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Abstract

Objectives/Scope: In light of unlocking unconventional fields such as (extra) heavy oil, its high viscosity poses a challenge for transportation, and eventually affects the economics of the project to develop these resources. JOGMEC and JGC Corporation (parties) have been developing a technology to meet the challenges and hereby propose an economic transportation method.

Methods, Procedures, Process: Parties have developed a Supercritical Water Cracking (SCWC) technology to partially upgrade the oil, and to lower the viscosity sufficient for pipeline transportation without diluents such as condensate. Supercritical water, due to its distinct properties, breaks the molecular chains of the heavy oils and produces upgraded oil (SCO; Synthetic Crude Oil), which can be transported by pipeline. A by-product heavy end will be obtained that can be used as fuel or materials for road asphalt, thus producing no waste from the process. The process comprises of a simple reactor, which contributes to a smaller footprint than conventional upgrading processes.

Results, Observations, Conclusions: The project started from a 0.15BPD scale lab test to confirm its applicability to heavy oils. Success of these tests lead to implementing a pilot plant test in Alberta, Canada. A 5BPD plant was constructed, and tests were conducted for further process validation, long term stability and obtaining engineering data for a commercial plant. Parties expect this process to produce pipeline transportable SCO with a yield of 85% or more. Economic studies also confirm that this method can improve the economics for developing heavy oil fields when compared to conventional methods, thus contributing to unlocking undeveloped heavy oil fields economically.

Novel/Additive Information: Unconventional resources with difficulty of accessing the market face a challenge when considering the preferable transportation method. SCWC, the Japanese proprietary technology, proposes an alternative for the development of these resources by treating heavy oils on site and producing upgraded oils.