. This is primarily attributable to the fact that through the first 29 legs of ODP (~5 yrs) the equivalent of only about 4 legs of drilling have been devoted to the highest priority lithospheric objectives outlined in the COSOD I report.

Some progress, however, has been made. The most notable technical achievement of ODP has been the development of the hard-rock guide base, and associated drilling hardware, which has proven to be an effective means of spudding a drill hole on bare rock with only minimal support for the bottom hole assembly. This has long been a goal of the lithospheric drilling community and overcomes a major engineering obstacle to the establishment of the "natural laboratories" at ridge crests envisioned in the COSOD I Report. Over the past year substantial progress has also been made in adapting small-kerf, diamond-bit mine coring systems for use in ODP. These systems offer considerable promise for significantly improving the penetration and recovery rates for crustal drilling. Communication between the ODP Engineering Development Group and the JOIDES advisory panels has also been substantially improved during the past three years, resulting in much better co-ordination of development efforts with long-term program planning.

From the perspective of the lithospheric drilling community, there have been three main scientific accomplishments of ODP to date: (1) characterization of the *in situ* physical properties of oceanic Layer 2, (2) exploration of the deeper structure of the oceanic crust, and (3) new constraints on hot spot evolution and true polar wander.

In situ Physical Properties of Layer 2 - An important accomplishment of the first two years of ODP was the completion on ODP Legs 102, 109 and 111 of logging programs at the three deepest crustal holes drilled in the Deep Sea Drilling Project (Holes 504B, 395A and 418A). The extensive suite of state-of-the-art logging tools and borehole experiments

154 carried out in these holes have provided unique data on the physical properties of both young and old oceanic crust. For example, at 504B it was found, somewhat unexpectedly, that the lower 1000 m of the hole, comprising the partially-sealed pillow lavas and sheeted dikes of Layer 2, has uniformly low permeability (5-20 x 10^{-18} m^2). Thus the only highly permeable section of the crust in this hole is the upper 100-200 m of pillow basalts. These results are extremely important for modeling hydrothermal processes at mid-ocean ridges and understanding the alteration history of the oceanic crust.

Exploration of the Lower Oceanic Crust - Drilling results from ODP Legs 109 and 118 on the Mid-Atlantic and Southwest Indian Ridges have provided important new constraints on the structure and composition of the oceanic crust and upper mantle along slowly accreting plate boundaries. On Leg 109 serpentinites and partially serpentinized harzburgites were recovered at Site 670 in the Mid-Atlantic Ridge rift valley only a few kilometers from the accretionary axis. The presence of these rocks, thought to be typical of the lower crust or upper mantle, at very shallow crustal levels away from any major fracture zone, indicates that slow spreading ridges must be characterized by periods of very low magma supply and/or extensive tectonic thinning. The peridotites themselves have been extremely useful in studies of the compositional variability and melting history of the upper mantle beneath a slow spreading ridge.

The most exciting, and unexpected, lithospheric drilling result to date is unquestionably the 500 m of gabbro drilled at Hole 735B during Leg 118 on the Southwest Indian Ridge. Technically, this hole was a major triumph for the new bare-rock drilling techniques developed by ODP, as well as setting new records for both penetration (60 m/day) and recovery rates (95% over over the bottom 400 m; 87% overall) in a crustal drill hole. The gabbros obtained at this site represent the first coherent section of *in situ* Layer 3-type material ever recovered from the ocean basins. Studies of the geochemical and petrologic variations in this section will allow the magmatic evolution of a fossil oceanic magma chamber to be investigated in its true stratigraphic context. The logging and borehole experiments carried out in Hole 735B have also provided the first *in situ* information on the physical properties (porosity, permeability, seismic velocity, magnetism) of Layer 3.

Hot Spot Evolution and True Polar Wander - The floor of the central Indian Ocean is dominated by two prominent hot spot lineaments, the Ninetyeast Ridge and the Chagos-Laccadive Ridge. Drilling on Leg 115 investigated the poorly known Chagos-Laccadive Ridge and clearly established that the age of the volcanoes comprising this feature increase from south to north as would be predicted for a model in which the hot spot remains fixed in the mantle. Surprisingly, however, this hot spot, which is now located under Reunion Island, appears to have gradually moved northward relative to the earth's magnetic pole over the past 55 million years. This corresponds with a proposed southward motion of the Hawaiian hot spot, suggesting that the paleomagnetic reference frames for the Pacific and Indian Ocean mantle have moved in opposite directions over the same time period. These

intriguing new results have lead to a revival of the old theory of "true polar wander" in which the whole outer shell of the Earth rotates with respect to the spin access, and caused renewed debate among geophysicists about the interaction between hot spots, the lithosphere and convection in the mantle.

B. *Practical spin-offs*

The hard-rock guide base, and associated drilling hardware, developed by ODP for ridge crest drilling also have potential applications in the exploitation of economically valuable, massive sulfide deposits in the ocean basins. The adaptation of high-speed, small-kerf, diamond-bit mine coring systems by ODP for ocean drilling is at the forefront of offshore technology, and is of considerable interest to both the petroleum and minerals industries. The oil industry is giving serious consideration to utilizing mining technology for drilling small diameter, low cost exploratory oil and gas wells both onshore and offshore. By drilling smaller diameter holes, there is potential for considerable savings in downhole equipment and operating costs. At the present time, several companies are field testing these same mining techniques for drilling ultradeep exploratory holes on land. In South Africa, for example, a mining company is currently drilling deep (>4000 m) exploration wells for the purpose of sampling specific ore bodies. There has also been limited deployment of mine coring systems from floating vessels for doing shallow soil studies and geological work.

III. Future Scientific Opportunities and Objectives

A. *Scientific Objectives defined by COSOD I and II*

In 1987 the accomplishments and future scientific objectives of ODP were discussed at the Second Conference on Scientific Ocean Drilling (COSOD II). The recommendations discussed at COSOD II, together with those included in the earlier COSOD I Report, can be used to construct the following set of major lithospheric drilling objectives for ODP (*not prioritized*):

- Determining the structure and composition of the oceanic crust, and its variation with age, tectonic setting and spreading history
- Investigating the magmatic and hydrothermal processes at mid-ocean ridges
- Characterizing the magmatic processes associated with the onset of the earliest phase of seafloor spreading
- Characterizing intraplate volcanism, especially that associated with seamount formation and the origin of oceanic plateaus
- Understanding the geochemical fluxes and magmatic processes at convergent margins
- Determining the state of stress, and thermal and mechanical evolution of the oceanic lithosphere

- Characterizing the dynamics, composition and geochemical evolution of the upper mantle

B. *Scientific Objectives Not Addressed by the COSOD Conferences*

One lithospheric drilling objective that was not specifically addressed in either COSOD Report, but that has been consistently ranked high by the Lithosphere Panel is the magmatic evolution of young hot spot volcanoes. The discovery of an early, alkalic phase of hot spot volcanism at Loihi was a milestone in the development of our understanding of mid-plate volcanism. It has had important implications for models of mantle plumes and their interaction with the lithosphere. However, the role of this juvenile alkalic stage in the formation of Loihi, and hot spot volcanism in general, remains controversial. Drilling a young hot spot volcano like Loihi or Mehetia could provide valuable, stratigraphically-controlled samples of this critical, early stage of hot spot volcanism. This type of drilling should be included in future plans for lithospheric drilling.

C. *Technical/Logistical Requirements*

Achieving the major scientific objectives of the lithospheric drilling community will require significant improvements in crustal drilling technology and borehole instrumentation. These requirements include:

- Penetration and sampling of young, highly fractured, extrusive basalts comprising the uppermost part of Layer 2
- Developing the capability of *routinely* drilling deep crustal sections (>3 km total penetration)
- Improved recovery rates for more representative sampling of the crustal section
- Drilling and logging equipment, and borehole instrumentation, capable of operating under sustained high-temperature conditions (up to 400°C)
- Improved methods of borehole and *in situ* fluid sampling
- Methods for long-term instrumentation and data recovery from boreholes

D. *Status of Scientific Objectives at the End of Phase I of ODP (1992)*

It is unlikely that any of the major lithospheric drilling objectives outlined above will achieved by the end of the first phase of ODP in 1992. However, depending upon the amount of time devoted to drilling in the Pacific during the next four years, and the success of ongoing engineering development efforts, substantial progress is possible in addressing several long-term lithospheric drilling goals.

LITHP has proposed that an additional 1 1/2 legs of drilling be spent at Hole 504B in the 1990-1992 time frame in order to deepen this hole into seismic Layer 3. Sampling of the Layer 2/3 boundary at this site, already the deepest crustal hole in the ocean basins, would be a major scientific achievement. However, even with this success we would still

be far from reaching our long-term objective of drilling a hole through the entire thickness of the oceanic crust. The COSOD II Report proposed that a realistic goal for ODP by 1992 is *routine* drilling, with a minimum of 75% recovery, to depths of 1000 m below the basement/sediment interface.

The East Pacific Rise Working Group has proposed that four legs be devoted to drilling ridge crests in the eastern Pacific prior to 1992; two legs on the fast spreading East Pacific Rise and two legs on the sedimented ridge crests of the northeast Pacific. If this drilling is successful, a major step will have been taken toward the establishment of the "natural laboratories" envisioned in the COSOD I Report. However, this would only be the first phase in a much longer-term effort. At least an additional 2-4 legs of drilling would be required after 1992 to complete the East Pacific Rise program, and a minimum of 4-6 legs would be needed to establish a comparable suite of holes at one site along a slow spreading ridge.

There are other important lithospheric drilling objectives that could be addressed in the next four years, if the necessary drilling time is made available. For example, drilling in the western Pacific near the Bonin and Mariana arcs could provide the first constraints on geochemical fluxes at convergent margins, while a drill hole on Loihi could be used to investigate the recently discovered juvenile, alkalic stage of hot spot volcanism discussed above. However, in both cases these programs would represent only one part in a longer-term, global effort to understand the geochemical evolution of the oceanic crust and the underlying mantle. The concept of global geochemical mapping to investigate the composition and dynamics of the mantle as outlined at COSOD II entails a large number of drill holes on a variety of targets (seamounts, plateaus, hot spots, old crust etc.) that will require a decade-long program of drilling on a global scale.

Attaining the major scientific objectives of lithospheric drilling will require a two-fold commitment on the part of ODP: a long-term (5-10 yr) engineering development effort to improve crustal drilling technology, and the allocation of significant amounts of drilling time, including multiple legs to a single site. Without this two-fold commitment it is unlikely that any of the major scientific objectives of lithospheric drilling will be achieved in the foreseeable future.

IV Prioritization and Implementation of Objectives

A. *Scientific Prioritization*

The overall thematic objective of lithospheric drilling is to understand the origin and evolution of the oceanic crust, lithosphere and underlying mantle. Over the years, there has been a remarkable consensus within the lithospheric community on its drilling priorities. The two highest priorities have consistently been: (1) determining the structure, composition and alteration history of the crust, and (2) characterizing the processes of magma generation, crustal construction and hydrothermal circulation involved in the

158 formation of oceanic crust. Drilling can also provide important insights into the magmatic processes associated with the onset of sea floor spreading, mid-plate volcanism, convergent margin processes, the physical properties of oceanic lithosphere, and the composition and dynamics of the underlying mantle. We have not attempted a prioritization of these secondary objectives, since it was recognized that they are all components of a global system, and thus are all equally important. In this section we briefly abstract from the LITHP White Paper and the COSOD I and II Reports the goals, drilling strategies and technical requirements needed to achieve each of these drilling objectives.

Primary Objectives

The structure and composition of the oceanic crust

Goals We still have no direct knowledge of the structure, composition and physical properties of over two-thirds of the oceanic crustal section. Deep crustal drilling is essential for determining the bulk composition and physical properties of the oceanic crust, interpreting the geological significance of seismically-defined crustal layering, and understanding the alteration history of the oceanic crust. Deep crustal drilling can provide definitive answers to major outstanding questions such as: How do ophiolites compare with "normal" oceanic crust?, What are the compositions of primary mantle-derived melts and how are they modified by magma chamber processes?, and What is the depth and nature of hydrothermal interaction in the crust? Drilling deep crustal sections would produce a quantum leap in our understanding of oceanic crustal processes, and has been ranked a top priority by COSOD I, by WG-2 at COSOD II and by the JOIDES Lithosphere Panel.

Drilling strategy In terms of cost, required engineering development and long-term planning, deep crustal drilling is on an entirely different scale from the kind of drilling ODP has attempted in the past. The long-term objective is nothing less than a complete crustal section from the top of Layer 2 to Moho, although in the shorter term much can be learned from intermediate-depth holes (1-3 km deep) on crust of different ages in a variety of tectonic environments. At a minimum, holes should be drilled on crust at a slow and fast spreading ridge, since a comparison of the crustal structure for these two end members would resolve many outstanding questions concerning the significance of spreading rate on the crustal formation process. Two general drilling strategies have been discussed. The first involves drilling through layer 2 into the lower crust at sites considered "typical" of normal oceanic crust. This approach has the advantage of providing a complete crustal section at a single site, but it will be both time consuming and technically difficult. An alternative drilling strategy for reaching the lowermost crust and upper mantle is to locate holes in areas (e.g. proximal to fracture zones) where the plutonic foundations of the crust are exposed. Ideally, these holes should be located near sites which sample the upper crust so that the entire crustal section can be reconstructed.

Technical/logistical requirements Some progress can be made in achieving these objectives using existing drilling systems by locating holes in older crust off-axis where layer 2 is weathered and sealed, or by drilling in areas where massive layer 3-type rocks are exposed. However, our longer-term goal of complete crustal penetration will require new drilling systems capable of drilling 5-6 km into the crust in water depths of 5000-6000 m. Development of these systems will require a long-term (~10 yr) phased development effort, ship time for testing, substantial financial resources and close collaboration between scientists and engineers. Also needed will be new high-temperature, small-diameter logging tools and borehole instrumentation. Most importantly, successful deep crustal drilling will require patience, and a willingness to commit the drillship to a single site for a year or more of drilling (although this drilling would not have to be done as consecutive legs). Overall, we estimate the need for at least three holes 2000-3000 m below basement, with the hope of extending one of them to Moho by the year 2000. One of the shallower holes should be located on thin crust.

Crustal Accretion Processes

Goals Sixty percent of the earth's surface is created at oceanic spreading centers, as magmas generated in the underlying mantle are transformed into crust. In the most general terms, the goal of crustal drilling at ridge crests is to understand the complex and interrelated magmatic, tectonic and hydrothermal processes involved in the formation of the ocean crust. An example of one important focus for ridge crest drilling is the dynamic boundary between magma and cooled, fractured rock at the margins of a magma chamber. The physical and chemical interactions between rock and water at this boundary are almost completely unknown, yet it is at this boundary that the solid crust is formed. Other important objectives of ridge crest drilling include investigating temporal and spatial variations in magmatic activity, providing ground truth for geophysical horizons such as the pillow/dike or dike/gabbro boundary, and providing sites that can be used for a variety of down-hole experiments and long-term geophysical monitoring. Ridge crest drilling was the highest crustal drilling objective identified at COSOD I, and was highly ranked by WG-2, 3 and 4 at COSOD II, as well as by the JOIDES Lithosphere Panel.

Drilling strategy The East Pacific Rise Working Group has outlined a potential drilling strategy for fast spreading, unsedimented ridge crests involving a suite of eight holes. The highest priority site is a single deep (>1 km) hole near the ridge axis, outside the central zone of fissuring, that penetrates as close as possible to the top of the magma chamber. The second priority is a ~500 m deep hole in the axial fissure zone that penetrates far enough into the underlying dikes to characterize the temperature gradients and permeability structure of the shallow crust. A transect of three, relatively shallow holes (~300 m deep) across the rise axis and, and three holes along the rise axis toward the boundary of a spreading cell segment, were also proposed to investigate temporal and spatial variations in

160 magmatic and hydrothermal activity. A somewhat different strategy might be appropriate at a slow spreading ridge or a sedimented ridge crest. For example, a shallow hole, or suite of holes, in an axial hydrothermal discharge zone is considered to be a very high priority, but was not recommended for the East Pacific Rise because the known vent sites are too small and immature.

Technical/logistical requirements None of the drilling described above can be attempted with present drilling technology. Especially critical is the development of a reliable technique for penetrating and stabilizing the upper 200-300 m of highly fractured extrusives present at ridge crests. High temperatures (>400°C) will be encountered at depth in many of the holes, and the mechanical and chemical consequences must be considered for drilling, fluid and rock sampling, and logging. A suite of holes, like that proposed for the East Pacific Rise, could require 8-12 months of drilling time. Individual legs should ideally be separated by 9-12 months to allow the engineers time to react to unanticipated problems. Drilling should, of course, be only part of a carefully co-ordinated and integrated program of multidisciplinary geological, geophysical, geochemical and biological investigations at each ridge crest "natural laboratory" as envisioned in the RIDGE Report. A major goal of ODP should be establishing three ridge crest "natural laboratories" by the year 2000: at both fast (EPR) and slow (MAR) spreading ridges, and at a sedimented ridge crest (Juan de Fuca/Gorda Ridge; Gulf of California).

Secondary Objectives

Magmatic processes associated with the initiation of sea floor spreading

Goal The transition from a continental to oceanic rift, and the initiation of sea floor spreading, is a fundamental geotectonic problem that is still very poorly understood. Variations in the response of the lithosphere to the rifting process provides an opportunity to examine the relative importance of brittle and ductile deformation, magmatism, and metamorphism on lithospheric evolution. Of particular interest is the nature and origin of the volcanism that accompanies early rifting, and the mechanisms that control the volume of rift-related volcanism. A better understanding of this magmatism is important to models of global crust-mantle interactions. At most margins the volcanic products of early rifting are buried under thick accumulations of post-rift sediments and drilling offers the only way of sampling this crust. Rift-related processes were identified as important secondary drilling objectives by both COSOD I and WG-4 at COSOD II.

Drilling strategy There are two different ways drilling can be used to address these problems. The first is to drill in young, active rifts like the Red Sea or Gulf of California. Both areas were drilled during the Deep Sea Drilling Project with considerable success, and further drilling in these areas is clearly warranted. A second approach is to drill relict rifts preserved in passive margins such as those bordering the Atlantic. In many cases, the thick accumulations of post-rift sediments along these margins make this approach impractical.

But in other, sediment-starved areas it is feasible to drill into rift-related volcanics as was successfully demonstrated on Leg 104.

Technical/logistical requirements Many of the drilling objectives outlined above are feasible using present drilling technology. WG-4 at COSOD II emphasized the need for deeper holes (3-4 km) into thicker sedimentary, igneous and metamorphic sections on conjugate margin pairs. On "volcanic" margins hard-rock penetration of 2-4 km is expected which will necessitate improved crustal drilling technology.

Intraplate volcanism

Goals Intraplate volcanism is the second most common type of volcanic activity occurring in the ocean basins. It takes many forms including small, near-axis seamounts, linear volcanic chains, aseismic ridges, oceanic plateaus and massive off-axis flood basalts or intrusive complexes. Studies of the products of mid-plate volcanism can provide important constraints on the composition and chemical evolution of the upper mantle. Four problems related to mid-plate volcanism are of particular interest: (1) the character and origin of compositional variability in the mantle, (2) the early magmatic evolution of hot spot volcanos, (3) the formation of near-axis seamounts and oceanic plateaus, and (4) determining the internal stucture of seamounts.

Drilling strategy The range of products of mid-plate volcanism (seamounts, plateaus, flood basalts, etc.) require different drilling strategies and technical capabilities. One of our highest priorities is a characterization of the magmatic evolution of young hot spot volcanoes. Loihi is a particularly attractive drilling target; it is already extremely well-mapped and studied, it is located in relatively shallow water (~1500 m), and it is logistically convienent to Hawaii for permanent instrumentation. A single, relatively deep hole (>500 m) near the summit of this volcano could provide valuable, stratigraphically controlled samples of the juvenile alkalic phase of Hawaiian volcanism and its transition to the main theoleiitic shield-building stage. It could also serve as a permanently instrumented "natural laboratory" on an active, submarine volcano. Similarly, drilling a small near-axis seamount is necessary for an understanding of the internal structure and composition of these features, the most abundant volcanoes on earth. Drilling is the only method of unambiguously determining the age and composition of oceanic plateaus, and of sampling the mid-Cretaceous flood basalts and intrusive complexes found in the western Pacific. For this type of drilling, modest basement penetration (100-500 m) is adequate at a few carefully chosen sites

Technical/logistical requirements Drilling young hot spot volcanoes or near-axis seamounts will be technically difficult and will require both a bare-rock drilling capability and improved techniques for drilling in young, fractured basaltic rocks. However, drilling of older seamounts may be feasible with present technology. Multiple legs may be necessary at a single site, although one logistical advantage of seamount drilling is the relatively shallow water depths of some of these targets. Drilling oceanic plateaus and mid-

Cretaceous flood basalts and intrusive complexes is technically feasible with present drilling technology, although penetration of overlying cherts may be a problem in some areas.

Geochemical fluxes and magmatic processes at convergent margins

Goals It has long been clear that the subduction of the lithosphere is intimately connected to volcanism at convergent margins. What remains unclear is to what extent subducted crust, and the overlying sediments, contribute to the source of these volcanics. Some workers have suggested almost no input from the downgoing plate, others maintain the downgoing plate is *the* major source of arc magmas, and still others have argued that the subducting plate contributes material primarily through metasomatic transport caused by dewatering of hydrous phases. A quantitative evaluation of the geochemical fluxes at convergent margins is critical to an understanding of crust-mantle interactions on a global scale. The main goals of this work are thus twofold: (1) characterizing the geochemical input (sediments and crust) from the downgoing plate, and (2) estimating the crustal output in the form of arc and back-arc volcanism on the overriding plate. Neither of these first order fluxes are well-known and both require drilling as one means of study. This program was ranked highly by WG-2 at COSOD II and has been endorsed by both the JOIDES Lithosphere and Tectonics panels.

Drilling strategy In order to evaluate the geochemical fluxes at convergent margins, drilling will be required on the downgoing plate, and in the forearc and backarc environments. Quantifying the input fluxes will require sampling of the three major components being subducted: (1) a normal, marine pelagic sequence, (2) oceanic crust, and (3) ocean-island lavas and volcanogenic sediments (in some areas off-axis flood basalts and intrusive complexes may also be important). Multiple holes will thus be required at any given arc. They should be located on older crust, comparable in age to the crust presently being subducted, adjacent to well-studied island arcs. Since a significant portion of the input from the downgoing slab may come from the uppermost crust, only moderate basement penetration (~300 m) will be necessary. There are two ways of obtaining a more complete and representative record of arc output through drilling. One approach is to drill directly into basement on the arc or in back-arc basins. An alternative strategy is to drill in the clastic aprons adjacent to the arc which should record a history of the arc's evolution. Ideally, the clastic apron drilling would be co-ordinated with deeper basement drilling on the arc itself. A transect of comparatively shallow basement holes across an arc-back-arc transition, carefully sited near one or two deep holes on the arc itself, would provide good constraints on the output flux. In the longer term, arcs in a variety of geologic and tectonic settings with different geochemical signatures should be investigated.

Technical/logistical requirements Most of the drilling described above can be accomplished using the conventional technology now employed by ODP. Basement

drilling in the arc and outboard of the trench would benefit from better crustal drilling techniques and improved capabilities for drilling through chert and in volcaniclastic sediments. Basement re-entry holes will be necessary in some cases, but many of the sites can be single-bit holes. Logistical considerations (weather, proximity to good ports and other drilling targets) will be important in choosing candidate arcs since the feasibility of multiple legs over a period of several years is desirable.

Physical state and evolution of the oceanic lithosphere

Goals A knowledge of the thermal and mechanical evolution of the oceanic lithosphere, and the stresses acting on the plates, is important for an understanding of a number of fundamental problems including the subsidence history of oceanic crust, the kinematic evolution of plate boundaries (spreading centers, transforms, convergent margins), and the coupling between lithospheric and asthenospheric processes. While these problems can be approached with a variety of different techniques (satellite geoid and gravity studies, high-resolution sea floor mapping, earthquake seismicity studies, seismic reflection and refraction investigations, heat flow measurements, etc.), drilling represents a potentially valuable, and often neglected, tool. A drilling program addressing these problems could have several different components. One high priority focus for this work should be to determine the stress and deformation history of the lithosphere in the critical tectonic regimes that characterize mid-ocean ridges. A program of this type could be closely integrated with the ridge crest drilling described above, and would complement the activities of RIDGE. It was ranked a top priority by WG-4 at COSOD II.

Drilling strategy. Reliable *in situ* stress measurements can now be made in ODP boreholes using stress-induced wellbore breakouts and acoustical imaging logging tools. Determining the stress regime at a mid-ocean would involve drilling a series of holes that penetrate 100-200 m into basement located in a number of relatively closely-spaced (<1 km to tens of km) arrays or transects along and across the ridge crest.. Spreading ridge segments with contrasting opening rates (2-16 cm/yr), ridge-transform intersections, and transforms with variable slip rates and strike-slip geometries should be studied. The *in situ* stress measurements should be augmented with detailed physical property and borehole studies which would help define the kinematics of brittle crustal deformation and the physical properties of the crust. Beyond this immediate goal, other lithospheric properties can be investigated as well. One drilling objective that is technically feasible, and addresses a scientifically mature problem, is flexural moat drilling. The volcanoclastic sediments filling flexural moats adjacent to mid-plate volcanoes potentially contain a valuable record of the mechanical response of the lithosphere to volcanic loading. This information will better constrain models for the mechanics of flexure, not only for oceanic volcanoes, but in other tectonic settings such as the sedimentary basins that form along passive continental margins and in front of orogenic fold/thrust belts.

Technical/logistical requirements A program of systematic mapping of *in situ* stress in crustal boreholes can begin immediately. In many cases, the same holes drilled for studies of paleoclimate change, extinction events or crustal geochemical variability can be used for *in situ* stress measurements, provided the hole is deepened 100-200 m into basement. The ridge axis stress studies will require improvements in drilling capabilities in young crust, but they can be closely co-ordinated with other ridge crest drilling.

Mantle chemistry and dynamics

Goals Long-standing questions of mantle composition, heterogeneity and dynamics are of fundamental importance to our understanding of the differentiation of the mantle, plate driving forces, and the evolution of the ocean basins and continents through geologic time. The geochemical and isotopic composition of lavas erupted along ocean ridges, at seamounts and hot spots, and on oceanic plateaus contain unique information on the chemistry and dynamics of the mantle. Radiogenic isotope ratios and related information on parent/daughter element ratios are particularly useful for identifying different mantle reservoirs, mixing of reservoirs, and the importance of crustal recycling. Major element variations in crustal and ultramafic rocks may also be useful for inferring mantle temperatures, and, with less certainty, the major element composition of the mantle source itself.

A complementary perspective on mantle dynamics has come from recent three-dimensional seismic imaging of the mantle. These "tomographic" images of the earth's mantle are showing large regional variations in the seismic velocity of the upper and lower mantle that can be related to patterns of mantle convection. Integrating these geophysical observations with a global program of geochemical mapping holds great promise for revolutionizing our understanding of the earth's mantle over the next decade.

ODP can make two unique contributions to these studies: (1) expansion of the Global Seismic Network to include ocean-bottom seismic stations located in drill holes to substantially improve the spatial resolution of mantle tomographic studies, and (2) systematic sampling of older, sedimented crust, seamounts, oceanic plateaus and hot spot volcanoes to improve constraints on the global geochemical variability of the mantle over time scales of 10^6-10^8 yrs.

Drilling strategy To accomplish the objective of improving mantle tomographic imaging, we endorse the goal of establishing 15-20 sea floor seismic stations by the year 2000. These stations should be located in crustal holes 100-200 m deep (placing the instruments in boreholes significantly reduces noise levels), and should include both short-period and long-period, broad-band seismometers. The stations should be located in all the major ocean basins in such a fashion so as to complement the land-based stations of the Global Seismic Network. Auxiliary studies, including seismic investigations, tilt and strain measurements and electromagnetic measurements may be desirable at many of these sites.

Grid-like geochemical mapping on a global scale, as envisioned in the COSOD II

document, is probably not feasible given present platform limitations (i.e. one drilling ship) and is probably not defensible scientifically. An alternative, more practical approach may be to carry out selected regional investigations, such as the sampling carried out around the Azores on DSDP 82. Another strategy is to drill transects of shallow holes, with 50-100 m of basement penetration, along a spreading flow line. Sampling of basement at seamounts, aseismic ridges, and oceanic plateaus is another approach.

Technical/logistical requirements Long-term, sea floor geophysical stations are not now technically feasible and will require advances on several fronts including: (1) a better understanding of the sources, propagation mechanisms and environmental controls on ocean floor noise in the 3 mHz- 50 Hz band, (2) determining the dependence of noise spectra on the depth of burial of the sensor below the sea floor, (3) comparing signal and noise data from sea floor stations with nearby island stations, (4) proving the operational reliability of sensors, data recording and/or telemetry schemes, power sources and timing systems for long-term (>1 year) deployments, (5) a routine wireline re-entry capability.

B. Implementation Plan

1. Needed Technological Development

Perhaps more than any other group in ODP, success in achieving the major scientific objectives of lithospheric drilling will require major new technological developments in drilling systems, logging equipment and borehole instrumentation.

Drilling In terms of drilling systems, three major problems must be overcome: (1) penetration and sampling of young, highly fractured, extrusive basalts comprising the uppermost part of Layer 2, (2) low penetration rates, short bit life, hole instability and incomplete flushing of cuttings in deeper crustal holes, and (3) low recovery rates. Solving these major engineering problems will require a commitment on the part of ODP to:

- Develop a long-term plan for improving crustal drilling technology
- Assign a senior ODP engineer (and staff) permanently to this project.
- Give this group an adequate development budget that is independent of leg-to-leg operating expenses.
- Devote ship time exclusively to testing new drilling equipment on a regular basis.
- Maintain close liaison between ODP engineers and scientists within the JOIDES panel advisory structure.

While it is impossible to predict with any confidence the pace at which this engineering development effort can proceed, we recommend that the following goals be established for the program:

By 1992: Routine drilling, with a minimum of 75% recovery, to depths of 1000 m below the basement-sediment interface

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By 1996: Drilling to 2000-3000 m, well within Layer 3
By 2000: The capability of drilling through the entire crustal section to Moho

Logging and borehole instruments Improvements in logging equipment and borehole instrumentation will also be required for a successful long-tern lithospheric drilling program. Both ridge crest drilling and deep crustal boreholes are likely to encounter high temperatures, up to and possibly exceeding 400°C. These high temperatures will necessitate special temperature-resistant logging tools and borehole instruments. A collection of slim-line logging tools may also be needed since the experimental mine coring systems will probably drill a hole with a maximum diameter of only about 4". A second major need is for improved borehole sampling techniques. A reliable side-wall coring technique could significantly improve the representativeness of the material recovered from crustal holes and reduce the need for very high recovery rates when drilling. New methods of borehole fluid sampling are critical for many hydrothermal and pore-water geochemistry studies. Techniques need to be developed for sealing boreholes after drilling and logging operations are completed, with some method of access for later work, Finally, ODP needs to improve the utilization of drill holes for a variety of possible hole-to-hole experiments, sea floor experiments and long-term measurements and sampling. Of particular importance is developing methods for remote data storage and retrieval from borehole emplaced, long-term instrumentation.

Ship facilities Our highest priority objectives of deep crustal and ridge crest drilling require a vessel with at least the capabilities of the present *JOIDES Resolution*. Logistically, these objectives will involve drilling a few (~ 30 total) technically difficult, time-consuming holes in a few carefully selected and intensely studied areas. However, some of our secondary objectives (e.g. geochemical mapping, global stress measurements) involve shallow basement holes, widely distributed throughout the ocean basins that could potentially be drilled with a vessel with much more modest capabilities. Such a vessel could also re-enter holes previously drilled by *JOIDES Resolution* for logging, downhole experiments and deployment or recovery of downhole instruments.

2. Drilling Areas and Required Pre-Drilling Data

The site survey requirements and selection criteria for deep crustal drilling and ridge crest drilling have been discussed in the COSOD II and East Pacific Rise Working Group Reports. For both kinds of drilling, sites should only be selected after exhaustive site surveys. Regional bathymetric, side scan, magnetic and gravity surveys will be required to unambiguously define the tectonic setting of candidate sites. The crustal structure near drill sites should be determined using multichannel seismic reflection techniques (CDP and expanding spread profiles), OBS seismic tomography studies and medium-scale

electromagnetic sounding experiments. Near ridge crests this work should be accompanied by detailed-surficial mapping and sampling to characterize the petrologic and geochemical diversity of the area, and water column geochemistry studies to define the distribution of hydrothermal vents and constrain the advective heat output from the ridge. This site survey work should begin as soon as possible to develop the necessary databases for at least 6 candidate sites for deep crustal drilling and 4 sites for ridge crest observatories so that site selection can proceed in a timely fashion. In addition, pilot experiments should be carried out at selected boreholes (e.g. near Hawaii), to begin to address the technical issues related to the establishment of sea floor seismic observatories and global stress mapping.

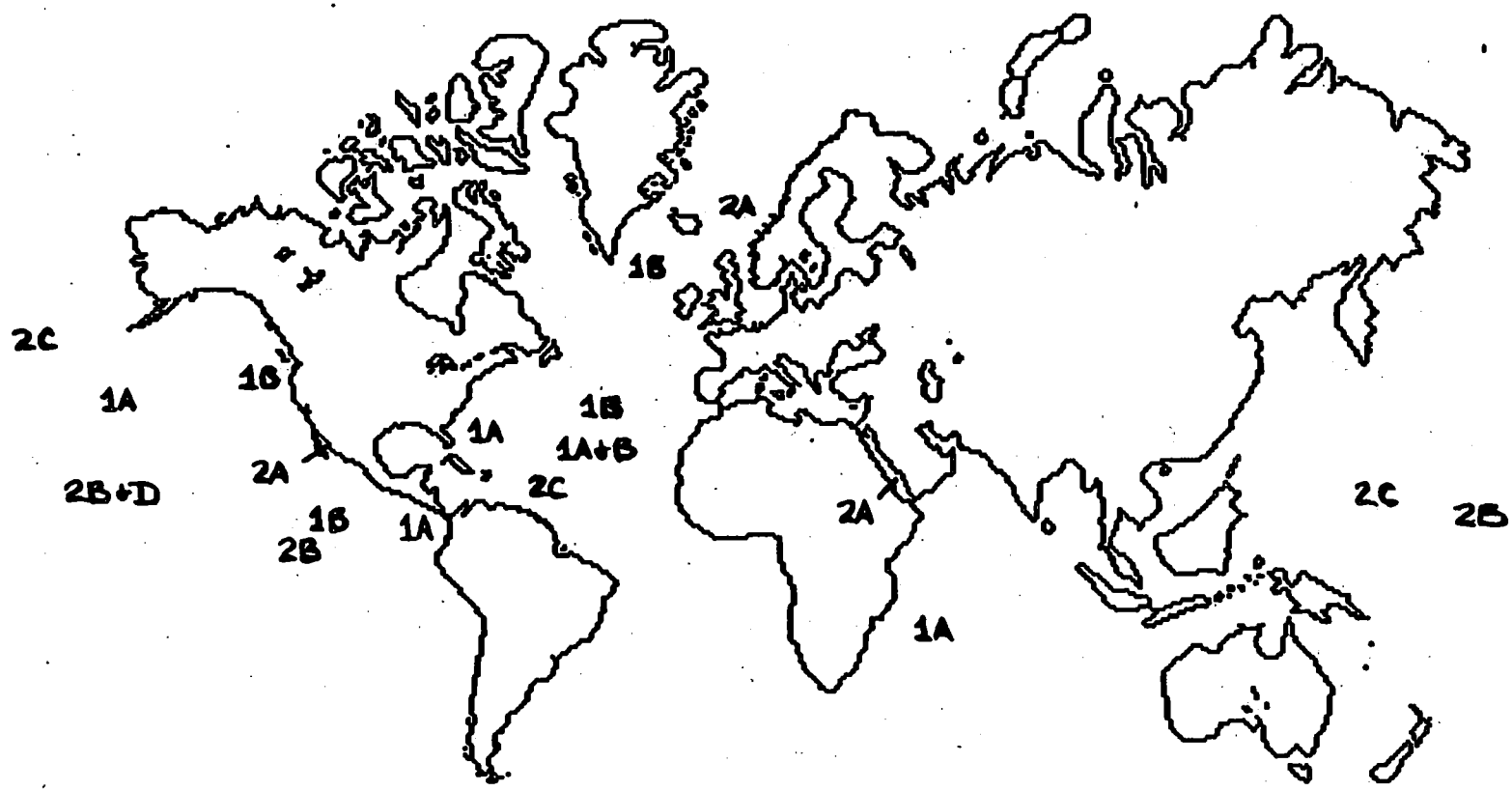
The accompanying map indicates the regions that are likely targets for future lithospheric drilling. As noted above, there is an obvious division between those objectives that require drilling a few technically difficult, time-consuming holes at a few carefully selected sites, and others that involve a relatively large number of shallow holes spaced widely across most of the major ocean basins. The most likely areas for drilling deep crustal holes, given the criteria discussed above, are in the central and western North Atlantic, in the eastern Pacific (Hole 504B), or in the north-central Pacific. Potential sites for a deep crustal hole proximal to a large-offset fracture zone include the Atlantis II fracture zone on the Southwest Indian Ridge, the Oceanographer or Kane fracture zones in the central North Atlantic, or one of the large equatorial Atlantic fracture zones. Likely locations for the ridge crest "natural laboratories" include the East Pacific Rise between 9°N and 13°N, the Juan de Fuca/Gorda Ridge system, the MARK/TAG area in the central North Atlantic, and possibly the Reykjanes and Southwest Indian Ridges, or the Guaymas Basin in the Gulf of California.. Other second priority lithospheric drilling targets exist in all the major ocean basins, although most are concentrated in the Atlantic and Pacific Oceans. None are located at high latitudes.

Finally, it is important to note that all of the highest priority lithospheric drilling requires multiple legs at individual sites or in the same area. Thus it is critical that the drillship be scheduled so that it can reoccupy drill sites at intervals of 9-12 months. All of these considerations suggest that the circumnavigation philosophy that has driven the first eight years of ODP planning is not the optimal strategy for lithospheric drilling. Instead, we would favor a plan in which ship scheduling is driven not by regional political interests, but by the longer-term thematic drilling objectives outlined above.

3. Implementation plans at different levels of effort

Addressing the major lithospheric objectives outlined above during the coming decade will require a focussed, interdisciplinary drilling effort with the following major goals:

- By 1996 drill three holes 2000-3000 m into the oceanic crust, with the prospect of extending one of these holes to Moho by the year 2000. One of these holes should be located on thin crust (e.g. proximal to a fracture zone), the others on



Likely Targets for Future Lithospheric Drilling

1A - Deep crustal drilling; 1B - Ridge crest drilling; 2A - Young oceanic rifts;
2B - Intraplate volcanism; 2C - Convergent margins; 2D - Lithosphere stress/flexure;
Global distribution: sea floor seismic stations; mantle geochemical mapping

crust formed at fast and slow spreading ridges

- Drill arrays of shallow (~300 m) and intermediate (1-1.5 km) depth holes in several locations along the mid-ocean ridge system, including fast, slow and sedimented ridge crests. One of these areas should be permanently instrumented to establish a sea floor "volcano observatory" by the year 2000.

- Complete select lithospheric "case studies" (5 over a 10-year period) of well-documented, representative features addressing magmatic and dynamic processes associated with intraplate volcanism, plate convergence and mantle evolution and heterogeneity.

- Establish a global network of sea floor geophysical stations throughout the major ocean basins in 100-200 m deep crustal holes equipped with short and long-period, broad-band seismometers and other appropriate long-term geophysical instrumentation.

The following implementation plan gives a rough estimate of the activities and level of effort that might be required to achieve these lithospheric drilling objectives in coming decade:

Phase 1 (1989-1992)

- Establish detailed planning groups (DPGs) on "Drilling Deep Crust", "Ridge Crest Drilling", "Sea Floor Observatories", and others as appropriate
- Develop a long-term engineering development plan to improve crustal drilling technology, including cost estimates, manpower needs, and test-leg requirements
- Begin site survey work for at least 6 candidate sites for deep crustal drilling, 4 sites for ridge crest drilling, and 5-10 sea floor geophysical stations
- Complete 2 legs of deep crustal drilling at Hole 504B, or at another suitable deep crustal drill site
- Complete 4 legs of drilling on sedimented and unsedimented ridge crests of the eastern Pacific
- Complete one lithospheric "case study" on the nature of hot spot volcanism by drilling Loihi (one leg)
- Carry out recommended pilot experiments for the establishment of a sea floor seismic station, probably at a site near Hawaii

Phase 2 (1993-1996)

- Complete site survey work for deep crustal holes, ridge crest drilling and sea floor geophysical stations
- Complete three holes 2000-3000 m into the crust, including one hole in thin crust (1 leg/yr for four years)
- Begin first phase of Mid-Atlantic Ridge drilling; complete second phase of EPR

program (1 leg/yr for four years)
- Establish 5 sea floor geophysical stations and carry out two lithospheric "case studies" (e.g. drilling a near-axis seamount and a back-arc spreading center) (1 leg/yr for four years)

Phase 3 (1997-2000)
- Extend one crustal hole to Moho (6 legs/yr over four years)
- Complete second phase of MAR drilling (2 legs)
- Establish a sea floor volcano observatory (in conjunction with RIDGE) on a volcanically active part of the mid-ocean ridge system (1 leg/yr for four years)
- Complete global network of sea floor seismic stations; carry out two lithospheric "case studies" (e.g. a regional geochemical mapping program and an *in situ* stress experiment along an accretionary plate boundary) (1 leg/yr for four years)

In this scenario, approximately 3 legs of drilling would be required per year over the next decade to complete the four long-term drilling goals outlined above (the equivalent of about 1 leg/yr for deep crustal drilling; 1 leg/yr for ridge crest drilling; and 1 leg/yr for establishing sea floor geophysical stations and carrying out selected lithospheric "case studies"). However, LITHP's interest in sea floor seismic stations and *in situ* stress measurements clearly overlap that of TECP, and at least some other lithospheric drilling could be carried out in conjunction with the programs of other thematic panels. Thus the amount of dedicated LITHP drilling required to achieve these four goals is probably about 2 1/2 legs per year over ten years.

The optimal situation for carrying out this program would the case in which a second drilling platform is available to carry out drilling (e.g. hydraulic piston coring, shallow basement penetration) that does not require the advanced capabilities of the *JOIDES Resolution*. This would probably require a substantial (~50%) increase in the level of funding for ODP, but would make it possible to drill the technically difficult, time-consuming deep crustal holes that are the highest priority of the lithospheric community without compromising other drilling programs, including some with lithospheric objectives, that require a large number of shallow holes distributed throughout the major ocean basins.

With a 10% increase in funding for ODP, a second drilling platform would not be feasible and a compromise will have to struck in long-term planning between drilling that involves a few time-consuming holes and other programs that require more global coverage. If a substantial portion of the 10% budget increase is devoted to engineering development, then the deep crustal and ridge crest drilling programs should still be feasible.

With a steady-state effort, and only inflationary increases in the ODP budget, it might be difficult to mount the major engineering development effort needed to improve crustal drilling techniques. If this occurred, even the two highest priority lithospheric drilling

objectives might not be achievable by the end of the next decade. However, even with level funding a more thematically-focussed, problem-oriented drilling program could make more progress in achieving long-term lithospheric drilling objectives than has been the case so far during the first phase of ODP.

V. Relationship between ODP and other Global Initiatives

The goals of the lithospheric drilling program outlined above are compatible with a number of international research initiatives that are in progress, or are planned. Our proposals for deep crustal drilling and ridge crest drilling are closely linked with RIDGE (Ridge InterDisciplinary Global Experiments), a major new global initiative which has the unifying goal of understanding the physical, chemical and geological processes involved in the formation of oceanic crust. Drilling is an important component of RIDGE plans for the establishment of one or more sea floor volcano observatories by the end of the next decade. Our proposal to establish 20 sea floor seismometer stations in boreholes would expand efforts already underway to establish a Global Digital Seismographic Network. The plans for global stress mapping would enhance an ongoing project to create a world stress map that is being compiled under the auspices of the Inter-Union Commission of the Lithosphere. Finally, our proposals to drill on seamounts and young hot spot volcanoes complement a proposal to DOSECC for a deep drill hole on Hawaii.

MEMORANDUM

173

To: Dr. Ralph Moberly
Chairman, PCOM

From: Dr. David K. Rea
Chairman, CEPAC

Re: Engineering Leg 124E, site ENG-3

Date: 19 October, 1988

Site ENG-3 is located near DSDP Site 452 and, judging from the records from that site it does not offer a good opportunity to test the ability to recover sequences of alternating chalk and chert. At Site 452 the drill penetrated only the top of a chert sequence together with zeolitic clay. No calcareous sequences were recovered and the site is believed to lie well below the calcite compensation depth at the time of chert deposition during the Late Cretaceous. CEPAC feels that time would be more adequately spent at that site studying the possibility of spudding into a section in which a soft sediment layer of a few tens of meters overlies hard chert and determining with the aid of the deep transducer: 1) the presence and nature of windows through the chert in this region, and 2) the presence of sediment "ponds" up to 50 or 60 meters thick above the chert layer. Such a study may be very important for the success of drilling in the Pigafetta Basin (CEPAC Old Pacific program).

xc: L. Garrison
M. Leinen

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MEMORANDUM

174

To: Dr. Ralph Moberly
Chairman, PCOM

From: Dr. David K. Rea
Chairman, CEPAC

Re: Engineering Leg 129E

Date: 19 October, 1988

During its Ann Arbor meeting October 17-19, 1988, CEPAC spent nearly half of one day in a discussion with Dave Huey of the TAMU/ODP Engineering Group. This exchange was the best discussion of engineering questions that the panel has had in years, and we strongly recommend that such visits by the Engineers to panel meetings become more common. I would like to issue an open invitation from CEPAC to that group, and insist on such a visit at least once a year, probably at the fall meeting.

Part of that discussion concerned the program of Leg 124E, and during its course we came to discover that NOT ONE of the basic engineering problems/requirements specific to the CEPAC program were being addressed during 124E. CEPAC is concerned because both formally as a panel and informally in personal discussions with PCOM members and representatives of ODP Engineering we have repeated our several engineering requirements.

Seeing Engineering Leg 129E on the program and hearing that there were no firm plans for that effort other than to follow-up on 124E, CEPAC strongly encourages the following program so that drilling technology be ready to deal with the problems expected in the CEPAC drilling.

A) Drilling and recovery of chert/chalk interlayers that are characteristic of oceanic plateaus, ie: CEPAC programs on the Shatsky Rise, Ogasawara Plateau, and the Ontong-Java Plateau. Note that tests at ENG-3 of Leg 124E will not meet this requirement because chert/chalk sequences will not be encountered there.

B) Drilling and recovery of reef and associated limestones characteristic of limestone caps on guyots and drowned atolls, ie. CEPAC programs in the Marshall Islands, Geisha and Mid-Pacific guyots, and the Northeast Australian margin program of WESTPAC.

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C) Establishing a hole, drilling and recovering rock in young, glassy, fractured and potentially rubbly basaltic crust, ie: CEPAC programs at the East Pacific Rise, Juan de Fuca Ridge, and Loihi. Tests must be completed of: a new, smaller guide base and new bit technology required for establishing a hole reliably in that difficult environment; and the full 4000m configuration of the diamond coring system in young, zero-age, oceanic crust.

CEPAC requests, therefore, that 129E test the requisite techniques on: 1) a plateau, Shatsky Rise, the classic chert/chalk site; 2) a reef-capped guyot, Menard Guyot is convenient, and 3) a moderately deep, 3000 to 3500m, sediment-free spreading center such as in the Mariana back-arc basin.

All of these objectives could be achieved during 129E leaving from Japan, proceeding to Shatsky Rise (2.5 days transit days), then to Menard Guyot (2.5 days transit), then to the northern Mariana back-arc to drill a generic site (2.5 days transit), and ending in Guam (a final 2.5 days transit).

xc: L. Garrison
M. Leinen

INSTITUTE FOR GEOPHYSICS
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19 October 1988

88-368

To: R. Moberly, PCOM Chairman

From: James A. Austin, Jr., Chairman, Atlantic Regional Panel (ARP) James A. Austin, Jr.

Subject: Preliminary assessment of Atlantic drilling programs

After consulting my panel members by mail over the last month, I am responding to the Pisias memo of 30 August requesting an update on the "ready-status" of Atlantic (including Caribbean, Mediterranean and other adjacent seas) drilling programs.

Perhaps the best way to get started is to take a brief look at the first round of ODP drilling in the Atlantic and identify a few first-order problems left unaddressed or unfinished by that effort. (Obviously, mature proposals already exist for all of these programs.):

Leg 102: resulted in extensive logging of a "clean" hole more than 0.5 km deep into 110 m.y.-old basement in the western North Atlantic. Further deepening is desirable, which is consistent with COSOD-II/LITHP goals of examining "oceanic crust...variation with age, tectonic setting and spreading history."

Leg 103: using the transect approach, successfully addressed the structural and stratigraphic evolution of perhaps the most extensively documented, sediment-starved, non-volcanic passive margin in the world. Nonetheless, further drilling is needed for the following reasons:

-to recover more complete sections of syn- and pre-rift sections.

-to sample to and through the "S" reflector, which may be a major intracrustal detachment.

-to conduct a drilling investigation of the well-studied conjugate margin off eastern Canada. (Mature proposals have not yet been submitted for this margin, but they will be forthcoming.)

Leg 104: other than the pioneering results derived from Leg 113 in the Weddell Sea, Site 642 is arguably the most outstanding success of the first round of Atlantic ODP activity. This site produced a detailed characterization of a volcanic passive margin (i.e., a seward dipping reflector wedge). However, drilling transects are required:

-to learn more about the structure, petrology and paleomagnetic record of the wedge under the Voring Plateau.

-to compare the Norwegian margin with its Greenland conjugate, in order to examine the degree of asymmetry of such wedges and improve temporal resolution concerning the role of magmatism in continental separation.

-to understand the evolution of the Voring Plateau in the context of the North Atlantic Volcanic Province (e.g., to document the relationship of the volcanic passive margins flanking the Norwegian Sea to the Iceland hot spot).

These goals are consistent with both COSOD-II and TECP themes regarding the evolution of divergent continental margins.

Legs 104/105/113/114: all of these legs began to examine important paleoceanographic questions relating to gateway evolution in the Atlantic, the only ocean presently being ventilated from both the Arctic and Antarctic (see Workshop section). Much more work needs to be done to understand the dynamics of this latitudinally-oriented, highly compartmentalized ocean basin.

Virtually all SOHP themes are served by these studies, and gateway activity through time also relates to the TECP theme regarding plate kinematics.

Legs 106/109: Despite limited penetration of 0-age oceanic crust at the MARK site, the North Atlantic in the vicinity of the Kane Fracture Zone remains the type example (and certainly the best studied) slow-spreading mid-ocean ridge. Further work must be conducted either at MARK or in the vicinity, hopefully with lessons learned both from projected engineering legs and EPR drilling activity.

Understanding the crustal accretion process at mid-ocean ridges and the structure and composition of oceanic lithosphere are the central themes of LITHP and COSOD-II, WG 2.

Leg 110: Barbados drilling resulted in successful penetration to and through a seismically-imaged décollement of an accretionary prism, the first time that this had ever been accomplished. More needs to be done:

- to understand defluidization and growth mechanisms of sedimentary forearcs. The Barbados (Lesser Antilles) forearc is perhaps the best place to do this because it includes changes of prism rheology (muddy to sandy) along strike, extensive existing geophysical and drilling data bases, and excellent biostratigraphic control owing to tropical latitudes.

Addressing accretionary wedge evolution is one of the important goals of SOHP (as a "depositional manifestation of continental uplift and erosion") and TECP, and also forms a major part of the COSOD-II, WG 3 and 4 reports.

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Based upon results from the aforementioned drilling programs, ARP generated its own "white paper" in 1987 (Appendix I). I will briefly summarize those themes, include (some, perhaps not all) extant drilling proposals which address them, and also summarize recent workshop efforts to address Atlantic issues.

I. Continental Break-Up

The Atlantic is unquestionably the only major ocean basin with such a diversity of (particularly well-defined conjugate) passive continental margins, spanning ages from Jurassic to Tertiary and ranging from volcanic to non-volcanic.

Under this general theme, topics A., B., D., E., and F. (see Appendix I) have all been identified by TECP as important objectives within a phased drilling approach.

Proposals: existing proposals for Legs 103, 104 and 107; new proposals from the U.K. (Appendix II) submitted to the JOIDES Office as 310/A and 311/A; WG 4 and Comas report from recent ECOD/ESF workshop (Appendix III). Others will be forthcoming (particularly for eastern Canada).

II. Evolution of Oceanic Lithosphere

The North Atlantic remains the obvious "natural laboratory" for a continuing study of the accretion of oceanic lithosphere at a slow-spreading mid-ocean ridge.

This general theme was the main focus for WG 2 at COSOD-II. Topics A., C. and F. (Appendix I) are critical for LITHP, while G. (Appendix I) is a high TECP priority.

Proposals: existing proposals for Legs 104, 106 and 109 (and others forthcoming); 310/A and 311/A from the U.K. (Appendix II); WG 3 report from the ECOD/ESF workshop report (Appendix III).

III. Convergence and Collision

Topics B. and D. (Appendix I) are important to TECP, while elements of A. (Appendix I) could be important to all of the thematic panels under the general heading of "orogenesis" or "mountain-building."

Proposals: existing proposals for Leg 110 (and the rest of the Lesser Antilles forearc); WG 1 report from the ECOD/ESF workshop (Appendix III); part of the COSOD-II, WG 4 report.

IV. Paleoceanography

The SOHP white paper has stressed the importance of drilling transects covering different water depths and latitudinal temperature gradients in order to study sea-level change, the history of primary productivity vs. CCD and heat transport. The Atlantic serves these needs well, because it is a compartmentalized ocean oriented north-south whose subsidence/spreading history is comparatively well-known.

Topics A, B., D. and E. (Appendix I) approximate SOHP themes 3 and 4 (as well as WG 1, COSOD-II), while SOHP theme 5 corresponds to topic C (Appendix I).

Proposals: existing proposals for Legs 101, 103, 104, 105, 107, 108, 110, 113 and 114; other existing proposals (e.g., revised 59/A (Appendix II), 63/A, 74/A, 254/A); WG 1 report, COSOD-II; WG 2 report, ECOD/ESF workshop (Appendix III).

V. Eustatic Sea-Levels Through Time

The study of relative and eustatic sea-level fluctuations must eventually be addressed in all ocean basins, but studies of the Atlantic must play an important role because of the existence of suitable sedimentary sections on conjugate passive margins (which can be addressed through well-placed drilling transects) and evolving bi-polar effects on circulation and sedimentation.

Topics A. and B. correspond to SOHP theme 2 and to a major portion of WG 1, COSOD-II.

Proposals: all of the paleoceanography proposals cited above; 276/A and 313/A, which bear on the evolution of the equatorial Atlatnic gateway, and hence also on the structural and stratigraphic evolution of perhaps the world's classic example of a transform/sheared continental margin.

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Workshops

In order to keep planning for drilling in the Atlantic and adjacent seas active over the last two years, ARP has endorsed a series of workshops. Two have already been held, under the auspices of JOI-USSAC:

1. "Workshop to Develop Scientific Drilling Initiatives in the South Atlantic and Adjacent Southern Ocean", J. Austin (ARP), convener, April, 1987, Woods Hole, MA. Report completed and circulated by JOI, Inc. in October, 1987.

2. "Caribbean Workshop", R. Speed (ARP), convener, November, 1987, Jamaica. Report to be circulated by November, 1988. As a result of this meeting, three major themes emerged which relate to COSOD-II and thematic panel concerns:

a. *Defluidization and growth mechanisms of sedimentary forearcs* (Barbados/Lesser Antilles forearc).

b. *Caribbean and central Atlantic gateways*: investigation of the development of lithosphere during rifting of North and South American plates, the history of interchange of water and biota between Pacific and Atlantic realms, and the concomitant effects on climatic changes; the study includes the question of midplate volcanism and development of oceanic plateaus within some Caribbean basins and the question of whether or not the Caribbean plate is a product of "insertion tectonics" from the Pacific.

c. *History and kinematics of the Caribbean/North American plate boundary*: including generation of oceanic lithosphere in a pull-apart basin with very high obliquity (giving a test of lateral heat flow factor) and a test of theories of basalt magma petrogenesis during progressive basin opening.

Two more are being held in Europe as this report goes to the JOIDES Office:

1. "Geologic History of the Polar Ocean: Arctic vs. Antarctic", J. Thiede (ex-ARP), convener, Bremen, Germany.

2. "Mediterranean Workshop", J. Mascle (ARP), convener, Athens, Greece.

Furthermore, both the U.K. and ESF have recently held workshops and generated "Atlantic" drilling documents:

1. "U.K. Proposals for ODP: Atlantic Ocean", August, 1988, recently circulated by NERC (Appendix II).

2. "Drilling in the Atlantic", report from the 4th ECOD workshop held in Helsinki, Finland, May, 1988, recently circulated by ESF (Appendix III).

More such documents will certainly be forthcoming, as the word gets out that ODP activities in 1992 and beyond will not be constrained by systematic circumnavigation.

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In conclusion, my own (somewhat personal) perspective at this early point in Atlantic planning is that there are (at least) three major/"global" characteristics that make the Atlantic a unique place to address themes cited by COSOD-II, LITHP, TECP and SOHP:

I. *Conjugate Passive Continental Margins*

II. *Slow-spreading Mid-Ocean Ridges*

III. *Latitudinal, Compartmentalized Ocean: Arctic vs. Antarctic Paleoceanography*

These topics are not prioritized, and any one or all could be the focus of a Detailed Planning Group. Furthermore, I believe that others will emerge as the results from recent

workshops arrive, and as the Atlantic drilling community realizes that their "ship has come in."

(For example, another possibility was suggested to me by Ian Dalziel, chairman, TECP, during internal review of this document: *Hot Spots and Plate Kinematics*, in light of the fact that each end of the Atlantic is characterized by extensive volcanic provinces: the North Atlantic Volcanic Province previously mentioned and the Karoo(South Africa)-Farrar (Antarctica)-Serra Geral (South America) volcanic system, which must in some way be related to the Late Paleozoic-Mesozoic fragmentation of Gondwanaland.)

ARP SUMMARY OF ACTIVITIES: 1987

On April 2 and 3, 1987, the Atlantic Regional Panel (ARP) met at Woods Hole Oceanographic Institution, Woods Hole, MA. This was the only meeting of ARP during calendar 1987.

The ARP had several drilling proposals on its agenda for review, but most of the members felt that it would be appropriate to spend time first on a group consideration of the members' regional/thematic interests in order to develop a viable context for the future consideration of such proposals. Each member was then asked to summarize his personal perspectives on important "Atlantic" problems and the best place(s) to consider their study/solution. The group then summarized and grouped these opinions under a number of major "Atlantic" topics. What follows probably constitutes the ARP's first (only?) attempt at outlining a "white paper".

Topics:

I. Continental Break-Up

A. Sequences of tectonic events (including the effects of episodes of vertical tectonism and the evolution of sedimentary sequences), e.g.'s various (conjugate and non-conjugate) passive continental margins: Galicia (tectonics) and Cape Basin (sediments).

B. Mechanisms of continental crust deformation and extension during rifting, e.g. Galicia.

C. Development, evolution and re-integration of (continental) microplates, e.g Rockall-Hatton-Greenland.

D. Magmatic events and their evolution (pre-, syn- and post-separation), e.g.'s selected (sediment-starved) margin features: J-Anomaly Ridge and Madeira-Tore Rise.

E. Identifying asymmetries in crustal structure across conjugate passive continental margins, e.g. Galicia-Newfoundland.

F. Ocean-continent boundary structure and evolution, e.g.'s a variety of passive margins of different age and structure: particularly Galicia-Newfoundland.

G. Sheared continental margins, e.g. Gulf of Guinea.

II. Evolution of Oceanic Lithosphere

A. Slow-spreading ridges, including their deformation, hydrogeology and the history of magma chambers, e.g. Kane FZ/MARK area.

B. Transform-ridge discontinuities, e.g.'s large-offset equatorial Atlantic FZ's.

C. Cretaceous-Cenozoic intraplate volcanism, e.g. Venezuelan Basin.

D. Paired aseismic ridges, e.g. Walvis Ridge/Rio Grande Rise.

E. Emplacement of ultramafics into oceanic crust, e.g. MARK area (Site 670).

F. Processes of aging in old oceanic crust; comparisons with ophiolites, e.g. Blake-Bahama Basin in vicinity of Blake Spur magnetic anomaly.

G. Seaward-dipping wedges*, e.g.'s Rockall-Hatton, SE Greenland. *ARP felt that this feature could have been listed under Topic I. as well.

III. Convergence and Collision

A. Continent-continent, e.g. Hellenic arc/Mediterranean.

B. Accretionary tectonics on thickly-sedimented oceanic lithosphere with normal convergence, e.g. Barbados.

C. Strike-slip convergent margins, e.g. North Scotia Ridge [continent-ocean], Azores-Gibralter Ridge [ocean-ocean].

D. Fore-arc basin evolution, e.g. Barbados.

IV. Paleoceanography

A. Gateways
--opening, e.g.'s from south to north: Agulhas FZ, Walvis Ridge/Rio Grande Rise, equatorial shear zone, Iceland-Faeroes Ridge, Davis Strait and others.
--closing, e.g.'s eastern Mediterranean, western Caribbean.

B. Circulation patterns.

1. History of deep circulation, e.g.'s eastern vs. western basins; northern vs. southern basins.

2. Upwelling, e.g.'s northwest Africa, southwest Africa.

C. Black shales.

1. Pelagic vs. terrestrial signals, e.g. Madeira-Tore Rise.

2. Distribution in space and time.

D. Deep Stratigraphic Tests and standard reference sections, e.g.'s every major Atlantic depocenter.

E. Initiation of glaciation--Arctic vs. Antarctic.

V. Eustatic Sea Levels Through Time

A. Timing and magnitude of eustatic sea level events, e.g.'s eastern U.S. and Canada, Cape Basin.

B. Controls on the sedimentary record: shelf/slope/rise/abyssal plain continuum, e.g.'s transects of various margins.

VI. Catastrophes

A. Impacts, e.g. Montaignais structure, Scotian shelf off Nova Scotia.

U.K. PROPOSALS FOR THE OCEAN DRILLING PROGRAM

APPENDIX II

ATLANTIC OCEAN

August 1988

Natural Environment Research Council

APPENDIX III

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DRILLING IN THE ATLANTIC

James A. Austin, Jr

Report from ECOD workshop in Helsinki, Finland, 5-7 May 1988

LIST OF PROPOSALS RECEIVED BY THE JOIDES OFFICE (as of October 1988)

#	THEME/AREA	AUTHOR(S)	RECEIVED (**bold=last version**)	LEG #
1/A	Pre-m. Cretac. history of SE Gulf of Mexico	(Phair & Buffler)	12/82	
2/E	Middle America trench and Costa Rica margin	(Crowe & Buffler)	12/82	
3/E	Flexural moats, Hawaiian Islands	(Watts et al.)	**10/88**	
4/E	Tuamoto Archipelago (French Polynesia)	(Okal et al.)	6/83	
5/A	Struc.& sedim. carbonate platforms	(Mullins et al)	7/83	LEG 101
6/A	Labrador Sea, ocean crust & paleoceanogr.	(Gradstein et al.)	**5/84**	LEG 105
7/A	Gulf of Mexico & Yucatan	(Buffler et al.)	8/83	
8/E	Southern Chile trench	(Cande)	9/83	
9/E	Pre-Messinian hist. of the Mediterranean	(Hsu et al.)	1/84	
10/A	Cenozoic circulation off NW Afric	(Sarnthein et al.)	**4/85**	LEG 108
[11/A	Porto & Virgo seamounts, Iberian margin	(Kidd et al.)	1/84]	
12/A	Tyrrhenian back-arc basin transect	(Cita & Malinverno)	1/84	LEG107
13/F	Water column research lab	(Wiebe)	1/84	
14/E	Zero age drilling: EPR 13^{0}N	(Bougault)	1/84	
15/A	Formation of the Atlantic Ocean	(Herbin)	1/84	
16/A	Atlantic-Mediterranean relationship	(Faugeres)	1/84	
17/A	Gorringe Bank, deep crust & mantle	(Mevel)	1/84	
18/A	Off Galicia Bank	(Mauffret et al.)	**6/84**	LEG 103
19/A	Eleuthera fan, Bahamas	(Ravenne & Le Quellec)	1/84	LEG 101
20/A	Subduction collision: Outher Hellenic Arc	(J.Mascle)	1/84	
21/A	Thyrrenian Basin: Rifting, stretching,accr.	(Rehault & Fabbri)	**7/85**	LEG 107
22/A	Rhone deep sea fan	(Bellaiche et al.)	1/84	
23/A	Carribean basins	(A.Mascle & Biju-Duval)	1/84	
24/A	Barbados transects	(A.Mascle & Biju-Duval)	1/84	LEG 110
25/D	New Hebrides arc	(ORSTOM team)	1/84	
26/D	Tonga-Kermadec arc	(Pelletier & Dupont)	**6/86**	
27/D	Sulu Sea marginal basin	(Rangin)	**7/85**	
28/D	South China Sea	(Letouzey et al.)	1/84	
29/D	Ryukyu Island & Okinawa backarc basin	(Letouzey)	1/84	
30/B	Davie Ridge & Malagasy margin, Indian Ocean	(Clocchiatti et al.)	**8/85**	
31/B	Red Sea, paleoenvironmental history	(Guennoc)	1/84	
32/A	Yucatan basin	(Rosencrantz & Bowland)	1/84	
33/A	Mediterranean drilling	(Hsu) [same as 9/A]		
34/E	Pacific-Aleutian-Bering Sea (Pac-a-bers)	(Scholl & Vallier)	2/84	
35/A	Barbados ridge accretionary complex	(Westbrook)	2/84	
36/A	Norwegian Sea	(Hinz & Norw.WG)	**5/84**	LEG 104
37/E	Costa Rica, test of duplex model	(Shipley et al.)	**8/84**	
38/A	Gulf of Mexico (DeSoto Canyon)	(Kennett & Moore)	2/84	
39/A	Cape Verde drilling	(Hill)	2/84	
40/A	Logging of site 534 (Blake-Bahamas basins)	(Sheridan et al.)	2/84	LEG 101

42/D	Sunda Straits area	(Huchon)	3/84	
43/D	SW Pacific drilling outline	(Falvey)	3/84	
44/B	Andaman Sea: Tectonic evolution	(Peltzer et al.)	3/84	
45/A	Equatorian Atlantic: Paleoenvironment	(Ruddiman)	3/84	
46/D	South China Sea margin history	(D.Hayes et al.)	11/87	
47/D	Manila trench, S.China Sea	(Lewis & Hayes)	3/84	
48/D	Sulu Sea & South China Sea	(Hinz & Schlueter)	12/85	
49/D	Eastern Banda arc/Arafura Sea	(Schlueter & Fritsch)	3/84	
50/D	Nankai trough & Shikoku forearc	(Kagami et al.)	8/85	
51/D	Sea of Japan	(Tamaki et al.	7/85	
52/D	Solomon Sea	(Milsom)	3/84	
53/F	Vertical Seismic Profiling	(Phillips & Stoffa)	3/84	LEG 102
54/C	Sub-Antarctic & Weddell Sea sites	(Kennett)	3/84	LEGS 113/114
55/B	Makran forearc, Pakistan	(Leggett)	3/84	
56/B	Intraplate deformation	(Weissel et al.)	10/84	LEG 116
57/B	Deformation of African-Arabian margin	(Stein)	9/88	
58/A	West Baffin Bay	(Grant & Jansen)	3/84	LEG 105
59/A	Continental margin instability testing	(Weaver & Kidd)	9/88	
60/A	Newfoundland basin: E Canadian margin	(Masson)	4/84	
61/B	Madagscar & E Africa conjugate margins	(Coffin & Matthias)	10/84	
62/B	Davie fracture zone	(Coffin et al.)	12/84	
63/A	[idea proposal]			
64/A	Site NJ-6	(Poag)	6/84	
65/B	S.Australian margin: Magnetic quiet zone	(Mutter & Cande)	10/84	
66/F	Laboratory rock studies to reveal stress	(Whitmarsh)	9/87	
67/D	Tonga-Lord Howe Rise transect	(Falvey et al.)	7/84	
68/A	Deep basins of the Mediterranean	(Montadert)	7/84	
69/F	Rock stress meas. in part of Norwegian Sea	(Stephansson)	7/84	
70/F	Borehole seismic experim. at 417 & 603	(Stephen et al.)	7/84	LEG 102
71/C	[idea proposal]			
72/A	Two-leg transect on Lesser Antilles forearc	(Speed et al.)	7/84	LEG 110
73/C	Antarctic margin off Adelie coast	(Wannesson et al.)	8/85	
74/A	Continental margin of Morocco, NW Africa	(Winterer & Hinz)	8/84	
75/E	Gulf of California	(K.Becker et al.)	8/84	
76/E	EPR: oceanic crust at the axis	(Francheteau & Hekinian)	9/87	
77/B	Seychelles bank & Amirante trough	(Mart)	8/84	
78/B	Indus fan	(Kolla)	8/84	
79/B	Tethyan stratigraphy & oceanic crust	(Coffin & Chanell)	8/84	
80/D	Sunda & Banda arc	(Karig & G.Moore)	10/84	
81/A	Ionian Sea transect, Mediterranean	(Hieke & Makris)	9/84	
82/D	Sulu Sea	(Thunell)	9/84	
83/D	Izu-Ogasawara (Bonin) arc transect	(Okada & Takayanagi)	4/86	
84/E	Peru margin	(Kulm & Hussong)	9/84	LEG 112
85/A	Margin of Morocco, NW Africa	(D.Hayes et al.)	9/84	
86/B	Red Sea	(Bonatti)	9/85	
87/B	Carlsberg Ridge, Arabian Sea: Basalt obj.	(Natland)	10/84	
88/B	Chagos-Laccadive-Mascarene volc. lineament	(Duncan et al.)	5/85	LEG 115
89/B	SWIR, mantle heterogeneity	(Dick & Natland)	5/86	LEG 118
90/B	SE Indian Ocean Ridge transect	(Duncan)	10/84	

91/B SE Indian Ocean oceanic crust	(Langmuir)	10/84	
92/B Crozet Basin, seismic observatory	(Butler & Brocher)	8/85	
93/B W Arabian Sea: upwelling, salinity etc.	(Prell)	10/84	LEG 117
94/B Owen Ridge: History of upwelling	(Prell)	10/84	LEG 117
95/B Asian monsoon, Bay of Bengal	(Cullen & Prell)	10/84	
96/B Bengal Fan (Indus & Ganges Fans)	(Klein)	10/84	
97/B Equatorial Indian Ocean:Fertil.& carb.comp.	(Peterson)	7/85	LEG 115
98/B History of atmosph. circ. (Austral. desert)	(Rea)	10/84	
99/B Agulhas Basin paleoceanogr. clim. dynamics	(Coulbourn)	10/84	
100/B SE Indian Ridge transect: Stratigr. section	(J.Hays & Lazarus)	10/84	
101/B Ridge crest hydrothermal activity	(Owen & Rea)	10/84	
102/B Somali Basin	(Matthias)	10/84	
103/B Laxmi Ridge, NW Indian Ocean	(Heirtzler)	10/84	
104/B 90°E Ridge transect	(Curray & Duncan)	10/84	LEG 121
105/B Timor, arc-continent collision	Karig)	10/84	
106/B Broken Ridge, Indian Ocean	(Curray et al.)	10/84	LEG 121
107/B SE Indian Ridge: Stress in ocean lithosph.	(Forsyth)	10/84	
108/C E Antarctic continental margin (Prydz Bay)	(SOP -Kennett)	10/84	LEG 119?
109/C Kerguelen - Heard Plateau	(SOP -Kennett)	10/84	LEGS 119/120
110/C Wilkesland - Adelie continental margin	(SOP -Kennett)	10/84	
111/C SE Indian Ocean Ridge transect (subantarc.)	(SOP -Kennett)	10/84	
112/B Lithosphere targets	(SOP -Kennett)	10/84	
113/B Agulhas Plateau	(SOP -Kennett)	10/84	
114/C Crozet Plateau	(SOP -Kennett)	10/84	
115/B Agulhas Plateau and adj. basins	(Herb & Oberhansli)	4/85	
116/B 90°E & Chagos-Laccadive Ridge drilling	(Oberhansli & Herb)	4/85	LEG 121)
117/B Northern Red Sea	(Cochran)	10/84	
118/B Cenozoic history of E Africa	(Kennett et al.)	11/84	
119/B Early opening of Gulf of Aden	(Stein)	12/84	
120/B Red Sea, Atlantis II deep	(Zierenberg et al.)	12/84	
121/B Exmouth & Wallaby Pl. & Argo Abys. Plain	(Von Rad et al.)	5/86	LEGS 122/123
122/A Kane fracture zone	(Karson)	12/84	LEGS 106/109
123/E Studies at site 501/504	(Mottl)	12/84	LEG 111
124/E To deepen Hole 504B	(LITHP -K.Becker)	1/85	LEG 111
125/A Bare-rock drilling at the Mid-Atl. Ridge	(Bryan et al.)	1/85	LEGS 106/109
126/D Drilling in the Australasian region	(Crook, Falvey,Packham)	1/85	
127/D E Sunda arc & NW Austral. collision	(Reed et al.)	1/85	
128/F Phys.props. in accretionary prisms	(Karig)	1/85	
129/C Bounty trough	(Davy)	5/86	
130/D Evolution of the SW Pacific (N of New Zeal.)	(Eade)	1/85	
131/D Banda Sea basin: Trapped ocean crust etc.	(Silver)	3/85	
132/D TTT-type triple junction off Boso, Japan	(Ogawa & Fujioka)	6/85	
133/F In-situ sampling of pore fluids	(McDuff & Barnes)	3/85	
134/B Gulf of Aden	(Girdler)	4/86	
135/B Broken Ridge: Thermo-mechanical models	(Weissel & Karner)	3/85	LEG 121
136/C Kerguelen - Heard Plateau	(Schlich et al.)	7/85	LEGS 119/120
137/B Fossil ridges in the Indian Ocean	(Schlich et al.)	8/85	
138/B Rodrigues triple junction, Indian Ocean	(Schlich et al.)	8/85	
139/B Agulhas Plateau, SW Indian Ocean	(Jacquart & Vincent)	8/85	

140/B	Central & N. Red Sea axial areas	(Pautot & Guennoc)	8 / 8 5	
141/B	Indus Fan	(Jacquart et al.)	8 / 8 5	
142/E	Ontong-Java Pl.:Equat. Pacific depth trans.	(L.Mayer & Berger)	4/85	
143/F	In-situ magnet. susc. measurements	(Krammer & Pohl)	12/85	LEG 109
144/D	Kuril forearc off Hokkaido: Arc-arc collis.	(Seno et al.)	6 / 8 6	
145/D	Ryukyu arc: Left-lateral dislocation	(Ujiie)	6 / 8 6	
146/D	Toyamu fan, E Japan Sea	(Klein)	7 / 8 5	
147/D	South China Sea	(Wang et al.)	6/85	
148/D	Near TTT-type triple junction off Japan	(Ogawa et al.)	6 / 8 6	
150/B	90°E Ridge & Kerg.-Gaussb.Ridge: Hard rock	(Frey & Sclater)	7/85	LEGS 120&1
151/D	Japan Sea: Mantle plume origin	(Wakita)	7/85	
152/F	Borehole seismic experim., Tyrrhenian Sea	(Avendik & Dietrich)	7/85	
153/E	Three sites in the SE Pacific	(J.Hays)	7/85	
154/D	Banda-Celebes-Sulu basin entrapment	(Hilde)	7/85	
155/F	Downhole measurem. in the Japan Sea	(Suyehiro et al.)	7/85	
156/D	Kita-Yamam. trough, Japan Sea: Massive sulf.	(Urabe)	7/85	
157/D	Japan Sea paleoceanography	(Koizumi & Oba)	7/85	
158/D	Japan Sea & trench: Geochem & sedimentol.	(Matsumoto & Minai)	7/85	
159/F	Phys.cond. across trench: Izu-Mariana-...	(Kinoshita et al.)	7/85	
160/F	Geophys.cond. of lithosp.plate, Weddell Sea	(Kinoshita et al.)	7/85	
161/F	Magn.field & water flow measurem.	(Kinoshita et al.)	7/85	
162/F	Offset VSP on the SW IO Ridge fract.zones	(Stephen)	7/85	LEG 118
163/D	Zenisu Ridge: Intraplate deformation	(Rangin et al.)	6 / 8 8	
164/D	Japan trench & Japan-Kuril trenches juntion	(Jolivet et al.)	7/85	
165/D	Shikoku basin ocean crust	(Chamot-Rooke & LePichon)	7/85	
166/D	Japan Sea: Evolution of the mantle wedge	(Tatsumi et al.)	7/85	
167/D	Okinawa trough & Ryukyu trench	(Uyeda et al.)	6 / 8 6	
168/D	Japan Sea: Sedim. of siliceous sediments	(Iijima et al.)	7/85	
169/C	South Tasman Rise	(Hinz & Dostmann)	7/85	
170/D	Valu Fa Ridge, Lau Basin: Back-arc spread.	(Morton et al.)	7/85	
171/D	Bonin region: Intra-oceanic arc-trench dev.	(B.Taylor)	4 / 8 6	
172/D	Mariana forearc, arc & back-arc basin	(Fryer)	8/85	
173/B	Seychelles, Mascarene Pl., NW Indian Ocean	(Patriat et al.)	8/85	LEG 115
174/D	Japan Sea: Forearc tectonics	(Otsuki)	8/85	
175/D	Japan trench: Origin of inner wall	(Niitsuma & Saito)	8/85	
176/D	S.Japan Trench: Migration of triple junct.	(Niitsuma)	8/85	
177/D	Zenisu Ridge: Intra-ocean. plate shortening	(Taira et al.)	9 / 8 7	
178/D	Nankai trough forearc	(Shiki & Miyake)	8/85	
179/D	Daito ridges region: NW Philippines Sea	(Tokuyama et al.)	6 / 8 6	
180/D	N.Philippines Sea: Kita-Amami basin & plat.	(Shiki)	8/85	
181/D	Izu-Ogasaw.-Mariana forearc:Crust & mantle	(Ishii)	8/85	
183/B	Periplatform ooze, Maldives, Indian Ocean	(Exon et al.)	8/85	
185/C	Kerguelen Plateau: Origin, evol. & paleo.	(Coffin et al.)	8/85	LEGS 119/120
186/F	SW Ind.Ocean fracture zones hydrology etc.	(von Herzen)	8/85	LEG 118
187/D	New Hebrides arc region, SW Pacific	(F.Taylor & Lawver)	9/85	
188/F	395A boreh.geophys. & 418A drill.& ge	(Stevenson et al.)	10/85	
190/D	New Hebrides (Vanuatu) arc-ridge collision	(Fisher et al.)	5 / 8 8	

191/D	Solomon Isl.: Arc-plateau coll. & intra arc	(Vedder & Bruns)	10/85	
192/E	Baranoff fan, SE Gulf of Alaska	(Stevenson & Scholl)	10/85	
193/F	Upper ocean partic.fluxes in Weddell Sea	(Biggs)	11/85	
194/D	South China Sea	(Liu et al.)	**4/88**	
195/E	Bering Sea paleo-environment & -climate	(Sancetta)	12/85	
195/E	**Suppl.**High latitude paleoceanography	(Scholl&Dadisman)	10/88	
196/B	90°E Ridge: Impact of India on Asia	(Peirce)	12/85	LEG 121
197/B	Otway Basin/W.Tasman region	(Wilcox et al.)	12/85	
198/D	Ulleung Basin: Neogene tectonics & sedim.	(Chough et al.)	12/85	
199/E	N.Pacific: Pelagic sedim in subarctic gyre	(Janecek et al.)	12/85	
199/E	**Suppl.**High latitude paleoceanography	(Scholl&Dadisman)	10/88	
200/F	Borehole magnet. logging on leg 109 (MARK)	(Bosum)	12/85	LEG 109
201/F	High-precision borehole temp. measurements	(Kopietz)	12/85	LEG 109
202/E	N.Marshall Isl. carbonate banks	(Schlanger)	12/85	
203/E	Guyots in the central Pacific	(Winterer et al.)	12/85	
204/A	Florida escarpment transect	(Paull et al.)	**10/86**	
205/A	Bahamas: Carb.fans, escarpm.erosion & roots	(Schlager et al.)	12/85	
206/D	Great Barrier R.: Mixed carb/epiclast.shelf	(Davies et al.)	**12/86**	
207/E	Bering Sea basin & Aleutian ridge tectonics	(Rubenstone)	1/86	
208/B	Ancestral triple junction, Indian Ocean	(Natland et al.)	1/86	
209/C	Eltanin fracture zone	(Dunn)	1/86	
210/E	NE Gulf of Alaska: Yakutat cont. margin	(Lagoe & Armentrout)	1/86	
211/B	Deep stratigraphic tests	(SOHP -Arthur)	1/86	LEG 123
212/E	Off northern & central California	(Greene)	1/86	
213/E	Aleutian subduction: accret. controlling p.	(McCarthy & Scholl)	1/86	
214/E	Central Aleutian forearc:Trench-slope break	(Ryan & Scholl)	1/86	
215/B	Red Sea: Sedim. & paleoceanogr. history	(Richardson & Arthur)	2/86	
216/D	South China Sea	(Rangin et al.)	2/86	
217/D	Lord Howe Rise	(Mauffret & Mignot)	2/86	
218/D	Manila trench & Taiwan collis.zone, SCS	(Lewis et al.)	2/86	
219/B	Gulf of Aden evolution	(Simpson)	3/86	
220/D	Three sites in the Lau Basin	(Hawkins)	3/86	
221/E	Equatorial Pacific: L.Cenozoic paleoenviron	(Pisias et al.)	**6/88**	
222/E	Ontong-Java Pl.: Origin, sedim. & tectonics	(Kroenke et al.)	**7/88**	
223/B	Central Indian Ocean fracture zone	(Natland & Fisher)	4/86	
224/E	Escanaba trough (Gorda Ridge), NE Pacific	(Fisk et al.)	**9/87**	
225/E	Aleutian Basin, Bering Sea	(Cooper & Marlow)	4/86	
226/B	Equat.Indian Ocean: carb. system & circul.	(Prell & Peterson)	**8/86**	LEG 115
227/E	Aleutian Ridge, subsidence and fragment.	(Vallier & Geist)	5/86	
228/C	Weddell Sea (E Antarctic contin. margin)	(Hinz et al.)	5/86	LEG 113
229/E	Bering Sea, Beringian cont. slope & rise	(Cooper et al.)	5/86	
230/C	Wilkes Land margin, E Antarctica	(Eittreim et al.)	5/86	
231/E	North Pacific magnetic quiet zone	(Mammerickx et al.)	5/86	
232/E	N.Juan de Fuca R.: High temp.zero age crust	(E.Davis et al.)	5/86	
233/E	Oregon accr. complex: Fluid proc. & struct.	(Kulm et al.)	**7/88**	
234/E	Aleutian trench: Kinematics of plate cover.	(von Huene et al.)	6/86	
235/D	Solomon Sea: Arc-trench dev., back-arc ...	(Honza et al.)	6/86	
236/E	N.Gulf of Alaska	(Bruns et al.)	6/86	
237/E	Active margin off Vancouver Isl., NE Pac.	(Brandon & Yorath)	6/86	

238/F	Pore pressure in the Makran subduction z.	(Wang & von Huene)	6/86
239/D	Two sites in the Lau Basin	(Cronan)	6/86
240/B	Argo Abyssal Plain	(Gradstein)	**7/86**
241/E	Gulf of Alaska (Yakutat block) & Zodiak fan	(Heller)	6/86
242/D	Backthrusting & back arc thrust., Sunda arc	(Silver & Reed)	**9/87**
243/D	Outer Tonga trench	(Bloomer & Fisher)	6/86
244/C	Western Ross Sea	(Cooper et al.)	**8/86**
245/E	Transform margin of California	(Howell et al.)	7/86
246/E	Mesozoic upwelling off the S.Arabian margin	(Jansa)	7/86
247/E	NE Pacific: Oceanogr.,climatic & volc.evol.	(Pisias et al.)	**7/88**
248/E	Ontong-Java Plateau	(Ben-Avraham & Nur)	8/86
249/E	Sedimentation in the Aleutian trench	(Underwood)	8/86
250/E	Navy fan, California borderland	(Underwood)	8/86
251/B	Seychelles-Mascarene-Saya de Mayha region	(Khanna)	8/86
252/E	Loihi Seamount, Hawaii	(Staudigel et al.)	**10/86**
253/E	Shatsky Rise:Black shales in ancestr. Pac.	(Schlanger & Sliter)	8/86
254/E	NW Africa: Black shales in pelagic realm	(Parrish & Tucholke)	8/86
255/A	Black shales in the Gulf of Guinea	(Herbin & Zimmerman)	8/86
256/E	Queen Charlotte Transform fault	(Hyndman et al.)	9/86
257/E	Farallon Basin, Gulf of California	(Lawver et al.)	9/86
258/E	Stockwork zone on Galapagos Ridge	(Embley et al.)	10/86
259/E	Meiji sediment drift, NE Pacific	(Keigwin)	10/86
259/E	**Suppl.**High latitude paleoceanography	(Scholl & Dadisman)	10/88
260/D	Ogasawara Pl., near Bonin arc	(Saito et al.)	10/86
261/E	History of the Mesozoic Pacific Ocean	(Larson & Lancelot)	10/86
263/E	S.Explorer Ridge, NE Pacific	(Chase et al.)	11/86
264/A	Montagnais impact struct.,Scotia Sh.	(Grieve et al/Jansa & Pe-Piper)	12/86
265/D	Western Woodlark Basin	(Scott et al.)	12/86
266/D	Lau Basin	(Lau-Consortium)	12/86
267/F	Old crust at converg. margins: Argo & W.Pac	(Langmuir & Natland)	12/86
268/D	Hydrothermal ore deposition, Queensland Pl..	(Jansa et al.)	12/86
269/E	Aleutian pyroclastic flows in marine envir.	(Stix)	12/86
270/F	Tomographic imaging of hydrotherm. circul.	(Nobes)	1/87
271/E	Paleoceanogr. trans. of California current	(Barron & Ingle)	**10/88**
272/F	Long-term downh. measurem.in seas a. Japan	(Kinoshita)	2/87
273/C	Southern Kerguelen Plateau	(Schlich et al.)	**11/87** LEGS 119/120
274/D	South China Sea	(Zaoshu & Yan)	3/87
275/E	Gulf of California (composite proposal)	(Simoneit & Dauphin,eds)	3/87
276/A	Equat. Atlantic transform margins	(J.Mascle)	4/87
277/E	Aseismic slip in the Cascadia margin	(Brandon)	4/87
278/E	Blanco transf. fault: Alter., layer three..	(Hart et al.)	5/87
279/E	Anatomy of a seamount:Seamount 6 near EPR	(Batiza)	5/87
280/E	Cretac.Geisha Seamounts & guyots, W-Pac	(Vogt et al.)	6/87
281/D	Accret.prisms at Kuril/Japan trench&Nankai Tr.	(Okumura& Yamazaki)	6/87
282/E	Teacing the Hawaiian hotspot	(Niitsuma &Okada)	6/87
283/E	Kuroshio current and plate motion history	(Jacobi &al)	6/87
284/E	Escanaba Trough,S-Gorda Ridge Hydrothermalism	(Zierenberg & al)	7/87
285/E	Jurassic quiet zone ,Western Pacific	(Handschumacher&al)	7/87
286/E	Return to 504/B to core&log llayer 2/3 trans.	(K.Becker)	7/87

286/E	Return to 504/B to core&log llayer 2/3 trans.	(K.Becker)	7/87
287/E	Deep drilling in the M-Series,Western Pacific	(Handschumacher&al)	8/87
288/B	Repositioning of EP2 to EP12,Exmouth Plateau	(Mutter & Larson)	8/87
289/E	Mass budget in Japan Arc-10Be Geochemical ref.	(Sacks &al)	9/87
290/E	Axial Seamount ,Juan de Fuca Ridge	(P.Johnson &al)	9/87
291/E	Volcanic moat ,apron...in the Marquesas	(Natland & McNutt)	9/87
292/D	Drilling in the SE Sulu Sea	(Hinz &al)	9/87
293/D	Drilling in the Celebes Sea	(Hinz & al)	9/87
294/D	Ophiolite analogues in the Aoba Basin,Vanuatu	(J.W.Shervais)	10/87
295/D	Hydrogeol.& structure,Nankai accr.complex	(J.Gieskes & al)	12/87
296/C	Ross Sea ,Antarctica (subsitute for 244/C)	(Cooper & al)	12/87
297/C	Pacific Margin of Antartica Peninsula	(P.Parker& al)	12/87
298/F	Vertical seismic prof. in Nankai Tr. ODP Sites	(G.Moore)	1/88
299/F	Self-bor.p-meter to study deform.in accr. sedim.	(M.Brandon & al.)	2/88
300/B	Return to site 735B-SW Indian Ridge	(H.Dick & al.)	2/88
301/D	Integrated prposal :Nankai forearc	(J.Gieskes &al)	3/88
302/F	Electrical conductivity structure,E-Japan Sea	(Y.Hamano & al)	3/88
303/E	Fracturing /volcanism on Hawaiian swell	(B.Keating)	4/88
304/F	ODP Nankai downhole observatory	(H.Kinoshita &al)	6/88
305/F	Artic Ocean drilling	(P.Mudie & al)	6/88
306/E	Old Pacific History	(Y.Lancelot & al)	6/88
307/E	Cross Seamount, Hawaiian swell	(B.Keating)	7/88
308/E	Reactivated Seamounts,Line Island chain	(B.Keating)	7/88
309/F	Proposal to come from HIG		
310/A	Geochemical sampling ,dippings ,E-Groenland	(A.Morton & al)	9/88
311/A	Sedim. equivalent of dippings ,Rockall	(D.Masson & al)	9/88
312/A	Potential of drilling on Reykjanes Ridge	(J.Cann & C.Powell)	9/88
313/A	Evolution of oceanog. pathway: The Equat. Atlan.	(E.Jones & al)	9/88
314/D	Fluid flow & mechan.response,accr.prism,Nankai	(D.Karig & al)	9/88
315/F	Network of ocean floor broad band seismometer	(Purdy&Dziewonski)	10/88
316/E	To drill a gas-hydrate hole (West Pacific)	(R.Hesse & al)	10/88

rev. Nov 1988

Ocean Drilling Program

Guidelines for the Submission of Proposals and Ideas

A. Introduction

The purpose of the JOIDES scientific advisory structure is to formulate the most productive plan for drilling in the oceans to aid in answering scientific questions, mainly about present-day and earlier processes of the earth. Drilling is based on suggestions and proposals from the entire scientific community. Before a specific proposal or set of proposals leads to drilling, JOIDES must be convinced (a) that the scientific objectives are of high priority, (b) that drill sites are located to address those objectives in the best and safest manner possible, and (c) that the operational plan to drill them has a reasonable chance of success. The Planning Committee depends mainly on its thematic panels for advice about scientific objectives, and on its service panels and detailed planning groups, as well as assistance from the Science Operator (TAMU), Wireline Logging Services, (LDGO), and ODP Data Bank (LDGO), for optimum and safe drill sites.

JOIDES accepts proposals by individuals or groups into the planning process as:

1. Preliminary Proposals. These are ideas or suggestions for scientific ocean drilling. Examples are objectives aimed at a specific process, general drilling targets, or experiments in the borehole. Such proposals may lack a strong scientific focus, geographic specificity, or site-survey data.

2. Mature Drilling Proposals. These are proposals to address specific scientific themes by drilling in specific areas.

Proposals will be reviewed and set into priority by one or more JOIDES advisory panels. Only mature proposals may ultimately be prioritized by the Planning Committee for actual drilling. Thus ideas which become part of the drilling program do so either by evolving into a mature proposal, or by incorporation into an existing proposal with multiple objectives. Maturity is gained by (a) obtaining a favorable thematic evaluation, and (b) meeting certain site-specific requirements.

B. Submission

The time required for an idea or proposal to be processed by the JOIDES scientific advisory structure and become a part of the drilling plan will depend on the scientific value of the proposal and the completeness of the required data when submitted. Proponents are therefore urged to submit as complete a package as possible. Ten copies of proposals should be submitted to the JOIDES Office.

C. Review Process

Proposals submitted to the JOIDES Office are logged and acknowledged, and forwarded to each of the four thematic panels for review of their science content (Attachment 1: copy of Log Sheet). Although it is unlikely that all panels have an interest in any specific proposal, in a proposal-generated, thematically-controlled program the only fair assessment is by having all thematic panels see all proposals. Proposals may also be sent to service panels or detailed planning groups if the proposer so requests or if deemed appropriate by the JOIDES Office. Information copies go to JOI, the Science Operator at TAMU, and the Site Survey Data Bank at LDGO.

Thematic evaluations by panel members are based on their experience and judgement, in the context of the panel White Papers, COSOD I and II, and other reports (Attachment 2: copy of Proposal Review Sheet). Panels may request additional information from the proponents and may suggest that the proposal be modified to enhance its scientific merit. Some proposals of limited scope may be incorporated by the advisory panels into a proposal of broader scope. Proposals receiving favorable thematic evaluations will be considered further by JOIDES.

As the proposal matures and proceeds through the system, service panels may make recommendations regarding technical aspects of the proposed drilling (e.g., site survey review, safety review, downhole measurements review, shipboard measurements review, and so on.)

The Planning Committee monitors and directs the proposal review process, reviews the recommendations of the advisory panels, decides the fate of proposals, and ultimately integrates approved proposals into a detailed drilling plan and ship track.

Attachment 3 is a schematic representation of the lead time and review process.

D. Minimum Requirements

1. A mature proposal should discuss the following items:

a) Specific scientific objectives with priorities

b) Proposed site locations and alternative sites

c) Background information, including regional and local geological setting and identification of existing geophysical and geological data bases.

d) Drilling requirements for each objective (e.g., estimated drilling time, steaming time, water depth, drill string length to deepest objective, reentry, etc.). The Science Operator at TAMU can provide tables with the necessary information.

e) Logging as well as downhole experiments and other supplementary programs (with estimated time, specialized tools, etc.). Wireline Logging Services at LDGO can assist.

f) Known deficiencies in data required for:
1) location of drill sites (site surveys*, and
2) interpretation and extrapolation of drilling results (regional geophysics).

*ODP standards for site-survey data are given in Attachment 4. It outlines the techniques to be used in the various environments that may be encountered.

g. Statement of potential safety problems in implementing proposed drilling. See Attachment 5.

h) Other potential problems (weather window, territorial jurisdiction, etc.).

i) The name and address of a person assigned as a proponent for each site, who will serve as a contact for JOIDES when additional information is required.

Proponents are also required to submit a Site Proposal Summary Form for each proposed drilling site (Attachment 6).

2. Data Availability and Deposition

Proponents are asked to identify available data in three categories:

a) The primary data necessary and sufficient to support the scientific proposal. The ODP Databank is authorized to duplicate and distribute these data as needed for ODP evaluation and planning proceedures.

b) Other data relevant to the proposal that may be obtained from publicly accessible data bases in the U.S. and elsewhere.

c) Data that will eventually be available for public access but has release clauses imposed by the data holder (proponent). These data can not normally be considered for part of the evaluation of the scientific merit of the proposal; they may, however, be used to support safety considerations.

It is emphasized that supporting data for proposals in the above categories must be deposited in the ODP Databank to ensure that a proposal is considsered mature. On the Site Proposal Summary Form, the data must be categorized as **a**, **b**, or **c**. Attachment 7 has guidelines for submission of data to the Databank.

E. Special Submission

Letters of Intent to Submit may be sent to the JOIDES Office at any time. Revised proposals and supplemental information should reference the original logged number, and also may be sent to the JOIDES Office at any time. A proposal sent directly to a panel will not be considered before it is received and logged at the JOIDES Office. In fiscal years 1989 and 1990 the address is

JOIDES Office
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822
Telephone: 808-948-7939; Telex: 7238861/HIGCY HR
Telemail: JOIDES.HIG FAX: 808-949-0243

Rev. Oct. 1988

ODP PROPOSAL LOG SHEET

Attachment 1
NO._____

TITLE	PROPONENT(S) (with name and address of contact)
	199
Area Approx. No. of sites	

Action	Date	Comments and Decisions
RECEIVED BY JOIDES OFFICE		Cross reference to similar titles or proponents
Submitted to Thematic Panels; Copied to JOI, SS Data Bank, Sci. Operator; Ack. to Proponents; also copied to:_____		
Initial evaluation received by JOIDES Office		
LITHP		
OHP		
SGPP		
TECP		
(Other)		
Review to Proponents (copied to JOI, SS Data Bank, Sci. Operator)		
If thematic evaluation generally favorable:		
Submit to SSP for evaluation (incl. obvious safety concerns)		
Initial SSP eval. rec. at JOIDES		
Subsequent rankings & decisions by Thematic Panels, DPGs, etc.		
1.		
2.		
3.		attach sheets as necessary
PPSP pre-review		
If PCOM incorporates in Program Plan:		
Submitted to JOI		
Copied: DMP/ODP-TAMU/ODP-LDGO		
Proponents informed		
Incorporated in Leg No.		
PPSP submission and action		
Final ODP action		
Proponents informed		

200

PROPOSAL REVIEW

Number:

Title:

Proponents:

Evaluation by _____ Panel (Check as appropriate)

[ ] 1. Not within the mandate of this panel.

[ ] 2. Does not address high-priority thematic objective.

[ ] 2a. Does, however, have secondary interest to us if it is of high priority to some other thematic panel.

[ ] 3. Addresses thematic objectives, but with deficiencies.

[ ] 4. Addresses high-priority objectives of this panel.

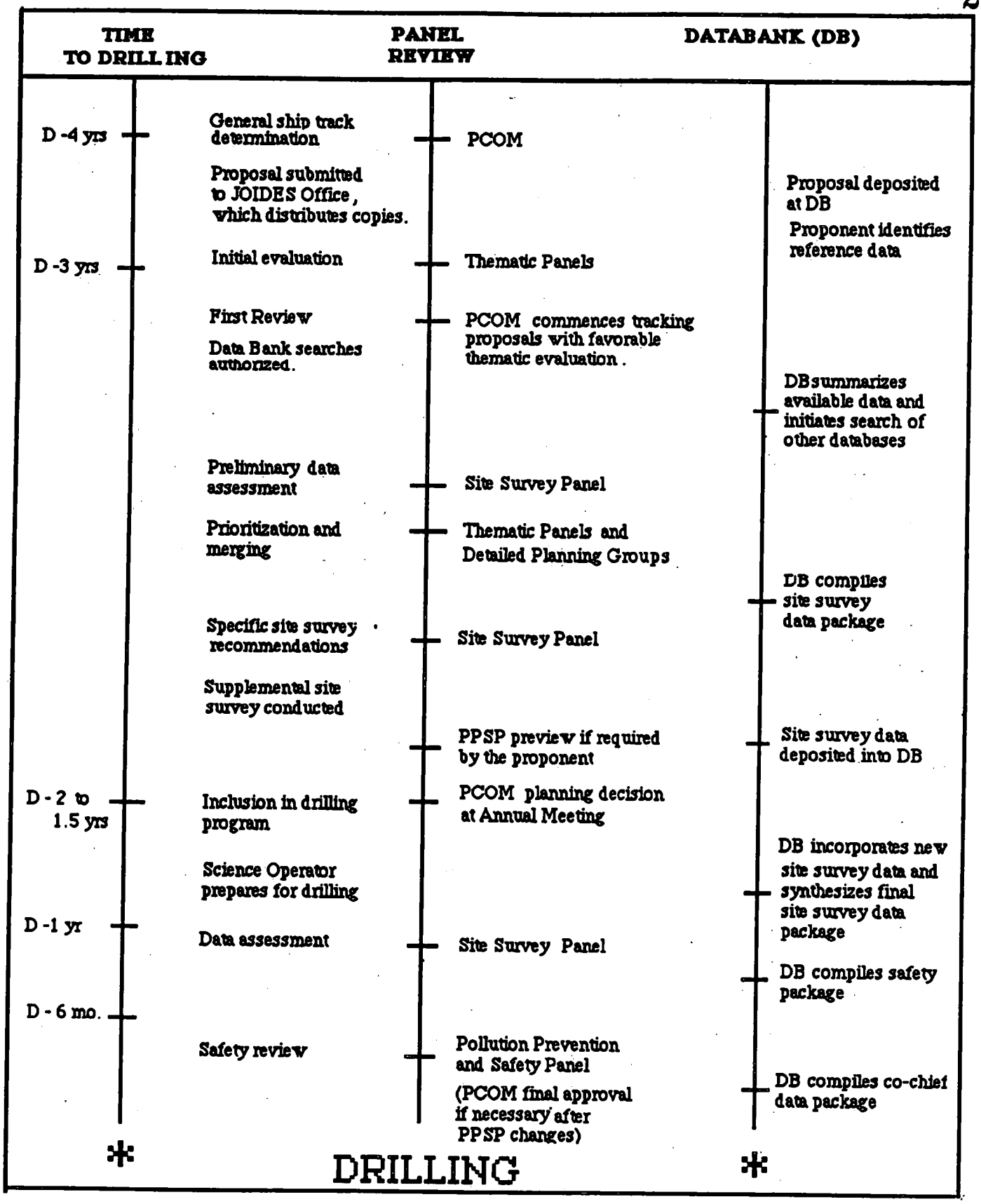
For 2a and 3: Provide brief statement:

Other comments:

Date _____

Return to: **JOIDES Planning Office**
Hawaii Institute of Geophysics
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822

A copy will be sent to the proponent(s).


TIME TO DRILLING
PANEL REVIEW
DATABANK (DB)
D -4 yrs
General ship track determination
Proposal submitted to JOIDES Office, which distributes copies.
PCOM
Proposal deposited at DB
Proponent identifies reference data
D -3 yrs
Initial evaluation
Thematic Panels
First Review
Data Bank searches authorized.
PCOM commences tracking proposals with favorable thematic evaluation.
DB summarizes available data and initiates search of other databases
Preliminary data assessment
Site Survey Panel
Prioritization and merging
Thematic Panels and Detailed Planning Groups
DB compiles site survey data package
Specific site survey recommendations
Site Survey Panel
Supplemental site survey conducted
PPSP preview if required by the proponent
Site survey data deposited into DB
D - 2 to 1.5 yrs
Inclusion in drilling program
PCOM planning decision at Annual Meeting
Science Operator prepares for drilling
DB incorporates new site survey data and synthesizes final site survey data package
D -1 yr
Data assessment
Site Survey Panel
DB compiles safety package
D - 6 mo.
Safety review
Pollution Prevention and Safety Panel
(PCOM final approval if necessary after PPSP changes)
DB compiles co-chief data package
DRILLING

Site Survey Data Standarts

	A	B	C	D	E	F	G
	Paleoenviron-ment(shallow water)	Passive margins	Active Margins	Ocean Crust (thick sediment cover)	Ocean Crust (< appro.400m sed.cover)	Bare -rock Drilling	Aseismic Rid-ges,Plateaus & Seamounts
1. Deep Penetration SCS	(X)	(X)	X or 3	X or 3		(X)*	(X)*
2. High resolution SCS	X	(X)	(X)	(X)	X	(X)	X
3. MCS &Velocity determination		X	X	X or 1		(X)*	(X)*
4. Grid of intersecting seismic lines	(X)*	X	X	(X)*	(X)	(X)	(X)*
5. Seismic refraction		(X)*	(X)*	(X)*	(X)	(X)*	(X)*
6. 3.5 kHz or 12 kHz	X	X	X	X	X	X	X
7. Multi-beam bathymetry	(X)*	(X)*	X or 12	(X)	X or 12	X	(X)* or 12
8. High resolution imagery					(X)*	X	(X)
9. Heat flow		(X)*	(X)*		(X),H	(X),H	
10. Magnetics and Gravity		(X)	(X)	(X)*	(X)*	X	(X)
11. Coring inform.: A-palaeoenviron. B-geotechnical	X	(X) R	(X) R	R	R,H		(X)* R
12. Dredging					(X)*	X	(X)*
13. Current meter (for bottom shear)	(X)*	(X)*	(X)*			(X)*	(X)*

X = Vital

(X)* = Desirable but may be required in some cases

(X) = Desirable

R = Vital for re-entry sites

H = Required for high temperature environments

(To follow)

ODP PROPOSAL : SITE SUMMARY FORM

(Submit 10 copies of proposal)

Proposed Site:	General Objective:
General Area:	
Position (Lat./Long.):	Thematic Panel Interest:
Alternate Site:	

Specific Objectives:

.....

.....

.....

Background Information (Indicate status of data as outlined in the guidelines):

1- Regional Geophysical Data:

Seismic Profiles: .....

.....

Other Data: .....

.....

2- Site Survey Specific Data:

Seismic Profiles: .....

.....

Other Data: .....

Operational Considerations:

Water Depth (m): ..... Sedi.Thickness (m): ..... Total Penetration (m): .....

HPC: ..... Double HPC: ..... Rotary Drill: ..... Single Bit: ..... Reentry: .....

Logging: .....

Nature of Sediments: .....

Rocks anticipated: .....

Weather Conditions: .....

Windows: .....

Territorial Jurisdiction: .....

Other: .....

Special Requirements (staffing,instrumentation,etc.): .....

.....

.....

Proponent (address,phone & electr. mail) .....

.....

Attachment .7

ODP DATABANK GUIDELINES FOR THE SUBMISSION OF REGIONAL GEOPHYSICAL AND SITE SPECIFIC SURVEY DATA

Data should be submitted in the following forms :

1) Digital magnetic tape of underway geophysical data values (topography,magnetics gravity) merged with smoothed final navigation .The preferred format is MGD77, which expects a " header " record as well as data records.

2) Cruise report describing in detail the results of surveys .

3) Large sepia or mylar copies (suitable for ozalid reproduction) of single-channel seismic reflection profiles The preferred format for 3.5kHz records is on 35 mm film negative .

4) Large sepia copies or mylar.(suitable for ozalid reproduction) of processed multi-channel seismic reflection profiles.

5) Large photographic negatives of any side scan sonar data (GLORIA ,Seamarc I and II) collected.

6) Large sepia copies (suitable for ozalid reproduction) of any SEABEAM data presented at a countour interval deemed appropriate.

7) Large sepia or mylar copies (suitable for ozalid reproduction) of any "specialized" data sets (such as sediment thickness maps, bathymetry/magnetic contour charts,velocity analyses,etc.) that have been developed in the course of a cruise report.The format and nature of the presentation of these data will be variable and will be dependent upon the nature of specific interest at each site.

Data should be deposited at :

ODP Site Survey Databank
Lamont-Doherty Geological Observatory
Palisades,New York 10964
U S A
Telephone:(914) 359 2900

The JOIDES Planning Year

The JOIDES planning year corresponds essentially with the calendar year. The attached sheets show the general sequence of planning meetings in a year. In the early and middle parts of the year the advisory panels and the Planning Commitee evaluate drilling proposals and consider a range of other drilling matters. In the late summer and fall the requests for advice become more specific, with a focus on the drilling period to start one year from that time. At the so-called Annual Meeting in early December a detailed drilling plan is assembled by the Planning Committee, so by the end of the calendar year the JOIDES Office can provide JOI, Inc., with a one-year Science Plan, which is the set of scientific objectives and drilling legs aimed at reaching those objectives.

In January and February JOI, Inc., prepares a Program Plan for submission to NSF, which becomes a part of the NSF budget request for the next fiscal year, starting 1 October. The scientific contribution for JOI's program plan came from the preceeding year's work of JOIDES, and includes not only the Science Plan for the next fiscal year but also a general outlook for the next four years. JOI, the prime contractor for the Ocean Drilling Program, also receives operational information from its subcontractors, TAMU for science operations and the actual drilling, and LDGO for borehole logging. Their estimates depend heavily on the detailed drilling plan assembled by the Planning Committee at the Annual Meeting.

The planning calendar that follows is prepared by working backwards from the time of the Annual Meeting. That has become rather fixed as the week between the US Thanksgiving holiday and the fall meeting of the American Geophysical Union, thus allowing the JOIDES Office two or three weeks to prepare its part (Science Plan) of the Program Plan and mail it to JOI before the Christmas holidays. In turn, the panels and other sources of advice must meet sufficiently before the Annual Meeting or other Planning Committee meetings so that the minutes and reports can be digested in advance. The JOIDES Office will attempt to schedule its own meetings more than a year in advance, so the panels can know what dates would be appropriate for their own meetings.

Planning Year

January through June

Thematic Panels meet once , with a general agenda to evaluate proposals, prepare long-range plans, up-date white papers, and re-evaluate priorities. The PCOM may call a second meeting if it needs special advice or if the general workload of a panel is high. Panel minutes must be distributed to PCOM members three weeks in advance of the August PCOM meeting, and so to allow for preparation of minutes and possibly for correction of draft minutes, Thematic Panels should meet no later than June (if there are two meetings, June is the ideal time for the second meeting).

Service Panels meet if necessary.

Detailed Planning Groups meet as necessary to prepare prospectuses arranged from thematically approved highly ranked proposals, or to answer specific charges of the PCOM. Ideally, they should meet in time for copies of the resulting prospectus or report to be distributed by the JOIDES Office to PCOM members three weeks in advance of the August (or Spring) PCOM meeting.

March

The *Budget Committee* provides JOIDES overview and a first review of the ODP Program Plan and its budgets. The BCOM meets as necessary to propose adjustments if the scientific objectives, estimated operating costs, and target NSF budget figures do not match one another in the Program Plan for the next fiscal year.

April or May

The *Planning Committee* in its Spring meeting clears up details of the impending Program Plan, including the budget if necessary; prepares itself for scientific evaluation for the next year's plan (assigns watchdogs for possible legs, decides need for detailed planning groups and special meetings of panels or ad hoc groups, etc.); handles routine business; and devotes a major part of its meeting to planning in the 3- to 5-year frame.

Late May or Early June

The *Executive Committee* meets concurrently with the *ODP Council* in Washington or at a US Oceanographic Institution to evaluate and assess the status of the Ocean Drilling Program. At this time the

EXCOM approves the final ODP Program Plan and detailed budget for the upcomming fiscal year.

August

The *Planning Committee* meets, partly to conduct routine but necessary business. At least one day, however, is devoted to a detailed scientific discussion about the next one-year Program Plan (the Science Plan part of which will be completed at the Annual Meeting). The discussion is based on the reports and prospectuses of its panels, planning groups, liaisons, and watchdog members. From this meeting a number of specific charges and questions may be directed to panels, to be mailed from the PCOM chairman.

September

Thematic and Service Panels meet to answer specific charges and to conduct other necessary business.

The *Executive Committee* meets and formulates any new scientific and policy recommendations.

October

On 1 October a new fiscal year starts, implementing the ODP Program Plan that was based on the previous year's planning efforts.

Detailed Planning Groups meet if called, to answer specific charges of PCOM, based on the most recent advice of the thematic and service panels, and to up-date drilling prospectuses for inclusion in the Annual Meeting agenda.

Latest November-earliest December

The *Panel Chairmen* meet a day before the Annual Meeting, to discuss issues common to many or all parts of the JOIDES advisory structure.

At the Annual Meeting the *PCOM* considers EXCOM policy and the status of NSF, JOI, Science Operations, and Wireline Logging; receives annual reports of its advisory panels; prepares a detailed one-year plan for drilling in the next fiscal year; prepares a 4-year outlook (the 1 year plus 3 more); and conducts routine business.

In late December, the JOIDES Office sends the Science Plan to JOI, Inc.

November 1988

Lamont-Doherty Geological Observatory | *Palisades, N.Y. 10964*
of Columbia University

Cable: LAMONTGEO
Palisades New York State
TWX-710-576-2653

Telephone: Code 914, 359-2900

88-389

Oct. 28, 1988

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Dear Dr. Moberly,

One of the most common criticisms of the ODP is the poor communication among panels, and between panels and proponents. The JOIDES Journal is no help, since it is 6 months out of date, and reports are usually very brief. Panelists receive partial copies of the minutes of other panel meetings, but usually months after the fact. Proponents, of course, do not receive these at all. In fact, proponents usually have no official communication from any part of the program during the important early stages of planning. If they are lucky, they have a friend on a panel, who may give them a garbled version of what is going on. Many people, both within and marginal to the panel system, have no idea what is happening in other areas, although they might be intensly interested, or have important information to contribute.

I admit there is no single perfect solution to this problem, but I suggest that a large step forward would be an e-mail bulletin board. There already exist two, of course--DRILLING and ODP. These, however, come out of TAMU, JOI and the DOSECC office, and deal with very different aspects of the programs, largely what might be called press releases and meeting news. What I have in mind would be a bulletin board used by members of all the panels and working groups, as well as proponents and interested others. Items which could go on the bulletin board include:

1. Executive summaries of recent panel meetings. Posted within two weeks of the meeting. All panels, including Safety and Downhole Measurements.
2. More specific information from panels, as appropriate. (I.e. what the panels are willing to reveal of their inner workings.)
3. Requests for information or data ("Does anyone know of seismic lines on Shatsky Rise? Please contact Bill Sliter.")
4. Announcements of formal (panel, DPG) and informal meetings ("There will be an evening meeting at AGU of all people interested in the Gulf of California.")
5. Changed address or phone number, new membership of panels, etc.
6. Information on planned or completed survey cruises; capsule reports of working groups; "preprints" of things in the works ("Joe Blow is putting together a proposal to drill the Canary Islands.")

Since bulletin boards are in principle available to everyone, including other nations, this obviates the accusation that only certain people are told about things. Both as a panelist, and as a proponent, I would very much appreciate such a medium of exchange, and would use it often. I think many others would feel the same. Especially, perhaps, the non-US members, who have very few lines to the inner workings.

I respectfully suggest Omnet as a good supplier. They are very helpful, and they have arrangements for international communication. It is probably the most widely used network for oceanographers--I've heard from France, Australia, and England on Omnet.

Thank you for your consideration of this idea.

Sincerely,

Constance Sancetta

JOI **Joint Oceanographic Institutions**
INCORPORATED

Suite 800
1755 Massachusetts Ave., N.W.
Washington, D.C. 20036 USA

Telephone (202) 232-3900
Telemail: JOI.INC
Telex 257828

213

88-356

agenda file, then file LDGO logging

MEMO

DATE: 13 October 1988

TO: Lou Garrison, TAMU
Rich Jarrard, LDGO

FROM: Tom Pyle, JOI

SUBJECT: Logging tool loss and fishing policy

Having gone to all the trouble of hammering out an understanding on our policy regarding fishing for lost tools, I see no reason not to adopt it as such. I see nothing in the wording which handcuffs anyone and I see advantages in having our policy specified for the insurance company and for NSF. Therefore, the ODP policy on fishing will be as specified in the enclosure.

cc: R. Moberly

Enclosure
TEP:jlg

Enclosure 1
13 October 1988

Ocean Drilling Program

Policy on Logging Tool Loss and Fishing

1. In the event of loss of downhole tools, all reasonable efforts at drillstring and/or wireline fishing will be made. Exceptions will only be made by TAMU in consultation with LDGO in cases where operational safety or efficiency are involved or by JOI when broader programmatic issues are involved. The kind and number of fishing attempts will be the responsibility of the TAMU Operations Superintendent in consultation with the LDGO logging representative.

2. Logging at any site will not ordinarily be curtailed because of the possibility that tool loss, requiring fishing-related delay, might occur.

3. TAMU will be financially responsible for logging or non-logging use of the cable cutter/crimper, minicones, bit releases and existing fishing equipment. LDGO will be financially responsible for logging or non-logging use of the winch and logging cable. Improvements to existing fishing equipment will be explored by LDGO; the advisability of their incorporation in ODP and the assignment of responsibility will be determined by JOI as part of the annual process of Program Plan development.

September 28, 1988

88-347

215

Dr. Tom Pyle
Director
Ocean Drilling Program
Joint Oceanographic Institutions Inc.
1755 Massachusetts Ave. NW
Suite 800
Washington, D.C. 20036

Dear Tom:

We have read your memo of 22 September 1988 and note that what started out as a discussion between Rich, you and me on loss of logging tools is now evolving into Policy. This adds another bureaucratic page in the Policy Book which is unnecessary and might restrict operational decisions based on overall Program benefits.

There is no basic disagreement on any of the major points in your (and Rich's original) letter, e.g.

1. In the event of loss of downhole tools, all reasonable efforts at drill string and/or wireline fishing will be made.

   Of course they will -- they always have. Exceptions can't be regulated, but must be considered case by case and decided between TAMU and LDGO -- as they always have.

2. Logging at any site will not be curtailed... etc.

   This is an operational decision so dependent on circumstances that to generalize it as policy is bound to cause trouble. TAMU understands the PCOM mandate that every hole deeper than 400 which can be logged, will be logged. Built in to the "can be" part is a whole spectrum of possibilities which determine the "will be". I feel that we have always done our best to see that the logging program is accomplished, but when so many unpredictable elements enter into each decision, our hands should not be tied with a restrictive and unnecessary policy.

3. TAMU will be financial responsible... etc.

   This need not be policy; it only needs to be agreed upon by TAMU/LDGO and/or JOI as cases arise. There is no major disagreement at the moment, but if a $25K expense is, or is about to be, incurred because of logging, you can be sure it will be brought up for discussion. Meanwhile, what is the need of a policy listing four out of possibly dozens possibilities?

Ocean Drilling Program
Office of the Director
Texas A&M University Research Park
`10 Discovery Drive
Jege Station, Texas 77840 USA
(409) 845-8480
Telex Number: 792779 ODP TAMU
or Easylink Number: 62760290

I recommend that we put this thing to rest, Tom. It didn't start out as a large problem, but by passing it back and forth and writing it as Policy, it promises to become one. I would like to leave it at the level of Rich's letter of 31 August which represents in general my understanding of our discussion at Oxford.

Regards,

Lou

Louis E. Garrison
Deputy Director

LEG:hk

cc: Dr. N. Pisias, PCOM
Dr. R. Moberly, PCOM
Dr. P. Rabinowitz, ODP
Mr. B. Harding, ODP

JOI **Joint Oceanographic Institutions**
INCORPORATED

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Suite 800
1755 Massachusetts Ave., N.W.
Washington, D.C. 20036 USA

Telephone (202) 232-3900
TELEX JOINC
Telex 257828

MEMO

DATE: 22 September 1988

TO: Rich Jarrard, LDGO
Lou Garrison, TAMU

FROM: Tom Pyle, JOI

SUBJECT: Tool loss and fishing policy

88-337

RECEIVED SEP 26 1988

Following up on our discussions at PCOM, Rich's strawman summary and Lou's comments, I propose that ODP's policy read as follows:

1. In the event of loss of downhole tools, all reasonable efforts at drillstring and/or wireline fishing will be made. Exceptions will only be made by TAMU in consultation with LDGO in cases where operational safety or efficiency are involved or by JOI when broader programmatic issues are involved. The kind and number of fishing attempts will be the responsibility of the TAMU Operations Superintendent in consultation with the LDGO logging representative.

2. Logging at any site will not be curtailed because of the possibility that tool loss, requiring fishing-related delay, might occur.

3. TAMU will be financially responsible for logging or non-logging use of the cable cutter/crimper, minicones, bit releases and existing fishing equipment. LDGO will be financially responsible for logging or non-logging use of the winch and logging cable. Improvements to existing fishing equipment will be explored by LDGO; the advisability of their incorporation in ODP and the assignment of responsibility will be determined by JOI as part of the annual process of Program Plan development.

I think point 1 satisfies Lou's concern about "wasting time" as well as contractual responsibilities. If the spirit of cooperation embodied in the "consultation with LDGO" clause is not evident, we can make the policy more restrictive and probably less efficient. Point 3 logically makes TAMU responsible for existing fishing equipment (and avoids the excess paper work of billing LDGO for TAMU-leased crimper/cutter). Point 3 also makes the addition of fishing equipment subject to the Program Plan process and the prioritizations inherent in advice from BCOM in particular and JOIDES in general.

If you have any further comments before we finalize this policy, please let me know as soon as possible.

cc: Nick Pisias
Ralph Moberly