

Integrated Tracers & Geochemistry Package

SRV Refinement, Completion Sizing & Compartment Fingerprinting

Tracers

Cross well communication, stage specific information, completion monitoring for optimization, identification of structural/stratigraphic fabric that interferes with completion design

TLG (Time Lapse Geochemistry)

Averaged, cumulative production signal on vertical drainage height, zone/source specific drainage, short/long term communication between wells, completion monitoring for optimization averaged on well.

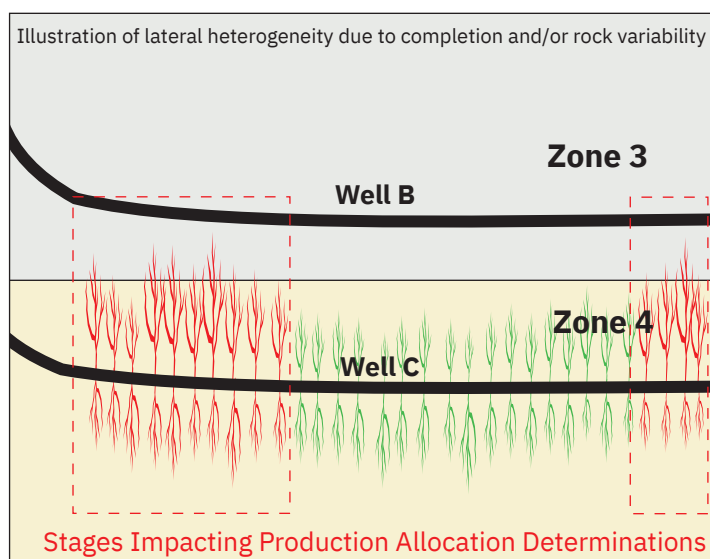
Tracers yield insight into stage-level fracture communication, which impacts allocation at the well level.

Benefits of an Integrated Package

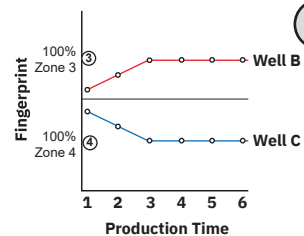
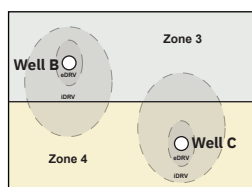
- Evaluates flowback, fracture communication, and impact on drainage in one cost-effective package.
- Sample acquisition costs are lowered substantially since samples can be utilized for both tracers and geochemical fingerprinting.
- Determines if initial fracture communication to offset formation has impact on drainage by looking at oil fingerprint through time.
- Ensures avoidance of erroneous spacing/stacking assumptions which rely only on a single dataset.
- Allows greater confidence in spacing/stacking decisions for development.
- Allows for cross-discipline collaboration between G&G, reservoir, & completions teams.

Geochemical Fingerprinting yields insight into bulk, vertical communication through time & spacing development.

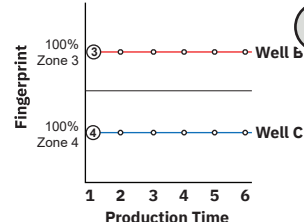
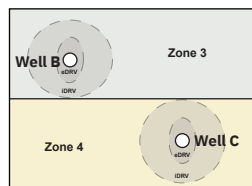
Example: Trace 'Well C' - Observe 'Well B'



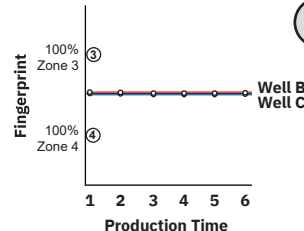
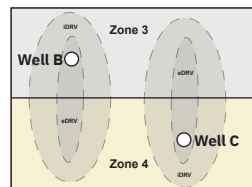
- ① & ② If only using tracers, no production samples – the operator might assume spacing too close, erroneously
- ③ If only using tracers, no production samples – the operator might assume spacing/job is ok, erroneously



1 Initial connection occurs in heel & toe as shown in tracers and produced oil. Over time fractures close and/or volume from zone 3 is minor over time.



2 Tracer communication occurs in heel & toe, but this is not material on production.



3 Significant drainage volume overlap. Current spacing design OR completion design is a problem.

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