CASE HISTORY

Fracturing

Water Technologies Address Drought Conditions in the Mid-Con Region
Effective Chemistry and Laboratory Testing Enable Operators to Use Produced Water for Fracturing

CHALLENGE – Despite recent rains, large areas of the Mid-Con region including much of Oklahoma, New Mexico and Texas are still in the grips of severe drought (Figure 1). This has resulted in limited availability of fresh surface water for completion operations.

SOLUTION – To meet this challenge, Halliburton has developed chemistry and technology that enable using a broad range of both flowback and produced water for fracturing fluid instead of further taxing fresh water sources.

Whether the fracturing treatment requires simple friction reducers or complicated crosslinked gel systems, Halliburton can provide the expertise and lab testing procedures to develop a fracturing fluid optimized for the reservoir.

RESULT – Recently Halliburton completed six fracturing stages in 16.5 hr using the plug and perf method, setting a record for a major operator in the Mississippi Lime play. Utilizing a recently developed cationic friction reducer, 100% produced water was used as the base fluid. Now, 100% produced water is used on one-third of fracturing treatments in the area. Halliburton technology enables producing high performance fracturing fluids from virtually any produced water (Figure 2).

Thorough Laboratory Analysis and Customized Chemistry Are Required – In the past, fresh water was preferred because flowback water and produced water can vary greatly. In fact, flowback water can change hourly from the same well while produced water may change in different areas of the field. This makes it extremely difficult to optimize a fracturing fluid.

Also, residual compounds in the flowback water from the previous treatment may interact with the fracturing chemicals, minimizing performance.

Recent developments, however, have made brackish water a legitimate alternative. In addition to saving fresh water, the use of flowback and produced water can sometimes significantly reduce an operator’s total water costs for trucking, storage and disposal.

Figure 1—As of Feb 14, 2012, the drought conditions in much of Oklahoma, Texas and New Mexico were rated extreme. Halliburton technologies enable using a broad range of flowback and produced water rather than fresh water for fracturing fluid.

Figure 2—This graph shows that a fluid formulation containing produced water can be optimized to provide virtually the same viscosity performance of a fluid based on 100% fresh water. Without modification though, the blended water does not yield a viable fracturing fluid.
It’s important to note that due diligence in the lab is necessary to determine chemical concentrations required to optimize the fracturing fluid. Understanding the chemistry of the desired source water is critical and is gained through testing for friction and viscosity performance, scaling tendencies and bacteria control requirements.

Even mixed waters should be tested as these potentially may cause more scaling and bacteria issues than 100% brines or fresh water (Figure 3). In addition, brines have a widely varying scaling tendency with little correlation to dissolved solid (Figure 4). Halliburton scale inhibitors, such as Scalechek® agents, can be customized for the water to minimize downhole precipitation which may limit production.

Bacteria control is also extremely important as waters that are being re-used will require extra treatment to control bacteria counts. Halliburton laboratory testing to determine scaling tendencies, biocide dosages and chemical compatibility with all the components in the entire fluid system is absolutely essential.

For more information about how advanced water technology can help reduce your requirements for fresh water, contact your local Halliburton representative or email stimulation@Halliburton.com.

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