



# Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

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*John F. Husted, Chief*  
Ohio Department of Natural Resources  
Division of Mineral Resources Management  
2045 Morse Road, Building H-2  
Columbus, OH 43229  
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## ORDER BY THE CHIEF

**TO: D & L Energy, Inc.**  
**2761 Salt Springs Road**  
**Youngstown, Ohio 44509**

**Order No. : 2011-13**

**Date: March 16, 2011**

**RE: Permit No. 3127**  
**Well No. 1**  
**Lease: Northstar**  
**SWIW: 10**  
**County: Mahoning**  
**Township: Youngstown**

**SUBJECT: INCREASE IN MAXIMUM ALLOWABLE INJECTION PRESSURE**

The Chief of the Division of Mineral Resources Management ("Division") having given due consideration to the matter contained herein makes the following Findings and issues the following Orders pursuant to Sections 1509.22 (D) of the Ohio Revised Code and 1501:9-3-07 (D) (2) of the Ohio Administrative Code:

### FINDINGS:

- (1) On July 12, 2010, the Division granted permission to convert the Northstar #1 (Permit #3127) in Mahoning County to a saltwater injection well.
- (2) On March 14, 2011, D & L Energy, Inc. sent a laboratory analysis of the brine from the Northstar #1 injection well facility and requested the maximum allowable injection pressure be modified based on the analysis of the actual specific gravity of the injection fluid.

**ORDERS:**

- (1) Based on the actual specific gravity analysis submitted by **D & L Energy, Inc.** the maximum allowable injection pressure for the Northstar #1 (Permit #3127) shall be **2250 psi**.
- (2) **The specific gravity of the injection fluid shall be tested by the operator daily and tested by an independent laboratory at least once each quarter. Both daily and quarterly test results shall be submitted to the Division with the operator's annual report.**
- (3) **D & L Energy, Inc.** shall use prudent management practices to ensure the **specific gravity on the injection fluid is 1.1 or less**. If at any time the specific gravity of the injection fluid exceeds 1.1, **D & L Energy Inc.** shall immediately cease injection and contact the Division. If **D & L Energy, Inc.** does not lower the specific gravity of the injectate to 1.1 or below within 48 hours, this Order is hereby revoked and the maximum allowable injection pressures shall revert back to **1890 psi** for the Northstar #1. During the 48-hour period after the specific gravity is found to exceed 1.1, **D & L Energy, Inc.** may inject into the referenced well at the lower pressures as specified in this paragraph.
- (4) If this Order is revoked by virtue of the operator's failure to maintain an injectate specific gravity of 1.1 or less, the operator may at any time request that the maximum allowable injection pressures of this Order be reinstated after the Division verifies the specific gravity of the injection fluid has returned to 1.1 or less.

3-16-11

Issue Date

  
JOHN F. HUSTED, Chief

Division of Mineral Resources Management

Addressee will be afforded an informal hearing, if requested, pursuant to Section 1509.06 of the Ohio Revised Code. If an informal hearing is desired, contact John F. Husted, Chief, Division of Mineral Resources Management, at (614) 265-6893.

Addressee is hereby notified that this action is final and effective and may be appealed to the Oil and Gas Commission pursuant to Section 1509.36 of the Ohio Revised Code. The appeal must be in writing and must set forth the orders complained of and the grounds upon which the appeal is based. Such appeal must be filed with the Oil and Gas

Commission at the following address: Oil and Gas Commission, Linda Osterman, 2045 Morse Road, F-2, Columbus, Ohio 43229, within thirty (30) days after the receipt of this order.

In addition, notice of the filing of the appeal must be filed with John F. Husted; Chief of the Division of Mineral Resources Management, Building H-2, 2045 Morse Road, H-2, Columbus, Ohio 43229-6693, within three (3) days after the appeal is filed with the Oil and Gas Commission.

cc: Jeff Fry, UIC Manager  
Carl Roberts, Mineral Resources Inspector  
Surety File  
Well File  
Legal File

CERTIFIED MAIL NO. 91 7108 2133 3934 5938 2234



Kroff Well Services, Inc.  
2301 Duss Avenue, Building 1A, Suite 34  
Ambridge, PA 15003  
PH: 412-321-9800 FAX: 724-266-7120

## Technical Service Laboratory Report

Date: 11/05/2010

*Analyst:* C. Cavey

*Company:* Superior Well Services, Inc

Submitted By: Dave Kern  
Account Name: North Star Oilfield

*Date Requested:* May 05, 2011  
*Samples Received:* April 28, 2011

*Identification of Sample(s):* Frac Disposal Well Water (flowback/production)

*Project ID:* 489

*Statement of Problem:* To evaluate the quality of the Frac Disposal Well water and reduce pump pressure for downhole disposal

*Labwork Performed:* Water Analysis and Friction Loop Testing



Subject: North Star Oilfield (Frac Disposal Water)–Water Analysis

Date: 05/05/2011

### Background

A sample was submitted labeled Disposal Well Water. It was identified as a mixture of flowback and production water from the Marcellus shale region for disposal at North Star Oilfield's Youngstown, OH facility. This report is a compilation of water analysis and friction loop testing.

### Results

1. The Disposal Well water is a high chloride water that contains very high iron and has a slightly acidic pH. The calcium, barium and strontium content are extremely high. The remaining dissolved constituents are also extremely high in content. (see Table 2)
2. Based on the water analysis, the Disposal Well water is predominately production water with very little flowback water.
3. Friction Loop tests using 1.0gpt KR-DP0527 and 0.5gpt KR-DP0528 yielded a 57.0% reduction in friction and very quick inversion. (see Table 1)
4. KR-DP0528 eliminates the need for conditioning time and allows the KR-DP0527 to be added on-the-fly. (see Table 1 & Figure 1)

### Recommendations

1. Inject KR-DP0527 @ 1.0gpt and KR-DP0528 @ 0.5gpt to the suction side of the Injection pump for the disposal well. The treatment should increase flow by 50% to 100% at the same injection pressure.



### FR Loop Discussion

FR Loop tests were used to evaluate the potential of various agents to reduce pump pressure in the supplied Disposal Well water. Due to the ionic quality of the water KR-DP0527 was selected. KR-DP0527@1.0gpt was assessed with and without KR-DP0528, .

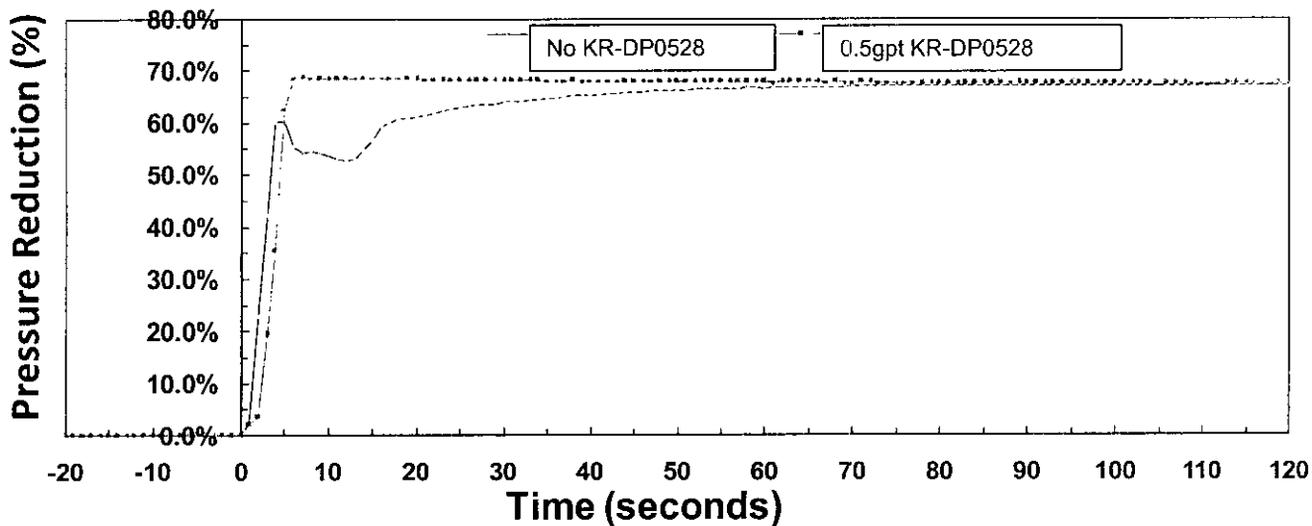
As observed in Table 1, KR-DP0527 was effective in improving pressure reduction in the Disposal Well water. As observed in Figure 1, rapid polymer activation only occurred with KR-DP0527 and KR-DP0528.

**Table 1.**

<b>Water Type</b>	<b>KR-DP0527(gpt)</b>	<b>% Pressure Reduction</b>
Disposal Well Water w/o KR-DP0528	1.0	51.8
Disposal Well Water w/ KR-DP0528	1.0	57.0

  
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Christopher L. Cavey

**Figure 1. Dynamic Polymer Activation Profile of KR-DP0527 @ 1.0gpt**





**Table 2. Water Analysis**

**Account Name: North Star Oilfield**

<b>ID #:</b>	<b>04/28/2011</b>		
<b>Sample ID:</b>	<b>Frac Disposal Well Water</b>		
<b>Sample Date:</b>	<b>04/28/2011</b>		
<b><u>Anions</u></b>			
P Alkalinity (mg/L as CaCO <sub>3</sub> )	0.0		
M Alkalinity (mg/L as CaCO <sub>3</sub> )	100		
Chloride (mg/L as Cl <sup>-</sup> )	158,000		
Sulfate (mg/L as SO <sub>4</sub> <sup>2-</sup> )	0.0		
<b><u>Cations</u></b>			
Sodium (mg/L as Na <sup>1+</sup> )	66,840		
Potassium (mg/L as K <sup>1+</sup> )	2,227		
Calcium (mg/L as Ca <sup>2+</sup> )	21,080		
Magnesium (mg/L as Mg <sup>2+</sup> )	1,473		
Barium (mg/L as Ba <sup>2+</sup> )	1,133		
Strontium(mg/L as Sr <sup>2+</sup> )	5,698		
Iron, Ferrous (mg/L as Fe)	54		
Iron, Total (mg/L as Fe)	144		
<b><u>Miscellaneous</u></b>			
pH	5.87		
Conductivity (micromhos)	291,800		
Osmotic Pressure (mOsm/Kg)	7,560		
Calc. Total Hardness (mg/L as CaCO <sub>3</sub> )	58,739		
Total Suspended Solids (mg/L)	180		
Specific Gravity (g/ml)	1.152		
Langelier Saturation Index (LSI)	0.64		
Langelier Potential	Mildly Scaling		

**Figure 2. Frac Disposal Well Water  
(Sample Date: 04/28/2011)**



ID#: 042811\_002

