EMD Gas Hydrates Committee Report

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Art Johnson and Ashley Gould

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Committee Activities

The Gas Hydrate Committee will be convening two sessions (one oral and one poster) at the 2012 ACE in Long Beach. In addition, Vice-Chair Ashley Gould has organized a "Friends of Gas Hydrate" meeting at the convention on Tuesday, April 24 from 5:00 to 7:30 p.m. Everyone with an interest in gas hydrate is encouraged to attend

In addition, members are being sought for the Advisory Committee. As much of the gas hydrate activity related to energy resource development is occurring outside of North America, there is a specific need for members who will contribute to the committee's work by reviewing reports, organizing sessions at AAPG conventions, and contributing to the EMD Web Portal

Gas Hydrate in Japan

Two deepwater hydrate production tests are currently planned for offshore Japan in 2013. The test durations are currently planned for 4 weeks and 3 months, respectively, and will provide important information for MH21, the Japanese gas hydrate program. Site selection, test details, and other considerations are currently under review. The proposed maximum production rates have not been released and the Gas Hydrate Committee hopes that the rates will be sufficiently high to raise industry interest in gas hydrate resource potential elsewhere in the world. Sources within the program indicate that commercial production of gas from hydrate could commence in as little as five years.

The Japanese program has taken on additional significance as the price for LNG cargos has remained at $17/million BTU as Japan has increased gas imports for the generation of electricity after the Fukushima Daiichi nuclear disaster and the resulting shutdown of several power plants.

Additional information on the Japanese program may be found at the MH21 website:
http://www.mh21japan.gr.jp/english/

Gas Hydrate in India

An LWD drilling program will commence in late 2012 for offshore India. This program is a follow-up to the 2006 program that recovered significant amounts of gas hydrate in cores. The 2006 program targeted bottom simulating reflectors (BSRs) but did not encounter reservoir lithologies suitable for production. India's National Gas Hydrate Program (NGHP) has focused since then on reservoir delineation and resource assessment.

Additional information about NGHP may be found at the website:
http://www.dghindia.org/NonConventionalEnergy.aspx

Gas Hydrate in New Zealand

New Zealand's only known large gas field, the Maui Field west of the North Island, is being depleted and other no other significant conventional gas fields have been discovered. In response to this, the government of New Zealand has increased efforts to assess the resource potential of gas hydrate on the nation's continental margin. In particular, the Hikurangi Margin east of New Zealand's North Island appears to have the highest potential for commercial gas hydrate development. Four major research cruises have been conducted in the past five years to study gas hydrates on this margin. The Hikurangi Margin covers an area of approximately 50,000 square kilometers and is located between Wairarapa and East Cape and has potential gas hydrate deposits.

Gas Hydrate in Alaska

ConocoPhillips is nearing completion of a 2-phase project that is injecting CO_2 into a methane hydrate reservoir to determine the potential for methane production while permanently sequestering CO_2. For the first phase, the Ignik Sikumi #1 well was drilled, tested and temporarily abandoned in March and early April 2011, using an ice pad adjacent to Prudhoe Bay Unit L-pad. The ice pad was reestablished in December, 2011. During the past several months the well was re-entered and the CO_2 injection/methane exchange was carried out. The project was initiated by ConocoPhillips with substantial funding from the U.S. Department of Energy. Significant additional funding for the ongoing second phase has been provided by Japan.

Twenty-two tons of liquid carbon dioxide were delivered to Ignik Sikumi #1 well site in February and offloaded into a storage vessel. After perforating thirty feet of casing into the hydrate-bearing Sagavanirktok "C" sandstone, carbon dioxide injection was initiated. Injection of mixed CO_2/N_2 gas at Ignik Sikumi #1 was completed on February 28.

A critical component of the test is a state-of-the-art Gas Mixing Skid (GMS) that was designed by ConocoPhillips. Specialized pumps, valves, and meters have been required because standard oilfield equipment cannot move, mix, or measure injection gases at the pressures, temperatures, and rates required by the test design.

Approximately 210,000 standard cubic feet (scf) of gas blend was injected into the Sagavanirktok "C". The initial injection rate was ~11,000 scf per day, and gradually increased to ~21,000 scf per day during thirteen days of injection. Stable injection rates were maintained by recirculating non-injected CO_2 and N_2 through on-site tanks. Upon completion of injection, the well was shut-in and surface equipment re-configured for flowback and drawdown testing.

Post-injection flowback began on March 4, with unassisted flowback (in which wellbore fluids flowed to the surface without artificial lift) lasting for approximately 33 hours. When sufficient produced water had filled the tubing to balance reservoir pressure, unassisted flow ceased, and surface equipment was reconfigured for reverse jet pumping. With reverse jet pumping, methane was produced immediately, increasing in abundance for two days, then produced-gas

composition stabilized. Carbon dioxide and nitrogen abundance dropped from injection percentages at initial flowback to relatively low percentages in a less than two days.

Jetpump-assisted flowing conditions were established March 7. Careful measurement of the relative abundances of injected carbon dioxide, nitrogen, and tracers versus produced methane and water have allowed for quantification of CO_2/CH_4 exchange. Results to-date are within the broad range of pre-test predictions, which were based on in-house reservoir simulations. Operations are expected to continue through mid-April.

Gas Hydrate in the Gulf of Mexico

As a result of the Deepwater Horizon disaster additional gas hydrate field operations in the Gulf of Mexico that were planned as a follow-up to the highly successful 2005 and 2009 expeditions are now on hold. A future expedition (Leg III) will use a new coring system designed to collect hydrate-bearing sands at reservoir pressure and transfer the samples at pressure to a variety of newly-constructed testing devices. These samples will enable the first measurements of a range of physical properties of marine gas hydrate sand reservoirs. Results of the 2009 expedition are available at:
http://www.netl.doe.gov/technologies/oil-gas/FutureSupply/MethaneHydrates/JIPLegII-IR/

In addition, the journal "Marine and Petroleum Geology" is publishing a series of peer-reviewed papers from the 2009 expedition.