U.S. State-by-State Stratigraphic Test Well Permitting Process for Carbon Storage Projects

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Objectives

- Provide a database of stratigraphic well test permitting requirements
- Identify the type of agencies that permit stratigraphic wells
- Determine if additional permits are required for water injection tests

Stratigraphic Test Well

What is it?:

- Any well drilled for the purpose of gathering geologic characterization information
- Data obtained from stratigraphic wells are used to determine the validity of pre-drilling predictions, quantify reservoir quality, and determine if the geology may be suitable for geologic CO_2 storage
- Does not need to be tied to a project and permitting process varies by state

Relevance towards Class VI permit applications?:

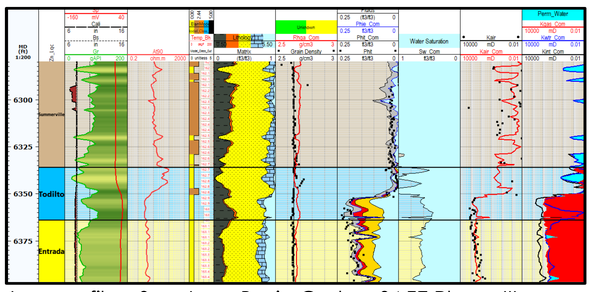
- Help to make better informed decisions related to well construction, testing, injection, and plugging practices

Permitting Process Review by State

- Permitting process varies by state and U.S. EPA regions
- State, county, and local permits are also required
- All states require that parties seeking to drill stratigraphic test wells have leaseholder and landowner permission to drill
- BLM, in conjunction with the states, presides over permitting on Federal Land
- An injection well permit may be needed to perform injection tests depending on the state and EPA region
- EPA regions 2 and 9 require a UIC Class V permit for freshwater injection testing
- New Mexico is the only State that has primacy that requires additional permitting for injection testing
- North Dakota has taken a different approach to stratigraphic test well permitting – requires all stratigraphic test wells associated with a potential carbon sequestration to be constructed to Class VI standards

Geologic Characterization Information Collected

- Borehole Geophysical Logs
- Downhole Seismic
- Downhole P&T
- Baseline Sampling
- Lithology Descriptions
- Step Rate Injection Test



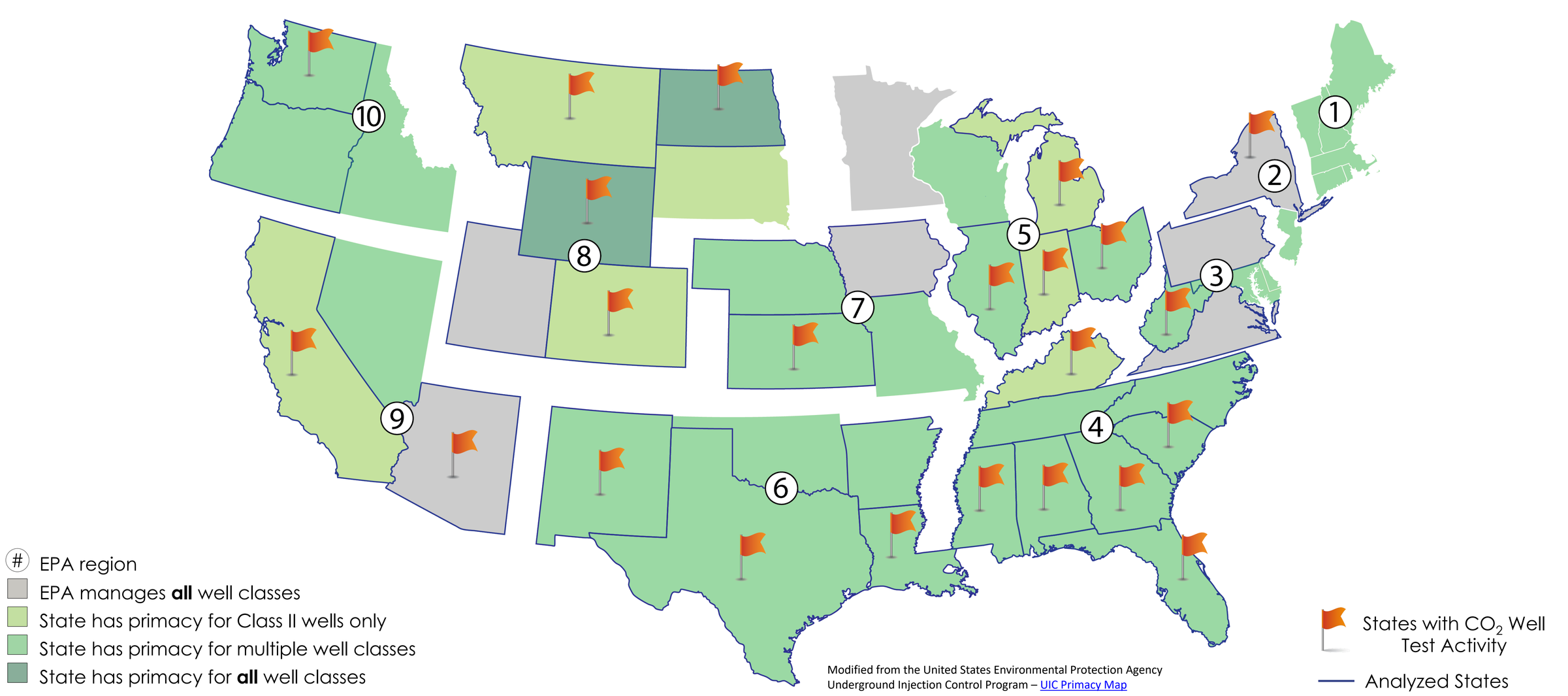
Log profiles: San Juan Basin CarbonSAFE Phase III DE-FE0031890

Core Samples: North Dakota CarbonSAFE Phase III DE-FE0031889

Addressing the Needs of the Class VI Permit

Major NDIC Permitting Requirements	Core	Logging	Downhole Testing	Lab Testing	Modeling	Simulation	Seismic Collection	Baseline Sampling
Determine Plume Extent	X	X	X	X	X	X	X	
Determine Pore Space Amalgamation	X	X	X		X	X	X	
Geologic Properties of Injection and Confining Zones	X	X	X	X				
Regional Faulting Assessment	X						X	
Potential for Seismic Activity			X		X		X	
Geologic Maps and Cross Sections		X			X		X	
Geomechanics of Confining Zones(s)		X	X	X	X			
Identify and Characterize Secondary Confining Zones		X	X		X		X	
Determine Area of Review		X	X	X	X	X	X	X
Baseline Geochemical Data	X			X				X
Baseline Water and Soil Data				X				X

EPA Regions, UIC Primacy and Analyzed States for Stratigraphic Test Well Applications



Modified from the United States Environmental Protection Agency Underground Injection Control Program – UIC Primacy Map

Tips for Effective Results

- Discuss with state regulators before starting the permitting process – facilitates in permit application process
- State upfront that not seeking a Class VI permit nor plan to inject CO_2 - rather wanting to acquire geologic information to determine if conditions are suitable for CO_2 sequestration
- Be aware of local regulations - can affect well placement and time delays

UIC Class VI Primacy: WY, ND
States applying for Class VI Primacy: AZ,WV,TX,LA

https://www.epa.gov/uic/primary-enforcement-authority-underground-injection-control-program-0