

Advances in Drilling and Safety For Oil/Gas and CO₂ Injection Wells in New Mexico

Dr. Tan Nguyen, Professor

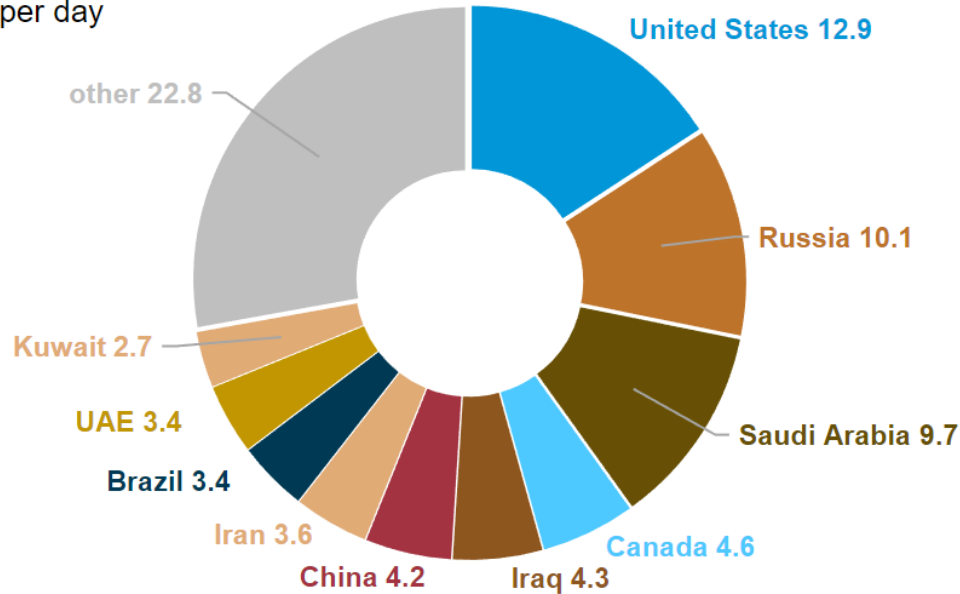
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Current Active & Pending Projects @ PRRC - NMT

#	FOA Number	Agency	Proposal Title	Submission	Status	Period	Role	Funding, MII
19	DE-FOA-0003256	DOE	Integration of New and Off-The-Shelf Technologies to Mitigate Methane Emissions at Oil and Gas Production Facilities	Aug-24	Pending	2024 - 2028	PI	5
18	DE-FOA-0003256	DOE	Collaborative Approach to Reducing Emissions (CARE) for MCWs	Aug-24	Pending	2024 - 2028	Key Person	299,000
17	DE-FOA-0003296	DOE	Advance Fiber Optic Sensing Technology Used as Downhole Logging Tools	Apr-24	Pending	2024 - 2028	PI	6.6
16	DE-FOA-0002711	DOE	Permian Regional Carbon Sequestration Hub: CarbonSAFE Phase III Project	Mar-24	Funded	2024 - 2027	Key Person	79
15	DE-FOA-0003014	DOE	Regional Initiative for Technical Assistance Partnership RITAP	Jan-24	Funded	2024 - 2027	Key Person	4
12	DE-FOA-0003109	DOE/ EPA	NM State Methane Reduction Program	Sep-23	Funded	Feb 24 - Feb 27	PI	2.2
11	DE-FOA-0003002	DOE	The Southwest CCUS Training and Research Partnership (CCUS-STRP)	Jul-23	Funded	May 24 - May 27		1
10	US-DOE DE- FE0031890	DOE	San Juan Basin CarbonSAFE Phase III Project	Jul-23	Funded	Oct 20 - May 25	Key Person	28
9	DE-FOA-0002711	DOE	Four Corners Carbon Storage Hub	Jul-23	Funded	Apr 24 - Mar 27	Key Person	52
8	DE-FOA-0002711	DOE	Permian Carbon Storage Hub - Omnia	Jul-23	Funded	Apr 24 - Mar 26	Key Person	4.96
7	DE-FOA-0002826	DOE	Pilot Stimulation Demonstration for Potential Geothermal Wells in New Mexico	Mar-23	Pending		PI	8.7
6	DE-FOA-0002799	DOE	CUSP: Four Corners Regional Initiative	Feb-23	Funded	Mar 24 - Feb 26	Key Person	3.1
5	N/A	S. Korean Agencies	Environmental Plug and Abandonment Technology Development with AI/ML	Jan-21	Funded	May 21 - May 24	PI	0.6
4	Industry	Lucid	Acid Gas Injection	Feb-22	Funded	May 21 - Aug 23	Key Person	3
3	US-DOE DE- FE0031890	DOE	San Juan Basin CarbonSAFE Phase III Project	Jan-20	Funded	Oct 20 - May 25	Key Person	28
2	N/A	S. Korean Agencies	Development and Field Scale Application for Productivity Enhancement	2019 - 2023	Funded	Jan 19 - May 23	PI	1.2
1	DE-FC26- 05NT42591	DOE	Southwest Regional Partnership CO2-EOR	Feb-19	Funded	Aug 19 - May 22	Key Person	1

Oil Production in the World and in the US

Global crude oil and condensate production in 2023 by select countries
million barrels per day



Crude oil is produced in 32 U.S. states and in U.S. coastal waters.

In 2022, five states combined accounted for about 72% of total U.S. crude oil production.

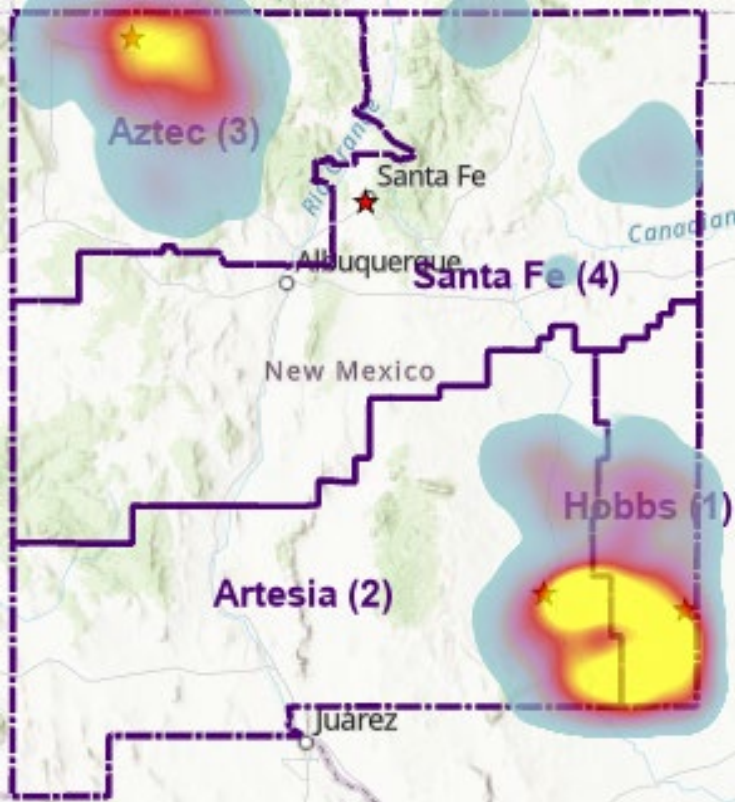
The top five crude oil-producing states in 2022:

- Texas 42.5%
- New Mexico 13.3%
- North Dakota 8.9%
- Colorado 3.7%
- Alaska 3.7%

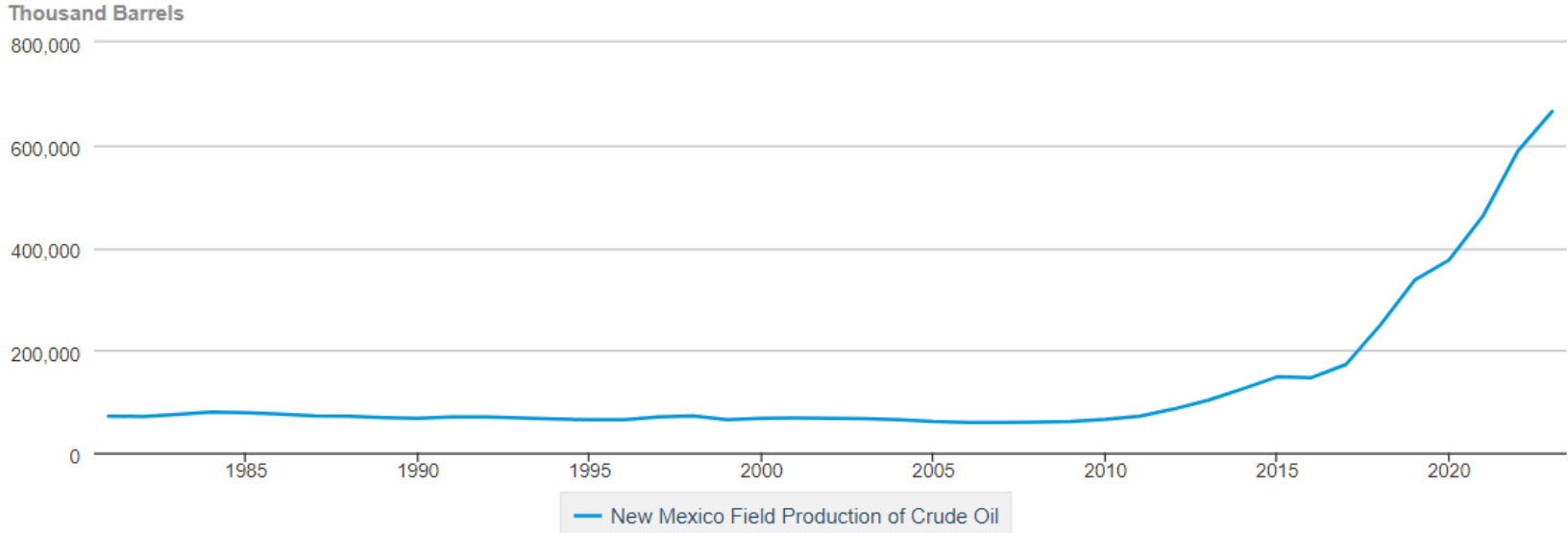
Source from US Energy Information Administration (EIA)

Oil and Gas in New Mexico

Annual Crude Oil Production in New Mexico (EIA)



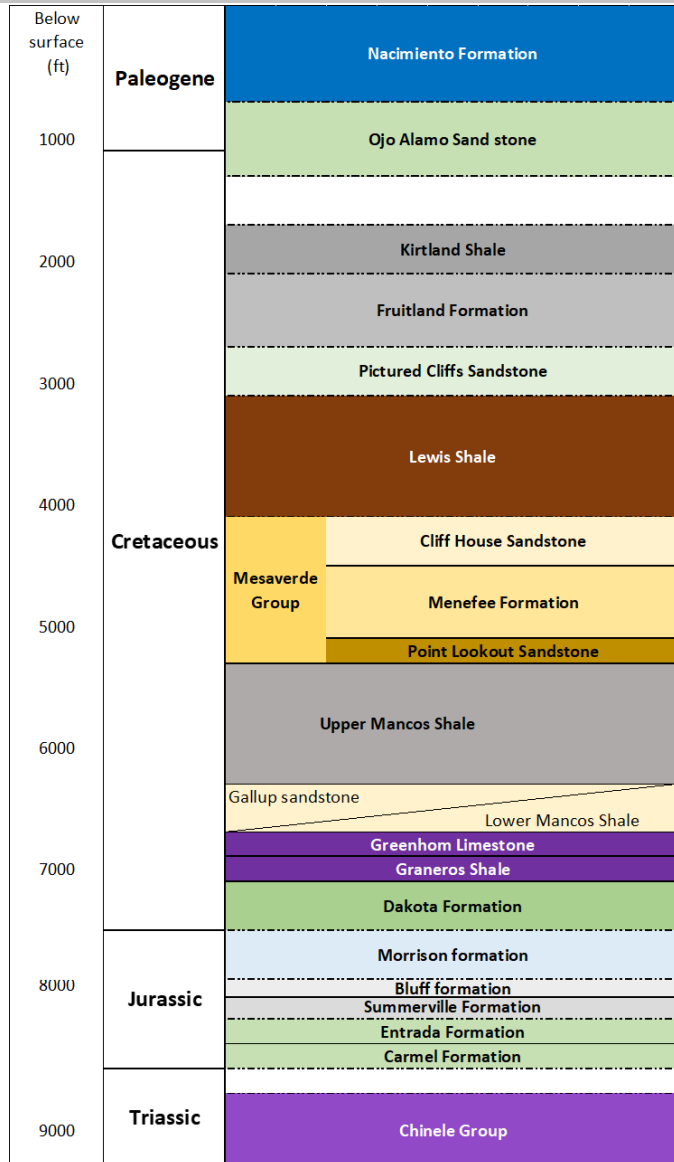
Source: NMOCD



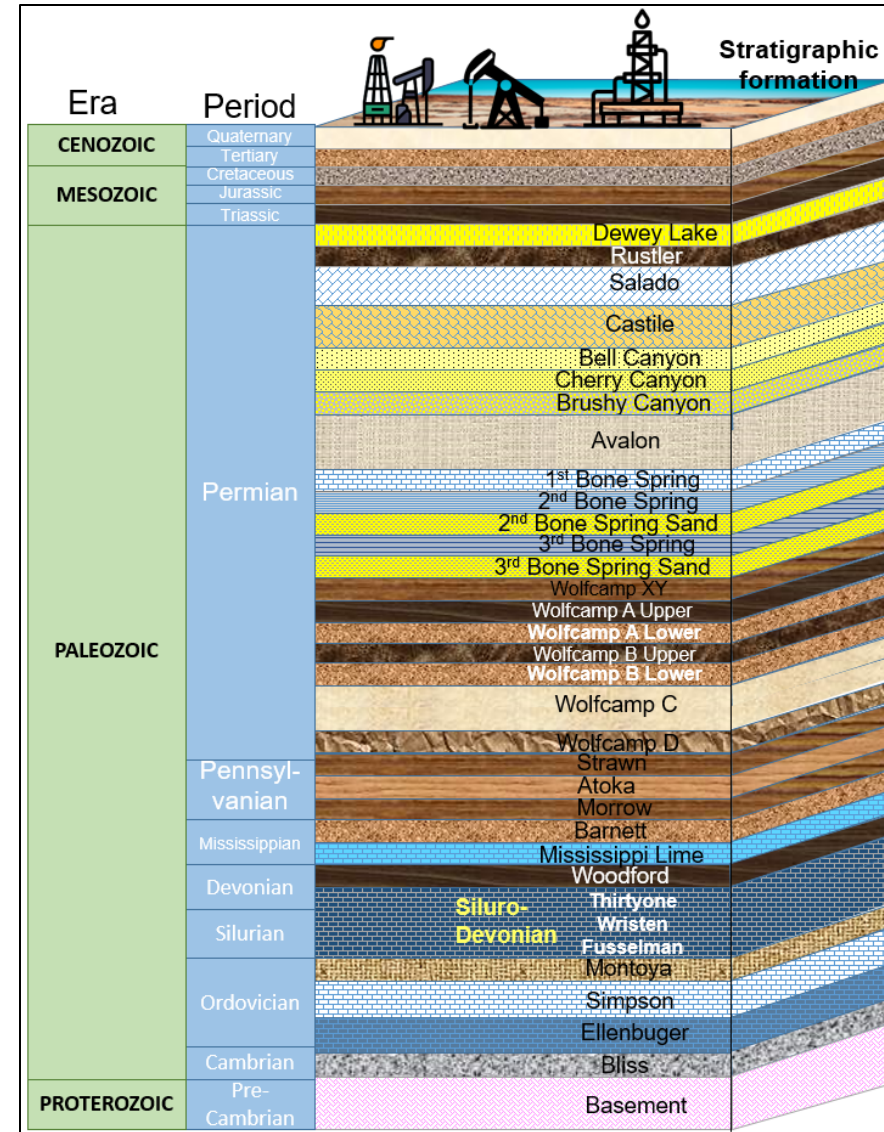
Gas Wells:	47,000
Oil Wells:	78,500
Injection Wells:	6,100
SW Disp. Wells:	1,800
Total:	133,400

Source: NMOCD

San Juan Basin vs. Permian Basin

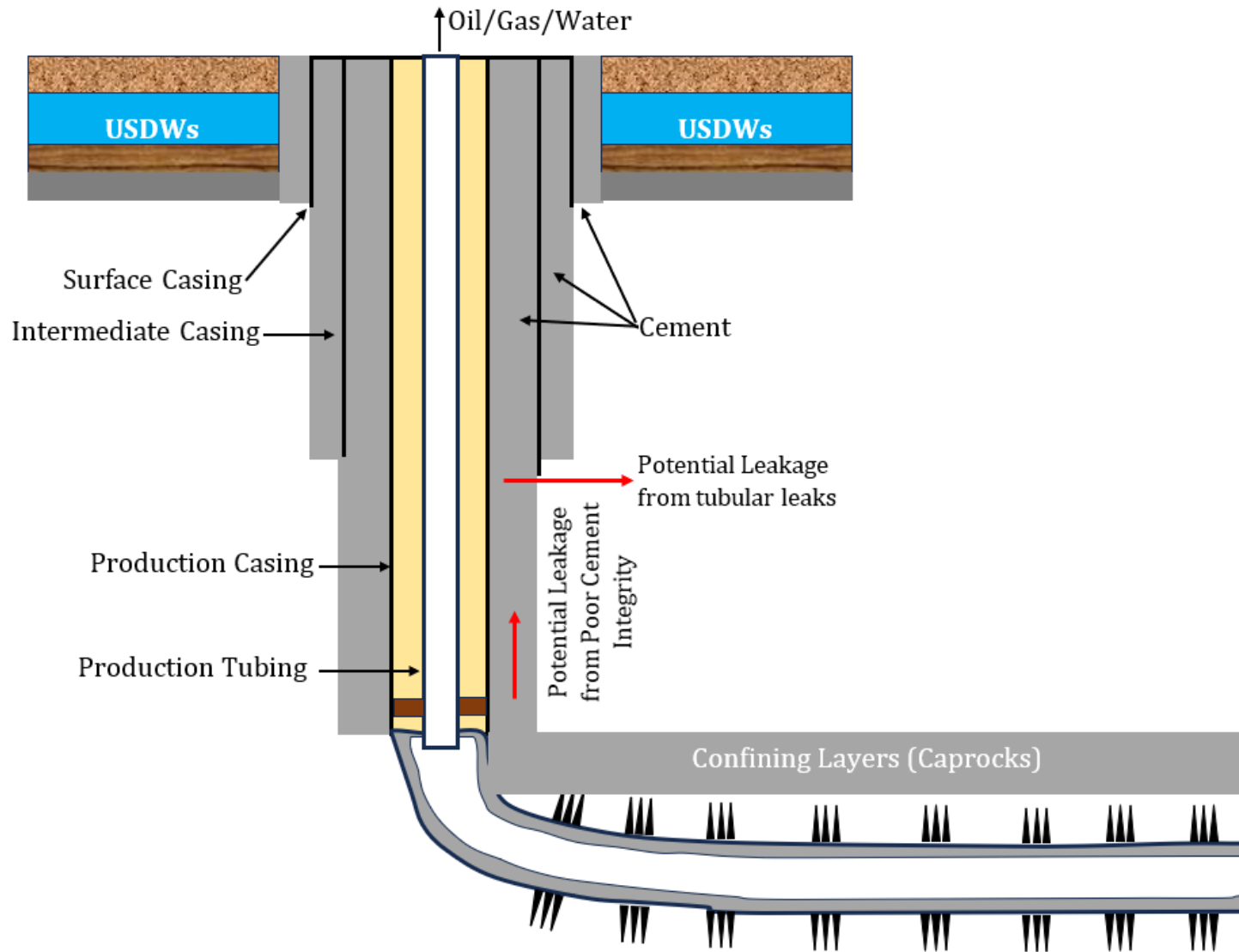


Lithology of the San Juan Basin

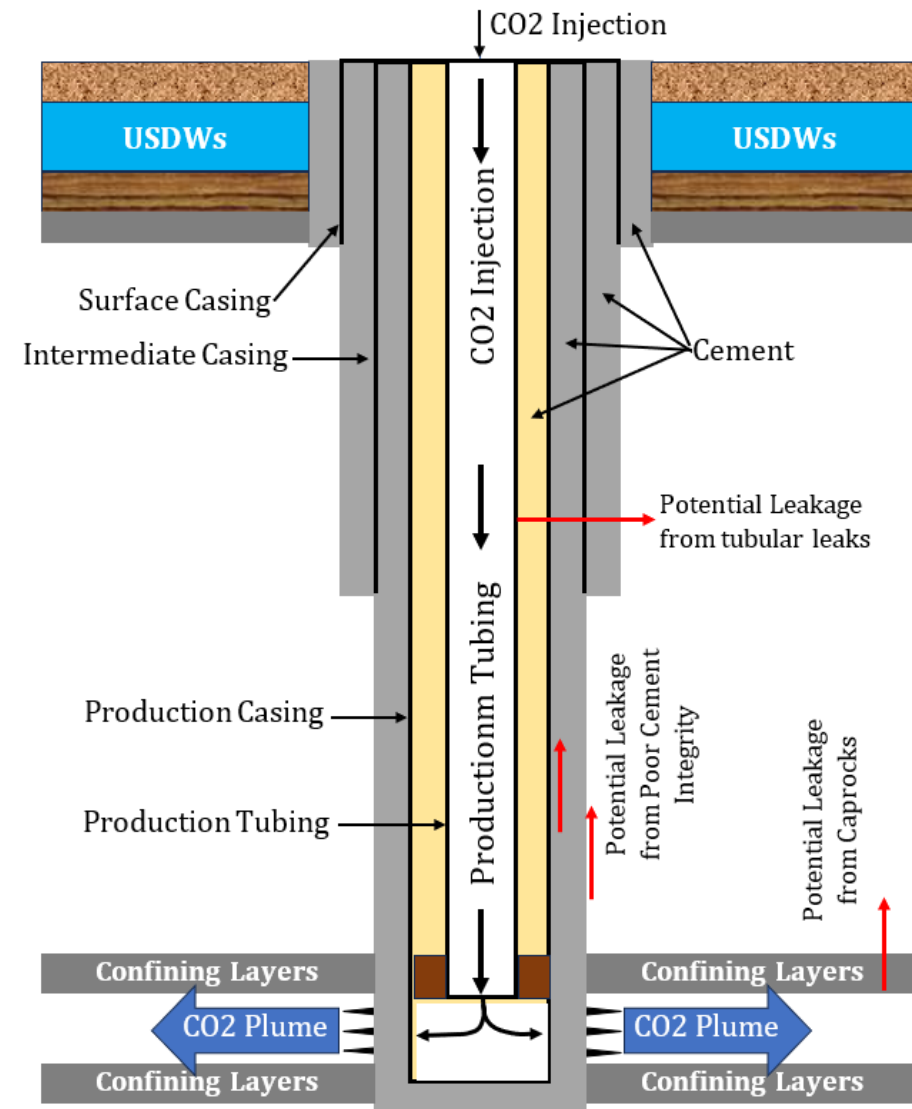


Lithology of the Permian Basin

Drilling and Completion for Oil/Gas and CO₂ Injection Wells

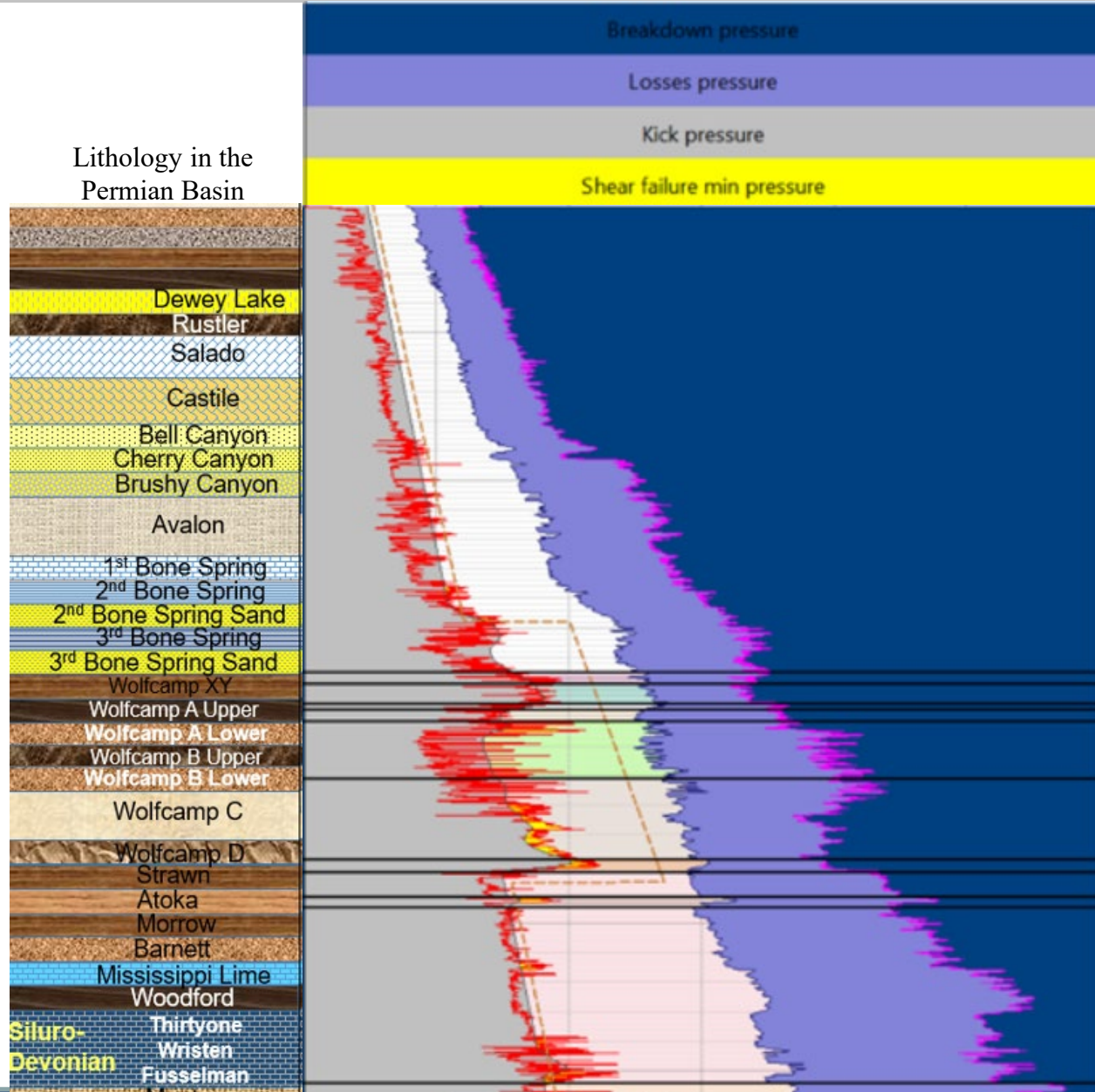
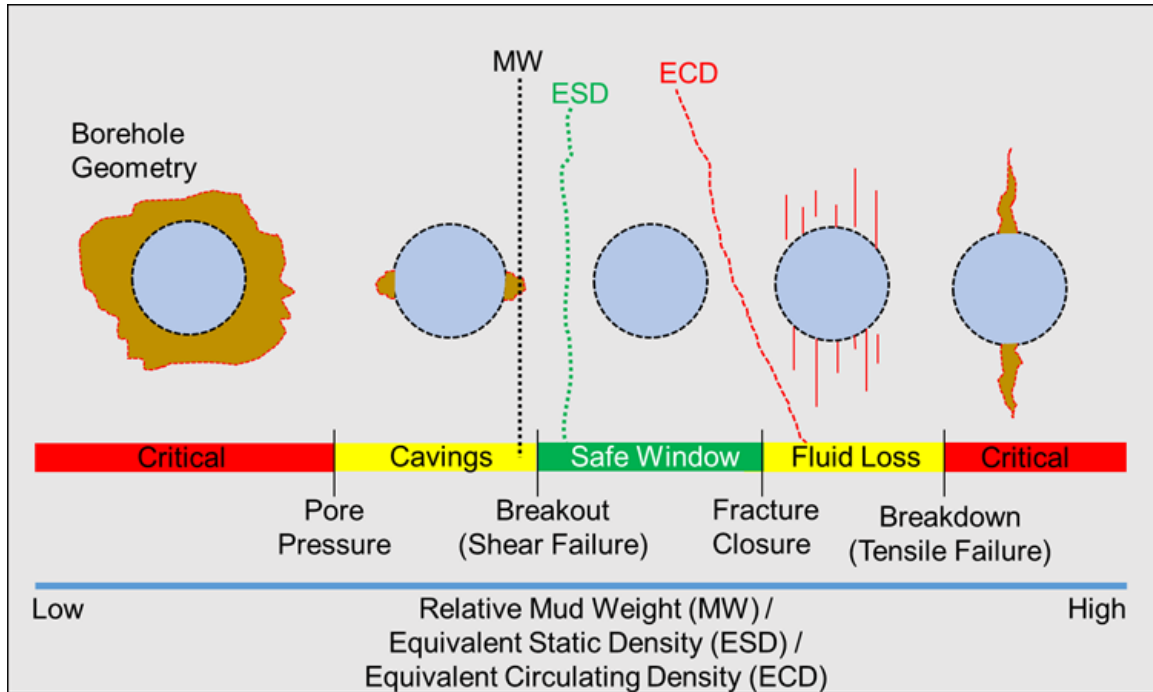


Completion of Oil and Gas Wells



Completion of Class VI CO₂ Injection Wells

Control of Drilling Operations in the Permian



Drilling and Well Design for a Class VI Well

30" Conductor hole
20" conductor casing
@ approx. 100'

GW @ 1,000-ft

17-1/2" Surface hole
13-3/8 surface casing
@1,500-ft

String	Hole In.	Casing In.	WPF Lb/ft	Grade	Con.	TVD Ft
Cond.	30	20	94	J-55	Welded	~100
Surf.	17-1/2	13-3/8	54.5	J-55	BTC	1,500
Int.	12-1/4	9-5/8	40.0	L-80	BTC	5,500
Prod.	8-3/4	5-1/2	23.0	L-80	BTC	8,800

12-1/4" Int. hole
9-5/8 Int. casing
L-80 - 40 lb/ft
@5,500-ft

Pt. Lookout top - 5,108-ft - 169-ft

U. Mancos top - 5,277-ft - 1,147-ft

Note: #-ft - #-ft: top - thickness

Fiber optic cable/sensor

Dakota top - 7,233-ft - 187-ft

Morrison top - 7,420-ft - 331-ft

Salt Wash top - 7,751-ft - 220-ft

Bluff top - 7,971-ft - 127-ft

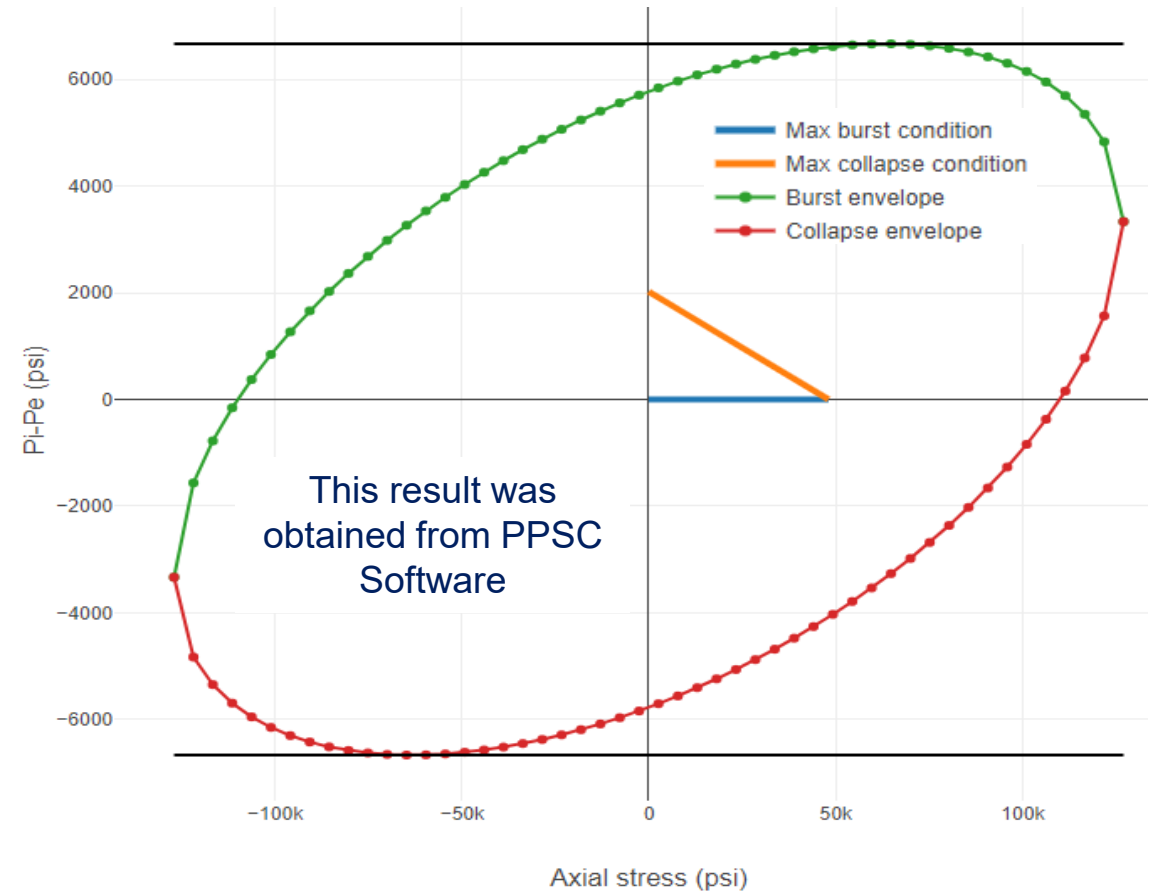
Summerville top - 8,098-ft - 82-ft

8-3/4" prod. hole
5-1/2 prod. Casing
L-80 - 23 lb/ft
@8,800-ft

Entrada top - 8,200-ft - 116-ft

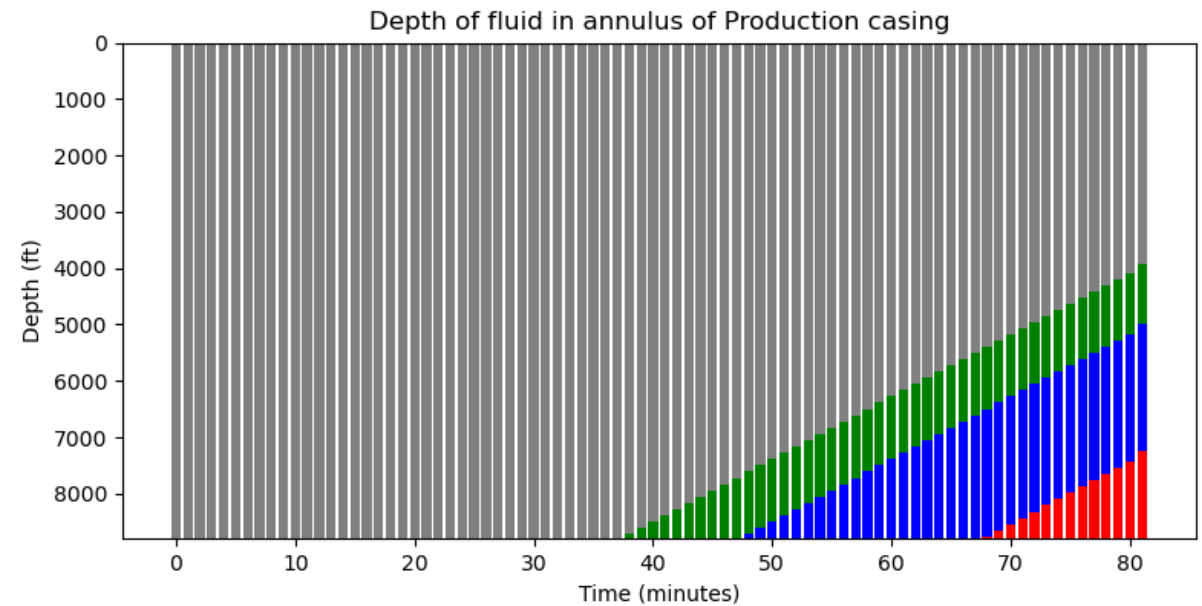
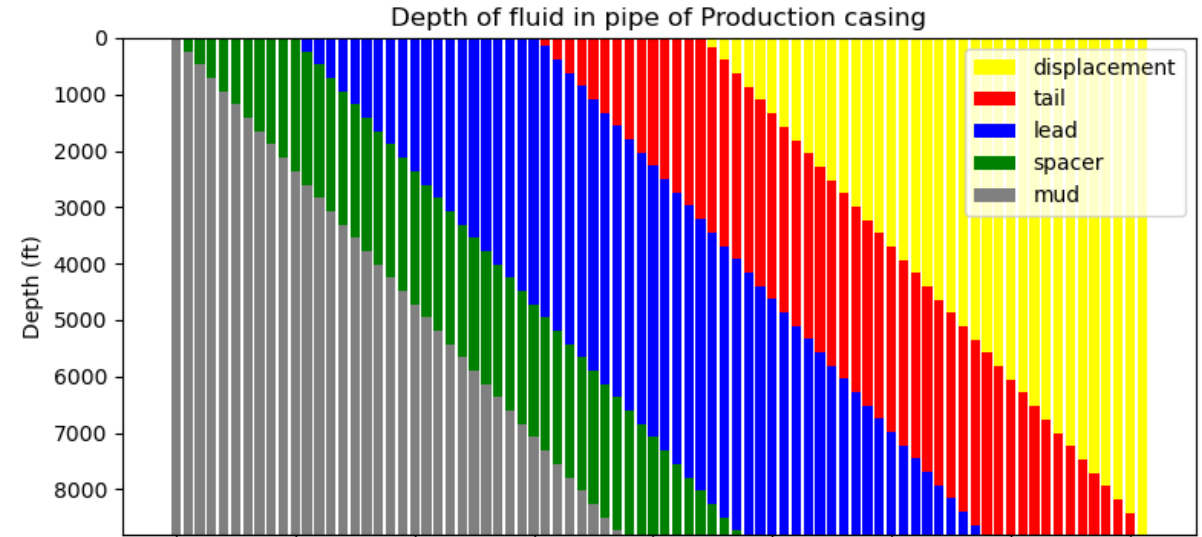
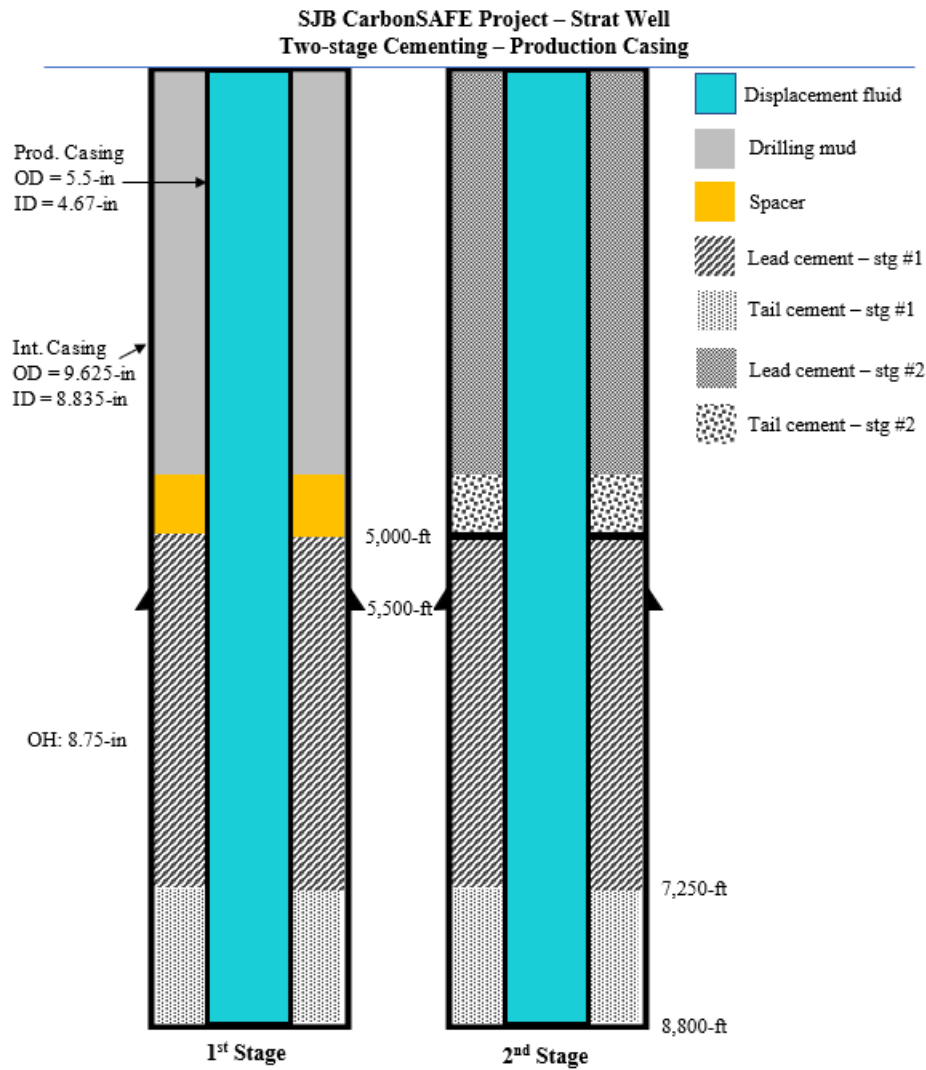
Carmel top - 8,316-ft - 221-ft

Chinle top - 8,537-ft - 700-1,500-ft



Von Mises Analysis for Burst and Collapse Loads
Casing: 5.5-in; WPF = 23 lb/ft; L-110

Cementing Oil & Gas Wells



Thank You