

Example of Reservoir Damage from Squeeze Operations

The following is an example of Exxon unsuccessfully attempting to restore production from a zone which was squeezed. This example shows how waste can result from squeeze operations. These same squeeze operations would be required in the Mary Fed. #5 to repair the channel if commingling is not approved.

New Mexico "DC" State #1
Sec. 18, T-19-S, R-29-E
Eddy County, New Mexico

The N.M. "DC" State #1 was completed in May, 1982 for 531 BOPD and 65 BWPD from perforations Exxon believed to be in the Cisco/Canyon formation. The NMOCD disagreed with the selection of formation tops and found that the top 11' of the perforations were actually in the Wolfcamp formation, thereby commingling the two formations in the wellbore. A production log was run in the hope that it would show an insignificant amount of production coming from the perforations in question. Had this been the case, the NMOCD would likely have given administrative approval to commingle in the wellbore. However, the log showed that 8% of the total flowstream was coming from the interval in question. After reviewing the log, the NMOCD chief engineer advised that he could not support administrative approval for downhole commingling. Therefore, an attempt was made to isolate the Wolfcamp ~~or~~ by lowering the packer assembly in the well below the Wolfcamp perfs to temporarily abandon the Wolfcamp zone until the Cisco/Canyon depleted. This attempt failed due to behind pipe communication between the two zones.

An attempt was then made to squeeze the Wolfcamp perforations. During the squeeze operations, the perfs below the bridge plug communicated with the Wolfcamp perfs. After drilling out, the Cisco/Canyon had to be reperforated and acidized. The well produced only 44 BOPD and 54 BWPD after the acid job.

It is unlikely that the majority of the production was coming from the Wolfcamp perfs, as a spinner-type production log indicated only about 8% of the total flow coming from the Wolfcamp perfs. Also, the well did not produce any significant volume prior to the squeeze job so it is unlikely that the Cisco/Canyon was depleted. In addition, the better porosity zones are in the Cisco/Canyon. It is suspected that the Cisco/Canyon interval was damaged during the squeeze operations and the acid job failed to clean it up.

EXXON
Exhibit No. 6
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An acid frac was then attempted to frac thru the formation damage. The well produced 65 BO + 113 BW after the acid frac. The acid frac did improve the productivity, but indicated that there was still substantial reservoir damage based on the production rates.

Production:

After completion - 531 BOPD, 65 BWPD, 1000 KCFPD

After cement squeeze operations - 65 BOPD, 113 BWPD,
218 KCFPD

Costs:

Cement squeezing, reperforing, and acidizing - \$70,000

Acid fracing - \$62,000

Total - \$132,000

Conclusions: Substantial reservoir damage occurred from cement squeezing the Cisco/Canyon. Considerable expense was incurred with several unsuccessful attempts to repair this damage. Waste of hydrocarbons occurred due to the cement squeezing operations.