



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

PROPOSAL FOR DECISION

OIL AND GAS DOCKET NO. 08-0297174

THE APPLICATION OF CATO OPERATING, INC. PURSUANT TO STATEWIDE RULE 9 FOR A COMMERCIAL PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A POROUS FORMATION NOT PRODUCTIVE OF OIL OR GAS, WOLF SWD LEASE, WELL NO. 1, SPRABERRY (TREND AREA) FIELD, HOWARD COUNTY, TEXAS

HEARD BY: Peggy Laird – Technical Examiner
Laura Miles-Valdez – Hearings Examiner

REVIEWED BY: Jennifer Cook – Administrative Law Judge

APPEARANCES:

REPRESENTING:

APPLICANT:

David Gross
Dale Miller

Cato Operating, Inc.

PROTESTANT:

John Hicks
Cary McGregor
Cherylyn Freiwald

Encana Oil & Gas (USA)

John Ed Ezell
Libby Ezell

Pro se
Pro se

PROCEDURAL HISTORY

Application Filed:	March 6, 2015
Protest Received:	March 10, 2015
Request for Hearing:	June 11, 2015
Notice of Hearing:	July 13, 2015
Date of Hearing:	August 11, 2015
Transcript Received:	August 25, 2015
Proposal For Decision Issued:	June 30, 2016

STATEMENT OF THE CASE

Pursuant to Statewide Rule 9 (16 Tex. Admin. Code § 3.9), Cato Operating, Inc. ("Cato") seeks a commercial permit to dispose of oil and gas waste by injection into a porous formation not productive of oil or gas, for the Wolf SWD Lease, Well No. 1, in the Spraberry (Trend Area) Field, Howard County, Texas. The proposed disposal well will be located about 1.5 miles east of Elbow, Texas, on the east side of Farm-to-Market Road 33. Cato seeks authority to dispose of 25,000 barrels of water per day ("bwpd") into the Clearfork Formation in the depth interval from 4,100 feet to 5,100 feet. The application is protested by Encana Oil & Gas (USA) ("Encana"), a nearby operator of wells, and by adjoining land owners John Ed and Libby Ezell.

The Technical Examiner and Administrative Law Judge (collectively, "Examiners") recommend the application be denied. The Examiners conclude that Cato has not met its burden of proof under Chapter 27 of the Texas Water Code and the Commission's Statewide Rule 9.

APPLICABLE LAW

The Railroad Commission may grant an application for a disposal well permit under Texas Water Code § 27.051(b) and may issue a permit if it finds:

1. The use or installation of the injection well is in the public interest;
2. The use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;
3. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and
4. The applicant has made a satisfactory showing of financial responsibility as required by Section 27.073.

DISCUSSION OF EVIDENCE

APPLICANT'S EVIDENCE

One witness, Dale Miller, a consulting petroleum engineer, testified and offered evidence on behalf of Cato. Mr. Miller stated that Cato has a surface agreement with the landowner for a commercial disposal well in the San Andres Formation, but the agreement allows for the utilization of other viable zones. Mr. Miller identified the Clearfork Formation as containing the selected viable injection interval for the subject application. Both the San Andres and the Clearfork Formations are in the Spraberry (Trend Area) Field, as captioned above.¹

¹ Tr. 81-84.

Notice

On January 19, 2015, notice of the application was published in the *Midland Reporter-Telegram*, a newspaper of general circulation in Howard County, Texas. On March 6, 2015, Cato mailed copies of the application as notice to the owner of the surface tract, owners of adjacent surface tracts, the Howard County Clerk, and operators of wells within one-half mile of the proposed disposal well.

Facility Design and Operation

Cato proposes to drill the Wolf SWD Lease Well No. 1 on a 4-acre tract of land located about 1.5 miles east of Elbow, Texas, and about 6 miles south of Big Spring. The well will be drilled to a total depth of 5,600 feet. Cato proposes to drill, complete and operate the well as follows:

- Surface casing (9 5/8-inch) will be set to a depth of 425 feet and cemented to the surface with 110 sacks of cement;
- Long-string casing (7-inch) will be set to a depth of 5,600 feet and cemented to the surface with 885 sacks of cement;
- Perforate the long-string casing in the Clearfork Formation disposal interval from 4,100 feet to 5,100 feet;
- Set tubing (3 1/2-inch) with a packer at a depth of 4,000 feet;
- The maximum daily injection volume will be 25,000 bwpd and the estimated average daily injection volume will be 15,000 bwpd;
- The maximum surface injection pressure will be 2,050 pounds per square inch gauge ("psig") and the average surface injection pressure will be 1,500 psig; and
- Injected waste will be limited to produced salt water and non-hazardous oil and gas waste exempt from regulation under the Resource Conservation and Recovery Act.

Surface facility design details were not described at the hearing. The standard permit conditions for a commercial disposal facility include provisions for surface facility design and operation.

Groundwater, Geology and Hydrocarbon Resources

The Commission's Groundwater Advisory Unit (GAU) indicates the interval from the ground surface to a depth of 325 feet must be protected. The base of usable quality groundwater ("BUQW") occurs at a depth of 325 feet. The base of the underground sources of drinking water ("USDW") is estimated to occur at 1,225 feet.² A review of records from the Texas Water Development Board identified 15 water wells within a one-mile radius of the proposed disposal well. The two deepest wells are 180 feet deep.

The Clearfork Formation is continuous and mappable across the area, but the formation is not productive of hydrocarbons in this area. However, the Clearfork Formation is within the correlative interval of the Spraberry (Trend Area) Field, which contains at least two productive formations in the immediate vicinity, the Spraberry and Wolfcamp Formations. In addition, within two miles of the proposed well there is some production from the Grayburg and San Andres Formations, which overly the Clearfork Formation, as well as the Strawn and Fusselman Formations, which are below the Spraberry (Trend Area) Field. Mr. Miller indicated that he was not familiar with the reservoir characteristics of the Clearfork Formation in the area. Specifically, Mr. Miller stated that he did not have an opinion on the permeability or porosity of the Clearfork, nor had he studied bottom-hole pressures of wells drilled into the formation.³

The Clearfork Formation is utilized as a disposal zone for several commercial disposal wells within a 10-mile radius of Cato's proposed well. Mr. Miller offered his opinion that injected fluids would be confined to the injection interval because of the manner in which the well would be cased and cemented. Mr. Miller did not comment on the reservoir characteristics of the confining strata directly above or below the Clearfork Formation. Further, Mr. Miller stated that he assembled and filed the application on Cato's behalf, but all of the disposal well parameters were provided by Cato.⁴

The Commission identifies the Clearfork Formation in Howard County as a "potential flow zone." The completion report (Form W-2) for a nearby Encana well identifies the Clearfork Formation as potentially having "severe water" flows in Howard County.⁵

Area of Review

There is one wellbore that penetrates the disposal interval within a one-quarter mile area of review around the proposed disposal well location. Encana's Ballard 35 Lease Well No. 1 (API No. 42-227-37711) is located about 1,180 feet west of the

² Cato Exh. No. 1. The GAU's "No Harm Letter" indicates the USDW to be at a depth of 1,200 feet, and the "Groundwater Protection Determination" identifies the USDW at a depth of 1,225 feet.

³ Tr. 88:13-24.

⁴ Tr. 81-86.

⁵ Cato Exh. No. 20.

proposed location, just inside the one-quarter mile area of review. The well was drilled on January 8, 2014, to a total depth of 9,863 feet and produces from the Spraberry (Trend Area) Field.⁶ The completion details of this wellbore include the following:

- Surface casing set to a depth of 1,482 feet and cemented to the surface;
- Intermediate casing set to a depth of 3,882 feet and cemented to a depth of 800 feet;
- Production casing set to a depth of 9,863;
- Top of cement behind the production casing was calculated to a depth of 1,637 feet, but later confirmation by cement bond log indicated top of cement between 5,150 feet and 5,490 feet; and
- Perforated from 6,899 feet to 9,779 feet.⁷

Within a one-half mile radius of the proposed disposal well there has been recent oil and gas permitting and development activity in the Spraberry (Trend Area) Field. At the time of Cato's permit application (March 16, 2015) two vertical well locations had been permitted by the Commission in the Spraberry (Trend Area) Field:

- Athlon Holdings, LP ("Athlon")⁸ received a permit for its C. J. Ballard 35 Lease, Well No. 3 (API No. 42-227-38268), a vertical well location 1,500 feet to the east; and
- Athlon received a permit for its Ezell 35 Lease, Well No. 2 (API No. 42-227-38154), a vertical well location about 2,600 feet to the east.⁹

Additionally, at the hearing Cato identified the following two permits for vertical wells and two permits for horizontal wells in the Spraberry (Trend Area) Field within the one-half mile radius that have been issued by the Commission between March 16, 2015 and August 11, 2015:

- A vertical well permit was issued to Encana for its Glass 38 Lease, Well No. 3803D (API No. 42-227-38518), located about 2,200 feet to the south;
- A vertical well permit was issued to Encana for its Huitt 38 Lease, Well No. 3804C (API No. 42-227-38529), located about 2,300 feet to the south;
- A horizontal well permit was issued to Encana for its Tubb 39 Lease, Well

⁶ Cato Exh. No. 1.

⁷ Encana Exh. No. 2.

⁸ Athlon has since been acquired by Encana. Tr. 161: 15-17.

⁹ Cato Exh. Nos. 7 and 8.

No. 3908I (API No. 42-227-38541), located about 2,600 feet to the west; and

- A horizontal well permit was issued to Encana for its Tubb 39 Lease, Well No. 3909I (API No. 42-227-38542), located about 2,100 feet to the west.¹⁰

All six of these permitted well locations were drilled in 2015, although at the time of the hearing a completion report had been filed for only one of the wells, Encana's Ezell 35 Lease, Well No. 2. The completion report for Encana's Ezell 35 Lease, Well No. 2, indicates the Spraberry (Trend Area) Field (defined as from the top of the Clearfork Formation to the top of the Strawn Formation) was encountered in the depth interval from 4,165 feet to 9,344 feet.¹¹

Public Interest and Need for Additional Disposal Capacity

Salt water is a by-product of oil and gas production and requires disposal. In addition, the hydraulic fracturing treatments performed on wells, especially horizontal wells, result in large volumes of flow-back water being produced. The evidence discussed above indicates that oil and gas development activity is continuing in the immediate area of the proposed disposal well. The subject well is located in Howard County, about six miles north of the Glasscock County line. Between February 2012 and February 2015, the number of producing wells in Howard and Glasscock Counties has increased from 5,106 wells to 8,111 wells. During the same time, the number of injection wells in the two counties has increased from 997 wells to 1,002 wells.¹² This information indicates the disposal well capacity has not kept pace with the development of producing wells in this area.

Cato identified 12 commercial disposal wells within a 10 mile radius of the proposed well, in an area that includes parts of Howard and Glasscock Counties. Nine of these commercial disposal wells are active, two have not been drilled, and one is temporarily abandoned. The nine active commercial disposal wells have a permitted capacity of about 4.4 million barrels per month and the maximum monthly disposal volume was about 1.6 million barrels per month, for a utilization of about 37 percent. The average monthly utilization of these nine wells is about 24 percent of permitted capacity.¹³

Cato asserts there is a need for additional disposal capacity at this location and at this time based on the ongoing development in the area, the relatively high utilization of permitted capacity in the area, and because the number of injection wells has not kept pace with development in recent years.

¹⁰ Cato Exh. Nos. 7 and 8.

¹¹ Cato Exh. No. 20.

¹² Cato Exh. No. 13.

¹³ Cato Exh. No. 11.

Seismicity

A review of the records of the U. S. Geologic Survey identified no seismic event with a magnitude greater than 1.0 within a 9.08 kilometer radius (100 square miles) of the proposed disposal well between January 1, 1973, and March 5, 2015.

Financial Assurance

Cato has an active Organization Report (Form P-5, Operator No. 677852). Cato's Form P-5 is currently set to expire on February 1, 2017. Cato filed with the Commission a \$25,000 letter of credit for financial assurance.

PROTESTANT'S EVIDENCE – ENCANA

Encana asserts that Cato's application does not meet the requirements of the Texas Water Code or Statewide Rule 9. In addition, Encana is the lease operator of the subject tract and Cato does not have authority to inject fluids into the Clearfork Formation. Cary McGregor, consulting petroleum engineer, testified on behalf of Encana.

Confinement of Waste Fluids to the Disposal Interval

Encana asserts that injected fluids will not be confined to the disposal interval requested by Cato because Encana's Ballard 35 Lease Well No. 1 (API No. 42-227-3771), located about 1,180 feet to the west, was not cemented across the Clearfork Formation. Mr. McGregor provided a cement bond log from the Ballard 35 Lease Well No. 1. The cement bond log indicated the top of cement on the production casing to be at a depth of about 5,490 feet to 5,150 feet. This depth was below the 1,637 feet originally reported on the Form W-2 for the well. Mr. McGregor stated that Encana is in the process of correcting the well records based on the cement bond log. The cement bond log indicates that the Ballard 35 Lease Well No. 1 has not been cemented across the Clearfork Formation disposal interval.¹⁴

The Commission identifies the Clearfork Formation as having the potential for "severe flow" of salt water in Howard County. Statewide Rule 13 requires casing be set across potential flow zones. Mr. McGregor stated that no groundwater flows in the Clearfork Formation were encountered when drilling the Ballard 35 Lease Well No. 1 or the Ezell 35 Lease Well No. 2, suggesting that cement across the Clearfork Formation at those locations is not necessary pursuant to Statewide Rule 13.¹⁵

Mr. McGregor also identified the H. E. Tubb Lease Well No. 1, about one mile east of the proposed disposal well location, as not being plugged across the Clearfork

¹⁴ Tr. 120-124.

¹⁵ Tr. 120: 11-19.

Formation disposal interval. The Tubb No. 1 well has been plugged. Three plugs have been set in the well between the BUQW and the top of the Clearfork Formation. When the well was plugged some of the production casing was removed, including through the Clearfork Formation and into the underlying Spraberry Formation, and only drilling mud remains in this portion of the wellbore. One plug is also located at 6,710 feet, above the perforated interval. Mr. McGregor stated the Tubb No. 1 well was properly plugged and abandoned.¹⁶

According to Encana, these two wellbores—the Ballard 35 Well No. 1 and the plugged Tubb Well No. 1—may function as conduits for injected fluids to migrate out of the disposal interval. Mr. McGregor performed a series of pressure front calculations to demonstrate how Cato's proposed disposal well could cause fluids to escape the Clearfork Formation disposal interval.¹⁷ Mr. McGregor calculated the increase in formation pressure at the top of the Clearfork Formation at the Ballard 35 Lease Well No. 1, located 1,180 feet west of the proposed disposal well, under several scenarios. He stated the petrophysical parameters described in Encana's Exhibit No. 4 (10 millidarcy permeability, 10 percent porosity, and 89.5 feet of formation exhibiting porosity greater than 6 percent) were the most reasonable estimates. The 10 millidarcy permeability was obtained from a Texas Water Development Board publication.¹⁸ Porosity and net thickness were based on log analysis. Calculations were conducted over several injection time horizons from one to 20 years; the calculations summarized in the following table are based on 10-years of injection activity and an initial formation pressure of 1907 psi at the top of the proposed disposal interval (4,100 feet.)

Summary of Pressure Front Calculation Results for the Ballard 35 Well No. 1				
Encana Exhibit Number	4	4	5	5
Injection Rate (barrels per day)	15,000	5,000	15,000	5,000
Permeability (millidarcies)	10	10	60	60
Porosity (percent)	10	10	10	10
Thickness (feet) of the disposal interval exhibiting a porosity greater than 6 percent	89.5	89.5	180	180
Increase in formation pressure (psi) after 10 years	9,234	3,078	770	257
Resulting pressure gradient (psi per foot of depth)	2.72	1.22	0.65	0.53

All four of the scenarios summarized above demonstrate that injection under those conditions will increase the reservoir pressure above the confining hydrostatic pressure of a 9.5 pound per gallon mud (0.494 psi per foot) that likely fills the annular

¹⁶ Tr. 128: 24-25.

¹⁷ Encana Exh. Nos. 4 and 5.

¹⁸ Tex. Water Dev. Bd., *A Survey of the Subsurface Saline Water of Texas, Vol. 3, Aquifer Rock Properties*, Rep. No. 157, (September 1972).

space behind the Ballard 35 Well No. 1's production casing, which is not cemented through the disposal interval. Further, the two scenarios reported on Encana Exhibit No. 4 indicate injection of fluids will result in a formation pressure gradient in excess of the normal fracture gradient (typically about 1 psi per foot).¹⁹ Thus, these injection scenarios could fracture the Clearfork Formation reservoir and adjacent strata, resulting in loss of waste containment.

Therefore, Encana concluded, Cato has not met its burden of proof pursuant to Texas Water Code § 27.051(b)(2) and (3), and has failed to demonstrate that the disposal activities will not cause pollution or harm oil and gas resources.

Public Interest

Encana stated that four commercial disposal wells within a 12-mile radius of the proposed well demonstrated a total of at least 41,000 barrels per day of excess, unused disposal capacity.²⁰ Based on this information Mr. McGregor concluded that the proposed disposal well is not needed and therefore not in the public interest.

Financial Harm to Encana

Finally, Encana argued that because it is the leasee for the Spraberry (Trend Area) Field underlying the proposed disposal tract, it would be financially harmed by the proposed disposal well. Specifically, Mr. McGregor stated that Encana would incur additional costs for any future wells it chooses to drill within a one-quarter mile radius of the proposed disposal well. These costs would be due to the requirements in Statewide Rule 13 to ensure cement coverage across the disposal interval. Although costs would be higher, Mr. McGregor did not anticipate the proposed disposal well would harm potential reserves.²¹

PROTESTANT'S EVIDENCE – EZELL

The Ezells are adjoining landowners. Their primary concern is protecting their fresh groundwater resources. The Ezell's home is about one-quarter mile northeast of the proposed disposal well, but the Ezells have two freshwater wells along a fenceline that are about 150 feet from the location of the proposed disposal well. At some point in the future the Ezells plan on connecting these two water wells to a third well that provides fresh groundwater to their home. They also plan on using the groundwater to irrigate land. The Ezells also stated that they represent several other persons living in the area who are opposed to the disposal well for the same reasons.

¹⁹ Tr. 130-139.

²⁰ Mr. McGregor stated there are about 15 commercial disposal wells within a 20-mile radius, but only four of the wells (all within a 12-mile radius) demonstrated significant excess capacity. Tr. 146: 1-24.

²¹ Tr. 145: 4-16.

EXAMINERS' ANALYSIS

The evidence in the record indicates that Cato has not met its burden of proof and that the proposed Wolf SWD Lease disposal well application does not meet the requirements of Chapter 27 of the Texas Water Code and Statewide Rule 9. Specifically, Cato failed to demonstrate the injected fluids would be confined to the disposal interval, a situation that may result in harm to oil, gas or other mineral formations or result in the pollution of fresh groundwater. Therefore, the Examiners recommend the subject disposal well application be denied.

In the analysis that follows, the Examiners will first consider the required elements of Texas Water Code § 27.051(b)(2) and (3) regarding the protection of mineral resources and fresh water together because the technical foundations and evidence are similar. Then the Examiners will consider Texas Water Code § 27.051(b)(1) and (4) separately.

Containment, Harm to Resources, and Potential for Pollution

Prior to the issuance of a disposal well permit, the Texas Water Code requires the Commission to find that the use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation, and that with proper safeguards, both ground and surface fresh water can be adequately protected from pollution. Further, Statewide Rule 9(6)(A)(v) affirms the Commission's authority to take action—such as to modify, suspend or terminate a disposal permit—if injected fluids are escaping from the disposal zone. In addition, the Commission's final orders granting commercial disposal well permits include a standard statement that, "...should it be determined that such injection fluid is not confined to the approved interval, then the permission given herein is suspended and the disposal operation must be stopped until the fluid migration from such interval is eliminated."

These issues—containment and the potential for harm or pollution—are inextricably related. That is, the failure of a disposal system to confine injected fluids to the disposal zone is an integral precursory event that may result in harm to resources or fresh water. Generally, an applicant will make three demonstrations of evidence to show that the fluids will be confined to the disposal interval and, thus, resources will be protected: (1) the proposed disposal well will be constructed such that the wellbore itself will not be a potential conduit for migration out of the disposal interval; (2) the disposal reservoir is capable of receiving the injected fluids and is sufficiently bounded by impermeable strata through which the disposal fluids cannot migrate; and (3) there are no other conduits for migration (i.e., existing wellbores) of injected fluids out of the disposal interval.

(1) Wellbore Construction

The BUQW is at a depth of 325 feet. The proposed wellbore will be equipped

with surface casing set to a depth of 425 feet, and cemented to the surface. The long-string casing will be set to a depth of 5,600 feet and cemented to the surface. The proposed disposal well design therefore includes two strings of cemented casing through the BUQW. Injection tubing will be set with a packer at a depth of 4,000 feet, which is 100 feet above the top of the disposal interval. The evidence in the record demonstrates that the wellbore is designed to be built in accordance with Commission rules for casing and cementing.

(2) Reservoir Suitability

The Clearfork Formation is used as a disposal zone by several other commercial disposal wells in the area, a fact on which both Cato and Encana agree. In addition, neither Cato nor Encana provided specific information that demonstrated the characteristics of the bounding conditions above or below the Clearfork Formation disposal interval. Rather, Cato and Encana relied on the established use of the Clearfork Formation as a disposal zone. Both Cato and Encana appeared to agree that injected fluids would migrate radially from the subject wellbore through the native rock formations, and that injected fluids would not migrate vertically in the absence of an artificial conduit.²² Therefore, the Examiners conclude Cato has met the burden of proof that the native conditions of the bounding strata provide sufficient horizontal confinement.

However, Encana provided evidence that the proposed disposal activities may harm the reservoir possibly resulting in confinement failure. Encana provided reservoir pressure-front calculations and testimony that indicated injection activity would result in excessive formation pressure within the Clearfork Formation disposal zone. Cato provided no evidence in its direct case to counter Encana's calculations. Cato did not provide as a witness the person or persons who were responsible for selecting, scoping and designing the disposal well facility; the application parameters were given to its consultant witness for filing such that he was unable to support the information in the application or provide additional information.²³ Further, on cross-examination Mr. Miller stated that he had no opinion with regard to the petrophysical properties of the Clearfork Formation as follows:

Mr. Hicks: Are you familiar with the characteristics of the Clearfork in this area?

Mr. Miller: Not specifically, no.

Mr. Hicks: So do you have an opinion on what the permeability is of the Clearfork in this area?

²² Tr. 31, 150-151.

²³ Tr. 85-86.

Mr. Miller: No, sir.

Mr. Hicks: How about the porosity?

Mr. Miller: No, sir.

Mr. Hicks: How about the bottom hole pressure?

Mr. Miller: I haven't done a study on it.²⁴

To further support their conclusions of reservoir harm and confinement failure, Encana provided Mr. McGregor's log analysis of porosity and net pay thickness, and the estimated permeability was referenced in published literature. Encana's best reasonable approximation of the effect of injecting 15,000 barrels of fluid per day for one year into the proposed well (given petrophysical properties of 10 percent porosity, 10 millidarcy permeability, and 89.5 feet of net reservoir thickness, and an initial reservoir pressure at original conditions) would be an increased formation pressure of 6,144 psi and a calculated pressure gradient of 1.96 psi per foot at the Ballard 35 Well No. 1. Mr. McGregor stated that, "the calculated pressure gradient, the resulting pressure from injecting those volumes into that reservoir description shows that we are well over, you know 1.96 psi per foot, which is well above the fracture gradient. . . ." ²⁵ After 20 years of injection, Mr. McGregor calculated an increased reservoir pressure of 10,264 psi and a pressure gradient of 2.97 per foot. Cato did not present any evidence to contradict Encana's evidence on this point.

Therefore, the Examiners conclude the preponderance of evidence in the record demonstrates that the proposed disposal operation carries sufficient risk that may result in fracturing of the disposal interval and, possibly, adjacent strata.

(3) Conduits for Migration

Both parties acknowledged the lack of cement across the injection interval and into adjacent formations in Encana's nearby Ballard 35 Lease Well No. 1, located 1,180 feet to the east. The responsibility for this situation belongs to Encana. Pursuant to Statewide Rule 13 (a)(2)(N), an operator is required to cement casing through any formation identified by the Commission as a "Potential Flow Zone." The Clearfork Formation in Howard County has been identified as potentially containing severe groundwater flows. Encana acknowledged the Ballard 35 Well No. 1 is not cemented

²⁴ Tr. 88: 15-24.

²⁵ Tr. 131:24-25. Encana Exh. No. 4. Note, Mr. McGregor did not state the pressure gradient that would fracture the Clearfork Formation. The Examiners understand that, as a rule of thumb in the permitting process, the Commission limits the allowable pressure gradient to 1.0 psi per foot. To utilize a pressure gradient higher than 1.0, an applicant must conduct a step rate test to ensure the fracture gradient is not exceeded.

through the Clearfork, but Encana also stated that no groundwater flows were encountered when the well or the nearby Ezell 35 Lease Well No. 2 were drilled.²⁶ Mr. McGregor testified that Encana was in the process of correcting its well records with the Commission.

There is no evidence in the record that the Clearfork Formation is productive within two miles of the proposed disposal well. Therefore, the Examiners conclude, the Clearfork Formation is unproductive at this location, even though it falls within the correlative interval of the Spraberry (Trend Area) Field. The Spraberry (Trend Area) field is productive in the area, although at deeper intervals in the Spraberry and Wolfcamp Formations. At the nearby Ballard 35 Lease Well No. 1, the Spraberry and Wolfcamp Formations are productive below 6,899 feet. Injection into the proposed disposal interval could result in fluids migrating out of the Clearfork Formation via the uncemented Ballard 35 Lease Well No. 1 casing annulus.²⁷ Encana presented evidence that a similar situation could exist at the H. E. Tubb Lease Well No. 1.²⁸ Mr. McGregor stated, "...so they have lack of confinement upward and downward on the Ballard 35 No.1. Lack of confinement for a small portion upward but really the main problem is downward on the Tubb No. 1..."²⁹ However, evidence was not presented by either party to demonstrate that fluids migrating out of the Clearfork Formation would result in harm to formations productive of oil, gas or other minerals.

The evidence in the record indicates that Cato has failed to demonstrate that the proposed disposal well will not endanger or injure any oil, gas, or other mineral formation, and that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution pursuant to Texas Water Code §27.051(b)(2) and (3).

Public Interest

Cato provided evidence of continued oil and gas development of the Spraberry (Trend Area) Field in the immediate vicinity of the proposed disposal well. Cato's evidence also demonstrated that the existing commercial disposal wells in the area were operating at 24 to 37 percent of permitted capacity. Further, Cato showed that the injection well capacity in Howard and nearby Glasscock Counties has not kept pace with rate of production well development over the last four years.

Encana identified four of about 15 commercial disposal wells within a 20-mile radius that had excess capacity (41,000 barrels per day) that is sufficient to accommodate industry needs in the area at this time. However, it is not clear in the record how those four wells were selected based on surplus capacity from the 15. The Examiners conclude the preponderance of the evidence with regard to public interest

²⁶ Tr. 120, 180.

²⁷ Tr. 143: 4-20.

²⁸ Encana Exh. Nos. 4 and 5.

²⁹ Tr. 202-203.

and the need for additional disposal capacity at this location and at this time favors Cato.

The Ezells are concerned about increased traffic in the area, a matter that is beyond the Commission's jurisdiction.

Finally, Encana alleges that the proposed disposal well, if permitted and built, will cause Encana to spend additional resources to ensure any future production wells in the area are fully cemented through the Clearfork Formation. The Examiners do not find this argument to be a sound basis on which to deny the application. The Examiners are unaware of and the record does not contain examples of any instances in which the Commission has denied a permit because injection into a particular interval will cause an operator to spend additional funds on casing or cementing. Further, the Examiners note that Encana had originally reported (in error) that the top of cement on its Ballard 35 Lease Well No. 1 was at a depth of 1,637 feet, well above the top of the Clearfork. Although this was later determined to be in error, it nonetheless demonstrates Encana's anticipation of routinely cementing its wells through the Clearfork Formation.

Therefore, the Examiners conclude the evidence in the record indicates the subject well is in the public interest pursuant to Texas Water Code § 27.051(b)(1).

Demonstration of Financial Responsibility

Cato has an active Organization Report (Form P-5, Operator No. 677852), which is currently set to expire on February 1, 2017. Cato filed with the Commission a \$25,000 letter of credit for financial assurance. The evidence in the record demonstrates the applicant has made a satisfactory showing of financial responsibility as required by Texas Water Code § 27.073 pursuant to Texas Water Code § 27.051(b)(4).

FINDINGS OF FACT

1. Notice of this hearing was given to all parties entitled to notice at least ten days prior to the date of hearing.
2. On January 19, 2015 Cato Operating, Inc. published notice of the application in the *Midland Reporter-Telegram*, a newspaper of general circulation in Howard County, Texas. On March 6, 2015, Cato mailed copies of the application as notice to the owner of the surface tract, owners of adjacent surface tracts, the Howard County Clerk, and operators of wells within one-half mile of the proposed disposal well of the application.

3. The Wolf SWD Lease Well No. 1 will be drilled on a 4-acre tract of land located about 1.5 miles east of Elbow, Texas, and about 6 miles south of Big Spring.
4. The disposal interval is in the Clearfork Formation.
 - a. The Clearfork Formation is a part of the Spraberry (Trend Area) Field, but the Clearfork Formation is not productive of hydrocarbons within two miles of the proposed disposal well.
 - b. The Clearfork Formation is used for fluid disposal by other commercial disposal wells in the area.
5. Cato proposes to drill, complete and operate the well as follows:
 - a. Total depth will be 5,600 feet;
 - b. Set surface casing (9 5/8-inch) to a depth of 425 feet and cemented to the surface with 110 sacks of cement;
 - c. Set long-string casing (7-inch) to a depth of 5,600 feet and cemented to the surface with 885 sacks of cement;
 - d. Perforate long-string casing in the Clearfork Formation disposal interval from 4,100 feet to 5,100 feet;
 - e. Set injection tubing (3 1/2-inch) with a packer at a depth of 4,000 feet;
 - f. The maximum daily injection volume will be 25,000 bwpd and the estimated average daily injection volume will be 15,000 bwpd;
 - g. The maximum surface injection pressure will be 2,050 psi gauge ("psig") and the average surface injection pressure will be 1,500 psig; and
 - h. Injected waste will be limited to produced salt water and non-hazardous oil and gas waste exempt from regulation under the Resource Conservation and Recovery Act.
6. The use or installation of the injection well is in the public interest.
 - a. The area continues to experience development of the Spraberry (Trend Area) Field.
 - b. Between February 2012 and February 2015, the number of

producing wells in Howard and Glasscock Counties has increased from 5,106 wells to 8,111 wells.

- c. Between February 2012 and February 2015 the number of injection wells in the two counties has increased from 997 wells to 1,002 wells.
 - d. The increase in available disposal capacity has not kept pace with demand.
 - e. There is a need for additional disposal capacity in this area.
7. The Applicant has not demonstrated that injected fluids will be confined to the disposal interval.
- a. Pressure front calculations indicate the injection of fluid may result in formation pressure gradients from 1.96 psi per foot after one year of injection to 2.97 psi per foot after 20 years of injection.
 - b. Pressure gradients of 1.96 or higher may be sufficient to induce fractures in the Clearfork and adjacent strata.
 - c. Excessive formation pressure and pressure gradients may cause injected fluids to migrate from the disposal interval via induced fractures or existing un-cemented wellbores.
 - d. Migration of injected fluid from the disposal interval may harm hydrocarbon formations or pollute fresh groundwater.
8. The applicant has made a satisfactory showing of financial responsibility as required by Section 27.073 of the Texas Water Code.
- a. Cato Operating, Inc. has an active Organization Report (Form P-5, Operator No. 677852), and has filed a \$25,000 letter of credit for financial assurance.

CONCLUSIONS OF LAW

1. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. Tex. Nat. Res. Code § 81.051.
2. All notice requirements have been satisfied. 16 Tex. Admin. Code § 3.9.
3. The use or installation of the proposed disposal well is in the public interest. Tex. Water Code § 27.051(b)(1).

4. Oil, gas, or other mineral formations may be endangered or injured. Tex. Water Code § 27.051(b)(2).
5. Ground and surface fresh water cannot be adequately protected from pollution. Tex. Water Code § 27.051(b)(3).
6. Cato Operating, Inc. has made a satisfactory showing of financial responsibility. Tex. Water Code § 27.051(b)(4).
7. Cato Operating, Inc. has not met its burden of proof and its application does not satisfy the requirements of Chapter 27 of the Texas Water Code and the Railroad Commission's Statewide Rule 9.

RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend the Commission enter an order denying the application of Cato Operating, Inc. for a commercial permit to dispose of oil and gas waste by injection into the Clearfork Formation, a porous formation not productive of oil or gas, for the Wolf SWD Lease, Well No. 1, in the Spraberry (Trend Area) Field, Howard County, Texas.

Respectfully submitted,



Peggy Laird, P.G.
Technical Examiner



Jennifer Cook
Administrative Law Judge

