

**MEETING OF THE
JOIDES OPERATIONS COMMITTEE
AT
21-22 August, 1998
Durham, U.K.**

DRAFT MINUTES

OPCOM Members

Dave Hodell	University of Florida, Gainesville
Susan E. Humphris (Chair)	Woods Hole Oceanographic Institution
J. Casey Moore	University of California, Santa Cruz
Kensaku Tamaki	Ocean Research Institute, University of Tokyo, Japan

Liaisons

Mahlon Ball	US Geological Survey, Denver (PPSP Chair)
Jack Baldauf	Science Operator (ODP-TAMU)
Tom Janecek	Florida State University (SCIMP Chair)
Bruce Malfait	U.S. National Science Foundation
Kate Moran	Joint Oceanographic Institutions, Inc.
Mary Reagan	Wireline Logging Services (ODP-LDEO)
Shiri Srivastava	Geological Survey of Canada Atlantic (SSP Chair)

Guests & Observers

Warner Brückmann	GEOMAR, JOIDES Office Science Coordinator (elect)
Christina Chondrogianni	JOIDES Office, Woods Hole Oceanographic Institution
Kathy Ellins	JOIDES Office, Woods Hole Oceanographic Institution
John Farrell	Joint Oceanographic Institutions, Inc.
P. Jeff Fox	Science Operator, ODP-TAMU
Dave Goldberg	Wireline Logging Services (ODP-LDEO)
Bill Hay	GEOMAR, SCICOM Chair (elect)
Kate Moran	Geological Survey of Canada Atlantic
Shirley Waskilewicz	JOIDES Office, Woods Hole Oceanographic Institution

Apologies

Robert Carter	University of Townsville, Australia
Jim Natland	University of Miami, RSMAS
Alister Skinner	British Geological Survey, TEDCOM Chair

**MEETING OF THE
JOIDES OPERATIONS COMMITTEE
AT
21-22 August, 1998
Durham, U.K.**

Consensus Items

OPCOM Consensus 98-2-1

OPCOM recommends that future two-ship experiments be proposed in sufficient time to be considered one of the primary objectives of a cruise.

OPCOM Consensus 98-2-2

OPCOM recommends that Leg 185 be extended by 2.2 days to carry out a comparative test of the DCB versus the RCB, which is a programmatic priority of ODP.

OPCOM Consensus 98-2-3

OPCOM endorses another test of the hammer drill system post-dry dock. ODP/TAMU will develop and present a schedule for this test to OPCOM at their March 1999 meeting.

OPCOM Consensus 98-2-4

OPCOM strongly urges that the microbiology contamination and sampling tests take place prior to Leg 184.

OPCOM Consensus 98-2-5

OPCOM endorses SCIMP Recommendation 98-2-3 regarding IR product distribution as follows:

The standard IR product distribution should be a package containing the booklet with the Leg Summary chapter and the volume CD-ROM. After standard distribution is completed, the CD-ROM can be sold without the booklet.

The price of the booklet and CD should be set at \$25. In addition, the CD can be distributed without the booklet for a reduced cost of \$10.

OPCOM Consensus 98-2-6

OPCOM endorses SCIMP Recommendation 98-2-5 regarding revision of the submission, production, and publication procedures to take advantage of the WWW medium as follows:

- 1) Allow participants to meet the publication obligation by submitting manuscripts or data reports at any time post cruise and initiate a peer review process upon submission.
- 2) Once accepted, publish individual papers on WWW.
- 3) Link all publications to the leg-related citation list on the WWW.
- 4) Require fulfillment of obligation (deadline for submission) to be 28 months post-cruise for all publications. Allow additional manuscripts and data reports to be submitted after 28 months.
- 5) Produce and distribute a CD-ROM containing reprints of leg-related SR papers at 48 months post-cruise.
- 6) Continue to require ERB members to remain active for 48 months postcruise. After this period, have Staff Scientists coordinate the peer-review process of additional data reports.

A proviso needs to be added that deals with those manuscripts that are rejected from the outside literature. They authors should be given six months to submit a report to TAMU for publication as part of the SR.

OPCOM Consensus 98-2-7

OPCOM endorses SCIMP Recommendation 98-2-6 regarding the SR Volume as follows:

- 1) Writing or coordinating a Leg synthesis paper for publication in the SR volume will be add to the responsibilities of the Co-Chief Scientists
- 2) A booklet will be published that contains the leg synthesis paper that will accompany the volume reprint series on CD-ROM.
- 3) JOI and TAMU will determine submission deadline for synthesis paper.

OPCOM Consensus 98-2-8

OPCOM endorses SCIMP Recommendation 98-2-6 that recommends that the Science Operator investigate the costs and tasks involved in compiling and maintaining a comprehensive list of publications resulting from DSDP and ODP research, in order to assess the significance and impact of the scientific drilling program.

OPCOM Consensus 98-2-9

OPCOM encourages the continued investigation by JOI of the NGDC proposal for DSDP/ODP archiving, and also encourages exploration of a wider range of options.

Action Items

Action Item 98-2-1A

Humphris will write a letter to the Head of the German ODP Office explaining the logistical problems on Leg 179 and expressing regret at the cancellation of the two-ship experiment.

Action Item 98-2-2A

Casey and Humphris will communicate with the proponents of Leg 186 pointing out the problem with the current casing requirement, and inquiring about the minimum depth of casing needed to achieve their scientific objectives. Specifically, they will ask if the cruise objectives can be met by casing only 800 meters.

Action Item 98-2-3A

Humphris will contact the Deep Biosphere PPG to solicit a person to sail on the test cruise.

Action Item 98-2-4A

With regard to the FY'00 schedule:

- ∑ Humphris will write to the PACMANUS proponents encouraging them to find external funds to cover the excess costs associated with including LWD, to which she will attach a copy of SCICOM Motion 98-2-8.
- ∑ Humphris will write to the Tonga proponents telling them that there is a slight chance that Tonga may be in the FY 2000 schedule and explaining why.

Action Item 98-2-5A

With regard to JOI's proposal to reduce the length of ODP legs to 56 days:

- ∑ ODP/TAMU will examine the drilling history in order to develop a clearer definition of what will be gained and what will be lost.
- ∑ JOI will include Moran's proposal as an agenda item for the fall Co-Chief Scientists Review Meeting.
- ∑ JOI, in consultation with ODP/TAMU, will develop a proposal clearly stating the with disadvantages and advantages for presentation to OPCOM, and then SCICOM, in March 1999.

Action Item 98-2-6A

Humphris will write a letter from the JOIDES Office to Dan Quoidbach and his staff recognizing the contribution of the SSDB to the JOIDES Advisory Structure.

Action Item 98-2-7A

ODP-TAMU will look into developing mechanisms to track ODP-related publications and possibly through encouragement of authors to use ODP in the key words. They will report back to SCIMP.

Action 98-2-8A:

LDEO-WLS will investigate the cost implications of making the WST part of the standard logging operations.

Action Item 98-2-9A

- ∑ JOI will send letters to the reviewer acknowledging their help, informing them how to find out which proposals got scheduled.
- ∑ The JOIDES Office will change the proposal guidelines to indicate that the length of the Proponents' Response Letters has been increased from 2 to 5 pages, including figures and tables.

Action Item 98-2-10A

- ∑ Humphris will write to the ODP Member Offices and to individuals at the time of selection to serve on Panels, explaining the expected commitment of a JOIDES Panel member. The JOIDES Office will be rigorous in reporting members who miss two consecutive meetings to the ODP Member Offices.
- ∑ Humphris will communicate with SCICOM members to inform them that the SCICOM liaisons to PPGs will now become watchdogs, and they will not attend every PPG meeting, but will be expected to obtain updates on the status from the PPG Chairs.

Action Item 98-2-11A

The JOIDES office will include a statement in the proposal guidelines for proponents directing proponents to contact ODP/TAMU if problems with currents, ice, shallow water, and other hazards are anticipated.

A. Welcome and Logistics

Humphris welcomed all to the continuation of the marathon. She noted that Jim Natland could not attend due to an illness in the family. Humphris was unable to arrange for Natland's alternate to attend due to the French holidays. Both Bob Carter and his alternate were unable to attend because they were Co-Chiefs on Leg 181.

B. Proposed Agenda

Humphris reviewed the proposed agenda. Concerns about two-ship experiments raised by Kudrass were added, because he had requested that OPCOM make a statement about how two-ship programs can be dealt with in the future.

C. Update on Action Items from the March Meeting

Action Item 98-1-1A

ODP-TAMU will complete the document on the policy and procedures for drilling in strong currents in time for the August SCICOM/OPCOM Meeting.

TAMU prepared a preliminary report, which was circulated previously.

Action Item 98-1-2A

OPCOM requests that ODP-TAMU provide a written report to the JANUS Steering Committee and SCIMP on the problems encountered on Leg 177 that resulted in no paleo-data being entered in the JANUS database. The JANUS SC will review this report to determine what changes need to be made.

Paleontological data (paleo data) were not entered into the JANUS database on Leg 177. OPCOM had requested a written report to SCIMP and the JANUS Steering Committee. SCIMP responded with a recommendation to hold development and then report to SCIMP. A new version with a different front end to make it more user friendly is currently being tested on Leg 181, along with the original data entry system. TAMU will provide a report to SCIMP after the leg.

Action Item 98-1-3A

OPCOM requests that the JOIDES Office work with ODP-TAMU to ensure that responsibilities for scientists participating on an ODP leg are clearly set out and communicated to scientists.

ODP/TAMU, in conjunction with the JOIDES Office, has addressed this item by changing the wording of the letter to shipboard participants and in the list of Co-Chief responsibilities. In particular, Humphris added words to reflect that scientists sailing on an ODP cruise are representing the community and not just their own science.

Discussion:

Janecek said that SCIMP considered a list of responsibilities presented by Ann Klaus. The decision was made to table this item until the potential legal ramifications were addressed. This list was intended to be part of the information (letter) that TAMU sends to participants. The letter now states clearly that any participant is responsible for entering data. Hodell reminded OPCOM that the source of this action item was the failure of some scientists on Leg 177 to enter the paleo data into JANUS. He said he was pleased that there has been recognition that there were problems with the application, and that the problems were not a result of a group of renegade scientists who did not want to enter paleo data. Moran pointed out that the same paleo application was used successfully during the Leg 180, and stated that it could also have been used on Leg 177. She admitted that there may have been some problems, but stressed that the JANUS paleo application could have been used. Hodell reviewed the chain of events on Leg 177, and noted that a flag was not raised when the scientists stopped using JANUS.

Action Item 98-1-4A

OPCOM request ODP-TAMU to investigate the possibility of requesting donations of used equipment (in particular, gas chromatographs) to ODP.

ODP/TAMU has started looking for donors of used equipment for the ship's laboratories to ODP.

Action Item 98-1-5A

OPCOM requests that SCIMP develop a plan for the archiving and distribution of ODP data and publications in order that OPCOM can have adequate information to make decisions on such things as web sites.

SCIMP was requested to look into the archiving of data and publications in order to facilitate knowledgeable discussions and decisions regarding mirror web sites. At the June 1998 SCIMP meeting, NGDC presented a proposal of an archiving system to SCIMP. SCIMP passed a motion that encouraged NGDC to work with ODP/TAMU to archive ODP data.

Action Item 98-1-6A

OPCOM requests the LDEO-BRG conduct a critical review of the status of high temperature tools for a potential leg in the Manus Basin based on Proposal 479, the Pacmanus felsic-hosted hydrothermal system. In their review, LDEO-BRG should consider input from the SSEPs on the types of measurements that are desirable.

A review of high temperature tools by LDEO-BRG is underway.

Action Item 98-1-7A

The JOIDES Office will request that the Nankai proponents work with the SSEPs, ODP/TAMU, and LDEO-BRG to clearly define their overall drilling and logging strategy prior to the August SCICOM Meeting. Note: Confusion is connected to whether the SSEPs support a one or two leg program, and which experiments (packers and CORKs) and logging programs will be carried out.

Proponents of proposed Nankai drilling and CORKing operations met with engineers and staff at ODP/TAMU in June. They defined a drilling and logging strategy, which has been presented to SCICOM.

Action Item 98-1-8A

The SCICOM Chair will communicate with the SSEPs Chairs prior to the May meeting in order to clarify the role of the SSP liaisons as conveyors of important site survey information on proposals.

The SCICOM Chair talked to the SSEP Chairs to clarify the role of SSP liaisons and included this in a letter regarding items for their Agenda. At the May SSEP meetings, SSP liaisons presented site survey issues and participated actively in discussions.

Action Item 98-1-9A

OPCOM requests that SCIMP develop an integrated policy for sampling, data, and publications in collaboration with the ODP Publications Office and the CAB. This will include revision of the section of the ODP Publications Policy that addresses the issue of "non-performance" and which defines the obligations of the scientists participating on ODP Legs.

The new integrated policy for sampling, data, and publications is being finalized. Publication of the *Guide to ODP* is waiting for this.

Action Item 98-1-10A

The LDEO/BRG liaison to SCIMP will present a summary of the proposed logging plans of highly regarded proposals to SCIMP for their comment.

The LDEO/BRG liaison to SCIMP presented the logging plans of highly regarded proposals to SCIMP at their June meeting.

Action Item 98-1-11A

The SCICOM/OPCOM Chair will communicate with OPCOM members regarding acceptance of the of the recommendations made by the MRC (Micropaleontological Reference Center).

Acceptance of the recommendations made by the Micropaleontological Reference Centers was done by Humphris via email.

Action Item 98-1-12A

SCIMP will identify a liaison to the Deep Biosphere PPG.

SCIMP has identified either Wonn Soh or Rick Murray (most likely) as the liaison to the Deep Biosphere PPG.

Action Item 98-1-13A

The SCICOM Chair will inform the national committees of the need for an individual with microbiology expertise to serve on SCIMP when next there is a membership change on the panel.

Humphris is notifying the National Committees of the need for microbiology expertise on SCIMP as opportunities arise. Three US members have rotated off SCIMP, so Humphris will let the USSAC Chair know of this need.

Action Item 98-1-14A

OPCOM requests that ODP-TAMU include the plans for the expansion of the DML in the bid packages to go out to dry-dock vendors, with some caveat, so that it would be possible to fund this project in the event that sufficient cost-savings become available

ODP/TAMU has included the plans for the expansion of the DML in the bid packages.

D. Operational Issues since the March OPCOM Meeting

Leg 179:

Humphris reported that Kudrass had raised the issue of ODP's obligations with respect to a **two-ship operation**. Kudrass felt that he was put in an awkward position with his funding agency, not because of the cancellation of the experiment, but because the JR arrived at its port call 15 hours early, and subsequently left port for the next leg two days earlier than scheduled! Two days were required for the two-ship (JR and the *R. V. Sonne*) Offset Seismic Experiment at the NERO site.

Discussion:

Humphris noted that the two-ship operation was an add-on to Leg 179 and, therefore, was not a primary objective of the cruise. Due to the unfortunate sequence of events, there was not adequate time for the experiment. Humphris said that she could only suggest that any future two-ship experiment needs to be incorporated into the primary objectives of a leg very early on in the planning, so that it takes on a very high priority. Baldauf agreed that this was the only thing that could be done. Srivastava concurred saying that if ODP wants to encourage such ancillary experiments, they must be an integral part of the planning. Baldauf said that two ship experiments should be presented to OPCOM and given consideration for scheduling. Ellins reviewed the sequence of how the two-ship ancillary program came forward through the JOIDES system. Baldauf said that information from the Panels should be available to OPCOM prior to their meeting. Humphris said that she was comfortable that, with respect to Leg 179, ODP did the best

possible. Tamaki noted that last year he had been unhappy with the late stage of submission of the ancillary proposals for seismic experiments on Leg 179. It was decided that OPCOM may need to be more cautious about embracing all late add-ons and should take a stronger role in seeing how they will affect the cruise in question. Hodell pointed out that SCICOM had developed a prioritization for Leg 179 in March, with which he concurred, but he said he understood Kudrass' position. He suggested that a letter of regret should be sent to Germany. Humphris said that this regret could be incorporated into the letter that she plans to send explaining how OPCOM will proceed in the future.

Baldauf was asked about the costs of transporting equipment from La Spezia to the JR and whether ODP/TAMU had changed shipping companies following the fiasco. The cost of shipping the mislocated items amounted to \$110,000. Baldauf replied that ODP/TAMU has not changed the primary shipper, which works through sub-contractual agreements. TAMU may need to go into litigation to be reimbursed, but it needs to be determined whether it is worthwhile. If the matter is litigated, ODP/TAMU will take additional damages into consideration. OPCOM inquired whether it had been established that the fault lay with the shipping companies and if TAMU should put in place procedures to safeguard against such a situation arising again in the future. Baldauf said that this was being done with regard to documentation and insurance on lading. Fox said that ODP/TAMU has drawn the attention of all relevant parties to the situation. The global shipper is Palapena and, although they are not legally responsible, they are aware of their link. The Magna Shipping company is responsible. ODP/TAMU has retained a TAMU lawyer; thus anticipated legal fees will be minimized. Goldberg noted that LDEO/BRG also has shipping issues from time-to time, and he inquired whether there was an international regulatory body that oversees shipping practices, or if such matters can be resolved only through litigation. Fox said that there is no overarching body that oversees shipping. Janecek said that the issue was also raised at SCIMP. He asked if there would be a general report explaining what had occurred and what will be done in the future to prevent a recurrence. Fox responded that a report was produced for EXCOM. He added that a year ago, major changes made at TAMU affected the shipping department (it was eliminated). He said that it was the time for a review of this. Moran said that ODP/TAMU and JOI are in discussion regarding an evaluation of the changes made previously at ODP/TAMU.

Action Item 98-2-1A

Humphris will write a letter to the Head of the German ODP Office explaining the logistical problems on Leg 179 and expressing regret at the cancellation of the two-ship experiment.

OPCOM Consensus 98-2-1

OPCOM recommends that future two-ship experiments be proposed in sufficient time to be considered one of the primary objectives of a cruise.

Leg 185:

A testing of the performance of the DCB in comparison to the RCB is proposed for the last pipe trip at each of the two sites on Leg 185. Two additional days will be required because it will be necessary to swap out the bit assembled for the RCB in order to deploy the DCB. Leg 185 is now 56 days; thus the required time can be added without losing science time. The DCB utilizes a diamond-studded bit which rotates at the same speed as the RCB. Moran pointed out that the DCB being tested is an industry type. Fox said that the DCB is only one element of the larger diamond coring project. To apply diamond coring in all seafloor environments it is necessary to address the heave. Heave is not expected to be a significant problem on Leg 185, however, so it will be possible to look at the relative recovery between the DCB and the RCB. SCIMP has inquired about the impact of the larger diameter DCB assembly on ODP drilling. Fox stressed the importance of the test, adding that the development of the DCB is also part of the JAMSTEC agreement. Fox said that if the test is scheduled for Leg 185, it would build a good foundation for the interface between JAMSTEC and ODP/TAMU as the test represents the first instance of the scheduling of something related to the JAMSTEC-JOI MOU. Hodell said that commitment to engineering development must be made clear to the Co-Chiefs of Leg 185. C. Moore noted that while the Co-Chiefs have a say in the drilling plans, the ship's operator is the ultimate authority.

OPCOM Consensus 98-2-2

OPCOM recommends that Leg 185 be extended by 2.2 days to carry out a comparative test of the DCB versus the RCB, which is a programmatic priority of ODP.

Leg 186 :

Baldauf reported that it would be possible to case a total of 1600 meters at both Japan Trench sites on Leg 186, but that these casing requirements will necessitate a mid-cruise port call. Four extra days will be needed for transit and loading of the additional casing as the JR can only transport 800 meters at a time. The cost of inserting a port call is about \$33,000 which, according to Fox, is not a huge amount to ensure that adequate casing is available. He added that just assembling the casing and getting it down the hole will be a challenge. Srivastava explained that the proposed depth of penetration at the sites is 1200 meters through the sediment thickness and then 200 meters into basement. C. Moore wondered if it was necessary to case to 800 meters at each site. He also inquired how SEDCO felt about extensions to 60 day legs. Baldauf replied that this is less of a problem so long as there is a balance between the SEDCO A and B teams. Moran suggested that making legs longer is not an attractive option, and indicated that she will ask OPCOM to consider changing the target length of legs to 56 days later in this meeting.

Action 98-2-2A:

Casey and Humphris will communicate with the proponents of Leg 186 pointing out the problem with the current casing requirement, and inquiring about the minimum depth of casing needed to achieve their scientific objectives. Specifically, they will ask if the cruise objectives can be met by casing only 800 meters.

Further Testing of the Hammer Drill:

Baldauf said that the hammer drilling system is the logical strategy for drilling in the Manus Basin. Future testing of the system will require 14 days of ship time. Discussion followed as to whether this could be inserted into the schedule immediately following the dry-dock. Humphris said that she was concerned about how this would affect the ice window for Prydz Bay. Baldauf pointed out that there are several unknown elements to factor into the equation: the location and time of dry-dock, and whether there will be time-savings associated with the dry dock. ODP/TAMU is willing to commit to a test of the hammer drilling system in principle, and will know where the yard is by spring at latest, and possibly earlier. Contracts will be awarded in March, but the short list of yards under final consideration will be available sooner. Once the location of the ship yard is known in March, ODP/TAMU will be able to develop a plan to provide to OPCOM at their March meeting. If there are no time savings associated with the dry-dock, then it will be necessary to insert two to three weeks into the schedule for the test, and this may have an impact on the ideal window for Prydz Bay. Srivastava asked why the dry-dock could not be carried out in Japan. Fox responded that cost is a factor. Although ODP/TAMU would like to schedule the dry-dock in a ship yard that is in a country that is an ODP partner, it may be too expensive.

OPCOM Consensus 98-2-3

OPCOM endorses another test of the hammer drill system post-dry dock. ODP-TAMU will develop and present a schedule for this test to OPCOM at their March 1999 meeting.

Leg 185 GLT:

Goldberg requested action from OPCOM on the matter of the GLT for Leg 185, noting that the issue is time-sensitive. Humphris indicated that there were no funds available. The underlying issue is the need for a new radioactive source, which will still cost \$82,000 no matter when the GLT is scheduled.

Microbiology Contamination Test. The original plan was to conduct this test on Leg 180. Humphris requested that ODP/TAMU indicate when this could happen in the near future in order to permit OPCOM to make a statement to ensure that the test gets included in the leg and not dropped because of the Co-Chiefs' desires. Baldauf replied that Leg 183 was the most likely Leg for the contamination test, but said that Leg 182 was also a possibility. The contamination test must be done with sufficient time to assess the results prior to Leg 185. A microbiologist will need to sail on the leg on which such a test is conducted. Fox added that a commitment is also needed from the PPG to provide a liaison to work with TAMU's engineers. He noted the meeting at TAMU with PPG members where a cost of about \$60K was estimated for the contamination test. He said that, while he could not recall the man-power allocation, TAMU engineers are enthusiastic about being involved. The contamination test will involve pumping mud with a tracer and will last several hours. Hodell said that he supports the experiment as the entire Biosphere research is predicated on the outcome of this test. The reason that the contamination test did not occur on Leg 180 was because of timing (the equipment was not ready). It was not a Co-Chief issue, although Taylor (one of Co-Chiefs) had expressed concern about the increasing complexity of the leg. Baldauf noted that Co-

Chiefs are always leery of having development done on a leg. Fox raised the issue of resources and asked whether SCICOM would recommend the microbiology contamination test as the highest priority, if funds can be found.

OPCOM Consensus 98-2-4:

OPCOM strongly urges that the microbiology contamination and sampling tests take place prior to Leg 184.

Action Item 98-2-3A

Humphris will contact the Deep Biosphere PPG to solicit a person to sail on the test cruise.

Leg 183:

Although there are no real problems with Leg 183, Srivastava noted the suggestion from SSP that certain Leg 183 sites be moved. In particular, SSP recommended that KIP-3 be moved slightly along the same line. He said it was not a safety issue, but the Panel felt that the scientific objectives would stand a better chance of being met if the sites were moved. Baldauf said that these recommendations go back Co-Chiefs. In addition, Srivastava pointed out that when the Panel reviewed the legs for FY 99, it was noted that the JR would need to do some geophysical surveying on Legs 187 and 184. He said that it might even be necessary to bring out a GI gun on the JR. Baldauf said that TAMU had done this before on Leg 172 (LDEO guns were used very successfully) and site surveying is essential for Leg 184. He said that he didn't envision a problem. Ellins noted the importance of seeking clearance from nations for permission for both surveying, as well as drilling, with the JR on Leg 184.

E. The FY'00 Schedule

SCICOM Motion 98-2-9 provided the rankings of highly rated proposals based on their science. The list of the top 10 were sent forward to OPCOM for consideration for inclusion in a drilling schedule for FY'00.

SCICOM Motion 98-2-9

SCICOM approves the following ranking for programs to be considered for scheduling by OPCOM in FY'00 and beyond:

1. 445 - Nankai
2. 485 - Southern Gateways
3. 431 - W. Pacific Seismic Network (WP-1 and WP-2)
4. 448 - Ontong-Java Plateau
5. 465 - SE Pacific Paleoceanography
6. 479 - PacManus
7. 486 - Paleogene Equatorial Pacific
8. 499 - ION Equatorial Pacific
9. 455 - Laurentide Ice Sheets

10. 500 - H₂O Observatory

SCICOM recommends that Nankai be allocated 2 legs (see Motion 98-2-4) and SE Pacific Paleooceanography and Paleogene Equatorial Pacific be allocated 1.5 legs each. Ontong-Java is approved for 1 leg at this time.

The following proposals ranked below the above proposals and will not go forward to OPCOM:

11. 451 - Tonga
12. 482 - Wilkes Land
13. 450 - Taiwan
14. 463 - Shatsky Rise
15. 489 - Ross Sea

Detailed correspondence will be sent to the proponents by the SCICOM Chair appraising them of their proposal status.

Baldauf presented ODP/TAMU's logistical and budgetary considerations for each proposal under consideration (Appendix 1). Included was information regarding the total estimated days required for each proposal, the non-standard hardware or equipment required, and identified risks or special concerns (weather, currents, ice, hydrocarbons, etc.). There have been some revisions to the proponents' drilling time estimates.

The SSP Chair, Srivastava, presented a table showing the site survey readiness of proposals under consideration. He said that all the proposals under consideration for scheduling are either ready, or very close to being ready. There are no serious site survey issues.

Reagan presented the logging programs for proposal under consideration (Appendix 2). She explained that proponents have become more involved in selecting the tools, but have not included tool deployment in the time estimates for sites. This is a problem with tight legs. Most of the tools under consideration have been reviewed by SCICOM, the SSEPs and SCIMP.

431B - WP sites

ODP/TAMU. The primary concern is the weather window, which is different for WP-1A and WP-2A. This may influence the scheduling as it may be necessary to split 431B into two legs. June is a concern for WP-1A.

SSP's ranking for WP1A is 1A; WP-2A is ranked 1B. There are some chert layers (bright reflector) at WP-2A and basement is below the chert. Because there is some level of uncertainty about where basement is, SSP has requested a shotpoint map to facilitate basement identification.

Logging. BHTV, and ARI. These have been reviewed by the relevant panels.

445 - Nankai

ODP/TAMU's main concern is potential operational down-time due to strong currents. ODP/TAMU is engaged in discussions with ODL concerning operations in strong currents. The scheduling of the Nankai program may result in modifications to the contract with ODL for this leg. Weather is also a factor. Baldauf reported that the optimum weather window for Nankai is between February and May); cyclones are a potential threat later in summer. Tamaki pointed out that July was within the weather window for Nankai, which corresponds to the information on the project summary sheet for Nankai CORKing.

Note: In a review of the project summary sheet prepared by ODP/TAMU for Proposal 517 Pre (Nankai 2 - CORKing), it was noted that the optimum weather window given is mid-May to the end of July. This is different than the weather window given for Proposal 445 (Nankai 1 - Coring) although the geographic region is the same.

SSP's ranking for Nankai is 1A.

Logging. VSP and LWD for the second Nankai leg. At the SCICOM meeting, the lead proponent (G. Moore) requested the WST for the first Nankai leg. The relevant panels have not reviewed this request.

448 - Ontong Java

ODP/TAMU's estimated drilling time is based on 7 sites, assuming washing down to basement in order to minimize time; it is more than a 56 day leg. Estimated drilling time for 4 sites would be about 61 days. There will be an additional fuel cost of \$75,000. The OJP can be drilled at any time of the year; weather is not a factor.

SSP's ranking is 2A. Srivastava noted that the sediment thickness calculation (1300 to 1400 meters) may be in error; the proponents have not provided velocity information. The Panel has suggested some shifting of sites.

Logging. WST and GLT. If the GLT is not run on Leg 185, then the Californium source will need to be purchased for the OJP program.

479 - PacManus

ODP/TAMU is concerned that the proponents have not taken into consideration the proposed CORKs, although they were briefly mentioned. The proposal requires 80 days to accomplish the objectives set out. Weather is not a factor.

SSP's ranking is 1A. The proponents have supplied a lot of data, including a video which was passed onto TAMU's engineers so that they could assess whether it was adequate for site location.

Logging. All the tools for this program are high temperature specialty tools and have been requested by the proponents. These include the GHMT and the lateral Log. LDEO/BRG

has recommended LWD. Reagan explained that if LWD is done at PACMANUS, then the wireline tools will not be run. This is an either/or situation.

485 - Southern Gateways

ODP/TAMU is concerned about the potential for hydrocarbons at one site. December to April is optimal for scheduling 485.

SSP's ranking is 1A.

Logging. GHMT and WST. There is the possibility that magnetic susceptibility may be too low for the GHMT.

486 - Paleogene Equatorial Pacific

ODP/TAMU - the time required exceeds one leg by 21 days.

SSP's ranking is 1A. Some small items are still missing (i.e. a quantitative contour map of the site).

490 - Prydz Bay

ODP/TAMU. Issues are (1) funding for the GHMT has not been secured, and (2) the acquisition of an ice support vessel. Alternate sites are needed. The Cape Crafton (Australian) and two Canadian vessels (John Tully and Sir Wilfred Laurier) have been identified as possible vessel ice vessels. ODP/TAMU have previously stated that they need to keep the cost for ice support at around \$800K. The Polar Duke (used on Leg 178) may be available and there is the possibility of some Russian vessels as well. Estimated costs for the Canadian vessels are about \$1.5M, because these ships would be coming from the Northern Hemisphere. The weather window for Prydz Bay is between December and April because of the ice conditions. Ideally, the program should be scheduled between the third week of December and the end of March, with the best window from late January through February. In Wilkes Land only four weeks are ice-free.

SSP's ranking is **1B**. The SSP watchdog attended a meeting of Prydz Bay proponents and ESSEP members last fall and was able to see in the data presented at that time the ties from the shelf to the slope for some of the horizons. SSP could not see this, however, because not all the vast amount of data available had been sent to the Data Bank.

Logging. GHMT and WST. Due to difficulties experienced on Leg 178, LDEO/BRG is recommending a new tool (CDR) that Schlumberger will develop for ODP to use for Antarctic drilling. This tool will measure natural gamma and resistivity using a LWD instrument. It is less expensive than the typical LWD tools.

500 - H2O ION Site

ODP/TAMU. A reentry cone will be needed.

SSP's ranking for the H2O site Proposal was changed from 2A to 2B because the Panel was concerned that the cable and junction box could not be relocated in one of the three

sediment ponds previously surveyed. SSP felt that the location could be off by as much as 10 nautical miles. The proponents have responded maintaining that they will be able to locate the junction box very close to the proposed hole -- within to 2 nautical miles.

Logging. VSP/WST, BHTV, and ARI. Schlumberger is developing a new three component VSP tool, one of which will be permanently available on the JR.

Possible Schedule Options

Baldauf presented OPCOM with five scheduling scenarios based on the proposals sent forward from SCICOM to OPCOM. Logistics, transit times, and weather were taken into consideration. For this reason, Proposal 451 (Tonga) has been included in Option 3, although this proposal ranked 11 and was not sent forward by SCICOM to OPCOM. Fox pointed out that the functional budgets are about the same for each leg and explained that functional costs are amortized over six legs. He said that the SOEs are unique hardware requirements for the legs.

Option 1:

Leg	Rank	Program		Site Time	Transit	Total
Days						
188		Prydz Bay	Dec - Feb	30	22	51
		Transit	Feb	0	14	
	14					
189	1	Nankai	Mar - Apr	50	7	57
190	3	WP - ION	May - Jun	32	14	46
191	6	Manus Basin	Jun - Aug	50	6	56
192	4	Ontong-Java	Aug - Oct	43	13	56
193	7	Eq. Pacific	Oct. - Dec.	<u>31</u>	<u>24</u>	<u>56</u>
			TOTAL	236	99	336

Southern Gateways is not included because the correct weather window is not available. Paleogene Equatorial Pacific is possible, but will require a large transit with only 31 days on site. The total days allocated for PACMANUS and OJP is 56 days each, but drilling all the PACMANUS and OJP sites requires more time (Pacmanus = 80; OJP is closer to 61 days). LDEO's budget will be increased if LWD is carried out at PACMANUS. Fox reminded the panel about SCICOM's motion regarding expensive legs (SCICOM Motion 98-2-8). C. Moore proposed that SCICOM, in light of the cost of PACMANUS LWD, suggest that the proponents need to obtain funds for this from other sources. Goldberg explained that LWD was a recommendation from LDEO/BRG, and he reminded OPCOM that the proponents had requested wireline tools. If an ice boat is not available for Prydz Bay, then Southern Gateways could be inserted into that window. Southern Gateways may not get done unless OPCOM is willing to schedule two legs beyond FY 2000 to include Southern Gateways.

Option 2:

Leg Days	Rank	Program		Site Time	Transit	Total
188	2	Southern Gateways	Dec - Feb	51	4	55
		Transit	Feb - Mar	0	14	
	14					
189	1	Nankai	Mar - Apr	50	7	57
190	3	WP - ION	May - Jun	32	14	46
191	6	Manus Basin	Jun - Aug	50	6	56
192	4	Ontong-Java	Aug - Oct	43	13	56
193	7	Eq. Pacific	Oct. - Dec.	<u>31</u>	<u>24</u>	<u>56</u>
		TOTAL		257	82	340
		Transit	Dec - Jan		~15	
		Prydz Bay	Jan - Feb	30	22	52

This option is based on the premise that Prydz Bay does not take place in the currently scheduled slot (Leg 188). It would allow the highest ranking science to be drilled and postpone Prydz Bay for one year, giving the Prydz Bay proponents more time to acquire an ice support vessel.

Option 3:

Leg Days	Rank	Program		Site Time	Transit	Total
188	2	Southern Gateways	Dec - Feb	51	4	55
		Transit	Feb - Mar	0	14	
	14					
189	1	Nankai	Mar - Apr	50	7	57
190	3	WP - ION	May - Jun	32	14	46
191	6	Manus Basin	Jun - Aug	46	10	56
192		Tonga	Aug - Oct	50	5	55
193	4	Ontong-Java	Oct - Dec	<u>43</u>	<u>13</u>	<u>56</u>
		TOTAL		268	71	338
		Prydz Bay	Dec - Feb	30	22	52

This option represents an attempt to reduce transit times in order to achieve more science by putting the savings in transit towards science. It replaces the Paleogene Equatorial Pacific program with Tonga, even though Tonga was below the line of those proposals sent forward from SCICOM to OPCOM.

Option 4:

Leg	Rank	Program		Site Time	Transit	Total
Days						
188		Prydz Bay	Dec - Feb	30	22	52
189	2	Southern Gateways	Feb - Apr	51	4	55
		Transit	April	0	14	
	14					
190	1	Nankai	Apr - Jun	50	7	57
191	3	WP - 2A	July	15	9	24
192	6	Manus Basin	Jul - Sept	43	13	56
193	4	Ontong-Java	Sept. - Nov	<u>42</u>	<u>14</u>	<u>56</u>
		TOTAL		231	83	314

This option has both Prydz Bay and Southern Gateways in the same year. It would be possible to do only one WP ION site (WP 2) because of the weather constraints. WP1 could be drilled the following year, however, with Nankai 2.

Discussion:

C. Moore stated that he was opposed to a leg (Paleogene Equatorial Pacific) with so much transit. Humphris asked if they could accomplish anything in 30 days. Time on site is actually 29.5 days. Hodell suggested that the Equatorial Pacific could be added after OJP in Option 4. It was pointed out that the transit time is merely deferred until the next year. Hodell asked if was possible to schedule the transit time separately from the leg. Baldauf said yes, but there is still a price to pay somewhere. Hodell commented that once the ship is in the Equatorial region, ODP should drill the Equatorial Pacific ION site (Proposal 499) as well as other ranked proposals in the regions. Baldauf said that if OPCOM decides that transit times make Paleogene Equatorial Pacific impractical, then Options 3 and 4 can be considered.

Some OPCOM members objected to the inclusion of Tonga in Option 3 and suggested that, if this option was presented to SCICOM, they might not approve it. Fox suggested that if SCICOM had been able to balance the issue of a leg with only 24 to 30 days of science against Tonga, they might have decided differently. Tamaki noted that Tonga was the subject of only a brief discussion at SCICOM. He said that he thought, based on his discussions with SCICOM members after the meeting, that Tonga may be an option that would be accepted by SCICOM. Tonga's logging program is simple, with only one specialty tool costing \$40K.

Hodell asked about the weather window for Nankai. Tamaki said that he thought July was still okay for Nankai. Baldauf said that ODP/TAMU'S weather analysis is done by someone in the Meteorology Department at TAMU. There is flexibility in other schedules permitting the alternation of Nankai and WP sites, but not in Option 4. Hodell asked how late in June Nankai could be scheduled. Baldauf responded that the risk

increases the later you go into June and July. Hodell said that if Nankai could be scheduled later, then Prydz Bay, Southern Gateways, WP1, Nankai, and WP2 could be scheduled. This pushes Nankai well into July. Baldauf repeated that the risks increase. Moran suggested that it might be possible, if the dry-dock is carried out in a yard in the north, to swap the dry-dock period with Leg 187. This would permit both Nankai and the WP sites to be drilled. Baldauf agreed that there were advantages to this plan. He said that dry-dock could be adjusted by one or two months, as long as the timing was in sync with the requirements of the Bureau of Shippers. He said it might be possible to do Leg 186, Nankai and then the dry-dock, but added that does not coincide with the ideal weather window for Nankai. Humphris said Nankai, which has potential problems with currents, should be scheduled in the optimal weather window.

Humphris asked if there was a way to include both WP sites in Option 4. Baldauf explained that WP1 must be scheduled prior to June because it is the earliest site affected by typhoons. Hodell asked if WP2 could be drilled before the dry-dock. Yes, but as Reagan pointed out, it becomes a FY 99 expense and the FY program budget has no money left in it! Reagan explained that LDEO/BRG will have to rent the tools twice which will double the cost of the logging program. After a lengthy discussion, OPCOM determined that it would be difficult to fit anything in around the dry-dock unless time could be saved during dry-dock. Thus, it is not possible to do Option 4 with both WP ION sites in FY 2000. Tamaki asked about weather during a typhoon. Fox said the ship would get out of the hole and head for protected water. OPCOM determined that another problem with Option 4 is what to replace Prydz Bay with if it does not go. The suggestion was that Tonga could be inserted.

The option that most closely matches the priorities given by SCICOM is Option 4, except that WP2 would not be done until the next year (FY '01). Fox asked how critical it was to drill WP1 in FY 2000. Tamaki said that the Ocean Hemisphere Network Program (OHP), which will end in 2000, would like both WP sites drilled in 2000 in order to get data. He added that he thought that since Proposal 431B (WP ION sites) was ranked 3rd by SCICOM, it should be done in FY 2000. He noted that WP1 is more important than WP2 because it is sitting on the Philippine Sea plate and there is already a seafloor cable in place. The first ION hole could be WP1. In Option 4, however, the time slot for a WP site is July. The latest that WP1 can be drilled is early June, thus only WP2 can be drilled in Option 4. Tamaki subsequently reported that he had spoken with Suyehiro by telephone who indicated that it was not critical for WP1 to be drilled in FY 2000.

In an attempt to schedule WP1 in FY 2000, ODP/TAMU presented Option 5.

Option 5:

Leg Days	Rank	Program		Site Time	Transit	Total
188		Prydz Bay	Dec - Feb	30	22	52
189	2	Southern Gateways	Feb - Apr	51	4	55
		Transit	April	0	14	
	14					
190	3	WP 1	Apr - May	18	7	25
191	1	Nankai	Jun - July	50	7	57
192	3	WP - 2A	July - Aug	15	13	28
193	6	Manus Basin	Sept - Oct	43	13	56
194	4	Ontong-Java	Nov - Dec	<u>42</u>	<u>14</u>	<u>56</u>
			TOTAL	249	94	343

This is the same as Option 4, but with WP1 inserted before Nankai. Baldauf said that the problem with Option 5 is that Nankai is moved forward into July, which is not the ideal time, and increases the risk. Thus, in Option 5 the gain is that WP 1 is drilled early, but with the penalty of Nankai in a higher risk slot. The benefit of Option 4 is that it keeps Nankai in the optimal time. In FY 2001, it could be possible to schedule two legs, Nankai 2 and WP1, in the Northern Pacific area, thereby reducing transit times.

F. The FY' 00 Program Budget

Overview of the FY '00 Draft Program Budget

Moran explained how she developed the FY'00 budget. Elements include an average cost for ice boat (based on the FY 98 budget) and a complicated leg. Moran costed each leg at \$6 million. Her rough estimates suggest that there is \$2 million remaining towards leg enhancement and other projects. Option one would cost \$ 1.5 million without the ice boat, consequently many leg enhancements would need to be eliminated. Humphris stressed that if the Program cannot afford an ice boat now, OPCOM must convey this information to SCICOM.

Discussion of the Budget Implications of the FY'00 Scheduling Options

Option 4 is the most cost-efficient and optimal schedule in that it incorporates all the high priority objectives, except priority five, the SE Pacific Paleoceanographic Transect, which cannot be done now. The logging costs for Option 4 are \$795K/\$550K. The logging program for Option 3 (\$640K/\$350K) is cheaper than Option 2 (\$740K/450K) and the transit differential is 11 days. Any leg scheduled for October FY 2000, however, will have the cost of logging incurred in FY 2001. Thus, with Option 4, no costs for OJP will be incurred in FY 2000. Logging will be expensive in FY 2001. The higher cost of the

logging programs given above reflects LWD for PACMANUS. The lower estimate is based on the use of wireline tools for PACMANUS.

Fox noted that on legs with long transits more fuel is burned and that could increase the cost of a Paleogene Equatorial Pacific leg by up to \$500K. Option 4 is the best option as it would supply the most science for the dollar.

OPCOM expressed optimism that an ice boat could be acquired for Prydz Bay. Although ANTOSTRAT does not have funds, they have been working hard to help ODP to identify an affordable ice support vessel. Humphris noted that the Australian ice boat has come to the attention of ODP/TAMU as a result of the efforts of ANTOSTRAT. Hay said that he knew of three separate initiatives undertaken by ANTOSTRAT to secure funds, but refused to elaborate. He agreed, however, to discuss the issue privately with Moran. By the end of this calendar year, TAMU will have made their decision (go/no go) regarding an ice support vessel. Baldauf said that he expected a decision by early November.

Selection of the FY '00 Schedule

OPCOM agreed that **Option 4** should be the scenario recommended to SCICOM. Baldauf noted that some on-site times would be adjusted, and transit times would need to be tweaked once ports are organized.

Leg	Rank	Program		Site Time	Transit
188		Prydz Bay	Dec - Feb	30	22
189	2	Southern Gateways	Feb - Apr	51	4
		Transit			14
190	1	Nankai	Apr - June	50	7
191	3	WP-2 Site	July	17	9
192	6	Manus Basin	July - Sept	43	13
193	4	Ontong-Java	Sept - Nov	42	14

Hodell observed that the sea trial for the second hammer drilling test has not been included in the FY 2000 schedule. Baldauf and Humphris responded that cannot be addressed until the dry-dock is firmed up. In response to a question from Moran, it was determined that if ODP/Industry partnerships yield a proposal to add a site to a leg, it will need to go through the JOIDES Advisory Structure (including the SSEPs) in order to determine whether it would be beneficial to the Program.

OPCOM then discussed what recommendation to make to SCICOM in the event that Prydz Bay cannot be drilled. Tamaki suggested that Option 3 could be done instead. Srivastava noted that Option 3 ignored the priorities of SCICOM. Following more discussion regarding the budgetary implications of an ice boat for Prydz Bay, Baldauf said that he would communicate with sources in Australia fairly soon (within one month) in order to find out about the availability of the Australian vessel (Cape Crafton). Humphris

said that OPCOM would be remiss in not presenting another scheduling option to SCICOM in light of SCICOM motion 98-2-8. The issue for SCICOM is whether the cost of sticking to priorities is worth the cost of the transit. Humphris said that SCICOM could decide that the greater glory of the Program is served by longer transits. She added that SCICOM must be given an explanation of the trade-offs. For example, if Option 2 that includes the Paleogene Equatorial Pacific program was presented, then SCICOM would need to understand that the long transit is money taken away from science, and that a prioritization of the sites would be critical. Hodell suggested that, with respect to Option 2, it would only be fair to keep the Paleogene Equatorial Pacific leg intact and itemize the transit time.

Next followed a discussion of the best strategy to present OPCOM's recommendations to SCICOM. Humphris said that she would like to present Option 4, the option that that OPCOM preferred, to SCICOM for approval. Then she would explain that, in the event that Prydz Bay does not go, SCICOM will need to select another option. She would then solicit opinions on Option 3, asking SCICOM to take into consideration the elements just discussed by OPCOM. She will not ask for a vote on options at this time -- only on the recommended schedule. Hodell agreed with Humphris' approach. Humphris asked if this procedure was a problem for TAMU. Baldauf said that it was not, but TAMU would need to know which proposals will be scheduled by the end of the year in order to move forward with staffing and the implementation of the Science Program. It was noted that many of the same legs occur in the different options considered. Humphris noted that one complicated issue is what to tell the Tonga proponents since their proposal was not sent forward to OPCOM, but is included as an option in the event that ice support for Prydz Bay is unavailable. She will tell them that there is a slight chance that Tonga may be in the FY 2000 schedule, but she will try not to be encouraging.

Tamaki asked if there is a guarantee that WP1 will be drilled in FY 2001. Humphris said that it was broadly scheduled like Nankai 2, but added that she was reluctant to pencil in either proposal to the schedule. She said that SCICOM can only say that WP1 is high priority, but there is no guarantee that it will be scheduled. C. Moore said that he wanted a commitment that WP1 would be scheduled except in unique circumstances. Fox pointed out that the Proposal 431B was essentially cut in half and said he thought that this represented the highest commitment possible that it would be scheduled. C. Moore said he was comfortable with that level of commitment. WP1 and Nankai 2 should not be re-ranked next year as SCICOM is already committed to scheduling them.

Goldberg suggested that the PACMANUS proponents be encouraged to find external funds to cover the excess costs associated with including LWD.

Baldauf noted as a problem the fact that PACMANUS and OJP are each greater than 56 days. C. Moore said that he felt that it was the job of proponents to package their science into 56 days.

Action Item 98-2-4A

With regard to the FY'00 schedule:

- Σ Humphris will write to the PACMANUS proponents encouraging them to find external funds to cover the excess costs associated with including LWD, to which she will attach a copy of SCICOM Motion 98-2-8.

- Σ Humphris will write to the Tonga proponents telling them that there is a slight chance that Tonga may be in the FY 2000 schedule and explaining why.

Proposal for 56 Day Legs

Moran presented a proposal to change the target length of legs from 61 days to 56 days. The 56 days include port calls. She said that this would allow the Program to gain 2 more legs for science in the time remaining until 2003. The extra time/legs could be used for high priority LRP objectives, industry partnerships, or engineering tests. The shortened legs would improve morale, help solve some of SEDCO and ODP/TAMU's problems with rotational logistics, and allow more flexibility. The disadvantage would be a small increase in cost because of extra port call activities. She suggested that if the change were implemented after the dry-dock, some programs would be affected. Leg 187, for example, which is 61 days on the schedule, would have to be shortened. Moran said that she had discussed her proposal with John Tarduno, the Interior SSEP Chair, who thought it reasonable and said that proponents, with help of the SSEPs, should be able to package their highest priorities into 56 days. The adoption of 56 day legs would also allow an engineering test (hammer drilling) in this fiscal year.

Discussion:

Fox said that an important intangible benefit is the improved morale of the people who serve the Program on board the ship. Going from 61 to 56 days is a small step, but will result in higher morale and less turnover. He observed that somewhere around 45 days, shipboard participants hit a brick wall. Two years ago, a start was made to implement 56 day legs, but ODP/TAMU backed away from this because the ship moved into the Southern Ocean. The ship is now moving out of the Southern Ocean, thus the timing to consider Moran's proposal is right. Fox noted, however, that flexibility must be maintained in the target from 61 to 56. C. Moore said that it should be tried, although proponents planning legs will be upset. It was asked how the costs were small if two additional port calls would be required. Fox replied that this was because two more legs would be amortized over the next five years. Humphris pointed out that science days would be lost because extra transit days would be needed to accompany the extra two legs. Moran agreed, but stressed that more objectives of the LRP would be addressed by focusing efforts. Malfait said that there were complaints from proponents about the science of a leg being cut back because of time constraints. Baldauf suggested that some legs have more sites than are needed to address the scientific questions. Fox said that it cut both ways: in some cases the situation is analogous to taking a puppy dog and expanding it, and in others, more like stuffing a gorilla into a small cage. Moran noted that operations on paleoceanographic legs have become so efficient that it has been possible to add sites and continue to break records in core recovery. On the other hand,

C. Moore said that many legs are planned returns to previous sites; thus, this approach was like cutting the pie smaller. He added, however, that ODP would be getting fewer, but more high energy science days. Farrell said that an awareness of the target length of an ODP leg often shapes the science. Janecek suggested an analysis of the history of high priority sites drilled, and accounting of how many add-ons were included. Goldberg expressed concern that Co-Chiefs might lop off logging at certain sites if legs were shortened.

Hodell commented that the proposal is psychologically sound because there would be more legs, and thus more involvement, in the count down to 2003. But, at the same time, there would be increased costs associated with travel to legs. There are pluses and minuses, he added. Tamaki said that while there would be more transit days, he felt the total amount of science would be increased. Moran argued further that shortening legs and focusing science priorities would permit ODP to accomplish the creme de la creme science. Bruckmann pointed out that this issue should go to SCICOM because its implementation would incur additional costs for the ODP partners and their national committees. The ODP partners must have a say. Ellins suggested that the issue should be included as an agenda item for discussion at the upcoming Co-Chief Scientist Review in the fall.

Action Item 98-2-5A

With regard to JOI's proposal to reduce the length of ODP legs to 56 days:

- Σ ODP/TAMU will examine the drilling history in order to develop a clearer definition of what will be gained and what will be lost.
- Σ JOI will include Moran's proposal as an agenda item for the fall Co-Chief Scientists Review Meeting.
- Σ JOI, in consultation with ODP/TAMU, will develop a proposal clearly stating the with disadvantages and advantages for presentation to OPCOM, and then SCICOM, in March 1999.

Baldauf questioned the potential impact on the FY 2000 schedule. It was agreed that he would set up a draft schedule taking into consideration the science priorities in the legs selected and, in consultation with Humphris, attempt to establish 56 day legs. Fox reminded them of the need to allow some flexibility in scheduling the FY 2000 legs since proponents may have designed their legs on the basis of longer target leg length.

G. Panel Reports and OPCOM Action Items

SSP (S. Srivastava)

Srivastava reviewed the panel's 1997-98 activities. He noted that 11 out of 17 members had rotated off the panel in the past year. The addition of 3 new US members as part of the complement of 17 helped the panel a lot. He explained the activities of SSP liaisons

to the SSEPs, PPGs, and the Seismogenic Zone DPG. He reviewed SSP's recommendations to SCICOM and the resulting action. The first recommendation, that *the new site summary forms be revised to more clearly explain to proponents when each form should be submitted, and that a system of for electronic submission of data on these forms set up*, was accepted by SCICOM. The Panel also recommended that, *for those proposals where it is envisaged that problems may arise during drilling certain sites so that the planned scientific objectives in the proposal may not be achieved, that it becomes mandatory to include more than one alternate site or sets of alternate scientific objectives for drilling a set of other sites nearby, in order to achieve maximum scientific benefits from drilling.* SCICOM endorsed the inclusion of more alternate sites, but declined to accept alternate sets of scientific objectives for drilling other sites. Srivastava also noted the items received by the Data Bank and added that a lot of credit is due the Data Bank for assisting the SSP in their work. Humphris thanked Srivastava for carrying out a very careful and detailed job as the Chair of the SSP.

Action Item 98-2-6A

Humphris will write a letter from the JOIDES Office to Dan Quoidbach and his staff recognizing the contribution of the SSDB to the JOIDES Advisory Structure.

PPSP

There were no action items.

SCIMP (T. Janecek)

SCIMP Recommendation 98-2-1:

SciMP recommends that ODP-TAMU send out the new PALEO application for testing as soon as possible but that ODP-TAMU should not continue with significant further development until ODP-TAMU can provide a report to SciMP about the robustness of the program and success of its data capture ability. The report to SciMP does not need to wait until the next SciMP meeting. It should be distributed via email as soon as it is ready for SciMP review.

SCIMP Recommendation 98-2-2:

SciMP recommends that the Borehole Research Group develop a web-based primer on the general use of logging data and specific applications.

SCIMP has also noted that it is not always apparent how to access or use data from BRG's web site.

SCIMP Recommendation 98-2-3:

SciMP recommends:

The standard IR product distribution should be a package containing the booklet with the Leg Summary chapter and the volume CD-ROM. After standard distribution is completed, the CD-ROM can be sold without the booklet.

The price of the booklet and CD should be set at \$25. In addition, the CD can be distributed without the booklet for a reduced cost of \$10.

Humphris said that ODP-TAMU wanted to produce something that was affordable, but not a give-away. Print runs would be the same as now, although they can be adjusted in future as needed.

OPCOM Consensus 98-2-5

OPCOM endorses SCIMP Recommendation 98-2-3 regarding IR product distribution as follows:

The standard IR product distribution should be a package containing the booklet with the Leg Summary chapter and the volume CD-ROM. After standard distribution is completed, the CD-ROM can be sold without the booklet.

The price of the booklet and CD should be set at \$25. In addition, the CD can be distributed without the booklet for a reduced cost of \$10.

SCIMP Recommendation 98-2-4:

SCIMP recommends that the Scientific Results (SR) submission, production, and publication procedures be revised to take advantage of the WWW medium:

- 1) Allow participants to meet the publication obligation by submitting manuscripts or data reports at any time post cruise and initiate a peer review process upon submission.
- 2) Once accepted, publish individual papers on WWW.
- 3) Link all publications to the leg-related citation list on the WWW.
- 4) Require fulfillment of obligation (deadline for submission) to be 28 months post-cruise for all publications. Allow additional manuscripts and data reports to be submitted after 28 months.
- 5) Produce and distribute a CD-ROM containing reprints of leg-related SR papers at 48 months post-cruise.
- 6) Continue to require ERB members to remain active for 48 months postcruise. After this period, have Staff Scientists coordinate the peer-review process of additional data reports.

Discussion: Hodell asked if these recommendations were retroactive to Leg 176. How these gets implemented is an operational issue for TAMU to deal with. Hodell commented that if one wants to make things uniform, then the SR would have the brochure with a synthesis paper, which he thought a good idea. C. Moore said that TAMU has done a really good job in making this transition. This is a very good recommendation because it allows publications to go out very quickly, and avoids having manuscripts sit on a shelf until compilation is done in a few years. There needs to be a slight change to deal with those manuscripts that are rejected from the outside literature. They will be given six months to get a report in to TAMU for publication as part of the SR.

OPCOM Consensus 98-2-6

OPCOM endorses SCIMP Recommendation 98-2-5 regarding revision of the submission, production, and publication procedures to take advantage of the WWW medium as follows:

- 1) Allow participants to meet the publication obligation by submitting manuscripts or data reports at any time post cruise and initiate a peer review process upon submission.
- 2) Once accepted, publish individual papers on WWW.
- 3) Link all publications to the leg-related citation list on the WWW.
- 4) Require fulfillment of obligation (deadline for submission) to be 28 months post-cruise for all publications. Allow additional manuscripts and data reports to be submitted after 28 months.
- 5) Produce and distribute a CD-ROM containing reprints of leg-related SR papers at 48 months post-cruise.
- 6) Continue to require ERB members to remain active for 48 months postcruise. After this period, have Staff Scientists coordinate the peer-review process of additional data reports.

A proviso needs to be added that deals with those manuscripts that are rejected from the outside literature. They authors should be given six months to submit a report to TAMU for publication as part of the SR.

SCIMP Recommendation 98-2-5:

Add to co-chief responsibility: write, or coordinate, a leg synthesis paper to be published in the SR volume.

Publish a booklet that contains the leg synthesis paper to accompany the volume reprint series on CD-ROM.

JOI and TAMU will determine submission deadline for synthesis paper.

C. Moore asked what are the cost implications for the SR booklet. Fox said they were not large, but ODP-TAMU is still pricing them out. They are assuming the cost to be less than \$50K, and about \$8000 a run. The synthesis articles are also on CD-ROM. OPCOM suggested a table of contents. SCIMP did not the price of the SR volume, but it is on the same order as the IR.

OPCOM Consensus 98-2-7

OPCOM endorses SCIMP Recommendation 98-2-6 regarding the SR Volume as follows:

- 1) Writing or coordinating a Leg synthesis paper for publication in the SR volume will be add to the responsibilities of the Co-Chief Scientists
- 2) A booklet will be published that contains the leg synthesis paper that will accompany the volume reprint series on CD-ROM.
- 3) JOI and TAMU will determine submission deadline for synthesis paper.

SCIMP Recommendation 98-2-6:

SciMP recommends that the science operator investigate the costs and tasks involved in compiling and maintaining a comprehensive list of publications resulting from DSDP and ODP research, in order to assess the significance and impact of the scientific drilling program.

Fox says that the ones that should be tracked are the second generation ones that do not mention ODP in the body, but bury ODP's name in the reference. These are the ones to capture. Farrell said that it was more desirable to get the citations to ODP articles in the outside literature. Some of this could be done through personal bibliographies. The idea is to get a listing as a legacy of the program in order to show the success of ODP. The logging group already does this. Hodell suggested that authors who publish in the outside literature be encouraged to use ODP in the "key words" so that they are easily searchable (maybe even in the title).

OPCOM Consensus 98-2-8

OPCOM endorses SCIMP Recommendation 98-2-6 that recommends that the Science Operator investigate the costs and tasks involved in compiling and maintaining a comprehensive list of publications resulting from DSDP and ODP research, in order to assess the significance and impact of the scientific drilling program.

Action Item 98-2-7A

ODP-TAMU will look into developing mechanisms to track ODP-related publications and possibly through encouragement of authors to use ODP in the key words. They will report back to SCIMP.

SCIMP Recommendation 98-2-7:

SciMP recommends that JOI and ODP-TAMU adopt the revised integrated curation and publications policy.

This item was dealt with at SCICOM and no action is required from OPCOM. The final version of the integrated Curation/Publication Policy needs to go forward to EXCOM and also to NSF.

SCIMP Recommendation 98-2-8:

SciMP recommends that NGDC work with JOI to investigate the most efficient way to complete the DSDP/ODP data archiving. The results of this investigation should be presented at the next SciMP meeting.

SCIMP did not make a final recommendation on this issue because there are cost implications. Fox gave the historical perspective on how this all came about. He noted that there was a hiatus between the end of DSDP and ODP, which the Program would like to avoid this time around. NGDC has indicated a willingness to set up a mechanism

to do this. This led to Carla's proposal which came forward to SCIMP. Fox said that if the process is started now, then it will be easy and seamless to create the archive as ODP grows. Farrell said OPCOM may want to consider if there are other means of addressing the matter.

OPCOM Consensus 98-2-9

OPCOM encourages the continued investigation by JOI of the NGDC proposal for DSDP/ODP archiving, and also encourages exploration of a wider range of options.

SCIMP has recommended that the WST be part of the standard logging operations. The Panel did not visit the cost implications of this. If it became a standard tool, then the cost of deploying the tool will go down per leg (cost of insurance, shipping around as needed, etc.) Estimated costs may drop by twenty five percent from the current \$19,000 on a leg-by-leg basis. Last year, the WST was used on 4 legs. In the ensuing discussion of the associated costs, it was unclear if there are actually savings.

Action 98-2-8A:

LDEO-WLS will investigate the cost implications of making the WST part of the standard logging operations.

SCIMP was hampered by the lack of PPG reports but this has been dealt with by the recommendations from the PANCH meeting.

SCIMP's service prioritization was presented at SCICOM and was not discussed further.

4. PANCH (T. Janecek)

Janecek reported that PANCH discussed the new JOIDES Advisory Structure. All were agreed that it was functioning well and are generally happy with the changes. There were some concerns regarding SCIMP due to the Panel's broad mandate and diversity of membership. The Panel needs to change from a reactive, detail-oriented panel to one that deals more with policy, as well as proactively pursues new technologies that will benefit ODP in obtaining the goals laid out in the Long Range Plan. Recent changes within SCIMP appear to have given the panel a clearer direction. These changes include:

- A more proactive agenda, especially in developing policy for implementation by ODP-TAMU.
- New interactions with SCIMP watchdogs and TAMU lab working groups.
- Regular updates on laboratory status.
- Invitations to experts outside the panel to increase expertise.
- Greater communication among SCIMP members via electronic message boards.

TEDCOM is problematic and the Panels Chairs felt it needed to be much more proactive in order for it to be effective in helping ODP achieve the goals of the Long Range Plan. PANCH was informed that the JOIDES Office is planning a change in the structure of TEDCOM this fall (1998) that should begin address some of the concerns.

Communication between Panels is going well, and measures have been taken to address problems identified. PANCH advocates the use of more email discussions for advice and interaction between the JOIDES panels and among members, and developing a proactive rather than reactive approach.

The proposal review process is considered to be working quite well. The change in the submission procedures to a Preliminary followed by a Full proposal an improvement, although it was noted that the process was not entirely understood by the proponents, as evidenced by the fact that some Full proposals are being prematurely submitted. The external evaluation process was thought to be a helpful addition, and the targeted questions good. The important contribution of evaluators whose workload is already tremendous was recognized. PANCH recommended that Proponents' Response Letters should be increased from 2 pages, but not to exceed five pages. PANCH has also recommended that the science for the subsequent legs of multi-leg proposals be reviewed again by the SSEPs before being scheduled.

Action Item 98-2-9A

- ∑ JOI will send letters to the reviewer acknowledging their help, informing them how to find out which proposals got scheduled.
- ∑ The JOIDES Office will change the proposal guidelines to indicate that the length of the Proponents' Response Letters has been increased from 2 to 5 pages, including figures and tables.

Matters of concern for JOIDES identified by PANCH include the following:

1. Are proposals penalized by SCICOM's current system of ranking? Current practice may result in high priority proposals being ranked highly the first time, and then declining in priority when re-ranked each of the following years until the ship is in the correct geographic area. One solution would be for those proposals outside the geographic area of operation under consideration to be excluded from the ranking process.
2. The lines of communication and reporting of the PPGs needs to be clarified, and the submission of brief meeting reports must be required in order to enhance more effective communication. PANCH has recommended that the SCICOM evaluation of the progress of PPGs be done in the spring; hence the SSEP Chairs will need to attend the Spring SCICOM meeting.
3. There are too many liaisons between Panels/PPGs, and the ODP member balance is not represented in the liaison functions; i.e. there are currently too many US liaisons. To reduce costs, the Panels will use watchdogs instead of sending liaisons to some meetings. SCICOM liaisons to PPGs will also become watchdogs so as not to confuse the proper reporting lines (PPGs report to the SSEPs, not to SCICOM).

Farrell noted that the Gas Hydrates PPG is concerned with tool development, among other things, and suggested that there should be a connection to SCIMP. Janecek said that there is a SCIMP liaison to the Gas Hydrates PPG.)

4. On the issue of Panel Chair support, Farrell explained that different Panels have different levels of support. He inquired about the terms of service for panel members (This is available in the JOIDES Terms and References, which is available at JOI and at the JOIDES web site).
5. Some JOIDES panel members are not taking their roles and responsibilities seriously as demonstrated by their absence. The Panels will report to the JOIDES Office if a member of the Panel misses two consecutive meetings, and the JOIDES Office will notify the ODP Member Office.

Action Item 98-2-10A:

- ∑ Humphris will write to the ODP Member Offices and to individuals at the time of selection to serve on Panels, explaining the expected commitment of a JOIDES Panel member. The JOIDES Office will be rigorous in reporting members who miss two consecutive meetings to the ODP Member Offices.
- ∑ Humphris will communicate with SCICOM members to inform them that the SCICOM liaisons to PPGs will now become watchdogs, and they will not attend every PPG meeting, but will be expected to obtain updates on the status from the PPG Chairs.

Discussion

The SSP Chair queried whether SSP should continue to track proposals outside the area of operations. Humphris clarified the site survey review process.

Janecek said that he thought PANCH was a very useful meeting. Humphris said that she was pleased with the level of satisfaction expressed by PANCH, especially with regard to the new structure and the new proposal process. Goldberg (who has a very long history of JOIDES activity) declared this PANCH meeting, "One of the best ever!"

PANCH meetings will be moved to the Spring since the SSEP Chairs will now be attending the Spring SCICOM meetings.

H. Dry-Dock

The dry-dock was discussed at SCICOM.

I. Status of Document on Policy and Procedures for Drilling in Strong Currents

Procedures for drilling in strong currents will be part of a document (in preparation - Appendix 3) entitled, *Ocean Drilling Program: Shipboard Safety and Operating Guidelines*. ODL generally does not permit drilling operations in currents greater than 3 knots. It is stated in the contract between ODL and ODP/TAMU that ODL can shut down operations if the currents exceed 3 knots. Accurate station keeping is one element of ship operations that can be detrimentally affected by strong currents. ODP/TAMU must develop a strategy in conjunction with ODL on a case by case basis for drilling in strong currents. The document in preparation is intended as a starting point to address all safety issues, including currents. ODP/TAMU has already developed operating procedures for ice and shallow water. Now that Nankai is on the schedule, ODP/TAMU will discuss the case with ODL. ODP/TAMU would like to urge individuals who intend to submit a proposal in an area with strong currents to contact ODP/TAMU for advice.

Discussion:

Humphris said that there are now some guidelines available to which proponents can refer. These will be put on the web. Ellins suggested that the JOIDES Office can monitor proposals submitted and direct proponents to ODP/TAMU, as is done with proposals to drill in shallow water. Srivastava pointed out that SSP also directs proponents to ODP/TAMU when situations call for this. Humphris said that she would like this information to be available to proponents before a proposal is submitted. Moran said that she had not seen any clear statement of issues associated with currents and wished to see this carried out by JOI and ODP/TAMU. C. Moore suggested that a simplified bullet list is needed for the proponents. Fox said that since Leg 163, ODL carefully observes the contract so that they are properly protected.

Action Item 98-2-11A

The JOIDES office will include a statement in the proposal guidelines for proponents directing proponents to contact ODP/TAMU if problems with currents, ice, shallow water, and other hazards are anticipated.

J. Next Meeting

The next OPCOM Meeting is scheduled to take place March 24 1999. The joint SCICOM/OPCOM Meeting is scheduled for March 25; SCICOM will follow on March 26. PANCH will meet on March 23. The "Gang of Four" will meet on the evening of March 22. Humphris thanked Srivastava for his dedication to the Ocean Drilling Program, and thanked the JOIDES Office Staff for their service. Srivastava thanked Ellins for her assistance to the SSP over four years and two JOIDES Offices, and for helping the panel with the transition to the New JOIDES Advisory Structure.

Meeting Adjourned

Appendix 1 Logistical and budgetary considerations for each proposal under consideration

Appendix 2**FY 00 ODP Logging Propsectus**

**Prepared by ODP Logging Services in consultation with
proponents, SSEPs, and SCIMP
July 1998**

(431-B) W. Pacific Seismic Network

The proposal for the W. Pacific Geophysical Network is endorsed by the International Ocean Network (ION) and outlined as an initiative in the ODP Long Range Plan (LRP) as part of its long-term observatories for the Global Seismic Network. The GSN has been successful in resolving the earth's interior from land and island based seismic installations, but lacks significant coverage over large areas of the oceans. Two specific sites are identified in this proposal to study the dynamics of the subducting plates, formation of island arcs, earthquake dynamics, and their relationship with mantle convection in and near the W. Pacific. Long-term seismic observatories will be installed at both sites which are located in proximity to existing telecommunications cables and in ION-objective areas. Quiet and stable boreholes are required for these installations.

The logging program for the two Western Pacific holes is designed to measure physical properties, anisotropy, and hole shape; objectives that are quite similar to the pilot site OSN-1 drilled during Leg 136. An azimuthal resistivity tool (ARI) should be used to measure resistivity anisotropy at approximately 1-m resolution, complementing the high-resolution FMS images. Standard geophysical logs will be used to measure physical properties; hole volume can be estimated with high accuracy using a BHTV log in the basement intervals. This will significantly improve grouting procedures for the strain sensors and emplacement for the seismometers. High-resolution temperature logs should be emphasized to identify permeable zones and in-flow/out-flow from both drilling-induced and natural fractures in the holes.

(445) – Deformation and Fluid Flow Processes - Nankai

Sediments in the Nankai Trough offer the ideal record to investigate the evolution of an accretionary prism. The two proposed transects will define the interrelationship of the dynamics of deformation and fluid flow processes in the Nankai accretionary prism which is characterized by thick, faulted sequences of terrigenous sediments.

LWD/MWD operations:

The Logging-While-Drilling operations that were implemented on Legs 156, 170, and 171A (Barbados and Costa Rica prisms) allowed estimates of physical properties to be measured through highly faulted prism sediments just minutes after cutting the hole. The "first generation" LWD tools that were used to measure resistivity, density, and natural gamma ray closely approximated natural in situ conditions. The neutron porosity

data were degraded in these high-porosity marine sediments. Second generation tools are now available to measure azimuthal density and more reliable neutron porosity (ADN tool) as well as to provide at-the-bit resistivity (RAB tool) and resistivity images which are similar to an FMS log. These tools can achieve bed detection equal to or better than that resolved by standard wireline resistivity tools. These azimuthal data should be particularly valuable for information about the ephemeral macrostructures within the prism as well as measurements that are made right at the bit itself. A sonic-while-drilling tool is also available, but only operates in formations with compressional velocities $>2,000$ m/s. This tool may be applicable to the Nankai environment.

Measurement-while-drilling (POWERPulse tool) enables mud-pulsing of some LWD data uphole in real time (ring resistivity, engineering parameters, etc). Sensors for weight-on-bit (WOB) and downhole torque are included in this tool which will, of course, improve drilling control through the section. A scientific advantage of measuring downhole WOB is that it allows for changes in the rate of penetration to be quantified in terms of formation strength. When calibrated to shear strength measurements on core, an estimation of formation strength together with porosity, density and lithology information enables the pore-pressure and effective stress to be quantified as a function of depth. Determining variations in the effective stress may be critical in understanding fault stability in the Nankai prism.

Wireline and other downhole measurements:

The VSP run in casing (5-element, 3-component ASI tool) should be run in the cased hole interval to permit a velocity-depth transform to the seismic section and the construction of synthetic seismograms. The cement bond log (with the DSI tool) should also be run in cased intervals to assist in the cement evaluation. Standard wireline logs, in particular the FMS, triple combo, and dipole sonic, should be run in open hole in at least one "golden interval" where wireline, core, and LWD data are all acquired (as conditions permit). This strategy will enable the comparison of wireline and LWD data for quality control and be incorporated into either the one- or two-leg drilling/logging scenarios at Nankai.

(448) History of the Ontong Java Plateau

The purpose of this drilling proposal is to study the largest volcanic oceanic plateau, the Ontong-Java Plateau (OJP). The main objectives are to determine the age and duration of emplacement of the plateau, the range and diversity of magmatism, the environment of eruption and post-emplacement vertical tectonic history, the effect of rift-related tectonism and the paleogeography of the plateau.

The tectonic, structural and geochemical objectives of this oceanic plateau study will particularly benefit from logging data. As the main aim of this proposal is to obtain a spatial coverage of basement compositional variations, of age and paleodepth of both the main body of the plateau and its eastern salient, standard geophysical logs will be run on each hole, as well as the Formation MicroScanner (FMS) for structural and tectonic purposes.

While the recording of in-situ physical properties data is essential to core-log integration studies, the conventional logs are also useful to provide a continuous lithological and acoustic characterization of penetrated structures and to determine the lithostratigraphy of the logged sequence (e.g., the presence and thickness of lava flows and massive units).

The FMS images will contribute to a detailed description of tectonic features by a clear identification of the succession of basement units. The FMS electrical images will give the necessary high-resolution (cm-scale) for accurate description of tectonic features, in terms of lithological boundaries, bedding attitude (dip and strike), presence of fractures and faults and their spatial orientation, and degree of alteration of basement features. Detailed comparison of spatially-oriented FMS images with core images (slabbed and/or circumferential core scans) should be useful for core orientation and analysis of structural and magnetic measurements on core. The Azimuthal Resistivity Imager (ARI) should be used to measure resistivity and resistivity anisotropy, with deep penetration into the formation, complementing the FMS images. The proponents have requested the geochemical logging tool (GLT), if available for use.

Detailed information on the velocity structure of the plateau will be necessary for correlation between borehole data and seismic reflection data and to understand the regional distribution of igneous activity. Sonic logs calibrated with WST check shot surveys should provide for precise determination of the velocity structure at the OTP drill sites.

(450) Taiwan Arc Continental Collision

The proposed drilling will establish the structural geometry and kinematics in the closure of a forearc basin during active collision; investigate tectonic and surface processes operating during early phases of collision; and detail the stratigraphic record of the active arc-continent collision. In short, it seeks a thorough quantitative knowledge about structure, stratigraphy, spatial distribution and history of the strain-stress field and chronological relationship with the developing collision. Paleomagnetic determination of the history of motion in the northern part of Philippine Sea plate is also sought. Along the developing collision front, active flow exists, and fluid production together with abnormally high pore-fluid pressure may control, in part, the collision processes.

As requested by the proponents, the standard suite of logging tools, Triple Combo and FMS/Sonic, should be run at all the sites. The Triple Combo provides formation density, neutron porosity, deep/intermediate/shallow resistivity, and natural gamma ray profiles for detailed lithologic and petrophysical information. Standard LWD tools have been recommended for use via SSEP review to insure that profiles of sediment properties are recorded from the seafloor to total depth through this potentially unstable prism. The high-resolution FMS images can be used to detect, identify, and map bedding, fractures, and faults. Sonic velocity data can be used with the density log to generate synthetic seismograms to provide ground truth for interpretation of large-scale MCS profiles and provide high-resolution velocity control which is lacking in the proposed drilling area. Check-shots are highly recommended in the deeper holes to establish the depth/seismic

tie and to resolve subsurface structure and faulting, critical for modeling of this arc-continent collision process. Full waveform sonic data in regions of active fluid flow and abnormal pore-fluid pressure, can be used to study the permeability structure of the collision zones.

Present-day tectonic stress orientation in the basement zones can be investigated with BHTV images. The Azimuthal Resistivity Imager (ARI) should be used to measure resistivity and resistivity anisotropy in low-porosity igneous environments. The GHMT allows identification of paleomagnetic field reversals from total field measurement which can provide a continuous dating of sedimentary sequences and help constrain the development and extension of the collision region.

(451) Tonga Forearc

This proposal is aimed at a number of fundamental questions about the processes involved in subduction and associated magmatism, and focuses on the Tonga subduction zone in the southwestern Pacific which is the world's most active plate boundary and the type example of an extension-dominated convergent margin system. Six or seven drill sites are proposed in the Tonga forearc which together will form three transects at different latitudes, and into each of the main structural sub-divisions of the forearc. Drilling data from Leg 135 in the adjacent Lau Basin provide additional and appropriate spatial constraints.

The primary objectives of the proposal are:

1. to assess the broad-scale plate dynamics and their controls on subduction geometry and marginal basin formation
2. to constrain the deformation history of the Tonga forearc
3. to determine the role of subduction in arc rifting and marginal basin formation
4. to document and constrain the spatial and temporal variations in arc volcanism and associated igneous activity

These objectives are to be addressed by drilling either six or seven holes. All holes are planned to penetrate at least 100m into basement, with 400 to 500 m of overlying sediment.

Achievement of all the scientific objectives requires a maximum amount of information about the lithological sequence and the spatial relationships between lithological units, as well as the nature and orientation of the structural elements (faults, fractures, shears, folded/tilted bedding, etc.), and the magnitudes and orientations of the in situ stresses. A full program of downhole measurements is proposed for all holes drilled, with lithological characterization from standard geophysical logs and measurement of the orientation and frequency of occurrence of all structural features from FMS electrical images. The Azimuthal Resistivity Imager (ARI) should be used to measure resistivity and resistivity anisotropy, with deep penetration into the formation, complementing the FMS images.

(463) Shatsky Rise

A seven-hole transect across Shatsky Rise has been proposed to investigate the formation of large oceanic plateaus. The proposal aims to determine eruption timing and rates, define geochemical trends, and gather other data that would help understand the formation and evolution of Shatsky Rise.

Logging operations are planned at three holes: Reference hole (SRSH-1), South High Flank re-entry hole (SRSH-2) and North High summit re-entry hole (SRNH-1). Running the triple combo and FMS/sonic logs will enable the collection of detailed information on downhole physical properties, lithology, magnetic polarity and structural features. This information will be invaluable where recovery is incomplete, which is often the case in deep rotary cored sedimentary and basement rocks. The FMS will provide oriented bedding planes, fractures, faults, foliations, and other formation structures, dip determination and borehole shape. The Azimuthal Resistivity Imager (ARI) should be used to measure resistivity and resistivity anisotropy, with deep penetration into the formation, complementing the FMS images. The GHMT will provide borehole magnetic reversal sequences from magnetic susceptibility and total magnetic field measurements, which will help define the age of the volcanic events cored at SRSH-1.

(465) Southeast Pacific Paleooceanographic Transect

A series of triple APC plus double XCB depth transects are proposed in sediments off the west coast of South America. The goals are to determine past changes in oceanic advection and mixing between the Antarctic Circumpolar belt and the Pacific Ocean, and to develop a detailed marine record of terrestrial climate of South America. Individual depth transects are proposed (from north to south) on the Cocos Rise (7°N), Carnegie Rise, Nazca Rise, Chile Basin, and Chile Rise (50° S).

This is a two-leg proposal, though there is an alternative one-leg drilling strategy. For the two-leg strategy, the standard tools plus GHMT and WST are recommended (Leg 1: for the 2x 500 m holes and possibly the 2x 300 m holes, Leg 2: for the 2x 600 m holes and 3x >300m holes). For the one leg alternative, the maximum hole depth is 250m, and the standard tools are recommended.

The logs will provide continuous records of sediment physical and chemical properties, aiding sediment interpretation and studies of cyclicity, particularly below 150m penetration when APC core recovery typically starts to deteriorate. The GHMT can provide a magnetostratigraphy in these sediments. The susceptibility and natural gamma logs will provide a good indication of terrestrial input to the sediment. Check-shot surveys using the WST at the deeper holes will provide the time-depth linkage to the seismic section.

(479) Felsic Volcanic-Hosted Hydrothermal System/Pacmanus

The strategy that ODP has adopted and used in high-temperature ($>165^{\circ}\text{C}$) holes in the past (i.e. TAG site, Juan de Fuca ridge, 504B) is that the "hole cooling during drilling" will sufficiently depress borehole temperatures into the sustainable range such that most of the standard tool suite can be used. Using the side-entry sub (with some extra time) allows for hole cooling by pumping during logging operations. Standard logging tools can be run reliably to about 160°C . Third-party memory temperature tools are available for use at elevated borehole temperatures.

In the case that hole conditions are as poor as the ODP drilling experience at TAG, a few wireline measurements would be reliable, perhaps resistivity and gamma ray only. Because the drill pipe is typically kept 70-90 meters into the seafloor during logging operations and since key mineralization zones are shallow, the most critical intervals could not be logged with wireline tools. Alternatively, the currently available LWD tools allow for natural gamma, density, resistivity, porosity, borehole images, and possibly sonic logs to be recorded right from the mudline to TD with minimal hole degradation. Borehole images and ephemeral properties (fluid flow and density effects), as well as engineering measurements made "while-drilling" can be acquired. The temperature limit for LWD tools is 150°C , but pumping while drilling with LWD should cool the hole continuously and significantly more than during wireline logging.

(482) Antarctic Glacial History/Wilkes Land

The primary goal of this proposal is to obtain a record of Antarctic glacial history and to investigate the relations between this record with respect to global sealevel, climate and oceanographic changes during the Cenozoic. Drilling is focused on the Wilkes Land margin of Antarctica and is designed primarily to investigate fluctuations in the East Antarctic Ice Sheet. The drilling strategy combines sites on the Wilkes Land shelf and on the drift deposits on the continental rise. Shelf sites aim at providing a proximal record of ice-sheet advances and retreats preserved on the topsets and foresets of prograding shelf deposits. Drift sites should contain a nearly continuous and high-resolution (high sedimentation rate) record of glacial changes, preserved in the hemipelagic and fine-grained turbidite deposits. Correlation between shelf and rise sequences will be accomplished through seismic stratigraphy integrated with magneto- and bio-stratigraphy of the drilled sequences.

Logging program:

Downhole logging can contribute significantly to the proposed objectives as highlighted by the proponents. In particular downhole logs can provide continuous data with which to evaluate the lithostratigraphy, paleo depositional environments, magneto-stratigraphy and detailed correlation between borehole data measured in depth and seismic data measured in two-way travel time.

The standard geophysical measurements (gamma-ray, density-PEF, neutron porosity, resistivity and sonic) together with magnetic susceptibility are all sensitive to lithologic variations, and after calibration to core measurements will help quantify the presence of clay minerals, carbonate, silica, etc. Cyclic variations in the content of diatoms and clay should be well expressed in most of these logs through variations in porosity, natural radioactivity and magnetic susceptibility. The GHMT tool enables measurement of total magnetic field and magnetic susceptibility, helping place core and log measurements at a common depth scale.

Sonic and density logs will be particularly important for tying borehole data to seismic profiles via synthetic seismograms. The sonic logs should be complemented by a check shot survey using the WST and should be performed at least on one site on the shelf and one on the rise, if not at all sites. FMS images, integrated with other wireline logs, can be used to interpret changes in bedding patterns, facies and depositional environment and to investigate cyclic sedimentation patterns, even where sedimentation rates are relatively low.

Core recovery is a major concern on the continental shelf due to the potential occurrence of intervals containing coarse grained till deposits. Poor borehole stability in this environment may severely degrade the quality of most downhole measurements and in extreme cases completely preclude the deployment of wireline logging tools. In contrast, core recovery in fine-grained sediments drilled on the continental rise is likely to be good (e.g., Leg 178). LWD provides measurements immediately after the hole is drilled and prior to severe borehole degradation. Use of the CDR tool (LWD) alone at the shelf and slope sites, in conjunction with wireline logging as conditions permit, will enable the lithology-sensitive logs to be acquired in almost all conditions at relatively low cost. The CDR tool measures natural gamma ray, resistivity, and caliper logs without nuclear sources. In the event that the drill string is at risk, the CDR data can be retrieved by a wireline upload.

(485) The “Southern Gateway” between Australia and Antarctica: a proposal for ODP paleoclimatic and paleoceanographic drilling.

Objectives:

The proposed leg aims to investigate the development of the Antarctic Circum-Polar Current (ACPC) by coring five sites near Tasmania. The sites span the time interval before, during and after the Tasmanian Seaway between Antarctica and Australia opened. The open “gateway” allowed the ACPC to be initiated, leading to thermal isolation, cooling and ice build-up on Antarctica, and probably the progressive global cooling of the Cenozoic Era.

The five sites will address Middle Eocene to Quaternary paleoceanographic and paleoclimatic changes related to: Eocene rifting between Antarctica and Australia (Tasmania being the last to separate), Middle Eocene onset of Circum-Antarctic surface water circulation (40 Ma and 70°S), mid-Oligocene breakthrough of deep water (30 Ma and 60°S), Neogene development of the ACPC, including zonal variations (compared to

other Southern Ocean ODP legs), interaction of the ACPC with other currents, possible early Pliocene warming, the mid-Pleistocene transition, cyclic movements of the polar front at astronomical periodicities.

Contribution of Downhole Logging:

Downhole logs are particularly useful to measure *in-situ* properties where there is no core recovery, or where XCB core recovery is biscuity. Logs also provide a key link between core and seismic section: sonic velocity logs and WST check shot surveys enable depth to travel-time conversion, and synthetic seismograms may be directly compared to seismic section.

Standard logs will be particularly important when dealing with cyclic sediments in particular, glauconitic sediment can be identified in gamma and PEF logs. The FMS images allow bedding, turbidites, faults, clasts, nodules, and bioturbated beds in the Eocene deltaic sediment to be observed.

The total magnetic field, in tandem with the magnetic susceptibility, provides a downhole magnetic polarity stratigraphy. The present Earth's field at the sites will be strong enough to be in the range of the magnetic field sensor, and there should be a strong borehole anomaly (sites are well clear of the +/- 35° inclination zone). The sites have moved about 20° northward since the middle Eocene, but this should not prevent a full polarity stratigraphy from being obtained using the GHMT.

(486) Paleogene Equatorial Pacific Transect

The first leg of this two-leg proposal includes a north-south transect of about nine shallow penetration (deepest 205m) sites is planned, from 25°N to 5°S of the early Eocene equator. Each will be triple APC/XCB; the MDCB may be used to recover chert layers. The scientific objectives are to:

1. to study the paleoceanography of the Early Eocene warm climatic episode.
2. to track the position of the ITCZ (inter-tropical convergence zone), and the intensity of the trade winds, over the lower Neogene and Paleogene. The position of the ITCZ will be determined from the composition of the aeolian fraction (Asian loess to the north, and American andesitic to the south).
3. to investigate the Eocene hydrothermal circulation history - how might hydrothermal activity relate to either warm climates or chert formation?

The main use for the standard logs will be to delineate the stratigraphic position of the chert layers, and for precise depth matching of cored sections. The logs should also provide proxies for lithology and for characterization of *in-situ* physical properties. High-resolution resistivity measurements with the FMS tool may be useful for the quantification of sedimentary cycles. Chert layers are more likely to occur in the lower part of the boreholes, therefore within the reach of most logging tools. FMS images should also pick out the resistive chert bands quite well.

Most sites are shallow and logging tool deployments should be focused in the deeper boreholes, where penetration is greater than 150-200 mbsf (2-3 holes).

The second leg of drilling will consist of a transect of about 9 sites, from 5°N to 20°S of the Upper Eocene equator, and recover sediment sections between 150 and 440m thick. Each will be triple APC/XCB cored. The main objective is to document the decay of late Eocene climate and the abrupt transition associated with the Eocene/Oligocene boundary. The transect will allow circulation changes in the tropical ocean and atmosphere to be mapped over this critical interval. Sites are located so that middle to late Eocene will be calcareous. The rapid deepening of the CCD at the start of the Oligocene will be studied.

Drilling will provide full Eocene coverage of paleoceanographic changes and (with seismic surveys) carbonate mass balance for the equatorial Pacific and also contribute to the mapping of the location of the ITCZ over the Cenozoic. Since most of the chert is Early/early-Middle Eocene in age, less chert is expected to be encountered at these sites.

Logging will provide proxies for lithology and physical properties, which will be especially useful in the deeper penetration sites. High-resolution FMS resistivity should provide for good characterization of sedimentary cycles in this relatively low sedimentation rate environment. Sonic and density logs should be used to produce synthetic seismograms, for assigning depths to seismic section travel times, and thus help with the carbonate mass- balance calculations. The WST should also be used for precise calibration of the sonic logs and travel-time to depth conversion.

(489) Antarctic Glacial History/Ross Sea

This drilling leg aims at unraveling the Cenozoic history of the West Antarctic Ice Sheet and East Antarctic Ice Sheet (WAIS and EAIS) by drilling a series of sites on the Ross Sea shelf. Scientific objectives include:

- a) determine changes in the extent of the WAIS and EAIS and its timing, in order to assess changes in climate in the region (e.g., warming events).
- b) determine the role of WAIS and EAIS fluctuations on eustatic sealevel changes, particularly its role on high-frequency sealevel changes in the Miocene and Pliocene, prior to the onset of major Northern hemisphere glaciations.
- c) establish the record of ice shelf physiographic changes and sea ice evolution on the Ross Sea and their role on the generation of bottom water.
- d) determine the faunal and floral evolution from the onset of glaciation in Antarctica
- e) calibrate the seismic stratigraphic interpretations and seismic facies, which have been the main tools used to interpret the evolution of Antarctic ice sheets and sealevel changes.

Downhole measurements will play a key role to achieve many of these objectives, in particular with regards to:

- precise tying of borehole data to the seismic profiles using density, velocity and WST check-shot data,
- site-to-site correlation of surfaces using pattern-matching of various geophysical logs

- helping with the construction of a continuous lithologic record using various lithology-sensitive measurements,
- determining the fine-scale bedding patterns from borehole electrical images,
- possibly helping constrain the age of sedimentary sequences through cyclo-stratigraphy and magneto-stratigraphy.

Most of the geophysical log measurements are sensitive to lithologic variations, in particular the spectral gamma-ray, density and neutron porosity logs can help evaluate the content of individual clay minerals, carbonate, silica, etc. The Formation MicroScanner images will illustrate bedding patterns, facies and depositional environment, and the GHMT will allow for continuous magnetic polarity time sequence for the interval drilled. Use of these tools will be very helpful to achieve a detailed chrono- and litho-stratigraphy for the Ross Sea sites.

Core recovery is a major concern on the continental shelf due to the potential occurrence of intervals containing coarse grained till deposits. Poor borehole stability in this environment may severely degrade the quality of most downhole measurements and in extreme cases completely preclude the deployment of wireline logging tools. In contrast, core recovery in fine grained sediments drilled on the continental rise is likely to be good (e.g., Leg 178). LWD provides measurements immediately after the hole is drilled and prior to severe borehole degradation. Use of the CDR tool (LWD) alone at the shelf and slope sites, in conjunction with wireline logging as conditions permit, will enable the lithology-sensitive logs to be acquired in almost all conditions at relatively low cost. The CDR tool measures natural gamma ray, resistivity, and caliper logs without nuclear sources. In the event that the drill string is at risk, the CDR data can be retrieved by wireline upload.

(490) Antarctic Glacial History/Prydz Bay

This proposal combines drilling of glacial fan deposits on the continental slope and of sediment drifts on the continental rise. This two-pronged objective might allow the comparison of the paleoceanographic evolution (sea surface temperature, bottom water formation in the southern ocean, sea ice extent) with Antarctica ice sheet fluctuations.

These regional and global objectives can be addressed by establishing a detailed high-resolution lithostratigraphy which can be obtained from a combination of standard geophysical (sonic, density, porosity, resistivity and gamma ray) data with the FMS records. Logging will contribute to the effort by identifying both cyclical lithologic variations and lithological responses to climatic transitions, and by providing important inter-site correlation. Ice rafted debris and turbiditic deposits can be delineated by their physical properties, notably gamma ray and magnetic susceptibility, and by the FMS imagery. The GHMT (magnetic susceptibility and total magnetic field) is strongly recommended in this high latitude environment in order to allow for the construction of a depth/time tie through the detection of reversals of the paleomagnetic field, especially for sites located on the continental rise. This is the only means to provide a continuous dating of the cored interval and thus a precise determination of the sedimentation rates.

The establishment of synthetic seismograms from WST as well as density and acoustic data is useful to the lateral extrapolation of results derived from drilling. The correlation of sediment core properties to log data can provide depth ties to resolve the undistorted depth of sedimentary layers from individual cores.

Core recovery is a major concern on the continental shelf due to the potential occurrence of intervals containing coarse grained till deposits. Poor borehole stability in this environment may severely degrade the quality of most downhole measurements and in extreme cases completely preclude the deployment of wireline logging tools. In contrast, core recovery in fine grained sediments drilled on the continental rise is likely to be good (e.g., Leg 178). LWD provides measurements immediately after the hole is drilled and prior to severe borehole degradation. Use of the CDR tool (LWD) alone at the shelf and slope sites, in conjunction with wireline logging as conditions permit, will enable the lithology-sensitive logs to be acquired in almost all conditions at relatively low cost. The CDR tool measures natural gamma ray, resistivity, and caliper logs without nuclear sources. In the event that the drill string is at risk, the CDR data can be retrieved by wireline upload.

(499) ION Equatorial Site

The primary objectives of this proposal are specifically to address the second of the three Initiatives in the ODP Long Range Plan (1995): in-situ monitoring of geological processes, and to study Mantle Dynamics and Global Seismic Monitoring. This reference site on fast-spreading Pacific plate crust, with an age of 10-12 Ma, is expected to provide an important step towards relating seismic observations to lithostratigraphy. This site will be drilled 100-500 m into basement, cased and cemented, and a re-entry cone installed. The installation of downhole equipment will be done using wireline re-entry and does not require installation by the drill ship. The site will include at least a broadband, triaxial borehole seismometer.

The proponents request that the drilling be followed by a full suite of downhole logs. These downhole log data will not only provide first-hand field data for constraints on boundary conditions for later modeling and inversion of structures and physical properties of the Crust, Mantle, and Core, but also provide excellent shipboard quality check on the hole conditions and the evaluation of the influence of the borehole environment on the performance of installed borehole measurements. Standard geophysical logs should be used to measure physical properties. An azimuthal resistivity Imager tool (ARI) should be used to measure electrical anisotropy with approximately 1-m resolution. FMS will provide cm-resolution of hole conditions, fractures, and anisotropy. Hole shape can be measured using the BHTV. A cement bond log is recommended to evaluate the grouting quality of the casing. In open hole sections, high resolution temperature logs, e.g. TLT (Lamont Temperature Tool) should be run to identify permeable zones and in-flow / out-flow from both drilling-induced and natural fractures in the hole that may affect the placement of downhole seismometers. A WST check shot or VSP survey is highly recommended to tie seismic observations to lithostratigraphy and to the downhole log data.

(500) Drilling Fast Spread Pacific Crust at the H2O (Hawaii-2 Observatory) Long Term Seafloor Observatory

The main objective of this multidisciplinary proposal concerns the creation of long-term observatories at the H2O Site (approximately located half-way between California and Hawaii). The purposes of this project are (a) an in situ study of the fast spread Pacific crust, (b) the integration of the site in the Ocean Seismic Network, (c) the continuous monitoring of geophysical and geochemical experiments in the crust.

These objectives will particularly benefit from downhole measurements as indicated by the proponents. The recommended logging program should include the standard geophysical string (Triple Combo) and the Formation MicroScanner string (FMS-sonic). Furthermore, we recommend the use of the BoreHole Televiwer (BHTV), and the recording of the spontaneous potential (SP, available with the resistivity tool in the triple combo string) and temperature.

A suite of borehole imaging tools (acoustic and electric) are highly recommended for this site, including the Formation MicroScanner (FMS), the Azimuthal Resistivity Imager (ARI) and an acoustic borehole televiwer (BHTV), to identify large and small-scale fractures, lithological units, and stress-induced breakout features. Comparison of features detected by these log images could provide information on the lateral extension of the fracture system beyond the borehole and the significance of borehole-induced versus natural fractures. The temperature and SP logs can be used to determine the thermal flux and thermal conductivity of the crust with the goal of understanding the hydrothermal circulation at this site. Downhole measurements will also be useful to optimize the penetration into the basement for the seismic station and the to characterize the hole and casing for downhole instrumentation

(504) NARM Non-Volcanic Transect I - Deep-Hole - Site NB-3A

Understanding early passive margin development and the nature of the continent-ocean transition is proposed by drilling a deep-hole into the Newfoundland Basin (conjugate of the Iberian margin). Site specific objectives include:

- (1) examine age, composition and age-depth history of the basement (continental versus oceanic),
- (2) determine the origin of the "U"-unconformity (i.e. the inferred breakup unconformity) and the overlying unconformities to constrain the age of the extensional deformation.,

The logging plan includes both standard Triple-Combo and FMS-Sonic tool strings and the GHMT as well as a temperature log.

The log data will be used primarily for interpretation and correlation of seismic reflection data to determine the unconformities within the overlying sediments. The standard logs will be used to calculate synthetic seismograms and to derive lithology (clay content, carbonate, dolomite, etc.). It is highly recommended that a check-shot survey be

performed to provide for precise time-depth conversion and calibration of the sonic traveltimes. The GHMT combined total field and susceptibility logs may be used to estimate the remanent magnetic field preserved in the sediments and date the sequence even if recovery is poor. The spectral gamma ray and the PEF/Litho-density were shown to be the most important logs to reconstruct the lithology during Leg 173. The FMS may be of moderate relevance for the upper post-rift sediments, however, it will be of major importance in the deeper part of the hole if core recovery is poor, to evaluate the nature of bedding, sedimentary structures and fault geometry below the U-unconformity.

Because this hole anticipates significant penetration, logging should be planned in two or more operation phases so as to ensure that data is acquired as the drilling progresses.

Appendix 3**Draft Copy****OCEAN DRILLING PROGRAM
SHIPBOARD SAFETY AND OPERATING GUIDELINES****TABLE OF CONTENTS****PART I: DRILLING/CORING OPERATIONS****I. GENERAL SAFETY & OPERATIONAL CONSIDERATIONS**

- A. Responsibility & Authority
- B. The Contract
- C. Policy
- D. Optimizing Operations & Safety

II. PLANNING & SAFETY MEETINGS

- A. Scientific Proposals & Pre-Leg Planning
- B. Initial Introduction & Safety Meeting
- C. Pre-Spud Meetings
- D. Rig Safety Meetings & Program

III. CORING GUIDELINES

- A. APC Coring Guidelines
- B. XCB & RCB Coring Guidelines
- C. Standing Instructions To Drillers

IV. ENVIRONMENTAL CONDITIONS

- A. Weather
- B. Heading
- C. Station Keeping
- D. Vessel Motion
- E. Currents
- F. Hanging Off The Drill String

V. EQUIPMENT LIMITATIONS

- A. Hoisting/Rig Equipment
- B. Drill String
- C. Severing & Backoff
- D. Coring Wireline
- E. Reentry & VIT/TV
- F. Logging Wireline
- G. Kinley Wireline Cutter

VI. SHALLOW WATER OPERATIONS

- A. General Guidelines for Shallow Water Operations
- B. Positioning Considerations & Beacons
- C. Logging In Shallow Water

VII. HYDROCARBON SAFETY

- A. Pollution Hazard Reduction
- B. Monitoring & Evaluating Hydrocarbons
- C. Backflow
- D. Detecting A Kick
- E. Running Back To Bottom
- F. Controlling A Kick
- G. Minor Flows
- H. Major Flows
- I. Hydrates & Gassy Cores

VIII. H₂S HAZARDS**IX. HIGH & LOW LATITUDE & ICE HAZARDS****X. COMBINED HAZARDS**

- A. Environmental & Operations
- B. BSRs, Hydrates, Gas, & H₂S
- C. Fire
- D. High Temperature Formations

XI. APPENDIX