MEETING OF JOIDES DOWNHOLE MEASUREMENTS PANEL

Scripps Institution of Oceanography
La Jolla, California

23-24 May 1989

EXECUTIVE SUMMARY

1. A major thrust of this meeting was to develop a proposed logging programme for CEPAC. The CEPDPG Chairman attended as a guest.

2. Specific recommendations were formulated in connection with the logging programmes for Legs 129 and 130.
[DMP Recommendations 89/9, 89/10]

3. Logging surveys were identified and proposed for the following CEPAC programmes which have not yet been structured into Legs: Cascadia accretionary prism, Chile triple junction, Neogene palaeoceanography in eastern equatorial Pacific, lower crustal penetration of layer 3 at 504 B, EPR bare rock drilling, and hydrothermal processes at sedimented ridge crests.

4. Panel noted that stress-direction measurements appear to have been overlooked in the Chile triple junction programme and wished to alert CEPDPG to this apparent omission.

5. Panel concurred that long-term sealing should be effected after further drilling at 504 B with subsequent in-hole experiments directed at temperature and fluid flow.

6. CEPAC programme contains several hostile-environment sites. These require urgent action to increase the probability of success in 1991. The key logging issue is one of high temperatures in slimhole environments.

7. "Hostile environment drilling programmes should be staggered to allow time for lessons learnt to be incorporated into subsequent Legs."
[DMP Recommendation 89/11]

8. The revised WPAC schedule has Nankai as Leg 131. Substantial changes to the drilling and logging programmes have emerged from the pre-cruise meeting. It was noted that these changes had impacted on the original thrust to obtain in-situ properties. More generally, the vast amount of time spent by DMP in discussing Nankai had been rendered partly irrelevant.

9. "Because of the importance of the Navidrill to the deployment of the geoprops probe during Leg 131, the Navidrill be modified to overcome operational problems prior to Leg 130 when it should be tested at sea."

[DMP Recommendation 89/12]

10. High temperature (slimhole) logging is the most important technical issue currently facing the Panel. This issue can be addressed through two scenarios:

    (i) a short-term scenario whereby existing technology is identified, evaluated, and accessed:

    (ii) a long-term scenario whereby shortfalls in this technology are identified and rectified through inter-programme funding.

    The previously proposed interprogramme workshop on high-temperature slimhole tools constitutes a potential bridgehead between these two scenarios. This workshop concept has been supported by TEDCOM.

11. Recognising that some full-time activity is needed if OPD is to prepare for high-temperature logging within 18 months, the following recommendation was formulated.

    "In view of the technical complexity and cost of high-temperature logging operations, an experienced engineering scientist be dedicated full time to evaluating the status of off-the-shelf high-temperature logging technology for possible future deployment in ODP. Because of time limitations this activity needs to be completed within a six-month period commencing as soon as possible. The deliverable would be technical advice to ODP on what is achievable with current technology at different temperatures and for different hole diameters. DMP considers this strategy to be the most cost effective in the short term, and one which would optimise the chances of success."

    [DMP Recommendation 89/13]

12. The DMP guidelines for monitoring the development of third party tools are in place. Both the wireline packer and the geoprops probe need to have their development timetables advanced. Both tools are being developed by TAM, Inc.

13. A workshop on log data quality was co-convened by Worthington and Wilkens with JOI support in Washington DC on 13-14 April 1989. The workshop was attended by former JOIDES logging scientists and contractor representatives. Twenty recommendations were formulated to improve shipboard logging practices. DMP will monitor progress in bringing these recommendations to fruition.

14. Two thematic or synthesis publications on the role of downhole measurements in ODP are in press. These are a thematic JGR volume, based on a poster session at the December 1988 AGU meeting, and a multi-authored paper on "Scientific applications of downhole measurements in the ocean basins" in the journal Basin Research. A further possibility is provided by the logging component of the Geochemistry Workshop proposed by Kastner et al.

15. The recommendations formulated by the DMP subgroup on shipboard physical properties measurements, which met in August 1987, have not been input to the new Shipboard Measurements Panel (SMP). SMP also seem unaware of the DMP policy on VSP, i.e. that VSP should not be carried out routinely. DMP Chairman proposes to attend the next SMP meeting to provide the appropriate input. The possibility of a joint DMP/SMP meeting in 1990 should be explored.

16. The next DMP meeting is scheduled for 11-12 September 1989 in FRG, Villinger to host. The subsequent meeting is scheduled for 16-17 January 1990 in College Station.

Paul F. Worthington

7th June 1989

MEETING OF JOIDES DOWNHOLE MEASUREMENTS PANEL

Scripps Institution of Oceanography
La Jolla, California

23 - 24 May 1989

MINUTES

Present

Chairman:	P F Worthington (UK)
Members:	B Carson (USA) J Gieskes (USA) E Howell (USA) M Hutchinson (USA) D Karig (USA) P Lysne (USA) R Morin (USA) C Sondergeld (USA) R Wilkens (USA) J P Foucher (France) H Kinoshita (Japan) H Villinger (FRG)
Liaisons:	D Cowan (PCOM) A Fisher (TAMU) X Golovchenko (LDGO) R Jarrard (LDGO)
Guest:	D Rea (CEPDPG)
Absent:	S Bell (Canada/Australia) O Stephansson (ESF) K Becker (LITHP)

1. Welcome and Introductory Remarks

The meeting was called to order at 8.30 am. The Chairman welcomed DMP Members, Liaisons and Guest, especially those attending for the first time as members (Foucher, Hutchinson, Morin), as liaisons (Cowan, Fisher) or as a guest (Rea). The major thrust of this meeting was to develop a preliminary logging programme for CEPAC as an input to the formulation of a leg structure.

Review of Agenda and Revisions

The precirculated agenda was adopted as a working document for the meeting without modification.

2. Minutes of Previous DMP Meeting, HIG, 16 - 18 January 1989

The minutes were adopted without modification. The Chairman signed the master copy for ODP records.

3. PCOM Report

Cowan reported on the PCOM meeting held in Oslo during the period 2 - 4 May 1989. PCOM responses to DMP Recommendations 89/1 - 89/8 were as follows:

Rec. No.	Description	PCOM Response
89/1	Guidelines for monitoring third party tools	Approved
89/2	Nankai leg deferral	Deferred to March 1990
89/3	Site NKT2 to be given priority during Nankai	PCOM did not discuss NKT2 vs NKT1
89/4	Modified logging programme, Leg 130	Leg has been dropped
89/5	Modified logging programme, Leg 131	Not discussed at this stage
89/6	Modified logging programme, Leg 133	Not discussed at this stage
89/7	Reciprocal guest arrangements between DMP and detailed planning groups	Individual guest arrangement will be entertained as specific proposals
89/8	Workshop on high-temperature, slimhole logging	No comment beyond need to take advantage of work already done at Sandia

PCOM changed the drilling schedule for FY90:

Leg 129	Old Pacific
Leg 130	Ontong Java
Leg 131	Nankai
Leg 132	Engineering
Leg 133	N E Australia
Leg 134	Vanuatu
Leg 135	Lau Basin

Then the ship will move to E Pacific.

Calendar-year 1991 programme to be chosen from:

Cascadia accretion, EPR, 504B, sedimented ridges, Chile triplejunction, E Pacific Neogene.

Remaining Pacific programmes will compete with proposals in any ocean.

PCOM has changed its publications policy to allow earlier publication in the open literature.

PCOM identified the implications of a 4" or 5" diameter scenario for the Diamond Coring System (DCS). At 4" the cost of logging tool development increases, at 5" the cost of using DCS increases. The situation is compounded by the need to drill and log in high-temperature environments.

4. CEPAC Planning

Consideration of CEPAC programmes was re-ordered to conform to the new schedule proposed by PCOM. Initially, consideration was given to those legs already in place.

(i) Leg 129 Old Pacific

(viii) Scientific Objectives

Palaeoceanography and palaeoenvironments of the oldest ocean.

Petrology of oceanic lithosphere.

Calibration of the oldest magnetic anomalies.

Nature and history of the Cretaceous volcanic episodes

Pre - 70 Ma plate motions.

Relevant DMP Thematic Thrusts

Crustal composition and structure
Intraplate stress

Logging Programme

This leg to some extent encompasses the geochemical reference objectives since the Geochemical Reference Leg as such has now been dropped.

DMP Recommendation 89/9

"The following programme of downhole measurements be carried out during Leg 129, Old Pacific:

Sites PIG 1-3	Standard logging suite (excluding FMS) Magnetometer/susceptibility
Site PIG-4	Standard logging suite (including FMS) Packer/wireline packer BHTV *Magnetometer/susceptibility Dual laterolog Barnes/Uyeda tool (WSTP) in sediments

Site PIG-4 (or EMB-2) should not be the last one drilled so that the very important programme of downhole measurements is not jeopardised by the shortage of time. This aspect is particularly important as this site is also serving as a geochemical reference site."

*This leg should seek to deploy the French high-resolution magnetometer, developed by a consortium including Schlumberger and Total, which has been tested in the Paris Basin and is to be used in the North Sea in 1990. The tool is 9 cm in diameter and 5 cm long. This diameter is on the borderline for ODP use without modification Panel wishes to know about (i) the vertical resolution of the tool and (ii) the route to be followed in arranging its availability for ODP. J P Foucher will investigate.

[ACTION : FOUCHER]

(ii) Leg 130 Ontong-Java Plateau

Scientific Objectives

Depth transect for high-resolution Neogene palaeoceanography and palaeoclimatology.

Palaeogene and Mesozoic palaeoceanography, palaeoclimatology, and global anoxic events.

Age, nature and palaeolatitude of basement.

Relevant DMP Thematic Thrusts

Crustal composition and structure
Intraplate stress
Sediment cyclicity

Logging Programme

DMP Recommendation 89/5 made provision for running a shear wave sonic tool. This will not be available. An alternative might be the ARCO tool. ARCO is seeking to license its shear wave sonic tool to a service company. Until this has been done, ARCO will not entertain an approach for the use of the tool. With these developments DMP Recommendation 89/5 falls away and is superseded by the following.

DMP Recommendation 89/10

"The following programme of downhole measurements be carried out during Leg 130, Ontong-Java Plateau:

Sites OJ-7, OJ-12, OJ-14
Standard logging suite (including FMS)

Re-entry site:
Standard logging suite (including FMS)
BHTV

The Geoprops Probe should be tested at the re-entry site. This would enhance the chances of a successful deployment at Nankai. Pore fluid samples would contribute to the objectives of Leg 130, in any case."

(iii) Leg 132 Engineering Leg

Primary purpose is to test the DCS over difficult lithologies, e.g. chalk/chert sequences, and at barerock sites. At present no logging is planned for the next engineering leg. It is often more appropriate to test logging tools during the course of scientific drilling.

(iv) Cascadia Accretionary Prism

Scientific Objectives

Oregon Margin : present and past fluid expulsion processes, pathways, and effects in the several structural and stratigraphic settings ; chemistry, sources and diagenetic effects of the fluids.

Vancouver Margin : deformation at the leading edge of the decollement, geology and physical properties of the materials involved, flow of heat and fluids, long-term observatories.

Relevant DMP Thematic Thrusts

Intraplate stress
Long-term monitoring
Hydrogeology

Logging Programme

Nankai results are likely to guide the planning of this programme. Key issues are physical properties and fluid characteristics.

Each hole:

Standard logging suite (including (FMS)
Geoprops Probe every 30m to base of XCB (or wireline packer every 60m)
LAST every 30m in soft sediments
WSTP every 30m in upper sediments
Rotable packer (3 - 4 deployments/1000m)
Multichannel sonic (shear source) or Schlumberger array dipole tool

Deeper holes: OR-1, VI-1, VI-2

Additional measurements:

VSP
BHTV
Rotable packer (3 - 4 deployments/1000m)

(v) Chile Triple Junction

Scientific Objectives

Investigate subsidence, deformation, volcanism and metamorphism within the collision zone.

Investigate the process of ophiolite emplacement at Taitao Ridge.

Investigate the process of "rebuilding" of the margin after the triple junction passes northward.

Relevant DMP Thematic Thrusts

Intraplate stress
Hydrogeology

Logging Programme

Sites TJ-1 , TJ-4 , TJ-5 ;

Standard logging suite (including FMS)
Wireline packer
Geoprops probe
WSTP

Site TJ-7 ;

Standard logging suite (including FMS)

Sites TJ-2 and TJ-3;

Standard logging suite (including FMS)

There is a possibility of high temperatures at these sites. ODP needs to think seriously about high temperature tools. If FMS cannot be run because of temperature considerations, BHTV should be run. High-temperature cable or cableheads will need to be available.

DMP Consensus

Panel noted that stress-direction measurements appear to have been overlooked in the Chile Triple Junction programme and wish to alert CEPDPG to this apparent omission.

Sites TJ-8, TJ-9, TJ-10;

These three sites have recently been proposed to study how the continental margin develops. In the absence of further information, the logging programme should be the same as that for sites TJ-1 et seq.

(vi) Neogene Palaeoceanography - Eastern Equatorial Pacific

Scientific Objectives

Evolution of equatorial circulation of ocean and atmosphere.

Hemispherical symmetry/asymmetry of oceanic and atmospheric changes.

Miocene and Pliocene variability in contrast to the Pleistocene.

Circulation before and after closing of Panamanian Seaway.

Effects of the above on the history of biological productivity.

Relevant DMP Thematic Thrusts

Intraplate stress
Sediment cyclicity

Logging Programme

Logging at all sites, regardless of depth.

Standard logging suite (including FMS)

The stress aspects of this programme require that the BHTV be run at sites WEQ-4, EEQ-3, EEQ-4.

The possibility of deploying LAST should be explored.

(vii) **Lower Crust - Penetration of Layer 3 at 504B**

Scientific Objectives

Physical, chemical, seismic, magnetic and hydrological nature of Oceanic Layer 3.

Dyke to gabbro transition

Relevant DMP Thematic Thrusts

Crustal composition and structure
Hydrogeology

Logging Programme (assuming 5" hole or greater)

Entire hole (pre-existing and new sections);

Geochemical string
FMS
Wireline packer
Temperature tool
Magnetometer/susceptibility (high sensitivity tool)

New hole only;

Seismic stratigraphic string
Packer
BHTV (200 m of overlap into pre-existing hole)
Dual laterolog

Good temperature logs and water samples are needed before the junk is cleared from 504B.

Estimated bottom hole temperature in pre-existing hole is 160°C; at base of new hole (2000 m) it will be about 190°C. This raises a question concerning the temperature range of the above tools.

This logging programme assumes at least a 5-inch hole. It would be regrettable if 504B had to be re-accessed with a primitive logging suite as would be necessitated if the DCS were to be used for hole deepening.

Permeability can be evaluated through flowmeter injection. A spinner flowmeter would have to be included in the logging programme. Before making a final decision, Panel asked if a typical data scenario could be prepared with indications of ranges of permeability and corresponding accuracies and precisions.

[ACTION : MORIN]

The question was raised of sealing the hole after drilling to minimize downflow and thereby to recover subsequently better fluids and temperature. For the same reason it is desirable to isolate the bottom of the hole. The feasibility of this proposal should be established.

[ACTION : FISHER]

DMP Consensus

Long-term sealing should be effected after further drilling at 504B with subsequent in-hole experiments directed at temperature and fluid flow.

(viii) <u>EPR Bare Rock Drilling</u>

<u>Scientific Objectives</u>

Definition of water-rock reaction zone above the axial magma chamber.

Physiochemistry of earliest phase of hydrothermal alteration.

Physical nature of geophysical horizons.

Spatial and temporal variability of magma composition.

Physical and compositional nature of zero-age crust.

Long-term experiments to determine temporal variations in the physical state of the crust and the chemistry of circulating fluids.

<u>Relevant DMP Thematic Thrusts</u>

Crustal structure and composition
Intraplate stress
Long-term monitoring
Hydrogeology

Logging Programme

With no temperature and diameter limitations;

Standard logging suite (including FMS)
BHTV
Wireline packer
Packer
Temperature
Magnetometer/susceptibility
VSP

In reality, temperatures of up to 400°C are expected. Unless hole cooling experiments are successful, high-temperature tools will be needed. A possibility would be to run Schlumberger hostile environment logging (HEL) tools but only to intermediate depths. Target must be to get as close to the above suite as possible taking account of the expected temperatures and with the possibility of a 4-inch hole.

(ix) Hydrothermal Processes at Sedimented Ridge Crests

Scientific Objectives

3D characterization of fluid flow and geochemical fluxes within a sediment-dominated hydrothermal system.

Geophysical properties of crust formed at a sedimented ridge crest.

Relevant DMP Thematic Thrusts

As for EPR

Logging Programme

Standard logging suite (FMS in sediments only)
BHTV (in basalts)
WSTP
Geoprops probe
Wireline packer
Temperature
VSP
Magnetometer/susceptibility
Induced polarization

Temperatures of up to 400°C are expected. Similar comments as for EPR except that 4-inch diameter hole is less likely.

The times necessary to effect the logging programmes of Items 5(iv) - 5(ix) should be calculated as an input to the formulation of a leg structure.

[ACTION : JARRARD]

The hostile environment programmes require urgent action to increase the probability of success in 1991. This will necessitate expenditure, a trimming of ambitions, and rapid progress up a learning curve. The key logging issue is one of high temperatures in slimhole environments.

DMP Recommendation 89/11

"Hostile environment drilling programmes should be staggered to allow time for lessons learnt to be incorporated into subsequent legs."

5. Liaison Reports

(i) Technology and Engineering Development Committee

The Chairman reported on the TEDCOM meeting held at ODP/TAMU, College Station, on 27-28 April 1989 (Annexure I).

Key points were:

- the DCS concept was not proven on Leg 124E, only 20 m of core being recovered;
- the Navidrill had five mechanical failures out of nine deployments; the geoprops probe is dependent upon a functioning Navidrill;
- TEDCOM supported the idea of an interprogramme workshop to progress high-temperature logging developments as a basis for scientific work in the 'Nineties;
- newly formed Shipboard Measurements Panel was not aware of recommendations on physical properties measurement by the DMP subgroup which met in August 1987. SMP Chairman requested that these recommendations be presented to SMP at their next meeting in October 1989.

DMP Recommendation 89/12

"Because of the importance of the Navidrill to the deployment of the geoprops probe during Leg 131, the Navidrill be modified to overcome operational problems prior to Leg 130 when it should be tested at sea."

(ii) Shipboard Measurements Panel

Gieskes reported on the first SMP meeting held in College Station, Texas, on 27 - 28 February 1989.

A key concern of SMP is the lack of contact between experts in the areas covered by shipboard measurements and interested scientists who participate in Legs. Should, for example, a

physical properties scientist receive training prior to a Leg? Specific improvements were recommended in the area of, inter alia, physical properties measurements.

The possibility of integrating a routine VSP programme with the underway geophysics was discussed. VSP is clearly within the DMP mandate. The concept of routine VSP is at variance with earlier DMP advice.

DMP supports the SMP view that there should be a greater flexibility of subsampling rules.

DMP views on the role of VSP within ODP should be outlined directly to SMP at their next meeting in October 1989.

[ACTION : WORTHINGTON]

(iii) KTB Update

Villinger reported that the pilot hole has reached 4000 m. The interval is completely cored. KTB is currently working on log analysis and the integration of log and core data.

Current need is to identify a site where deep drilling could take place without exceeding 300°C. Preliminary drilling and heat flow measurements have allowed a site to be identified where the 300°C limit is reached at 10 km. This depth is not adequate for reaching a major seismic reflector but it would avoid need for an ultra-deep drilling rig. These issues are being investigated further to try to optimise the outcome.

6. Report on Workshop on Log Data Quality

The Chairman reported on this workshop, co-convened with Wilkens, held in Washington, D.C., on 13 - 14 April 1989 (Annexure II). Twenty recommendations were formulated to improve shipboard logging practices. DMP will monitor progress in bringing these recommendations to fruition.

[ACTION: PANEL]

In order to build on these efforts, and to maintain the initiative, the JOIDES logging scientist should prepare a short report at the end of his Leg outlining perceived difficulties associated with shipboard logging operations. This requirement should form an integral part of the recommended Job Description for the post of JOIDES Logging Scientist. The Job Description is to be ready in draft form for the next DMP meeting.

[ACTION : GOLOVCHENKO, WILKENS]

7. Monitor Reports - Third Party Tools

(i) Wireline Packer

Howell reported on developments to date. TAM Inc are confident that a six-month delivery date can be met. At

present the tool cannot pass the land test which is a prerequisite for handover to LDGO.

Wireline packer is scheduled for testing on Leg 129. With this schedule, the deadline for tool delivery, if dry-dock is in Japan, is early September. This allows lead time for import/export licences. If dry-dock is elsewhere, slightly more time is available for tool completion. Either way, the wireline packer may not be available for Leg 129 unless the delivery time is drastically shortened. TAM are receiving increased support from Amoco and are benefiting from liaison with ODP. There is some optimism that the shorter delivery time might be achieved.

The Chairman commented that the development of the wireline packer did not constitute a success story in view of contractual shortcomings, questionable subcontractor performance, and cumulative delays. Future tools developed in accordance with the recently formulated DMP guidelines on third-party tools would have a tighter control on their progress through the identification of agreed technical milestones at the outset.

(ii) Geoprops Probe

Karig reported that the contract has not yet been let, although the design phase has started. The reason is that a tighter contract is being drawn up. The contract requires delivery within nine months of signing. However, if the contract were signed now, this delivery time would not guarantee availability of the geoprops probe for Leg 131 which is scheduled to begin in March 1990. There is a need to advance this timetable through negotiation with TAM.

[ACTION : KARIG]

(iii) Lateral Stress Tool (LAST)

No Canadian representative was present to give this report. Panel considered it essential to have an updated report on LAST at the next DMP meeting. Kate Moran should be invited to give this presentation.

[ACTION : WORTHINGTON]

8. Third Party Tools

Golovchenko provided a list of third party tools scheduled for the next few legs. In essence these are:

Leg 128:

Large-scale resistivity - Becker (Miami) & ORI (Japan) 2nd ship
Oblique seismic experiment - ORI (Japan) 2nd ship
Long-term seismometer - ERI (Japan)

Leg 129:

VSP/WST - no scientific proponents as yet

Leg 131:

Geoprops Probe	- Karig (Cornell)
Lateral Stress	- Moran (Canada)
VSP/WST	- Moore (HIG)
Long-term temperature	- ORI (Japan)
Wireline packer	- Stanford/TAM

The following monitors are (re-)appointed and asked to report on the specific tools for Leg 131 at the next DMP.

Geoprops Probe	- **KARIG**
LAST	- **BELL** (or MORAN)
VSP/WST	- **WILKENS** (for MOORE)
Long term temperature	- **KINOSHITA**
Wireline packer	- **HOWELL**

If any of the above cannot attend the next DMP, a written report must be submitted.

9. <u>Logging Contractor's Report</u>

Golovchenko reported that the new tool strings are in place. These are:

(i) DIT-E/LSS/HLDT/CNT-G/TCC (value $350,635)

(ii) GST/AACT/CNT-G/NGT/GPIT/TCC (value $222,915)

(iii) FMS/NGT/TCC (value $327,169)

A tool nomenclature is appended.

At present the limit of insurance cover is $275,000: this is only sufficient to cover the second tool string. Current premium is $139,000 with a $50,000 deductible.

The FMS has just been run successfully for the first time in ODP.

The GST is now fitted with a boron sleeve to reduce boreholeperturbations.

The contract for the new side-entry-sub (SES) has just been let.

A WBK digital borehole televiewer can be leased at $58,000 per year with an option to purchase the tool after three years. The tool would be available nine months after signing an agreement. Before signing, EXCOM approval is required. It is likely that FRG would provide a

back-up televiewer for shipboard operations. Confirmation is awaited prior to proceeding. The target date for dispatch of a letter of commitment to WBK is 5 June 1989.

The latest version of the basic Terralog package (log reading and processing) can be available in the autumn at a price to institutions of $10,000. This availability would depend on the degree of potential interest. Panel members were asked to canvas opinion from their own areas and report at the next DMP meeting.

[ACTION : PANEL]

Terralog is not the only facility for reading LIS tapes. There may be other, more economic alternatives. Terrascience might sell the reading version only, at a much lower price. These aspects should be investigated and reported at the next DMP meeting.

[ACTION : HUTCHINSON]

Logging operations were reviewed for Legs 124 - 125. In particular, of the seven tests proposed for the Engineering Leg (124E) only two were actually done. The site drilled specifically for logging suffered a stuck BHA which necessitated testing the telemetry of the two new standard tool combinations in the drill pipe. The wireline heave compensator was tested and improved. The wireline packer test was cancelled because the tool is not ready. Leg 125, and recently Leg 126, have encountered problems of hole stability.

10. <u>WPAC Planning</u>

(i) <u>Leg 131 - Nankai</u>

Jarrard reported that the pre-cruise meeting had increased the number of holes to be drilled and that partly as a consequence, changes had been made to the logging programme. In particular, the BHTV has been dropped and the MCS (shear source) tool will not be available. Four holes instead of one are now planned at NKT 2 (or NKT 10) to reduce hole condition problems and one at NKT 1.

NKT 1 - target depth 900 m
Logging to be carried out at 600 m and total depth, as follows:

Standard logging suite (including FMS)
Wireline packer - 4 deployments
WSTP - 4 deployments
LAST - 4 deployments

NKT 2-A - target depth 600 m with XCB

Standard logging suite (including FMS)
Geoprops probe - 12 deployments
WSTP - 4 deployments
LAST - 4 deployments

NKT 2-B - target depth 950 m

Standard logging suite (including FMS)
Wireline packer - 4 deployments
WSTP if sediments allow

NKT 2-C - target depth 900 m

Hole dedicated to zero-offset VSP and
rotatablepacker (3 deployments)

One wireline logging combination is to be run for correlation purposes, probably the FMS/gamma ray string.

NKT 2-D - target depth 1300 m

Hole to be drilled and cased for the temperature experiment.Coring scheduled for the deeper section, 950 - 1300 m, which will be logged with:

Standard logging suite (including FMS)
Wireline packer - 4 deployments

Karig commented that the substantial changes to the earlier DMP recommendations had jeopardized the thrust to obtain in-situ properties. However, it was recognized that the geoprops probe could still not be guaranteed to be ready in time for Leg 131.

The Chairman commented on the broader implications. DMP had spent 200 man-hours discussing the Nankai Leg, subject to the planning constraints laid down by PCOM. Now the goal-posts had been moved at the pre-cruise meeting, rendering much of the Panel's earlier discussion irrelevant. With this sort of changeability permitted by the system, the investment of substantial amounts of time at the technical planning stage cannot be defended. In future, the Panel should self-impose a two-hour time limit on discussions relating to any given leg. This policy would provide for some damage containment.

(ii) Legs 133 - 135

No changes to the previously recommended logging programmes for N.E. Australia, Vanuatu and Lau Basin.

11. Thematic or Synthesis Publications

PCOM have requested that DMP consider how to encourage such publications that relate to downhole measurements. Two initiatives have already been taken:

(i) a thematic JGR volume based on a poster session at the December 1988 AGU meeting;

(ii) a multi-authored paper on "Scientific applications of downhole measurements in the ocean basins" in the journal Basin Research.

Both of these are in press.

Panel was asked to propose further possibilities at the next DMP meeting.

[ACTION : PANEL]

12. ODP Accomplishments and Benefits

PCOM have asked what DMP considers these to be. The key is to identify those aspects of downhole measurements that have advanced science. Other benefits might include the education and training of earth scientists. Panel was asked to identify key areas for discussion at the next DMP meeting.

[ACTION : PANEL]

13. Proposed Workshop on High-Temperature Slimhole Tools

Lysne reported that the purpose of this proposal is to define common problems between ODP and other science programmes, e.g. Continental Scientific Drilling, with a view to collaborating in rectifying identified shortcomings in technology. The proposal was submitted to JOI/USSAC who suggested the establishment of long-term working groups instead. This indicates that progress will be slow. ODP has just 18 months to take effective action if there is to be a useful logging programme for the East Pacific Rise and at sedimented ridge crests. Thus, although the workshop concept will continue to be advanced, ODP needs a short-term strategy.

The Chairman commented that high-temperature (slimhole) logging is the most important technical issue currently facing the Panel. In the short term there is no prospect of a high-temperature logging suite which matches that for conventional temperatures. Also ODP does not have the resources to undertake tool development projects for hostile environments, In any case, there is insufficient time. We therefore have two scenarios:

(i) a short-term scenario whereby existing technology is identified, evaluated, and accessed;

(ii) a long-term scenario whereby shortfalls in this technology are identified and rectified through inter-programme funding.

The proposed workshop constitutes a potential bridgehead between these two scenarios.

Recognizing that some full-time activity is needed if ODP is to prepare for high-temperature logging within 18 months, the following recommendation was formulated.

DMP Recommendation 89/13

"In view of the technical complexity and cost of high-temperature logging operations, an experienced engineering scientist be dedicated full time to evaluating the status of off-the-shelf high-temperature logging technology for possible future deployment in ODP. Because of time limitations this activity needs to be completed within a six-month period commencing as soon as possible. The deliverable would be technical advice to ODP on what is achievable with current technology at different temperatures and for different hole diameters. DMP considers this strategy to be the most cost effective in the short term, and one which would optimise the chances of success."

Panel noted that, pursuant upon DMP Recommendation 88/11, there remains a PCOM action on TAMU and LDGO to provide further cost comparisons of slimholing vs drilling at different diameters.

14. Proposed Geochemistry Workshop

This has been proposed by Kastner et al. and is to have a logging component coordinated by Worthington and Howell. The Chairman had been unable to contact the proposers directly but it was believed that the workshop is scheduled for the autumn. The possibility was raised of using the logging component of the workshop as a basis for a thematic publication on geochemical logging, in the spirit of agenda item 11.

[ACTION : WORTHINGTON, HOWELL]

15. Other Business

The Chairman observed that with the vast amount of business transacted at DMP meetings, new panel members have a great deal to assimilate in a short time. The introduction might be facilitated by prior availability to new members of the previous year's DMP minutes. This proposal was welcomed by the new members who will shortly receive back-issues of DMP minutes for 1988.

[ACTION : WORTHINGTON]

16. Dates and Formats of Next DMP Meetings

The next DMP meeting is scheduled for 11 - 12 September 1989 in FRG. Villinger to host. This meeting will be followed by a workshop with KTB on topical logging problems. As the format of the workshop unfolds, some panel members will be invited to make presentations.

[ACTION : WORTHINGTON, VILLINGER]

The following DMP meeting is scheduled for College Station on 16 - 17 January 1990. Fisher to host. This would allow a timely meeting with TAMU engineers.

Subsequent panel meetings will be held in May and September 1990. Panel supported the concept of one of these meetings being held at a port of call to allow a tour of shipboard facilities on JOIDES Resolution.

Close of Meeting

The Chairman thanked Members, Liaisons and Guests for their contribution to the meeting, Scripps Institution of Oceanography for their kind hospitality, and Dr J Gieskes for his gracious hosting. The meeting closed at 2.46 pm on Wednesday 24 May 1989.

Paul F Worthington
27 May 1989

ANNEXURE I

MEETING OF JOIDES TECHNOLOGY AND ENGINEERING DEVELOPMENT COMMITTEE

TEXAS A & M UNIVERSITY
COLLEGE STATION
27-28 APRIL 1989

REPORT

1. Statement of Purpose

The Seventh JOIDES TEDCOM meeting was attended in my capacity as Liaison from the Downhole Measurements Panel (DMP). These notes relate to those discussion items which have a bearing on the ODP programme of downhole measurements.

Main purposes of meeting:

(i) to assess the results of the trial deployment of the Diamond Coring System (DCS) during the Engineering Leg (124E);

(ii) to formulate a response to the ODP long range plan for submittal to PCOM.

2. NSF Report

Soviet membership of ODP: although there has been a relaxing of attitudes, there are no official indicators that the USSR might enter the programme.

3. Diamond Coring System (DCS)

The DCS is being developed as a speciality system for difficult drilling conditions or where substantial penetration into basement is sought. In other cases the existing APC/XCB/Navidrill system will be used and is likely to remain the standard drilling technique for the next 10 years. DCS has depth limitations of about 6000m including the water depth.

System uses a "top drive" concept rather than downhole turbines. Currently the Tonto hydraulic top drive is in place. During testing (124 E) only about 5% of allotted time was spent coring. Core recovery was about 85%. Total length of core recovered was less than 20m, compared to the expected 200m. Future activity includes re-designing the existing heave compensator, deciding whether to introduce an electric top drive to replace the hydraulic drive, and working towards a land test (in England?) in December 1989.

Reasons for disappointing core recovery during Leg 124E were unstable hole conditions and time spent in attempting to locate a site where drilling could take place without a re-entry cone.

Messages for next time:

Better site preparation: set a re-entry cone: then concentrate on a technical evaluation of the system. Site selection should draw upon 3D seismics where possible. Alternatively, an existing hole which already has a re-entry cone could be considered.

Key difficulty is the low speed of rotation (100 rpm). This needs to be increased but without introducing excessive vibration. ARCO have a useful vibration analysis facility which is to be commercialized. This should be accessed by ODP.

DCS technology is not yet proven. A sub-committee on mining drilling comprising five people was formed to take the subject further forward within TEDCOM.

4. Test of Navidrill Core Barrel

Deployed nine times; mechanical failure on five. Four runs recovered some core but bit plugging was a problem. Specific tool improvements are recommended. More land tests are planned before further ship time is committed to Navidrill testing. The Navidrill has to be available before the Geoprops Probe can be used.

5. ODP Long Range Plan (LRP)

TEDCOM formulated its response to the LRP. Many of the technical requirements for achievement of the scientific objectives relate to improvements in downhole measurements. TEDCOM encourages continuing liaison with DMP to ensure that technical developments are correctly coordinated. In particular, TEDCOM supported the proposal for a joint ODP - DOSECC - Continental Drilling Programme workshop later in 1989 to evaluate specifically slimhole logging in high temperature environments. Co-convenors are Worthington (ODP) and Lysne (Continental Drilling Prog.).

Cost estimates for additional engineering and operating expenses needed to address the objectives of the long range plan in areas related to downhole measurements are as follows:

	Phase I (1989-92)	Phase II (1993-96)	Phase III (1997-2000)
		$	
Borehole seismometers + operation of seismic system	600K	600K	600K
Improved packer + fluid samplers	800K	500K	300K
Oriented core samples	250K	250K	-
In-situ pressure sampler	250K	250K	150K
Slimhole logging and borehole experiments	650K	2M	-

These are ballpark figures which may turn out to be substantially underestimated.

6. Other results from 124E

(i) Pressure core sampler

Tool tested three times, once inside drillpipe, twice in formation. Core samples were fully recovered on both attempts. Full hydrostatic pressure was recovered two out of three times. Downhole mechanical function was flawless. Deployment/redressing is vastly improved over predecessor. Core size 36" long and 2" diameter.

(ii) Extended core barrel

Tool deployed in rugged environment without mechanical failure. New thread design effective in preventing over-torque failures leading to a more reliable deep penetration (1000m) XCB coring system. This has implications for the logging programme which has sometimes been truncated because of XCB sticking. The new XCB, in conjunction with the lockable flapper, should augur well for logging programmes at depth.

(iii) Sonic core monitor

Under development with Diamont Boart (Reed Dowdco System). Downhole, self-contained core entry monitoring system using sonic transducer, mated with XCB. The core locator is based on acoustic reflection which monitors the rate of entry of core into the barrel. This would allow the rate of penetration to be monitored and core depths to be identified in cases of poor core recovery. Tool is currently under evaluation on Leg 126.

(iv) Hard rock core orientation

Current industry standard technique for hard rock core orientation requires near 100% core recovery. ODP experiences less than 100% recovery due to current operating depths, drillstring technology, and heave compensation capabilities. There are three approaches to achieving viable hard rock orientation capabilities.

(a) Modification of current oilfield technology
(b) Use the DCS in conjunction with current oilfield technology
(c) Development of the sonic core monitor to be used with current ODP coring technology

Option (b) is favoured.

(v) High temperature drilling

A meeting was held with geoscientists concerning the definition of high temperature "hydrothermal" drilling requirements. Input details are currently being collated into a strategy document. Initial target temperature is 400°C.

The use of the side entry sub for circulating to cool logging tools is viewed cautiously because, although the tool is just below the pipe, it is considered too far away from the drillbit for effective cooling.

(vi) Vibracoring

Projected applications are:

APC, for possible undisturbed recovery of loose flowing sands.

XCB, for better recovery of turbidites and/or chalk/chert sequences.

DCS, for enhanced bit life and improved penetration rates in crystalline rock.

Jack Pheasant of BGS, who will be a visiting engineer to ODP from mid-summer, will be initiating the integration of "hydraulic" vibracoring into an ODP coring system.

7. Downhole Measurements

DMP Liaison commented on the reasons why logs are run; their continuous nature, providing data at reservoir conditions, a wide range of measurements at a scale intermediate between core data and geophysical measurements. In contrast, core is discontinuous, is rarely measured at truly simulated in-situ conditions, is at a small scale, and potentially suffers from recovery damage. Core and log data are complementary: neither is a substitute for the other.

The ODP standard logging suite was reviewed in the context of a 4-inch hole scenario as per the DCS. Data that would be lost from the standard suite include:

Sonic waveform
Dual induction
Geochemical logging tool
Natural gamma spectral
Formation microscanner

In response to a question, it was estimated that 50% of the information that is gathered by the standard suite would not be obtainable in 4-inch holes.

Slimhole options include BPB Industries, whose background in coal logging has stimulated slimhole tool developments at low temperatures, and the Schlumberger hostile environment logs (HEL) which operate up to 500°F. The latter tools, all 2.75 inches in diameter, are: single induction, gamma ray, neutron, density, sonic and caliper. These tools can be deployed in a 4 inch hole although the sonic requires to have its centralizers removed, an action which does degrade the data.

Miscellaneous topics included the miniaturized formation microscanner, now on board ship, the proposed workshop on slimhole and high-temperature logging, third-party tool delays in connection with Nankai, and the need to match downhole measurements with corresponding shipboard measurements of physical properties.

8. Operations

Leg 123: side-entry-sub successfully deployed to overcome bridging problems and allow logging to be undertaken.

Leg 124: again side-entry-sub used to allow logging which included the borehole televiewer for stress orientation. Planned hydrofracturing not undertaken because of difficulties in lowering a packer in uncased hole.

Leg 125: leg characterized by hole stability problems. Solution to these problems is impeded by absence of a riser. Hole stability is recognized as a major problem within ODP.

9. Onboard Physical Properties Measurements

Shipboard Measurements Panel (SMP) Chairman reviewed the current status. Physical properties measured on board ship include:

Acoustic velocity (Vp), magnetic susceptibility, density/water content, thermal conductivity, shear strength. resistivity.

Potential additional measurements are:

Improved shear strength
Rock quality evaluation
Engineering sediment classification
Swell index
Strain relaxation

SMP is a new panel, formed in early 1989, and has only had one meeting to date. It is in the process of formulating its policies. Reference was made to a one-day subcommittee meeting of DMP held in 1987 on the status of shipboard physical properties measurements. It would be helpful if those ideas could be input to SMP. Since there is facility for a DMP liaison to SMP, the DMP chairman was asked to attend the next SMP meeting (in October 1989) to outline the recommendations of that subcommittee.

10. Next Meeting of TEDCOM

To be held in the autumn (November). Venue to be decided.

Paul F Worthington

3 April 1989

ANNEXURE II

ODP WORKSHOP ON LOG DATA QUALITY

Holiday Inn Central
Washington D.C.

13 - 14 April 1989

COMMUNIQUE

Since the inception of the Ocean Drilling Program (ODP) in 1983 the role of downhole measurements has steadily grown to become an important integral part of the overall scientific effort. This growth can be attributed to two complementary factors, an increasing rate of acquisition of wireline logging data and a wider appreciation of the scientific benefits of downhole measurements as a whole. This most satisfactory state of affairs is due to the efforts of the ODP logging contractor, Lamont-Doherty Geological Observatory (LDGO), and the wireline subcontractor, Schlumberger. As a result of these efforts, ODP has access to the most advanced logging suite that is run routinely in the world today, and these data are providing vital pointers in our drive to learn more about the earth's structure and history as it is revealed beneath the oceans.

Motivated by these successes, it was considered appropriate to re-examine the status of log data acquisition within ODP, in anticipation of an even greater usage of these data in the future. Accordingly, a workshop on log data quality was convened with the support of Joint Oceanographic Institutions (JOI), Inc. Convenors were Roy H Wilkens and Paul F Worthington. The workshop comprised former JOIDES logging scientists together with guest representatives of the science operator, Texas A & M University, the logging contractor and the wireline subcontractor. Three attendees were members of the JOIDES Downhole Measurements Panel (DMP).

The stated purpose of the workshop was:

"to evaluate the impact of shipboard logging practices on log data quality by identifying problematic areas and recommending ways in which these might be improved".

The workshop formulated the following recommendations:

(1) Data quality rather than quantity should be the overriding priority in log data acquisition: present time restrictions do not allow both to be achieved satisfactorily.

[JOIDES]

(2) Logging programmes should be identified *after* the thematic objectives have been formulated but *before* the provisional leg structure is established. Thereafter, logging should comprise an integral part of the planning process.

[LDGO, DMP]

(3) Co-chief scientists should be contacted by the JOIDES Downhole Measurements Panel (DMP) shortly after being named to be made aware of the role of downhole measurements in addressing the scientific objectives of their Leg. DMP should consult the Co-chiefs on any subsequent revisions to the DMP logging recommendations.

[DMP]

(4) The JOIDES logging scientist should be identified and trained at the earliest possible stage in the pre-cruise planning process. All prospective JOIDES logging scientists should attend LDGO for at least one week. Training is essential in view of the technical complexity of the downhole measurements program.

[TAMU, LDGO]

(5) DMP in consultation with LDGO should formulate a more specific job description for the JOIDES logging scientist.

[DMP, LDGO]

(6) Because of the remoteness of the shipboard location, LDGO should particularly ensure that at least one logging scientist is completely capable of operating and maintaining the shipboard systems. These should be simplified so that the JOIDES logging scientist can fully participate in the routine log processing and analysis.

[LDGO]

(7) The LDGO or the JOIDES logging scientist should make a presentation to the shipboard party early in a cruise to outline the scientific purpose of the logging program.

[JOIDES, LDGO]

(8) Adequate time for hole conditioning should be included in all Leg schedules.

[JOIDES, TAMU, LDGO]

(9) Development of the new side-entry-sub (SES) is essential in view of its safety, operational and time-saving benefits, relative to the existing facility.

[JOIDES, TAMU]

(10) The side-entry-sub should be run in all cases except where hole conditions appear to be superior.

[JOIDES, TAMU]

(11) Time provision should be made at the earliest possible stage of planning *either* to deploy the side-entry-sub without detriment to the scientific logging schedule *or* to drill a separate hole dedicated to logging at that site.

[JOIDES,TAMU]

(12) The wireline heave compensator (WHC) must be fully maintained by the time-shared SEDCO mechanic. Routine standard testing of the WHC should be undertaken at least six-monthly. Analysis of accelerometer data from the formation microscanner (FMS) would serve in lieu of routine testing.

[TAMU]

(13) LDGO should be formally assigned a half-time technician for shipboard electronics support.

[TAMU]

(14) The degradation of data from the neutron porosity and sonic tools, caused by the new standard tool combinations, is unacceptable in view of the emphasis on data quality. Where high quality neutron porosity and sonic data are deemed essential, provision should be made for running separately an eccentered tool combination and a centred tool combination taken from the seismic stratigraphy/porosity string. This will require an additional logging run.

[LDGO]

(15) A composite plot of total natural gamma, induction resistivity, lithodensity and sonic logs should be prepared and distributed as soon as possible after completion of the first logging run, subject to appropriate quality control criteria. This would ultimately require data transfer from the CSU to another shipboard system. A system should be developed to read raw Cyber Service Unit (CSU) field tapes directly into a processing system to facilitate the rapid presentation of primary field data.

[TAMU, LDGO]

(16) The shipboard whole core scanning facility should be extended to include natural gamma spectroscopy and, if possible, induction resistivity, for correlation with and calibration of borehole logs.

[JOIDES, TAMU]

(17) The TAMU computer users group are urged to give high priority to the implementation of a system to merge well-log and core-barrel data on board ship.

[TAMU]

(18) A software user-directory should be compiled of all shipboard systems, to include personal and mainframe computers. A synthesis of this should be distributed to the scientific party prior to each Leg.

[TAMU]

(19) The post-cruise integration of log and core data from selected Legs should be undertaken, with JOI support, to refine further the calibration and accuracy evaluation of well logs. JOIDES logging and physical-property scientists should be encouraged to submit joint proposals to JOI for funding post-cruise studies to correlate log and core data.

[JOIDES, JOI]

(20) An archive of tool response characteristics should be established at LDGO. LDGO should approach the logging subcontractor who should be asked to provide sufficient information to enable log response to be properly simulated.

[LDGO]

The following persons were in attendance.

Convenors	:	Roy H Wilkens (HIG) Paul F Worthington (BP Research)
Members	:	A Cooper (USGS) C Griffiths (IKU) M A Lovell (Nottingham University) P Lysne (Sandia) J Mendelson (MIT) D Moos (Stanford University) C J Mwenifumbo (Can. Geol. Survey)
Guests	:	C Broglia (LDGO) G Foss (ODP/TAMU) L Geiser (Schlumberger) R Jarrard (LDGO)
Observer	:	E Kappel (JOI)

Dated 11 May 1989