Bakken Operator Reduces
Water Injection by 76%

HALITE INHIBITOR USED WITH FRESH WATER TO PREVENT
SALT BRIDGING AND LOWER WATER COST

OVERVIEW

High salinity brines are a common problem in the Williston Basin. As these brines are produced from the reservoir, super saturation and downhole evaporative effects cause sodium chloride salt to precipitate into a hard deposit known as halite. This precipitated salt can deposit downhole, in pipelines, or in surface equipment which can restrict, limit or prevent production. Operators have only a few options in dealing with salt precipitation:

- Control the system pressure and temperature to keep the produced water under saturation with respect to halite formation. This proves to be difficult to maintain and operationally not reliable
- Inject fresh water in order to dilute the salt to control saturation. Fresh water is a valuable resource, estimated at $3 – $5/bbl in the Williston Basin. Reduces production rates by 10 – 20%. Batch treatment dissolves already formed downhole halite deposits over a limited period of time causing fluctuating production rates
- Use halite inhibitors with fresh water to keep salt in solution. Can allow for a reduction in total fresh water use. Fresh water reduction savings pay for inhibitor product

CHALLENGE

Multi-Chem worked with a Bakken operator to address a severe salt deposition issue. After relying on high volume fresh water continuous treatments to maintain normal production, a patented halite control product, MX 2-3875, was introduced to control salt precipitation and reduce the required fresh water volumes.

The active ingredient in MX 2-3875 halite inhibitor, through the mechanism of nucleate crystal threshold inhibition, adsorbs into salt nucleate crystalline faces and edges, preventing precipitation into a hard scale. Proprietary salt saturation indices were used to both optimize fresh water reduction volumes and halite inhibitor dosages.

SOLUTION

Through the addition of Multi-Chem’s MX 2-3875 halite inhibitor, salt precipitation was halted and the required amount of fresh water was reduced over time by 76%. The
optimization process reduced fresh water injection by 65 barrels per day, with plans to optimize further. This resulted in a demonstrated savings of $74,000 per annum per well with a return on investment (ROI) of 111%. The ROI did not take into account increased production rate benefits.

**BENEFITS**

Multi-Chem has the expertise to optimize chemical treatment programs to the exact combination of water and halite control product needed for a particular well and reservoir formation. This solution delivered the following benefits:

- Easy-to-apply technology
- Optimized field operations, treatment programs and well performance
- Documented results based on actual field performance

**Water Usage Over Time**

<table>
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<th>Base Line</th>
<th>Initial</th>
<th>2 Wks</th>
<th>4 Wks</th>
<th>6 Wks</th>
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<tr>
<td>Fresh Water BBLS/D</td>
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<td>85</td>
<td>60</td>
<td>40</td>
<td>20</td>
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<tr>
<td>MX 2-3875 Gpd</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
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</tbody>
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Graph shows dramatic reduction of fresh water required for injections when combined with patented MX 2-3875 halite inhibitor.