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RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL AND GAS DOCKET NO. 01-0314038

APPLICATION OF SILVERBOW RESOURCES OPERATING, LLC (781915) FOR CERTIFICATION PURSUANT TO TAC §3.101 FOR ALL GAS PRODUCTION FROM THE NMC EF (282221) LEASE, WELL NO. 1H IN THE DESIGNATED TIGHT FORMATION IN THE HAWKVILLE (EAGLE FORD SHALE) FIELD, LA SALLE COUNTY, TEXAS

HEARD BY: Karl Caldwell – Technical Examiner
Kristi M. Reeve – Administrative Law Judge

HEARING DATE: September 25, 2018
RECORD CLOSED: October 2, 2018
CONFERENCE DATE: December 11, 2018

APPEARANCES:

James Clark, P.E.
Austin Comeaux
Monica Drolet

REPRESENTING:

Silverbow Resources Operating, LLC

EXAMINERS' REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

On July 30, 2018, Silverbow Resources Operating, LLC ("Silverbow") (Operator No. 781915) requested a hearing pursuant to Statewide Rule 101(g)(2) (16 Tex. Admin. Code §3.101(g)(2), to demonstrate why 100% of the gas produced from the NMC EF Lease, Well No. 1H, ("subject well"), RRC Gas ID No. 282221, Hawkville (Eagle Ford Shale) Field, La Salle County, Texas should qualify as tight gas. Commission staff administratively approved a tight gas certification for the subject well, but for only 91% of the total gas production from this well (due to a portion of the lateral inadvertently drifting into the underlying Buda Formation). Silverbow asserts that 100% of the gas produced from the subject well originates from the Eagle Ford Formation, which has been designated as a tight gas formation in La Salle County.

Notice of the application was provided to Commission Staff. The application is unopposed and the Technical Examiner and Administrative Law Judge (collectively, "Examiners") recommend approval of the application.

STATUTORY AUTHORITY

Pursuant to Statewide Rule 101(g)(2), Commission action on applications for individual well certifications and for tight formation area designations, is as follows:

1. Each application, for an individual well certification, shall be assigned a docket number identifying it as a severance tax application. A notice of receipt shall be sent to the applicant, indicating the assigned docket number and receipt date. All further correspondence shall include this docket number.
2. The director may administratively approve the individual well certification applications if the forms and information submitted by the operator establish that the gas qualifies as high-cost gas eligible for the severance tax exemption or tax reduction. If the director denies administrative approval, the applicant shall have the right to a hearing.

DISCUSSION OF THE EVIDENCE

Silverbow seeks a certification that 100% of the gas production from the NMC EF Lese, Well No. 1H, qualifies as production from the designated tight gas Eagle Ford Formation. Silverbow's application for a high-cost gas state severance incentive certification (ST-1) was certified on June 7, 2017 (Docket F-01-221205) to be 91% eligible. 100% of the gas was not certified administratively since 9% of the lateral is in the Buda Formation. A portion of the well, the heel of the lateral, is located in the Buda Formation, from roughly 12,943 feet measured depth (MD) to 13,600 feet MD. While attempting to land the lateral in the lower section of the Eagle Ford Formation, a portion of the lateral crossed a fault and ended up in the upper section of the Buda Formation. James Clark, P.E., Silverbow's engineering witness, contends that 100% of the gas produced from the subject well ultimately originates from the Eagle Ford Formation. Mr. Clark maintains that it is very easy to ascertain when a lateral enters the Buda Formation, because you go from being essentially in a shale, to being in a very clean carbonate, and the gamma ray log drops to essentially zero. Perforations in the section of the lateral that is landed in the Eagle Ford Formation accounts for 91% of the total perforations in the lateral. The perforations from 13,662 feet MD to 20,391 feet MD are in the section of lateral in the Eagle Ford Formation, while the remaining perforations in the lateral from 12,943 feet MD to 13,541 feet MD are in the section of the lateral in the Buda Formation.

The Eagle Ford Formation was designated as a tight gas formation in La Salle County in Oil and Gas Docket No. 01-0264919. In a Final Order, Oil and Gas Docket No. 01-0264919, the Eagle Ford Shale Formation was designated as tight gas in Live Oak, La Salle, and McMullen Counties. Wells completed in the Eagle Ford Formation in these three counties, are producing from a high cost tight gas formation, which includes the Hawkville (Eagleford Shale) Field in La Salle County. Silverbow seeks a certification that 100% of the gas produced from their NMC EF Lease, Well No. 1H qualifies as gas production from the designated tight Eagle Ford Formation. The Buda Formation is not

included in the tight gas designation because it is not productive, if it were productive, James Clark, P.E., represents that it too would qualify as a tight gas formation, because its permeability would be extremely low.

Silverbow completed their NMC EF No. 1H horizontal well from 12,943 feet MD to 20,391 feet MD on June 4, 2017. Landing a portion of the lateral in the upper Buda Formation while attempting to drill the lower Eagle Ford Formation is not uncommon in this area, and a blanket downhole commingling order (Final Order No. 01-0277305), has been authorized for the Briscoe Ranch (Eagle Ford) and Ammann (Buda) Fields in La Salle and other counties. Mr. Clark testified that the Ammann (Buda) Field is not productive in the area, but is used as a "dummy" field for the purposes of commingling with the Buda Formation when operators unintentionally penetrate the Buda Formation in this area. The nearest well completion solely in the Ammann (Buda) Field is approximately 40 miles away, and the discovery well for the Ammann (Buda) Field is approximately 70 miles away.

There is no production from the Buda Formation within a 10-mile radius of the subject well. Based on offset log information and the lack of wells completed in the Buda Formation in the area, Silverbow asserts that the Buda Formation is non-productive. The distance between the subject Silverbow NMC EF 1H, and a well with a pilot hole that penetrates the Buda Formation, the Common Resources NMC 20-1H ("pilot hole"), is about 2.75 miles away. A vertical well log is available for the pilot hole that shows the entire Buda Formation. The well log information indicates there is zero porosity in the Buda Formation, and there were zero gas shows when drilling through the Buda Formation. The Buda Formation is easy to identify based on the gamma ray log response, and looking at both the neutron and density porosity curves, both porosity curves read very close to, or essentially zero, in the Buda Formation, and that is what Silverbow would expect at the subject well location. The pilot hole shows the Buda Formation 2.75 miles from the subject well has no porosity and it is not productive.

In addition, a mud log from the Common Resources NMC 20-1H pilot hole 2.75 miles away from the subject well, indicated there is a change in lithology just below 12,800 feet, from shale to limestone while drilling through the Buda Formation, and the gas shows that are present throughout the entire Eagle Ford Formation, go away as soon as the Buda Formation is penetrated. This is further evidence that the Buda Formation is not productive in this area. Mr. Clark asserts that the Buda Formation is not productive in this area and has not been designated as a tight gas formation in this area since it is not productive.

Silverbow represents that around the landing point of the well, the lateral crossed a fault with a throw of roughly 20 to 30 feet. As a result, a portion of the lateral is in the Buda Formation. Silverbow's witness Austin Comeaux contends that it takes a few hundred feet to steer the well back up into the Eagle Ford Formation after entering the Buda Formation. Based on the well trajectory and computer models, Mr. Comeau estimates for the portion of the lateral that is in the Buda Formation, a depth of 5 feet as

an average depth of the lateral in the Buda Formation, with a maximum depth of 10 feet into the Buda Formation.

Three frac stages of the total 37 frac stages in the NMC EF No. 1H were perforated in the Buda Formation. Of the three stages perforated in the Buda Formation, two stages are perforated in the lateral that is completely landed in the Buda Formation while a third stage is perforated in the lateral in both the Buda Formation and Eagle Ford Formation. The average spacing between frac stages in the lateral is about 220 feet. The three stages in the Buda Formation perforated from 12,943 feet MD to 13,541 feet MD were hydraulically fracture-stimulated through these perforations, with the induced fractures extending up into the Eagle Ford Formation and creating a conductive pathway to the perforations in the lateral section that is landed in the Buda Formation. The other 34 stages were perforated and hydraulically fracture-stimulated in the Eagle Ford Formation.

Silverbow asserts that any production through the Buda Formation perforations and into the wellbore in the subject NMC EF No. 1H originates from the Eagle Ford Formation. Silverbow's position is that all of the gas produced from the well comes from the Eagle Ford Formation, even the portion of the lateral that is landed in the Buda Formation, because there is no production from the Buda Formation in the area and during hydraulic fracture stimulation of the well, the hydraulic fractures grew up into the Eagle Ford Formation.

A frac model of the well completion predicts that the hydraulically-induced, propped fractures would have extended up into the Eagle Ford Formation. The frac stages completed in the Buda Formation from 12,943 feet MD to 13,600 MD are modeled to have hydraulically-fractured into the Eagle Ford Formation and any gas produced from these stages is coming from the Eagle Ford Formation. The well log information for the nearby pilot hole was used to develop stress profile properties that were used by Silverbow for frac modeling. Silverbow's frac modelling of the lateral landed in the upper portion of the Buda Formation shows the fracture migration from the lateral would be expected to extend upward into the Eagle Ford Formation. Therefore, the any gas produced by that portion of the lateral that was landed and perforated in the Buda Formation would originate from the Eagle Ford Formation.

Mr. Clark asserts that it is not uncommon when trying to drill laterals in the base of the organic-rich Eagle Ford Formation to cross a fault unexpectedly and end up in the upper portion of the underlying Buda Formation for a short portion of the lateral. At least two Commission-designated field have blanket orders to cover this occurrence, the Eagleville (Eagle Ford) Fields, and the Briscoe Ranch (Eagleford) Field, which are both in this immediate area in La Salle County. In this case, the subject well is completed in the Hawkville (Eagle Ford Shale) Field, which is not covered by a blanket order. Since a blanket Statewide Rule 10 commingling exception is not in place for this field, operators are required to file an exception to Statewide Rule 10 application on an individual well basis. The subject well, NMC EF, Well No. 1H (API No. 283-35968) has a Statewide Rule 10 commingling exception due to the portion of the lateral being landed in the Ammann (Buda) Field.

Mr. Clark noted a clerical error in which the Commission reversed the perforations listed on the exception to Statewide Rule 10. The correct well information is as follows: 13,595 feet MD to 20,391 feet MD completion depth is in the Hawkville (Eagle Ford Shale) and 12,840 feet MD to 13,595 feet MD completion depth is in the Ammann (Buda) Field.

Silverbow agreed, that, pursuant to the provisions of Texas Government Code §2001.144(a)(4)(A), this Final Order shall be final and effective on the date a Master Order relating to this Final Order is signed.

FINDINGS OF FACT

1. Silverbow's application for a high-cost gas state severance incentive certification (ST-1) was certified on June 7, 2017 (Docket F-01-221205) to be 91% eligible.
 - a. 100% of the gas was not certified administratively since 9% of the lateral is in the Buda Formation.
 - b. A portion of the well, the heel of the lateral, is located in the Buda Formation, from roughly 12,943 feet MD to 13,600 feet MD.
 - c. While attempting to land the lateral in the lower section of the Eagle Ford Formation, a portion of the lateral crossed a fault and ended up in the upper section of the Buda Formation.
 - d. Perforations in the section of the lateral that is landed in the Eagle Ford Formation accounts for 91% of the total perforations in the lateral. The perforations from 13,662 feet MD to 20,391 feet MD are in the section of lateral in the Eagle Ford Formation, while the remaining perforations in the lateral from 12,943 feet MD to 13,541 feet MD are in the section of the lateral in the Buda Formation.
2. The Eagle Ford Formation was designated as a tight gas formation in La Salle County in Oil and Gas Docket No. 01-0264919. In a Final Order, Oil and Gas Docket No. 01-0264919, the Eagle Ford Shale Formation was designated as tight gas in Live Oak, La Salle, and McMullen Counties. Wells completed in the Eagle Ford Formation in these three counties, are producing from a high cost tight gas formation, which includes the Hawkville (Eagleford Shale) Field in La Salle County.
3. Silverbow seeks a certification that 100% of the gas produced from their NMC EF Lease, Well No. 1H qualifies as gas production from the designated tight Eagle Ford Formation. The Buda Formation is not included in the tight gas designation because it is not productive. Silverbow completed their NMC EF No. 1H horizontal well from 12,943 feet MD to 20,391 feet MD on June 4, 2017.

4. Landing a portion of the lateral in the upper Buda Formation while attempting to drill the lower Eagle Ford Formation is not uncommon in this area, and a blanket downhole commingling order (Final Order No. 01-0277305), has been authorized for the Briscoe Ranch (Eagle Ford) and Ammann (Buda) Fields in La Salle and other counties. The Ammann (Buda) Field is not productive in the area, but is used for the purposes of commingling Eagle Ford Formation wells with the Buda Formation when operators unintentionally penetrate the Buda Formation when drilling Eagle Ford Formation wells in this area.
5. There is no production from the Buda Formation within a 10-mile radius of the subject well.
 - a. The Buda Formation is non-productive in the subject well based on offset well log information and the lack of wells completed in the Buda Formation in the area.
 - b. The distance between the subject Silverbow NMC EF 1H, and a well with a pilot hole that penetrates the Buda Formation, the Common Resources NMC 20-1H ("pilot hole"), is about 2.75 miles away.
 - i. A vertical well log is available for the pilot hole that shows the entire Buda Formation.

The well log information indicates there is zero porosity in the Buda Formation, and there were zero gas shows when drilling through the Buda Formation.
 - ii. The Buda Formation is easy to identify based on the gamma ray log response, and both the neutron and density porosity curves, read very close to, or essentially zero, in the Buda Formation.
 - iii. The pilot hole shows the Buda Formation 2.75 miles from the subject well has no porosity and it is not productive.
 - iv. A mud log from the Common Resources NMC 20-1H pilot hole 2.75 miles away from the subject well indicated there is a change in lithology just below 12,800 feet from shale to limestone, while drilling through the Buda Formation, and the gas shows that are present throughout the entire Eagle Ford Formation disappear as soon as the Buda Formation is penetrated.
6. The Buda Formation is not productive in this area and has not been designated as a tight gas formation in this area since it is not productive. The nearest offset well which logged the Buda Formation is 2.75 miles away and the well log had no gas shows and indicated no porosity in the Buda Formation.

7. Near the landing point of the subject well, the lateral crossed a fault with a throw of roughly 20 to 30 feet.
 - a. A portion of the lateral ended up in the Buda Formation. It takes a few hundred feet to steer the well back up into the Eagle Ford Formation after entering the Buda Formation.
 - b. Based on the well trajectory and computer models, the estimated depth of the lateral into the Buda Formation is 5 feet, on average, with a maximum depth of 10 feet into the Buda Formation for that portion of the lateral that is in the Buda Formation.
8. Three frac stages of the total 37 frac stages in the NMC EF No. 1H were perforated in the Buda Formation.
 - a. Of the three stages perforated in the Buda Formation, two stages are perforated in the lateral that is completely landed in the Buda Formation while a third stage is perforated in the lateral in both the Buda Formation and Eagle Ford Formation.
 - b. The average spacing between frac stages in the lateral is about 220 feet.
 - c. The three stages in the Buda Formation perforated from 12,943 feet MD to 13,541 feet MD were hydraulically fracture-stimulated through these perforations, with the induced fractures extending up into the Eagle Ford Formation and creating a conductive pathway to the perforations in the lateral section that is landed in the Buda Formation.
 - d. The other 34 stages were perforated and hydraulically fracture-stimulated in the Eagle Ford Formation.
9. Any production through the Buda Formation perforations in the subject NMC EF No. 1H originates from the Eagle Ford Formation. All of the gas produced from the subject well comes from the Eagle Ford Formation, even the portion of the lateral that is landed in the Buda Formation.
 - a. There is no production from the Buda Formation in the area.
 - b. During hydraulic fracture stimulation of the well, the hydraulic fractures grew up into the Eagle Ford Formation.
 - c. A frac model of the well completion predicts that the hydraulically-induced, propped fractures would extend up into the Eagle Ford Formation.
 - d. The frac stages completed in the Buda from 12,943 to 13,600 MD are modeled to have hydraulically-fractured into the Eagle Ford Formation and

- any gas produced from these stages originates from the Eagle Ford Formation.
- e. The well log information for the nearby pilot hole was used to develop stress profile properties that were used by Silverbow for frac modeling.
 - f. Silverbow's frac modelling of the lateral landed in the upper portion of the Buda Formation shows the fracture migration from the lateral would be expected to extend upward into the Eagle Ford Formation.
 - g. Any gas produced by that portion of the lateral that was landed and perforated in the Buda Formation would originate from the Eagle Ford Formation.
10. It is not uncommon when trying to drill laterals in the base of the organic-rich Eagle Ford Formation to cross a fault unexpectedly and end up in the upper portion of the underlying Buda Formation for a short portion of the lateral.
- a. At least two Commission-designated field have blanket orders to cover this occurrence, the Eagleville (Eagle Ford) Fields, and the Briscoe Ranch (Eagleford) Field, which are both in this immediate area in La Salle County.
 - b. In this case, the subject well is completed in the Hawkville (Eagle Ford Shale) Field, which is not covered by a blanket order. Since a blanket Statewide Rule 10 exception is not in place for this field, operators are required to file an exception to Statewide Rule 10 application on an individual well basis.
 - c. The subject well, NMC EF, Well No. 1H (API No. 283-35968) has received a Statewide Rule 10 exception due to the portion of the lateral being landed in the Ammann (Buda) Field.
 - i. The nearest well completion solely in the Ammann (Buda) Field is approximately 40 miles away.
 - ii. The discovery well for the Ammann (Buda) Field is approximately 70 miles away.
11. There a clerical error in which the Commission reversed the perforations listed on the exception to Statewide Rule 10. The correct well information is as follows: 13,595 feet MD to 20,391 feet MD completion depth is in the Hawkville (Eagle Ford Shale) and 12,840 feet MD to 13,595 feet MD completion depth is in the Ammann (Buda) Field.

12. Silverbow agreed, that, pursuant to the provisions of Texas Government Code §2001.144(a)(4)(A), this Final Order shall be final and effective on the date a Master Order relating to this Final Order is signed.

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 § 3.101.
3. Pursuant to § 2001.144(a)(4)(A), of the Texas Government Code, this Final Order is final and effective when a Master Order relating to this Final Order is signed.
4. The application for certification for severance tax exemption or reduction for gas produced from high-cost gas wells meets the requirements of Statewide Rule 101. 16 Tex. Admin. Code § 3.101.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend the Commission enter an order to approve amending the Tax Exemption Certification for the NMC EF (282221) Lease, Well No. 1H, Docket No. F-01-221205, to certify that 100% of gas produced from perforations between 12,943 feet MD to 20,391 feet MD is produced from the Hawkville (Eagleford Shale) Field was designated as a tight gas formation in La Salle County in Oil and Gas Docket No. 01-0264919. Formation.

Respectfully submitted,



Karl Caldwell
Technical Examiner



Kristi M. Reeve
Administrative Law Judge