

UNCONVENTIONAL RESOURCES – USE OF HYDRAULIC FRACTURING

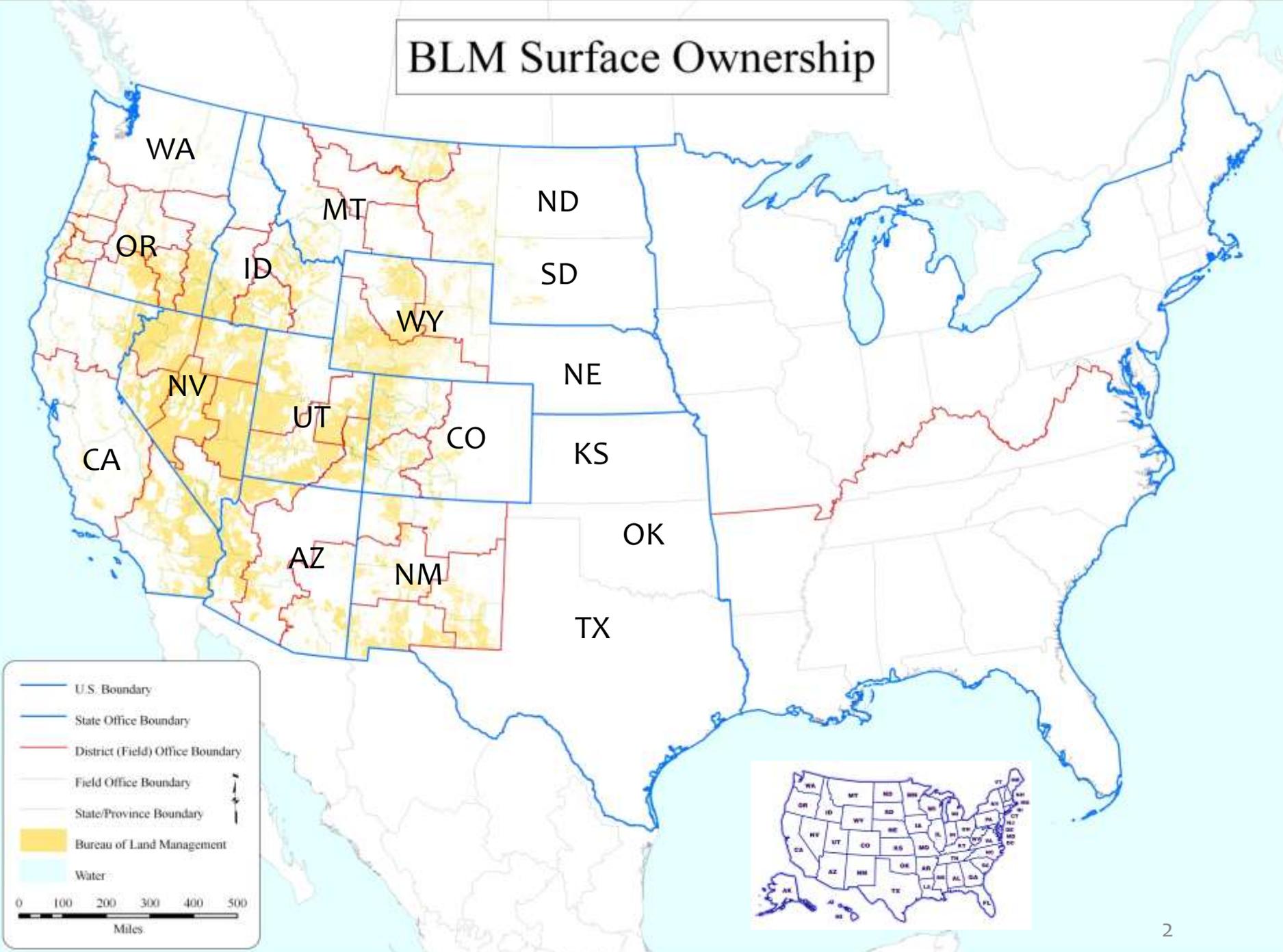
BLM

High Desert District – Rawlins Field Office

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High Desert District-Rawlins Field Office
March 11, 2015



BLM Surface Ownership

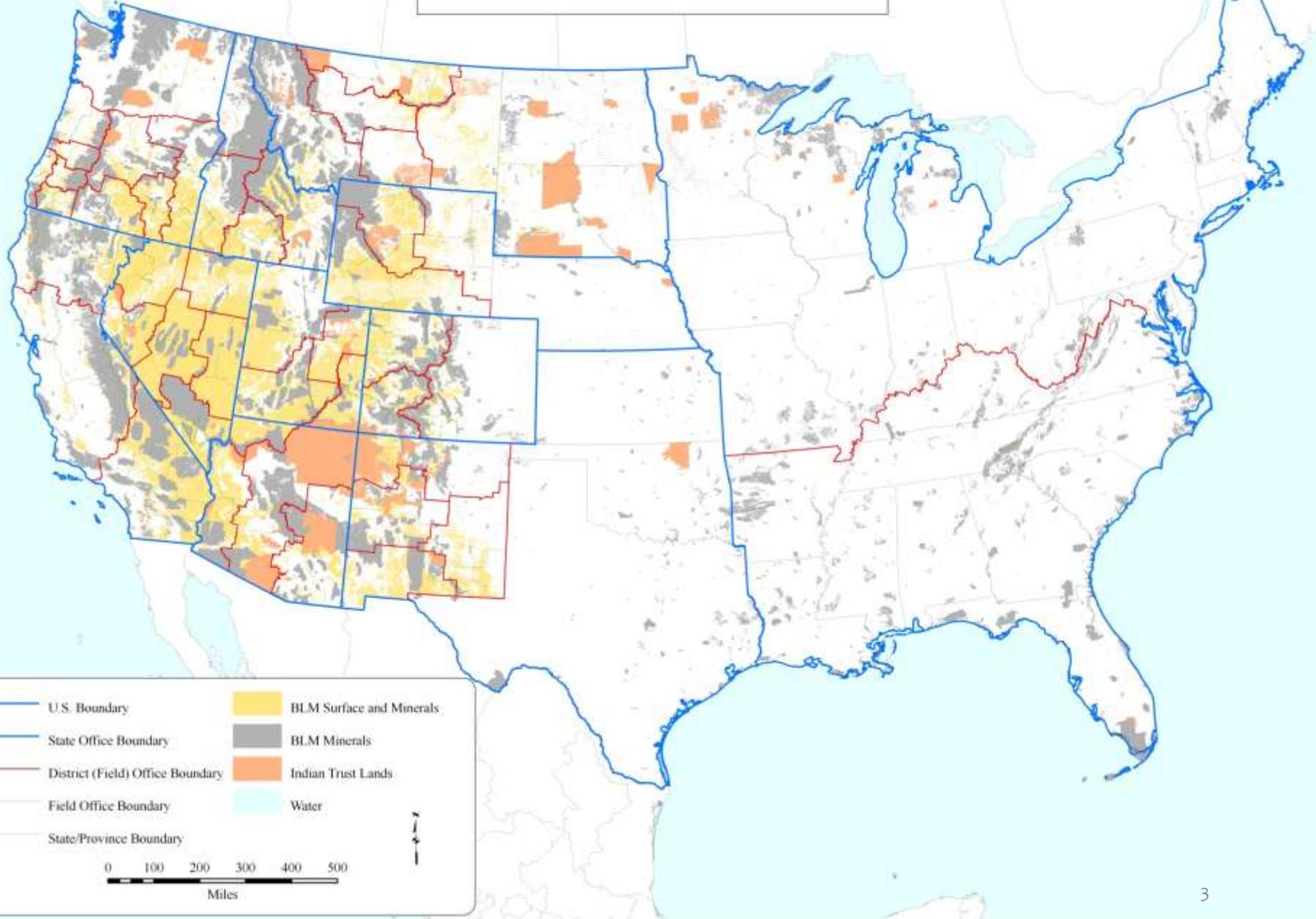


— U.S. Boundary
— State Office Boundary
— District (Field) Office Boundary
— Field Office Boundary
— State/Province Boundary
■ Bureau of Land Management
■ Water

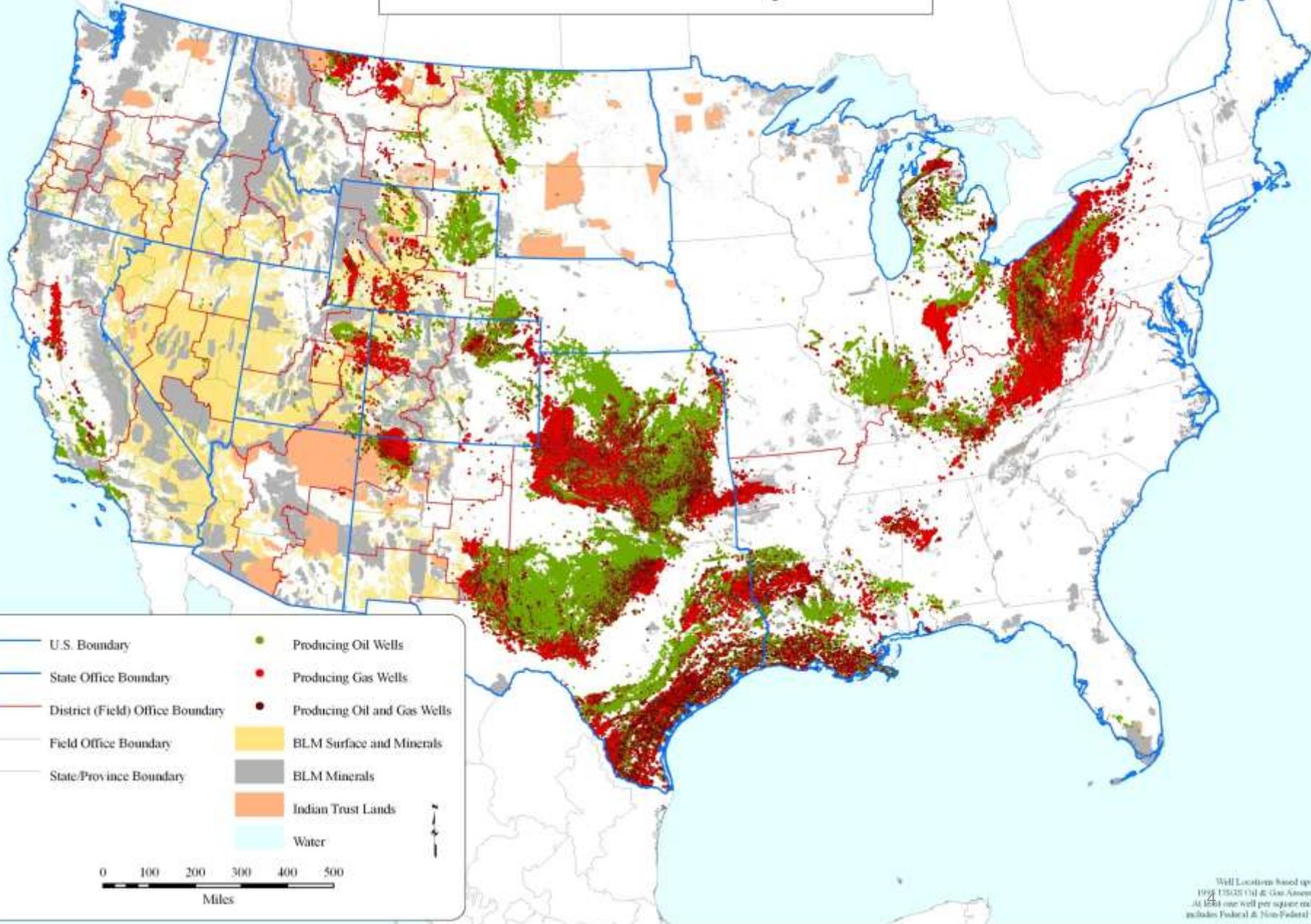
0 100 200 300 400 500
Miles



Federal Mineral Estate

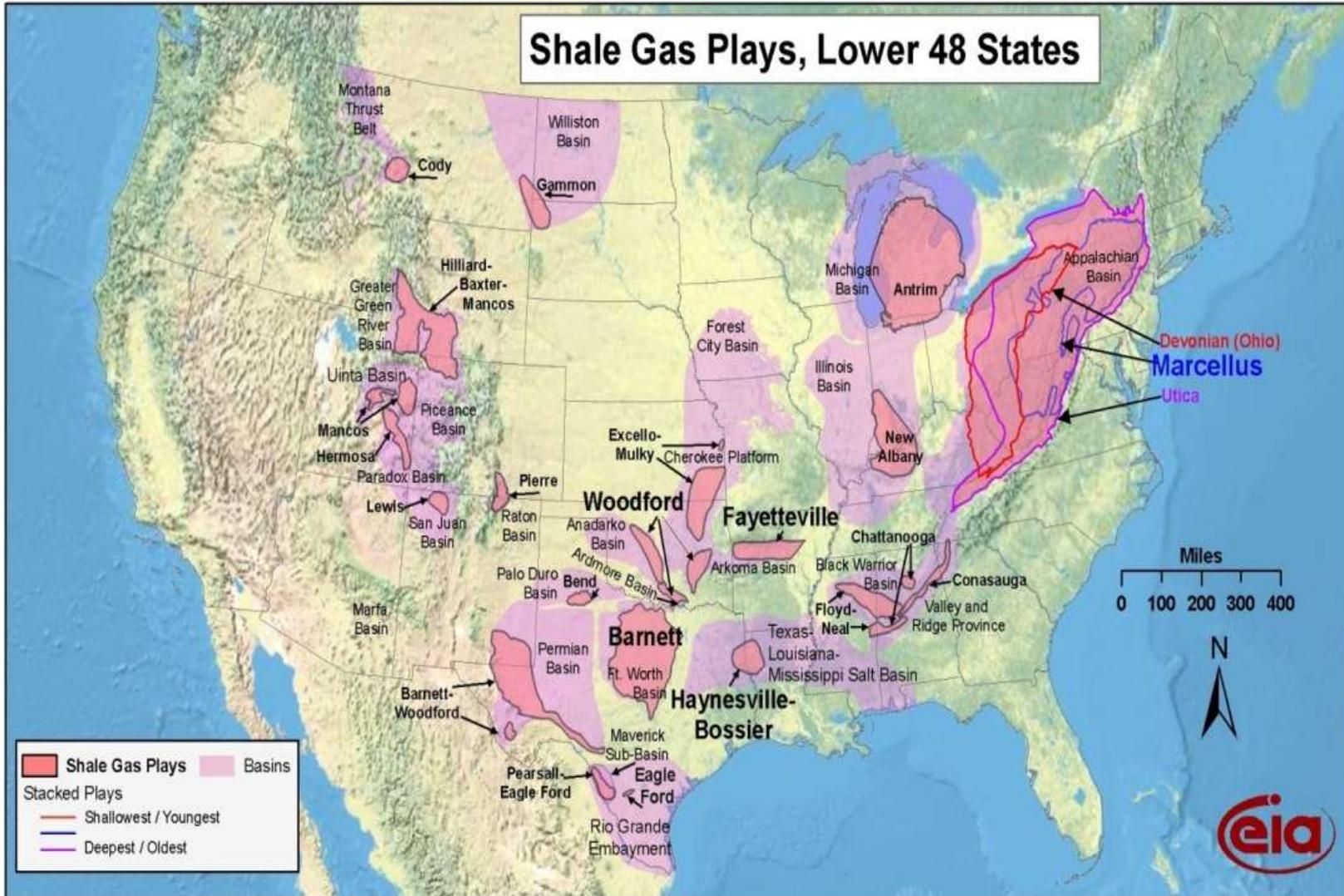


Oil and Gas Activity Areas



Well Locations based upon the
1993 USGS Oil & Gas Assessment.
At BLM one well per square mile and
includes Federal & Non-Federal wells

Shale Gas Plays, Lower 48 States



Source: Energy Information Administration based on data from various published studies.
 Updated: March 10, 2010

Rule Making Objective

The **BLM HF rule** focuses on the need for:

- Wellbore integrity
- Recovered fluid management
- Chemical disclosure for hydraulic fracturing fluid

Concerns



- Protection of groundwater and surface water from contamination
- Chemicals and additives in the fracturing fluid
- Large volumes of water needed for hydraulic fracturing
- Disposal of fracturing fluid (or recovered fluid)



Finalized Rule Will Cover

Wellbore Integrity- the operator must:

- Verify adequate cement bonding.
- Monitor and record the cement flow rate, density, and pump pressure and report.
- Certify that the information is correct.
- If there is an anomaly in cementing then determine the top of cement with a Cement Evaluation Log (CEL).
- Mechanical Integrity Tests-
 - Conducted prior to hydraulic fracturing operations
 - Issues reported within 24 hours

Finalized Rule Will Cover

Require Chemical Disclosure of HF Fluid by:

- Describe each additive in the hydraulic fracturing fluid except proprietary additives under trade secret exemption.
- Trade name, supplier, purpose, ingredients, Chemical Abstract Service Number (CAS), and maximum ingredient concentration in HF fluid(% by mass).
- Require a report 30 days after completion of HF operation.
- Disclosure would be through FracFocus, another BLM-designated database, or in a Subsequent Report Sundry Notice.

Finalized Rule Will Cover

An affidavit with the following will be required for an exempted additive:

- Identifying Federal Statute for such withholding.
- Affirming that the information is not required to be publicly available under any applicable law.
- Affirming that release of the information would likely harm the operator's competitive position.
- Affirming that the information is not readily apparent through reverse engineering.
- If BLM determines the information as non-exempt, then the operator will be notified 10 days prior to the public disclosure.

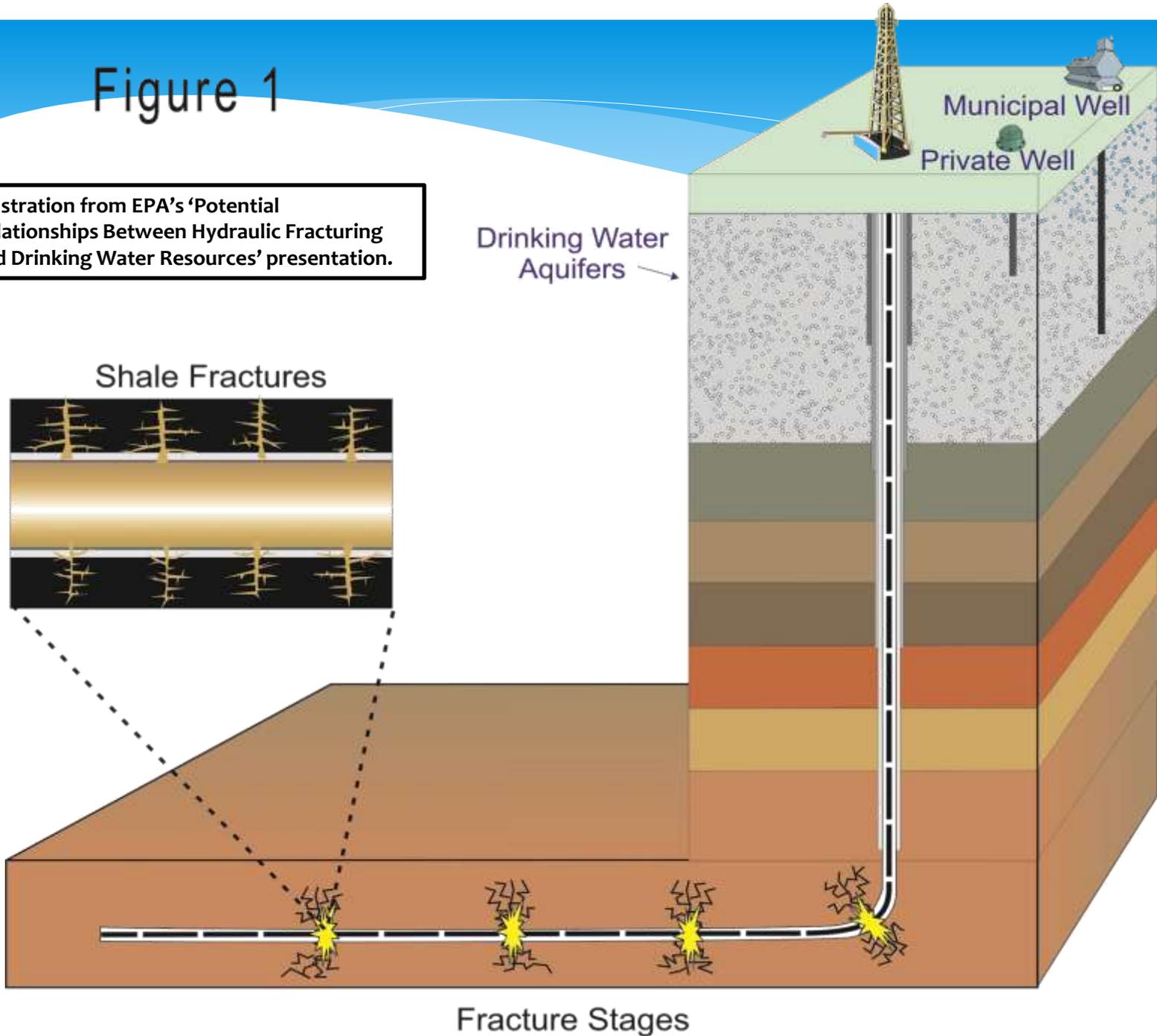
Finalized Rule Will Cover

Recovered Fluid Management

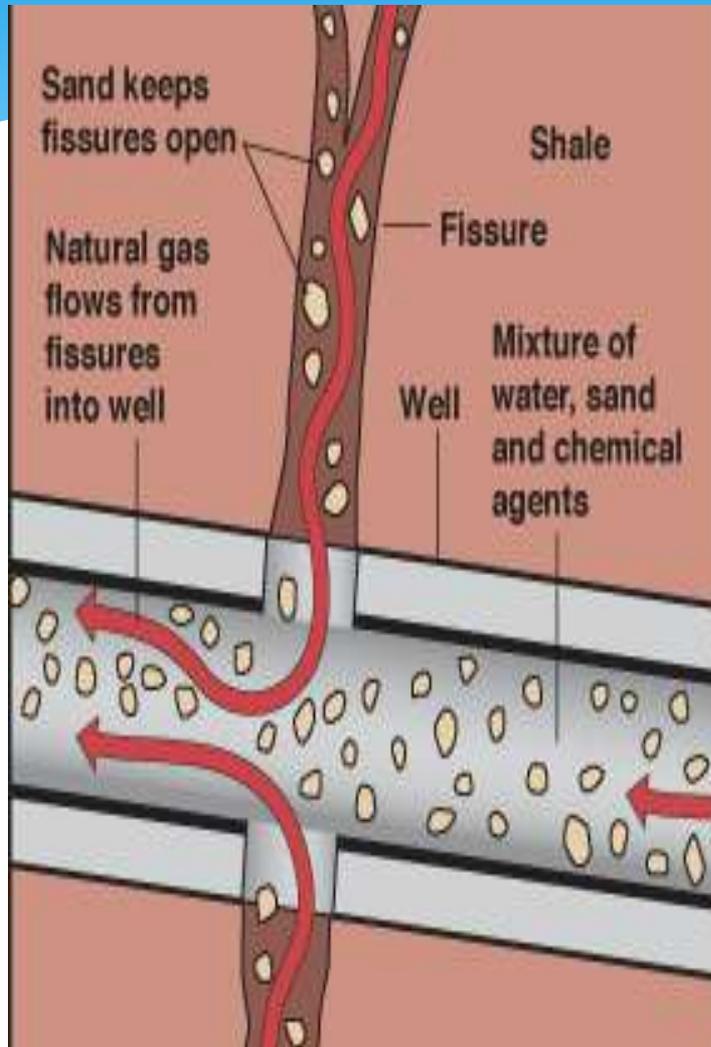
- Storage in closed tanks until approval of produced water disposal plan.
- AO may consider lined pits with a number of limiting conditions.
- Would need Operator's certification on accuracy and correctness of data

Figure 1

Illustration from EPA's 'Potential Relationships Between Hydraulic Fracturing and Drinking Water Resources' presentation.



What is Hydraulic Fracturing?



Hydraulic Fracturing is a well stimulation technique that has been employed by the oil and gas industry since 1947.

The technique creates spaces in the rock pores deep underground to release the oil/ natural gas to flow to the surface.

Why HF and Horizontal Drilling?



- **Horizontal drilling in shale formations with HF has unlocked vast new supplies of oil/ natural gas**

- **HF makes production feasible in many areas that were previously considered too deep, too hard, and too expensive to access**

- **The “fracture paths” created by HF with increased surface area exposed by horizontal drilling can increase production rates significantly**

- **HF and horizontal drilling provide environmental advantages in reducing the number of wells needed to drain an underground oil/gas reservoir**



<http://geology.com>

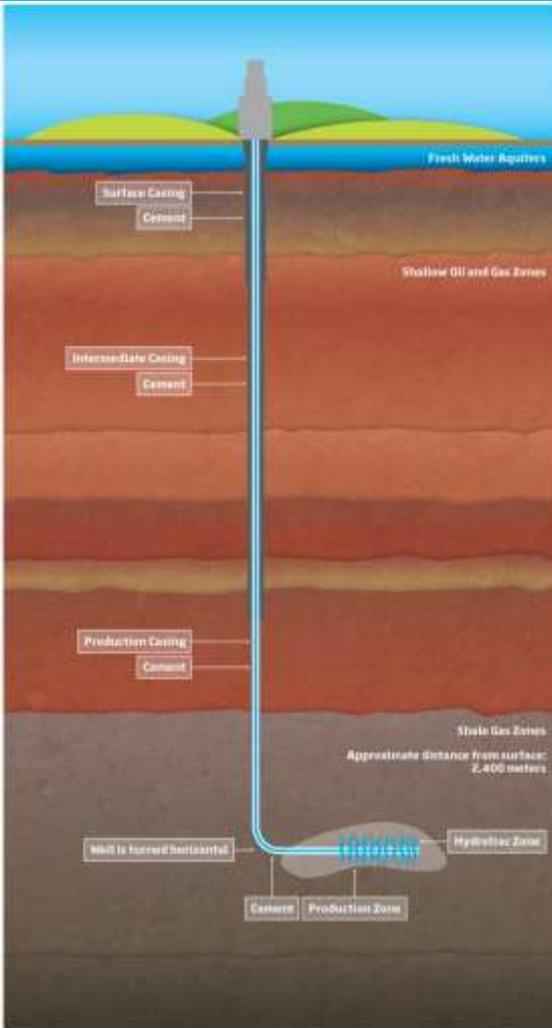
Environmental Concerns

- **Protection of groundwater and surface water from contamination.**

- Chemicals and additives in the fracturing fluid
- Large volumes of water needed for hydraulic fracturing
- Disposal of spent fracturing fluid (or flow-backfluid)



Groundwater Protection



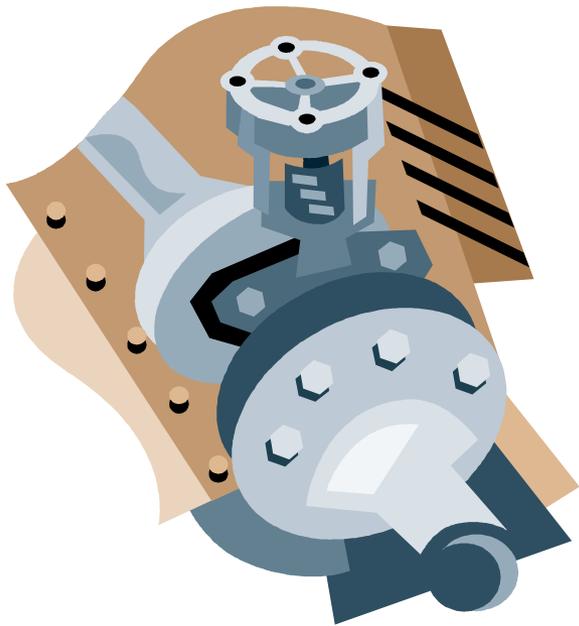
- **Wellbore integrity: Design and construction of the well to ensure isolation in wellbore**
- **Surface casing set below useable groundwater and cemented to surface**
- **Intermediate and Production casing is cemented to isolate hydrocarbon zones and provide further protection to groundwater**
- **Multiple layers of protective steel casing surrounded by cement**
- **Cement Evaluation Logs verify quality of cement job**

Water Volumes Needed for HF



- **Typically 10,000-25,000 barrels (420-1,050,000 gallons) per well are needed for fracture stimulation. 30-40% will flow back to surface**
- **The amount of water that is used can be reduced when fracture fluids are recycled**

Fluid Disposal



- **Underground injection**
- **Commercial disposal facilities**
- **Treatment/Reuse/Recycling**

Questions?

