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## Participant Letter



*U.S. Department of Energy*

*National Energy Technology Laboratory*



October 2000

Dear Gulf of Mexico Hydrates Workshop Participant:

The National Energy Technology Laboratory (NETL) and the Chevron Petroleum Technology Company (Chevron) are pleased to provide the proceedings of the Gulf of Mexico (GOM) Hydrates R&D Planning Workshop held on August 9-10, 2000 in Houston. These proceedings include the presentations made during the workshop and the breakout session results that were developed for drilling safely, seafloor stability, resource characterization, and production technology. We have attempted to accurately capture all the ideas, comments, and consensus opinions generated during the workshop. A list of participants and poster sessions is also included. If you note any omissions or wish to provide additional information, we welcome your comments.

We hope your organization is interested in a new gas hydrate initiative that can result in Joint Industry Projects (JIPs) focusing on the Gulf of Mexico. With this in mind, NETL is already taking steps to analyze the workshop results (from its perspective) and to develop a solicitation. Further details and updates will be available at the NETL website: [www.netl.doe.gov](http://www.netl.doe.gov). We hope that all stakeholder groups will use these proceedings in their planning endeavors as well.

Your active participation in the workshop and the breakout work sessions is sincerely appreciated. Over 90 participants from more than 50 organizations representing various stakeholders groups provided a wealth of information and opinions. This collaboration among stakeholders groups will undoubtedly accelerate the planning for and the ultimate realization of GOM hydrate production.

We look forward to your future participation in GOM hydrates efforts.

Sincerely,

Brad Tomer,  
Product Manager  
Gas Exploration, Production, and Storage  
Strategic Center for Natural Gas

## Executive Summary

The National Energy Technology Laboratory (NETL) and the Chevron Petroleum Technology Company hosted the Gulf of Mexico (GOM) Hydrates R&D Planning Workshop on August 9-10, 2000. The purpose was to gather stakeholder input on the opportunities and challenges for hydrate research and development (R&D) needs in the areas of drilling safely, seafloor stability, resource characterization, and production technology for the GOM.

These workshop proceedings include all of the speaker presentations, question and answer documentation, and three appendices for the breakout session products, the participant list, and the poster session. The proceedings are publicly available at the NETL website: [www.netl.doe.gov](http://www.netl.doe.gov), where CD-ROM ordering is also available.

During the workshop, participants actively shared ideas through facilitated sessions. Structured brainstorming and critical analysis were used to identify barriers and technology opportunities and to build consensus on collaborative actions. The workshop is expected to enhance dialog with industry on how to develop strategic alliances among industry, academia, and government.

### Program Goals

Methane hydrates represent a potentially enormous natural gas resource. Estimates range as high as 700,000 trillion cubic feet (Tcf) worldwide, many times the estimated total in conventional resources of natural gas. The U.S. hydrates resource is estimated at 100,000 to 300,000 Tcf. The DOE Office of Fossil Energy, in collaboration with other agencies, academia, and industry, is poised to implement a program that builds upon the existing knowledge base to investigate and obtain the information necessary to bring methane hydrates into the natural gas resource base and to ensure safe drilling operations in and around hydrate formations.

The National Methane Hydrate Multi-Year R&D Program Plan illustrates how technology is expected to proceed from the current state of the art to the technological level needed to achieve program goals. The Federal role provides the coordination, integration, and synthesis of research efforts needed to:

- Respond to industry concerns regarding safety and seafloor stability issues with methane hydrates that are associated with the exploration, production, and transportation of conventional hydrocarbons,
- Establish an estimate of the gas resource from methane hydrate deposits,
- Develop the technology necessary for the commercial production of methane from hydrates, and

- Understand and quantify the dual roles of methane hydrates in the global carbon cycle and their relationship to global climate change.

The R&D program is framed as four technology areas that share data, theoretical concepts, and results. The four technology areas are safety and seafloor stability, resource characterization, production, and global carbon cycle.

## Workshop Breakout Sessions

Five parallel breakout sessions were held on the afternoon of Wednesday, August 9 and the morning of Thursday, August 10:

- Drilling Safely
- Seafloor Stability
- Resource Characterization – Group A
- Resource Characterization – Group B
- Production Technology

Another breakout for long-term production through hydrates was deleted because of under-subscription. The scope definitions for these technical areas are as follows:

**Drilling Safely:** The purpose of this session was to address research needs in the area of drilling through hydrate zones in order to access conventional hydrocarbons. Topics in this session included plugging of well choke and kill lines; annular plug around drill string in riser, BOP, or casing; and sticking drill pipe as well as affecting circulation.

**Seafloor Stability:** This breakout session examined the R&D needs associated with movements in the seafloor resulting from hydrate disassociation. Topics included seafloor monitoring systems as well as others.

**Resource Characterization:** These breakout sessions examined the quantity, location, and properties of methane hydrates in the Gulf of Mexico. This included improved geophysical tools that increase confidence in the presence and quantity of hydrates and also help determine the mechanical properties of the sediment for safety and facility design.

**Production Technology:** This session examined the research needed to convert hydrate resources into natural gas reserves. Topics included improved reservoir modeling to determine the flow rate for different production systems, low cost production systems, and co-production of conventional gas could speed utilization by helping with economics.

Through the breakout group sessions, participants identified:

- Key barriers and issues to meeting the hydrate program goals,
- R&D opportunities to overcome these issues, and
- Action plans identifying objectives, actions and products, resources and timeframe, and collaboration opportunities, with an emphasis on in-kind contributions.

A summary is provided along with the “storyboard” products for barriers and issues, opportunities, and action plans in Appendix A. Participants are listed in Appendix B, and poster session details are in Appendix C.

## **Papers and Presentations**

*Welcome:* Leonard Graham, Deputy Associate Director—Strategic Center for Natural Gas, U.S. DOE National Energy Technology Laboratory

*DOE National Hydrates Program Overview:* Brad Tomer, Gas Exploration, Production & Storage Product Manager—Strategic Center for Natural Gas, U.S. DOE National Energy Technology Laboratory

### **Industry Perspectives Panel Session**

*Commercialization of Natural Gas Hydrates:* Emrys H. Jones—Chevron Petroleum Technology Company

*Industry Perspective:* Stephen A. Holditch—Schlumberger Technology Corporation

*Gas Hydrate Drilling Problems:* William C. Maurer—Maurer Engineering

*Industry Perspectives:* Eddie Cousins—Conoco, Inc.

*Hydrates [includes a movie file]:* Puneet Sharma—Halliburton

Question and Answer Period

## Papers and Presentations

(continued)

### Project Reviews Panel Session

*Methane Hydrates Research at DOE National Laboratories:* Lorie Langley—Oak Ridge National Laboratory

*USGS Gas Hydrate Research Program:* William P. Dillon and Timothy S. Collett—U.S. Geological Survey

*Gulf of Mexico Sea Floor Stability and Gas Hydrates Monitoring Station Project:* J. Robert Woolsey and Thomas M. McGee—The Center for Marine Resources and Environmental Technology, University of Mississippi

*Gas Hydrates:* Roger Sassen—Texas A&M University

*Gas Hydrate Dissociation/Generation in the Marine Environment:* Andrew Gettrust—U.S. Naval Research Laboratory

*Undersea Gas Hydrate: Interaction With Climate and Deep-Sea Biology:* Andy Shepard—National Undersea Research Center, University of North Carolina at Bloomington; and Ian R. MacDonald—Texas A&M University

*Dynamics of the Gas Hydrate Reservoir in the Gulf of Mexico:* Carolyn Ruppel—Georgia Institute of Technology