MINUTES

JOIDES Downhole Measurements Panel Meeting

College Station, Texas

14-16 January 1986

Panel Members Present	Absent
M.H. Salisbury (Chairman)	S. Bell
R.N. Anderson (ex-officio)	R. Goodman
K. Becker	G. Ohloeft
D. Georgi	F. Sayles
E. Howell	T. Timur
A. Jageler	
H. Kinoshita	Guests
J. Kopietz	
R. McDuff (PCOM liaison)	R. Carlson (TAMU)
S. O'Connell (TAMU liaison)	R. Jarrard (LDGO)
J. Pozzi	R. Kidd (TAMU)
R. Traeger	R. Merrill (TAMU)
P. Worthington	A. Meyer (TAMU)
	J. Phillips (UTA)
	J. Potter (Chevron)
	M. Storms (TAMU)
	A. Sutherland (NSF)
	E. Taylor (TAMU)
	H. Winkler (UTA)

1. Previous Minutes (June 1985)

Approved with the recommendation (Recommendation 17, Appendix 1) that the DMP Chairman forward the Minutes directly to the co-chief scientists of each upcoming leg to ensure that the Panel's recommendations are incorporated in leg planning.

2. NSF (Sutherland)

Since the last meeting, the U.K. has joined the program and the ESF, which now includes Scandinavia, has raised 80% of the funds necessary to join (Australia has been invited to join the consortium and contribute the remaining 20%). A decision by the ESF is expected in March. There is a good possibility the Soviet Union may join as well but the timing is uncertain. According to the present terms of the Memorandums of Understanding (MOU's), each country or consortium contributes $2.5M U.S. to the program, but the rate can be re-negotiated if the day rates change. Though not binding, the

MOU's also speak in terms of a ten year program.

The total FY '86 ODP budget is $32.5M ($20M from the U.S., $12.5M from the foreign partners). The NSF is providing an additional $8.85M to support U.S. scientific activities as follows:

DSDP		$2.1M
USSAC:		6.75
U.S. scientists' salaries, workshops,	3.75M	
Solicited site surveys (Falklands, Broken Ridge)	1.4	
Unsolicited proposals:		
Funded: (Indian Ocean survey, Conrad airgun upgrades, Collateral Science Workshop)	0.6	
Pending: ($2.4M submitted)	1.0	

Although the FY '86 budget is reasonably secure, the '87 budget remains uncertain because of the Graham-Ruddman (balanced budget) Bill.

3. PCOM (McDuff)

A major topic of discussion at the Hannover PCOM meeting was the $3-7M budget shortfall. This has been alleviated somewhat with the entry of the U.K. in the program but a sixth non-U.S. partner is needed to restore USSAC to its intended funding level and a seventh is needed to restore the ODP budget fully. In the interim, PCOM recommended saving money by delaying publications and cutting the number of bare rock guidebases from four to two. The Planning Committee also instructed Roger Anderson to proceed with wireline packer development but postpone the BHTV upgrades.

The second major topic was short and intermediate range planning. Leg 109 is still tentatively planned as a return to the bare rock site started on 106 but a final decision was postponed until after Leg 106 is over. The Planning Committee decided to drill the Barbados Thrust on 110 and instructed TAMU to develop drill-in casing to get past the overpressured zone. The final decision on Leg 111 (504B vs EPR barerock drilling) was also postponed until after 106. The plan for the next year is thus:

107	Mediterranean
108	N.W. Africa
109	MARK 2 (?)
110	Barbados
111	504B or EPR
112	Peru Trench
113	Weddell Sea (starting 1 January 1987)

The post-Weddell Sea drilling is beginning to shape up as follows:

Atlantic Subantarctic Paleoenvironment Transect
S.W. Indian Ocean Ridge/Fossil Ridges

Red Sea
Neogene Package
Kerguelen (starting 1 January 1988)
Broken Ridge
90E Ridge
Bengal Fan
Exmouth Plateau

The ship will then drill for an extended period (1-1/2 years) in the W. Pacific, then drill for another 1-1/2 years in the E. Pacific before returning to the Atlantic in 1991.

Finally, several panel chairmen have resigned (Arthur, Purdy) and have taken the opportunity to protest the failure of the Planning Committee to adhere to the COSOD recommendation that the ship should not be used for reconnaissance drilling but to slow down and solve problems. Their specific recommendation is to place the thematic panels over regional panels in the JOIDES hierarchy.

Question (Salisbury): What does the Lithosphere Panel recommend now that only two guidebases will be available?

Answer (McDuff): They strongly objected to the reduction in the number of guidebases. They have also postponed a decision on what to do with the second guidebase until after Leg 106.

4. TAMU (O'Connell)

In response to PCOM's instructions to TAMU to develop a means to drill through the decollement on Leg 110, the engineering group at TAMU will deploy drill-in casing, a triple casing string and under-reamers. The pressure core barrel (PCB), however, is not being worked on since no requests have been received for PCB material from Leg 110.

Discussion (Salisbury): The request by the DMP to refurbish the PCB was in response to a plea from Keith Kvenvolden to have the tool available for legs on which clathrates are anticipated. After a brief discussion, the Panel recommended (Recommendation 14) that the PCB be refurbished for possible use on Leg 112 since a strong BSR is observed on the Peru margin.

In response to a request from the DMP, a 1600 BPI tape drive has been placed on board the ship so that log analysis programs brought to the ship by participating scientists can be read on board.

With the assistance of Christina Broglia at LDGO, a set of logs has been prepared at the same scale as the barrel sheets so that the two can be published side-by-side for comparison. Even if the DMP approves of this publication format, however, TAMU will not be able to prepare the paste-ups, since LDGO has the data. LDGO will thus have to prepare them and Anderson's group is neither funded nor staffed to do this on a production basis.

Discussion: Although the Panel felt that publication of the logs at the expanded scale of the barrel sheets would aid in log (and core)

interpretation in zones of 100% recovery if the depth of both sets of data were known with precision, ship's heave and incomplete recovery will generally reduce the accuracy of log and coring depth information to the point where the format would be misleading. Accordingly, the Panel recommends (Recommendation 15) publication of the logs in Part A at a compressed scale with a bar graph on the barrel sheets to show where the logs were run and does not recommend publication of the logs parallel to and at the same vertical scale as the barrel sheets since this constitutes false accuracy.

5. LDGO (Anderson)

Schlumberger operations:

Since Schlumberger now owns SEDCO, ODP now pays Schlumberger $19M per year for combined drilling and logging services. The "standard" commercial logging equipment put on board now includes two of each of the following tools:

Nuclear combination:
NGT (K in wt. %; U, Th in ppm)
CNT-G (thermal, epithermal neutron porosity)
LDT (density, photoelectric)
GST (neutron activation: Fe, Si, Ca, S, OH, Cl, porosity)

Sonic/resistivity combination:
LSS (full wave, travel time)
DIL-SFL
GR
Caliper

Others:
LLD
Temperature (±4oC)

The fluid sampler (PFS) has been removed (it died) but VSP is available upon request. LDGO is also trying to arrange for a field test of Schlumberger's new upgraded nuclear tool, the ACT or "Advanced Clay Typing" tool on Leg 109. This is a 95 foot long NGT/CNT-G/NGT/GST/LDT combination tool with a high energy Californium source which allows wt. % Al to be determined. The first NGT tool in the string monitors background gamma radiation, the second measures that due to activation. Faciolog matrix analysis by Schlumberger, in conjunction with further interpretation at LDGO, will allow quantitative determination of K, OH, U, Th, Al and porosity and determination of the relative abundance of Fe, Ca and Si. Na and Mg are not determined. Clay typing is then done by computer assuming an 8-sided figure with standard compositional end members. Schlumberger is interested in testing the tool on the Resolution because they want to log non-hydrocarbon holes (for control) and because XRF and XRD facilities on the ship will allow the actual composition and mineralogy of the sediments to be determined for comparison with the logs. The test would be more complete if SEM grain size and shape analysis could be performed on board (estimated equipment cost: $25K). LDGO is also trying to get Schlumberger's cryogenic ERT tool for Leg 111. In

addition to the elements listed above, this will allow wt. % determination of Mg, Ni, Na, Ti, Mn, Cr and V. These are of particular interest because the Cr/V ratio is a measure of basalt fractionation and the Ni/Al ratio may be an iridium (meteorite impact) marker.

A common problem, despite PCOM's enactment of our 400 m rule, is the reluctance of the shipboard party to take the time to log. Logging now averages about 36 hr/hole, including hole preparation, trip time and two major logging runs (nuclear and sonic/electric). Furthermore, logging times will increase once the neutron activation tools are run routinely since the present tool and the ACT should be run at 500'/hr or less and the ERT should be run at 100'/hr. The problem has two causes: 1) ignorance of the value of logs, and 2) bad hole conditions often prevent logging even when an attempt is made.

To solve the second problem, LDGO is modifying the tool pusher which Symphor (IFP) developed for logging in deviated holes so that it can be used to clean the hole while logging. The complete system consists of a sidewall entry sub (plus an array of sheaves) which allows pipe to be added or subtracted from the string above the sub without cutting the cable, a tool pusher at the bottom of the string which allows the tools to be clamped in place and raised or lowered with the pipe, and a wet connect with seven slip rings to allow underwater electrical connection. In addition to regular tools, the tool pusher can be used in conjunction with a dipmeter, a sidewall corer or an RFT tool. During routine logging, a regular bit would be used instead of the tool pusher. If a bridge is encountered, the tool would simply be drawn back into the pipe and the bit used for reaming. The tool pusher would only be used for deviated holes or in hot holes where water pumped through the pusher to maintain circulation would also cool the tools. The sidewall sub will be ready for testing on Leg 108 and the whole system on Leg 111.

Another problem affecting hole quality is that ODP is required to fill all holes with mud prior to departure, including re-entry holes. ODP uses fresh water mud because it's cheap but LDGO doesn't know its composition or how it affects the logs. TAMU is holding a "mud meeting" soon, however, and LDGO will send someone to find out what's being used.

Discussion: In regard to neutron activation logging, it was noted that a pass-through tool (available in Canada for about $0.5M) would allow calibration of the logs and precise depth correlation.

The continuing indoctrination problem was also discussed and it was concluded that a review paper on the results of the logging program to date, which are quite spectacular in many cases, would partially fulfill this end. (Carlson pointed out that USSAC plans to issue an RFP for a logging synthesis.) Although several new texts (Merkel; deBrandeis; Titman; Hearst and Nelson; Schlumberger's new Geologic Applications of Well Logs) make the field more accessible, the panel recommended that LDGO prepare a manual and perhaps training tapes for ODP use, using DSDP and ODP examples (Recommendation 12). These might be subsidized by the International Human Resources Development Corporation. Alternatively, Al Jageler and Dick Merkel have been commissioned to prepare a similar manual for DOSEC; perhaps the two efforts can be combined.

Specialty Tools

LDGO has responsibility for the following four special tools:

Tool	# in Inventory
BHTV	2
12 Channel Sonic	1-1/2
Wireline Heave Compensator	1
Wireline Packer	0

In general, the special tool operation is suffering from lack of spare tools, lack of spare parts for existing tools and lack of time to run them. The status of the individual tools is as follows:

BHTV

Plans to upgrade the two Simplec BHTVs to digital operation (wave form, peak height, travel time) are on hold. A $120K contract was signed with WBK in West Germany to convert the tools over a period of three years ($40K in the first year to acquire the surface software; $40K in the second and third years to digitize the two tools), but the funds have not been released because of budget cuts. The PCOM decided instead to push development of the wireline packer since we already have a (nominal) BHTV capability.

Wireline Heave Compensator

A preliminary test of the wireline heave compensator was performed on Leg 105. On the first trials, the compensator reduced the heave amplitude by 50-75% and significantly reduced the cogging problem by reducing line tension fluctuations (without the heave compensator, the minimum logging speed is 66m/hr). Since the DBMI failed on Leg 105, a quantitative test of the tool can't be made until Leg 107 when Schlumberger will deploy a borehole accelerometer (GPSI) for the purpose. The first dramatic test will occur on Leg 109 when the BHTV will be used with the heave compensator to log pillow basalts.

Wireline Packer

Progress is being made on the wireline packer but the contract arrangements with AMOCO and the tool configuration have changed. The tool was originally planned as a wireline-deployable straddle packer with a downhole pump, four 100 ml samplers and a series of sensors (Eh, Ph, resistivity, T and five chemical sensors) which could be monitored from the surface. When the sensors indicate that the water being pumped past the sensors has reached steady state values different from seawater, the samplers will be closed on command from the surface. Each station should take about 15 minutes plus trip time. The first version of the tool will have a 4-1/2" O.D. Since this is too large to be wireline-deployed, it will have to be deployed on the string through a cone like a conventional packer. All of the components have been successfully tested except the

Jakarta valve and the wet connect. With testing planned to start this summer, the tool won't be ready until Leg 112 at the earliest.

When PCOM instructed LDGO to proceed, LDGO sent a proposal to AMOCO offering to contribute $100K per year for three years toward development costs. In exchange, ODP would be a partner in terms of licensing, AMOCO would test in at least one ODP hole and LDGO would acquire one prototype of the large tool, a set of spare parts and the designs for a miniaturized tool. The construction of the miniaturized tool, however, would require more funds later.

Although the requirement for cone deployment is not a major problem, particularly if ODP's new minicones (to be tested on Leg 108) are successful, the panel was concerned about three developments: 1) the increased cost; 2) the long delay; and 3) the fact that the tool will not be wireline-deployable. Later miniaturization of the plumbing will also be difficult, although not as difficult as it would be for an oil field tool since the filters would be less formidable.

Given these problems, the panel discussed the following alternatives.

a) RFT (Wireline Repeat Formation Tester).
By strengthening the arm of Schlumberger's RFT, it may be possible to press the doughnut sampler more firmly against the borehole wall, measure pore pressure and collect uncontaminated porewater samples.
Cost - $20K.
Problem: No guarantee, or way of telling, that the sample is uncontaminated.

b) Drill String RFT.
Same problems.

c) Straddle Packer/Sampler.
By using a wireline-powered or go-devil-triggered sampler in conjunction with the TAM straddle packer (see below), it may be possible to get a clean water sample, but again, there is no way to tell the degree of contamination before bringing it to the surface.

d) FIT (Schlumberger Formation Interval Tester).
Tool and problems similar to those of straddle packer.

e) Gearhart/Tesla Sampler.
Worthington pointed out that Gearhart has taken over Tesla's flushing multisampler. The tool is designed to pump and measure fluid resistivity until the water is uncontaminated, then take 1 or 2 pressurized samples. Problem (per telecom Jageler/Gearhart): tool still only exists on paper.

f) Blanton Engineering Sampler.
Howell noted that Blanton Eng. in Houston has a small (2-1/2 inch diameter) tool.

After reviewing the possibilities, the panel recommended (Recommendation 10)

that LDGO continue to develop the wireline packer with AMOCO since it appears to be the most advanced of the tools designed to collect uncontaminated samples. Because of the large costs and lead time involved, however, the Panel recommended that participation in the second and third years be contingent on the results of the tests in the first, that LDGO continue to search for other vendors and that Schlumberger's RFT tool be modified for service during the interim (including Leg 110).

Hydrogeologic Tools (Becker)

In addition to the wireline packer discussed above, a number of other hydrogeologic tools are now, or will shortly, become available:

a) TAM straddle packer (RSMAS). The TAM straddle packer was tested on Leg 102 but failed to inflate. Additional inflation ports have been drilled and more time will be allowed for inflation in future runs. The tool can be used as either a single or a double element packer but cannot presently be rotated. Thus it can only be used in soft sediments or re-entry holes. Present plans call for its use on Legs 109, 110 and 111.

b) TAM rotatable packer. TAMU is acquiring a single element packer from TAM which can be rotated. Thus it can be used in single bit holes. The tool will be used on Legs 110, 111 and 114 (South-west Indian Ridge) .

   Neither packer is presently equipped with a water sampler but both will allow the well to flow. Different elements can be used for different temperatures (e.g. 100-120°, 180°, 300°C) but in general, the higher the temperature, the less inflation; for example the 180°C element only inflates by 50% and the 300°C EPDM element only inflates 5% and once.

c) Barnes water sampler (University of Washington).
   Being redesigned for Leg 110.

d) Kuster sampler (SIO).
   A proposal has been submitted by Gieskes to USSAC to acquire Kuster samplers for use on Leg 110.

e) Flowmeter.
   Two flowmeters are potentially available: one from Schlumberger and one from Kuster. It is planned to have one of these onboard for Leg 110.

Duplicate Tools

A persistent problem during the first year of operation has been the lack of duplicate tools, particularly BHTV and MCS tools. In practice, this means that if one of these tools fails, the log is not obtained or rig time is lost while the trouble is diagnosed. The Panel recommended (Recommendation 11) that ODP follow standard industry practice, which is to have a backup tool available in the field at all times. This has been found to be a cost

effective way of saving on rig time. The panel also recommended (returning to the earlier discussion on televiewers) that LDGO acquire a digital BHTV.

High Temperature Tools

An extensive suite of high temperature tools will be needed to log the lower levels of Hole 504B as it's deepened into Layer 3 and the hydrothermal wells planned for the EPR and the Red Sea. Salisbury reported that numerous tools have been built which can operate for short periods of time at temperatures of up to 320°C (Appendix 1) using military spec. solid state electronics and dewars, heat sinks and phase change materials in various combinations to delay the rise of temperature inside the tool. By vigorous pumping to cool the hole, the residence time of the tool downhole or the temperature range can be extended. LDGO is currently modifying a sidewall entry sub to be used in conjunction with a tool pusher for cooling and hole cleaning operations. The Hostile Environment (HEL) tools are available from Schlumberger by contract and agreement has been reached in principle with Los Alamos (LANL) and the USGS for the use of their tools on a non-interference basis, provided these agencies are not asked to incur expenses on ODP's behalf.

Traeger pointed out that a number of the tools listed in Appendix 2 were recently tested in the Salton Sea well. The original plans called for drilling and spot coring to about 10,000 feet where temperatures of 400°C were anticipated and logging at several key times in the drilling operation. In practice, logging was initiated when circulation was lost at 6200 feet (i.e. before high temperatures were encountered) and was still in progress at the time of our meeting. In addition to a number of successful runs using HEL and USGS tools, a dewared Kuster tool obtained good pressure and temperature data to 300°C during shut-in tests and a variety of water samplers were run including: the LANL sampler, which is activated on command from the surface; a Sandia tool which takes 0.5 l samples, is rated to 500°C and can be activated from the surface via a conventional 7-conductor cable; a 4-conductor cable or a high temperature (900°C) MgO cable; and a smart dewared tool built jointly by LANL and Sandia. The latter was scaled shut (the fluid contains 300,000 ppm dissolved salts and metals).

Traeger also noted that TFE logging cables can operate up to 320°C as indicated in Appendix 2 but are only safe to about 300°C. Since MgO cables don't have very good electrical characteristics, the best strategy for higher temperatures may be to deploy downhole-recording, thermally protected tools on slicklines. Sandia is now building self-contained, slickline-deployed dewared tools for measuring T and P to 400°C. Tools which can operate indefinitely at elevated temperatures, however, are still a long way off.

Kinoshita pointed out that the Japanese have developed a slickline-deployed, 3-axis borehole magnetometer with downhole sensors, power and memory. The electronics are enclosed in a pressure case and thermally protected with dewars and a two-phase heat sink which will enable it to operate in 6 km of water at 300°C for 2 hrs. Plans call for combining the tool with a water sampler, and eventually with P, T and tilt sensors for long term observations. Kinoshita also noted that the magnetometer will be available for ODP use very shortly but that the JAPEX gear is still undergoing testing and development. The tools should be operational in 1988, at which time they

could be made available to ODP on a rental basis.

Staffing and Log Analysis

Three logging personnel now participate on each cruise: the Schlumberger engineer; a logging scientist from the scientific community; and a logging scientist from LDGO (who is also considered a member of the shipboard scientific party). With the exception of Leg 108, which may not have logging at all, the logging party has been staffed through Leg 111 but nominations are still needed for the community scientist position for Legs 112 and 113.

At the recommendation of the DMP, LDGO is planning to put log analysis software on board the ship so that the logs can be analyzed immediately and the results integrated with the results of the rest of the shipboard party. Two packages are being considered: Terralog, which normally costs $90K but was donated to the program for $1 and is now on board; and Energy systems, which costs $45K/package. LDGO has acquired one package for shorebased use but will put it out on Leg 107 for a shipboard comparison with the Terralog software package.

6. National Reports

United Kingdom (Worthington)

The U.K. is back in the program and is determined to make up for lost time. Tim Francis will represent the U.K. on PCOM and will be spending approximately half his time on ODP affairs. Joe Cann will be submitting a proposal shortly on sensors to be used in monitoring the chemistry of borehole fluids.

Canada (Salisbury for Bell)

Kate Moran at the Atlantic Geoscience Centre is conducting a feasibility study on adapting self-boring pressure meters for ODP use and Bill Morris is investigating the possibility of using fibre optics technology to measure tool orientation.

Japan (Kinoshita)

The Japanese have submitted a proposal to JOIDES to drill a transect across the Japan/Bonin triple junction. A major objective of the proposal is to instrument four holes (1 in the Pacific plate, 1 in the Philippine plate, 2 in the Eurasian plate) with long term observatories to monitor tilt, seismicity, temperature and magnetic field strength vs. time. An alternate would be to drill a transect across the Bonin Arc and instrument two holes (1 in the Pacific plate, 1 in the Philippine plate). Prototypes of the borehole magnetometer and tiltmeter are nearly completed but will need another two-three years to miniaturize.

Discussion: The Panel was delighted that the first real steps toward the development of long term observatories were being taken and recommended drilling and instrumenting the transect (Recommendation 8).

Germany (Kopietz)

Three borehole instruments have been, or are being, developed for ODP use in Germany:

a) Three-axis, gyro-stabilized magnetometer (BGR).
The tool was successfully run on Leg 102. Salisbury pointed out, however, that because of ship's heave and the tool's low digitization rate, the accuracy of the declination data is questionable.

b) Magnetic susceptibility tool (Munich).

c) HRT (Prakla).
A high resolution (.001°C) temperature tool with an accuracy of .01°C has been built by Prakla for radioactive waste disposal studies (changes in gradient are sensitive indicators of fluid flux). The tool uses Pt resistors and can be run at a logging speed of 3 m/min. It is planned to upgrade the tool for 300°C service so that it can be used by ODP and the German Continental Drilling Program (KTB). The Germans hope to have all three tools available for Leg 109.

Discussion: The Panel endorsed the German instrumentation efforts but recommended (again; see June 1985 Minutes) that the magnetometer and susceptibility tools be combined in order to save rig time and facilitate data correlation (Recommendation 13). Anderson asked if the German representative on the Panel could request WBK to put their digital BHTV on Leg 109 on a trial basis. If they agreed, there could be up to four German scientists on Leg 109: Kramer, Kopietz, an engineer from BGR to run the magnetometer, and an engineer from WBK.

France (Pozzi)

The French are developing four tools for ODP use:

a) High temperature probe (Gable).
The tool is similar to the German HRT but can operate to 500°C and to 0.6 kb. with a precision of 0.01°C.

b) Magnetic susceptibility/3-axis magnetometer combination tool.
The tool will consist of a dipole-dipole susceptibility tool operating at 110, 440 and 1760 Hz combined initially with a proton precession magnetometer to measure total field intensity. Eventually, it will be upgraded to a 3-axis tool oriented with a ring laser gyro. The tool, which will be 88 mm in diameter and is designed to operate to 90°C and 0.7 kb, will be tested in about one year.

c) Fracture detector (Rummel/Cornet).
The tool consists of a 24-electrode low frequency imaging device which gives an "image" of the borehole in terms of resistivity rather than reflectivity.

d) Wireline Re-entry.
The French are developing a wireline re-entry vehicle for logging and servicing tools in DSDP/ODP holes in the absence of the drillship. A test of the prototype system is planned for June 1986 in Hole 396B using the Nautile for observation and support. Diagrams of the re-entry vehicle and its floatation pods are shown in Appendix 3. After some discussion, the panel recommended that Hole 396B be cleaned on Leg 109 enroute to Hole 395A (Recommendation 2).

7. Recent Downhole Measurements Results

Leg 101: Bahamas (Anderson)
A 500 m interval was logged through the pipe at the prime site using the GST. The logging data was then combined with laboratory physical properties data to reconstruct a synthetic seismogram through the section. Since recovery was low, this provided the only means for correlating the drilled section to seismic profiles. The success of this operation convinced Schlumberger to put the GST on the ship on a continuous basis.

Leg 102: Downhole Measurements in Old Crust (Salisbury)
Hole 418A was re-entered in order to fish out a logging tool lost in the hole on Leg 53 and to conduct logging and geophysical experiments in the well in an effort to determine the in situ geophysical behavior of old oceanic basement. Although extensive bridges had developed in the uncased sediments since the hole was drilled, we succeeded in re-opening the hole to total depth (544 m sub-basement). The tool was not in the hole.

Since the hole was thought to have been isolated from the water column by cavings for the past eight years, a limited temperature measurement and water sampling program was conducted in the hole immediately after re-entry. The temperature measurements indicate that heat transfer is conductive at the site. A water sample taken in the basement at 649 m is strongly enriched in Ca^{++} and depleted in Mg^{++} and K^{+}, suggesting exchange with basement water.

The hole was nearly to gauge (10") throughout, allowing virtually all of the tools to operate flawlessly. The only exceptions were the deep laterlog. which was improperly calibrated, the packer, which failed to seat and the borehole televiewer, which caught on a ledge just outside the pipe. The only limitations experienced were those imposed by the presence of a bridge 145 m into basement, which required that the hole be logged in stages and those imposed by time constraints, which prevented us from running several tools in the upper third of the basement and from logging the bottom 79 m after it was reopened toward the end of the leg.

In general, the logs confirm and refine the lithologic units defined on Legs 52 and 53 on the basis of petrology and the log values of velocity, density, porosity and magnetic susceptibility often approach or match laboratory values obtained on core

material. In particular, the massive basalts display compressional wave velocities of 5.5-6.0 km/s, shear wave velocities as high as 3.3 km/s, high Vp and Vs semblance values, densities of 2.9 g/cc, and resistivities exceeding 1000 ohm-m. On the other hand, the pillow basalts, which dominate the section, display compressional and shear wave velocities ranging, respectively, from 4.5-6.0 km/s and 2.6-3.3 km/s, lower values of semblance, densities of 2.6-2.8 g/cc and resistivities of 40-200 ohm-m. While distinct from the massive basalts, the pillow basalts in Hole 418A also behave quite differently from pillow basalts in young crust: the velocities and densities are much higher and the porosities are lower, suggesting the infilling and sealing of interpillow voids by alteration products. Since the compressional wave velocity throughout the section matches that of Layer 2B, but the natural gamma count in the top 200 m is high, we conclude that the upper part of the section was once much more porous and represents paleo-2A. Interestingly, the boundary between this unit and the rest of the section is also marked by a thick smectite-sealed breccia, a sharp magnetic polarity reversal and a pronounced decrease in magnetic susceptibility from an average apparent value of about 1.5 m cgs units to about 0.5 m cgs units. At greater depths, however, the susceptibility climbs sharply again to values exceeding 2.0 m cgs units.

In addition to conducting measurements of the borehole wall, a major two-ship seismic experiment was conducted on Leg 102 in which the R/V Fred Moore shot radial and circular lines around the site while a borehole seismometer was clamped at different levels in the hole. The objectives of the study were to determine the velocity structure of the upper crust and to determine azimuthal variations in velocity and attenuation. Although a cursory examination of the data suggested these objectives had been met, the quality of the data was degraded by a positioning error.

Leg 103: Galicia Bank (Anderson)
Good logs were obtained in several holes. As on Leg 101, synthetic seismograms derived from the logs made it possible to correlate drilling results with seismic reflection data. The "basement" at the prime site turned out to be a 6.0 km/s dolomite.

Leg 104: Voring Plateau (Anderson/Phillips)
Drilling at the prime site (642) demonstrated that the seaward-dipping reflector series on the Voring Plateau consists of alternating flows and clastic sediments. An excellent set of standard logs was obtained over an 800 m section of the hole. The BHTV could not be used because of lack of time.

A VSP run was made at Site 642 by UT personnel using a clamped, 3 component (Galperian array) borehole seismometer built by Phillips Petroleum. The pipe was locked in the re-entry cone to reduce noise. The combined results of drilling and VSP show that Vp varies, for the most part, between 3.25-3.9 km/s in the dipping reflector series, (one massive unit displayed a velocity of 5.0

km/s), that reflector K at 1.3 s consists of a particularly thick volcanoclastic unit and that the units above K could be clearly seen in the VSP data.

The success of the VSP operation prompted the Panel to recommend that VSP be run in Hole 504B to determine interval velocities in the upper crust and (perhaps) the depth to the cumulates (Recommendation 4) and that a proposal be submitted to redrill Site 603 for VSP studies in order to correlate the Leg 93 drilling results with the North Atlantic reflector series (Recommendation 9). The long-awaited VSP link-up between drilling and the seismic intercomparison experiment sponsored by the Navy at the site was thwarted when the pipe broke on Leg 93 and when Leg 102 was shortened.

Leg 105: Baffin Bay/Labrador Sea (Jarrard)
Logging on Leg 105 was plagued by bridging and bit release problems. Nonetheless reasonable Vp, resistivity and natural gamma logs were obtained at the Baffin Bay site (645) which supplemented coring and showed a marked change in physical properties at the onset of ice rafting. At Site 646 in the Labrador Sea, excellent sonic and nuclear (including) GST combination logs were obtained with the tools. The K, porosity and GST logs showed lithology changes which appear to correspond to Malinkovich cycles and synthetic seismograms derived from the logs demonstrated that drilling reached the target reflector.

Leg 106: MAR Bare Rock Drilling (joint meeting with LITHP, TAMU engineers)
An extensive debriefing was held by TAMU and Detrick for DMP, LITHP, and the Leg 109 co-chiefs so that informed recommendations could be made regarding bare rock drilling on Legs 109 and 111. Two sites were drilled on Leg 106, Sites 648 and 649.

Site 648, the prime bare rock drilling site, was located on the rim of a small flat-topped volcano (Serocki volcano) in the median rift valley south of the Kane Fracture Zone. The basement, which consists of hard, fractured basalt cut every 20 m or so by fissures up to 1 m wide, is considered typical of zero age crust.

The site was surveyed and the guidebase successfully deployed and re-entered using GPS and dynamic positioning to position the ship and a drillpipe-mounted TV in combination with a Mesotech re-entry sonar to scan the seafloor. The only difficulties encountered during the 26 hr. long deployment operation were a 20-30 m positioning uncertainty and the inability to see past the guidebase during deployment.

Once the guidebase was deployed, a mud motor built by Norton Christensen was used to start the hole on the premise that the pipe might not need lateral support if only the bottom 40 m were rotating. Drilling was difficult, with only 33 m drilled in one month for a recovery of 23%. Progress was slow for several reasons: 1) the section drilled consisted of hard, unstable rubble

- due to cavings, the hole had to be redrilled and reamed repeatedly; 2) oversized bits which drill very slowly had to be used in the top of the hole in order to set casing and numerous pipe trips had to be made for the casing itself - only three days out of 26 on site were actually spent drilling; 3) the ship's stock of drilling jars was consumed immediately, necessitating a very conservative drilling program.

The upper 3/4 of the hole was drilled with an oversize bit and the bottom quarter with a 9-7/8" bit. The upper third of the oversized hole is cased and the bottom third is filled with cement. After drilling out the cement and casing the rest of the oversized hole, the TAMU engineers predict that the penetration rate will increase because: 1) there will be fewer cavings; 2) it will be possible to continue using a 9-7/8" bit which drills faster than the larger bits and leaves a more stable hole; 3) it will be possible to use heavier drill collars and thus increase the weight on the bit; 4) jars will again be available; and 5) on Leg 106, the rate of penetration increased with depth.

Discussion and Prognosis: Two questions were addressed in considering whether or not the ship should return to 648 on Leg 109 to deepen the hole. What additional penetration could be expected on Leg 109 and what targets were within reach of this penetration? Estimates ranged from 100-400 m after taking a week to set the rest of the casing. Howard pointed out that delaying the return to 648 would serve no purpose since no improvements in drilling technique other than those listed above could be expected in the near future. Since seismic evidence suggests that the rubble layer at the site is only 200-300 m thick (Purdy) and a 300 m hole would get below the base of the volcano and perhaps into the frozen magma chamber (Detrick), LITHP recommended that Leg 109 return to deepen 648. LITHP further recommended that 4-1/2 days be set aside on the leg to log the hole (assuming sufficient penetration) and that seven days be set aside to log Hole 395A as originally planned.

Site 649. In addition to bare rock drilling with a guidebase, an array of eigh t shallow holes was drilled across an active hydrothermal mound using only a coring motor and the deep sea TV. The drilling was suprisingly successful and suggests that re-entry may be possible without a cone.

(At this point, the two panels split up and reconvened in separate meetings.)

Leg 107: Mediterranean (Anderson)

Leg 107 has three principal objectives: to determine the early rifting history of the passive margin off Sardinia, the tectonic history of the active margin off Sicily, and to study bio- and magnetostratigraphic relations in the western Mediterranean. The leg has just gotten underway and no logging results are in yet. A standard logging operation is planned at several sites.

8. Upcoming Leg Plans and Recommendations

(See Appendix 4 for Ship Schedule)

Leg 108: NW Africa (Anderson)
An array of shallow holes along the margin off NW Africa is planned to study north African climate and wind patterns during the Tertiary. Since the holes were originally to be HPC holes, the DMP had earlier recommended against logging. Three new developments, however, suggest that it may be appropriate to reconsider: 1) Wissmann (BGR) has requested that logging be conducted at several sites so that the data can be integrated into the Circum-Atlantic Mapping Project and a BGR study of fans off NW Africa (Appendix 5); 2) the discovery of Malinkovich cycles in shallow sediments on Leg 105 demonstrates the value of continuous, climate-sensitive logs (such as natural gamma, clay-type and porosity logs) in paleoenvironment studies; 3) because of drilling clearance problems at several sites, time may become available to deepen and log several of the remaining sites. In view of these developments, the Leg 108 co-chiefs have informally requested that LDGO prepare a backup logging program, but Anderson is reluctant to send an engineer on the leg unless a commitment is made to log. Other activities scheduled on Leg 108 which are of DMP interest include the first test of the sidewall entry sub and the new minicone being developed by TAMU. After considering the objectives of the leg, the Panel made the following recommendation:

Recommendation 1. In view of the possible availability of time for logging on Leg 108, it is recommended that logging be scheduled at a minimum of four sites (e.g. MAU-5, MAU-4, SLR-1 and EQ-3) along a north-south profile. The objectives would encompass identification of sedimentation cycles (by measuring variations in carbonate content and in humid vs. arid clay content) and an improved understanding of seismic stratigraphy in the region. Recommended logging suites are the LSS/DIL combination tool and the standard nuclear suite, including the GST. The nuclear suite should be replaced by Schlumberger's new ACT if the tool is available in time. Estimates of logging time are 18 hrs per hole, including preparation, so that the minimum logging requirement is three days. The scientific interest in sediment characterization through downhole measurements is underlined by the submission from Wissmann (Appendix 5).

Leg 109: MAR Bare Rock Drilling/395A Downhole Measurements
On the basis of the Leg 106 drilling report received at the joint LITH/DMP meeting, the Panel endorsed the LITHP recommendation that Leg 109 be spent deepening and logging Hole 648B and logging Hole 395A. Upon reviewing the logging program for each site, however, the Panel recommended that one day be added to the downhole measurements program at 395A, bringing the total to eight, and that 1-1/2 days be subtracted from logging at 648B (Recommendation 2). The extra time at 395A is needed, in part, to conduct HPC-T measurements in the sediment section in order to constrain basement

circulation models. In addition, the Panel recommended that: 1) Hole 396B be cleaned enroute to 395A in preparation for the French wireline re-entry attempt scheduled in June; 2) that a whipstock be placed above the bit in Hole 395A; 3) that downhole operations be completed in Hole 395A before the ship returns to 648B; 4) that Keir Becker be put in charge of the downhole measurements operations at Site 395; 5) that 648B be cased to the base of the rubble zone before logging; and 6) that if Hole 648B has to be abandoned early in the leg because of drilling problems, the ship should return to Hole 418A to deepen the hole and conduct downhole measurements. Specifically, we recommend that 20 days be spent casing the hole to basement and deepening it into the dikes and that 10 days be spent on logging and experiments as at 395A. This will accomplish two longstanding LITHP and DMP objectives: the deepening of a major hole into the dikes in old crust along the 648B/395A/418A flowline, and the geophysical characterization of Layer 2 in old crust through in situ measurements.

Leg 110: Barbados (Taylor)

Four sites are planned for Leg 110: an oceanic reference site (LAF-0) which will be drilled and logged but not cored; the prime site (LAF-1) which will be drilled through the accretionary prism, the basal thrust and the underlying oceanic sediments to basement; LAF-2 which will start higher upslope and penetrate to the decollement; and LAF-3 which will be drilled further upslope but not reach the decollement. At the prime site, two single bit holes will be drilled to the decollement (one for oriented cores, one for packer studies) and a third re-entry hole will be cased as necessary and cored to basement. To ensure penetration through the basal thrust (which is likely to be overpressured), the ship will be equipped with a triple casing string, drill-in casing, under-reamers and a downhole motor. Other optional drilling equipment will include casing perforators and minicones.

Since the objective of the leg is to determine the mechanical and hydrogeologic properties of the accretionary wedge, the decollement and the underlying sediments as a function of deformation, the Panel reiterated its plans for a major program of downhole measurements at the prime site (Recommendation 3) and complementary studies at the remaining sites. The Panel also endorsed the Barnes/McDuff effort to add a pore pressure sensor to the Barnes pore water sampler and Carlson's efforts to put new lab gear on board for measuring Vp, Vs and permeability under pressure. The Panel also asked Carlson to check with Holman at AMOCO to see if the penetrometer designed by Jageler and now at TAMU in the Civil Engineering Department might be used on 110.

Leg 111: EPR Bare Rock Drilling or 504B

Returning to the bare rock drilling question, the Panel debated two options for 111: starting a new bare rock hole on the EPR or returning to 504B to deepen the hole and conduct logging and downhole experiments. Despite our enthusiasm for hydrothermal drilling on the EPR, we unanimously recommended that the ship

return to 504B on 111 as proposed by Becker (Recommendation 4) for the following reasons: 1) Leg 106 demonstrated that at least two legs will be needed to set a guidebase and drill a deep hole on the EPR; but 2) only one leg is available (TAMU rejected a suggestion that two legs could be committed to EPR drilling by cancelling MARK II and moving Barbados up a leg); and 3) there is some concern that a cone set in an active hydrothermal area will survive more than a year (Delaney pointed out that steel left 250 m from a smoker on the Juan de Fuca Ridge corroded through in six months). Finally, 4) 504B is a "sure thing" in that one more leg will bring it close to the 2/3 boundary - the holy grail of marine geophysics. If the PCOM decides, however, to start bare rock drilling on the EPR, the Panel recommended a limited high temperature logging program at the bare rock site using Schlumberger, Los Alamos, U.S.G.S. and Japanese gear to measure ephemeral properties and gain experience with high temperature tools and a limited logging program at 504B using the wireline heave compensator to complement measurements made earlier (Recommendation 4).

Leg 112: Peru Trench (Meyer)

Approximately 17 holes are being considered for drilling between 9-15°S along the Peru margin for tectonic and paleoenvironmental studies. The tectonic objectives include determination of the timing and origin of uplift and subsidence in forearc basins, the nature of the transition zone between the accretionary complex and the metamorphic basement, the P/T history of the basement and the relationship between permeability, pore pressure, pore fluids and diagenesis in the accretionary prism. The paleoenvironmental objectives include studies of upwelling along the margin, the history of the Peru Current, dolomitization, hydrates and sediment geochemistry.

To these ends, two cross-shaped arrays of sites have been proposed across the Trujuillo, Yaguina and Lima Basins, with the shallow and deep water sites dedicated to paleoenvironmental and tectonic objectives, respectively. In general, the shallow sites (water depths of 100-400 m) will be double HPC-cored to 150-200 m through soft, organic-rich mud with dolomite stringers. The deep water sites will be HPC, XCB and rotary cored in various combinations to 600-1000 m.

Anderson pointed out that the wireline packer might be ready by 112 and Salisbury commented that the self-boring pressure meter may also be ready.

After reviewing the objectives of the leg, the Panel recommended: 1) that the nuclear and sonic combination tools be run at the shallow sites (if penetration warranted); 2) that these tools plus the Barnes and RFT tools be run at the deep (tectonic) sites; and 3) that at the prime tectonic site (probably site 17), an extensive suite of hydrogeologic tools be run in addition to the standard tools in order to study relationships between deformation and hydrology in accretionary prisms (Recommendation 5). Since a

strong BSR is observed on the Peru margin, the Panel also recommended that the PCB be refurbished for 112 (Recommendation 14).

Leg 113: Weddell Sea (McConnell)
A transect of 500 m holes (W6-W8) across the S. Scotia ridge, plus a 900 m hole (W-5) in the Weddell Sea and a 1 km hole (W-4) to basement on the Antarctic continental margin are planned to study tectonic and paleoenvironmental problems. In particular the holes across the Scotia Ridge are designed to study carbonate deposition and the history of the Antarctic Bottom Current, the Western Boudary Current and the CCD during the Cenozoic. At W-5 in the middle of the Weddell Sea, it is hoped to date the opening of the Drake Passage, to study the glacial history of the continent, to drill into the Mesozoic and to study the development of Antarctic Bottom water. At W-4, it is hoped to drill to the breakup unconformity, to determine location of the margin during the breakup of Gondwanaland and to correlate seismic stratigraphy to lithology.

The Panel recommended (Recommendation 6) that the sonic and nuclear combination tools, plus the Barnes tool be run at Sites W-4 and 5. In addition, the new Japanese magnetometer should be run in basement if significant penetration is achieved. To increase the chances of successful logging (and drilling), minicones should be deployed at both sites. The standard logging suite should be used in the transect holes.

The Panel recommends logging these holes for several reasons: 1) The Weddell Sea is a large high latitude basin with no cores or logs. Logs will be needed for correlation of seismic stratigraphy and coring results and for regional extrapolation. 2) Logs will be needed to supplement for poor core recovery (recovery will be low because of dropstones). 3) The logs, in conjunction with laboratory physical property data, will be useful in sediment typing and in the interpretation of depositional environments.

Leg 114: S. Atlantic - No details available

9. Indian Ocean Preview (Kidd)

Because of clearance and survey problems (many sites have not yet been surveyed), the drilling program listed below for the Indian Ocean is still very tentative.

Leg 115: SW Indian Ridge/Mascarene Ridge
The SW Indian Ridge/transform system shows the highest relief on the mid-ocean ridge system and recent dredge hauls recovered gabbros and ultramafics from scarps in the area. A series of shallow (50-100 m) single bit holes located on the basis of seabeam data is planned to sample basement at known positions on the scarps in order to determine the relationship between petrology and

structure in a ridge/transform setting. Consideration is also being given to drilling a series of holes on the Mascarene fossil spreading center. The principal problem with the leg is that existing surveys in the area are inadequate for locating sites.

The Panel endorsed the leg and recommended (Recommendation 7) that heat flow and permeability studies be conducted in the fault zone as proposed by Von Herzen and that at least one deep re-entry hole be drilled in the transform valley in order to conduct the obique seismic experiment as proposed by Stephen.

Leg 116: Red Sea
An array of HPC holes is planned to sample the hydrothermal sediments in the central rift and deeper holes have been proposed to sample the evaporites and basement. The leg is in jeopardy because of difficulties in obtaining drilling clearance.

Leg 117: Neogene Package
An array of HPC and rotary holes is planned in the Gulf of Aden, the Somali margin and the Indus Fan to study high resolution stratigraphic relations in the Neogene.

Legs 118 & 119: Kerguelen Plateau
A two-leg depth and latitude transect is planned along the Kerguelen Plateau to study water mass evolution, CCD migration and paleoenvironmental problems.

Leg 120: Mascarene Plateau/Intraplate Deformation
A series of holes is planned on the Mascarene Plateau to study paleoenvironmental problems and on the Bengal Fan to study mid-plate deformation structures (faults and fold belts).

Leg 121: 90E Ridge/Broken Ridge
An HPC Neogene drilling transect has been proposed to extend the Kerguelen latitudinal transect.

Leg 122: Exmouth Plateau/Argo Basin
Deep holes have been proposed to study the depositional history of the margin and to sample the Jurassic.

Leg 123: Otway Basin
An array of holes has been proposed to study basin development and sedimentation.

It should be noted that two major thematic panel targets, a deep hole in the Somali Basin (SOHP) and a transect across the Macran margin (TECPAN) are not included in the present schedule.

10. Program Weaknesses (Carlson/Salisbury)

A number of disciplines (physical properties, paleomagnetics, organic and inorganic geochemistry, geotechnical studies) are no longer represented in

the JOIDES panel structure or are so scattered that they have no effective input. To rectify the situation, USSAC has funded several workshops, including one on physical properties to be held at Cornell (26-28 June) and is considering funding workshops on unconventional sampling and borehole observatories. All of these are of direct or indirect DMP interest, with physical properties being of most immediate concern. The Panel noted, for example, that much of the physical properties gear on the ship is obsolete, and that high quality lab data, including permeability, resistivity and strain relaxation data (none of which are currently attempted) are needed for comparison with log data. The Panel pointed out that workshops have no authority to execute their suggestions and thus recommended that a Physical/Geotechnical Properties Working Group reporting to DMP be formed to provide a mechanism within JOIDES for discussing and upgrading the program (Recommendation 16). It was suggested that the Working Group be chaired by Worthington with Karig. Carlson, Traeger and (Ron) Anderson as members.

Another weakness noted was that neither NSF nor USSAC has succeeded in funding tool development or acquisition. It was pointed out, however, that USSAC has recently funded a feasibility/applications study for a borehole gravimeter for ODP and hopes to acquire a dipmeter.

11. Miscellaneous

Carlson advised the Panel that USSAC is issuing an RFP for a DSDP/ODP logging synthesis and that USSAC is taking out a monthly column in EOS to update the community on USSAC ODP activities.

12. Future Meetings (Recommendation 18)

Mid-July 1986	-	Woods Hole
November/December 1986	-	Japan (per invitation from Hajimu Kinoshita)

JOIDES Downhole Measurements Panel

Texas A&M University -- January 14-16, 1986

Summary of Recommendations

Leg-by-Leg Recommendations

After reviewing the objectives of each leg and the geological and geophysical data available for each site, the DMP made the following recommendations:

1. Leg 108 Moroccan Margin

   If permission is not received to drill in Moroccan waters and the drilling plan must be changed, the DMP recommends deeper drilling and logging at Sites MAU-4, MAU-5, SLR-1 and EQ-3 for clay typing and seismic stratigraphic correlation.

   MAU-4, MAU-5, SLR-1A, EQ-3

Hole preparation	3 hrs.
LSS combination	4
LDT/GST/ACT combination	11
	18 hrs./hole

2. Leg 109 MARK 1/395A

LITH and DMP still recommend deepening of the barerock hole and completion of downhole measurements at 395A on Leg 109.

395A	Pipe trip	12 hrs.
	T/H_2O samples	12
	German HRT	12
	Schlumberger suite	37
	BHTV	11
	MCS	11
	MCS	11
	Large scale resistivity	8
	3-axis magnetometer	15
	Magnetic susceptibility	8
	Packer	48
395D	HPC-T	6
	Pipe trip	12
		8 days
648B	Deepen hole to 200 m.	
	Schlumberger suite	24 hrs.
	BHTV	12
	MCS	8
	Packer	12
	3-axis magnetometer	6
	Magnetic susceptibility	6
		2.8 days

In addition, DMP recommends that:

a) Hole 396B be cleaned enroute to Hole 395A in preparation for the French wireline re-entry attempt scheduled in June. (1d);

b) A whipstock should be placed above the bit in Hole 395A;

c) Downhole operations should be completed in Hole 395A before the ship returns to Hole 648B;

d) Keir Becker be put in charge of downhole measurements at Site 395A;

e) 648B should be cased to the base of the nibble zone before logging;

f) If Hole 648B has to be abandoned early in the leg, the ship should return to Hole 418A to deepen the hole into the dikes and conduct downhole measurements.

Hole 418A Deepen hole into dikes	20 days
Logging and experiments as at 395A	10 days
	30 days

This will accomplish two major LITHP and DMP objectives: the deepening of a major hole into the dikes in old crust along the barerock/395A418A flowline and the geophysical characterization of Layer 2 in old crust through in situ measurements.

3. Leg 110 Barbados Thrust (revised from DMP recommendations of June 1985)

LAF-1	Schlumberger suite	36 hrs.
	Flowmeter	4
	In situ pressure (TAM packer, drill-in packer, RFT or modified Barnes/ Uyeda tool in various combinations)	5-6 days
	Heat flow	6 hrs.
	Fluid/pore water sampling (Barnes tool of RFT)	12
	BHTV	8
	Oriented coring	4
	Borehole geotechnical	1-2 days
		8-11 days

4. Leg 111 504B or EPR

Although the Panel strongly endorses barerock drilling on the EPR, the Panel recommends that Leg 111 be spent on drilling and downhole experiments at 504B because:

a) Drilling at 504B is finally within reach of the Layer 2/3 boundary--the holy graille of marine geophysics.

b) The Leg 106 experience shows that two legs will be need on the EPR to drill a barerock hole deep enough to log. Since active hydro-thermal systems are ephemeral, these legs should be closely spaced; if the Ph is low and the hole vents water, the re-entry cone

and guidebase may self-destruct before the hole can be deepened unless the legs are consecutive.

504B If Leg 111 returns to 504B, the Panel endorses the drilling and downhole measurements program outlined by Becker.

EPR If Leg 111 begins barerock drilling on the EPR, the Panel recommends a limited downhole measurements program in the barerock hole as follows:

Hel, Los Alamos or USGS high T logging suite	24 hrs.
French T probe	6
water sampler	6
USGS BHTV	12
Packer	12
Flowmeter	8
Japanese magnetometer	6
	3.1 days

and that Hole 504B be re-entered enroute to the site for the following studies:

French T probe	8 hrs.
water sampler	8
Packer	18
German 3 axis magnetometer	12
German susceptibility meter	8
VSP	24
LDT/GST/ACT combination	12
	3.8 days

5. Leg 112 Peru Margin

Paleoenvironment Sites 1, 2, 4, 9-13 (if penetration significant)

	LSS combination	2 hrs.
	LDT/GST/ACT combination	6
		8 hrs./site

Tectonic Sites 3, 6-8, 14-16

	LSS combination	4 hrs.
	LDG/GST/ACT combination	11
	$T/P/H_2O$ samples (Barnes/RFT)	8
		1 day

17	LSS combination	4 hrs.
	LDT/GST/ACT combination	12
	$T/P/H_2O$ samples	8
	Pressure meter	12
	Packer (stress)	12
	BHTV	8
	PCB	6
		2.6 days

6. Leg 113 Weddell Sea

The Panel insists that logging be conducted on Leg 113 and urges to this end, that mini cones be set at Sites W4 and 5.

W4	LSS combination	4 hrs.
	LDT combination	11
	Japanese magnetometer (in basement)	4
	T/H_2O samples	5
		1 day
W5	LSS combination	6 hrs.
	LDT combination	13
	Japanese magnetometer	8
	T/H_2O samples	8
		1.5 days
Arc Transect Sites		
	LSS combination	4 hrs.
	LDT/GST/ACT combination)	11
		.6 days/hole

Intermediate and Long-Range Planning

7. Southwest Indian Ocean Ridge

The DMP endorses the von Herzen proposal to conduct heat flow and permeability studies in the SW Indian Ocean Ridge fracture zones and the Stephen proposal to conduct the Oblique Seismic Experiment on the same leg. To the latter end, the Panel urges that a RE core be set and significant basement penetration be attempted at at least one site.

8. Japan Triple Junction

The Panel endorses both the Japanese proposal to drill a transect across the triple junction southwest of Japan and their plans to instrument the holes with long-term observatories monitoring tilt, seismicity, T and magnetic field variations.

9. Site 603 Seismic Stratigraphy

Since the VSP experiment was cancelled at Site 603 on Leg 102, it has not been possible to correlate accurately the seismic stratigraphy of the N. American Basin with the section drilled at Site 603 on Leg 93. The Panel recommends that this experiment be conducted as soon as the ship returns to the Atlantic from the Pacific.

LDGO

10. Wireline Packer/RFT

The Panel endorses LDGO's cooperative program with AMOCO t develop a wireline packer. In view of the costs and lead time involved, however, the Panel recommends that participation in the 2nd and 3rd years be contingent on the result of tests in the first, that LDGO continue to search for other vendors and that Schlumberger's RFT tool be modified for service during the interim (including 110).

11. BHTV, MCS Duplicate Tools

The Panel recommends acquisition of a digital BHTV and a second MCS tool as soon as possible to ensure reliable service on the ship.

12. Logging Manual

DMP requests that LDGO prepare an ODP training manual on logging with examples from the DSDP/ODP data base. The manual might be supplemented with logging classes on tape for shipboard use.

FRG

13. Magnetometer/Susceptibility Combination Tool

The Panel reminds the groups developing downhole magnetometer and magnetic susceptibility tools in Germany that both tools will see more use of they are configured as a combination tool.

TAMU

14. Refurbish PCB for Leg 112

TAMU is requested to refurbish the pcb for possible use on Leg 112 since a strong BSR is observed on the Peru margin.

15. Log Publication

The DMP does not recommend publication of logs parallel to and at the same vertical scale as the barrel sheets since this constitutes false accuracy. Rather, we recommend publication in Part A at a compressed scale with a bar graph on the barrel sheets to show where the logs were run.

PCOM

16. Physical/Geotechnical Properties Working Group

The Panel urges PCOM to approve the formation of a Physical Properties/Geotechnical Studies Working Group to advise the Panel on sample preservation techniques for physical properties studies, laboratory physical properties equipment and borehole geotechnical studies.

DMP

17. DMP Minutes to Co-Chiefs

To ensure the incorporation of DMP logging recommendations into the planning for each leg. The DMP chairman is instructed to send DMP minutes to the co-chief scientists for each upcoming leg.

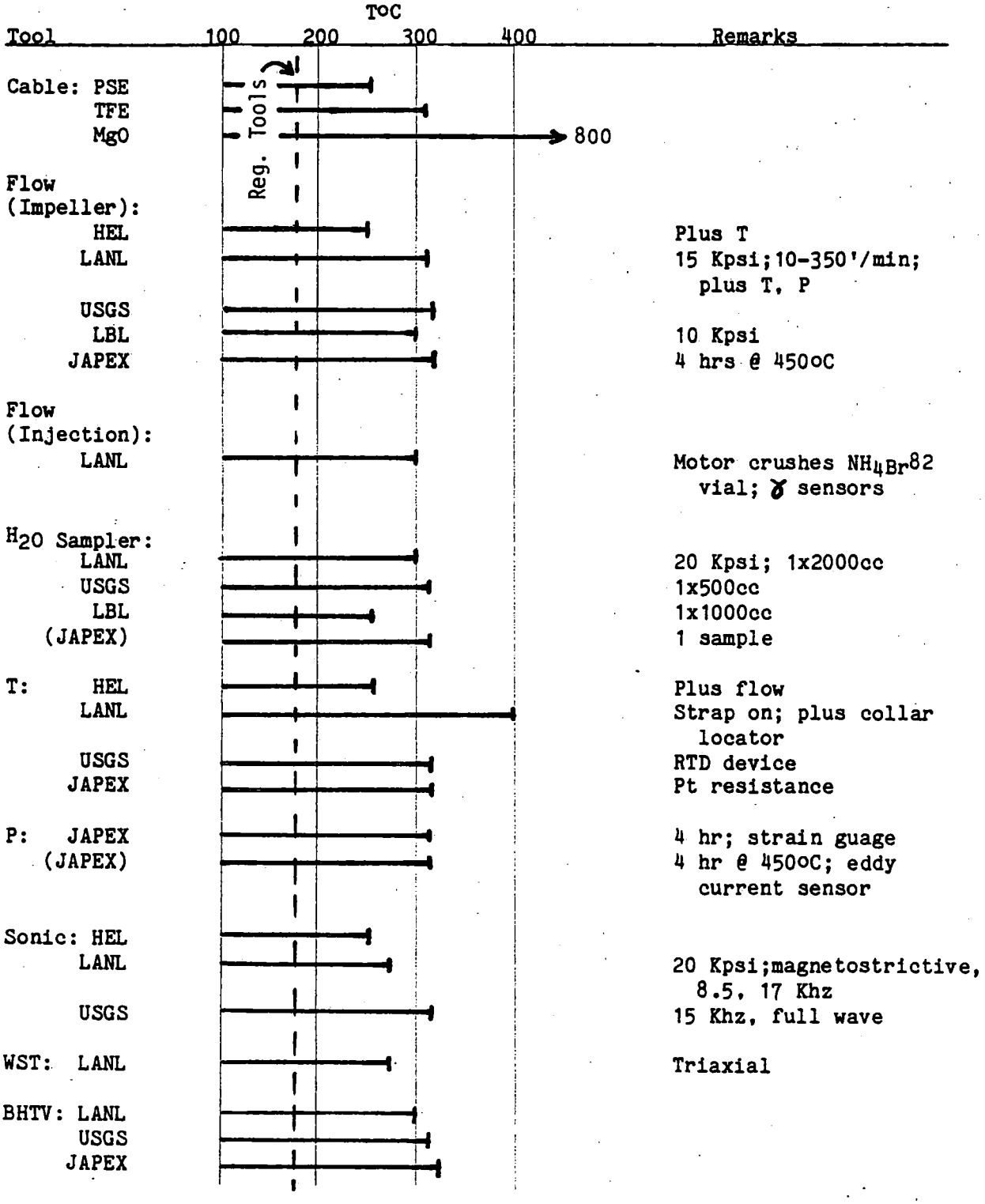
18. Next Meetings

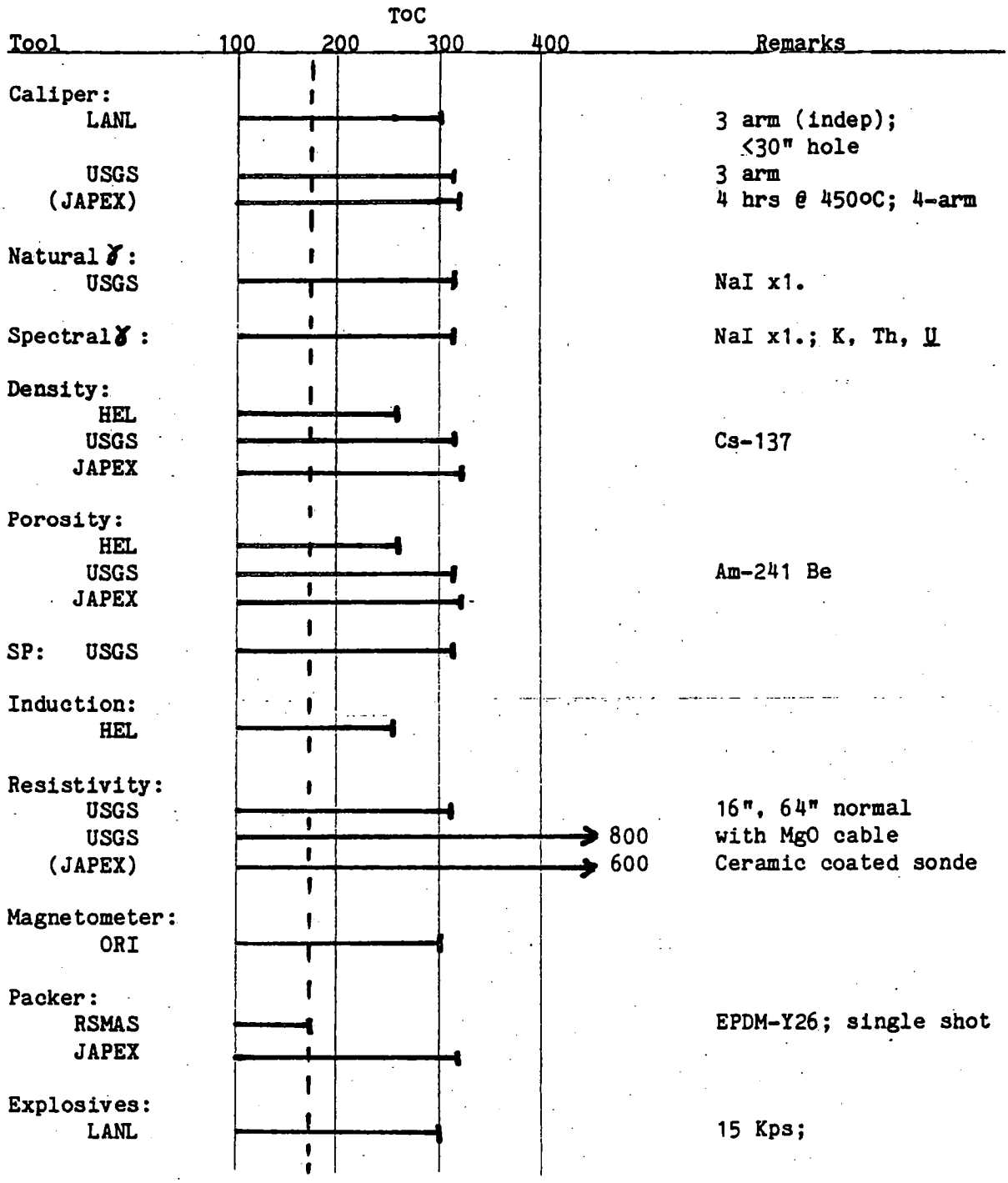
3rd week in July 1986 at Woods Hole. Early December 1986 in Japan

APPENDIX 2

OPERATIONAL HIGH TEMPERATURE TOOLS

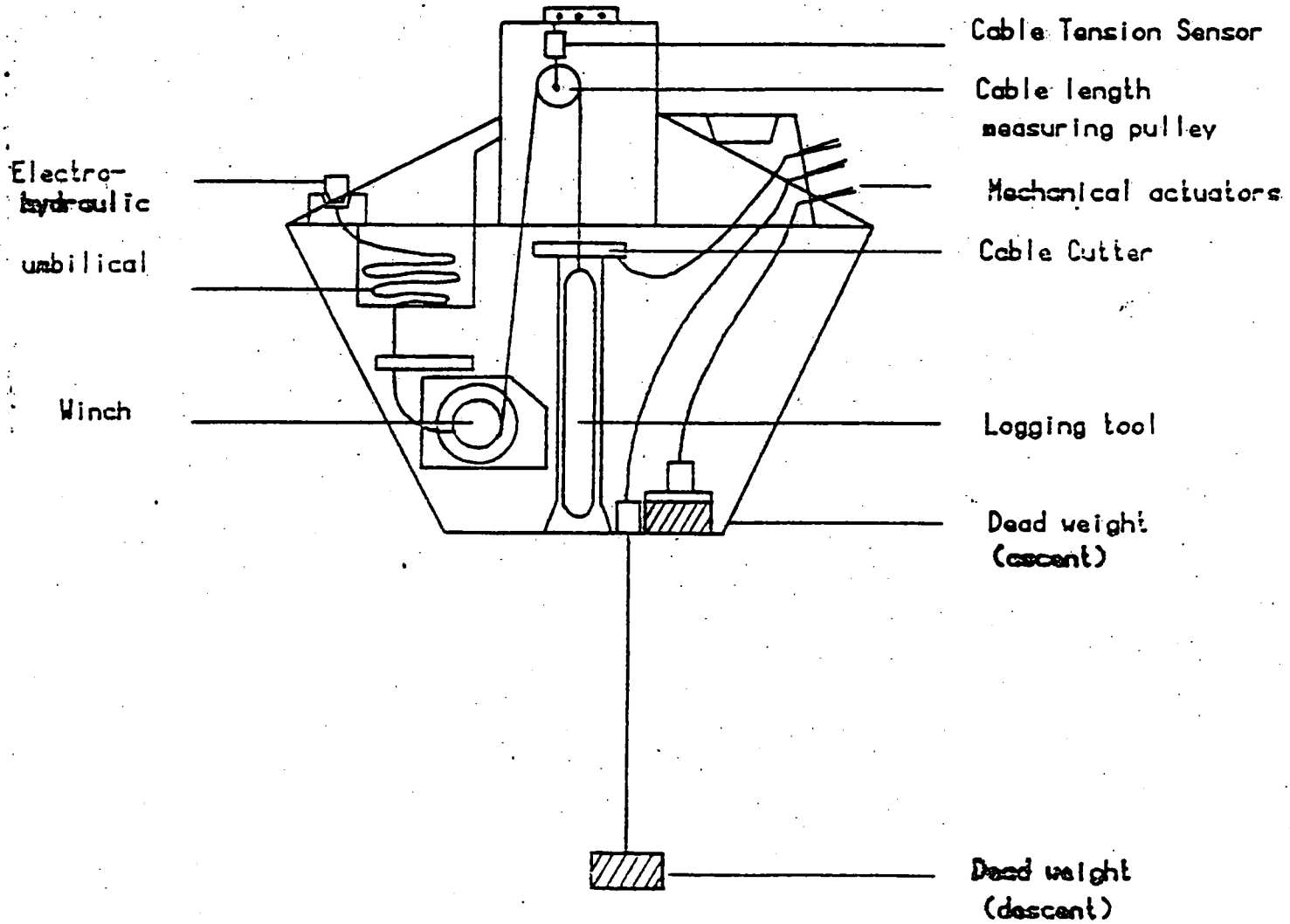
$d \leq 3\text{-}1/2"$, $P \geq 7500$ psi





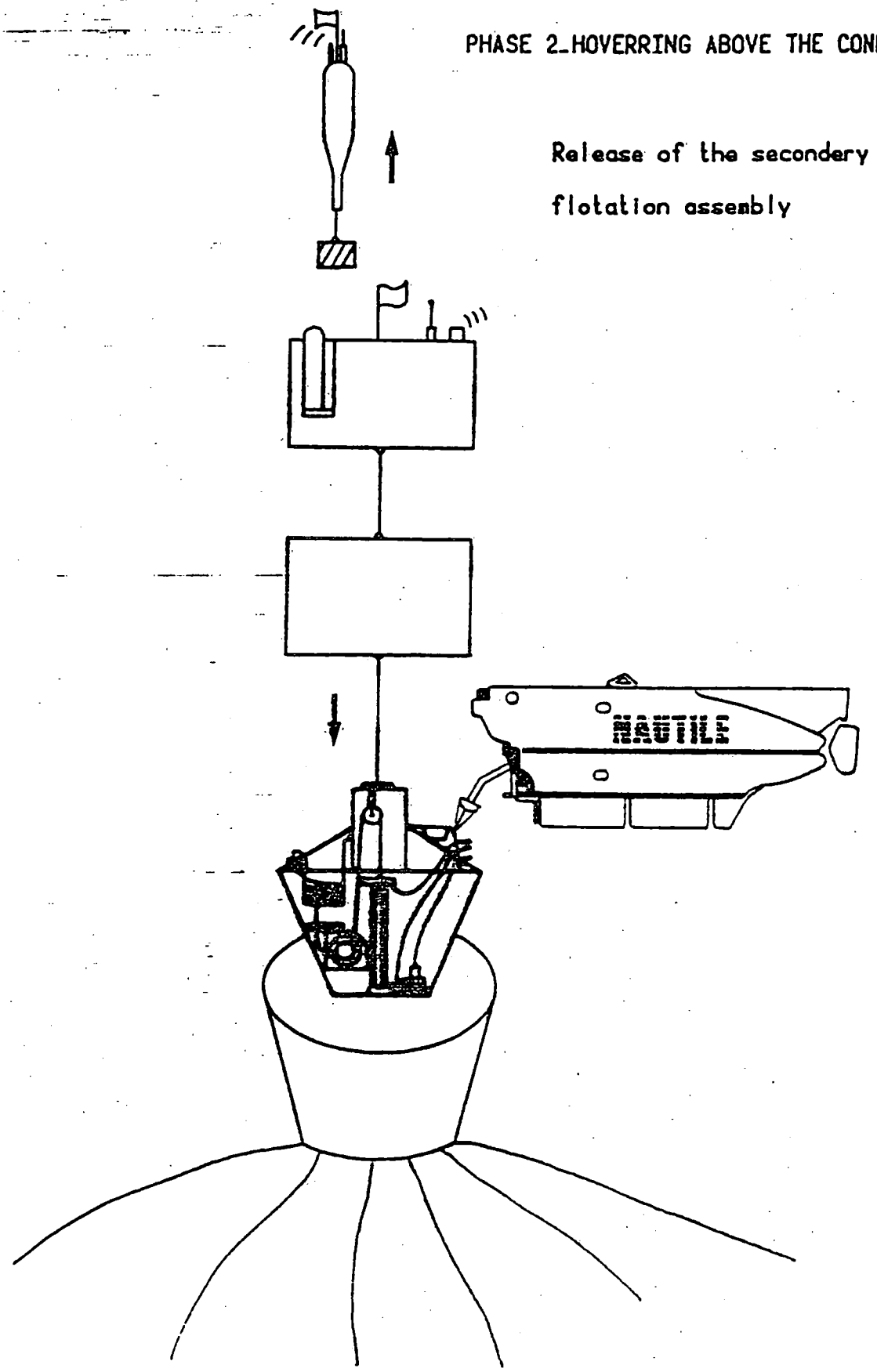
HEL: Schlumberger Hostile Environment Log
LANL: Los Alamos National Laboratory
USGS: United States Geological Survey, Water Resources Division
LBL: Lawrence Berkeley Lab
JAPEX: Japan Petroleum Exploration Co.
ORI: Ocean Research Institute

Appendix 3


Cable Tension Sensor
Cable length measuring pulley
Electro-hydraulic umbilical
Mechanical actuators
Cable Cutter
Winch
Logging tool
Dead weight (descent)
Dead weight (descent)

PHASE 2_HOVERRING ABOVE THE CONE

Release of the secondery flotation assembly



Appendix 4

1986
ODP OPERATIONS SCHEDULE
OCEAN DRILLING PROGRAM
Legs 107-112

LEG	DEPARTS LOCATION	DATE	ARRIVES AT DESTINATION	DATE	IN PORT
107	Malaga, Spain	1 Jan 1986	Marseilles, France	18 Feb	Feb 18-22
108	Marseilles, France	23 Feb	Dakar, Senegal	21 April	April 21-25
109	Dakar, Senegal	26 April	Barbados, West Indies	22 June	June 22-26
110	Barbados, West Indies	27 June	Barbados, West Indies	17 Aug	Aug 17-18
111T	Barbados, West Indies	19 Aug	Panama, Panama	26 Aug	Aug 26-30
111	Panama, Panama	31 Aug	Callao, Peru	24 Oct	Oct 24-28
112	Callao, Peru	29 Oct	Callao, Peru	17 Dec	Dec 17-19
112T	Callao, Peru	20 Dec	Punta Arenas, Chile	30 Dec	Dec 30-31

Revised 1/17/86
LEG

G. Wissmann
BGR - F.R. Germany

Re: DMP-Meeting

I want to go on record to have at least one hole of Leg ODP 108 Westafrica logged. My choices for likely holes to be logged are in delining order of priority.

1) MAU-6
MCS or LSS, HRT

At Cape Blanc (20°N) where the Requibat basement high comes closest to the coast and continental crust juts out far to the west along the paleo-Kane Fracture Zone (ca. 150 km) left-laterally there is a definite change of sedimentation from the late Paleogeneous to the north erosion (contour-following currents (?), mass-wasting, canyon-formation) cuts down into Cretaceous rocks. In the south erosional unconformities are much more subdued and inconspicuous in seismic profiles. When does the erosion occur at different points? What causes the unconformities (DSP 397)?

2) MAU-4
MCS or LSS, HRT

This site is situated on the Cape Verde Rise which was uplifted in the Miocene by intrusion of sills and ioneous bodies. The hole is to reach a M. Miocene basalt. Exact definition of overlying Neogene unconformities could quantify rates of uplift and check possible erosion (in seismic mainly paraconformities, i.e. no clear erosional unconformities visible for reflectors that are strong unconformities on the continental slope).

3) SLR-1
LSS

Are erosional time intervals on the Guinea Plateau associated w) deposition in the deep sea or does erosion prevail there also?

To my knowledge there exist no logged DSDP sites off NW Africa between Cape Blanc (20°N) and the equator. For the Circum-Atlantic Mapping Project we need precise seismic definition of Neogene unconformities via sonic parameters in a N-S transect of holes to check time-transgressive nature of possible contour-following erosional / north-flowing currents.

In the BGR study of Offshore NW-Africa deep-sea fans were considered as potential future hydrocarbon plays. Examples of such interesting deep sea fan complexes with good source rock, reservoir and trap situations exist in the Neogene (Miocene) off NW-Africa; a comparable fn complex of Lower Cretaceous age has been drilled in site 603 of DSDP Leg 93/1983 off the Baltimore Canyon Trough (Eastern North America).
To better evaluate such fans, data about the formation porosity, heatflow and geothermal grdient are badly needed off NW Africa, esp. the latter.

Therefore the use of a sonic tool (LSS or MCS) allowing inferences about porosity and enabling a precise stratigraphical correlation (in a N-S transect of 3 holes) is recommended in holes MAU-6, MAU-4 and SLR-1. These measurements should be supplemented by the high resolution temperature log, to see whether NW-Africa is really too cold a margin to be written off by the oil industry. (In fact the numerous signs of intra-plate volcanism (Cape Verde, Canaries, sea-mounts) speak against this view).

JOIDES Downhole Measurements Panel

Texas A&M University -- January 14-16, 1986

Summary of Recommendations

Leg-by-Leg Recommendations

After reviewing the objectives of each leg and the geological and geophysical data available for each site, the DMP made the following recommendations:

1. Leg 108 Moroccan Margin

If permission is not received to drill in Moroccan waters and the drilling plan must be changed, the DMP recommends deeper drilling and logging at Sites MAU-4, MAU-5, SLR-1 and EQ-3 for clay typing and seismic stratigraphic correlation.

MAU-4, MAU-5, SLR-1A, EQ-3

Hole preparation	3 hrs.
LSS combination	4
LDT/GST/ACT combination	11
	18 hrs./hole

2. Leg 109 MARK 1/395A

LITH and DMP still recommend deepening of the barerock hole and completion of downhole measurements at 395A on Leg 109.

395A	Pipe trip	12 hrs.
	T/H_2O samples	12
	German HRT	12
	Schlumberger suite	37
	BHTV	11
	MCS	11
	MCS	11
	Large scale resistivity	8
	3-axis magnetometer	15
	Magnetic susceptibility	8
	Packer	48
395D	HPC-T	6
	Pipe trip	12
		8 days
648B	Deepen hole to 200 m.	
	Schlumberger suite	24 hrs.
	BHTV	12
	MCS	8
	Packer	12
	3-axis magnetometer	6
	Magnetic susceptibility	6
		2.8 days

In addition, DMP recommends that:

a) Hole 396B be cleaned enroute to Hole 395A in preparation for the French wireline re-entry attempt scheduled in June. (1d);

b) A whipstock should be placed above the bit in Hole 395A;

c) Downhole operations should be completed in Hole 395A before the ship returns to Hole 648B;

d) Keir Becker be put in charge of downhole measurements at Site 395A;

e) 648B should be cased to the base of the nibble zone before logging:

f) If Hole 648B has to be abandoned early in the leg, the ship should return to Hole 418A to deepen the hole into the dikes and conduct downhole measurements.

Hole 418A Deepen hole into dikes	20 days
Logging and experiments as at 395A	10 days
	30 days

This will accomplish two major LITHP and DMP objectives: the deepening of a major hole into the dikes in old crust along the barerock/395A418A flowline and the geophysical characterization of Layer 2 in old crust through in situ measurements.

3. Leg 110 Barbados Thrust (revised from DMP recommendations of June 1985)

LAF-1	Schlumberger suite	36 hrs.
	Flowmeter	4
	In situ pressure (TAM packer, drill-in packer, RFT or modified Barnes/ Uyeda tool in various combinations)	5-6 days
	Heat flow	6 hrs.
	Fluid/pore water sampling (Barnes tool of RFT)	12
	BHTV	8
	Oriented coring	4
	Borehole geotechnical	1-2 days
		8-11 days

4. Leg 111 504B or EPR

Although the Panel strongly endorses barerock drilling on the EPR, the Panel recommends that Leg 111 be spent on drilling and downhole experiments at 504B because:

a) Drilling at 504B is finally within reach of the Layer 2/3 boundary--the holy graille of marine geophysics.

b) The Leg 106 experience shows that two legs will be need on the EPR to drill a barerock hole deep enough to log. Since active hydro-thermal systems are ephemeral, these legs should be closely spaced; if the Ph is low and the hole vents water, the re-entry cone

and guidebase may self-destruct before the hole can be deepened unless the legs are consecutive.

504B If Leg 111 returns to 504B, the Panel endorses the drilling and downhole measurements program outlined by Becker.

EPR If Leg 111 begins barerock drilling on the EPR, the Panel recommends a limited downhole measurements program in the barerock hole as follows:

Hel, Los Alamos or USGS high T logging suite	24 hrs.
French T probe	6
water sampler	6
USGS BHTV	12
Packer	12
Flowmeter	8
Japanese magnetometer	6
	3.1 days

and that Hole 504B be re-entered enroute to the site for the following studies:

French T probe	8 hrs.
water sampler	8
Packer	18
German 3 axis magnetometer	12
German susceptibility meter	8
VSP	24
LDT/GST/ACT combination	12
	3.8 days

5. Leg 112 Peru Margin

Paleoenvironment Sites 1, 2, 4, 9-13 (if penetration significant)

	LSS combination	2 hrs.
	LDT/GST/ACT combination	6
		8 hrs./site

Tectonic Sites 3, 6-8, 14-16

	LSS combination	4 hrs.
	LDG/GST/ACT combination	11
	$T/P/H_2O$ samples (Barnes/RFT)	8
		1 day

17	LSS combination	4 hrs.
	LDT/GST/ACT combination	12
	$T/P/H_2O$ samples	8
	Pressure meter	12
	Packer (stress)	12
	BHTV	8
	PCB	6
		2.6 days

6. Leg 113 Weddell Sea

The Panel insists that logging be conducted on Leg 113 and urges to this end, that mini cones be set at Sites W4 and 5.

W4	LSS combination	4 hrs.
	LDT combination	11
	Japanese magnetometer (in basement)	4
	T/H_2O samples	5
		1 day
W5	LSS combination	6 hrs.
	LDT combination	13
	Japanese magnetometer	8
	T/H_2O samples	8
		1.5 days
Arc Transect Sites		
	LSS combination	4 hrs.
	LDT/GST/ACT combination)	11
		.6 days/hole

Intermediate and Long-Range Planning

7. Southwest Indian Ocean Ridge

The DMP endorses the von Herzen proposal to conduct heat flow and permeability studies in the SW Indian Ocean Ridge fracture zones and the Stephen proposal to conduct the Oblique Seismic Experiment on the same leg. To the latter end, the Panel urges that a RE core be set and significant basement penetration be attempted at at least one site.

8. Japan Triple Junction

The Panel endorses both the Japanese proposal to drill a transect across the triple junction southwest of Japan and their plans to instrument the holes with long-term observatories monitoring tilt, seismicity, T and magnetic field variations.

9. Site 603 Seismic Stratigraphy

Since the VSP experiment was cancelled at Site 603 on Leg 102, it has not been possible to correlate accurately the seismic stratigraphy of the N. American Basin with the section drilled at Site 603 on Leg 93. The Panel recommends that this experiment be conducted as soon as the ship returns to the Atlantic from the Pacific.

LDGO

10. Wireline Packer/RFT

The Panel endorses LDGO's cooperative program with AMOCO t develop a wireline packer. In view of the costs and lead time involved, however, the Panel recommends that participation in the 2nd and 3rd years be contingent on the result of tests in the first, that LDGO continue to search for other vendors and that Schlumberger's RFT tool be modified for service during the interim (including 110).

11. BHTV, MCS Duplicate Tools

The Panel recommends acquisition of a digital BHTV and a second MCS tool as soon as possible to ensure reliable service on the ship.

12. Logging Manual

DMP requests that LDGO prepare an ODP training manual on logging with examples from the DSDP/ODP data base. The manual might be supplemented with logging classes on tape for shipboard use.

FRG

13. Magnetometer/Susceptibility Combination Tool

The Panel reminds the groups developing downhole magnetometer and magnetic susceptibility tools in Germany that both tools will see more use of they are configured as a combination tool.

TAMU

14. Refurbish PCB for Leg 112

TAMU is requested to refurbish the pcb for possible use on Leg 112 since a strong BSR is observed on the Peru margin.

15. Log Publication

The DMP does not recommend publication of logs parallel to and at the same vertical scale as the barrel sheets since this constitutes false accuracy. Rather, we recommend publication in Part A at a compressed scale with a bar graph on the barrel sheets to show where the logs were run.

PCOM

16. Physical/Geotechnical Properties Working Group

The Panel urges PCOM to approve the formation of a Physical Properties/Geotechnical Studies Working Group to advise the Panel on sample preservation techniques for physical properties studies, laboratory physical properties equipment and borehole geotechnical studies.

DMP

17. DMP Minutes to Co-Chiefs

To ensure the incorporation of DMP logging recommendations into the planning for each leg. The DMP chairman is instructed to send DMP minutes to the co-chief scientists for each upcoming leg.

18. Next Meetings

3rd week in July 1986 at Woods Hole. Early December 1986 in Japan.

86/64

DMP EXECUTIVE SUMMARY 1985

DMP Goals

1. Establish a state-of-the-art borehole measurements capability within the Ocean Drilling Program.

2. Acquire a worldwide marine logging data base.

3. Expand the role of geophysics and borehole measurements in the Ocean Drilling Program by sponsoring sites and legs of interest to the borehole measurements community.

Implementation

To achieve the first goal, the Panel advocates a 3-pronged approach:

1. Contract with industry for the best available commercial logging services. This has been achieved by LDGO through an extremely favourable contract with Schlumberger under which Schlumberger maintains and operates their most advanced field equipment from the D/V JOIDES Resolution while the Project provides a test platform for the company's experimental tools.

2. "Organized" equipment upgrades by LDGO. Many modifications or pieces of equipment needed by the Program are too specialized for commercial development or too complex and expensive for development by individual investigators; these must be developed directly or through subcontracts let by LDGO. This effort has been partially successful: the Panel's highest priority tool(wireline heave compensator) has been built and deployed but budget cuts have prevented or seriously delayed the development and deployment of all remaining tools on the Panel's high priority list (wireline packer; digital BHTV; multichannel sonic).

3. Equipment from individual investigators. To encourage both the introduction of new equipment and the widest participation in the Program, the Panel has endorsed and, in many instances, solicited proposals from individual investigators to develop and operate the following tools:

Straddle Packer
3 Axis Magnetometer
Magnetic Susceptibility
HPC Water Sampler
VSP
Oblique Seismic
Large Scale Resistivity
Geotechnical
Wireline Re-entry

With the exception of the wireline re-entry and borehole geotechnical instrumentation proposals, all have been funded. Proposals are currently being sought for high temperature logging, geotechnical tools and a borehole gravimeter.

To achieve the second goal (a comprehensive marine logging data base), the Panel adopted a "400 meter rule" stating that all holes over 400 m deep should be logged. As an aid to the scientific party on each leg, the Panel has instituted a review of the sites and objectives of each leg and designs a downhole measurements program for each site which is tailored to meet the objectives of the leg.

From its inception, the Panel has felt that, in addition to its role as a service panel, it has a responsibility to serve as a thematic panel for the field of geophysics. To this end the panel sponsored and manned Leg 102, is currently sponsoring the geophysical studies planned in Hole 395A on Leg 109, has proposed a return to Hole 418A to deepen the hole into the dikes and complete the borehole studies begun on Leg 102, and endorses the drilling and logging efforts proposed at Site 504 and on the East Pacific Rise (Leg 111).

Special Projects

1. High Temperature Logging. Since many of the objectives of bare rock/hydrothermal drilling can only be met if high temperature logging equipment is available, the Panel has set itself the task of locating and securing such equipment for ODP use. An extensive suite of gear is now available for Leg 111 (Appendix 1).

2. Hydrogeologic Testing for Leg 110. Four sets of hydrogeologic measurements (in addition to routine logging) are considered critical to the success of the leg: pore pressure/in situ stress, water sampling, temperature and borehole geotechnical. Current capabilities are as follows:

- Pore pressure/in situ stress. Two packers (Lynes, TAM) will be available for pore pressure and stress measurements. Stress orientation can be measured with the BHTV.

- Water sampling. The TAM wireline packer will not be available (see above) but interstitial water can be obtained using the Barnes tool and satisfactory samples can be obtained from the aquifer (if it's overpressured) using the Barnes sampler and the PFS sampler.

- Temperature. Satisfactory measurements can be obtained using the HPC temperature probe, the Uyeda tool and Schlumberger logs.

- Geotechnical properties. No equipment is available. A proposal by McClelland Engineers to upgrade existing equipment for deepwater use was rejected by the NSF.

Problem Areas

1. Cuts to LDGO tool acquisition budget.

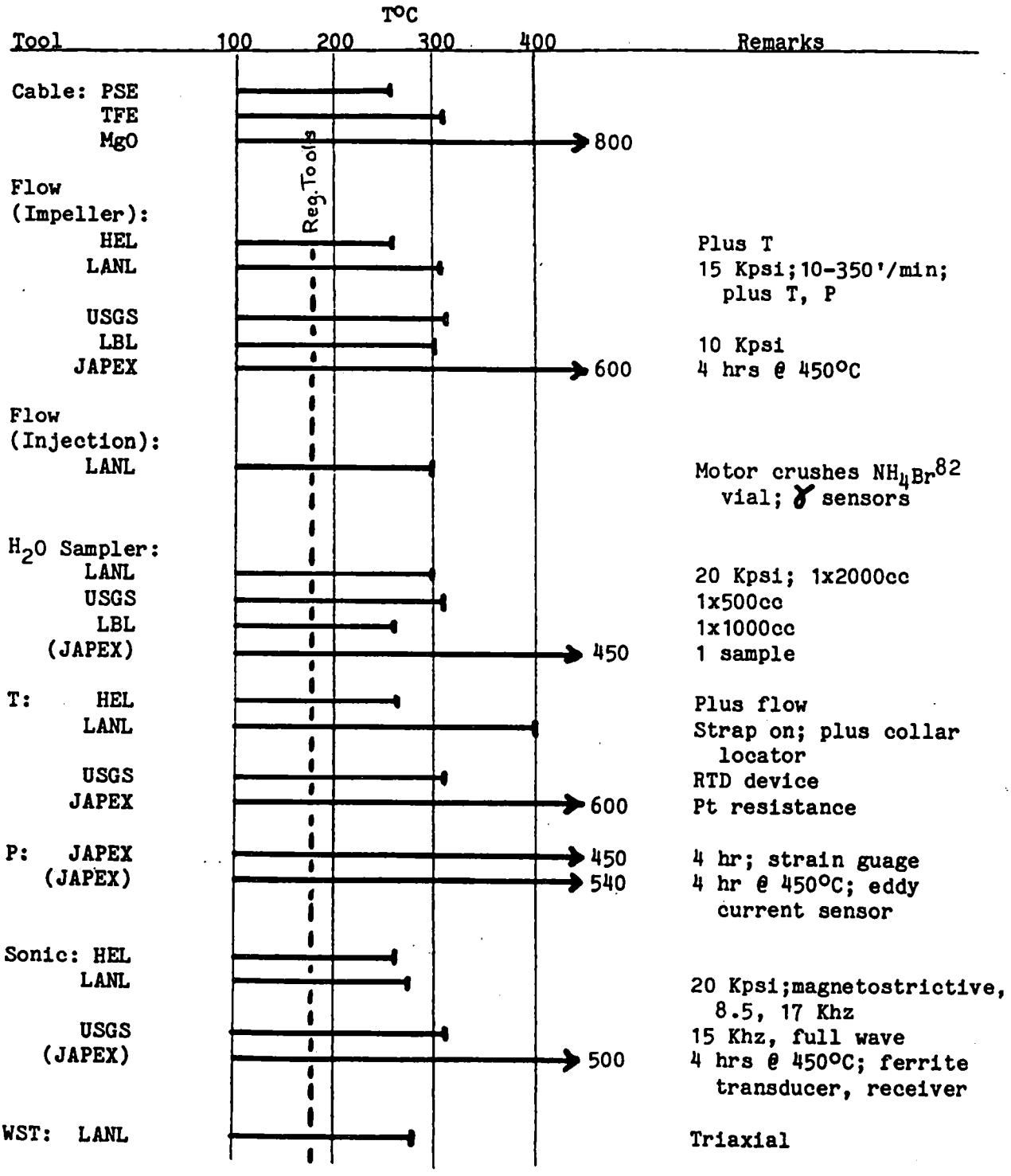
2. Long term measurements at high temperatures (electronics currently limited to about 225°C).

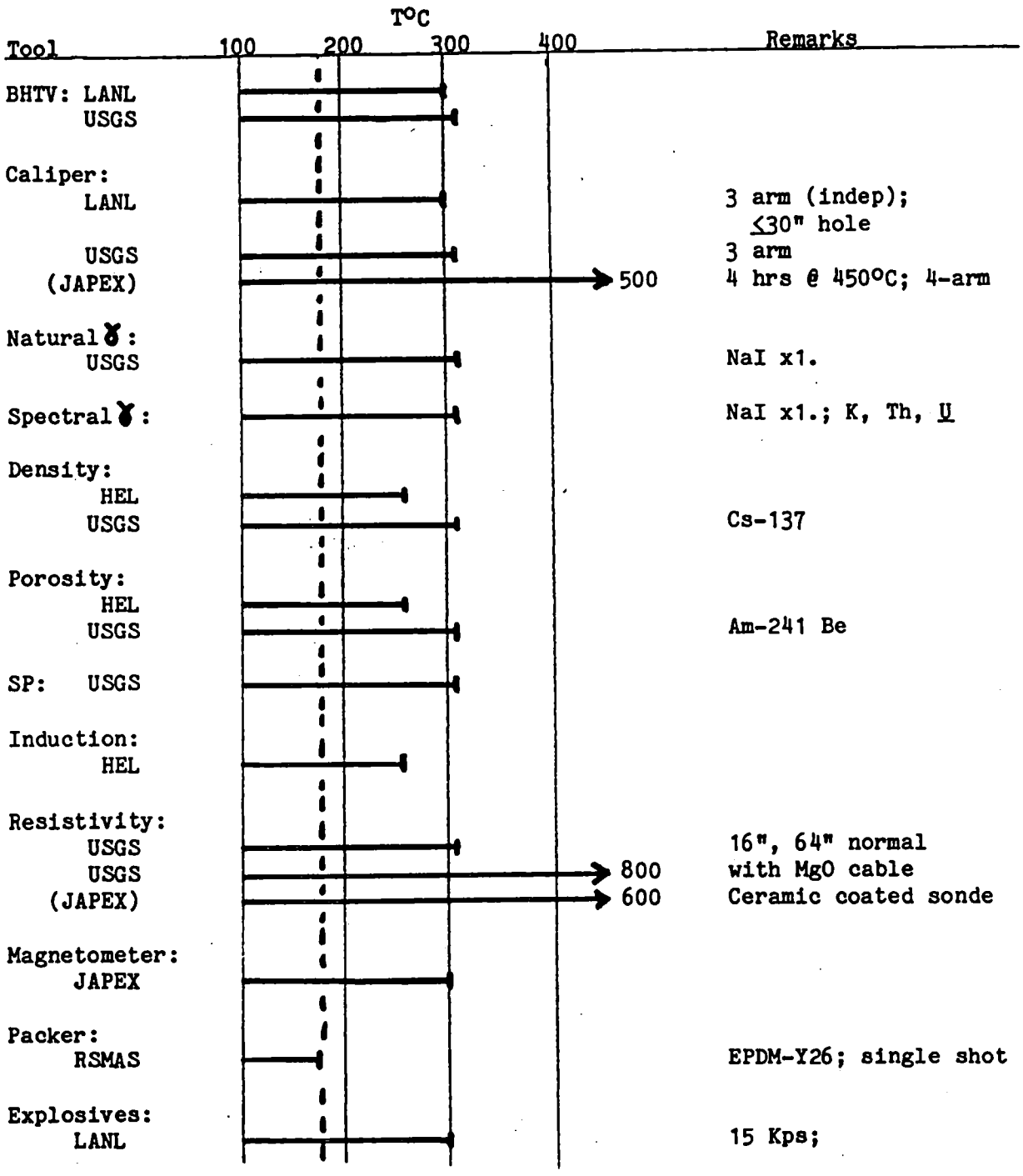
3. Need for geotechnical/physical properties and geochemical working groups.

APPENDIX 1

OPERATIONAL HIGH TEMPERATURE TOOLS

$d \leq 3\text{-}1/2"$, $P \geq 7500$ psi




T°C
100
200
300
400
Tool
Remarks
BHTV: LANL
USGS
Caliper:
LANL
3 arm (indep);
≤30" hole
USGS
3 arm
(JAPEX)
500
4 hrs @ 450°C; 4-arm
Natural γ:
USGS
NaI x1.
Spectral γ:
NaI x1.; K, Th, U
Density:
HEL
USGS
Cs-137
Porosity:
HEL
USGS
Am-241 Be
SP: USGS
Induction:
HEL
Resistivity:
USGS
16", 64" normal
USGS
800
with MgO cable
(JAPEX)
600
Ceramic coated sonde
Magnetometer:
JAPEX
Packer:
RSMAS
EPDM-Y26; single shot
Explosives:
LANL
15 Kps;