MEWBOURNE COLLEGE OF EARTH AND ENERGY

MEWBOURNE SCHOOL OF PETROLEUM AND GEOLOGICAL ENGINEERING

The UNIVERSITY *of* OKLAHOMA

MPGE Technical Seminar

CCUS: Flow Assurance Challenges and Opportunities

Abstract: Large-scale Carbon Capture and Storage (CCS) hubs have emerged as a cost-effective means for industries to reduce carbon dioxide (CO2) emissions to atmosphere. Designing a system that connects multiple emitters into a common dense phase transportation pipeline and storage site introduces significant challenges, not least of which is the management of non-CO2 components (impurities). A unique aspect of CO2 pipelines is that they typically operate close to the fluid phase envelope. The presence of simple impurities at low volumes can therefore lead to major impacts. The impurities will have an impact on fluid behavior (thermodynamics), transport (thermo-hydraulic), integrity (chemical reaction, corrosion, material selection, reservoir, etc.), safety, sequestration (injectivity, long-term storage), etc. Impurities therefore can ultimately impact the capacity, integrity, and operability of the pipeline network.

The primary control mechanism is to set a tight specification on impurity levels. A substantial amount of work has been carried out and published on impurity level recommendations/ specifications. These references give various thresholds for the impurities. However, the reasons behind the recommended tolerances are sometimes vague or non-existent. Some thresholds are set based on potential upset conditions that may not actually occur, and for some of them the presence and/or lack of other impurities are not considered. These limitations can make it very difficult to adapt the thresholds for a specific system or project. Furthermore, overly onerous requirements will discourage users (emitters) from connecting into the network.

A case study will be presented demonstrating the influence of impurities on a dense phase CO2 pipeline design, and then showing the development of a practical and implementable CCS hub fluid specification to protect the pipeline integrity, based on the CO2 sources and expected system operating conditions.

Dr. Dale Erikson

Fri, Sept - 22nd @ 2:30 PM SEC N202

Dale Erikson serves as the Technical Authority and Technology Development Lead for Wood Group Intelligent Operations. At Wood he has pioneered the development of real-time, transient, multiphase flow simulators, leak detection systems, and control/optimization software for platforms/pipelines and wrote most of the core code for the multiphase pipeline simulator. In addition, he has been involved in numerous technical studies involving transient multiphase flow and dynamic process modeling. Since 1996, has had a significant role in over 100 projects, by providing functional design, detailed design approval, trouble shooting, tuning, quality review and testing and technical supervision. He first worked in the area of flow assurance by writing the first version of the Colorado School of Mines Hydrate program in 1983; then developed high accuracy equations of state in conjunction with NIST in Boulder, for things like CO2 in the Critical Region while getting his PhD from Rice University. He co-developed a thermal soil model enhancement and a bundle model enhancement for OLGA and developed the first commercial model for paraffin formation. He has recently developed a model of Oil Shale Well Operation including a simplified Reservoir Model. Finally worked on a model of the largest CO2 Storage Network. In lived in Ponca City from 1988 to 1998 while I worked for Conoco.