As mature wells suffer from declining reservoir pressure and increased liquid loading, they typically will not flow without the injection of a foaming agent. An operator of a mature gas field was previously applying foamer to 200 pressure-depleted sweet gas wells spread across a wide geographic area to unload liquids and maximize gas production. The incumbent chemical was an inefficient, low performing well foamer, which caused the operator to incur high injection rates, high treatment costs and high frequency well top-up.

Multi-Chem was invited to create a more effective and cost-competitive foamer for this particularly challenging environment, with the following stringent requirements.

- Remain stable when flowing or static for a period of 28 days, without causing blockages in the capillary string, at downhole temperatures up to 180°C and well depths of 10,000 ft.
- Formulate with a suitable preservative/biostat to ensure no bacteria growth in warehouse or wellsite storage tanks
- Capstring approved
- Minimum NAS Class 8 specification

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while the foamer consumption was reduced by 39%. The success of the trial led the operator to apply the new foamer across the entire field, yielding an overall chemical spend savings of $1.67 million per year.

<table>
<thead>
<tr>
<th>Well</th>
<th>Gas Production Increase from Baseline (%)</th>
<th>Foamer Injection Rate Change from Baseline (L/Day)</th>
<th>Foamer Injection Rate Change from Baseline (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>-78</td>
<td>-52</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>-30</td>
<td>-35</td>
</tr>
<tr>
<td>C</td>
<td>14</td>
<td>-46</td>
<td>-46</td>
</tr>
<tr>
<td>D</td>
<td>5</td>
<td>-50</td>
<td>-59</td>
</tr>
<tr>
<td>E</td>
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<tr>
<td>F</td>
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<td>-47</td>
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<tr>
<td>G</td>
<td>15</td>
<td>-25</td>
<td>-31</td>
</tr>
<tr>
<td>H</td>
<td>18</td>
<td>-6</td>
<td>-8</td>
</tr>
<tr>
<td><strong>Total (Avg.)</strong></td>
<td><strong>(15)</strong></td>
<td><strong>-322</strong></td>
<td><strong>(-39)</strong></td>
</tr>
</tbody>
</table>

Gas production increase and foamer injection rate optimization during field trial of representative wells.