MULTIWELL RETROSPECTIVE TESTING
MRT
WATER FLOODING (WF)
Waterflood at start
... 5 years later
... another 5 years later
Multiwell Retrospective Testing (MRT)

MRT Cell

Pressure impact decomposition

Frm. pressure history reconstruction

PI history reconstruction

Field-wide MRT Analysis
Waterflood fine tuning with MRT
Low $\sigma$ @ $X05 \rightarrow X12$

$X05$ breakthrough to $X12$

Recommendation: reduce $X01$ drawdown to decrease watercut %

High $\sigma$ @ $X52,X07,X09, X08 \rightarrow prod$

$X52, X07, X09, X08$ are losing most water into underlaying pay

Low $P_{frm} X04$, low PI

Recommendation: switch $X28$ to injection

Low $P_{frm}$ zones.

$X05$ breakthrough to $X12$, causing pressure drop in $X03$ and $X28$. 

$X05$ breakthrough to $X12$

High $\sigma$ @ $X52, X07, X09, X08 \rightarrow prod$

$X52, X07, X09, X08 \rightarrow prod$

$X03, X09, X08 \rightarrow prod$

$X52, X07, X09, X08$ are losing most water into underlaying pay

Recommendation: switch $X28$ to injection
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Waterflood fine tuning with MRT
Adjusting target rates with MRT
Adapting target rates with MPT

**ISSUES:**
1. Non-uniform reservoir pressure drop
2. Unclear injection impact
3. Possible anisotropy of well interference
4. Oil production decrease

**GOALS:**
1. Identify injection impact
2. Assess cross-well pressure impact
3. Assess reservoir properties
Results: well and reservoir properties

- **FORMATION PRESSURE HISTORY RECONSTRUCTION**
  - Sharp production increase in 2018
  - Formation pressure dropping at 0.23 bar/mnth

- **PRODUCTIVITY INDEX HISTORY RECONSTRUCTION**
  - PI drop 20-30%

- **PI DECREASE DUE TO SKIN RAISE**
  - Skin raises from +9.4 to +25
  - Gas liberating with $P_{wf}$ going below $P_b$, causing skin raise

- **WELL AND RESERVOIR PROPERTIES**
  - Skin = 25
  - Transmissibility = 34222 mD·m/cP
  - Permeability = 1920 mD
  - Drainage volume $5.37 \times 10^8$ m³
  - Drainage radius 9050 m
Results: formation pressure forecast

**AROUND X20**

Low actual injection, NFA forecasts reservoir pressure drop at 1.15 bar/mnth.

**AROUND X65**

Dramatic reservoir pressure drop in last 1.5 years (around 50% of overall drop through the field history) due to production increase. NFA forecasts reservoir pressure drop at 0.23 bar/mnth.

MRT results highlighting the urgency to increase injection
Results: well interference

1. Well interference tends to be higher in N-S direction

2. Well X72 has no impact on producing area during the tested time

3. Some wells are closely connected, stealing production from each other

4. High and fast producer-producer pressure impact points to NOT converting producers to new injectors
RESULTING IN:

1. Finding high watercut wells with fast connection with good oil producers and redistribute liquid production to increase oil cut (wells 255 and 459)

2. Understanding individual injector’s performance

IN 3 SCENARIOS:

1. No further activity
2. 302 injection increase
3. Reducing production of 255 and 302 injection increase
Thank you!

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