Aqueous- & Vapor-Phase Studies at the SWP Farnsworth Unit





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SWP MVA Program

The SWP Farnsworth Unit MVA program is designed to provide the data needed to characterize injected CO₂ and existing reservoir fluids, including volumes of CO₂ injected, produced, recycled and ultimately stored; fluid migration; and identification and quantification of any potential release of CO₂ and/or fluids from the reservoir. Identification and quantification of fluid migration and any potential leakage is being addressed by several methods, including seismic and fluid compositional analysis, but it is the SWP tracer program that yields the highest accuracy results.

Tracers

SWP Utilization of Tracers...

• Primary

- Determine fluid-flow patterns
- Determine fluid travel time between wells

Cumulative tracer recovery from production wells surrounding separate injections at the #13-3 well (right: PECH vapor-phase tracer, left: 2-NS aqueous-phase tracer. Disparate tracer recovery, depending on phase, illustrates complex reservoir and fluid dynamics at the FWU. Such results are likely exacerbated by the intersecting faults to the south and west of the #13-3 injection well (see map below).

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- Identify any fast pathways or barriers between wells
- Constrain and calibrate flow models
- Detect and quantify CO₂/brine leakage

Secondary

- Attempt to determine CO₂/oil saturation levels
- CO₂ storage capacity
- Attempt to determine sweep efficiency
- Confirm other verification methods (e.g. seismic)

The SWP is using the perfluorocarbon compounds (PFT) to track the injected CO₂ and the naphthalene sulfonates compounds (NPT) to track the injected water (Tables below). All of the tracers utilized at the Farnsworth Unit are considered conservative (non-reactive) and each is significantly detectable to the sub-parts per billion level, allowing for high-resolution inter-well testing with minimal tracer volumes.

NETL-Pittsburgh is assisting with the vapor-phase tracers and Peter Rose (EGI, University of Utah) is assisting with the aqueous-phase tracers:



