

Methane Hydrate Advisory Committee (MHAC) Meeting

April 4-5, 2017

Hyatt Regency Hotel Dulles

Herndon, Virginia

MEETING SUMMARY

Attached are the meeting agenda and the list of attendees.

Welcome and Introductions

The meeting was called to order on April 4, 2017 at 9:00 am EST by Lou Capitanio, the Committee Manager.

Committee Business, Lou Capitanio, Committee Manager

Lou Capitanio conducted committee business and made announcements. He reminded the group that all federal advisory committees are open to the public and deliberations must be done openly and transparently; minutes will be published 2-3 weeks on the Committee website. He further informed the committee that no public comments were received in advance of the meeting nor has anyone requested to address the committee at the meeting. He then confirmed that a quorum of committee members was present. Mr. Capitanio advised the members that their membership appointments will expire on October 12, 2017, and that they would be hearing from DOE soon to gauge their interest in continuing on the committee and for nominations for additional prospective members.

Mr. Capitanio introduced the Rob Smith, Acting Deputy Assistant Secretary for Oil and Natural Gas (ADAS) and Designated Federal Official (DFO) for the Methane Hydrate Advisory Committee (MHAC); Tim Reinhardt, Acting Division Director for Supply and Delivery; and Gabby Intihar, Co-Committee Manager. All members introduced themselves and shared with the group their expertise relating to gas hydrates. Mr. Capitanio then turned over the meeting to DFO Rob Smith for his welcoming remarks.

DFO Welcome, Rob Smith, DFO

In his introductory remarks DFO Rob Smith thanked the members for their presence and stated that the Gas Hydrate Program is of great interest and importance to the DOE. DFO Smith stated that not much has changed regarding the status of the FY 2017 budget since the February committee meeting; DOE is operating under a continuing resolution (CR) through April 28, 2017. We will have more certainty on FY 2017 after Congress takes action on the CR at the end of April.

DFO Smith noted that Governor Rick Perry was confirmed as Secretary of Energy. DFO Smith reiterated the importance of DOE's federal role and highlighted the Gas Hydrate Program priorities on the Alaska North Slope (ANS) collaboration with Japan and gas hydrate pressure-coring project in the Gulf of Mexico (GOM) led by the University of Texas – Austin (UT-A) scheduled for this summer.

President Donald J. Trump's Administration released the FY 2018 Budget Blueprint March 16, 2017, and a full FY 2018 budget request will be submitted to Congress in May. The Blueprint section relevant to the Department of Energy, particularly Fossil Energy, was shared with the committee (attached). The

Blueprint stresses early-stage research and development (R&D) and DFO Smith noted that despite some short-term production successes, this technology is still in the early stage of development and that government support of the research is necessary.

DFO Smith concluded his remarks by noting that the committee's stated purpose of today's meeting is to draft a letter of MHAC recommendations to the Secretary; and that such a letter may have some impact on the FY 2018 budget process if it is prepared very soon. A robust discussion ensued on the language in the Blueprint and what it means for Fossil Energy appropriations and the Gas Hydrate research program. The discussion included several questions by the committee members regarding energy security, gas hydrate resources, Technology Readiness Level's, program management, and U.S. leadership in gas hydrate R&D primarily for the purpose of gaining background information for the letter of recommendations that the committee plans to prepare.

Presentation: Summary of FY16 and FY17 Distribution of Funds and Projects – Jared Ciferno, NETL

Mr. Jared Ciferno, Associate Director for Oil and Gas at NETL, presented an overview of the FY 2016 budget distribution by category (NETL, other National Laboratories and Academia). Key highlights of the FY 2016 budget allocation include: Universities account for approximately 50% of the funding and the remainder of the funding towards NETL in-house R&D, National Laboratories, and funding to other Federal Agencies. Given that we are under a CR, Mr. Ciferno advised that the Gas Hydrate Program is planning a FY 2017 budget to support the ANS field project while continuing to fund the Universities, NETL in-house, National Laboratories, and Federal Agencies hydrates work. Mr. Ciferno's presentation can be found on the Committee website at <https://energy.gov/fe/downloads/presentations-april-4-5-2017-advisory-committee-meeting>

Major Projects Review: Gulf of Mexico Project Update – Ray Boswell, NETL

Dr. Ray Boswell presented a review of the Gulf of Mexico exploration and characterization project being led by UT-A. He provided an overview of the prior GOM major field projects including an international partnership "joint industry project" (JIP). A 2005 JIP Leg I assessed drilling hazards and a 2009 JIP Leg II prospected for resource-grade deposits. Dr. Boswell also reviewed the post JIP Leg-2 activities with the goal of that Leg being to gather samples at known sites to continue exploration and resource confirmation. DOE-USGS-Chevron developed extensive plans for Leg-3 coring within industry protocols. In 2014, DOE awarded a new project to UT-A.

The UT-A project's objective is to take pressure-cores at identified known sites and explore high-value new sites. A first expedition is scheduled for Spring 2017 with the objective to test tools and gather scientific information. Expedition 1 is a single site, two-hole program with pressure cores being collected, transferred and analyzed. A second expedition is being planned for 2019/2020. Expedition 2 will include logging and pressure coring at multiple sites in the GOM.

Dr. Boswell described the pressure coring and core transfer tools that will be utilized in the expeditions. He also provided the current status of Expedition 1, the tools that will be tested, the science objectives, and key challenges of the project. Several members of the committee questioned the rationale for only logging one of the two wells being cored in Expedition 1, thus losing a correlation opportunity. Dr. Boswell noted the logging decision was a cost/time decision explaining that gamma ray logs of the

pressure cores would be run on the ship. Dr. Boswell's presentation can be found on the Committee website at <https://energy.gov/fe/downloads/presentations-april-4-5-2017-advisory-committee-meeting>

Major Projects Review: Alaska Project Update (including review of the technical questions posed in January 2016 SEAB Report on Methane Hydrates) – Ray Boswell, NETL

Dr. Boswell presented a review of the Alaska North Slope (ANS) reservoir response field experiment. He began with a brief description of types of gas hydrate production technology - thermal, chemical, mining, and depressurization. He proceeded to present data on observed and modeled gas flow rates for various projects to date. Dr. Boswell stated that to date there has only been a few short-duration scientific field experiments that have been carried out. He showed the gas hydrate potential insights from numerical simulations (from early 2000s to present) and challenges.

Dr. Boswell illustrated the ANS gas hydrates most promising accumulation in the westend of the Prudhoe Bay Unit, Greater PBU Infrastructure Area. He then presented prior Alaska field programs – Hot Ice (2004), Mt. Elbert (2007), and Ignik Sikumi (2011-2012).

Dr. Boswell reviewed the potential testing sites on Alaska unleased lands but there were several issues associated with these lands, such as: high logistics cost (roads, pads); high operational risk (lack of infrastructure); uncertain regulatory environment; high geologic risk; and who would be the operator. He provided a review of the sites in westend PBU, specifically Kuparuk well site information and seismic data. Dr. Boswell provided a nominal timeline of the project; planning, stratigraphic test, production testing, and site abandonment.

Regarding the review of the technical questions posed in the January 2016 SEAB Report on Methane Hydrates, the Committee requested Dr. Boswell to briefly review the information due to time constraints. Dr. Boswell provided a SEAB report summary which stated that the Gas Hydrate Program has made significant contributions and DOE should continue funding at FY 2015 levels (i.e., \$15M). Gas hydrate R&D success will be facilitated by more stable funding and support, the SEAB recognized the need for stable and consistent gas hydrate research budgets. The SEAB Report recommended 33% of the budget should remain dedicated to fundamental science and 67% of budget for participation in large field testing programs. Work should continue to prioritize issues of relevance to anticipated future industry technical priorities. Dr. Boswell briefly discussed the technical questions regarding: heat transfer; maintaining formation and well stability; and assuring continuity of methane release and production. Both presentations can be found on the Committee website at <https://energy.gov/fe/downloads/presentations-april-4-5-2017-advisory-committee-meeting>

Gas Hydrate Proposal and Program Review – Jared Ciferno, NETL

Mr. Jared Ciferno, Associate Director for Oil and Gas at NETL, presented on behalf of Rick Baker, NETL Project Manager, who wasn't able to attend the meeting. He provided a general overview of the DOE-NETL financial assistance process; both planning and funding opportunity announcement (FOA) preparation, selection, and awards. Mr. Ciferno followed the general overview with a detailed description of the process.

The planning stage includes activities leading to initiation of the formal FOA process. This stage is guided by multiple factors, such as: overarching program guidance; long-term program plans;

input/guidance from DOE leadership; assessment of current program portfolio and needs; external program assessments; budget funding levels; and identification of types of entities that can submit proposals under an FOA. Planning starts a year or more in advance with the requirements document, but is often compressed due to delay because of annual program funding levels.

The FOA development stage takes the concept FOA from the requirements document to issuance of the final FOA. Once the development stage is initiated, external interactions regarding the pending FOA are precluded to prevent giving any group potential advantage. The FOA preparation stage is the period under which the FOA is open, typically 45 to 90 days for applicants to submit proposals. Applicants prepare and submit FOA proposal packages in accordance with format and requirements defined for the FOA via Grants.gov. All questions regarding FOA must be formally submitted through the grants.gov website so that questions and answers are available to all potential applicants.

Questions were asked on how DOE select projects. Mr. Ciferno explained that the FOA evaluation and selection stage includes formal review, comment, scoring and selection of applications. The review is coordinated by Merit Review Board (MRB) consistent with Federal Personnel with expertise in FOA focus areas. The Selecting Official considers the MRB results and DOE leadership guidance for application(s) selection and begins the negotiation of an award. Congressional notifications of selection are sent, selection and non-selection applicants are formally notified. The FOA award stage focuses on negotiation of new awards from selected FOA applications, which involves finalization of the project scope, schedule and budgets. An overview of recent FOA awards from FY12 to FY16 was presented to the committee.

Regarding Program Reviews, Mr. Ciferno discussed the process and challenges associated with project and program review and showed an overview of recent history of the methane hydrate program-led reviews. DOE-NETL occasionally conducts a formal program review (peer review) of gas hydrate projects. DOE and NETL do routinely review projects internally, but do not conduct a formal program review. The Committee Members generally agreed that peer reviews are beneficial and recommended they would like to see DOE hold a program review of the hydrate projects in FY 2017, if possible. There was a general consensus among attendees that regular formal peer/program reviews (every 2-3 years) as well as informal (discussions in conjunction with conferences, MHAC meetings, etc.) should be organized. Mr. Ciferno advised that NETL will work with the Committee on the logistics and selection of reviewers. Mr. Ciferno's presentation can be found on the Committee website at <https://energy.gov/fe/downloads/presentations-april-4-5-2017-advisory-committee-meeting>

Status/Future Plans of International Gas Hydrate Program Activities – Ray Boswell, NETL

Dr. Boswell presented the status of DOE-NETL international gas hydrate program activities. He began with the U.S. international formal agreements between DOE-NETL with Japan, India, and South Korea. DOE's and Japan's gas hydrate R&D collaboration in Alaska and the Nankai Trough started in 1998 and has continued through 2016. An overview of specific projects was reviewed in detail ranging from laboratory cooperation with international partners to collaboration in large field projects conducted by Japan and India. Dr. Boswell provided a brief overview of the R&D collaboration with India the NGHP-02 project. He also briefly discussed the South Korea UBGH-01/02/03 projects and the new project involving South Korea and Texas A&M University. He also provided a brief overview of other

international gas hydrate R&D activities being conducted worldwide, including programs of China, New Zealand, and Europe, and others. Mr. Boswell's presentation can be found on the Committee website at <https://energy.gov/fe/downloads/presentations-april-4-5-2017-advisory-committee-meeting>

Climate Projects and Current State of Hydrate-Climate Interactions – Ray Boswell, NETL

Committee Chair Dr. Carolyn Koh and the Committee members agreed that this topic can be skipped at this time due to time constraints, since the more pressing matter is to draft the committee letter of recommendations to the Secretary.

Committee Discussion: Drafting and Review of Committee Recommendations for the Secretary

Dr. Carolyn Koh, Committee Chair, led the discussion to review the draft Committee recommendations letter to the Secretary. The discussion was spirited and focused on the key recommendations the Committee wanted to pursue with regards to the gas hydrate research program.

A Committee member noted that fossil fuels are important to the current Administration and stated that the U.S. is the technology leader in gas hydrate research. The U.S. should continue to provide support in order to continue to address gas hydrate basic research questions, conduct early stage research and a long-term reservoir response experiment (field test). The DOE methane hydrate research program is at an early stage of gas hydrate R&D today: it is answering fundamental, long-term questions required to assess the technical and economic viability of gas hydrate production, and providing a better understanding of geohazards such as seafloor slope and wellbore instabilities. These questions are not being addressed by industry, whose technology developments are instead directed to resources likely to be produced in the immediate future.

The MHAC has determined that a long-term reservoir response experiment is the next step in the gas hydrate research program. There has been no such long-term experiment anywhere in the world, which leaves key questions unanswered about production over the many years that a commercial well would have to flow. Brief tests in Alaska, Canada, and offshore Japan provided encouraging results, and demonstrated a long-term reservoir response experiment is needed. The MHAC recommended key tasks whereby the proposed reservoir response experiment is one step in a long-term program. The Committee discussed estimates of funding required over the next five years to achieve these key goals. Finally, the Committee decided to request to meet with the Secretary to discuss the importance of the gas hydrate resource as a potential domestic energy source and the Committee's strategy to realize this U.S. natural gas resource and ensure continued U.S. technical leadership in gas hydrates.

At the conclusion of the Committee discussion, Dr. Koh had a draft letter of committee recommendations and notes to complete the letter.

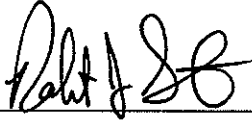
Next Steps

Dr. Carolyn Koh will finalize the draft recommendations letter to the Secretary and transmit it to Lou Capitano, Committee Manager, to send to Committee Members for final review and comment. Upon finalizing the letter, it will be submitted by Chair Koh to the Secretary on behalf of the MHAC. Depending on the Secretary's response to the MHAC letter, it was suggested that a possible date for the next in-person committee meeting could be in conjunction with the 9th International Conference on Gas Hydrates in Denver, CO in late June.

The meeting adjourned on April 5, 2017 at 12:00pm EST.



Carolyn Koh, Chair



Robert J. Smith, DFO

March 13, 2017

Methane Hydrate Advisory Committee Meeting

April 4, 2017 9:00am – 4:30pm (EDT)

April 5, 2017 8:30am – 12:00pm (EDT)

Public Access

Hyatt Regency Dulles
2300 Dulles Corner Blvd.
Layton Room
Herndon, Virginia, 20171

AGENDA

April 4, 2017 9:00am – 4:30pm (EDT)

Time	Discussion Item	Speaker
8:30 am – 9:00 am	Registration	All
9:00 am – 9:10 am	DFO Welcome and Introductions	Robert J. Smith, Acting DAS for Oil and Natural Gas, and Designated Federal Officer (DFO)
9:10 am – 9:20 am	Committee Business	Lou Capitanio, Committee Manager, and Methane Hydrate Program Manager
9:20 am – 9:30 am	Budget Update	Robert J. Smith, Acting DAS for Oil and Natural Gas, and Designated Federal Officer (DFO)
9:30 am – 9:50 am	Summary of current Distribution of Funds and projects in NETL, other National Laboratories, and Academia	Jared Ciferno National Energy Technology Laboratory (NETL)
9:50 am – 10:30 am	Major Project Review <ul style="list-style-type: none">Gulf of Mexico Project Update and Committee Discussion	Ray Boswell National Energy Technology Laboratory (NETL)
10:30 am – 10:45 am	Break	All
10:45 am – 11:40 am	Major Project Review (continued) <ul style="list-style-type: none">Alaska Project Update (including review of technical questions posed in January 2016 SEAB Report on Methane Hydrates) and Committee Discussion	Ray Boswell National Energy Technology Laboratory (NETL)

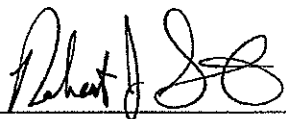
March 13, 2017

11:40 am – 12:00 pm	Gas Hydrate Proposal and Program Reviews	Rick Baker National Energy Technology Laboratory (NETL)
12:00 pm – 1:00 pm	Lunch	All
1:00 pm – 2:00 pm	Status/future plans of International Gas Hydrate Program Activities	Ray Boswell National Energy Technology Laboratory (NETL)
2:00 pm – 2:45 pm	Climate Projects and Current State of Hydrate-Climate Interaction	Ray Boswell National Energy Technology Laboratory (NETL)
2:45 pm – 3:00 pm	Break	All
3:00 pm – 4:30 pm	Committee Discussion <ul style="list-style-type: none">Drafting and Review of Committee Recommendations for the Secretary	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrate Advisory Committee
4:30pm	Adjourn	

March 13, 2017

AGENDA
April 5, 2017 8:30am – 12:00pm (EDT)

Time	Discussion Item	Speaker
8:15 am – 8:30 am	Registration	All
8:30 am – 10:15 am	Committee Discussion (continued)	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrate Advisory Committee
10:15 am – 10:30 am	Break	All
10:30 am – 11:45 am	Committee Discussion (continued) Summary and Next Steps	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrate Advisory Committee
11:45 am – 12:00 pm	Public comments, if any	Robert J. Smith, Acting DAS for Oil and Natural Gas, and Designated Federal Officer (DFO)
12:00pm	Adjourn	



APPROVED: Robert J. Smith
Designated Federal Official

3-20-17

Date

Methane Hydrate Advisory Committee (MHAC) Meeting

April 4-5, 2017

Herndon, VA

Table 1: List of Attendees

Attendee	Role	Participated April 4	Participated April 5
Dr. Thomas Blasingame Texas A&M University Department of Petroleum Engineering	Committee Member	X	X
Mr. Richard Charter Senior Fellow The Ocean Foundation	Committee Member	X	X
Dr. Miriam Kastner Scripps Institute of Oceanography University of California, San Diego	Committee Member	X	X
Dr. Carolyn Koh Colorado School of Mines Chemical Engineering Department	Committee Member	X	X
Dr. Michael Max Chief of Research Hydrate Energy International, Inc.	Committee Member	X	X
Dr. Joel E. Johnson University of New Hampshire Department of Earth Sciences	Committee Member	X	X
Dr. Robert L. Kleinberg Schlumberger Fellow Schlumberger-Doll Research	Committee Member	X	X
Dr. Robert D. Kaminsky Emerging Resources Advisor ExxonMobil Upstream Research Co.	Committee Member	X	X
Dr. George J. Moridis Head, Hydrocarbon Resources Program Lawrence Berkeley National Lab University of California	Committee Member	X	X
Dr. Mark D. Myers Commissioner, Alaska Department of Natural Resources – retired	Committee Member	X	X
Dr. Evan Solomon University of Washington School of Oceanography	Committee Member	X	X

Robert J. Smith Acting Deputy Assistant Secretary for Oil and Gas U.S. Department of Energy	DFO	X	X
Tim Reinhardt Senior Technical Advisor, Office of Oil and Nat. Gas U.S. Department of Energy	DOE Staff	X	X
Lou Capitanio Committee Manager U.S. Department of Energy	DOE Staff	X	X
Gabby Intihar U.S. Department of Energy	DOE Staff	X	X
Doreen Nevin ADS	DOE Support	X	X
Ray Boswell National Energy Technology Laboratory Pittsburgh, PA	DOE Staff	X	X
Jared Ciferno National Energy Technology Laboratory Morgantown, WV	DOE Staff	X	
Yongkoo Seol National Energy Technology Laboratory Morgantown, WV	DOE Staff	X	
Matt Frye BOEM	Other	X	
Stephen Palmes BOEM	Other	X	