

## II. INTRODUCTION

In September 1981, the U.S. Department of Energy (DOE) and Air Products and Chemicals, Inc. began a 50-month R&D program to prove the feasibility of Liquid Phase Methanol (LPMEOH) technology. Chem Systems Inc., inventor of the technology, is performing as the key subcontractor in the program. Cost-sharing participants are DOE, Air Products, Fluor Engineers, Inc. and the Electric Power Research Institute.

LPMEOH technology has the potential to be a lower-cost conversion route to methanol from coal than current gas phase processes. Laboratory work to date shows LPMEOH technology particularly suited to coal-derived synthesis gas rich in carbon monoxide. The LPMEOH process is capable of processing feed gas containing CO and H<sub>2</sub> at high concentration and in variable proportion. The LPMEOH process can achieve high CO conversion per pass, and it permits effective recovery of the heat liberated by the exothermic methanol synthesis reaction.

In this program, a DOE-owned skid-mounted pilot plant was disassembled and renovated. The unit was transferred from Chicago to Air Products' LaPorte, TX facility, refurbished, and expanded for service as the LPMEOH Process Development Unit (PDU). Synthesis feed gas from the facility is used to test the unit. The LaPorte LPMEOH PDU design provides for a liquid-fluidized (ebullated bed) mode of operation and a liquid-entrained (slurry) mode of operation.

The operation of the LaPorte LPMEOH PDU is supported by an extensive laboratory program which is conducted at both Air Products and Chem Systems. The laboratory program includes catalyst screening and testing in bench scale reactors and operation of a Lab PDU at a Chem Systems research facility. The Lab PDU was expanded to allow testing of both the liquid-fluidized and liquid-entrained modes. The research program also includes a fundamental modeling effort.