Methane Hydrate Advisory Committee (MHAC) Meeting

April 23-24, 2019
Hilton Americas - Houston
Houston, TX
MEETING SUMMARY

Attached are the meeting agenda and the list of attendees.

Welcome and Introductions
The meeting was called to order on April 23, 2019 at 9:00 am CST by Gabby Intihar, the Committee Manager. Mrs. Intihar welcomed and thanked the Committee members. Mrs. Intihar introduced Mr. Shawn Bennett, Deputy Assistant Secretary (DAS) for Oil and Natural Gas and Designated Federal Official (DFO) for the Methane Hydrate Advisory Committee (MHAC), then turned over the meeting to DFO Shawn Bennett for his welcoming remarks.

DFO Welcome, Shawn Bennett, DFO
Shawn Bennett is the Deputy Assistant Secretary (DAS) for Oil and Natural Gas within the U.S. Department of Energy (DOE) and Designated Federal Officer (DFO) for the Methane Hydrate Advisory Committee (MHAC). DFO Bennett thanked the Committee members for their continued commitment to the MHAC. He stated that the program goals remain unchanged and that DOE plans to continue with a research approach that is collaborative, interagency, and international.

DFO Bennett stated that the Department's primary objectives are to conduct field work to establish the resource potential of methane hydrates via a sustained, long-term reservoir response experiment on the Alaska North Slope and the coring expedition in the Gulf of Mexico. These projects will provide valuable information to DOE to determine the scale and feasibility of methane hydrate as a future energy resource. In addition to these two major field projects, the Program continues its participation in international partnerships in order to advance our understanding of methane hydrate in natural settings and techniques for its evaluation and production.

DFO Bennett highlighted the Alaska project's recent accomplishment in December 2018 of successfully drilling the Stratigraphic Test Well, which confirmed the occurrence of gas hydrates in two zones that are suitable for potential future testing. The stratigraphic test well was drilled in partnership with JOGMEC, USGS, and Petrotechnical Resources-Alaska and in cooperation with the Prudhoe Bay unit owners. The next phase on the Alaska North Slope is to drill two wells, the Science-Data Well and the Production Test Well, and perform a long-term reservoir response experiment. This field work will provide an initial assessment of the potential to successfully produce the vast gas hydrates resource in similar settings throughout the U.S.

DFO Bennett stated that DOE recognizes that sustained, multi-year funding is critical to address the key challenges of the Program and noted that the MHAC funding recommendations have been taken into consideration when developing the program's budget request. DOE was successful in increasing the gas hydrates program's budget from $3.5M to $8.7M in the President's Fiscal Year 2020 Budget Request. Although this budget request is not at the funding level the MHAC recommended to the Secretary, he reiterated there are simply too many competing priorities within DOE for a finite amount of research funds.

The Committee had funding questions regarding what the competing priorities are for DOE. DFO Bennett stressed that the Department's priorities are within Fossil Energy and other energy programs.

DFO Bennett provided a quick update of the November 12, 2018 Recommendation Committee Letter to the Secretary stating that the Department had prepared a response letter and it was making its way to the Secretary and that is was with the Under Secretary of Energy, Mark Menezes. The letter is expected to be cleared through the Department and signed off in the next few weeks.

DFO Bennett introduced the agenda for the two full days of meetings and then turned over the meeting to Gabby Intihar to conduct committee business.

Committee Business, Gabby Intihar, Committee Manager
Gabby Intihar conducted committee business and made general safety announcements. She 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 on the Committee website. She 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.

Mrs. Intihar confirmed that a quorum of Committee members were present. The Committee Members and speakers introduced themselves and shared their expertise relating to gas hydrates. Finally, she noted that there were changes to the agenda and Mr. Yongkoo Seol, National Energy Technology Laboratory, will be the presenter for the DOE National Labs and NETL Research Innovation Center (RIC) Hydrates Activities Update.

Committee Readout on Gas Hydrates R&D Program Recommendations to Secretary Nov 2018 Letter – Gabby Intihar, Committee Manager
Gabby Intihar reiterated that the Department had prepared a response letter to the November 12, 2018 Recommendation Committee Letter to the Secretary and it was making its way to the Secretary and that is was with the Under Secretary of Energy, Mark Menezes. The letter is expected to be cleared through the Department and signed off in the next few weeks.

DOE National Labs and NETL Research Innovation Center (RIC) Hydrates Activities Update – Yongkoo Seol, NETL
Dr. Yongkoo Seol presented the DOE's National Laboratories gas hydrate field work proposals (FWPs). Mr. Seol provided an overview of the two types of FWPs; stand-alone FWPs and support FWPs. Stand-alone FWPs are focused on addressing specific program needs, which are primarily lab or modeling studies. Support FWPs contribute to specific activities in support of a bigger project as part of an FOA selected project. DOE currently has six active FWPs with three National Labs.

Dr. Seol provided a description of each of the studies' overall objective, key accomplishments, key findings and FY19 activities. The four standalone FWPs are focused on laboratory and numerical studies, three with Lawrence Berkeley National Laboratory (LBNL) and one with Pacific Northwest National Laboratory (PNNL). The three LBNL studies cover properties of gas hydrate sediment lab study, numerical study on characterization of methane hydrate recoverability, and collaboration with South Korea on investigating the gas production potential of hydrate deposits.

Dr. Seol additionally provided a review of the DOE-NETL's Research Innovation Center (RIC) FWP covering various research tasks they are currently working on. The NETL RIC major tasks cover numerical simulation, code development, laboratory study on gas hydrate basic science, pressure core analytical tool development, and gas recourses and supply/demand economic analysis. He provided brief overviews of the importance of each of the six tasks, the FY18-19 scope, and recent updates and accomplishments.

Dr. Seol's presentations can be found on the Committee website at
https://www.energy.gov/fe/downloads/presentations-april-23-24-2019-advisory-committee-meeting

Overview of Alaska Project and Gulf of Mexico Projects – Ray Boswell, NETL
Dr. Ray Boswell presented a review of the gas hydrates R&D in Alaska and the Gulf of Mexico. Dr. Boswell began with the Alaska North Slope project status and provided a brief overview of the project structure under the Cooperative Research & Development Agreement (CRADA) between DOE-NETL and Japan Oil, Gas, Metal and National Corporation (JOGMEC).

Dr. Boswell provided a review of the site selected within the Western Prudhoe Bay area. He provided details on the well design and the data needed to confirm the site will be suitable for the next phase of the project. He presented the criteria that would help determine the stratigraphic test well a success. In December 2018, DOE and partners drilled the STW and successfully acquired outstanding data quality through both the target sections. The analysis of the data needed is suitable for testing and proceeding to the next phase with B-sand being the best location for the long-term reservoir response experiment.

Dr. Boswell also provided a summary of the Alaska North Slope test plan, which included planning, drill design, and site characterization for the geo-data well (GDW) and the production test well (PTW). He also provided a discussion on the data acquisition for items for the next field operations and provided a details on the design of the GDW, PTW, and the surface facilities.

Dr. Boswell then presented the Gulf of Mexico project status by first providing an overview, which included a brief historical prospective of the initial GOM Joint Industry Partnership starting back in 2001. Dr. Boswell stated that the expedition for the Gulf of Mexico, GOM2-2, is continuing to be planned. He explained that the project plan changed as a result of the IODP Joides Resolution drillship (JR) being unable to operate in the Gulf of Mexico as currently designed and that the necessary alterations to the JR are not feasible. Other avenues were considered with the IODPs mission specific platform organization (ECORD) but were not successful. He discussed the impact on the GOM2-2 plans due to this revised plan and walked the Committee through the recommended option plan.

Dr. Boswell walked the Committee through different scenarios to take based on the number of days needed for the expedition, and proposed carrying out an expedition that will capture all of the necessary data and still meet DOE's science objectives. The proposal provided various project scenarios with varying costs, research findings, and time constraints.

The Committee expressed several concerns regarding the revised UT-Austin GOM2-2 expedition plan to cut out the drilling and coring of the second site and not doing all of the science objectives from the original plan with the JODIS Resolution drillship. They had a long discussion on the value of having a 'short-cut' project in the GOM or to divert this funds elsewhere. The committee urged DOE to do whatever possible to be able to carry out the full program planned in the GOM.

After highlighting various challenges ahead as well as fiscal realities, the Committee stated that the research of the GOM2-2 project is of strategic national interest, and not just for the interest of the research itself, but stressed the importance of the research in the Gulf of Mexico.

Dr. Boswell's presentation can be found on the Committee website at
https://www.energy.gov/fe/downloads/presentations-april-23-24-2019-advisory-committee-meeting

FE Roadmap Gas Hydrates Pathways Overview and Discussion – Gabby Intihar, Committee Manager
Mrs. Gabby Intihar started her presentation with some background on the DOE gas hydrates program and how it was established via the Energy Policy Act of 2000 and reauthorized in the Energy Policy Act of 2005. She provided an overview of the DOE Fossil Energy Office of Oil and Gas' gas hydrates research program goals. She presented the gas hydrates program pathway's key drivers, research timeline and out-year goals.

The Committee asked questions regarding the timeline for the roadmap and if it could be extended further out from 2035. Mrs. Intihar noted that the timeline on the gas hydrates pathway for a Fossil Energy Roadmap and the Committee could go out into the future for their road-mapping efforts if they desire to do so. A key point made by a Committee member was that the gas hydrates research program "keeps us in the game" and the U.S. manages to maintain Leadership in gas hydrates research. The Committee will be looking to develop more broadly the gas hydrates program goals.

Mrs. Intihar's presentation can be found on the Committee website at
https://www.energy.gov/fe/downloads/presentations-april-23-24-2019-advisory-committee-meeting

Committee Review of Gas Hydrates R&D Roadmap Process & Program Priorities Outline – Carolyn Koh, Methane Hydrates Advisory Committee
Dr. Carolyn Koh kicked off the gas hydrates program roadmap discussion. She discussed the purpose of this Committee meeting, which was to begin to develop the gas hydrates R&D roadmap and provide an update to the Draft Interagency Roadmap from 2013. The roadmap would cover the timeline from 2020 to 2035 or a suitable date that the Committee wanted to make research priority recommendations to the Secretary.

Committee Discussion on Long-term Production Test on the Alaska North Slope – Mark Meyers and Robert Kaminsky, Methane Hydrates Advisory Committee
Dr. Mark Meyers and Dr. Robert Kaminsky led a discussion on the long-term hydrates pilot and next scale up on the Alaska North Slope and the future proposed work of the drilling program. They stated that there is a need to gather sufficient reservoir production data to enable prediction of commercial-scale long-term reservoir production with high confidence. Very large uncertainty currently exists on hydrate reservoir performance since prior pilots were short and thus largely only dependent on the near-wellbore region, required little heat to transfer from outside reservoir, and did not strongly probe the impact of heterogeneity in the dissociation front. There was discussion on the need to pre-assess the types of data required to reasonably constrain commercial-scale simulations and the need to demonstrate that long-term problem-free production is feasible at a reasonable cost.

The Committee discussed that after the pilot (long-term reservoir response experiment) and the DOE National Labs' simulation work, the next scale up production test needs to include operators cost contributions and tying into the existing pipeline infrastructure, as well as a need for a commercialization path leading to a demonstration designed for maximum production rates. They

discussed the long-term goal on the pathway diagram and that the goal should be changed to de-risking to commercialization, specifically how to make this commercially available in the U.S.

There was a discussion on the current Alaska long-term reservoir response experiment being planned and if it will answer the questions of: what will be known after the production test; what does success look like; is two years long enough for gas rates; and if depressurization doesn't work what are the flow assurance designs. This was followed by a discussion for a second test with partners to get higher gas rates, to show that commercial rates are feasible, and other options for another test on a new site, or possibly extending the production test on the existing site.

Dr. Meyers and Dr. Kaminsky discussed with the other Committee Members the importance of continuing the work on the Alaska North Slope and proposed technical goals that the industry and DOE would hope to see come out of the tests and what information would need to be found in order to motivate industry support.

Dr. Meyers and Dr. Kaminsky's presentation can be found on the Committee website at https://www.energy.gov/fe/downloads/presentations-april-23-24-2019-advisory-committee-meeting

Committee Discussion on Reservoir Characterization through Drilling and Coring in the Gulf of Mexico (GOM) – George Moridis, Methane Hydrates Advisory Committee

Dr. George Moridis led a discussion on the data needs for characterizing hydrate deposits in the Gulf of Mexico, and the support and validation for numerical models. He began the discussion by specifying the data requirements for geologic modeling; layering/stratification; boundaries (existence and type); and geometry/extent of the reservoir. He discussed that there is still a need for information on initial and boundary conditions: pressure, temperature, phase saturations, hydrate interface (Class I), and salinity.

Dr. Moridis stressed the importance of coring and the need to obtain multiple cores over an extended area. He also stated that there has not been a single undisturbed core obtained, even when pressurized. Dr. Moridis concluded his presentation by suggesting that through drilling and coring, we will be able to find almost all of the data that are still required.

The Committee discussion included questions of whether the Gulf of Mexico's next expedition will be able to answer the scientific questions it needs to address with the revised plan. The Committee agreed that DOE needs to continue to be in the Gulf of Mexico and plan for more expeditions, as they are a vital part of the program.

Dr. Moridis' presentation can be found on the Committee website at https://www.energy.gov/fe/downloads/presentations-april-23-24-2019-advisory-committee-meeting

Committee Discussion & Wrap-up – Carolyn Koh, Methane Hydrates Advisory Committee

Dr. Carolyn Koh, Committee Chair, led the Committee through a short discussion, food for thought, on the gas hydrates R&D program, which mostly included fundamental science research areas. The research areas would ideally provide a better insight into where the committee is interested in seeing the Alaska North Slope and Gulf of Mexico projects go in the future. Dr. Koh suggested extending the methane hydrates R&D roadmap to 2035 or beyond. She also had discussion leaders come up with a list of goals they would like the research areas to meet during this extended time frame.

Committee Review of Day 1 Discussion – Carolyn Koh, Methane Hydrates Advisory Committee
Dr. Carolyn Koh, Committee Chair, recapped the discussion on the Alaska North Slope and Gulf of Mexico. This began with reiterating the priorities from the November 12, 2018 Recommendation Letter to the Secretary. Dr. Koh summarized the discussion on the long-term Production Test on the Alaska North Slope and considering the roadmap covering 2018 out to 2035, items included: long-term production test for 2 years, or longer; and afterwards, keeping the site to test new hydrate production technologies in partnership with industry and the state of Alaska.

Dr. Koh also summarized the discussion on the reservoir characterization through drilling & coring in the Gulf of Mexico from 2020 extended out to 2035 to validate/tune simulation models. Dr. Koh further discussed the gas hydrates pathway diagram and how it will be useful to modify and incorporate into the Committee's Gas hydrates R&D roadmap. She proceeded to introduce the next discussion topic on evaluation of hydrate reservoir quality in offshore U.S. waters.

Dr. Koh's presentation can be found on the Committee website at
https://www.energy.gov/fe/downloads/presentations-april-23-24-2019-advisory-committee-meeting

Committee Discussion on Evaluation of Hydrate Reservoir Quality in Offshore U.S. Waters – Joel Johnson and Miriam Kastner, Methane Hydrates Advisory Committee
Dr. Joel Johnson and Dr. Miriam Kastner, Vice-Chair, led a discussion on the potential of gas hydrates in U.S. offshore waters. The discussion began with an explanation of diffuse vs advective systems, disseminated versus pore and fracture filling gas hydrate systems, respectively.

Dr. Johnson presented and provided supporting information on each of the various margins in the U.S., including Atlantic, Gulf of Mexico, Pacific Cascadia and Alaska North Slope. He provided a comparison table of each margin's controls for concentrated gas hydrate accumulation, such as: coarse lithology, deformation regime, and available gas. Using information from the Bureau of Ocean Energy Management (BOEM), Dr. Johnson illustrated the similarities and differences in characterization of each margin. It was noted that the project would be beneficial to future exploration projects as it would provide greater knowledge of the drilling efforts needed to be taken.

The committee agreed on the importance of this research. They recommend or suggest that BOEM data should continue to be used as the data source for the program since it assures consistency.

Dr. Johnson and Dr. Kastner's presentation can be found on the Committee website at
https://www.energy.gov/fe/downloads/presentations-april-23-24-2019-advisory-committee-meeting

International R&D Activities – Timothy S. Collett, U.S. Geological Survey
Dr. Timothy Collett presented the status of international gas hydrate projects. Dr. Collett provided a timeline of research and an overview of international gas hydrates scientific and industry drilling activities being conducted internationally. Dr. Collett provided a brief synopsis of the Offshore Technology Conference 2019, the 2020 Gordon Research Conference on Gas Hydrate Systems, and the 10th International Conference on Gas Hydrates.

Dr. Collett provided a summary of the gas hydrates scientific and industry drilling and international gas hydrate R&D projects in deepwater marine, permafrost and Academic Ocean drilling throughout the world to date. He also presented an update on the R&D conducted by Japan, China India, and South Korea, European Union, New Zealand, Norway and Canada, Taiwan, Brazil, Mexico, Columbia, and

Uruguay. The discussion including details on the recent expedition, which included project descriptions, scientific objectives and the most significant accomplishments from their work.

Dr. Collett's presentation can be found on the Committee website at
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Gas Hydrate Technologies – Christopher Carstens, Methane Hydrates Advisory Committee
Mr. Christopher Carstens presented on the industrial applications of gas hydrates. He provided a history of what technologies have been used in the past. He provided details on various solutions used to form gas hydrates and their uses. He explained how the hydrates will get to the market. He described the energy supply chain, the demand for liquid natural gas (LNG), and how hydrates offers an unconventional alternative.

Mr. Carsten presented details of the LNG chain supply chain. He focused on how hydrates can simplify the shipping cost and delivery cost comparison of LNG vs. hydrates. He provided examples on how it can be improved and made more cost competitive. He went on to describe the issues with flaring gas and impacts. He concluded his talk with the value of gas hydrates.

Mr. Carstens' presentation can be found on the Committee website at
https://www.energy.gov/fe/downloads/presentations-april-23-24-2019-advisory-committee-meeting

Committee Gas Hydrate Roadmap Discussion Continued – Carolyn Koh, Methane Hydrates Advisory Committee
The discussion resumed with a discussion on the goal's for the gas hydrate R&D program that it is planning to achieve over the course of the roadmap starting from the priorities the Committee noted in the November 12, 2018 letter to Secretary Perry and going out to 2035 and beyond. They discussed the advantages of being in the Gulf of Mexico due to its extensive infrastructure and maintaining capabilities in both the Arctic and Gulf of Mexico.

Dr. Koh instructed each of the discussion leads to prepare a two page document describing each of the goals and shaping a pathway to achieving those goals for each area discussed: the Alaska North Slope, the Gulf of Mexico Characterization and Gas Hydrate Potential in U.S. Offshore Waters.

Next Steps
The Committee discussion leaders are to prepare two-pages of details on area discussed above with goals and description for each pathway to achieve the goal.

The meeting adjourned on April 24, 2019 at 3:40 pm CST.

Carolyn Koh, Chair

Shawn Bennett, DFO

February 21, 2019

Methane Hydrate Advisory Committee Meeting
April 23, 2019 9:00 am – 5:00 pm (CST)
April 24, 2018 8:30 am – 5:00 pm (CST)

Public Access
Hilton Americas-Houston
1600 Lamar; Room 337
Houston, Texas 77010

DAY 1 AGENDA
April 23, 2019 8:30 am – 5:00 pm (CST)

Time	Discussion Item	Speaker
8:30 am – 9:00 am	Registration	All
9:00 am – 9:20 am	DFO Welcome and Introductions	Shawn Bennett, DAS for Oil and Natural Gas, Designated Federal Officer (DFO)
9:20 am – 9:30 am	Committee Business	Gabby Intihar, Program Manager Gas Hydrates Program
9:30 am – 10:00 am	Committee Readout on Gas Hydrates R&D Program Recommendations to Secretary Nov 2018 Letter	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrate Advisory Committee
10:00 am – 10:15 am	Break	All
10:15 am – 11:00 am	DOE National Labs and NETL Research Innovation Center (RIC) Hydrates Activities Update	Jared Ciferno, Technology Manager, National Energy Technology Laboratory
11:00 am – 12:00 pm	Overview of Alaska North Slope & Gulf of Mexico Projects	Ray Boswell, RIC/SEA Analyst, National Energy Technology Laboratory
12:00 pm – 1:00 pm	Lunch	All
1:00 pm – 1:15 pm	FE Roadmap Gas Hydrates Pathways Overview and Discussion	Gabby Intihar, Program Manager, Gas Hydrates Program
1:15 pm – 1:45 pm	Committee Review of Gas Hydrates R&D Roadmap Process & Program Priorities Outline	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrates Advisory Committee

1:45 pm – 3:00 pm	Committee Discussion – Long-term Production Test on the Alaska North Slope (2018-2024) - What's Next?	Mark Meyers, Bob Kaminsky Methane Hydrates Advisory Committee Members
3:00 pm – 3:15 pm	Break	All
3:15 pm – 4:30 pm	Committee Discussion – Reservoir Characterization Through Drilling & Coring in the Gulf of Mexico (2020-2024) - What's Next?	George Moridis, Carolyn Koh Methane Hydrates Advisory Committee Members
4:30 pm – 5:00 pm	Discussion and Wrap-up	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrates Advisory Committee
5:00 pm	Adjourn	

DAY 2 AGENDA
April 24, 2019 8:30 am – 5:00 pm (CST)

Time	Discussion Item	Speaker
8:15 am – 8:30 am	Registration	All
8:30 am – 9:00 am	Committee Review of Day 1 Discussion: Long-term Production Test and Reservoir Characterization through Drilling & Coring	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrates Advisory Committee
9:00 am – 10:30 am	Committee Discussion – Evaluation of Hydrate Reservoir Quality in Offshore U.S. Waters - Where to Next? (e.g. Atlantic Margin)	Joel Johnson, Miriam Kastner Methane Hydrates Advisory Committee Members
10:30 am – 10:45 am	Break	All
10:45 am – 11:45 am	Current Activities of the International Hydrate Drilling Programs Presentation	Tim Collett, U.S Geologic Survey
11:45 am – 1:00 pm	Lunch	All
1:00 pm – 2:00 pm	Gas Hydrate Technologies Presentation	Chris Carstens, Methane Hydrates Advisory Committee Member
2:00 pm – 3:00 pm	Committee Gas Hydrates Roadmap Discussion	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrates Advisory Committee
3:00 pm – 3:15 pm	Break	All

3:15 pm – 4:30 pm	Committee Gas Hydrates Roadmap Discussion Wrap-up & Next Steps	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrates Advisory Committee
4:30 pm – 4:45 pm	Other Business: Discuss Ms. Ann Cook, Ohio State University, Letter To Committee and Decision	Carolyn Koh, Chair Miriam Kastner, Vice-Chair Methane Hydrates Advisory Committee
4:45 pm – 5:00 pm	Public Comments, if any	Shawn Bennett, DAS for Oil and Natural Gas, Designated Federal Officer (DFO)
5:00 pm	Adjourn	

APPROVED: Shawn Bennett
Designated Federal Official

2/26/19
Date

Methane Hydrate Advisory Committee (MHAC) Meeting
April 23-24, 2019
Houston, TX

Table 1: List of Attendees

Attendee	Role	April 23	April 24
Dr. Thomas Blasingame Texas A&M University Department of Petroleum Engineering	Committee Member	X	X
Mr. Christopher Carstens Carbo Culture Inc	Committee Member	X	X
Dr. Joel E. Johnson University of New Hampshire Department of Earth Sciences	Committee Member	X	X
Dr. Robert D. Kaminsky ExxonMobil Upstream Research Co.	Committee Member	X	X
Dr. Miriam Kastner Scripps Institute of Oceanography University of California, San Diego	Committee Member	X	X
Dr. Robert L. Kleinberg Schlumberger Fellow - Retired	Committee Member	X	X
Dr. Carolyn Koh Colorado School of Mines Chemical Engineering Department	Committee Member	X	X
Dr. Michael Max Hydrate Energy International, Inc	Committee Member	X	X
Mr. Daniel R. McConnell Fugro	Committee Member	X	X
Dr. George J. Moridis Lawrence Berkeley National Lab University of California	Committee Member	X	X

Attendee	Role	April 23	April 24
Dr. Mark D. Myers Myenergies	Committee Member	X	X
Dr. Craig Shipp Consultant	Committee Member	X	X
Dr. John Thurmond Equinor	Committee Member	X	X
Shawn Bennett Deputy Assistant Secretary for Oil and Gas U.S. Department of Energy	DFO	X	X
Tim Reinhardt Supply and Delivery Director, Office of Oil and Natural Gas U.S. Department of Energy	DOE Staff	X	X
Gabby Intihar Committee Manager U.S. Department of Energy	DOE Staff	X	X
Bianca Tedesco ADS	DOE Support	X	X
Ray Boswell National Energy Technology Laboratory Pittsburgh, PA	DOE Staff	X	X
Yongkoo Seol National Energy Technology Laboratory Morgantown, WV	DOE Staff	X	X
Tim Collett, Research Geologist, U.S. Geological Survey	Presenter	X	X