JOIDES PLANNING COMMITTEE SPRING MEETING
2-4 May 1989
Voksenåsen Hotel
Oslo, Norway

MINUTES

Members:

R. Moberly (Chairman) - Hawaii Institute of Geophysics
G. Brass - University of Miami
D. Cowan - University of Washington
O. Eldholm - University of Oslo, ESF Consortium
D. Falvey - BMR, Australia (for J. Malpas)
H. Jenkyns - Oxford, United Kingdom
M. Kastner - Scripps Institution of Oceanography
Y. Lancelot - Université Pierre et Marie Curie, France
M. Langseth - Lamont-Doherty Geological Observatory
M. Leinen - University of Rhode Island
N. Pisias - Oregon State University
T. Shipley - University of Texas at Austin
A. Taira - Ocean Research Institute, Japan
B. Tucholke - Woods Hole Oceanographic Institution
U. von Rad - BGR, Federal Republic of Germany
J. Watkins - Texas A&M University

Liaisons:

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

Guests and Observers:

M. Cita-Sironi - University of Milano, Italy
E. Kappel - Joint Oceanographic Institutions, Inc.
M. Storms - ODP-TAMU Engineering
J. Thiede - GEOMAR, Federal Republic of Germany

JOIDES Planning Office:

L. d'Ozouville - Executive Assistant and Non-US Liaison
G. Waggoner - Science Coordinator

Tuesday, 2 May 1989

769 Introduction

PCOM Chairman Ralph Moberly called the 1989 Spring Meeting of the JOIDES Planning Committee to order. Olav Eldholm welcomed everyone to Norway on

behalf of the NAVF, the ESCO-Secretariat, and the Institutt for Geologi of the University of Oslo. Eldholm explained logistics including a dinner party to be hosted by the NAVF. A field trip led by Bjørn Larsen of Statoil Stavanger was planned for Friday and Saturday to visit the Oslo Rift.

770 Minutes of Miami PCOM Meeting 28 Nov.-2 Dec. 1988

Moberly called for comments, corrections and approval of the previous minutes.

Pisias asked that the following clarification be added to the first paragraph under Discussion on page 5 of the Minutes: "It was noted that the $800K cost for 2 HRGBs was not only for the purchase of the guidebases, but included all costs associated with deploying and using these items."

Lancelot asked for a correction to page 35 in minute 755 New Drilling Vessel, with the third sentence of the third paragraph under Discussion corrected to read: "Lancelot said that France has **modified** an ice-breaking vessel which will be run by TAAF ..."

PCOM Motion

PCOM approves the minutes of the 28 November-2 December 1988 Planning Committee meeting with amendments. (Motion Kastner, second von Rad)

Vote: for 16; against 0; abstain 0

771 Approval of Agenda

Moberly called for additions or revisions, and then for adoption of the agenda for the meeting. Lancelot and Brass asked for additions.

PCOM Motion

PCOM adopts the agenda for the 2-4 May 1989 Planning Committee meeting with amendments. (Motion Pisias, second Brass)

Vote: for 16; against 0; abstain 0

772 Reports By Liaisons

Reports were given by the ODP Liaisons to PCOM.

B. Malfait from NSF gave an update on the NSF budget and new US oceanographic research vessels (Appendix B). There has been a reaffirmation by the new administration to double the NSF budget on a 5-year time scale. There has not been as quick a matching commitment from congress. Overall the 1989 NSF budget has increased by 9.8%. The 1990 request working its way through congress is for a 13.9% increase. Within the Ocean Sciences Division this translates into a 4% increase in 1990. The increases in the Ocean Sciences Division are for some major new initiatives such as GOFS and WOCE. 1989 overall budget for NSF/ODP related programs is $31.4M. US ODP science support is divided between unsolicited proposals $5.1M and US Science Support/USSAC $4.3M.

B. Malfait discussed changes in the US research fleet. The *Conrad* has been retired. The *Knorr* and *Melville* will be stretched. The keel has been laid for the AGOR-23 which will replace the *Thompson* operated by the University of Washington. The Division of Polar Programs is proceeding to acquire services of an Antarctic research vessel. The Division of Polar Programs and NSF/ODP Program are jointly supporting a workshop at Woods Hole in late September to plan for future US geology and geophysics work in the Arctic.

T. Pyle from JOI reported on how the ODP FY90 budget was produced (Appendix C). The budget includes $1.5 M in SOE which are already committed. $53K of the SOE is for publishing the LRP, publication of a "highlights" brochure, and includes "seed money" for thematic publications. Pyle also discussed possible JOIDES liaisons with other global science initiatives (see below). Outside liaisons were again discussed in Minute 785.

T. Pyle presented the JOIDES response to the Performance Evaluation Committee and the National Science Board reviews of the program. Responses have been made in the following areas:

> Reorganizing the advisory structure on a thematic basis by: 1) deleting the regional panels; 2) emphasizing thematic panels; 3) splitting SOHP thematic panel into SGPP and OHP; 4) adding SMP service panel; and 5) revising and updating mandates.
>
> Emphasizing timeliness of publications and need for thematic synthesis publications by: 1) providing funds for temporary copy editors in FY90 (SOE); 2) providing seed money for thematic publications in FY90 (SOE).
>
> Criticism of JOI and the lines of communication have been addressed by: 1) providing a mandate for BCOM so that its purpose is not misunderstood; 2) clarifying the JOIDES chain-of-command; and 3) clarifying JOI is sensitive to the international character of the program.
>
> Coordination with other Earth Science programs has been proposed by: 1) Liaisoning with the following groups: Arctic Ocean Drilling; National digital seismic networks (IRIS, POSEIDON, etc.); RIDGE, BRIDGE, FRIDGE; Global Sediment. Geol. Project (IUGS); Continental Drilling; WCRP-WOCE, JGOFS, etc. and 2) Briefings of PCOM by other programs (see Minute 773).
>
> Question of why there is not deeper drilling: 1) less deep drilling being proposed; 2) some objectives reached earlier than expected; 3) some lithologies still causing drilling problems.
>
> Advice on increasing "dues" has been ignored. ODP will seek more partners.

T. Pyle and R. Moberly reported on the BCOM meeting. Some of the principal concerns of BCOM included (a) potential increases in the SEDCO day-rate for the vessel have not been budgeted, (b) there appears to be little attempt to constrain

payroll costs, (c) the initial SOE was short of 4%, and (d) without increased funding in FY91 and FY92 it will not be possible to meet the technology and engineering developments necessary to move ODP into the 1990s. BCOM approved the addition of two editors to help reduce delay time for publications.

L. Garrison gave the Science Operator report on ship operations and staffing of cruises. Leg 124E was to test engineering developments, primarily the Diamond Coring System. It proved the concept of using a mining coring system for drilling core from the *JOIDES Resolution*. Leg 125 was located in the Mariana and Izu-Bonin forearc regions, where it successfully drilled serpentinite diapirs. Leg 126 has been encountering problems with loose sands and consequently getting the pipe stuck. B. Taylor has requested the relocastion of several sites. One day has been added to each of the upcoming Japan Sea legs. The request to collect a third APC core for an experiment to study biological activity using a C^{14} radiotracer elicited considerable discussion and was taken up again in Minute 779. The location of the scheduled late October dry dock has not been set, since bids are still out.

Co-Chief Scientists have been chosen through the Vanuatu Leg and staffing has been completed through Japan Sea II. Co-Chief Scientists for upcoming legs are: Loren Kroenke and Wolfgang Berger (Ontong Java Plateau); Peter Davies and Judith McKenzie (NE Australian Margin); Gary Greene and Jean-Yves Collot (Vanuatu Collision Zone); and L.M. Parson and James Hawkins (Lau Basin). Garrison also presented a breakdown by country of participation on ODP legs (Appendix D).

The 4th Annual Co-Chief Scientist Review Meeting for legs 119 to 124 was held in mid-April. It was a productive meeting with a thorough review; no major problems were identified. There was a concern that Co-Chiefs do not always fully understand the objectives of a leg as defined by PCOM and JOIDES panels. Proponents should be invited to the pre-cruise meeting if they are not otherwise participating on the cruise.

Cowan brought up a concern that the actual drilling results do not always meet the goals that were set in the proposals. Moberly said that a study is being made of expectations versus results of drilling by L. d'Ozouville. In general, HPC is usually sucessful while RCB is not as good under ODP as DSDP. Pisias noted that in general most sites do not reach the projected depth. Both Pisias and von Rad said that the proposed meeting of the former Indian Ocean Panel and Indian Ocean Co-Chiefs will be important for evaluating these kinds of problems. Malfait commented that since the scientific objectives have been reached, these kinds of problems have generated few negative evaluations. Brass said that something scientifically important usually comes out of these legs, even if it was not expected beforehand. Moberly said that at the next PCOM meeting recent Co-Chief Scientists will be present to answer questions.

R. Jarrard gave the Wireline Logging Services report. The Side-Entry-Sub (SES) has allowed increased logging of unstable holes (Appendix E), but results in increased logging time requirements and since it allows logging in unstable holes increases the risk of tool losses. There is a need for a new SES so that even if the pipe gets stuck, tools can be pulled out of the hole. Also the new SES will save up to an hour and a half for each tool change. WLS would like to go ahead and have it ready for

use on the *Resolution* by early 1990. The TAM wireline packer continues to have development problems and may not be ready for the Nankai Leg. Use of the larger diameter AMOCO pump has solved the problem of inflating the packer, but deflation of the packer is now a problem. A smaller diameter pump will be tried. The chemical sensors require cleaning after about 24 hours of deployment, this will require the presence of an Electronics Technician onboard the vessel to maintain the tool, which may cause both budgetary and space problems. TAM is now somewhat reluctant to develop the packer further since it may take another 6 months to get the packer acceptable for ODP use.

Reports were presented by the PCOM liaisons to: LITHP by G. Brass; OHP by G. Brass; SGPP by M. Kastner; TECP by O. Eldholm; DMP by R. Moberly; IHP by Y. Lancelot; SMP by M. Leinen; SSP by T. Shipley; PPSP by R. Moberly; TEDCOM by J. Watkins; and the detailed planning group CEPAC by R. Moberly. Except for TEDCOM, draft minutes of recent meetings were included in the PCOM Agenda Book.

Items brought up for PCOM's attention during these presentations included:

LITHP was concerned that NSF-supported site survey work guidelines might not be consummate with thematic planning (see Minute 790). There is a concern that the cost of deployment of a worldwide seismic network estimated at $60 to $70M, will be entirely an ODP expense.

OHP was concerned that it did not have more direct access to TAMU drilling and engineering information needed for planning. The panel was confused about the proposal review scheme, whether they respond directly to proponents or through the JOIDES Office. OHP concluded that sealevel changes should be left to SGPP. Kastner said sealevel changes should be considered by both panels, OHP and SGPP, not just by SGPP. Pisias said that OHP cannot reject ocean history outside the Neogene and must consider sealevel change, since only the sedimentary response to sealevel change belongs to SGPP.

SGPP will be writing a new "White Paper". SGPP mandate is viewed as being concerned with the sources, sinks and behavior of elements in the ocean. Two or three additional members will be requested after evaluation of membership in July. Volume A can be speeded up, but should not be published immediately off the ship.

TECP recommends a DPG to coordinate efforts for convergent margin drilling. TECP's two highest ranked proposals are Chile Rise Triple Junction and Old Pacific. Proposals to drill volcanic margins, such as Rockall, while generally having a good thematic component, require more work before they are acceptable for drilling. TECP encourages the various proponents to interact with one another to improve the proposals. G. Westbrook was reminded that a report of the Fluid Processes in Accretionary Prisms Working Group is required.

DMP has suggested guidelines for Third-Party Tool Policies that needs PCOM approval.

IHP has done an extensive survey on publications, and made formal recommendations to PCOM in its minutes. Some more staff members are required at TAMU to speed up publications regardless of which options are chosen. Lancelot made the observation that IHP may operate too close to the Science Operator, and may need to have some meetings at other locations. Pisias and Lancelot were both concerned with the format and quality control used by ODP to archive data. Pisias said he would write up what he sees as the position PCOM should take on putting ODP data on CD ROM and problems with archiving data. Leinen commented that SMP is also considering these problems. Kastner was concerned about who makes the decisions about data storage.

SMP has made some specific recommendations for shipboard improvements.

SSP has complained that it doesn't see proposals until they are "mature". Moberly pointed out that they see those with thematic priority.

PPSP needs additional information for evaluating the Cascadia and Vancouver programs.

TEDCOM regards the cost estimates in the Long Range Plan for engineering development to be too low by a factor of 2. ODP-TAMU Engineering may be trying to do too much. TEDCOM wants to form a subcommittee of 5-6 people plus a consultant from the British Geological Survey (travel expenses paid by JOI) to focus on the DCS and mining drilling and make recommendations about development.

773 Arctic Drilling

Arctic drilling was discussed by J. Thiede. He presented the scope and present status of the proposed drilling program that is developing within some countries. The presentation was followed by a general discussion. Arctic drilling is representative of a number of major new international geoscience programs with which JOIDES intends to develop and maintain some sort of liaison for mutual advantage.

774 Engineering developments at TAMU

Engineering developments at TAMU were discussed by M. Storms, including principal systems under development, and results of the tests completed on the Engineering Leg. The Diamond Coring System was successfully deployed under severe operating conditions with successful "active" heave compensation under environmental conditions in excess of design parameters for the system. Increasing the drilling depth capability of the DCS from its present 2000 m depth limit to 3500-4500 m is estimated to cost $700K to $800K. A further test of the DCS will be conducted on land, probably in chert and chalk sequences in the UK or France. Test of the Navi-drill core barrel showed that the new Mach 1P, "drainhole" mud motor, is a significant improvement over previous designs. Motor failures and other design problems, however, indicate more work is needed before the Navi-drill can be deployed routinely as required for use of the Geoprops probe.

Discussion

Lancelot was concerned that the on-land test would not be the same as drilling interbedded chert and calcareous ooze which is causing some problems.

Wednesday, 3 May 1989

775 Relative Costs to Achieve Compatibility between DCS Hole Size and Logging

The relative costs to achieve compatibility between hole size and logging were presented. A basic problem is that the Diamond Coring System (DCS) is designed to be most effective while coring holes with diameters too small for the present suite of logging tools. Assuming the DCS might be deployed on the *Resolution*, Mike Storms presented the ODP-TAMU Engineering estimates of the relative costs to achieve compatibility between the 4-inch diameter borehole made by the DCS and the minimum 5-inch (preferably larger) borehole required to use the present suite of logging tools. It is estimated that reaming a preexisting 4-inch diameter, 500-m borehole made with the DCS, to a 7.5-inch borehole compatible with the present suite of logging tools, requires 17.5 days of drilling time and would cost $76K for the drilling hardware needed for just the reaming. The estimated cost for increasing the size of the borehole drilled by the DCS to 5 inches is $2.72M (mainly purchase of larger diameter drill string and its racking system), and would require 2-3 weeks in dry dock for modifications to the *JOIDES Resolution*. Drilling a hole greater than 6.5 inches in diameter with the DCS would require even more extensive modifications to the *JOIDES Resolution*. It was noted that reaming, besides being exceptionally slow, has its own particular drilling problems including sticking the pipe.

Rich Jarrard for WLS provided an estimate of $60K per leg to rent a basic logging tool assembly for a 4-inch diameter hole. That assembly, however, would sacrifice a considerable amount of valuable information that is obtained with the suite of logging tools currently in use. Modifying the present tools for use in a 4-inch hole would be prohibitively expensive, and in the case of geochemical logs, impossible to achieve. With the current budgets a choice between renting tools for high temperature logging and logging 4-inch holes would also have to be made.

A further cost-analysis on drilling a 4-inch hole with the Diamond Coring System for core recovery with a second but larger hole drilled (but not cored) for logging purposes will be prepared before the next PCOM meeting for mailing to PCOM. Theoretical studies of hole cooling by circulation of drilling fluids will continue by WLS for presentation at the next meeting. In any event, an increase in funding appears to be necessary to achieve compatibility between hole size and logging if the DCS is used.

Discussion

Kastner, Langseth and Brass all expressed concern that the wireline packer cannot be deployed in the 4-inch DCS hole. Brass and Kastner were also concerned with the effect of corrosive environments on the packer. It was pointed out that the primary goal of using the DCS is to recover core.

Brass wanted to know the advantage of drilling a second hole over reaming the 4-inch hole. Storms said reaming is often unsucessful due to problems peculiar to reaming. Brass was concerned that cores and logs would not come from the same holes.

Lancelot expressed concern that with only a slow increase in funding, the chance of a major breakthrough in drilling technology is slim. A series of failures will put ODP in a poor situation. ODP should drill what it can do the best now and wait until after 1993 and any major increases in funding to develop these drilling capabilities. Brass was concerned that if an attempt is not made to reach COSOD I & II objectives by 1993, then ODP is equally open to criticism.

Pisias wanted to know if going to the larger pipe limits the depth of drilling. Storms said that the pipe storage capabilities will be reduced from about 9 km to about 7 km with the larger pipe. Pisias said that the thematic panels should be aware of this limitation.

Leinen wanted to know if the 5-inch DCS system could be developed now. Storms said that the optimum way to proceed is to prove the concept of deploying the DCS from the drill ship with the 4-inch DCS system and then develop the 5-inch system. Jarrard asked if using the larger pipe precluded using the smaller pipe. Storms said that this would be so due to ship modifications for using the larger pipe.

Eldholm said that for some programs recovery of cores is the most important factor. A reduced logging and downhole measurements program may be necessary to attain some COSOD goals.

It was generally agreed that continued testing of the 4-inch DCS system concurrent with other development studies was the most realistic choice.

776 CEPAC Programs

PCOM watchdogs for CEPAC programs reported on their maturity. There was virtually no change from the PCOM Agenda Book summary. In the order of the listing of the last CEPAC prospectus, these were the programs of high thematic rank through fall 1988, and their PCOM watchdogs. R. Moberly attended the recent CEPAC DPG meeting, where on 12 April each program's status was reviewed and is summarized in brackets below. All need PPSP reviews.

Hawaii Flexure: G. Brass [Little new information, except a response from D. Kent on dating: paleomagnetism may give reversal datums but provides no precision between datums. GLORIA records show products of abundant mass wasting in moat and of extensive volcanism on arch.] TECP needs to decide if the dating resolution is sufficient to test the flexure models.

Chile Triple Junction: O. Eldholm [Processing of MCS is continuing. Recently acquired GLORIA data in the region. Final endorsement by TECP as a 1-leg or 2-leg program will depend on final presentation of data.]

Cascadia Accretion: D. Cowan [Safety preview was in March. Extensive MCS funded for Oregon margin for summer, and probably funded for Vancouver margin for summer].

Old Pacific: A. Taira. [Needs specific drilling sites based on what is available now; proponents are to prepare. Sites for the Pigafetta Basin will be readjusted after Y. Lancelot cruise in late summer.]

Atolls and Guyots: B. Tucholke [Evaluation of recent cruise information virtually complete. Proponents will have revised proposals by early June. Remaining problems: design of 1-leg vs 2-leg program; uncertain recovery in part of reef holes. CEPAC has recommended that a test of recovery methods be made on MIT Guyot on the next engineering leg.]

Ontong Java Plateau: M. Kastner [This was approved for the FY90 schedule. In response to PCOM's directive, CEPAC members and a guest from OHP prepared a 1-leg program, based on the L. Mayer et al combined proposal, of 4 sites for the Neogene depth-transect objectives and one deep site for the Paleogene and basement objectives. There have been questions about the assignments of co-chiefs.]

Eastern Equatorial Pacific: M. Leinen [Sites can be placed on the two long north-south transects after the funded site-specific survey at the end of this summer.]

North Pacific Neogene: Y. Lancelot [In response to PCOM's directive, CEPAC members and guests have prepared a l-leg program based on combining the three proposals. It will be sent to the thematic panels. No additional survey or processing seems necessary.]

Bering Sea: Y. Lancelot [In response to PCOM's directive, CEPAC members and guests prepared a 1-leg program based on the proposals. It will be sent to Thematic panels. Information is complete for two areas. Soviet geophysical data would aid site selection at Shirshov Ridge, where the ideal site probably would lie west of the US-Soviet treaty boundary. Direct Soviet participation in ODP would help, but there will be attempts anyway to acquire the Soviet data.]

Shatsky Rise: H. Jenkyns [Much depends on the ability to recover alternating hard chert and softer chalk or limestone lithologies, especially in nodular sections in which a nodular "roller" blocks the bit throat. CEPAC recommended a site on Shatsky for the next engineering leg. An additional old seismic line through Hole 47 has come to light. The scientific aims for the Ogasawara Plateau proposal seem to fit closer to Shatsky Rise than Atolls and Guyots.]

Deep Crust at 504-B: G. Brass [Awaiting the clearing of junk that is in the hole.] Hangups have been at expansion joints, so there may not be a buckle in the casing.

EPR Bare-rock Program: G. Brass [In March the revised D. Fornari et al. proposal was received. Objectives are keyed to the LITH White Paper, and an area at 9° 43' N was selected based on a synthesis of new and older information. The French proposal will be revised by late summer, for an area farther north. LITHP should evaluate these proposals next fall. There are requirements for obtaining core and fluid samples and measurements in young brittle rocks, some of which may be hot.

In preparation for legs in young basalt, CEPAC recommends that a test site in the Mariana trough be included in the nest engineering leg.]

Sedimented Ridges: M. Langseth [PCOM has charged a DPG to plan a site-specific program of two Juan de Fuca legs, one in the Middle Valley hydrothermal system, and one in the sulfide system to the south. The DPG, composed of the former Bare Rock and Sedimented Ridges working groups and chaired by Bob Detrick, meets 13-15 June in Ottawa. There are requirements for sampling and measuring hot and corrosive fluids.]

Young Hotspots: Loihi: R. Moberly [All survey work is completed. The petrologic objectives require obtaining young, brittle rocks. The natural-laboratory objectives are not compatible with the M. Purdy et al. request for a hole for a down-hole seismometer near Hawaii to detect teleseisms because Loihi itself is an active seismic source.]

777 FY90 Rescheduling; Engineering Development Legs

In light of the probable delay at Nankai and the initial statement by TAMU engineers that they would need about one year after Leg 124-E to prepare for another engineering leg, Moberly had asked L. Garrison and also CEPAC to prepare some draft schedules for a revised FY90 program. To accommodate these delays and minimize weather and transit difficulties, the drafts proposed that in addition to the legs previously accepted, there be included an Old Pacific leg and one leg of the Atolls and Guyots program, based on the maturity of those proposals and their thematic standing.

Evaluation of FY90 rescheduling commenced with extensive discussion of the Nankai program, because of concerns about: 1) the uncertain status of several of the geotechnical instruments scheduled to be deployed during the Nankai Geotechnical Leg (Navi-drill, Geoprops probe, TAM wireline packer); 2) the weather; 3) one-leg versus two-leg drilling strategies; and 4) which sites were the proper ones to drill.

Brass and Pisias were both concerned that the thematic panels have identified the Navi-drill and Geoprops probe as necessary for a successful leg. Jarrard said that fluids can be sampled from cores and the scales of permeability can be measured using other tools which are available. The tools under development will enhance the types of measurements that can be made but a successful program can be done with what is available. Brass questioned why delay the program if it can be done now. Both Langseth and Kastner said that although better results will be obtained by having these tools available, scientifically valuable results could be obtained without them.

Cowan asked that Taira explain why the science is important without the measurements made by the new geotechnical tools. Taira explained that the original proposal was made without Geoprops, using the packers that provided good results at Barbados. Nankai will provide major understanding of processes at accretionary margins even without the new tools. Shipley said that the FPAP view is that a spectrum of structures, sediment types, convergence rates and other parameters involved in accretion need to be studied. Nankai has good geophysical

imaging, the sediments provide good reflections and structures show up well. Other margins such as Vancouver will eventually have this quality of structural imaging, but Nankai is the best right now. It also has more background information provided by extensive drilling in surrounding areas. The weight of information favors drilling at Nankai.

Cowan, Leinen, and Eldholm all wanted to know if a conventional leg at Nankai would be a significant advance without the geotechnical tools. Why not wait and make a quantum leap at Nankai? There was a general concern that delay of the leg after 1990 might result in postponement until near the end of the current drilling program. Both Pisias and Langseth were concerned that the Japanese have invested considerable money in arranging the oblique seismic experiment and the "ONDO" experiment. Coordination with the Japanese vessel requires that any postponement be until March, which will allow additional time for finishing the Geoprops tool. von Rad said that the SGPP minutes suggest that Nankai can be done successfully without Geoprops.

Moberly asked Taira what the drilling strategy would be if the Geoprops tool is not available. Taira said it depends on whether it is a one-leg or a two-leg program. In a two-leg program drill NKT 10 & 1 on the first leg and NKT 2 on the second; in a one-leg program drill NKT 2 & 1. Both Taira and Kastner absented themselves after answering questions during the following discussion and votes.

A poll of PCOM members showed that although an initial drilling leg would benefit from the use of the geotechnical instruments under current development, it was generally agreed that the scientific objectives of the Nankai Leg, as originally proposed, stand on their own without the Geoprops probe; therefore the following motion was made.

PCOM Motion

PCOM reaffirms its acceptance in the FY90 drilling program of a Nankai Leg , independent of the availability of the Geoprops tool. (Motion Pisias, second Watkins)

Vote: for 13; against 0; abstain 1; absent 2

Because of the questions about the necessity of delaying the Nankai program if it can be done now, the following motion was proposed. Discussion by Garrison pointed out that this time period is the worst weather at Nankai and it does not allow any possibility of having the Geoprops ready. Jarrard also said that the new SES will not be ready at that time and that this would result in greater danger of loosing the downhole experiments. Langseth also pointed out that the "ONDO" experiment cannot be done until after the beginning of March.

PCOM Motion

Schedule the Nankai Leg to be immediately after the dry dock. (Motion Brass, second Leinen)

Vote: for 0; against 12; abstain 2; absent 2 **(Failed)**

Since there was a general consensus that new engineering developments are essential for the continued success of ODP, and field testing is a necessary component of the development process, PCOM next discussed how to manage future Engineering Development Legs.

Pisias suggested that a rigid policy may not be attainable, since the scientific needs should determine priorities. He suggested that participation of scientists in developing these legs is essential and there should be both a scientist and an engineer Co-Chief Scientist arrangement. Eldholm said that flexibility is needed, but PCOM should establish the priorities. Proper preparedness is required before sea trials.

Lancelot said that some initiative by TAMU Engineering is good, they have undertaken the solution of general problems associated with drilling, however PCOM needs to set some priorities for engineering developments. Brass said that high priority scientific requirements must be translated into engineering developments. Kastner, Tucholke, and Jarrard all emphasized the need for flexibility.

Garrison and Storms both commented on the problem of poor site selection on Leg 124E. The options seem to be either to occupy sites drilled previously or to do site surveys as extensively as is done for science legs. Leinen noted that the site surveys do not have to be as extensive as for the science legs, since the science content does not have to be evaluated against other competing programs, but rather if the specific goal of the engineering test can be done at that site.

Storms suggested that the science staffing should be limited in number, but should include those persons who understand the long-term engineering development goals. Proponents of engineering developments should also be included.

PCOM Consensus

PCOM affirms the use of the ship's time for testing of engineering developments in joint science-engineering legs or within a scientific leg, as opportunities and the stage of developments allow. PCOM, however, will not include such uses of the drilling vessel without some assurances that the time will be used to good advantage, and therefore provides some guidelines as follows: PCOM in consultation with ODP-TAMU Engineering and with the advice of JOIDES Panels, will establish priorities for these legs, check that preparations for tests are adequate, and determine if the necessary site surveys are available for proper site selection.

PCOM Consensus

There will be both an engineer co-chief and a science co-chief on the engineering development legs. Although the scientific staffing of these legs should be minimal, staffing should include JOIDES panel members or other scientists concerned with the long-term engineering development goals, and proponents of the particular engineering development undergoing tests. During the leg itself, engineering operations will have priority over scientific objectives.

PCOM Consensus

Engineering legs will not be given an "E" designation, but will be sequentially numbered along with the scientific drilling legs.

PCOM Consensus

The next engineering development leg should be a joint science-engineering leg to test developments aimed at bettering the drilling and recovery of chert-chalk sequences, reefal limestones, and young brittle crust. The JOIDES structure will be asked to find appropriate sites at Shatsky Rise, M.I.T. Guyot, and in the Mariana Trough (if too deep, Bonin back-arc basin), as well as provide appropriate advice on a scientific Co-Chief and other staffing. TAMU's estimate of approximately two months of ship time was thought to be reasonable.

The draft insertion of two scientific legs and a longer science-engineering leg into the FY90 schedule would delay the transit east across the equatorial Pacific from Lau to 504B by about 5 months. Concerns expressed by Kastner, Brass and Pisias about the coincidence of the EPR drilling with the end of the current drilling program showed that PCOM members wanted no such delay. Lancelot absented himself from the room during the following discussion. The position of the four southwest Pacific legs (Ontong Java, NE Australian Margin, Vanuatu, Lau) on the program, including their weather constraints, was evaluated, but most discussion concerned Atolls and Guyots, Geochemical Reference, and Old Pacific. These three programs were examined carefully, including rankings, maturity of proposals, the weather, and transit backtracking. Pisias pointed out that Atolls and Guyots has not yet been evaluated thematically by OHP and SGPP. Revised proposals for Atolls and Guyots also have not yet arrived for review, precluding any decision about which leg of two potentially strong ones should be drilled first. Additionally, concerns by Tucholke, von Rad and Brass about low recovery of reefal limestones might be answered on the science-engineering leg. These concerns resulted in the following motion.

PCOM Motion

Remove Atolls and Guyots from consideration for the the FY90 drilling program. (Motion Leinen, second Eldholm)

Vote: for 12; against 0; abstain 3; absent 1

A discussion was held comparing Old Pacific and Geochemical Reference programs. Old Pacific had received high ranking from both TECP and the former SOHP panels, while Geochemical Reference had received high but not the highest ranking by the LITHP. Jenkyns suggested that there was some question about whether Jurassic oceanic crust and sediments would be found at the proposed sites for Old Pacific, and consequently a pilot hole drilled in the Pigafetta Basin during the Engineering Development Leg might be more appropriate. Since the goal of the Old Pacific program is to sample the oldest oceanic crust, this was not judged to be a problem. Langseth questioned whether the site survey data for Old Pacific will be ready for drilling. Sites can be chosen however, from the present data and subsequently

adjusted based on data obtained from the cruise of Lancelot. This discussion led to the following motion.

PCOM Motion

Remove Old Pacific from consideration for the FY90 drilling program. (Motion Kastner, second Brass)

Vote: for 6; against 6; abstain 3; absent 1 **(Failed)**

A straw vote showed that the majority favored the substitution of Old Pacific, because of its higher thematic ranking, for Geochemical Reference. Tucholke expressed his concern with this substitution. The thematic rankings given to Geochemical Reference by LITHP and WESTPAC were reviewed. Moberly pointed out that such global programs as geochemical reference, excursions of the magnetic field, stress in the lithosphere, and seismic observatories generally will fail in head-to-head competition with many individual programs, yet the start must be made sometime. Leinen pointed out that LITHP ranked it behind both 504B and EPR drilling, for whose advancement in the drilling schedule this rescheduling is being done. It was suggested by Kastner that results from drilling Old Pacific will help to improve any future Geochemical Reference Leg and it is not lost forever from the drilling schedule. A subcommittee of PCOM, consisting of Eldholm, Falvey, Pisias and Taira with the help of Garrison, was appointed to suggest a schedule for drilling in FY90 from the accepted programs. This led to the following motion and consensus, that in effect substituted an Old Pacific Leg for the Geochemical Reference Leg previously scheduled for FY90.

PCOM Motion

PCOM adopts the following approximate schedule for the FY90 drilling program.

129	Nov.-Dec. 1989	2 mo.	Old Pacific
130	Jan.-Feb. 1990	2 mo.	Ontong Java Plateau
131	Mar.-Apr. 1990	2 mo.	Nankai
132	May -June 1990	2 mo.	Engineering (Shatsky, MIT, Mariana)
133	July-Aug. 1990	2 mo.	NE Australia Margin
134	Sep.-Oct. 1990	2 mo.	Vanuatu
135	Nov.-Dec. 1990	2 mo.	Lau-Tonga

(Motion Brass, second Langseth)

Vote: for 12; against 0; abstain 2; absent 2

PCOM Consensus

Following Leg 135 there will be a transit of the *Resolution* eastwards across the Pacific to Site 504B and East Pacific Rise to prepare for drilling in these locations.

For Co-Chief Scientists on the Old Pacific Leg, PCOM nominated in no order of preference: Y. Lancelot, R. Larson, P. Vogt (who were suggested previously by SOHP and CEPAC) and J. Natland.

778 General Track of the Vessel, Spring 1989 - Spring 1992

PCOM had not been meeting its obligation to determine the general track of the vessel sufficiently in advance to be able to allow for orderly site surveys and reviews and maturation of proposals. To attain again a four-year general plan, PCOM was to advance its planning in two stages one year apart. The main order of business for PCOM at Oslo was to have been to determine the general course of the vessel for the period between the end of FY90 planning, and three years in advance of drilling, or to Spring 1992. The main order of business at next spring's PCOM meeting was to have set the general course for four years in advance, or to Spring 1994.

PCOM planned the direction through calendar 1991, somewhat less that three years in advance of the vessel, namely the specific legs for FY90 (see preceding minute), and a general direction in the easternmost Pacific in calendar 1991 from among programs that had received high thematic ranking as suggested by Brass.

PCOM Motion

PCOM will schedule the general ship track for calendar year 1991 from among the following list of programs given high priority by the thematic panels: Cascadia Accretionary Prism; Chile Triple Junction; Eastern Equatorial Pacific Neogene Transect; East Pacific Rise Bare Rock Drilling; Hydrothermal Processes at Sedimented Ridge Crests; Lower Crust at Site 504B. (Motion Brass, second Kastner)

Vote: for 13; against 0; abstain 2; absent 1

The effect of this motion will be that at its November 1989 Annual Meeting, scheduling for the Program Plan for FY91 will (a) start with the two-month engineering operations and transit Leg 136, to clear the junk from the bottom of 504B and set two hard-rock guidebases on the EPR, followed by (b) selection of 10 months of scientific drilling from the 9 potential legs of the 6 scientific programs listed in the motion. Presumably, 5 legs will be selected on the basis of continued thematic evaluations, engineering developments, and proposal maturity, as well as weather and transit constraints.

Eldholm, Brass, von Rad, Watkins, Tucholke, Lancelot and Kastner all expressed concern that a reasonably sufficient opportunity has not been given for new and revised proposals to be submitted for thematic evaluation and ranking, before planning the general position of the vessel beyond 1991 and the end of the present program. Eldholm suggested that the drilling community must be made aware of the deadline involved if proposals are to be considered for drilling in this phase of the program before these slots are filled. Watkins suggested that if there is a perception that the ship will stay in the Pacific, then proposals for elsewhere will not get submitted. Proposals need to be in the JOIDES Office no later than August 15, 1989 if the thematic panels are to receive them by fall. The thematic panels will meet twice (early fall 1989, late winter 1990) to provide rankings before spring 1990, when PCOM will determine the general direction of the vessel through spring 1994. The PCOM Chairman is asked to call again for revised and new proposals, and to

alert the thematic panels to their major responsibilities over the next two panel meetings.

779 Radioactive Isotopes and Enriched Stable Isotopes

L. Garrison requested from PCOM the time to collect a third core at a site in the Japan Sea, and his request raised an unexpected problem. UK microbiologists had proposed to the Science Operator to conduct C^{14} radiotracer experiments onboard the *Resolution* on on a third APC core collected for that purpose. This disclosure generated considerable controversy. PCOM was concerned (a) that radioisotope reagents (as opposed to the radioactive sources sealed in logging tools) were going to be used onboard the *Resolution,* even though their use might lead to contamination of the vessel and (b) that another experiment was to be conducted that had not gone through the proper review by appropriate JOIDES panels and which had not received PCOM approval. Brass and Kastner explained the difficulties in maintaining clean laboratories on the vessel. Kastner stated that, even though the proposal would not involve stable isotopes, it was exceptionally important to keep solutions of concentrated stable isotopes from the ship, as spills become impossible to detect. Kastner and Brass emphasized the necessity of totally banning under any conditions all enriched stable isotope solutions from the *Resolution.* Pisias said that any policy that is adopted should govern both enriched-stable and radioactive isotopes. Furthermore, Taira pointed out that without proper approval from Japan, the use of these radioisotopes could prevent the *Resolution* from entering Japanese harbors. It was agreed that a formal policy on the use of enriched stable and radioactive isotopes is needed for the *Resolution.* UNOLS guidelines were suggested as a starting place. Jenkyns said the UK deems this experiment extremely important. PCOM also recognized the importance of this experiment towards broadening the scientific base of participation in ODP and regretted that it had not heard of the proposed experiments until such a late date. It was suggested by Taira and Tucholke that alternative laboratories to the *Resolution's* could be used to conduct these experiments, either by transfer of the core ashore or onto another vessel. Taira indicated he would help to identify an onshore lab. These discussions produced the following motion and consensus.

PCOM Motion

Neither enriched stable nor radioactive isotope reagents will be brought onboard the *Resolution* until such time as the Shipboard Measurements Panel provides satisfactory guidelines for their use to the Planning Committee. (Motion Brass, second Falvey)

Vote: for 12; against 0; abstain 4

PCOM Consensus

PCOM endorses the use of ship time for obtaining a third APC core for the UK bacteriological experiment. The proposed experiments using C^{14} radiotracers cannot, however, be done at this time on the *Resolution.* Use of laboratories on

another ship or shore-based laboratories is recommended for the C^{14} radiotracer experiments.

Thursday, 4 May 1989

780 Publications

The problem of publications was extensively discussed since a major criticism of reviewers of ODP has been the delay in publication of Initial Reports and Scientific Results, as well as the lack of thematic (synthesis) publications. Related is the problem that ODP publications have not become fully accepted as peer-reviewed literature, especially outside the drilling community. There is strong sentiment among some that policy be changed to favor a more immediate and unrestricted publication in the open literature. A return to the style and guidelines of DSDP days has also been suggested, which could even be speeded up because so much work can now be done onboard ship with computers. PEC II recommended that Part A [Initial Reports] be published so as to appear within one year of the end of the cruise, "even if this means some sacrifice in appearance and makes for unhappy paleontologists." Two-thirds of respondents to the IHP survey thought IR publication could be accelerated by 1 to 4 months. The present schedule calls for 14 months, but the IRs are appearing about 16 to 18 months post-cruise. With most IR material now ready for publication at the end of a leg, the main requirements for time seem to be for 1) biostratigraphic adjustments, 2) preparing or improving illustrations, 3) editing, and 4) printing and binding.

PEC II also suggested that "every effort be made to publish [Part B, the Scientific Results] in less than 30 months." Sixty per cent in the IHP poll thought the results should be published less than 30 months post-cruise; only 5% said 36 months or more. At present, 36 months is the target, but about 45 months is the actual time to appearance of the SR volumes. A major delay is post-schedule receipt (or non-receipt) of manuscripts from authors.

Discussion

Brass said that the Initial Reports are an effective way of communication, while it does impede publication in the open literature, this may not be a serious problem. Lancelot said the Initial Reports are a specialized literature that gives the permanent results of ODP research, however, faster publication in the open literature is required. Kastner agreed that more publication in the open literature is needed. Cowan said that Leg 110 has produced numerous publications in the open literature. Taira emphasized that what is needed is a less restrictive policy on individual publication in the open literature. Pisias cautioned against creating a free-for-all onboard ship, if there are not some rules about joint authorship.

Both Brass and Pisias suggested that the Initial Reports are always going to be viewed as a "grey" in-house literature and that it is a waste of time and resources to try and "bleach it". Pisias recommended adoption of the IHP suggestions. Eldholm agreed that the discussion should focus on the IHP recommendations. Lancelot,

von Rad, Brass, Pisias, Leinen, Kastner, Eldholm and Tucholke all affirmed that what comes off the ship is what should be submitted to the printer 3-4 months post-cruise. Langseth suggested that some flexibility should be retained.

Tucholke said that the IHP suggestions for outside publications is overly restrictive. Publication of new ideas based on personal experience should be allowed without having to include the shipboard science party. Some flexibility must be allowed. Lancelot suggested that the Co-Chief Scientists and staff representatives could decide what can be published in the outside literature at the 3-4 month post-cruise meeting. Brass suggested that during the 12 month period following a cruise, any paper that has had its topic and authorship agreed to by the shipboard party could be published outside. Tucholke said that obligations to contribute to Part B may have to be redefined, so that the inclusion of reprints satisfy these obligations. Lancelot said that preprints of outside publications would also satisfy the obligation and could save time for the reviewers. Garrison expressed concern that permission from outside publishers would have to be obtained to include reprints or preprints.

Langseth voiced his concern that the persons who do the site survey work sometimes have their data published by others, they also need to be included in this process. Moberly said that the site survey chapter can include both the shipboard team and those who did the initial surveys. Brass noted that present policy allows site survey persons to be included at their wish. Pisias observed that site surveys are funded by outside agencies and sometimes done by scientists outside the JOIDES structure, and their publications cannot be restricted by ODP policy. Falvey said that the rights of the site survey data owners should be respected.

von Rad was concerned that the quality of Part B might be decreased if there is a mixture of reprints, preprints, and manuscripts. Lancelot suggested that it would increase the value of Part B. Garrison was concerned that problems with copyrights may increase publication time. Brass suggested that a cover letter be sent out by ODP to publishers stating that ODP reserves the right to reprint the paper in Part B. Brass, Pisias and Eldholm suggested that IHP needs to draft a policy for ODP concerning rights of site survey data owners, copyrights, etc. to be published in the JOIDES Journal.

von Rad asked what period of time the ODP publication policy would cover after a cruise, would it be 30 months? Tucholke, Cowan and Pisias suggested that 30 months for publication was not an unrealistic time. Tucholke said that the main need is to set a deadline for submission of manuscripts.

Langseth questioned the continued need for the Editorial Review Boards if PCOM is backing off from the intent to make the ODP literature "white".

PCOM Motion

PCOM endorses the publication policy outlined below and forwards it to EXCOM for adoption by ODP. (Motion Brass, second Eldholm)

Vote: for 14; against 0; abstain 2

ODP Publication Policy

In order to provide a framework for more timely publication, both in the ODP literature and in the open literature, while maintaining the integrity of the Scientific Results volumes, PCOM recommends the following policies for publications.

A. The Initial Reports volume will be scheduled to appear within one year of the end of a drilling leg. A small meeting of the co-chief scientists and key personnel, about 3 or 4 months post-cruise, will refine, edit, and complete the Initial Reports volume, which essentially will be what had been written onboard ship.

B. The Scientific Results volume will be scheduled to appear 30 months from the end of a drilling leg. The volume can be composed of contributions directly to the volume, as well as reprints and preprints of publications submitted to the open reviewed literature. These latter two options are subject to the following restrictions:

   1. Any submission for publication within 12 months post-cruise must have had its authorship and theme agreed to by a consensus of the scientific party before the end of the cruise. The co-chief scientists will examine the manuscript to ensure that the agreement about theme and authorship has been fulfilled.

   2. Any submission for publication between 12 months post-cruise and the fulfillment of the author's obligation to the Scientific Results volume must have had its theme and authorship agreed to by a consensus of the scientific party at the main post-cruise meeting. The co-chief scientists will examine the manuscript to ensure that the agreement about theme and authorship has been fulfilled.

   3. After the author's contribution to the Scientific Results volume has been accepted, authors may publish at will in the open literature.

C. Within this policy framework PCOM will direct its Information Handling Panel to advise it of more detailed guidelines. They will include for example, issues regarding copyright, site-survey publications, lead times to meet publication dates, and editorial policy including the need for an editorial review board.

781 Thematic Publications

The subcommittee of PCOM on Thematic Publications chaired by M. Leinen recommended that thematic publications cover multiple-leg topics, focus on themes (e.g. processes, conceptual models, environments, history), and highlight ODP

results in the framework of their influence and contributions to science. They suggest a "Dahlem Conference" model, where papers are submitted in advance as a pre-requisite for attendance; papers evolve as a result of interactions; volumes of papers are published quickly; and Dahlem conferences are familiar to geoscientists. Thematic panels would suggest appropriate themes. To begin with, funding would be from co-mingled sources (estimate around $50K). Publications of the volumes would be by firms or societies outside of ODP, such as AGU or Kluwer, which have experience with these types of publications. Other funding sources will eventually take over when the conferences are well established. Thematic symposia at meetings are also to be encouraged, especially those that result in special issues of journals. PCOM has asked the thematic panels to take the lead toward thematic publications. The PCOM chairman and PCOM liaisons will keep reminding panels of this responsibility.

Discussion

Tucholke said that in order to be sucessful it is essential to find someone who is motivated to prepare the synthesis volumes. Lancelot was concerned that adoption of the "Dahlem" model would prevent other ways of generating synthesis volumes from being tried. Cowan thought that this was the wrong approach as well, since it does not get a wider community involved and participating in ODP. Falvey agreed that wider community involvement is required, with more open symposia. Kastner expressed the concern that symposia volumes are also "grey literature".

782 Third-Party Tool Policies

Third-Party Tool policies were discussed. Keir Becker wants to turn over to ODP-TAMU the operation and maintenance of the drillstring saddle packer that he developed. Because that would involve future support by co-mingled funds rather than by US funds alone, any transfer should first be approved for reasons of scientific value by DMP (they have done so) and for policy by PCOM. TAMU Engineering has agreed to accept the packer for routine operations.

PCOM Motion

PCOM accepts the Downhole Measurements Panel's recommendation that the operation and maintenance of the drillstring straddle packer developed by Keir Becker be turned over to ODP-TAMU. (Motion Pisias, second Langseth)

Vote: for 14; against 0; abstain 2

The Downhole Measurements Panel has suggested guidelines for monitoring third party tools. A subcommittee of PCOM consisting of D. Cowan, M. Langseth and N. Pisias, examined these guidelines and recommended their adoption by PCOM.

PCOM Motion

PCOM accepts the guidelines for monitoring third party tools suggested by the Downhole Measurements Panel. (Motion Langseth, second Cowan)

Vote: for 11; against 0; abstain 4; absent 1

783 Rewording of Panel Mandates

Some rewording of panel mandates have been proposed and the following motion resulted.

PCOM Motion

PCOM recommends and forwards to EXCOM for approval the following proposed rewording of mandates:

1) The Technology and Engineering Development Committee was concerned that it is described as responsible for ensuring, rather than for recommending, the proper tools. In section 5, paragraph 1, change *ensuring that* to *recommending to the Planning Committee,* so that the paragraph now reads "The Technology and Engineering Development Committee (TEDCOM) is responsible for recommending to the Planning Committee the proper drilling tools and techniques to meet the objectives of ODP drilling targets, especially those for achieving highly-ranked objectives identified in ODP long-range planning."

2) Shipboard Measurements Panel noted that an important shipboard activity was left out in last year's attempt to stuff all activities into the mandate. In section 7.6.2(d), add *paleontological* and *micropaleontological* to the listing so that the paragraph now reads "(d) Petrological, mineralogical, sedimentological, biological, paleontological, micropaleontological, organic and inorganic geochemistry analysis, and such equipment as microscopes for performing these measurements;"

3) Ocean History Panel requested that the phrase *ocean paleoproductivity* replace the phrase *sedimentation patterns* in view of the fact that this concisely describes one area of particular concern, so that section 4.5 now reads: "(a) Long-term history and driving mechanisms of the evolution of the ocean, atmosphere and biosphere. Central to this theme are relations among plate tectonics and ocean paleocirculation, ocean paleoproductivity, global paleoclimates, glacial and ice-sheet evolution, sea level change and its effect on marine sedimentation and evolution of marine life."

(Motion Langseth, second Eldholm)
Vote: for 15; against 0; abstain 1

784 Long Range Planning Document

The Long Range Planning document was reviewed. A new section on costs has been added. Pisias wanted to acknowledge the contributions of the thematic panel chairmen, L. Mayer, R. Detrick, I. Dalziel, E. Suess and N. Shackleton as well as input from PCOM members G. Brass, D. Cowan and J. Malpas. Pisias said that it appears that ODP has reached the optimum balance between the pace of engineering development and design of scientific drilling experiments.

Discussion

Langseth suggested that the hole diameter for the DCS should on page 67, be left more flexible than specifying that the 4-inch DCS system would be used. TEDCOM had suggested that the budget for engineering development was too low by a factor of 2, but since ODP-TAMU Engineering has a history of accomplishing their development for less than industry estimates, this was judged not to be a problem.

Cowan had some reservations about targets for future drilling on page 46-47; he thought the themes should be limited to focus on 4 items. Pisias said this was to provide an estimate of the level of effort required to accomplish drilling themes that are hard to do but thematically important. Moberly and Leinen both stressed the importance of including topics of interest to a broad community.

Eldholm thought that achievements should be emphasized more strongly. von Rad and Falvey agreed to write something about the benefits of ODP techniques to the oil industry.

JOI will be doing the production work, improving the look and style of the document. Any good figures or comments should be sent to JOI. An executive summary is required.

PCOM Motion

PCOM endorses the Long Range Planning document and forwards it to EXCOM for adoption by ODP. (Motion Leinen, second Brass)

Vote: for 16; against 0; abstain 0

785 Liaisons

The problem of liaisons was discussed. In many instances the need to exchange information more rapidly and completely than by mailed minutes requires liaison by individuals at meetings. The cost in man-hours and travel funds, however, may outweigh the usefulness of liaison. The recent change in the number of thematic panels and the elimination of regional panels, has led to some important gaps in liaison. There has been some confusion on liaison procedures. In many instances it may be more appropriate to ask for a guest or guests to attend a meeting to provide specific information, rather than have a formal liaison.

PCOM Consensus

Having previously accepted the principle of double liaisons between certain thematic panels, the suggested liaisons are approved. Other liaisons between panels will be approved on an *ad hoc* basis by the PCOM Chairman. PCOM reaffirms that panel liaisons to or from DPGs are not acceptable and that having panel members on DPGs is preferred to liaisons.

The attempt to provide mutual information and cooperation between JOIDES and other large international programs in the earth and marine sciences will require liaison or some sort of *ad hoc* committees. T. Pyle has informally contacted some of these programs about establishing more formal links with ODP. Several of these

groups already have members who overlap with the JOIDES advisory structure. Pisias suggested that Pyle contact these programs and ask if they approve of establishing liaisons and whether overlapping members were appropriate.

PCOM Consensus

Establishment of liaisons between ODP and other international science efforts is desirable. If acceptable to these organizations, liaisons will be overlapping members of the JOIDES advisory structure and these other organizations.

The following liaisons established between PCOM and panels take into account impending changes in PCOM membership.

	TECP	LITHP	SGPP	OHP	TEDCOM	IHP	SSP	SMP	PPSP	DMP
J. Austin						•				
G. Brass				•	•					
M.Cita-Sironi								•		
D. Cowan										•
R. Duncan		•								
H. Jenkyns				•						
M. Kastner			•							
Y. Lancelot						•	•			
M. Langseth										•
M. Leinen								•		
J. Malpas		•								
R. Moberly									•	
A. Taira	•									
B. Tucholke	•									
U. von Rad			•							
J. Watkins							•			

PCOM Liaisons to DPGs

M. Langseth & M. Kastner	SRDPG
M. Leinen & R. Moberly	CEPAC
A. Taira	WPAC

786 Choice of Co-Chief Scientists

The problems associated with choosing Co-Chief Scientists and scientific staff had considerable discussion. Lancelot was concerned that in some instances the Co-Chief Scientists are chosen based on politically made decisions, rather than the best choice based on the science objectives. Proponents of drilling are the ones whose ideas drive the program. They invest time and effort to bring proposals to maturity and then someone else runs the cruise and the person with the best ideas is not in a position to make sure the science is done correctly. Because ODP is proposal driven, we need to have proponents onboard the ship. PCOM needs to take the position that science should lead more than politics. Brass agreed with Lancelot that

relaxation of the rule that countries should expect one invitation of a Co-Chief per year. A greater emphasis should be placed on nomination of proponents of drilling where appropriate. Pisias said that PCOM should identify proponents. Garrison said that it has never been said that a proposal is a guarantee of participation. TAMU investigates candidates for Co-Chief Scientists by talking to thematic panels and concerned individuals both in the US and overseas, but has the right to choose who they see best fit to accomplish the science.

PCOM Consensus

Because the Science Operator is no longer obligated to select the Co-Chief Scientists from the rankings provided by PCOM and because ODP is now driven by thematically ranked scientific drilling proposals with the need to encourage proponents to invest the time and effort necessary to bring drilling proposals to maturity, PCOM recommends to EXCOM a change in emphasis for choosing the Co-Chief Scientists on drilling legs away from maintaining a political balance and more towards encouraging the participation of the primary science proponents without regards to nationality. The same recommendation holds for the staffing of the remainder of the scientific party. The wording of the MOU allows this flexibility.

787 Miscellaneous Business

Present core-sampling policy is so restrictive that it causes problems in obtaining the necessary sampling density for many isotopic and paleomagnetic studies of sedimentary sections and petrological studies of igneous cumulate sections. For the sedimentary sections adequate sampling is not allowed unless a section has double or triple coring runs, thus creating difficulties in scheduling logging and additional sites in a leg. Brass pointed out that this was an OHP concern, and high resolution studies are a critically important part of the science done on these legs. Leinen said that SMP has also made this recommendation.

PCOM Consensus

PCOM in principle endorses the use of cores for high resolution studies. The Information Handling Panel is asked whether a change in sampling density, additional APC cores or other policy is recommended.

In response to a request from Robert Ginsburg, Malfait stated that there has been a precedent that PPSP might review non-ODP proposals. Therefore PCOM approved the following.

PCOM Consensus

PCOM has no objections to the Pollution Prevention and Safety Panel conducting a safety review of the non-ODP drilling of the Bahamas Bank proposed by Robert Ginsburg.

788 Panel Membership

Moberly discussed the overall balance of the JOIDES advisory structure, with panel memberships and chairmanships approximately balanced in the US between JOIDES Institutions and Non-JOIDES Institutions (Appendix F). Memberships and chairmanships are also approximately balanced between the US and Non-Us Partners.

Panel membership decisions were made for the following panels.

LITHP is directed to examine its expertise to see if the present membership is adequate.

OHP new person to be invited to join the panel is Lisa Pratt. In recognition of his service to ODP and to complete his term of panel membership, Larry Mayer can attend the fall OHP meeting as a member of the panel. A new panel member with seismic stratigraphy interpretation expertise needs to be nominated for next year.

SGPP needs to evaluate its membership and make suggestions.

TECP new persons to be invited to join panel are Eldridge Moores, Kim Klitgord, and Dale Sawyers.

DMP new person to be invited to join the panel is Mark Hutchinson.

IHP new persons to be asked to join the panel are Will Sager and Bill Riedel.

PPSP members are to be asked to designate alternates who can cover meetings when they are unable to attend.

SMP has a new international partner member from the UK, R.B. Whitmarsh.

SSP new persons to be invited to join the panel are Jim Hedberg, Kim Kastens and Dick von Herzen.

CEPAC membership was discussed since there was a concern about who will be making the detailed programs for drilling in the Eastern Pacific. PCOM members are to make suggestions about who might move from thematic panels to CEPAC to provide the necessary expertise for preparing drilling programs for: Cascadia, Chile Triple Junction, Eastern Equatorial Pacific Neogene and ERP Bare Rock Drilling.

789 Possible New Detailed Planning Groups

Two new Detailed Planning Groups have been proposed. TECP has requested an *Accretionary Wedges DPG*, to evaluate, clarify objectives, and coordinate plans for Nankai, Cascadia, and Barbados programs. It would include considerations of fluids and gas hydrates, as well as structural and tectonic ones. Their proposal is for a joint TECP and SGPP group (i.e., making recommendations to both thematic panels), perhaps based on the membership of the ad hoc working group on Fluids in Accretionary Prisms. Langseth and Brass both observed that the proposed DPG would be doing the job of TECP and is therfore not needed. Eldholm pointed out that FPAP has yet to submit its report.

LITHP has recommended that a *Deep Crustal Drilling DPG* be formed early in 1990 to consider site selection criteria for deep crustal drilling sites and to consider specific proposals. Without any current need having been established, it was decided that no new DPGs would be formed at this time.

790 Effect of Site Surveys on a Thematic Program

A discussion was held about site surveys and how they affect drilling plans. Brass and some other PCOM members were dismayed that NSF Guidelines favoring proposals for surveys in the Atlantic Ocean may have the effect of returning ODP to a regionally driven program. It was pointed out by Malfait however, that the time between surveys and drilling is commonly four or more years, and so there should be no significant effect resulting from these guidelines (Appendix G).

791 Future Meeting Schedule

The next PCOM meeting will be held in Seattle, Washington on 22-24 August, 1989 and will be hosted by the University of Washington. A one day field trip is scheduled for Monday, 21 August to the San Juan Islands. The University of Washington will be within walking distance of the hotel.

The 1989 Annual PCOM meeting will be held at Woods Hole, Massachusetts on 27-30 November, 1989 and will be hosted by the Woods Hole Oceanographic Institution. It will be preceded by the Panel Chairmen meeting on 26 November. A glacial geology field trip of Cape Cod is tentatively scheduled.

The 1990 Spring PCOM meeting is scheduled near Nice in the South of France on 24-26 April, 1990.

The 1990 Summer PCOM meeting is tentatively scheduled for the 7-9 August 1990 to be hosted either by the Hawaii Institute of Geophysics or Scripps Institution of Oceanography.

The 1990 Annual PCOM meeting is tentatively scheduled for 26-29 November, 1990 to be hosted by either Scripps Institution of Oceanography, the Hawaii Institute of Geophysics or elsewhere. It will be preceded by the Panel Chairmen meeting on 25 November.

792 Conclusion of the Meeting

The Planning Committee expressed appreciation to the following persons:

Olav Eldholm, Nick Pisias and Tom Shipley for their dedicated service on PCOM.

Nick Pisias for his long-enduring efforts in developing and adjusting the Long-Range Planning Document.

Grete Andresen, Olav Eldholm and Bjørg Stabell for their efforts towards making this meeting both productive and enjoyable.

The 1989 Spring PCOM meeting adjourned at 4:12 PM so that participants could view the demonstration by N. Pisias of the CD ROM method of storing and retrieving drilling data using the NGDC disk and the computer facilities at the Institutt of Geologi of the University of Oslo at Blindern.

APPENDICES TO 2-4 MAY, 1989 OSLO PCOM MINUTES

A List of handouts at 2-4 May PCOM meeting

B FY 1989 and 1990 NSF Budget and Other Items

C JOI FY89-90 Budget Summary and Summary of FY90 SOE

D Participant Tally by Country for Shipboard Scientists and Co-Chief Scientists

E Drilling and Logging: Leg 124 - 125

F Representation in the JOIDES Advisory Structure

G Field Program Planning

Appendix A

List of handouts at 2-4 May, 1989 PCOM meeting in Oslo

1. Package on Engineering Development Tests and Cost Estimates for Increasing DCS Hole Diameter.
2. Development Engineering Schedules
3. ODP Hard Rock Core Orientation Capabilities
4. Wireline Logging Services Operator Report
5. WLS Cost Estimates for Logging 4-Inch Diameter DCS Hole (2 Handouts)
6. Arctic Deep Sea Drilling: Scientific and Technical Challenge of the Next Decade by J. Thiede, et al.
7. Letters from G. Brass to R. Moberly and B. Malfait concerning site surveys.

Appendix B

THE FY 1989 and 1990 NSF BUDGET

	88-89 Increase	FY 1990 Request
RESEARCH AND RELATED		
Math.& Physical Sci.	6.6%	10.0%
Engineering	8.7%	12.8%
Bio., Behavioral, Soc.	6.0%	11.7%
GEOSCIENCES	6.9%	10.0%
Comp.& Inform. Sci.	23.6%	25.7%
Sci., Tech. & Int.	16.0%	15.4%
U.S. ANTARCTIC PROGRAM	5.6%	18.9%
SCI. AND ENGINEERING ED.	23.9%	11.1%
TOTAL FOUNDATION	9.8%	13.9%

In <u>GEOSCIENCES</u>. (Earth, Atmospheric, Ocean, Arctic Sciences)

Requested Increase	$30M (10.0%)	$31.0M (10%)
Actual Increase	$19.6M (6.9%)	

In <u>OCEAN SCIENCES</u> (MG&G, Bio, Phys,Chem, Facilities, ODP)

Requested Increase	$11.1M (8.2%)	$6.7M (4.1%)
Actual Increase	$11.1M (8.2%)	

OCEAN SCIENCES DIVISION DETAIL

	FY 1988	FY 1989	FY 1990
OCEAN SCIENCES DIVISION	$ 135.3 M	146.2 M	152.9 M
Ocean Sciences Research	67.2 M	71.2 M	74.7 M
Ocean Drilling Program	30.6 M	31.4 M	32.9 M
Oceanographic Facilities	37.2 M	43.6 M	45.3 M

OTHER ITEMS

* US Research Ships

    * RV Conrad operated by Lamont has completed last cruise. NSF supporting Lamont to acquire and convert the M/V Bernier. 238 ft geophysical survey ship. Will have state-of-the-art multibeam system and digital seismic capability. Carries a scientific party of 30.

    * RV Knorr presently in yard being "stretched" by thirty feet to 275 feet and being re-engined. RV Melville will enter yard later this year for a similar "stretch" and re-engineing.

    * AGOR 23 is being built to replace Thompson operated by University of Washington. Will be approximately 275 feet. Will probably have state-of-the-art multibeam capability and limited seismic capability.

* Arctic Planning

    * Division of Polar Programs and NSF ODP are jointly supporting a workshop to be held at Woods Hole in late September to plan future US geology and geophysics work in Arctic. Dr. Brass will represent US drilling interests.

* ODP Council and EXCOM - 31 May to 2 June

    * Primary discussion topic will be Long Range Plan and development of strategy for considering renewal of MOU's for post 1993 drilling.

Table PP-2 FY89-90 Budget Summary ($K)

	FY89			FY90		
	Std.	SOE	Total	Std.	SOE	Total
Drilling & Engineering	3,122	405	3,527	3,164	1030	4,194
Tech. & Log. Support	3,105		3,105	3,485		3,485
Sci. Operations	939		939	1,002	170	1,172
Science Services	3,100	18	3,118	3,363	86	3,449
Headquarters/Admin.	1,665		1,665	1,809		1,809
Subtotal	11,931	423	12,354	12,823	1,286	14,109
Ship Operations	18572	588	19,160	18,969		18,969
Total TAMU	**30,503**	**1,011**	**31,514**	**31,792**	**1,286**	**33,078**
L-DGO						
General	1,190	155	1,345	1,279	161	1,440
Schlumberger	1,585	93	1,678	1,757		1,757
Total LDGO	**2,775**	**248**	**3,023**	**3,036**	**161**	**3,197**
JOI/JOIDES	**1,600**	**13**	**1,613**	**1,672**	**53**	**1,725**
Total Uncommitted SOE		0			0	
Totals	**34,878**	**1,272**	**36,150**	**36,500**	**1,500**	**38,000**
NSF Target			36,150			38,000

Summary of FY90 Special Operating Expenses

TAMU

1.	$16,000	publications equipment to improve graphics capability
2.	$70,000	two copy editors
3.	$364,600	casing, guide bases, hard-rock drilling supplies
4.	$45,000	development of smaller hard rock guide base
5.	$400,000	further development of the diamond coring system (DCS)
6.	$95,000	land testing of the DCS
7.	$125,000	feasibility study of drilling to 7000 m with the DCS and the feasibility of reaming the hole for use of specialized downhole tools
8.	$170,000	upgrading shipboard science equipment, including $20,000 for the seismic computer system
	$1,285,000	TOTAL TAMU Special Operating Expenses

LDGO

9.	$103,488	covers unanticipated additional insurance costs
10.	$57,600	lease-purchase of the digital borehole televiewer
	$161,088	TOTAL LDGO Special Operating Expenses

JOI/JOIDES

11.	$53,000	publication of the Long Range Plan, publication of a "highlights" brochure, and thematic publications "seed money"
	$1,499,688	**TOTAL Special Operating Expenses**

Appendix D

PARTICIPANT TALLY BY COUNTRY

April 26, 1989

LEG	USA	FRANCE	FRG	CAN/AUS*	JAPAN	UK	ESF	TOTAL	CO-CHIEF SCIENTISTS
101	15	2	1	0	0	2	2	22	Austin/Schlager
102	13	1	2	0	0	0	1	17	Salisbury/Scott
103	12	4	1	2	1	0	3	23	Boillot/Winterer
104	11	2	4	2	0	1	6	26	Eldholm/Thiede
105	12	3	2	5	0	0	2	24	Arthur/Srivastava
106	8	1	2	1	2	0	0	14	Detrick/Honnorez
END YR 1:	71	13	12	10	3	3	14	126	
107	9	4	2	0	2	1	3	21	Kastens/J.Mascle
108	9	3	3	0	2	3	1	21	Ruddiman/Sarnthein
109	7	4	3	1	2	1	0	18	Bryan/Juteau
110	12	4	1	2	2	2	0	23	A.Mascle/Moore
111	12	2	2	2	4	2	0	24	Becker/Sakai
112	12	2	2	3	2	3	0	24.+4	Suess/vonHuene
END YR 2:	61	19	13	8	14	12	4	135	
113	12	1	3	2	1	4	2	25	Barker/Kennett
114	9	1	2	2	0	2	3	19	Ciesielski/Kristoffersen
115	13	2	1	2	2	3	3	26.+1	Backman/Duncan
116	10	2	2	2	2	3	2	23.+2	Cochran/Stow
117	14	2	2	2	3	2	2	27.+2	Niitsuma/Prell
118	15	1	1	3	2	1	2	25	Robinson/vonHerzen
END YR 3:	73	9	11	13	10	15	14	150	
119	16	2	2	3	1	3	3	30	Barron/Larsen
120	13	4	2	4	3	2	1	29	Schlich/Wise
121	15	1	2	3	2	2	2	27	Peirce/Weissel
122	14	2	2	4	2	2	2	28	Haq/vonRad
123	12	2	3	6	2	2	2	29	Gradstein/Ludden
124	13	3	3	3	1	1	2	26.+2	Rangin/Silver
END YR 4:	83	14	14	23	11	12	12	171	

Note: Beginning of new member country participation indicated by underline.

* Australia joined Canada in the Canada/Australia Consortium for the Ocean Drilling Program in 1988.

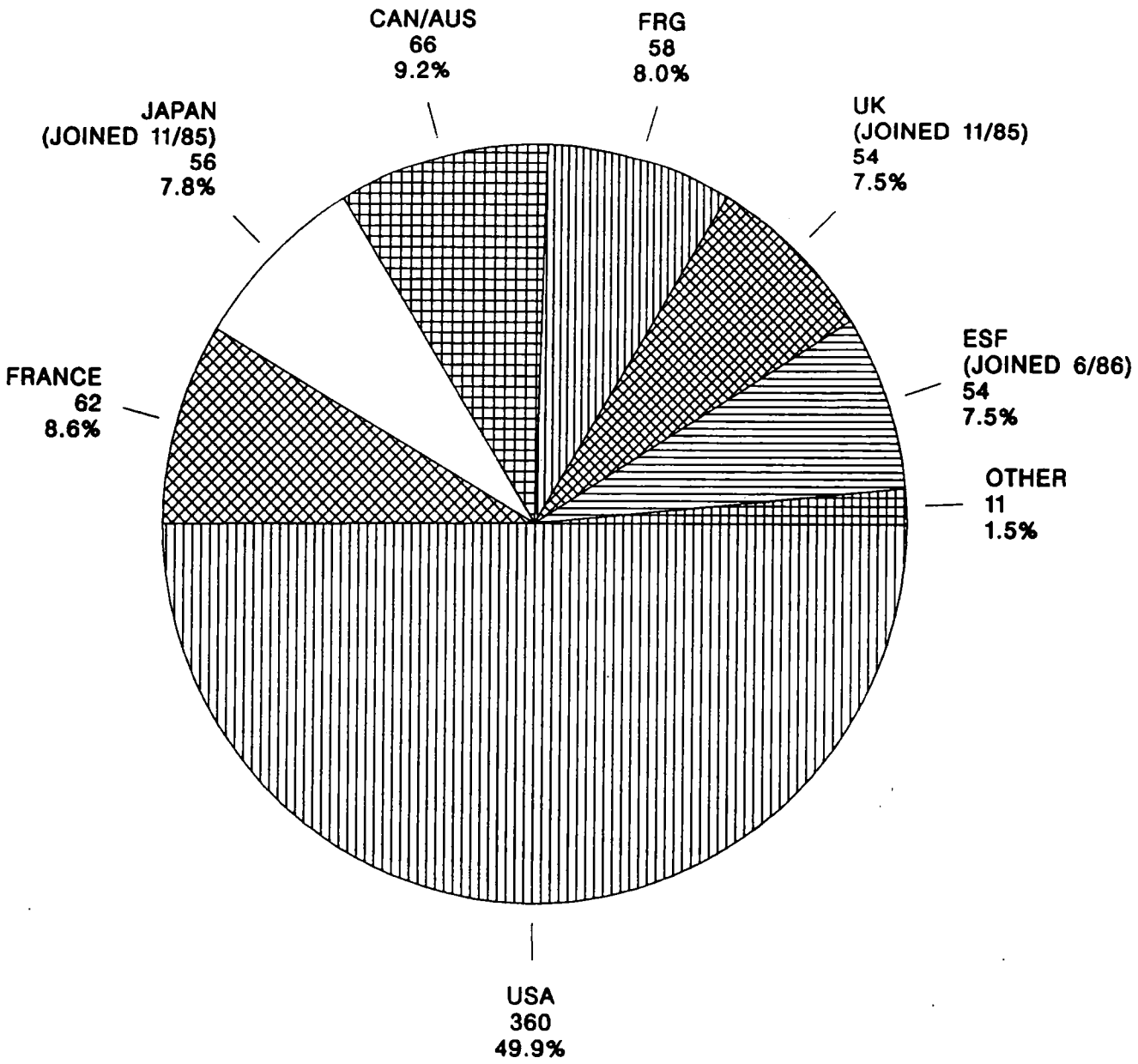
PARTICIPANT TALLY BY COUNTRY

April 26, 1989

LEG	USA	FRANCE	FRG	CAN/AUS*	JAPAN	UK	ESF	TOTAL	CO-CHIEF SCIENTISTS
125	16	1	1	3	1	3	2	27	Fryer/Pearce
126	13	1	0	3	4	2	3	26	Fujioka/Taylor
127	14	1	2	2	5	2	2	28	Pisciotto/Tamaki
128	14	2	3	2	5	2	1	29	Ingle/Suyehiro
129	15	2	2	2	3	3	2	29	Hill/Taira
	360	62	58	66	56	54	54	721	SUBTOTAL
130									Natland/TBN
END YR 5:	31								
131									Kroenke/Berger
132									Davies/McKenzie
133									Collot/Greene
134									Hawkins/Parsons
135									
136									
END YR 6:									

SHIPBOARD PARTICIPANT TALLY
LEGS 101 - 129

(January 1984 - December 1989)



TOTAL 721 PARTICIPANTS
(Does not include scientists on Leg 124E)

CO-CHIEF TALLY BY COUNTRY

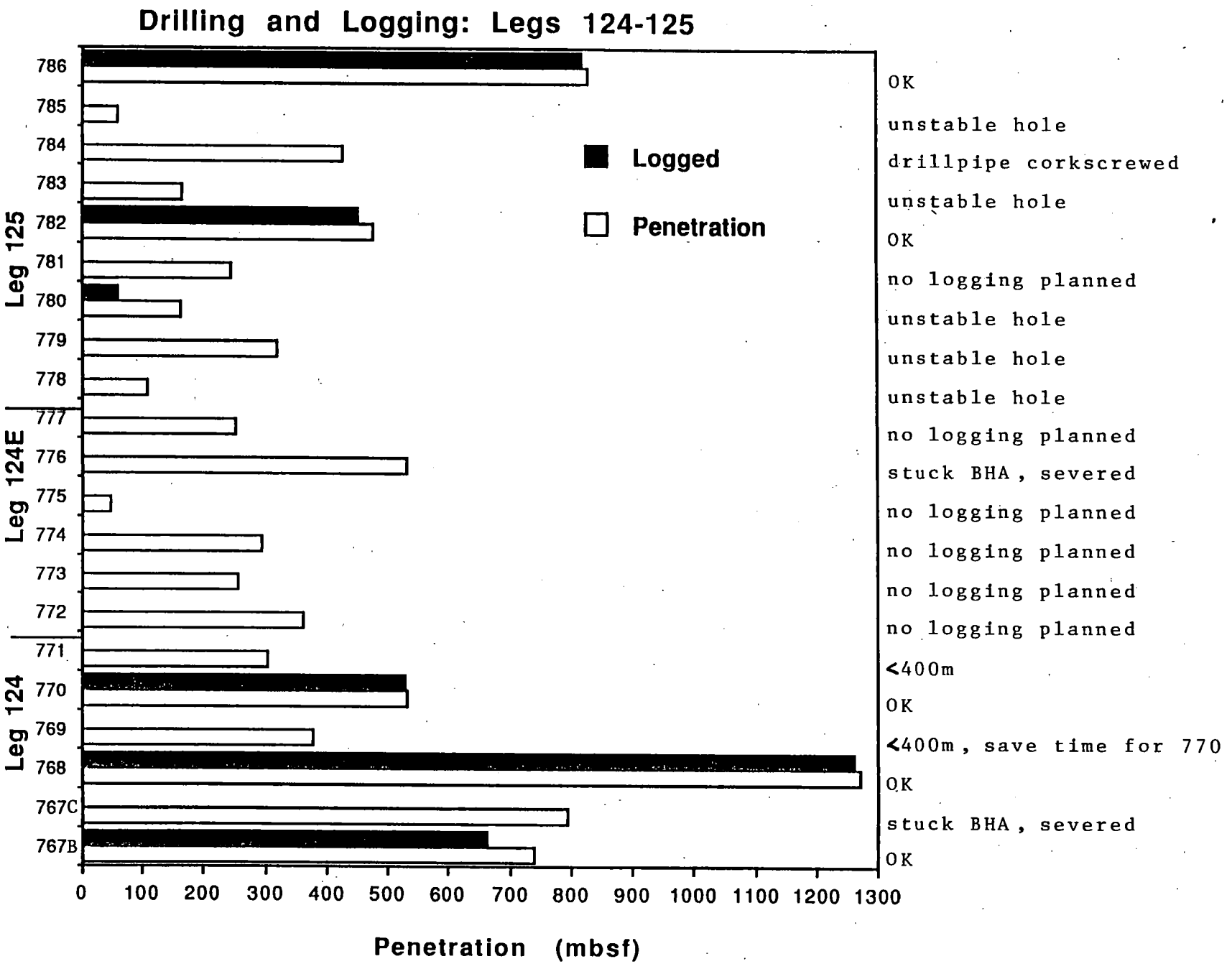
April 26, 1989

LEG	USA	FRANCE	FRG	CAN/AUS*	new members			CO-CHIEF SCIENTISTS
101	2							Austin/Schlager
102	2							Salisbury/Scott
103	1	1						Boillot/Winterer
104			1				1	Eldholm/Thiede
105	1			1	JAPAN	UK		Arthur/Srivastava
106	2							Detrick/Honnorez
107	1	1						Kastens/J.Mascle
108	1		1					Ruddiman/Sarnthein
109	1	1					ESF	Bryan/Juteau
110	1	1						A.Mascle/Moore
111	1				1			Becker/Sakai
112	2							Suess/vonHuene
END YR 2:	15	4	2	1	1	0	1	
113	1					1		Barker/Kennett
114	1						1	Ciesielski/Kristoffersen
115	1						1	Backman/Duncan
116	1					1		Cochran/Stow
117	1				1			Niitsuma/Prell
118	1			1				Robinson/vonHerzen
END YR 3:	21	4	2	2	2	2	3	
119	1						1	Barron/Larsen
120	1	1						Schlich/Wise
121	1			1				Peirce/Weissel
122	1		1					Haq/vonRad
123				2				Gradstein/Ludden
124	1	1						Rangin/Silver
END YR 4:	26	6	3	5	2	2	4	

Note: Beginning of new member country participation indicated by underline.
* Australia joined Canada in the Canada/Australia Consortium for the Ocean Drilling Program in 1988.

April 26, 1989

LEG	USA	FRANCE	FRG	CAN/AUS*	JAPAN	UK	ESF	CO-CHIEF SCIENTISTS
125	1					1		Fryer/Pearce
126	1				1			Fujioka/Taylor
127	1				1			Pisciotto/Tamaki
128	1				1			Ingle/Suyehiro
129					1	1		Hill/Taira
130	1		(1)					Natland/(tbn - FRG)
END YR 5:	31	(6)	(4)	(5)	(6)	(4)	(4)	
131	1		1					Kroenke/Berger
132				1			1	Davies/McKenzie
133	1	1						Collot/Greene
134	1					1		Hawkins/Parsons
135								
136								
END YR 6:								


Drilling and Logging: Legs 124-125
Logged
Penetration
Leg 125
Leg 124E
Leg 124
786
785
784
783
782
781
780
779
778
777
776
775
774
773
772
771
770
769
768
767C
767B
OK
unstable hole
drillpipe corkscrewed
unstable hole
OK
no logging planned
unstable hole
unstable hole
unstable hole
no logging planned
stuck BHA, severed
no logging planned
no logging planned
no logging planned
no logging planned
<400m
OK
<400m, save time for 770
OK
stuck BHA, severed
OK
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300
Penetration (mbsf)

Appendix E

Appendix F

April 25, 1989

Dear Lou:

I thought that I'd start my comments by giving a brief overview of the objectives, followed by what I think are some important criteria and limitations to keep in mind when designing the drill strategy. Being a petrologist, I will naturally confine most of my discussion to my area of expertise. I'll follow up by summarizing my recent phone conversations with other members of the discussion group that I contacted by phone.

HARD-ROCK SITE: The major objectives are: 1. Nature of the crust, including nature of stratigraphic and structural horizons; 2. Physiochemical conditions of the crust; 3. Volcanic history; and 4. Description of fluid-rock reaction in the axial environment, including defining fluid-rock and fluid-fluid reaction zones.

For the petrologist, the key objectives would include an understanding of both the volcanic stratigraphy and the volcanic structure at the drill site. A key point to keep in mind is that lateral stratigraphy is as important as vertical stratigraphy in volcanic terrains, particularly in terrains dominated by fissure eruptions. A second important point is that full sample recovery is absolutely crucial.

There is a major conflict of interest in drilling approaches when considering the needs of the fluid geochemists, well-loggers, and physical propoerties specialists versus the needs of the petrologists. The larger diameter hole produced by the piston-corers and larger rotary corers is much more compatible with the down-hole logging tools currently available and would make fluid sampling easier (packing and down-hole sampling would be less problematic). Use of the piston corers would also be nothing less than disastrous for the petrology community, due to the very poor sample recovery and loss of sample continuity. It was made very clear to me that the smaller-diameter diamond core technique should be used at both shallow and deep levels if the hole is to be of optimum value to the petrological and structural community. In particular, it is crucial that quench glass recovery (preferably attached to the flow interior) be maximized. At

the same time, it is clearly of importance to the petrological community to make use of the gamma ray spectroscopy tools for downhole chemical logging, so compromise on the hole size may have to be made. My prejeudice is that the actual recovery of core is of more relative importance than down-hole logging, as then there is no question what the porosity, alteration, etc. actually is. I was left with the impression that the possible down-hole capabilities available for the smaller hole sizes were left rather up in the air at the meeting, although there seemed to be no problem with the current drilling technology for extended drilling in sites where the temperature is 400° or less (except for the plastic core liners).

A major safety concern (really more of a success concern) is that defining the vertical thermal regime before drilling looks rather impractical at this point. It is quite possible that if the surface of a thick, recent lava lake is drilled, temperatures in excess of 500-600° C may be reached within tens of meters from the surface. Secondly, because of the heterogenous nature of the shallow volcanic crust, lateral hydrothermal flow may be quite important, making the task of identifying downwelling or even "cool", safe areas of the crust to drill problematic. An approach to the two problems above may be to actually drill a series of shallow holes from which heat measurements could be made, in order to better map the heat distribution at the site. These holes would also provide the means for a 3 dimensional view of the shallow site stratigraphy and structure, allowing an appraisal of lateral volcanic variation.

SEDIMENTED RIDGE DRILLING: The objectives here are primarily centered towards understanding the hydrothermal system. The areas of interest extend from the overlying sediments to the underlying basement, although no deep crustal targets are included.

Drilling success here is likely to be less problematic than at the hard rock site, due to: 1. easier initial penetration and stabilisation of the hole; and 2. better definition of the site thermal regime, because the sediments allow meaningful heat flow measurements to be made in advance. I have no recommendations to make here, other than note that volcanic dikes and sills within the sediments may pose unforseen problems with concentration of hydrothermal fluids, and may cause drilling complications.

April 25, 1989

COMMENTS OF ALAN WILLIAMS:

Upon reflection, he feels that boiling will not be a hazard. He believes that the pressure from the cold water in the drill pipe will prevent boiling from occurring, although small amounts of boiling may take place in the formation during pumping on the well.

A major problem will be loss of circulation fluid in drillhole wall fractures, and these fractures will also prove to be a problem in obtaining formation water samples. He feels that it may be necessary to intermittently stop drilling and cement over fractures, in order to maintain fluid flow. He suggests that this could be done at the same time as when fluids are tested- after sampling or during sampling.

He believes that packing will prove difficult because of the small hole size and high temperatures, and feels that it may be easier to sample formation fluids by pumping on the well and collecting samples by downhole sampling.

COMMENTS OF KAREN VON DAMM:

She stressed the importance of obtaining in-situ water samples at different depths and at different temperatures, as all sea-floor surface samples that have been obtained represent mixtures of various fluids. She also does not believe that the double-diffusive model put forward by Jim Bischoff is necessarily correct- she noted several pieces of evidence that two-phase separation occurs in the uppre oceanic crust, including the observation that both low and high salinity fluids have been sampled from vents on Axial Seamount.

COMMENTS OF WILFRED ELDERS:

He is in Italy until May 6- no comments were obtained.

COMMENTS OF DAVID CHAPMAN:

I have been unable to reach him by phone, and he as yet has not responded to my

messages. I will give you his comments when I receive them.

Well, that's it for now- I hope these notes are of some use.

UNITED STATES DEPARTMENT OF THE INTERIOR

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

12 April ~~May~~ 1989

Louis E. Garrison, Deputy Director
Ocean Drilling Program
Texas A&M University Park
1000 Discovery Drive
College Station, TX 77840

Dear Lou:

This is a follow-up of the very interesting meeting yesterday in Dallas on the environmental conditions to be encountered in drilling into a seafloor hydrothermal system. As I mentioned during the meeting, I believe subsurface circulation takes place in two nested convection cells. I enclose a copy of the manuscript which details the idea. The top cell is composed of seawater and extends down to near the bottom of the sheeted dike complex, has maximum temperatures probably no greater than 365°C and minimum pH of about 3.0. The seafloor vents are the surface manifestation of this upper cell (I believe you have a copy of my paper, "An empirical equation of state for hydrothermal seawater" which describes the maximum conditions in this cell). Below, extending from the lower parts of the sheeted dikes down to the magma a brine is postulated to exist. A highly saline brine is required to circulate into the cracking front which separates the molten rock from solidified rock. Hydrothermal flow will extend all the way to the bottom of the cracking front, that is wherever the rocks are sufficiently solid to support cracks, and this must be very close to the magma chamber itself. Temperatures here are probably in the range of 450 to 900°C, much above the boiling temperature of seawater, thus the need for high salinity. Heat is transferred between the lower and upper cell very efficiently whereas little mass transfer occurs.

I suspect there is a likelihood that during drilling to a depth of 1.5 km below a spreading center($P_{hdrostatic}$ = 400 bars), the brine-seawater interface may be penetrated. I suspect the interface is rather sharp, and that near the base of the sheeted dikes temperatures may abruptly rise from 350° or so to 500°C or more. One of the questions raised at the meeting was whether there would be explosive flashing of the seawater drilling-fluid at the bottom of the hole if circulation were stopped to make various scientific measurements. At 400 bars the temperature of phase-separation of seawater is 443°C At these conditions phase-separation is not boiling but condensation. That is, the seawater has already expanded to become very vapor-like at say 440° at which its density is only 0.36 g cc^{-1}. During phase-separation droplets of brine appear as a fog, and there is no abrupt and violent explosive pressure increase such as occurs during flashing. If, for example, the seawater were heated from 443° to 500°C at the bottom of the hole because of the cessation of drilling, the pressure would gradually rise to 540

bars as phase-separation takes place, permitting sufficient time for venting off of the excess pressure.

I left a copy with you of my recently-published paper, "Liquid-vapor relations for the system $NaCl-H_2O$--", which may be of some use in clarifying the conditions of phase-separation at these high pressures.

Good luck on this very ambitious adventure!

Sincerely,

James L. Bischoff

Drilling the Hydrothermal Systems of the Mid-Oceanic Ridge Axial Zones
Comments by M. Langseth April 7, 1989

The drilling environment:

A. The bare rock ridge-crest environment-

A recent proposal to JOIDES to drill a fast spreading Mid-ocean Ridge crest (Fornari and others) has identified two specific sites as targets for drilling. The Sites, located near 9 40N on the EPR serve as a good strawman for defining the sub-surface drilling environment. Emphasis at these holes is petrology. A copy of the proposal has been made available.

Both holes they recommend are located over a well defined intracrustal seismic reflector that is interpreted as the top of an Axial Magma Chamber in this case it is about 1.6 km below the seafloor. The deeper of the two holes EPR-1 is off axis and thus will not drill into the narrow zone right at the axis where high temperature discharge is most vigorous. This is hole is to be drilled as deeply as possible. The second shallower hole is planned at the axis and the exact location relative to active hydrothermal vents is not known. One requirement of the proposal is a full suite of logging in the holes including borehole televiewer and packer measurements, even in the smaller holes drilled with the diamond coring system!

B. Sedimented Ridge Crest environment:

An overview of the environment at sedimented ridge crests is provided by the ODP East Pacific Rise Working Group report (Chaired by R. Detrick). Their highest priority area for the first two legs of sedimented ridge drilling is the "Middle Valley" in the northern end of the Juan de Fuca Ridge. Extensive survey data is available in Middle Valley and the sea-floor pattern of heat flow and probably associated fluid flow are well mapped. More sea-floor information on pore fluid chemistry and pore pressure gradients would be valuable. They also propose sites in the Escanaba Trough and Quaymas Basin hydrothermal systems as targets later in the program.

The primary objectives in the Middle Valley drilling put forward by the working group are:

. 3-D characterizations of hydrothermal flow.
. Study of sediment-hosted massive sulfide bodies.

The environment at Middle Valley and engineering requirements are well summarized in the working group document, however they may understate potential drilling and logging problems associated with chemical corrosion in these holes.

Comments on technical requirements:

With respect to drilling plans in both environments I am concerned that there are unrealistic expectations about the existing technology and what can be developed within the time and money available to the ODP program. For

example; acquiring a "full suite" of high temprature tools that can be used in a 4" diameter hole. If they do not exist in industry there is no hope that they could be developed as an ODP development project. Another example is the requirement to seal some of the holes to throttle vertical flow. Does such a device that can be operated in the axial hydrothermal environment exist? If not, one would have to be developed.

It seems to me it would be valuable to make a list of what is currently "hardware" and what is "vaporware" in the current proposals. Sometime soon hard decisions will have to be made as to what can be realistically included in the program.

Another valuable list would be questions that the operators and engineers would like to address to scientists about the environments they will encounter in drilling, coring, sampling, and logging the holes proposed in the existing plans and proposals.

Below is list of questions on the environments at the axis of seidmented and unsedimented ridges that should be investigated as fully as possible by analysis of existing data, further surveys and modeling.

Critical questions:

(1) The depth of hydrothermal circulation i.e. depth to which forced convection has a significant effect on subsurface temperatures.

(2) Geometry of hydrothermal flow both normal to and along axis!

(3) Subsurface permeability and porosity of rocks where drilling is to be carried out. From the engineering perspective these properties are critical to anticipating the effects of forced convection on flow and temperatures in the bore hole during drilling and logging.

(4) The maximum temperature of hydrothermal fluids. This is a function of depth and there is a vigorous discussion about the thermodynamics of high temperature hydrothermal fluid in the ridge subsurface environment.

(5) The chemistry of the hydrothermal fluids and their likely reactions with materials in drilling and logging tools.

Assessment of axial drilling objectives in the context of the hydrothermal circulation system: This has been provided in the sedimented working groups report but the bare crest proposal needs to address such questions as:
Do objectives require penetration of a discharge zone? Is it necessary to penetrate a very high temperature zone?

These figures were kindly loaned to me by Rachel Haymon. They are based on her study of the Bayda coplex in the Oman Ophiolite. They provide one of the few bits of hard evidence as to the geometry of the sub-seafloor hydrothermal regime at a base rock ridge crest. Two important aspects of near axis circulation are highlighted.

1. The hydrothermal circulation is three dimensional so that recharge areas are likely right in the axial zone.

2. The sheeted dike complex may be more permeable just over the magma chamber and therefore hydrothermal circulation may be enhanced to greater depth.

Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

Earth Sciences
Sciences de la Terre

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V8L 4B2

Centre géoscientifique du Pacifique
9860, chemin Saanich ouest
C.P. 6000
Sidney, C.-B.
V8L 4B2

Your file Votre référence

Our file Notre référence

89-04-16

To: L. Garrison, convener ODP high temperature drilling meeting (Copies to M. Langseth, PCOM; Batiza, LITHP; D. Rea, CEPDPG; R. Detrick, Sedimented Ridge DPG)

From: E. Davis

Re: High temperature drilling meeting, Dallas airport, April 11

The following is a summary of my notes from what I felt to be a very informative and valuable meeting focused on the problems that are likely to be encountered when drilling high-temperature, young oceanic crust and active hydrothermal systems. I hope they are of some use to you as you prepare a report from the meeting.

1. Scientific needs (summarized by E. Davis):

To penetrate up to 1 - 1.5 km into "zero age" oceanic crust, sample rocks and fluids, and make down-hole observations in order to characterize the hydrogeology and geochemistry of ocean crust hydrothermal systems, the processes involved in the formation of massive sulfide bodies, and the magmatic and tectonic processes associated with crustal accretion. Sites are being selected at bare-rock (East Pacific Rise) and sedimented (Juan de Fuca Ridge) ridge crest locations. Much critical information can be obtained through good core recovery, fluid sampling, and observations of a few fundamental parameters such as temperature, permeability, and pressure. Care should be taken to minimize formation contamination (thermal and chemical) caused by drilling fluids and downhole seawater flow both during and after drilling. I have added to this note sketches of "nominal" sections that might be encountered during these drilling programs. Full descriptions of the scientific programs can be found in the EPR DPG and Sedimented Ridge DPG reports.

2. Salton Sea Deep Drilling experience (summarized by A. Williams):

Loss of circulation fluids in major fractures provided the greatest difficulties to drilling. High temperatures (up to 355°C) limited life of roller cone and large-kerf diamond bits (narrow-kerf bits may be better). High salinity, low pH, and high temperature fluids caused corrosional or hydrogen-embrittlement failure of uncemented (hung) section of casing, and

of logging tool conductor cables. The only down-hole tool that survived and operated successfully was a self-contained ("slick-line") dewared temperature/pressure tool (USGS). It is noteworthy that at 89 mm (3.5 in) o.d., this tool could be deployed down an ODP diamond coring system hole. None of the more sophistocated logging tools or downhole experiments worked.

3. Physical and chemical fluid properties (summarized by J. Bischoff and K. Von Damm):

Temperatures in upper part of hydrothermal system are not likely to exceed about 350°C owing to the highly non-linear heat transport characteristics of water at these temperatures. Rock is likely to be strong enough to support open fractures up to 600 to 800°C, however, and it has been suggested that a second convective circulation system exists at these elevated temperatures which involves high-salinity fluids that form as a condensate during phase separation (brine/fresh) at super-critical pressures. This hypothesis can be tested fairly simply if fluid samples can be obtained at sufficiently great depths in the system.

Kinetics of water-rock (and water-steel) interaction are probably slow enough (order days) that modifcations of drilling fluids, scaling, etc. at high temperature should be minor because of the short round-trip time for drilling fluids (order hours). Formation fluid pH may be as low as 2 at high temperatures, or the equivalent of 3 at 25°C. In general, salinities are not expected to be much different than seawater; salinities as high as those encountered in the Salton sea program are not expected. Physical properties of seawater at high pressures are such that "flashing" is not a problem (confirmed by TAMU simulation that predicted 50°C @ 100's of gal/min discharge at rig floor from 2500 m + 500 m hole into 350°C formation).

4. These discussions were followed by ones more general which I would summarize as follows:

-Successful penetration and good core recovery are the highest priority objectives of the ridgecrest drilling programs. There is good reason to believe that the DCS will be the best system to use given the nature of the formations that will be encountered. S. Howard noted that some diamond bits are rated (not tested) to temperatures up to 700°C. Drill string is tempered at 680°C. Just how realizable these limits are is not known. Experience from geothermal and mining industry concerning bit design and operational parameters such as circulation rates and weight on bit should be sought. D. Chapman will provide the name of a contact with Annaconda; they recently have drilled numerous high-temperature exploration holes in a gold deposit in Papua New Guinea. Metal core liner undoubably will be required, as plastics are rated to 220°C only. Thermo-mechanical failure of the hole wall perhaps can be minimized by minimizing thermal cycling and rates of cooling by circulation. Failure of the core under thermal and unloading stresses was experienced in the

Salton Sea program; cm-scale transverse fractures developed in cores recovered, but this did not cause wholesale loss of material.

Fluid sampling will be difficult, but as this is another high priority aspect of the program, it is worth considerable effort. A sample volume of 500 ml is considered adequate. A self-contained system would be ideal to avoid the problems with conductor cable failure (insulation failure) mentioned above. Some small diameter samplers exist; these or modifications of these should be investigated. Particular attention should be paid to potential precipitation during sampling. An ambient-pressure flushed sampler would be best suited to this task. To be able to back out the contaminating effects of drilling fluids, it may be necessary or desirable to use "spiked" fluids.

Constraints on the thermal regime are also of great importance; temperatures provide important constraints on the physics of flow in hydrothermal systems, and also on the chemistry of the fluids and the fluid-rock interactions. The most effective way to reliably determine in situ temperatures is via frequent bottom-hole measurements. The self-contained instrument described above would be ideal for this task. Although it is difficult to obtain accurate equilibrium formation temperatures from temperature logs, they should be carried out, since continuous logs are useful for identifying permeable zones or fractures.

Toward the goal of obtaining the most reliable bottom-hole temperatures and fluid samples, it would be desirable to be able to isolate the bottom of the hole. This could be done using a "standard" packer, although the high-temperature requirements may provide insurmoutable difficulties. What is actually needed is less than a packer, perhaps better called a baffle, since only low differential pressures need to be dealt with. It is only necessary to allow the bottom section of the hole to re-equilibrate and a measurement of temperature to be made or a fluid sample to be collected, potentially while circulation above the "baffle" is maintained. A high pressure seal may be rendered somewhat unnecessary if permeabilities can be measured in some other way (see below).

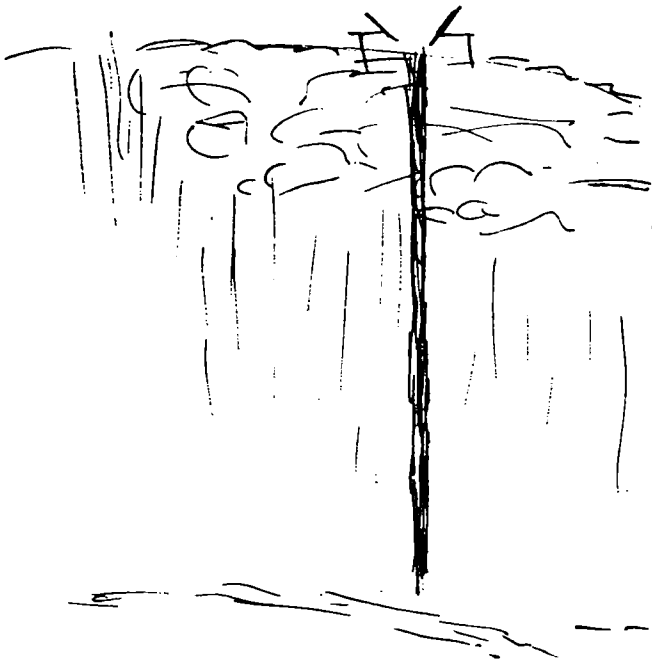
The DCS configuration offers the possibility of a closed-loop circulation "riser" geometry through the use of 1) a mechanical packer below the seafloor between the main ODP drill string and the casing, and 2) a controlable seal at the drill ship between the DCS pipe and the ODP pipe (similar to that tested on the last ODP engineering leg. This geometry provides a means of: 1) providing limited "blow-out" protection, 2) recovering and recirculating special drilling fluids, and 3) producing fluids from the formation and testing permeability by drawing down on both sides of the "circulation loop". The normal positive pressure permeability tests should be avoided because of the possibility of inducing hydrofracture.

For post-drilling down-hole measurements or samples to be meaningful, any holes into oceanic crust should be left with a

hydrologic seal at the sea floor that can be later removed, either with the drill ship or with a re-entry vehicle. Third-party experiments (that do not jeopardize later re-entry for drilling) should be encouraged. As an example, a measurement of differential pressure across the seafloor seal would be simple but of great value.

Some effort should be put into investigating what logging tools are available from sources other than Schlumberger for slim-hole, intermediate and high temperature use.

EAST PACIFIC RISE - 2500 m WATER DEPTH



0 m BSF T = 0°C → 350°C

EXTRUSIVE BASALTS
POROSITY ≃ 10-45%
PERMEABILITY ≃ 10^{-14} m^2
CONDUCTIVITY ≃ 1.7 $W m^{-1} K^{-1}$

100-500 m -- T = 105°C → 350°C

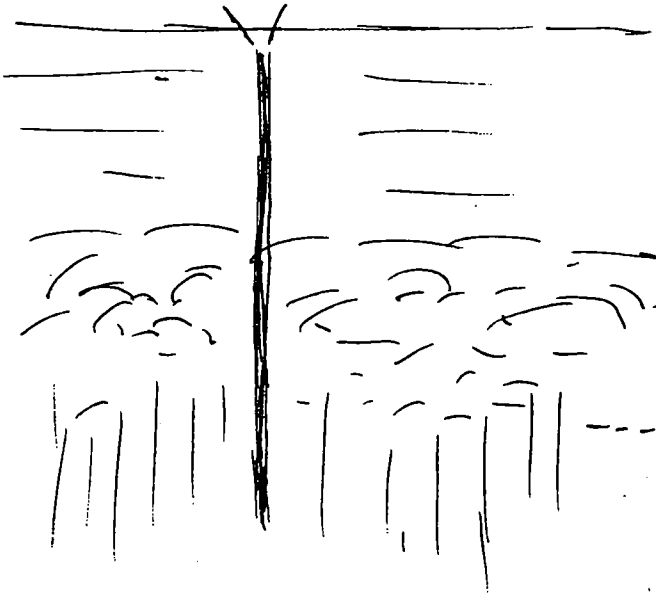
DIKES AND SHALLOW INTRUSIVES
POROSITY ≃ 5%
PERMEABILITY ≃ 10^{-17} m^2
CONDUCTIVITY ≃ 1.7 $W m^{-1} K^{-1}$

1500 m -- T = 700°C → 1200°C

AXIAL MAGMA CHAMBER
T = 1200°C

MELT OR PARTIAL MELT @ 1200°C

JUAN DE FUCA RIDGE - 2500 m WATER DEPTH



0 m BSF T = 0°C → 350°C

TURBIDITE SEDIMENTS
POROSITY ≃ 40%
PERMEABILITY ≃ 10^{-18} m^2
CONDUCTIVITY ≃ 1.2 $W m^{-1} K^{-1}$

150-300 m --- T = 350°C

EXTRUSIVES AND SILLS
POROSITY ≃ 10%
PERMEABILITY ≃ 10^{-14} m^2
CONDUCTIVITY ≃ 1.7 $W m^{-1} K^{-1}$

500-800 m? --- T = 350°C

DIKES AND INTRUSIVES
POROSITY ≃ 5%
PERMEABILITY ≃ 10^{-17} m^2
CONDUCTIVITY ≃ 1.7 $W m^{-1} K^{-1}$

0

?

T = 700°C
?

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April 25, 1989

Dr. Louis Garrison
Ocean Drilling Program
Teas A&M University Research Park
1000 Discovery Drive
College Station, Texas 77840

Dear Lou:

Attached is a summary of my thoughts regarding the fluids which might be encountered in drilling either a bare rock or a sedimented ridge crest. I have copied the general format of Marcus Langseth's comments. Included are some references as well as some slide copy I have made for various talks, which summarize our knowledge of seafloor hydrothermal chemistry and the evidence for the existence of brines within the oceanic crust.

Other expenses I incurred in connection with the trip to Dallas were $7.00 airport parking at Knoxville airport, $19.35 for mileage (43 miles each way to the airport x $0.225/mile x 2), and $5.00 for food Monday evening, for a total of $31.35. As ORNL required me to file a travel authorization through them, they will most likely bill ODP directly for this. If it is easier to reimburse me, I will just give them the check and you should ignore their slow billing procedures and (mildly) threatening letters.

In general, I learned a lot about drilling at the meeting and was impressed with the general capabilities to handle the 400°C temperatures.

Sincerely,

Karen

Karen L. Von Damm, Ph.D.
Research Staff
Geosciences Section
Environmental Sciences Division

Enclosures

Drilling the Hydrothermal Systems of the Mid-Oceanic Ridge Axial Zones:
What Might the Fluid Problems Be?
Comments by K. L. Von Damm, following the 11 April 1989 Discussions

1. Temperature: The highest (confirmed) temperature readings of hydrothermal vent fluids from both sedimented and bare rock environments are under 400°C, and appear to cluster mostly around 350°C, for systems at water depths greater than 2000 m. Thermodynamic data and various chemical indicators suggest the temperatures may be slightly higher, approximately 360-375°C at depths of 1-2 km below the seafloor. Based on the physical properties of seawater, and the solubility of quartz, temperatures of less than approximately 400°C are reasonable to expect for waters of close to seawater salinity. Fluid inclusions from dredged oceanic rocks (see discussion below under #3) suggest higher salinities, and higher temperatures. Most of these fluids probably originated at greater depths within the oceanic crust than the planned drill holes. Hence, while fluids of higher temperature undoubtedly exist within the oceanic crust, planning for temperatures of 400 C is reasonable for the proposed drilling.

2. Pressure: As the fluid is very expanded under the high temperature conditions, any cooling occurring as a result of drilling will result in a pressure drop.

3. Composition:

   a. Salinity: The maximum measured salinity from a seafloor hydrothermal vent is approximately twice seawater at the Southern Juan de Fuca (SJdF) site and the minimum is about one-fourth seawater at Axial Volcano. For the SJdF site we believe a fluid with a salinity about six times seawater (3.3 moles/kg Cl, or 20 wt. % NaCl) must be present within the system [Von Damm & Bischoff, JGR 92 (1987) 11334-11346; Von Damm, JGR 93 (1988) 4551-4561]. Phase separation is actively occurring within seafloor hydrothermal systems, producing low and high salinity phases. We do not understand if it is a common feature of all systems, or the conditions which may make it occur in only certain systems. It is certainly occurring at the present time at Axial Seamount, and most likely occurring at the SJdF site; to explain the chemistry of the fluids at the other sites probably does not require phase separation. There is evidence from fluid inclusion studies (see attachment) that high salinity fluids occur within the oceanic crust. How common they are, and where they occur is largely unknown. At least some of these studies suggest the brines occur deeper than what is planned in the ODP drilling of the ridge crest.

   b. pH: The minimum pH (measured at 25°C and 1 atm) for bare rock systems is 3.1, with all values being less than 4. Hence these solutions are quite acid, although they are slightly less acid under in situ conditions. In comparison, for the two sedimented areas from which vent fluid samples have been obtained (Guaymas Basin and Escanaba Trough) the pHs are close to 6. Under in situ conditions these fluids are close to neutral pH. Since these higher pHs are a result of reaction with organic matter and $CaCO_3$, if the sediments in an area contain very little of these two components, the pH could be more acidic.

   c. Major and trace elements: See the attached tables for a summary of the known chemistries. In general, the higher the salinity and the lower the pH, the more silica- and metal-rich the fluids will be. The higher pH and alkalinity at Guaymas, and presumably other sedimented areas, leads to lower Fe, Mn, Cu, and Zn concentrations. Temperature

/also has an effect on the chemistry and those vent fluids with exit temperatures less than 300°C have lower Cu, Se, Co, Ag, and Cd. [References for data in tables: 21°N - Von Damm et al., GCA 49 (1985) 2197-2220; SJdF (Southern Juan de Fuca Ridge, an unsedimented area) Von Damm & Bischoff, JGR 92 (1987) 11334-11346; 13 N - Bowers et al., JGR 93 (1988) 4522-4536 (the ranges given in the tables include the data previously published by Michard et al.); GSC (Galapagos Spreading Center) - Edmond et al., EPSL 46 (1979) 1-18, & 19-30; Guaymas - Von Damm et al., GCA 49 (1985) 2221-2237.] Data for the MARK and TAG areas on the mid-Atlantic ridge are not in the table, but fall within the range of the other data. Data for Axial Seamount are also not included. The high salinity fluids from this area fall within the range of other areas, and the lowest salinity fluid has approximately 150 mmoles/kg Cl (and associated low metals), making this the most dilute vent fluid yet sampled. [There was a special Axial Seamount session at Dec. 1988 AGU with abstracts published in EOS and a special JGR volume in preparation.]

d. Gases: The main gases present are CO_2 and H_2S, with lesser amounts of CH_4, H_2, He, and other noble gases. In general, fluids from sedimented ridge crests, especially if a lot of organic matter is present will be more gas-rich than bare rock fluids. Since phase separation does appear to be occurring in some of the fluids, low salinity fluids will tend to be richer in gases [see attached abstract by Lupton et al. which describes some quite gas-rich samples]. Samples from sedimented ridge crests could also contain significant Rn (radon).

4. Structure of the Hydrothermal Circulation Cell: This is largely unknown and remains a subject of speculation. The model recently proposed by Bischoff and Rosenbauer for layered double-diffusive convection, which suggests a lower circulating brine and an upper "normal" salinity fluid is not, at this time, accepted by many other workers. Brines certainly exist; at what depths, of what composition, and how common they are within the oceanic crust remains unknown.

5. Ideal Sampling: One of the main limitations in sampling seafloor hydrothermal solutions to date has been that we get a single sample, at the seafloor, from which we have to infer all the subsurface processes which have occurred. The chemistry is an integration of all the reactions, and conditions the fluid has seen since leaving the seafloor and entering the hydrothermal system. It is probably a mixture of a number of fluids with different temperature and reaction histories. Similarly we get one temperature, and by using this combined with certain chemical [illegible] to infer the temperature conditions at depth. The great opportunity which drilling into an active hydrothermal system provides is the potential ability to sample the fluid at different parts of the circulation system and to directly measure the temperature conditions in the various reaction zones. Only this kind of sampling will lead to better understanding of the alteration of the oceanic crust and the structure of the hydrothermal system. Unless fluid samples and temperatures can be obtained at several discrete points within the hydrothermal cell, we will be left with the same limitations we encounter sampling the single point of the seafloor vent.

The following list of measurement parameters is listed in (somewhat) decreasing order of importance and (probable) increasing sampling difficulty.

a. Temperature: This is probably the single most important parameter to measure. It is needed for both physical and chemical modeling of hydrothermal circulation and alteration.

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The following list of measurement parameters is listed in (somewhat) decreasing order of importance and (probable) increasing sampling difficulty.

a. Temperature: This is probably the single most important parameter to measure. It is needed for both physical and chemical modeling of hydrothermal circulation and alteration.

b. Salinity: Knowing the overall salinity of the fluid would enable the testing of various models for phase separation and the geometry of the hydrothermal circulation cell. Overall salinity is also related to overall composition as the more saline a fluid, the better it is at transporting metals and the more aggressive it is in altering the rocks. Several good measurements of temperature and salinity would really aid the understanding of the hydrothermal system.

c. Major Element Chemistry: Fluid samples on which a fairly complete set of analyses could be done for metals (including Fe, Mn, Zn, and Cu) and anions, would start to provide a reasonable understanding of the circulation cell, and begin to provide an understanding of the alteration of the crust. With this type of analytical date, direct comparisons could be made between the fluid-(altered) rock system. Without at least this level of sampling, while certain general statements could be made based on salinity and temperature, the understanding of the system would be severely limited. These samples need to be taken from several, known depths. If the fluid samples included particles of rock, clays, or drilling mud, back reaction could occur between the fluids and solids within the sampling apparatus. This could have a major effect on the chemistry of the water, hence compromising its usefulness. The preferred sampling set-up would therefore filter out particles from the fluid sample.

d. Gases: While knowledge of the gas concentrations (e.g., CO_2, H_2S, CH_4, H_2, He) can provide us with information not available from other chemistry, (i.e., whether there is a "mantle" input) it requires an increased level of sampling complexity, requiring a gas-tight sampler. In fact, few of the vents have been sampled with gas-tight samplers, hindering the interpretation of some of the chemical data (i.e., whether phase separation had occurred).

e. Volumes: The samplers currently used to sample hydrothermal vent fluids hold 750 ml. Samples of 100's of ml would be great. In practice, at the concentration levels found in these fluids, most analyses can be done on just a few mls. An exception is the gases which are often extracted from a larger volume. [It would be better to check with a "gas" person, e.g. John Lupton, on the volumes they need.] Samples of 10's of mls would be adequate for most analyses. A potential problem is the highly expanded nature of the fluids. In sampling the seafloor vents, the sampler is bathed in cold seawater, hence the fluid is immediately condensed and a full sample volume is ibtained. If the sampler is close to the fluid temperature, the volume obtained on recovery may only be half the sampler volume. Also if the sample sees a significant pressure drop, a large amount of gas may exsolve into a separate phase.

THE ALKALIS						
	Li µmol	Na mmol	K mmol	Rb µmol	NH_4 mmol	B µmol
21°N	891 - 1322	432 - 510	23.2 - 25.8	27 - 33	<0.01	500 - 548
SJdF	1108 - 1808	661 - 796	37.3 - 51.6	28 - 37		496
13°N	484 - 884	290 - 596	18.7 - 32.9	14 - 25		451 - 492
GSC	689 - 1142	259 - 487	18.7 - 18.8	13.4 - 21.2		
GUAYMAS	630 - 1076	475 - 513	32.5 - 49.2	57 - 86	10.3 - 15.6	1570 - 1730
SEAWATER	26	464	9.8	1.3	<0.01	416

THE ALKALINE EARTHS					
	Be nmol	Mg mmol	Ca mmol	Sr µmol	Ba µmol
21°N	10 - 37	0	11.7 - 20.8	65 - 97	>7 - >16
SJdF	95 - 150	0	77.3 - 96.4	230 - 312	
13°N		0	10.6 - 54.8	38 - 182	
GSC	11 - 37	0	24.6 - 40.2	87	17.2 - 42.6
GUAYMAS	12 - 91	0	26.6 - 41.5	160 - 253	>7 - >54
SEAWATER	0.02	52.6	10.2	87	0.14

pH, ALKALINITY, Cl, SiO_2 & Al					
	pH	Alk meq	Cl mmol	SiO_2 mmol	Al µmol
21°N	3.3 - 3.8	-0.19 - -0.50	489 - 579	15.6 - 19.5	4.0 - 5.2
SJdF	3.2	~0	896 - 1090	22.7 - 23.3	1.9
13°N	3.1 - 3.7	-0.28 - -1.02	338 - 760	14.3 - 21.9	12.9 - 20.0
GSC		0	322 - 595	21.9	
GUAYMAS	5.9	2.8 - 10.6	581 - 637	9.3 - 13.8	0.9 - 7.9
SEAWATER	7.8	2.3	540	0.16	0.005

THE "TRACE" METALS					
	Mn mmol	Fe mmol	Fe/Mn	Cu µmol	Zn µmol
21°N	0.70 - 1.00	0.75 - 2.42	0.9 - 2.9	<0.02 - 44	40 - 106
SJdF	2.61 - 4.48	10.3 - 18.7	4.0 - 5.2	<2	≤900
13°N	0.74 - 2.93	1.64 - 10.8	2.2 - 8.5		2 - 105
GSC	0.36 - 1.14	+		0	
GUAYMAS	0.13 - 0.24	0.017 - 0.18	0.1 - 0.8	<0.02 - 1.1	0.1 - 40
SEAWATER	<0.001	<0.001		0.007	0.01

THE "TRACE" METALS				
	Co nmol	Ag nmol	Cd nmol	Pb nmol
21°N	22 - 227	<1 - 38	17 - 180	183 - 359
SJdF				~900
13°N			<1 - 70	9 - 270
GSC			0	
GUAYMAS	<5	<1 - 230	<10 - 46	<20 - 652
SEAWATER	0.03	0.02	1	0.01

SULFUR, ARSENIC & SELENIUM				
	SO_4 mmol	H_2S mmol	As nmol	Se nmol
21°N	0 - 0.6	6.6 - 8.4	<30 - 452	0 - 72
SJdF	-0.5 - -1.7	3.0 - 4.4		<1
13°N	0	2.9 - 12.1		
GSC	0	+		
GUAYMAS	-4.2 - 0.06	3.8 - 6.0	283 - 1074	0 - 103
SEAWATER	27.9	0	27	2.5

Fluid Inclusions	Wt. % NaCl	Inferred T, P	
Mathematician Ridge	58	600°->700°C, 600-1000 bars	Vanko; Stakes & Vanko
Kane Fracture Zone	10	290°(>407°)C,	Kelley & Delaney
Troodos Ophiolite	48 (57)	≤430°(525°)C, 350-400 bars	Cowan & Cann
Seawater	3.2	C_p=407°C, 298.5 bars	
Distilled water	0	C_p=374.1°C, 220.4 bars	

V11B-10 1050 INVITED

Geology of the ASHES Hydrothermal Vent Field in the Axial Volcano Caldera

Steve Hammond, Susan Hanneman*, Robert Embley, Chris Fox, Andy Lau*, and Kim Murphy* (All at: Marine Resources Research Division, Pacific Marine Environmental Laboratory, NOAA, Hatfield Marine Science Center, Newport, OR 97365)

*OSU Cooperative Institute for Marine Resources Studies (same address)

During the past four years, the NOAA VENTS Program has undertaken numerous hydrothermal processes studies within the ASHES vent field, located in the southwestern corner of the rectangular caldera of Axial Seamount. A permanent bottom-transponder array, maintained throughout these studies, has made it possible to co-register several thousand (deeptow and submersible) 35mm photographs and video images of a concentrated 150m x 150m area where high-temperature "normal" and phase-separated fluids are issuing from the chimney and fissure vents. (Large-area photographs of the vent field acquired using a charge-coupled device digital camera during a late summer dive series with ALVIN may also be processed in time for this presentation.)

High-resolution sidescan sonar images and deeptow altimeter/bathymetric data have also been integrated with the photographic information to provide additional insight into the detailed geological environment of the hydrothermal activity and associated animal communities.

Detailed maps will illustrate that venting is preferentially associated with specific lava morphology, that hydrothermal activity significantly contributes to near-field sediment accumulation, and that some venting behavior may be related to small-scale bathymetry.

V11B-11 1104 INVITED

Chemistry of Hydrothermal Fluids From the ASHES Vent Field: Evidence for Phase Separation

D.A. Butterfield, R.E. McDuff and M.D. Lilley (all at: School of Oceanography, University of Washington, Seattle, WA 98195)
G.J. Massoth (NOAA/PMEL, Seattle, WA 98115)
J.E. Lupton (Marine Science Institute, University of California at Santa Barbara, Santa Barbara, CA 93106)

Analysis of hydrothermal fluids from the ASHES vent field in the caldera of Axial Volcano on the Juan de Fuca Ridge during submersible cruises in 1986, 1987 and 1988 has revealed the presence of two chemically distinct hydrothermal endmembers within a single vent field of approximately 50m radius. One of these is a 'normal' hydrothermal endmember, enriched in calcium, metals and sulfide, with a chloride concentration slightly above ambient seawater. The other endmember shows a previously unobserved chemistry depleted in chloride and ore-forming metals, but showing high concentrations of H_2S and dissolved gases (173mmol/kg condensable gas). Dissolved silica concentrations from 1986 and 1987 indicate that the low-chloride endmember is below quartz saturation levels. Gas analysis indicates that CO_2 is very high, relative to other vent fields, in all vent fluids from the ASHES field; the highest values are found in the low-chloride fluids (endmember CO_2 = 150-170 mmol/kg), while the normal-chloride fluids are a factor of three lower. The chemical data, together with measured temperatures (326 C) near the predicted boiling point (348C) support the hypothesis that hydrothermal fluid rising through the ocean crust underwent subcritical phase separation, which generated a low-salinity vapor phase. The vapor phase has become partially segregated from the parent fluid and exits the seafloor at several locations marked by the presence of nearly pure anhydrite. Preliminary data from 1988 suggest that the chemistry of individual vents has remained relatively constant over the 2-year period of observation.

V11B-12 1118 INVITED

Gas Chemistry of Subsurine Hydrothermal Systems on the Juan de Fuca Ridge

J.E. Lupton (Marine Science Institute and Dept. of Geological Sciences, Univ. of California, Santa Barbara, CA 93106)
M.D. Lilley, D.A. Butterfield, R.E. McDuff (all at School of Oceanography, Univ. of Washington, Seattle, WA 98195)
and G.J. Massoth (NOAA/PMEL, 7600 Sand Point Way NE, Seattle, WA 98115-0070)

We report preliminary results on the vent fluid gas chemistry for three hydrothermal sites on the Juan de Fuca Ridge: the Cleft Segment site on the southern JdFR (44°40'N, 130°24'W), the CASM and ASHES vent fields within the caldera of Axial Seamount (~45°57'N, 130°02'W), and the Endeavour Segment vent field (47°57'N, 129°06'W). Each of these hydrothermal systems has distinctive vent fluid characteristics as evidenced by measurements of dissolved He, CO_2, CH_4, etc., in undiluted samples of the vent fluids collected with gas-tight titanium bottles. The highest gas concentrations were found within the ASHES vent field at Virgin Mound vent, which is a ~1 m high white anhydrite spire venting clear, low salinity, 300°C fluid with helium and CO_2 concentrations of ~10^{-4} cc/g and ~2.8 cc/g (~100 mM/kg), respectively. Inferno vent, also in the ASHES field and situated only 50 m from Virgin Mound, is a "black smoker" vent consisting of a ~4 m high sulfide edifice discharging 328°C fluid with gas concentrations about ~1/4 those at Virgin Mound. This unusual variation in the gas chemistry of hydrothermal fluids within a single vent field lends strong support to the hypothesis of Butterfield et al. (EOS 69, 303, 1988) that phase separation is occurring within the plumbing system of the ASHES vent field, and that Virgin Mound and Inferno fluids are enriched in the separated vapor and brine phases, repectively.

V11B-13 1132 INVITED

Biogeography of the Ashes Vent Field, Axial Volcano: How Much Can Bottom Photographs Tell Us?

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Ashes Vent Field has been under steady investigation since its discovery in July, 1984. Results of this study are based on observations recorded from 14,369 bottom photographs taken at the site between 1984 and 1986. Previous work has shown that megafauna are concentrated near the locus of venting at Ashes; this study uses nonparametric statistics to elucidate some potential geological influences on the distribution of organisms, and regression analysis to see how well observations made from photographic data predict proximity to a vent.

In a general sense, nonvent regions can be distinguished from areas of vent activity (marked by the presence of tube worms, clams, bacterial mats, low temperature hydrothermal sediment or chimneys) by differences in 1) lava flow morphology, 2) surface character of sheet flows, 3) surface sediment cover, 4) the presence of various tectonic features, 5) the density of typical benthic sponges and 6) the ratio of sponges to holothurians present. When these parameters are entered into a regression equation predicting distance from a known vent site, the following equation results:

D=2.9SP+36.2FC+175.5S-136YS+119.7

(where D=distance from vent, SP=density of sponges, FC=character of sheet flows, S=% sediment coverage and YS=area of low-T hydrothermal sediment cover). Implications of these analyses will be discussed.

V11B-14 1146 INVITED

The Anomalous Magnetic Signature of Axial Seamount; Central Juan de Fuca Ridge.

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H. P. Johnson (School of Oceanography, University of Washington, Seattle, WA 98195)

Axial seamount is a large, volcanically active, seamount located on the Juan de Fuca (JDF) ridge at 46°N. A compilation of sea-surface magnetic anomaly data shows that Axial lies within the Brunhes normal polarity epoch, but does not produce a simple positive anomaly due to its mass excess. Several pronounced negative anomalies are associated with the seamount, including both a low, northwest of the summit, and an elongate low on the southeast flank. These anomalies form part of a regional anomaly low trend extending across the seamount edifice, perpendicular to the general JDF ridge trend of 020°. A third negative anomaly is found associated with Helium basin, a deep basin on the northeast flank of the seamount.

Both forward and inversion modelling of the anomalies were done, and show that bathymetry can explain the Helium basin anomaly, but cannot produce the anomaly low trend across the seamount summit. If crustal magnetization does not vary spatially, then the observed negative anomalies at the summit are due to variations in the magnetic source layer thickness i.e. shoaling of the Curie isotherm depth. In a simple forward model, assuming no significant variation in magnetization, the source layer would have to thin by 75% in order to generate the observed magnetic response. This thinned source layer is consistent with the presence of a substantial magma chamber at depth beneath the summit of Axial and oriented perpendicular to the general ridge trend.

Behavior of Volatiles in Magmatic Processes II (V12A)

HIVN Emerald Mon PM
Presiding, P. Michael
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Sandia National Lab

V12A-01 1330

Mobile Charge Carriers in Obsidian: Evidence for Peroxy.

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Light grey obsidian from Glass Butte OR, generates highly mobile charge carriers when heated above 450°C. These carriers are positively charged and cause a conductivity maximum between 550-650°C which is higher than the conductivity due to Na^+. The charge carriers probably derive from dissociation of peroxy entities, $O_3X/^{OO}\backslash XO_3$ (X = Si, Al) and consist of $O_3XO\cdot$ radicals or O^- states, e.g. positive holes in the O^{2-} matrix. Because O^- states represent delocalized defect electrons in the valence band, repelling each other electrostatically, they diffuse to the surface. They cause the surface to become positively charged. By analogy to fused SiO_2, where $O_3Si/^{OO}\backslash SiO_3$ links are believed to form through conversion of O_3Si-OH pairs (F. Freund: J. Non-Cryst. Solids 71, 195, 1985) the obsidian appears to be particularly rich in peroxy because it derives from a very H_2O-rich magma. At present it is unknown whether the peroxy entities were formed in the magma, possibly accompanied by loss of H_2, or later in the glass. The presence of peroxy may be of importance for understanding the genesis of magmas and the working of volcanoes.

V12A-02 1345

Evidence for Peroxy in a Sanidine from the Lower Crust.

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In the Eifel Volcanic District, West Germany, maar-forming eruptions of alkali basalt have produced large (40 cm) sanidine crystals from the lower crust. By CDA (Charge Distribution Analysis), a newly developed technique, it can be shown that the sanidine, $(K,Na)AlSi_3O_8$, generates strong positive surface charges between 550-800°C. This suggests that this lower-crust sanidine contains peroxy entities, $O_3X/^{OO}\backslash XO_3$ (X = Si or Al) or some other anion complexes which release mobile positive hole charge carriers ($O_3XO\cdot$ radicals or O^- states) by dissociation. O^- states represent defect electrons in the valence band. Because they delocalize, they repel each other in the bulk and diffuse to the surface. The appearance of the O^- states supports the contention (F. Freund: Phys. Chem. Minerals 15, 1-18, 1987) that CO_2, the dominant lower crust fluid phase component, can become structurally incorporated in silicates. However, the dissolved CO_2 component appears not to form carbonate anions, CO_3^{2-}, but a redox anion pair, O_2^{2-} and CO_2^{2-}. Upon dissociation both generate O^-.

V12A-03 1400 INVITED

Effect of fluorine on the viscosity of diopside melt.

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The effect of fluorine on the viscosity of diopside melt has been investigated in order to test the proposal that fluorine may increase the viscosity of initially depolymerized silicate melts in response to an increase in the activity of silica. The determinations were made using concentric cylinder viscometry at 1 atm and in the temperature range of 1300 to 1500°C. Mixtures corresponding to 0, 0.25, 0.5 and 1 mole of fluorine per 4 cation molecule were fused directly at 1500°C to yield glassy starting materials. Electron microprobe analyses of the glasses indicate that significant fluorine volatilization occurred during synthesis but that the base composition ratio of Ca:Mg:Si = 1:1:2 was maintained. The viscosity of diopside melt is significantly reduced by the substitution of fluorine for oxygen in these melts (approx. 0.06 log units per wt.% F). The effect observed for diopside melt is much less than that observed for polymerized melts such as jadeite and albite (approx. 0.2 log units per wt.% F).

Evidence from liquidus phase equilibria and Raman and infrared spectra of quench glasses of depolymerized silicate melts indicate that the exchange of fluorine for oxygen increases silica activity, implying a polymerization of the oxide portion of these melts and the formation of discrete metal-fluoride complexes. If so then this study indicates a significant factor in determining melt viscosity is the presence of complexes such as CaF_2 and MgF_2 (and possibly CO_2 and H_2O).

The observation of decreasing viscosity with increasing fluorine content of diopsidic melt indicates that the viscosity-reducing effect of fluorine extends over the range of polymerization states of silicate melts that is commonly inferred for igneous melts. Thus fluorine is predicted to enhance petrogenetic processes in relatively depolymerized basic igneous melts as is the case for polymerized acidic melts.

A. US Representation in JOIDES Advisory Structure

JOIDES Institutions	37 positions	3 Chairmen
Non-JOIDES Institutions	25 positions	2 Chairmen
Industry	12 positions	1 Chairman
Government Labs	12 positions	1 Chairman
Total US	86 positions	7 Chairmen

Non-US Representation in JOIDES Advisory Structure

Non-US Partners	90 positions	7 Chairmen

B. US JOIDES Institution Representation on Panels

	THEMATIC	SERVICE	DPG, etc.	TOTAL	comments
Lamont				7	
	1 LITHP 1 OHP 2 SGPP 2 TECP	0	1 CEPAC-DPG		
OSU				4	
	1 OHP 1 SGPP	0	2 SR-DPG		
TAMU				1	(ODP)
	0	0	1 SR-DPG		
Scripps				4	(3 persons)
	1 OHP	1 DMP	2 FPAP-WG		
HIG				8	(7 persons)
	1 LITHP(Chr)	1 DMP 1 SMP 1 SSP	1 CEPAC-DPG 2 WPAC-DPG 1 SR-DPG		
Miami				3	(1 person)
	1 LITHP	0	1 SR-DPG 1 FPAP-WG		
URI				2	
	0	1 SMP	1 SR-DPG(Chr)		
Texas				3	
	1 TECP (Chr)	1 TEDCOM (Dept Pet Eng)	1 FWAP-WG		
Washington				1	
	0	0	1 SR-DPG		
Woods Hole				4	
	1 LITHP 1 OHP	0	2 SR-DPG		

C. US Non-JOIDES Institutions Representation on Panels

3 Cornell Univ. - DMP, FPAPWG, LITHP (2 persons)
1 Lehigh Univ. - DMP
1 Massachusetts Inst. of Technology - LITHP
1 Northwestern Univ. - CEPDPG
1 Pennsylvania State Univ. - OHP
1 Rice University - OHP
1 St. Louis Univ. - LITHP
1 State Univ. of New York, Stony Brook - TECP
1 Univ. of California, Los Angeles - IHP
1 Univ. of California, Santa Barbara - SRDPG
4 Univ. of California, Santa Cruz - 2 Thematic Panels OHP & SGPP; 2 DPGs FPAPWG & WPDPG(Chm)
2 Univ. of Florida - LITHP, SRDPG (1 person)
1 Univ. of Illinois, Chicago - CEPDPG
1 Univ. of Massachusetts - SMP
1 Univ. of Michigan - CEPDPG(Chm)
1 Univ. of Utah - SRDPG
1 Utah State Univ. - SRDPG
1 Wesleyan Univ. - SMP
1 Western Washington State Univ. - TECP

D. US Government Laboratories Representation on Panels

1 Los Alamos - TEDCOM
1 National Geophysical Data Center - IHP
1 Sandia - DMP
9 USGS - 1 Thematic Panel SGPP(2); 4 Service Panels DMP, IHP, PPSP(Chm), SSP; 3 DPGs CEPDPG, FPAPWG, SRDPG

E. US Industry Representation on Panels

2 AMOCO - DMP, TEDCOM
1 ARCO - DMP
1 Chevron - TEDCOM
3 EXXON - IHP(Chm), PPSP, TEDCOM
3 Independents - PPSP, TEDCOM(2)
1 Longyear - TEDCOM
1 Mobil - PPSP

FIELD PROGRAM PLANNING

1. The Planning Committee is responsible for developing a general science plan and general track of the drilling vessel about four years in advance of drilling !

2. Schedule

January 1	January 1	January 1	January 1	January 1
	---------	*	----------	
	field work	PCOM Plan	drilling	

3. Field work should preferably be done even earlier than the above schedule.

4. NSF will give priority to field programs in areas 2 to 3 years ahead of the drilling vessel.

5. In FY 1988 and 1989 NSF/ODP spent approximately $ 7 Million on field programs in the Pacific. Atlantic proponents were told to wait.

6. USSAC has support for limited amounts of data acquisition.

7. Development of down-hole instrumentation requires comparable lead time.

8. There are high quality research and drilling objectives in the Atlantic !