

# Flowback Case Study

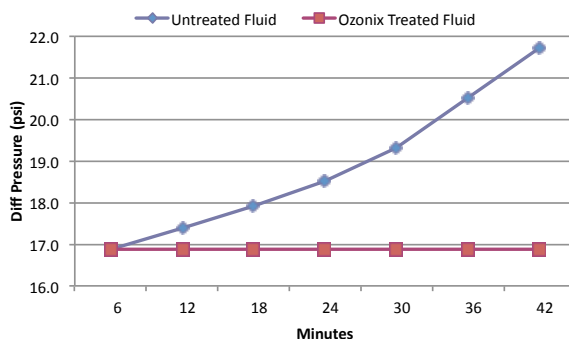
## Coil Tubing Flowback Treatment in Fayetteville Shale

## Successfully Treated Bacteria & DRO

The objective of this pilot study was to treat coil-tubing flowback fluid specifically for bacteria and diesel range organics. This fluid was particularly challenging because of very high organic concentrations and the use of lubricants in the coil-tubing process that remain in the fluid during flowback. The customer had traditionally disposed of this fluid but would prefer to reuse it once treated through the Ozonix® process.

FNES tested both the EF10 and EF20 Ozonix® treatment units with this fluid. Although the increased oxidation capacity of the EF20 system proved to increase the reaction rates, both systems successfully treated the fluid by reducing the DRO concentrations and eliminating the bacteria.

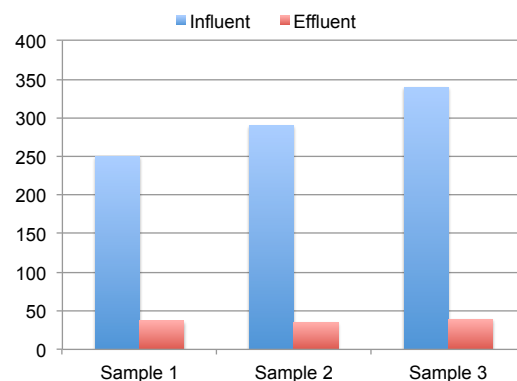
In addition to testing for bacteria and DRO, FNES also tested the scaling effects of the fluid both untreated and treated. Using the Dynamic Tube Blocking Test, which measures the physical deposition of scale, FNES demonstrated the treated fluid did not cause scale.



**Figure 3: Dynamic Tube Blocking Test Shows Scale Inhibition**

Sulfide	pH	TOC	Alk as CaCO3	Cl	SO4	Ba	Ca	Fe	Mg	K	Na	Sr	DRO
6.0	7.5	160	1,200	5,900	24	2.1	150	6	36	94	3,900	26	340

**Figure 4: Representative Influent Water Analytics of Coil-Tubing Flowback Fluid**



**Figure 1: Diesel Range Organics (DRO) Results in mg/l**

APB Influent	APB Effluent	SRB Influent	SRB Effluent
1,100,000	-	1,100,000	-
1,100,000	93	460,000	-
1,100,000	230	1,100,000	-
23,000	-	240,000	-
9,300	93	460,000	-
9,300	360	240,000	-
1,500	430	43,000	-
43,000	-	460,000	-
2,300	-	460,000	-
3,800	93	460,000	-
9,300	93	1,100,000	4

**Figure 2: Bacteria Test Results Measured in MPN/mL**

## BACKGROUND

**DATE:**  
August 2010

**EQUIPMENT:**  
EcosFrac 10 BPM ("EF10") &  
EcosFrac 20 BPM  
("EF20") Ozonix® Units

**FORMATION:**  
Fayetteville Shale

**FLUID TYPE:**  
Coil Tubing Flowback

**VOLUME:**  
~1,000 barrels

**TREATMENT RATE:**  
~10 & 20 barrels per minute

**LABORATORY:**  
American Interplex Inc &  
Weatherford Labs

**TESTS & METHOD:**

- Sulfate Reducing Bacteria & Acid Producing Bacteria (SM9221C; Upper limits of 1.1 million MPN/mL)

- Diesel Range Organics (EPA 3510C, 8015C)

- Dynamic Tube Blocking Test