

## Case Study 4: Similarity Index (SI) Correlates to Oil Production Rates

**Challenge:** Operator wanted to understand the impact of well communication on oil production in order to optimize stacking, spacing, and completion designs.

### Geochemical Tools:

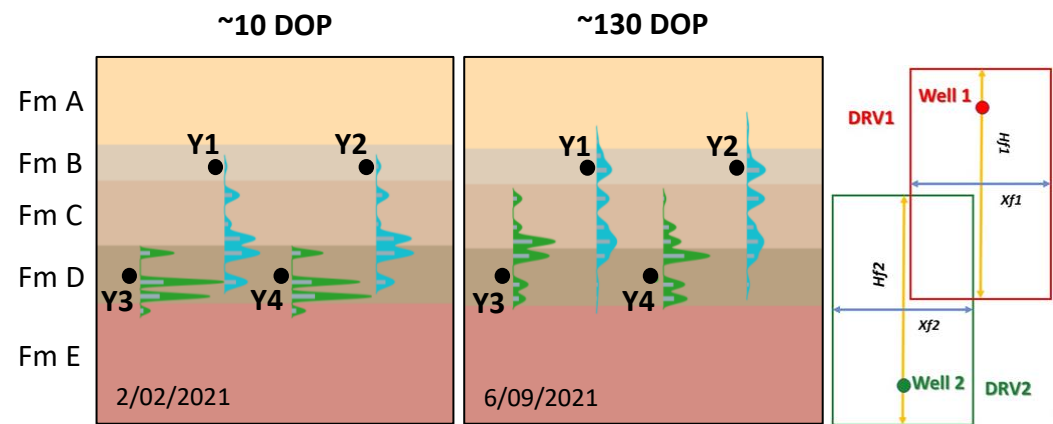
- Similarity Index (SI): compares similarity of oil samples to identify potential inter well communication of neighboring wells
- Production Allocation (PA): quantitatively identifies rock intervals contributing to production

### Process:

- 1) Cuttings from one vertical well and produced oils from 9 horizontal wells over ~20 months were collected
- 2) Geochemical fingerprint of oil extracted from the cuttings, and produced oils, were collected
- 3) Similarity Index (SI) was calculated between each well pair as an indicator for well communication and/or overlapped DRV; a regression model was also built to allocate the produced oil back to its producing zone and calculate drainage height

### Similarity Index (SI) and Well Performance Results

- **25-50% drainage change** (moved shallower) was observed in all four wells during the first four months of production.
- **Higher SI values correlated with lower production rates**, indicating significantly overlapped DRV and/or well communication could impair well performance.
- The data also showed **significant variation of lateral communication through time** which was strongest about a month into production and then reduced through time.
- **Pressure data also supported these observations**, providing critical evidence for optimizing the stacking & spacing, and completion designs of future development.



Correlation between SI Lateral (SIL) and Well Performance

