

Brine Unitization for Lithium Production

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Agenda

- Mining lithium from brine
- Background property issues
- Unitization
- Operational issues



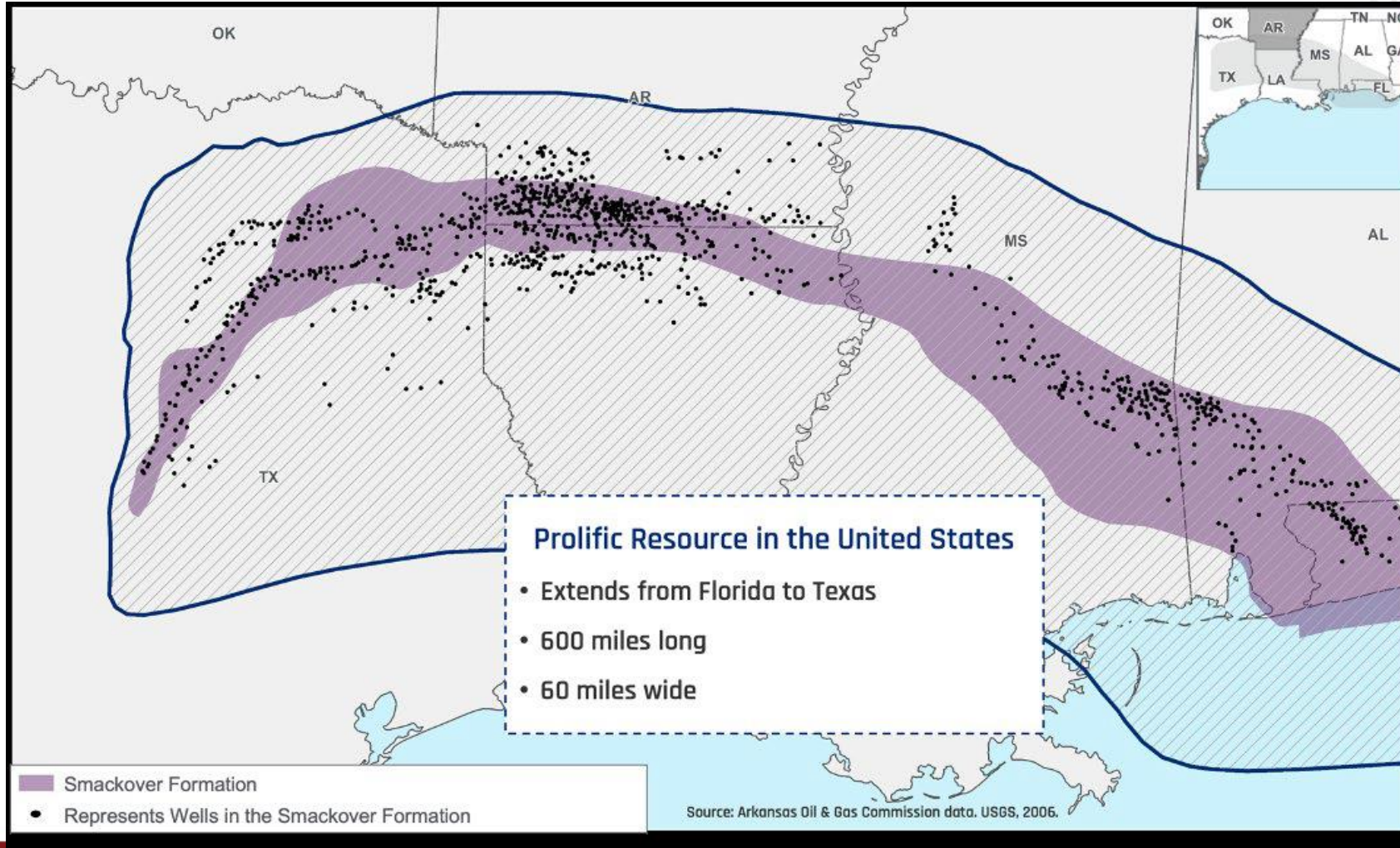
Brine Mining and Lithium Production



Brine Mining

- Extracting connate saltwater to isolate valuable constituents and reinjecting the spent saltwater.
 - EPA Class V Permit
 - Lithium (“direct lithium extraction”)
 - Smackover Formation
 - Magnesium
 - Bromine
 - Iodine
 - Salt
 - Solution gas
- Contrast with injecting fluids to dissolve subsurface salt formations (“Solution Brine Mining”).
 - EPA Class III Permit

The Smackover Formation



Background Property Issues



Brine Extraction

- Physical Nature
 - Deep underground
 - Entrained in saltwater located in porous saline aquifers
 - Saltwater is migratory in response to changes in pressure
- Legal Character
 - No Absolute Ownership in Place
 - Qualified ownership?
 - Exclusive right to take?
 - Rule of Capture
 - Offset drilling corollary

Brine Reinjection

- Physical Consequences
 - Injectate migrates away from point of injection in all directions
 - May cross property boundaries
 - Spent injectate dilutes lithium concentration of connate brine and may displace lithium-rich brine
- Legal Consequences: Subsurface Trespass
 - By encroachment of injectate
 - From sweeping or pushing of brine

Arkansas Case Law



Budd v. Ethyl Corp., 251 Ark. 639 (1971)

- Ethyl Corp. operated a saltwater recycling operation on 16,000 acres of land where it owned mineral leases.
 - Extracted saltwater from output wells for bromine, then reinjected the spent water into input wells, which facilitated further withdrawals from output wells.
 - Circular well pattern
- Plaintiff claimed the recycling operation drained saltwater from under his 240-acre tract lying **adjacent** to the operation.
- Held: Rule of capture precludes relief.

Budd v. Ethyl Corp., 251 Ark. 639 (1971)

- Plaintiff claimed drainage from a 40-acre tract lying **within** the operation, in which he held a 1/10 leasehold interest.
 - Ethyl Corp. owned 9/10 of the leasehold and mineral fee.
- Court:
 - The parties enjoyed co-equal rights to produce.
 - “Had [the plaintiff] refused an offer to participate in the venture, he would not have had any standing in equity to insist upon a share in the profits.”
 - Held: Plaintiff is in the same position as an interest owner who refused a chance to participate. No recovery.

Young v. Ethyl Corp., 521 F.2d 771 (8th Cir. 1975)

- Plaintiff's 180-acre tract was **surrounded** by Ethyl Corp.'s recycling operation.
- Ethyl Corp. attempts to acquire a lease rebuffed by plaintiff who found the terms onerous.
- Court:
 - Issue is whether the rule of capture precludes relief under Arkansas law.
 - *Budd* does not mean “that the rule of capture protects one who, by force, pushes minerals out from under the land of another when the minerals would remain in place without the application of such force.”
 - Held that

Young v. Ethyl Corp., 521 F.2d 771 (8th Cir. 1975)

- Predicts the Arkansas Supreme Court would hold the rule of capture does not apply to forcible displacement of brine from a non-consenting owner's land.
- Two rationales:
 - 1) Oil and gas capture concepts are inapplicable given more sophisticated knowledge of geology and greater ability to measure drainage, and the fact that brine would not migrate unless forced by Ethyl Corp.
 - 2) Forcing brine from a non-consenting owner's land violates the owner's correlative rights.

Jameson v. Ethyl Corp., 271 Ark. 621 (1980)

- Plaintiff owned a 95-acre tract **within** Ethyl's recycling operation and never agreed to a lease.
- Court:
 - “While Arkansas’s unitization laws are not . . . involved in this case, we do believe that the underlying rationale for the adoption of such laws, i.e., to avoid waste and provide for maximizing recovery of mineral resources, may be interpreted as expressing a public policy of this State which is pertinent to the rule of law in this case.”
 - “Inherent in such laws is the realization that transient minerals such as oil, gas, and brine will be wasted if a single landowner is able to thwart secondary recovery processes.”

Jameson v. Ethyl Corp., 271 Ark. 621 (1980)

- Court:
 - Identifies a dilemma:
 - On the one hand, “[a] determination that a trespass or nuisance occurs through secondary recovery processes within a recovery area would tend to promote waste,”
 - On the other hand, a determination that the rule of capture precludes recovery in the present situation “could unnecessarily extend the license of mineral extraction companies to appropriate minerals which might be induced to be moved from other properties through such processes.”
 - Thus, “we are holding that reasonable and necessary secondary recovery processes of pools of transient materials should be permitted when carried out in good faith for the purpose of maximizing recovery from a common pool.”
 - But subject to the obligation “to compensate the owner of the depleted lands for the minerals extracted in excess of natural depletion.”

Jameson v. Ethyl Corp., 271 Ark. 621 (1980)

- Court:

- Therefore, “we are holding that reasonable and necessary secondary recovery processes of pools of transient materials should be permitted when carried out in good faith for the purpose of maximizing recovery from a common pool.”
- Subject, however, to the obligation “to compensate the owner of the depleted lands for the minerals extracted in excess of natural depletion.”

Deltic Timber Corp. v. Great Lakes Chem. Corp., 2 F. Supp. 2d 1192 (W.D. Ark. 1998)

- Great Lakes operated a bromine waterflood that utilized roughly parallel lines of input and output wells. Plaintiff owned unleased land both in between input and output wells and adjacent to the waterflood.
- Court interprets *Budd, Young, and Jameson*:
 - “[T]he determinative issue with regard to the rule of capture in the case of a waterflood operation seems not to be based on whether lands are within a ‘recycling area,’ as defined by a straight line from one outer well to another.”
 - **“Rather, the issue is whether displaced brine is being forced into the production wells of a producer when it would not have otherwise moved.”**

Deltic Timber Corp. v. Great Lakes Chem. Corp., 2 F. Supp. 2d 1192 (W.D. Ark. 1998)

- Court:
 - As to plaintiff's lands lying **adjacent to** the waterflood, Great Lakes operated in good faith, relying on the opinion of counsel interpreting *Young*.
 - However, as to areas of plaintiff's land located **between** input and output wells, Great Lakes converted brine in bad faith, because it knew that those lands would be included within the waterflood.

Takeaways

- Rule of capture applies to brine drained from a neighbor's land.
- Rule of capture does not license the injection of water to artificially force brine from another's land and into the injector's producing wells.
- Good faith recycling operations may be permitted against unconsenting owners if they are compensated for the drainage.
 - Unconsenting owners might be precluded from recovering for drainage by refusal to participate on fair terms.

Unitization



Voluntary Unitization

- Where efficiency, prevention of waste, or protection of correlative rights in the development of lithium demand that an aquifer be operated as an integrated unit, regardless of property boundaries, all persons with an operating interest in the lithium may consent to a plan of unitization voluntarily.
- Distinguish unitization from pooling, which is the combination of separate tracts for the initial drilling of a well.
- Division of revenues and costs can be divisive.
- Requires unanimity, unless owners who refuse are precluded from complaining. *See Budd.*

Compulsory Unitization

- Agency integration upon application of interested person.
- Authorized for prevention of waste and protection of correlative rights in the fieldwide development of an entire common source of supply.
- Requires a majority of interested owners to consent.
- Provides for the allocation of costs and expenses by statute or a plan of unitization.
- May provide for the effects of an owner electing not to participate.

Arkansas



Compulsory Unitization: Arkansas

Act 937 (1979)

- Ark. Code Ann. 15-76-306: Grants the Oil and Gas Commission authority over brine development to prevent waste and protect correlative rights, including authority to:
 - Regulate spacing of wells for brine production and injection
 - See also Code Ark. R. 118.03.1-B-3
 - Form brine production units

Compulsory Unitization: Arkansas

- Ark. Code Ann. 15-76-308 to -311: Brine production units
 - Shall comprise no fewer than 1280 acres underlying a common aquifer.
 - Plan of development must efficiently drain the area and protect correlative rights.
 - Petitioner must have leases or otherwise control the right to produce brine from not less than 75% of the entire area of the proposed unit.
 - Must afford the owner of each tract the opportunity to recover or receive his or her just and equitable share of brine in the unit.
 - I.e., Each owner's proportionate share on an acreage basis. 15-76-302(9)

Compulsory Unitization: Arkansas

- Ark. Code Ann. 15-76-314: Participation and Compensation
 - Unleased owners may elect to participate proportionally in the unit or be deemed to transfer the right to produce brine to the operator.
 - Commission may treat as permanent or temporary until the operator recoups the nonparticipating interest's share of costs.
 - The commission must determine “reasonable consideration” in the absence of an agreement by the parties.
 - All unleased owners are entitled to receive a “royalty interest equal to one-eighth of the **value** of his or her just and equitable share of the brine produced from the unit.”
- Ark. Code Ann. 15-76-315: Determining the “value” of brine; imposing a minimum in-lieu royalty; and requiring separate payment of royalty for lithium in addition to brine.

Louisiana



Compulsory *Pooling*: Louisiana

Act 126 (2024)

- La. Rev. Stat. 30:3: definitions of “field” and “pool” expanded to refer to brine in addition to oil and gas.
- La. Rev. Stat. 30:4(18): authorizes the Office of Conservation to regulate brine production operations.
- La. Rev. Stat. 30:9(B): mandates the commissioner establish drilling units for each pool of brine based on the maximum area that a single well efficiently and economically drains.
 - (C): each tract is entitled to its “just and equitable share” of brine reserves in the pool.
- La. Rev. Stat. 30:10(A): Where owners in a drilling unit do not agree to pool, drill, and produce their interests, “the commissioner shall require them to do so and to develop their lands as a drilling unit, if he finds it to be necessary to prevent waste or to avoid drilling unnecessary wells.”

Compulsory *Unitization*: Louisiana

- La. Rev. Stat. 30:5(C)
 - The Office is authorized to enter an order requiring the unit operation of any pool in connection with secondary recovery or where the ultimate recovery can be increased and waste and the drilling of unnecessary wells can be prevented by such a unit operation.
 - “The order will provide for the allocation to each separate tract within the unit of a proportionate share of the unit production which shall ensure the recovery by the owners of that tract of their just and equitable share of the recoverable . . . brine in the unitized pool.”
 - Must be approved by at least 75% of the interest owners (but not royalty owners).

Oklahoma



Compulsory Unitization: Oklahoma

Oklahoma Brine Development Act (1990)

- 17 Okla. Stat. Ann. 503: Authorizes the Corporation Commission to regulate the drilling and production of brine for commercial purposes.
 - But no authority over Class V injection wells. (C)
- 17 Okla. Stat. Ann. 506(C): Spacing Orders
 - “Orders of the Commission . . . establishing drilling and spacing units for the production of oil, gas, or oil and gas shall not be applicable to the drilling of wells and production of solution gas from a unit established by an order issued pursuant to this act.”

Compulsory Unitization: Oklahoma

- 17 Okla. Stat. Ann. 504, 505, 508: Authorizes commission to unitize brine rights upon application.
 - Must find that unitized management is reasonably necessary to effectively develop the common source of brine; it will prevent waste and result in greater ultimate recovery; and it is for the common good and will result in the general advantage of the owners of the brine rights.
- 17 Okla. Stat. Ann. 508: No unitization is effective until approved by “record owners of the right to drill of not less than 55% of the unit area affected thereby *and* by owners of record of not less than 55% (exclusive of royalty interest owned by lessees or subsidiaries of any lessee) of the royalty interest in and to the unit area.”
- 17 Okla. Stat. Ann. 507: Brine owners shall share on an acreage basis.
- 17 Okla. Stat. Ann. 508: Plan of unitization must provide for fair, just, and reasonable compensation for owners who do not wish to participate.

Operational Issues



Adjoining Interests

- Expansion by Operator
 - Ark. Code Ann 15-76-309
 - 17 Okla. Stat. Ann. 504(A) & 510.
- Application by Adjoining Owner
 - Ark. Code Ann 15-76-312: Any owner of an interest in a tract which is adjacent to a unit but that is not included may petition to have their tract included “provided that it is demonstrated to the satisfaction of the commission that the tract is being unlawfully drained or is imminent danger of being so drained through the operation of the adjacent unit.”
 - “Unlawful drainage” is “the withdrawal or removal of brine by production or displacement which deprives the owner thereof of his or her fair and equitable share of brine in violation of his or her correlative rights.”

Concurrent Oil and Gas Operations

Does unitized brine include **produced water**?

- Ark. Code Ann. 15-76-302(2)(B): “Brine” “does not include brine produced as an incident to the production of oil and gas, unless the brine is saved or sold for the purpose of extracting the chemical substances in the brine.”
- La. Rev. Stat. 30:3(1): “Brine” does not include brine produced as an incident to the production of oil and gas, unless the brine is saved, retained, used, or sold for the purpose of extracting the constituent parts, minerals, elements, compounds, or substances contained or dissolved in the brine.
- 17 Okla. Stat. Ann. 502(4): “Brine produced as an incident to the production of oil or gas, unless such brine is saved or sold for purposes of removing chemical substances therefrom, shall not be considered brine for the purposes of this act.”
 - Brine mining may not “result in additional costs or delays to the rights of the operator to” extract or exploit hydrocarbons. 52 Okla. Stat. Ann. 86.7(C).

Concurrent Oil and Gas Operations

Liability for interference with oil and gas producing zones?

- Ark. Code Ann. 15-76-302(2)(B) defines “waste” to include the “undue drowning with effluent of any stratum . . . containing commercial quantities of oil or gas.”
- La. Rev. Stat. 30:4 (19)-(20): Office of Conservation may:
 - “designate an area within the state as a multiple mineral development area for purposes of brine production operations, and
 - Adjudicate multiple mineral development conflicts among brine production operations if either (a) there is potential injury to other mineral deposits or mineral development beneath the property affected, or (b) there are simultaneous or concurrent operations conducted by other mineral owners or lessees affecting the property.

Surface Use Issues

- Ark. Code Ann. 15-76-311(B): “The commission shall have no authority to allow wells or other installations on the surface of lands without the consent of the surface owner.”
- 17 Okla. Stat. Ann. 519-522, 525
 - Requires pre-notice to surface owner for brine well drilling.
 - Obligates operator and surface owner “to enter into good faith negotiations to determine the surface damages.”
 - Requires operators to post a bond for surface damages.
 - Provides procedure for appointment of appraisers in event parties cannot agree on damages.
 - Provides for treble damages for willful entry without compliance.

Thank You

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