Assessment of Using Reject Concentrate Streams from Brackish Groundwater Desalination Plants in the Eagle Ford Region as Hydraulic Fracturing Fluid

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BACKGROUND

Water is a key factor in the development of the oil and gas industry in Texas. Recent estimates predict in the next 15 years ~30,000 wells will be drilled for hydraulic fracturing in the Eagle Ford Shale. Since each well requires 3-7 million gallons of water (Jester et al., 2011), there is significant concern about fresh water consumption, which in turn has stimulated interest in use of non-potable water supplies for hydraulic fracturing.

Brackish groundwater desalination is becoming an important “drought resistant” source of fresh water in Texas, especially in coastal areas where fresh groundwater availability is limited (Arroyo, 2011).

The apparent conflict between hydraulic fracturing and water-deprived communities can potentially be mitigated by using the byproduct concentrate streams of brackish groundwater desalination as an alternative to fresh water as a hydraulic fracturing fluid (Burnett & Bateman, 2012).

PROJECT DESCRIPTION

The main goal of this study is to investigate use of brackish groundwater desalination concentrate as fracturing fluid:

- Characterization of concentrate stream from groundwater desalination plant.
- Characterization of hydraulic fracturing flow back water.
- Performing geochemical modeling analyses to assess down-hole scaling potential.

EXPECTED OUTCOMES

1. This project will help to forge productive collaboration between the oil and gas industry, the industrial water treatment industry, municipalities and academia in South Texas.
2. The project will also identify opportunities and obstacles for increasing use of brackish water resources for hydraulic fracturing operations.
3. Lessons learned can be applied to other brackish water sources, including cooling tower blow down from refineries and power stations.
4. Also, it is expected that the water characterization and subsequent geochemical modeling will complement ongoing frac water treatment research being performed by the Environmentally Friendly Drilling (EFD) program.
5. Finally, total water consumption is expected to grow in South Texas, so there is a promising market for beneficial use of desalination concentrate.

PRELIMINARY MODELLING RESULTS

Graphs of saturation index (SI) versus pH are shown for water compositions corresponding to fresh surface water and brackish groundwater RO concentrate (columns 1 and 3 above, respectively).

Graphs a-b show SI versus pH for dominant carbonate minerals without considering any equilibrium phases. The freshwater is theoretically below saturation at pH 7, but exceeds saturation at higher pH. The RO concentrate exceeds saturation at all pHs between 7 and 10.

Graphs c-d show SI versus pH for the same carbonate minerals, but assuming that calcite (CaCO3) can precipitate at SI > 0. These plots show that calcite is the controlling carbonate mineral phase.

REFERENCES


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