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May 26, 1993

Memorandum

To: Brian Lewis, Chairman, JOI-PCOM

From: Mahlon M. Ball, Chairman, JOI-PPSP M.M. Ball by yc

Subject: PPSP meeting of April 1-2, 1993

This meeting was held in a conference room of GEOMAR, Kiel, Germany.

Attendance:

JOI-PPSP
- Yutaka Aoki
- George Claypool
- Claude Delas
- Mimi Fortier
- Dietrich Horn
- Martin Hovland
- Barry Katz
- David MacKenzie
- Ed Purdy

TAMU-ODP-SP
- Kevin Burke
- Thomas Thompson
- Henk Wories

ODP-TAMU
- Tim Francis

JOI-PCOM
- Brian Lewis

JOI-SSP-Liaison
- Kim Kastens

JOI-ODP-Data Bank
- Greg Mountain

Chief Scientists
- Leg 150, Greg Mountain
- Leg 151, Annik Myhre
  Jorn Thiede
- Leg 152, Hans Christian Larsen
- Leg 156, Tom Shipley

Proponents
- Alboran Sea, Tony Watts

Geomar Guests
- Ingo Pecher
- Roland von Huene

George Claypool opened the meeting by requesting self introductions and circulating a signature list to attendees.

Jorn Thiede and Roland von Huene, Geomar hosts, greeted attendees and made housekeeping announcements.

Minutes of last meeting were approved.

Tim Francis reported on drilling operations. The following is based on Francis' discussion and Glen Foss' memo, to Francis, of 12 January 1993 concerning H_2S encountered on Leg 146, Cascadia Accretionary Prism. Foss was ODP Operations Superintendent on Leg 146.

High H_2S concentrations derived from hydrates at site 892 were unexpected. The initial H_2S core smelled of "rotten eggs" as soon as the drill string was "broken" and the core barrel laid out. Marine specialist Kuro Kuroki immediately checked the ends of the core liner with a hand-held H_2S monitor. The monitor read offscale (in excess of 100 ppm). Foss, ODP Operations Superintendent, on receiving this information recognized the situation was potentially serious. The lab officer and Mate on Duty were notified and unprotected personnel were moved to a safe distance from the core as Foss proceeded to the drill floor. Foss learned that a crew member had been made dizzy and was nearly overcome by gas when the core was removed from the barrel. Foss instructed the drill crew to stop the wireline trip and hold the next core barrel in the drill string below the ship until further notice. A general announcement of "Hydrogen Sulfide Alert" was made via the PA system. Non-essential personnel were directed to stay clear of the rig floor and core walk until further notice. Marine specialists donned breathing apparatus (BA's) to finish core-walk processing of the core which was left on the rack to degas.

A meeting was held in the chem lab (to consult geochemists without delaying gas analyses that were in progress). The ODL Drilling Superintendent, Captain, ODP Operations Superintendent, Lab Officer, Chief Scientists, Staff Scientist, and geochemists (including a PPSP member) were in attendance. The high H_2S concentrations were confirmed by gas chromatograph. It was agreed that the H_2S was associated with the hydrates and that somehow hydration facilitated the extremely high H_2S concentrations. It was recognized that it was fortunate that key personnel trained in H_2S safety were present (B. Julson, Foss, and Kuroki had received training in connection with preparation for leg 139. ODP technical staff were trained in the use of breathing apparatus and ODL rig personnel had applicable training through their ongoing safety training program).

It was not possible to implement full H_2S safety procedures set forth in ODP Technical Note 16 as most monitoring and breathing equipment was removed from the ship after leg 139. Remaining equipment consisted of two electronic detectors, conventional (Draeger) detectors, and the ship's standard stock of (BA's) for emergency use. The consensus was that the core on deck could be processed safely

and that subsequent cores would be processed on a core-by-core basis as the supply of air for breathing apparatus permitted.

Before operations resumed, all those working with cores were briefed on safety precautions. A member of the drill crew, wearing a BA, was given a hand-held detector to "sniff" the drill pipe and the top of the inner barrel when the drill pipe connection was broken. All core walk personnel were required to wear BA's until meter readings indicated safe conditions. The core liner was perforated and left on the outdoor rack for degassing. Core 2 also had high H_2S readings and was handled without incident. The H_2S zone, at this site, was limited to the upper 20 m of the sediment section.

Although degassing time for cores 1 and 2 was judged adequate and low meter readings were registered adjacent to the perforated liners of these cores, when split, personnel working on the cores complained of dizziness, headaches, and nausea. The cores were moved outside for further degassing.

Hole 892C was put down with a wash core barrel. The core barrel filled with H_2S hydrate charged sediment so the H_2S Alert declared as a precautionary measure was warranted. The H_2S zone was cored again in holes 892D and E. The same precautions were taken and no problems developed.

Experiences of Leg 146 may raise questions regarding the adequacy of ODP's preparedness for dealing with H_2S problems. Clearly, without the preparations made for Leg 139, hole 892 operations would have been terminated, after core 1, sacrificing a considerable amount of science. It is also possible that casualties might have occurred before it was realized that dangerous amounts of H2S were involved.

Foss feels that current ODP policies are adequate for the following reasons:

1) Accumulations of H_2S at site 892 are exceptional. Nothing similar has been encountered in 25 years of DSDP/ODP worldwide ocean coring.

2) Equipment available for Leg 146 together with training available as a result of preparation for Leg 139 sufficed to avoid sacrifice of Leg 146 science objectives and to avoid injury to shipboard personnel.

3) ODP policy (Technical Note 16) already requires special training and equipment for legs where H_2S presence is deemed likely.

Since this surprise encounter with H_2S rich sediments, ODP has taken the following actions:

1) The number of ODP staff (Operations Superintendents, Laboratory Officers, Assistant Laboratory Officers) who get regular H_2S training has been increased.

2) All ODP's portable H_2S detectors are now kept on the ship. Fixed detector equipment is stored on the ship, but will not be permanently installed (because of the occurrence of false alarms and the burden of maintenance) except for legs with known H_2S targets.
3) A revised "H_2S Contingency Plan" is in preparation.
4) A warning is being issued about the hazards which might be encountered at Site 892.

PPSP will review the actions taken at its next meeting.

Francis described aspects of the Santa Barbara piston coring operation including the prevalence of seismic evidence of gas saturated sediments and the considerable disruption of core material by gas expansion that indicate PPSP should discuss this venture more fully. Martin Hovland (PPSP and leg 146 scientist) will be asked to lead this discussion at PPSP's next meeting.

Brian Lewis summarized PCOM activities pertinent to PPSP. The major item of interest was his enumeration of high-priority proposals currently favored by thematic panels. PPSP, with SSP assistance, will select from these candidates for safety preview as soon as possible.

Greg Mountain reported on the status of the ODP data bank. A replacement for Carl Brenner is in the process of being selected. Late delivery of packages for safety review continues to be a problem. Tom Shipley said that the data bank doesn't require material to be delivered soon enough and that some chief scientists feel that the Safety Manual is not suitable for all legs.

Mountain then proceeded to discuss the regional geology and geophysics of Leg 150, the New Jersey slope and rise. Objectives are to date Oligocene and Miocene unconformities as part of the larger study of the history of sea level changes in this area. Following his introductory description, Mountain led the site-by-site review of changes and additions to the New Jersey margin drilling program.

MAT 11 Previously approved at 38°56.22'N, 72°49.00'W. Deepening to a sub-bottom depth of 1200 m was approved.

MAT 13 At 39°12.60'N, 72°26.94'W (CDP 5900 on seismic line EW1002) approved to a sub-bottom depth of 950 m.

MAT 14 At 38°37.00'N, 72°17.30'W (CDP 10880 on seismic line BGR 201) approved to a sub-bottom depth of 1430 m.

MAT 15 At 38°51.60'N, 72°50.40'W (CDP 2537 on line EW 1006) approved to a sub-bottom depth of 860 m.

MAT 16 At 38°53.04'N, 72°52.86'W (CDP 2875 on seismic line EW 1006) approved to a sub-bottom depth of 1230 m.

MAT 17 At 38°31.80', 72°05.50'W (CDP 4380 on seismic line USGS 25) approved to a sub-bottom depth of 1530 m.

Claude Delas then described the regional geology, geophysics, and scientific objectives of Leg 153 MARK. This leg is intended to drill mantle peridotites and gabbros on the Mid-Atlantic Ridge at the Kane Fracture Zone. There is no risk of encountering hydrocarbons at this location.

Delas lead the discussion of the two sites proposed for this leg.

MK 1 At 23°34'N, 45°02'W, approved as proposed.

MK 2 At 23°21'N, 45°01'W, approved as proposed.

Jorn Thiede and Annik Myhre then described the regional geology, geophysics and scientific objectives of Leg 151, North Atlantic Arctic Gateways I. This leg is intended to increase understanding of causes and consequences of global climatic and environmental change.

Following their description of regional characteristics and goals, Thiede and Myhre lead the discussion of the site-by-site safety review.

ICEP-1 At 69°15'N, 12°42'W, approved to a sub-bottom penetration of 370 m.

FRAM-1B At 78°33'N, 5°E, approved to a sub-bottom penetration of 810 m.

FRAM-1A At 78°36'N, 3°E, approved to a sub-bottom penetration of 875 m.

YERM 1 At 81°05.5'N, 7°E, approved to a sub-bottom penetration of 750 m.

YERM 3 At 80°25.5'N, 8°13'E, approved to a sub-bottom penetration of 500 m.

YERM 5 At 79°58.5'N, 1°42'E, approved to a sub-bottom penetration of 600 m.

YERM 2A At SP 955 on line AW 191131, approved to a sub-bottom penetration of 600 m.

YERM 4 At 80°16'N, 6°38'E, approved to a sub-bottom penetration of 500 m.

FRAM 2 At 78°22'N, 1°25'E, approved to a sub-bottom penetration of 360 m with the understanding that seismic data at this site be reprocessed.

EGM 2 At 75°25'N, 7°20'W, approved to a sub-bottom depth of 750 m.

EGM 4 At 70°30'N, 18°20'W, approved to a sub-bottom depth of 800 m.

EGM 1 At 74°52'N, 10°06.5'W, approved to a sub-bottom depth of 900 m.

EGM 3 — At 78°28.5'N, 13°9'W (SP 804 on line NGT 46) approved to a sub-bottom depth of 900 m.

ICEP 3 — At 66°56'N, 6°27'W, approved to a sub-bottom depth of 500 m.

ICEP 2 — At 66°54'N, 5°56'W, approved to a sub-bottom depth of 700 m.

ICEP 4 — At SP 6615 on seismic line UB-ICEP-2, Segment D, approved to a sub-bottom depth of 300 m.

NIFR 1 — At 63°26.55'N, 7°14.51'W, approved to a sub-bottom depth of 1000 m.

SIFR 1 — At 60°33.30'N, 11°29.0'W, approved to a sub-bottom depth of 500 m. The quality of seismic data at this site is poor.

Dave MacKenzie asked that the minutes reflect recognition of possible ice problems on Leg 151 and need for site relocations at sea pending ODP/PPSP approval. Delas asked that undrilled approved holes be reevaluated in light of Leg 151 results prior to drilling on any subsequent leg in the Arctic gateways.

Tony Watts described the regional geology, geophysics and scientific objectives of drilling in the Alboran Sea (Westernmost Mediterranean). The problem of the Alboran Basin is to explain the existence of this Neogene extensional feature between the converging margins of Africa and Eurasia.

Watts led a site-by-site discussion of the 4 sites planned for the Alboran Basin.

AL-1 — Deep hole (sub-bottom penetration of 2700-3000 m) planned to penetrate the upper portion of Unit 6, a possible olistostrome with a mix of clays, silty clays, sand and carbonate. This unit is overpressured in a commercial well toward the north off the Spanish coast.

AL-2 — A 1300 m penetration on the crest of basement high.

AL-3 — A 1300-1550 m penetration on the flank of the Alboran Ridge bottoming in package of sediments that pinches out on the ridge flank.

AL-4 — A 1250-1850 m penetration in a graben in the eastern Alboran basin.

A number of potentially hazardous situations are associated with these sites. MacKenzie emphasized the problem of the deep overpressured section at AL-1. Barry Katz and Tommy Thompson pointed out the danger represented by high gas readings in the updip commercial well in the basal interval proposed for penetration by AL-1. Thompson stressed the fact that the non-commercial character of the updip shows did not make this problem go away. Delas and Dietrich Horn expressed the opinion that the overpressured section couldn't be safely drilled without setting casing and using weighted drilling mud. Ed Purdy, Martin

Hovland, and Yutaka Aoki all emphasized the need for detailed velocity analysis to detect overpressured section prior to drilling. Delas asked whether there was an information about surface shows near the Elf wells to the north off the Spanish coast and stressed the need for a good structure map on a seismic event at the total depth to be penetrated in AL-1. Delas also said AL-2 should be moved off its present location on a structural crest. Mimi Fortier emphasized the potential for pinchout traps at AL-3 and Horn said AL-4 would have to be relocated to avoid deep structural highs. Kevin Burke expressed the opinion that more mapping could enable movement of sites to avoid potential structural traps but problems of overpressured section would be hard to overcome. Henk Wories cited the potential for source rocks in the thickening section downdip, toward the southwest, adjacent to AL-1 and the possibility of turbidite reservoirs. Watts said that an Alboran drilling leg could be made without AL-1. Watts expressed some reservations about the amount of time that might be devoted to additional studies on the AL-1 site when a likelihood still existed that the site would be turned down. The sense conveyed by the overall discussion of the AL-1 site was that it would not be approved.

Hans Christian Larsen described the regional geology, geophysics and scientific objectives of Leg 152, S.E. Greenland. This leg begins a transect of the S.E. Greenland margin.

Larsen then led the site-by-site safety review for Leg 152.

EG63-1 At 63°27'46"N, 39°43'30"W, approved to a sub-bottom penetration of 1000 m.

EG63-2 At 63°05'52"N, 38°38'10"W, approved to a sub-bottom penetration of 1800 m.

EG63-3 At 62°40'45"N, 37°27'26"W, approved to a sub-bottom penetration of 1700 m.

EG63-4 At 63°12'43"N, 38°56'42"W, approved to a sub-bottom penetration of 1400 m.

MacKenzie observed that Larsen's safety review presentation was exemplary and recommended that the presentation be videotaped and distributed to future chief scientists as instructional material. Larsen attributed the acceptance of his presentation, at least in part, to his having read the safety manual.

Shipley described the regional geology, geophysics and scientific objectives of Leg 156, Barbados Ridge, Shipley treated the subjects of structure, reservoir, seal and hydrocarbons well. During the site-by-site preview, no negative comments regarding safety problems were made.

NBR 1 Proposed sub-bottom penetration of 700 m.

NBR 2 Proposed sub-bottom penetration of 950 m.

NBR 3 Proposed sub-bottom penetration of 820 m. This hole will intersect a high-amplitude, reverse-polarity, fault-plane reflection modeled as water bearing zone.

NBR 4 Proposed sub-bottom penetration of 540 m.

NR5 5 Proposed sub-bottom penetration of 960 m.

Hovland made a presentation dealing with detection of gas in shallow sediments. Regarding the North Sea, Vanguard blowout, high resolution, 3-D seismic measurements indicate the shallow gas reservoir consists of sands deposited from relatively high energy currents channeled in a network of iceberg gouge tracks. Other examples of anastomosing channel systems serving as shallow gas reservoirs were given.

Roland von Huene described geophysical analyses of Bottom Simulating Reflections (BSRs). Apparently, some free gas below the hydrate base is necessary to give rise to the observed seismic response associated with BSRs.

Francis summarized results of the shallow gas detection meeting in February. Open hole drilling appears to be the best safety option where shallow gas hazards are a potential problem. A general conclusion is that in water depth of 200 m or less, a high resolution hazard survey should be conducted. This type of survey should be adequate to detect gas hazards to a depth of at least 1000 m. A report presenting guidelines for detection of gas hazards for ODP drilling in water depths of 200 m or less is being prepared by Mahlon Ball and ODP staff.

In discussion of old and new business it is apparent that several members of PPSP haven't received copies of the new safety manual. This will be remedied prior to PPSP's next meeting.

The next meeting is planned for the week of October 18-22, 1993, at Woods Hole.

At this point the meeting was adjourned.