

EMD Gas Hydrate Committee -- Status Report

November 2, 2004

The following report has been prepared to review recent EMD activities related to gas hydrates. Tim Collett and Art Johnson, AAPG-EMD Gas Hydrate Committee Co-Chairs prepared this report.

The Energy Mineral Division continues to contribute to the increased awareness of gas hydrates as a potential energy resource. The 2004 Annual Meeting in Dallas, Texas featured three gas hydrate sessions jointly sponsored by EMD and SEPM. EMD will also sponsor a hydrate poster session at the 2005 Annual Meeting in Calgary. We have also been approached to arrange a gas hydrate contribution to the 2006 Annual Meeting. The most significant AAPG-EMD gas hydrate related event for this year was the sponsoring of a Hedberg research Conference on Gas Hydrates in early September; which will include the publication of a 60+ chapter research publication on the energy-hazard-climate aspects of gas hydrates. EMD's continued commitment to the contributions listed above is gratefully acknowledged.

The 2004 Annual Meeting, Dallas

The 2004 Annual Meeting in Dallas included three gas hydrate sessions jointly sponsored by EMD and SEPM. The gas hydrate oral and posters sessions (including 31 presentations) dealt with gas hydrate energy issues and slope stability problems associated with the occurrence of gas hydrates in marine environments.

The annual meeting of the AAPG-EMD Gas Hydrate Committee was held in Dallas on April 20, 2004 (in conjunction with the 2004 AAPG Annual Meeting). Because the convention included 19 oral gas hydrate presentations and 12 posters, the committee meeting was planned with a less formal format than usual, consisting of information sharing among the meeting's 38 attendees. The following is a recap of the meeting.

Chair Art Johnson opened the meeting and welcomed 38 participants from North America and Australia. The Hedberg Research Conference on Gas Hydrates was discussed. A one-page description of the conference was made available and all present were encouraged to get additional information from the AAPG website or by contacting either Art Johnson or Tim Collett.

Gulf of Mexico JIP

Bill Shedd (MMS) reported on the Gulf of Mexico JIP drilling schedule. Due to problems involving the EPA discharge permit, the drilling/coring program that had been scheduled to begin in May, 2004 has been moved back to April, 2005. In addition to the Atwater and Keathley Canyon sites, alternative locations are being evaluated for the program. With the additional time available prior to drilling, the committee discussed the opportunity of gathering additional data in the Atwater area with an AUV survey that would include side-scanning sonar and other tools.

New International Consortium

Edith Allison (DOE) led a discussion of a new gas hydrate consortium being established through APEC (Asia Pacific Economic Cooperation). Plans for the consortium were announced at the November, 2003 International Gas Hydrate Workshop in Chile and consortium was endorsed by 15 APEC countries (including China and Japan) at a recent APEC meeting in China. As currently envisioned, the consortium will focus on exploration of gas hydrates on the Pacific Rim. Individual projects are envisioned to be of less than one year duration and less than \$1 million. Examples of projects include seismic acquisition, coring, and sampling. Projects will be driven by research community needs. An organizational meeting is being planned for 04/05, probably in San Francisco. There will be at most a minimal charge for joining the consortium. Ms. Allison will be the primary contact.

BP Exploration (Alaska), Inc. – DOE Alaska Gas Hydrate Project Update

Robert Hunter (program manager for the BP gas hydrate project) led a discussion on recent and planned projects on the North Slope of Alaska. BP continues its work in gaining a better understanding of gas hydrates and the underlying free gas system with a goal of determining whether gas hydrates can be part of an overall gas portfolio. There was strong agreement from those present that a petroleum systems approach is key to gas hydrate exploration.

Mauer-Anadarko Alaska research Program Discussion

The committee discussed the impact of the plugging and abandoning of the “Hot Ice” well on the North Slope. Several of those present noted that the lack of success with that well had raised concerns within some government agencies about the validity of future hydrate research. It was viewed as critically important for this group and those groups we represent to clearly manage expectations for gas hydrate research programs and help minimize any negative repercussions on current and planned research activities. In particular, dry holes are an expected part of any exploration program and also provide valuable information. It was also viewed as important that the DOE determine what led up to this “failure” to enhance future activities.

Mallik Update

The results of the 2002 Mallik program were discussed. Because no one directly involved in the Mallik Consortium was in attendance, the discussion was in general terms regarding the positive aspects of the program. The fact that gas was actually produced and flared from hydrate-bearing reservoirs was seen as very encouraging. Industry publications have noted the small amount of gas produced and framed the results in negative terms, not realizing that with the methods employed in the test, the results are actually quite promising. The relative permeability of gas hydrate-bearing formations is a critical issue, and there is some controversy around possible gas “lost” into formation during flow testing. George Moridis’ modeling, as presented at the December, 2003 meeting in Chiba, showed that commercial flow rates are possible using a moveable heating source. The Geological Survey of Canada has an announcement on their website regarding publication of Mallik results (~March 2005).

Japan Update

The committee discussed the current Japanese drilling program in the Nankai Trough although little hard information is available as yet. Richard Uden (Rock Solid Images) described some of the work that he had undertaken with the Japanese. The research on seismic attributes shows elastic and amplitude attenuation, contrary to intuition. Cross-well tomography with the shallow gas hydrates at Mallik also shows this attribute attenuation. Initial results of the current Nankai Trough drilling program are planned for the Hedberg Research Conference.

MMS GOM Resource Assessment

Pulak Ray and Bill Shedd discussed the US Minerals Management Service assessment of gas hydrate resources. The methodology for the assessment was finalized at a meeting two weeks ago that included MMS personnel, Tim Collett (USGS) and Roger Sassen (Texas A&M). It was noted that the assessment will take a petroleum systems approach and there was a strong consensus from those present supporting this. The MMS will evaluate four play types separately. Seeps and mounds were determined not to be producible and will not be part of the assessment. The database collected reveals that over deepwater 1,100 wells have LWD data, mostly GR and resistivity. The MMS plans to evaluate well and seismic data, map potential reservoir sands, and evaluate any indications of gas and gas hydrate. The goal of the project is a set of “3D” maps and probability of the four play types presented in GIS-based system maps. An initial component of the project is an isochron from water bottom to top salt. Low gas hydrate probability areas will be identified: including thick minibasins without indications of thermogenic-derived gas and/or with shallow (50-100 ms) salts. Areas with a high probability for gas hydrates will be identified. These include salt edges, amplitude anomalies, and

associated hydrocarbon seepage areas. The assessment will start with a test area, and then expand to the entire deepwater Gulf. Preliminary results will be presented at the Hedberg Research Conference, including mapped amplitudes and bathymetry. The complete assessment of the Gulf of Mexico is due in December, 2005, with assessments of other areas of the US to be undertaken later.

Round Table Discussion

Several representatives from Shell were present. They noted that Shell's primary interest in gas hydrates at this time is with regard to drilling hazards. They may seek involvement at some level in the Gulf of Mexico JIP. Two representatives from Marine Desalination Systems were present. MDS takes an alternative approach to gas hydrates as they are focused on the creation of hydrates rather than on their dissociation. MDS is researching the application of gas hydrates in the desalination of sea water at their lab in St. Petersburg, FL. John Osegovic (MDS) noted that the chemistry involved in hydrate formation indicates a simple phase boundary without significant problems. He also noted that salinity is a linear effect. MDS has achieved very high rates of production of gas hydrates (on the order of kg/sec). MDS has submitted an abstract for the Hedberg Conference.

The 2005 Annual Meeting, Calgary

The 2005 Annual meeting in Calgary, Alberta, Canada will see a EMD sponsored poster session on gas hydrates. The EMD gas hydrate session in Calgary will be co-chaired by Kirk Osadetz and Scott Dallimore (both with the Geological Survey of Canada). This session will deal mostly with gas hydrate energy issues in Canada, with a specific focus on reporting the results of the Mallik 2002 Gas Hydrate Production test Well project. One of the main goals of this coming year will be to solicit new members to the Gas Hydrate Committee and make EMD and the AAPG a central organizing body for gas hydrate research and development activities. Last year saw the regular meeting of the EMD Gas Hydrate Committee (in association with the AAPG Annual Meeting in Dallas) decline slightly to 38 participants, but with about half of the members representing industry concerns. We will continue to actively solicit the participation of representatives from the National gas hydrate research programs in the United States, Japan, and India. This year's AAPG-EMD Gas Hydrate Committee meeting, associated with the AAPG Annual Meeting in Calgary will again be held at its regular time on Tuesday evening.

Hedberg Research Conference on Gas Hydrates

From September 12th through the 16th the AAPG hosted a Hedberg Research Conference titled *Gas Hydrates: Energy Resource Potential and Associated Geologic Hazards*. This conference was convened in Vancouver, British Columbia, Canada. It is important to note that EMD was listed in all conference materials as a co-sponsor of the Hedberg conference in recognition of EMD's history of support for gas hydrate research and development issues. This co-sponsorship recognition came with no financial commitment from EMD. The primary objectives of the Hedberg Research Conference on gas hydrates was to critically examine the geologic parameters that control the occurrence and stability of gas hydrates, assess the volume of natural gas stored within known gas hydrate accumulations, assess exploration methods for identifying gas hydrate prospects, identify the technologies needed to economically produce gas from hydrate, assess possible marine slope stability hazards that can be attributed the occurrence of gas hydrate, and analyze the effects of gas hydrate on drilling safety. Because of overwhelming interest, we were forced to expand the conference registration to a maximum of 120 participants (from more than 15 countries), yet we still had a long waiting list. In keeping with the spirit of open communication and the exchange of ideas through both formal and informal group discussions, we felt it was important to limit the number of conference participants. The conference featured 46 oral presentations, 42 poster presentations, three formal discussion sessions, a banquet key note address by Marlan Downey titled *Boulders in the Path, Problems on the Way Towards The Gas Hydrate Rainbow*, and the conference concluded with a panel discussion on geology and energy resource potential of gas hydrates. For more information on the Hedberg conference on gas hydrates see the Education Department section of the AAPG web site.

It is important to note that all of the extended abstracts published in the conference proceedings volume and all associated conference acknowledgments are now being moved from the active side of the AAPG web site to the archival site. We will need to build links in the EMD web site to the Hedberg gas hydrate conference web site. More detailed meeting summaries are still being prepared for publication in the Explorer, the EMD web site, and in the DOE gas hydrate project news letter.

Gas Hydrate Book Proposal

As a continuation of the Hedberg Research Conference in Vancouver, the conveners of the conference are soliciting contributors to a special publication on gas hydrates. The planned publication will follow the goals of the Hedberg conference; however, the contents of this special publication will be expanded to include all aspects of gas hydrates in nature including supportive laboratory studies and related climate change studies. We are soliciting the submission of both long topical summaries and short focused research papers. Contributions can draw directly from the Hedberg Conference presentations or can be on any other relevant topic. Submissions from non conference participants are welcome. We will also likely invite other editors to help with this effort. At this time we have no firm commitment from a publisher; however, after we have compiled a list of probable contributors (which now totals more than 60+ papers) we will likely approach the AAPG Publication Department/Committee with a proposal for either an AAPG Memoir or AAPG Studies and Geology series publication. We may also consider publishing a special book publication with EMD. Depending on the number of submissions and the type of publication we will be moving ahead with, we are likely considering paper lengths in the range of 6,000-10,000 words; with possible additional room allotted for significant summary contributions. To avoid conflicts with other important conferences we are delaying the submission deadline for this publication until **August 1, 2005**; however, we plan to publish this volume by the end of 2005.