A New Environmentally – and Equipment-Friendly Blend for Well Stimulation, Matrix Acidizing and Acid Fracturing

Presented by Kyle Taylor
101st Earthborn Environmental Technologies, LP
Presentation Overview

• Hydrochloric Acid (HCL) History and Use in the Oil and Gas Industry
• Safety and Health Concerns of HCL
• Environmental Impacts
• Equipment Degradation
• UltraSeries HCL Replacement
• UltraSeries – How it works
• In-Lab Testing Results
• In-Field Testing Results
HCL has been used in the oil and gas industry for formation stimulation in carbonate formations – to increase the rate that the formation will deliver hydrocarbons.

Earliest Acid Treatment dates as far back as 1895 – Lima, OH
Hydrochloric Acid Uses in Today’s O&G Industry

- Well Stimulation
- Matrix Acidizing
- Acid Fracturing
- Hydraulic Fracturing Techniques
- Lateral Jetting
- Wellbore Clean Up
Corrosive Effect Can Cause Damage To:

- Human Tissue
- Respiratory Organs
- Eyes
- Skin
- Intestinal
HCL = Toxic Substance

The U.S. EPA rates and regulates HCL as a toxic substance!
Environmental Effects – HCL has a highly acute toxic effect on all life forms.

Fresh Water Contamination

Hydrogen Chloride (gas by-product) carried into the air forms a component of ACID RAIN

Photo-Chemical fog
Corrosive effects on Equipment
Break down (corrosion) of materials including seals, pumps, tanks, hoses, pipes and equipment
Earthborn Clean
UltraSeries
Oil & Gas Specialty Fluids

• UltraFrack™
• UltraMatrix
• UltraComplete
Earthborn Clean
UltraSeries (HCL Replacement)
Oil & Gas Specialty Fluids

• Safe
• Biodegradable
• Non-Toxic
• Earth Friendly
• Non-Flammable
• Non-Corrosive
• Effective
UltraSeries Solutions incorporate surface tension relievers and buffers that dissolve the material into a molecular level. Once broken down they become suspended in the solution.

- pH of UltraSeries is less than 1
- Not an acid – Safe Organic Acid
UltraSeries
In-Lab Testing

• Rheological Testing
• Beaker Test
• Core Flood Testing
• Frack Fluid Compatibility Test (Ongoing)
• Conductivity Cell Testing (Ongoing)

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In-Lab Testing
Shearing – Viscosity Test – UltraFrack™ Fluid

Graph showing the relationship between Viscosity (cP) and Shear Rate (s⁻¹) for different temperatures and pressures.
In Lab Testing

Beaker Test

Schematic picture of the beaker test setup

Calcium concentration versus time for UltraFrack™ and 15% HCl reacting with limestone rock samples
Core-Flooding Setup
In Lab Testing

Schematic picture of the core-flooding setup.
In-Lab Testing

Core Flood Testing

Pressure Drop Vs. Time in minutes

Pressure drop vs. time during core-flooding with 15% HCl and UltraFrack™ at 25 °C.
Cores pics of HCL used in core-flood Testing

Core pics. Of UltraFrack used in core-flood Testing

<table>
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<tr>
<th>Fluid</th>
<th>k (before), mD</th>
<th>K (after), mD</th>
<th>k ratio</th>
<th>P (max), PSI</th>
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<tr>
<td>UltraFrack</td>
<td>.39</td>
<td>32.25</td>
<td>82.69231</td>
<td>848</td>
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<tr>
<td>15% HCL</td>
<td>.46</td>
<td>32.25</td>
<td>70.1087</td>
<td>911</td>
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UltraSeries Summary

In-Lab Results

• Core-floods using HCl and UltraSeries were performed at 25 °C. The results showed higher permeability for the core that was treated with UltraSeries compared to the core that was treated using HCl.

• Rheology tests: A shear-thinning behavior was observed for UltraSeries.

• Beaker tests: UltraSeries dissolves the same mass and volumes of limestone rock samples with slower reaction rates and leaves fewer residues compared to HCl. UltraSeries products stay effective for much longer than HCl.
Longevity of UltraSeries makes it more favorable for long or multi-stage fractures.

Slower reaction reduces formation damage.

More efficient break through creates more permeability in carbonate formations.
Further Testing
In-Lab

• Conductivity Cell Testing – Acid Fracking
• Fluid-Loss Testing
• More core-flood testing
• Hydraulic Fracturing Models
August 14, 2012 – Morris, OK - First application of UltraSeries (Backside Treatment) – Initial increase in production from <.25 bopd to 2.75 bopd
Ellis County Kansas – Backside Treatment

550 Gallon Backside Treatment Near Munjor, KS, Ellis County

Increase in production from 10 BOPD to 42 BOPD
UltraSeries In Lateral Jetting

Lateral Jetting Procedures were done on well in Sheridan Co. KS and Rice Co. KS. Successful completion with 300% and 400% production increase respectively!
"Our main focus and goal is to replace toxic chemicals (such as HCL and H2SO4) with an aggressive, safe, non-toxic and earth friendly version that will outperform the toxic versions. There are many additional benefits that enhance productivity for the customer and/or applicator”

Daniel Ackwith, CEO of 101st Earthborn Environmental Technologies, LP.
Acknowledgements

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