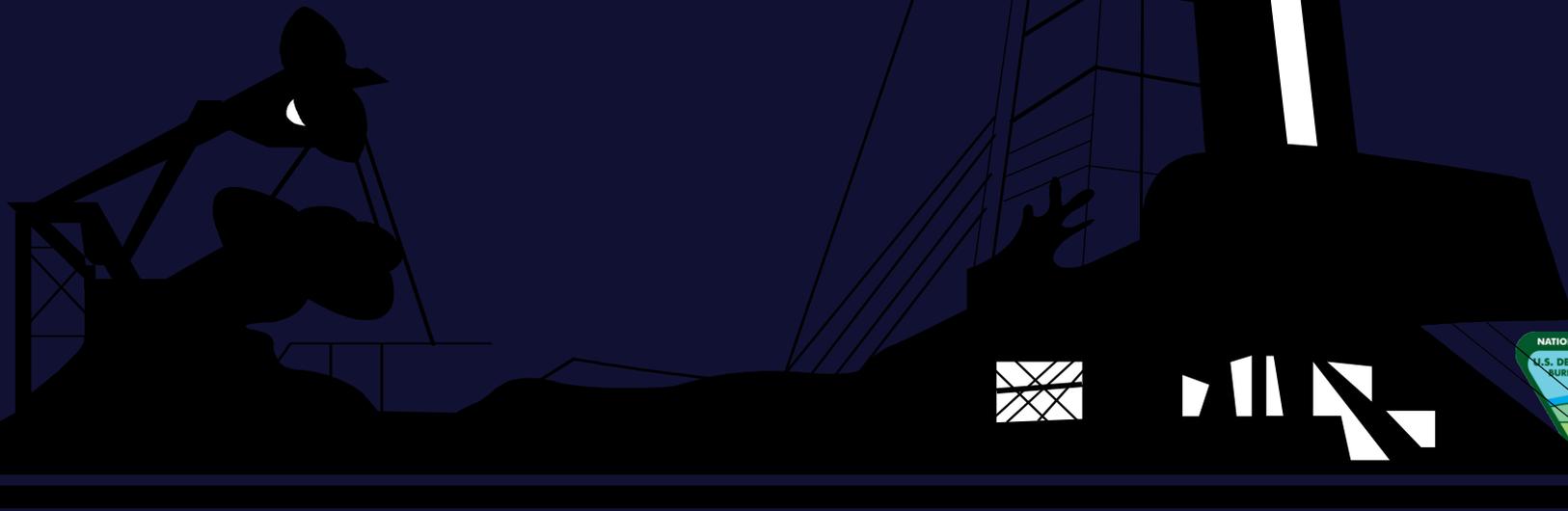


Hydraulic Fracturing

BLM Proposed Rule

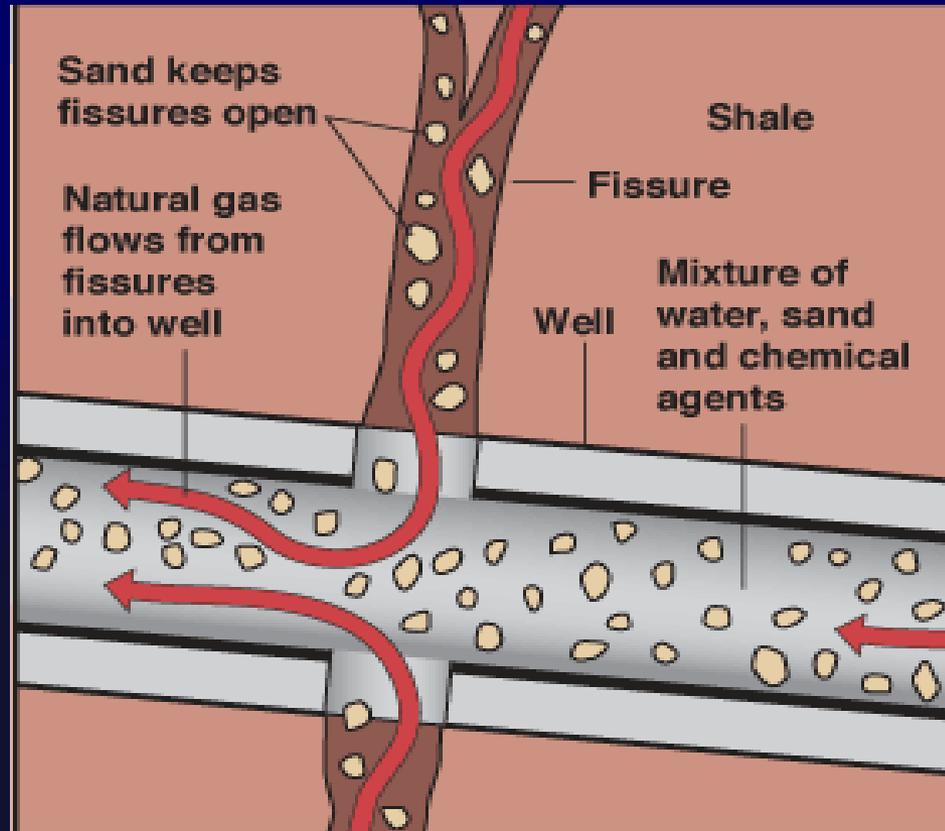
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Topics

- **What is Hydraulic Fracturing?**
- **Brief History of Hydraulic Fracturing**
- **Laws and Regulations**
- **Overview:**
 - BLM Proposed Hydraulic Fracturing Rule**

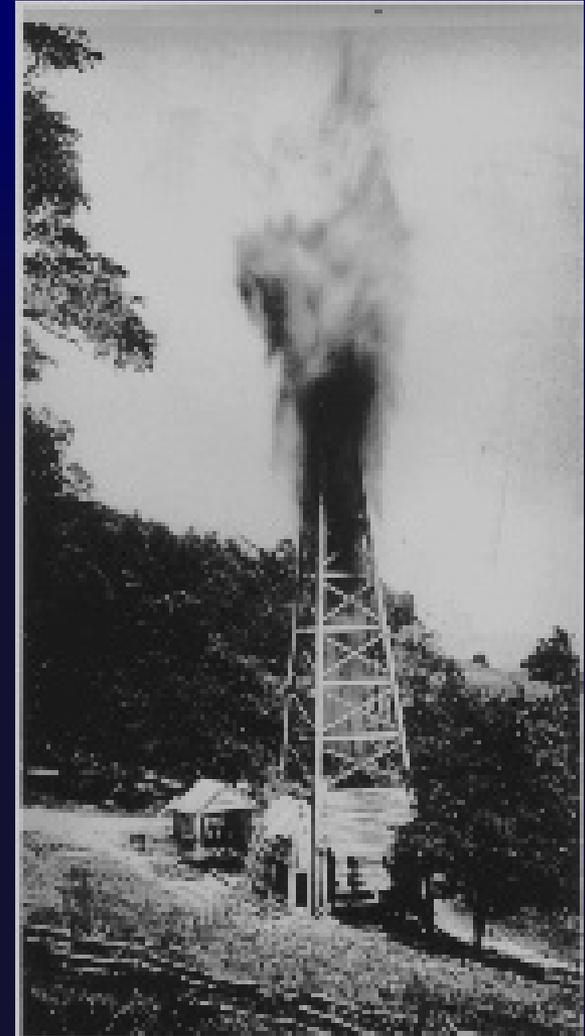
What is Hydraulic Fracturing?



- Fracturing fluids are injected at high pressure into the targeted formation, fractures the rock and creates fissures that are propped open which allow oil and gas to move freely into the wellbore.

History of Hydraulic Fracturing

- **Roots can be traced back to the 1860s:**
 - **Initially, black powder explosives were dropped down well bore and ignited**
 - **Nitroglycerin was later used, extremely dangerous**



History of Hydraulic Fracturing

- **1947**
 - **Stanolind Oil Company conducts first experimental fracturing in the Hugaton Field, Kansas, USA**
 - **Utilized 1000 gallons gelled gasoline (napalm)**
 - **Nearby river sand was used as proppant**
 - **Fractured a Limestone FM. at 2,400 ft. depth**





History of Hydraulic Fracturing

- **1949**
 - **First commercial hydraulic fracture treatment**
 - **Duncan, Oklahoma, USA**
- **Late 1980s/early 1990s**
 - **Horizontal drilling and hydraulic fracturing combined successfully**
 - **Barnett Shale – north Texas, USA**
- **Today**
 - **Over 2.5 million fractures worldwide**

Laws and Regulations

Federal hydraulic fracturing regulations:

43 CFR Section 3161 Jurisdiction and Responsibility

43 CFR 3161.1(a):

“All operations (including hydraulic fracturing operations) conducted on a Federal or Indian oil and gas lease are subject to the regulations in this part.”

Laws and Regulations

Continued:

- **Hydraulic Fracturing is recognized as a standard well completion practice.**
- **No prior approval required unless additional surface disturbance will occur.**

Laws and Regulations

Other statutes and regulations are in place to help ensure protection of the surface and subsurface environment:

- **Onshore Order #2 (Drilling Operations)**
 - **Provides for proper well casing and cementing techniques to prevent unwanted fluid migration**
- **The Federal Oil and Gas Royalty Management Act**
 - **Provides authority for BLM to inspect fracking operations**
- **Clean Air Act**
- **Clean Water Act**

Public Outreach for Hydraulic Fracturing

Several meetings were held throughout the country

Purpose of meetings:

- Explain hydraulic fracturing techniques
- Listen to public comments/concerns
- Discuss the draft proposed rule

Public Concerns

- Amount of surface disturbance involved
- Potential impacts to surface and groundwater quality
- Water consumption
- Wellbore integrity
- Public disclosure of chemicals used
- Who should regulate (federal or state government)



Why is a Hydraulic Fracturing Rule Necessary?

- 90 percent of all wells drilled on Federal and Indian lands use hydraulic fracturing**
- BLM's regulations are over 30 years old**
- The regulations do not address modern hydraulic fracturing methods and techniques**
- BLM needed to modernize and establish baseline environmental safeguards for hydraulic fracturing on all public and Indian lands**
- Public concern about the chemicals being used**

Major Environmental Concerns

- 1. Protect groundwater and surface water from contamination**
- 2. What kind of chemicals and additives are being used in the fracturing fluid**
- 3. Large volumes of water needed for hydraulic fracturing operations**
- 4. How and where to dispose fracturing fluid after it is used**

1. Protection of Groundwater and Surface Water from Contamination

Proposed Rule:

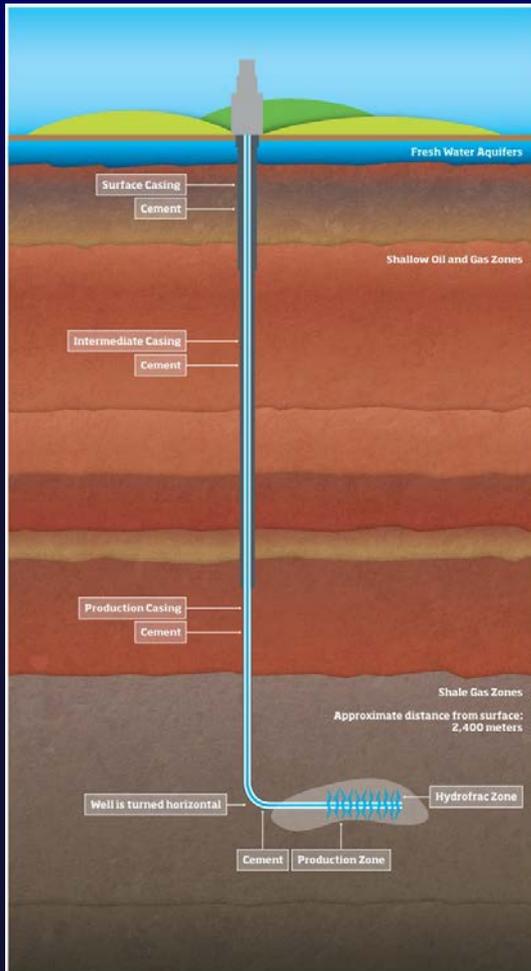
Requires protection of all “usable” water

- Up to 10,000 ppm of total dissolved solids**

Cement evaluation logs required on new wells

- Confirm that the casing string is properly cemented and usable water zones are isolated (prevent fluid migration from fracture zone to usable water horizons)**

1. Protection of Groundwater and Surface Water from Contamination (cont.)



Proposed Rule:

A well casing mechanical integrity test is required prior to well stimulation

– Ensure integrity of casing under anticipated maximum injection pressure

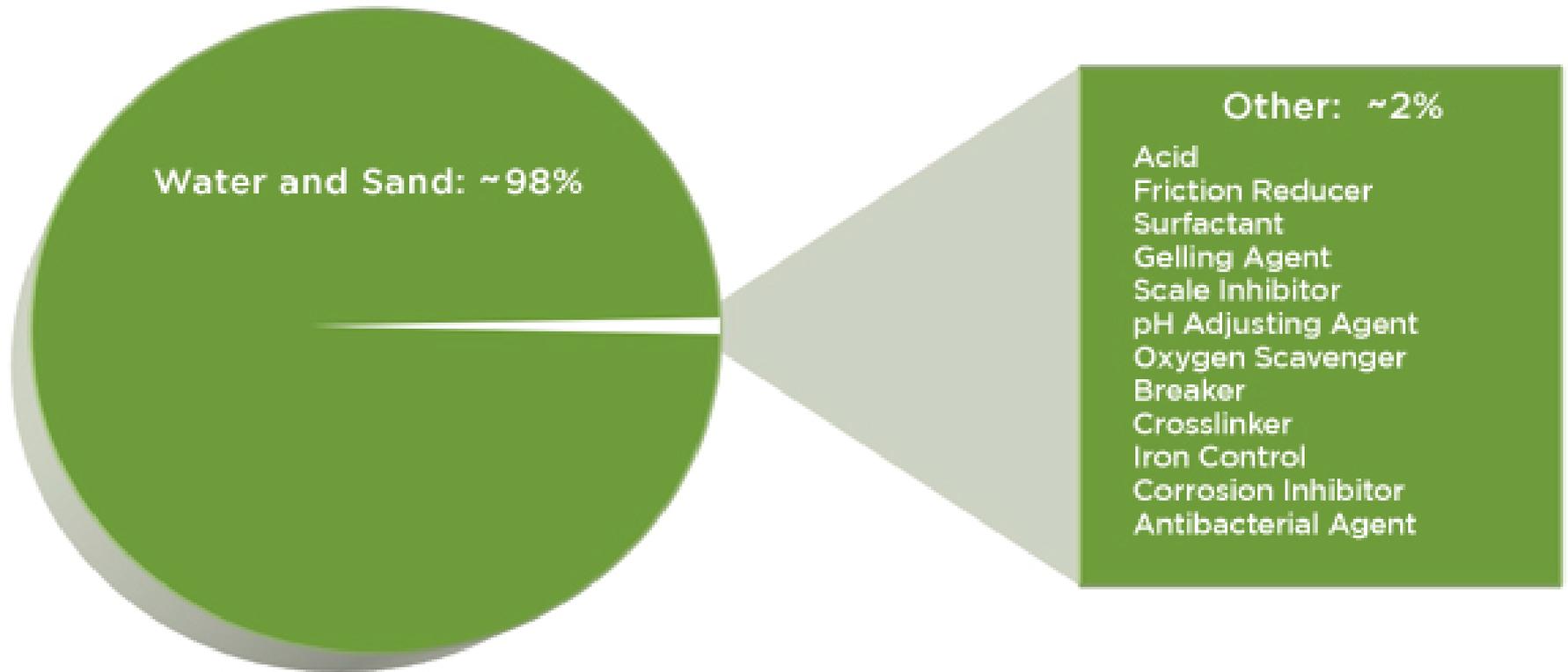
2. Disclosure of Chemicals and Other Additives used in the Fracturing Fluid

Proposed Rule:

Operator is required to identify the composition of the fracturing fluid

- Trade name and purpose of chemical used**
- Percent mass (volume) of each ingredient**
- Provides chemical trade secret protection**
- However, BLM maintains the right to acquire trade secret information, if necessary**

2. Disclosure of Chemicals and Additives in the Fracturing Fluid



2. Disclosure of Chemicals and Additives in the Fracturing Fluid

Product	Main Ingredient	Purpose	Other Common Uses
Water		Expand fracture and deliver sand.	Municipal, agricultural, manufacturing, etc.
Sand		Props the fractures open so that oil/gas can escape.	Drinking water filtration, play sand, concrete and brick mortar.
Acid	Hydrochloric acid or muriatic acid.	Helps dissolve minerals and initiate cracks in the rock.	Swimming pool chemical and cleaner.
Antibacterial agent	Glutaraldehyde	Eliminates bacteria in the water that produces corrosive by-products.	Disinfectant; Sterilizer for medical and dental equipment.
Breaker	Ammonium persulfate	Allows a delayed breakdown of the gel.	Used in hair coloring, as a disinfectant, and in the manufacture of common household plastics.
Corrosion inhibitor	N, n-dimethyl formamide	Prevents the corrosion of the steel pipe.	Used in pharmaceuticals, acrylic fibers and plastics.
Crosslinker	Borate salts	Maintains fluid viscosity as temperature increases.	Used in laundry detergents, hand soaps and cosmetics.

2. Disclosure of Chemicals and Additives in the Fracturing Fluid

Product	Main Ingredient	Purpose	Other Common Uses
Friction Reducer	Petroleum distillate	“Slicks” the water to minimize friction.	Used in cosmetics including hair, make-up, nail and skin products.
Gel	Guar gum or hydroxyethyl cellulose	Thickens the water in order to suspend the sand.	Thickener used in cosmetics, baked goods, ice cream, toothpaste, sauces and salad dressings.
Iron control	Citric acid	Prevents precipitation of iron oxides.	Food additive, food and beverages; lemon juice.
Clay stabilizer	Potassium chloride	Creates a brine carrier fluid.	Used in low-sodium table salt substitute, medicines and IV fluids.
pH adjusting agent	Sodium or potassium carbonate	Maintains the effectiveness of other components, such as crosslinkers.	Used in laundry detergents, soap, water softener and dishwasher detergents.
Scale inhibitor	Ethylene glycol	Prevents scale deposits in the pipe.	Used in household cleaners, de-icer, paints and caulk.
Surfactant	Isopropanol	Used to increase the viscosity of the fracture fluid.	Used in glass cleaner, multi-surface cleaners, antiperspirant, deodorants and hair color.

3. Water Consumption Concerns

Pre-fracture operation proposal must include the following information:

- Estimated total volume of water to be used**
- Estimated volume of frac fluid to be recovered during flow-back, swabbing, and production operations**
- Proposed method of disposing the recovered fluids**

3. Water Consumption Concerns

Post-fracture operations report must include the following information:

- Source of water used in the frac fluid**
- Actual volume of fluid used**
- Actual volume of fluid recovered during flow-back, swabbing, and production operations**
- Method used to dispose the recovered frac fluids**

Opportunities for a Variance from the Proposed Rule

- **Some states already have a fracking rule**
- **The Federal rule may allow the BLM to defer to the state's rule (a variance) if:**
- **The state rule meets or exceeds the requirements of the Federal rule**

The BLM draft fracking rule was issued on May 11, 2012, for a 90-day public comment period

BLM received 177,000 comments from the public and the oil and gas industry

After review and consideration of all the comments, BLM decided to revise portions of the draft rule

Key differences between the initial and the revised draft rules

Updated Rule:

- Allows use of expanded set of cement evaluation tools
- Introduces a “type well” concept
- Provides trade secret protection
- Relies on the state to identify usable water formations that need protection and which formations that do not need protection

Status of BLM Revised Hydraulic Fracturing Rule

- **BLM released revised draft fracturing rule for public comment on May 16, 2013**
- **1.35 million comments received**
- **BLM is currently analyzing the comments and plans to issue a final rule in 2014**

The End

