



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL AND GAS DOCKET NO. 08-0288418

THE APPLICATION OF LEGACY RESERVES OPERATING LLP TO AMEND FIELD RULES FOR THE DEEP ROCK (GLORIETTA 5950) FIELD, ANDREWS COUNTY, TEXAS

HEARD BY: Brian Fancher, P.G. - Technical Examiner
Laura Miles-Valdez - Legal Examiner

HEARING DATE: May 29, 2014

APPEARANCES:
APPLICANT:

REPRESENTING:

Brian R. Sullivan, P.E.
Maurice P. Gaddis, Jr., P.E.

Legacy Reserves Operating, LLP

EXAMINERS' REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Legacy Reserves Operating, LLP ("Legacy") seeks to amend the special field rules in effect for the Deep Rock (Glorietta 5950) Field ("the Field").

The Field is governed by the following special field rules:

1. 330' lease, property, or subdivision line spacing and 933' between well spacing;
2. 40-acre proration units and 20-acre tolerance for the last well on a lease; 2,100' maximum diagonal for 40-acre proration unit;
3. Allocation based on 75% acreage and 25% per well; Maximum Efficient Rate ("MER") of 102 barrels of oil per day;
4. A minimum of 150' surface casing from top to bottom shall be set.

Dated April 17, 2014, the subject application's Notice of Hearing ("NOH") indicates that Legacy seeks to amend the current special field rules to provide for the following:

1. Designated correlative interval;
2. 330' lease, property, or subdivision line spacing and 0' between well spacing;
3. Supplement the current density provision with 20-acre optional proration units, and the appropriate 20-acre diagonal;
4. No change.

At the hearing, the examiners requested drainage area calculations to support Legacy's request for 20-acre optional proration units. In response, Legacy submitted late-filed exhibit numbers thirteen, fourteen, and fifteen.

By electronic correspondence dated July 23, 2014, the examiners requested: (1) that Legacy submit a type log which identifies a designated correlative interval for the subject field, and (2) provide further clarification with regard to Legacy's request to remove the minimum between well spacing requirement.

On October 11, 2014, Legacy submitted its response to the examiners July 23rd inquiry; however, Legacy did not include a designated correlative interval for the subject field in its October 11th response.

On October 14, 2014, the examiners issued a letter to Legacy requesting that it submit a designated correlative interval that defines the top and bottom of the subject field.

On October 16, 2014, Legacy submitted its late-filed exhibit number sixteen, which is a type-log that proposes the subject field be defined as the correlative interval from 5,552 feet to 6,006 feet.

The examiners recommend that special field rules for the Field be amended, as proposed by Legacy Reserves Operating, LLP.

DISCUSSION OF THE EVIDENCE

Mr. Maurice P. Gaddis, Jr. P.E., a senior reservoir engineer with Legacy, testified on behalf of Legacy. Mr. Gaddis, Jr. is a seasoned reservoir engineer, and is registered as a Professional Engineer with the Texas Board of Professional Engineers with specialization in petroleum engineering.

The Deep Rock (Glorietta 5950) Field was discovered in June 1954, and has produced 16.7 million barrels of oil and 1.3 billion cubic feet of natural gas. The Field is located immediately west of Andrews, Texas by about five miles and immediately north of the nearby Fuhrman (Glorieta)

Field. Mr. Gaddis, Jr. testified that the Fuhrman (Glorieta) Field (the analog field) is similar to the Field, and has been developed with infill drilling and secondary recovery waterflood operations.

Legacy requests the current between well spacing provision be amended to allow for a zero distance requirement between wells. In support of this request, Mr. Gaddis, Jr. asserted that the Field and analog field are surrounded by heavy oil and gas development which includes a multitude of wells completed in fields outside the subject application, pipeline infrastructure, and tank batteries. Mr. Gaddis, Jr. testified that because of the heavy infrastructure within and around the Field, Legacy seeks to remove the minimum between well spacing requirement altogether¹. Mr. Gaddis, Jr. asserts that removal of the between well spacing requirement will facilitate Legacy's infill development in the Field by providing maximum flexibility in placing well locations in the Field.

The existing density provision for the Field provides forty-acre proration units. Legacy requests to supplement the Field's existing minimum well-density provision (*i.e.*, the minimum acreage required for a well at normal location, with respect to well-density on a given lease) by adopting twenty-acre optional proration units (20-acre options). Legacy contends that the Field is made-up of dolomitic-type rock in the Glorieta formation, and that the pay intervals within the Field exhibit inconsistent porosity values. However, infill drilling of the Field has increased the ultimate recovery of hydrocarbons, and as a result Legacy believes that 20-acre options will further the ultimate recovery from the Field.

In support of its 20-acre optional density request, Legacy submitted multiple research papers published by the Society of Petroleum Engineers (SPE)². For instance, the SPE paper titled "Infill Drilling To Increase Reserves - Actual Experience in Nine Fields in Texas, Oklahoma, and Illinois" evaluates a west Texas carbonate reservoir, such as the Field, and concludes that: (1) total oil reserves are increased by millions of barrels because of infill drilling; and (2) carbonate reservoirs are highly stratified and discontinuous which leads to inconsistent drainage calculations per well. In other words, Legacy believes that the Field is composed of lenticular carbonate pay zones that are discontinuous throughout the geographical area, and as a result drainage calculations will significantly vary from well to well.

In addition, Mr. Gaddis, Jr. Submitted a historical production graph for the EF King Lease, which is located in the analog field. The production graph plots time from 1970 through 2014 on the x-axis and approximate production values of barrels of oil per day (BOPD), barrels of water injected per day (BWIPD), barrels of water produced per day (BWPD), volume of produced natural gas in cubic feet multiplied by 1000 (MCFPD), and gas to oil ratio (GOR) on the y-axis. In summary, the EF King Lease's cumulative oil production totaled 1.4 million barrels of oil in January 1990. At that time, Mr. Gaddis, Jr., estimated the remaining reserves on the EF King Lease were roughly 631,000 barrels of oil on 40-acre density. Between December 1989 and February 1990, however,

¹ Tape recording at 4:35.

² Exh. Nos. 13, 14, and 15.

five wells were drilled on the analog field on the EF King Lease on 20-acre development to determine whether 20-acre infill drilling would increase the ultimate recovery from the analog field. From the 20-acre infill development wells, the recoverable reserves increased from about 100 barrels of oil per day to nearly 400 barrels of oil per day. Beyond that, a waterflood commenced on the EF King Lease in January 2005 that resulted in an incremental 1.14 million barrels of oil. Mr. Gaddis, Jr., testified that the analog field is comparable to the Field, and that Legacy anticipates similar results in the Field as that seen on the EF King Lease in the analog field.

Legacy submitted a list that contains thirty-six (36) fields which produce from carbonate reservoirs in Oil and Gas Districts 8 and 8A with no minimum lease line spacing requirement³. In addition, Legacy submitted a list of Glorieta Fields in Oil and Gas Districts 8 and 8A that contain field rules allowing 20-acre optional proration units and 330' lease, property, or subdivision line spacing⁴. In total, twenty-two Glorieta fields currently exist with 20-acre optional proration units and 330' lease, property, or subdivision line spacing.

Finally, Legacy requests that the Field be defined as the correlative interval from 5,552 feet to 6,006 feet, as shown on the log COG Operating, LLC's Deep Rock Et.al. A Lease, Well No. 9G (API No. 42-003-39833) in the PSL Survey, Section 5, Block A46, Abstract 2131 in Andrews County. Legacy's proposed correlative interval includes the Glorieta formation.

FINDINGS OF FACT

1. Legacy Reserves Operating, LLP ("Legacy") seeks to amend the special field rules in effect for the Deep Rock (Glorietta 5950) Field ("the Field").
2. Legacy requests the following field rules:
 - a. The Field be defined as the designated correlative interval from 5,552 feet to 6,006 feet, as shown on the log COG Operating, LLC's Deep Rock Etal A Lease, Well No. 9G (API No. 42-003-39833) in the PSL Survey, Section 5, Block A46, Abstract 2131 in Andrews County;
 - b. 330' lease, property, or subdivision line spacing and 0' between well spacing;
 - c. Supplement the current density provision with 20-acre optional proration units, and the appropriate 20-acre diagonal.
3. The Field was discovered in June 1954, and has produced 16.7 million barrels of oil and 1.3 billion cubic feet of natural gas.

³ Exh. No. 12.

⁴ Exh. No. 11.

4. The Field is located immediately west of Andrews, Texas by about five miles and immediately north of the nearby Fuhrman (Glorieta) Field.
5. The Fuhrman (Glorieta) Field (“the analog field”) is similar to the Field, and has been developed with infill drilling and secondary recovery waterflood operations.
6. The Field and analog field are surrounded by heavy oil and gas development which includes a multitude of wells completed in fields outside the subject application, pipeline infrastructure, and tank batteries.
7. Removal of the between well spacing requirement from the Field will facilitate infill drilling in the Field by providing maximum flexibility in placing well locations in the Field.
8. The Field is made-up of dolomitic-type rock in the Glorieta formation, and the pay intervals within the Field exhibit inconsistent porosity values.
9. Adoption of 20-acre optional proration units in the Field will promote development of the remaining recoverable reserves and will increase the recovery of the remaining recoverable reserves as seen in the analog field.
10. The Field should be defined as the correlative interval from 5,552 feet to 6,006 feet, as shown on the log COG Operating, LLC’s Deep Rock Etal A Lease, Well No. 9G (API No. 42-003-39833) in the PSL Survey, Section 5, Block A46, Abstract 2131 in Andrews County.
11. Adoption of Legacys proposed field rule amendments is appropriate for further development of the Field.

CONCLUSIONS OF LAW

1. Proper notice of this hearing was given to all persons legally entitled to notice.
2. All things have occurred or been accomplished to give the Railroad Commission jurisdiction in this matter.
3. Amending field rules as proposed by Legacy Reserves Operating, LLP is necessary to prevent waste and protect correlative rights in the Deep Rock (Glorietta 5950) Field.

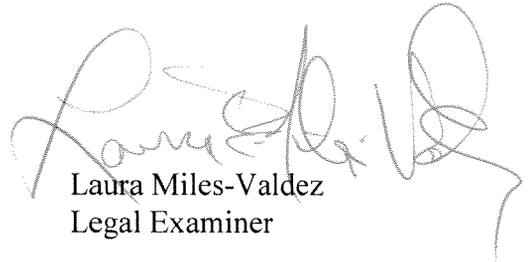
EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the examiners recommend that field rules be amended for the Deep Rock (Glorietta 5950) Field, as proposed by Legacy Reserves Operating, LLP.



Brian Fancher, P.G.
Technical Examiner

Respectfully submitted,



Laura Miles-Valdez
Legal Examiner