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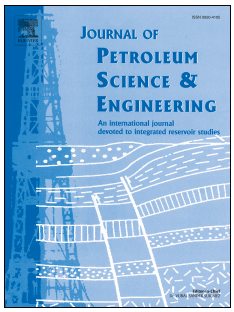

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Effect of fluid flow on biofilm formation and microbiologically influenced corrosion of pipelines in oilfield produced water

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Abstract

Microbiologically influenced corrosion (MIC) is the primary mechanism causing failures of upstream oil pipelines. This work investigated the biofilm formation and MIC of an X70 pipeline steel in oilfield produced water containing sulfate reducing bacteria at various flow velocities. Results demonstrate that the fluid flow affects the biofilm formation, and thus MIC of the steel under biofilm. At low flow velocities such as 0.2 m/s, a layer of biofilm forms on the steel surface, and the steel suffers from MIC, especially pitting corrosion. With the increase of flow velocity to 1.0 m/s, the biofilm is not able to form. Thus, the steel MIC reduces with the increasing flow velocity of the fluid. Moreover, the corrosion products and biofilm are overlapped at the low flow velocity. At the high flow velocity, the surface layer formed on the steel is mainly corrosion products. Corrosion pits can be formed on the steel at the low flow velocity due to microbial attack.

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