

Reservoir Revitalization: Key Questions to Address

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Abstract

This presentation presents a framework for further analysis and discussion of the best approaches for revitalizing reservoirs. With the recent surge in new techniques and technology, as well as new plays put into production, a tremendous opportunity exists in both U.S. and international reservoirs to apply lessons learned to existing reservoirs in order to economically increase production and recoverable reserves.

Identifying Good Candidates

The first step is to identify good candidates for reservoir revitalization. Not only is it necessary to have re-coverable reserves, doing so must be economic. Now that the price of new technologies has begun to normalize, revitalization projects that may not have been considered viable or economic can now make sense.

- Mature Fields
- Shale plays with steep decline rates in the laterals

Refracturing

- Understimulated potential between laterals
- Horizontals: drilled but not completed

Bringing together teams: Geology, engineering, petro-physics and geophysics matter. While it's common to use multi-disciplinary teams for exploratory efforts, revitalization of mature fields has often left to reservoir engineers. In order to make the most of a reservoir, it's important to pull in the entire team, and also to see which new technologies can be adapted for use in reservoir optimization.

Question 1: What do we do about reservoirs that have lost their drive? How can geologists and geo-physicists contribute?

- Mature fields: types of flooding to restore pressure
- CO2 floods
- Waterfloods: how / why geology matters
- Shale Plays:
 - Do they decline because they have lost their drive?
 - Precisely why do shale reservoirs decline?
 - What we do we know about fractures, proppants, interference?

- If they have lost pressure / drive, what are the implications?

Question 2: What are the best ways to recover oil within an old field?

- Infill drilling: where and why do we drill?
- Depositional environment / understanding the geology
- Geochemistry: what can it tell us?
- Geomechanics: Drive / migration pathways
- Structure: Faults / fracture networks
- Horizontal drilling: where? when?
- Examples of horizontal drilling in a "conventional" play
- What are some of the key hazards?
- water?
- heterogeneity?
- formation damage?
- drive / low pressure?
- Synchronous information gathering:

What do I need? When does it help?

- Smart Drilling / Geosteering
- Mudlogging?
- XRF?
- XRT?
- Logging While Drilling: what is the state of the art right now?

Question 3: I've drilled but not completed a horizontal well. I wanted to get a better price on my completion. Is that all I need to think about?

- Completing horizontals:
- Geological vs. Geometrical fracs
- Selecting proppants
- Developing a reservoir model using logs, geochemistry, geology

Question 4: What is the information I need to revitalize a reservoir? How do I develop workflows and put together teams?

- Solutions on a shoestring budget
- Larger fields / moderate budgets
- "If we could have it all" budgets / workflows