RAILROAD COMMISSION OF TEXAS
HEARINGS DIVISION

OIL AND GAS DOCKET NO. 08-0309912

APPLICATION OF SHELL WESTERN E&P, PURSUANT TO STATEWIDE RULE 46 TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL AND GAS FOR THE SABINE 53-2-15 LOV LEASE, WELL NO. 1D, DIMMITT (DELAWARE CONS) FIELD, LOVING COUNTY, TEXAS

HEARD BY: Peggy Laird – Technical Examiner
Petar Buva – Technical Examiner
Jennifer N. Cook – Administrative Law Judge

PROCEDURAL HISTORY:

Application Filed:	December 4, 2017
Protest Received:	November 17, 2017
Request for Hearing Received:	February 23, 2018
Hearing Held:	June 1 and 8, 2018
Hearings Closed:	July 18, 2018
Transcript Received:	July 3, 2018
Proposal for Decision Issued:	November 7, 2018

APPEARANCES:	**REPRESENTING:**
APPLICANT:	Shell Western E&P

Brian Sullivan (Attorney)
Bill Hayenga (Attorney)
Ross Wardlaw (Landman)
Jason Dupres (Environmental and Regulatory Specialist)
Todd Reynolds (Geologist)
Cary McGregor (Engineer)

PROTESTANTS: Iskandia Energy Operating, Inc.

Glenn Johnson (Attorney)
Eric Unverzagt (Landman)
Wayman T. Gore, Jr. (Engineer)
Daniel Benedict (Engineer)
Jack Carter (Geologist)
Thomas H. "Buddy" Richter (Engineer)

CASE SUMMARY

The Applicant requested a hearing on its disposal well application pursuant to Statewide Rule 46 to inject fluid into a reservoir productive of oil or gas for the Sabine 53-2-15 LOV Lease, Well No. 1D, Dimmitt (Delaware Consolidate) Field, Loving County, Texas. The application is a non-commercial disposal application, and the subject well is a new well. If granted, the permit would authorize the injection of 25,000 barrels of salt water per day into the Dimmitt (Delaware Consolidated) Field between 4,640 feet and 8,180 feet.[1]

The application is protested by Iskandia Energy Operating, Inc. The Protestant believes the application should be denied due to the potential injury to the productive hydrocarbon formation in the Dimmitt (Delaware Consolidated) Field.

Based on the evidence in the record, the Administrative Law Judge and Technical Examiner (collectively "Examiners") recommend that the application be denied.

APPLICABLE LAW

Any person who engages in fluid injection operations in reservoirs productive of oil, gas, or geothermal resources pursuant to 16 Tex. Admin. Code §3.46 must obtain a permit from the Commission. Pursuant to Texas Water Code § 27.051(b), the Commission has authority to permit disposal wells if it finds:

1) that the use or installation of the injection well is in the public interest;

2) that the use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;

3) that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and

[1] At the hearing, the Applicant offered to reduce the requested maximum injection rate from 30,000 bpd to 25,000 bpd. Tr. pg. 46, ln 4- pg. 49, ln 12.

4) that the applicant has made a satisfactory showing of financial responsibility if required by Section 27.073 of this code.

DISCUSSION OF THE EVIDENCE

Applicant's Evidence (Shell Exploration E&P)

Application

Shell Exploration E&P ("Shell" or "Applicant") requests disposal authority pursuant to Statewide Rule 46[2] for the Sabine 53-2-15 LOV Lease, Well No. 1D ("Sabine"), Dimmitt (Delaware Consolidated) Field, Loving County, Texas. The application is a non-commercial disposal application for a new well, Drilling Permit No. 831186. The subject well is in the central part of Loving County, Section 15, Block 53, Township 2, approximately 25 miles west of Kermit, Texas. Notice of the application was published in the *Winkler County News* on November 2, 2017. Notice of the application was mailed to the operators within one half-mile radius of the subject well location, the surface owner, Texas Pacific Land Trust, and the Loving County Clerk. The application is protested by Iskandia Energy Operating, Inc. ("Iskandia"or "Protestant"). Iskandia has an active oil well in the Dimmitt (Delaware Consolidated) Field that is within the half-mile radius from the proposed injection well and has expressed concern that the proposed well will have a negative impact on their oil production and cause waste.

Injection Interval

The proposed disposal interval is in the Dimmitt (Delaware Consolidated) Field at the depth between 4,640 feet and 8,180 feet, for the total of 3,540 feet of injection interval. The Dimmitt (Delaware Consolidated) Field consists of Bell Canyon and Cherry Canyon Formations, and it is a part of the Delaware Mountain Group sands. The proposed injection interval has a top anhydrite seal in the Castile Formation and the bottom limestone seal in the Bone Spring Formation.[3]

Well Specifications

The Forms H-1 and H-1A were originally provided to the Commission as part of the application package for disposal Well No. 1D on December 4, 2018. An amended application[5] was presented at the hearing with changes in total depth ("TD") from 8,500 feet to 8,180 feet, and maximum daily injection volume from 30,000 barrels per day ("bpd")

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[2] 16 Tex. Admin. Code §3.46 (Fluid Injection into Productive Reservoirs).

[3] Geological column presented in a Shell's Exhibit 19.

to 25,000 bpd.[4] If granted, the permit would authorize a maximum surface injection pressure of 2,320 psi with the injection interval from 4,640 feet to 8,180 feet (total of 3,540 cumulative feet) encompassing Dimmit (Delaware Consolidated) Field. Saltwater injected into Well No. 1D would originate from fracture stimulation waste water used for well completion operations for Shell's wells in the Phantom (Wolfcamp) Field.

Fresh Water Formations

A Groundwater Protection Determination letter states that to protect usable-quality groundwater at this location, the Groundwater Advisory Unit ("GAU") of the Railroad Commission of Texas recommends the interval from the land surface to 1,000 feet must be protected. The GAU estimates the base of underground sources of drinking water ("USDW") occurs at a depth of 2,150 feet at the site of the referenced well (API No. 301-33674).

The 9 5/8" casing will be set at 1,150 feet with cement to surface to protect the base of usable quality water at 1,000 feet. The 7" casing will be set at a depth of 4,640 feet and cemented to surface, protecting GAU estimated base of USDW at a depth of 2,150 feet. The Sabine Well will have 4 1/2" tubing placed in the well within 100' from the top of the injection interval to allow for disposal. Shell will dispose from 4,640 to 8,180 feet.

Productive Formations

The productive formations in the area are in the Dimmitt (Delaware Consolidated) Field, Bone Spring Field, and Phantom (Wolfcamp) Field. The Bushy Canyon and Cherry Canyon producing intervals of the Dimmitt (Delaware Consolidated) Field are mature zones in the later stages of pressure depletion with water cut of 96% or more.[5] Because of the pressure depletion, in 2007 these reservoirs were consolidated into a single consolidated field under Oil and Gas Docket No. 08-0250637. Mr. Reynolds, a geologist, testified on behalf of Shell that there is sufficient geological isolation below the proposed injection interval to protect the deeper productive intervals.

Nearby Wellbores (Area of Review)

Within the quarter-mile radius from the proposed Sabine Well No. 1D there are no other wellbores. A half-mile radius shows one dry hole, one plugged well, a gas well (API 30131694) operated by Anadarko E&P Onshore LLC, and an oil well (API 30130799)

[4] Shell's Exhibit 9 and 10.

[5] Shell's Exhibit 30 and 43; Tr. Vol. 1, Pg. 146 – 150.

operated by the Protestant, Iskandia Energy Operating, Inc., for a total of 4 wells in the half-mile radius.[6]

Nearby Injection Wells

Mr. Reynolds performed a study of active injection wells within approximately 2-mile radius of the Well No. 1D and found five injectors in the area.[8] In his testimony Mr. Reynolds pointed out Iskandia's wells, W.D. Johnson No. 9D, Slash-R-2D, and Johnson 16S No. 1, are injecting into the Dimmit (Delaware Consolidated) Formation.[7]

The Need for Disposal Well Sabine 53-2-15 Well No. 1D

Shell is seeking the application for well Sabine 52-2-15 No. 1D as a necessity for continuance of its production activity in the Phantom (Wolfcamp) Field. Dominant production in the subject area comes from the Phantom (Wolfcamp) Formation, but this productive zone is not suitable for injection. On the other hand, Dimmitt (Delaware Consolidated) Field is a depleted field in the later stages of production consisting of sandstones favorable for injection activity. Of the 516 injection wells in the Loving County, 99% of them are injecting in the Delaware Mountain Group Formation.

Shell's position is that without the ability to inject into the Dimmitt (Delaware Consolidated) Field it will not be able to produce wells in Phantom (Wolfcamp) Field. Mr. Wardlaw and Mr. McGregor testified that the alternatives to injection are not viable because the landowners do not allow trucking water from facilities or installation of separation tanks.[8] Shell maintains that the best practice is to avoid trucking if possible, especially considering the amount of water they are seeking to inject.

The restrictions placed by surface owners on Shell prohibit installation of tanks or tank batteries for the complete high-pressure separation of all the fluids. Although Shell has existing plans of installing piping infrastructure throughout the area, which includes oil and water pipelines, the high-pressure water contains gas. As the pressure drops in the pipeline, the gas evolves from the water and tends to accumulate along high points of the line causing potential blockages and malfunction of the pumps. As a result, Shell asserts this water cannot be transported long distances using pipeline.[9]

Shell contends that its injection well, Sabine 53-2-15 No. 1D, will have little to no influence on the production capability of Iskandia's wells in the Dimmitt (Delaware Consolidated) Field. Mr. Reynolds sponsored an exhibit that, in his opinion, demonstrates

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[6] Shell's Exhibit 9 and 28.

[7] Shell's Exhibit 8; injection wells marked in blue; Tr. Vol. 1, Pg. 98-99.

[8] Tr. Vol. 1, Page 31.

[9] Tr. Vol. 1, Pg. 77-78.

separation of reservoirs within the Dimmitt (Delaware Consolidated) Formation, describing them as laterally discontinuous, encapsulated lenses of sandstone.[10] Furthermore, he testified that the proposed injection interval has uniform, extensive top and bottom seal provided by the Castile Formation and the Bone Spring Formation respectively.[11] Mr. Reynolds contests that with the separation between reservoirs and with the top and bottom seals present, proposed interval is ideal for injection and will not affect offset operations in the area.

Mr. McGregor, a petroleum engineer, performed a pressure front calculation for Shell. According to his calculation, over a 20-year period and an injection rate of 25,000 bpd, the initial reservoir pressure would change from 2,172 psi to 2,400 psi.[12] That is a pressure difference of 228 psi a half-mile away from the proposed injection well. He maintains that the proposed injection well will have little, if any, impact on the offsets operators.

Shell asserts that the production from the Phantom (Wolfcamp) Field outweighs the production from Dimmitt (Delaware Consolidated) Filed. Since 2010 there are over 1500 approved drilling permits in the Phantom (Wolfcamp) Field, which is in stark contrast to just over 20 drilling permits approved for the Dimmitt (Delaware) Field during that period.[13] Mr. McGregor provided calculation for estimated ultimate recovery ("EUR"). Based on his calculation, each of the wells producing from the Phantom (Wolfcamp) Field in Loving County would produce an average of 532,000 EUR.[14] It is Shell's estimation that there is a total of 51.111 million barrels of hydrocarbons to be recovered in the Phantom (Wolfcamp)Field.[15]

In comparison, according to Mr. McGregor's testimony, the productive zone of the Dimmitt (Delaware Consolidated) Field will produce approximately 235,000 to 440,000 barrels of EUR.[16] It is Mr. McGregor conclusion that intense production in the Phantom (Wolfcamp) Field justifies the subject disposal Well No. 1D.

Financial Assurance

Shell Western E&P (Operator No. 774719) has an active P-5 on file with the Commission with an expiration date of January 31, 2019, and a $250,000 letter of credit.

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[10] Shell's Exhibit 50.

[11] Geological column presented in Sell's Exhibit 19.

[12] Tr. Vol. 1, Pg. 115-120.

[13] Tr. Vol. 1, Pg. 152-153; Shell's Exhibit 44 and 45.

[14] Tr. Vol. 1, Pg. 155.

[15] Shell's Exhibit 46-49.

[16] Tr. Vol. 1, Pg. 148; Shell's Exhibit 43.

Seismic Survey

A review of USGS seismic data within 100 square miles (a radius of 9.08 kilometers) of the subject well location shows that no seismic events have been reported.

Protestant's Evidence

Iskandia Operating Energy, Inc. has approximately 5,000 acres of leaseholds, with 106 wells and 15 new drills in Loving County.[17] Iskandia expressed concerns that the proposed location for the well Sabine 53-2-15 No. 1D would have negative impact on their producing wells in the area. If approved, Sabine would inject into Dimmitt (Delaware Consolidated) Field, an active productive field where Iskandia is an operator.

Mr. Benedict, petroleum engineer for Iskandia, testified that at the time Iskandia took over the wells in the field, the wells were in poor condition and in need of additional funding and redesign in order to produce. Since their acquisition in 2017, Iskandia has spent $406,718 to reactivate 37 wells in the field, each currently producing anywhere between 1 to 25 barrels of oil per day.[18] Iskiandia plans to reactivate 19 more wells and has plans, approved by the Commission in March of 2018, to apply microbial enhanced oil recovery in the field.[19]

According to Mr. Benedict, Iskandia is injecting water produced from the Dimmitt (Delaware Consolidated) Field back into the reservoir. After being separated from oil and gas at the surface, the injected water services as pressure maintenance and slows pressure depletion of the reservoir. Iskandia is actively monitoring production, injection rates, pressures, and fluid levels on the nearby producing wells.[20]

Iskandia provided a map showing all non-commercial injection wells in the Block 53 Dimmitt part of the field. Of the 24 injection wells, seven are temporarily abandoned, six are operated by Iskandia, and four are operated by Shell. All four of the Shell wells are active and are injecting about 58,700 bbl/day combined, which makes for about 82% of the total 70,400 bbl injected into the field. Iskandia's six-well total injected volume is 6,000 bbl/day or about 8% total.[21]

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[17] Tr. Vol. 2, Pg. 15.

[18] Iskandia's Exhibit 45.

[19] Tr. Vol. 2, Pg. 26 and 31; Iskandia's Exhibit 36.

[20] Tr. Vol. 2, Pg. 41; Iskandia's Exhibit 46.

[21] Tr. Vol. 2, Pg. 49; Exhibit 2.

Mr. Richter, a petroleum engineer, further testified that since January of 2017 Iskandia's production from the Dimmitt (Delaware Consolidated) Field was 92,152 barrels of oil. During that same period Shell reported no production from this field.[22]

Mr. Richter expressed his opinion that Shell's pressure front calculations are flawed. He believes that the assumptions used by Shell in their pressure front calculations are not appropriate for this multi-reservoir field productive of oil and gas, because the injected fluids are not going to expand at the same rate radially from a well. The injected fluids are going to prefer the path of the least resistance, which are pressured depleted areas around producing wells.[23]

Because of the requested injection rate for the Sabine Well No. 1D, and the fact that Shell filed three additional injection applications for the same field[24], Mr. Richter believes that Shell's operation will flood the Dimmitt (Delaware Consolidated) Field and endanger production formations.

Iskandia expressed concerns with Shell's plan to complete the proposed Sabine well with a slotted liner, since the slotted liners employ no cement and no perforations. According to Mr. Carter, a geologist, that means that the entire formation is open to the water being injected and if something goes wrong with the slotted liner it cannot be repaired.[25] In the hearing it was clarified that the Shell's injection well has an open hole completion,[26] but the opinion that the proposed design lacks operational control was retained.

When discussing geology of the field, Mr. Carter also challenged Shell's emphasis on the lenticularity of the sand bodies and the lateral pinch out. While he agrees that Dimmitt (Delaware Consolidated) basin is a complex system composed of massive sands, channel lines or ventricular sand bodies, sheet sands, lobe and levy deposits, he is of the opinion that these are sheets of sand extending over long distances.[27] He concludes that complete continuous sheets, like the sand body in this field, does not represent a stratigraphic isolation between the proposed injector well and the bulk of the field.[28] Mr. Carter, like Mr. Richter, is of the opinion that without stratigraphic barriers the water injected in the Sabine well will go into the path of the least resistance, which is the producing area.[29]

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[22] Iskandia's Exhibit 4.

[23] Tr. Vol. 2, Pg. 69.

[24] Iskandia's Exhibit 7.

[25] Tr. Vol 2., Pg. 75.

[26] Tr. Vol. 2, Pg 184-186.

[27] Iskandia's Exhibit 13.

[28] Tr. Vol. 2, Pg. 79, Ln. 21-23.

[29] Tr. Vol. 2, Pg. 92.

According to Mr. Gore's research, testified on behalf of Iskandia that all commercial salt water disposal wells in the area are located outside of the Dimmitt (Delaware Consolidated) Field, which is still producing oil and gas.[30]

Mr. Wayman Gore, a petroleum engineer, presented an exhibit that shows the total amount of production of oil and gas from the Dimmitt (Delaware Consolidated) Field.[31] He determined there has been about 18 million barrels of oil and 51.9 bcf of gas produced from the field. Mr. Gore provided remaining reserves estimation, which in his opinion are about 1.8 million barrels of oil remaining in the field and about five BCF of gas.[32] To address the discrepancy between his and the remaining reserves as calculated by Shell, Mr. Gore referred to the methodologies. According to him, the difference is that Shell in its analysis considered all the wells in the field, including the wells that are shut in, creating a false estimated volume.[33]

Next, Mr. Gore presented the case of Shell's well Bass TXL No. 5D. It is a non-commercial injection well injecting into the Dimmit (Delaware Consolidated) Field. The well was initially approved for maximum injection rate of 3,600 bbl/day. In April of 2011 it was amended to 20,000 bbl/day. In 2015 Shell applied to amend a permit to increase the injection interval by adding some footage at the top. The application was protested by the offset operators, and Shell withdrew the application in January of 2016.[34]

Mr. Gore went on to testify that the 2011 increase in injection rates for well Bass TXL No. 5D negatively impacted production on the offset leases.[35] He researched production data for Johnson, W. D. Et Al. - E Lease and Johnson, W. D. Et Al. - E Lease, and observed a decline in oil production that, in his opinion, correlates with the beginning of increased injection rates at the Bass TXL No. 5D well. He estimated that as a direct impact of the higher injection rates, Lease E and F recovered approximately 125,000 barrels of oil less than estimated prior to injection rate increase.[36] Similarly the TXL 45 Lease and TXL 30 Lease had a stable production going back to 2007. According to Mr. Gore increased injection in the well number TXL No. 5D has resulted in loss to the existing oil production of over 67,000 barrels of oil.[37]

Mr. Gore provided evidence of four Shell leases that are on the proration schedule and have shut in wells. The Bass TXL 27 Lease, Ritchey 1 Lease, Chevron 1 Lease, and TXL 1 Lease, had more or less steady production until October 2012 when Shell took

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[30] Iskandia's Exhibit 24.

[31] Iskandia's Exhibit 26.

[32] Iskandia's Exhibit 27.

[33] Tr. Vol. 2, Pg. 120-122; Exhibit 34 and 35.

[34] Iskandia's Exhibit 28 and 29.

[35] Iskandia's Exhibit 31.

[36] Tr. Vol. 2, Pg. 31; Iskandia's Exhibit 31.

[37] Tr. Vol. 2, Pg. 142; Iskandia's Exhibit 32.

over operations of those leases. After Shell started injection operations on Well TXL No. 5D, the production from Shell's productive leases became erratic and soon ceased. Mr. Gore expressed his opinion that Shell did not keep its Dimmitt (Delaware Consolidated) Field production, instead favoring injection into that field.[38]

According to Mr. Gore, the fact that the injection well TXL No. 5D was not injecting into the producing zone of the Dimmitt (Delaware Consolidate) Field and yet had influence on the production on the offset leases, is because of the fracture stimulation performed at the time those offset producing wells were initially completed. He testified that in the geological structure of the Dimmitt (Delaware Consolidated) Field, fracture stimulation is not going to confine injected fluids to that vertical interval, because there is no barrier.[39]

Mr. Gore concluded that the increased injection rates in this field have damaged the production in the field. Further large increase of the injection rates in the middle of the field, as proposed in the application for Sabine 53-2-15 Well No. 1D, will endanger production of the remaining recoverable reserves in the field and cause waste.[40]

EXAMINERS' ANALYSIS OF THE EVIDENCE

Based on the evidence in the record, the Examiners recommend denial of the application for Sabine 53-2-15 injection well. The Examiners find that Shell has met three of the four criteria necessary for an injection well:

1) the use or installation of this injection well is not against the public interest;

2) the proposed well design represents adequate protection of ground and surface water, with the 9 5/8" casing set at 1,150 feet and cemented to surface protecting the base of usable quality water at 1,000 feet, and 7" casing set at 4,640 feet cemented to surface protecting the estimated base of USDW at a depth of 2,150 feet; and

3) the applicant has made a satisfactory showing of financial responsibility if required by Section 27.073 of this code.

However, the Examiners find that Shell failed to demonstrate that the proposed well will not endanger or injure any oil, gas, or other mineral formation in the Dimmitt (Delaware Consolidated) Field. While the Examiners agree that the Delaware Mountain Group sands are ideal for an injection activity, absence of communication between the zones within the group has not been established.

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[38] Tr. Vol. 2, Pg. 138-139.

[39] Tr. Vol. 2, Pg. 138-139.

[40] Tr. Vol. 2, Pg. 131-132; 152-153.

Shell maintains that the Dimmitt (Delaware Consolidated) Field consists of laterally discontinuous, encapsulated lenses of sandstone, whereas Iskandia believes that the Field is made of laterally continuous sheets of sand that are in communication with each other. According to Shell's postition, the Cherry Canyon hydrocarbons would have moved up to the Bell Canyon above, had there not been a hydraulic seal between them. Iskandia's counter argument indicates that if all reservoirs in this consolidated field have decline in the downhole pressure to 1000 psi, it would suggest that the reservoirs are in communication.

Both parties have presented compelling evidence in support of their interpretation of local geology. However, the Examiners also considered evidence of some of the wells in the subject zone being fracture stimulated; if the seal between different structures existed at some point, it could have potentially been compromised by fracture stimulation. As such, injections rates that go beyond the existing pressure maintenance injection may endanger or injure any oil, gas, or other mineral formation.

The Examiners find that Shell's pressure front calculation does not serve as sufficient evidence negating potential injury or harm to the production in the Dimmitt (Delaware Consolidated) Field. The pressure front calculations are heavily dependent on assumptions, and in this case, the main discord is the interpretation of geology, as discussed in the previous paragraph. Since the Examiners determination is insufficient evidence of stratigraphic barriers within the Dimmitt (Delaware Consolidated) Field, the Examiners find compelling the Protestant's claim that the injected fluids are not going to expand at the same rate radially from the injection well; instead, the fluids will prefer the path of the least resistance, which are pressured depleted areas around producing wells.

The Examiners take note that there are permitted injection wells in this area. The main difference between the existing wells and the proposed Sabine well is the source of the injected water. The existing wells are injecting water that originated from the production in the Dimmitt (Delaware Consolidated) Field back into the reservoir. Considering the 96% water cut in the production, the water reintroduced to the reservoir services pressure maintenance and slows pressure depletion of the reservoir. The origin of the water that would be injected into the Sabine well is from a different field, Phantom (Wolfcamp) Field. Injection of an additional average of 17,500 bbl of water per day from the Phantom (Wolfcamp) Field into Dimmitt (Delaware Consolidated) Field has a potential to endanger or injure the hydrocarbon production in the Dimmitt (Delaware Consolidated) Field.

The Examiners evaluated the cases of production decline or disruption in leases Johnson, W. D. Et Al. - E Lease, Johnson, W. D. Et Al. - E Lease, Bass TXL 27 Lease, Ritchey 1 Lease, Chevron 1 Lease, and TXL 1 Lease in correlation to the increase in injection rates at Bass TXL No. 5D well. While there are several potential and often mutually affecting causes to a change in production, it is the Examiners' opinion that the concurrence of the two events indicates potential communication between the wells.

Shell has presented evidence that shows the production and drilling activity in the Wolfcamp Field is far greater than the production activities in the Dimmitt Delaware Consolidated) Field. The Examiner's find that production from the two fields is in no way mutually exclusive or codependent. The Commission is aware of Iskandia's efforts to restore wells in the Dimmitt (Delaware Consolidated) Field and put them back into production. Furthermore, it is Commission's responsibility to prevent waste and allow for all reserves to be recovered.

FINDINGS OF FACT

1. Shell Western E&P seeks a permit authorizing disposal operation pursuant to 16 Tex. Admin. Code § 3.46 for the Sabine 53-2-15 LOV Lease, Well No. 1D, Dimmitt (Delaware Consolidate) Field, Loving County, Texas.

   a. The application for the Sabine 53-2-15 LOV Lease, Well No. 1D, was mailed to Texas Pacific Land Trust which is the surface owner of the tract where the well is located, and the Loving County Clerk. Notice was also given to the Iskandia Energy Operating, Inc. and Anadarko E&P Onshore LLC, the two operators with have active wells within the half-mile radius. 16 Tex. Admin. Code § 3.46(c)(1),(2).

   b. Notice of the Sabine 53-2-15 LOV Lease, Well No. 1D disposal well application was published in the *Winkler County News* on November 2, 2017.

   c. The application is protested by the offset operator Iskandia Energy Operating, Inc.

   d. At least 10 days' notice of the hearing was provided to the surface owner and to the Loving County Clerk. 16 Tex. Admin. Code § 3.46(c)(5)(A).

2. The applicant requested maximum daily injection volume of 25,000 barrels per day, injection interval from 4,640 to 8,180 feet, and maximum surface pressure of 2,320 psi. The injection interval is from 4,640 to 8,180 feet, total of 3,540 feet. The saltwater injected into the Well No. 1D would originate from Phantom (Wolfcamp) Field.

3. A Groundwater Protection Determination letter states that to protect usable-quality groundwater at this location, the Groundwater Advisory Unit (GAU) of the RRC recommends the interval from the land surface to 1,000 feet must be protected. The GAU estimates the base of underground sources of drinking water (USDW) occurs at a depth of 2,150 feet at the site of the referenced well (API No. 301-33674).

4. The proposed construction of Sabine Well No. 1D is as follows: 9 5/8" casing set at 1,150 feet with cement to surface to protect the base of usable quality water at

1,000 feet; 7" casing set at a depth of 4,640 feet and cemented to surface, protecting GAU estimated base of USDW at a depth of 2,150 feet; 4 1/2" tubing placed within 100' from the top of the injection interval to surface.

5. The installation or use of this well is not against public interest.

6. The Delaware Mountain Group sands, which include the producing Dimmitt (Delaware Consolidated) Filed, are suitable for injection.

7. The proposed injection interval in the Delaware Mountain Group sands, has top and bottom seal represented by Castile Formation and the Bone Spring Formation respectively.

8. There is a potential for communication among different zones and reservoirs in the Dimmitt (Delaware Consolidated) Filed, due to inconclusive geology and fracture stimulation in the nearby wells that may have compromised existing stratigraphic barriers.

9. The pressure front calculation does not provide sufficient evidence that the Sabine well will not endanger or injure any oil, gas, or other mineral formation in the Dimmitt (Delaware Consolidated) Field, because the assumptions used in the calculation are inconclusive.

10. If the communication among different zones exists, the injected fluids will prefer the path of the least resistance, which in this case are pressured depleted areas around the producing wells.

11. The existing injection wells inject water produced from the Dimmitt (Delaware Consolidated) Field. The water reintroduced to the reservoir maintains pressure and slows pressure depletion of the reservoir. Injection of an average 17,500 bbl of water per day from a different field could disrupt hydrocarbon production in the Dimmitt (Delaware Consolidated) Field.

12. The estimated EUR for the Dimmitt (Delaware Consolidated) Field is between 223,000 and 1.8 million barrels of oil.

13. Shell Western E&P (Operator No. 774719) has an active P-5 on file with the Commission with an expiration date of January 31, 2019, and a $250,000 letter of credit.

14. No seismic events have been reported within 100 square miles of the proposed disposal well location.

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. The proposed fluid disposal operations will endanger oil, gas or geothermal resources. *Texas Water Code § 27.051(b)(2).*

3. Injection operations will not cause the pollution of freshwater strata. *Texas Water Code § 27.051(b)(3), 16 Tex. Admin. Code § 3.46 (a).*

4. Shell Western E&P failed to establish the application for the Sabine 53-2-15 LOV Lease, Well No. 1D, Dimmitt (Delaware Consolidate) Field, Loving County, Texas satisfy the requirements of Statewide Rule 46.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend that the application of Shell Western E&P for disposal authority pursuant to Statewide Rule 46 for the Sabine 53-2-15 LOV Lease, Well No. 1D, Dimmitt (Delaware Consolidate) Field, Loving County, Texas, be denied, as set out in the attached Final Order.

Respectfully submitted,

Petar Buva
Technical Examiner

Jennifer N. Cook
Administrative Law Judge