SHARMA ISOTOPE LAB

Stable Isotope Characterization of Produced Fluids at MSEEL

What we propose to measure:

- $\delta^{18}O$ and δD of water
- $\delta^{13}C$ of dissolved inorganic carbon (DIC)
- $\delta^{18}O$ and $\delta^{34}S$ of dissolved sulphate (SO_4)
- Geochemistry and Microbiology data from collaborators

Research questions we seek to answer:

- What are the primary controls on evolution of produced water chemistry?
- What are the possible water-rock-microbial interactions in shale as a result of injection of fracturing fluids ?
  - ✓ *Well longevity/productivity*
  - ✓ *Well infrastructure and souring*
  - ✓ *In situ production of organic pollutants*
- Can we verify water-rock reactions from laboratory to field scale?
- Are there any changes in hydrologic connections associated with hydraulic fracturing?

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Our sample requirement:

- Freshwater used for fracturing (1.5L)
- Hydraulic fracturing fluid (8L for experiments)
- Flowback 0-14 days: collect 14 samples daily AFTER separator with minimal exposure to atmosphere and no filtration (1.5L)
- Flowback 15-90 days: collect 6 samples every 2 weeks AFTER separator with minimal exposure to atmosphere and no filtration (1.5L & sampling frequency can be coordinated with other groups)
- Produced fluids > 90 days: collect samples every 2-3 months AFTER separator with minimal exposure to atmosphere and no filtration (1.5L & sampling frequency can be coordinated with other groups)