MEETING OF JOIDES DOWNHOLE MEASUREMENTS PANEL

University of Washington
Seattle

28-29 June 1990

EXECUTIVE SUMMARY

1. The primary objectives of this DMP meeting were to synthesize experiences from the Nankai leg, to review CEPAC downhole-measurement plans, and to assess the status of the high-temperature logging initiative.

2. In order that the implementation of the logging programme might be properly assessed, DMP requests the Logging Contractor to prepare a written account of each event that leads to a significant departure from the logging programme. This version, and only this version, should be disseminated for consistency. This action is especially necessary where events are set against a backdrop of earlier moves to alter the programme.

3. An ad-hoc working group, comprising representatives from DMP, SMP IHP, LDGO and TAMU, is charged with formulating in workshop session strawman user requirements for the shipboard integration of core and log data. The workshop report is to be set before the October 1990 joint meeting of DMP and SMP with a view to adoption by the two panels. The workshop is scheduled for 29-30 August 1990 in Miami, with Keir Becker as host.

4. The Geoprops Probe, deployed in conjunction with the motor-driven core barrel (MDCB), is needed for the Sedimented Ridges leg (138). The MDCB is scheduled for field trials during Leg 134, but it is unlikely that Geoprops will have completed its land testing by then. If land testing of the Geoprops Probe is satisfactory, the tool should be subjected to sea trials during Leg 135. From this standpoint, Leg 135 would be a better leg for testing the MDCB. Geoprops cannot be deployed until the MDCB is proven.

5. The high-resolution sediment magnetometer, developed by Schlumberger in conjunction with Total and CEA (France), has been satisfactorily tested offshore and is scheduled for deployment during Leg 134. This will provide an ODP test of the tool's capabilities for reversal stratigraphy and for the measurement of susceptibility.

6. A grey paper has been prepared in which messages from Nankai are collated as an aid to the planning of similar future legs, e.g. Cascadia. The disappointing log productivity was a consequence of our inability to drill stable, loggable holes in these difficult environments, as experienced previously during Leg 110. It was not due to downhole-measurement failures.

7. A review should be carried out (by TAMU/TEDCOM) of previous drilling difficulties in Barbados (Leg 110) and Nankai (Leg 131) and solutions be developed to the hole stability problem to permit logging operations in such environments. This review should be undertaken urgently in view of the imminence of Cascadia.

[DMP Recommendation 90/10]

8. Panel reiterates its support for the upgrading of the WSTP tool.

9. Due to a change of policy in Japan, the high-temperature logging tools developed during the 'Eighties by JAPEX (Japan Petroleum Exploration Co.) might now become available to ODP. This development could change the entire scenario for high-temperature logging in ODP.

10. JAPEX should be approached by ODP to establish the availability of (super) high-temperature logging tools and cables. A report on the visit should be provided to the DMP high-temperature subcommittee.

[DMP Recommendation 90/11]

11. The Oahu test hole of Leg 136 should be logged in open hole for sonic, density and BHTV. VSP using the Well Seismic Tool should be discretionary according to the quality of the sonic log. An oblique seismic experiment should be carried out on a re-visit to the site.

[DMP Recommendation 90/12]

12. The instrumented borehole seal should be tested at the Oahu test site during Leg 136. This work is to be assigned a higher priority than VSP at this site.

[DMP Recommendation 90/13]

13. A TECP liaison should be appointed to DMP.

[DMP Recommendation 90/14]

14. A representative of LDGO and/or DMP should be present at DPG meetings to provide input on the nature and scheduling of downhole measurements.

[DMP Recommendation 90/15]

15. Next DMP meeting is scheduled for 12-13 October 1990 in Townsville, Queensland, Australia. A one-day joint meeting with SMP is scheduled for 11 October 1990. These meetings coincide with a port call of the JOIDES Resolution: there will be a ship tour as part of the DMP meeting.

PAUL F WORTHINGTON
12 July 1990

MEETING OF JOIDES DOWNHOLE MEASUREMENTS PANEL

University of Washington
Seattle

28-29 June 1990

MINUTES

Present

Chairman:	P F Worthington (UK)
Members:	B Carson (USA) J Gieskes (USA) M Hutchinson (USA) P Lysne (USA) R Morin (USA) C Sondergeld (USA) R Wilkens (USA) D M Williams (USA) H Crocker (Canada/Australia) J P Foucher (France) T Nagao (Japan) H Villinger (FRG)
Liaisons:	D Cowan (PCOM) A Fisher (TAMU) X Golovchenko (LDGO) J McClain (LITHP) J Mienert (SGPP)
Guests:	R Jarrard (LDGO) B Malfait (NSF) T Pyle (JOI)
Apologies:	D Karig (USA) K Moran (SMP)
Absent:	O Stephansson (ESF)

1. Welcome and Introductory Remarks

The meeting was called to order at 8.40am on Thursday 28 June 1990. The Chairman welcomed DMP Members and Liaisons, especially those attending for the first time (Nagao, Williams and McClain), and also the three guests. This DMP meeting was taking place one month later than usual to allow Nankai participants to attend and to report back on that leg. The meeting had two further principal thrusts, a review of CEPAC downhole-measurement plans and an assessment of the status of the high-temperature logging initiative.

Review of Agenda and Revisions

Item 5(vi) to constitute a JOI report from T Pyle: original item 5(vi) to be considered under item 10.

Item 10, CEPAC Planning, to be renamed "Planning" to allow review of WPAC objectives.

Nankai would be discussed under the logging contractor's report (Item 7).

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

2. Minutes of Previous DMP Meeting, Texas A & M University, College Station, 23 - 24 January 1990

The minutes were adopted with the following modifications:

Page 13, Paragraph 3, Lines 6-7

Delete "... obtain 30m of additional core,"
Substitute "... core for 30 additional hours,"

Page 13, Paragraph 3, Line 12

To read "... but was not discussed by the scientific party."

Page 13, Paragraph 3, Line 14

Insert additional sentence:

"There were two splices in the cable at the time of the decision not to log."

Matters Arising

An issue that needs clarification is the omission of logging at hole 801C, Leg 129. Panel had been advised by the Logging Contractor that the option to log was available. Yet, the Logging Contractor's report to PCOM (PCOM Minutes, April 1990) indicated

that the lower part of 801C could not be "confidently logged", presumably because of the risk of tool loss. This suggests that the option to log (safely) was not available.

DMP Consensus

DMP requests the Logging Contractor to prepare a written account of each event that leads to a significant departure from the logging programme. This version, and only this version, should be disseminated for consistency. This action is especially necessary where events are set against a backdrop of earlier moves to alter the programme.

3. PCOM Report

Cowan reported on the PCOM meeting held in Paris in April 1990. The main purpose of the meeting had been to plan the direction of the drilling vessel during the period 1990-1994. The ship will operate in the Pacific and the North Atlantic during the four-year period beginning April 1990. In particular, an additional minileg has been scheduled to drill and case a hole north of Oahu for emplacement of a digital seismograph.

PCOM is alert to the need to plan for renewal, e.g. by focussing the future programme on a few thematic objectives of global significance. PCOM supported the formation of a working group on deep drilling.

Cowan reported on the PCOM response to DMP Recommendations 89/17 - 89/19 and 90/1 - 90/9, with the qualification that PCOM does not necessarily address each and every panel recommendation as a specific item.

Rec. No.	Description	PCOM Response
89/17-19	High-temperature logging	PCOM is aware of need for high-temperature tools. Funds have been re-allocated to start developments as soon as possible. Contracts for tool development should be bid competitively.
90/1	Re-entry of hole 801C	This is already on the list of LITHP proposals (ranked 10th). Target is FY92.
90/2	Short-term high-temp. logging tools.	PCOM agrees. Matter being handled by BCOM/JOI/LDGO

90/3	Reaming of 4-inch DCS holes	Logging capability will become a big issue if DCS is used widely. TAMU is not prepared to get into reaming until DCS has been further tested (Leg 132). Await more information on DCS capability.
90/4-5	Integration of core and log data	No response
90/6	Use of BGR/FRG borehole magnetometer in 504B	Pre-achieved
90/7	Downhole-measurement programme at 504B before engineering work	Endorsed by LITHP. Accepted by PCOM
90/8	Downhole measurement programme at 504B before casing operations	Agreed, but these measurements do not have to be made on the Engineering Leg.
90/9	LDGO membership of the Conoco-led MWD consortium	Pre-achieved

In thanking Cowan for his presentation, the Chairman commented on the urgency of Recommendations 90/4 and 90/5, which are concerned with developing user requirements for the shipboard integration of core and log data. Until this is done, TAMU computer staff cannot commence work on developing the necessary system. It had been recommended to convene a meeting of DMP/SMP/IHP representatives to develop a strawman strategy for subsequent discussion/adoption by the October 1990 joint meeting of DMP and SMP in Townsville, Queensland. For this to be achievable, the working group would need to meet before the end of August. Unfortunately, PCOM had not endorsed the recommendations.

Pyle commented that DMP Recommendation 90/5 referred to the working group meeting as a "workshop". JOI is responsible for workshops and PCOM probably felt that the issue was not part of their remit. In fact, the intention was for a one-off ad-hoc working group to meet in workshop session in support of an upcoming panel meeting. PCOM Chairman should be approached as a matter of urgency to clarify the situation, after which JOI will be able to handle the necessary arrangements.

[ACTION: WORTHINGTON]

The workshop is scheduled for 29-30 August 1990 at the University of Miami. Keir Becker has agreed to host. Projected attendees from DMP are Worthington, Wilkens, Hutchinson and Karig. Sondergeld is not available on those dates.

4. NSB Briefing

The Chairman reported on the ODP briefing of the US National Science Board (NSB) in Washington DC on 16 March 1990. Downhole measurements featured as one of the highlights of ODP Phase 1, and the Chairman had made a presentation to the Board on "Developments in Logging and Instrumentation". The presentation had been structured in terms of the rationale behind wireline logging, the scope of contemporary measurements, examples of scientific products, benefits to industry, and future projections. The presentation was repeated for the benefit of Panel members.

Malfait commented that the NSB are concerned with new technology, relationships of science to industry, and education and training of new scientists, as well as environmental factors such as global change. The overall presentation, which brought all these issues together, was very well received. In fact, there had been follow-up communication from NSB. There are likely to be further briefings as part of the ODP renewal preparations. The possibility of a road show is being considered. The briefing had been organised by Pyle who complimented the DMP Chairman and the other speakers on its success.

5. Liaison Reports

(i) Lithosphere Panel (LITHP)

McClain reported that many proposals had been evaluated. In general, deep crust/upper mantle targets had been favoured. The DMP initiative on Lithosphere Characterisation could not be ranked highly in its present embryonic form but interest would be strong if this were to be developed further into a drilling proposal. The issue of further drilling at 504B, i.e. whether to deepen the existing hole or spud a new one nearby, did not need to be resolved at present.

LITHP had recommended a working group for volcanic rifted margins. As a consequence of a joint LITHP/TECP meeting, more tectonic aspects are to be accommodated in mid-ocean-ridge drilling. This would have implications for tool developments, e.g. a high-temperature BHTV.

McClain noted that the success of the joint LITHP/DMP meeting at the KTB site in September 1989 points to the desirability of DMP holding joint meetings with other thematic panels (e.g. SGPP, TECP).

(ii) Sedimentary and Geochemical Processes Panel (SGPP)

Mienert reported that the next SGPP meeting is scheduled for November 1990 in Paris. It would be useful to have a DMP member present. Since Villinger and Karig would be attending the fluid-flow workshop in Paris on the previous day, they are the obvious DMP nominees. They could decide later which one would attend SGPP.

[ACTION: KARIG/VILLINGER]

(iii) Technology and Engineering Development Committee (TEDCOM)

The Chairman reported on the meeting of TEDCOM held in Salt Lake City on 14-15 February 1990. The primary purpose had been to review progress on the Diamond Coring System (DCS) and to visit the test rig facility. (Annexure I)

(iv) Shipboard Measurements Panel (SMP)

There had been no DMP liaison at the March 1990 meeting of SMP and SMP Chairman, Kate Moran, had been unable to attend the present DMP meeting. Therefore no report could be tabled. The Chairman undertook to contact Moran to clarify issues pertaining to the proposed August working group meeting on the shipboard integration of core and log data.

[ACTION: WORTHINGTON]

(v) KTB

Villinger reported that the pilot-hole rig had now been removed and the new rig for drilling the deep hole was due to be activated on 8 September 1990. An international conference on scientific drilling and logging is scheduled for 10-11 September 1990 in Regensburg, FRG. The aim is to bring together programmes for continental scientific drilling. Pyle is to make a presentation on the logistics of developing a collaborative programme. In the present climate, this meeting is likely to attract more attendees from Eastern Europe.

(vi) JOI

Pyle reported that the ODP Long Range Plan had been issued together with a brochure describing the scope and aims of ODP. Other activities of interest to DMP include keeping track of the development and expenditure associated with the DCS, progressing the issue of high-temperature (slimhole) logging, and establishing links with other geoscience programmes.

EXCOM have approved the draft budget plan for FY91 and NSF approval is now awaited. This makes provision for, inter alia, ODP participation in the Conoco-led MWD consortium, development of high-temperature slimhole tools (temperature log, water sampler),

dewaring of donated equipment for high-temperature deployment (resistivity log), and provision of a person for shipboard FMS processing.

6. Tool Monitor Reports

(i) Geoprops Probe

The tool is almost ready for land testing. Karig has funds to run land tests at the ODP site. Contact should be made with Tom Pettigrew (TAMU) to ascertain the precise nature of the tests.

[ACTION: FISHER]

The Geoprops Probe will be needed for the Sedimented Ridges leg (138) and for Cascadia (not yet scheduled). The tool is run in conjunction with the Navidrill, now re-named "Motor-Driven Core Barrel (MDCB)", which is itself scheduled for sea trials during the Vanuatu leg (134) with a view to being operational by Leg 137. This suggests that Geoprops should also be tested at sea during Leg 134 but such a schedule would probably not allow sufficient time for land testing.

DMP Consensus

If land testing of the Geoprops Probe is satisfactory, the tool should be subjected to sea trials during Leg 135. From this standpoint, Leg 135 would be a better leg for testing the MDCB.

The Chairman noted that Geoprops cannot be deployed until the MDCB is proven. However, when this has been done, a non-functioning Geoprops would be a visible impediment to successful data gathering during Leg 138. It is therefore important that the testing of Geoprops progresses as quickly as possible.

(ii) LAST

Moran tabled the following written report in absentia.

LAST-I

The Lateral Stress Tool (I) was deployed in the final two holes of Site 808. The tool successfully completed measurement of in situ lateral stress and pore fluid pressure in three out of six deployments. Software operational errors and one deployment where the piston corer did not fire were the reasons for failure of the tool to make measurements in the other deployments. Initial interpretation of the data suggests excess fluid pressure and lateral stress equivalent to a horizontal/vertical stress ratio of 1.2.

Given the severe pipe conditions (excessive vibration) and its first time operational use, the tool performed remarkably well. The only damage was the loss of one (of three) stress sensors on one of the two tools during the second deployment. Needless to say, the operator was very pleased.

LAST-II

LAST-II was successfully tested onshore in February at Fugro-McClelland in Houston. No major modifications are required. It is scheduled for offshore tests this summer in the Gulf of Mexico at relatively deep water sites (1000ft). The tests will be run using a diamond coring system.

(iii) BGR Borehole Magnetometer

Villinger reported that the tool is under construction but has not yet been tested. The tool will be rated to 200°C. Bosum is the principal investigator. DMP has previously recommended that this tool be run in hole 504B after deepening. Villinger will establish when the tool is likely to be ready for shipboard deployment.

[ACTION: VILLINGER]

Nagao commented that a new Japanese magnetometer is being rebuilt from an earlier tool as part of the Japanese national plan for downhole measurements. The diameter is 63mm. Kinoshita is the principal investigator. This might also be available for Leg 139.

(iv) Wireline Packer

The tool was land-tested at LDGO but the packers would not deflate. The problem was the dump housing. A new one was developed and sent to the ship for use in Nankai. However, the tool was not deployed because of hole conditions. There are two tools: one is at LDGO, the other on board ship. The next scheduled deployment is in reef carbonates during Leg 133.

(v) Sediment Magnetometer

Foucher reported that the (Schlumberger-Total-CEA) high-resolution downhole magnetometer, which was land-tested prior to September 1989, has now been satisfactorily tested offshore in Indonesia. Diurnal variations are recorded using another magnetometer located in a rubber boat that is remote from the ship. The two constituent downhole tools, for measuring magnetic field and susceptibility, are on schedule for deployment in Vanuatu (Leg 134). This will provide an ODP test of reversal stratigraphy and susceptibility. If successful, DMP will need to decide whether the tool should become a routine tool. An important factor is that the tool uses proprietary software for post-cruise analysis: therefore, magnetic logs in sediments would not be available in real time on board ship. The costs associated with an additional routine tool might impact on the funds available for high-temperature logging tools.

(vi) Flowmeter Permeability

Morin reported on a proposal submitted to NSF to develop a flowmeter tool for use with the drillstring packer. The proposal is for the purchase of a tool comprising spinner (velocity),

pressure and caliper measuring components. The tool would require a new go-devil design to be developed with the help of TAMU engineers. The aim is to deploy the tool at 504B and/or on the Sedimented Ridges leg (138).

7. Logging Contractor's Report

Golovchenko reported some scientific highlights from the logging data acquired during Legs 129-130.

Leg 129: Old Pacific Crust

Hole 801B penetrated some of the oldest oceanic crust and pelagic sediments that have been drilled. The filtered gamma ray log has revealed 100 and 410 ka Milankovitch periodicities in the Jurassic.

Leg 130: Ontong Java Plateau

Several failures of the GST occurred with no back-up tool available. There is good correlation of resistivity logs between holes 807A and 807C, and of velocity vs depth profiles between holes 806B and DSDP 586.

Leg 131: Nankai

No logging highlights. The FMS was not run and no logs were obtained in the decollement. Poor hole conditions and strong currents made logging very hazardous. The currents caused toolstrings to start unscrewing. There were serious hole stability problems. One toolstring was lost in hole 808B when the tool was lowered using the SES to a position below the drillpipe near the bottom of the hole: for some reason the pipe was lowered again and the tool was crushed.

The panel debated messages from Nankai at some length. The first point of concern was that the disappointing log productivity would be seen as a downhole measurements failure whereas it was due to the difficulties of drilling stable, loggable hole. The second was that Nankai had been affected by the same problems as Leg 110: it was therefore reasonable to suppose that without remedial action these same problems would return to inhibit future legs targeted at similar areas, e.g. Cascadia. The key issue is one of improved hole stabilisation. If no improvement in hole stability is achievable, perhaps these environments should not be drilled. A sealed circulation system would be an obvious benefit. Even if some improvement in hole stability is obtained, it might still be advisable to change drastically the logging strategy. Should we, for example, consider measurement-while-drilling (MWD) as an alternative to wireline logs in these environments?

The Panel identified three general requirements. First, it was imperative that the lessons of Nankai (and of Leg 110) be acted upon to prevent a recurrence.

DMP Recommendation 90/10

"A review should be carried out (by TAMU/TEDCOM) of previous drilling difficulties in Barbados (Leg 110) and Nankai (Leg 131) and solutions be developed to the hole stability problem to permit logging operations in such environments. This review should be undertaken urgently in view of the imminence of Cascadia."

The second identified requirement was to keep in close touch with the Cascadia DPG on which DMP is represented (Carson). A report on the August 1990 meeting of the Cascadia DPG should be an agenda item for the next DMP meeting in October.

[ACTION: CARSON, WORTHINGTON]

The third requirement was to synthesize messages from DMP participants in the Nankai Leg (Fisher, Foucher, Gieskes, Karig, Yamano). The Chairman asked these persons to provide him with a summary of their key messages so that these could be emphasized for the future benefit of the programme.

[ACTION: FISHER, FOUCHER, GIESKES, KARIG, YAMANO]

In a letter to the Chairman, Karig proposed that these messages be incorporated into a grey paper to stimulate improvements in drilling, logging techniques and downhole tool design. The Chairman undertook to synthesize these messages. (See Annexure II)

[ACTION: WORTHINGTON]

Leg 131: WSTP Performance

Karig specifically identified the need for improvements to the WSTP tool. During deployment at Nankai the tool flooded twice due to the dislodgement of a plug by vibration. Attempts to collect pore pressure data using the WSTP in conjunction with a recording package were successful only one out of four times.

Fisher reported that TAMU are working on improvements to the WSTP. These include:

- high-temperature (200°C) upgrade for the Sedimented Ridges leg;
- upgrade the electronics (125°C);
- incorporation of a separate, intelligent recording package;
- strengthening the tool.

DMP Consensus

Panel reiterates its support for the upgrading of the WSTP tool.

Legs 131 & 132: ONDO Experiment

Nagao reported on the ONDO (ODP Nankai Downhole Observatory) experiment. In introducing his report, Nagao related that the Japanese community very much appreciated the scientific opportunities afforded by recent ODP legs.

The ONDO is a long-term temperature monitoring system developed specially for ODP drill holes. The main objective of this experiment is to detect possible temporal variations in fluid flows in the Nankai accretionary prism. The ONDO system originally had an 800 m long temperature cable with 19 thermistor sensors at intervals of 40 m and one pressure gauge at each end. Temperature and pressure are recorded once a day and the data can be retrieved by a surface ship through acoustic telemetry signals. The system must be lowered through the drill pipe with the logging cable and hung on the topmost part of the casing with landing pads.

The ONDO system was deployed in Hole 808E drilled during Leg 131 at the toe of the Nankai prism. The hole is 1200 m deep and cased down to about 520 mbsf. Since it was proved that the hole condition is too unstable to deploy the 800 m long cable, the bottom 280 m of the cable carrying six temperature sensors was cut off before attempting deployment.

On Leg 131, deployment of the system was attempted several times but not accomplished. In the early stages, many of the physical connections of the system became loose due to strong vibration of the drill pipe excited by the Kuroshio current, resulting in various mechanical and electrical damages in the system. The electronics were repaired, and the mechanical strength of the system was enhanced as far as possible on board. Thereafter the tool did not suffer any significant damage, but it could not be run through the pipe. A core barrel with a sinker bar was run through the pipe twice to clear any obstructions, and the landing pads were replaced by weaker ones to reduce the friction while running through the pipe. Despite these efforts, the tool sat down inside the bottom-hole assembly every time.

The cause of the failure was probably that the thermistor cable was stretched by its own weight and that of the sinker much more than expected and that it landed on a bridge below the casing shoe. The large friction between the landing pads and the bottom-hole assembly may also have contributed. Thus, after the operations on Leg 131, the thermistor cable was shortened by 80 m, and the strength of the landing pads was further reduced. The final number of temperature sensors is 11.

On Leg 132, the ONDO system was successfully deployed in Hole 808E on 11 June. The tool passed through the pipe, landed on the landing sub, and was released with the electric release system. After pulling up the drill pipe, a test of acoustic telemetry was conducted with all the thrusters of the ship shut down, but no data were obtained probably because of the high level of ship's noise.

First data retrieval will be attempted at the end of July 1990 and the results will be reported at the next DMP meeting.

[ACTION: NAGAO/YAMANO]

Budget Status

Golovchenko reviewed the FY91 budget highlights that relate to downhole measurements. Featured items were:

High-temperature logging tools; double-dewaring of the ARCO resistivity tool and development of thermal protection for sonic and gamma-ray tools.	$180 000
Computer equipment	$ 30 000
DMT (WBK) digital televiewers (N.B. existing BHTVs to be retained as back-up)	$ 82 600
Additional personnel (i) to handle increased requests for logging data, (ii) data processer (iii) part-time computer programmer, (iv) half-time TAMU technician for FMS processing.	$ 60 000
Conoco consortium (MWD and wireline tools)	$ 30 000

Schlumberger
- 4.5% increase in the daily charge
- purchase of wireline cable
  (N.B. the Schlumberger MAXIS 500 recording system is to be acquired for ODP use)

8. Workshop on Log Data Quality

The ODP workshop on log data quality was held in Washington DC on 13-14 April 1989. Fisher and Golovchenko reported on progress made towards fulfilling each of those recommendations which relate to TAMU and LDGO.

Recommendation (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.

Progress

During the Indian Ocean programme, logging plans were incorporated very late because the programme itself changed at the last minute due to late site-survey results or permit requirements. Beginning

with WPAC, the logging plans were formulated at a very early stage in the programme and were an integral part of the programme from that point. With Central and Eastern Pacific, the logging plans are still being integrated into the programme at the early planning stage, but only two years ahead of cruise dates as opposed to three years for WPAC.

Recommendation (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 programme.

Progress

JOIDES logging scientists are identified as early as is possible, at the same time that the rest of the scientific party for a particular leg is chosen. The job is completed by the ODP Manager of Science Operations with the assistance and advice of the Borehole Group Chief Scientist, Co-chiefs and the TAMU Staff Scientist. There has been some difficulty in finding JOIDES logging scientists in the past, but increased education of the community, largely through Logging Schools offered at major meetings, has helped to increase interest in the position. Once a scientist accepts the position of JOIDES logging scientist, it is up to that scientist to make arrangements to attend a training session at the LDGO BRG facility.

Recommendation (5)

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

Progress

A specific job description for the JOIDES logging scientist was written at the Sept. 1989 meeting of the DMP. This job description will be used to advertise the position in the JOIDES Journal and will be sent to prospective logging scientists.

Recommendation (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.

Progress

Every effort is made to train thoroughly the Lamont logging scientist in Masscomp maintenance and minor repairs during his or her pre-cruise training. However, more complex problems with the system require the aid of TAMU personnel familiar with Masscomp hardware. Occasionally, they, too, cannot resolve the problem (usually because of the lack of parts), and the equipment must be sent back to Lamont for repair. The JOIDES logging scientist receives pre-cruise training at Lamont on the use of Terralog, the log analysis program used on the ship. Prior to the first logging operation, the JOIDES logging scientist is encouraged to spend time practising data analysis using existing data sets to that he or she is fully proficient when the first logs of the leg become available.

Recommendation (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 programme.

Progress

The Lamont logging scientist, often in conjunction with the JOIDES logging scientist, presents an overview of the logging programme and the type of interpretation possible from each log. This has been done routinely on every leg since Leg 120.

Recommendation (8)

Adequate time for hole conditioning should be included in all leg schedules.

Progress

Time estimates for logging routinely provide time for one or more "wiper trips". It is difficult to estimate the actual time necessary for conditioning a particular hole until after drilling is complete and conditions are known.

Recommendation (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.

Progress

Development of the new SES is completed and it has been delivered to TAMU.

Recommendation (10)

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

Progress

It would actually be a major mistake to deploy the SES in all cases of poor hole conditions. The SES is best used in cases where there are small bridges which can be punched through relatively easily. In instances where large sections of the hole are swelling and grabbing the drillpipe, the SES has been a hindrance because it has prevented quick removal of logging tools from the string so that the string can be rotated. In addition, deployment of the present SES prevents use of the Kinley crimper and cutter and may thus result in the loss of logging tools. The decision to use or not the SES is left to the Operations Superintendent, Co-chiefs and logging scientists (JOIDES and LDGO) in consultation.

Recommendation (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.

Progress

The initial stages of time planning typically take place at the pre-cruise meeting, with the Co-chiefs, LDGO representative and Staff Scientist in attendance. The time dedicated to conducting downhole measurements should be based on the scientific priorities of the cruise. It is the job of the LDGO representative to inform those present at the meeting of the options available and the time required for each. As demonstrated on Leg 131, drilling a dedicated hole provides no more of a guarantee of logging success than does use of the SES.

Recommendation (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.

Progress

The WHC is now maintained by a time-shared SEDCO mechanic.

Recommendation (13)

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

Progress

There is a fixed number of berths available on the Resolution for scientific and technical staff. It is up to the Co-chiefs and the Manager of Science Operations to determine how those berths are to be divided. The inclusion of an additional logging technician requires the elimination of either another technician or another scientist. This recommendation can be partly accommodated by occasionally sailing an LDGO electronics technician.

Recommendation (14)

The degradation of the 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.

Progress

Where high quality neutron porosity and sonic data are considered a priority, separate eccentered and centered tool combinations are run. However, time constraints often preclude an additional logging run and, in these cases, the data must be reprocessed to obtain satisfactory sonic and neutron porosity logs.

Recommendation (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.

Progress

Standardization of logging and core data displays is now being considered by DMP, SMP and IHP. Schlumberger has installed a new, faster CSU system. Currently, a copy of the logs is available at the end of each logging run. During the summer of 1991, an interactive data acquisition/processing system will be installed on the ship by Schlumberger. This system will help in getting the processed logs out to the shipboard party while logging operations are still underway.

Recommendation (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.

Progress

The SMP is now considering which additions to the whole-core multisensor track (MST) are most desirable and how these might be incorporated. The SMP is also considering the addition of a split-core system. It is not clear if a natural gamma system is compatible with the MST or if it will require a separate machine/room.

Recommendation (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.

Progress

The computerization of barrel sheets is now under development, along with real-time merging of MST data. Merging these datasets with logs will require additional time. The biggest problem is correlating logs with cores in cases of low core recovery.

Recommendation (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.

Progress

A directory of available software is now made available at the start of each cruise.

Recommendation (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.

Progress

The LDGO BRG has approached Schlumberger to provide tool response characteristics. LDGO has been promised their full cooperation in obtaining this information on an as-needed basis. The LDGO BRG,

using the information provided in the raw field tapes, could determine some of the characteristics, but time constraints and a personnel shortage prevent this endeavour from being undertaken.

The Chairman thanked Fisher and Golovchenko for their comprehensive report. Ongoing items would be revisited at a future date.

9. High-Temperature Technology

(i) High-temperature logging technology in member countries

United Kingdom

The Chairman reported that the Hot Dry Rock Project at the Camborne School of Mines anticipated temperatures of around 200°C. The logging tools being deployed do not therefore approach the 350°C ratings that are being sought in ODP. There are no other high-temperature initiatives in the UK although the BRIDGE programme might have a logging requirement at some future date.

France

Foucher reported that the high-temperature thermal probe, an adaption of that which has previously been used in 504B, is rated to 500°C. A proposal is being submitted (to JOI) to supply the probe to ODP.

FRG

Villinger had nothing to add to the review provided by Kessels (KTB) at the last DMP meeting.

Japan

Nagao reported that high-temperature logging tools are mainly developed by JAPEX (Japan Petroleum Exploration Co.) which is 50% owned by the government. In the past, JAPEX tools have not been available to ODP. However, there has recently been a change of policy and JAPEX tools may now be made available for upcoming ODP legs.

A super-high-temperature geothermal well logging system was developed in 1985. This system, which is rated to 450°C, includes temperature, pressure and spinner tools as well as sonic, laterolog and borehole fluid sampler. All tools are slimhole. They are not combination tools and must therefore be run separately.

Recently JAPEX has been engaged upon developing the following combination tools.

1. PTS (Pressure, Temperature, and Spinner) combination tool.

Maximum operating temperature	300°C
Maximum operating pressure	700kg/cm^2
Outer diameter of sonde	62mm
Overall Length	2950mm
Weight	40.0kg
Wire line	7 conductors
Standard logging speed	20m/min
Maximum operating time	8 hours at 300°C
Recording	Digital

JAPEX has three sets of PTS tools. They believe that there would be no problem in using them in ODP in FY92. If the appropriate (300°C) on-board Schlumberger cable is available, they can be used at very low cost.

It is believed that a U.S. company (SDI) also has a 300°C PTS tool.

2. PTF (Pressure, Temperature, and Flow rate) combination tool.

Maximum operating temperature	375°C
Maximum operating pressure	350kg/cm^2
Outer diameter of sonde	43mm and 56mm
Overall Length	4000mm
Wire line	1 conductor
Maximum operating time (40mm)	4 hours at 375°C
Maximum operating time (56mm)	8 hours at 375°C
Recording	Digital

JAPEX is now developing this 375°C PTF tool. They also believe that there would be no problem in using it in ODP in FY92. A rental charge for this tool is about US$ 4000 per month including a retrieving (on-board) unit and two sondes.

3. Geophone tools

Maximum operating temperature	260°C
Maximum operating pressure	350kg/cm^2
Outer diameter of sonde	100mm
Maximum operating time	8 hours at 260°C

JAPEX is currently developing an unlimited-operating-time type geophone tool: it can be available in FY91.

4. Open Hole Logging Tool

The following tools are available as of today. The maximum operating temperature is 260°C.

Dual laterolog
Borehole compensated (BHC) sonic log
Gamma-ray spectral log
Formation density compensated (FDC) log
Neutron log (NL)

5. Borehole Televiewer (BHTV)

Maximum operating temperature	230°C, unlimited
Recording	analog

6. Packer

JAPEX is developing an open hole packer system which can be used up to 260°C.

7. Cable

The following cables are available.

Temperature up to 300°C	Teflon cable
Temperature up to 500°C	Mineral-insulated cable

The Chairman welcomed Nagao's report. The revelation that JAPEX tools/cables might become available to ODP was an exciting one, and it could change the entire scenario for high-temperature logging in ODP. The Chairman thanked Nagao for conveying such a promising message.

(ii) <u>High-temperature logging technology in the USA</u>

Lysne identified three areas of activity, national laboratories, logging service companies and combined scientific programmes.

Prior to 1983, Los Alamos built high-temperature tools for their Hot Dry Rock Project, and Sandia evaluated the components. These tools were rated to 300°C but were of large diameter.

Post 1983, the Continental Scientific Drilling Program (CSDP) has pursued diamond core drilling with core recovery in excess of 95%. Temperature and fluid sampling tools that are compatible with this system have been deployed. There have also been interactions with the geothermal industry, e.g. for the development of a high-temperature BHTV.

In 1990. as a demonstration to ODP, the VC-2B exercise was carried out. This involved the deployment of active and memory temperature tools (Sandia), and the Los Alamos and Lawrence Berkeley fluid samplers. There have subsequently been moves towards a TAMU/Sandia corporate research agreement for the development of high-temperature tools.

Future Sandia activity is intended to encompass the development of multi-megabyte memory systems, MWD memory tools, collaborative geothermal logging, and interactions with ODP. Sandia's existing CSDP technology is available to ODP, e.g. through the loan of a temperature tool. New CSDP tools and technology would require a formal agreement before transfer.

In terms of logging companies, Lysne is working with Eddie Howell (UNOCAL) to test the HLS hostile environment logging (HEL) system in UNOCAL wells. Tool diameters are 2.75 inches.

(iii) Future Strategy

ODP priorities are for downhole measurements of temperature, pressure, formation resistivity and fluid resistivity, the latter by means of a water sampler. The deadline for this technology to become available is June 1991 for the Sedimented Ridges leg (138). This leg will use conventional drilling, so cooling by circulation might be feasible.

Options are:

(a) JAPEX suite
(b) HEL tools
(c) Sandia temperature tool & slimhole water sampler
(d) double-dewared ARCO tools (resistivity)

Options (b) - (d) are being pursued, although activity on option (c) has been slowed by the need to trawl the ODP community. A subcommittee comprising Worthington, Lysne and Sondergeld was charged with monitoring progress. Option (a) needs action, and Panel formulated the following recommendation.

DMP Recommendation 90/11

"JAPEX should be approached by ODP to establish the availability of (super) high-temperature logging tools and cables. A report on the visit should be provided to the DMP high-temperature subcommittee."

Pyle informed the Panel that he was scheduled to visit Japan in mid-July 1990. He would undertake to investigate how ODP might pursue the Japanese offer of tools/cable.

He would report back to the DMP subcommitte and also to TAMU via Fisher.

[ACTION: PYLE]

The Chairman offered to provide Pyle with appropriate technical briefing papers prior to his departure.

[ACTION: WORTHINGTON]

10. Planning

Fisher provided a summary of the scheduling and scientific/engineering objectives for Legs 132 - 139 (Annexure III). Jarrard reviewed the logging programmes, most of which are essentially as previously recommended by DMP. Specific points of interest are emphasized.

Leg 132: Engineering

The second engineering leg has as its primary objective the testing of the DCS, which is expected to be deployed selectively on Legs 139 et seq.

Leg 133: NE Australia

The new (strengthened) SES will be available. The wireline packer is to be used to sample fluids in reef carbonates.

Leg 134: Vanuatu

The German digital televiewer is to be deployed. This leg sees the first use in ODP of the Schlumberger et al. sediment magnetometer. Shipboard FMS processing should be available for the first time.

Leg 135: Lau Basin

No pre-cruise meeting has been held because two sites were rejected on safety grounds. Standard logs are scheduled for all loggable sites. In addition, FMS, wireline packer, BHTV and magnetic susceptibility are scheduled at all these sites except LG3. The University of Washington magnetometer is not functional: if available, the German (BGR) magnetometer would be ideal for this leg. Villinger will approach Bosum to ask if this magnetometer can be deployed during Leg 135 instead of at 504B.

[ACTION: VILLINGER]

Leg 136a: Seismometer Test Hole, Oahu

Panel reviewed the logs that should be run in this hole. These are:

BHTV	(to see how and to what the seismometers are clamped)
Sonic/Density	(for seismic characterisation)
VSP	(if sonic log poor)

Oblique Seismic Experiment (OSE) using another ship on a re-visit.

DMP Recommendation 90/12

"The Oahu test hole of Leg 136 should be logged in open hole for sonic, density and BHTV. VSP using the Well Seismic Tool should be discretionary according to the quality of the sonic log. An oblique seismic experiment should be carried out on a re-visit to the site."

An instrumented borehole seal is being developed for deployment during the Sedimented Ridges leg (138). Keir Becker has pointed out by letter that the Oahu test hole provides an ideal, and possibly the only, window for testing. This would require modifications to the re-entry cone for the test hole. The sealing mechanism could then be tested during a 12-day period on site. Panel understood that there would be very little risk to the hole.

DMP Recommendation 90/13

"The instrumented borehole seal should be tested at the Oahu test site during Leg 136. This work is to be assigned a higher priority than VSP at this site."

Leg 136b: 504B

The initial downhole measurements at 504B comprise temperature logging and fluid sampling (using Sandia or equivalent technology). It is proposed to measure permeability by deploying a flowmeter with the drillstring packer.

Leg 137: Eastern Equatorial Pacific

The original DMP proposals included provision for stress measurements. These are not part of the final schedule. The leg would benefit enormously from downhole reversal magnetometry but there are doubts that the sedimentation rate and/or magnetisation would be sufficiently high.

Leg 138: Sedimented Ridges I

This has evolved into two legs. Leg I is to be drilled with full-size holes: Leg II will use the DCS. Hole cooling may be an option for Leg 138 provided that there is no active upwelling. Leg 138 is the highest priority for high-temperature fluid-sampling and downhole measurement of temperature.

In terms of the earlier DMP logging recommendations, no induced polarisation tool has been identified and no proponent for VSP has come forward. Flowmeter permeability would be useful here. Hole sealing is planned. A high-temperature cable will be needed, probably teflon with a 300°C rating. This cable rating suggests that some form of hole cooling will be essential if the temperature estimates of 350°C turn out to be correct. However, hole cooling can introduce hole stability problems.

The Leg 138 pre-cruise meeting would benefit from the presence of a high-temperature logging specialist in addition to the LDGO logging scientist. Chairman will write to Co-chiefs Earl Davis and Mike Mottl with the proposal that Lysne attends.

[ACTION: WORTHINGTON]

Legs 139 et seq.

Logging programmes will be discussed at the next DMP meeting. In particular, there is a need to learn from Nankai to prevent a recurrence at Cascadia. It was noted that the detailed fluid sampling proposed for Cascadia is likely to be prohibitive in terms of time.

11. COSOD I Objectives

No report available on the extent to which downhole measurements have helped COSOD I objectives to be met. Deferred to next meeting.

[ACTION: LDGO LIAISON]

12. Lithosphere Characterisation

This is to be progressed as a working group. Basement objectives are to be addressed initially. There may be some commonality with the RIDGE programme. It was encouraging to note that LITHP had ranked this proposal even though it had not yet been formally drafted. An international group of proponents is to be drawn together over the next few months.

[ACTION: WORTHINGTON, MORIN]

13. Next Meetings

The next DMP meeting is scheduled for 12-13 October 1990 in Townsville, Queensland, Australia. Key agenda items will be later CEPAC planning, the status of high-temperature logging developments, and the role of downhole measurements in contributing to scientific objectives. The meeting will be preceded by a joint meeting with SMP on 11 October 1990. The principal objective is to review and adopt the recommendations of the inter-panel working group on user requirements for the shipboard integration of core and log data (this group is due to meet on 29-30 August 1990). A ship tour is scheduled as part of the meeting.

The January 1991 meeting of DMP is tentatively scheduled for College Station so that discussions can be held with systems engineers on progress towards implementing the user requirements for the shipboard integration of core and log data, as adopted by the DMP/SMP joint meeting in October 1990.

The May 1991 meeting of DMP is proposed to encompass a joint meeting with a thematic panel. Mienert proposed that a joint meeting with SGPP would be highly topical and that the May schedule would be mutually convenient. Mienert is to raise this question with the SGPP Chairman.

[ACTION: MIENERT]

14. Liaison from TECP

In view of the high degree of commonality of DMP and TECP objectives, especially with regard to current drilling goals, a liaison from TECP to DMP would be highly beneficial.

DMP Recommendation 90/14

"A TECP liaison should be appointed to DMP."

15. Detailed Planning Groups

Without considered advice from LDGO and/or DMP, there is a renewed risk that the time needed for effective logging surveys will be underestimated at the planning stage.

DMP Recommendation 90/15

"A representative of LDGO and/or DMP should be present at DPG meetings to provide input on the nature and scheduling of downhole measurements."

16. Thematic Publications

The thematic issue of JGR, in which ODP downhole measurements are featured, is due to be published imminently.

Nagao informed the Panel that the review paper "Scientific applications of downhole measurements in the ocean basins" written by the Chairman and others, and originally published in the journal Basin Research, has been translated into Japanese and is to be re-published in a Japanese earth science journal for dissemination within the Japanese scientific community.

17. Fifth Annual Co-chief Scientists' Review Workshop

The Chairman drew attention to a recommendation from the above workshop:

"DMP should better scientifically justify their logging recommendations and get them into the planning process earlier so that their recommendations can be acted upon by PCOM at the time PCOM initially plans a cruise."

After some discussion, Panel concluded that this recommendation referred back to the Indian Ocean days when everything had to be planned on a short-fuse due to enforced changes in the ship's schedule.

With WPAC and CEPAC, DMP has been 2-3 years ahead of the cruises in its planning. Ninety per cent of all logging is standard and its scientific justification is implicit in the PCOM ruling to log holes greater than 400m in depth. If better scientific justification is needed for non-standard logging, it will hopefully be achieved through DMP Recommendation 90/15 (Agenda Item 15).

18. **Close of Meeting**

The Chairman thanked Members, Liaisons and Guests for their contributions to the meeting, the School of Oceanography of the University of Washington for their kind hospitality, and Dr D Cowan for his gracious hosting. The meeting closed at 2.50pm on Friday 29 June 1990.

PAUL F WORTHINGTON
6 July 1990

REPORT ON MEETING OF JOIDES TECHNOLOGY AND ENGINEERING DEVELOPMENT COMMITTEE

Salt Lake City
Utah

14 - 15 February 1990

1. Preamble

This meeting was attended in the capacity of liaison from the JOIDES Downhole Measurements Panel (DMP) to the JOIDES Technology and Engineering Development Committee (TEDCOM). Key aspects of the agenda were the evolution of the Diamond Coring System (DCS), scheduled for deployment on the EPR in early 1991, and the TEDCOM position as regards the ODP long range plan, particularly in connection with very deep drilling. These notes highlight those aspects of the meeting which have implications for the downhole measurements programme of ODP.

2. Operations Summary, Legs 126 - 129

Harding (ODP/TAMU) reported that the last four legs have been costly (lost drillpipe, BHAs, TV cameras, etc). Leg 126 provided the deepest penetration of any ODP drillhole to date. The sonic core monitor was run twelve times during Legs 127 and 128 with encouraging results. It has subsequently been modified and is now back out at sea on Leg 130. The sonic core monitor would allow partially recovered core to be assigned to its true position within the barrel. As such, it could make an important contribution to the effective integration of core and log data.

3. Status Report on Engineering Projects

Storms (ODP/TAMU) reported that the TAM straddle packer now resides within ODP's domain of reponsibility. A complete operations manual is being written. New operations manuals for the TAM drilling packer have been sent to the ship for first use on Leg 129.

The Navidrill has been renamed "Motor-driven core barrel" (MDCB). A third generation tool is targeted with residual engineering problems resolved. e.g. there is a need for an indication of the extent of penetration beyond the bit face, which at present is unknown.

A new side-entry-sub (SES) is being developed with capability for much larger loads, for putting both logging tool and cable through the side entry port, and for more efficient rigging up and down. The new SES was originally intended to be deployed on the Nankai Leg but this deadline will not now be met.

The pressure core sampler is being modified prior to deployment in Nankai. An external proposal is being progressed for a laboratory pressure chamber which would allow recovered core to be studied under in-situ conditions.

4. Unconsolidated Cohesionless Sediments

Stow (SGPP) emphasized the scientific need for full recovery of these sediments as opposed to the partial recovery (<50%) which has been the case at several sites. These sands are cased out and are therefore not fully logged. A promising venture is the vibra-percussive coring (VPC) project, contracted to Novatek, Salt Lake City, which is at the prototype stage.

5. Diamond Coring System (DCS)

Howard (ODP/TAMU) reported that the DCS phase II with a drilling capability of 4500 m water depth is advancing strongly. Hole size is 3.96 inches: core size is 2.2 inches. The DCS test rig is to be visited as part of this meeting. The technology cannnot yet be regarded as proven for drilling and core recovery in very hot environments such as on the EPR and at sedimented ridge crests.

Storms (ODP/TAMU) reported that the second engineering leg is dedicated to shipboard testing of the DCS: no other tools are to be tested. Three drillsites are scheduled: Eng-5 (Bonin), Eng-6 (Shatsky Rise), Eng-7 (M.I.T. Guyot). Aims are to evaluate the DCS in water depths from 1000 - 3000 m in three distinct geological environments: bare/fractured crystalline rock, interbedded chalk/chert, and atoll/guyot carbonates.

The current DCS platform concept is expected to be operated for 2 - 3 years. Thereafter, it is anticipated that the platform will be removed in favour of a system with riser tensioners, which would be more efficient. The DCS will only be deployed where conventional drilling practices cannot satisfy scientific requirements.

6. Very Deep Drilling Objectives

Natland (PCOM), representing LITHP interests, reported that COSOD II had identified full crustal penetration by the year 2000 as a priority target. The JOI-USSAC Deep Drilling Workshop held in 1989 suggested that this objective cannnot realistically be achieved before 2005.

For this deep penetration, the crust must be of moderate age (20 - 50 Ma), depth and temperature. We would need a longer drillstring (9.5 km by 1998, 11.5 km by 2003), longer logging cables, slimhole logging tools, and smaller diameter fluid samplers.

If all this is to be feasible, we urgently need 6 km - hole feasibility studies. For example, logging tool modifications should begin now: a post-performance evaluation of existing logs should be

progressed as a guide to future tool developments. These studies would require 2 - 3 meetings to deal with overall performance evaluation. A report should subsequently be prepared for publication.

7. Long-Term Planning of Technological Developments

Sawyer (TECP) reported that TECP do not have a specific goal as regards deep drilling. TECP has identified, inter alia, the following technology needs:-

- collection of undisturbed, oriented core;
- packers for in-situ pressure measurement, flow testing and fluid sampling;
- instrumentation for long-term monitoring of temperature, fluid flow and seismicity;
- improved in-situ stress and strain measurement.

In particular, an increased use of the borehole televiewer, possibly in conjunction with packer-hydrofracture programmes, was advocated.

Normark (SGPP) stated that SGPP had not formulated a policy on needs from deep holes. In general, it is important that needs are not merely identified but placed in order of priority. SGPP sees the sand recovery problem as its highest priority.

TEDCOM concluded that LITHP, TECP and SGPP liaisons should attend TEDCOM meetings on a regular basis.

8. Update on High-Temperature Downhole Measurements

Worthington (DMP) reported that the operating ranges of commercially available tools did not encompass the estimated temperatures in boreholes at EPR and sedimented ridges, i.e. 350°C. Even if they did, the (wireline) cable is limited to 300°C, although special cables such as MgO have higher ratings. Other options are to cool the hole and/or to cut thermally damaged cable after each deployment, logging downwards. EPR and sedimented ridge "hot" holes are scheduled to be drilled with the DCS. It may be necessary to drill/ream a larger diameter hole at each DCS site for logging and/or cooling. If the scientific needs for downhole measurements at EPR and sedimented ridges are to be met, remedial technology must be developed. Options are simple analogue tools (no downhole electronics but need for a cable), dewared tools (cable also required), or memory tools (no cable).

A two-level future strategy is being pursued. In the short term (1 - 2 years) it is proposd to address those objectives identified by LITHP which might be achieved using existing technology. These are

temperature and pressure (a modified version of the Sandia slimhole memory tool rated to 400°C), formation resistivity (dewared slimhole tool but restricted to 300°C because of cable limitations), and fluid resistivity (at present under evaluation). It is also proposed to address a principal requirement of the Sedimented Ridges DPG for a high-temperature fluid sampler. In the long term (5 - 10 years) memory tools for natural gamma radioactivity, formation resistivity, seismic velocity, caliper and flowmeter studies will all be required with temperature ratings in excess of 350°C. The most promising avenue towards funding is through interprogramme collaboration. This is currently being explored.

In conclusion, a scientific requirement for a high-temperature logging capability in sub-ocean studies is inevitable, although the diametral constraints on logging tools will not become fully clear until the DCS is proven and the reaming option has been evaluated. The short-term target capability of slimhole temperature, pressure, resistivity and fluid-sampling tools is inadequate to meet scientific needs. Attainment of a useful long-term high-temperature downhole-measurements capability depends on the availability of co-mingled funds. An international task force is needed to bring this initiative to fruition in the long term.

9. Next TEDCOM Meeting

Target date is September 1990; suggested venue is College Station.

Paul F Worthington

19 February 1990

SYNTHESIZED MESSAGES FROM NANKAI

JOIDES Downhole Measurements Panel

There are two key issues, drilling technology and tool performance.

Drilling Technology

Hole instability or hole closure is a serious obstacle to successful downhole measurements in accretionary prisms and ODP has not so far dealt with the problem satisfactorily. Problems of hole instability have previously been encountered on Leg 110 (Barbados).

On Leg 131, hole closure was the main cause of the inability to conduct the logging and downhole measurements programme and this is shown by the fact that only 200 meters of open hole could be logged. Clearly, it would be unreasonable to plan the Cascadia legs unless a new strategy to drill loggable holes in accretionary prisms is put forward. Suitable methods should be studied and tested in advance. This point is essential and is a first lesson. Possible causes of hole closure on Leg 131 included clay swelling (role of ash layers?), formation overpressure, and large compressive or shear stresses. The use of a heavy mud and the deployment of casing by steps in the hole at different times of drilling were two suggested solutions.

Some thought should be given to the problem of drilling for core recovery and drilling for logging purposes. In the former, geochemists are concerned about potential contamination of the cores with drilling mud and the potential bias that this may cause in the pore water chemistry. In the latter, one would want to use drilling mud as soon as possible. Although, of course, less territory will be covered by drilling two separate holes next to each other, the time has come to substitute quantity with quality. If only we had been successful in Nankai with the second hole (i.e, the logging hole), we would have had the ideal solution. The Engineering Advisory Group should consider this problem. They may suggest ways to optimize both objectives.

Tool Performance

Packer Experiments

Packer measurements were intended to provide information on pore fluid pressure and bulk permeability within the accretionary complex. We elected to make use of the TAM Rotable Packer (TRP) rather than the proven TAM Straddle Packer (TSP) because (1) setting the TSP charges the isolated zone with a pulse of pressurized fluid which would have jeopardized our ability to measure formation pressure, and (2) we intended to set the packer several times in open hole and were concerned that the TSP would be endangered should the hole become unstable. The TRP had recently been modified to use a "no-pulse" go-devil which would not disturb the isolated zone below the element during setting operations. Unlike the TSP, however, the TRP requires that the seals on the go-devil remain intact throughout the experiment in order for pressure to be maintained in the inflation element.

Excessive vibration of the pipe, due to the Kuroshio Current, caused the four go-devil seals to be damaged and stripped away during the time that the go-devil was falling down the drill pipe. In addition, collapse of a significant portion of the open section of the hole below the casing shoe apparently displaced mud upwards into the packer element, eventually clogging the ports and preventing later deflation and inflation attempts. A partial set was achieved on the first inflation attempt, during which the packer supported approximately 15,000 lbs of weight, but the element would not continue to support weight once the zone below the packer was opened for testing.

A successful measurement of bulk permeability might have been completed using the TSP with a single set in the cased section of the hole, as this tool does not require a perfect go-devil seal in order to maintain pressure in the element. There would still have been ambiguity as to the fluid compressibility within, and size of, the test interval as it would not have been possible to clean out or even venture into much of the open hole with the TSP in the string. In the light of our experiences with the TRP on Leg 131, the design of the no-pulse go-devil is being reconsidered by ODP engineering.

Sediment Temperature, Pressure and Pore Fluid Sampling

The WSTP tool was deployed 12 times to measure temperatures and pressures and collect pore fluids. New recording packages were modified onboard the Resolution to collect temperature and pressure data at a high frequency. These packages proved to be unreliable, particularly for recording pore-pressure data, with a success rate of approximately 50%. In addition, a data distortion was introduced into temperature records during transfer of data between the new recording packages and the PC clone in the downhole tools laboratory, making data analysis difficult. All the recorders have now been returned to ODP for testing and modification to handle higher temperatures in anticipation of Leg 138 at the Juan de Fuca Ridge.

Screws and connectors backed off during WSTP tool deployments due to vibration of the drillstring. This problem eventually led to tool flooding and the loss of two electronics packages. The actual location of the leak(s) is still not known, but they may be in the front bulkhead or in the end of the core barrel that serves as a pressure case for the WSTP tool. An empty case will be tested at sea during Leg 132 to locate the leak, which will be fixed before additional recorders are risked.

The WSTP tool failed to obtain useful water samples during Leg 131, though not due to any failure in the operation of the tool itself. In several instances the tool was returned with borehole fluid rather than formation fluid, probably because the tool was seated in fill at the bottom of the hole or cracked the formation during insertion. In other instances the tool returned without a fluid sample, apparently because of the low fluid content and low permeability of the formation. The ODP is machining a modified filter block, which will be longer and somewhat narrower, to improve WSTP fluid sampling capabilities. The tools will also be fitted with titanium tubing, filters and components for use in high-temperature, corrosive environments. The complete WSTP tools will be returned to ODP following Leg 134 or 135 so that modifications and testing can be completed under controlled conditions.

General

Although we expected less that 100% success in logging efforts during Leg 131, the euphoria about the very nice sediment recovery (as well as good pore water samples) was somewhat tempered by the less than satisfactory logging programme. Somehow we did quite well and with a better drilling technology we might also have obtained good logs. Perhaps it is not too late to think of Nankai-2. One could go back to Site 808 and carry out a good logging effort, drill a reference site and describe this interesting accretionary complex well and properly. If so, we should use appropriate drilling technology and tools that are of proven reliability in these difficult environments.

Collated by
PAUL F WORTHINGTON
13 July 1990

Leg 132
Engineering II
June 7 - August 5, 1990

The overall objective of a second engineering test leg will be to test newly developed tools and techniques necessary to attain the immediate program objectives in the central and eastern Pacific. The required engineering capabilities have been clearly defined by the Planning Committee as (a) the penetration and recovery of alternating layers of hard and soft material, such as chert and chalk sequences; (b) penetration and recovery of young, fractured crustal rocks; (c) recovery of unconsolidated sediments, such as shallow-water carbonates or sandy turbidites; and (d) coring and logging in hot, corrosive hydrothermal environments.

The highest priorities will be the testing of tools to penetrate and increase recovery in the chert/chalk sequences on Shatsky Rise, the Cretaceous reef corals at M.I.T. Guyot, and the young, fractured basalts in the Marianas spreading center. Because of the importance of these tests in attaining future high priority objectives, and because of the long transit times involved, this cruise is scheduled as a full length leg of eight weeks at sea.

Leg 133
Northeast Australian Margin
August 10 - October 11, 1990

Co-chiefs: Judy McKenzie (Swit.) and Peter Davies (Aust.)

The primary objective of drilling on the northeast Australian margin and Queensland Trough/Queensland Plateau is to examine the sedimentary response to global sea-level changes of the late Cenozoic. The northeast Australian margin provides an opportunity for such a study in a mixed reefal carbonate/siliciclastic shelf sediment regime. During periods of lowered sea-level, deltaic progradation occurred at the shelf edge accompanied by fan deposition on the middle and lower slope. These sedimentary sequences are well imaged seismically, and drilling will provide the detailed stratigraphy necessary for interpretation of the sedimentary facies. Sites on the upper slope above the hinge line of tectonic subsidence will provide a strong signal of sea-level history. Sites on the lower slope and in the Queensland Trough will provide the relationship between the sea-level signal and seismic sequences and the change from slope to basin environment.

Leg 134
Vanuatu Region
October 16 - December 17, 1990
Gary Greene (USA) and Jean-Yves Collot (France)

A scientific theme of major tectonic interest is the nature of collision at plate boundaries where a continent, a large seamount, or other feature thicker than normal oceanic crust cannot be subducted at a trench. The principal objectives of the drilling on Leg 133 include the study of the processes involved in the collision of an aseismic ridge and a guyot with an island arc including the collision itself, backarc rifting, reversal of subduction direction and the formation of intra-arc basins. In the Vanuatu region these wide-ranging objectives can be investigated within a relatively small area.

Six sites are scheduled for drilling during this cruise. Site DEZ-1 will provide a reference section of rocks of the D'Entrecasteaux Ridge. Site DEZ-2 will penetrate the lowermost accretionary wedge, the interplate thrust fault, and the ridge itself. This site will show if the ridge rocks have been accreted onto the arc, as well as provide the age and mechanical properties of rocks where, despite the great relief of the subducted ridge, the collision has caused little forearc deformation. Sites DEZ-4 and DEZ-5 are located where a guyot has collided with the arc, causing considerable forearc deformation. Site IAB-1, in the center of Aoba Basin, and IAB-2a (or b), along the basin's eastern flank, are located where sediments, including volcaniclastics and their unconformities, will give a record of the late Cenozoic tectonic and magmatic evolution of the arc.

Leg 135
Lau Basin
December 20, 1990 - February 18, 1991
Jim Hawkins (USA) and Lindsay Parsons (UK)

The Lau Basin was the first backarc basin in which active seafloor spreading was documented nearly 20 years ago. It is one of the best developed regions of backarc spreading in the world. A drilling transect of six sites across the active region of spreading and into the forearc of the Tonga Trench will provide the opportunity to investigate processes of crustal generation. These processes include changes in composition of both basement basalt and overlying sediments during opening of the basin, and the relationship of each to the basin's tectonic history; the time-transgressive character of basin opening and its relationship to magmatic evolution and vertical tectonic history of the adjacent arc; and the geochemically distinctive and widespread volcanism which forms the basement of the oceanic island arcs.

Leg 136
Oahu Hole and Engineering 3A (Hole 504B)
Oahu Hole: March 4 - March 18, 1991
Engineering 3A: March 18 - April 21, 1991

Co-Chief Scientists: To be named

This cruise is divided into two parts. The first part will drill a hole on the Hawaiian arch 270 km northeast of Oahu, Hawaii, as a site for ocean seismic network (OSN) pilot experiments. A broad-band seismometer, to allow remote sensing of the physical properties of Earth's deep interior, will be emplaced in this hole at a later date. This seismometer will improve source location, focal mechanism, and rupture process determinations critical for studies of the depth of the seismic decoupling zone, the depth extent of outer rise events, and the rheology of the oceanic lithosphere. Near field data will improve the resolution of source mechanisms of events caused by slumping or magmatic injection. The proposed site location combines the advantages of proximity to a high-quality Global Seismic Network (GSN) station in the Kipapa tunnel with excellent logistical support available from the Hawaii Institute of Geophysics. The Oahu hole is located in approximately 4,500 m of water with a 150-200 m sediment thickness. The hole will be drilled 50-100 m into igneous basement, and will then be cased through the sediment section and down into competent basement material.

The second part of Leg 136 is dedicated to cleaning out junk left in the bottom of Hole 504B during Leg 111. Prior to these operations, two or three days of downhole experiments will be completed in Hole 504B. These experiments include temperature and permeability measurements and fluid sampling. If the fishing/milling operations to clean Hole 504B are successful, the hole will be deepened during a later leg (Leg 139?).

Leg 137
Eastern Equatorial Pacific
April 21, 1991 - June 26, 1991

Co-Chief Scientists: Dr. Larry Mayer (Dalhousie University, Halifax, NS, Canada)
Dr. Nicklas Pisias (Oregon State University, Corvallis, OR)

Leg 137 will drill two transects of sites to obtain continuous undisturbed sedimentary sections. The primary objective is to study the Late Cenozoic paleoceanography of the eastern equatorial Pacific Ocean, an important complement to the transects already drilled in the equatorial Atlantic and the Indian Ocean monsoon region. The proposed sites focus on the evolution of climates when the earth changed from an essentially non-glacial world to one dominated by extensive glaciation in the high latitudes. The sites will sample sediments under each of the major oceanographic features of the equatorial region: the North Equatorial Current, the South Equatorial Current, North Equatorial Counter Current, the Peru Current extension, the equatorial divergence, and the Costa Rica Dome. The proposed western transect, at 110°W, spans the equatorial current system where it is fully developed, but is far enough east to have relatively high sedimentation rates (1-3 cm/k.y.) and good preservation of microfossils. Circulation in the area of the eastern transect, at 90-95°W, is not as well developed and the influence of the Peru Current can still be identified. Sedimentation rates in the transect are higher (2-5 cm/k.y.) due to higher biogenic productivity and closer proximity to the continents.

Six sites are proposed for the western transect; four sites and two alternatives are proposed for the eastern transect. Plate reconstruction models that trace these sites back through time indicate that

these sites remain within present water masses if no oceanographic changes had occurred during the Neogene. Thus, these sites will provide a continuous record of the eastern tropical Pacific current systems throughout the past 8 to 10 million years.

Leg 138
Sedimented Ridges I
June 26, 1991 - September 2, 1991

Co-Chief Scientists: Dr. Earl Davis (Pacific Geoscience Centre, Sidney, BC, Canada)
Dr. Mike Mottl (Hawaii Institute of Geophysics, Honolulu, HI)

Sediment-covered spreading centers provide an unparalleled opportunity for quantitative studies of the fundamental physical and chemical processes associated with submarine hydrothermal systems. A regionally continuous, relatively impermeable sediment cover over zero-age crust limits the recharge and discharge of hydrothermal fluids, and conductively insulates the underlying crust. Where discharge of fluids does occur, very large hydrothermal sulfide deposits can be produced. The sediments may also preserve a relatively continuous stratigraphic record of magmatic, tectonic, and thermal events, providing clues to the spatial and temporal variability of these processes. The drilling program planned for sedimented ridges will provide information on all of these processes; however, it is aimed primarily at investigating hydrothermal problems. Specifically, the two highest priority objectives are (1) characterizing the fluid flow and geoche-mical fluxes within a sediment-dominated hydrothermal system in three dimensions, and (2) investigating the processes involved in the formation of sediment-hosted massive sulfide deposits.

The Sedimented Ridges Detailed Planning Group (SR-DPG) has selected the Middle Valley on the Northern Juan de Fuca Ridge and the Escanaba Trough along the Southern Gorda Ridge as the best locations to study these processes. Leg 138 will drill seven sites in the Middle Valley (MV1-MV7), where regional structure and hydrothermal characteristics are particularly simple, crustal temperatures are high, and massive sulfide deposits are present that are not in direct contact with intrusive or extrusive volcanic rocks. Extensive downhole measurements and fluid sampling programs will be carried out. A second leg, to drill sites in the Escanaba Trough, is tentatively planned for drilling at a later date.

Leg 139
Engineering 3B (East Pacific Rise) or Hole 504B
September 2 - November 6, 1991

Co-Chief Scientists: To be named

One alternative plan for Leg 139 is to conduct engineering and logging test operations at the East Pacific Rise. Specifically, the leg will be dedicated to setting a bare-rock guidebase (HRB) and establishing a drill hole for one (and possibly both) of the two prime sites planned for drilling on the East Pacific Rise. This site will be in the 9°30'N latitude region, but whether it will be located directly on the ridge axis or ~1 km off-axis awaits results of additional pre-cruise seismic data to be collected in early 1991. Additional testing of drilling and logging developments, such as further improvements to the diamond coring system and high-temperature logging and fluid sampling tools, will also be conducted. Potentially, two mini-HRBs could be deployed for DCS drilling.

Depending on the results of Leg 136, an alternative plan for Leg 139 is to drill deeper into the crust at Hole 504B. A primary objective of JOIDES and ODP is to core as deeply as possible beneath the ocean floor to constrain seismic and petrologic models of the structure and evolution of the oceanic crust. Lithologic/petrologic interpretations of oceanic Layer 3 are based on seismic profiles and ophiolite analogues. As ophiolites in many cases formed in supra-subduction settings, there is a

critical need to sample Layer 3 directly by deep drilling. Drilling at Hole 504B addresses this objective, as it represents a classic crustal profile and has significant drilling and downhole measurement efforts already invested. Hole 504B has penetrated more than twice as deep into oceanic basement as any other DSDP or ODP section and is the only hole that reaches the sheeted dikes of Layer 2C. An oblique seismic experiment during ODP Leg 111 indicates that Layer 3 gabbros probably lie a few hundred meters below the present total depth of 504B (1287.8 meters into basement), within reach of the drill bit. Therefore, the primary goal of Hole 504B drilling is to core into Layer 3 and to log continuously the newly cored section.

SUMMARY OF FY91 CRUISES

LEG	LOCATION	DEPARTS	PORT	ENDS	PORT	CO-CHIEFS
133	NE Australian Margin	8/10/90	Guam	10/11/90	Townsville	P. Davies J. McKenzie
134	Vanuatu	10/16/90	Townsville	12/17/90	Suva, Fiji	J.-Y. Collot G. Greene
135	Lau Basin	12/22/90	Suva	2/18/91	Suva	J. Hawkins L. Parson
136	Transit OSN-1 Engineering 3A	2/19/91 3/04/91 3/18/91	Suva Honolulu Honolulu	3/01/91 3/18/91 4/21/91	Honolulu Honolulu Panama	-- TBN TBN
137	East. Eq. Pacific	4/27/91	Panama	6/26/91	San Diego	L. Mayer N. Pisias
138	Sedimented Ridges I	7/01/91	San Diego	9/02/91	Victoria	E. Davis M. Mottl
139	Engineering 3B or Hole 504B	9/07/91	Victoria	11/06/91	Panama	TBN TBN