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Mapping heavy oil behaviour to improve efficiency of oil sands and heavy oil processing

Even after decades of production, there are still plenty of mysteries about oil and the way it behaves in certain situations, especially when it's mixed with other substances. A solid understanding is essential in order to create new methods and technologies that make operations more efficient and economic while reducing their environmental impact.

Today, the Schulich School of Engineering launched a research program to map heavy oil characteristics and help industry take the production of heavy oil to the next level. Harvey Yarranton is the NSERC Industrial Research Chair in Heavy Oil Properties and Processing with support from Schlumberger Canada Ltd. and Shell Canada Energy.

Heavy oil, unlike crude oil, is so thick it often needs to be heated with steam to make it flow. An ongoing challenge is to find ways to use less water and energy such as with the use of solvent, a growing practice in industry. A solvent is a substance that dissolves another substance to form a solution. In the case of heavy oil production, the solution becomes thinner, or less viscous, and is therefore easier to produce.

"Solvent-based and solvent-assisted recovery methods are attractive because solvent replaces some of the steam. Less steam means less energy and water usage for each barrel of oil produced," explains Yarranton. "The challenge is that the properties of mixtures of solvent and heavy oil are complex and we don't have adequate methods of characterizing these mixtures and predicting their behavior. We need the right tools to understand the fluid so we can be confident we're designing efficient and economic processes."

Funding for this \$2.6-million five-year program has been provided by the Natural Sciences and Engineering Research Council of Canada (NSERC) and industry partners Schlumberger and Shell Canada Energy.

"Harvey Yarranton brings the expertise and commitment that will make this chair an important resource for heavy oil and bitumen research," says Suzanne Fortier, president of the Natural Sciences and Engineering Research Council of Canada. "His research addresses fundamental questions that will assist the heavy oil and oil sands industry in developing more efficient and environmentally friendly methods of extraction and achieve greater economic impact for Canadians."

Yarranton will develop new characterization methods and modeling methodologies primarily for use in process and reservoir simulators, which industry uses to develop recovery and surface processes.

“Innovation and ingenuity will lead us to breakthroughs in heavy oil production and the development of more efficient methods that protect our environment and make good business sense,” says Elizabeth Cannon, dean of the Schulich School of Engineering. “It is encouraging to see major players in the energy industry contributing financial support for this research program, one of many that define us as the green engineering school in the heart of the oil patch.”

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