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Title	In-Situ Sand Consolidation by Low-Temperature Oxidation
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Preview	Abstract

Low-temperature oxidation (LTO) of crude oil has been employed to investigate its potential as a sand consolidation technique. Loose sand (20/30 mesh) saturated with crude oil (18 - 20 API) and brine was subjected to air injection at a low temperature (100 - 150 C) for a period of time (6 - 18 hours). The sand packs developed compressive strengths ranging between 375 and 1264 psi and suffered a maximum permeability loss of 22%.

It was found that higher oxidation temperatures reduced the consolidation time and increased the compressive strength; but had no effect on the magnitude of permeability loss. Heavier oils required less oxidation time, caused slightly larger permeability losses, but had an insignificant effect on compressive strength. The presence of clay enhanced the LTO reactions by shortening the oxidation time and increasing the amount of residue deposited on the sand grains. This greatly increased the compressive strength, but at the expense of larger permeability losses. When interstitial water was present with clay, the permeability loss was increased further while the compressive strength was slightly reduced. Acid treatment had no effect on the residue deposited on the sand grains.

Experimental testing as well as two predictive models showed that this technique provides sufficient compressive strength to withstand sand-free, high flow velocities and results in much smaller permeability losses compared with plastic consolidation.

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