JOIDES Lithosphere Panel Meeting
Windischeschenbach, FRG (KTB site)
September 8-12, 1989

EXECUTIVE SUMMARY

Leg 129: LITHP endorses the Leg 129 prospectus with at least 100 m of basement penetration at PIG-1, or PIG-2 and PIG-3. The nature of Jurassic ocean crust is extremely important, so if drilling conditions are favorable, up to 300 m of basement penetration at one site would be highly desirable. LITHP objects most strongly to the suggestion of not drilling a deep basement reentry site on Leg 129.

Leg 130: This program has had strong support from LITHP as a multi-objective drilling program. Even so, there has been no LITHP thematic input into the draft prospectus for the Ontong-Java Plateau. We strongly urge that the deep reentry site be targeted to recover at least 150 m of basement and be drilled as the first site on the Leg.

Lack of communication for Leg 130 raises the general issue of the detailed planning of drilling legs. To avoid future problems, LITHP strongly endorses the notion of thematic input/participation in putting together Leg prospectii. A related issue concerns effective communication among all thematic panels. In order to insure effective communications for multi-objective legs, LITHP requests a permanent liaison to OHP.

Geochemical Reference Sites - Our new ranking places GRS as a very high priority. Fundamental questions raised by Legs 125 and 126 require constraints on the nature of material being subducted. LITHP strongly urges that GRS be drilled in 1992 or 1993.

Sedimented Ridges DPG Prospectus: LITHP strongly endorse the two-leg drilling plan for sedimented ridges formulated by the SRDG. We strongly urge that the recommendations of this report be implemented and that drilling be scheduled for 1991.

Long-range Planning: LITHP has four long-term goals, incorporated in the ODP long-rage planning document:

-- a deep drill hole traversing normal ocean crust to mantle
-- establishing global-seismic arrays and ridge-crest observatories
-- investigating the magmatic and hydrothermal processes of crustal accretion at a variety of spreading rates
-- improved understanding of off-axis volcanism.

Drilling a deep hole through the crust will require future modifications to the drill ship and development of heavy-duty reentry cores and casing. We strongly urge that a DPG be created to start examining these issues. This "deep drilling" DPG (DDDPG) also should evaluate proposals for deep drilling in offset crustal sections and formulate drilling plans. It is urgent that the DPG be approved soon, as the need to examine these questions in detail will probably arise in 1990.

A pilot hole for global seismic arrays should be drilled before 1992 or 1993. We urge PCOM to discuss the need for more ODP sites equipped with reentry cores, as such sites (15-20) will be need to establish the oceanic part of the array.

LITHP Priorities for 1991 Drilling: LITHP ranks the six programs for possible Central and Eastern Pacific drilling as follows:

1. 504B (1 Leg)
2. Sedimented Ridges (1 Leg)
3. EPR bare rock (1 Leg)
4. Chile triple junction (1 Leg)
5. Cascadia Margin
6. E. Equatorial Pacific Neogene.

LITHP urges that at least 1 Leg of drilling be devoted to each of the three top ranked programs. The long-awaited capabilities of the drill ship now offer promise that the most highly ranked thematic objectives of LITHP can be successfully drilled. Since 1986 there has been no ODP drilling that addresses these themes. We thus feel very strongly that 1991 and part of 1992 be devoted to these highest priority LITHP programs. An engineering leg at the EPR and 504B and three legs of scientific drilling in 1991 should be followed up with at least 2 additional legs at sedimented ridges and the EPR.

High Temperature and Slimhole Logging Needs: LITHP met jointly with DMP to consider immiment logging needs. Our recommendations are that the logging group at LDGO be given the responsibility and needed resources to construct a high-temperature, slimhole tool string to measure as many as possible of the following: temperature, borehole fluid resistivity, formation resistivity, natural gamma, sonic, caliper, flow meter, borehole fluid pressure.

At the same time, we strongly urge that TAMU develop: 1) high-temperature bits and coreliners, 2) a modified Barnes-Uyeda tool, 3) continued development of the DCS and pogo guidebase, 4) post-drilling seals for ODP holes. These developments are deemed essential and urgent.

Next Meeting: First week of March, 1990; New Orleans - to overlap with TECP for a joint meeting.

JOIDES Lithosphere Panel Minutes
September 8-12, 1989
Windischeschenbach, FRG (J. Erzinger, host)

Present:

R. Batiza	J. Mutter
K. Becker	J. Pierce
L. Cathles	M. Perfit
S. Cloetingh	J. Phipps-Morgan
J. Erzinger	G. Smith
J. Franklin	E. Davis (CEPDPG)
T. Fujii	R. Buck (TECP)
S. Humphris	J. Malpas (PCOM)
C. Mevel	

R. Anderson (quest; Logging Group)
P. Bitschene (quest; Bochum)

Absent: M. Goldhaber (SGPP)
J. McLain (new LITHP member)
T. Brocher (new LITHP member)

On September 8, LITHP was treated to a complete tour of the KTB deep drill site. The tour included talks by KTB geologists and engineers, who described the geologic results of the completed 4000 m-deep pilot hole and some of the drilling/logging techniques and difficulties. After this, we toured the very impressive on-site laboratory facilities. The pilot hole employed a novel closed-system of synthetic drilling mud. This system allowed analysis of many components mixed into the mud by drilling, including rock flour, deep fluids/gases and cutting. Comparison of chemical analyses of rock cores (>95% recovery with a narrow kerf DCS) with cuttings and rock flour show that the rock flour (whose origin can be pinpointed $\pm$ 20 cm in hole) is fully representative of the cored rock, whereas cutting>140 μ in size are mostly from cavings. Since the composition of the drill mud is known and carefully monitored, addition of fluids can confidently be detected. In this way, several horizons of fluid influx were identified. Drilling of the main hole (target depth >10 km) is scheduled to begin in Fall 1990. Overall, the drilling, logging, on site-analytical and follow-up analysis programs are extremely impressive. Many of the new techniques developed at the KTB site may have application to ODP drill holes, so it seemed very appropriate for LITHP and DMP to meet at the site.

On September 9, LITHP officially began its meeting at the Oberpfalz Hof hotel at 0830. Joerg Erzinger made some welcoming remarks and discussed meeting logistics. For those not able to participate in the KTB tours on September 8, a special tour was arranged for the evening. LITHP also welcomed S. Cloetingh (ESF) and (in absentia) Jim McClain and Tom Brocher to the panel.

1.0 LIAISON REPORTS

1.1 PCOM:

John Malpas and Catherine Mevel gave a report on PCOM activities at their August meeting in Seattle. Some items also required discussion of the earlier PCOM meeting in Oslo (March, 1989).

ODP budget - ODP will receive only a 4-5% increase in 1991 for inflation. This is important to LITHP because the drill string on the RESOLUTION may have to be replaced and there is a vital need for additional funds to build logging tools for high-temperature slimhole drilling anticipated in 1991.

TAMU report - Of interest to LITHP is the issue of the aging drill string which the drill ship is presently using. This 5-year old string shows signs of failing and may have to be replaced.

Ontong-Java Plateau (Leg 130) - PCOM discussed a drill plan for the upcoming OJP drilling leg (142/E - Revised and draft of the Leg 130 prospectus). This plan calls for 4 sites as a Neogene transect and one reentry site for deeper penetration into pre-Neogene sediments and basement. The draft Leg 130 prospectus recommended that the deep-reentry site be drilled first with the four Neogene transect sites to follow. PCOM reversed this recommendation, apparently because of a perception that the Neogene program was the only goal of the Ontong-Java plateau (OJP) drilling program.

LITHP has provided strong support for Leg 130. At the 1987 LITHP meeting in Paris, LITHP ranked drilling at OJP as its fifth highest priority and sent its list of top six programs to CEPAC. This strong endorsement from LITHP is one reason that CEPAC included OJP as a multi-objective program in its prospectus for drilling in the Central and Eastern Pacific. LITHP recommended at the time that 300 to 500 m of basement be recovered from at least one site. As shown by drilling on Leg 81 on the Norwegian margin, significant (>100) penetration into basement is needed to interpret melting processes and origin of thick submarine volcanic piles. LITHP reaffirms the vital importance of drilling at least 150 m into basement. In addition we strongly urge that the deep reentry site be drilled first because, basement objectives are vital to the success of Leg 130 and putting this objective at the very end places it in jeopardy of not being completed.

LITHP decries the erosion in importance of the basement objectives during Leg 130. We feel that this is partly due to poor communication - LITHP had no liaison at the latest OHP and CEPDPG meetings. For this reason we ask that LITHP be allowed to have a liaison to OHP. While there is not a great deal of scientific overlap between LITHP and OHP, discussion of objectives and priorities are important to squeeze the best science out of each and every ODP hole. Chances of doing this are greatly improved if all thematic panels communicate effectively and optimize site selection and drilling strategy to maximize the scientific return for a variety of objectives.

ODP Long-Range Plan - PCOM has approved the ODP long-range planning document. This document recommends an emphasis on lithosphere drilling, which is appropriate given the present and developing capabilities of the drill ship. This plan recommends significant progress on LITHP priority objectives which have been addressed only minimally by previous ODP drilling. In order to meet important COSOD 1 and COSOD 2 goals, the ODP long-range plan calls for 37 drilling legs dedicated to LITHP drilling in

the period 1989-2002 (43% of the total drilling time available). The program is phased (Phase 1, 89-93 - 9 legs; Phase II, 93-97 - 14 legs; Phase III, 93-02 - 14 legs) to achieve significant progress on deep crustal drilling, seismic and ridge crest observations, understanding hydrothermal and magmatic processes at active ridge crests and intraplate volcanism. The amount of drilling for LITHP objectives will be sufficient to make significant progress in these areas and to achieve the long-term goals of LITHP. However these estimates assume that technological developments that are in progress will be successful. Reduction in the amount of drilling time allocated in the ODP long-range plan for LITHP objectives would seriously jeopardize the possibility of achieving the scientific objectives outlined in the LITHP White paper and ODP long-range plan.

Preparation of Prospectii for Drilling Legs: PCOM has proposed that PCOM or thematic panels send representatives to help write the prospectii of upcoming drilling legs. LITHP strongly supports this notion, especially for drilling legs which have been put together without the benefit of a DPG or WG.

Engineering Developments: Barry Harding reported to PCOM on progress of engineering developments. The DCS drill string will be lengthened to ~4000 m and the DCS system will be tested at two land sites in the U.S. The Navidrill has a tendency to stall, but can still be used for several important tasks during Leg 131 (Nankai). The XCB is fully operational.

Roger Anderson of the Logging group raised the issue of high-temperature and slimhole logging capabilities. Later sections of these minutes (section 4.0) also addresses these questions and makes several important recommendations. LITHP believes that the Logging group rather than TAMU should be given responsibility for developing logging capabilities in hot, slim DCS holes. TAMU, in turn, should have the responsibility of developing high-temperature bits and core lines, of improving the Barnes-Uyeda tool and helping to develop needed drillable plugs for holes where hydrothermal objectives are important.

FY91 Drilling Program: Later in these minutes, we give our prioritized listing of the six programs proposed for 1991 drilling in the Central and Eastern Pacific.

DPGs and WGs: PCOM discussed the general issue of detailed planning groups (DPGs) and ad-hoc working groups (WGs). This issue is of great concern to LITHP, which has had experience with both DPGs and WGs. We feel that the most important function for such groups is to hammer out the best drilling programs to achieve both long-term and short-term goals. This is a difficult and time-consuming task, especially in cases where there is more than one proposal addressing a high-ranked drilling theme or in cases where several different proposals address the same theme but in different geographic areas. Thematic panels lack the expertise and time needed to accomplish this reasonably detailed sort of planning at the level of excellence required. However, it is vital that thematic input for such planning be constantly maintained and for this reason we favor DPGs over WGs, at least as presently configured. As an example, or model, of how DPGs can very effectively put together an excellent drilling program, we would cite the sedimented ridges DPG (SRDPG) which used input from several different proposals for drilling in several diverse geographic areas. The fact that the DPG had significant overlap in membership with LITHP, and reported its findings to LITHP for additional discussion, insured strong thematic input into the program that was hammered out in detail by SRDPG.

LITHP has also had excellent experiences with WGs such as the one for Lau Basin drilling. Partly this is, again, because of overlapping membership and excellent communications. If ad-hoc WGs are formed to formulate detailed drilling plans, then it is very important to insure that thematic input is maintained. There are probably several good ways of insuring this, but the easiest is probably by having overlapping membership with the appropriate thematic panels and frequent updates of activity and discussion at thematic panel meetings. This is especially important for drilling programs that address the goals of more than one thematic panel. LITHP has several important concerns regarding thematic long-term planning and thematic input to multi-objective legs. These are discussed more fully later in these minutes under "Long-term planning" and "CEPDPG" respectively.

Thematic Panel Replacements: LITHP is gratified by PCOM's concern for disciplinary balance in thematic panels. LITHP feels that its present membership reflects an adequate balance of expertise to evaluate diverse drilling proposals and for thematic planning of long-range goals. LITHP also feels that disciplinary balance is extremely important on PCOM. We note (ruefully) that in several previous instances, misunderstanding of the scientific goals of particular drilling programs, exacerbated by the absence of the PCOM members expert in the field, has led to great confusion. Such situations could be partly avoided by having a better disciplinary balance on PCOM.

Non-JOI Membership on PCOM: As discussed in the report of the Peck committee, involvement of non-JOI members in ODP could be beneficial for many reasons. Scientifically, of course, the entire Earth sciences community has great interest in ODP results. Further, several long-term goals of ODP (as set out in the ODP long-range plan), such as extending global seismic observations and in-situ stress measurements to the ocean basin, requires active participation by scientists not necessarily working at JOI institutions. For this reason, LITHP endorses the notion of broader community input into ODP. Such input would scientifically strengthen the program but may be most effective at the thematic panel level. Already, most thematic panels have U.S. members from non-JOI institutions. For LITHP, at least, this is very beneficial and we hope the practice will continue in the future.

Geochemical Reference Sites Drilling: PCOM reconsidered its decision to cut GRS from the 1990 drilling schedule but decided not to reverse it. Since LITHP strongly supports GRS drilling, a direct outgrowth of COSOD II, we are disappointed by this decision. LITHP will continue to strongly advocate such drilling because, as shown by the Leg 125 and 126 results, it is essential to provide constraints on the nature of the material being subducted if we are to understand the material fluxes occurring at convergent margins. LITHP has ranked GRS very highly (see later parts of these minutes) and hopes that the drilling can be done in 1992 or 1993.

LITHP believes that the decision to cancel the GRS leg at its Oslo (1988) meeting was an error. However we also believe that the ODP planning structure can benefit from this error if we understand the reasons for it and can avoid future problems of the same type. Several suggestions emerged during a lengthy discussion and we offer these for consideration by PCOM and perhaps other thematic panels: LITHP has identified two factors which we feel contributed adversely to consideration of the GRS program:

Scientific misunderstanding of GRS: We conclude that many members of PCOM did not understand the scientific goals of the leg beyond the superficial and now-famous "cow-eating-grass" analogy. Given that the proponents attempted to clarify the goals and methods numerous times, in both written and oral presentations, LITHP is puzzled

that confusion apparently still existed. Partly, this may be because the name "Geochemical reference sites" does not explicitly convey the scientific goals: "Quantitative tests of material fluxes at convergent margins" would perhaps be a better name. In addition it would convey the vital need for such drilling as an integral part of the Mariannas-Bonin transects (as demonstrated by the Leg 125, 126 results). Partly, however, we feel that this confusion is a direct and negative result of poor disciplinary balances on PCOM. Accordingly, we hope that new PCOM members will be selected partly with consideration of disciplinary balance as an important goals.

Absence of LITHP-PCOM liaison at Oslo: Related to the above, is the feeling that the absence of the LITHP liaison (J. Malpas) at Oslo was an important factor in cancelling the GRS leg. This is difficult to assess with confidence, however it is clearly important for PCOM to have accurate and timely thematic input to important decisions. We offer the following suggestions which may help to prevent future problems.

1.) That PCOM not reverse decisions (positive or negative) on scheduled drilling legs at consecutive meetings.

2.) That PCOM decide to require at least a 2/3 to 3/4 majority to reverse any major decision affecting the drilling schedule.

Leg 132 Plans and Staffing: PCOM recommended that J. Natland be a co-chief on the upcoming engineering leg. LITHP believe this is an excellent choice. LITHP has important concerns regarding detailed site selection and believes it is vital that a good site be chosen to test the capability of the DCS in young, rubbly volcanic rock such as will probably be encountered at the EPR and other young ridge crest terrains.

1.2 TECP:

The Tectonics panel has not met since LITHP's last meeting in Miami, thus C. Mevel (LITHP liaison to TECP) and R. Buck (TECP liaison to LITHP) had nothing new to reports. TECP next meets in Honolulu, September 26-28. TECP and LITHP have agreed to have an overlapping meeting at their early spring meeting in 1990. Tentatively this is set for the 1st week of March in New Orleans so that the TAMU engineers who commonly attend the spring LITHP meeting, will not have to travel long distances to the meeting.

1.3 SGPP:

The Sedimentary and Geochemical Processes Panel has produced its White paper, which indicates considerable scientific overlap with LITHP, particularly in the area of hydrothermal processes at sedimented and unsedimented ridge crests. SGPP will meet next at GEOMAR (FRG) 19-20 September.

1.4 CEPDPG:

The Central and Eastern Pacific DPG met in Hilo, April 11 and 12. Unfortunately, E. Davis, LITHP liaison to CEPDPG was unable to attend. It is the perception of LITHP, that there has been a certain erosion of LITHP priorities within CEPDPG, as reflected in the CEPAC straw-man drilling schedule. This is a serious concern because of LITHP's highest priority drilling themes (3 of the top 4, 6 out of the top 10), most can best be addressed in the Pacific. In the last three years (since Leg 111, there has been no ODP drilling which addresses the highest priorities of LITHP. LITHP has been waiting since 1986, and before, to achieve progress on COSOD I, COSOD II

goals and those discussed in the ODP long-range plan. For this reason, we strongly urge that a large proportion of the drilling time available for Pacific drilling in 1991 and beyond be used to start addressing these high-priority LITHP drilling objectives.

Another issue involving CEPDPG is the upcoming Ontong-Java drilling (Leg 130). As discussed earlier, LITHP is distressed over the continued erosion of LITHP goals for the OJP. We feel that this sets a bad precedent for future multi-objective legs and that more effective planning is needed to insure that the scientific accomplishments of each drilling leg reflect joint thematic priorities. The example of OJP can be used to illustrate how not to plan a very important, multi-objective drilling leg. In the future, this perhaps can be remedied by having thematic input to leg prospectii. However, thematic input at an earlier stage would be much more useful. In the case of OJP, the CEPDPG prospectus for CEPAC was well balanced and excellent, so we are puzzled that LITHP objectives have apparently been down-graded. Is this because PCOM chose to ignore the recommendations of the CEPDPG? Is it because realistic drilling estimates were not made soon enough? For the future, it seems clear that an effective way must be found to insure timely thematic input to planned drilling programs. If these programs arise largely from a single thematic panel, (for example through the efforts of a DPG) then the DPG should include representation from all other interested thematic panels as well. Failing this, perhaps the policy of circulating all DPG reports to all thematic panels (in time to respond before drilling decisions are made) will be effective.

Old Pacific Crust (Leg 129): LITHP has important goals (see 2d CEPAC prospectus) which will be addressed by Leg 129, including: 1) Nature and composition of oldest Jurassic basaltic basement, 2) chronology and significance of regional Cretaceous off-axis volcanism, and 3) nature of the Jurassic quiet zone. We strongly support multiple reentry drilling at sites PIG-1 or PIG-2 and 3 as proposed in the Leg 129 prospectus and hope that at least 100 m of basement can be recovered from the deep basement reentry site. For LITHP objectives, up to 300 m would be highly desirable, so if drilling conditions are favorable; LITHP would assign a high priority to achieving this goal.

Lau Basin (Leg 135). J. Pierce, a member of the Lau Basin Working group reports that planning for the leg is well-underway and on track.

1.5 SRDPG:

Earl Davis presented the final results of the Sediment Ridges DPG. These are summarized in the SRDPG's "Sedimented Ridge Drilling Prospectus". The planned two leg program is aimed at 1) a three-dimensional characterization of the fluid flow and geochemical fluxes within a sediment-dominated hydrothermal system, and 2) a systematic investigation of the processes involved in the formation of sediment-hosted massive sulfide deposits. These goals have been and continue to be among the highest LITHP priorities for drilling.

LITHP strongly endorsed the SRDPG prospectus for two legs of drilling. Furthermore, we strongly urge that the engineering developments needed to successfully undertake the program be completed. These essential developments include:

1.) the DCS and pogo guidebase, which are essential for sulfide drilling

2.) high-temperature drill bits and core liners

3.) modifying the Barnes-Uyeda tool for higher temperatures (up to 200°C) and tougher conditions (shortening the tool?)

4.) Post-drilling seals which could be installed and removed either by the drill ship, or (more desirable) by a submersible or ROV.

In addition to these essential developments, there are other developments which are highly desirable and would result in significantly enhanced scientific return. These include:

1.) Openable annulus seals for the DCS system. These are needed to measure interval permeability and apparently such seals already exists.

2.) Standard logging through side entry sub with circulation. This capability also exists for standard-diameter RCB holes. If the DCS is used in basement, reaming with the RCB would be needed to complete standard logging.

3.) Slimeline, high-temperature logging tools of various types. The essential logging needs for the sedimented ridge program (using RCB drilling) can probably be done with standard dewared high-temperature tools if in-hole circulation is maintained. However other programs using the DCS extensively , such as EPR drilling, will require slimhole capability. These needs, possible solutions and joint LITHP-DMP recommendations are discussed later in these minutes.

4.) Pressure core barrel

5.) high-temperature packers.

6.) Capability to measure H_2S and related gases on the drillship.

Overall, the sedimented ridges drilling program is considered by LITHP to be extremely strong. Its overall success, however, depends on technological development for drilling and logging. We thus strongly urge that the necessary resources be made available to TAMU and the logging group to implement the needed developments.

2.0 LONG-TERM PLANNING

2.1 General

LITHP discussed the difficulties of long-term planning in a proposal driven and (partly) ship-track driven program. How can long-term goals such as those of COSOD I, COSOD II and the ODP long-range plan be implemented? LITHP has several important long-term goals:

LITHP Long-term Goals for ODP

1.) A continuous deep drill hole penetrating normal ocean crust into the mantle

2.) Establishing global seismic arrays and ridge-crest observatories

3.) Investigating crustal accretion processes at a range of spreading rates

4.) Improved understanding of off-axis volcanism which modifies oceanic crust and lithosphere.

These priorities have remained more-or-less the same since COSOD I and continue to be the driving force for LITHP in proposal evaluation and long-term planning.

In order to achieve progress on these goals, a phased approach is suggested in the ODP long-range planning document. This phased approach could probably succeed, however the planning document provides only a broad outline. In addition to this broad outline, there is need for planning groups to insure that the capabilities needed to achieve these goals come on-line in a timely fashion. Many details need to be worked out and strategies to do this have to be developed. It is not clear that the present ODP planning structure is designed to meet these long-term needs. For example, in order to drill through normal crust in water depths of 4-5 km, a total drill-strong length of at least 11.5 km will be required (Report of USSAC Deep Crustal Drilling Workshop). Handling such a long string will probably required some modifications to the drill ship. In addition, much heavier duty reentry cores and casing will have to be developed to sustain 80-100 plus reentries. Other modifications, to the sand line system and elsewhere would have to be implemented as well.

Another example of long-term planning needs concerns the important goal of establishing a network of broad-band seismometers in the ocean basins. To do this will probably require 15 to 20 approriately located holes equipped with reentry cones. Many people have simply assumed that these reentry-cone-equipped holes will be available, but ODP has placed only about half a dozen reentry cones on the seafloor since its inception (drop-in reentry cones will not work for this purpose).

LITHP tried to consider how long-term issues of this sort could best be handled. While many of these issues may be within its mandate, PCOM already has a great deal to do. It does not seem likely that PCOM could implement long-term planning at this level of detail and still do all the other things it has to do.

Another possibility would be thematic panels. Thematic panels are certainly in a good position to specify what needs to be done, however it is not clear that thematic panels have the necessary expertise to find the best solutions. Thus, the option which seems best is to designate a special group or groups to consider in detail, long-term planning issues for thematic scientific goals.

For total crustal penetration and seismic networks, LITHP has specific recommendations: For long-term planning of total crustal penetration, LITHP recommends that PCOM appoint a DPG. This DPG, called the "deep crustal drilling DPG" should also have the task of evaluating proposals and formulating drilling plans for recovery of deep crustal rocks in offset crustal sections. LITHP anticipates receiving about ten new proposals prior to the November 1989 PCOM meeting and thus formation of such a DPG should not be delayed any longer. The core membership for such a DPG could be drawn from a group of scientists/engineers who will meet (Spring 1989?) at a JOI USSAC sponsored workshop to consider the technological requirements of Deep Drilling.

The reentry cone problem for seismic and RIDGE observatories is a longer lead-time question. New seismometers for the global array will be ready for testing at a pilot hole near Hawaii in 1992 or 1993. Placing of reentry cones could thus be done as an

integral part of ODP drilling scheduled in 1990-1992. It is very important that progress be monitored, so that phased installation of new observatories can proceed effectively.

2.2 LITHP Priorities for 1991 Drilling: In response to the PCOM chairman's letter of 25 May, 1988, LITHP ranked the six drilling programs from which the 1991 drilling schedule in the Pacific will be chosen. The results are:

Rank	No. of votes	LITHP Theme	Proposal	Drilling Program
1	95	layer 2/3 transition	286/E	Deepening of hole 504B (1 leg)
2	83	hydrothermal processes at sedimented ridges	232/E, 284/E 224E/Rev, 275E Rev	SR DPG Prospectus (2 legs)
3	83	hydrothermal and magmatic processes at fast, unsedimented ridges	76/E Rev, 321/E 325/E	EPR Bare rock (1 leg) (SRDPG needed for 1 meeting after 12/88 to formulate prospectus)
4	N/A	sedimented ridges (TJ-4); ophiolites (TJ-7); ridge subduction	318/E	Chile triple junction
5	N/A	(fluids and accretionary processes)	CEPAC Prospectus	Cascadia margin
6	N/A	(climate evolution)	CEPAC Prospectus	East Equatorial Pacific Neogene

Our highest priority is deepening hole 504B during 1 leg of drilling after the hole has been clear or deviated on the engineering leg (engineering Leg 3). Second and third place are a tie with sedimented ridges and EPR bore-rock drilling each receiving 83 votes. The three top-ranked thematic programs for 1991 are also among LITHP's top-ranked programs in any ocean (discussed later). Considering the present capabilities of the drill ship and on-going technological development, these three objectives can probably be achieved. LITHP strongly urges that all three programs be drilled in 1991 and 1992. For 1991, LITHP recommends 1 leg of scientific drilling each at 504, EPR and middle valley, with follow up legs in 1992.

In preparation for its next meeting and the April 1990 PCOM meeting, LITHP also ranked all its present drilling programs and "expected drilling programs" (highly rated theme plus expected proposal). It is expected that all the listed drilling "programs" will in fact be programs (highly rated theme plus highly rated proposal) by January 1990 even though our requested Deep-Drilling DPG may just have begun to work on proposal evaluation and program formulation. Our complete list of programs is:

Rank	No. of votes	LITHP Theme	Proposal	Comments
1	95	layer 2/3 transition	286/E	deepen 504B
2	88	layer 3 - mantle transition	300B	proposals expected for Atlantic & Pacific
3	83	sedimented ridges	SRDPG	Middle Valley - Escanaba
4	83	magmatic, hydrothermal processes at fast ridges	76/E, 321/E, 325/E	revised French proposal expected
5	56	magmatic, hydrothermal processes at slow ridges	312/A, 333A	proposals for VEMA and MARK areas expected
6	53	Geochemical Reference Sites	267/F	could be drilled in 1992 or later
7	49	deep mantle section	-- --	proposals expected for Hess Deep (Pacific) & MARK area
8	44	Layer 3 deep section	300B	proposals expected for Pacific & Atlantic
9	35	Early hot spot evolution	252/E	Loihi
10	30	Early continental rifting	275/E Rev	coordinated Norwegian-Greenland margin proposal expected
11	25	oceanic plateaus	222/E Rev	Ontong-Java (Leg 130)
12	23	transform faults	333A	
13	23	Hawaii Pilot Hole	315E	essential for seismic observations, prior to 1993
14	19	Processes at medium spreading rate ridges	--	proposals may be received

15	15	near-EPR seamounts	279/E, 290/E	
16	11	old Pacific crust	306/E and others	Leg 129
17	10	extinct ridges	352/E	other proposals expected
18	9	temporal evolution of hot spots	291/E	Marquesas
19	7	rift valley master fault	--	
20	4	old Atlantic crust	208B	proposals expected for Atlantic

This list will be updated at LITHP's early March 1990 meeting on the basis of proposals received by then.

3.0 PROPOSAL REVIEWS

3.1 LITHP review of 349/A (VICAP; H.-U. Schmincke et al.)

Understanding processes of mid-plate volcanism is an important long-term priority of LITHP and the VICAP proposal addresses this question by examining the unroofing history of Grand Canaria. The proposal itself is somewhat immature, lacking extensive seismic data needed for selection of specific sites. Nevertheless planned future studies and abundant Exxon data in the region should allow specific sites to be chosen. The proposal presents a very thorough approach to understanding the volcanic apron sediments and addresses a number of important scientific questions including the issue of chemical fluxes involved in insular/seamount aprons. The tie to good on-land mapping is a significant plus as is the comprehensive dating program.

The dating will no doubt present a challenge, especially for altered material, however the resolution of 0.1 Ma should be sufficient to constrain the unroofing history. This resolution, however, is probably not sufficient to examine the history of the lithosphere's response to loading, which already is known to be quite complex. Reworked material in the apron could cause unwanted complications. A more serious problem is that, especially on the northern transect, material from other islands may be incorporated in the apron sediments. This possibility, and the possible influx of material derived from the continent can only be evaluated with precise seismic data of sufficient density. While much of the post-shield stage of Gran Canaria can be studied by VICAP, the early history of the volcano will not be accessible by this approach. This, plus the fact that the Canary Islands are in an unusual tectonic setting make this study unsuitable for characterizing "typical" oceanic volcanoes. The origin of the Canaries and an explanation of their unusually long volcanic history are unknown. Drilling may shed light on these questions, however the Canaries are clearly not suited for a case study of the behavior of typical oceanic islands: for this, a simpler case is desirable.

Even so, the complex environment and evolution of the Canaries may also be turned to advantage. Provided the study can be put in a context that would shed light on fundamental questions of lithosphere evolution, it would potentially be of great interest, not only to LITHP but to TECP as well. We encourage the proponents to submit a proposal which is more mature and which more directly addresses the questions of interest to the Lithosphere Panel (see e.g. LITHP White paper in JOIDES Journal and JOIDES long-range plan). For example, a convincing case can probably be made for wider application of what would be learned by drilling the apron of Gran Canaria. Alternatively, a case could be made that Canary-type island groups constitute a significant proportion of intra-plate volcanism (especially in the Atlantic). Another possibility is to argue that specific hypotheses for the origin and evolution of island groups of this type requires drilling. In any case, a more general applicability of drilling results would strengthen the proposal.

3.2 LITHP review of 303/E (Hawaiian Arch Volcanism; B. Keating)

This proposal, like another (3/E Rev.) reviewed previously by LITHP, addresses the issue of the significance of newly-discovered volcanics on the Hawaiian arch. Since these volcanics are related in some way to the evolution of the Hawaiian hot spot, they are of great interest. This phenomena may be global and thus has important implications for intraplate volcanism. Consequently, this topic is of great interest to LITHP. However, this proposal (like 3/E Rev.) is immature. Not enough is yet known from dredge results, to frame the questions that could be addressed by drilling. Furthermore, the volume of these volcanic rocks and their spatial/temporal significance needs to be assessed with seismic data prior to choosing an optimal site for drilling. The volcanics themselves and the enclosing sediments in the subsurface may be very difficult to date, so some attention should be paid to the potential problems this poses.

Overall, LITHP enthusiastically supports continued efforts to bring a drilling program to maturity. We note that an investigation of the arch volcanics might be possible in less than a full leg of drilling. Possibly this drilling could thus be combined with drilling a hole for tests of the global seismic array seismometers. Alternatively, drilling might be combined with drilling of Loihi. The Lithosphere Panel strongly endorses all three of these programs and encourages continued efforts to bring such a program to fruition.

3.3 LITHP review of 203/E Rev. (Cretaceous guyots, Winterer et al.)

This proposal addresses several questions that are of interest to LITHP, however it mainly is aimed at ocean history questions. LITHP obviously is interested in basement drilling, particularly in areas where sampling by other means is difficult and important questions of global geochemical patterns in the mantle can be clarified. In addition, the paleomagnetic objectives, as they will help to clarify the significance of surface seamount paleomagnetic poles are of some interest to LITHP. We note that many flows (> 30) are generally needed to obtain high-quality results. Since some of the guyots were at one time subjected to subaerial weathering, we question that drilled rocks will necessarily be fresher than dredged samples. This is possible, but depends in detail on the depth of subaerial weathering and other factors. For this reason, radiometric dating of the samples may pose a problem. While single holes, separated geographically by large distances are not sufficient to adequately address many questions of seamount evolution, LITHP nevertheless is interested in basement drilling at all the proposed sites.

3.4 LITHP review of 326/A (Morocco Margin; K. Hinz et al.)

The Lithosphere Panel has highly ranked the scientific theme of learning more about the early rift history of continents. Thus this proposal is potentially of great interest. However, at present, the proposal is judged to be very immature. The proposal is not framed in the context of existing models of early rifting, and thus it is not clear how the drilling will be used to test among competing models. There is no mention of data for the conjugate margin, which is also of interest. It is unclear whether the proponents favor deepening hole 547 to basement or whether they propose a new 3-7 km-deep site. Considering that such a deep hole would probably take several legs of drilling, much stronger justification is needed that the results may definitely solve a very significant question. For example, it is not clear how many holes are really needed to address the questions properly. The lithospheric objectives, beyond obtaining an age for basement, are vague. We encourage the proponents to be more specific in their aims. We note that the VICAP proposal, to drill the insular apron of Gran Canaria may complement drilling of the Morocco Margin and vice versa. Overall, we encourage the proponents to submit a more mature proposal and to make a much stronger case for the importance of the proposed drilling.

3.5 LITHP review of 328/A (Greenland margin; K. Hinz et al.)

LITHP has highly ranked the scientific theme of understanding the early stages of continental rifting. Thus this proposal is potentially of considerable interest. Overall, however, the Panel feels that after Leg 104, fundamental new knowledge requires a better coordinated effort of drilling on both the Norwegian and Greenland margins. Clearly, more information on the conjugate margins is needed to constrain the mechanism of continental rifting; while there is a great deal of information available for the Greenland side; additional drilling on the Norwegian side is also probably warranted to gain a complete picture.

LITHP thus strongly encourages the proponents to coordinate their efforts with those of others interested in this problem. Several proposals have already been reviewed by LITHP and we anticipate receiving others aimed at the same general scientific question. We would welcome a proposal for a well-coordinated program to make fundamental progress on this important question.

3.6 LITHP review of 331/A (Aegir Ridge; R. B. Whitmarsh et al.)

The processes of crustal accretion at mid-ocean ridges is one of LITHP's highest ranked scientific themes. The notion of doing so at extinct ridges is novel and certainly worthy of very serious consideration, because even though extinct ridges are not active, it may be more feasible technologically to approach the problem in this way. Thus even though the theme of drilling extinct ridges per se has not been highly ranked, its relation to crustal accretion processes may make it very attractive in the future. While in principle drilling extinct ridges is of potential interest to LITHP, we feel that this proposal needs better documentation. For example, the rocks of hole 337 exhibit only low-temperature weathering. There is no indication of hydrothermal activity. The irregular mounds along axis may, in fact, be of hydrothermal origin, but this must be documented. Mounds of the size shown could also be of volcanic origin or represent post-extinction volcanism such as found at other extinct ridge axes in the Pacific.

There is inadequate documentation of along-axis variability and if the rocks at the axis are like the ones in 337, most petrogenetic objectives would be very difficult to

achieve. Drilling an old magma chamber would be of considerable interest, however the depth to such a chamber is not well documented. Since a very deep hole would be required, much better documentation and stronger scientific justification is needed. Likewise, documentation of sulfides or, in fact any hydrothermal activity, is lacking. Magnetics may be of some help in this regard. However, even if hydrothermal activity could be documented, one or two holes would not provide a good understanding of the extinct system. Finally, it is not clear when the sediments overlying the axis were deposited. Was the axis buried by sediment at this time it was active?

Because of these deficiencies, LITHP does not rank this proposal highly. However if more documentation could be provided and if drilling active ridges is unsuccessful, an extensively revised proposal may be much more attractive.

3.7 LITHP review of 334/A (Galicia margin; G. Boillot et al.)

LITHP has placed a high priority on the scientific theme of learning more about early continental rifting. Leg 103 was very successful and this proposal is reasonably mature. We note that further work is planned in 1990, and LITHP anticipates that this new data will help to clarify some issues regarding site selection. It is very important, for example, to verify that the S-reflector is indeed the same as the deep reflector shown on Figure 6 of the proposal. If it is, drilling would be used to test a well-posed hypothesis of continental rifting.

However stronger justification is needed for drilling. If reflector Ś is exposed at the surface (as it appears to be), why couldn't parts of this problem be addressed by dredging or at least much shallower drilling? It is also important to establish the nature of the crust west of the peridotite ridge, but is drilling the best way to do this? It is possible that magnetic data could be used to determine where significant basaltic crust is present. We consider this objective very important, but less mature than the main objective. Finally, it would be of interest to know what the conjugate margin shows. The hypothesis predicts early subsidence at the conjugate. Is this observed?

Overall, this proposal is of strong interest to LITHP. We encourage the proponents to update the proposal after more data are in hand. Hopefully, these data can be used to address some of the issues raised in our discussion.

3.8 LITHP review of 335/A (Marshall atolls and guyots; Schlanger et al.)

This proposal is aimed primarily at answering important questions concerning ocean history. Nevertheless, the drilling is of moderate interest to LITHP because of the basement objectives at all sites. As with proposal 203/E Rev., LITHP strongly endorses significant basement penetration for purposes of mapping mantle geochemical provinces. It is not clear that drilled samples will necessarily be significantly fresher than dredged ones, particularly for edifices that may have been subjected to deep subaerial weathering. Even so, significant recovery in basement would also be valuable for paleomagnetic results, of interest to both LITHP and TECP. The new site survey data have clearly been very beneficial for site selection, and this program is quite mature.

Overall, the program is of moderate interest to LITHP because of the proposed basement objectives. We note, however, that addition of these objectives will require additional drilling time. The drilling-time estimates appear to us to be overly optimistic; the full program probably will require more than one full leg of drilling.

3.9 LITHP review of 343/A (Caribbean Window; A. Mauffret and A. Mascle)

Learning more about the circumstances of formation and significance of oceanic plateaus is a highly ranked scientific theme of LITHP. The nature of very old ocean crust, is presenting ranked considerably lower. Even so, this proposal directly and indirectly addresses both of these LITHP priorities. While we believe that a drilling program of the type proposed could potentially be very valuable, the present proposal is clearly not mature. Stronger scientific justification for the drilling needs to be provided. Part of this could come from a combined/ coordinated program which also addresses the question of the origin/significance of the B" horizon. For example, is there a significant hiatus between normal ocean crust and B"? Since there are many other drilling objectives in this region of great potential to LITHP, we believe that a coordinated effort to maximize the scientific return of drilling is warranted. This is particularly true for the Caribbean where the tectonic and paleooceanographic situation is complex.

In addition to a broader scientific context, we suggest that a revised proposal include fuller documentation of the window and it's relationships to the surroundings. Because of the potential importance of this program, additional MCS data is strongly justified. The presentation also needs to be improved. We found many parts of the text to be somewhat confusing and the lack of vertical scales on some of the figures made it difficult to assess the validity of some of the arguments.

Overall, we encourage the proponents to do additional work. The drilling program is potentially very exciting, however a much more mature proposal with stronger justification is needed.

3.10 LITHP review of 344/A (Jurassic Quiet Zone; R. Sheridan)

The nature of old ocean crust is of interest to LITHP, but is not among the highest priority scientific themes. The history of the Earth's magnetic field is clearly very important since it provides clues about the causes of the geomagnetic field--an issue of fundamental importances in Earth Sciences. Even so, we find that the proposal has some deficiencies and that drilling in the ocean may not necessarily be the only approach to the problem. Resolving the on-going controversy about the nature of the Jurassic quiet zone is of clear importance, however the proposed drilling program may not be the only (or even the best) means of doing so.

Deepening of site 534 may fail to provide a definitive answer, as the lack of reversed intervals would not prove that the Earth's field necessarily remained continuously normal. Sites near hole 603, in sediments, would provide a more continuous record, but still may not be definitive. Because alteration of basalt can render paleointensity data unreliable, sediments are also preferred over old basalt flows. A drilling program in very old basaltics crust could be very attractive if it were done for a number of other objectives at the same time. It is difficult to justify drilling for the paleomagnetic objectives alone.

Overall, we do not rank the proposal in its present form very highly.

3.11 LITHP review of 333/A (Cayman trough; Perfit et al.)

Recovery of rocks from deep levels in the ocean crust and the nature of crustal accretion processes are among the most highly ranked objectives of LITHP. This proposal can potentially address several of these objectives as well as many important

objectives of TECP. The Cayman trough represents an end-member case of slow spreading and ridge axial depth. Furthermore, the crust produced by the Cayman trough may be anomalously thin, permitting recovery of deep crustal rocks. Such rocks could be obtained near the axis if tectonic thinning processes are active (i.e. using the offset section strategy). Alternatively, if verification can be obtained that the flanks also are composed of thin crust, drilling the flanks could be used to study the layer 2/3 transition, layer 3 and perhaps even deeper portions of the crust.

Of the numerous objectives and sites proposal, we feel that the transect composed of CAY-4, 5, and 6 has the strongest justification. It is not clear whether the cold-edge effect is better addressed by dredging. The origin and evolution of pull-apart basins is a question of great interest, however it will probably be of greater interest to TECP than to LITHP.

One problem, of course, is that due to poor magnetics the tectonic environment of the Cayman trough flanks is not well-defined. A transect on the flank is attractive because drilling could be used to date the magnetic anomalies. However the present siting of CAY-4 and CAY-6, near the edge of the observed magnetic sequence, can be improved. It is important that the holes be squarely within the anomaly sequence and as far as possible from crustal offset boundaries. CAY-4 and CAY-6 could probably be drilled with conventional RCB; CAY-5 probably would need the DCS, however we note that the great water depth of the Cayman trough adds severe constraints to drilling with the DCS. This affects not only the timing of a potential drilling leg, but also limits the total depth of CAY-5.

We feel that documentation of the petrology and geochemistry of the Cayman trough is inadequate. This makes it difficult to assess what will be gained by drilling for the geochemical objectives. For example, the influence of mantle flow on modified sub-arc mantle below the Cayman trough is potentially of great interest, the proposal would be strengthened considerably if these objectives were framed in the context of existing data and related more directly to the other objectives of the drilling. Are any samples of crust available off-axis? Could the GLORIA data and new SeaMARC II data be used to constrain site selection.

The most serious concern, however, with the prospect of drilling at the Cayman trough, is the relatively poor constraint on crustal thickness. The available data are quite old and the steep dips on layer boundaries may indicate poor data quality. Higher quality data to verify crusted thickness are essential. We strongly encourage the proponents to seek support for a comprehensive program of necessary seismic work.

Overall, we believe that a drilling program at the Cayman trough could potentially be very exciting. Many highly-ranked objectives of LITHP could potentially be met by such a program. We thus strongly encourage the proponents to submit a revised proposal, preferably after additional seismic constraints on crustal thickness can be provided.

<u>3.12 Additional LITHP comments on 315/F (Pilot study for global seismic array, Purdy and Dziewonski)</u>

Initial review of 315/F at the LITHP spring 1989 meeting was very positive. LITHP strongly supports the need for a global seismic network with seismometers in the deep sea. For this long-term objective to succeed, instruments must be built and thoroughly tested prior to deployment. The test site for such a pilot program is proposed, in 315/F, to be near Hawaii. In its initial review, LITHP has several queries

for the proponents, mainly regarding logistics and choice of test sites. In a recent letter from G. M. Purdy, these minor concerns were fully addressed. We believe that the justification for choosing Hawaii is considerably strengthened by this letter. In addition, the time frame for drilling is better defined and several minor issues are now clarified.

In view of this, LITHP now very strongly endorses the notion that drilling near Hawaii go forward. Because of the importance of the global seismic array, we feel that providing a hole to basement for the testing of instruments stands on its own merits. Consequently, we strongly support drilling whether any other programs for drilling near Hawaii are approved or not. Obviously, since drilling the pilot hole will take much less than a full drilling leg, this program could be completed either as part of a leg or during a transit.

4.0 ENGINEERING DEVELOPMENTS

A number of recent developments concerning high-temperature logging and logging in slim (DCS) holes were discussed. Earl Davis reviewed the discussion of issues which occurred at the April 11, 1989 Dallas airport meeting. In addition, we reviewed the modest logging needs discussed in the SRDPG Prospectus. On this basis, LITHP discussed and prioritized the scientific needs for logging. Since these capabilities will be needed during 1991, LITHP strongly urges that resources be made available to the logging group and TAMU for development of the needed capabilities and tools. Since LITHP met jointly with DMP, we have prepared joint minutes of this meeting:

4.1 High-Temperature Slimhole Logging

This item of the DMP agenda was addressed through a joint session with the JOIDES Lithosphere Panel (LITHP). The purpose of the meeting was to exchange cultures in the context of LITHP's projected requirements for downhole measurements in hostile environments. The meeting was co-chaired by the DMP Chairman and the LITHP Chairman, R. Batiza. The following are joint minutes.

4.2 Proposed Workshop on High-Temperature Slimhole Tools

DMP Chairman reported that ODP needs a strategy for the phased development of logging tools for deployment in high-temperature, and possibly slimhole, environments. Development costs are likely to be extremely high: it is unlikely that ODP would be able to fund these in isolation. There is therefore a need to involve other scientific programs that face similar problems. As a first step, an interprogram workshop had been proposed. The aim is to bring together all those scientific programs with a need for high-temperature (slimhole) logging tools, to identify the existing technology for various temperature and hole diameter scenarios, to agree on shortfalls that impact on all programs, and to set in motion initiatives designed to remedy the identified shortcomings. In this way, it might be possible to share development costs that would otherwise be prohibitive. However, the involvement of other scientific programs makes the concept more complicated. A pre-workshop planning meeting might be needed to agree on an agenda and structure the required inputs. No date has been fixed for either the pre-workshop meeting or the workshop itself. Possible targets are November 1989 and April 1990, respectively. Before then, we need to identify ODP's scientific requirements and what tools are needed to meet them.

4.3 Perceived Scientific Requirements for Downhole Measurements

Davis (CEPDPG, SRDPG) introduced the scientific goals in the context of the East Pacific Rise (EPR) and Sedimented Ridge Crests (SR) drilling.

The EPR plan is to drill to about 1.5 km depth bsf as close as possible to the axial magma chamber. The Diamond Coring System (DCS) will be used almost exclusively. Temperatures are not known, but are estimated at about 350° over much of the depth.

The SR aim is to drill through the sediment pile (200-1000 m thick) and to penetrate as far as possible into basaltic basement. Both the DCS and The Rotary Core Barrel (RCB) will be used. Expected temperature range in the sediment section is 200-400°C. In the basement, temperatures are typically expected to be up to 350°C.

Becker (LITHP) described the required downhole measurements in terms of scientific themes, hydrothermal (at SR and EPR) and magmatic processes (at EPR only).

Hydrothermal	Magmatic
Temperature	Natural Gamma
Pressure	Density
Permeability	Porosity
Discrete Fluid Samples	Stress
Borehole Fluid Logs of pH and Resistivity	Sonic & Seismic Velocities (P and S)

A borehole seal is essential for hydrothermal studies.

4.4 Identification of Technical Shortfalls

Howell reported on the status of off-the-shelf high-temperature logging tools. In general, high-temperature tools require more preventive maintenance. Calibration problems can be expected, especially with slimhole tools and those from different contractors, and therefore calibration blocks are needed onboard ship. Laboratory experiments may be needed to verify tool responses at high temperatures. Off-the-shelf high-temperature tools do not afford the same reliability as conventional tools and it is usual to ask for three high-temperature tools of each type at the logging site rather than two.

Various (slimhole) service-company tools are available up to 260°C. These provide for all the hydrothermal and magmatic requirements up to this temperature except for:

permeability
pH
stress

Permeability is impeded by the difficulties of packer design and deployment; the strategy would be to use the packer in the cool part of a hole and measure only interval permeabilities. pH is not measured routinely even at low temperatures. Stress

measurement using the BHTV is seriously affected by temperature degradation of the cable. Further, a dewared BHTV requires a large-diameter hole, the other measurements (density, sonic, etc.) do not.

Extending the operating temperature range of tools requires additional thermal insulation or hole cooling. Off-the-shelf 260°C logging tools can be double-dewared to reach 300°C at which temperature they would have a typical operational period of 6-8 hours. Double-dewared tools require a large-diameter hole. They cannot be deployed in DCS holes although with modifications to the dewar design they could be slimholed. Difficulties are anticipated with the very high-temperature operation of nuclear and sonic tools due to the functioning of crystals and transducers, respectively. Also a teflon cable is needed for operations up to 300°C. For 350°C operation, it would be necessary to cool the 300°C tools.

Hole cooling is very difficult in DCS holes because of the restricted annulus around the tool which impedes circulation. Large diameter holes can be cooled during logging, e.g. by using a "toolpusher" system with circulation, in which the SES is deployed with a wet connect and with the (dewared) tool attached to the base of the drillstring. Such a strategy might also require in-hole data recording.

The two possible approaches are:

(a) at DCS sites drill a large-diameter hole, specifically for logging, or

(b) drill each hole with DCS and ream to a larger diameter.

In either case, dewared tools should be used in conjunction with a toolpusher and circulation.

In summary, off-the-shelf temperature and pressure (slimhole) tools exist with ratings up to 350°C, and existing gamma, density, porosity, resistivity and sonic/seismic tools might be dewared in a large-diameter mode to the same temperature rating, especially if deployed in conjunction with cooling.

Anderson proposed the development of a single combination slimhole, 350°C tool string for use as a stand-alone high-temperature logging tool with a logging cable or with downhole recording. Temperature, pressure and fluid and rock resistivity would be logged with this combination. The feasibility of this development will depend on further investigations. Operating a fluid sampler at high temperature and pressure is beyond the capability of the LDGO Borehole Research Group. The development of high-temperature permeability and pore pressure tools is more within the brief of TAMU.

4.5 Future Strategy

A short-term strategy was required to address as far as possible the immediate needs of LITHP, the Central and Eastern Pacific DPG, and the Sedimented Ridge DPG. A longer term strategy should be developed to address those issues that could not be resolved in the short term.

Becker reported that for the short term, the following were the LITHP priorities for downhole measurement at high temperatures to be addressed by the ODP logging contractor.

1. Temperature (all hydrothermal objectives fail without this)
2. Downhole Fluid Resistivity (in borehole)
3. Formation Resistivity (for porosity)
4. Natural Gamma
5. Sonic (preferred over density tool)
6. Caliper
7. Flowmeter
8. Borehole Fluid Pressure

LITHP view was that 1-5 must be measured, 6-8 were of lower priority.

Other LITHP needs are high-temperature permeability and pore pressure determinations and pore fluid sampling.

In the longer term, provision must be made for developments that are too complex or costly to be met before mid-1991. The concept of an inter-program workshop on downhole measurements at high-temperature should be strongly supported.

After the joint meeting with LITHP, DMP formulated the following.

LITHP/DMP Recommendation 89/17

"A high-temperature logging tool combination rated to at least 350°C be developed by the logging contractor to address as many as possible of the following scientific needs identified by LITHP and listed below in decreasing order of priority.

1. Temperature
2. Borehole Fluid Resistivity
3. Formation Resistivity
4. Natural Gamma
5. Sonic
6. Caliper
7. Flowmeter
8. Borehole Fluid Pressure

These objectives are to be achieved by repackaging existing tools, not by the development of new tools."

LITHP/DMP Recommendation 89/18

"Funds for the development of the high-temperature tool combination, currently allocated as $300,000 for tool hire during FY91 and FY92, should be made available as soon as possible to allow the redirected initiative to be brought to fruition before the estimated tool deployment date of mid-1991."

LITHP/DMP Recommendation 89/19

"A JOI-supported inter-program workshop on high-temperature logging should be planned, and scheduled to take place before mid-1990, in order to develop the necessary engineering science for the longer term."

LITHP/DMP Consensus

DMP support the following recommendations for the Sedimented Ridge DPG.

(i) The Barnes-Uyeda tool be modified for higher temperatures (up to 200°C) and be made stronger.

(ii) A slimline self-contained probe be developed or acquired to measure temperatures up to 350°C.

Further, DMP support the development of a high-temperature fluid-sampling capability.

5.0 NEW LITHP MEMBERS:

PCOM has approved the nominations of Jim Mclean and Tom Brocker as new LITHP members. Keir Becker will be leaving LITHP after our next meeting and John Mutter will rotate off after LITHP's Fall 1990 meeting.

6.0 NEXT MEETING:

LITHP and TECP will plan an overlapping meeting in New Orleans during the first week of March, 1990. There will be no official host, but logistics pose no special problem.