

IMPACT OF FRAC WATER on Drinking Water Systems

Presented By:

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NORTH DAKOTA
DEPARTMENT of HEALTH





Outline

- **Oil Impact (40 New PWS's)**
- **Mancamps, Hauling, etc.**
- **Frac Water Demands in ND**
- **Location of Fracs**
- **Hydraulic Fracturing Process**
- **Break Point Curve**
- **Frac Gels**
- **EPA – Killdeer**

Oil IMPACT

Additional Public Water Systems (PWSs)

- 54 New PWSs in 2 years a 10% increase
 - 6 Community Systems
 - 7 Non-Transient Non-Community Systems
 - 41 Transient Non-Community Systems
 - 10 New Water Haulers



Oil IMPACT

Sources of Water

- 22 Ground Water Systems
- 16 Purchased Ground Water
- 15 Purchased Surface Water
- 1 Purchased GW under the influence of SW

Total population: approximately 7,000 people

Oil IMPACT

– Demand for Water

- Water Appropriation Permits

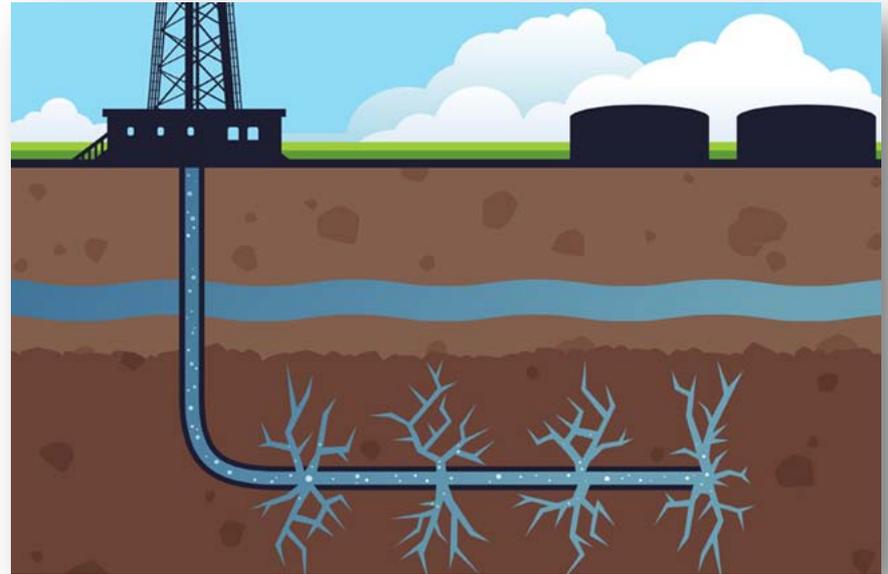
– Demand on current PWS facilities

– Loss of Certified Operators

Other Issues
Just Ahead

What is HYDRAULIC FRACTURING?

- Use of High-Pressure Fluids to Fracture Rock Layers
- Sand “props” Open Fractured Rock Layers



Hydraulic Frac CHRONOLOGY

1948 – First Hydraulic Frac

1974 – SDWA Enacted (No Frac)

1986/1996 – SDWA Amendments
(No Frac)

1997 – Alabama Methane: LEAF vs.
EPA (EPA says AL can regulate)

2002/2004 – EPA Frac Study
(Minimal Threat)

2005 Energy Bill –
Frac Never Intended to be Regulated
under SDWA

Bakken Play Increasing

2007 – Ohio Gas Well Explosion
Blamed on Frac

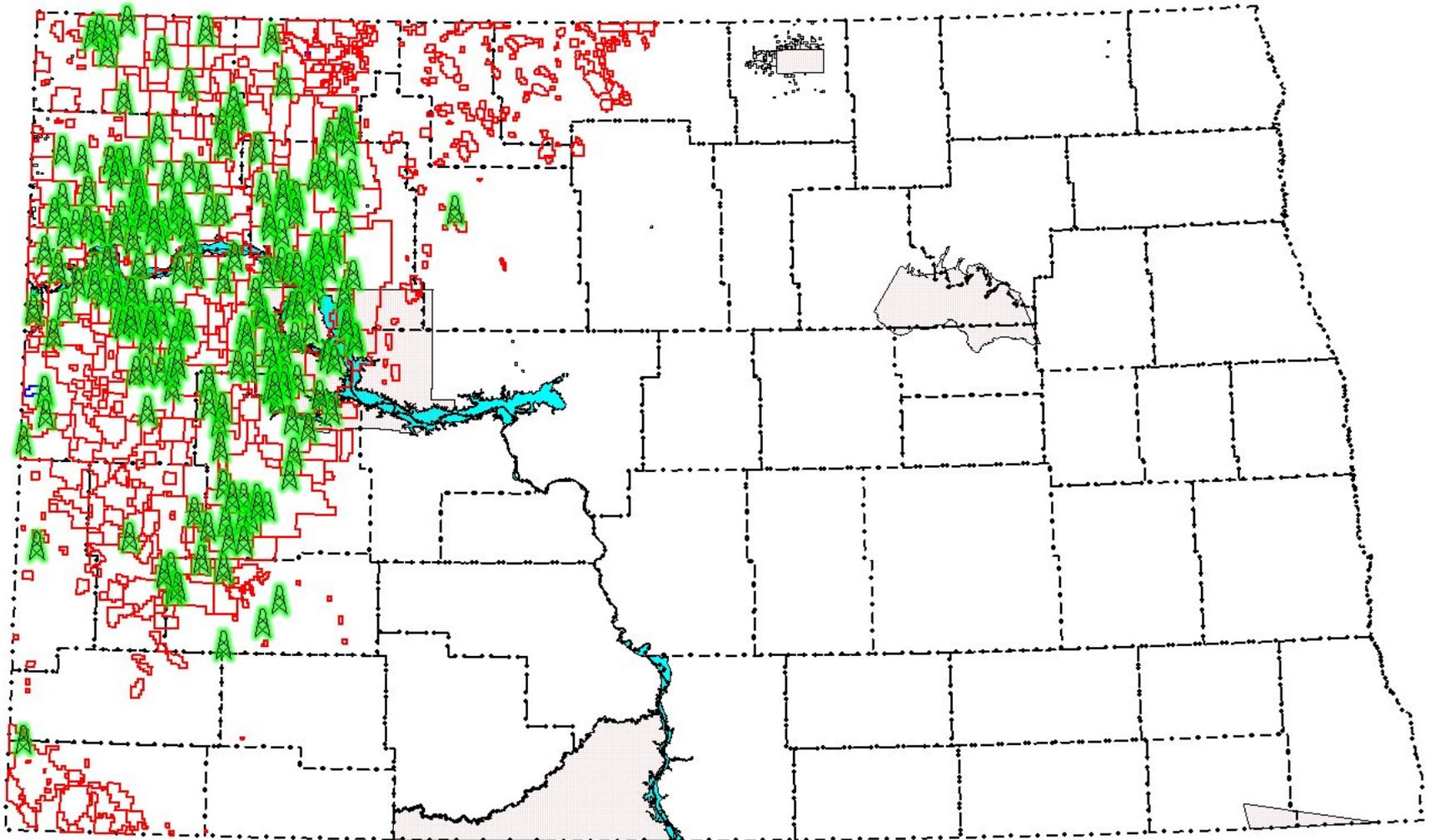
2008 – Marcellus Shale
Attack on Frac

2009 – IOGCC Opposes Frac
Regulation under SDWA

2011 – EPA Study

2011 – Halliburton Exec Drinks
Frac Fluid

OIL in North Dakota



Frac Water DEMANDS

Million Gallons of Water Needed per Frac
Western North Dakota Water Shortages



North Dakota Century Code 61-24.5 states:

“... many areas and localities in southwestern North Dakota do not enjoy adequate quantities of high-quality drinking water. It is also found and declared that other areas and localities in southwestern North Dakota do not have sufficient quantities of water to ensure a dependable, long-term supply.”

BANG

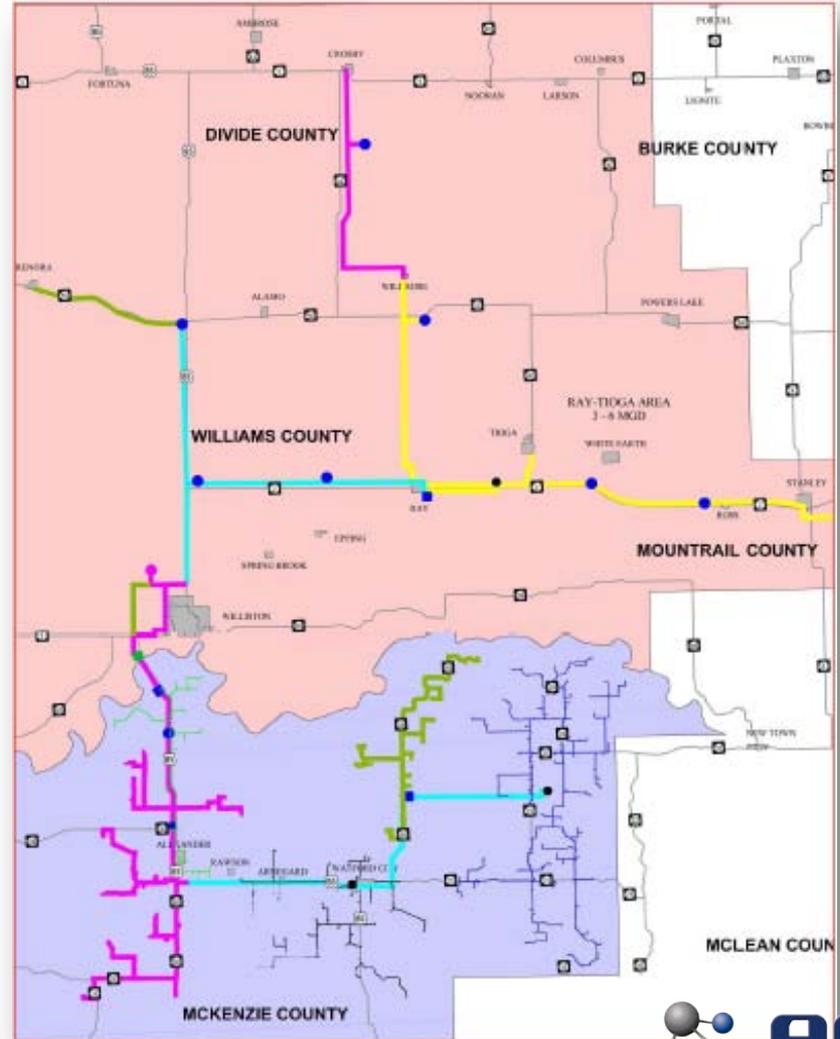
ON Water Treatment Plants

- Approx 25% to 100% Increases
- WTP Designs did not Anticipate Frac Water Demands



Western Area Water Supply Project

**Capable of Providing
Hydraulic Fracturing
Water to Northwest
North Dakota**



WHY USE Hydraulic Fracturing?

Stimulate Oil and/or Gas Production

Accelerates production rates
(increased income) Increases
total production

Makes More Oil and/or Gas Reserves Economical

i.e. Bakken, Tyler, etc.



FLUID SITUATION

Typical Solution Used in Hydraulic Fracturing



99.5%
Water & Sand

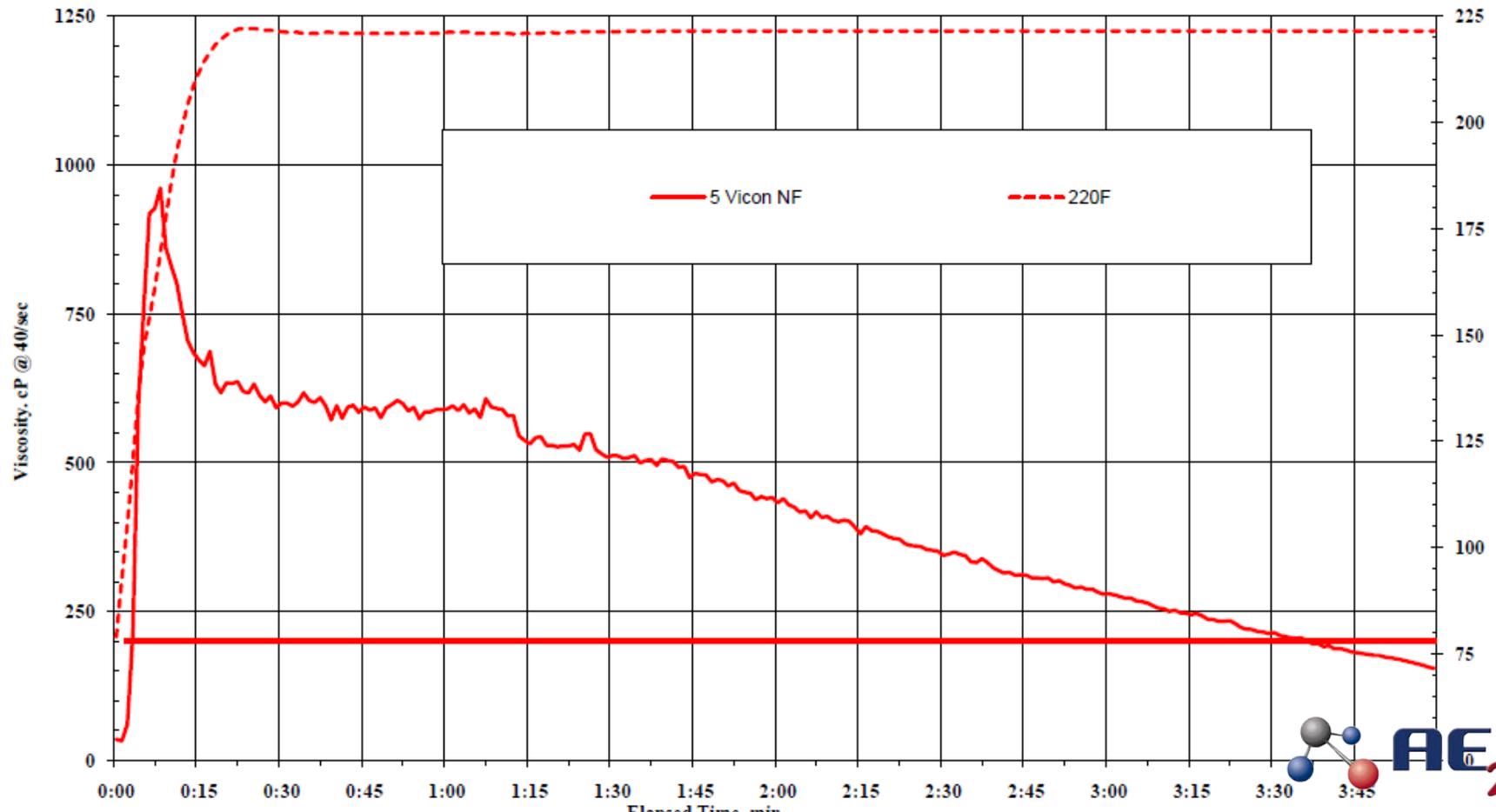
Frac Gels

- Water is Mixed with Sand, Gel, and other Additives
- Frac Gels are used to Suspend Sand during Fracturing Process
- Sand Acts as “Proppant”
- Mixture Returns to Liquid-like State
- Flows back as Produced Water



BREAKPOINT Curves

- **Increase Viscosity of Mixture**
 - Allows suspension of sand
- **Cannot Remain Viscous (must flow back)**



EPA CONCERNS



Potential Contamination of Drinking Water

2004 Study

EPA Studied Hydraulic Fracturing of Coalbed Methane Wells

“EPA found no confirmed cases that are linked to fracturing fluid into CBM wells or subsequent underground movement of fracturing fluids.”

Further, although thousands of CBM wells are fractured annually, EPA did not find confirmed evidence that drinking water wells have been contaminated by hydraulic fracturing fluid injection into CBM wells.”



EPA 2014 Frac Study

Killdeer, North Dakota

EPA Selected 7 Case Studies

Investigating Impacts of Hydraulic Fracturing on Drinking Water

**NORTH
DAKOTA**

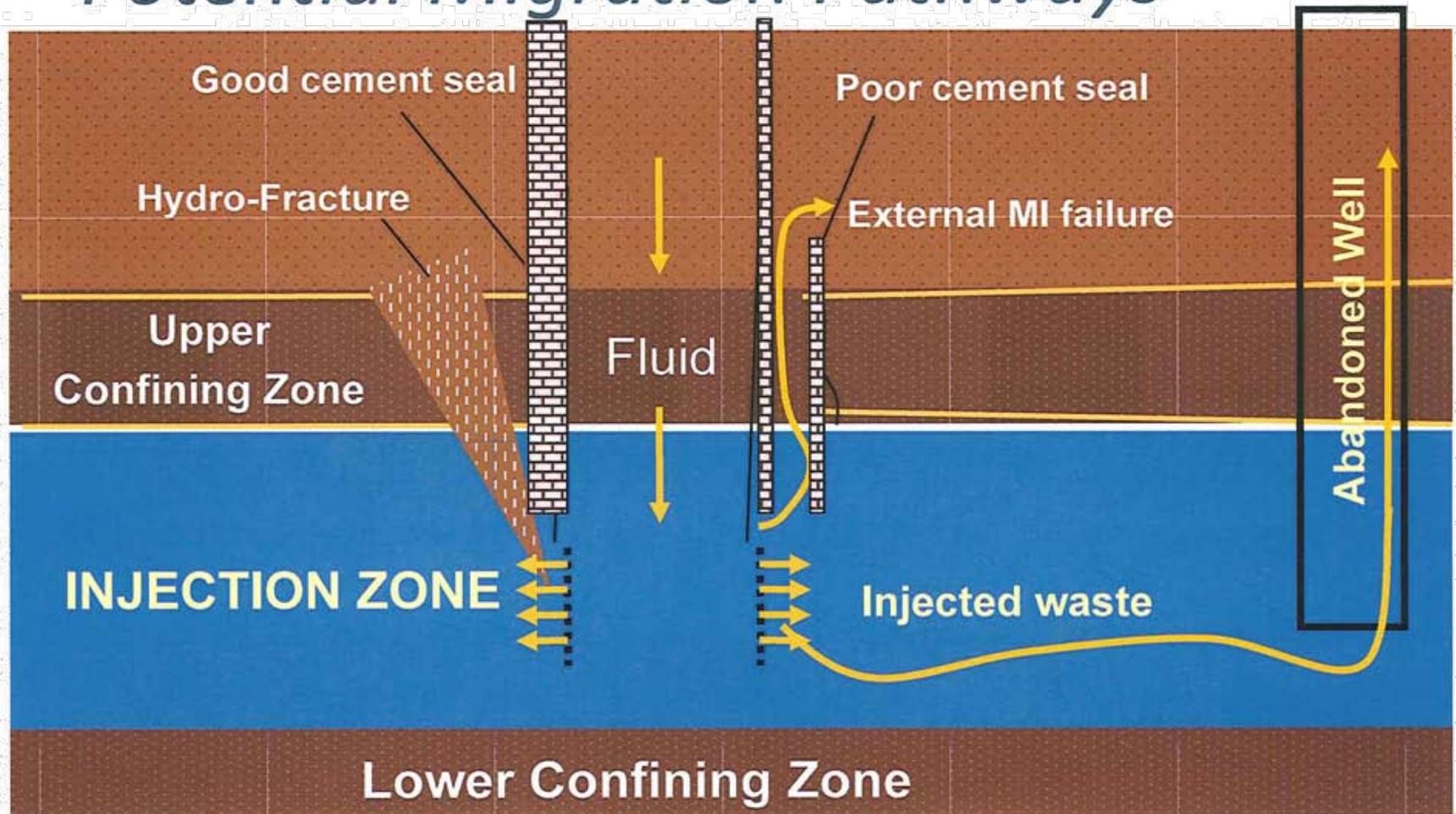
STRAIGHT AHEAD

40 CFR 144.12(a): No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water...



CONCERN

Potential Migration Pathways



QUESTIONS?



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SUMMARY

