

## SUBSURFACE INJECTION: STORAGE, RECOVERY, DISPOSAL AND CARBON SEQUESTRATION – WHOSE RIGHT IS IT?

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Texas courts have long recognized the attributes of the mineral estate: the right to (i) develop, (ii) lease, (iii) receive bonus payments, (iv) receive delay rentals and (v) receive royalties. *French v. Chevron USA, Inc.*, 896 S.W.2d 795, 797 (Tex. 1995); *Altman v. Blake*, 712 S.W.2d 117 (Tex. 1986). Although these attributes come from a day and time when oil and gas leasing was highly standardized, they seem to remain predominant in today's more complex and sophisticated oil and gas business. Among these five rights, only the right to develop directly affects physical occupation, use and manipulation of the earth. Despite the seemingly static nature of the mineral ownership realm, it seems clear that the law must evolve to keep up with the changing techniques of the oil and gas business in the actual search for and production of hydrocarbons. See ERNEST SMITH AND JAQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 2.1(A)(1)(b) (Matthew Bender 2004) (discussing the need for oil and gas law to become more flexible). Today's energy exploration and production business makes important use of not only the surface, but also the subsurface of real property. Subsurface injection, as a subset of the right to develop, is prevalent in almost every oil and gas operation occurring today. The expanding use of the subsurface part of the "surface estate" is creating new and interesting problems for our industry. It is in this area – the physical use of the subsurface – that the law must adopt new constructs for ownership, rights and obligations.

For decades, it has been the undercurrent of Texas law to create policies designed to encourage and achieve the greatest production of our minerals. This policy may be best illustrated by the concept of the severance of the mineral and surface estates. Once severed, the minerals and surface become separate but unequal estates. *Atlantic Refining Co. v. Noel*, 443 S.W.2 35, 40 (Tex. 1968); *Humphreys-Mexia Co. v. Gammon*, 113 Tex. 246, 254 SW 296, 302 (Tex. 1923). A mineral estate is a corporeal interest in real property and gives the owner the same basic rights as any other fee owner. However, once severed, the mineral estate takes precedence over the surface estate and is accorded rights of the dominant estate in connection with maximizing the value of the minerals physically present under the lands.

Despite this implied easement for the use and benefit of the mineral estate, the mineral estate owner is not permitted to completely dominate the surface estate. Texas law requires reasonable and non-negligent use of the surface estate by the mineral owner or her lessee. Under the accommodation doctrine, the mineral estate owner is to accommodate the surface estate whenever reasonably possible. *Tarrant Co. Water Control and Improvement Dist. No. One v. Haupt, Inc.*, 854 S.W.2d 909, 911 (Tex. 1993), *Davis v. Devon*, 136 S.W.3d 419, 423-24 (Tex. App. – Amarillo 2004, no pet.). Thus, if the proposed use of the surface (or subsurface part of the surface estate) is considered unreasonable, a fact

intensive inquiry must be made and, the mineral estate owner may be prevented from using his predominant estate. Additionally, the mineral estate owner may not use the surface estate to benefit other lands owned by the mineral estate. *Robinson v. Robbins Petroleum Corp.*, 501 S.W.2d 865, 867 (Tex. 1973).

With the relationship between the mineral estate and surface estate as a backdrop, this article will focus on subsurface injection and which estate has the authority to grant permission for subsurface injection. Subsurface injection may occur for three primary purposes: (1) storage; (2) enhanced recovery operations; and (3) disposal of unwanted wastes or materials. In theory, Items 1 and 3 are quickly converging purposes as the oil and gas industry seeks to store unusual products for longer and longer periods of time.

## I. Storage

When considering subsurface injection for storage, a distinction must be made between the storage of valuable products and injection for disposal of unwanted materials. The case law seems to draw a clear distinction between injected valuables for later recovery and the injection of wastes and other unwanted material, even though both are essentially components of storage. Although the question of "storage" turns on a temporal analysis, Texas law and regulation focus on the intent of the injector to later retrieve the "stored" product and the current industry and market rationalization of the product whether it is a waste or will someone probably pay for it's later retrieval.

### A. Personal Property Storage.

When natural gas was first injected underground for storage purposes, title

questions emerged as essential problems in determining ownership. Early case law implied that the rule of capture applied to gas injected for storage purposes. See *Hammonds v. Central KY Nat. Gas. Co.*, 75 S.W.2d 204, 206 (Ky. 1934) overruled 736 S.W.2d 25 (Ky 1987) (analogizing injected storage gas to wild animals to which title can be lost when their owner no longer retains possession). However, since the early 1960s it has been clear that gas, like all other minerals, once severed from the earth becomes personal property. See *Lone Star Gas Co. v. Murchison*, 353 S.W.2d 870, 878 (Tex. Civ. App. - Dalls 1962, writ ref'd n.r.e.). Because severed gas is personal property, the issue as to whether underground injection and release of the gas in a well-defined storage reservoir leads to a loss of title depends on whether the injector intends to abandon the gas. See *Lone Star Gas* 353 S.W.2d at 879. Because the doctrine of abandonment focuses on intent to forever relinquish property, the underground injection of gas for purely storage purposes cannot be considered abandonment. See *Lone Star Gas*, 353 S.W.2d at 879.

As indicated above, the rule of capture has been rejected as applied to stored gas. See *Lone Star Gas*, 353 S.W.2d at 879. An adjacent landowner to a storage site does not have a right to withdraw injected gas, even though it may migrate onto his lands because the owner of the injected gas has not relinquished his title to the gas. But, title to storage gas may be lost if the gas is injected into a storage facility lacking adequately defined boundaries. Again, the focus must be on the intent of the injector and the reasonableness of their conduct in segregating the stored gas.

## B. Commingling.

Once the initial title issue has been resolved, the next matter which must be confronted is the commingling of extraneous gas, that is previously severed gas brought from elsewhere to the leasehold premises, and gas native to the storage site. In *Humble Oil & Refining Co. v. West*, the Texas Supreme Court addressed the commingling issue. 508 S.W.2d 812 (Tex. 1974). In *West*, Humble owned the mineral rights and West owned the right to receive royalties from production. As the field was nearing depletion, Humble sought permission to convert the reservoir from production to a storage facility. Humble contended that it had produced 89% of the recoverable gas in the reservoir and that further production would have resulted in diminishment to the reservoir's storage capability. *West*, 508 S.W.2d at 814.

The Texas Supreme Court concluded that Humble owned the lands in fee simple, including the reservoir storage space, subject only to the West's royalty interest. Unfortunately, the court was not confronted with specifically detailing storage rights as an exclusive attribute of either the surface or mineral estate. Even though Humble owned the storage rights in the reservoir as part of the fee interest, West argued Humble could not exercise those rights until the reservoir had been completely depleted. *West*, 508 S.W.2d at 815. West contended that the requirement that Humble pay royalties from production also applied to Humble's production of extraneous gas, as well as native gas. *West*, 508 S.W.2d at 817. Thus, Humble would forever be obligated to pay West royalties for stored gas, as well as gas native to the reservoir.

Although Humble retained title to the extraneous injected gas, upon injection

the extraneous gas mixed with the native gas in which West owned a royalty interest. *West*, 508 S.W.2d at 818. The question became whether Humble could be forced to pay West a royalty on the extraneous gas due to Humble's commingling of the gas. Commingling, or the confusion of goods, occurs when the goods of different parties become so intertwined and mixed that the property of each cannot be distinguished. *West*, 508 S.W.2d at 818. The person who causes the commingling of goods bears the burden of proof in establishing the proportionate share of ownership in the mixed goods. *West*, 508 S.W.2d at 818. Thus, Humble was not required to pay royalty on all gas produced from the reservoir if it could establish with "reasonable certainty" the amount of gas reserves on which the Wests were owed royalties, absent the injection of extraneous gas. *West*, 508 S.W.2d at 819.

Many of these issues have now been settled by regulation. See TEX. ADMIN. CODE §§ 3.95-97 (2005) (discussing the regulatory requirements for various underground storage facilities). When filing for a permit to operate an underground storage facility in a depleted reservoir, the Texas Railroad Commission requires an applicant to demonstrate the amount of recoverable native gas remaining the reservoir before a permit is issued. See TEX. NAT. RES. CODE § 91.176 (2005) (limiting the amount of gas withdrawn to the amount of extraneous gas injected.); TEX. ADMIN. CODE § 3.96(c)(2)(B) (2005). Thus, fewer disputes emerge between native gas owners and storage facility operators because the Railroad Commission controls the amount of extraneous gas injected into the reservoir vis-à-vis the native gas left in the depleted reservoir.

### C. Right To Authorize Underground Injection For Storage

Although the rules of ownership to injected stored gas are now well accepted, it remains unclear as to who has the exclusive right to authorize the underground storage of gas in the first place. ERNEST SMITH AND JAQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 2.1(B)(3) (Matthew Bender 2004). Does this right belong to the surface estate owner or the mineral estate owner? To date, Texas case law has not provided a clear answer. In *Mapco Inc. v. Carter*, the Beaumont Court of Appeals hinted that the ownership of storage rights belonged to the mineral estate owner. *Mapco Inc. v. Carter*, 808 S.W.2d 262 (Tex. App. – Beaumont 1991) *rev'd in part*, 817 S.W.2d 686 (Tex. 1991). However, in *Emeny v. United States*, the Federal Court of Claims, purportedly applying Texas law, held that oil and gas leases (being a lease on the mineral estate only) acquired by eminent domain did not include the rights of underground storage. *Emeny v. United States*, 412 F.2d 1319, 1323 (Ct. Cl. 1969). In other words, *Emeny* seems to indicate that the surface estate, and not the mineral estate or its assigns, owns the storage right.

#### 1. *Mapco Inc. v. Carter*.

In *Mapco*, the controversy involved the partition of an underground cavern between mineral co-owners. Mapco owned 1/8th interest in the mineral estate and the Carters owned 5/8th of the mineral estate. *Mapco*, 808 S.W.2d at 264-65. The Carter's requested partition in kind and by owelty. The nature of the suit is not as important as the discussion of the control of the underlying mineral estate.

The underground cavern at issue in *Mapco*, was formed by leaching out

underground mineral salt deposits without the consent of the Carters. *Mapco*, 808 S.W.2d at 266. In the trial court's conclusions of law, the trial court found that the Carters were co-owners of the mineral salt which formed the walls of the underground storage facility. *Mapco*, 808 S.W.2d at 270. In findings of fact, the trial court determined that the mineral salt forming the underground storage facility was a part of the mineral estate. *Mapco*, 808 S.W.2d at 271.

The court found that because the underground storage facility was comprised of the mineral estate, the mineral fee owners retained an interest in the underground storage facility itself. *Mapco*, 808 S.W.2d at 274. The mineral fee owners maintained a vested right in the cavern because it was essentially carved from, and a subset, of their mineral estate. *Mapco*, 808 S.W.2d at 274. Crucial to the court's reasoning was the fact that the cavern had been formed out of mineral salts, a previously recognized mineral under Texas law. *Mapco*, 808 S.W.2d at 274. Because the Carters owned an outright interest in the mineral salts, they were entitled to continuing ownership of the underground storage facility. Furthermore, the court goes on to conclude that the Underground Natural Gas Storage Act (UNGSA) is applicable to the dispute. See *infra* Section II(C)(3)(b). However, under the court's rationale, even if the UNGSA had not applied, the Carters would have still maintained their interest in the underground storage facility.

It seems crucial to the holding in *Mapco* that the actual underground storage facility was not a depleted natural reservoir. The storage capacity was created as a physical space within the actual minerals (the salts) themselves. Had a mineral owner not been the original creator of the storage facility, one must wonder whether the surface

owner would have had a claim on the space. It is possible, therefore, to harmonize this case with more traditional understandings of Texas oil and gas storage jurisprudence. *Mapco* can be limited as holding that storage rights uniquely part of the minerals themselves, remain part of the mineral estate. In other words, intrained storage capability that only lasts while all or some of the minerals remain present is a mineral estate characteristic. This is because once the salt/mineral is removed no natural storage capability remains. This is opposite of the case with voids or unfilled spaces that are developed when a reservoir is depleted. Here the storage capacity develops when the minerals are removed. In *Mapco* the storage capacity came into being when some, but not all, of the hard minerals were removed.

## 2. *Emeny v. United States*.

In *Emeny*, the United States acquired interests in the oil and gas estate by both lease and condemnation. *Emeny*, 412 F.2d at 1322. The surface owners brought suit claiming that the United States did not have a right to use the underground Bush Dome as a storage facility under either the mineral leases or by virtue of the condemnation proceeding. *Emeny*, 412 F.2d at 1320. The United States had entered into a series of contracts where helium gas produced under the leases was sent to various processing plants, refined and then returned to the Bush Dome for underground storage. *Emeny*, 412 F.2d at 1322. Additionally, the United States entered into contract with private companies to store their helium in the Bush Dome as well. *Emeny*, 412 F.2d at 1322.

In reaching its conclusion, the Commissioner honed in on the specific language contained in the underlying mineral leases. The leases stated that

they were granted "...for the sole and only purpose of mining and operating for oil and gas and of laying pipe lines and of building tanks, power stations and structures thereon, to produce, save and take care of said products..." *Emeny*, 412 F.2d at 1323. Based on the specific language of the leases, the court concluded that there was no reasonable basis which authorized a lessee to import extraneous gas and store it on the leasehold. *Emeny*, 412 F.2d at 1323. The intent of the oil and gas leases was to grant the right to explore, produce, possess, use and dispose of all oil and gas but this grant did purport to convey the right to use the leasehold for any other purpose than mineral exploration and production. *Emeny*, 412 F.2d at 1323. Therefore, the surface and all additional attendant rights still belonged to the respective landowners, including the geological structures beneath the surface. *Emeny*, 412 F.2d at 1323.

To date, the Texas Supreme Court has not passed on whether underground storage rights belong to the mineral or surface owner. However, in *Humble Oil & Refining Co. v. West*, the court did cite to *Emeny* as authority stating that

"where it was said that the surface of the leased lands remaining as the property of the respective landowners included the geological structures beneath the surface, together with any such structure that might be suitable for the underground storage of extraneous gas produced elsewhere."

*West*, 508 S.W.2d at 815 (citing *Emeny* as authority that the surface owner possessed the right to control underground storage). Lending additional credence to the surface owner's control of underground storage rights is the fact that storage facilities are taxed as if they were a part of the

surface. See *Coastal Liquids Partners, L.P. v. Matagorda Co. Appraisal Dist.*, 118 S.W.3d 464, 468-69 (Tex. App. – Corpus Christi 2003, pet. granted) (holding that the improvement of an underground storage cavern is considered a part of the surface estate for tax purposes).

#### D. Storage Is Part of the Surface Estate.

Professors Ernest Smith and Jacqueline Weaver theorize that the issue of ownership and control of underground storage relates directly to the implied easement to use the surface and subsurface in a manner reasonably necessary for exploration and drilling. ERNEST SMITH AND JAQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 2.1(B)(3) (Matthew Bender 2004). Smith and Weaver contend that unlike enhanced recovery operations, underground storage has no direct bearing on production. ERNEST SMITH AND JAQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 2.1(B)(3) (Matthew Bender 2004). Instead, storage is too downstream to be considered related to production, and, as such, the right must belong to the surface owner. ERNEST SMITH AND JAQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 2.1(B)(3) (Matthew Bender 2004).

Despite the inference contained in *West* and the opinions of two well-respected commentators, until the Texas Supreme Court ultimately decides whether the control of underground storage rights rest with the either the surface estate or the mineral estate the issue will remain unresolved and may hinder further use of Texas' natural resources. This legal uncertainty is only underscored against the backdrop of Texas policy concerning underground storage which states:

[T]he Underground storage of natural gas promotes conservation

of natural gas, permits the building of reserves for orderly withdrawal in periods of peak demand, make more readily available natural gas resources to residential, commercial, and industrial customers of this state, provides a better year-round market to the various gas fields, and promotes the public interest and welfare.

TEX. NAT. RES. CODE § 91.172 (Vernon 2005); see also Railroad Commission of Texas, *PetroFacts* (January 2005) (noting that Texas has more than 347,929 mmcf of stored natural gas on hand as of November 30, 2004). Thus, until the controversy is resolved, Texas' policy relating to underground storage may be too elusive to implement.

#### II. Enhanced and Secondary Recovery Operations

The second purpose of subsurface injection is to enhance the recovery of then-present native oil and gas reserves. A majority of Texas oil and gas production is a result of some enhanced recovery effort. The range of methods used to enhance recovery generally depends on whether oil production or gas production is targeted. Methods of recovery range from water or gas drives (including the injection of carbon dioxide) to pressure maintenance or cycling of gas, and fracturing. Enhanced recovery projects involving subsurface injection, regardless of the type, fall within the jurisdiction of the Texas Railroad Commission. See 16 TEX. ADMIN. CODE §§ 3.46, 3.50 (2005) (discussing the Commission's authority over injection for recovery purposes).

The Texas Legislature has recognized the importance of secondary recovery operations and reduced the severance tax to encourage them. TEX. TAX CODE §§ 202.052, 202.054 (2005).

Essentially, the severance tax on approved secondary recovery operations is reduced from 4.6 percent to 2.3 percent. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 8.4(C) (Matthew Bender 2004). This definitely created an incentive to explore all reasonable secondary recovery methods.

As discussed above, the mineral estate owner has the sole right to explore for and exploit the minerals beneath the surface, including using all necessary and reasonable methods that may be developed over time such as enhanced recovery techniques. As will be shown below, the purpose of each of these operations is aimed at increasing the productivity of existing oil and gas wells. Even though the law in Texas is clear that the mineral estate owner has this right, there are additional issues, primarily the question of subsurface trespass, which present challenges to the mineral estate owners use of enhanced recovery operations.

#### A. Pressure Maintenance.

In oil and gas operations, it is understood that both oil and gas flow from areas of high pressure to areas of low pressure (i.e. the wellbore). Thus, it is possible to inject something (generally water or gas) subsurface so as to increase the pressure in a specific area. Whether the injection is considered a "pressure maintenance" operation or a "secondary recovery" operation depends on when it occurs within the life of the reservoir. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 8.2(B)(3) (Matthew Bender 2004). Meaning, a pressure maintenance operation occurs early in the life of a reservoir while a secondary recovery operation, as the name implies, occurs later in the life of the reservoir. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL

AND GAS LAW § 8.2(B)(3) (Matthew Bender 2004).

#### 1. Ownership.

Once gas has been injected into a reservoir for purposes of pressure maintenance, Texas law is unclear as to who owns the gas. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 1.3(C)(2) (Matthew Bender 2004). It has been theorized that pressure maintenance operations differ substantially from storage operations because the intent of the parties is different. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 1.3(C)(2) (Matthew Bender 2004). As discussed above, in the case of storage, the intent of the injector is to keep gas confined within a specified area for later withdrawal and use. However, in pressure maintenance operations, the intent of the injector is to use the gas to drive a more sought after commodity to a production point, and not to reclaim the injected gas.

Further complicating an injector's claim to pressure maintenance gas is the operations of other working interest owners in the area. Compared to storage sites where offsetting operators and others are restricted by the Texas Railroad Commission, nothing prevents nearby operators from producing pressure gas as their own. Regardless, claims to ownership of pressure maintenance gas are not often vigorously advanced because the native hydrocarbon products that are being driven to the production points are much more valuable. Also, parties seeking to engage in any secondary recovery project must receive authority from the Railroad Commission prior to beginning the project. See 16 TEX. ADMIN. CODE § 3.46 (2005).

## 2. Authorization.

Ownership of pressure maintenance gas is less an important factor than the ability of an operator to legally inject substances into the subsurface reservoir in the first place. The use of groundwater withdrawn from the leased premises for pressure maintenance and secondary operation is a legal use of the surface estate. *Sun Oil Co. v. Whitaker*, 483 S.W.2d 808, 811 (Tex. 1972). Both the withdrawal and consumption of the water and the operator's program of subsurface injection were deemed reasonable uses of the surface estate in connection with enhancing the production of minerals. So long as the water used is reasonably necessary for the production of minerals, a mineral lessee may use as much of the water as necessary. *Carroll v. Roger Lacy, Inc.*, 402 S.W.2d 307, 315-16 (Tex. Civ. App. 1966, writ ref'd n.r.e). Such a rule applies even when the lease is silent as to method of secondary recovery. *Sun Oil*, 483 S.W.2d at 811 (Tex. 1972).

However, the use of the water must be on and for the benefit of the leased premises. See *Sun Oil*, 483 S.W.2d at 811 (Tex. 1972). In *Robinson v. Robbins Petroleum Corp., Inc.*, the Supreme Court of Texas agreed that it was improper to remove salt water from one lease and inject it beneath other lands. *Robinson v. Robbins Petroleum Corp., Inc.*, 501 S.W.2d 865, 867 (Tex. 1973). Thus, the injection of both gas and water for pressure maintenance and secondary recovery operations are a continued extension of the accommodation doctrine. Secondary recovery injection rights rest with the mineral owner because such operations increase production.

### B. Cycling.

Cycling, though similar to pressure maintenance, involves the production of

gas and some means of refining the native gas before re-injecting the gas into the same reservoir from which it came to increase pressure in the reservoir. Cycling is used primarily in areas where the gaseous hydrocarbons are heavier and may liquefy when the reservoirs' pressure drops, preventing ultimate recovery rates. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 1.3(C)(2) (Matthew Bender 2004). In a cycling operation, the "wet" gas is produced and refined to remove the heavier hydrocarbons and then the dry gas is re-injected in the reservoir. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 1.3(C)(2) (Matthew Bender 2004). This re-injected gas pressurizes the reservoir and drives additional gas to production points. See *Corzeli v. Harrell*, 186 S.W.2d 961, 970 (Tex. 1945) (describing the cycling process) And, ultimately, the dry gas and more of the native gas may be extracted.

### 1. Ownership of Cycled Gas.

Commentators Smith and Weaver point out that the case for the loss of title to the "dry" gas is not as clear as it is for pressure maintenance. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 1.3(C)(2) (Matthew Bender 2004). The "dry" gas clearly has different chemical characteristics and properties once the "wet" hydrocarbons have been removed. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 1.3(C)(2) (Matthew Bender 2004). However, the injector's claim to title is questionable because the injector retains little control over the gas while being used to pressurize the reservoir, especially if others have the capability of producing the re-injected "dry" gas at other locations. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 1.3(C)(2) (Matthew Bender 2004).



This theory seems to be based on the Texas Supreme Court's finding in *Corzelius v. Harrell*. In *Corzelius*, the court permitted a lessee to withdraw gas in a pro-rated amount from a field while another lessee was engaged in a cycling operation in the same field. *Corzelius*, 186 S.W.2d at 970 - 72. The Texas Supreme Court authorized both the injection of "dry" processed gas and the withdrawal of recycled "dry" gas. However, the court was inclined to limit withdrawals by the non-cycling operation to protect correlative rights of proportional production from the entire reservoir by both operators. *Corzelius*, 186 S.W.2d at 971 - 972.

## 2. Cycling Authorization.

The right to engage in cycling operations rests with the mineral estate owner for two reasons. First, cycling is aimed at increasing the production of mineral resources. Thus, it is a reasonable use of the subsurface strata to re-inject produced gas. Second, the operator is only injecting gas that was previously withdrawn. That is the native gas is being returned but free of certain constituent parts. However, unless a lease indicates otherwise, a likely area of dispute over cycling operations is whether and when a royalty must be paid on the extracted wet gas. A royalty owner is likely to contend a royalty should be paid on the extracted wet gas and then again when the dry gas is finally produced. This conflict is specially ripe if other operators are in the area and may produce the re-injected dry gas.

## III. Fracturing.

Fracturing, developed in the late 1940s, is one of the most widely used means of enhanced recovery. Hydraulic fracturing is estimated to account for 30 percent of current United States domestic recoverable oil and gas reserves. It is

estimated that hydraulic fracturing is responsible for more than seven million additional barrels of oil and 600 trillion cubic feet of natural gas. Given its potential for increasing productivity, the National Petroleum Council estimates that between 60-80% of all gas wells drilling in the coming decade will utilize fracturing. OIL AND GAS JOURNAL, *Government Developments* (October 25, 2004).

In fracturing, an operator injects water or other substances, mixed with sand or other "proppants" into a reservoir under very high pressure which causes the rock to break apart. American Association of Petroleum Geologists, Policy Statement: Regulation of Hydraulic Fracturing, available at [http://dpa.aapg.org/gac/papers/hydraulic\\_fracturing.cfm](http://dpa.aapg.org/gac/papers/hydraulic_fracturing.cfm) (last visited December 29, 2004). The proppants are introduced into the newly created cracks in the formation and once the water is removed keep the new cracks from settling. American Association of Petroleum Geologists, Policy Statement: Regulation of Hydraulic Fracturing, available at [http://dpa.aapg.org/gac/papers/hydraulic\\_fracturing.cfm](http://dpa.aapg.org/gac/papers/hydraulic_fracturing.cfm) (last visited December 29, 2004).

As with all oil and gas production, the Texas Railroad Commission has sole regulatory jurisdiction over fracturing operations. TEX. NAT. RES. CODE § 81.051 (Vernon 2001) (establishing the scope of the Commission's jurisdiction). The Railroad Commission is empowered by statute to adopt any and necessary rules governing fracturing operations. See TEX. NAT. RES. CODE § 81.052 (Vernon 2001). However, the Railroad Commission's regulatory jurisdiction begins and ends with matters pertaining to production and it has no jurisdiction over the other potential legal affects of fracturing, such

as subsurface trespass or damage to the land of another.

Despite its apparent effectiveness, fracturing is not without its critics. Several members of Congress have complained to the Environmental Protection Agency that hydraulic fracturing should be regulated under the Safe Drinking Water Act. OIL AND GAS JOURNAL, *Government Developments* (October 25, 2004). Currently, oil and gas operations are exempt from EPA's regulation of underground injection wells. Other than wells associated with oil and gas operations, all subsurface injection is subject to the Underground Injection Control environmental scheme regulated by the TCEQ AND EPA. TEX. WATER CODE §§ 27.003-27.011 (West 2004), 42 U.S.C.A. §§ 300f-300j (West 2003). However, recent court decisions have questioned this exemption and the issue is now pending before Congress. See *Legal Environmental Assistance Foundation, Inc. (LEAF) v. EPA*, 276 F.3d 1253 (11th Cir. 2001). Although this paper will not address these policy concerns it is important to operators to understand the potential ramifications of increased regulation under the Safe Drinking Water Act.

The right of a mineral owner or lessee to conduct fracturing operations and title to the materials injected by "fracing" is not seriously debated. As with cycling and pressure maintenance, the right to conduct fracing rests solely with the mineral estate owner. Based on the potential productivity of fracturing, it seems apparent that these operations are conducted with an eye toward maximizing potential production within a well. Generally speaking, there is no conflict between the mineral estate owner and the surface estate owner as to any of these enhanced recovery methods. However, the potential for problems with adjacent owners may

complicate the desire to conduct fracing operations.

#### **IV. Production v. Trespass.**

Like fracing, each of the above discussed enhanced recovery operations increases productivity, but also likely results in a technical subsurface trespass. It is unlikely adjacent owners would complain about either pressure maintenance operations involving the injection of gas or cycling operations because the injected gas may migrate to their lands and also increase their production. Because the injector's title to the injected gas may arguably be lost, an adjacent landowner may benefit greatly by the increased presence of produceable hydrocarbons. However, disputes do arise when either water or other materials migrate underground, resulting in a potential subsurface trespass.

When these disputes occur, courts are again faced with competing claims and must balance the rights of adjacent owners with the overarching policy goal of increasing oil and gas production within the State of Texas. To date, Texas courts have achieved this balancing act with little clarity or uniformity.

The issue of subsurface trespass was first addressed in the context of fracing in *Delhi-Taylor Oil Corp. v. Gregg* by the Austin Court of Appeals in 1960. In *Delhi-Taylor*, the plaintiff alleged that fracing would cause the injected particles to migrate beneath his neighboring lands, permitting the drainage of gas which could not otherwise be obtained. *Delhi-Taylor Oil Corp. v. Gregg*, 337 S.W.2d 216, 217 (Tex. Civ. App. – Austin 1960) *aff'd* 344 S.W.2d 411 (1961). The defendant argued that the Texas Railroad Commission had approved the fracing and that the plaintiff's remedy should be

limited to administrative relief before the Commission. *Gregg*, 337 S.W.2d at 218 (Tex. Civ. App. – Austin 1960). Although not specifically deciding the subsurface trespass issue, the court determined that it was the jurisdiction of the courts, not the Railroad Commission to hear questions relating to property rights (i.e. trespass) and ownership of oil and gas. *Gregg*, 337 S.W.2d at 221 (Tex. Civ. App. – Austin 1960). This jurisdictional turf war between Texas trial courts and the Railroad Commission continues to be at the center of subsurface trespass issues today. Regardless, a Railroad Commission approved frac operation does not insulate the operator from claims of trespass for the subsurface injection.

On appeal to the Texas Supreme Court, the court again chose to examine the jurisdictional and procedural issues rather than the substantive trespassing claim. *Gregg v. Delhi-Taylor Oil Corp.*, 344 S.W.2d 411, 412 (Tex. 1961). The court noted that the facts surrounding fracking are sufficient to create a technical claim for trespass. In Texas, a claim for trespass may be brought for entry upon another's land by either a person or by causing a thing to cross onto the land of another. *Gregg*, 344 S.W.2d at 416. The court noted that for all practical purposes *Gregg's* well would be "extended to and partially completed on Delhi-Taylor's land" because the cracks caused by the fracking would extend onto their land. *Gregg*, 344 S.W.2d at 416. Although the Railroad Commission had the right to regulate how, when and where wells are drilled, it did not have the authority to authorize a subsurface trespass because each person owns the minerals beneath his land separately, subject to the rule of capture. *Gregg*, 344 S.W.2d at 417-19.

#### A. *Manziel*.

In 1961, just one year following the *Gregg* decision, the Texas Supreme Court was again called on to address a subsurface trespass claim, this time in the context of a saltwater pressuring operation. In *Railroad Commission of Tex. v. Manziel*, the question presented was whether water injected under Railroad Commission jurisdiction could effectively "water out" a neighboring well by flooding it to a point where it was no longer productive. *Railroad Commission of Tex. v. Manziel*, 361 S.W.2d 560, 564 (Tex. 1961). The Railroad Commission argued that it had the authority and jurisdiction to locate water injection wells so as to permit efficient recovery of the reservoir. *Manziel*, 361 S.W.2d at 565. However, the *Manziel's* argued that while the Commission has the authority to regulate injection wells, it lacks the authority to authorize a subsurface trespass. *Manziel*, 361 S.W.2d at 565.

Although declaring that courts have the authority to decide questions of law, the court appears to back away from its prior finding in *Gregg* by saying that:

"[I]f, in the valid exercise of its authority to prevent waste, protect correlative rights, or in the exercise of its jurisdiction, the Commission authorizes secondary recovery projects, a trespass does not occur when the injected secondary recovery forces move across lease lines, and the operations are not subject to an injunction on that basis. The technical rules of trespass have no place in the consideration of the validity of the orders of the Commission."

*Manziel*, 361 S.W.2d at 568-69.

The court's rationale appears based primarily on policy rather than a strict adherence to the common law to trespass. The court recognizes

secondary recovery operations are necessary to enhance the production of oil and gas and should be encouraged. *Manziel*, 361 S.W.2d at 569. The court assumes that secondary recovery operations would be jeopardized if they became subject to claims for subsurface trespass. *Manziel*, 361 S.W.2d at 569. *Manziel* offers significant, but not full, protection to operators conducting well completions involving fracturing the subsurface reservoir. A Railroad Commission permit establishes the appropriate conduct and leaves the complaining neighbor in the position of proving a nuisance rather than the far easier claim for trespass.

#### B. *Geo-Viking*.

Almost 30 years later, in *Geo-Viking, Inc. v. Tex-Lee Operating Co.*, the Texarkana Court of Appeals addressed the issue of damages for subsurface trespass caused by fracing. *Geo-Viking, Inc. v. Tex-Lee Operating Co.*, 817 S.W. 2d 357, 363-64, (Tex. App. – Texarkana 1991) *opinion withdrawn and superceded on overruling rehearing* 839 S.W. 2d 797 (1992). In a Deceptive Trade Practices Act action for damages as a result of an improperly performed "frac-job", the defendant alleged that the plaintiff should not be allowed to include in the damage model the value of oil and gas chained from offsetting premises. *Geo-Viking*, 817 S.W.2d at 363-64. The court of appeals rejected this argument as a contravention of the rule of capture. *Geo-Viking*, 817 S.W.2d at 364.

In a dissenting opinion, it was questioned whether the rule of capture permitted production as a result of a trespass. *Geo-Viking, Inc. v. Tex-Lee Operating Co.*, 817 S.W.2d 357, 365, (Tex. App. – Texarkana 1991) (Grant, J., dissenting on Motion for Rehearing). The dissent relied on the language found in *Gregg* which stated that fracing

the land of someone else was a trespass. *Geo-Viking* 817 S.W.2d at 365 (Grant, J., dissenting on Motion for Rehearing). Interestingly, the dissenting opinion on the motion for rehearing was authored by the same judge writing for the majority in the initial case.

On original appeal to the Texas Supreme Court, the court seemed to finally address the fracing question as it relates directly to subsurface trespass. In discussing the measure of damages for the improperly performed "frac-job," the Texas Supreme Court made an uncharacteristically bold statement in finding "[F]racing under the surface of another's land constitutes a subsurface trespass." *Geo-Viking, Inc. v. Tex-Lee Operating Co.*, 1992 WL 80263 \*2 (Tex. 1992) (opinion withdrawn). Finally, it appeared the Texas Supreme Court had brought clarity to the issue.

Such clarity was to be short lived. Upon motion for rehearing, in a per curiam opinion, the Texas Supreme Court balked at its original holding and stated "we should not be understood as approving or disapproving the opinions of the court of appeals analyzing the rule of capture or trespass as they apply to hydraulic fracturing." *Geo-Viking, Inc. v. Tex-Lee Operating Co.*, 839 S.W.2d 797, 798 (Tex. 1992) (on rehearing). Instead of finally clarifying the subsurface trespass issue, the court simply determined the writ had been improvidently granted. It has been speculated that the Texas Supreme Court backed away from its original statement in *Geo-Viking* regarding subsurface trespass out of concern that it might have a negative impact on fracing and other recovery operations. See RYAN MAGEE, STATE BAR OF TEXAS, OIL, GAS AND ENERGY RESOURCES SECTION REPORT, *Hydraulic Fracturing and Trespass*, 71 (June 2004) (quoting LAURA H. BURNEY, *A Pragmatic Approach To Decision Making In The*

*Next Era of Oil and Gas Jurisprudence*, 16 J. ENERGY NAT. RESOURCES & ENVTL. L. 1, 22, 39 (1996);

However, the weight to be afforded the court of appeals discussion of fracturing must be questioned. As noted above, the dissenting judge on motion for rehearing was same judge who authorized the majority opinion on original appeal. Thus, the outcome in *Geo-Viking* remains questionable as to whether fracing across boundary lines constitutes a trespass. Now, it appears the courts have reverted to *Manziel* to determine whether and when fracing is proper.

#### C. Railroad Commission Protection.

The weight and authority of *Manziel* must also be questioned in light of several recent decisions addressing the ability of the Railroad Commission to interject its authority into matters of law. In *Amarillo Oil Co. v. Energy-Agri Products, Inc.*, the Texas Supreme Court drew a clear distinction between the Railroad Commission's right to govern production and the right to determine ownership, a province left solely to the courts. *Amarillo Oil Co. v. Energy-Agri Products, Inc.*, 794 S.W.2d 20, 27 (Tex. 1990). This same rationale was followed in *SWEPI, L.P. v. Camden Resources, Inc.*, where the court stated that "[E]ven though the [Railroad Commission] has primary jurisdiction over matters concerning production of oil and gas, it is well established that the [Railroad Commission] does not have jurisdiction over inherently judicial actions such as trespass and conversion." *SWEPI, L.P. v. Camden Resources, Inc.*, 139 S.W.3d 332, 339 (Tex. App. – San Antonio, 2004, - pet denied). The court goes on to state that trespass and conversion are distinct property rights claims and are not within the jurisdiction of the Railroad

Commission. *SWEPI*, 139 S.W.3d at 339.

In light of these confusing and contradictory opinions, we are no closer to an answer as to whether fracing and other enhanced recovery methods which involve subsurface injection are considered actionable subsurface trespass. So much for clarity.

#### D. Current – Fracing Across Lease Lines Is Probably, At Most, A Nuisance.

Generally, the oil and gas industry has come to a common understanding regarding the legality of fracing and other enhanced recovery methods that may push products onto another's land or break open fractures in underground formations that would otherwise constitute a "legal" subsurface trespass. Most landowners and their lessees view these activities in the nature of corollary nuisances, each desiring the ability to fracture their wells or inject gases to maintain reservoir pressure, if needed. Private nuisances between adjoining landowners are gauged on the reasonableness of the conduct, not on the mere technicality of the subsurface trespass. The Railroad Commission and Texas courts' interpretation of their regulations, particularly those relating to fracing operations and secondary recovery, seem to turn a blind legal eye or even tacitly acknowledge the technical trespass that may occur to neighboring properties. Mineral owners and their lessees are content not to engage in an analysis of any damage caused by the invasion, if any, because it seems so ordinary and has received the Railroad Commission's approval. However, the issue is far from settled law in Texas as to whether subsurface migration of these enhanced recovery products are considered a legal trespass.

## V. DISPOSAL

The third major purpose for subsurface injection is disposal of unwanted materials. Unlike subsurface injection for both storage and enhanced recovery, no future extraction is ever anticipated. Once material is disposed of, the injector generally not only intends, but hopes, to part with title to the material.

### A. Salt Water Disposal.

Clearly, one of the most important tools for oil and gas recovery is the ability of dispose of produced salt water and other oil field waste. For every barrel of oil produced, it is estimated that at 8.5 barrels of water are also produced. ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 14.4(A) (Matthew Bender 2004). Included within this excess water are a number of highly toxic pollutants. See ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 14.4(A) (Matthew Bender 2004).

Salt water which has been produced with oil or gas may be disposed of at the leased premises through either the use of surface evaporation pits or subsurface injection. Both techniques can occur without consultation or compensation to the surface owner. Likewise, both types of disposal are deemed a reasonably necessary use of the surface estate. *Brown v. Lundell*, 344 S.W.2d 863, 865-66 (Tex. 1961); *TDC Engineering, Inc. v. Dunlap*, 686 S.W.2d 346, 348-49 (Tex. Civ. App – Eastland 1985, writ ref'd n.r.e). Thus, the question returns to what constitutes a reasonably necessary use of the surface estate for purposes of production. However, the case law indicates that salt water produced from one tract cannot be disposed of on another tract without the permission of the surface estate owner. See *TDC*

*Engineering*, 686 S.W.2d at 349 (discussing salt water disposal on the *leased* premises) (emphasis added). The surface owner, therefore, retains all rights to authorize underground disposal of salt water produced off leased premises. The mineral owner and mineral lessees only possess a right of dominant use, to the extent such use is squarely related to production of the underlying minerals.

The use of surface disposal pits has fallen into disfavor and is now prohibited by statute. See TEX. NAT. RES. CODE ANN. §§ 91.451-91.452 (2005). As a result, the majority of oil-related saltwater is disposed of by subsurface injection. See ERNEST SMITH AND JACQUELINE LANG WEAVER, TEXAS OIL AND GAS LAW § 14.4(A) (Matthew Bender 2004) (noting that more than 28 million barrels of saltwater re-injected each year in the United States). According to the Texas Railroad Commission, Texas currently has approximately 52,000 injection wells related directly to oil and gas production. Railroad Commission of Texas, Oil and Gas Division, Underground Injection Control Seminar Manual, Forward available at <http://www.rrc.state.tx.us/divisions/og/uic/manual/HTML/man-forw.htm>.

The ideal injection well is situated over a porous zone under low to moderate pressures which is sealed both above and below by impermeable strata. Railroad Commission of Texas, Oil and Gas Division, Underground Injection Control Seminar Manual, Forward available at <http://www.rrc.state.tx.us/divisions/og/uic/manual/HTML/man-forw.htm>. From the Railroad Commission's perspective, although injection wells are necessary for the efficient production of oil and gas, they must be situated and designed in such a manner so as to protect groundwater resources. Railroad Commission of

Texas, Oil and Gas Division, Underground Injection Control Seminar Manual, Forward available at <http://www.rrc.state.tx.us/divisions/og/ui/c/manual/HTML/man-forw.htm>.

#### B. Exempt Oil Field Waste Disposal.

Underground disposal of oil field waste raises obvious environmental issues. Injection wells are regulated under Chapter 27 of the Texas Water Code. As a general rule, the Texas Commission on Environmental Quality ("TCEQ") has jurisdiction over all subsurface injection wells, **EXCEPT** those relating to oil and gas waste. TEX WATER CODE §§ 27.11, 27.31 (West 2003). Under the Water Code, regulated "oil and gas waste" includes:

"waste arising out of or incidental to drilling for or producing oil, gas, or geothermal resources, waste arising out of or incidental to the underground storage of hydrocarbons other than storage in artificial tanks or containers....The term includes but is not limited to salt water, brine, sludge, drilling mud, and other liquid or semi-liquid waste material."

TEX. WATER CODE § 27.02(6) (West 2003). It is important to note that this definition of oil field waste is significantly broader than EPA's definition of exempt oilfield waste. EPA's understanding of the oil and gas exemption includes drilling fluids, produced water, and other wastes associated with the exploration and development, or production of crude oil or natural gas.<sup>1</sup> ENVIRONMENTAL

<sup>1</sup> The following wastes are considered exempt: produced water; drilling fluids; drill cuttings; rigwash; drilling fluids and cuttings from offshore operations disposed of onshore; geothermal production fluids; hydrogen sulfide abatement wastes from geothermal energy production; well completion, treatment, and stimulation fluids; basic sediment, water, and other tank

PROTECTION AGENCY, EXEMPTION OF OIL AND GAS EXPLORATION AND PRODUCTION WASTES FROM FEDERAL HAZARDOUS WASTE REGULATIONS, 6 *available at* <http://www.epa.gov/epaoswer/other/oil/index.htm>. The Railroad Commission takes the position that because EPA has delegated it authority to regulate Texas'

bottoms from storage facilities that hold product and exempt waste; accumulated materials such as hydrocarbons, solids, sands, and emulsion from production separators, fluid treating vessels, and production impoundments; pit sludges and contaminated bottoms from storage or disposal of exempt wastes; gas plant dehydration wastes, including glycol-based compounds, glycol filters, and filter media, backwash, and molecular sieves; workover wastes; cooling tower blowdown; gas plant sweetening wastes for sulfur removal, including amines, amine filters, amine filter media, backwash, precipitated amine sludge, iron sponge, and hydrogen sulfide scrubber liquid and sludge; spent filters, filter media, and backwash (assuming the filter itself is not hazardous and the residue in it is from an exempt waste stream); pipe scale, hydrocarbon solids, hydrates, and other deposits removed from piping and equipment prior to transportation; produced sand; packing fluids; hydrocarbon-bearing soil; pigging wastes from gathering lines; wastes from subsurface gas storage and retrieval, except for the non-exempt wastes; constituents removed from produced water before it is injected or otherwise disposed of; liquid hydrocarbons removed from the production stream but not from oil refining; gases from the production stream, such as hydrogen sulfide and **carbon dioxide**, and volatilized hydrocarbons; materials ejected from a producing well during blowdown; waste crude oil from primary field operations; light organics volatilized from exempt wastes in reserve pits, impoundments, or production equipment. See ENVIRONMENTAL PROTECTION AGENCY, EXEMPTION OF OIL AND GAS EXPLORATION AND PRODUCTION WASTES FROM FEDERAL HAZARDOUS WASTE REGULATIONS, 10 *available at* <http://www.epa.gov/epaoswer/other/oil/index.htm>. (emphasis added)

Underground Injection Control program and by incorporating the Railroad Commission's broader definition, it has greater authority than afforded under the federal regulation. JEFF CIVINS, JIMMY ALAN HALL, MARY K. SAHS, ENV. LAW, *RRC Regulation of UIC Activities*, 45 TEX. PRAC. § 9.5 (1997)

As discussed above, the TCEQ and the Railroad Commission share regulatory jurisdiction over underground injection. By a 1998 Memorandum of Understanding between the Railroad Commission of Texas and the TCEQ, the agencies have agreed as to a clear division of regulatory jurisdiction over underground injection control. See TEX. ADMIN. CODE § 3.30 (2005). The Texas Railroad Commission asserts jurisdiction over underground injection wells based on two criteria: 1) whether the injection is for disposal purposes or 2) whether the injection is into a productive reservoir. If the injection is solely for disposal purposes then the well is regulated under Rule 9. TEX. ADMIN. CODE § 3.9 (2005). But, if the well is for fluid injection into a productive reservoir or zone, the well is regulated under Rule 46. TEX. ADMIN. CODE § 3.46 (2005) Rule 46 mainly regulates secondary recovering operations that are designed to push or flood hydrocarbons to production wells. Rule 9 provides that any person seeking to dispose of oil and gas waste as defined in the Water Code, must obtain a permit from the Texas Railroad Commission. 16 TEX. ADMIN. CODE §3.9(1) (2005). Much like produced salt water, oil and gas operators routinely dispose of oil and gas exempt waste into the subsurface strata. Such disposal is considered a reasonable use of the surface estate in connection with developing and producing the underlying minerals. Texas courts have not been asked to decide directly the propriety of using the subsurface strata for disposal of exempt oil field waste.

Most mineral owners and their lessees continue to disposal of waste through injection under the assumption that the waste is analogous to salt water. That is the waste has the same characteristics and circumstances as are present with salt water. In fact, produced salt water is a subset of exempt oil field waste.

### C. Carbon Sequestration.

As Texas continues to exhaust its hydrocarbon reserves, geologists and scientists are looking to find new uses for depleted oil and gas fields. One of the uses of these soon to be emptied reservoirs is the subsurface disposal of carbon dioxide. See *Texas Oil Fields May Store Carbon Dioxide* (November 29, 2004) available at <http://www.cnn.com/2004/TECH/science/11/29/environment.texas.reut/index.htm> (last visited November 30, 2004). Carbon sequestration, as the process is known, occurs when waste from burned fossil fuels is captured and injected back into the earth rather than allowing it to escape into the atmosphere. The injection part of the process is not unknown to the Texas oil and gas industry because operators have used carbon dioxide to enhance oil and gas production for decades. See SCIENCE BEAT, *Playing Keep Away With Carbon* (Berkeley Lab February 17, 2004) available at <http://www.lbl.gov/Science-Articles/Archive/sb-EETD-carbon-keep-away.html> (last visited December 28, 2004). Most of this CO<sub>2</sub> is used for secondary recovery efforts in the Permian Basin. The only difference is that carbon sequestration involves injecting CO<sub>2</sub> into fully depleted reservoirs while traditional CO<sub>2</sub> injection involves secondary recovery of producing reservoirs.



## 1. Technical Ability.

Scientists estimate that carbon sequestration may result in an additional 74 billion stock-tank barrels of oil. MARK H. HOLTZ AND ROBERT J. FINLEY, BUREAU OF ECONOMIC GEOLOGY, *CO<sub>2</sub> Sequestration In Hydrocarbon Reservoirs*, available at <http://www.beg.utexas.edu/environquilty/abndnhyrores/abdnhydrores.htm> (last visited February 20, 2005). However, in addition to increasing production, scientists are potentially eyeing carbon sequestration as a means by which to reduce greenhouse gas pollution. See *Texas Oil Fields May Store Carbon Dioxide* (November 29, 2004) available at <http://www.cnn.com/2004/TECH/science/11/29/environment.texas.reut/index.html> (last visited November 30, 2004).

It is estimated that the Texas Gulf Coast region produces 160 metric tons of carbon dioxide. SCIENCE BEAT, *Playing Keep Away With Carbon* (Berkeley Lab February 17, 2004) available at <http://www.lbl.gov/Science-Articles/Archive/sb-EETD-carbon-keep-away.html> (last visited December 28, 2004). Some public advocacy groups have estimated that Texas alone ranks as the seventh largest producer in the world of greenhouse gas emissions.

Fortunately, scientists believe that the Texas Gulf Coast region is uniquely situated to become a test for the efficacy of carbon sequestration projects in the United States. The proximity of geologically compatible formations and high density emissions of carbon dioxide make for a unique laboratory. See MARK H. HOLTZ AND ROBERT J. FINLEY BUREAU OF ECONOMIC GEOLOGY, *CO<sub>2</sub> Sequestration In Hydrocarbon Reservoirs*, available at <http://www.beg.utexas.edu/environquilty/abndnhyrores/abdnhydrores.htm> (last visited February 20, 2005). These

deleted reservoirs and carbon dioxide sources sit atop deep saline aquifers which are interrupted with thick layers impermeable layers of shale. SCIENCE BEAT, *Playing Keep Away With Carbon* (Berkeley Lab February 17, 2004) available at <http://www.lbl.gov/Science-Articles/Archive/sb-EETD-carbon-keep-away.html> (last visited December 28, 2004). This allows the pollution to be injected deep underground beneath potable water and stored indefinitely.

In theory, carbon sequestration makes sense in areas of former production. Obviously, now empty reservoirs were at one time capable of storing and holding oil and gas. By simple physics, these same reservoirs must be capable of storing gas, including CO<sub>2</sub> gas. The difficulty becomes in how to efficiently re-inject carbon dioxide back into the ground.

The concept has now gone beyond theory and is fast approaching reality. A University of Texas team of scientists has injected approximately 1,600 tons of carbon dioxide into a depleted oil field near Dayton, Texas. *Texas Oil Fields May Store Carbon Dioxide* (November 29, 2004) available at <http://www.cnn.com/2004/TECH/science/11/29/environment.texas.reut/index.html> (last visited November 30, 2004). It is estimated that this test formation could hold up to 350 billion metric tons of carbon dioxide. SCIENCE BEAT, *Texas tests Carbon Sequestration in Geological Formations* (Berkeley Lab April 30, 2004) available at <http://www.lbl.gov/Science-Articles/Archive/sb-Apr-04-ESD-carbon-sequestration.html> (last visited December 28, 2004). That is estimated to be more than 1,000 years of pollution at current rates. WIRED NEWS, *Sequester That Carbon Dioxide* (Reuters, November 27, 2004) available at <http://www.wired.com/news/technology/>

[0,1282,65852,00.html?tw+wn\\_15techhead](http://0,1282,65852,00.html?tw+wn_15techhead) (last visited December 28, 2004).

## 2. Storage Rights and Regulations.

Beyond the technical requirements and environmental concerns, Texas oil and gas practitioners are now confronted with questions relating to ownership of subsurface CO<sub>2</sub> disposal rights, where such injections are unrelated to production. Clearly, if the carbon dioxide injection is used to enhance production at a Railroad Commission approved location, the right belongs to the mineral owner as a reasonable use of the surface estate. See *supra* Section II(B)(1)-(2). However, if the pollution is being disposed or stored, i.e. sequestered, does that right belong to the surface owner? And if so, what regulatory schemes apply – is the Railroad Commission or the TCEO the primary regulator?

It is probable that the surface estate owner holds all rights to authorize the underground injection and sequestration of carbon dioxide. The injection of carbon dioxide is closely analogous to the storage of natural gas, with the only exception being on the ultimate long term nature of disposal, rather than storage. The qualitative distinction between storage of natural gas for later retrieval and the storage of carbon dioxide for disposal rests on the settled law related to the underground disposal of products in general. Texas law clearly gives the surface owner rights to authorize disposal on or within the property subject, however, only to the mineral owners reasonable use of such storage rights. It is under this reasonable use standard that mineral owners and their lessees routinely dispose of saltwater and exempt oil field waste under Railroad Commission Rule 9. The reasonable use standard belies the fact that the surface owner is the one with actual vested primary authority

to permit storage. Nonetheless, the protection afforded by regulatory approval generally acts to block neighboring claims of subsurface trespasses and the like caused by the underground movement of foreign matter occasioned by the injection. Almost complete occupation of the issue by the regulatory approval process seems to offer paramount, but not exclusive protection from trespass claims. With the advent of carbon sequestration, questions will arise on the advisability and legality of the storage without some certainty on the viability of trespass claims for injection of non-native CO<sub>2</sub>.

It appears that the Texas Underground Natural Gas Storage and Conservation Act ("UNGSCA") codified in § 91.171 *et seq.* of the Texas Natural Resources Code may provide regulatory coverage for these operators desiring to sequester CO<sub>2</sub>. Originally envisioned to enhance natural gas production by providing for ready means of storage for produced natural gas, the UNGSCA may already authorize the Railroad Commission to regulate carbon sequestration wells under Rule 9, rather than the more restrictive underground injection control scheme enforced by the Texas Commission on Environmental Quality, and ultimately the U.S. Environmental Protection Agency. The UNGSCA creates a regulatory framework for the injection and storage of hydrocarbon products. Section 91.201 of the Texas Natural Resources Code defines hydrocarbons subject to storage by reference to other statutes, to-wit: "'Hydrocarbons' means oil, gas or products of oil or gas as those terms are defined by Section 85.001" of the Texas Natural Resources Code (linking the definition of "hydrocarbon" in the UNGSCA to the broader definition of oil and gas "product"). See TEX. NAT. RES. CODE § 91.201 (2005).

At first glance the UNGSCA seems to cover only the injection and storage of oil and gas or products derived. However, the cross-reference to § 85.001 of the Texas Natural Resources code proves helpful to carbon sequestration inasmuch as carbon dioxide is a "product" of oil and gas. Particularly, § 85.001 [4] provides for a definition of 'product' and 'product of oil and gas' to provide for all of the common by-products of hydrocarbons, including crude oil, processed crude, residue crude, cracking stock oil, distillate gasoline and blends or mixtures of oil or gas, "or any derivatives or by-products of them". TEX. NAT. RES. CODE § 85.001 (2005). If carbon dioxide reasonably can be drawn into the definitional coverage of 'by-product' of oil and gas, then the storage (for whatever term of time) of carbon dioxide could be authorized under the UNGSCA.

Underground hydrocarbon storage wells under the UNGSCA are regulated under the Railroad Commission's Underground Injection Control section (now called the Environmental Services Section). These Class II wells are permitted and operated under Rule 9 of the Railroad Commission. Regulation under Rule 9 provides complete regulatory approval for operation of gas storage facilities and potentially for carbon sequestration activities under the UNGSCA. Mr. Steve Seni, Assistant Director for Environmental Services indicates that no person has yet made application with the Railroad Commission for a permit to operate a facility solely dedicated to carbon sequestration. According to the Railroad Commission, such activity would probably encourage coordination between the Railroad Commission and the TCEQ to undertake a memorandum of understanding detailing regulatory jurisdiction between the two agencies.

It seems appropriate that a substance such as carbon dioxide with characteristics so analogous to normal oil field wastes would not be regulated by the same agency. Moreover, carbon dioxide is a product which in other contexts is routinely used for pressure maintenance and secondary recovery operations. Simply, one would question why regulatory jurisdiction should turn on the intent of the injector in placing the CO<sub>2</sub> in the ground.

There also remains the argument that the TECQ and other state and federal agencies may be without jurisdiction over underground injection of carbon dioxide because it falls within the regulatory definition of "oil and gas waste". The Railroad Commission regulates oil and gas waste as that term is defined in § 27.002 (6) of the Texas Water Code. Under a 1987 Memorandum of Understanding, now superseded by a similar Memorandum of Understanding in 1998, the Texas Natural Resource Conservation Commission (now the TECQ) and the Texas Railroad Commission stipulated those wastes exempt from regulation and thus eligible for subsurface disposal as an exempt oil field waste. The current definition of oil field waste found in the Water Code may be broad enough to capture CO<sub>2</sub> within its coverage. CO<sub>2</sub> used as part of secondary recovery operations is directly related to oil and gas production. The production of the CO<sub>2</sub> in the conduct of the enhanced recovery results in oil field waste. This waste is clearly an exempt oil field waste when associated with production. CO<sub>2</sub> injected for sequestration does not lose its chemical or physical characteristics. More importantly, however, the waste is sequestered into "depleted" oil and gas reservoir. Thus, the sequestration operation meets both prongs of the disposal rule enforced by the Railroad Commission.

The current regulatory schemes and laws do not contemplate long-term storage (or sequestration) of carbon dioxide. Although there do exist traditional tools and legal constructs in addressing carbon dioxide's use for pressure maintenance and secondary recovery operations. This history, together with the recent increased activities in underground gas storage, leads to a conclusion that hydrocarbon sequestration can occur without dramatic changes in the current understandings of oil and gas law. At its core, CO<sub>2</sub> is a mere by-product of oil, gas and mineral production and should be handled under the same legal rules as other exempt oil field wastes and the legal rules relating to the storage of natural gas.

#### **IV. CONCLUSION**

Oil, gas and mineral law has long focused on the development and production, and not the storage of valuable hydrocarbon resources. Injection of substances to enhance such recovery is a well accepted and reasonable use of the surface estate. Hydrocarbon storage, including carbon sequestration rights, being unrelated to physical production, are part of the surface estate interest.

As technology continues to develop more ways to enhance oil and gas production, as well as increase utilization of Texas natural resources, Texas mineral law must continue to evolve to meet those new demands. To date, however, Texas courts have been reluctant to address the substantive issues relating to subsurface injection. In spite of this, Texas oil and gas operators continue to forge ahead and literally break new ground in utilizing the subsurface.