Assessing Reservoir Performance in Water-Alternating-Gas Flood & Fluid Disposal

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Production/Injection Performance in MWAG

(after Laochamroonvorapongse et al. JPSE (2014) 18-30)
Connectivity Maps During Water & CO₂ Injection Cycle

Water Cycle

(after Laochamroonvorapongse et al. JPSE (2014) 18-30)
Flow Profiles Help Understand I02 Injector Performance

(after Laochamroonvorapongse et al. JPSE (2014) 18-30)
Spikes Suggest Flow Impediments in Alternating Cycles in I02

(after Laochamroonvorapongse et al. JPSE (2014) 18-30)
Induced Seismicity in Class-II Disposal Wells

{after EPA: Minimizing and Managing Potential Impacts of Injection-induced Seismicity From Class II Disposal Wells: Practical Approaches (Feb. 6. 2015)}
Trigger Point Limits Water & CO$_2$ Disposal

Fig. 6. Departure point identification in the modified-Hall plot; (a) waste-water disposal and (b) CO$_2$ injection.

Fig. 10. Histograms of percent pore-volume injection for waste-water disposal (a) and CO$_2$ injection (b).

(after Phan et al. JPSE 170 (2018) 197-205)
Discussion Items

1. How Does Uncertainty in Alternating Fluid Injection Help Assess Sequestration Potential?

2. Do We Have Much Room for Significant CO$_2$ Sequestration in a Mature Flood? Should We Use Water Cut as a Metric &/or Any Other?

3. What Steps do we Follow to Assess Injection Performance to Minimize Seismic Events?
Discussion Items

1. How Does Uncertainty in Alternating Fluid Injection Help Assess Sequestration Potential?
   - Awfully complicated because fluids do not follow each other's trail
   - Reservoir heterogeneity 'elephant in the room'

2. Do We Have Much Room for Significant CO\(_2\) Sequestration in a Mature Flood? Should We Use Water Cut as a Metric &/or Any Other?
   - Yes, high water cut implies low compressibility system; reservoirs in primary depletion offer better potential
   - Of course, depleted gas reservoirs offer best opportunity!

3. What Steps do we Follow to Assess Injection Performance to Minimize Seismic Events?
   - Real-time surveillance
   - Modified Hall plot (SPE-127563-PA)

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Fig. 17. EOR-efficiency-measure plots for individual well performance assessment.

(SPE-127563-PA)