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In-Situ Catalytic Aquathermolysis Combined with Geomechanical Dilation to Enhance Thermal Heavy Oil Production

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Summary

This technology has been applied on more than 10 SAGD well pairs and excellent field results were generated in terms of reduced steam use, shortened steam circulation time, and increased initial oil production. This paper presents this integrated chemical geomechanics technology with relevant laboratory test and field results supporting the description.

Introduction

Steam-assisted gravity drainage (SAGD) has been used to develop the “super heavy” oil reservoirs in PetroChina Xinjiang Oilfield Branch. These reservoirs have a very high oil viscosity that can reach more than 50,000 cp at 50°C. Moreover, owing to their continental deposit origin, these reservoirs have a low porosity and a low permeability, as well as frequent and heterogeneous occurrence of mud/shale stringers within. Because of these challenging reservoir qualities, the conventional steam circulation SAGD start-up process takes 10 to 12 months before the SAGD well pair can be switched to production. A geomechanical dilation mechanism is used to startup the SAGD production with outstanding success. As a result, dilation startup has recently become the routine start-up process in Xinjiang’s SAGD production.

Theory and/or Method

The oilsands reservoir is first dilated via geomechanical dilation start-up technology. It increases the porosity and creates micro-cracks in the oilsands reservoir. Catalytic is then injected into these newly created pore space, contacting the heavy oil in a large area and helping to reduce its in-situ viscosity.

Examples

This integrated chemical-geomechanics technology is now widely used in Petro-China’s Xinjiang oilfield. Catalytic aquathermolysis process is one of the key and economical viscosity reduction technologies being considered for the successful exploitation of super heavy oil deposits. This paper presents a new technology which combines the geomechanical dilation with the catalytic aquathermolysis process. To the author’s knowledge, it is the first time that real oil field experience and data about this technology is presented.

Conclusions

This technology has been applied on more than 10 SAGD well pairs and excellent field results were generated in terms of reduced steam use, shortened steam circulation time, and increased initial oil production. This paper presents this integrated chemical geomechanics technology with relevant laboratory test and field results supporting the description.

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