WI06

An Effective Approach to Improve Acid Stimulation of Low-Permeability Carbonate Formation in Long Horizontal Water Injection Wells: Case Histories

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SUMMARY

Hydrochloric acid effectively dissolve calcium carbonate mineral present in the filter cake and the formation, but is not capable of dissolving or degrading some of mud damaging components (polymers). Lab results indicate that the conventional acidizing practice was not effective and yielded a loss in the initial core permeability of more than 80%. Based on lab findings, an initial stage of flowing back the well prior to acid stimulation was recommended. This stage was intended to remove as much as possible of mud debris and prevent some polymers from penetrating into the formation, a main cause of injectivity decline. It will also improve the contact of injected acids with the treated formation. Application of this technique in three carbonate power water injectors resulted in significant improvement in their injectivity index. The paper presents six field cases in the same carbonate formation: three wells were treated with the typical acid stimulation practice and the others were treated using the new method. The post treatment injectivity tests revealed that the wells treated using the new method had more than 2-fold increase in injection rates at lower injection pressures compared with those treated using the typical acid stimulation practice.

Abstract

Acid stimulation treatments are typically carried out following drilling of the target zone (horizontal section) in carbonate water injection wells. The purpose of such treatments is to remove mud-induced formation damage and improve formation permeability. Acids interaction with filter cake components and the formation is conventionally displaced by injection into the formation. This practice has been proven to be successful for relatively high permeability (average $K \sim 200$ md) water injectors. Application of the same stimulation practice for long horizontal water injectors in relatively tight ($K < 10$ md) carbonate formation did not achieve as good results as expected.

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