Minutes
Methane Hydrates Advisory Committee
Atlanta, Georgia
January 28-29, 2010

Thursday, January 28, 2010

1. Introduction

The Methane Hydrate Advisory Committee Meeting (MHAC) convened at 9:00 a.m. at the Georgia Institute of Technology in Atlanta, Georgia on Thursday, January 28, 2010.

1.1 Welcome and Introductions by Guido DeHoratiis, Acting Designated Federal Officer (DFO), Office of Oil and Natural Gas

Mr. DeHoratiis kicked off the meeting by welcoming all the members to Atlanta and asking everyone to introduce themselves. Mr. DeHoratiis was acting as the DFO in place of Chris Smith. His first topic was the U.S. Department of Energy (DOE) budget. He explained that the DOE methane hydrate budget will be released on Monday, February 1st and he feels the methane hydrate funding request will be supported in 2011. There is a sense within DOE that natural gas will play an important part in our country's future for several decades. He then turned the meeting over to the MHAC chair, Dendy Sloan. Dr. Sloan briefly discussed the National Research Council (NRC) report and re-iterated their view that scientific oversight was the primary role of the MHAC.

2. Presentations

All presentations and corresponding questions and discussion from the first day of the two-day meeting follow.

2.1 Report of Committee representatives' meeting with Secretary Chu by Richard Charter, National Outer Continental Shelf (OCS) Coalition

Richard Charter of the National OCS Coalition gave the MHAC an overview of the MHAC representatives' meeting with DOE Secretary Steven Chu. The Committee representatives sensed that Secretary Chu was very interested in the science of methane hydrate. Even so, the Committee representatives felt they needed to stress to the Secretary that methane hydrate as a resource is not too far off in the distant future. CO_2 sequestration is also a strong area of interest for the Secretary and the discussions on the CO_2/CH_4 exchange project by ConocoPhillips were particularly relevant. Good questions were raised about the hazards of producing gas from hydrate and impact on water quality. There was an awareness and excitement on the part of the Secretary's staff. Secretary Chu also commented on the environmental concerns/risks. He is very familiar with carbon sequestration and understands how there are synergies with methane hydrate.

Mr. Charter next showed that the FY2010 budget appropriation is $15 million for methane hydrate (which is significantly less than the requested $25 million). The appropriation also included $20 million for a new R&D program in the area of unconventional fossil fuels (which includes $4 million to supplement the Methane Hydrate Program).

2.1.1 Discussion

The budget appropriation process was the first topic discussed after the presentation. The importance of how the timing can be so crucial for a meeting with the Secretary or a visit to Capitol Hill was stressed. The effect the Committee can have on the FY 2011 budget has already passed. In the spring of 2010 the budget for 2012 will be considered. The Committee also discussed the importance of keeping the issue of methane hydrate in front of the Secretary with regular meetings. Finally, it was noted that the MHAC is not authorized to lobby DOE and visits to Congress cannot be reimbursed.

The general sense of the meeting was that the Secretary had tough questions and that indicated the strong interest by him and his staff in methane hydrates. The discussion concluded with the DFO explaining that he will notify the Committee chair on any and all methane hydrate developments.

2.2 Report and Discussion on Modeling Hydrate in the Global Climate Cycle by David Archer, University of Chicago

The next presentation was given by David Archer of the University of Chicago. Dr. Archer explained the different pathways methane hydrate can be released from formations in the seafloor to affect the climate. He explained that if all the methane in hydrate formations were to somehow be released into the atmosphere, it would do damage to the environment. However, he stressed that assuredly won't happen. Rising sea temperatures lead to thinner hydrate stability zones, but even if methane hydrate is dissociated, it is very difficult to for it to make its way up through the water column and into the atmosphere.

In summary, there is a massive amount of methane hydrate resource. However, modeling its impact on climate change is in its infancy. Dr. Archer showed that methane is unlikely to be released catastrophically into the atmosphere. His simulations demonstrated that the methane release from subsea landslides is too small to affect climate. Potentially, methane hydrate may contribute to long-term amplifying of the carbon cycle feedback. That could potentially double the carbon dioxide fossil fuel levels. Natural methane release will be a far greater issue compared to methane hydrate being released during production.

2.2.1 Discussion

The discussion of Dr. Archer's presentation began with supporting arguments against the likelihood that hydrate degassing will ever be a contemporary issue. The Committee members feel it's very hard to make a case that there could be a looming catastrophe due to hydrate degassing. Methane hydrate should always be a very small part of the climate picture. It was also noted that the NRC report mentions that dissociation associated with production should be the focus for the part of the DOE program concerning climate.

The committee broke for coffee at 10:30 a.m. and reconvened at 10:45 a.m.

2.3 Report on FY 2009 and planned FY 2010 activities by Ray Boswell, National Energy Technology Laboratory (NETL)

Dr. Boswell of NETL gave an overview of the DOE methane hydrate program. He began by describing the budget and where the money has gone the last two years. The bulk of the money continues to support large field projects and universities. Next, he discussed the current projects and their participants along with projects they have planned for the future. He feels the National Laboratories are in consensus that the community should get together to solve the issue of synthesizing samples that replicate nature. Some molecular modeling projects he described that are going on at NETL include: reservoir modeling, pore-scale modeling, and a code comparison study. Regarding the latter, a recent advancement was the demonstration that the 10 year lag in production time was removed by adding heterogeneity to the reservoir. They have also been doing global climate change modeling. These projects were funded because there was a delay in the field projects. It's important that the environmental risks are addressed when the methane hydrate resource is produced. As for geomechanics and geohazards, these projects are being wrapped into the field monitoring efforts, as well as efforts by Lawrence Berkeley National Laboratory. He also described how the linkages/collaborations between hydrate researchers are growing significantly through numerous meetings. The BP project will take place around the beginning of 2011. The ConocoPhillips project is in the planning stage. Finally, the Barrow project has been phased out. It was not possible to mitigate the risks due to geological problems.

Dr. Boswell discussed the outreach activities they have done in the past year and the activities they are planning for the future. Dr. Boswell explained how NETL has been reporting on the Joint Industry Project (JIP) by putting out numerous papers. The JIP technical reports are currently being posted on the NETL Web site. Some of the specific outreach activities he mentioned were: putting a perspective into *Science Magazine*, Korea/India participation, organized five sessions at the American Geophysical Union meeting, organized four sessions at the Offshore Technology Conference, and the invitation to the Gordon Research Conference in 2010.

Dr. Boswell also mentioned that there have been five students in their fellowship program. The Fellows have been doing great work with their research. They are funded by the program, with the next call deadline at the end of the month.

2.3.1 Discussion

The discussion of Dr. Boswell's presentation began with a reflection by the Committee members. The members were very impressed by the work NETL has been doing and wanted to congratulate everyone involved. The Committee also agrees with NETL that the issue of climate change should continue to be emphasized. These sentiments were followed by more discussion of climate change and greenhouse gas emissions as perceived by people not familiar with methane hydrate. However, the members felt that methane hydrate's impact on the global climate scale is minimal. Dr. Boswell wrapped up the discussion by showing some of their peer reviewed publications.

2.4 Report and Discussion of Gulf of Mexico Joint Industry Project 2009 Expedition by Tim Collett, U.S. Geological Survey (USGS) and Ray Boswell, NETL

Dr. Collett started the presentation by giving a brief overview of the JIP and his outline for the discussion. He explained that Dr. Boswell would be describing the more technical aspects of the expedition and he would be talking about the planning aspects. The outline of his presentation was as follows:

- Project objectives and participants
- Pre-drill review and site selection
- Drilling and LWD operations
- Pre-drill drilling plan
- Borehole stability issues and washouts
- Modified drilling plan (actual)
- Water flow, gas release, & well kill
- Summary
  - Project cost
  - Post-expedition research & reporting plan

Dr. Collett described the objective of the JIP from its inception. He noted that the most important aspect of the JIP was the collection of logging-while-drilling (LWD) data over hydrate bearing sand. Leg II of the expedition lasted from April 16 to May 5, 2009 and Dr. Collett expanded on the participants.

The budget for the project was $11.2 million and the total cost came out to approximately $10.7 million. As such, the JIP was on time and under budget. There were many agencies contributing to the process of evaluating the sites, performing operational planning, and doing site hazard assessment. Four candidate sites were selected moving forward. The primary marine target of the drilling was gas hydrate bearing sands. He next detailed the drill string tools that assisted in collecting experimental data while they were drilling. Dr. Collett then discussed the details of the pre-drill plan, their focus on mud operations, borehole stability issues, and the actual drilling plan.

Dr. Collett discussed some issues they encountered. One issue they faced was a gas bubble made up of hydrate dissociated gas and drill cuttings. They actually had to pull out of the hole and abandon it.

In summary, they completed the project on time and under budget and the comprehensive set of logging data was invaluable considering the complexities they had to work with. The reports from the JIP are complete and under review. They will be released soon along with the entire data set.

Dr. Boswell led the discussion on the geologic environment. They were looking for sand in the Gulf of Mexico but there were only a few available locations. He detailed the sites where they conducted their research and demonstrated much of the data collected and the findings from all the sites. Their findings were of moderate saturations of methane hydrate that were obtained in clean, shallow, young sands. Their research approach had been confirmed. They also felt that if they were able to locate more sand they would have found more hydrate.

The key implications from the expedition are as follows:

- Gas hydrate R&D
  - 1000' deeper than any previous research well
  - Advanced mud handling will be needed (cuttings removal; hole stability)
- Full data collection from LWD
  - Gas hydrate confirmed in sand reservoirs at multiple sites
  - Multiple accumulations per site
  - Range of accumulations types/host lithologies
  - Excellent research sites for further data acquisition defined
- Initial validation of Minerals Management Service (MMS) assessment results
- Confirmation of research approach
  - focus on the reservoir (hydrates in sands)
  - "direct" detection
  - use/tailor existing hydrocarbon exploration concepts

He wrapped up with the next steps the JIP will take. They need to look at the Leg II data analysis and report on it, they need to recalibrate their prospecting techniques, and they need to prepare for Leg III by doing sampling and tool testing.

2.4.1 Discussion

The Committee was impressed and excited with their findings. The discussion began with questions about MMS assumptions and ranges they use to estimate how much sand is in the Gulf of Mexico. Another short discussion focused on the methods of site selection and drilling used by the project. The expedition used existing empirical data sets to help them select the sites that were to be drilled. There was discussion on the project gaining worldwide recognition. Korea and India have contacted Dr. Boswell and Dr. Collett to aid in their data analysis and provided recommendations on site selections. The

Committee felt that was important to mention when visiting Capitol Hill. The Committee ended with further discussion about site selection and how that site information transfers to other locations.

The committee broke for lunch at 12:45 p.m. and reconvened at 1:30 p.m.

2.5 Report and Discussion of ConocoPhillips Alaska North Slope CO_2 Injection Project by David Schoderbek and Helen Farrell, ConocoPhillips

Mr. Schoderbek gave an update and an overview on the CO_2 injection project ConocoPhillips is currently managing on the North Slope of Alaska. He started his talk by describing the current school of thought and present work on CO_2 exchange. Certain techniques to produce methane hydrate were also discussed. He then went on to describe how they selected test sites and showed geographical maps of the areas that show where hydrate would be stable. He described the top five candidate sites and how they were ranked. Mr. Schoderbek talked about how the field test was designed. It was done with laboratory experiments, reservoir stimulation, and well planning.

The next part of his presentation explored some 2009 experimental results and what they are planning for 2010. He described some of the experiments such as CO_2 injection, depressurization, and flow back/drawdown. He then gave an overview of the field trial. The field trial had three goals: confirm that they can inject liquid CO_2 into a formation that is saturated with natural methane hydrate, assure that methane release occurs without dissociation, and obtain rate data to facilitate reservoir-scale modeling. The permitting process at the Prudhoe Bay location was also described in detail. Mr. Schoderbek next moved on to discuss their drilling, logging, and completion plans and the timeline for all the tasks that would be done onsite. Near-term goals seek to procure co-owner approvals, assemble a ConocoPhillips/BP execution team, complete the design, permit, and order leads, obtain DOE review and approval, and drill the well while performing the field trial in the winter of 2011.

2.5.1 Discussion

There was some discussion following the presentation dealing with CO_2/CH_4 exchange rates. Several Committee members wanted to know if it was possible to inject CO_2 and release methane hydrate. There was also concern from the Committee that Japan, which was at the forefront of this process for over fifteen years, abandoned it a few years ago. Making artificial methane hydrate is very difficult and the Committee doesn't think it can be done. Despite this, the Committee agreed that these CO_2 exchange projects should go ahead. The CO_2/CH_4 exchange project can provide important lessons on this topic provided that there is enough instrumentation to interpret the operational results. The Committee chair will help coordinate visits and/or interactions between ConocoPhillips and Japanese researchers who have worked on CO_2/CH_4 exchange. Finally, the Committee discussed the expense of transporting CO_2. ConocoPhillips has large volumes available in nearby fields and the cost will be minimal.

2.6 Status Report on BP Alaska North Slope Proposed Production Test by Stephen Lewis, BP Exploration (Alaska) Inc.

Mr. Lewis gave the MHAC a status report on BP Alaska's proposed production test on the North Slope. He wanted to share with everyone how the test has been going in Alaska and where it's headed. The general outline of his presentation was as follows:

- Facilities on the North Slope
- Participating companies and percentage of ownership
- Amount of oil and gas produced
- Focus areas
- Challenges and risks

The main point he tried to stress with his talk was that executing the methane hydrate test program in Prudhoe Bay is and will continue to be a challenge. They are working towards a scientific production test on the North Slope. He gave an overview of all the fields in the area and the challenges they face with being the operator while simultaneously being a minority owner. Mr. Lewis talked about the amount of oil they produce (~250,000 barrels per day) that involve several thousand penetrations, or drilled wells, all over their operating area. He also discussed the challenges they face with the permafrost which impacts the quality of the imaging they produce from seismic. It is very important that the work they are doing on methane hydrate needs to be integrated with the current production operations. They won't stop work on a pad just to drill a well for hydrate research. It's a challenge to obtain long-term access (18-24 months) in the area for that reason. He then stated the need to ensure safe operations and the need to fit in with all the other operations in the field. They're working towards minimizing the operational risks and the complexity of any tests they're doing and avoiding the use of any unproven technologies. Some of the challenges they face include: gaining approval from working interest owners, location selection, tying into existing infrastructures, simultaneous operations on a pad, delays caused by higher priority activities, bad weather, and ambiguous results. Finally, he showed the Committee the estimated timeline and talked about their path forward in 2010.

2.6.1 Discussion

The discussion of Mr. Lewis' presentation was brief and began with some the challenges BP faces with getting well tie-ins. Mr. Lewis feels that scheduling is a critical factor. It's hard to justify leaving oil or gas down in the reservoir for an extended amount of time just to hook up a methane hydrate well. Another short discussion took place about the link, or lack thereof, between the CO_2 sequestration community and the BP project. The Committee feels that these communications should continue.

The committee broke for coffee at 3:00 p.m. and reconvened at 3:15 p.m.

2.7 Report on Beaufort Sea 2009 Expedition by Kelly Rose, NETL

Ms. Rose provided the MHAC with preliminary results from the Beaufort Expedition in September of 2009. The area they explored had been ignored in the past. The expedition was an international and multi-disciplinary effort. The study was conducted in Beaufort because a few prior studies documented focused flow of methane from subsurface accumulations through sediments and into the overlying water column. The goals of the program were to understand the sources of the methane gas, the rate of flux from the subsurface, and the fate of methane in the water column and the atmosphere. Ms. Rose discussed the sites they explored such as Thetis Island, the Belcher area, and the Hammerhead area which was an area of more focus. The site selection process preceded the expedition by about a year. On board they did coring, logging, and sub sampling. They had a variety of experts in the fields of geochemistry, geomicrobiology, biochemistry, sedimentology, lithostratigraphy, and microbiology. They were at sea for 12 days and conducted more than 4,000 km of acoustic transects and atmospheric measurements. They took over 70 cores and Ms. Rose demonstrated the data collected in each area. They found no evidence of gas in the shallow system they were sampling. Next, she detailed the porosity, density, magnetic susceptibility, and wave velocity of the piston cores. The sound speed, density, and porosity increased as they moved west. Iron precipitation was obvious and the free gas was clearly indicated by sound speed reduction in the cores. In the deepwater shelf (~280 meters) the only evidence of gas flux through the shallow sediment column was in cores in the upper slope. There was also evidence of a clear deepwater bottom simulating reflector (BSR). No associated gas flares were observed. In the shallow shelf, there was no evidence of gas flares along any of the transects. There was also no conclusive acoustic evidence of methane hydrate. Water column methane saturations were not consistent with gas flux from the seafloor to the water column. Ms. Rose wrapped up by describing some of their current activities and next steps. They want to link some of their findings to that of the work in the Canadian Beaufort in the east and to the west with the recent National Oceanic and Atmospheric Administration (NOAA) expedition.

2.7.1 Discussion

The MHAC were somewhat surprised by the results of the expedition because it contrasts with other work done in the vicinity. The Committee gave an opinion that the Arctic temperatures are rising faster than any other area. They felt it was really beneficial to obtain the data to provide a baseline for future research. The MHAC next talked about the lack of biogenic gas found. Finally, there was talk of another expedition planned in the area. The U.S. Geological Survey is planning an expedition in the area, but they are not planning to do coring, rather, they are primarily interested in using geophysical methods.

2.8 Report on Post-Doctoral Fellowship and Laboratory R&D by Ray Boswell, NETL and Fellows: Evan Solomon, Laura Lapham, Ann Cook, and Hugh Daigle

Dr. Boswell began his talk by providing progress updates on the Fellowship program and how the Fellows are progressing. The National Methane Hydrate Fellowship program is sponsored by NETL and is in association with the National Academy of Sciences (NAS). It is a Dedicated Fellowship Program that lasts either two or three years, offers competitive stipends, preserves student mentor relationships, and is subject to NAS and interagency reviews. He began by discussing the first two fellows in the program, Monica Heintz and Evan Soloman. Monica Heintz of the University of California at Santa Barbara (UCSB) was unable to attend in person, but Dr. Boswell was able to provide a quick update of her progress. She had participated in six field expeditions, has conducted over 2000 methane oxidation rate measurements in a variety of hydrate and seep-influenced environments, took over 100 samples for DNA extraction and methanotroph identification, collaborated with five groups outside UCSB, and helped establish frequent sampling trips in Santa Barbara Basin with over ten trips.

Evan Solomon of the Scripps Institution of Oceanography (SIO) was also unable to attend in person. Miriam Kastner of SIO gave an update of his progress in his stead. His latest project has been to constrain the rates of biogeochemical reactions and CH_4 generation in the Krishna Godavari Basin offshore the Southeast coast of India. He has completed the fluid analysis which was one of the most comprehensive geochemical datasets from an ocean drilling project to date. Numerical modeling is in progress and will help constrain the relative importance of methanogenesis coupled to Fe-reduction and methane production coupled to silicate weathering at depth. The geochemical dataset will be published in the special publication of shore-based scientific results. Results of the biogeochemical modeling will be presented this spring and a manuscript will be prepared for submission this summer.

Laura Lapham of Florida State University was the next to give an update on her fellowship work. Her work has dealt with controls on hydrate stability in methane systems. She has been looking at methane hydrate in shallow sediments. She described both her field study and the laboratory work she conducted. In the laboratory she put together a methane hydrate pressure vessel system and pressurized it with a mix of gas to form hydrate and took water samples periodically over time to measure for methane. In one experiment she reached saturation in about 17 days. She still has ongoing hydrate dissolution experiments dealing with mixed gas and measuring for methane, ethane, and propane. Her future experiments will test the hypothesis of the oils or other contaminants in the real system that controls the dissolution rate.

Hugh Daigle of Rice University discussed his work focused on fracture genesis and fracture filling in methane hydrate systems. He hypothesized that there is some kind of interaction that occurs between the physical properties of the sediment and the formation of hydrate during the time hydrate is forming. That may result in fractures. They tested this using numerical modeling. His research showed that if he had lower permeability

layers, it really enhanced the ability of the sediment to fracture by the pore pressure build-up process. It also required a lot less hydrate saturation which is more in line with what he sees in the field. He is currently assembling a manuscript including these results.

Ann Cook of the Lamont Doherty Earth Observatory's research has been focused on finding how much gas hydrate is in place by looking at the anisotropy in gas hydrate filled fracture environments and corroborating the logging data with core data and seismic data. She also wanted to find the dimensions and features of a gas hydrate reservoir. To accomplish that, she needed to tie the logging data to the controlled-source electromagnetic data. That is what she is currently working on. She is hoping to continue with it and introduce some new data from the JIP.

2.9 Report on Gas Production from Hydrate Bearing Sediments: Geomechanical Implications by Carlos Santamarina, Georgia Institute of Technology

Dr. Santamarina gave a report on the geomechanical implications with gas production from hydrate bearing sediments. The outline of his presentation was as follows:

- Sediments: Particulars of the Particulate
- Hydrate Bearing Sediment
- Hydrate Mass Loss –Volume Change
- Fluid Expansion –Gas Recovery
- Gas-driven Fractures (Thermal Stimulation)
- Fines Migration –Clogging
- CH_4-CO_2 replacement (Chemical Stimulation)
- Closing Thoughts

Dr. Santamarina talked about the particulars of the sediments and the governing roles of the fines. He then gave a detailed demonstration of the makeup of the hydrate bearing sediment and how they explored them. It is very difficult to make hydrate in sediment. He showed the results of the experiments they ran on sand, crushed silt, precipitated silt, and kaolinite. Dr. Santamarina next demonstrated some of the experiments they ran to show volume change and fluid expansion. He showed the results of an experiment that forced gas into sediment. Their next experiment, fines migration, showed that thermal stimulation had a great effect on changing the hydraulic conductivity of the sediment. They ran several experiments testing the surface tension and contact angle of water droplets after introducing CO_2. Dr. Santamarina demonstrated the strategy they used to characterize the sediments. They indexed the properties of the sediment, reconstituted the specimens, took pressure cores within the stability fields, and conducted in-situ tests. They are able to take pressure cores and conduct experimentation on them without ever reducing the pressure.

2.9.1 Discussion

The discussion began with the topic of sediment reaction. The Committee was interested to know what the hydrate is doing in the sediment. They feel the effects are quite

different when the hydrate particles are flowing around in the pore pace instead of supporting the rock fabric itself. There is a real difference between Arctic and marine hydrate properties taking these factors into account.

3. Day 1 Wrap-up and Adjournment

The first day of the committee meeting was adjourned at approximately 5:15 p.m. by Chairman Dendy Sloan. DOE staff provided directions for everyone in the room to attend dinner at an off campus location

Friday, January, 29, 2010

4. Re-convening of the Meeting

The second day of the meeting was called to order at 8:30 a.m. by Chairman Sloan. He began with welcoming remarks and a few remarks about the NRC report that was just officially released within the past few minutes.

5. Presentation

All presentations and corresponding questions and discussion from members or any other attendees from the second day of the meeting are in the following section.

5.1 Report and Discussion on National Research Council Assessment and 2010 Report to Congress by Charles Paull, Monterey Bay Aquarium Research Institute (MBARI)

Mr. Paull's presentation discussed the findings and recommendations of the NRC's assessment of DOE's Methane Hydrate R&D Program. The NRC established a committee and tasked them with reviewing the research the program has performed and the process in which it was conducted. They also evaluated future R&D needs and made recommendations as to what the Program should do moving forward. The Program essentially evaluates methane hydrate as a viable future energy source. Mr. Paul said the Committee was impressed with the overall quality and impact the program is having. The program management has been consistent and effective.

He provided a background on methane hydrate, the Methane Hydrate Program, and a background of the study that was conducted. Mr. Paull explained the structure of the NRC report, he outlined the program achievements and progress, and he discussed the issues and needs the Program faces. He next spent some time giving an overview of the program management involving: the review process, education and training, communication, interagency coordination, and international collaboration. The NRC Committee's conclusions and recommendations were:

- Designing future production tests
- Geohazard and environmental issues related to production

- Methane hydrate's impact on the global environment
- Quantification of the resources
- Program management

The Committee found that there are many challenges that lie ahead before methane hydrate can be produced in an economically and environmentally feasible manner. They don't feel that any of the challenges are insurmountable, but it will take a sustained national commitment and substantial support. To wrap up, Mr. Paull gave an overview of the NRC Committee and its structure and thanked the people involved with the study.

5.1.1 Discussion

The MHAC was interested to know what kind of reactions the NRC Committee saw in their meetings. There was a sense during the meetings that people were interested in knowing when the Program would move from a federally funded program to one wholly supported by industry. Also, the NRC Committee members were looking at how the program was progressing toward the goal of production by 2025. The NRC Committee's study gave overall high marks to DOE for their program. The NRC Committee was only asked to look at the Program from 2005 to the present time.

There was discussion about international collaboration and how it was covered in the study, how it works, and how it can be improved. The governments always have good intentions to enable connections between countries, but there are always debates over what data they are allowed to report. The collaboration has to be open to succeed.

The MHAC agreed with the NRC and was impressed with the work DOE has done. This is despite the lack of funding the Program receives. There seems to be a general consensus on Capitol Hill that the U.S. is awash in natural gas and there is no short term need. However, they do realize that in the longer term, methane hydrate could help fill that need.

There was an implication made by the NRC Report that the attention paid to the major projects was not proportional to the money given to them. On inspection of the peer reviewed efforts there was a considerable amount of time spent reviewing all projects. However, the review effort was not necessarily proportional to the cost of the project.

The next topic discussed was resource estimates. The estimate of methane hydrate resources has come down in recent years into more understandable ranges and the MHAC feels that the effort to update the estimates is well justified.

There was discussion about the intangible impacts the Program has and how they were reflected in the NRC study. There was also discussion about the international climate impact and how Capitol Hill views it. Next, MHAC members were interested to know how funding for the Program could be increased. It was made clear to all Committee members that they cannot make recommendations about financial support. They can

stress their sustained commitment and ongoing support of the Program, but they can't make specific funding requests.

The Committee moved on to discuss the conclusions and recommendations made by the NRC Committee. After everyone was finished speaking, the Chairman called for a motion that endorsed the key recommendations of the Report and encouraged DOE to implement them. There was significant discussion in several areas following the call for a motion. Each of the conclusions and recommendations made by the NRC Committee were discussed individually. Furthermore, there was discussion of specific geohazards and environmental issues caused by methane hydrate. There was also a question from the Committee and follow-up discussion about long-term production tests. Finally, after much dialogue, the Chairman called for the MHAC to endorse the NRC Report's key findings. The vote was unanimously approved by all members in attendance.

The committee broke for coffee at 10:00 a.m. and reconvened at 10:15 a.m.

6. Discussion and Preparation of Recommendations to DOE

The next portion of the meeting was opened with Chairman Dendy Sloan asking for discussion of recommendations. The first topic discussed was a Committee letter to the Secretary discussing their recommendations. It was clarified that the Committee has authority to write a report to the Secretary with recommendations at any time. There was a feeling by the Committee that industry is not going to take methane hydrate research on in a big way for some time. It is important for everyone involved to look long-term. At the end of the discussion, Dr. Boswell gave a short overview of NETL's five year plan.

The letter from the Committee to the Secretary likely needs something that will help influence the DOE plan. They could tie the funding needs to the NRC recommendations and conclusions and put that in the letter to the Secretary. After discussion, the Committee decided the letter would be a one-pager in outline form with recommendations. It will be a broad, over-arching letter that will hopefully affect the 2012 budget request. The Secretary has no authority at this time in regards to the 2011 budget. Chairman Sloan has volunteered to draft the letter and send it out to the MHAC members for review.

There was discussion by DOE officials on the upcoming schedule of the MHAC. All Federal Advisory Committees are termed for two years. The current membership ends on April 23, 2010. All paperwork for all members interested in serving another term is on its way to the Secretary's office. DOE is not at liberty to discuss who the recommended members are. The membership and the Committee charter are updated every two years. They are not synchronized; the charter was renewed on October 23, 2009.

There is some frustration by the Committee members regarding the rules of the Federal Advisory Committee Act (FACA). It was noted that some Federal Advisory Committees set up standing subcommittees. They can participate in various activities but the meetings don't have to comply with all the FACA requirements. The subcommittee is a popular

mechanism to achieve program goals. It was also noted that the DOE reimburses travel as a full committee or standing subcommittee, but not as individuals. Finally, a few Committee members voiced their discomfort with NETL's control over funding while simultaneously managing in-house projects.

7. Meeting Wrap-up, Action Items, and Adjournment

Once the discussion and preparation of recommendations for DOE were complete, the Chairman briefly moved the discussion back to the topic of subcommittees. The Committee would like to append the MHAC meeting to the end of the next Program Review Committee meeting. If they circulate the Program far enough in advance they can get some people who would volunteer to come and participate.

Dr. Sloan instructed the Committee that he would draft a letter to the Secretary in about one week and welcomes the Committee's input. At the conclusion of the discussion, Chairman Sloan called for adjournment at approximately 11:30 a.m.

E. Dendy Sloan
Chairman, Methane Hydrate Advisory Committee

Guido DeHoratiis
Acting Designated Federal Officer, Methane Hydrate Advisory Committee

Appendix A: Meeting Attendees

Committee Members
Peter Brewer, Monterey Bay Aquarium Research Institute
Richard Charter, National OCS Coalition
Arthur Johnson, Hydrate Energy International
Miriam Kastner, Scripps Institute of Oceanography
Robert Miller, ConocoPhillips
Craig Shipp, Shell International E&P
Dendy Sloan, Colorado School of Mines
Robert Swenson, Alaska Department of Natural Resources
Anne Trehu, Oregon State University
Joseph Wilder, University of Akron

Staff Members
Guido DeHoratiis, Designated Federal Officer, U.S. Department of Energy
Edie Allison, U.S. Department of Energy
Trudy Transtrum, U.S. Department of Energy
Robert Matey, Technology & Management Services, Inc.

General Public
David Archer, University of Chicago
Ann Cook, Columbia University (Fellow)
Hugh Daigle, Rice University (Fellow)
Nicolas Espinoza, Georgia Institute of Technology (Student)
Helen Farrell, ConocoPhillips
Keith Hester, ConocoPhillips
Carolyn Koh, Colorado School of Mines
Laura Lapham, Florida State University (Fellow)
Stephen Lewis, BP Exploration (Alaska) Inc.
Patrick McGuire, University of Chicago
Charles Paull, Monterey Bay Aquarium Research Institute
Carlos Santamarina, Georgia Institute of Technology
David Schoderbek, ConocoPhillips

Interagency Visitors
Ray Boswell, National Energy Technology Laboratory
Tim Collett, U.S. Geological Survey
Bhakta Rath, Naval Research Laboratory
Matt Reagan, Lawrence Berkeley National Laboratory
Kelly Rose, National Energy Technology Laboratory

Appendix B: Agenda

Methane Hydrate Advisory Committee Meeting
Georgia Institute of Technology
790 Atlantic Drive, Atlanta, Georgia
January 28 – 29, 2010

Thursday, January, 28, 2010

8:30 a.m.	Registration and Continental Breakfast
9:00 a.m.	Welcome and Introductions (Guido DeHoratiis)
9:15 a.m.	Report of Committee representatives' meeting with Secretary Chu
9:45 a.m.	Report and Discussion: Modeling Hydrate in the Global Climate Cycle (David Archer)
10:30 a.m.	Break
10:45 a.m.	Report FY 2009 and planned FY 2010 activities (Ray Boswell)
11:15 a.m.	Report and Discussion of Gulf of Mexico Joint Industry Project 2009 Expedition (Tim Collett and Ray Boswell)
12:15 p.m.	Working Lunch
1:30 p.m.	Report and Discussion of ConocoPhillips Alaska North Slope CO_2 Injection Project (David Schoderbek and Helen Farrell)
2:30 p.m.	Status Report on BP Alaska North Slope Proposed Production Test (Stephen Lewis)
3:00 p.m.	Break
3:30 p.m.	Report on Beaufort Sea 2009 Expedition (Kelly Rose)
4:00 p.m.	Report on Post-Doctoral Fellowship and Laboratory R&D (Ray Boswell and Fellows: Ann Cook, Laura Lapham and Hugh Daigle)
4:30 p.m.	Gas Production from Hydrate Bearing Sediments: Geomechanical Implications (Carlos Santamarina)
5:00 p.m.	Adjourn for the day
6:00 p.m.	Optional Group Dinner

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Friday, January 29, 2010

8:00 a.m.	Registration and Continental Breakfast
8:30 a.m.	Report and Discussion on National Research Council Assessment and 2010 Report to Congress (Charles Paull)
10:00 a.m.	Break
10:15 a.m.	Continue Discussion of NRC Report
11:00 a.m.	Discussion and Preparation of Recommendations to DOE
12:00 p.m.	Working Lunch
1:00 p.m.	Continue Preparation of Recommendations to DOE
3:00 p.m.	Wrap up - Adjourn