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The use of direct current treatment of paraffin plugging in oil wells: A case study

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Abstract

The use of Direct Current to enhanced oil production has a number of advantages over other oil recovery processes, EOR. These advantages are joule heating created by the electrical resistance of the formation, Electro-Kinetic transport, and Cold Cracking or Electrochemical upgrading which changes the molecular structure of the oil. The majority of our work in the field and laboratory focused on the use of the EEOR^{TM} process in heavy oil. In this presentation we will briefly discuss heavy oil but will concentrate on the application to light oil containing paraffin in a low permeability formation with paraffin production issues. In our presentation we will review the process used in designing this project including the use of electrical field modeling to efficiently locate the electrode in the formation. Core floods of formation rock were conducted in the laboratory to assess the effectiveness of EK to sweep of the light oil from the formation. A field demonstration was conducted which demonstrated that the EEOR^{TM} process increased the temperature around the well bore. This heating increased the paraffin although the production of total fluids were not increased significantly. Subsequent modeling of the formation including an EK module suggested that the process did in fact not run long enough for the EK pressure front to reach the producing well, even though the impact of heat to the wellbore was effective in the removal of paraffin from the well. We propose to discuss how the DC may play a significant role in freeing paraffin to improve other wells having paraffin production issues.