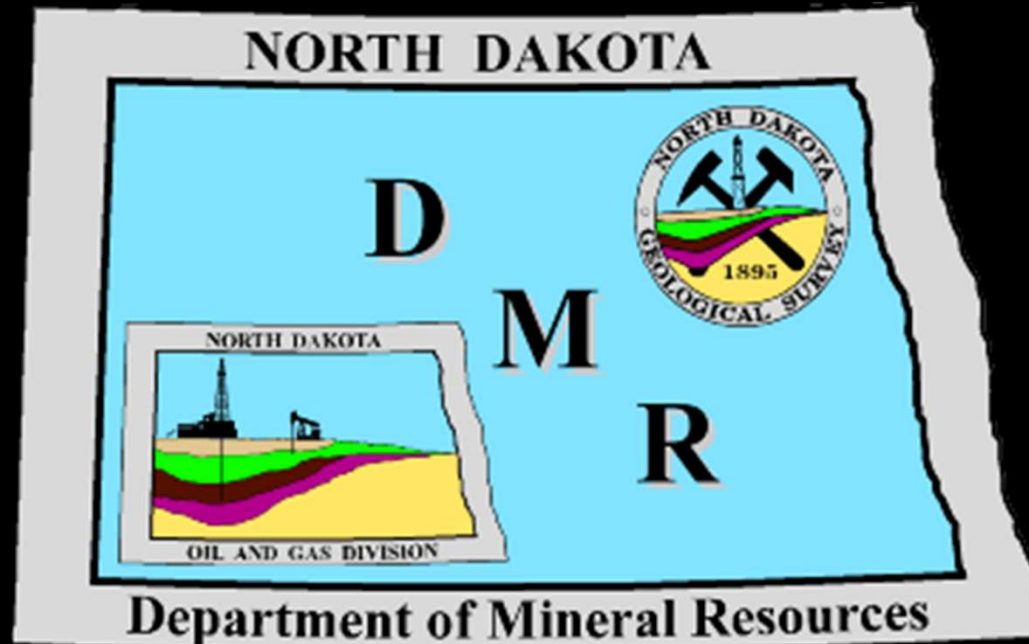


North Dakota Department of Mineral Resources



<https://www.dmr.nd.gov/oilgas/>

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Fracking

Gas Drilling's Environmental Threat

The Story So Far



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Fracking: The Music Video

Is Gas Drilling Endangering U.S. Water Supplies?

Natural Gas Politics

Natural Gas Drilling: What We Don't Know

State Oil and Gas Regulators Are Spread Too Thin

My Water's On Fire Tonight (The Fracking Song)



Fracking: The Music Video

Have you been curious what all the hubbub on "fracking" is about?

[Here is a music video explaining it](#)

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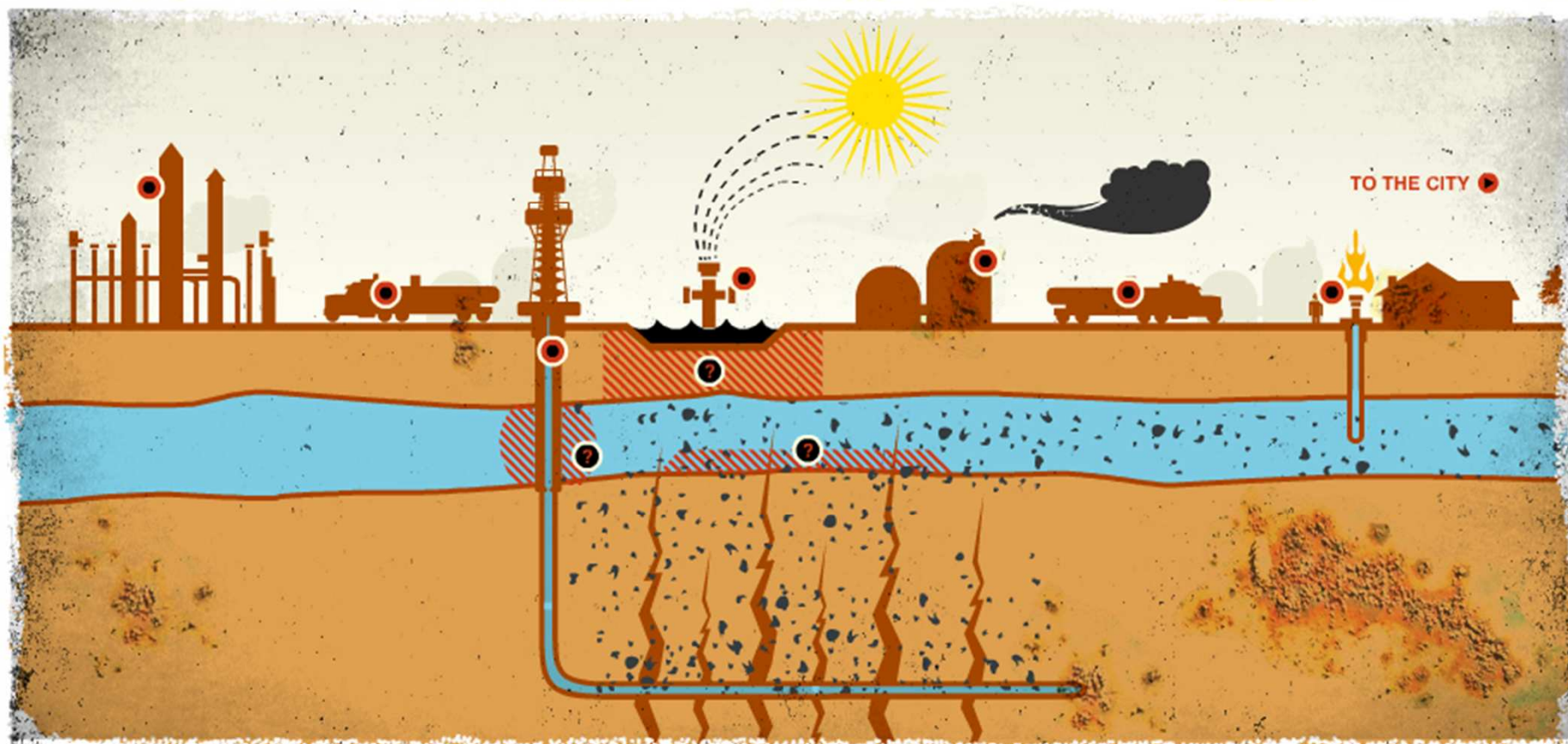
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A FILM BY JOSH FOX



Once a well is drilled, millions of gallons
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WATER CONTAMINATION FROM SHALE



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Water Contamination From Hydraulic Fracturing

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Water Contamination from Shale Gas Drilling

Hydraulic fracturing, the growing practice of drilling for the natural gas embedded in shale rock formations deep below the Earth's surface, may be contaminating water in many places. Critics of hydraulic fracturing, or fracking, suspect that the chemicals used in shale gas drilling can leak into groundwater supplies. Landowners in shale gas drilling areas have reported foul smells in tap water, and toxic chemicals, such as benzene, have been

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Shale Gas Drilling: Pros & Cons

November 14, 2010 12:34 PM

While some complain that extracting natural gas from shale rock formations is tainting their water supply, others who have allowed drilling on their property are getting wealthy. Lesley Stahl reports.

RECENT SEGMENTS



60 Minutes, 09.11.11
43:37 | September 11, 20



Ground Zero responders remember 9/11
16:20 | September 11, 20



The interrogator, Pt. 2
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Offshore Finance

Frack and ruin: the rise of hydraulic fracturing

Inflammable tap water, cancer threats and earthquakes: probably coming soon, near you. Sebastian Doggart reports from New York on the dangers of hydraulic fracturing, or 'fracking'.



Activists rally against proposed hydraulic fracturing in New York Photo: Richard Levine / Alamy

9:14AM BST 06 May 2011

44 Comments

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Long-Missing Tech
Pioneer Reappears

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U.S. NEWS | MARCH 3, 2011, 3:53 P.M. ET

EPA Chief Grilled on Safety of Hydraulic Fracturing

Article

Comments (13)



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By RYAN TRACY

WASHINGTON—The U.S. Environmental Protection Agency, as part of its review of a natural-gas drilling procedure, is looking at the radioactivity of wastewater used in the process.

Environmental Protection Agency Administrator Lisa Jackson, speaking at a congressional hearing Thursday, defended her agency's efforts to study the safety of natural-gas drilling and left the door open to further regulatory action on the issue. The process, known as hydraulic fracturing, is used to extract hard-to-reach natural-gas pockets in the ground.

Ms. Jackson suggested that if public water-treatment plants couldn't adequately treat

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City of Buffalo bans hydraulic fracturing

1,983 people recommend this.

NEW YORK | Tue Feb 8, 2011 5:33pm EST

(Reuters) - The city of Buffalo banned the natural gas drilling technique of hydraulic fracturing on Tuesday in a largely symbolic vote that fuels debate over the potential harm to ground water from mining an abundant energy source.

The city council voted 9-0 to prohibit natural gas extraction including the process known as "fracking" in which chemicals, sand and water are blasted deep into the earth to fracture shale formations and allow gas to escape.

The ordinance also bans storing, transferring, treating or disposing fracking waste within the city.

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Fracking could have caused East Coast earthquake

Published: 24 August, 2011, 20:36

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United States, Mineral: A sign on the door lets visitors know that City Hall, which shares a building with the local DMV office, was closed after the building was damaged by yesterday's 5.8 earthquake August 24, 2011 in Mineral, Virginia. (AFP Photo / Scott Olson)

TAGS: [Ecology](#), [Natural disasters](#), [Nuclear](#), [Accident](#), [Protest](#), [USA](#), [Resources](#)

MORE ON THE STORY



23.08, 23:12

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[DC quake turns off two nuclear reactors](#)

Tuesday afternoon's 5.8 earthquake caused two nuclear reactors at a plant outside of Washington DC to go offline.



17.05, 01:41

[1 comment](#)

[France may ban fracking cites US disasters](#)

The French government is considering instituting a nationwide ban on hydraulic fracturing, a controversial practice used to extract gas from the earth, due to fears of earthquakes and other disasters.



14.06, 00:56

[3 comments](#)

[Appalachia Rising](#)

In 1921, West Virginian miners took up arms against coal companies in the insurrection since the American Civil War.



[Researchers study link between fracking, earthquakes](#)

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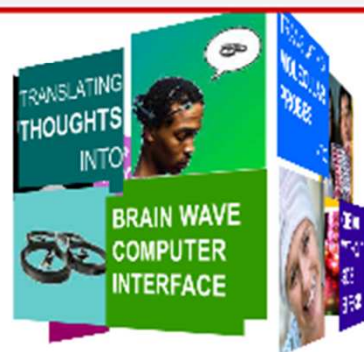
2

What the Frack? Natural Gas from Subterranean Shale Promises U.S. Energy Independence--With Environmental Costs [Slide Show]

Natural gas cracked out of shale deposits may mean the U.S. has a stable supply for a century--but at what cost to the environment and human health?

By David Biello | March 30, 2010 | 33

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- A lie can travel halfway around the world while the truth is putting on its shoes. Mark Twain
- It isn't what we don't know that gives us trouble, it's what we know that ain't so Will Rogers
- Men are Moved by two levers only: fear and self interest
Napoleon Bonaparte. French general
- Fear is the darkroom where negatives are developed
unknown

You have to confront rumors carefully. Here are some tips from Guy Bergstrom:

1) Always stay calm, no matter how horrible the rumors are.

- Some attacks are so outrageous and unbelievable that they work anyway by making the other side lose their cool in front of the press or public.

2) Let others defend you.

- If a rumor attacks your credibility, everybody knows you have a vested interest in defending yourself. So does any spokesperson or PR firm in defending a client.
- Whenever you can, have somebody else lead the counter-attack against a rumor, preferably someone with credibility and authority who can be seen as independent.

3) Refute big rumors quickly, before they fester.

- Silence is interpreted as guilt. There used to be a 24-hour news cycle, but those days are over. The news cycle has been shortened to nano-seconds by blogs and the internet. Don't wait to respond.

4) You can't wound rumors -- you have to kill them.

- Rumors will live on if you simply deny them. You have to provide an alternative explanation.
- Kill a rumor by beheading its credibility. Give evidence of the truth with real support -- a document, video, audio, support from an independent authority -- and go after the motive of whoever may have started the rumor.

Given a strong enough motive, people will continue to believe a lie, no matter how many facts they're exposed to or how much you undercut their supposed proof.

According to Guy Bergstrom you have to attack lies from three different directions:

1) Motive

- This may be the most important counter to a lie. Chip away at the motive. Expose those who keep repeating the lie and link them with other groups happily spreading the lie. Are they in it for money, fame, etc?

2) Facts

- Only after you've attacked the motive should you start laying out the facts.
- More important than the volume of evidence is the variety of evidence: photos, witnesses, documents, video.
- Use independent sources and physical evidence whenever possible. That gives you more credibility. If it all comes from one source, it's easier to attack.

3) Mockery

- Research shows that mockery is one of the most effective techniques for persuasion. When you provide evidence of the truth, and they counter with their own supposed evidence, it can make it look like a legitimate debate.
- Average people who don't have the time to research who's right and who's wrong may just throw up their hands, which is sometimes the whole point of a lie.

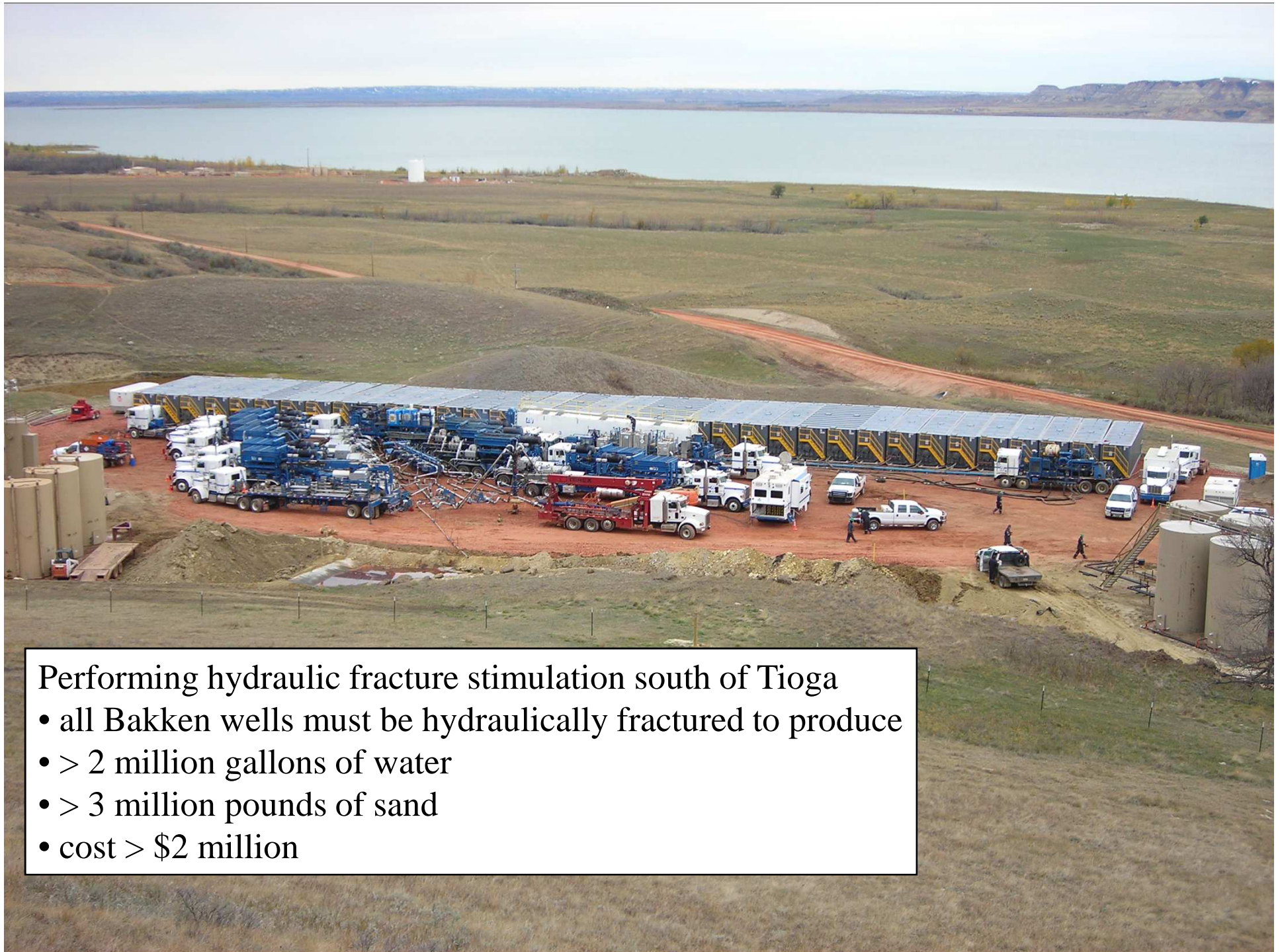
Hydraulic Fracturing

Lifeline to Domestic Energy

- **Hydraulic Fracturing**
 - **Why**
 - **How**
- **State Regulation**
- **Frac fluid**

WHY FRACK THE ROCK?

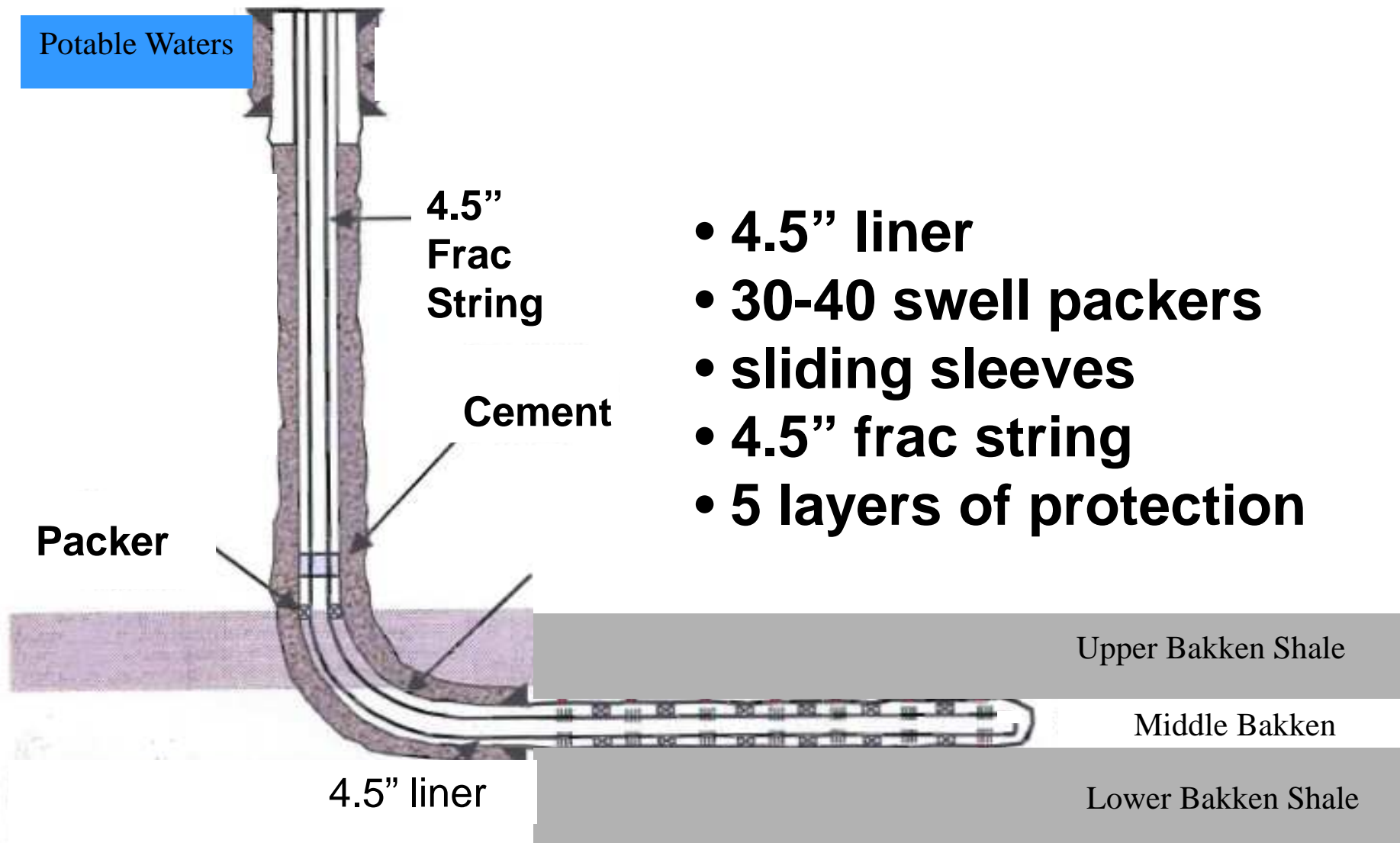
- **Easy oil and gas are already developed**
 - **flow without fracing**
- **Unconventional Reserves**
 - **reservoirs are tight**
 - **look at sample**
 - **uneconomic to produce without fracing**
 - **must create a path for oil to flow**



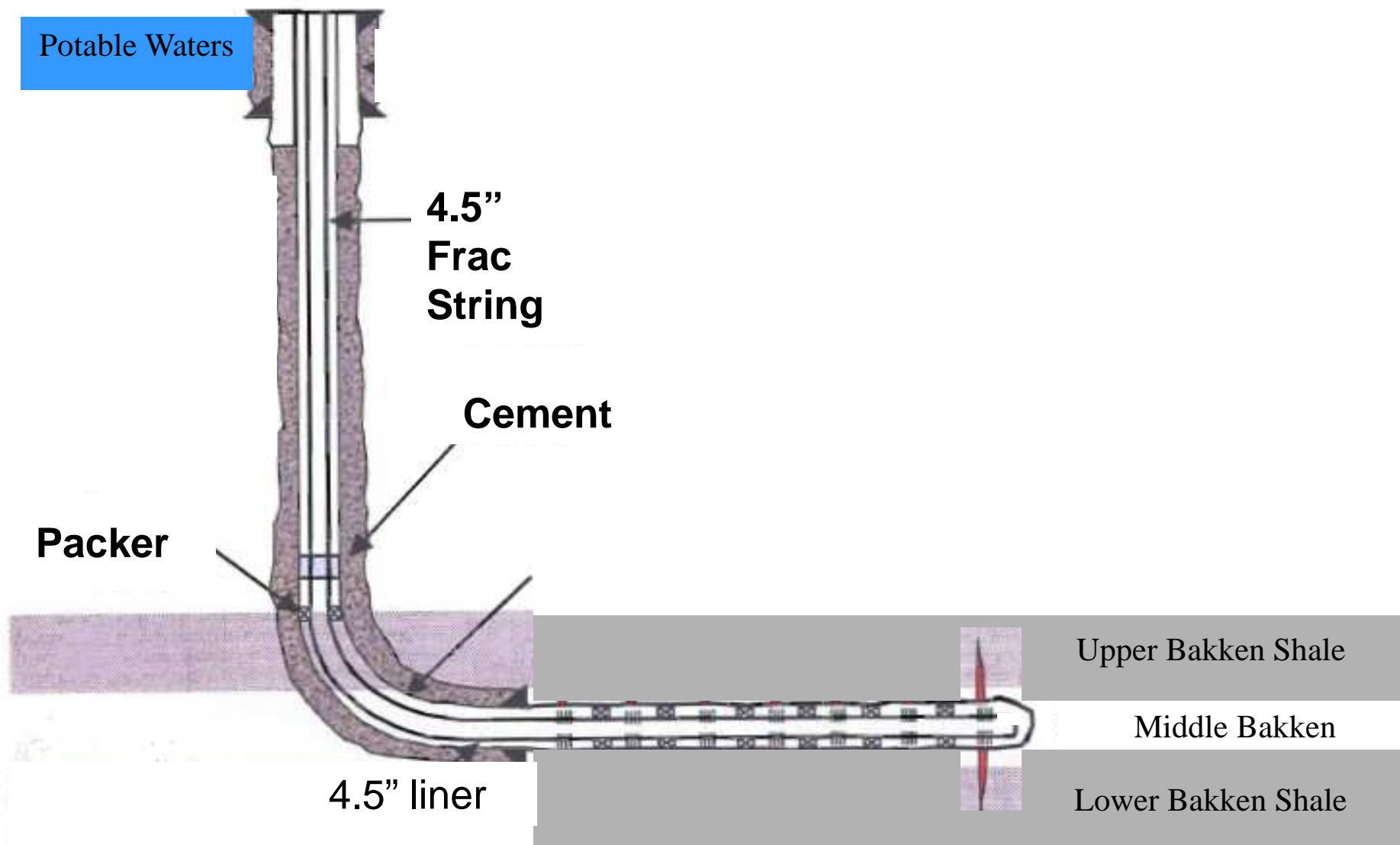
Performing hydraulic fracture stimulation south of Tioga

- all Bakken wells must be hydraulically fractured to produce
- > 2 million gallons of water
- > 3 million pounds of sand
- cost > \$2 million

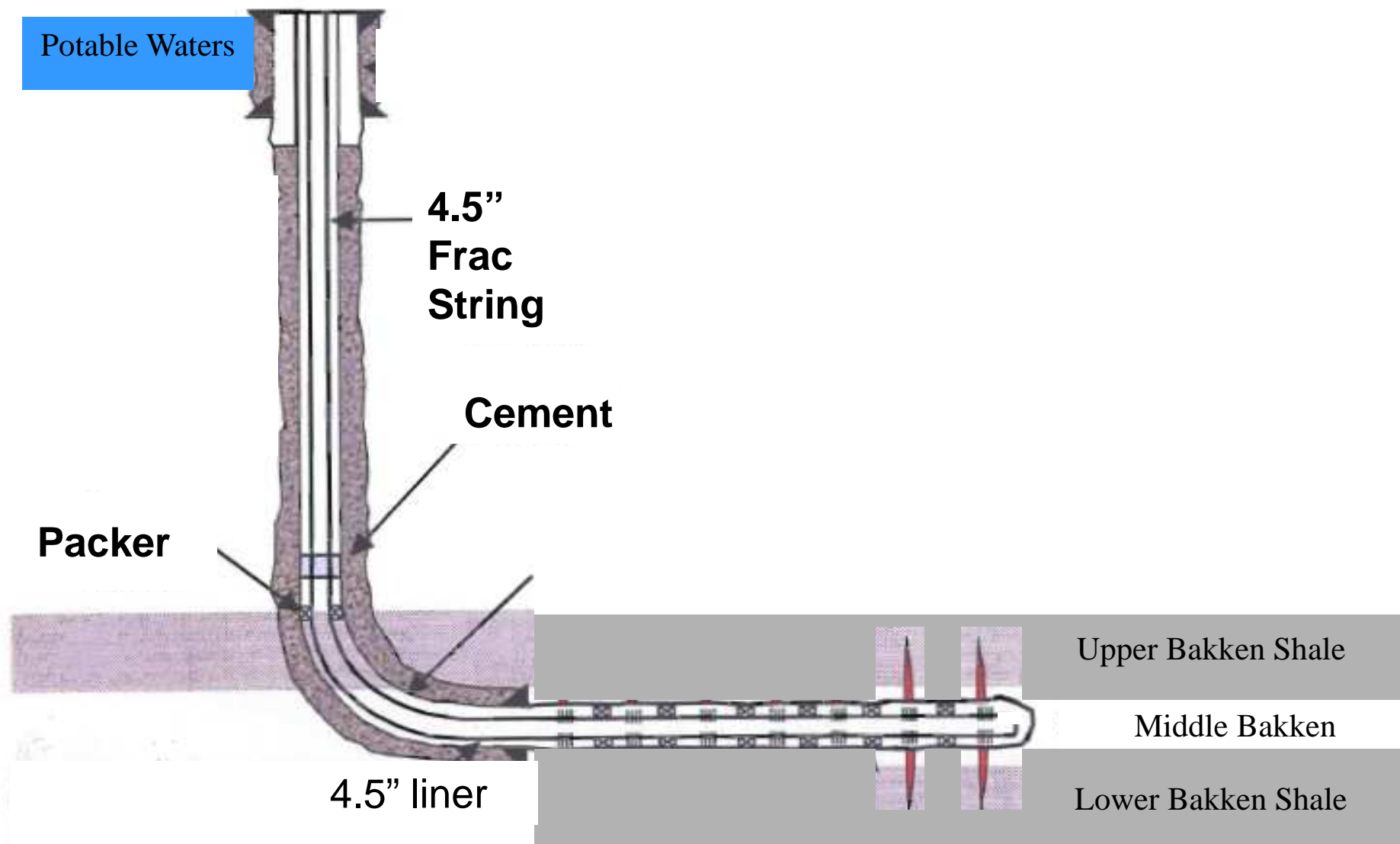
TYPICAL HORIZONTAL OIL WELL



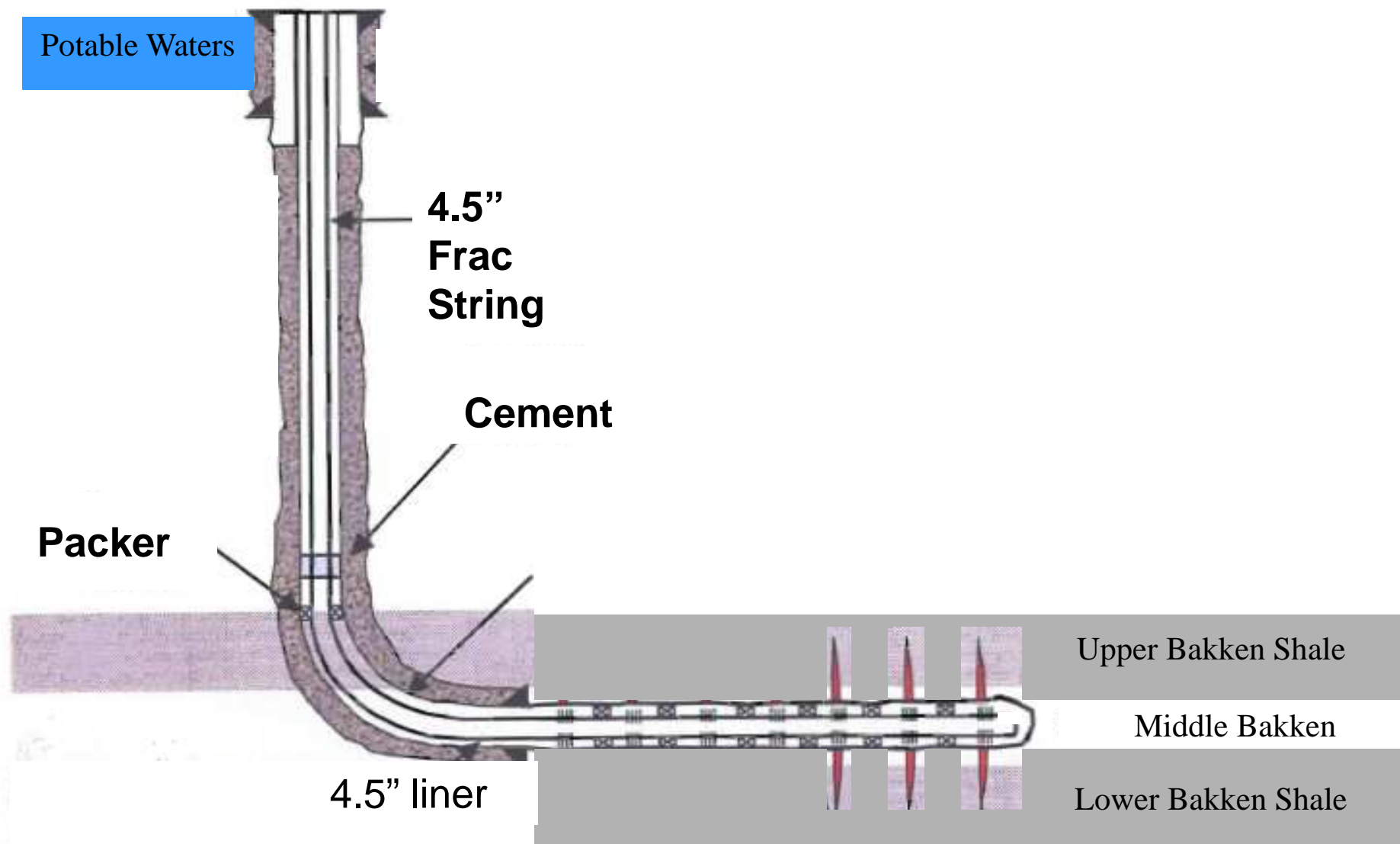
TYPICAL HORIZONTAL OIL WELL



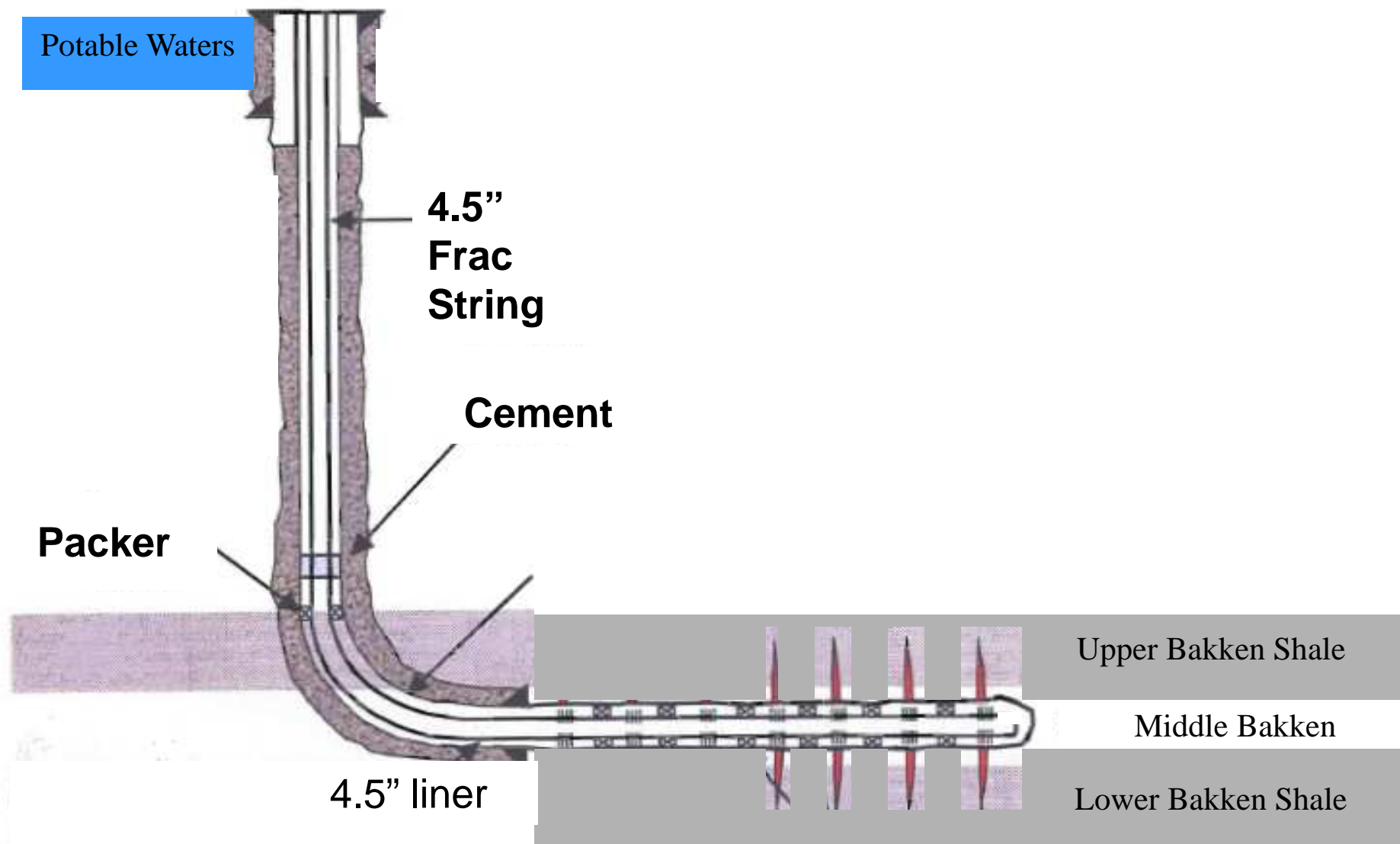
TYPICAL HORIZONTAL OIL WELL



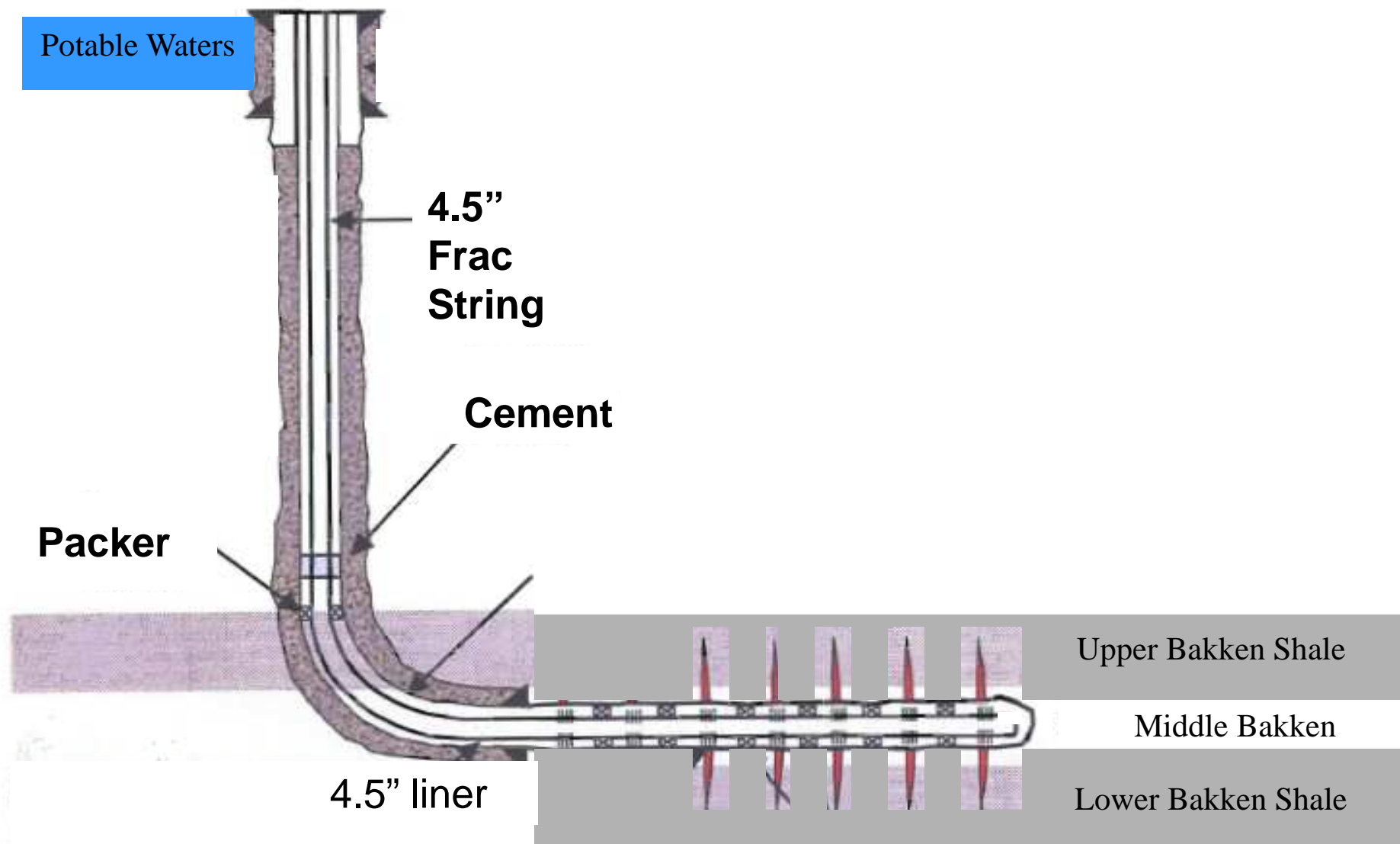
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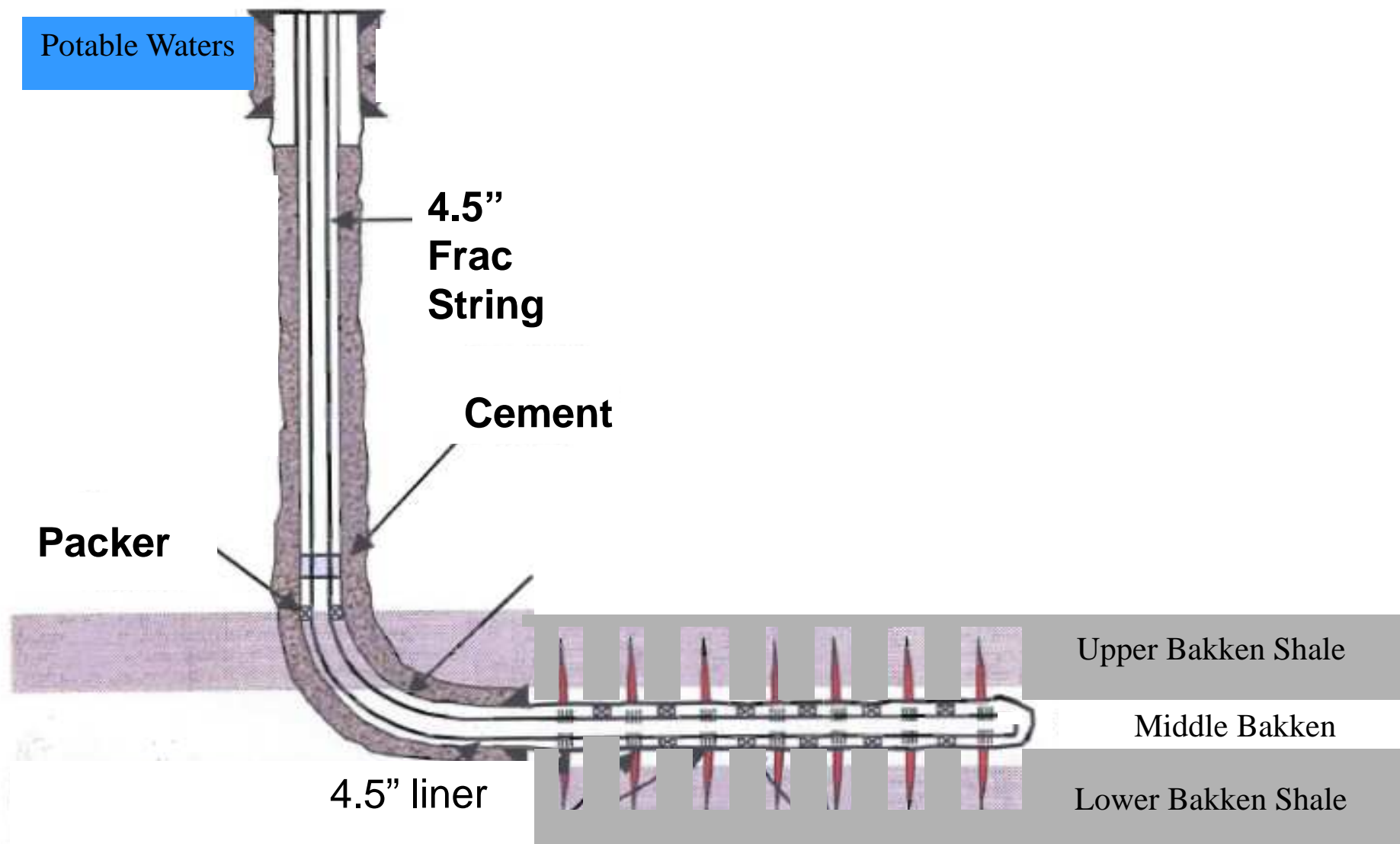
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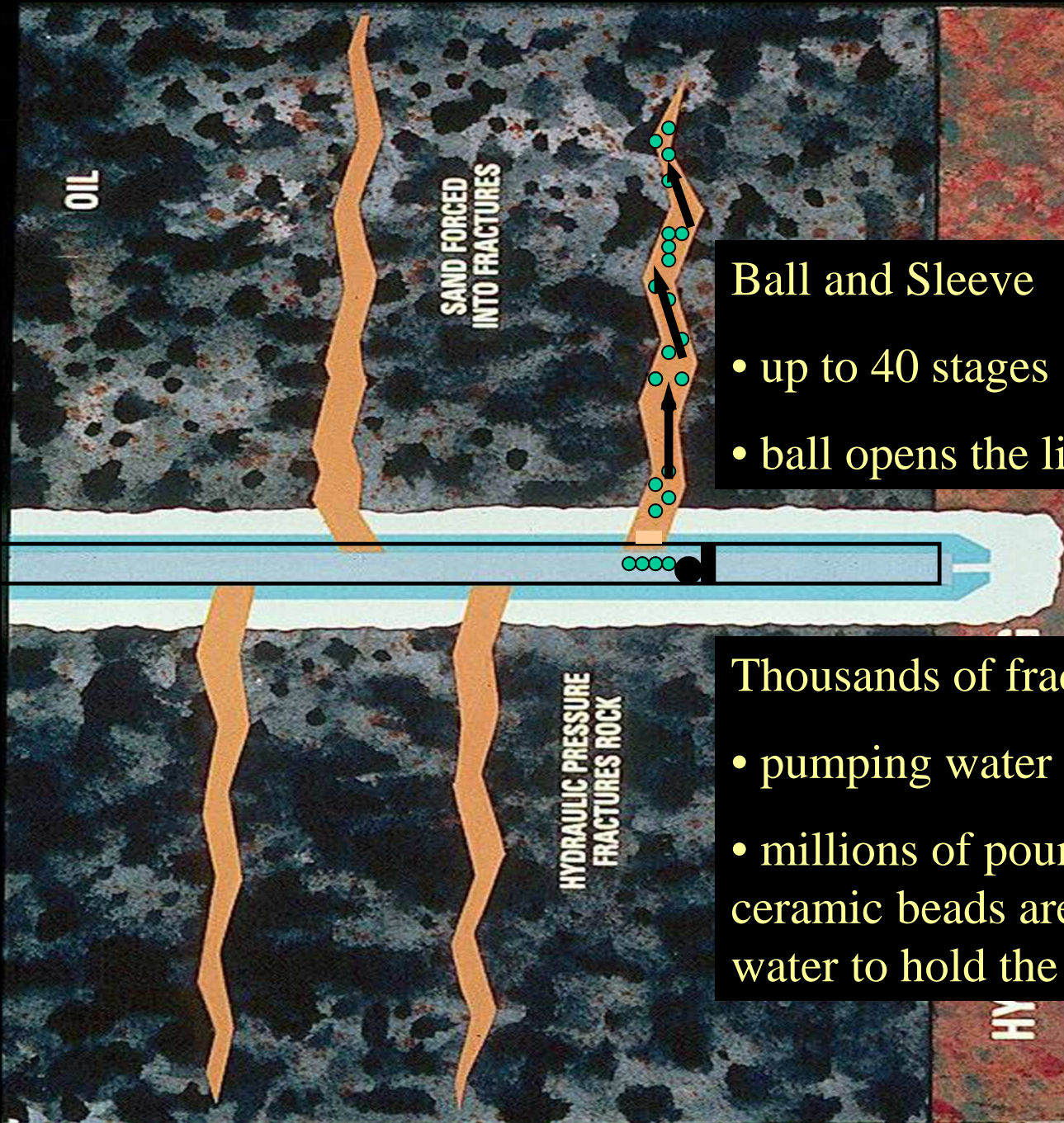


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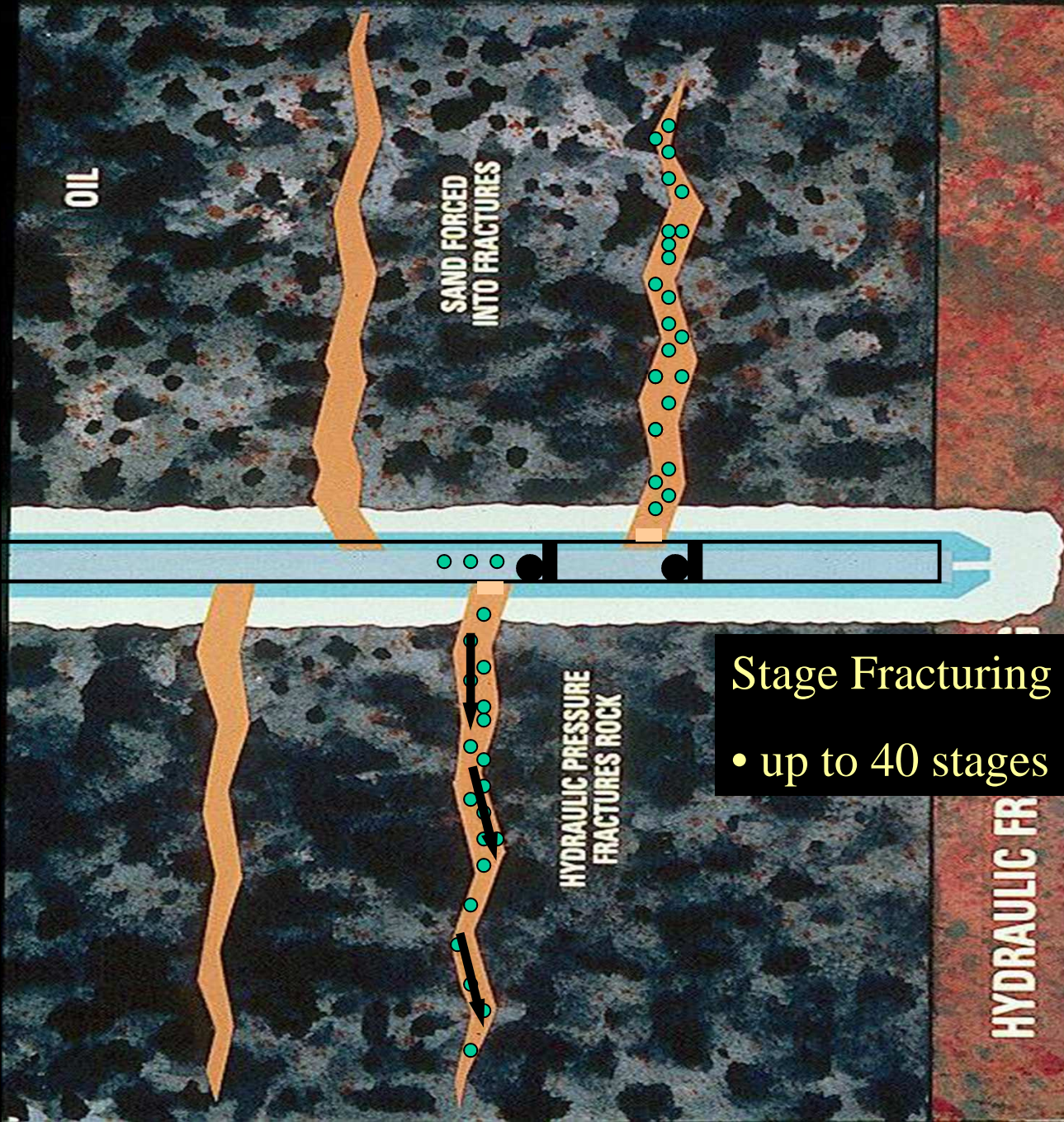


Ball and Sleeve

- up to 40 stages
- ball opens the liner sleeve

Thousands of fractures are created

- pumping water at 6,000-9,000 psi
- millions of pounds of sand and ceramic beads are pumped with the water to hold the fractures open.



Stage Fracturing

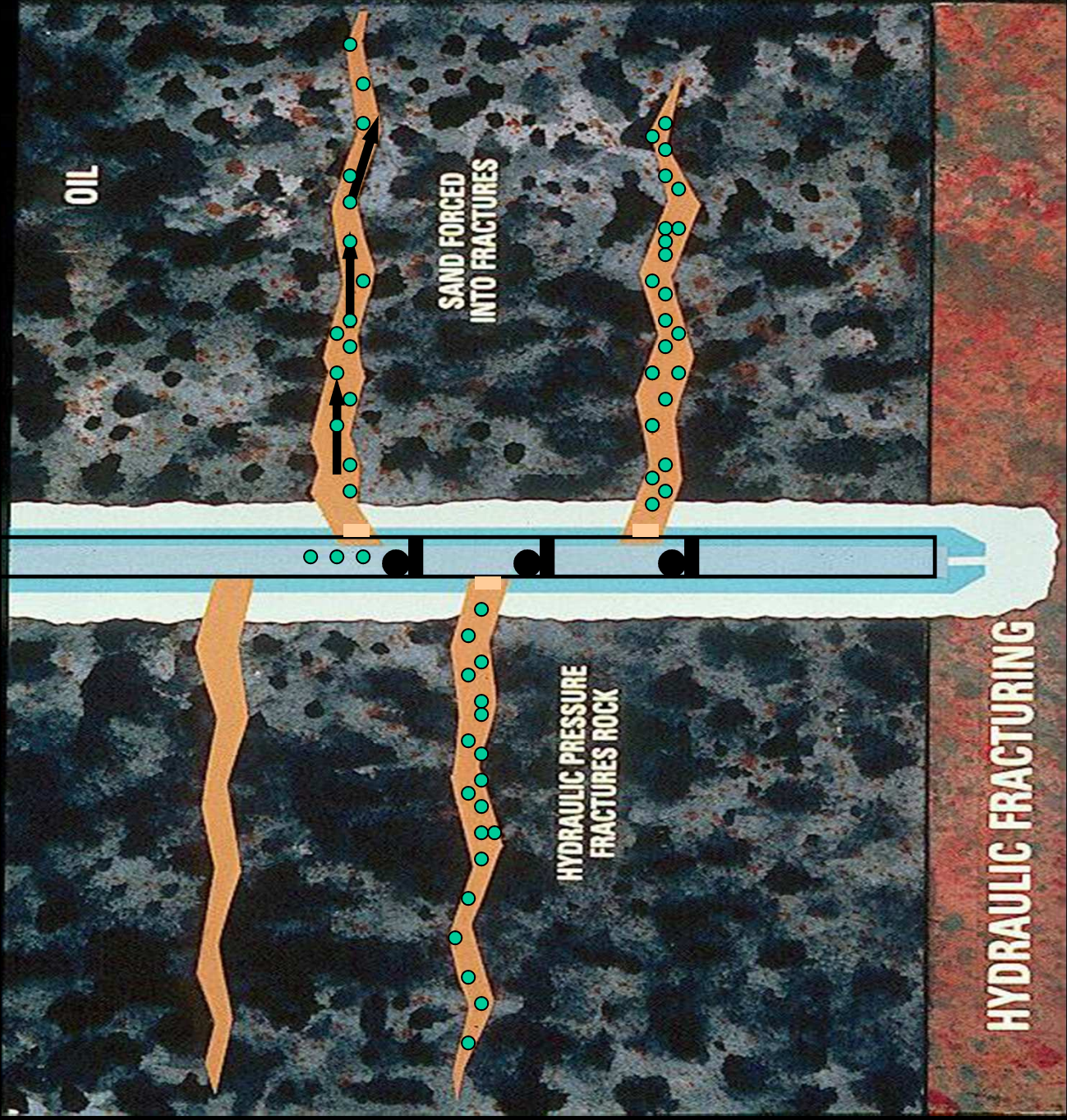
- up to 40 stages

OIL

SAND FORCED
INTO FRACTURES

HYDRAULIC PRESSURE
FRACTURES ROCK

HYDRAULIC FRACTURING

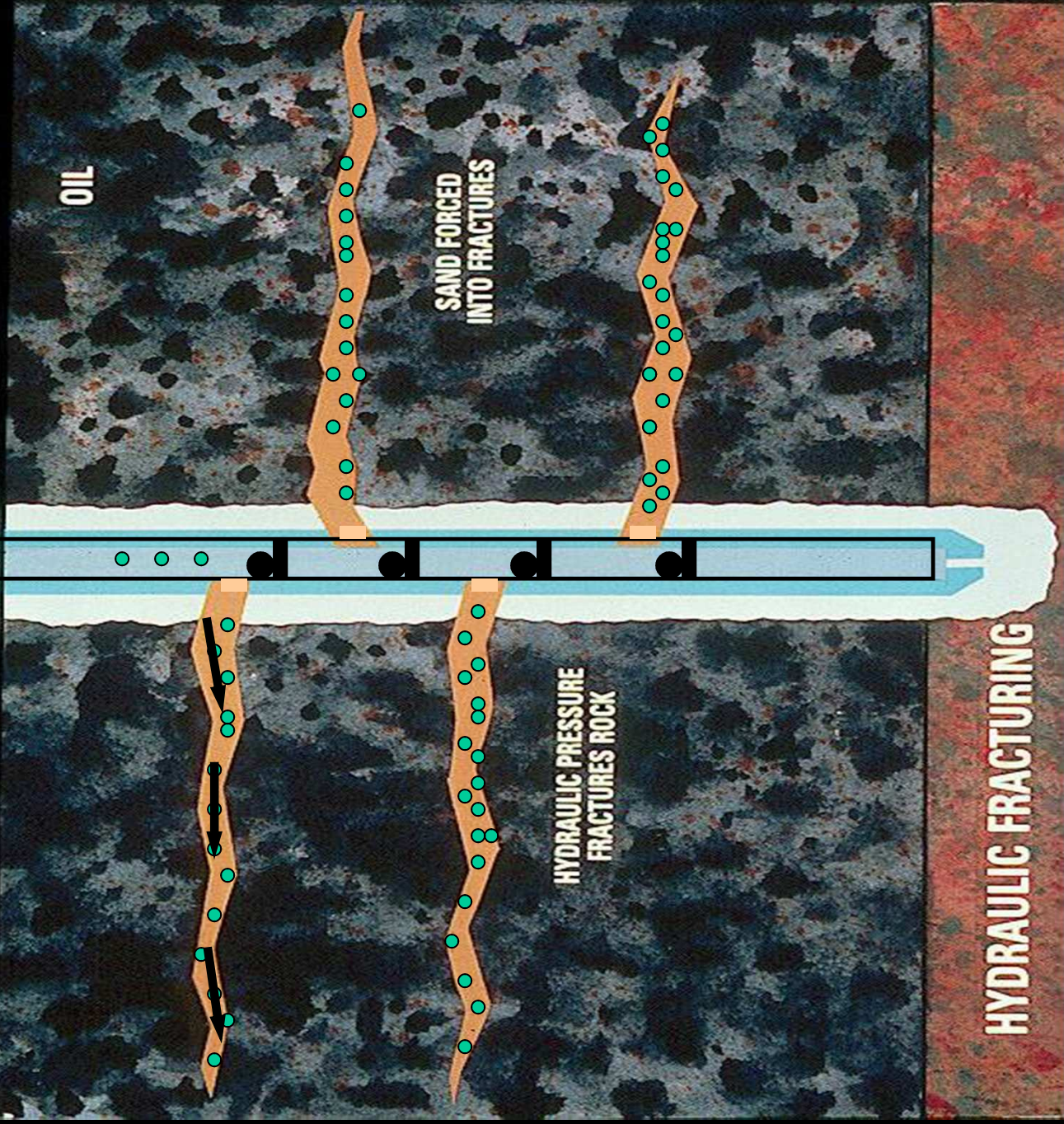


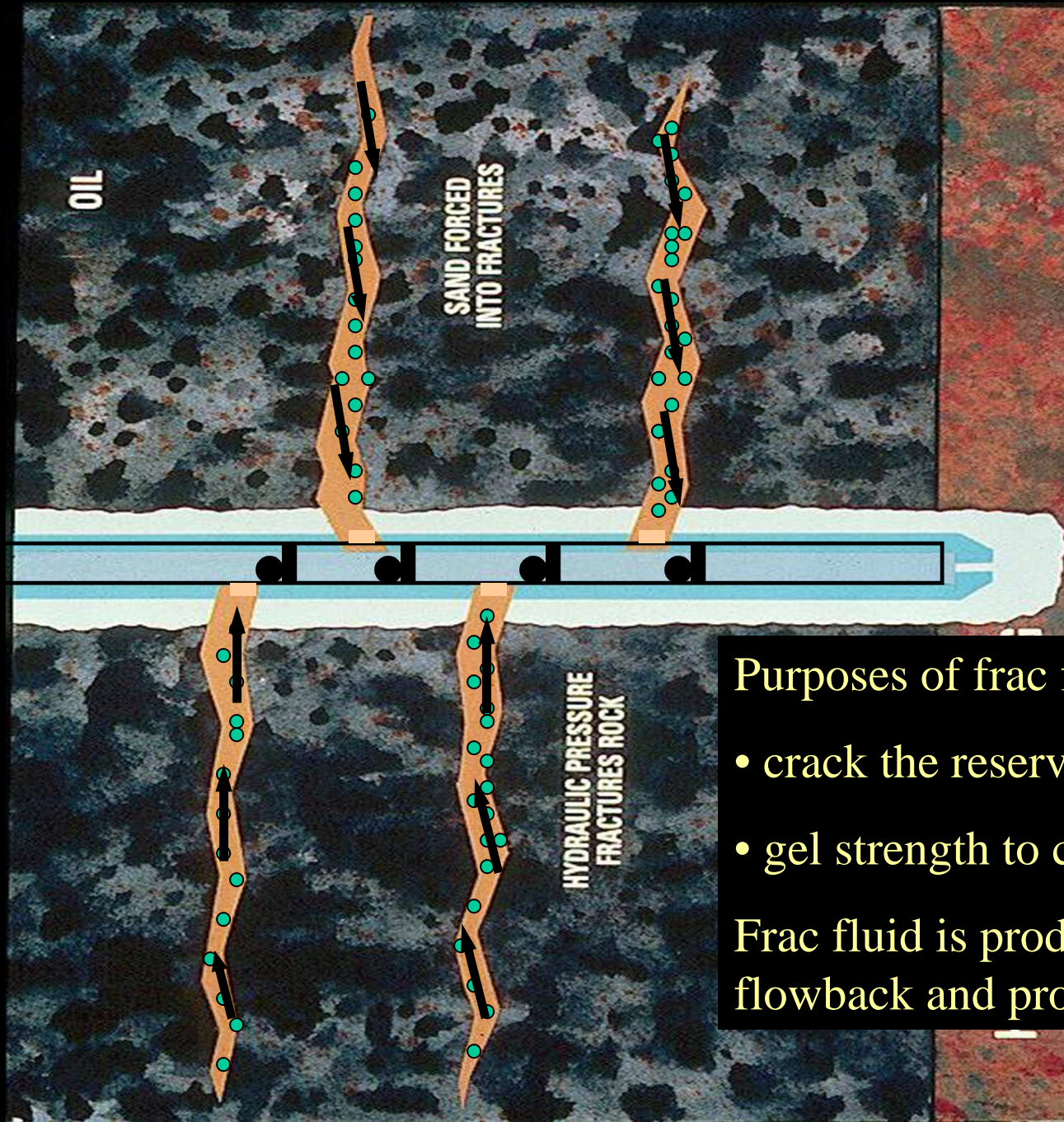
OIL

SAND FORCED
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FRACTURES ROCK

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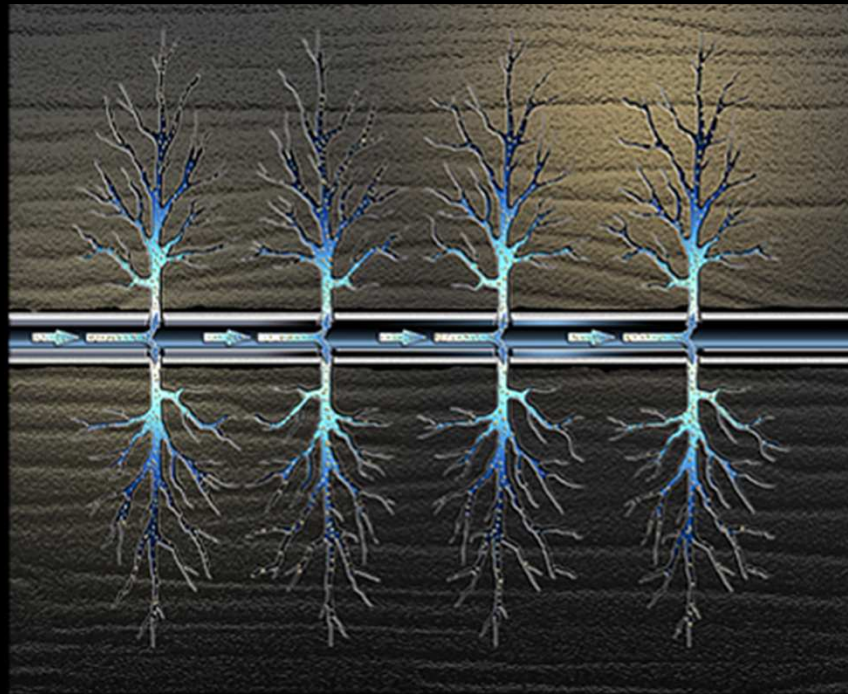


Purposes of frac fluid

- crack the reservoir
- gel strength to carry sand

Frac fluid is produced back as flowback and produced water

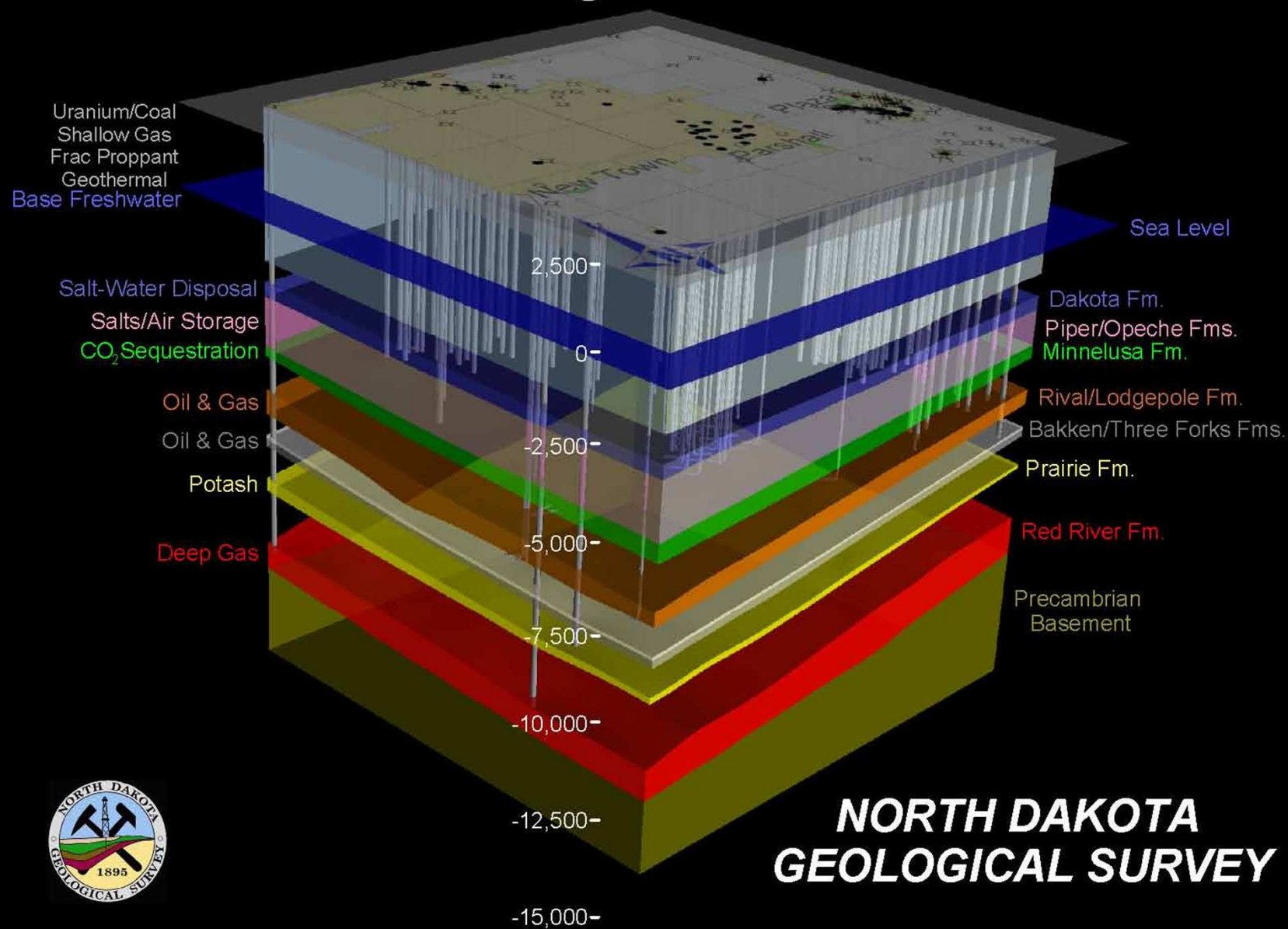
Each hydraulic fracturing stage
creates hundreds of fractures
extending several hundred feet
from wellbore



States have been regulating the full life cycle of hydraulic fracturing for decades

- **Geology of each sedimentary basin is different**
- **Water Appropriation Regulation**
- **Oil & Gas Regulation**
- **Health and Environmental Regulation**

Three-Dimensional Geologic Model of the Parshall Area



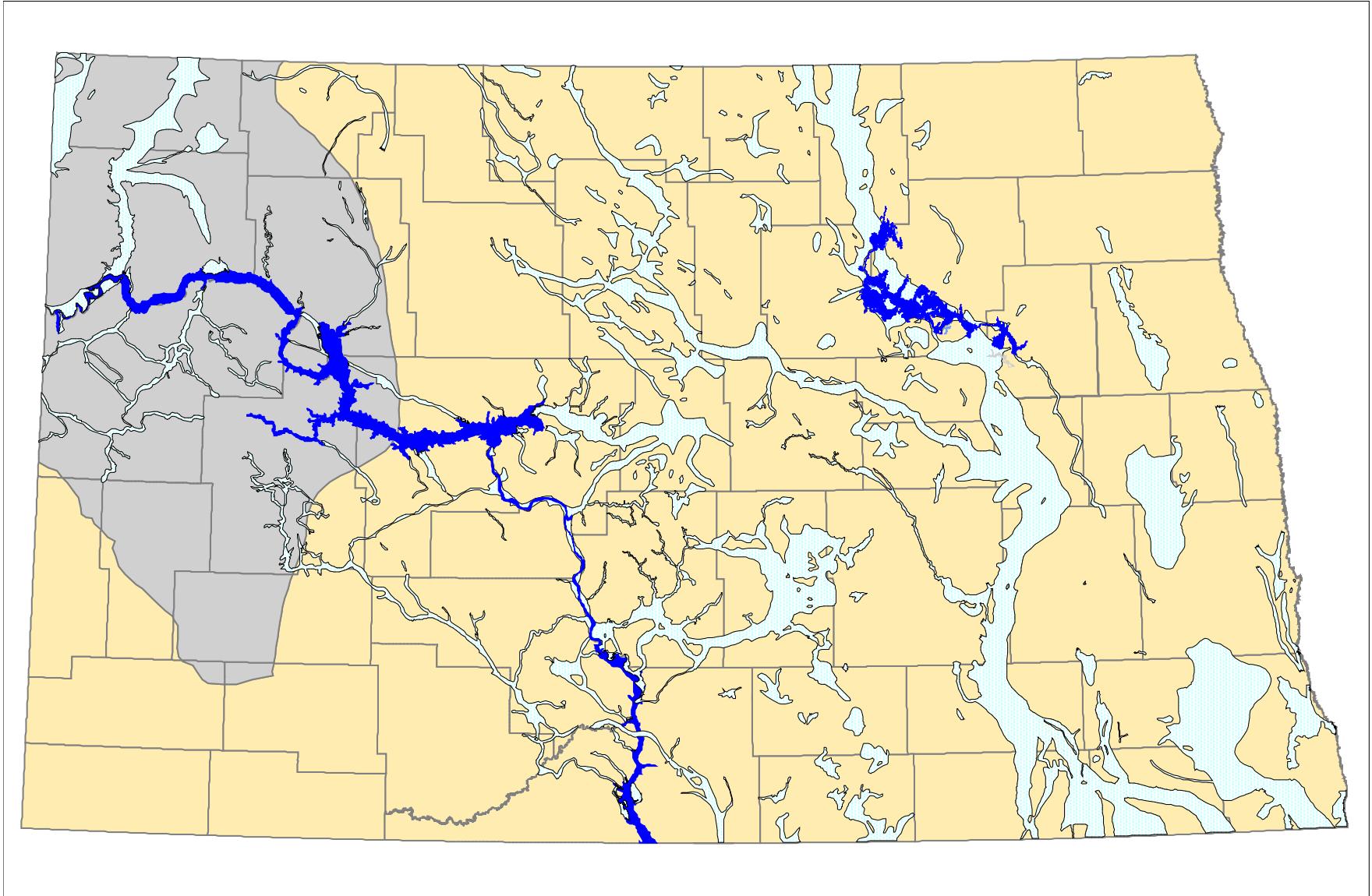
Water Commission Regulation

- **Regulate water appropriations**
- **Guard against withdrawals exceeding recharge**

Thirsty Horizontal Wells

- **2,000 - 3,000 wells / year**
- **15 - 25 years duration**
- **20 - 30 million gallons water / day**

Glacial Drift Aquifers



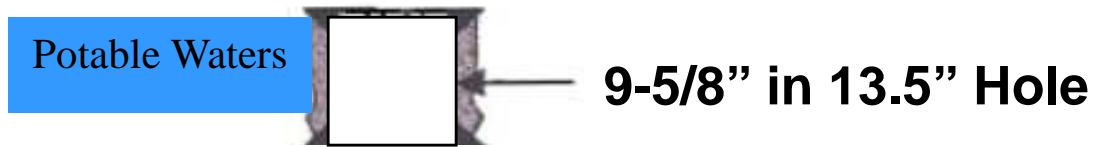
FRAC WATER NEEDS

- **Lake Sakakawea (Missouri River) is the best water resource**
 - **one inch contains 10 billion gal water**
 - **=5,000 wells @ 2 million gal/well**
 - **2 - 2.5-year supply**

Industrial Commission Regulation

- **Hydraulic fracturing**
 - **Two casing strings required**
 - **Both strings must be cemented**
 - **Pressure tests required**
 - **Frac is > 1 mile below potable water**

TYPICAL HORIZONTAL OIL WELL



- Drill with fresh water
- Total depth below lowest potable water
- Run in hole with surface casing
- 1st layer of surface water protection
- Cement casing back to surface of ground
- 2nd layer of surface water protection

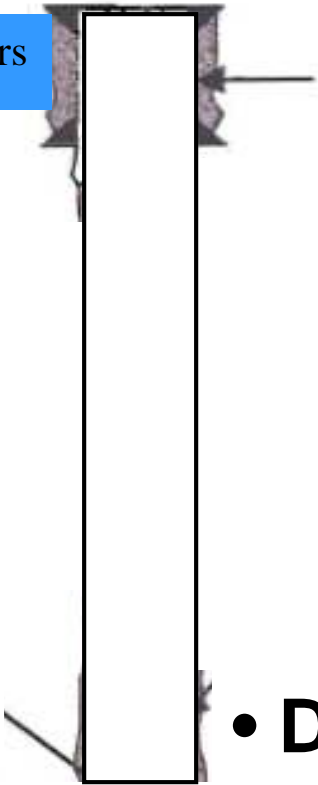
TYPICAL HORIZONTAL OIL WELL

Potable Waters

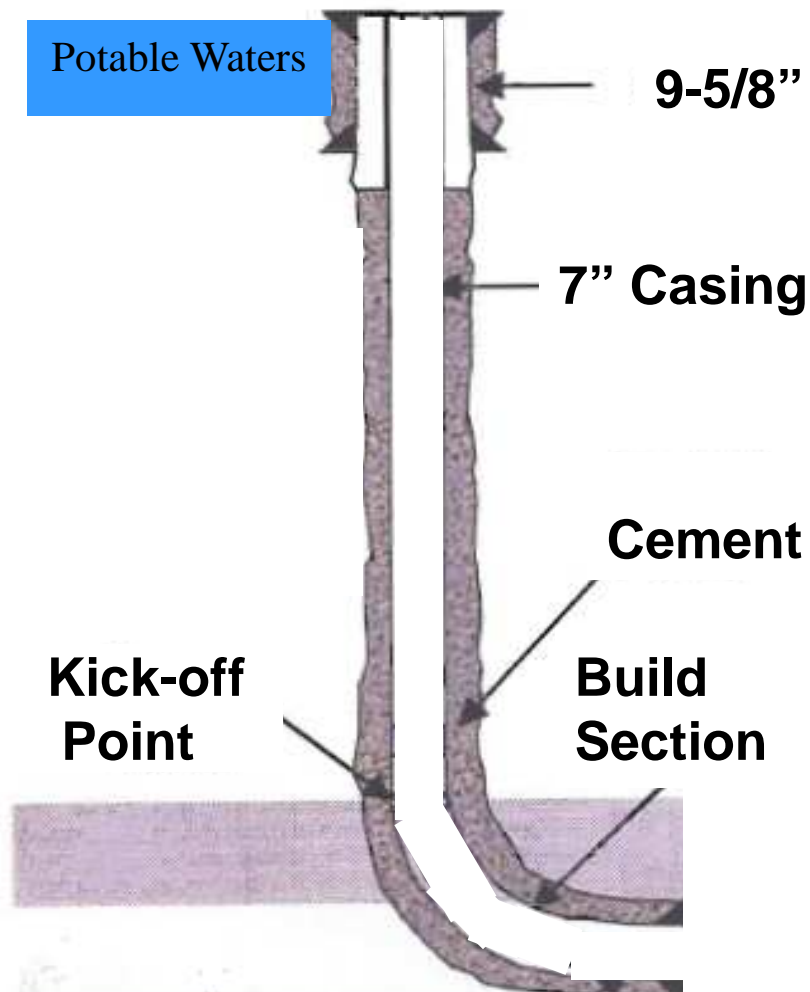
9-5/8" in 13.5" Hole

Kick-off
Point

- Drill vertically to kick-off point
- Run in hole with bent assembly
- Downhole mud motor

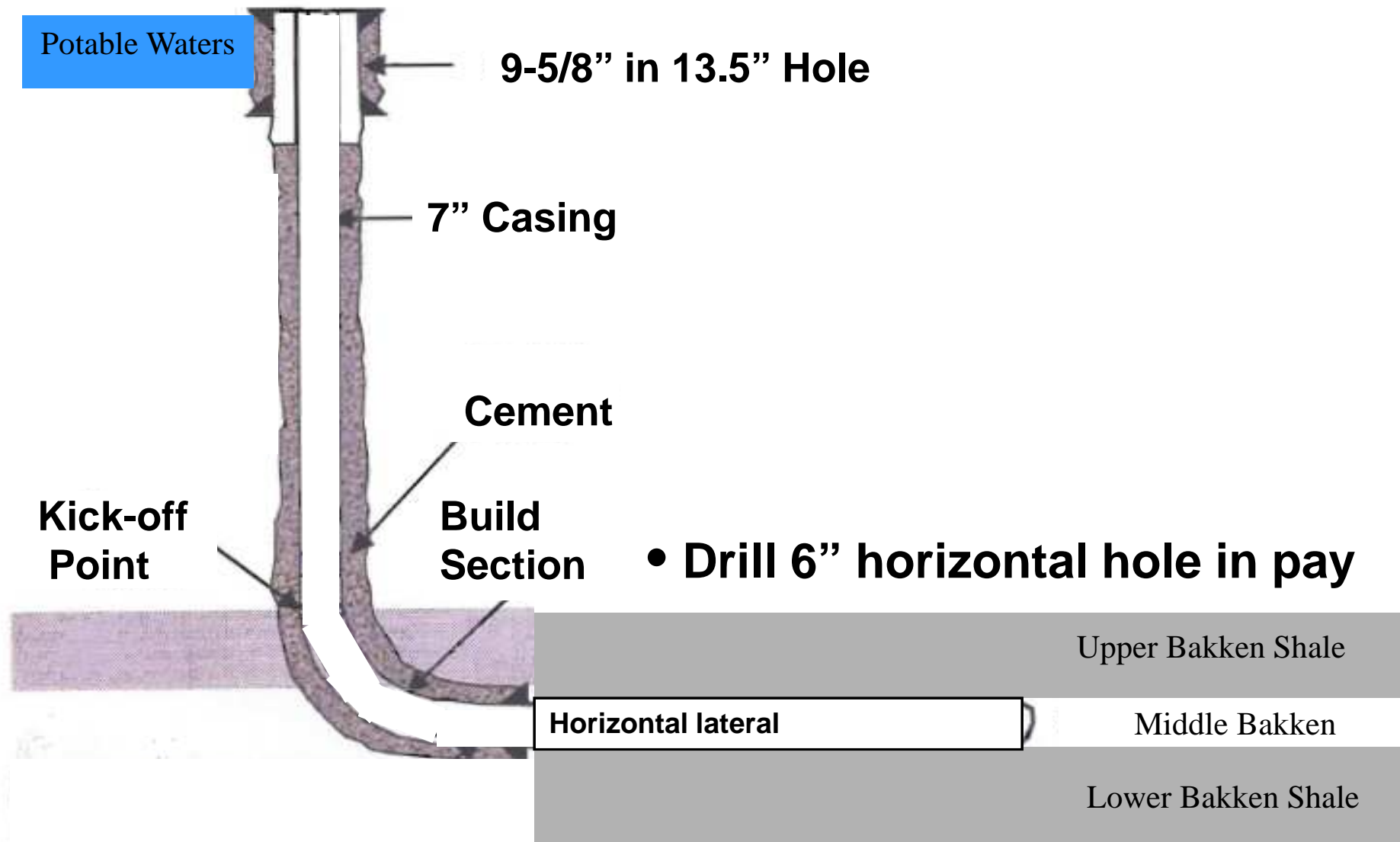


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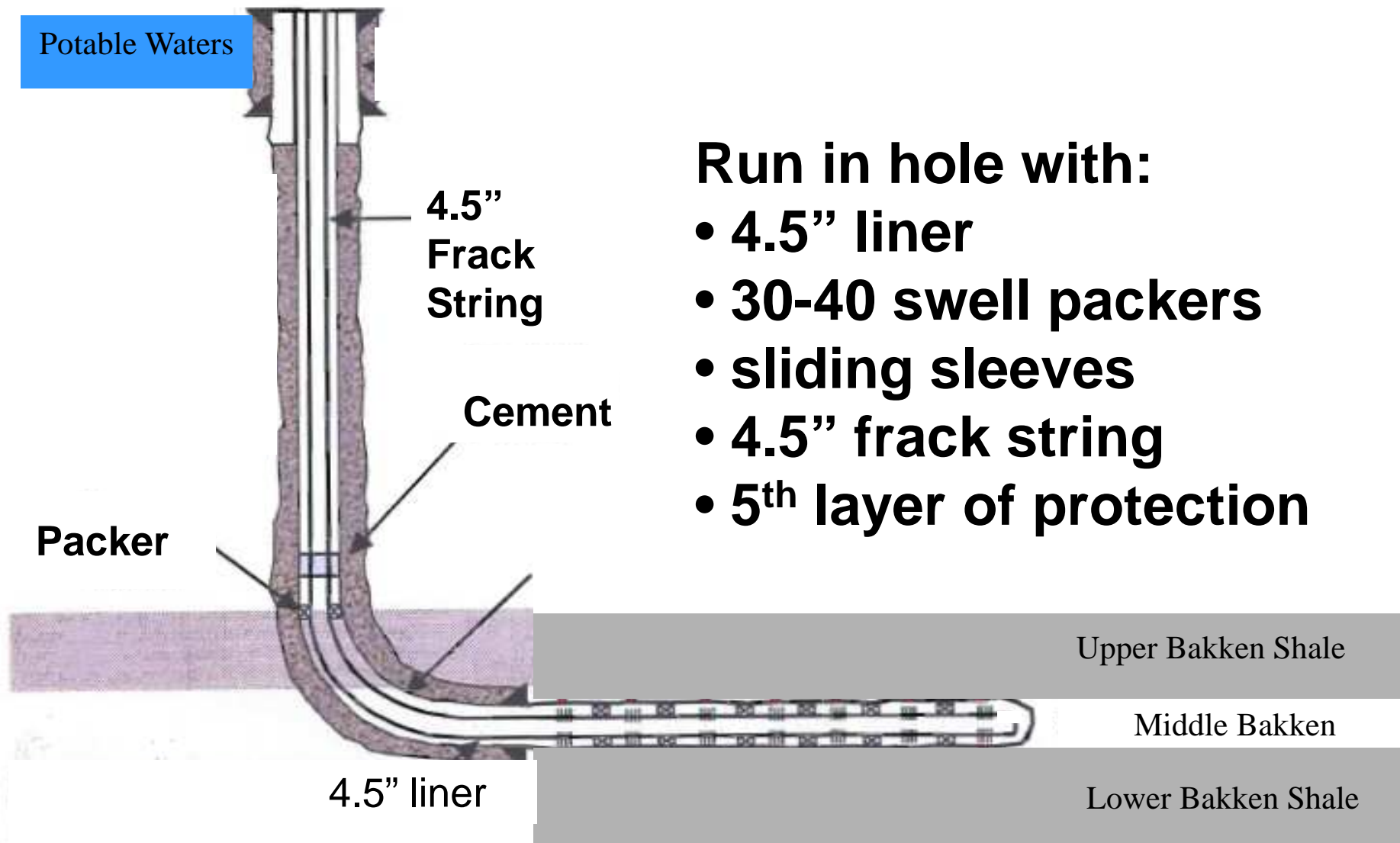


- Drill 8-3/4" hole to pay
- Run in hole with 7" casing
- 3rd layer of protection
- Cement 7" casing
- 4th layer of protection

TYPICAL HORIZONTAL OIL WELL



TYPICAL HORIZONTAL OIL WELL



Three-Dimensional Geologic Model of the Parshall Area

Uranium/Coal
Shallow Gas
Frac Proppant
Geothermal
Base Freshwater

Salt-Water Disposal
Salts/Air Storage
CO₂ Sequestration

Oil & Gas

Oil & Gas

Potash

Deep Gas

Sea Level

Dakota Fm.
Piper/Opeche Fms.
Minnelusa Fm.

Rival/Lodgepole Fm.
Bakken/Three Forks Fms.
Prairie Fm.

Red River Fm.

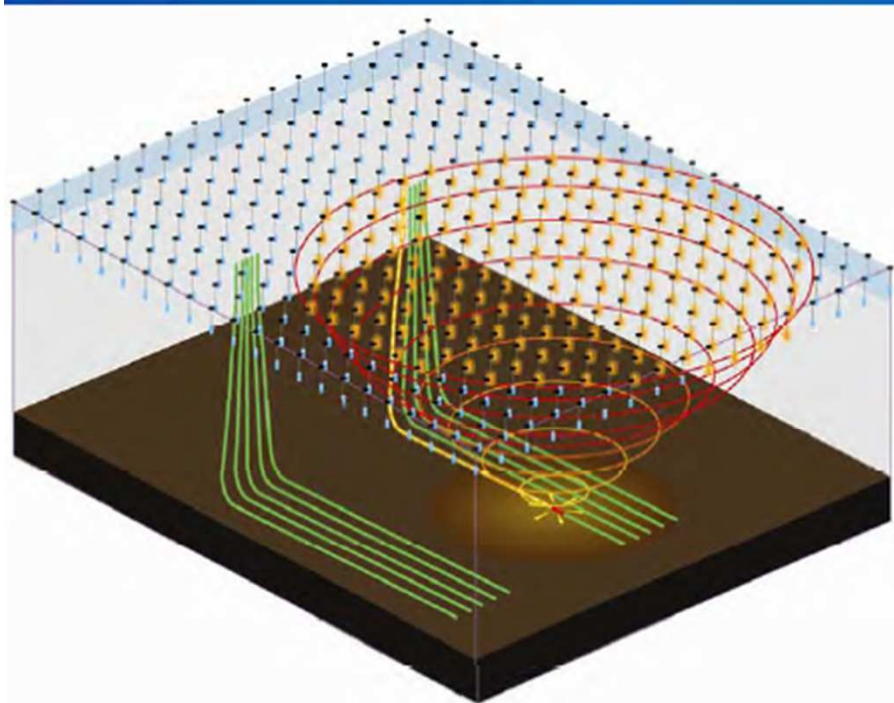
Precambrian
Basement



**NORTH DAKOTA
GEOLOGICAL SURVEY**

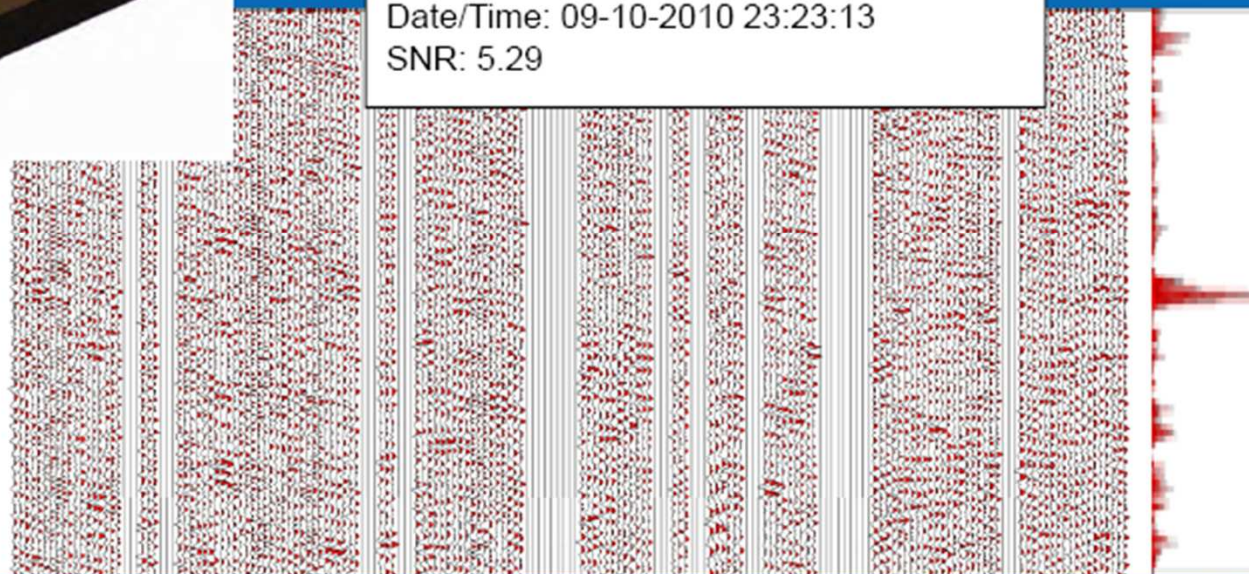
-15,000-

PSET Imaging

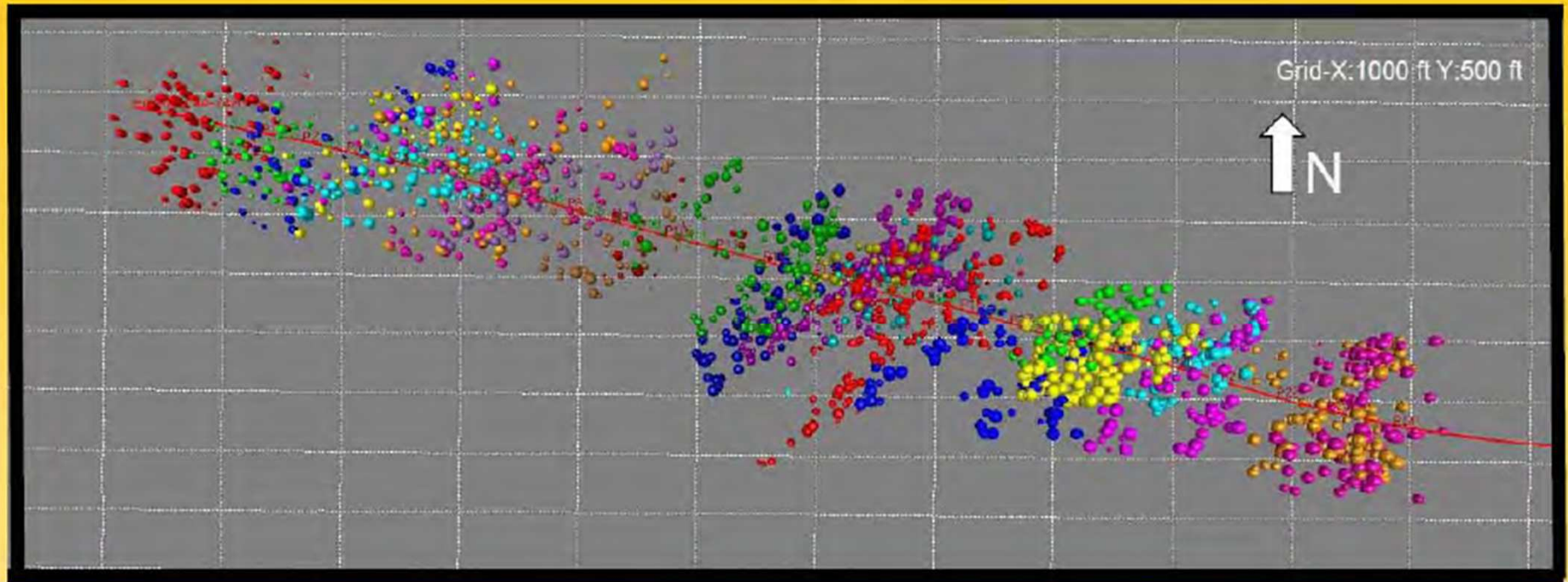


Microseismic events are imaged via PSET, a migration based imaging algorithm.

X: 2235819 Y: 17474568 Z: 9854
Date/Time: 09-10-2010 23:23:13
SNR: 5.29



“Excellent ‘frac saturation’”

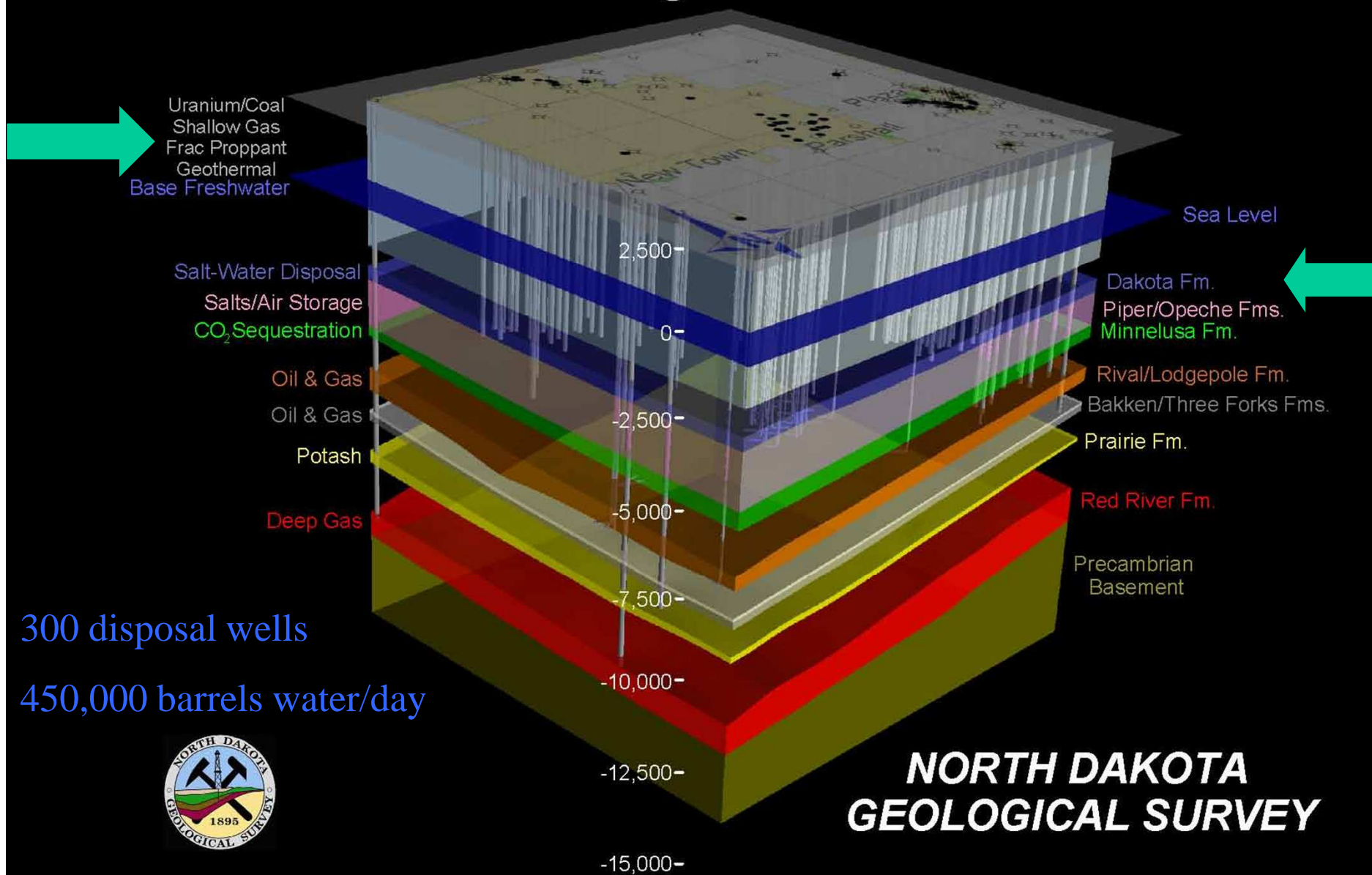


- **24-Stage Frac / IP: 2,558 BOE/D**
- **Excellent “frac saturation”** evidenced by minimal gaps of unfraced rock along the wellbore with some stages impacting the same rock volume.
- **Minimal gaps along NE trending natural fractures** where the frac follows large regionally extensive fractures. These areas already have good naturally occurring fractures.
- **Lateral frac wings that average 750’** on either side of the wellbore. This is consistent with our other fracs and planned spacing pattern for full field development.

Industrial Commission Regulation

- **Water flow back after frac**
 - **Storage in open pits prohibited**
 - **Disposal wells permitted through
Underground Injection Program**
 - **Disposal zone is 2,500 feet below
potable waters with impermeable
shale between**

Three-Dimensional Geologic Model of the Parshall Area



Health Department Regulation

- **Cleanup of discharge to environment**
- **Coordinate with local Emergency Managers**
- **Emergency Planning and Community
Right-to-know Act (EPCRA)**
- **Congress passed for storing and handling of
chemicals**
- **Requires material safety data sheet (MSDS)
for each chemical on location**

- **Compound**
 - **Purpose**
 - **Common application**
- Fresh **Water** – 80.5%
- Proppant – 19.0%
 - Allows the fractures to remain open so the oil and gas can escape
 - Drinking water filtration, **play ground sand**
- Acids - 0.12%
 - Help dissolve minerals and initiate fractures in rock (pre-fracture)
 - **Swimming pool cleaner**
- Petroleum distillates – 0.088%
 - Dissolve polymers and minimize friction
 - **Make-up remover**, laxatives, and candy
- Isopropanol – 0.081%
 - Increases the viscosity of the fracture fluid
 - **Glass cleaner**, antiperspirant, and hair color
- Potassium chloride – 0.06%
 - Creates a brine carrier fluid
 - Low-sodium **table salt substitute**
- Guar gum – 0.056%
 - Thickens the water to suspend the sand
 - **Thickener used in cosmetics**, baked goods, ice cream, toothpaste, sauces, and salad dressing
- Ethylene glycol – 0.043%
 - Prevents scale deposits in the pipe
 - Automotive **antifreeze**, household cleansers, deicing, and caulk



- Sodium or potassium carbonate – 0.011%
 - Improves the effectiveness of other components, such as cross-linkers
 - Washing soda, detergents, **soap**, water softeners, glass and ceramics
- Sodium Chloride – 0.01%
 - Delays break down of the gel polymer chains
 - **Table Salt**
- Polyacrylamide – 0.009%
 - Minimizes friction between fluid and pipe
 - **Water treatment**, soil conditioner
- Ammonium bisulfite – 0.008%
 - Removes oxygen from the water to protect the pipe from corrosion
 - Cosmetics, **food and beverage processing**, water treatment
- Borate salts – 0.007%
 - Maintain fluid viscosity as temperature increases
 - Used in laundry **detergents**, hand soaps and cosmetics
- Citric Acid – 0.004%
 - Prevents precipitation of metal oxides
 - **Food additive**; food and beverages; lemon juice
- N, n-Dimethyl formamide – 0.002%
 - Prevents the corrosion of the pipe
 - Used in **pharmaceuticals**, acrylic fibers and plastics
- Glutaraldehyde – 0.001%
 - Eliminates bacteria in the water
 - **Disinfectant**; Sterilizer for medical and dental equipment



Hydraulic Fracturing Stimulation is Safe

- **IOGCC survey—no contamination**
- **EPA survey – no contamination**
- **GWPC study verifies State's regs**
- **GWPC National Registry f/chemicals**
 - **FracFocus**

SHALLOW GAS PROJECT



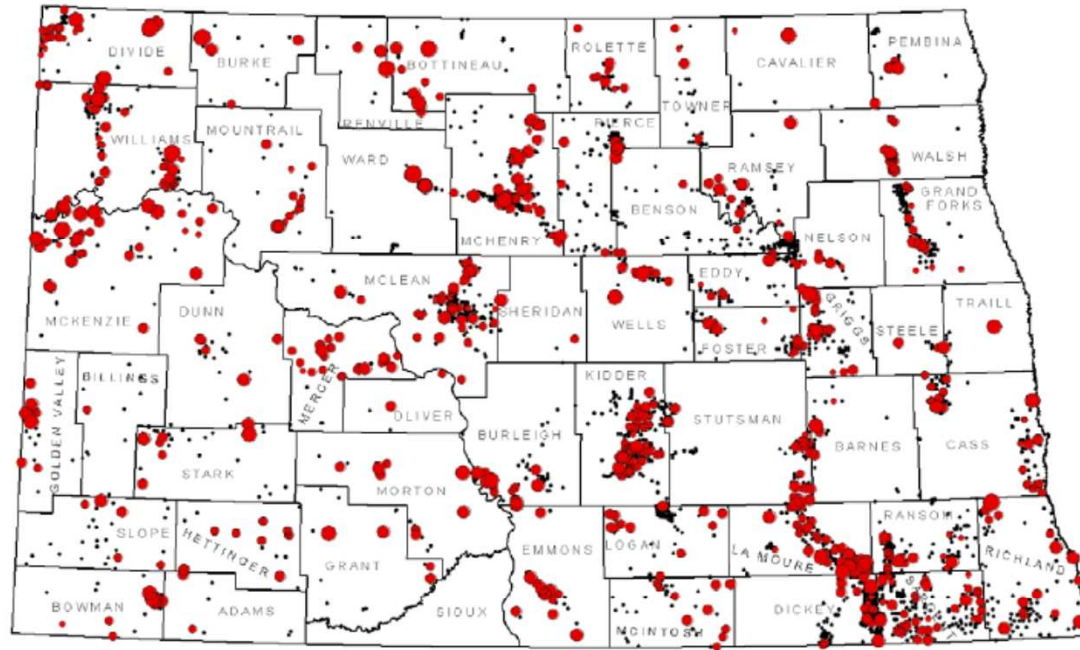
The Geological Survey tested 4,325 NDSWC monitoring wells for methane in 52 of the 53 counties in North Dakota from 2006-2010.



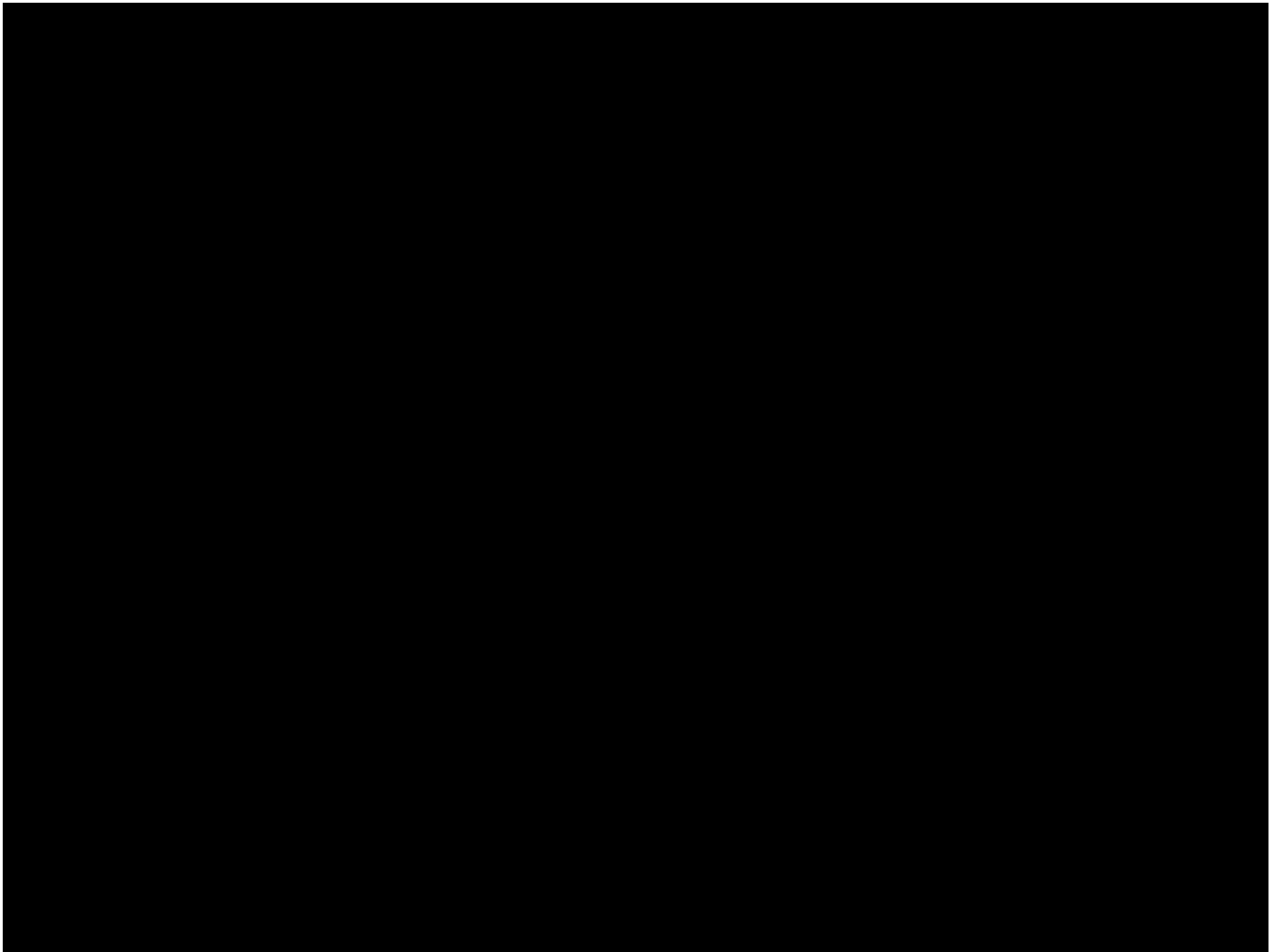
Methane bubbling to the surface in a two-inch NDSWC monitoring well.

The Geological Survey recently completed phase I of a study of shallow natural gas in North Dakota. We investigated 9,400 ND State Water Commission monitoring well sites, tested 4,325 wells, and detected methane in 905 wells. Approximately 20% of the wells contained detectable gas.

During the second phase of the project, thirty groundwater samples, primarily from eastern North Dakota, will be analyzed for dissolved gas composition, isotopes, and general chemistry. This will enable us to determine the source of the gas and identify chemical groundwater signatures that might assist the oil and gas industry in natural gas exploration.



Monitoring wells that contained methane are indicated with red dots, black dots are wells that contained no detectable methane. The red dots are sized to reflect the concentration of methane -- the higher the concentration, the larger the dot.



BAKKEN FORMATION

NDIC-DMR estimated

- appr 200-300 billion bo in place in ND
- 34-yr supply @ current US consumption
 - 2.1 billion bo recovery in ND w/1well
 - 4.2 billion bo recovery in ND w/2wells
 - 1-7 horizontal wells / spacing unit

USGS estimated (independent simultaneous study)

- 2.6 billion bo recovery in ND
- largest continuous resource they have assessed in lower 48 States





THREE FORKS FORMATION

NDIC-DMR estimated

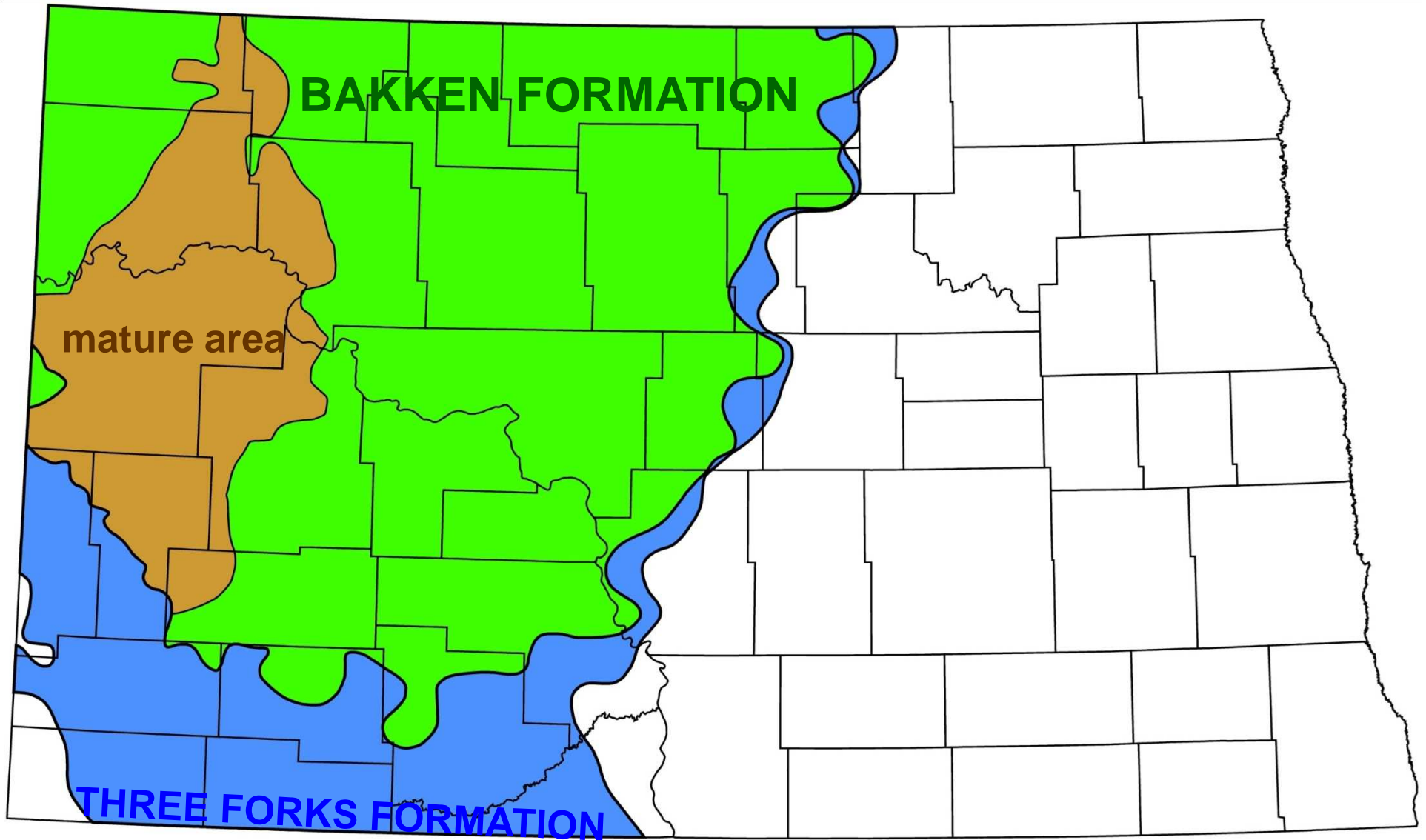
- **1.9 billion bo recovery in ND w/1well**
- **3.8 billion bo recovery in ND w/2wells**

USGS: (No study)

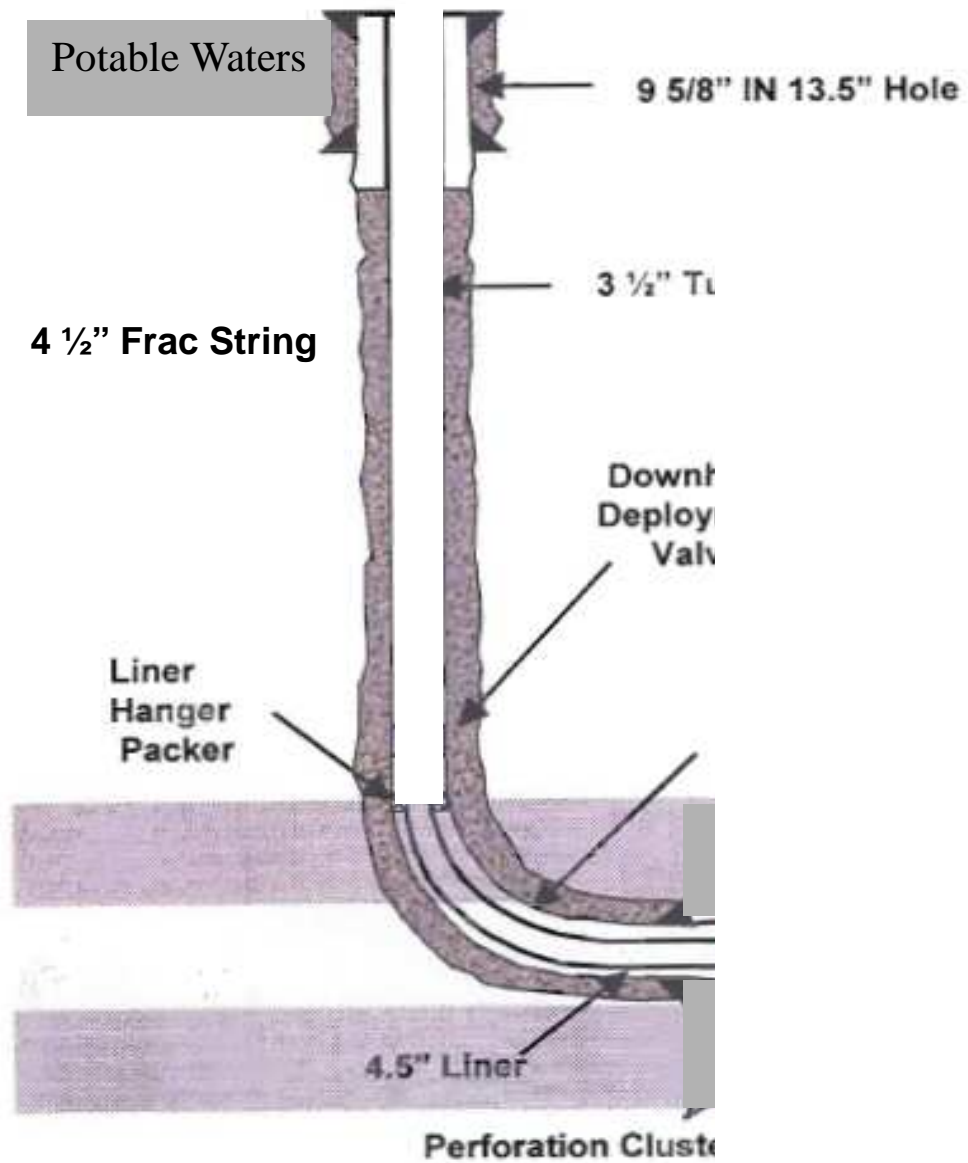
BAKKEN PROVIDES ENERGY/JOBS

- **Over 5,000 wells in next 3 yrs**
 - **will double our cur wells @ cur rigs**
 - **all require hydraulic stimulation**
 - **provides significant domestic energy**
 - **creates numerous jobs**

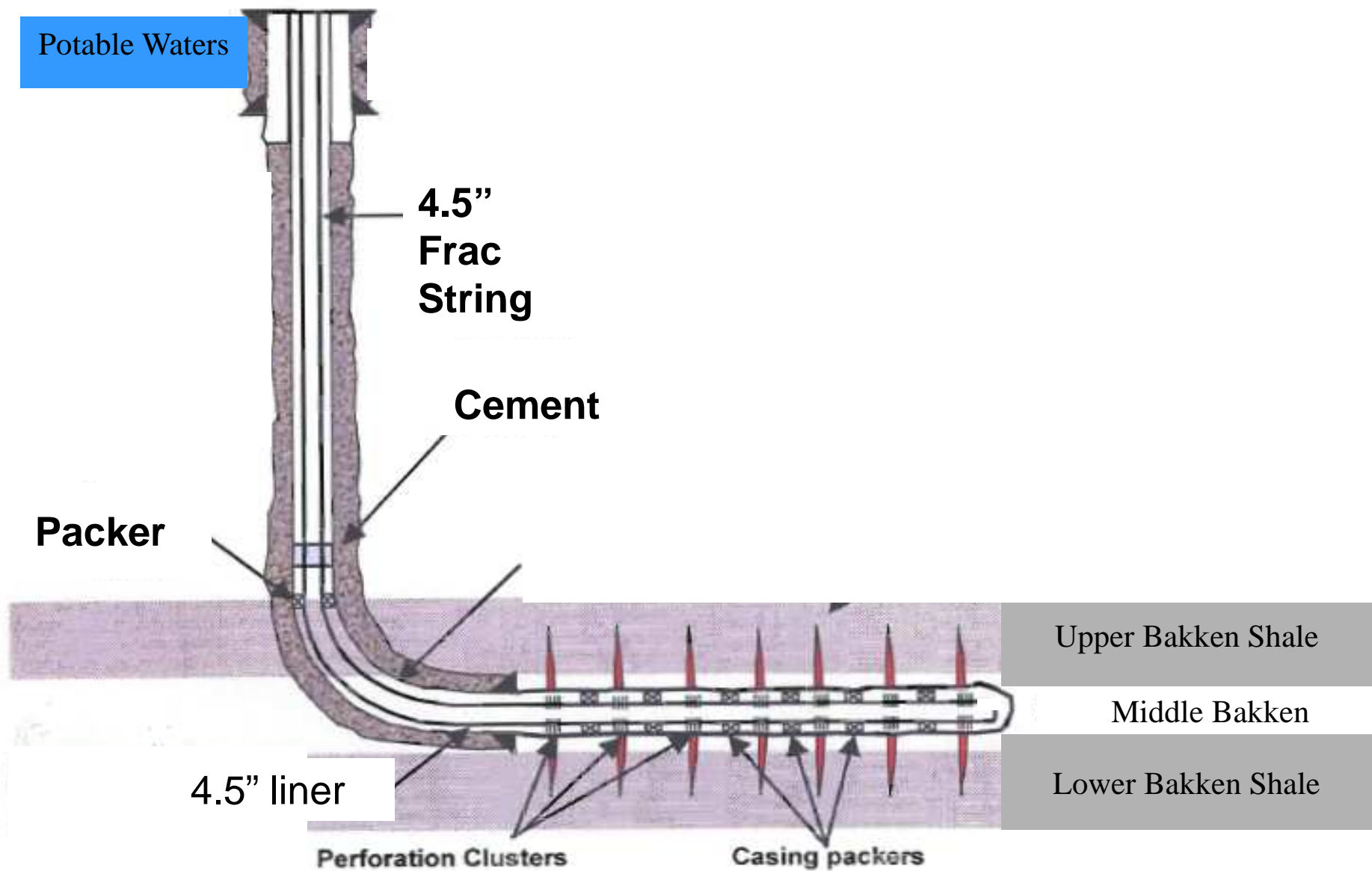
ESTIMATED MATURE AREA OF THE BAKKEN FORMATION

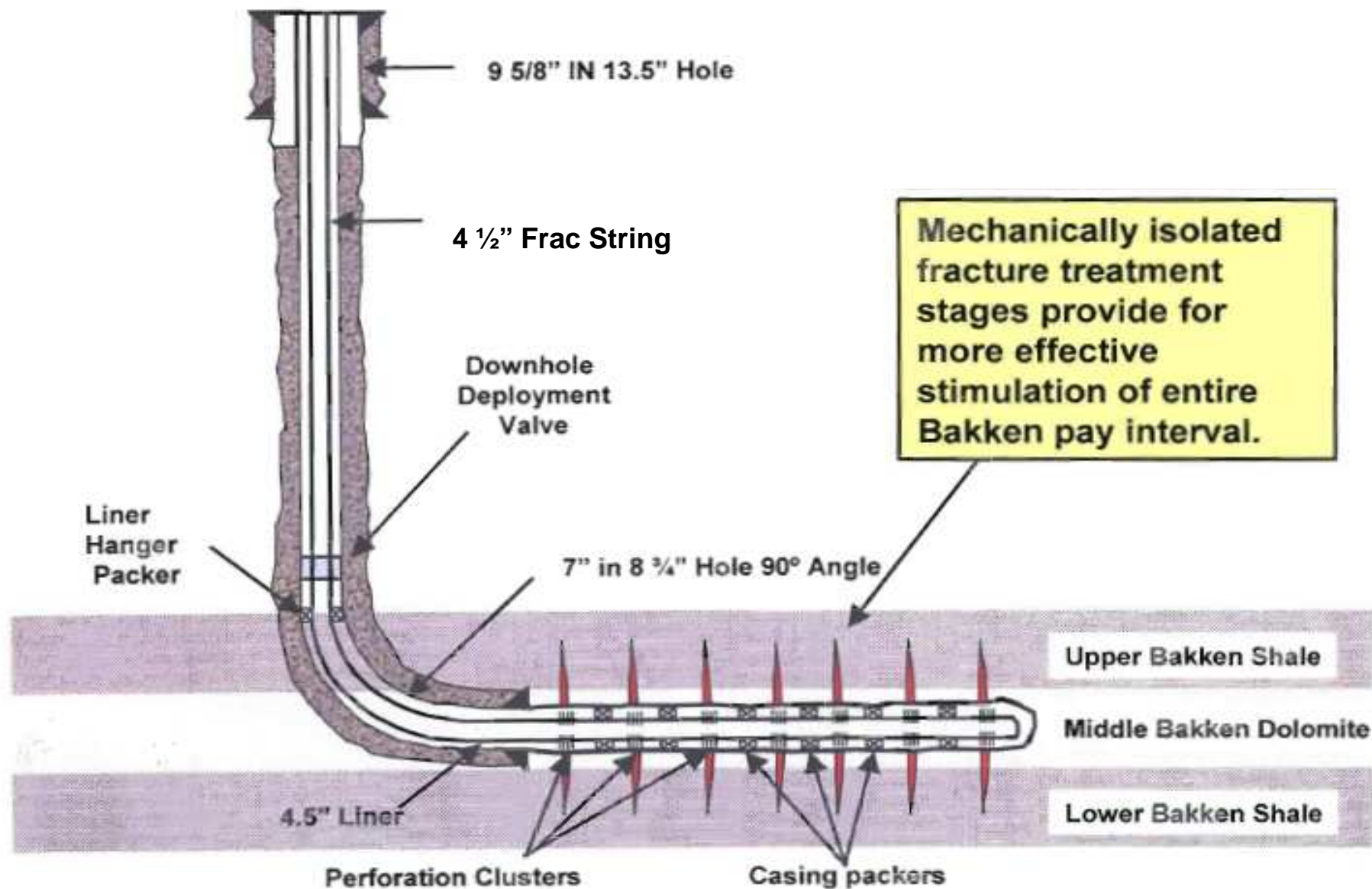


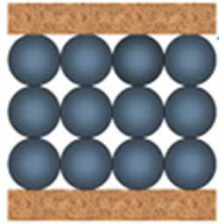
(Nordeng, 2010)



TYPICAL HORIZONTAL OIL WELL

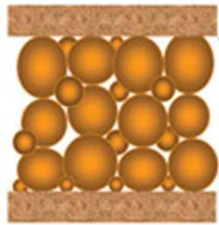






Ceramic Proppant Benefits

Uniform size and shape ceramic grains provide maximum porosity and allow more oil and gas to flow through the proppant pack.



Alternative Proppant

Broadly sieved and irregularly shaped proppants such as sand and resin coated sand pack more tightly, resulting in loss of fracture width and reduced conductivity.

ND Water Commission

61-04-02. Permit for beneficial use of water required. Any person, before commencing any construction for the purpose of appropriating waters of the state or before taking waters of the state from any constructed works, shall first secure a water permit from the state engineer

North Dakota has been regulating the full life cycle of hydraulic fracturing for decades

- The Industrial Commission regulates well permitting and construction
 - Assure that a minimum of 2 steel casings and 2 layers of cement are installed and tested between ground water and any fluids pumped into or produced from an oil and gas well.
- The Hydraulically Fractured formations are 6,000 to 8,000 feet below our fresh water formations.
 - Most formations between are impermeable shale, salt, and limestone

North Dakota has been regulating the full life cycle of hydraulic fracturing for decades

- Water Commission regulates water appropriations
 - Guards against ground water withdrawals exceeding recharge
- The Industrial Commission regulates well permitting and construction
 - Assure that a minimum of 2 steel casings and 2 layers of cement are installed and tested between ground water and any fluids pumped into or produced from an oil and gas well.
- The Health Department and local Emergency Managers
 - Clean up of any discharge to the environment
 - EPCRA (material safety data on any released chemicals).
- The Industrial Commission regulates flow back water collection and disposal
 - SDWA UIC Class II underground injection program

ND Industrial Commission

38-08-04. JURISDICTION OF COMMISSION. The commission has continuing jurisdiction and authority over all persons and property, public and private, necessary to enforce effectively the provisions of this chapter. The commission has authority, and it is its duty, to make such investigations as it deems proper to determine whether waste exists or is imminent or whether other facts exist which justify action by the commission. The commission has the authority:

1. To require:
 - a. Identification of ownership of oil or gas wells, producing leases, tanks, plants, structures, and facilities for the transportation or refining of oil and gas.
 - b. The making and filing with the industrial commission of all resistivity, radioactivity, and mechanical well logs and the filing of directional surveys if taken, and the filing of reports on well location, drilling, and production.
 - c. The drilling, casing, operation, and plugging of wells in such manner as to prevent the escape of oil or gas out of one stratum into another, the intrusion of water into oil or gas strata, the pollution of freshwater supplies by oil, gas, or saltwater, and to prevent blowouts, cavings, seepages, and fires.

North Dakota has been regulating the full life cycle of hydraulic fracturing for decades

- The Health Department and local Emergency Managers regulate
 - Clean up of any discharge to the environment
 - EPCRA (material safety data on any released chemicals)
- The chemicals used are found in things we encounter daily and are in very low concentrations when mixed and pumped

ND Water Commission

61-04-02. Permit for beneficial use of water required. Any person, before commencing any construction for the purpose of appropriating waters of the state or before taking waters of the state from any constructed works, shall first secure a water permit from the state engineer unless such construction or taking from such constructed works is for domestic or livestock purposes or for fish, wildlife, and other recreational uses or unless otherwise provided by law. However, immediately upon completing any constructed works for domestic or livestock purposes or for fish, wildlife, and other recreational uses, the water user shall notify the state engineer of the location and acre-feet [1233.48 cubic meters] capacity of such constructed works, dams, or dugouts. Regardless of proposed use, however, all water users shall secure a water permit prior to constructing an impoundment capable of retaining more than twelve and one-half acre-feet [15418.52 cubic meters] of water or the construction of a well from which more than twelve and one-half acre-feet [15418.52 cubic meters] of water per year will be appropriated. If a permit is not required of a landowner or the landowner's lessee to appropriate less than twelve and one-half acre-feet [15418.52 cubic meters] of water from any source for domestic or livestock purposes or for fish, wildlife, and other recreational uses, those appropriators may apply for water permits in order to clearly establish a priority date and the state engineer may waive any fee or hearing for such applications. An applicant for a water permit to irrigate need not be the owner of the land to be irrigated.

North Dakota has been regulating
the full life cycle of hydraulic
fracturing for decades

- Water Commission regulates water appropriations
 - Guards against ground water withdrawals exceeding recharge

Western North Dakota

- 1,050 to 2,700 wells / year = 2,000 expected
 - 85-225 rigs = 10,000 – 27,000 jobs = 21,000 expected
- 10 - 25 million gallons frac water / day
 - Equal to 1” of water from Lake Sakakawea / yr
- 10 to 20 years
 - 28,000 new wells expected = $\pm 28,000$ long term jobs

ND Department of Health

23-33-04. Chemical use data and confidentiality requirement. The department may require chemical use data from product registrants on products that have been or may likely be found in ground water in order to conduct its ground water protection program. This information must include chemical registration data and sales information. The department shall keep this information confidential.

23-33-05. Ground water standards. The department shall establish standards for compounds in ground water as set forth by other states and the United States environmental protection agency unless new scientifically confirmed data provides justification for changing these standards.

23-33-06. Ground water quality monitoring. The department shall conduct ground water quality monitoring activities in cooperation with the state engineer and other state agencies. **Build** monitoring results, the department shall implement or require appropriate mitigation activities or remedial action to prevent future contamination of **Section** ground water. The commissioner may implement or require appropriate mitigation activities pursuant to chapter 4-35 to prevent future contamination of ground water as it relates to the use of pesticides.

23-33-07. Notification requirement. Any person with verifiable information on the presence of contamination of ground water within the state shall notify the department regarding such contamination.

33-16-02.1-11. Discharge of wastes. Following are general requirements for all waste discharges or chemical additions:

4. Any spill or discharge of waste which causes or is likely to cause pollution of waters of the state must be reported immediately. The owner, operator, or person responsible for a spill or discharge must notify the department as soon as possible (701-328-5210) or the North Dakota hazardous materials emergency assistance and spill reporting number (1-800-472-2121) and provide all relevant information about the spill. Depending on the severity of the spill or accidental discharge, the department may require the owner or operator to:

- a. Take immediate remedial measures;
- b. Determine the extent of pollution to waters of the state;
- c. Provide alternate water sources to water users impacted by the spill or accidental discharge; or
- d. Any other actions necessary to comply with this chapter.

- EPCRA was passed in response to concerns regarding the environmental and safety hazards posed by the storage and handling of toxic chemicals. These concerns were triggered by the disaster in Bhopal, India, in which more than 2,000 people suffered death or serious injury from the accidental release of methyl isocyanate. To reduce the likelihood of such a disaster in the United States, Congress imposed requirements on both states and regulated facilities.
- **Key Provisions of the Emergency Planning and Community Right-to-Know Act**
- **Sections 301 to 303. Emergency Planning** Local governments are required to prepare chemical emergency response plans, and to review plans at least annually. State governments are required to oversee and coordinate local planning efforts. Facilities that maintain Extremely Hazardous Substances (EHSs) on-site in quantities greater than corresponding Threshold Planning Quantities (TPQs) must cooperate in emergency plan preparation.
- **Section 304. Emergency Notification** Facilities must immediately report accidental releases of EHS chemicals and "hazardous substances" in quantities greater than corresponding Reportable Quantities (RQs) defined under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to state and local officials. Information about accidental chemical releases must be available to the public.
- **Sections 311 and 312. Community Right-to-Know Requirements** Facilities manufacturing, processing, or storing designated hazardous chemicals must make Material Safety Data Sheets (MSDSs) describing the properties and health effects of these chemicals available to state and local officials and local fire departments. Facilities must also report, to state and local officials and local fire departments, inventories of all on-site chemicals for which MSDSs exist. Information about chemical inventories at facilities and MSDSs must be available to the public.
- **Section 313. Toxics Release Inventory** Facilities must complete and submit a Toxic Chemical Release Inventory Form annually for each of the more than 600 Toxic Release Inventory (TRI) chemicals that are manufactured or otherwise used above the applicable threshold quantities.
- **Section 322 Trade Secrets** Facilities are allowed to withhold the specific chemical identity from the reports filed under sections 303, 311, 312 and 313 of EPCRA if the facilities submit a claim with substantiation to EPA.

North Dakota has been regulating the full life cycle of hydraulic fracturing for decades

- The Industrial Commission regulates flow back water collection and disposal
 - Storage in open pits is not allowed
 - Disposal wells are regulated under the SDWA UIC Class II underground injection program
 - The disposal formation is approximately 2,500 feet below our fresh water zones
 - The formations between are impermeable shale

43-02-03-19.2. DISPOSAL OF WASTE. All waste associated with exploration or production of oil and gas must be properly disposed of in an authorized facility in accord with all applicable local, state, and federal laws and regulations. This is not to be construed as requiring the offsite disposal of drilling mud or drill cuttings associated with the drilling of a well. However, top water remaining in the reserve pit used in the drilling and completion operations is to be removed from the reserve pit and disposed of in an authorized disposal well or used in a manner approved by the director. The disposition or use of the water must be included on the sundry notice (form 4) reporting the plan of reclamation pursuant to section 43-02-03-19.

43-02-03-19.3 EARTHEN PITS AND OPEN RECEPTACLES. Except as otherwise provided in section 43-02-03-19, no saltwater, drilling mud, crude oil, waste oil, or other waste shall be stored in earthen pits or open receptacles except in an emergency and upon approval by the director. An earthen pit or open receptacle may be temporarily used to retain oil, water, or fluids generated in well servicing or plugging operations. A pit or receptacle used for this purpose must be sufficiently impermeable to provide adequate temporary containment of the oil, water, or fluids. The contents of the pit or receptacle must be removed within seventy-two hours after operations have ceased and must be disposed of at an authorized facility in accordance with section 43-02-03-19.2. The director may permit pits or receptacles used solely for the purpose of flaring casinghead gas. A pit or receptacle used for this purpose must be sufficiently impermeable to provide adequate temporary containment of fluids. Permission for such pit or receptacle will be conditioned on keeping it free of any saltwater, crude oil, waste oil, or other waste. Saltwater, drilling mud, crude oil, waste oil, or other waste shall be removed from the pit or receptacle within twenty-four hours after being discovered and must be disposed of at an authorized facility in accordance with section 43-02-03-19.2.