

Who has the Right to Produce Lithium from Subsurface Brines?

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Outline

1. Short introduction to lithium production
2. Who has the right to produce lithium from subsurface water?
3. Some other legal issues

1. Short Introduction to Lithium Production

Four types of potential sources of Li

Current

- Certain ores
- Brine (not produced water)

Potential

- Certain clays
- Produced water

Process for Recovering Li from brine

1. First, subterranean brine is pumped to the surface.
2. Then, lithium dissolved in the brine is recovered either by
 - a. Evaporating the water in large evaporation ponds
- *(historically, the most common method)*
 - b. Separation from water by chemical means

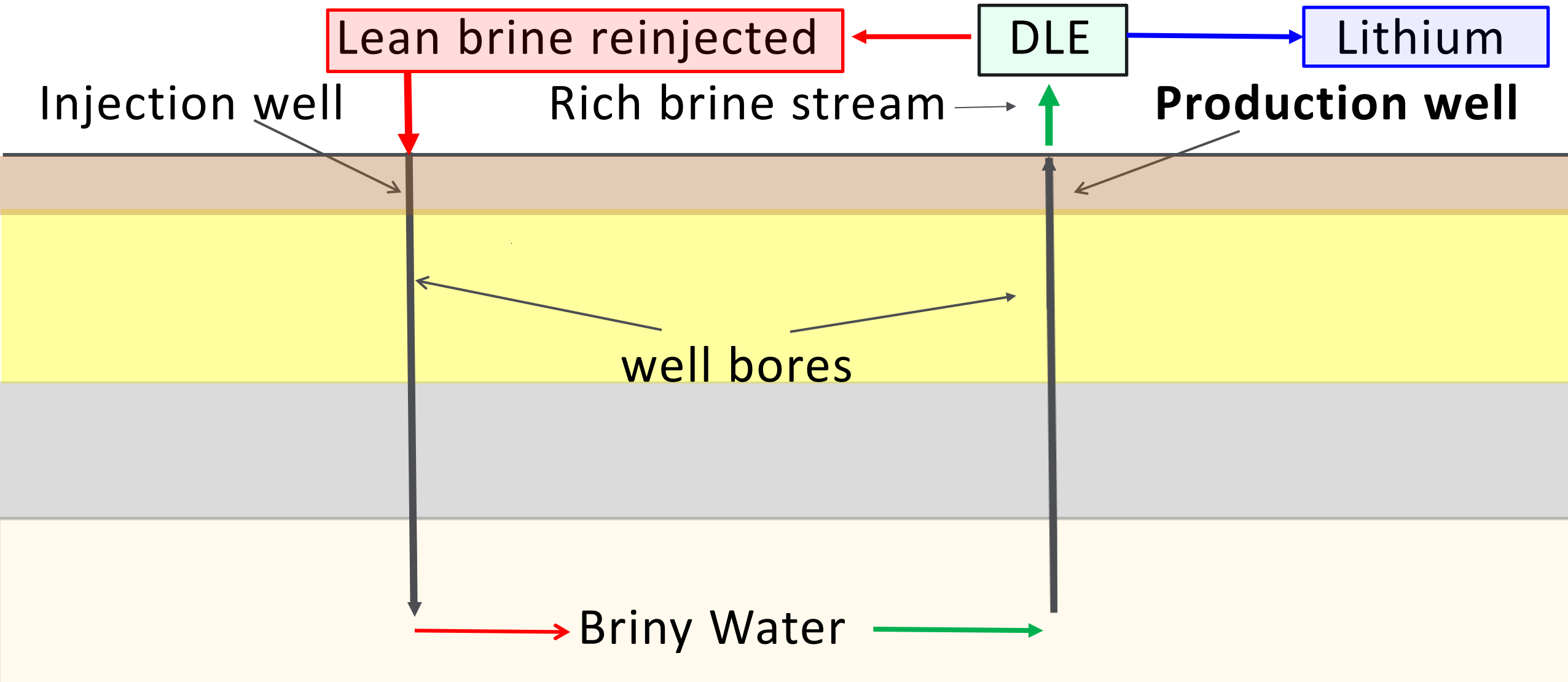
Evaporation ponds for recovering Li from brine in Chile



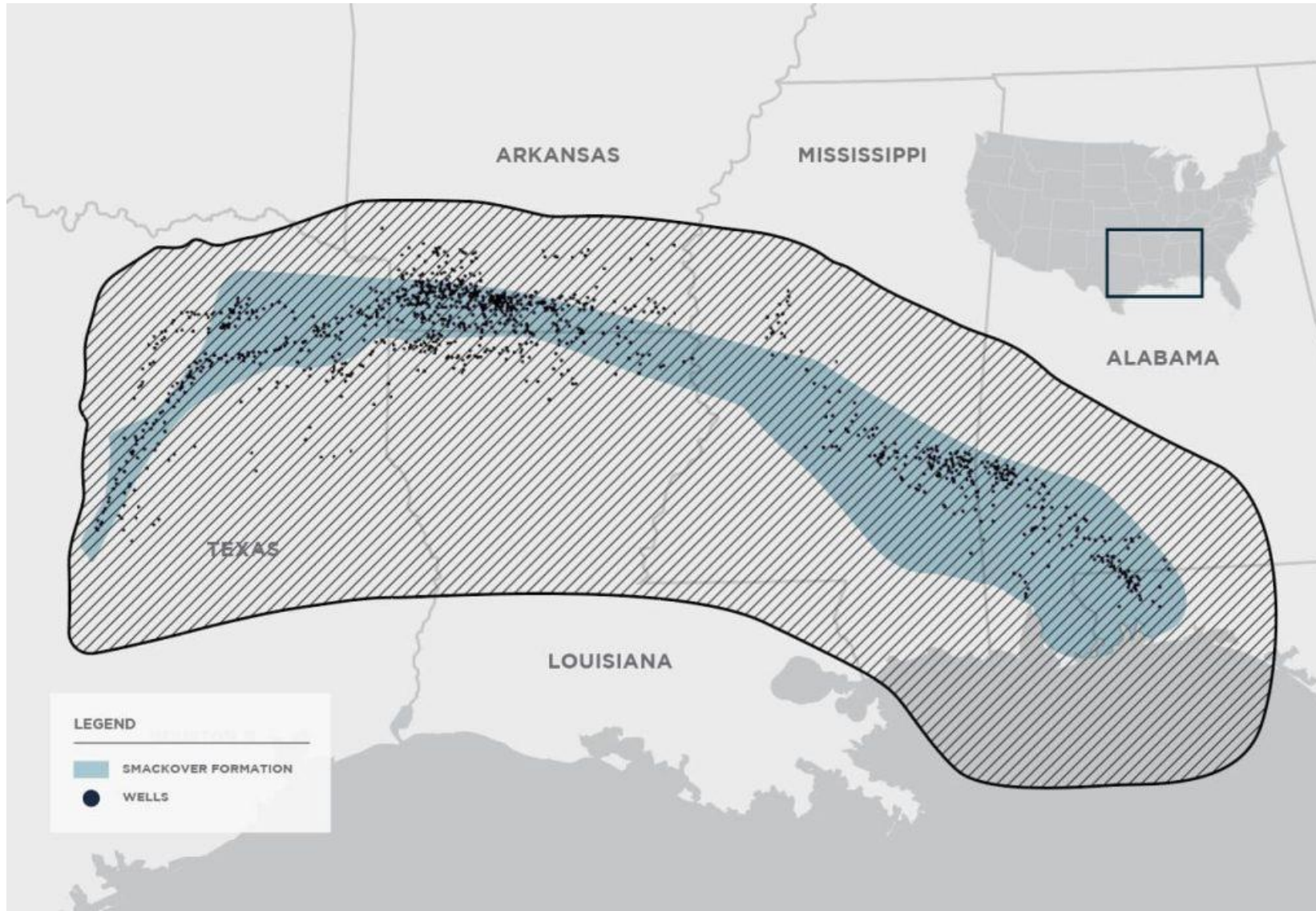
Direct lithium extraction (DLE)

- Li could be removed from water using chemical means in “directly lithium extraction” or “DLE.”
- The leftover “lithium-lean” water could be pumped back into the formation from which it was removed.
- The flow of fluids would be similar to a waterflood for secondary recovery of oil.

Recovery of Lithium from Brine and Reinjection



Brine from Smackover Contains Lithium (sweet spot is in South Arkansas)



Arkansas

- There has been production of bromine from brine from Smackover for decades by Albemarle, others.
- Growing interest in recovering Li from this brine.
- Three largest leaseholders for brine from Smackover
 1. Exxon
 2. Standard Lithium, now partnered with Equinor
 3. Albemarle

Produced Water

- Testing of produced water in certain places in Texas and Pennsylvania show the presence of Li.
- *E.g.*, a National Energy Technologies Laboratory Study discusses levels of Li found in produced water from the Marcellus formation in Pennsylvania.

<https://www.nature.com/articles/s41598-024-58887-x>

2. Who has right to produce lithium from subsurface water?

(From whom do you lease?)

Assumptions

- Assume that there has been a severance and/or lease of “mineral” rights
- Assume that the severance/lease does not expressly address lithium

Suggested analysis

- a) Who owns the right to subsurface water?
- b) Does the mineral owner have the right to use subsurface water to extract any “minerals” dissolved in the water?
- c) Is lithium a “mineral” for purposes of any mineral severance/lease?

a) Who owns the right to subsurface water?

The rights might depend on whether we are talking about produced water or other subsurface water.

Who “owns” the right to extract groundwater/brine (that is not produced water)?

Groundwater rights will vary by state.

Three Regimes for Groundwater Rights

- **Prior appropriation**
- **Rights based on ownership of land**
 - **Unlimited right to extract groundwater**
 - **Reasonable use**

Prior appropriation

- In some states, particularly some of the arid states in the West, water rights are not tied to land ownership.
- A rule of prior appropriation, based on who first put water to a beneficial use, applies.
- First person to put water to beneficial use obtains a priority for using the water.
- An oil and gas state example is New Mexico.

Rights based on ownership of land

- In most states in Eastern half of U.S., landowner has right to extract groundwater.
- In some states, the rules of property law do not limit the rate at which a landowner can extract groundwater (though regulations may).
- In others, landowner is limited to “reasonable use.”
- Rule of capture applies in both.

No limit

- Texas and Louisiana are oil and gas state examples in which rules of property law allow a landowner to extract unlimited quantity of groundwater.

Reasonable use limit

- Oil and gas states examples of states that limit a landowner's groundwater extraction rights to "reasonable use" include:
 - Ohio
 - Pennsylvania
 - West Virginia
 - Kentucky
 - Arkansas
 - Oklahoma

Query

- In the “reasonable use” states, would the “reasonable use” limit on extraction apply to briny water?
- Might the reasonable use limit apply only to freshwater than can be used for drinking water or irrigation?

Who owns produced water?

The analysis will vary by state.

Texas—ownership of produced water

Cactus Water Services, LLC v. COG Operating, LLC, 676 S.W.3d 733
(Tex. App—El Paso 2023)

- Leases did not address ownership of produced water
- Court holds that produced water belongs to lessee.
- Court relied on historic practices, statutory distinctions between oil & gas waste, groundwater.
- Petition for review by Tex. Sup. Ct. was filed

If produced water is oil and gas waste

- If substances can be profitably extracted from produced water, is produced water still a “waste”?
- If produced water belongs to the operator because it is oil and gas waste ...
 - Does the operator also own any substances that can profitably be extracted from the produced water?
 - In other words, does the operator own everything in the produced water?

b) Does the mineral owner have the right to use subsurface water to extract any “minerals” dissolved in the water?

Use of subsurface water by mineral owner

- The mineral owner generally has an implied easement of surface use.
- This gives the mineral owner a right to use land as reasonably necessary for mineral exploration and production.
- This should include reasonable use of subsurface water.
- The mineral severance/lease may also include an express grant or restriction of surface use rights.

c) Is lithium a “mineral” for purposes of any lease/severance?

Reference to “minerals”

- A mineral lease or mineral severance may apply to specifically listed substances and “minerals.”
 - *E.g.*, “iron, coal, and minerals,” or “oil, gas, and minerals”
- Or, a mineral lease or severance might not list any specific substances, but might apply to “minerals”
- In each of these two circumstances, what substances qualify as “minerals”?

Different states consider different factors

- a) Generally understood meaning of term “minerals”
- b) *Ejusdem generis* – Is substance at issue like the substances specifically named in the instrument?
- c) Was substance known to be valuable at the time?
- d) Does granting clause mention a specific type of operation? *E.g.*, “mining” or “drilling”?
- e) Would production destroy the surface?
- f) Has a classification become settled as a rule of property law?



What is a “mineral”?



- Leading Texas case is *Moser v. United States Steel Corp.*, 676 S.W.2d 99 (Tex. 1984)
- Reservation applied to “oil, gas and other minerals”
- Dispute involved the right to uranium ore
- Court reviewed previously established principles
- Court modified some rules in part for prospective transfers.



“Oil, gas, and minerals”

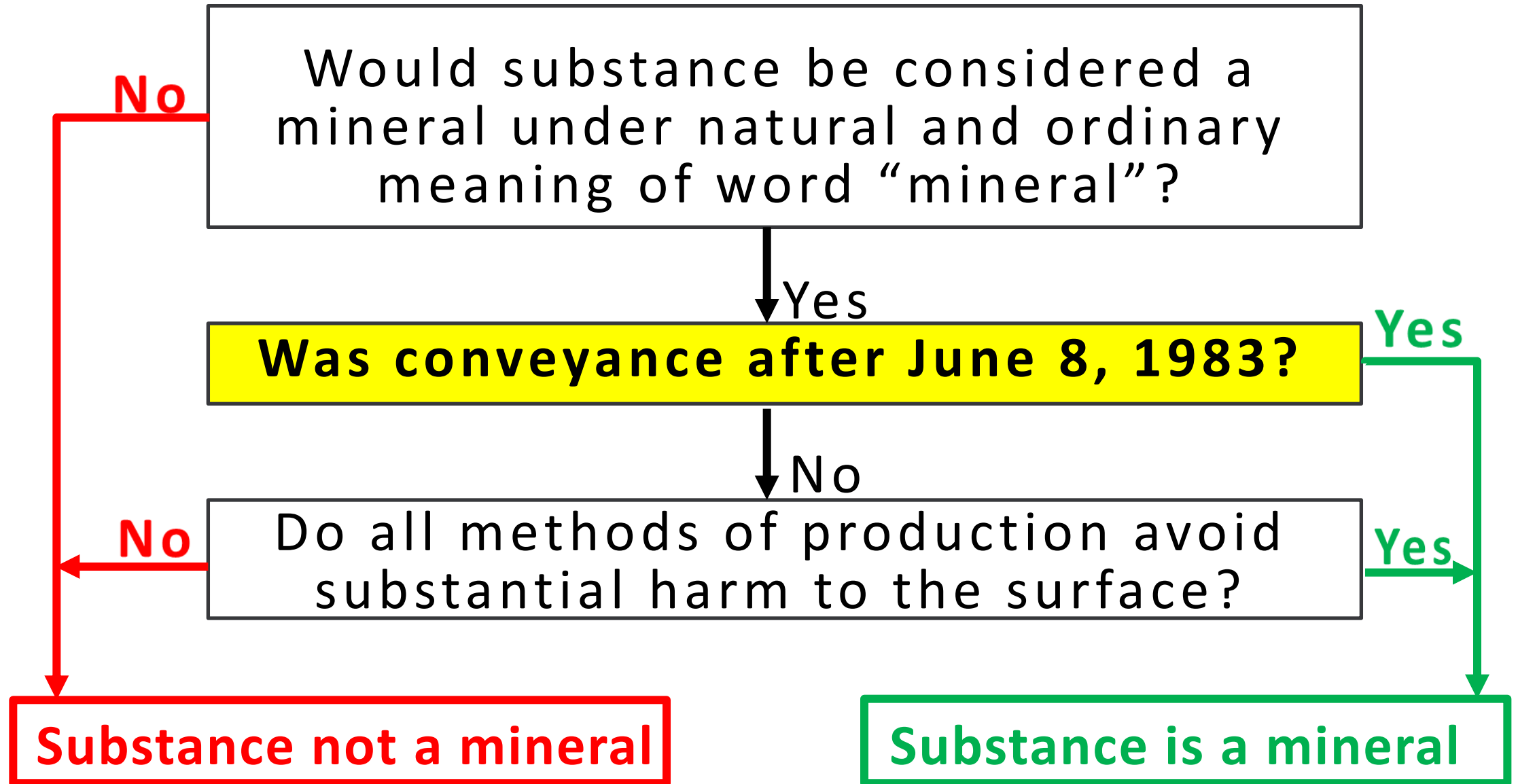


“We now hold a severance of minerals in an oil, gas and other minerals clause includes all substances ***within the ordinary and natural meaning of that word.***” *Moser v. U.S. Steel Corp.*, 676 S.W.2d 99 (Tex. 1984)

But note:

- ❖ New rule applies to post-*Moser* severances.
- ❖ Prior rule included a surface destruction test.
- ❖ A few substances are not minerals as a matter of law.

Moser test under TX law





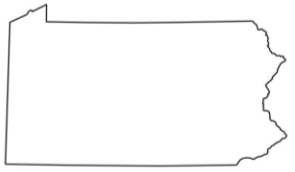
“iron, coal, and other minerals”

Huie Hodge Lumber Co. v. Railroad Lands Co., 91 So. 676 (La. 1922)



Does 1888 reservation of “iron, coal, and other minerals” include oil? Court says “No.” Court says:

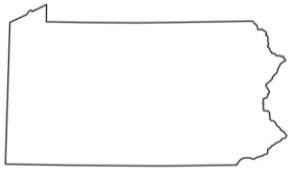
- *Ejusdem generis* requires that “other minerals” be like specifically mentioned substances
- Grant of rights includes “all necessary privileges of mining,” but does not mention drilling
- In 1888, “petroleum and gas were unknown” in this state



What is a “mineral”?



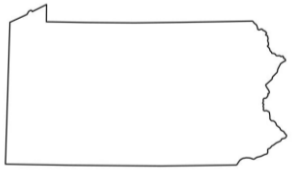
- In deciding what is a “mineral” for purposes of deed or lease, court should attempt to determine parties’ intent.
- Court should use a common or lay understanding of the term “minerals.”
- Court holdings in “what is a mineral” disputes can become settled rules of property law that apply even after common understanding of “mineral” changes.



Dunham rule



- 1836, *Gibson v. Tyson*: Pa. S. Ct. holds that “minerals” included chrome because common understanding is “mineral” means something metallic.
- *Dunham & Shortt v. Kirkpatrick*, 101 Pa. 36 (Pa. 1882) held that oil is not a “mineral” because common person would not consider it a “mineral.”
- Although “popular understanding” may have changed over time, it has become a settled rule of property law that oil/gas are not “minerals.” *Butler v. Charles Powers Estate*, 65 A.3d 885, 890 (Pa. 2013).



Lithium



- There are no reported PA decisions on whether lithium is a “mineral.”
- Thus, there is not a settled rule of property law.
- Court might base decision regarding whether Li is “mineral” on common understanding of “mineral.”
- Note: *Nikolov v. Livent Corp.*, 470 F. Supp. 3d 461 (E.D. Pa. 2020) refers to “lithium mineral deposits.”

3. Some other legal issues

Statutes that address
ownership of produced water

New Mexico—ownership of produced water

- 2019 legislation states that, unless otherwise provided by law or contract, working interest owner can sell produced water and obtain proceeds.

N.M. Stat. § 70-13-4. This is part of “Produced Water Act.”

- Can this apply to mineral leases or severances executed before 2019?
- The statute also grants WI owner the right to “byproducts” from treating the water. Would lithium extracted from produced water be a “byproduct”?

Oklahoma—ownership of produced water

- 2020 legislation declares that produced water generally belongs to oil & gas operator.
- Could this apply to pre-2020 leases? Split estates?
- **But** if “constituent elements” are extracted “for commercial purposes” (other than using water solely in oil & gas) produced water is considered brine for purposes of Okla. Brine Development Act.

Texas—ownership of produced water

- 2019 legislation states that, unless oil & gas lease provides otherwise, produced water belongs to oil & gas leaseholder

Tex. Natural Resources Code § 122.002

- Could this provision apply for mineral leases or severances granted before 2019?
- Statute grants lessee the right to “byproducts” from treating the water. Would Li extracted from produced water be a “byproduct”?

Louisiana—ownership of produced water

- 2024 legislation states that, unless mineral lease provides otherwise, produced water **and substances in it** belong to oil & gas leaseholder.

La. Rev. Stat. 30:2.1

- Could this provision apply for mineral leases or mineral servitudes granted before 2024?

Is authority for pooling
or unitization available?

This could be particularly important for extraction of lithium from brine because the process looks much like a waterflood for secondary recovery.

Via leases?

- Does oil & gas lease allow recovery of brine?
- If so, does lease contain a pooling or unitization clause?
- If so, does the pooling or unitization clause apply to substances other than oil & gas?
- If your client has a brine lease, does it give unitization authority?

Unitization statutes used for oil & gas?

- Most oil & gas producing states have statutory pooling for drilling units and statutory unitization for secondary recovery, ERO, pressure maintenance.
- Many of these statutes apply only to oil & gas.
- Definitions and language in PA and WV old pooling statutes, WV's new horizontal well pooling statute, and statute authorizing units for secondary recovery all seem to apply only to oil and gas.

Arkansas provides for brine units

- Ark. Code §§ 15-76-308 thru 15-76-320
- “Brine” is defined as “salt water, whether contained in or removed from an aquifer, and all other chemical substances produced with or extracted from such salt water except for commercial production of oil and gas.”
- Statutes do not apply to produced water “unless [it] is saved or sold for the purpose of extracting the chemical substances in [it].”

Oklahoma Brine Development Act

- 1990 legislation.
- Authorizes unitization scheme for “brine” production
- Defines “brine” as “subterranean saltwater and all constituent parts and chemical substances therein ... including ... lithium. ...”

17 Okla. St. §§ 500 through 525

Louisiana's 2024 Legislation

- 2024 legislation.
- Authorizes unitization scheme for “brine” production.

La. Rev. Stats. 30:5, 30:9, 30:10 (as amended by La. Acts 2024, No. 126).

What is royalty based on?

- Does a mineral lease's royalty clause address the royalty on "minerals" other than oil and gas?
- Is "production" complete when the produced water or brine reaches the surface?
- Would the royalty be based on the value of the produced water or brine "at the well" or the value of lithium after it has been extracted from the water and processed?



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EXTRA SLIDES FOR REFERENCE

What is lithium and
why is it important?

Lithium

- Lithium is a very light metal.
- It is not found in nature in its pure metallic form. It is found in ores, clays, or dissolved in water.
- It has been used in various ways for more than a century.
- The largest and fastest growing current use is in rechargeable batteries.

Why is it important?

- a. It *important economically* because of its use in rechargeable batteries.

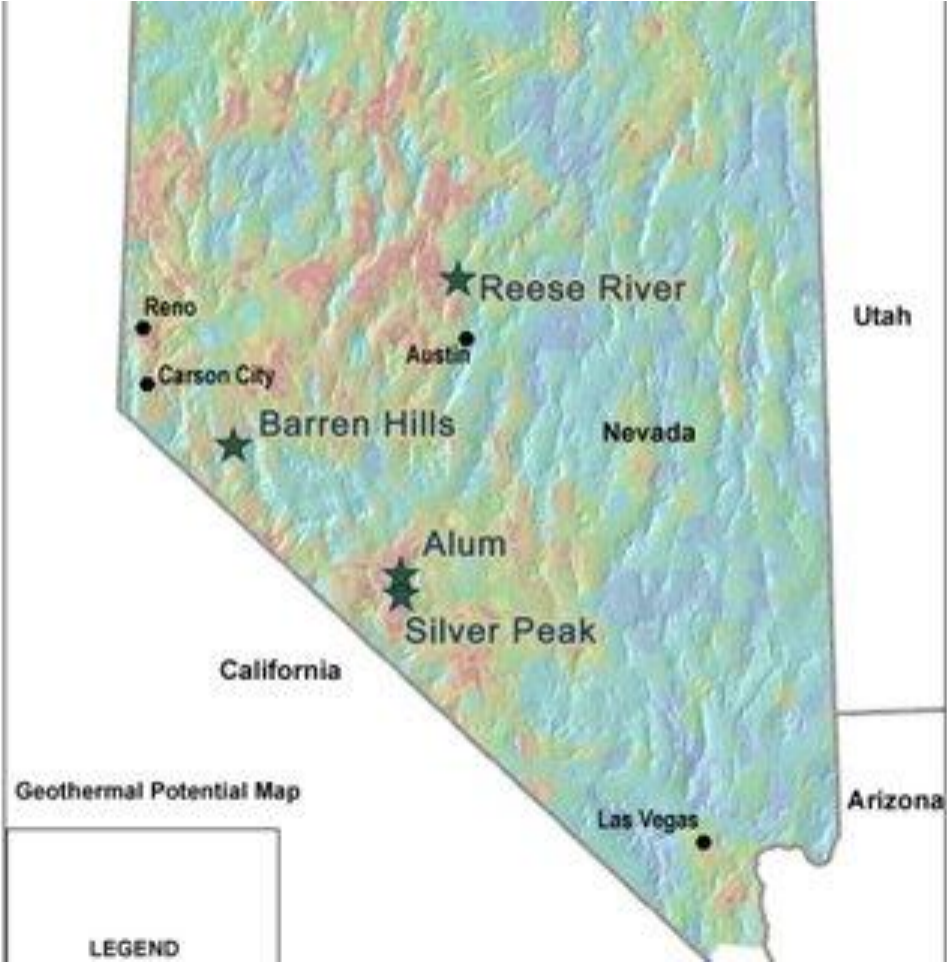
- b. Lithium production and processing raise *important national security issues* because of China's domination of lithium processing and battery making

Where is potential
production in U.S.?

U.S. Production—Historic

- Production of lithium by mining ore started in 1898 in S. Dakota. This was the first significant commercial production anywhere.
- Later, production began in California & New Mexico.
- U.S. first produced lithium from brine in 1938
- U.S. was world's leading producer into the 1970s
- U.S. no longer produces lithium by mining ore.

Albemarle's Existing Silver Peak Mine in Nevada (evaporation ponds and map)



Albemarle and Piedmont Lithium have plans for mining at or around at Kings Mountain, N.C.

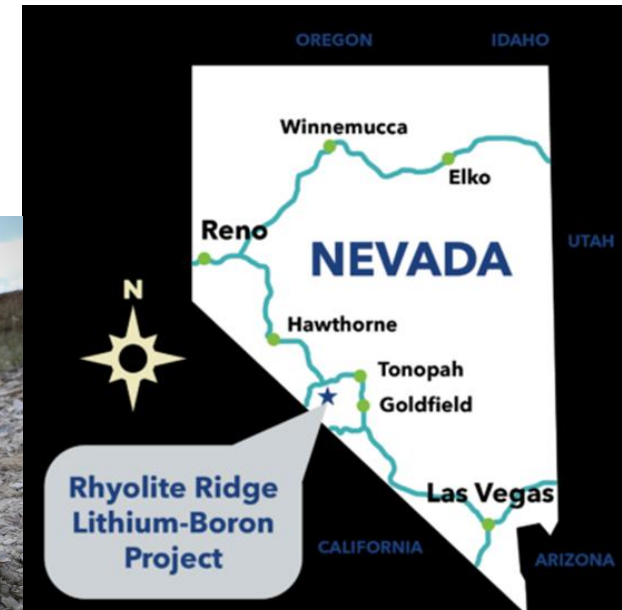


North Carolina



loneer's Rhyolite Ridge project

- loneer has plans for a lithium and boron mine at Rhyolite Ridge in Nevada.
- Project has received opposition, based in part on existence of an endangered flower that lives in the area (the Tiehm's buckwheat).
- BLM granted permit in October 2024.

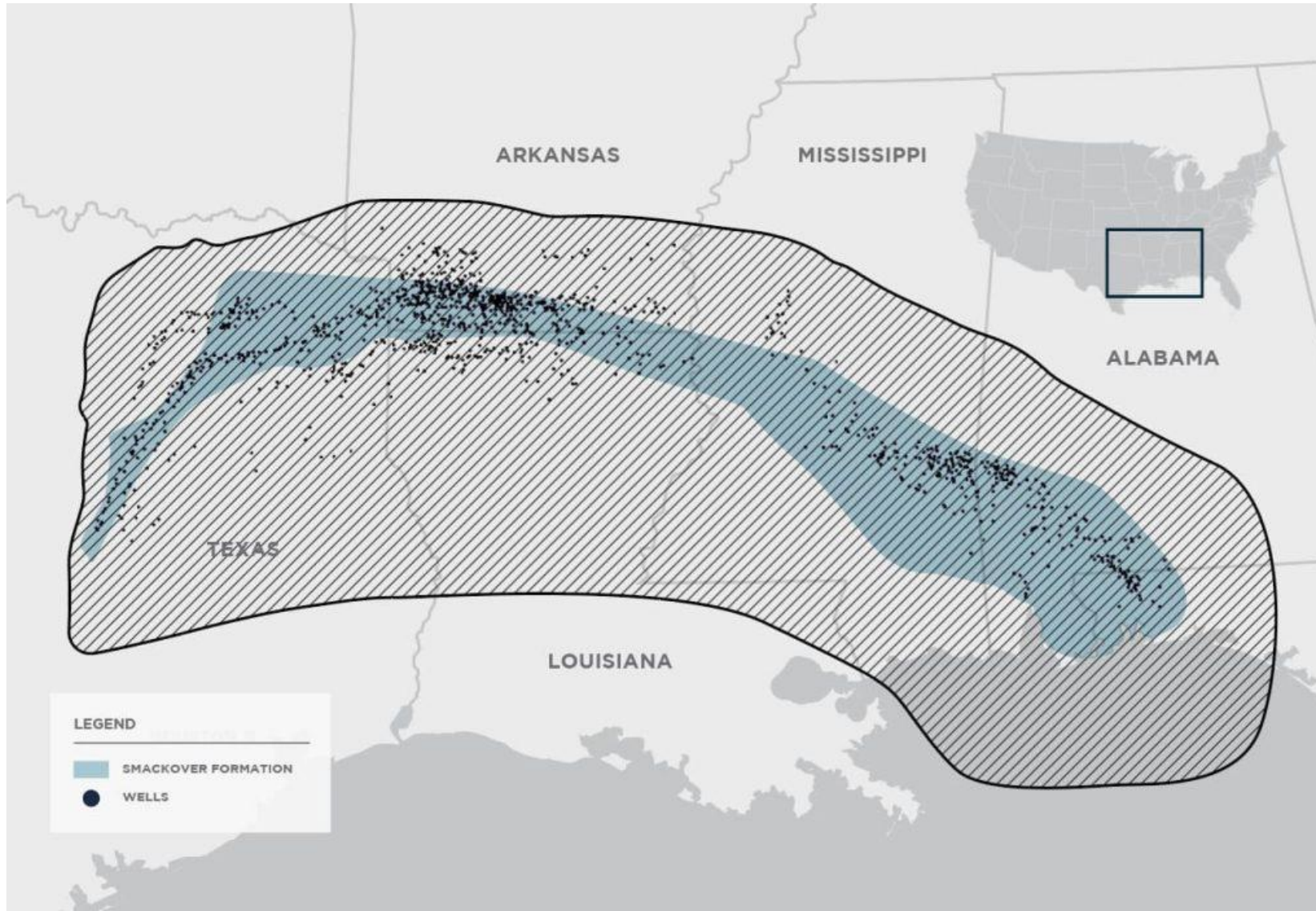


Brine at proposed Salton Sea project

- A project to extract lithium from geothermal brine in Southern California.
- Geothermal power also would be produced.



Brine from Smackover (sweet spot is in South Arkansas)



Arkansas

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- Growing interest in recovering Li from this brine.
- Three largest leaseholders for brine from Smackover
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Produced Water

- Interest in several areas
- There has been some testing/analysis of produced water in Texas and elsewhere, including Pennsylvania.
- A National Energy Technologies Laboratory Study discusses levels of lithium found in produced water from the Marcellus. <https://www.nature.com/articles/s41598-024-58887-x>

Groundwater rights

This will vary by state.

Three Regimes for Groundwater Rights

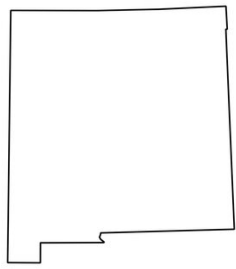
- **Prior appropriation** – landownership does not give right to extract groundwater; right based on first use
- **Rights based on ownership of land**
 - **Unlimited right** – landowner has unlimited right to extract groundwater; rule of capture applies
 - **Reasonable use** – landowner has “reasonable use” right to extract groundwater; rule of capture applies

Prior appropriation

- In some states, particularly some of the arid states in the West, a rule of prior appropriation, based on who first put water to a beneficial use, applies.
- Under prior appropriation, water rights are not tied to land ownership.

No limit

- Texas and Louisiana are oil and gas state examples in which rules of property law allow a landowner to extract unlimited quantity of groundwater.



Groundwater in New Mexico



Prior appropriation

- “Ground water, like surface water, must be appropriated and applied to beneficial use before a vested water right will result.” *Hydro Resources Corp. v. Gray*, 173 P.3d 749 (N.M. 2007).



Groundwater in Colorado



Prior appropriation (as to tributary groundwater)

- “Thus, rights to use tributary groundwater, like surface water, are determined by the state's water courts and administered by the State Engineer under the constitutional doctrine of prior appropriation.”

Parker Water and Sanitation Dist. v. Rein, 559 P.3d 217 (Colo. 2024).

Old Groundwater Cases (1)

Is there a limit on how much groundwater a landowner can pump?

- Some courts distinguished between water flowing in defined subsurface streams and “percolating” water (typical groundwater).
- Subsurface streams would be governed by same rules surface streams (typically, a reasonable-use doctrine)

See, e.g., Pence v. Carney, 52 S.E. 702 (W. Va. 1905)

Old Groundwater Cases (2)

- For percolating water, some states adopted “English” or “absolute dominion” rule that landowner could pump at unlimited rate, even if this harmed neighbor (e.g., by lowering water table).
- Other states adopted “American rule” that landowner was limited to reasonable use (this does prohibit landowner from causing “drainage” of neighboring tracts).
- Under both English rule and American rule, the rule of capture applies.

Justifications for English Rule

Courts said that

1. understanding the movement of subsurface water was practically impossible.
2. Restrictions on use would interfere with economic development

See, e.g., Frazier v. Brown, 12 Ohio St. 294 (1861)

American Rule

Many states now follow what is sometimes called the “American rule” or “reasonable use” rule. This rule provides that the landowner ...

1. Can pump as much water as the landowner wishes,
2. Except that landowner will be limited to “reasonable use” if rates of withdrawal larger than that would harm others by lowering water table or limiting the water that neighbors can extract.

See, e.g., Pence v. Carney, 52 S.E. 702 (W. Va. 1905)



Groundwater in Texas



Surface owner owns it in place.

“In our state the landowner is regarded as having absolute title in severalty to the [groundwater] in place beneath his land. *** The [groundwaters] beneath the soil are considered a part of the realty.”

Edwards Aquifer Authority v. Day, 369 S.W.3d 814 (Tex. 2012).

See also Tex. Water Code § 36.002 (recognizing landowner’s ownership of groundwater).



Can water rights be severed?

Yes, there can be a groundwater estate.



Coyote Lake Ranch, LLC v. City of Lubbock, 498 S.W.3d 53 (Tex. 2016)



Does severance of
“minerals” include groundwater?



No.

Sun Oil Co. v. Whitaker, 483 S.W.2d 808 (Tex. 1972)

“Water, unsevered expressly by conveyance or reservation, has been held to be a part of the surface estate.”



Groundwater belongs to surface estate *even if it is salty*



Robinson v. Robbins Petroleum Corp., Inc., 501 S.W.2d 865 (Tex. 1973)

“We are not attracted to a rule that would classify water according to a mineral contained in solution. Water is never absolutely pure unless it is treated in a laboratory. *** ... the saline content has no consequence upon ownership.”



Does rule of capture
govern drainage disputes
between neighbors?



Yes, rule of capture applies to groundwater.

“The only qualification of that rule of [the landowner’s] ownership [of groundwater] ***is*** that it must be considered in connection with ***the law of capture*** and is subject to police regulations.”

Edwards Aquifer Authority v. Day, 369 S.W.3d 814 (Tex. 2012) (emphasis added).



Ownership in place?

No, groundwater is not owned in place.



“Ownership of land does not include ownership of oil, gas, and other minerals occurring naturally in liquid or gaseous form, or of any elements or compounds in solution, emulsion, or association with such minerals. ***”

La. Min. Code art. 6 (La. Rev. Stat. 31:6) (emphasis added)



Rule of capture for GW?



Yes, rule of capture applies to groundwater.

- La. Min. Code art. 6 (landowner has exclusive right to use land to explore for and produce fugacious minerals)
- Min. Code art. 8 (landowner has right to reduce minerals to possession and ownership)
- Min. Code arts. 10, 14 (no liability for drainage)
- Min. Code art. 4 (Mineral Code governs groundwater)
- *Adams v. Grigsby*, 152 So. 2d 619 (La. App. 2nd Cir. 1963) (pre-Mineral Code case applying r/c to GW)



Groundwater in Arkansas

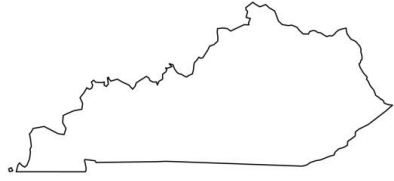


Riparian system

- Landowner can utilize groundwater. Landowner has no liability merely because there is drainage, but landowner can only use a reasonable amount.

Lingo v. City of Jacksonville, 522 S.W.2d 403 (Ark. 1975);
Jones v. Oz-Ark-Val Poultry Co., 306 S.W.2d 111 (Ark. 1957)

Groundwater in Kentucky



American rule (reasonable use)

The better rule is that “the right of a landowner to subterranean percolating waters is limited to a reasonable and beneficial use of the waters under his land.”

Sycamore Coal Co. v. Stanley, 166 S.W.2d 293 (Ky. App. 1942).



Groundwater in Ohio

American rule (reasonable use)



Landowner can withdraw groundwater from his land and put it to beneficial use without liability for interfering with use by neighbor unless the withdrawal ...

- unreasonably causes harm to neighbor by lowering water table
- exceeds landowner's reasonable share of the total, or
- has direct and substantial effect upon watercourse or lake, and harms person entitled to use the water

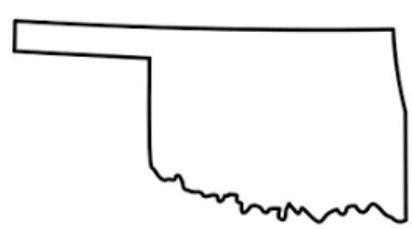


Groundwater in Ohio



Reasonable use doctrine

- Ohio Supreme adopted reasonable use doctrine in *Cline v. American Aggregates Corp.*, 474 N.E.2d 324 (Ohio 1984)
- *Cline* adopted Restatement 2nd Torts § 858
- *Cline* overruled *Frazier v. Brown*, 12 Ohio St. 294 (1861)



Groundwater in Oklahoma



Reasonable use

- “[It] t is clear that the owner of the surface estate also owns the underlying fresh groundwater.” *Ricks Exploration Co. v. Oklahoma Water Resources Bd.*, 695 P.2d 498 (Okla. 1984).
- But reasonable-use doctrine applies. *Canada v. City of Shawnee*, 64 P.2d 694 (Okla. 1936)

Groundwater in Penn.

American rule (reasonable use)



Seems to follow the American rule of reasonable use.

Rothrauff v. Sinking Spring Water Co., 14 A.2d 87 (Pa. 1940)



Groundwater in W. Va.



American rule (reasonable use)

“The owner of land who explores for and produces subterranean percolating water within the boundary of his land is limited to a reasonable and beneficial use of such water, when to otherwise use it would deplete the water supply of a valuable natural spring of another on adjoining or neighboring land, and thereby materially injure or destroy such spring.”

Pence v. Carney, 52 S.E. 702 (W. Va. 1905) (from syllabus prepared by the court)

What is a “mineral” in some states other than those discussed earlier?



What is a “mineral”?



“The term ‘mineral,’ when employed in conveyancing ... is understood to include every inorganic substance which can be extracted from the earth for profit, whether it be solid, ... or liquid, as, for example, **salt and other mineral waters and petroleum oil, or gaseous, unless there are words qualifying or limiting its meaning, or unless from the deed, read and construed as a whole, it appears that the intention was to give the word a more limited application.”**

Horse Creek Land & Mining Co. v. Midkiff, 95 S.E. 26 (W. Va. 1918)



What is a “mineral”?



- “Terms are to be understood in their plain, ordinary, and popular sense, unless they have acquired a particular technical sense by the known usage of the trade.”
- Court may look at such things as
 - whether a substance was known to be one that could be commercially extracted
 - the types of surface use referenced in the grant

Detlor v. Holland, 49 N.E. 690 (Ohio 1898)



What is a “mineral”?

Strohacker test



- Was substance considered a commercially recoverable mineral at time of severance?

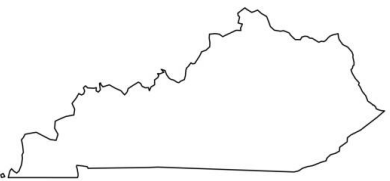
Missouri Pacific R.R. Co. v. Strohacker, 152 S.W.2d 557 (Ark. 1941); *Stegall v. Bugh*, 310 S.W.2d 251 (Ark. 1958); *Ahne v. Reinhart & Donovan Co.*, 401 S.W.2d 565 (Ark. 1966).



Is brine a “mineral”?



- One app. ct. concluded brine is a “mineral” for severances after some date.
- Some commentary suggests that brine is a mineral for severances after 1/1/1955.
- Does it matter whether operator seeks to recover Li, as opposed to bromine?



What is a “mineral”?



- “[A] grant or exception of ‘minerals’ in a deed includes **all mineral substances which can be taken from the land** unless restrictive language is used indicating that the parties contemplated something less general”
- “The mere fact that a particular mineral has not been discovered in the vicinity of the land conveyed or is unknown at the time the deed is executed does not alter the rule.”

Maynard v. McHenry, 113 S.W.2d 13 (Ky. App. 1938)