Carbon Capture and Storage

Keith B. Hall
LSU Law School
Baton Rouge, Louisiana
(504) 250-2636
khall@lsu.edu

LSU Law
John P. Laborde Energy Law Center

Baton Rouge, Louisiana

December 5, 2025

2025 Legislative Legal Seminar

What is Carbon Capture and Storage

Carbon capture and storage involves

- ***Capture*** of ***carbon*** dioxide (CO_2) by separating it from a mixture of gases in some industrial emissions or in the atmosphere itself
- Transport of CO_2 from capture site to injection site
- ***Storage*** of the captured CO_2 by injecting it into an underground for permanent sequestration

What is Carbon Capture and Storage

Carbon capture and storage involves

- ***Capture*** of ***carbon*** dioxide (CO_2) by separating it from a mixture of gases in some industrial emissions or in the atmosphere itself

- Transport of CO_2 from capture site to injection site

- ***Storage*** of the captured CO_2 by injecting it into an underground for permanent sequestration

More Terminology (1)

- Carbon capture and sequestration (CCS) – this is the same thing as carbon capture and storage, but is older terminology
- Carbon capture utilization and storage (CCUS) – a broader category that includes CCS and capture of CO_2, followed by its use or utilization in some process

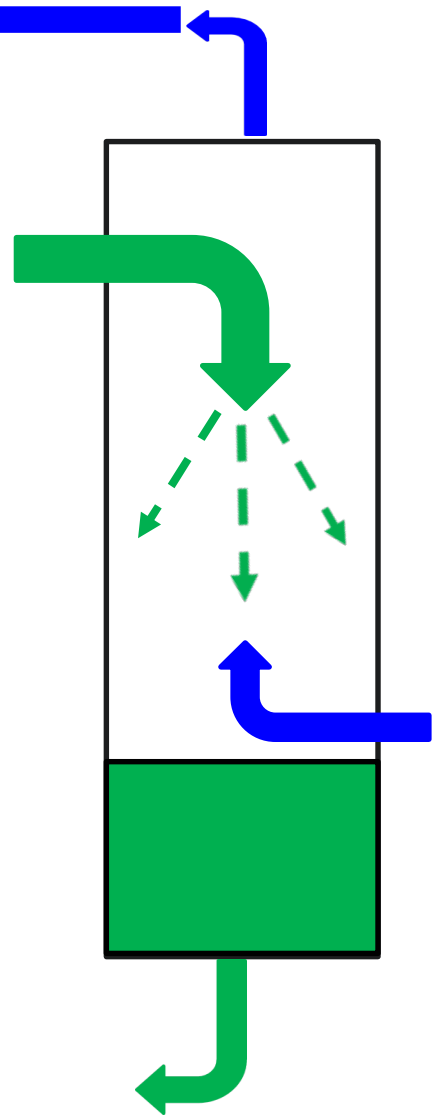
More Terminology (2)

- Direct air capture – (DAC) this is CCS when the CO_2 is captured from the atmosphere
- Point source – a source of industrial emissions into the atmosphere

Capturing CO_2

Gaseous stream after CO_2 removed

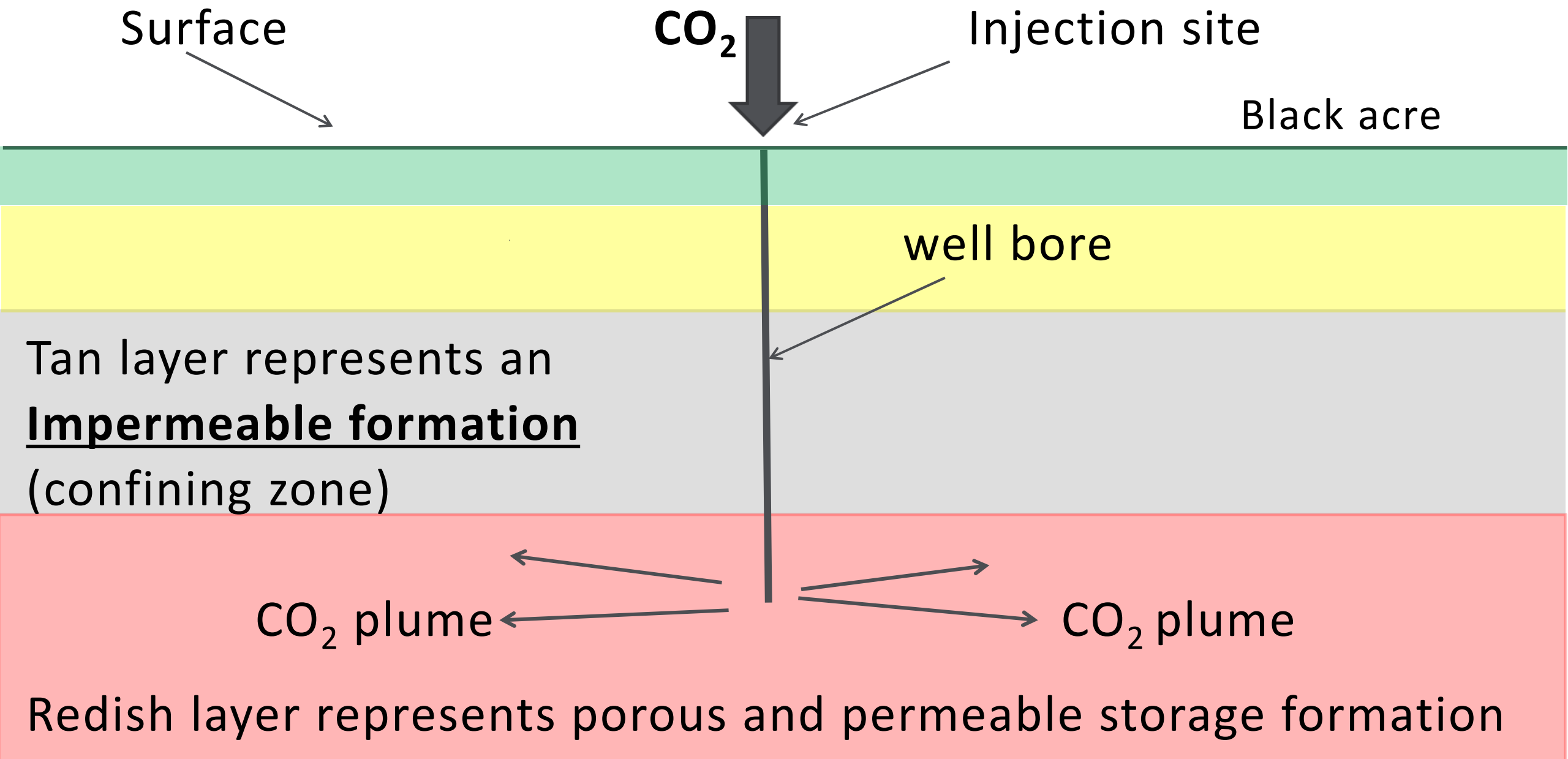
Absorbing fluid in (amine solution)



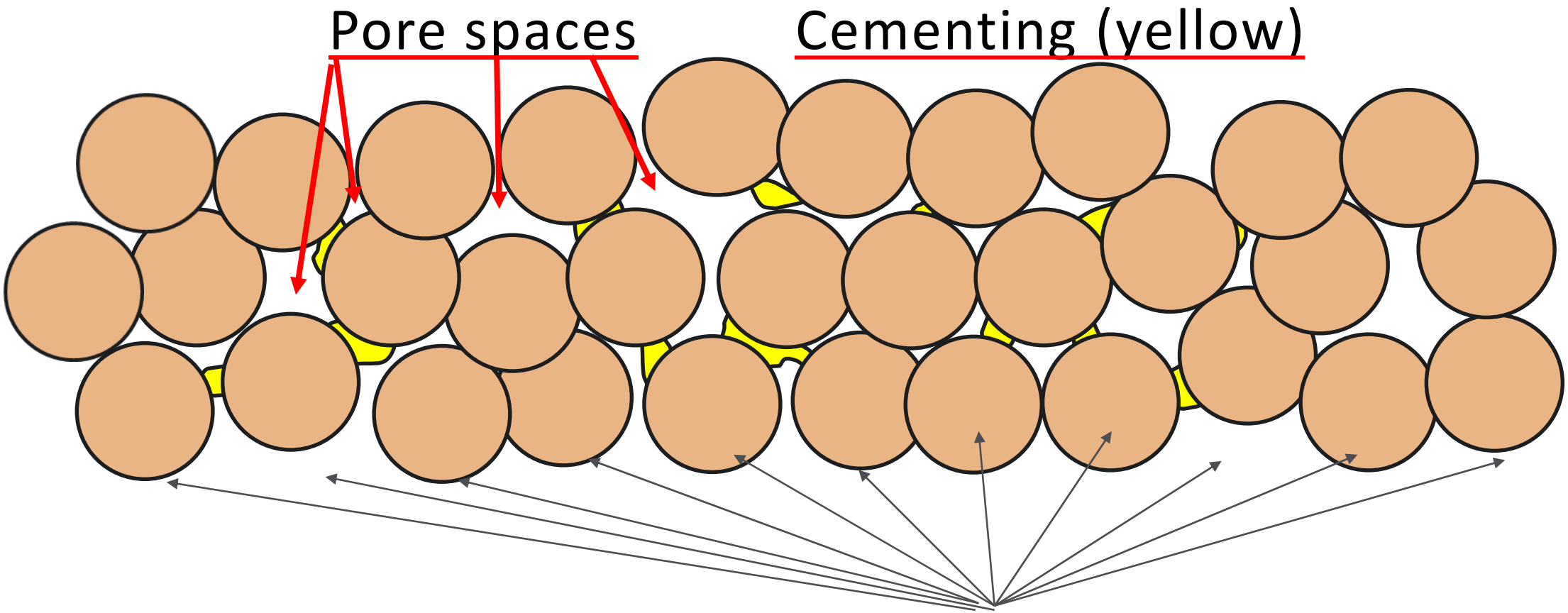
Gaseous stream containing CO_2

Absorbing fluid with CO_2 is heated to release CO_2

CO_2 injected into subsurface for storage



Sandstone formation



Individual sand particles in sandstone formation

Pore spaces may contain brine or other fluids.

Why does society provide incentives for CCS?

Climate change mitigation

- CCS is a measure to address climate change
- Intergovernmental Panel on Climate Change describes CCS as “a critical mitigation option” for addressing CO_2 emissions
- For decades, Congress and every Presidential administration in U.S. has supported CCS
- Several states are encouraging CCS

Incentives for CCS

- 45Q federal tax credit
- California's Low Carbon Fuel Standard
- Voluntary carbon credit markets
- Avoiding European Union's Carbon Border Adjustment Mechanism and similar laws
- Customers want low carbon products

45Q tax credit overview

- Credit against federal income tax liability
- Enacted in 2008, increased in 2018, and increased again in 2022 in the “Inflation Reduction Act,”
- Credit increased for enhanced oil recovery (EOR) in One Big Beautiful Bill Act in 2025
- Credit amount of tax credit depends on whether the CO_2 was captured from a point source or directly from the air

45Q tax credit amounts (if "prevailing wage" standards met)

Type of operation	**$ per ton tax credit**
CCS and EOR; CO_2 from a point source	$85
CCS and EOR; CO_2 from direct air capture (DAC)	$180

California Low Carbon Fuel Standard

- Companies must earn or purchase “credits” to offset sale of transportation fuels that generate more than a specified amount of CO_2 under “life cycle analysis.”
- Companies can earn credits by supplying fuels that produce less CO_2 under “life cycle analysis”
- Credit can be earned by producing biofuels and using CCS to reduce CO_2 under “life cycle analysis”

How much experience
do we have with these activities?

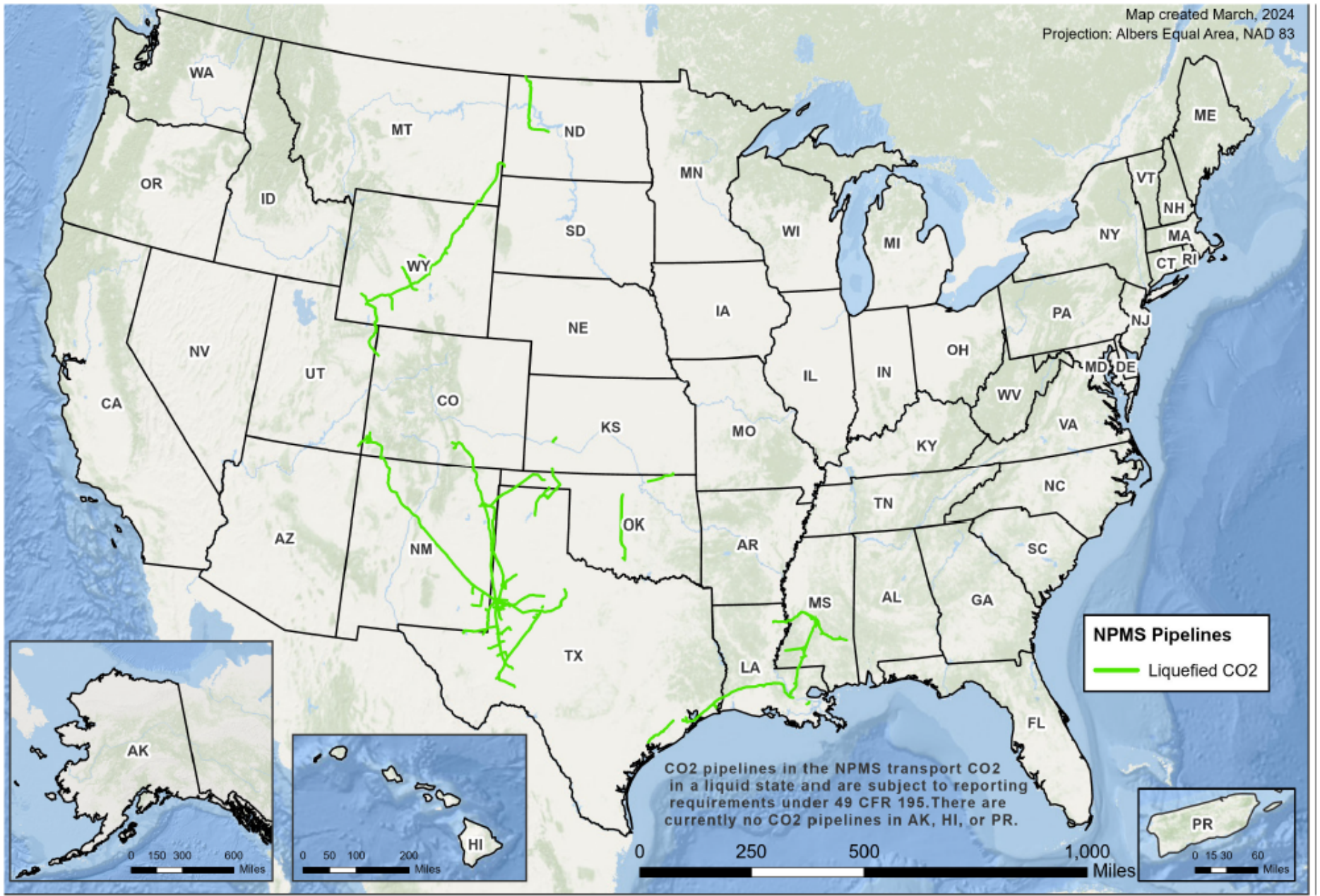
Experience with CCS-type activities

- U.S. has substantial experience with "capture" of CO_2 (*e.g.*, from natural gas in gas processing plants and the removal of CO_2 from natural gas at LNG facilities)
- U.S. has over 5000 miles of CO_2 pipelines. Network began decades ago.
- U.S. has substantial experience injecting CO_2 during enhanced oil recovery (EOR)

Experience with CCS itself

- Archer Daniels Midland has done CCS (capturing CO_2 from an ethanol plant near Decatur, Illinois)
- Global CCS Institute says 41 CCS facilities currently operate worldwide

Carbon dioxide pipelines



How is CCS regulated?

Regulation of CCS

- The main regulation of CCS is through the federal Safe Drinking Water Act (SDWA)
- Part C of the Act has underground injection control (**UIC**) provisions designed to protect underground sources of drinking water (USDWs).
- There are UIC regulations for six classes of injection wells—**Class VI** covers wells that will inject CO_2 for CCS.

Who regulates?

- Unless a state has “primacy,” someone who wants a Class VI permit applies to EPA.
- SDWA encourages states to develop their own UIC program and to apply for primary regulatory authority (primacy) for SDWA.
- La. has had primacy for Classes I - V for many years; and obtained primacy for Class VI in early 2024.
- Apply to La. Dept. Conserv. & Energy for permits.

The regulations

- Class VI regulations require applicant to provide significant information on subsurface geology to demonstrate that it is safe to do CCS where permit applicant proposes.

- Pipelines that carry CO_2 are regulated by federal Pipeline and Hazardous Materials Safety Administration (PHMSA). Louisiana also has some of its own pipeline regulations.

From where is the CO_2 captured?

Point Sources for CCS (1)

CO_2 comes from *burning fuel*

- Natural gas power plants
- Coal-fired power plants

Point Sources for CCS (2)

CO_2 comes from *removing CO_2 as an impurity*

- Natural gas processing plants
- LNG liquefaction facilities

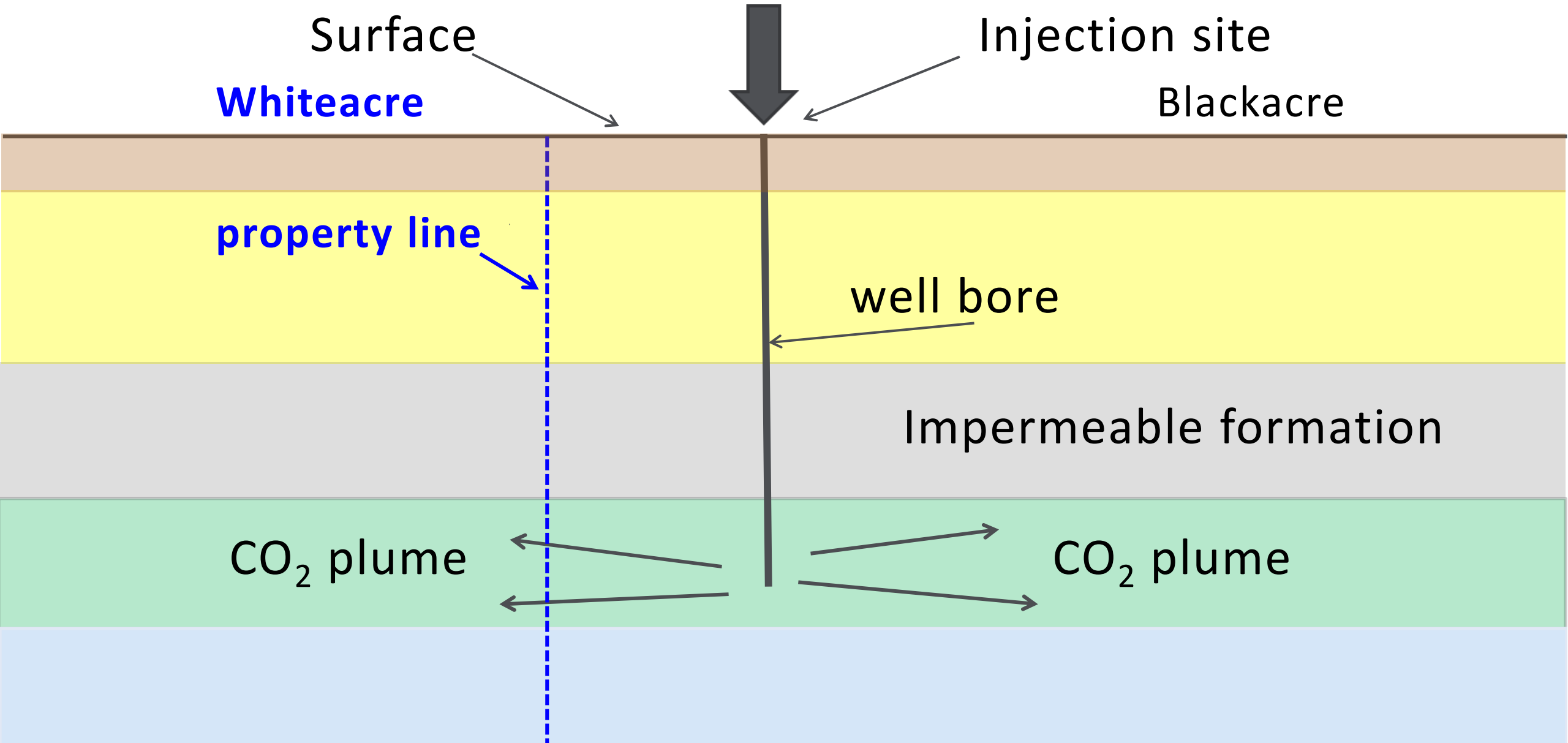
Point Sources for CCS (3)

CO_2 comes from *chemistry of a process*

- Hydrogen production
- Fertilizer plants
- Ethanol plants
- Cement plants
- Steel mills

What are some property law issues?

Does owner of Whiteacre have redress?



La. Civ. Code art. 490.
Accession above and below the surface

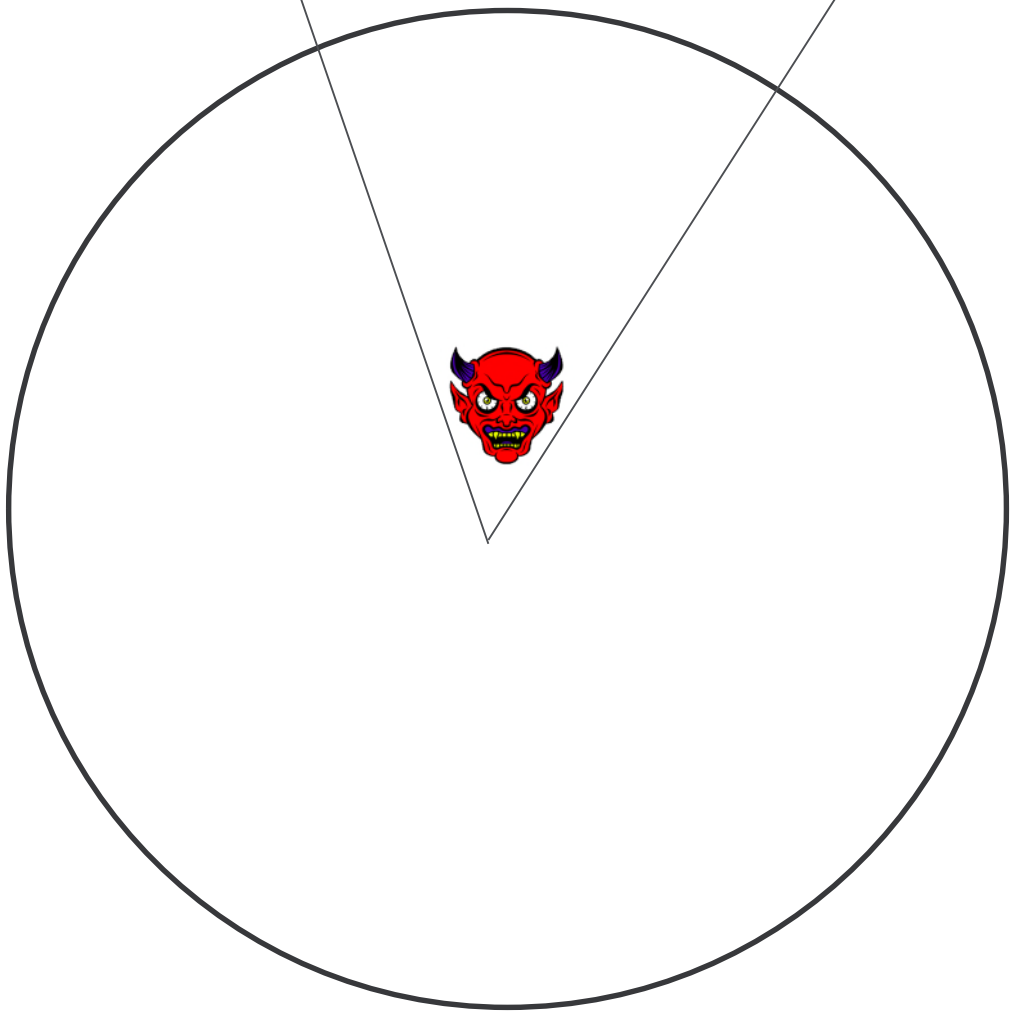
Unless otherwise provided by law, the ownership of a tract of land carries with it the ownership of everything that is directly above or under it.

***

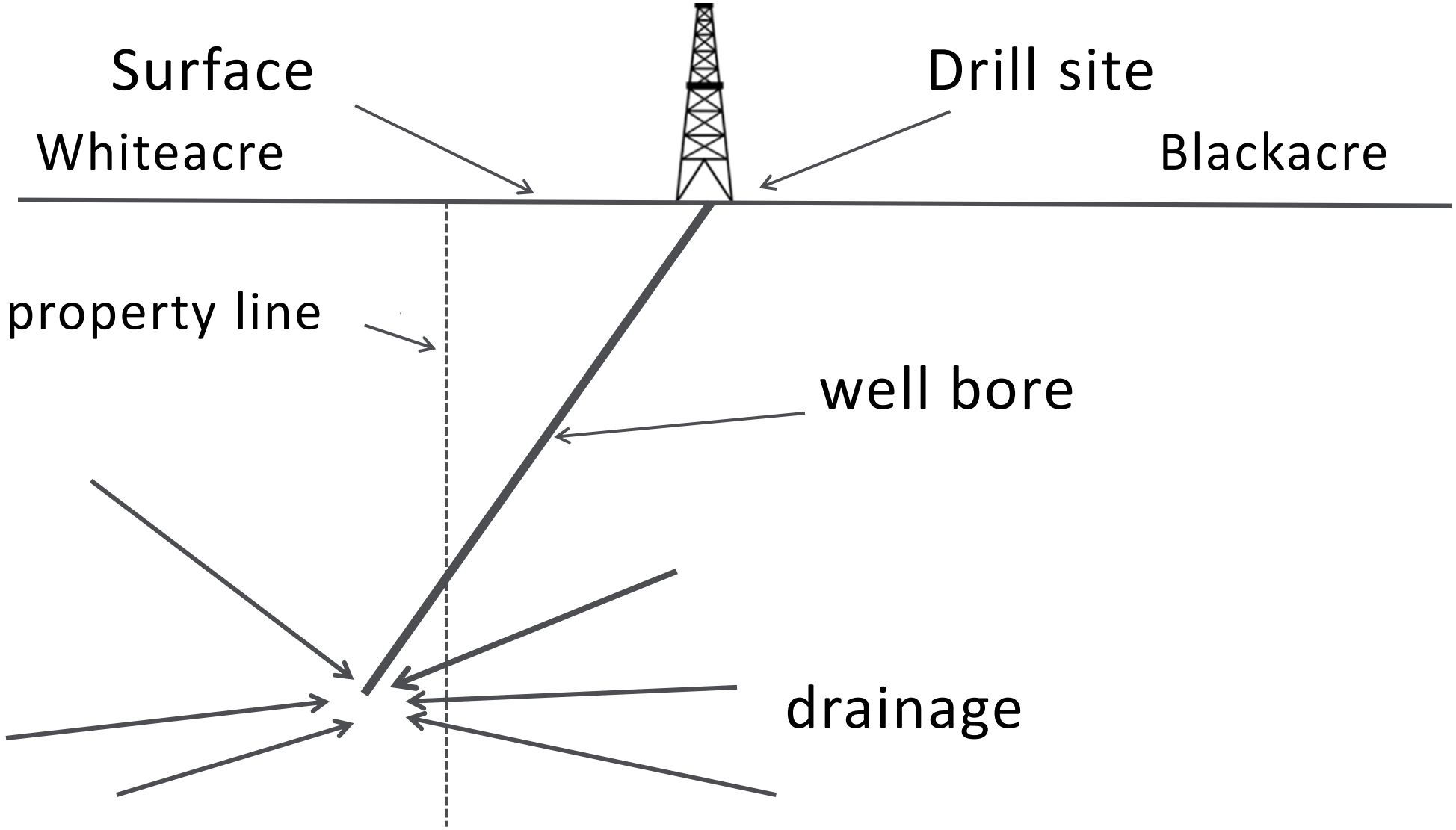
The *ad coelum* doctrine

- "*cujus est solum ejus est usque ad coelum et ad inferos*"
- "For whoever owns the soil, it is theirs up to Heaven and down to Hell."

Alyce Gaines Johnson Special Trust v. El Paso E & P Co., L.P., 773 F.Supp.2d 640, 645 (W.D. La. 2011)



Subsurface trespass



Gliptis v. Fifteen Oil Co., 16 So. 2d 471 (La. 1943); *Hastings Oil Co. v. Texas Co.*, 234 S.W.2d 389 (Tex. 1950);

Subsurface Trespass?

- It might be a subsurface trespass if CCS operator causes CO_2 to migrate into the subsurface of neighbors' land without permission.
- It is not 100% clear that this would be a trespass.
- But CCS operators are not going to risk a project that might cost billions of dollars by injecting CO_2 without securing "pore space rights."

How would a prospective CCS operator obtain pore space rights?

What provisions are in the contracts?

Obtaining Pore Space Rights by Contract

Numerous prospective CCS operators have acquired pore space rights using various sorts of agreements, including

- Leases
- Servitudes
- Easements (in other states)
- Purchase of subsurface estate (in other states)

Example—Duration of **Louisiana** CCS agreements

- "Initial Term" – up to 3 years to apply for Class VI permit (with possible extension) (lease terminates if no application filed timely)
- "Permit/Construction Term" – up to 4 years to start injections (with possible extension) (lease terminates absent timely start)
- "Operational Term" – as long as lessee continues to inject without gap of more than 1 year in injections
- Right to conduct monitoring required by law continues after the Operational Term

Typical structure of compensation

- Upfront payment that may be called a “bonus.”
- Perhaps additional “bonuses” as CCS project meets certain milestones
- Annual rentals (until injections begin or until injection rights end)
- Either an injection fee based on the number of tons of CO_2 injected or a royalty based on revenue from the CCS operation.

Other clauses

Surface owner should bargain for

- Indemnities and defense from CCS operator
- Consider requiring operator to provide insurance
  - Perhaps making surface owner a named insured and requiring insurer to waive subrogation rights
- Bargain for a surface damages and restoration
- Information/audit rights?

Publicly available agreements

- La. has granted six leases (called “operating agreements”). These are publicly available at https://www.dnr.louisiana.gov/index.cfm/page/168
- Texas has granted CCS leases, including a lease to Talos for area in Texas waters in the Gulf of Mexico. It is available by public records request from General Land Office.
- Wyoming has granted a couple of leases.

Alternatives to agreement?

Eminent Domain

At least three two states have authorized a prospective CCS operator to acquire subsurface rights by eminent domain

- Ala. Code § 9-17-154
- Ark. Code §§ 15-17-602, 15-17-604
- La. Rev. Stat. 31:1108

Unitization-like process authorized

- Cal. Pub. Res. Code § 71461
- Colo. Rev. Stat. § 34-60-141
- 415 Ill. Comp. Stat. 185/15
- Ind. Code § 14-39-2-4
- Ken. Rev. Stat. 353.808
- La. Rev. Stat. 30:1104.2
- Miss. Code § 53-11-9
- Mon. Code § 82-11-204
- Neb. Rev. Stat. 57-1612
- N.D. Cent. Code § 38-22-10
- 32 P.S. § 696.5
- Utah § 40-11-10
- W. Va. Code § 22-11B-19
- W. Va. Code § 22-11B-19

Potential disputes between CCS operator and oil and gas operators

Increased costs of drilling to depths beneath CCS storage reservoir

Materials of construction for CCS well

- CO_2 in water can be acidic and slightly corrosive.
- A CCS well will use different and more expensive materials of construction (casing and cement) than is typically used in oil and gas drilling.
- An oil and gas well that passes through CCS storage zone will need to use the more expensive materials.
- Does the added expense constitute an undue interference with the mineral owner's rights?

Geophysical exploration

Need for geophysical exploration

- Safe Drinking Water Act regulations require a person applying for a Class VI permit to provide extensive information about the subsurface.
- Applicant will need to submit information from geophysical surveys, such as seismic surveys and perhaps test well logs and/or cores.
- If the CCS operator performs seismic studies of the subsurface or drills stratigraphic test wells, is this a violation of the mineral owner's rights?

States with Class VI Primacy

- Louisiana
- North Dakota
- Wyoming
  - Texas is working in primacy
  - Several other states have expressed interest, but are not as far along

Who is for it and who is against it?

Governments

- UN's Intergovernmental Panel on Climate Change describes CCS as "a critical mitigation option" for addressing CO_2 emissions
- International Energy says CCS "will be crucial"
- U.S. government has supported CCS across multiple Presidential administrations
- Several states are encouraging CCS. Some local governments oppose it.

Support for CCS

- Various industries, including oil & gas, ethanol plants, LNG facilities, coal
- Some mainstream environmental organizations are supportive (*e.g.*, Environmental Defense Fund)
- Businesses that believe doing CCS will make their products more competitive for export

Opposition to CCS

- Environmental NGOs that are less mainstream
- Climate change skeptics who believe climate change is not real or not worth addressing
- Individuals who oppose CCS projects that would be located near them
- Pipeline opponents
- In La., some small oil & gas operators/owners

Local opposition

Significant local opposition has arisen to some projects, including projects

- at Lake Maurepas in Louisiana, other places
- in Midwest (Iowa, South Dakota, North Dakota, Nebraska),

A variety of reasons for opposition have been given. Most common are fear of pipeline leaks, opposition to pipelines crossing the opponent's land

Litigation

Deep South v. EPA (5th Cir. 2025)

- Multiple environmental NGOs challenged EPA's grant of primacy to Louisiana.
- Challenge largely based on La. statutes allowing eventual handoff of liability to State
- Case filed in U.S. Fifth Circuit
- Fifth Circuit dismisses, finding lack of standing

Air Products Blue Energy v. Livingston Parish (M.D. La. 2022)

- Livingston Parish passes ordinance to place moratorium on Class V test wells used to gather information for Class VI injection well applications for CCS
- Air Products files suit, challenging moratorium
- Court grants preliminary injunction, block enforcement of moratorium on grounds that it likely is preempted by state law

Louisiana legislation

Louisiana Geologic Sequestration of Carbon Dioxide Act (1)

- Enacted in 2009, amended a few times since then
- Found at La. Rev. Stat. 30:1101 to 30:1115
- Section 1101 – title of the legislation
- Section 1102 – states a public policy favoring CCS
- Section 1103 – definitions

Louisiana Geologic Sequestration of Carbon Dioxide Act (2)

- Section 1104 – duties and powers of Dept. of Conservation & Energy relative to CCS
- Section 1104.1 – requirement for environmental analysis
- Section 1104.2 – unitization
- Section 1105 – requirement for public hearings

Louisiana Geologic Sequestration of Carbon Dioxide Act (3)

- Section 1106 – regulator's authority to seek primacy, other authority
- Section 1107 – granting of certificates of public convenience and necessity; eminent domain authority
- Section 1107.1 – recordkeeping requirements
- Section 1107.2 – emergency preparedness requirements

Louisiana Geologic Sequestration of Carbon Dioxide Act (4)

- Section 1107.2 – emergency preparedness requirements
- Section 1108 – eminent domain
- Section 1109 – limited liability release
- Section 1109.1 – landowner liability limitation
- Section 1110 – Trust Fund

Louisiana Geologic Sequestration of Carbon Dioxide Act (5)

- Section 1111 – site-specific trust accounts
- Section 1112 – recordation of notices of pore space agreements
- Section 1113 – Siting restrictions
- Section 1114 – groundwater quality monitoring
- Section 1115 – notices regarding applications

LSU Law | John P. Laborde Energy Law Center

Keith B. Hall
LSU Law School
Baton Rouge, Louisiana
(504) 250-2636
khall@lsu.edu