

HALLIBURTON

What to Expect or Not

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Potential Sources of Constituents

- Native reservoir fluid
- Fracturing fluid
- Raw water

Downhole (InSitu) Conditions

- High temperature/high pressure
- Reducing conditions
- Low pH/oxidizing agents in frac systems

Salts

- Shales trending upward >300,000 mg/l TDS over other formations
- Much is naturally occurring in formation
- Makes flowback/produced water recycling possible

Organics

- Low levels (ppb/ppm) hydrocarbons
- Undetermined source - native formation fluid or frac fluid or raw water or some combination

Metals

- Metals most easily solubilized by downhole conditions
- Much is naturally occurring from the formation – raw water can contribute

Others

- Sulfides/Sulfates
- Carbonates/Bicarbonates
- Biocides/pesticides
- NORM

Data Comments

- Statically speaking – small amounts of data
- Needs to be paired with data from all potential sources to properly evaluate
- More work needs to be done