JOIDES LITHOSPHERE PANEL:
MINUTES OF 5-7 MARCH, 1990 MEETING (NEW ORLEANS)
EXECUTIVE SUMMARY

3.0 PLANNING ACTIVITIES

3.1 Engineering Leg at 504B

LITHP favors the following strategy for Engineering 3A: 1) At the start, a 2-3 day logging program, including temperature, fluid sampling and permeability. 2) Milling and fishing to attempt to clear the junk. 3) If this attempt is successful, deepening 504B as much as possible in the remaining time. 4) If junk cannot be cleared, a full-logging program should be carried out, either on 3A or at a latter time. A decision to start a new hole close to 504B should be deferred until after Engineering 3A results are known.

3.2 Engineering at EPR (3B)

Sufficient time between Leg 132 and 3B should be given for any engineering development that may be needed. During 3B, as many holes as possible should be established ($\geq$50m), possibly using mini-guidebases and drill-in casing.

3.3 LITHP Prioritized Drilling Programs for 1991-1994

In order, the programs favored by LITHP are: 1) Hess deep, 2.5) EPR, 2.5) MARK area, 4) TAG area, 5) Sedimented Ridges II, 6&7) VEMA, 8) Hawaii Pilot hole, 9.5) Geochemical Reference Sites, 9.5) Deepening 801-C - Old Pacific, 11) Volcanic Rifted Margins, 12) Endeavour Ridge hydrothermal activity, 14) Loihi, 16) Axial Seamount, 17.5) Valu Fa, 17.5) 735-B (Indian Ocean), 19.5) Site 505 - Stress, 19.5) Lithosphere Characteristics (DMP Initiatives), 21) Oceanographer F.Z., 22) Mathematician Ridge, 23) Marquesas, 24.5) Chile Triple Junction, and 24.5) Cayman Trough.

4.0 JOINT LITHP-TECP MEETING

4.1 Very Deep Drilling

We recommend formation of a technical task force to examine long-term strategies for very deep drilling.

4.2 Working Group for Volcanic Rifted Margins (VRM)

We strongly urge that a working group be appointed by PCOM at its April meeting.

5.3 LITHP Suggestions to IHP

LITHP suggests that XRD data and data from TAMU downhole tools be added to the computerized data bank.

5.6 Next Meeting

11-13 October, 1990, Tokyo; T. Fujii host.

JOIDES LITHOSPHERE PANEL MINUTES
March 5-7, 1990 New Orleans

Attending:	R. Batiza	S. Humphris
	K. Becker	J. McClain
	T. Brocher	C. Mevel
	S. Cloetingh	J. Mutter
	J. Erzinger	J. Pierce
	J. Franklin	J. Phipps-Morgan
	T. Fujii	G. Smith
Liaisons and guests:	J. Natland (PCOM)	R. Moberly (PCOM Chair)
	R. Duncan (PCOM)	G. Waggoner (JOIDES Office)
	M. Goldhaber (SGPP)	S. Howard (TAMU)
	J. Allan (TAMU)	K. Millheim (Amoco Prod. Co.).
	R. Larson (URI; Leg 129 Co-chief)	
Regrets:	L. Cathles	

WELCOMING REMARKS: R. Batiza welcomed J. McLain and T. Brocher to LITHP and welcomed the panel and guests to New Orleans. The meeting got underway at 0830.

1.0 LIAISON REPORTS

1.1 R. Moberly (Chair, PCOM)

Ralph Moberly reviewed for LITHP the important upcoming needs for planning. At its April meeting (April 24-26, Paris) PCOM will decide on a general track of the drilling vessel through Spring 1994. To do this, PCOM needs from each thematic panel, a ranked list of its prioritized drilling programs (important scientific theme plus proposal which successfully addressed the theme in a particular area). Moberly provided suggestions and examples of how this ranking might be done and what the finished list should look like. Once the general track of the Resolution is set for 1991-1994, specific drilling legs will be scheduled by PCOM about one year in advance. This is done each year at the "Annual Meeting" of PCOM in November. Thus, thematic panels will, yearly, have the opportunity to revise and update their rankings. The LITHP ranking for 1990 (this meeting) should exclude programs that are already scheduled for drilling in 1991: Sedimented Ridges I, and deepening 504B. Those LITHP programs which were tentatively scheduled for 1992 at the November 1989 PCOM meeting, such as Sedimented Ridges II and East Pacific Rise (which would be substituted for 504B in the event that the engineering leg at 504 cannot clear the hole) will be included in the ranking.

1.2 PCOM (R. Duncan and J. Natland)

In the future, the LITHP liaison from PCOM will be J. Natland. LITHP wishes to thank R. Duncan for being our liaison for the last half year. At its November 27-30, 1989 meeting at Woods Hole, PCOM scheduled the following legs for drilling in calendar year 1991: Sedimented Ridges I, Eastern Equatorial Pacific Neogene transect, and Layer 2/3 transition at Site 504B. In the event that 504 cannot be deepened, East Pacific Rise I will be substituted. PCOM also tentatively scheduled (for calendar 1992): 2 legs of drilling at the Chile Triple Junction, East Pacific Rise I (if 504B is drilled in 1991), Cascadia Accretionary Prism I and Sedimented Ridges II. These tentatively scheduled programs will have to be reevaluated in the future. PCOM also

discussed official liaison activities with other major geoscience programs and initiatives such as RIDGE, Global Seismic Networks (FDSN), etc. EXCOM decided to proceed with establishing such liaisons with the condition that no PCOM or EXCOM members could act as liaisons to these other programs. Under the topic of new ODP partner nations, it was noted that the Soviet Union might join ODP soon. Additional possibilities include an IOC consortium and possibly a consortium of East Asian countries (Korea, Taiwan, PRC). These possibilities are viewed very favorably, as continued technological development in drilling and logging will require continued new resources.

The issue of logging in slim (4") and hot (>300°C) holes was discussed at PCOM. Since then, several meetings at TAMU have resulted in an effort to obtain existing high-temperature, slim hole tools from Sandia labs. These tools are expected to be available in time for the engineering leg (Leg 132). It is clear that development of appropriate tools for slim and/or hot holes is essential for future ODP drilling.

PCOM established general guidelines for Working Groups (WG) and Detailed Planning Groups (DPG). Essentially working groups are for concept development and establishing general drilling strategies, whereas DPG's are used for more detailed planning. PCOM approved a DPG for the East Pacific Rise, chaired by Earl Davis which will meet 5-7 April at the Pacific Geoscience Center. In addition PCOM approved a DPG for the Cascadia margin, chaired by Larry Cathles.

PCOM approved a new 30-month publication schedule for Leg Reports. LITHP presented its annual report at the November PCOM meeting (see attached). LITHP noted the importance of long-range planning for implementation of the ODP long-range plan. Such planning is needed for several long-term objectives including a total penetration of the ocean crust. LITHP also suggested a better disciplinary balance on PCOM and reaffirmed its commitment to four long-term objectives: 1) penetration of normal ocean crust into the mantle, 2) establishing seismic and ridge-crest observations, 3) investigating magmatic and hydrothermal processes of crustal accretion and 4) improved understanding of off-axis volcanisms.

PCOM discussed the upcoming engineering leg (Leg 132). During the leg, the diamond coring system will be tested at three different sites (rubbly, young basalt, reef carbonate and chalk-chert sequences). This test will allow a thorough evaluation of the performance of the DCS under a variety of conditions. Continued development may be needed prior to Leg 136 (engineering leg for 504B and EPR). PCOM has approved a retrospective/forward-looking meeting on Indian Ocean drilling. The purpose is to synthesize previous results with a look to future possibilities for drilling.

1.3 OHP

Guy Smith presented a brief report on the last OHP meeting (26-28 Oct. 1989) in Germany. OHP is extremely interested in high latitude drilling, which may provide opportunities for multi-objective sites with interest from other thematic panels.

1.4 SGPP

Marty Goldhaber presented a summary of the last SGPP meeting (14-16 January, 1990, Santa Cruz) at which the panel established its rankings for the April 1990 PCOM meeting. SGPP has five themes: Sea level, fluids and gases, metallogenesis, paleooceanography and sedimentary processes. Within these, the overall SGPP rankings are: 1) Cascadia margin, 2) Chile triple junction, 3) Atolls and guyots, 4) Sedimented Ridges II, 5) New Jersey margin, 6) Gas hydrates, 7) EPR, 8) Gulf of California, 9) New Zealand, 10) Barbados, 11) TAG, 12) Nankai II and 13) Valu Fa ridge. SGPP also has a possible interest in geochemical reference

holes and other topics of mutual interest with LITHP. In terms of technological development, SGPP is pushing for improved fluid sampling, the pressure core barrel and better drilling/recovery in unconsolidated sand.

1.5 DMP

Keir Becker, LITHP liaison to DMP, reported on the late January meeting of DMP at TAMU. Much of this meeting was devoted to the issue of high-temperature logging and drilling. ODP now has a contract with Sandia to provide temperature and fluid sampling tools. A workshop is planned before mid 1990, to look ahead to further tool development. DMP has suggested testing the option of reaming DCS holes, which would allow large diameter tools to be used in the hole. This is particularly important for use of the borehole televiewer and VSP experiments. A sub group of DMP has been formed to look at hot/slim hole questions. Development of plugs for the sedimented ridges and Cascadia programs is moving forward, but sensors are a problem the at moment.

DMP has proposed an initiative on Lithosphere Characterization which would feature logging and other experiments done across closely spaced (1-2 km) holes. One objective is to provide a larger scale context for interpreting logging measurements in individual holes. This initiative is of obvious interest to LITHP and Jim McLain expressed interest in providing representation to DMP on this topic. Upgrading of the Barnes-Uyeda tool for higher temperatures is being undertaken at TAMU.

1.6 TECP

Prior to this joint meeting with LITHP, TECP met in Hawaii in September, 1989. C. Mevel provided a summary of TECP's high-ranked CEPAC drilling programs. TECP rated the Chile Triple Junction, Cascadia, EPR and Sedimented Ridges as high priority CEPAC programs. TECP's high-priority themes are 1) Convergent margins (accretion and collision processes), 2) Intraplate deformation, 3) Divergent plate boundaries, 4) Passive and transform margins, 5) Plate kinematics and 6) Plate dynamics.

1.7 Other Matters of Interest

J. Natland gave a brief review of the Lake Arrowhead Geochemistry meeting, which included sessions on alteration of the crust and metallogenesis. This conference endorsed the importance of drilling geochemical reference sites and global geochemical cycles. Seird Cloetingh attended the Nereis meeting in Brussels at the end of January and provided a brief report. Nereis is the name of a new planned platform which could be used for shallow drilling aimed at global problems such as climate change. This multifaceted proposed "program" is based primarily on great interest in Europe, however it is planned as a fully international program. The Nereis program appears to be a fine idea, however several international members of LITHP voiced the opinion that their countries could probably not afford funds for both ODP participation as well as involvement with Nereis.

2.0 PROPOSAL REVIEWS

2.1 286/E Addendum - Engineering Options at 504B and More (K. Becker)

The option of milling the junk from the bottom of 504B still appears to be promising. Another possibility is to start a new hole nearby. This possibility has many engineering advantages, however a decision to drill without coring must be made with due regard for the time scales of crustal heterogeneity and other matters. For example, in view of the DMP

Lithosphere Characterization Initiative, a distance of 1 to 2 km would seem an optimal separation between 504B and a possible new hole. However this distance is just large enough that correlations within the volcanic section (without coring) could be difficult. Clearly the issue of starting a new hole very near (100-500 m) 504B is one which should be fully aired and is of great interest to LITHP. Probably a new proposal is needed, however, as the issue of a new, un-cored hole raises important scientific as well as engineering questions. The issue of the engineering leg for hole 504B is taken up separately elsewhere in these minutes (section 3.1).

2.2 325/E - High-Temperature Hydrothermal Site - Endeavour Ridge (H. P. Johnson et al.)

This proposal was previously reviewed by the Sedimented Ridges DPG, however LITHP undertook to review it within the Lithosphere Panel as well. This proposal addresses: 1) the composition of hydrothermal deposits and their precipitation mechanisms, 2) the nature of discharge and local advective (fluid pathways) processes and 3) extent and compositional variations in the conduit. The proposal has the following very attractive features: 1) The Endeavour deposits are large deposits precipitated at an unsedimented ridge crest. 2) The natural laboratory aspect of starting a smoker (by drilling) and then studying the evolution of discharge and precipitation. 3) The planned experiments could be very useful in elucidating the permeability structure of the upper crust. For these scientific objectives, Endeavour is a better site than the East Pacific Rise. As at other unsedimented ridges, the drilling would require the use of a hard rock guide base. Some deficiencies of the proposal are that it has no magmatic objectives. For example, are the location of hydrothermal discharge sites related to the chemistry of volcanic rocks in the area (vis a vis fractionation and magma chamber processes)? Also, the planned program would provide few constraints on the flow regime in three dimensions. On balance, this proposal was highly rated, as reflected in the rankings of drilling programs for 1991-1994.

2.3 351/C - Bransfield Straight (B. C. Storey et al.)

This proposal is clearly very preliminary. Our copy contained no site forms and had no reference list. Much site survey data and additional documentation is clearly needed (e.g. data on sediments). Of particular importance is heat flow data to document possible sites of hydrothermal activity. Even so, the back-arc basin setting is very interesting and somewhat analogous to the Okinawa trough. The evolution of petrogenesis from calc-alkaline rocks to those of the Antarctic peninsula is of particular interest to LITHP. Given the possible importance of changes in sea level and the thick sediments, several of the sites should also be of interest to OHP. The thick sediments might pose a safety problem, and clearly more site-survey work is justified. LITHP supports continued work in the area and would be glad to see a revised, more mature proposal in the future.

2.4 352/E - Layer 3 at the Mathematician Ridge (D. Stakes and D. Vanko)

The objectives of this proposal are important priorities of LITHP. However the proposal is presently immature. In order to achieve its objectives and to locate sites, seabeam and perhaps submersible work will be needed. The Mathematician Ridge is a very promising site for drilling fast-spread layer 3 gabbros. LITHP would like to see a more mature proposal after additional site surveys are completed.

2.5 358/A - Volcanic Rifted Margins - Voring Margin (O. Eldholm et al.)

In contrast with several other proposals on the same subject that LITHP has previously reviewed, this proposal makes good use of previous drill results and would build on these results. However, the proposed transect is not really a continuous one and the proposal has no firm magmatic objectives (which would make it much more attractive to LITHP). LITHP

believes that the whole question of volcanic rifted margins must be put into a global context. It would then be possible to more clearly define the problems that can be solved and to set out a strategy and criteria for deciding the best areas. Elsewhere in these minutes we request that PCOM approve a Working Group for Volcanic Rifted Margins to do this. Overall this general problem of volcanic rifted margins is of great interest to LITHP. However this proposal, like others, is deficient in addressing the magmatic questions associated with the general phenomena.

2.6 359/A - North Atlantic Conjugate Margin Drilling - Letter of Intent

The early rift history of continents, documented on passive margins, is of interest to LITHP. 359/A is, however, only a letter of intent. 365/A, a more mature version of this letter of intent, was separately reviewed.

2.7 360/D - Hydrothermal Activity and Metallogenesis at Valu Fa Ridge (U. von Stachelberg et al.)

Although this is a preliminary proposal which lacks much detail, the area is of great interest as are the scientific questions addressed. Valu Fa is interesting because of its high SiO_2 rocks, shallow depth (possibility of boiling) and because the setting is appropriate for many of the large sulfide deposits in the geologic record. Further, Valu Fa has a well-documented magma chamber. However the hydrothermal deposits and the area are not as well documented as might be wished. In addition, the specific problems to be addressed and reasons why Valu Fa is the best place to address them are not given. Even though the proposal is rather preliminary, LITHP recommends that the Lau Basin Working Group strongly consider having the site as an alternative site during Leg 135. Particularly if the DCS is aboard, drilling the Valu Fa deposits would potentially be very rewarding.

2.8 361A - Active Hydrothermal System in the TAG Area (Thompson et al).

This is a very good proposal which addresses high priority objectives of LITHP. The proposed work has good potential for definitive studies of the stock work, alteration zone (flow regime; past history) but the high-temperature reaction zone may be difficult to reach. The TAG area may be the best site available for such a study of deep-water activity (no boiling). The intermittent activity at TAG is a mixed blessing since correlations from place to place in the deposit may be difficult. Some deficiencies in the proposal itself are that: 1) relation of hydrothermal activity to petrology/magmatic processes is not well covered, 2) more detailed information needed for specific site selection should be presented. Overall, this proposal is highly ranked as reflected by the proposal rankings.

2.9 362/E Rev. - Chile Triple Junction (S. Cande et al.)

As before, the proposal remains of interest to LITHP. Of particular interest are the hydrothermal objectives and deepening TJ-7 at least 50 m into basement. As before, LITHP notes that a great deal of documentation for particular drilling objective and sites is still lacking, however the setting and potential of this program are both extremely interesting.

2.10 363/A - Plume Volcanism: Grand Banks-Iberia Separation (B. Tucholke et al.)

This program is a subset of a larger program for drilling the rifted margins of the North Atlantic. As such, LITHP feels that the Volcanic Rifted Margins (VRM) Working Group would want to include some discussion of the possible role of early plume volcanism. As a general topic this issue is of great potential interest to LITHP. Drilling probably could succeed in testing the plume hypothesis for the seamounts in question. However LITHP asks whether such a test would be of broader interest than just locally? It is for this reason that a broader context

for plume volcanism in the rifting history of VRM is important. Overall, LITHP ranks this proposal rather highly, but still recommends that it be considered by a DPG at a latter time, when an integrated program of VRM drilling is being put together.

2.11 365/A - Conjugate Margins - North Atlantic (J. Austin et al.)

This proposal addresses the early rift history of a non-volcanic rifted margin. It is of interest to lithosphere in its own right, but also a potential endmember of volcanic/non-volcanic rifted margins. Overall, the proposal is excellent and consistent with the strategy advocated by COSOD II. The need for two transects is not well defended, however except for this, the proposal is well-documented and obviously quite mature. LITHP notes that the program is very ambitious and many holes are extremely deep (probably will require a riser). Probably in the future, a DPG should be formed to determine how a program like this could be pared down to its essentials.

2.12 366/A - Laborador-Greenland (M. Salisbury)

This is a letter of intent only. It will be reviewed when a proposal is received.

2.13 368/E - Return to 801-C - Jurassic Pacific Crust (R. Larson et al.)

Deepening 801-C is of great interest to LITHP, as it addresses the high priority of characterizing old fast-spread ocean crust and its hydrothermal/alteration history. More information is needed on the nature of alteration and hydrothermal products. The deep reflectors are of interest, particularly to discover whether they represent alteration fronts or the layer 2/3 boundary. If 801-C is deepened, it is important that a full logging program be carried out. Overall, LITHP ranks the proposal highly, as reflected in the program rankings.

2.14 369/A - Deep Mantle Section in the MARK Area (C. Mevel and M. Cannat)

This is an excellent proposal addressing very highly ranked scientific questions of LITHP. The advantage of drilling a deep mantle section in the MARK area, is that it is away from severe transform activity. While there is excellent evidence for peridotite, it is not clear how deep it goes. A deep hole would be most interesting to sample the full variability of shallow mantle. At the same time, a number of shallow holes would complement the deep hole. A disadvantage of the MARK area is that the deep mantle hole could not be used with offset section to determine the relationship to gabbros and volcanics. Also, the nature of the peridotite contacts is not well known. Overall, however, LITHP ranks this proposal very highly, as reflected in its rankings of drilling programs.

2.15 370/A - Magmatic Processes and Natural Tracers - Deep Crustal Drilling (H. Dick and P. Robinson)

While this program proposes deep drilling into layer 3 rocks, of great interest to LITHP, the scientific rationale and hypotheses to be examined are not clearly presented. Understanding magma chamber processes is extremely important, however it is not clear exactly how this proposed drilling would get at this question. The comparison of Oceanographer and SWIR is also difficult to understand, because the documentation for coeval volcanic rocks at Oceanographer is scanty. LITHP feels that this proposal is potentially of interest, and would welcome a more mature proposal clarifying the scientific rationale for drilling.

2.16 371/E - Nova Canton Trough (B. Rosendahl et al.)

This letter of intent is of great interest to LITHP because the area offers promise for off-set drilling of an intact portion of normal Pacific crust. LITHP welcomes a mature, more detailed drilling proposal.

2.17 373/E - State of Stresses, Hydrothermal Circulation and Heat Flow, Site 505 (M. Zoback et al.)

Assessing the state of stress in very young crust is an important objective. This proposed site, if drilled could tell much about the interplay of thermoelastic stresses and regional stresss. Furthermore, Site 505 could potentially tell a great deal about hydrothermal processes, by comparison with Site 504B. One problem is that hole 505 was a very difficult hole and it may be impossible to deepen unless the DCS is used. Another complication is the rough-smooth progression of ridge topography, which could indicate complex ridge processes. In such a case, the stress regime could be quite complex and difficult to interpret. Is Site 505 the best place to do such an experiment? Overall, the proposal was moderately well ranked in LITHP's ranking of drilling programs.

2.18 374/A - Oceanographer Fracture Zone - Mantle Heterogeneity Deep Hole (H. Dick and J. Quick)

This proposal addresses several high-priority objectives of LITHP. The proposal is attractive because it addresses the issue of the scale of mantle heterogeneity, the region is near a hot spot (more melting) but also near a fracture zone (less melting?). Alteration of the peridotite and its history of emplacement are also of interest. At Oceanographer, all crustal components are present and exposed, so an off-set drilling strategy could be successful. LITHP thus wonders why drilling the crust-mantle boundary was not also proposed. LITHP also questioned putting the mantle and layer 3 holes on opposite sides of the transform. Overall, this proposal has many features of great interest to LITHP, which would welcome a more mature proposal.

2.19 375-D - Layer 2/3 Boundary and Long Section of Layer 3 at Hess Deep (H. Dick et al.)

This is an excellent proposal addressing several very highly-ranked thematic priorities of LITHP. The area appears very promising, though additional site survey data and documentation are needed. Sites HD-1 and HD-2 are of great interest to LITHP; of less interest is HD-3. LITHP notes that the program is very ambitious and could take two legs of drilling or more (HD-1 and 2). Overall, LITHP very enthusiastically endorses the program.

2.20 376/A Layer 2/3 and 3/Mantle Boundary at Vema (J.-M. Auzende et al.)

This is an excellent proposal which addresses very highly ranked thematic priorities of LITHP. At Vema, it would be possible to use an off-set drilling strategy to recover rocks from the layer 2/3 boundary and the layer 3/mantle boundary (Moho). Though the proposal is preliminary in nature, the area and promise are exciting. LITHP notes that the hydrothermal objectives probably do not require drilling. LITHP would welcome a more specific proposal with better documentation. However, even on the basis of this preliminary proposal, LITHP ranks the Vema program very highly.

2.21 280A Rev. - VICAP - Revised

This revised proposal has many of the strengths and weaknesses of the original. For example, is the Canaries the best place to carry out the study: an inland far from the continent may be a better choice. Despite the argument that the aprons are a closed system, is it not possible that inputs from other islands are received? What about the role of possible large slumps? Such slumps are well-documented on other islands and could complicate interpretations. Some evidence for these slumps appears in the seismic data. The Lithosphere loading question is very interesting, but for this deeper seismic data are needed. More site surveys are needed, and might be more useful in the northern part of the area. While this proposal does not address any of LITHP's highly-ranked thematic objectives (e.g. LITHP White Paper), it is still of moderate interest for eventual drilling.

3.0 SHORT-TERM AND LONG-TERM PLANNING

3.1 Engineering Leg 3A at Site 504B

At its April meeting, PCOM firmly scheduled Engineering 3A and 3B (Leg 136) for 504B and the EPR respectively. After this, Leg 137 is Sedimented Ridges I, Leg 138 is East Pacific Neogene transect and Leg 139 is either to continue deepening of 504B or EPR-1, depending on whether 504B can be cleared of junk.

The question of whether Engineering 3A and 3B need be contiguous has recently arisen. Before addressing this, we first turn to the question of what LITHP views as the important missions of each engineering half-leg. Leg 3A at 504B is presently scheduled for 37-38 days. With transit time (~17 days), there is really only sufficient time for milling junk (and/or fishing, as required) and a modest program of downhole measurements. LITHP feels it is important to complete 2-3 days of downhole logs (temperature, fluid sampling and permeability) prior to milling. The remaining time, LITHP feels, should be devoted to milling the junk and if the hole is cleared with time still remaining, an effort should be made to drill ahead. It is for this reason that at least a small scientific party be present on Engineering 3A.

If milling and fishing operations are unable to clear the hole after 19 or so days, than an evaluation for a best course of action can be made later. If it is clear very early in the leg that 504 cannot be cleared (for whatever reason), LITHP recommends that the remaining time of Engineering 3A be used to carry out a full logging program of: FMS, wire-line packer, flow meter, geochemical logging and sidewall coring. Alteratively, if the hole can be cleared, then this logging program (1 week or so) could be carried out at the beginning of Leg 139. If 504B cannot be deepened during Engineering 3A, an attractive possibility may be to drill a new hole nearby without coring. Assessing this option from a scientific point of view, however, would require a new proposal and considerable discussion of alternative sites for a deep hole. In any case, this decision can be made after Engineering 3A is complete.

3.2 Engineering 3B at the EPR

Engineering half-leg 5B need not follow immediately after 5A, however LITHP feels that it should be scheduled as soon as possible, consistent with engineering needs for possible additional development after Leg 132. From previous discussion with the TAMU engineering group, LITHP views the purpose of Engineering Leg 3B as being much more important than simply deploying two or more old-style large guidebases. Instead, the purpose of the engineering half-leg is to fully establish one or more drill sites at the EPR. Several possible options for doing this have been discussed, and one attractive possibility is to use pogo mini-guidebases and drill-in casing. With this technique, established holes ($\geq$ 50 m deep) could be

sealed and be ready for further deepening during later drilling. If these new techniques are unsuccessful, Engineering 3B could be used to try an array of others. In either case, one or more EPR sites could be established and perhaps significant penetration could occur during Engineering 3B. In this case also, it would be useful to have a small scientific party aboard to handle the samples and to help make scientific decisions during the leg.

3.3 Long-Term Planning: General Track of the Vessel 1992-1994

Since 504B, Sedimented Ridge I and Engineering 3A and 3B are scheduled, we did not consider these in our ranking of drilling programs. In this ranking, LITHP did consider all themes and other proposals reviewed to date. Our ranking is as follows:

LITHOSPHERE PANEL RANKED DRILLING PROGRAMS - 3/90

Rank	Theme	Proposal	Area	# of votes
1	Layer 2/3 transition and long section of layer 3	375/D	Hess Deep (central Pacific)	255
2.5	Magmatic and hydrothermal processes at fast-spreading ridges	321/E, 357/E	East Pacific Rise	133
2.5	Long section of upper mantle	369/A	MARK area of the Mid-Atlantic Ridge (26°N)	133
4	Hydrothermal processes and metallogenesis at slow spreading ridges	361/A	TAG area of the Mid-Atlantic Ridge (26°N)	115
5	Magmatic and hydrothermal processes at sedimented ridges	SRDPG drilling prospectus	Middle Valley and Escanaba trough (NE Pacific)	106
6	Layer 3 - mantle transition	376/A	Vema Fracture Zone	93
7	Layer 2/3 transition	376/A	Vema Fracture Zone	92
8	Global Seismic Network Pilot hole	315/E (377/E)* *not reviewed	N.E. of Oahu, Hawaii	88
9.5	Element fluxes and mass at subduction zones	267/F	West Pacific off Mariana and Bonin arcs	49
9.5	Characteristics of old, spreading ocean crust	368/E	Site 801-C	49
11	Early history of continental rifting	Various: drilling program to be designed by future proposed) WG	North Atlantic margins	46

12	Hydrothermal and metallogenic processes at medium spreading ridges	325/E	Endeavour Ridge (N.E. Pacific)	41
13	Long section of layer 3	376/A	Vema Fracture Zone	38
14	Early hot-spot evolution	252/E	Loihi Seamount	37
15	Origin of large metal sulfide deposits	325/E	Endeavour Ridge	23
16	Evolution of near-axis seamounts	290/E	Axial Seamount	21
17.5	Hydrothermal processes in back-arc basins	360/D	Valu Fa Ridge-Lau Basin	20
17.5	Layer 3 - mantle transition	300B	Site 735-B, A-II Fracture Zone, Indian Ocean	20
19.5	State of stress in the lithosphere	373/E	Site 505, Costa Rica Rift	18
19.5	Lithosphere characteristics	DMP initiative	Specific sites not yet chosen	18
21	Long section of upper mantle	374/A	Oceanographer Fracture Zone	17
22	Extinct ridges	352/E	Mathematician Ridge	16
23	Temporal evolution of hot spots	291/E	Marquesas	12
24.5	Ridge collision processes	362/E Rev.	Chile Triple Junction	11
24.5	Transform dominated ridges	333/A	Cayman Trough	11

Explanations, qualifying statements and caveats for each program follows:

Hess Deep: Hess Deep is not fully mature yet, however it should be (soon after Spring 1990) when additional ALVIN dives are completed. Detailed site selection could occur anytime after that. Two important LITHP themes can be successfully approached in this area: the layer 2/3 transition and a long section of layer 3. It may even be possible to drill to the layer 3/mantle boundary, but this is not yet well-documented. This program could be successfully completed with conventional RCB drilling and bare-rock guidebases.

EPR: The EPRDPG meets in April 5-7, 1990 to construct a specific drilling program at the EPR, 9°30'N and/or 12°50'N. Clearly, success of this program depends on successful tests and development of the DCS. Drilling at the EPR will elucidate magmatic and hydrothermal processes at fast-spreading ridges.

MARK areas: The MARK area south of the Kane F.Z. is ideal for drilling a long section of the oceanic upper mantle away from a transform. This program could be carried out with conventional RCB drilling plus bare-rock guidebase and the proposal is mature.

TAG area: The important theme of hydrothermal and metallogenic processes at slow-spreading rates can be successfully addressed at the TAG hydrothermal area with its very large massive sulfide deposits. This program will be fully mature as soon as data from the last cruises is worked up. Probably this program would be most successful with the DCS, however much of it could perhaps be done with RCB drilling.

Sedimented Ridges II: As outlined in the Sedimented Ridges DPG drilling prospectus. This program is tentatively scheduled for 1992.

VEMA: A multi-leg program using the off-set section drilling strategy could successfully address three highly-ranked LITHP themes: 1) layer 2/3 transition, 2) layer 3/mantle transition and 3) long section of layer 3. This program is mature and could be drilled with conventional RCB drilling/hard-rock guidebases. A full suite of large diameter logging tools could be deployed as part of the program.

Global seismic arrays: In order to make progress on establishing ocean broad-band seismic observatories for the global network, it is vital that the Hawaii Pilot hole be drilled as soon as possible--LITHP recommends 1992. The pilot hole is urgently needed to establish observatory protocols and to insure timely instrument design and testing. This program would take much less than one leg and could be completed during a transit or in combination with other drilling in the Central Pacific (e.g. Loihi Seamount).

Geochemical Reference Sites: As previously proposed. Results of Legs 125/126 increase the importance of drilling outboard of the trench.

Old Pacific: Site 801-C is clear and fitted with a reentry cone. LITHP urges that it be deepened to characterize the volcanic layer of Old Pacific Crust. This proposal complements Geochemical reference sites but does not replace it.

Early rifting: LITHP is strongly interested in the early rift history of continents, particularly those involving the emplacement of voluminous volcanic rocks. A working group to develop a drilling strategy should be formed to determine the best program possible. A large number of excellent proposals already are available, so the Working Group should be formed as soon as possible: LITHP and TECP jointly recommend that PCOM establish a working group in April 1990.

Endeavour Ridge hydrothermal deposits: These large sulfide deposits and hydrothermal fields are ideal for studying the active flow regime and alteration history. Drilling is part of a complete natural-laboratory study program.

Loihi: As previously proposed by CEPAC. This program probably require the DCS and could be drilled in combination with the Hawaii pilot hole for seismic observatories.

Axial Seamount: As originally proposed; requires the DCS.

Valu Fa: LITHP recommends that this site be chosen as an alternate site for Leg 135 by the Lau Basin working group, especially as the DCS probably will be on board.

Return to 735B: to reach the layer 3/mantle transition as previously proposed.

State of stress - Site 505: The DMP Lithosphere Characterization Initiative is germane to the issue of hole-spacing near 504B.

Lithosphere characterization: This new initiative is in its early stages of definition, however establishing the scale of heterogeneity in crustal properties is an important LITHP goal.

Oceanographer: No special requirements. (See Minutes 2.15 and 2.18)

Mathematicians Ridge: No special requirements, still needs some site survey work to be mature. (See Minutes 2.4)

Marquesas: No special requirements, proposal 291/E.

Chile Triple Junction: TJ-7 and hydrothermal objectives are of the greatest interest to LITHP.

Cayman Trough: Additional site survey work is still needed, proposal 333/A.

4.0 JOINT TECP-LITHP MINUTES

The joint meeting of the Lithosphere and Tectonics Panel was convened by I. Dalziel and R. Batiza. The two panels have many scientific interests in common, so the joint meeting presented a welcomed opportunity to discuss the best ways to insure progress on these questions using scientific drilling. An ambitious agenda was agreed upon and what follows are the joint minutes of the meeting.

4.1 Very Deep Drilling (J. Natland and K. Millheim)

The ODP Long-Range Plan discusses the importance and rationale of very deep; (>2 km) drillholes in the ocean. Such deep drilling is of obvious future importance for a variety of scientific goals, including some important scientific priorities of LITHP, TECP and SGPP. However, at present, the capability to achieve such deep objectives does not exist. One purpose, then, of the joint meeting was to discuss the future prospects of very deep drilling and to begin a discussion aimed at assessing the technical feasibility and costs of such drilling.

This discussion was initiated at the mid-February TEDCOM meeting in Utah and two participants in the meeting, Jim Natland and Keith Millheim of Amoco Production Company reviewed the early findings. As an example for discussion, Natland showed that to penetrate normal ocean crust with normal rotary drilling would require an 11.5 km drill string, new heavy duty casing and a great deal of drilling time. Millheim pointed out that extrapolation of needs and costs from past ODP experience, was probably not the correct approach. Instead, he suggested that very deep holes would have to be "custom-designed" newly and the tools would have to be tailored accordingly. Such a procedure throws open such questions as platform capabilities, development of entirely new drilling technologies and hardware and the need for careful long-term planning.

Drilling very deep holes is a great technical challenge and is not a trivial extension of existing ODP drilling. It should be approached in a careful phased manner. For this, Millheim considers it essential that the experience of experts in very deep on-land drilling (the Soviet Union and W. Germany) be brought to bear on the problem. The Japanese apparently are also planning for a very deep drilling capability at sea, so the task of very deep drilling is clearly international in scope and interest. The difficulty, estimated costs and development time for such a capability appear to go beyond what is possible within the present ODP program. However ODP can play an extremely important role by initiating the planning, engineering

development and tests that are needed. If such a capability is to exist in the time frame of the ODP Long-Range Plan (next 10-12 years), the planning must begin very soon.

It was suggested at TEDCOM that a **technically-oriented task force** be organized to initiate planning for very deep drilling. Such a task force could be organized with leadership from TEDCOM and participation by all interested thematic panels. In addition, it is vital that TAMU and the TAMU engineering group participate also. Our joint meeting strongly endorsed the notion that planning efforts for very deep drilling should go forward.

A closely related issue is the possibility of using the new DCS system as a mini-riser for drilling 2-3 km deep holes. Such a capability requires further development, but probably can be achieved within the next 2-4 years within ODP. This capability would make it possible to achieve a variety of very high-priority goals of TECP, LITHP and SGPP and thus is of very great interest. Our joint panels strongly encourage the continued development of the DCS systems for this purpose. It is possible, but perhaps not necessary, that very deep drilling and extending the DCS capability could be considered as subtasks by the same task group. On the other hand, perhaps extending the DCS capability should be considered separately. In either case, our joint panels consider it most important that extending the capabilities of the DCS be viewed as the next logical step for engineering development within ODP. Establishing the capability for very deep drilling and development of the mini-riser DCS for 2-3 km deep holes will both require a continued commitment by ODP to long-term technological development.

4.2 Volcanic Rifted Margins (VRM)

LITHP and TCP have a strong joint interest in learning more about early continental rifting and the reasons why passive continental margins commonly have very thick sections of rift-related volcanic rocks. We need a better understanding of mantle processes that occur before, during and after rifting, as well as the effects on the style of continental breakage. Scientific ocean drilling provides a very important tool for investigating this problem. As amply demonstrated by COSOD II the ODP long-range plan and the large number of drilling proposals that have been received, this problem is of first-order importance in modern geosciences.

However, partly because the volcanic sections at many VRMs are very thick (>5 km), an integrated strategy for study needs to be developed. Establishing this strategy and defining the role for drilling is not only essential for further progress but is also very urgent. **We thus strongly urge that PCOM establish a working group on volcanic rifted margins at its April meeting.** This group should consist of persons with expertise in passive margin studies as well as petrologists. Already, some members of the passive margin community have presented a document outlining one possible drilling strategy ("Drilling Volcanic Rifted Margins", H. C. Larsen and others). In addition, a large number of mature drilling proposals by several groups are available for discussion.

It is our understanding that Mike Coffin of UTIG has independently been preparing a Workshop Proposal for immediate submission to USSAC on this topic (including oceanic plateaus). The plan is for there to be a European co-convenor. This Workshop could serve as community wide input to the proposed Working Group which should, in our view, definitely exist before the Workshop is convened because of the urgent need for planning.

We propose that the following working group be established at the April meeting of PCOM (we suggest the following group of 11 scientists), PCOM may wish to appoint a "Watchdog(s)":

Volcanic Rifted Margins Working Group

I. Campbell (Australia)
S. Cloetingh (Netherlands)
M. Coffin (UTIG)
K. Cox (U.K.)
O. Eldholm (Oslo)
K. Hinz (BGR)
G. Houseman (Australia)
H. C. Larsen* (Geol. Survey Greenland)
A. Morton (British Geol. Survey)
J. Mutter (LDGO)
D. Sawyer (Rice U.)

*Suggested Chairman

We would expect the Working Group to participate in the Workshop and meet at least once and no more than twice thereafter to prepare a report soliciting revised drilling proposals that could then be evaluated by the Working Group, LITHP and TECP.

4.3 Status and Developments to the Diamond Coring System (DCS)

Steve Howard of the TAMU engineering group provided an interesting summary of the latest improvements to the DCS. The on-land tests are proceeding as planned and the system has undergone numerous design improvements. The rate of progress on the DCS system has been phenomenally good and both panels look forward eagerly to the full-scale tests of the DCS on Leg 132. S. Howard also answered numerous questions regarding the capabilities of the DCS and other active engineering development projects.

4.4 Results of Leg 129

Roger Larson, co-chief scientist on Leg 129 provided a brief summary of the drilling results of Leg 129 (old Pacific). Of greatest interest to LITHP and TECP is the fact that hole 801-C, which penetrated over 100 m of normal Jurassic, fast-spread ocean crust, is fitted with a reentry cone and is clean. A proposal to deepen this hole (368/E) was highly ranked by LITHP.

4.5 Tectonics of Mid-Ocean Ridges

Both TECP and LITHP have a strong interest in the activity of mid-ocean ridges. Traditionally, LITHP has emphasized the magmatic and hydrothermal aspects of ridges, but clearly the origin of ocean crust involves stretching, faulting and other tectonic processes. Our joint LITHP-TECP meeting provided a good forum for discussion of the tectonic activity at ridge crests. This discussion, led by E. Moores, served as an interesting focal point for joint LITHP/TECP interests. Clearly, progress on understanding the activity of mid-ocean ridges requires a committed multi-disciplinary effort, and future ODP drilling is a very important component of this effort.

4.6 Global Seismic Arrays

Mike Purdy presented a discussion of the need for establishing an array of 15-20 broad-band ocean seismic stations or observations. This long-term effort is an important initiative in the geosciences and ODP is vitally necessary in the beginning stages of the program in order to

help complete critical pilot studies. LITHP has provided strong support for this initiative. Our joint panels reaffirm the importance of establishing global seismic coverage and strongly urge that the Hawaii pilot hole be drilled as soon as possible.

5.0 OTHER BUSINESS

5.1 "Rumor" Proposals

It was noted that not all proposals considered by LITHP in its discussion and ranking were equally mature or even of equal status in some sense. For example, some documents with JOIDES office numbers (official proposals) are little more than letters of intent. LITHP considers it important that the international community recognize that such letter proposals are acceptable for long-range planning. LITHP encourages all investigators with ideas for possible drilling targets to send such letters to the JOIDES office.

5.2 Panel Replacements

Keir Becker is rotating off LITHP. We wish to thank Keir for his great help on LITHP and recommends that his replacement on LITHP be:

1) Dr. M. Langseth (LDGO)
2) Dr. M. Zoback (Stanford)
3) Dr. D. Moos (Stanford)

Dr. Toshi Fujii also is rotating off. We wish to extend our gratitude to Toshi for his long and valuable service to LITHP. We also wish to thank Dr. Julian Pierce, who will be replaced by Dr. Paul Browning. Julian will remain as the UK alternate LITHP representative.

5.3 Suggestions for IHP on Data Bank Entries

In response to IHP's solicitation for input on the information for the computerized data bank, LITHP recommends that the following be added, if a convenient form can be found: 1) X-ray diffractometer and 2) downhole information collected with non-Borehole-Research Group tools, e.g. TAMU downhole tools.

5.4 LITHP Representation on Working Groups

For the Sea-Level Working Group, LITHP appoints Dr. Seird Cloetingh. For the DMP Lithosphere Characterization Initiative, LITHP could be represented by Dr. James McClain.

5.5 LITHP Chairmanship

As its new chair, LITHP unanimously nominates Dr. Susan Humphris (WHOI).

5.6 Next Meeting

T. Fujii offered to host the next LITHP meeting in Tokyo, 11-13 October, 1990.

Annual Report (FY89) of JOIDES Lithosphere Panel

The activities of the JOIDES Lithosphere Panel (LITHP) are documented in detail in the minutes of its two latest meetings (28-30 March, Miami and September 8-12, FRG). In this report, I will list important accomplishments of the JOIDES lithosphere community and outline some of LITHP's concerns for future ODP scientific planning.

IMPORTANT EVENTS - 1989:

1.) Approval by PCOM and EXCOM of the ODP Long-Range Planning Document which spells out a staged long-term strategy for understanding the origin and evolution of ocean crust and lithosphere.

2.) JOI-USAAC sponsored workshop for drilling the oceanic lower crust and mantle (March, 1989 at Woods Hole). The value of this workshop is that it provides a detailed and logical approach to implementing the recommendations of the ODP Long-Range Plan. LITHP has prioritized the items which comprise the 10-year, 12-leg program of deep crustal and mantle drilling.

3.) LITHP reaffirms its commitment to the following themes for scientific drilling by ODP:

- penetration of normal ocean crust into mantle
- establishing global seismic arrays and ridge-crest observatories
- investigation of magmatic and hydrothermal processes of crustal accretion at a variety of spreading rates
- improved understanding of off-axis volcanism.

LITHP Concerns:

General: 1.) Implementation of the ODP long-range plan will require detailed planning to ensure that engineering capabilities are brought on-line in a timely fashion. LITHP feels that TAMU (with input from thematic and service panels and the community), in concert with PCOM is best qualified to carry out detailed, long-range planning.

2.) Role of DPG's: Without regional panels, it is still unclear how detailed and realistic drilling programs are to be crafted routinely from one or more drilling proposals. LITHP has had excellent success with using DPG's for this purpose (e.g. Sedimented Ridges DPG). LITHP suggests therefore that DPG's fill this role in the future. This activity necessarily involves at least two distinct functions: a) reviewing proposals to determine whether they meet general thematic guidelines for a successful attack on a high-priority scientific question and b) optimizing the elements of existing proposals to create a well-balanced, scientifically strong and realistic detailed drilling program.

3.) PCOM decisions: LITHP feels that a better disciplinary balance on PCOM is important for promoting the best possible scientific drilling decisions.

Specific: 1.) LITHP will continue to support drilling at "Geochemical Reference Sites" in the western Pacific.

2.) Logging of high-temperature holes and/or slim DCS holes is essential for scientific success of many LITHP drilling programs in CEPAC and beyond.

3.) For FY91, LITHP ranks are:

1.) 504B
2.) Sedimented ridges
3.) EPR bare rock
4.) Chile Triple junction
5.) Cascadia margin
6.) East Pacific Neogene.

4.) A DPG for EPR bare rock drilling is urgently needed and should meet in January or February 1990.

5.) A DPG to assess deep crustal drilling, in either the Atlantic or Pacific is urgenly needed to set guidelines, evaluate proposals and formulate drilling programs.

6.) LITHP urges that its objectives on Leg 130 (Ontong-Java Plateau) be assigned a high priority for drilling. Continued erosion of these objectives jeopardizes the overall success of multi-objective drilling programs which OJP represents.

7). For the eventual success of global seismic arrays, LITHP urges that more re-entry cones be routinely deployed by ODP.