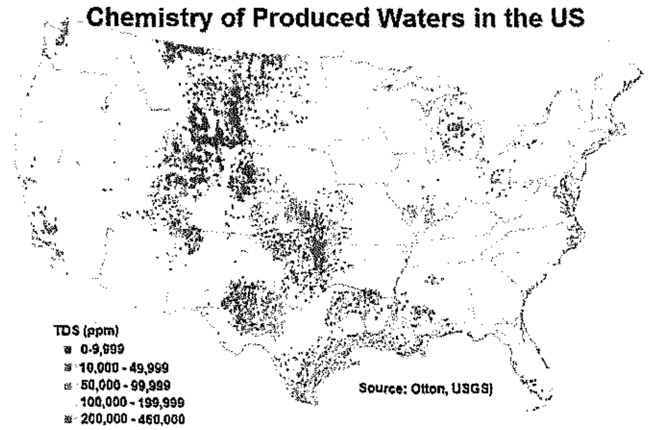
Key Concerns with the Proposed Rule

- Failure to identify deficiencies in the existing system that justify new federal government action -- Operators already comply with state requirements on Federal lands, environmental record is excellent
  - Operators not using best practices: fit-for-the-area: these rules are a departure from best practices in several cases and are a one-size-fits-all approach
  - Inappropriate assignment of benefits
  - Underestimation of costs (clearly economically significant)
- Technical / Implementation shortcomings
  - Multi-step approval process (i.e. CBL review prior to approval of fracture)
  - Requirement for CBL on surface casing / failure to recognize pressure testing
  - Usable Water Definition
  - Chemical Disclosure – FracFocus and appropriate CBI protection
  - Reporting requirements on water source and location – water use is a state authority
  - Certification requirements beyond the legal bound
  - Regulation scope (beyond hydraulic fracturing)

Usable Water

- Preferred alternative: rely on states to define "usable water." Allows consideration of local conditions, standards & economics. Upholds effective status quo (States are accountable)
- BLM definition of usable water at 10,000 TDS directives is:
  - inconsistent with EPA safe drinking water act (SDWA) and
  - in contrast with BLM's water policy which provides that states have the primary authority and responsibility for the allocation and management of water resources.
- Claims that Onshore Order 2 already has 10,000tds definition:
  - Current ex. – Current Application is Not Consistent with Strict 10,000 TDS Definition.
  - An unworkable paradigm should not be introduced or perpetuated depending on interpretation of the rule.

Challenges in Protecting 10,000 ppm "Usable" Waters



- Brines of <10,000 ppm TDS & oil/gas frequently co-inhabit same formations. (CBM; all shallow oil;
- Brine maps show low to moderate salinity brines are not depth related, but rather area specific.
- Problems & Impacts of the 10,000 ppm TDS protection rule
  - To protect all 10,000 ppm brines could deny access to most CBM (1997 USGS est. 700 tcf in US coal)
  - Nearly all major US oil & Gas basins have some wells that produce <10,000 ppm TDS waters with gas or oil.
  - Salinity gradient is not consistent w/ depth. Many <10,000 ppm zones are below 50,000 ppm zones.
  - 63,000 onshore Federal land wells –not designed to protect 10K ppm water. Can they be refraced?
  - Significant impact on nation's ability to produce Oil, Gas & Coal.
    - 2% to 10% of US produced oil & gas associated with ~<10,000 ppm waters (EIA, USGS & BLM)
  - 5% of US oil produced on Federal lands, plus reserves that may not be reached.

Sources: http://www.eia.gov/naturalgas/crudeoilreserves/pdf/uscrudeoil.pdf
http://www.eia.gov/analysis/requests/federallands/pdf/eia-federallandsales.pdf

Recover & treat cost for 10,000 ppm water, which untreated has no wide-spread agriculture or municipal use, increases sharply with depth of recovery and with presence of oil.

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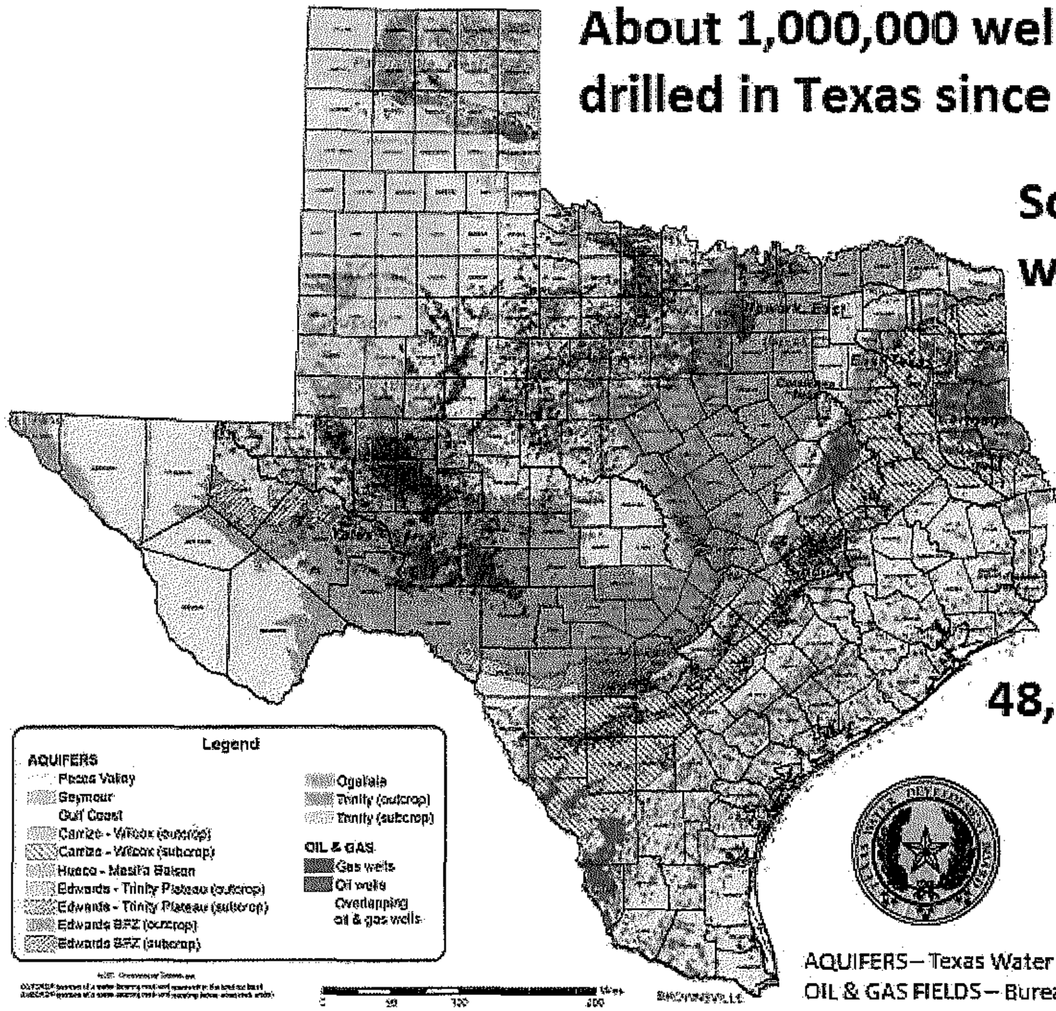
Groundwater pollution potential from fracturing and well construction proven to be very small with a very high number of wells drilled through the aquifers and a pollution incident rate lower than 0.005% (0.00005 fractional) from well construction and none from fracturing.



About 1,000,000 wells drilled in Texas since 1866

Some of longest standing fresh water protection regulations in US.

250,000 producing wells

500,000 fracturing jobs since 1950

48,000 injection & disposal wells

AQUIFERS—Texas Water Development Board
OIL & GAS FIELDS—Bureau of Economic Geology, UT Austin

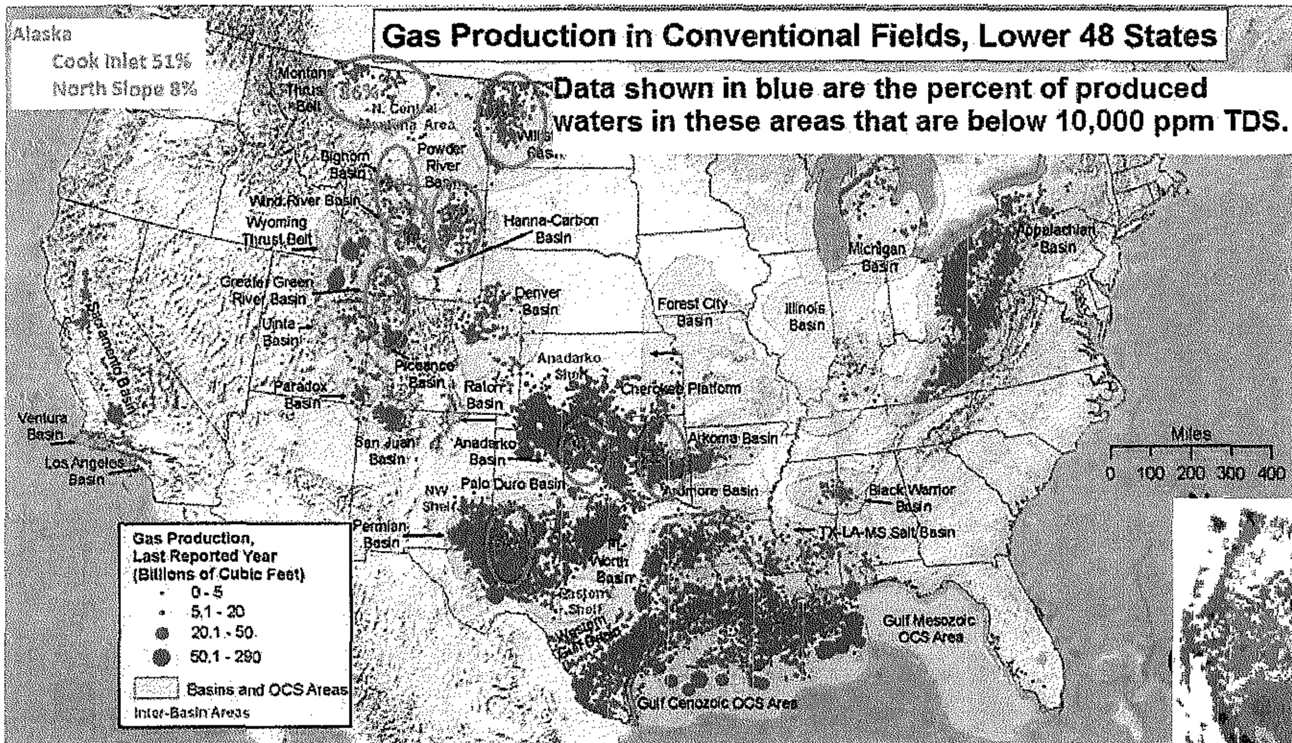
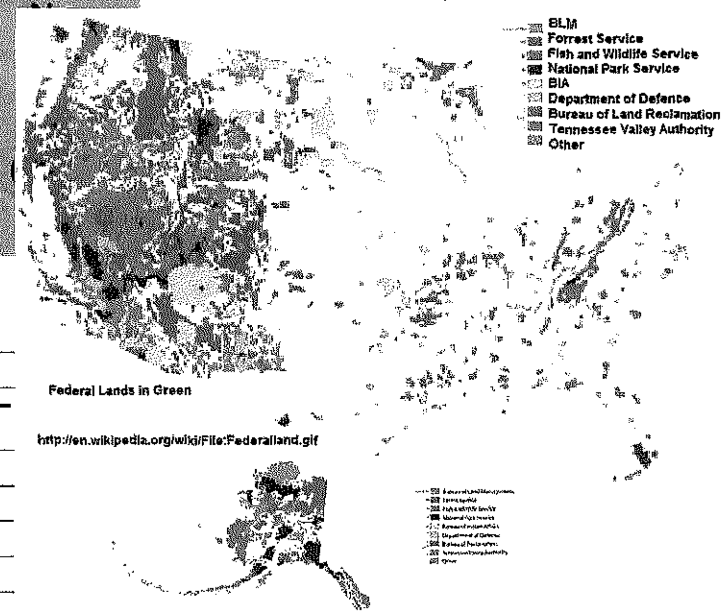


Table 7.1 Summary of Produced Water Quality Statistics

Basin Name	Produced Water Quality Percentage for Ranges (mg/L TDS)				
	0 – 9,999	**10,000 – 49,999**	**50,000 – 99,999**	**100,000 – 199,999**	**200,000 – 460,000**
Alaska North Slope	8	92	0	0	0
Alaska Cook Inlet	51	48	1	0	0
Anadarko Basin	4	25	15	28	28
Arkoma Basin	23	19	18	39	1
Bighorn Basin	79	20	1	0.4	0.04
Fort Worth Basin	0	4	15	49	31
Greater Green River	65	23	8	4	0
North Central Montana	86	13	0.5	0.3	0.5
Permian Basin	6	21	29	31	13
Powder River Basin	60	33	3	4	0.8
Williston Basin	10	16	13	19	41
Wind River Basin	75	24	0.8	0.6	0.08

Federal Lands



Produced Water Less than 10,000 ppm
Cook Inlet: 51%
North Slope: 8%

Salt Creek Stratigraphic Column
Wyoming, BLM Lease

Formation	Quality
Fort Union	
Teapot	
Parkman	
Sussex	
Shannon	
Niobrara	
Carlile	
Wall Creek 1	8,700 ppm*
Wall Creek 2	8,700 ppm*
Wall Creek 3	
Mowry	
Muddy	
Dakota	
Lakota	9,000 ppm*
Morrison	
Sundance 1	
Sundance 2	8,000 ppm*
Sundance 3	9,000 ppm*
Alcova	
Tensleep	3,000 ppm
Amsden	
Madison	2,700 ppm

Clarification of "Usable Water" Definition Needed

- Better Water Quality Deeper in the Stratigraphic Column
- BLM Surface Casing Setting Depth Requirement is 400'
- Wall Creek 1 Formation - 1000'
- Madison Formation Depth - 5000'
- Is BLM Proposing a Requirement to Isolate Madison from Shallower Hydrocarbon Producing Zones With Surface Casing?
- Would BLM Require Isolation with Surface Casing if Shallower Zones were not Hydrocarbon Bearing?
- 4600 Feet of Additional Surface Casing would be Required
- Additional Well Cost of $210,000

**Not original formation water TDS. Madison and/or Tensleep water has been injected into horizon.*

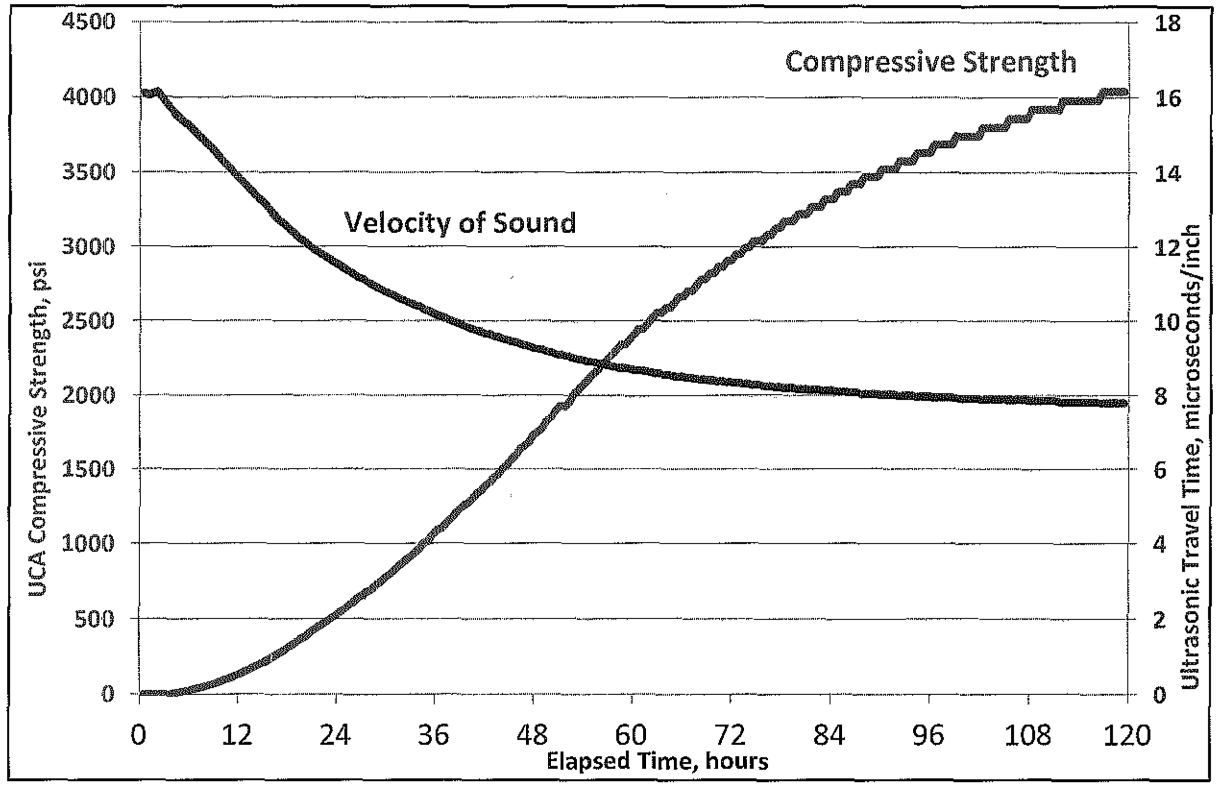
Primary Hydrocarbon Producing Zones
Primary Water Producing Zone

Safety/Environmental Risk Increases with Open Hole Logging.

- New Requirement (from 10,000 PPM Rule):
  - Requires leaving hole uncased and uncemented until logs can be run, thereby sharply increasing chances of hole cave-in or well control issues.
- Usable waters, within economic and technical reason, are the shallower occurrences of the freshest waters. Deeper "usuable" water zones are less economic and less attainable.

What is adequate cement?

- Well integrity and isolation assured with as little as 50 feet of good cement. The entire CBL record is almost never perfect.
- Cement best practices are fit for purpose in a specific area.
- CEL testing is used to tune performance of a cement design and application plan for an area.
- Well seal integrity can only be measure with a pressure integrity test.
- A CBL is not practical on surface casing or most intermediate casing until after up to 72 hours after cementing.



Other Implementation Challenges

- Remove Distinction Between Produced Water, Recovered Fluids and Flowback.
- Pressure Testing vs. MIT – Pressure Test is Routine. MIT is a very different test.
- Definition of "inadequate cement job" - No purpose – problem is remedied - Notification delay for no benefit & Approval step?
- Retroactive application of rule
  - BLM still intends that the rule apply to wells permitted prior to the effective date of the rule - Changes impact economics, can lead to stranded wells
  - None of the statutory authorities BLM invokes to promulgate this rule include a Congressional authorization to promulgate retroactive rules.
- Chemical Identity: Affidavit requirement re: CBI claim – operators cannot comply because we do not have the CBI.
- Fracture modeling is an engineering tool, not fit as regulatory tool. Calibration data is very expensive and output is widely variable. Adds cost for questionable benefit.

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Business Impact of Proposed Changes – New Wells

Cost Per New Well	As Proposed Cost, $/well	Total Annual Cost 5000 Wells/Yr - As Proposed	Economic Assumptions
Initial APD Approval Delay	11,000	55,000,000	49 additional days delay to first production; current APD approval time is 10 months; with no additional funding & current APD back log assume expanded APD approval time of 3-1/2 months; using 7% discount rate and Monte Carlo analysis
CBL Approval *	7,600	38,000,000	*7 days delay; cost of carrying capital*
Administrative Cost	500	2,500,000	*Admin Cost (BLM) - $500 per well*
Additional Surface Casing			
Rig Cost - Range $0 to $146,000	40,000		*20% of wells will not require additional rig time; log normal distribution to generate average through Monte Carlo analysis generated an average $40,018 per well.*
Pipe Cost - Approx $27.5 per ft	64,600		*Current average surface casing setting depth is 2000 feet; assuming surface casing depths may increase down to 4000 to 7500 feet the Monte Carlo average is 2350 feet of additional surface casing.*
Cementing Cost - Approx $10 per ft	23,900		*Calculated as described above; 2350 feet*
Sub-Total Additional Surface Csg	128,500	642,500,000	
Surface Casing CBL Cost *	9,000	45,000,000	*CBL cost per BLM - $9,000 per well*
MIT Cost	2,000	10,000,000	*MIT Cost (BLM) - $10,000 per well; 20% wells*
Total Cost for New Well	**$158,600**	**$793,000,000**	

*** Green shaded area highlights cost reduction with new changes to rule proposal.**

Potential Additional Costs with Type Wells

- CBL type log - $9,000+ to $184,000 per well (pre-set vs. drill rig set and sonic imaging tool)
  - Surface open hole type log - $ 6,000 per well
  - Assume 5 percent of wells drilled annually require type logs – 250 wells annually
  - Combined type log costs range from $4 MM to $48 MM (depending logs, rigs, and well numbers)

Reduction on annual cost with new rule proposal is $83 MM, or $17,000 per well

Business Impact of Proposed Changes – Workovers & ReFracs

Workover Cost	As Proposed Cost, $/well	Total Annual Cost 1171 Wells/Yr - As Proposed	Comments As Proposed
Administrative Cost	500	580,000	*Admin Cost - $500 per well*
Cost of Delay	570	667,000	*50 day delay by Monte Carlo; PV calc for post stimulation production delay of 15 BOPD and 250 MCFD delay*
Repair Cost (CBL & Squeeze)	40,000	46,800,000	*Avg cost based on 1171 wells (API)*
30% wells $22,000 per well (PIT)			
40% wells $33,000 per well (PIT, CBL)			
25% wells $56,000 per well (1 cmt sqz)			
5% wells $120,00 per well (2 cmt sqz)			
Total Cost of Workover	**$41,100**	**$48,047,000**	

Potential for Additional Costs

- Additional diagnostics (i.e. ultrasonic tools, pressure tests)
- Request for additional squeeze attempts based on subjective log interpretations
- Additional rig days associated with all of the above

Total Cost New Proposal (new wells and workovers) is $758 MM.

Backup Slide

Usable Water Definitions

- EPA Criteria for Exempting Aquifers (40 CFR 146.4)
  - It does not currently serve as a source of drinking water; and
  - It cannot now and will not in the future serve as a source of drinking water because:
    - It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of the permit application for Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.
    - It is situated at a depth or location making recovery of water for drinking water purposes economically or technologically impractical;
    - It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or
    - It is located over a Class III well mining areas and subject to subsidence or catastrophic collapse; or
    - The total dissolved solids content of the ground water is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

- Wyoming Oil and Gas Conservation Commission (WOGCC Chapter 1, Section 2 (s))
  - Fresh Water and Potable Water are defined as water currently being used as a drinking water source or having a total dissolved solids (TDS) concentration of less than 10,000 milligrams per liter (mg/l) and which:
    - (i) Can reasonably be expected to be used for domestic, agricultural, or livestock use; or,
    - (ii) Is suitable for fish or aquatic life.