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## Iron sulfide scale removal from production wells by new chemical formulation: A field application in a sandstone reservoir in Egypt

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Iron sulfide scale is a significant problem in the oil and gas industry whereas the iron sulfide deposition has adverse impact to the production operations. The scale is present in various species with different iron to sulfur ratios. Iron sulfide species with high iron content is soluble in acids, whereas those rich in sulfur are almost insoluble in acids. The formation is sandstone with the following specs: Lose, pale yellow, quartz, very fine to fine grained, sub-rounded to rounded, and moderately sorted sand grains. The reservoir temperature is 300°F. The well was producing using jet pump (JP) and the production stopped due to scale formation. A work over started to replace the completion. The JP was used again to produce the well with very low productivity; +/-0.06 bbl/psi. The scale was expected to cover all the casing areas below the tubing end until PBTD. A scale sample was obtained and analysis of the scale through XRD showed that the scale composition is as follows; 36% Marcasite (FeS<sub>2</sub>), 21% Greigite (Fe<sub>3</sub>S<sub>4</sub>), 17% Pyrite (FeS<sub>2</sub>) and 26% Siderite (FeCO<sub>3</sub>). Both pyrite and marcasite have very low solubility in HCl, and the only available method of removal in the oil industry is milling. The milling operation failed to solve the problem; therefore, the production was stopped until finding an alternative solution. An effective treatment strategy proposed to remove the scale efficiently; the technical proposal was designed taking into consideration the complicated nature of the scale. Furthermore, the proposed treatments were conducted and placed using coiled tubing (CT). The first application using the SCSR-02 solution has been successfully carried out and the job results were outstanding. Production has been returned with an increment 50% above its original rate. The well is producing natural flow without using the JP, and efficient cost /Bbl.

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