

# California Oilfield Operations, Hydraulic Fracturing (HF) and Proposed HF Regulations

**Tim Kustic, State Oil and Gas Supervisor  
Division of Oil, Gas, and Geothermal Resources**

# Division Mandates

...supervisor shall so supervise the drilling, operation, maintenance, and abandonment of wells and the operation, maintenance, and removal or abandonment of tanks and facilities...

# Division Mandates

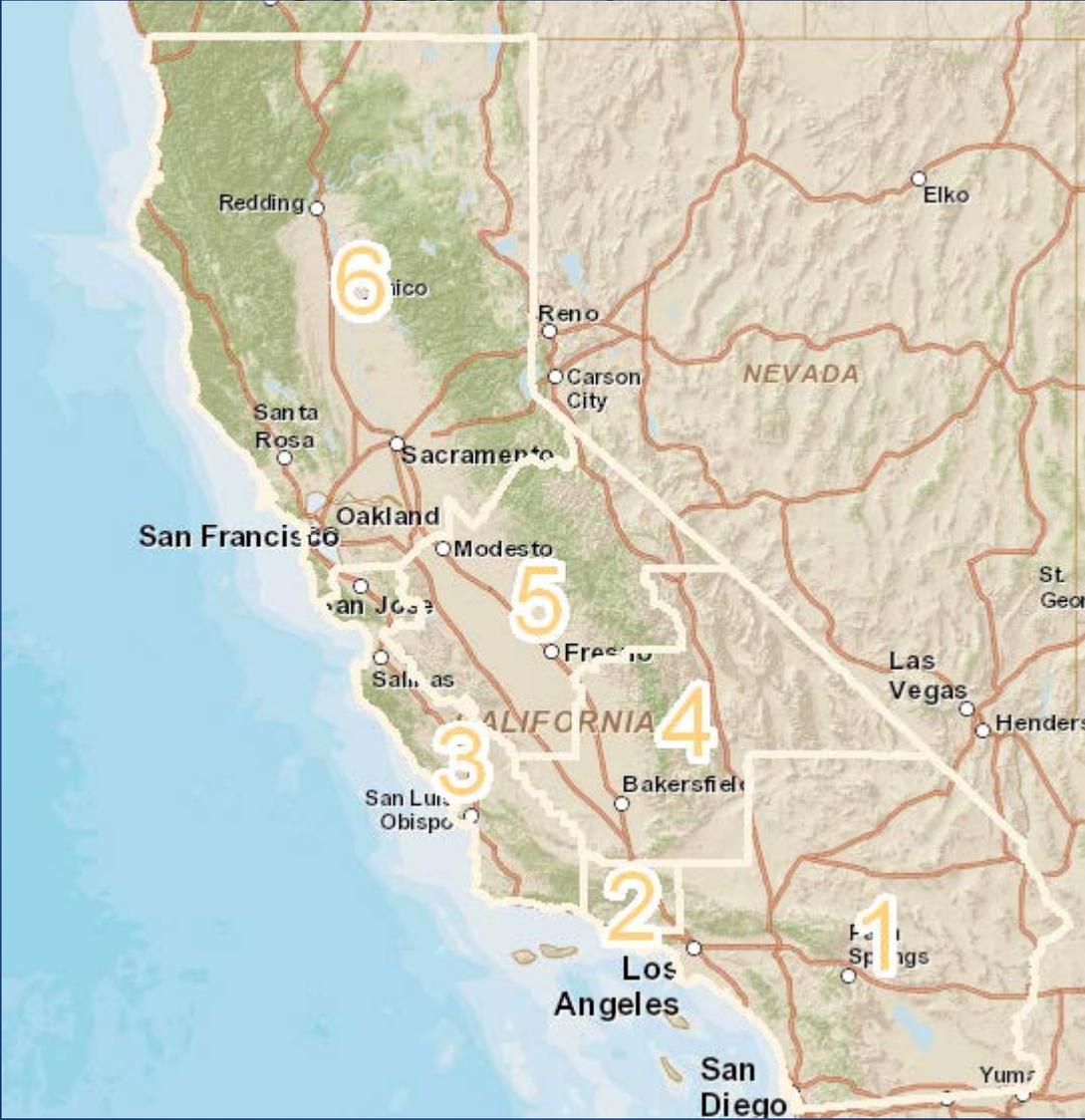
...so as to prevent, as far as possible, damage to life, health, property, and natural resources; damage to underground oil and gas deposits from infiltrating water ... prevent damage...and waste...to underground and surface waters

# Division Mandates

...supervisor shall also supervise...to permit the owners...to utilize all methods...and practices known to the industry for the purpose of increasing the ultimate recovery.

# Division Mandates

To best meet oil and gas needs in this state, the supervisor shall administer this division so as to encourage the wise development of oil and gas resources.



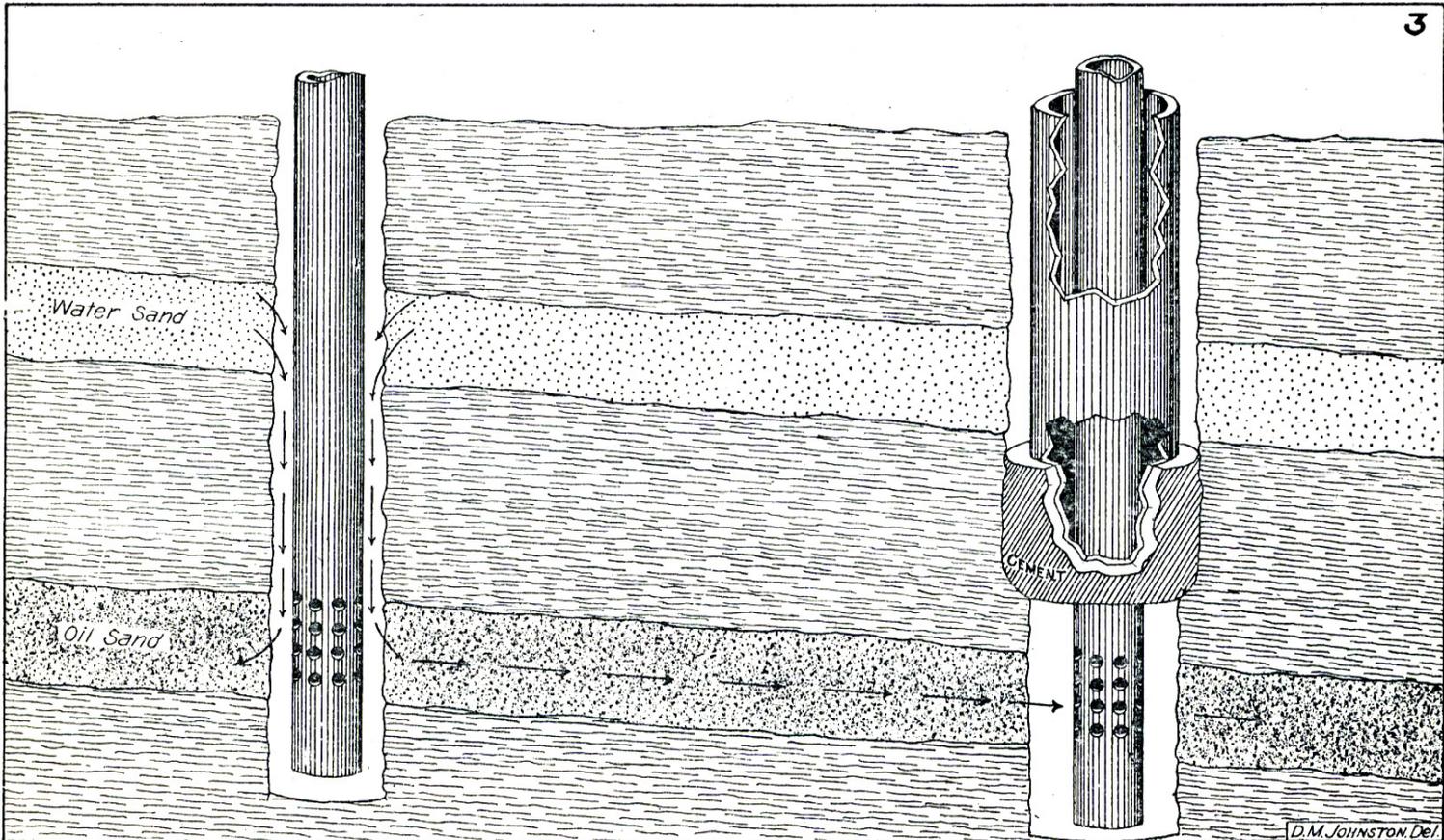
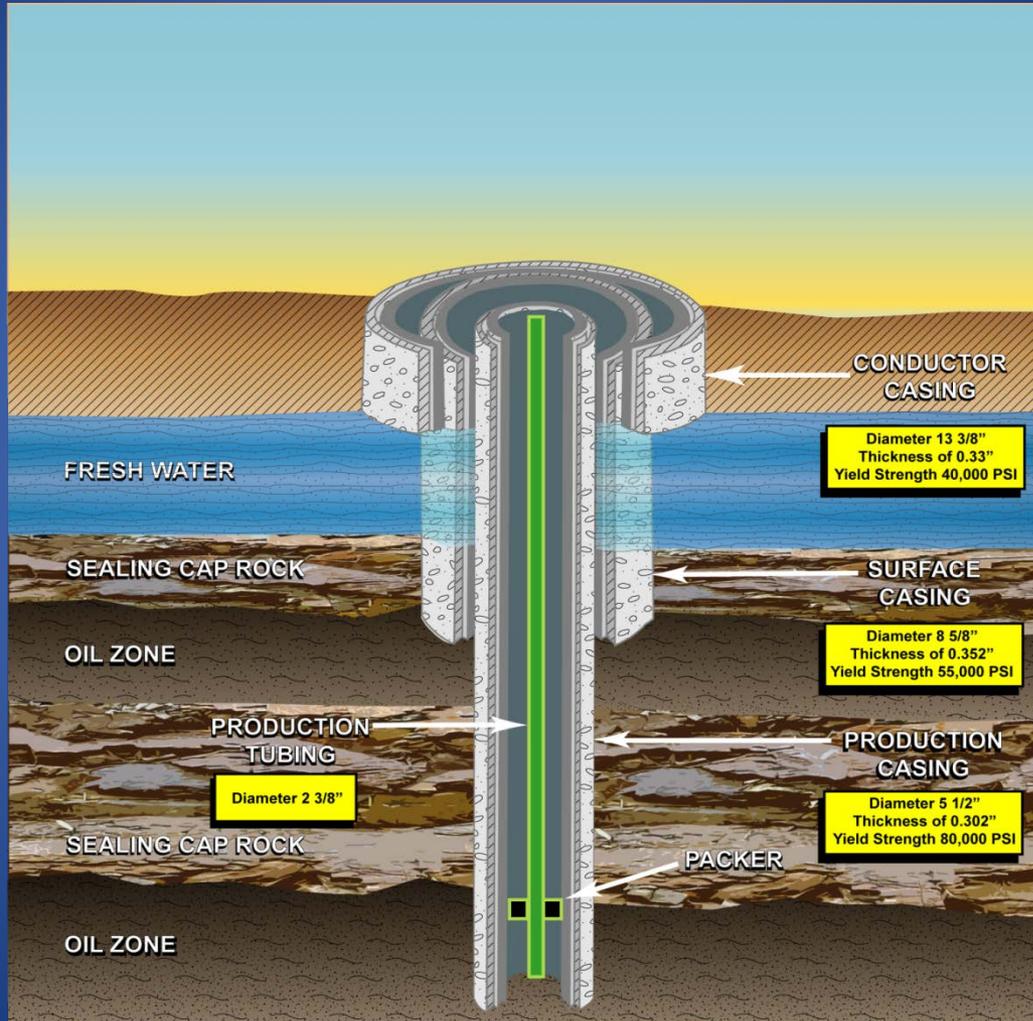
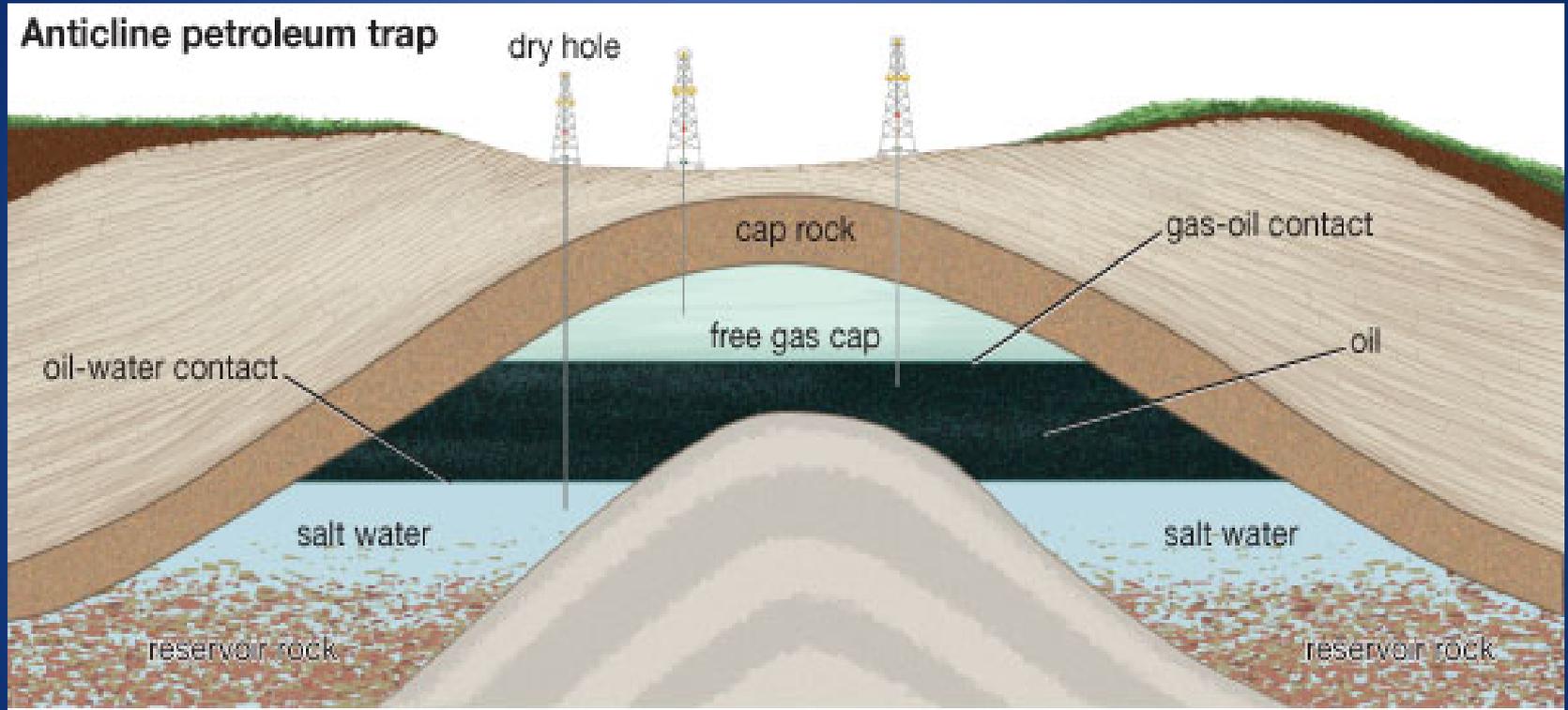


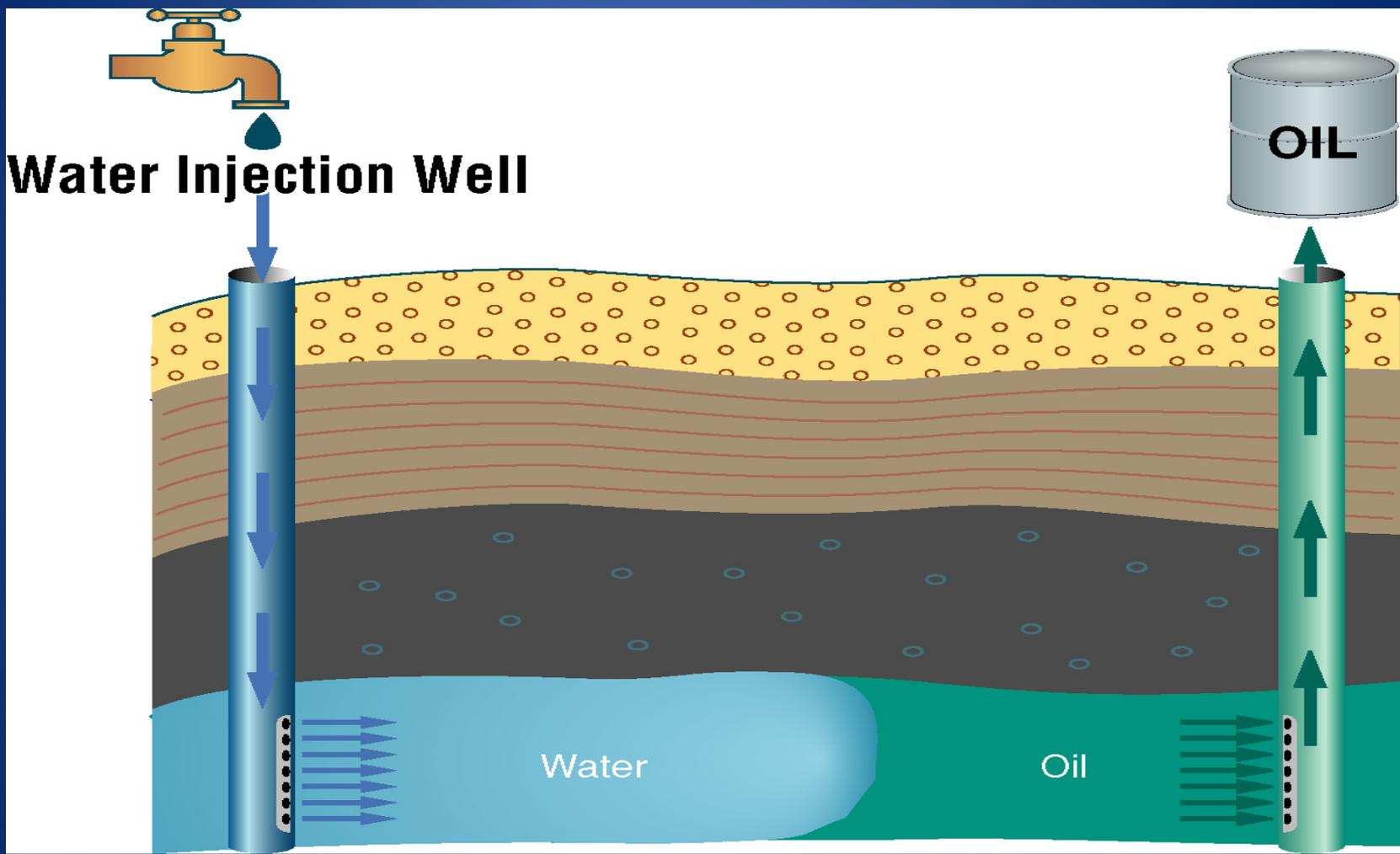
Fig. 3. Sketch showing entrance of water into oil sand and its migration to a properly drilled well. Due to use of only one string of casing in first well,

# Well Construction



# Anticline petroleum trap





# Water Injection

Total Produced Water Injection: 2.7 Billion bbls/yr  
(348,000 a-f)

Enhanced Oil Recovery (EOR): 1.9 Billion bbls/yr (240,000 a-f) (70%)

- o Water Flood - 50%
- o Steam Flood - 13%
- o Cyclic Steam - 6%

Water Disposal (WD): .8 Billion bbls/yr (105,000 a-f) (30%)

# Non-Injected Produced Water

Total Produced Water Non-Inject: 866 Million bbls/yr

Evaporation - Percolation: 624 Million bbls/yr (72%)

Freshwater Uses: 198 Million bbls/yr (25,400 a-f) (23%)

Sewer Systems: 44 Million bbls/yr (5%)

# Fresh Water Balance

Produced Freshwater: 198 Million bbls/yr (25,400 a-f)

Industry's Use for:

Well Drilling Operations: 3 Million bbls (386 a-f)

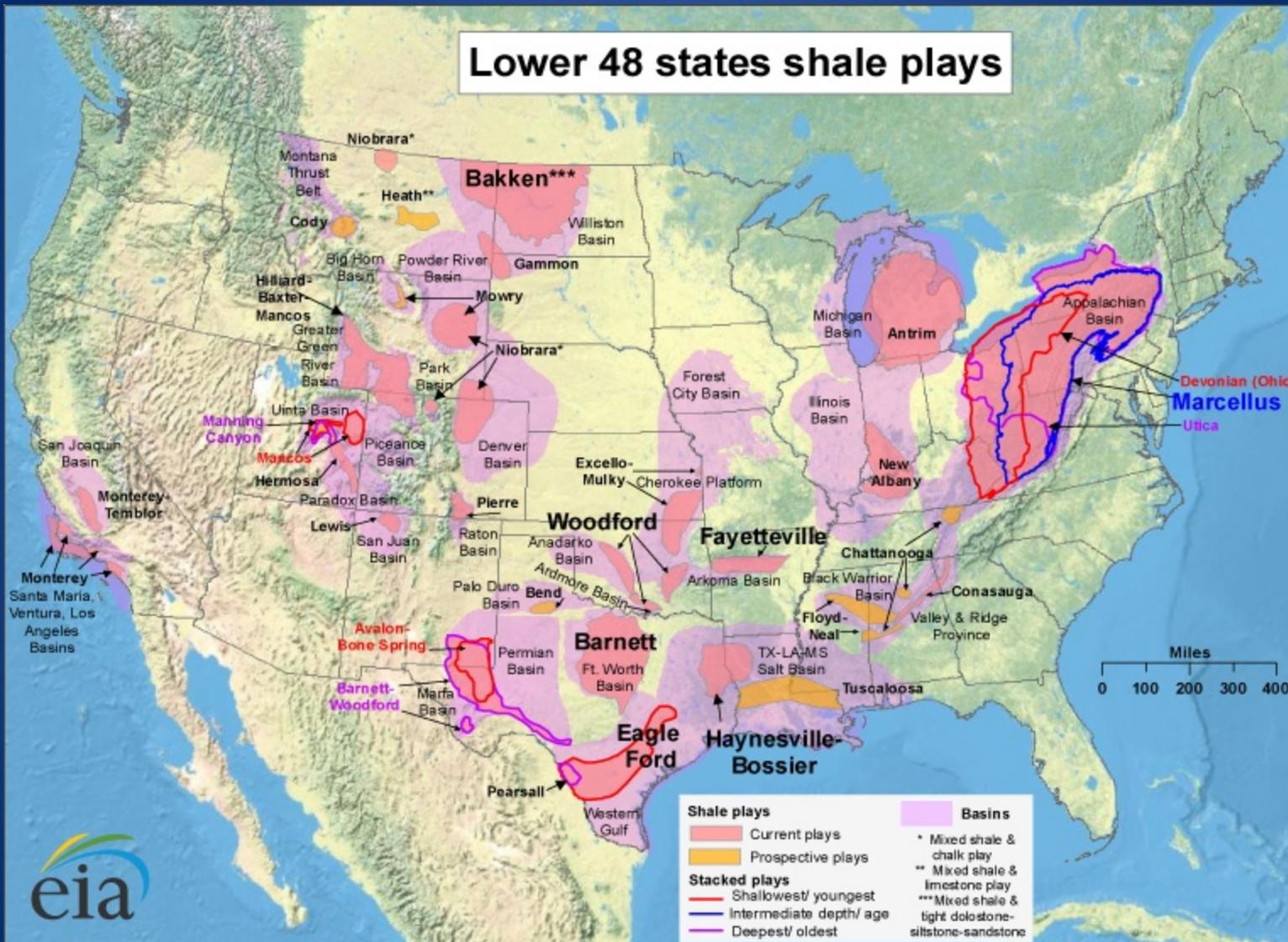
Hydraulic Fracturing Operations: 2 Million bbls (270 a-f)

Cementing: .6 Million bbls (80 a-f)

Total: 5.6 Million bbls (736 a-f)

Balance: 192,400,000 bbls or 24,800 acre-feet

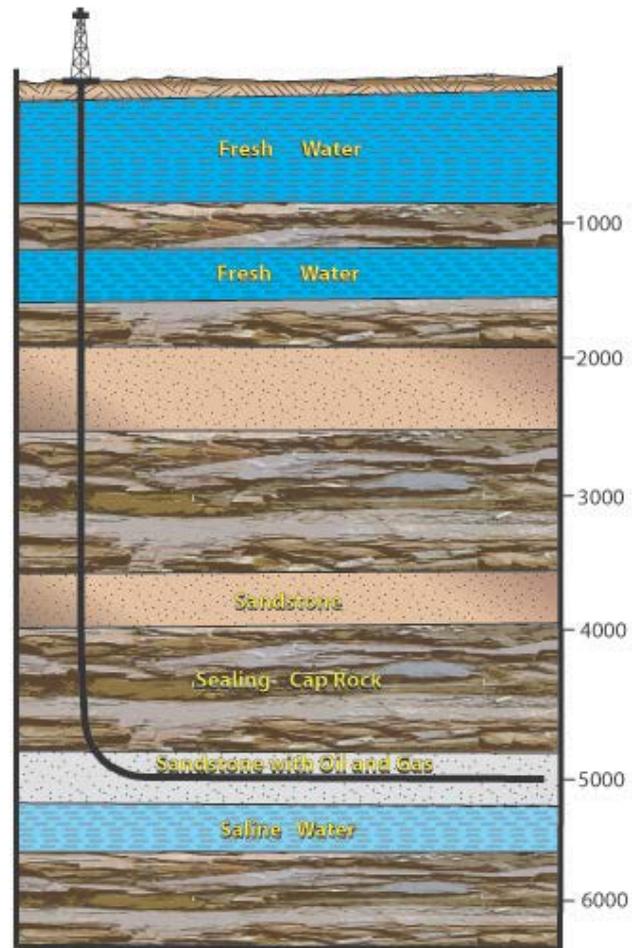
# Lower 48 states shale plays



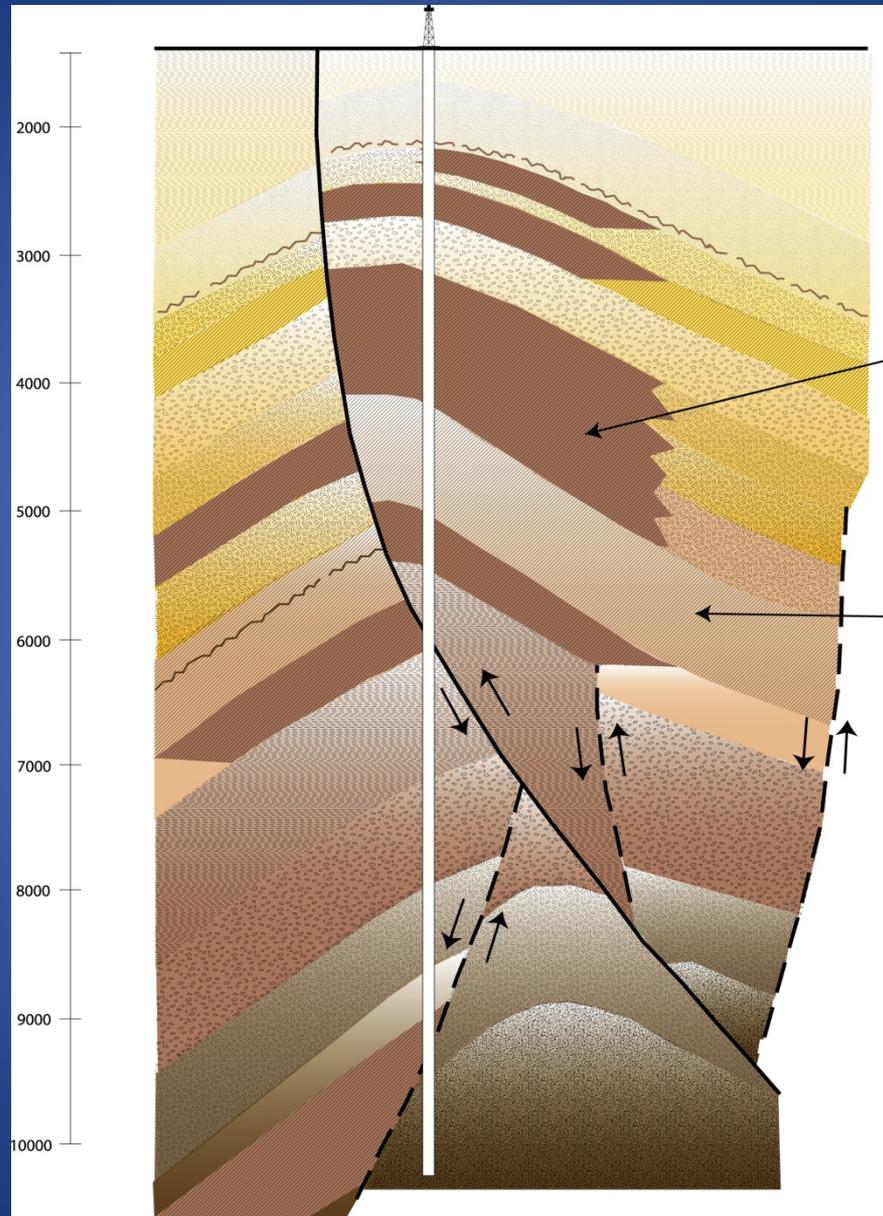
Source: Energy Information Administration based on data from various published studies.  
 Updated: May 9, 2011



# Horizontal Well Completion



# Oil Field Cross Section

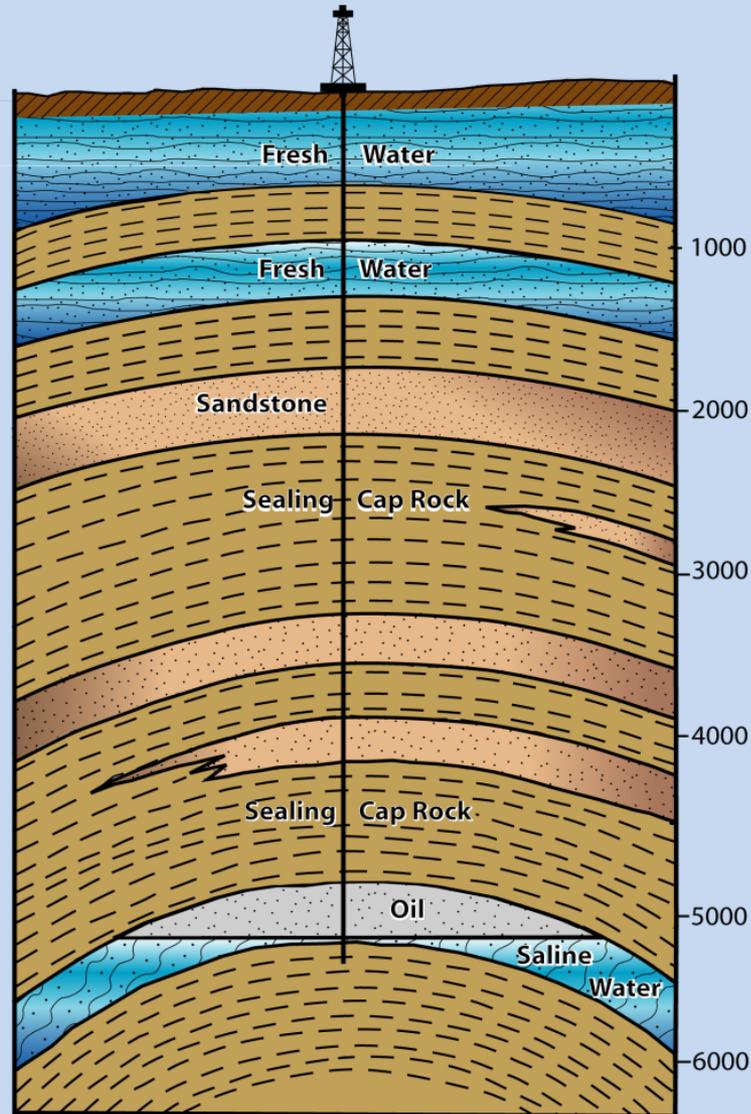


**Production  
Sandstone  
Formation**

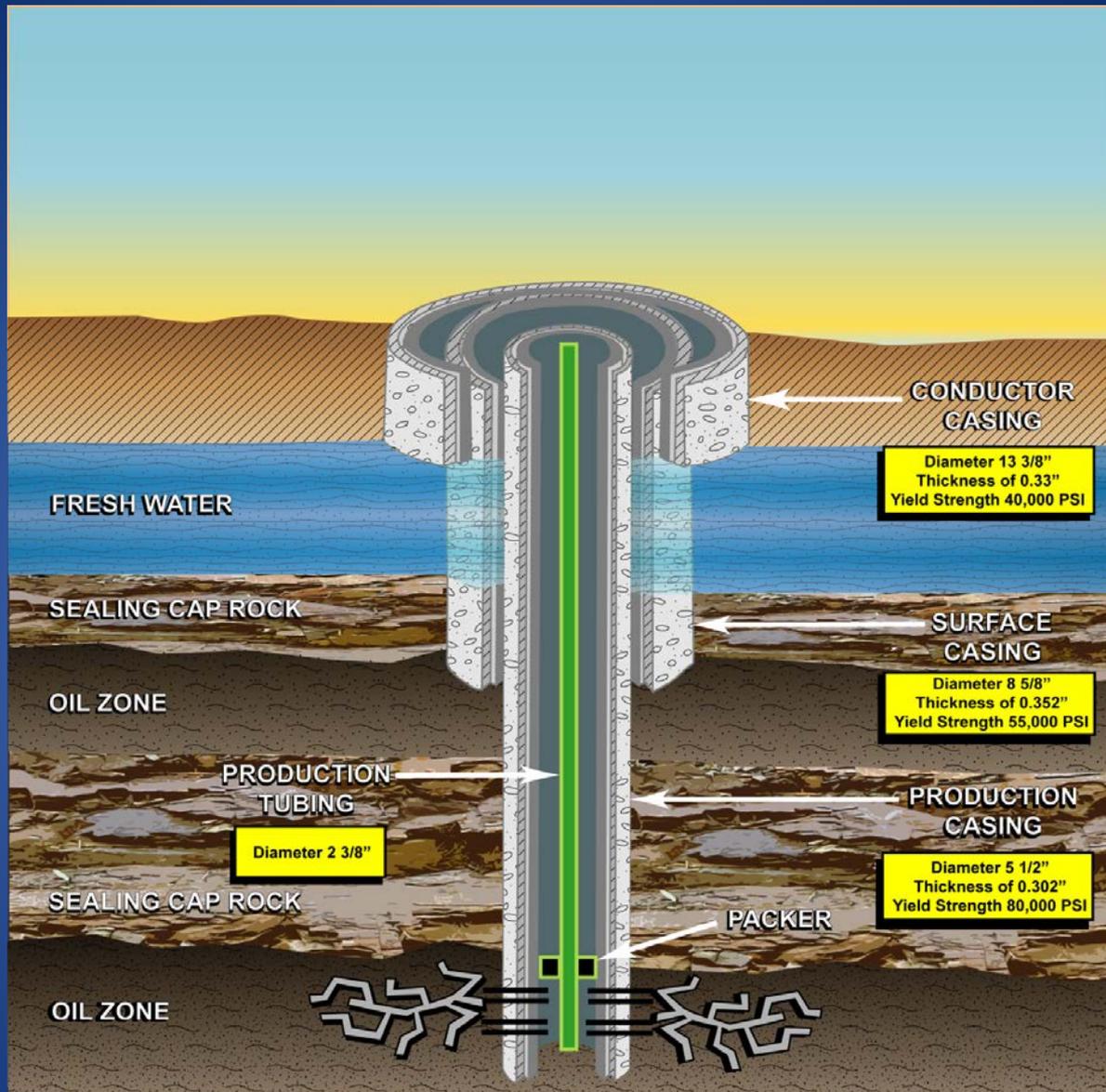
**Non-Productive  
Formation**

**Faults**

# Simplified Geology of Conventional Oil and Gas



Typical Well Casing with Packer and Fracking (not to scale)



# Section I: Pre-Fracturing Well Testing

- Fracture radius analysis
- Cement evaluation logs
- Well pressure testing
- Surface equipment testing

# Section II: Advance Notification

- 10-day+ Notice to DOGGR and RWQCB
- DOGGR posting no more than 7-days after receiving HF-1
- 24-hour notice of fracturing ops to allow observation of HF

# Section III: Monitoring During & After Fracturing Operations

- Continuous monitoring
- Stop operations due to pressure spike/drop, fluid volume return outside expectation, any reason to suspect casing breach
- Daily monitoring x 30 days after HF
- Monthly monitoring x 5 years after HF

# Section IV: Disclosure of Materials Used in Fracturing Fluid

- Disclosure details – operator, well, depth, fluid content, tracers?, volume
- Apply to all HF operations
- Use FracFocus

# Section V: Trade Secrets

- California Uniform Trade Secrets Act applies
- Trade secret law prevents public disclosure of trade secrets but it does not prevent regulatory agencies from obtaining the information as needed
- Two goals for regulations:
  - Establish procedure for asserting trade secret claim
  - Specify when trade secret information must be provided to DOGGR or others

# Section V: Trade Secrets

- Must disclose if spill/release, medical treatment need, investigation
- Trade secret information disclosed to DOGGR or other entity must be maintained as confidential

# Section VI: Storage and Handling of Hydraulic Fracturing Fluids

- Storage of HF fluids in compliance with existing facilities regulations
- Spill Contingency Plan inclusion
- No unlined sump storage
- Spill clean-up and reporting

Formal Rulemaking Process to Begin Summer 2013