U.S. DEPARTMENT OF ENERGY

FY 2011 Methane Hydrate Program

Report to Congress
July 2012

United States Department of Energy
Washington, DC 20585

Message from the Secretary

Section 968 of the Energy Policy Act of 2005 requires the Department of Energy to submit to Congress an annual report on the results of methane hydrate research.

I am pleased to submit the enclosed report entitled *U.S. Department of Energy FY 2011 Methane Hydrate Program Report to Congress*. The report was prepared by the Department of Energy's Office of Fossil Energy and summarizes the progress being made in this important area of research. Pursuant to statutory requirements, this report is being provided to the following Members of Congress:

- **The Honorable Joseph R. Biden**
  President of the Senate

- **The Honorable John Boehner**
  Speaker of the House of Representatives

- **The Honorable Jeff Bingaman**
  Chairman, Senate Committee on Energy and Natural Resources

- **The Honorable Lisa Murkowski**
  Ranking Member, Senate Committee on Energy and Natural Resources

- **The Honorable Ralph M. Hall**
  Chairman, House Committee on Science and Technology

- **The Honorable Eddie Bernice Johnson**
  Ranking Member, House Committee on Science and Technology

- **The Honorable Fred Upton**
  Chairman, House Committee on Energy and Commerce

- **The Honorable Henry A. Waxman**
  Ranking Member, House Committee on Energy and Commerce

If you need additional information, please contact me or Mr. Jeff Lane, Assistant Secretary, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Steven Chu

Executive Summary

This report describes actions taken in Fiscal Year (FY) 2011 to implement the Methane Hydrate Research and Development Act of 2000, as amended by the Energy Policy Act of 2005. The Energy Policy Act requires that the Secretary of Energy provide this report to Congress annually.

Since 2001, the Department of Energy's Methane Hydrate Research and Development (R&D) Program has pursued a range of science and technology development efforts designed to determine energy resource and environmental implications of the potentially vast occurrence of gas hydrate in nature. In a congressionally mandated report released in January, 2010, the National Research Council concluded that National Energy Technology Laboratory has been *consistent and effective* in leading a *high quality research portfolio that has enabled significant progress toward the Program's long term goals*. In 2011, the Massachusetts Institute of Technology Energy Initiative issued its report *The Future of Natural Gas*, and recommended that *The U.S. government should continue to sponsor methane hydrate research, with a particular emphasis on the demonstration of production feasibility and economics*. Later in 2011, the National Petroleum Council, as part of its report *Prudent Development – Realizing the Potential of North America's Abundant Natural Gas and Oil Resources* recommended *the Department of Energy should lead in identifying, in some cases funding, and in other cases supporting public-private partnerships for research and development on energy and certain environmental issues of national interest. Examples where federal involvement is needed include science and pre-commercial technology relating to methane hydrates*. These comments reflect a broad consensus that the Program continues to conduct relevant research in an efficient and effective manner, thereby maintaining the U.S. position at the forefront of this important area of research.

The Program did not receive direct appropriation for gas hydrate research and development in FY 2011; nonetheless, we were successful in maintaining and advancing our major cooperative programs with industry, academia, and with international programs. In FY 2011 the programs energy resource evaluation efforts remained focused on the Alaska North Slope and the Gulf of Mexico. With respect to research in Alaska, key accomplishments included the successful drilling, completion, and evaluation of a fully-instrumented scientific well in the western Prudhoe Bay Unit. This well was suspended in preparation for extended field scientific testing slated for FY 2012. In addition, plans for long-term depressurization tests have been developed and approved in concept by the Alaska North Slope operators, yet await resolution of legal and logistical issues related to access to the chosen field location. In the Gulf of Mexico, the program completed the evaluation of 2009 drilling data and have proceeded in the construction and testing of new coring and core analysis devices designed to support future deepwater gas hydrate field programs. The Program also maintained active international R&D collaborations with Japan, India, and Korea and continued its effort to report on results of work funded in prior years to better understand the potential role of gas hydrate with respect to ongoing climate change.

This report outlines key accomplishments of the DOE-led gas hydrates program during FY 2011, and provides a bibliography of referenced papers, articles, and conference presentations that appeared during the year.

FY 2011 METHANE HYDRATE PROGRAM REPORT TO CONGRESS

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FY 2011 METHANE HYDRATE PROGRAM REPORT TO CONGRESS

I. Legislative Action

This report describes actions taken in Fiscal Year (FY) 2011 to implement the Methane Hydrate Research and Development Act of 2000, as amended by section 968 of the Energy Policy Act of 2005 (EPAct). The Energy Policy Act requires that the Secretary of Energy provide this report to Congress annually.

II. Summary of Accomplishments in FY 2011

During FY 2011, DOE's Methane Hydrate Program received no direct appropriation. Accomplishments discussed below are related to ongoing work enabled exclusively by prior year funding. The program was also successful in ensuring continuity of its Alaska gas hydrate field testing effort through development of a Field Work Proposal (FWP) to the Department of Energy's (DOE) Office of Science and expanded collaboration with partners in Alaska and Japan that ensured that planned FY 2012 field testing utilizing the scientific borehole established in FY 2011 could proceed, avoiding the premature abandonment of that well.

Gulf of Mexico Field Projects

Chevron-led Joint Industry Project

The Gulf of Mexico Joint Industry Project (JIP) is a cooperative research program between the DOE and an international consortium of industry partners under the leadership of Chevron. The overall objective of the project is to understand the nature of gas hydrate occurrence in the deepwater Gulf of Mexico, to develop technology to detect, delineate, and characterize methane hydrate accumulations, and to assess the implications of naturally-occurring gas hydrate for drilling safety and future energy supply.

During 2011, the project team completed the evaluation of field data acquired during the FY 2009 exploration drilling program (JIP Leg II). JIP Leg II confirmed the existence of gas hydrate in sand reservoirs in the Gulf of Mexico, validated the prospecting approaches employed by the JIP science team, and provided an initial calibration of earlier FY 2008 Department of Interior Gulf of Mexico gas hydrate resource assessment. Thirteen detailed technical *Initial Results* reports were provided to the public in FY 2010 on the National Energy Technology Laboratory's (NETL) website; the reports were published (and made available via *ScienceDIrect*) as peer-reviewed reports in FY 2011 (see Appendix A for a list of these and all 2011 papers).

The success of the 2009 drilling program (in which resource-grade gas hydrates were found in four of seven wells drilled) spurred agreement between the JIP and the DOE to develop plans to conduct a follow-on expedition designed to collect and maintain sediment samples of gas-hydrate-bearing sands and associated sediments under *in situ* pressures and conduct specific wireline evaluation programs, including limited pressure testing in the newly-discovered reservoirs. Planning for this expedition continues to address uncertainty in deepwater regulatory environments and emerging industry deepwater drilling protocols in the aftermath of the 2010 *Deepwater Horizon* disaster. A major development in FY 2011 was the significant expansion in collaboration between the U.S. DOE/JIP effort and the Japanese national research and development (R&D) effort with respect to deepwater pressure coring technology development. This collaboration includes direct engagement in the design and testing of a potentially common suite of tools to be used both during 2012/2013 testing activities offshore Japan as well as in future U.S. drilling programs.

Mississippi Canyon 118 Seafloor Observatory

The University of Mississippi continues to lead a consortium working to establish and maintain a seafloor observatory for long-term monitoring of gas hydrate occurrences in Mississippi Canyon Block 118 in the Gulf of Mexico and their response to ongoing environmental changes. This project is conducted in conjunction with the National Oceanic and Atmospheric Administration and the Bureau of Ocean Energy Management and Resource Evaluation.

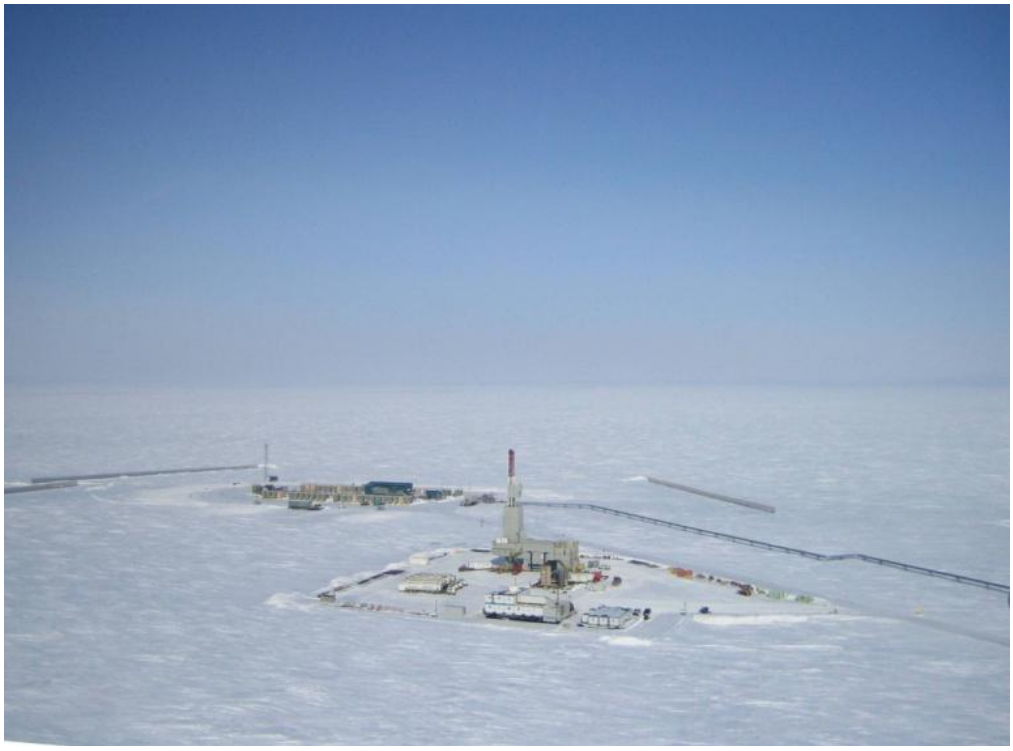
During FY 2011 DOE funded activities continued to focus on design and deployment of instrumentation for collection of geophysical, geochemical, and biological data at the Mississippi Canyon 118 hydrate observatory site. Key accomplishments during the year included collection of jumbo piston cores, and the acquisition of four component ocean bottom seismometer data both of which aid in the characterization of the geology and hydrate occurrence at the site. Poster and oral presentations were made at national and international meetings and consortium research results were documented through scientific literature (See Appendix A).

Alaska North Slope Field Projects

CO_2-CH_4 Exchange Field Trial

NETL is continuing to work with ConocoPhillips, Alaska, to advance the science of chemical exchange in gas hydrate reservoirs for the purpose of simultaneous production of methane and permanent storage of carbon dioxide. In FY 2009, the ConocoPhillips project team identified the western part of the Prudhoe Bay Unit as the most appropriate field test site and in 2010 gained the necessary partner approvals to conduct the test within the existing oil and gas production and gathering infrastructure. As ConocoPhillips is not the operator in the Prudhoe Bay Unit, a new ice pad was built, necessitating operations occur in two separate winter field seasons. The drilling, logging, and instrumentation of the borehole occurred during FY 2011; and downhole injection and production experiments are scheduled in FY 2012. See Figure 1.

Figure 1: Foreground: Nordic #3 Drill Rig at site of Iġnik Sikumi #1 well, Prudhoe Bay Unit (PBU), Alaska, in April 2011. The PBU L-pad is in the background (courtesy ConocoPhillips).



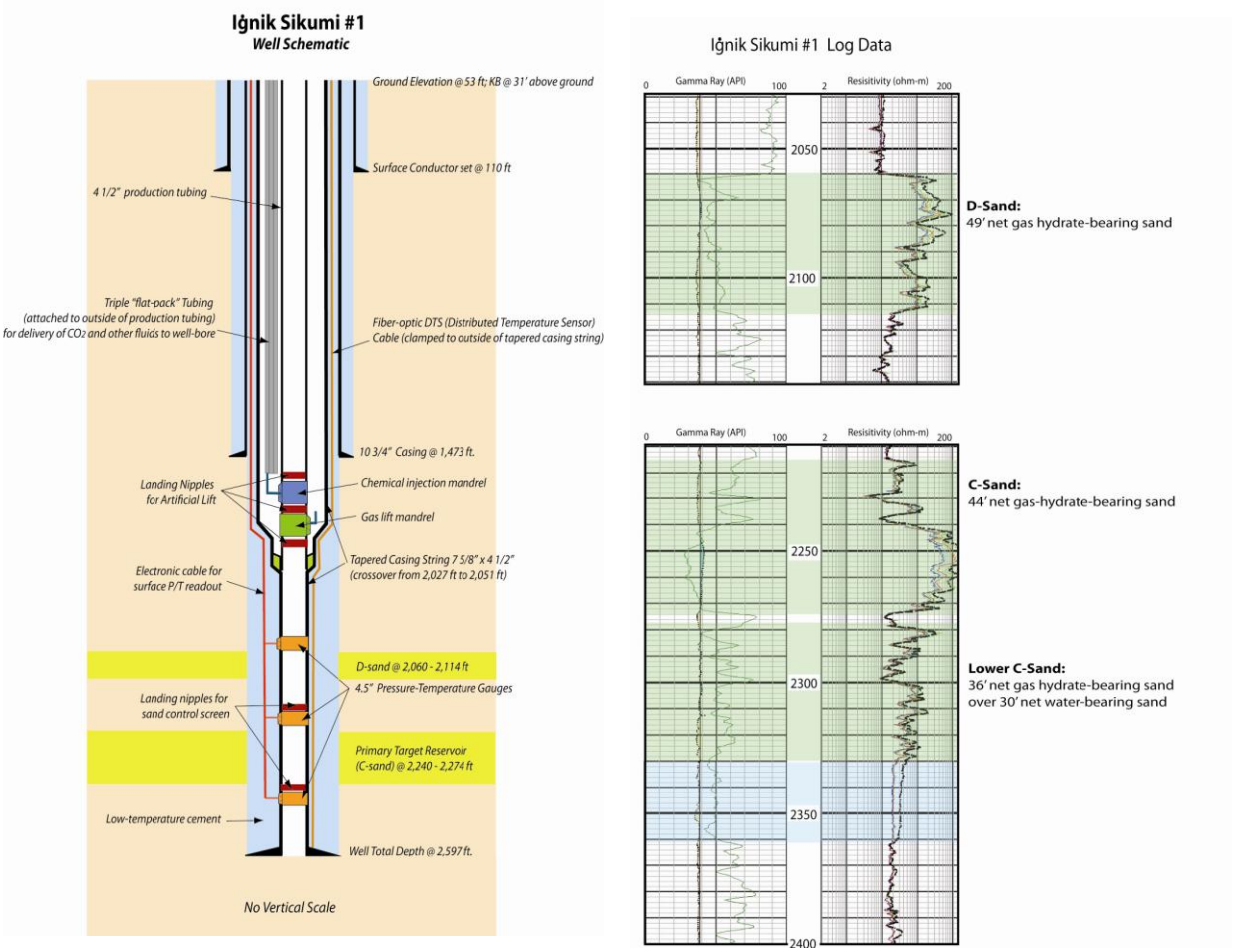
The field operations were conducted from April 5 to April 28, 2011. The *surface* hole was drilled using water-based mud and Logging While Drilling (LWD) measurements to a depth of 1,482 feet, where 10 ‘ ¾” surface casing was run, cemented, and pressure tested. LWD operations then continued using chilled oil based drilling fluid to minimize thermal disturbance of the permafrost and hydrate-bearing formations. The well was drilled to a total depth of 2,597 feet and a full suite of wire line well logs were then obtained (see Figure 2); followed by a series of short-duration wire line pressure tests utilizing Schlumberger’s Express Pressure Tool (XPT) and Modular Formation Dynamics Tester (MDT) tools.

Upon conclusion of the data acquisition program, a well completion was installed consisting of a fully-instrumented tapered casing string that included multiple downhole temperature and pressure gauges and a continuous fiber-optic DTS (Distributed Temperature Sensor) cable (see Figure 2). All equipment was fully functional and monitored throughout cementing operations. The upper completion was then installed, which included a chemical injection mandrel and gas-lift mandrel. The well was been temporarily suspended, with the rig moving off location April 28, 2011.

Wire line data collected during the FY 2011 field program indicate that four gas-hydrate-bearing sand horizons were encountered at the site, as expected. The primary test target, the Sagavanirktok “Upper “C” sandstone (2214 to 2274 ft below the rig floor), was confirmed to

contain 44 ft of clean, high-porosity sandstone with very high gas hydrate saturations and to be within the optimal pressure-temperature conditions to conduct the planned field trial. The XPT successfully obtained data at 16 locations to provide insight into the ambient reservoir pressure and potential injectivity of various stratigraphic units, while the MDT tool was used primarily to conduct "mini-frac" tests, designed to measure breakdown pressures, the pressure at which fluids may be injected before the formation will fail via extensional fracturing. The DTS cable recorded the temperature perturbances related to drilling and completion, and has subsequently been recording the temperature re-equilibration to ambient conditions, providing valuable information on the thermal properties of the reservoirs.

Figure 2: Left: Schematic of the well completion for the Iġnik Sikumi #1 well; Right: Summary of key log data acquired during the FY 2011 field program (from Schoderbek and Boswell, 2011).



Throughout FY 2011, it remained uncertain as to whether the testing portion of the planned program would be conducted. While industry remained unable to justify significant expenditure on the testing portion of this R&D program and inability to support long-term liabilities related to indefinite suspension, there was concern that the well would need to be cemented and abandoned. To avoid abandonment of the test, NETL worked with ConocoPhillips to engage

international partners, ultimately securing the participation (including $7 million in funding) of the Japan Oil Gas and Metals National Corporation (JOGMEC) as a direct project cost share partner to ConocoPhillips. JOGMEC required, as a condition of their participation, ongoing U.S. federal involvement which was enabled with DOE's Office of Science's acceptance of a FWP from NETL.

Extended-duration Depressurization Testing Program

The main goals of this project, conducted in partnership with BP Exploration-Alaska (BPXA), are to characterize the nature and commercial implications of methane hydrate resources on the Alaska North Slope through the ultimate conduct of an extended-duration depressurization test. This project is designed to provide critical information with which to estimate the potential productivity and environmental impacts associated with this most-promising gas hydrate production technology. Progression toward this test has been hindered due both to lack of funding as well as ongoing EPA-imposed debarment of BPXA's Prudhoe Bay element due to pipeline failures and resultant spills in 2006. DOE continues to work with BPXA, other partners in the Prudhoe Bay Unit, and our international collaborators to develop a feasible project structure and rigorous scientific design for the testing program.

Gas Hydrate Exploration Technologies

In addition to the work ongoing within the major field programs to advance the geophysical evaluation of gas hydrates using existing datasets (see Appendix A for key 2011 publications), a number of projects in partnership with Universities are nearing completion. These include:

- Baylor University, in 2011 completed reconfiguration of a direct current resistivity array and performed shallow water testing of the system in preparation for performance of a high resolution 3-D resistivity scan of the MC118 seafloor observatory in the summer of 2012.
- Scripps Institution of Oceanography at the University of California San Diego completed experimental efforts of hydrate bearing soil conductivity and continued dissemination of project results through journal articles and presentations at scientific / technical meetings, including the 7th International Conference on Gas Hydrates.
- Researchers at Oregon State University completed their project investigating the relationship of residual heat flow anomalies to fluid flow and gas hydrate distribution in the subsurface and submitted a final project scientific report.

Global Environmental and Climate Studies

DOE continues to support a range of studies designed to determine the sources, sinks, and fluxes of methane in arctic and marine gas-hydrate-bearing environments. The portfolio of projects are now concluding, and includes field work in a range of geologic settings, as well as lab based analyses and initial attempts to incorporate gas hydrate into global climate and environmental process models. The portfolio of projects includes:

- In FY 2011 researchers at Lawrence Berkeley and Los Alamos National Laboratories scaled up basin and regional scale models to simulate hydrate dissociation and methane release on a global scale. Preliminary results were presented at the 7th International Conference on Gas Hydrates and at the 2011 Arctic Technology Conference.
- The University of Texas A&M – Corpus Christi in conjunction with Florida State University and Scripps Institution of Oceanography completed project efforts evaluating new satellite based techniques for assessing methane flux from oceanic environments with project results reported in numerous publications, including a manuscript in the Journal of Geophysical Research. A final report detailing the results of the project will be provided to DOE in 2012.
- The University of Chicago and the University of California – Berkeley completed development of a 2-D basin scale model to assess the sensitivity of the hydrate inventory to various parameters, and the vulnerability of hydrates to potential climatic warming. Project results are expected to be disseminated through Journal articles and a DOE final project report in 2012.
- Researchers at the University of Delaware completed megagenomic analyses of sediment core samples collected in the Beaufort Sea in 2009, used to provide insight into the biological communities responsible for methane oxidation in shallow Arctic waters.
- The University of Alaska – Fairbanks, in partnership with the U.S. Geological Survey (USGS), completed field studies of methane ebullition in Arctic lakes, including geophysical profiling of lakes, sampling of lake sediments and water chemistry, and detailed data analysis and integration. Project results, disseminated through multiple journal articles, are adding scientific insight into the role of permafrost thawing and methane release during past climate change events.
- The USGS, under an interagency agreement with DOE, continued efforts to better define the changing permafrost boundary in the shallow shelf of the Beaufort Sea.
- The University of California – Santa Barbara (UCSB) has completed field studies in the Santa Barbara and Santa Monica basins to evaluate the interactions of basin currents and water column methane oxidation. Final results, expected in 2012, will help to frame methane's role in atmospheric accumulation of greenhouse gases and climate change. UCSB researchers under the project also participated in a broad scientific assessment of the environmental impacts resulting from the Macondo/Deepwater Horizon oil spill in the Gulf of Mexico in 2010. UCSB findings, published widely in FY 2011 and incorporated into a National Academy of Science volume, suggest that microbiological communities were successful at consuming essentially all of the methane and other hydrocarbons in the water column prior to escaping to the atmosphere.

Fundamental Experimental and Modeling Studies

In prior years, the program has supported a number of experimental and modeling efforts within the DOE National Laboratory system, universities, and other federal agencies. Limited efforts did continue during FY 2011, and release of results from prior year efforts did occur. Publications

and presentations in FY 2011 resulting from these efforts are contained in Appendix A and include:

- Research conducted directly at NETL in FY 2011 focused on the development of fundamental relationships and viable numerical simulations codes related to CO_2-CH_4-N_2 interactions in natural systems.
- Efforts at the Georgia Institute of Technology focused on experiments to identify, understand, and model processes involved in methane production from hydrate-bearing sediments to contribute to new insight into: hydrate formation and growth, hydrate-mineral bonding, and gas production by chemo-driven methods with emphasis on the fundamental understanding of CO2-CH4 exchange. Project results were highlighted through multiple journal articles during FY 2011.
- The University of Texas at Austin, in collaboration with the Massachusetts Institute of Technology, completed project efforts modeling interactions of gas, water, and hydrate in sediments. Project results are expected to aid in improvement of existing reservoir models and thus prediction of in-place hydrate accumulations and saturations.
- Efforts under an interagency agreement between DOE and the USGS continue to provide multi-disciplinary scientific support to the Methane Hydrate Research Program, including progress towards development of a novel fingerprinting method to identify methane gas originating from hydrates and leadership in an inter-lab comparison of key geomechanical attributes of lab synthesized samples of methane hydrates bearing sediments.
- Modelers at Lawrence Berkeley National Laboratory continued performing, and publishing, simulations aimed at better understanding the production potential and geomechanical impacts of production from various classes of hydrate in marine and arctic settings from around the globe, including simulations of potential long term hydrate production test scenarios.
- Pacific Northwest National Laboratory researchers continued code development and computer simulations with their STOMP model focused on CO_2 / CH_4 exchange in hydrates as a part of collaborative research with the Korean National Hydrate Program.
- Lawrence Berkeley National Laboratory continued investigating and publishing on the mechanical and geophysical properties of hydrate-bearing sands, the capillary controls of hydrate formation in North Slope sediments, and effects of hydrate patchy saturation.

International Collaboration

DOE maintained active engagement and discussion with the world's leading international gas hydrate R&D programs in FY 2011. Formal departmental-level agreements continued with government entities in Japan, Korea, and India. Entities from each of these countries are participants in the DOE's Gulf of Mexico JIP lead by Chevron, and continue to demonstrate strong interest in future Alaska North Slope extended duration field tests. A U.S.-Korea workshop to report the findings of prior year collaborative programs occurred in Daejeon, Korea, in early 2011.

In addition to these Departmental-level agreements, NETL maintains active collaborations with gas hydrate efforts in New Zealand, China, Canada, and Taiwan.

NETL is also supporting an ongoing global assessment of gas hydrate science and technology issues being conducted by the United Nations Environmental Program which is scheduled to release its report in the summer of 2012. The steering committee includes representatives from NETL and the USGS, as well as from Canada, Japan, Korea, India, Germany, and Norway.

Fellowship Programs

DOE was unable to award an NETL-NAS National Methane Hydrate R&D Program Fellowship in FY 2011. Six fellowships have been awarded since the fellowship program was initiated in 2007. A seventh fellow is expected to be selected early in FY 2012 to Dr. Laura Brothers. Dr. Brothers, who received her PhD in Earth Sciences from the University of Maine in 2010, will work with the USGS to conduct geophysical studies. She was previously stationed at the USGS Woods Hole Sciences Center where her work included research on permafrost degradation and potential hydrate dissociation in nearshore Beaufort Sea.

Program Management and Oversight

Throughout FY 2011, DOE/NETL continued to monitor a broad portfolio of R&D projects, as specified by EPAct. The effectiveness of this management was positively reviewed in a report released by the National Academies in January 2010. However, no meetings of the Federal Advisory Committee were held during FY 2011. DOE/NETL continued to engage its interagency partners, however, through regular meetings of the Interagency Technical Coordination Team.

In a 2011 review of "*The Future of Natural Gas*," the MIT Energy Initiative reviewed the state of gas hydrate R&D and remarked "methane hydrate represents a vast potential resource for the long term," and "DOE… has partnered with other government agencies, academe, and industry in field, modeling, and laboratory programs that have produced numerous successes." The MIT report included the following summary recommendation: "Continue methane hydrates research program to develop methods for remote detection of highly concentrated deposits; conduct formal resource assessments; and prove the resource potential through long-term production testing" (MITEI, 2011).

Also in FY 2011, the National Petroleum Council released its study "*Prudent Development – Realizing the Potential of North America's Abundant Natural Gas and Oil Resources"* and remarked "substantial methane hydrate resources have also been identified, particularly in the Gulf of Mexico and portions of the Arctic. These could be available for development in the long term, beginning in 2030–2050 period, leading to production of 1–10 trillion cubic feet per year by 2050, and with the potential for sustained growth over the remainder of the century" (NPC, 2011).

Technology Transfer

DOE and its research partners continued to disseminate research results to the scientific community during FY 2011. Appendix A provides a list of 85 peer-reviewed publications, 116 grey literature and government publications, and 65 professional conference presentations during the fiscal year that resulted, in whole or in part, from DOE supported projects. In particular, 13 peer-reviewed articles detailing the Scientific Results of the 2009 DOE/Gulf of Mexico JIP Leg II drilling program were released on-line in FY2011 in advance of compilation into a *Special Issue of Marine and Petroleum Geology (Elsevier)* that will be published in hard copy form in 2012. A similar special volume on the 2007 DOE/BPXA Mt Elbert (Alaska) field test program was published in February, 2011 (Boswell et al., eds, 2011). The DOE/NETL Methane Hydrate Newsletter, *Fire in the Ice*, continued to report on global developments in gas hydrate R&D in FY 2011. This periodic publication is distributed to 1,500 subscribers in more than 40 countries.

Information on the DOE Methane Hydrate Program, including detailed summaries of all active and completed projects and reports and publications resulting from DOE-funded investigations, are available at www.netl.doe.gov. Additional information, such as program reports and activities of the Methane Hydrate Advisory Committee, is available at www.fe.doe.gov.

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III. Conclusion

This report describes the accomplishments of the DOE-lead Methane Hydrate R&D Program in FY 2011. DOE effectively managed ongoing work funded in prior years to further advance science and technology development activities designed to determine the resource potential and environmental implications of gas hydrate.

Work in 2011 was highlighted by the successful drilling, logging, and completion of a fully-instrumented scientific well-bore within the Prudhoe Bay infrastructure area of the Alaska North Slope. In addition, the Department's efforts to maintain and expand industry and international collaborations was successful in assuring that the field testing portion of the program could be conducted in FY 2012, avoiding the premature abandonment of the test well. This well will be a critical milestone in advancing the scientific understanding of gas hydrate reservoir response to alternative gas hydrate production strategies and provide vital information to the future planning of extended-duration production tests.

In the Gulf of Mexico, evaluation of the data acquired in the program's landmark 2009 exploration was completed and reported to the public, and expanding international collaboration continues to advance the preparations for further future marine resource sampling and characterization. The program also continued its effort to work with academia, DOE national laboratories and other federal agencies to better understand the potential response of gas hydrate to ongoing climate change. Finally, the program maintained active international R&D collaborations with Japan, India, and Korea throughout FY 2011.

Appendix A: FY 2011 Publications and Reports

Peer-Reviewed Publications

Anderson, B., Hancock, S., Wilson, S., Enger, C., Collett, T., Boswell, R., Hunter, R., 2011. Formation pressure testing at the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope: Operational summary, history matching, and interpretations. *J. Mar. Pet. Geo.,* 28(2), p. 478-492.

Anderson, B., Kurihara, M., Wilson, S., Pooladi-Darvish, M., White, M., Moridis, G., Gaddipati, M., Masuda, Y., Collett, T., Hunter, R., Narita, H., Rose, K., Boswell, R., 2011. Regional long-term production modeling from a single well test, Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 493-501.

Bhatnagar G., Chatterjee, S., Chapman, W., Dugan, B., Dickens, G, Hirasaki, G., 2011. Analytical theory relating the depth of the sulfate-methane transition to gas hydrates distribution and saturation. *Geochemistry, Geophysics, Geosystems,* 12.

Boswell, R., Rose, K., Collett, T., Lee, M., Winters, W., Lewis, K., Agena, W., 2011. Geologic controls on gas hydrate occurrence in the Mount Elbert prospect, Alaska North Slope, *J. Mar. Pet. Geo.,* 28(2), p. 589-607.

Boswell, R., Collett, T., Frye, M., Shedd, B., McConnell, D., Shelander, D., 2011. Subsurface gas hydrates in the northern Gulf of Mexico. *J. Mar. Pet. Geol.,* 27 pp.

Boswell, R., Frye, M., Shelander, D., Shedd, B., McConnell, D., Cook, A., 2011. Architecture of gas hydrate-bearing sand reservoirs from Walker Ridge 313, Green Canyon 955, and Alaminos Canyon 21: Northern Gulf of Mexico. *J. Mar. Pet. Geol.,* 16 pp.

Boswell, R., 2011. Gas Hydrates: Research Status and Potential Source of Future Energy Supply for the United States: Topical Paper #1-11: NPC 2011 natural gas report. *National Petroleum Council.* Washington, D.C., 24 pp.

Boswell, R., Collett, T., 2011. Current perspectives on gas hydrate resources. *Energy and Environmental Science,* 4, 6 pp.

Briggs, B., Pohlman, J., Torres, M., Riedel, M., Brodie, E., Colwell, F., 2011. Macroscopic Biofilms in Fracture-Dominated Sediment that Anaerobically Oxidize Methane. *Applied and Environmental Microbiology*, 77, 7 pp.

Brunner, C., Ingram, W., Meyers, S., Lutken, C., 2011. Sedimentation at the Woolsey gas-vent complex in the northern Gulf of Mexico. *J. Miss. Acad. Sci*., 56(1), p. 69.

Chatterjee S., Dickens, G., Bhatnagar, G., Chapman, W., Dugan, B., Snyder, G., Hirasaki, G., 2011. Pore water sulfate, alkalinity and carbon isotope profiles in shallow sediment above marine gas hydrate systems: A numerical modeling perspective. *J. Geophys. Res. - Solid Earth*, 116.

Choi, J., Seol, Y., Boswell, R., Juanes, R., 2011. X-ray computed-tomography imaging of gas migration in water-saturated sediments: From capillary invasion to conduit opening. *Geophys. Res. Lett.,* 38, 5 pp.

Collett, T., Lee, M., Agena, W., Miller, J., Lewis, K., Zyrianova, M., Boswell, R., Inks, T., 2011. Permafrost-associated natural gas hydrate occurrences on the Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 279-294.

Collett, T., Lewis, R., Winters, W., Lee, M., Rose, R., Boswell, R., 2011. Downhole well log and core montages from the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 561-577.

Colwell, F., Briggs, B., Schwartz, A., 2011. Microbial community distribution in sediments from the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 404-410.

Dai, S., Lee, C., Santamarina, A., 2011. Formation history and physical properties of sediments from the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 427-438.

Daigle, H., Dugan, B., 2011. Capillary controls on methane hydrate distribution and fracturing in advective systems. *Geochemistry, Geophysics, Geosystems,* 12.

Daigle, H., Dugan, B., 2011. An improved technique for computing permeability from NMR measurements in mudstones. *Geophys. Res. Lett,* 116.

Daigle, H., Dugan, B., 2011. Permeability anisotropy and fabric development: A mechanistic explanation. *Water Resources Research,* 47.

Daigle, H., Bangs, N., Dugan, B., 2011. Transient hydraulic fracturing and gas release in methane hydrate settings: A case study from southern Hydrate Ridge. *Geochemistry, Geophysics, Geosystems*, 12.

Dickens, G. , 2011. Down the Rabbit Hole: toward appropriate discussion of methane release from gas hydrate systems during the Paleocene-Eocene thermal maximum and other past hyperthermal events. *Clim. Past,* 7, 15 pp.

Du Frane, W., Stern, L., Weitemeyer, K., Constable, S., Pinkston, J., Roberts, J., 2011. Electrical properties of polycrystalline methane hydrate. *Geophys. Res. Lett*., 38.

Elliott, S., Maltrud, M., Reagan, M., Moridis, G., Cameron-Smith, P., 2011. Marine methane cycle simulations for the period of early global warming. *J. Geophys. Res*., 116.

Espinoza, D., Kim, S., Santamarina, J., 2011. Carbon Geological Storage. *KSCE Journal of Civil Engineering*, 15, 12 pp.

Frye, M., Shedd, B., Boswell, R., 2011. Gas Hydrate Resources of the Terrebonne Basin, Northern Gulf of Mexico: *J. Mar. Pet. Geol.*, 19 pp.

Fragaszy, R., Santamarina, J., Amekudzi, A., Assimaki, D., Bachus, R., Burns, S., Cha, M., Cho, G., Cortes, D., Dai, S., Espinoza, D., Garrow, L., Huang, H., Jang, J., Jung, J., Kim, S., Kurtis, K., Lee, C., Pasten, C., Phadnis, H., Rix, G., Shin, H., Torres, M., Tsouris, C., 2011. Sustainable development and energy geotechnology – potential roles for geotechnical engineering. *KSCE Journal of Civil Engineering, Special Issue on Energy Geotechnology,* 15, 10 pp.

Gonsalves, M-J., Fernandes, C., Fernandes, S., Kirchman, D., Bharathi, P., 2011. Effects of composition of labile organic matter on biogenic production of methane in the coastal sediments of the Arabian Sea. *Environ Monit Assess,* 182, 10 pp.

Gu, G., Dickens, G., Bhatnagar, G., Colwell, F., Hirasaki, G., Chapman, W., 2011. Abundant Early Palaeogene marine gas hydrates despite warm deep ocean temperatures. *Nature Geoscience*, 4, 3 pp.

Hamdan, L., Gillevet, P., Pohlman, J., Sikaroodi, M., Greinert, J., Coffin, R., 2011. Diversity and biogeochemical structuring of bacterial communities across the Porangahau ridge accretionary prism. New Zealand. *FEMS Micobiol Ecol*.

Hutchinson, D., Ruppel, C., Roberts, H., Carney, R., Smith, M., 2011. Gas hydrates in the Gulf of Mexico. In *Gulf of Mexico Origin, Waters, and Biota,* Volume 3: Geology, N. Buster and C. Holmes, eds., Texas A&M University Press, pp. 247-277.

Isaksen, I., Gauss, M., Myhre, G., Anthony, K., Ruppel, C., 2011. Strong atmospheric chemistry feedback to climate warming from Arctic methane emissions. *Global Biogeochemical Cycles,* 25.

Jang, J., Narsilio, G., Santamarina, J., 2011. Hydraulic Conductivity in Spatially Varying Media -A Pore-Scale Investigation. *Geophysical Journal International*, 184. 12 pp.

Joye, S., Leifer, I., MacDonald, I., Chanton, J., Meile, C., Teske, A., Kostka, J., Chistoserdova, L., Coffin, R., Hollander, D., Kastner, M., Montoya, J., Rehder, G., Solomon, E., Treude, T., Villareal, T., 2011. Comment on "A Persistent Oxygen Anomaly Reveals the Fate of Spilled Methane in the Deep Gulf of Mexico." *Science,* 322.

Jung, J., Santamarina, J., 2010. CH_4-CO_2 Replacement in Hydrate-Bearing Sediments: A Pore-Scale Study. *Geochemistry, Geophysics and Geosystems*, 11.

Jung, J., Espinoza, D., Santamarina, J., 2010. Hydrate Bearing Sediments: CH_4-CO_2 Replacement. *J. Geophys. Res*, 115.

Kessler, J., Valentine, D. , Redmond, M. , Du, M., Chan, E., Mendes, S., Quiroz, E., Villanueva, C., Shusta, S., Werra, L., Yvon-Lewis, S., Weber, T., 2011. A Persistent Oxygen Anomaly Reveals the Fate of Spilled Methane in the Deep Gulf of Mexico. *Science Express*.

Kneafsey, T., Seol, Y., Gupta, A., Tomutsa, L., 2011. Permeability of laboratory-formed methane hydrate bearing sand: Measurements and observations using X-ray computed tomography. *J. Soc. Pet. Eng.*, 16, 6 pp.

Kneafsey, T., Liu, H., Winters, W., Boswell, R., Hunter, R., Collett, T., 2011. Analysis of core samples from the BPXA-DOE-USGS Mount Elbert gas hydrate stratigraphic test well: Insights into core disturbance and handling. *J. Mar. Pet. Geo.,* 28(2), p. 381-393.

Kwon, T.H., Kneafsey, T.J., and Rees, E.V.L., 2011. Thermal dissociation behavior and dissociation enthalpies of methane-carbon dioxide mixed hydrates. *J. Phys. Chem*., 115, 6 pp.

Lee, J., Santamarina, J., Ruppel, C., 2010a. Parametric study of the physical properties of hydrate-bearing sand, silt, and clay sediments: 1. Electromagnetic properties. *J. Geophys. Res.*, 115, B11104.

Lee, J., Francisca, F., Santamarina, J., Ruppel, C., 2010. Parametric study of the physical properties of hydrate-bearing sand, silt, and clay sediments: 2. Small-strain mechanical properties. *J. Geophys. Res.*, 115, B11105.

Lee, J., Santamarina, J., Ruppel, C., 2010b, Volume change associated with formation and dissociation of hydrate in sediment, *Geochemistry, Geophysics. Geosystems,* 11, Q03007.

Lee, M., Waite, W., 2011. Anomalous waveforms observed in laboratory-formed gas hydrate-bearing and ice-bearing sediments. *J. Acoust. Soc. Amer*., 129(4), 13 pp.

Lee, M., Agena, W., Collett, T., Inks, T., 2011. Pre- and post-drill comparison of the Mount Elbert gas hydrate prospect, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 578-588.

Lee, M., Collett, T., 2011. In-situ gas hydrate hydrate saturation estimated from various well logs at the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 439-449.

Lorenson, T., Collett, T., Hunter, R., 2011. Gas geochemistry of the Mount Elbert Gas Hydrate Test Well, Milne Pt. Alaska: Implications for gas hydrate exploration in the Arctic. *J. Mar. Pet. Geo.,* 28(2), p. 343-360.

Lu, H., Lorenson, T., Moudrakovski, I., Ripmeester, J., Collett, T., Hunter, R., Ratcliffe, C., 2011. The characteristics of gas hydrates recovered from the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 411-418.

Macelloni, L., Battista, B., Knapp, C., 2011. Optimal Filtering High-Resolution Seismic Reflection Data Using a Weighted-Mode Empirical Mode Decomposition. *Operator.Journal of Applied Geophysics* 75, 11 pp.

Malinverno, A., Pohlman, J., 2011. Modeling sulfate reduction in methane hydrate-bearing continental margin sediments: Does a sulfate-methane transition require anaerobic oxidation of methane? *Geochemistry, Geophysics, Geosystems*. 12

McGee, T., 2011. *Probabilistic concepts in signal analysis.* LAP LAMBERT Academic Publishing GmbH & Co., Saarbrücken, Germany.

Moridis, G., Silpngarmlet, S, Reagan, M., Collett, T., Zhang, K., 2011. Gas production from a cold, stratigraphically-bounded gas hydrate deposit at the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope: Implications of uncertainties. *J. Mar. Pet. Geo.,* 28(2), p. 517-534.

Moridis, G., Collett, T., Pooladi-Darvish, M., Hancock, S., Santamarina, J., Boswell, R., Kneafsey, T., Rutqvist, J., Kowalsky, M., Reagan, M., Sloan, D., Sum, A., Koh, C., 2011. Challenges, uncertainties, and issues facing gas production from gas hydrate deposits. *SPE Reservoir Engineering and Evaluation,* 14, 36 pp.

Moridis, G., Reagan, M., 2011. Estimating the Upper Limit of Gas Production from Class 2 Hydrate Accumulations in the Permafrost: 1. Concepts, System Description, and the Production Base Case. *J. Soc. Pet. Eng.*, 76, 10 pp.

Moridis, G., Reagan, M., Boyle, K., Zhang, K., 2011. Evaluation of the Gas Production Potential of Some Particularly Challenging Types of Hydrate Deposits. *Transport in Porous Media.*

Myshakin, E., Anderson, B., Rose, K., Boswell, R., 2011. Simulations of variable bottomhole pressure regimes to improve production from the double-unit Mount Elbert, Milne Point Unit, North Slope Alaska hydrate deposit. *Energy & Fuels,* 25, 14 pp.

Pohlman, J., Bauer, J., Waite, W., Osburn, C., Chapman, N., 2011. Methane hydrate-bearing seeps as a source of aged dissolved organic carbon to the oceans. *Nature Geoscience*, 4, 4 pp.

Pooladi-Darvish, M., Hong, H., 2011. Use of formation pressure test results over a hydrate interval for long-term production forecasting at the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope: Implications of uncertainties. *J. Mar. Pet. Geo.,* 28(2), p. 535-545.

Rawn, C., Leeman, J., Ulrich, S., Alford, J., Phelps,T., Madden, M., 2011. Fiber optic sensing technology for detecting gas hydrate formation and decomposition. *Review of Scientific Instruments*, 82.

Reagan, M., Moridis, G., Elliott, S., Maltrud, M., 2011. Contributions of Oceanic Gas Hydrate Dissociation to the Formation of Arctic Ocean Methane Plumes. *J. Geophys. Res. Oceans*, 116.

Redmond, M., Valentine, D., 2011. Natural gas and temperature structured a microbial community response to the Deepwater Horizon oil spill. *Proceedings of the National Academy of Sciences*, USA.

Rees, E., Kneafsey, T., Seol, Y., 2011. Methane hydrate distribution from prolonged and repeated formation in natural and compacted sand samples: X-Ray CT observations. *J. Geo. Res.*, 791815, 15 pp.

Rose, K., Boswell, R., Collett, T., 2011. Mount Elbert gas hydrate stratigraphic test well, Alaska North Slope: coring operations, core sedimentology, and lithostratigraphy. *J. Mar. Pet. Geo.,* 28(2), p. 311-331.

Ruppel, C., 2011. Methane hydrates and contemporary climate change. *Nature Education Knowledge*, 2 (12).

Ruppel, C., 2011. Scientific ocean drilling and gas hydrates studies, in *Scientific Ocean Drilling—Accomplishments and Challenges*. National Research Council Report. 4 pp.

Ruppel, C., 2011. Methane hydrates and the future of natural gas, Supplementary Paper 2.4. *The Future of Natural Gas.* MIT Energy Initiative.

Santamarina, J., Ruppel, C., 2010. The impact of hydrate saturation on the mechanical, electrical, and thermal properties of hydrate-bearing sand, silts, and clay. In: Riedel, Willoughby, Chopra (eds), *Geophysical Characterization of Gas Hydrates, Society of Exploration Geophysicists Geophysical Developments*, 14, 11 pp.

Scandella, B., Varadharajan, C., Hemond, H., Ruppel, C., Juanes, R., 2011. A conduit dilation model of methane venting from lake sediments. *Geophys. Res. Lett.*, 38.

Seol, Y., Myshakin, E., 2011. Experimental and numerical observations of hydrate reformation during depressurization in a core-scale reactor. *Energy & Fuels*, 25.

Seol, Y., Kneafsey, T., 2011. Methane hydrate induced permeability modification for multiphase flow in unsaturated porous media. *J. Geophys. Res*., 116.

Shedd, W., Boswell, R., Frye, M., Godfriaux, P., Kramer, K., 2011. Occurrence and nature of "bottom simulating reflectors" in the northern Gulf of Mexico. *J. Mar. Pet. Geol.*, 10 pp.

Shin, H., Santamarina, J., 2010. Fluid-driven fractures in uncemented sediments: Underlying particle-level processes. *J. Earth and Planetary Science Letters*, 299, 9 pp.

Shin, H., Santamarina J., 2011. Desiccation Cracks in saturated fine-grained soils: particle level phenomena and effective stress analysis. *Geotechnique Letters*.

Shin, H., Santamarina, J., 2011. Opening mode discontinuities in soils. *Geotechnique Letters*.

Shu, J., Chen, X., Chou, I-M., Yang, W., Hu, J., Hemley, R., Mao, H-K., 2011. Structural stability of methane hydrate at high pressures, *J. Geoscience Frontiers*, 2(1). 7 pp.

Stern, L., Lorenson, T., Pinkston, J., 2010. Gas hydrate characterization and grain-scale imaging of recovered cores from the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 394-403.

Sun, Y., Goldberg, D., Collett, T., Hunter, R., 2011. High-resolution well-log derived dielectric properties of gas-hydrate-bearing sediments, Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 450-459.

Torres, M., Collett, T., Rose, K., Sample, J., Agena, W., Rosenbaum, E., 2011. Pore fluid geochemistry from the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 332-342.

Wang, X., Hutchinson, D., Wu, S., Yang, S., Guo, Y., 2011. Elevated hydrate saturation within silt and silty clay sediments in the Shenhu area, South China Sea. *J. Geophys. Res.,* 116.

Weitemeyer, K., Gao, G., Constable, S., Alumbaugh, D., 2010. The practical application of 2D inversion to marine controlled-source electromagnetic sounding. *Geophysics*, 75, 12 pp.

Weitemeyer, K., Constable, S., Trehu, A., 2011. A marine electromagnetic survey to detect gas hydrate at Hydrate Ridge, Oregon. *Geophysical Journal International*, 187, 17 pp.

White, M., Wurstner, S., McGrail, P., 2011. Numerical studies of methane production from Class 1 gas hydrate accumulations enhanced with carbon dioxide injection. *J. Mar. Pet. Geo.,* 28(2), p. 546-560.

Wilson, S., Hunter, R., Collett, T., Hancock, S., Boswell, R., Anderson, B., 2011. Alaska North Slope regional gas hydrate production modeling forecasts. *J. Mar. Pet. Geo.,* 28(2), p. 460-477.

Winters, W., Walker, M., Hunter, R., Collett, T., Boswell, R., Rose, K., Waite, W., Torres, M., Patil, S., Dandekar, A., 2011. Physical properties of sediment from the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *J. Mar. Pet. Geo.,* 28(2), p. 361-380.

Yun, T., Lee, C., Lee, J., Bahk, J., Santamarina, J., 2011. A Pressure Core Based Characterization of Hydrate Bearing Sediments in the Ulleung basin, East Sea. *J. Geophys. Res.,* 117, 7 pp.

Grey Literature and Dissertations

Bahk, J., Kim, D., Chun, J., Son, B., Kim, J., Ryu, B., Torres, M., Schultheiss, P., Collett, T., Riedel, M., Lee, S., and the UBGH2 Scientists, 2011. Gas hydrate occurrences and their relation to hosting sediment properties: results from UBGH2, East Sea. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 8 p.

Baker, R., Boswell, R., 2011. Integrating gas hydrate research and development activities in the United States. *241st Annual Am. Chem. Soc. Meeting*.

Balczewksi, J., Boswell, R., Collett, T., Baker, R., 2011. International collaboration on deepwater natural gas hydrate continues – Gulf of Mexico gas hydrate JIP: past, present, and future. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 6 pp.

Behseresht, J., Bryant, S., 2011. Sedimentological control on saturation distribution in arctic gas-hydrate-bearing sands. *U.S. DOE-NETL Fire in the Ice Newsletter*, 11(1).

Behseresht, J., Bryant, S., 2011. Sedimentological Control on Hydrate Saturation Distribution in Arctic Gas-Hydrate-Bearing Deposits. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Boswell, R., Moridis, G., Collett, T., 2011. Gas hydrate accumulation types and their application to numerical simulation. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 12 pp.

Boswell, R., 2011. Subsea gas hydrates offer huge resource potential. *Offshore*. PennWell, February 2011, pp 76-77.

Bowles, M., 2011. Carbon, nitrogen, and sulfur cycling interactions in organic carbon rich extreme environments. *PhD Dissertation*. University of Georgia

Brothers, L., Kelley, J., Belknap, D., Koons, P., Barnhardt, W., 2011. Pockmarks: Self-scouring seep features? *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Cha, J., Wang, J., Wang, R., Li, J., Yoon, R., Seol, Y., 2011. Effect of hydrophobic surfaces of the kinetics of hydrate formation. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Chatterjee S., Gu, G., Bhatnagar, G., Chapman, W., Dugan, B., Dickens, G., Hirasaki, G., 2011. Effects of heterogeneous lithology and focused fluid flow on gas hydrate distribution in marine sediments. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Choi, J., Seol Y., Boswell, R., Rosenbaum,E., 2011. X-ray computed tomography observations of preferential modes of gas migration in saturated sediment samples. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Collett, T., Boswell, R., Balczewski, J., 2011. Results of the Gulf of Mexico Gas Hydrate Joint Industry Project Leg II Drilling Expedition: Impact on global energy development. *241st Annual Am. Chem Soc. Meeting.*

Collett, T., Boswell, R., 2010. Results of the Gulf of Mexico Gas Hydrate Joint Industry Project Leg II Drilling Expedition: Impact on Global Energy Development. *Proceedings*, Petrotech-2010. New Delhi, India. October 31 - November 3, 2010, 8 p.

Collett, T., Boswell, R., Lee, M., Anderson, B., Rose, K., Lewis, K., 2011. Evaluation of Long-Term Gas Hydrate Production Testing Locations on the Alaska North Slope. *Proceedings*, SPE Arctic Technology Conference, 15 pp.

Collett, T., Lee, M., 2011. Well log characterization of natural gas hydrates. *Proceedings.* Society of Petrophysicists and Well Log Analysts (SPWLA) 52nd Annual Logging Symposium. Colorado Springs, Colorado. May 14-18, 2011. 16 p.

Collett, T., Ruppel, C., Dallimore, S., Paull, C., 2011. Degrading permafrost and gas hydrates on the Beaufort Sea Shelf with a special focus on research downhole logging and coring technologies. *Proceedings*, Deep Sea and Sub-Seafloor Frontier Workshop. Tromso, Norway. May 30-31, 2011. 2 p.

Collett, T., Lee, M., 2011. Downhole well log characterization of gas hydrates in nature – a review. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 16 p.

Cook, A., Rasmus, J., Li, Q., Sun, K., Anderson, B., Collett, T., Goldberg, D., 2011. Analyzing Electrical Anisotropy in Gas Hydrate Reservoirs Using Logging-While-Drilling Directional Resistivity Data from the Gulf of Mexico Gas Hydrate Joint Industry Project. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Daigle, H., 2011. Pore-scale controls on permeability, fluid flow, and methane hydrate distribution in fine-grained sediments. *Ph.D. thesis*. Rice University. Houston, Texas.

Daigle, H., Bangs, N., Dugan, B., 2011. Transient pressures, hydraulic fracturing, and gas migration at southern Hydrate Ridge: Geophysical observations and flow modeling. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Du Frane, W., Stern, L., Weitemeyer, K., Constable, S., Pinkston, J., Roberts, J., 2011. Electrical conductivity of laboratory-synthesized methane hydrate. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Gaddapati, M., Myshakin, E., Boswell, R., Anderson, B., 2011. Gas production modeling from a complex 3-D description of marine gas hydrate sand reservoirs. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 11 pp.

Gaddapati, M., Rose, K., Boswell, R., Anderson, B., 2011. Modeling of the thermal disturbance in a gas hydrate formation due to a hot well-bore. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 8 pp.

Garapati, N., Velaga, S., Anderson, B., 2011. Development of a Thermodynamic Framework for the Simulation of Mixed Gas Hydrates: Formation, Dissociation, and CO_2-CH_4 Exchange. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Garg, S., Pritchett, J. W., 2011. Modeling studies of hydrate mound, Mississippi Canyon Block 118, Gulf of Mexico. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Haines, S., Lee, M., Collett, T., 2011. Multicomponent seismic methods for characterizing gas hydrate occurrences and systems in deep-water Gulf of Mexico. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 10 p.

Hart, P., Pohlman, J., Lorenson,T., Edwards, B., 2011. Beaufort Sea deep-water gas hydrate: Piston core recovery from a seafloor mound in a region of widespread BSR occurrence. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland. 16 p.

Hester, K., Howard, J., Stevens, J., 2011. Composition Studies to Determine Rate and Extent of CO_2 Exchange in a Hydrate-Bearing Core. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Howard, J., Hester, K., Stevens, J., Rydzy, M., 2011. Ultrasonic Velocity Measurements during Experimental CH_4 Hydrate Formation and During CO_2 Exchange. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Hunt, A, Pohlman, J., Stern, L., Ruppel, C., Moscati, R., Landis, G., Pinkston, J., 2011. Observations of mass fractionation of noble gases in synthetic methane hydrate. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Ingrassia, M., 2011. High Resolution benthic habitat mapping of Woolsey Mound (Mississippi Canyon Block 118, Northern Gulf of Mexico). *M.S. Thesis*. University of Rome, La Sapienza

Jaiswal, P., Dewangan,P., Zelt,C., 2011. Gas hydrate imaging with traveltime and waveform inversion. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Kneafsey, T., Nakagawa. S., 2011. Repeated methane hydrate formation and dissociation in a partially water saturated sand: impact on hydrate heterogeneity and sonic-frequency seismic properties. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Kneafsey, T., Moridis, G., 2011. Methane hydrate dissociation by depressurization in a Mount Elbert sandstone sample: experimental observations and numerical simulations. OTC Paper Number 944097. *Proceedings*, Arctic Technology Conference. Houston, Texas, USA. February 7–9, 2011.

Lee, M., Collett, T., 2011. Three types of gas hydrate reservoirs in the Gulf of Mexico identified in LWD data. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 12 p.

Lorenson, T., Collett T., Wong, F., 2011. A petroleum system model for gas hydrate deposits in northern Alaska. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 18 p.

Lorenson T., Collett, T., 2011. Geochemical Evidence for Gas Hydrate Occurrences in Northern Alaska. *AAPG Annual Meeting*. Houston, TX. AAPG Search and Discovery Article 90124.

Lutken, C., Macelloni, L. Sleeper, K., D'Emidio, M., McGee, T., Simonetti, A., Knapp, J., Knapp, C., Caruso, S., Chanton, J., Lapham, L., Lodi, M., Ingrassia, M., Higley, P., Brunner, C., Camilli, R., Battista, B., Short, T., Bell, R., Fietzek, P., 2011. New discoveries at Woolsey Mound, MC118, northern Gulf of Mexico. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Moridis, G., Reagan, M., Kuzma, H., Zhao, Y., Boyle, K., Rector, J., 2011. Evaluation of the Hydrate Deposit at the PBU L-106 Site, North Slope, Alaska, for a Long-Term Test of Gas Production. *Proceedings*, Arctic Technology Conference. Houston, Texas, USA. February 7–9, 2011.

Paull, C., Dallimore, S., Hughes-Clarke, J., Blasco, S., Lundsten, E., Ussler, W., Graves, D., Sherman, A.,

Conway, K., Melling, H., Vagle, S., Collett, T., 2011. Tracking the decomposition of submarine permafrost and gas hydrate under the shelf and slope of the Beaufort Sea. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 12 p.

Peng, Y., 2011. Study of methane hydrate formation and distribution in arctic regions: from pore scale to field scale: Ph.D. Dissertation – *The University of Texas at Austin*.

Phirani, J., Mohanty, K., 2011. Production strategy for marine hydrate reservoirs. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Pierdomenico, M., 2011. Mesoscale Benthic habitat mapping of Hudson Canyon Head. *M.S. Thesis.* University of Rome, La Sapienza

Pohlman, J., Riedel, M., Novosel, I., Bauer, J., Canuel, E., Paull, C., Coffin, R., Grabowski, K., Knies, D., Hyndman, R., Spence, G., 2011. Evidence and biogeochemical implications for glacially-derived sediments in an active margin cold seep. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Reagan, M., Moridis, G., Elliott, S., Maltrud, M., 2011. Simulation of arctic gas hydrate dissociation in response to climate change: basin-scale assessment, OTC 22153, *Proceedings*, Arctic Technology Conference. Houston, Texas, USA. February 7–9, 2011.

Reagan, M., Moridis, G., Elliott, S., Maltrud, M., Cameron-Smith, P., 2011. Basin-scale assessment of gas hydrate dissociation in response to climate change. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Rees, E., Nakagawa, S., Kneafsey, T., 2011. The geomechanical properties of synthetic hydrate bearing sediments. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Rogers, R., Radich, J., Xiong, S., 2011. The Multiple Roles of Microbes in the Formation, Dissociation and Stability of Seafloor Gas Hydrates. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Ruppel, C., 2011. USGS gas hydrates project convenes DOE workshop on climate-gas hydrates interactions. US DOE/NETL *Fire in the Ice,* 11(1). 2 pp.

Ruppel, C., Collett, T., Boswell, R., Lorenson, T., Buckzowski, B., Waite, W., 2011. A new global gas hydrate drilling map based on reservoir type. US DOE/NETL *Fire in the Ice*, 11(1). 4 pp.

Rutqvist, J., Moridis, G., Kim, J., Reagan, M., 2011. Geomechanical performance analysis of potential long-term tests of gas production from hydrate deposits in the North Slope, Alaska, Paper OTC 22154. *Proceedings*, Arctic Technology Conference. Houston, Texas, USA. February 7–9, 2011.

Schoderbek, D., Boswell, R., 2011. Ignik Sikumi #1, gas hydrate test well, successfully installed on the Alaska North Slope. US DOE/NETL *Fire in the Ice,* 11(1). 4 pp.

Scholz, N., Riedel, M., Spence, G., Hyndman, R., James, T., Naegeli, K., Dugan, B., Pohlman, J., Hamilton, T., 2011. Do dissociating gas hydrates play a role in triggering submarine slope failures? A case study from the northern Cascadia margin. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Seol Y., Myshakin, E., Kneafsey, T., 2011. Quantitative applications of X-ray CT observations for core-scale hydrate studies. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Seol, Y., Choi, J., Boswell, R., 2011. X-Ray computed tomography observations of preferential modes of gas migration in saturated sediment samples, *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 12 pp.

Shelander, D., Dai., J., Bunge, G., Boswell, R., Collett, T., Balczewski, J., Jones, E., 2011. Prediction of gas hydrates using pre-stack seismic data: deepwater Gulf of Mexico. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland. 10 pp.

Silpngarmlert, S., 2011. Modeling the Thermal Disturbance of Gas Hydrate Related to Oil and Gas Production. *U.S. DOE-NETL Fire in the Ice Newsletter,* January 2011.

Simonetti, A., Knapp, J., Knapp, C., Macelloni, L., Lutken, C., 2011. Defining the hydrocarbon leakage zone and the possible accumulation model for marine gas hydrates in a salt tectonic driven cold seep: examples from Woolsey Mound, MC118, northern Gulf of Mexico. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Solomon, E. , Kastner, M., Robertson, G., Leifer, I., MacDonald, I., Chanton, J., 2011. Sea-air hydrocarbon fluxes associated with a 900-m seafloor gas hydrate deposit in the Gulf of Mexico. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Torres, M., Kim, J., Choi, J., Ryu, B., Bahk, J., Riedel, M., Collett, T., Hong, W., Kastner, M., 2011. Occurrence of high salinity fluids associated with massive near-seafloor gas hydrate deposits. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 10 p.

Traer, J., 2011. Geophysical inversion with adaptive array processing of ambient noise. *PhD Dissertation*. University of California – San Diego.

Velaga, S., Vedam, V., Anderson, B., 2011. Molecular Dynamics Studies of the Stability of CO_2 and CH_4 Hydrates in the Presence of Undersaturated Fluids. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Waite, W., Santamarina, J., Rydzy, M., Chong, S., Grozic, J., Hester, K., Howard, J., Kneafsey, T., Lee, J., Nakagawa, S., Priest, J., Rees, E., Koh, C., Sloan, E., Sultaniya, A., 2011. Inter-laboratory comparison of wave velocity measurements in a sand under hydrate-bearing and other set conditions. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 11 p.

Waite, W., Bratton, P., Mason, D., 2011. Laboratory formation of non-cementing, methane hydrate-bearing sands. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 7p.

Wang, X., Wu, S. Yang, S., Guo, Y., Hutchinson, D., 2011. Gas hydrate occurrence, saturations and geophysical signatures associated with fluid flow in silt-dominated reservoirs, in the Northern of the South China Sea. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland, 7 pp.

Wang, J., Schlosser, C., Yoon, R., Troya, D., Seol, Y, 2011. The role of acid-base interaction in the formation of CO_2 hydrate. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Weitemeyer, K., Constable, S., 2011. Mapping Gas Hydrates with Marine Controlled Source Electromagnetics. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

White M., 2011. Role of guest molecule exchange kinetics on the injectivity of liquid CO_2 into gas hydrate bearing formations. *Proceedings*, 2011 SIAM Conference on Mathematical & Computational Issues in the Geosciences, Long Beach, CA.

White M., 2010. Impact of kinetics on the injectivity of liquid CO_2 into arctic hydrates. *Proceedings*, Arctic Technology Conference. Houston, Texas, USA. February 7–9, 2011.

Wilson, R., Lapham, L., Riedel, M., Chanton, J., 2011. Measuring in situ dissolved methane concentrations in gas-hydrate rich systems to understand hydrate stability and dissolution rates. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Winters, W., 2011. Physical and geotechnical properties of gas-hydrate-bearing sediment from offshore India and the northern Cascadia margin compared to other hydrate reservoirs. *Proceedings*, 7th International Conference on Gas Hydrates. Edinburgh, Scotland.

Government Reports

Archer, D., 2011. Integrating Natural Gas Hydrates in the Global Carbon Cycle. *Quarterly Progress Report*, *April 2011 - June 2011*. University of Chicago, DOE Award No.: DE-NT0006558. August 2011.

Archer, D., 2011. Integrating Natural Gas Hydrates in the Global Carbon Cycle. *Quarterly Progress Report*, *July 2011 - September 2011*. University of Chicago, DOE Award No.: DE-NT0006558. November 2011.

Balczewski, J., 2011. Characterizing Natural Gas Hydrates in the Deep Water Gulf of Mexico: Applications for Safe Exploration and Production Activities*. Semi-Annual Progress Report, April 2011 –September, 2011*. Chevron, DOE Award No.: DE- DE-FC26-01NT41330. October, 2011.

Balczewski, J., 2011. Characterizing Natural Gas Hydrates in the Deep Water Gulf of Mexico: Applications for Safe Exploration and Production Activities*. Semi-Annual Progress Report, October 2010 –March, 2011*. Chevron, DOE Award No.: DE- DE-FC26-01NT41330. April, 2011.

Balczewski, J., 2010. Characterizing Natural Gas Hydrates in the Deep Water Gulf of Mexico: Applications for Safe Exploration and Production Activities*. Semi-Annual Progress Report, April 2010 – September, 2010*. Chevron, DOE Award No.: DE- DE-FC26-01NT41330. October, 2010.

Beaudoin, Y., 2011. Global Assessment of Methane Gas Hydrates. *Semi-Annual Progress Report*, Stiftelsen GRID-Arendal, DOE Award No.: DE-FE0003060. May 2011.

Coffin, R., Hamdan, L., Smith, J., Plummer, R., Millholland, C., Larson, R., Wood, W. 2011. Beaufort Sea Methane Hydrate Exploration: Energy and Climate Change. *U.S. Naval Research Laboratory Technical Memorandum*, *NRL/MR/6110—10-9330.*

Constable, S., 2011. Gas Hydrate Characterization in the GoM using Marine EM Methods. *Quarterly Progress Report, October 2010 – December 2010*. Scripps Institution of Oceanography, University of California San Diego, DOE Award No.: DE-NT0005668. February 2011.

Constable, S., 2011. Gas Hydrate Characterization in the GoM using Marine EM Methods. *Summary of Phase II Research*. Scripps Institution of Oceanography, University of California San Diego, DOE Award No.: DE-NT0005668. May 2011.

Constable, S., 2011. Gas Hydrate Characterization in the GoM using Marine EM Methods. *Quarterly Progress Report, April 2011 – July 2010*. Scripps Institution of Oceanography, University of California San Diego, DOE Award No.: DE-NT0005668. August 2011.

Constable, S., 2010. Gas Hydrate Characterization in the GoM using Marine EM Methods. *Quarterly Progress Report, July 2010 – September 2010.* Scripps Institution of Oceanography, University of California San Diego, DOE Award No.: DE-NT0005668. November 2010.

Dunbar, J., 2010. Electrical Resistivity Investigation of Gas Hydrate Distribution in Mississippi Canyon Block 118, Gulf of Mexico. *Quarterly Progress Report, July - September 2010*, Baylor University, DOE Award No.: DE-FC26-06NT42959. October 2010.

Dunbar, J., 2011. Electrical Resistivity Investigation of Gas Hydrate Distribution in Mississippi Canyon Block 118, Gulf of Mexico. *Quarterly Progress Report, October – December 2010*, Baylor University, DOE Award No.: DE-FC26-06NT42959. January 2011.

Dunbar, J., 2011. Electrical Resistivity Investigation of Gas Hydrate Distribution in Mississippi Canyon Block 118, Gulf of Mexico. *Quarterly Progress Report, January – March 2011*, Baylor University, DOE Award No.: DE-FC26-06NT42959. April 2011.

Dunbar, J., 2011. Electrical Resistivity Investigation of Gas Hydrate Distribution in Mississippi Canyon Block 118, Gulf of Mexico. *Quarterly Progress Report, April –June 2011*, Baylor University, DOE Award No.: DE-FC26-06NT42959. July 2011.

Hirasaki, G., 2010. Detection and Production of Methane Hydrates. *Semi-Annual Progress Report, April 2010 – September 2010,* Rice University, DOE Award No.: DE-FC26-06NT42960. November 2010.

Juanes, R., Bryant, S., 2010. Mechanisms Leading to Co-Existence of Gas and Hydrate in Ocean Sediments. *Quarterly Progress Report, July - September 2010*, University of Texas, DOE Award No.: DE-FC26-06NT43067. November 2010.

Juanes, R., Bryant, S., 2011. Mechanisms Leading to Co-Existence of Gas and Hydrate in Ocean Sediments. *Quarterly Progress Report, October - December 2010*, University of Texas, DOE Award No.: DE-FC26-06NT43067. February 2011.

Juanes, R., Bryant, S. , 2011. Mechanisms Leading to Co-Existence of Gas and Hydrate in Ocean Sediments. *Quarterly Progress Report, January – March 2011*, University of Texas, DOE Award No.: DE-FC26-06NT43067. April 2011.

Juanes, R., Bryant, S., 2011. Mechanisms Leading to Co-Existence of Gas and Hydrate in Ocean Sediments. *Quarterly Progress Report, April –June 2011*, University of Texas, DOE Award No.: DE-FC26-06NT43067. July 2011

Kirchman, D., 2010. Characterization of Methane Degradation and Methane-Degrading Microbes in Alaska Coastal Water. *Quarterly Progress Report, July - September, 2010.* DOE Award No.: DE-NT0005666. October 2010.

Kirchman, D., 2010. Characterization of Methane Degradation and Methane-Degrading Microbes in Alaska Coastal Water. *Quarterly Progress Report, October - December, 2010.* DOE Award No.: DE-NT0005666. February 2011.

Kirchman, D., 2011. Characterization of Methane Degradation and Methane-Degrading Microbes in Alaska Coastal Water. *Quarterly Progress Report, April 2011 - June 2011.* DOE Award No.: DE-NT0005666. August 2011.

Lewis, S., 2010. Resource Characterization and Quantification of Natural Gas Hydrate and Associated Free-Gas Accumulations in the Prudhoe Bay – Kuparuk River Area on the North Slope of Alaska. *Semi-Annual Progress Report, April 1 – September 1, 2010*. BP Exploration (Alaska), DOE Award No.: DE- DE-FC26-01NT41332. November 4, 2010.

MacDonald, I., Naehr, T., 2010. Remote Sensing and Sea-Truth Measurements of Methane Flux to the Atmosphere (HYFLUX project). *Quarterly Progress Report, July – September, 2010,* Texas A&M University-Corpus Christi, DOE Award No.: DE-NT0005638. November 2010.

MacDonald, I., Naehr, T., 2011. Remote Sensing and Sea-Truth Measurements of Methane Flux to the Atmosphere (HYFLUX project). *Quarterly Progress Report, October - December 2010,* Texas A&M University-Corpus Christi, DOE Award No.: DE-NT0005638. January 2011.

MacDonald, I., Naehr, T., 2011. Remote Sensing and Sea-Truth Measurements of Methane Flux to the Atmosphere (HYFLUX project). *Quarterly Progress Report, January - March 2011,* Texas A&M University-Corpus Christi, DOE Award No.: DE-NT0005638. April 2011.

MacDonald, I., Naehr, T., 2011. Remote Sensing and Sea-Truth Measurements of Methane Flux to the Atmosphere (HYFLUX project). *Final Report, October 01, 2008 - May 31, 2011*, Texas A&M University-Corpus Christi, DOE Award No.: DE-NT0005638.

Ruppel, C., 2011. Report for USGS-DOE Interagency Agreement: DE-FE0002911. October-December 2010.

Ruppel, C., 2011. Report for USGS-DOE Interagency Agreement: DE-FE0002911. January – March 2011.

Ruppel, C., 2011. Report for USGS-DOE Interagency Agreement: DE-FE0002911. April-June 2011.

Santamarina, J. , 2010. Methane Recovery from Hydrate-bearing Sediments. *Quarterly Progress Report, July 2010 - September 2010*, Georgia Institute of Technology, DOE Award No.: DE-FC26-06NT42963. November 2010

Schoderbek, D., 2011. ConocoPhillips Gas Hydrate Production Test*. Semi-Annual Progress Report, First-Half, 2011, ConocoPhillips Gas Hydrate Production Test.* DOE Award No.: DE-NT0006553. July 31, 2011.

Schoderbek, D., 2011. ConocoPhillips Gas Hydrate Production Test*. Semi-Annual Progress Report, Second-Half, 2010, ConocoPhillips Gas Hydrate Production Test.* DOE Award No.: DE-NT0006553. January 31, 2011.

Tréhu, A., 2010. Heat Flow and Gas Hydrates on the Continental Margin of India. *Quarterly Progress Report, July – September, 2010*. Oregon State University, DOE Award No.: DE-NT0005669. November, 2010.

Tréhu, A., 2011. Heat Flow and Gas Hydrates on the Continental Margin of India. *Quarterly Progress Report, October – December, 2010*. Oregon State University, DOE Award No.: DE-NT0005669. March, 2011.

Valentine, D., 2010. Assessing the Efficacy of the Aerobic Methanotrophic Biofilter in Methane Hydrate Environments. *Quarterly Progress Report, July 2010 – September 2010.* University of California Santa Barbara, DOE Award No.: DE-NT0005667, October 2010.

Valentine, D., 2011. Assessing the Efficacy of the Aerobic Methanotrophic Biofilter in Methane Hydrate Environments. *Quarterly Progress Report, October 2010 – December 2010*. University of California Santa Barbara, DOE Award No.: DE-NT0005667, January 2011.

Valentine, D., 2011. Assessing the Efficacy of the Aerobic Methanotrophic Biofilter in Methane Hydrate Environments. *Quarterly Progress Report, January 2011 – March 2011*. University of California Santa Barbara, DOE Award No.: DE-NT0005667, April 2011.

Valentine, D., 2011. Assessing the Efficacy of the Aerobic Methanotrophic Biofilter in Methane Hydrate Environments. *Quarterly Progress Report, April 2011 – June 2011*. University of California Santa Barbara, DOE Award No.: DE-NT0005667, July 2011.

Wooller, M., 2010. Source Characterization and Temporal Variation of Methane Seepage from Thermokarst Lakes on the Alaska North Slope in Response to Arctic Climate Change. *Quarterly Progress Report*, *July 2010 – September 2010*. University of Alaska Fairbanks, DOE Award No.: DE-NT0005665. November 2010.

Wooller, M., 2011. Source Characterization and Temporal Variation of Methane Seepage from Thermokarst Lakes on the Alaska North Slope in Response to Arctic Climate Change. *Quarterly Progress Report*, *October 2010 – December 2010*. University of Alaska Fairbanks, DOE Award No.: DE-NT0005665. February 2011.

Wooller, M., 2011. Source Characterization and Temporal Variation of Methane Seepage from Thermokarst Lakes on the Alaska North Slope in Response to Arctic Climate Change. *Quarterly Progress Report*, *January 2011 – March 2011*. University of Alaska Fairbanks, DOE Award No.: DE-NT0005665. May 2011.

Wooller, M., 2011. Source Characterization and Temporal Variation of Methane Seepage from Thermokarst Lakes on the Alaska North Slope in Response to Arctic Climate Change. *Quarterly Progress Report*, *April 2011 – June 2011. University of Alaska Fairbanks, DOE Award No.: DE-NT0005665. August 2011.*

Presentations

Boswell, R., Collett, T., Balczewski, J., 2010. Natural gas hydrate research and development in the United States. *International Symposium on Gas Hydrates: from Mallik to Nankai Trough*. Tokyo, Japan. Nov. 13.

Boswell, R., 2011. Review of status of US DOE gas hydrate R&D program. *US-Korea Collaboration Workshop.* Daejeon, Korea. Feb. 23

Beaudoin, Y., 2011. Frozen Heat: UNEP Global Outlook on Methane Gas Hydrates. *Platts 2nd Annual Unconventional Gas Conference*. Düsseldorf, Germany. Sept. 19-20.

Brothers, L., 2011. Estuarine pockmark field—dynamics and evolution. UNH/Center for Coastal and Ocean Mapping, March 11, 2011.

Brothers, L., Hart, P., Ruppel, C., 2011. U.S. Beaufort Shelf Subsea Permafrost/Gas Hydrates Distribution from Legacy Seismic Data. USGS-DOE Climate-Hydrates Workshop. Boston, MA. March 15, 2011.

Brothers, L.,Hart, P., Ruppel, C., 2011. U.S. Beaufort Shelf Subsea Permafrost/Gas Hydrates Distribution from Legacy Seismic Data. *Marine Geosciences Leadership Symposium, Consortium for Ocean Leadership*. Washington, D. C. April 18, 2011.

Brothers, L., 2011. The thawing arctic: Alaskan nearshore permafrost/gas hydrates. WHOI Summer Student Fellow Seminar Series. June 13, 2011.

Bui, T., Pohlman, J., Lapham, L., Riedel, M., Wing, B., 2010. Sulfur isotopic inferences of the controls on porewater sulfate profiles in the northern Cascadia margin gas hydrate system. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17, 2010.

Chatterjee, S., Gu, G., Bhatnagar, G., Chapman, W., Dickens, G., Dugan, B., Hirasaki, G., 2010. Focused fluid flow and gas hydrate distribution in heterogeneous marine sediments. Abstract OS43B-03, 2010 Fall Meeting, AGU, San Francisco, Calif. 13-17 Dec.

Chatterjee, S., Bhatnagar, W., Chapman, B., Dugan, G., Dickens, G., Hirasaki, G., 2011. Effects of heterogeneous lithology and focused fluid flow on gas hydrate distribution in marine sediments. *Society of Petroleum Engineers Gulf Coast Regional Student Paper Contest, Texas A&M University,* College Station, Texas, USA*,* April 2011.

Chatterjee, S., Bhatnagar, G., Chapman, W., Dickens, G., Dugan, B., Hirasaki, G., 2011. Lithologic heterogeneity, focused fluid flow and gas hydrate distribution in marine sediments. *Offshore Technology Conference University R&D Showcase.* Houston, Texas, USA. May 2011.

Chatterjee, S., Bhatnagar, G., Chapman, W., Dickens, G., Dugan, B., Hirasaki, G., 2011. Lithologic heterogeneity, focused fluid flow and gas hydrate distribution in marine sediments . *Society of Petroleum Engineers Gulf Coast Section Emerging Engineers Conference.* Houston, Texas, USA. June 2011.

Coffin, R., 2011. Methane contribution to shallow sediment carbon cycling across the Alaskan shelf, Beaufort Sea. Taiwan National University. August, 2011.

Coffin, R., 2011. Surface sediment geochemical profiles applied to prediction of deep sediment methane hydrate deposits. AOGS. Taipei, Taiwan.

Coffin, R., 2011. Shallow sediment geochemical surveys of deep sediment methane hydrate deposits. *PETRAD-CCOP-PetroVietnam-VASI workshop on Gas Hydrates*. Halong Bay, Vietnam. March 1-3, 2011.

Coffin, R., 2011. NRL Arctic initiatives. *Arctic Science and Technology Synchronization III Workshop*. Hanover, NH. May 9-11, 2011.

Coffin, R.. 2011. NRL Research in the Arctic ocean-energy, climate and Navy issues. *11th National Conference on Science, Policy and the Environment*. Ronald Reagan Building and International Trade Center. Washington D.C. January 19-21, 2011.

Coffin R., 2011. Shallow sediment geochemistry driven by deep sediment properties. GEOMAR Germany Research Center. Santiago Chile. November 2010.

Coffin, R., Hamdan, L., Plummer, R., Millholland, C., Wood, W., 2011. Methane contribution to shallow sediment carbon cycling across the Alaskan Shelf, Beaufort Sea. *COST-PERGAMON research review*. Brussels, Belgium. March 8-9, 2011.

Coffin, R. 2011. Research in the Arctic Ocean; Energy, climate and Navy issues. US European Command & US Africa Command. *Arctic Way-Ahead Panel*, June 15, 2011.

Cook, A., Malinverno, A., 2010. Can in-situ methanogenesis explain a 3 m-thick gas hydrate-filled sand in Walker Ridge Block 313, Gulf of Mexico? Abstract OS53A-1353, 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Daigle, H., Dugan, B., 2010. Free gas in the regional hydrate stability zone: Implications for hydrate distribution and fracturing behavior. Abstract OS53A-1355. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Dunbar, J., Higley, P., 2010. Mapping hydrate deposits in deepwater sediments using DC resistivity techniques. *Subsea Survey Conference*. Galveston, Texas. Nov. 9-11.

Elliott, S., 2011. Trace Greenhouse Gases and Sea Ice. *NCAR Polar Climate Working Group Meeting.* Boulder, CO. February 28 – March 1, 2011.

Elvert, M, Hinrichs, K-U, Wooller, M., Gaglioti, B., Becker, K., Pohlman, J., 2011. Carbon and hydrogen isotope biomarker records of methane release and hydroclimatic variability from a thermokarst lake in the Alaskan Arctic. *International Meeting on Organic Geochemistry*. Interlaken, Switzerland. September 18-23, 2011.

Gamwo, I., Liu, Y., 2011. Comparison between Equilibrium and Kinetic Models for Methane Hydrate Dissociation. *AICHE Annual Meeting.* Minneapolis, Minnesota.

Gilhooly, W., Ruppel, C., Dickens, G., Berg, P., Macko, S., 2010. Flux rates and sulfur isotopic composition of pore fluids from three mud volcanoes in the northern Gulf of Mexico, AGU Fall Meeting. Abstract OS52B-03; 2010 Fall Meeting, AGU, San Francisco, California. December 13-17, 2010.

He., R., Leigh, M., Pohlman J., Wooller M.,2011. Methane oxidizing microbes in Alaskan lakes. ASM Meeting.

Heintz, M., Pohlman, J., Wooller, M., Elvert, M., Ruppel, C., Valentine, D., 2010. Ice Cover Enhances Methane Consumption in Alaskan Thermokarst Lakes. Abstract GC51J-03 presented at 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Hester, K., 2011. Energy production from natural gas hydrate deposits through CO_2 Exchange: Concept, Advantages, and Challenges*. Symposium on Natural Gas Hydrates at Institute of Advanced Sustainability Studies*. Potsdam, Germany. Nov. 2011.

Hunt, A., Pohlman, J., Stern, L., Pinkston, J., Ruppel, C., Landis, G., 2010. Noble gas fractionation in synthetic methane hydrates. *Geological Society of America National Meeting*. Denver, CO. November, 2010.

Joseph, C., Torres, M., Martin, R., Rose, K., Ryan, T., Snyder, G., Pohlman, J.W., 2010. New insights on methane cycling from analyses of carbonate samples from the Cascadia margin. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17, 2010.

Joye, S., Diercks, A., Teske, A., Valentine, D., 2010. Open ocean impacts of the BP Oil Well Blowout. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Kessler, J., Valentine, D., Yvon-Lewis, S., Heintz, M., Hu, L., Garcia Tigreros, F., Du, M., Chan, E., 2010. Using the Deepwater Horizon disaster to investigate natural biogeochemical cycling associated with rapid methane emissions (invited). Abstract GC41F-04 presented at 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Kim, J., Yang, D., Moridis, G., Rutqvist, J., 2011. Numerical Studies on Coupled Flow and Geomechanics in Hydrate Deposits. Paper SPE 141304, *2011 Reservoir Simulation Symposium*, The Woodlands, Texas. February 21-23, 2011.

Lapham, L., Wilson, R., Paull, C., Chanton, J., Riedel, M., 2010. Measuring in situ dissolved methane concentrations in gas hydrate-rich systems Part 1: Investigating the correlation between tectonics and methane release from sediments. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Mendes, S. , Valentine, D., Farwell, C., 2010. Microbial consumption of natural gases released from the BP Deewater Horizon oil spill. Abstract OS533B-1476 presented at the 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

O'Neil, C., Coffin, R., Larsen, R., 2011. Classification of Beaufort Sea sediment using a FTIR-Drift methodology. *American Society for Limnology and Oceanography*. Portland Oregon. February 22-26, 2011.

Reagan, M., 2010. Basin-scale simulation of oceanic gas hydrate dissociation in response to climate change. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Redmond, M., Valentine, D., Joye, S., 2010. Microbial community response to the Deepwater Horizon oil spill. Abstract OS522B-07, 2010 Fall Meeting, AGU, San Francisco, California. December 13-17, 2010.

Rees, E.., Kneafsey, T., Kwon, T., 2010. Synthesising uniform gas hydrate in natural porous media under partially saturated and fully water saturated conditions. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Ruppel, C., 2011. USGS Programs in Arctic climate-hydrates interactions. *COST PERGAMON*, Brussels, Belgium. February 23.

Ruppel, C., 2011. Planned scientific drilling on the US Beaufort margin. *IODP USSSP workshop on Catching Climate Change in Progress—Drilling on Circum-Arctic margins*, San Francisco, December 10-11.

Ruppel, C., 2011. Gas hydrates and the global methane budget. *The Enigma of the Current Methane Budget*. Max-Planck Institute. Jena, Germany. September 7-9.

Ruppel, C., 2011. Methane hydrates on Arctic continental shelves. *The Enigma of the Current Methane Budget*. Max-Planck Institute. Jena, Germany. September 7-9.

Schoderbek, D., 2011. ConocoPhillips North Slope CO_2-CH_4 Exchange Field Trial. Alaska Department of Natural Resources, Division of Oil and Gas, January 21, 2011.

Schoderbek, D., 2011. Methane Hydrate: Production Challenge or Future Energy Source? *Alaska Forum on the Environment*. February 8, 2011.

Scholz, N., Riedel, M., Spence, G., Dugan, B., Daigle, H., Hyndman, R., James, T., Naegeli, K., 2010. Slope failure of continental frontal ridges offshore Vancouver Island, British Columbia. Abstract OS13EA-1291, 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Short, R., Bell, R., Wener, P., Toler, S., Langebrake, L., 2011. In situ characterization of subsurface chemical distributions using underwater mass spectrometry., *Sustainable Remediation Forum 16 Meeting.* Tampa, FL. February 3, 2011.

Short, R., Bell, R., Toler, S., Wenner, P., 2011. In situ characterization of subsurface chemical distributions using underwater mass spectrometry. *Marine Technology Society TechSurge Workshop*. Sarasota, FL. April 13, 2011.

Short, R., Bell, R., Chaudhary, A., Toler, S.., van Amerom, F., 2011. In situ characterization of distributions of dissolved chemicals using underwater mass spectrometry. *SPIE Defense, Security, and Sensing Conference*. Orlando, FL. April 27, 2011.

Short, R., Bell, R., Toler, S., 2011. Characterization of subsurface distributions of dissolved gases near the Deepwater Horizon site using in situ membrane introduction mass spectrometry. Poster. *ASMS on Mass Spectrometry and Allied Topics.* June 5-9, 2011.

Short, R., Toler, S., Bell, R., Byrne, R., 2011. Underwater membrane introduction mass spectrometers: Recent developments and deployments*. 8th Harsh-Environment Mass Spectrometry Workshop*. St. Petersburg Beach, FL. September 19-22, 2011.

Sleeper, K., Bell, R., Short, T., Chanton, J., Wilson, R. D'Emidio, M., Macelloni, L., 2010. The Detection of Elevated Methane Concentration Indicate The Presence of Deep-Water Plumes Northwest of the DWH Site. Abstract OS21G-05, 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Teske, A., 2011. Underwater landscapes in the Gulf of Mexico: Brine Lakes, Mud volcanoes, and Deep Oil. Max-Planck-Institute for Marine Microbiology. Bremen, Germany. December 6, 2011.

Teske, A., 2011. Underwater landscapes in the Gulf of Mexico: Brine Lakes, Mud volcanoes, and Deep Oil. *Hanse Fellow lecture*. Hanse Institute for Advanced Study. Delmenhorst, Germany. October 12, 2011

Valentine, D., Kessler, J., Redmond, M., Mendes, S., Heintz, M., Farwell, C., Hu, L., Kinnaman, F., Yvon-Lewis, S., Du, M., Chan, E., Garcia Tigreros, F., Villanueva, C., 2010. A horizon of natural gas in the deep Gulf of Mexico dominates the microbial landscape (invited). Abstract OS22B-02, 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Wade, T., Sweet S., Sericano, J., Guinasso, N. Jr., Lohrenz, S., Shiller, A., Joye, S., Dierks, A., Asper, V., Highsmith, R., 2010. Documentation of Sub-Surface Oil Plume by Analyses of Toxic PAH in Water Samples from the Deep Water Horizon Oil Spill. *SETAC 31th Annual Meeting.* Portland, Oregon. November 7-11, 2010.

Winters, W., 2010. Physical properties of host sediments and their geologic controls on the formation of gas hydrate. *Japan-US Symposium on Geomechanics of Hydrate Bearing Sediments*. Georgia Institute of Technology. Atlanta, GA. December 10, 2010.

Yang, T., Nigro, L., McKay, L., Gutierrez, T., Teske, A., 2010. Bacterial communities of surface and deep hydrocarbon-contaminated waters of the Deepwater Horizon oil spill. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Yao, H., Gouedard, P., Gerstoft, P., McGuire, J., Collins, J., van der Hilst, R., 2010. Analysis of fundamental and higher mode surface waves from noise correlation near Eastern Pacific Rise. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Yoshinaga, M., Lazar, C., Briggs, B., Colwell, F., Pohlman, J., Elvert, M., Teske, A., Hinrichs, K.-U., 2011. Archaeal metabolism in methane-impacted sediments through molecular and stable carbon isotopic compositions of intact polar lipids coupled to 16S rRNA sequencing. *ISME Meeting.* August 14-24. Copenhagen, Denmark.

Yoshinaga, M., Pohlman, J., Goldhammer, T., Broda, N., Riedel, M., Elvert, M., Hinrichs, K.-U., 2011. Methane fluxes modulating the molecular and carbon isotopic composition of microbial lipids in gas hydrate bearing sediments from the northern Cascadia margin. *International Meeting on Organic Geochemistry*. Sept. 18-23. Interlaken, Switzerland.

Zhang, J., Gerstoft, P., Shearer, P., Bromirski, P., Yao, H., 2010. Imaging Earth structure and microseism sources using seismic array observations of oceanic storms. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.

Ziervogel, K., McKay, L., Yang, T., Nigro, L., Gutierrez, T., Rhodes, B., Dickson-Brown, J., Osburn, C., Arnosti C., Teske, A., 2010. Formation of marine snow and enhanced enzymatic activities in oil-contaminated seawater. 2010 Fall Meeting, AGU, San Francisco, California. December 13-17.