Project 48984

Gas Hydrates Assessment

Q3 (Apr-Jul) FY2006

Phase I

Task 1: Project Management

A draft Research Management Plan (RMP) was submitted to the U.S. Department of Energy Contracting Officer's Technical Representative (COR) for review. B.P. McGrail traveled to Morgantown, WV on July 20-21 for a project kickoff meeting. A presentation on the planned project work scope and computer simulation tool we plan to use was given. Additional comments on the RMP were received from the NETL COR and a final draft is in preparation for submittal next quarter.

Task 2: Tech Status Assessment

No work underway until RMP is approved.

Task 3: Basic reservoir Simulation

In order to stay on schedule with the simulation work after formal startup of the technical tasks on this project, some preparatory work with the STOMP-HYD reservoir simulator was begun this quarter under SubTask 3.1.1: Algorithm Review, Verification and Establish Baseline Methane Hydrate Reservoir Simulation Parameters. A review of experimental research associated with the understanding of the pore morphology of hydrate bearing geologic media has shown that the assumption of having gas hydrate occluded or surrounded by the aqueous phase is justified. This conceptual model of the pore-space distribution of the active phases (i.e., aqueous, gas, liquid CO_2, hydrate, ice, and precipitated salts) agrees with the earlier work of Clennell and allows the hydrate and ice phases to be treated as immobile bodies in a manner similar to trapped ganglia of non-aqueous phase liquids. A literature review found a recent publication by Østergaard et al. that reports a generalized algorithm for predicting the equilibrium conditions for hydrates in the presence of salt and organic inhibitors. This algorithm and parameters have been incorporated and tested in the STOMP-HYD simulator. The modeling approach taken in STOMP-HYD for the migration of liquid CO_2 micro-emulsions will be to assume that the micro-emulsion dissociates into an aqueous and nonaqueous phase and that within the geologic media, the phases migrate with respect to phase pressure gradients. Numerically this approach avoids solving an additional governing equation. The solution approach in STOMP-HYD assumes that the fluid, hydrate, and ice phase saturations are related to the interphase capillary pressures. During this quarter we made a change to the capillary pressure approach that has significantly improved the simulator's performance without altering the results. Originally the hydrate-aqueous interfacial radius was correlated with the ratio of *in-situ* gas pressure and *ex-situ* equilibrium pressures. This scheme has been replaced with one where the hydrate-aqueous interfacial radius is correlated to the ratio of the *in-situ* temperature and equilibrium temperature, following the equation proposed by Jiang et al.

Task4: Reservoir Simulation with ANS Field Data

This task is not scheduled to start until Task 3 scope has been completed.

Significant Issues and Corrective Action

None.

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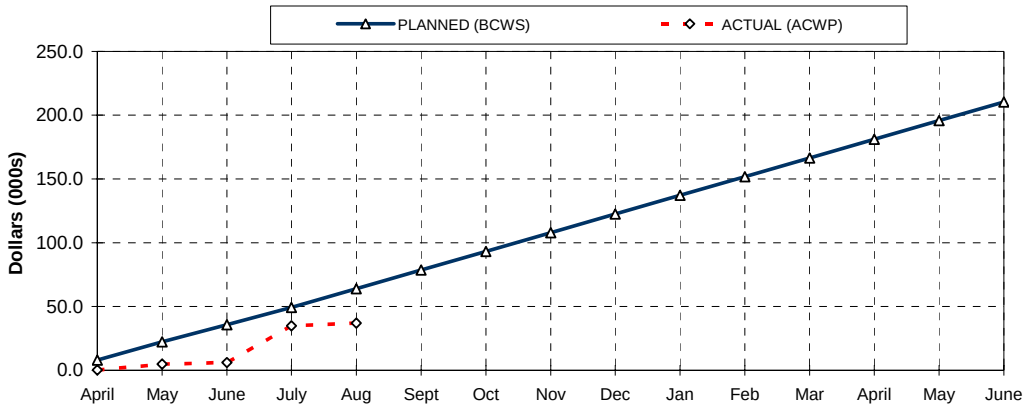
August 2006

Planned and Actual Cumulative Spending Curve
(DOLLARS IN THOUSANDS)



($K)	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	FY07
Planned Cost	7.97	14.33	13.37	13.7	14.64	14.64	14.6	14.6	14.64	14.6	14.64	14.6	14.6	14.6	14.64	210.4
Actual Cost by Month	0.2	4.6	1.2	28.8	2.2											37.0
Variance Cost	7.7	9.7	12.2	-15.1	12.5											
Cumulative Planned	8.0	22.3	35.7	49.4	64.0	78.6	93.3	107.9	122.6	137.2	151.8	166.5	181.1	195.8	210.4	210.4
Cumulative Actual	0.2	4.8	6.0	34.8	37.0											
Cumulative Variance	7.7	17.5	29.7	14.6	27.0											

Milestones	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June
Task 1. Prepare a Research Development Plan															
Task 2. Prepare a technology Status Assessment															
Quarterly Reports															

LEGEND: SCHEDULED △ DEVIATION □ COMPLETED ☆ TIME LINE ——— ELIMINATED BY REDUCTION ⊘