Wettability alteration for improved oil recovery

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Current Oil Market

Drilling Paradigm

Conventional fields production is declining

Few new discoveries

Industry heavily focused on drilling in prolific shale plays

- Majority of drilling is in “sweet spots” that account for ~12% of acreage

- Most “sweet spots” will be fully utilized in mid 2020’s

CHALLENGES

- CONVENTIONAL:
  - DECLINING WITH AGE
  - FEW NEW DISCOVERIES

- SHALE:
  - LOWER YIELD: 5-8% OOIP
  - HIGHER DECLINE RATES: 10-15%
  - HIGH WATER PRODUCTION: UP TO 2:1
  - HIGH CAPITAL EXPENDITURE

“We know exactly where it is, we have wells drilled to it, and we know how to get the next 20 percent. Cost is the big issue.” —Russell Ostermann, Director of Petroleum, The University of Kansas.
A simple example

Which water would you use?
Would you rather

Water Source
Oil Production

Which water would you use?
The solution is wettability through salinity

Reservoir wettability is the adhesion of oil to rock

The best oil recovery is at neutral wettability

Changing salinity will alter wettability in many reservoirs
Case 1

Change in Sor: .18 units
Estimated increased production: up to 8% OOIP

Case 2

Change in Sor = .25
Estimated increased production: up to 12% OOIP

Increased production is dependent on heterogeneity, well spacing, porosity, original saturation, temp and pressure.
Increased production is dependent on heterogeneity, well spacing, porosity, original saturation, temp and pressure.

**Case 3**

Change in Sor = 0.22
Estimated increased production: up to 10% OOIP

**Case 4**

Change in Sor = 0
Estimated increased production: 0% OOIP
What ESaI™ can do for you

Improve oil recovery:
- 2-4% OOIP shale
- 5-15% OOIP conventional

Lower water production

Low CAPEX
Reduce Payback Period
ESal™ Technical Work Flow

Stage I
Screening
- Determine potential of properties for wettability alteration

Stage II
Laboratory
- Confirm screening results
- Quantify wettability in the lab
- Determine optimal salinity

Stage III
Deployment
- Water Resources Evaluation
- Design injection water chemistry
- Generate water source or water treatment specifications
- Support and Quality Control
Analytical Screening Tool
Water, oil, rock and field parameters = score.

<table>
<thead>
<tr>
<th>Quality</th>
<th>Score Range</th>
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<tbody>
<tr>
<td>Excellent</td>
<td>92-100</td>
</tr>
<tr>
<td>Good</td>
<td>78-91</td>
</tr>
<tr>
<td>Average</td>
<td>60-77</td>
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<td>50-59</td>
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<tr>
<td>Not recommended</td>
<td>&lt;50</td>
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We give you various options to match your cost constraints and logistics for your maximum benefit.
About our company

- FAMILY OWNED AND OPERATED
- REVENUE > $1 MILLION IN 2019
  - CONSISTENT 200%+ GROWTH OVER LAST 3 YEARS
- ZERO DEBT
- ALL WORK PROCESSES PATENTED OR PROTECTED
Currently developing full-service software solution

The future of engineered salinity

- Characterize full range of reservoirs
- Provide scoring for wettability alteration
- Provide the ideal water to attain neutral wettability
- Provide full range of solutions coupled with economic forecasts
What we want to continue growth

- Additional partners to continue technology validation
- Capital partners to increase market size and adoption