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Application of the Radioactive Tracer Log for Flow Measurement in Polymer Injection Wells.

S. P. Figliuolo, F. Peñalba, H. P. Burbridge, M. Ichard, M. Ravicule, J. E. Juri, and A. M. Ruiz Martinez

Abstract

EOR technologies assessment aims to increase recovery factor from mature fields. To achieve this objective the work is directed to progressively reduce uncertainty by recording and evaluating laboratory and field information, as well as performing forecasts using modeling and simulation. In this context of technological exploration, implementation of a polymer injection pilot project challenges techniques and tools routinely used in secondary recovery.

One of these challenges is the measurement of polymer flow rate taken at each perforation. This parameter aids to optimize the efficiency of the CEOR process by allowing the evaluation of the sweep efficiency per layer and its evolution over time.

As part of a pilot project in the San Jorge Gulf basin (Argentina) a polymer injectivity test was conducted in the well A. During this test the radioactive flow-log tool was used in an attempt to determine the fluid intake by perforation. This tool is commonly used for monitoring water injection in secondary recovery projects.

In water injection wells the flow is turbulent, which promotes the diffusion of radioactive tracer into the main stream in the well. But when the tool is used with polymer, due to the increased viscosity of the fluid, the flow regime becomes laminar, which impairs the tracer diffusion process.

Thus, for polymer injectors, the flow-log tool response complicates the determination of flow rate received by each perforation.

In order to better understand the process of measuring and estimating flow rates for each perforated interval in the well, the workflow applied consisted of the following steps:

- All records of operations carried out using the flow-log tool in well A is thoroughly analyzed.
- Literature on the theory and practice of the flow-log tool and tracers was reviewed.
- Using the method proposed by the service provider and an alternative method, all records were reinterpreted, including both water and polymer injection for well A.

Computational fluid dynamic simulations (CFD) were conducted to better understand the phenomenon and evaluate the validity of the proposed alternative method of interpretation