1.0 Executive Summary
Michael Volk

Two inhibitor dissociation models, one for nitrogen and another for MEG, were coded using VBA within Excel. Calsep’s PVTSim program was used for the thermodynamic package in the coding. The results of the models were compared to the experimental data. The predicted dissociation times for both the models are higher than the experimental times. For the nitrogen model, the predicted dissociation times were 1.2 to 2.2 times the experimental dissociation times whereas for the MEG model, the predicted dissociation times were 1.1 to 1.4 times the experimental dissociation times. A draft of the final report was prepared.

The twin screw pump was repaired and returned to the University late July. Ten flow loop experiments were then conducted to understand water continuous and dispersed systems. Various tests were conducted so as to understand the effect of water cut, velocity, operating pressure, and water cut at high velocities. All ten tests were a fail as the system was not inhibited and deposition was detected on the pipe wall. Seven tests were then conducted continuing the systematic definition of the safe operating window for production with hydrates without a significant risk of hydrate blockage. The relative performance of AAs was evaluated with respect to fluid chemistry and operating conditions. Flow loop tests with prescribed AA concentration were a pass but were a fail at 1/3rd of the prescribed concentration.

The next series of tests scheduled for the flow loop after the ABM is a four week testing program to evaluate a tomographic device to detect hydrates since the results from the bench top ERT and ECT tests demonstrated potential for successful testing of these sensors on the flow loop to detect hydrate deposition on pipe walls, bedding/segregation, flow regime, and general phase distribution. 10 tests will be conducted to assess the effect of surfactant, AA and water cut. The tomograms would provide information about hydrate deposition/bed formation, distribution of phases at different pump speeds, slugging etc…and can also be compared to observations in the view cell. If successful, this study could pave the way for high-pressure studies and field trials; real-time information of holdup, phase distribution, and hydrate location has long eluded practitioners, and would be valuable information for making engineering decisions.

The design of the test facility for the riser study was completed by selecting new instrumentation. A test separator will be connected in a bypass loop which will be located at the pump discharge. The test separator will be used to determine the average gas, oil and water flow rates circulating in the loop. The loop is comprised with three main test sections, namely, west horizontal section, riser and downcomer. Differential pressure transducers are used to define the pressure gradient while the holdup is measured with gamma densitometer (two-phase flow cases). Capacitance sensors are utilized to determine the slug characteristics (translational velocity, slug length distribution and slug frequency). Construction will begin in January.

The proposal for the next phase was issued. This three year study will focus on monitoring technologies, vertical multiphase flow and hydrate studies, and evaluating hydrate risk as a function of system chemistry. Total three year budget is approximately $3.2 million. Almost half of these funds are for instrumentation to detect hydrate deposition on pipe walls as well as construct a high pressure riser for vertical flow studies. This will result in an increase in the current membership fee from $60,000 to $120,000 per year per member. The next phase will need at least nine members to move forward.