Understanding Toe-To-Heel Air Injection Process, Clues for Future In-Situ Combustion Technologies for Heavy Oil Recovery

One-Day Course

1. Essential information on current ISC commercial projects
   Challenges in Application of Conventional ISC process, SDOD processes, and New ISC processes
   - Current conventional ISC commercial operations: Bellevue (USA), Suplacu de Barcau (Romania), Balol and Shantal (India)
   - Challenges in application of conventional ISC process
   - Short-distance oil displacement (SDOD) concept
   - SDOD thermal processes; COSH, Top-down ISC and THAI/CAPRI processes

2. History of development of THAI and CAPRI processes
   - 3-D lab work of U of B investigating ISC in different configurations, including horizontal wells
   - Patenting of THAI
   - Systematic investigation of THAI; significant lab tests
   - Development of CAPRI
   - Systematic investigation of CAPRI

3. Basic mechanisms of THAI/CAPRI; general and combustion reaction mechanisms
   - Description of THAI; the three phases; communication, start up (ignition) and propagation of ISC front
   - The three main crucial mechanisms of THAI (SDOD, gravity stable and self – healing feature preventing air/O2 short circuit)
   - Differentiation of THAI chemistry from that of conventional ISC
   - Upgrading potential of THAI/unintentional in-situ upgrading in some field ISC projects
   - Description of CAPRI and its upgrading potential

4. Status of technology; some essential laboratory 3-D cell test results
   - Systematic investigation of THAI and CAPRI
   - Main conclusions from the systematic investigation of THAI and CAPRI
5. **Status of technology; field testing results**
   - Description of the Athabasca White Sands THAI pilot and of the conventional Heavy Oil Kerrobert (Saskatchewan Province, Canada) THAI Project (in the presence of bottom water
     - Communication and ignition phases
     - Main phase (TTH propagation)
     - Performance of the pilot/project; control of the process, peak temperature, burning characteristics, oil rate, upgrading and hydrogen production, etc.
     - Operational issues
     - Lessons learned
   - Discussion on possible applications of THAI process in other fields in Canada; May River Project and Dawson Creek Project
   - Four THAI pilots outside Canada with emphasis on Fengcheng Pilot in Xingjiang Province, China

6. **Pros and Cons of THAI application; screening criteria**
   - Maturity of the THAI process; challenges/limitations
   - Pros & Cons
   - Screening criteria
   - Sweet spots for applications

7. **Towards commercialization of THAI; possible improvements of the THAI process**
   - Staggered line drive application
   - THAI grafted on a suspended or active ISC operation
   - THAI as a follow up process after SAGD and THAI conducted as a stand-alone process in a SAGD well configuration
   - Propagation of the ISC front on the last portion of the horizontal section (heel section)
   - Reduction of the gas injection rate, controlling wells just for gas production (partial) to some extent as in COSH, other possible solutions
   - Safety of operation; oxygen ingress in the horizontal producer
   - Excessive catalyst loading in CAPRI process

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