

**STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT  
OIL CONSERVATION DIVISION**

**IN THE MATTER OF THE HEARING CALLED  
BY THE OIL CONSERVATION DIVISION FOR  
THE PURPOSE OF CONSIDERING:**

**CASE NO. 14124  
ORDER NO. R-13013**

**APPLICATION OF CIMAREX ENERGY COMPANY  
OF COLORADO FOR SPECIAL RULES AND  
REGULATIONS FOR THE APACHE RIDGE-  
BONE SPRING POOL, LEA COUNTY, NEW  
MEXICO.**

**ORDER OF THE DIVISION**

**BY THE DIVISION:**

This case came on for hearing at 8:15 a.m. on June 26, 2008, at Santa Fe, New Mexico, before Examiner Richard Ezeanyim.

NOW, on this 5<sup>th</sup> day of November, 2008, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner,

**FINDS THAT:**

(1) Due public notice has been given, and the Division has jurisdiction of this case and of the subject matter.

(2) Cimarex Energy Company of Colorado ("applicant" or "Cimarex") seeks an order establishing special rules and regulations for the Apache Ridge-Bone Spring Pool (the "Pool"), including a depth bracket allowable of 1,300 barrels of oil per day with a limiting gas-oil ratio (GOR) of 3,000 cubic feet of gas for each barrel of oil produced. Applicant further requests that the pool rules be effective as of August 1, 2007.

(3) The Pool was created by Division Order No. R-8075, dated November 8, 1985, and currently covers the following lands in Lea County, New Mexico.

Township 19 South, Range 33 East, N.M.P.M.  
Section 36: SE/4

Township 19 South, Range 34 East, N.M.P.M.

Section 30: SE/4  
Section 31: W/2 and NE/4  
Section 32: NW/4

(4) The discovery well for the Pool is the Mescalero 30 Fed. Well No. 1 (API No. 30-025-29266), located 510 feet from the South line and 990 feet from the East line of Section 30, Township 19 South, Range 34 East, N.M.P.M. It is an oil well with perforations in the Bone Spring formation at 9,376-9,604 feet subsurface. Under Division Rule 104, spacing in the Pool is 40 acres, with wells to be located no closer than 330 feet to a quarter-quarter section line. Under Division Rules 505 and 506, the Pool has a depth bracket allowable of 275 barrels of oil per day with a limiting gas-oil ratio of 2,000 cubic feet per barrel of oil produced.

(5) Fasken Oil and Ranch, Ltd. ("Fasken") appeared through legal counsel in this case in opposition to the relief sought by applicant. In addition, Fasken filed an application in Case No. 14145 entitled "*Application of Fasken Oil and Ranch, Ltd. for a compliance order requiring Cimarex Energy Company of Colorado to comply with the Division's oil proration rules for the Apache Ridge-Bone Spring Pool, Lea County, New Mexico.*" This case and Case No. 14145 were consolidated at the hearing for the purpose of testimony; however, separate orders will be issued in each case.

(6) The applicant (Cimarex) presented land evidence which demonstrates that:

(a) Under Division Rule 1210.A(4)(b), applicant is required to give notice of this application to (i) Division-designated operators in the Pool, and (ii) Division-designated operators of wells in the same formation as the Pool and within one mile of the Pool's outer boundary which have not been assigned to another pool. The only such operators in the Pool are Matador Production Company and Fasken Oil and Ranch, Ltd.

(b) Fasken is the operator of all of Section 31, Township 19 South, Range 34 East, N.M.P.M. Fasken Land and Minerals, Ltd., a related company, is owner of Federal Lease NM 14496 (the "Ling Federal Lease") which covers all of Section 31 except the NE/4 NW/4. David and Barbara Fasken, and Fasken Land and Minerals, Ltd. have owned the Ling Federal Lease since 1983.

(c) The NE/4 NW/4 of Section 31 is covered by Federal Lease NM 10474 owned by Magnum Hunter Production, Inc., a sister corporation of applicant. By virtue of a joint operating agreement, Magnum Hunter Production, Inc. owns a contractual working interest throughout the W/2 of Section 31.

(d) Applicant is the operator of the following acreage, upon which the Apache Ridge Bone Spring wells have been drilled or are planned to be drilled.

Township 19 South, Range 33 East, N.M.P.M.

Section 36: All

Township 19 South, Range 34 East, N.M.P.M.

Section 29: SW/4

Section 30: S/2

(e) Applicant became operator of this acreage in July of 2005.

(7) Applicant presented geological and engineering evidence which demonstrates that:

(a) The Bone Spring reservoir in the Pool is highly complex and discontinuous, with four main producing zones: From top to bottom, the Lower First Bone Spring Sand ("FBSS"), the Upper Airstrip, the Airstrip Dolomite, and the Basal Bone Spring Sand. The Upper Airstrip is a dolomitic sand or sandy dolomite. There is a lack of continuity in each zone from well to well across the Pool.

(b) The Upper Airstrip/Airstrip Dolomite structure exhibits two "noses," with the high areas generally occurring in the E/2 of Section 36, the SE/4 of Section 30, and the NE/4 of Section 31. A pronounced structural low exists in the SW/4 SW/4 of Section 30, and in the NW/4 and SE/4 of Section 31. The North-South and the East-West stratigraphic cross sections exhibit significant lateral discontinuity of both sand and dolomite intervals.

(c) The wells listed below have been drilled in the Pool. The operator, well locations, completion dates, and cumulative oil production (as of April 2008) are as follows:

<u>Operator</u>	<u>Name</u>	<u>Location</u>	<u>Compl. Date</u>	<u>Cum.</u>
<u>Oil</u>				
Cimarex	Laguna Deep Unit 16	K-16-19S-33E	1/08	2,910
Cimarex	Laguna Deep Unit 12	K-25-19S-33E	11/06	8,196
Cimarex	Pennzoil B 36 St. 7	A-36-19S-33E	3/08	24,827
Cimarex	Pennzoil B 36 St. 3	G-36-19S-33E	1/08	606
Cimarex	Pennzoil B 36 St. 1	H-36-19S-33E	11/06	83,631
Cimarex	Pennzoil 36 St. 1	I-36-19S-33E	3/97	534,682
Cimarex	Pennzoil B 36 St. 2	J-36-19S-33E	7/07	88,118
Cimarex	Pennzoil B 36 St. 4	O-36-19S-33E	1/08	1,733
Cimarex	Pennzoil B 36 St. 5	P-36-19S-33E	2/08	5,341
Cimarex	Mescalero B 29 Fed. 1	M-29-19S-34E	3/08	1,407

Cimarex	Mescalero 30 Fed. 7	M-30-19S-34E	Dry	0
Cimarex	Mescalero 30 Fed. 2	N-30-19S-34E	9/07	12,857
Cimarex	Mescalero 30 Fed. 6	O-30-19S-34E	12/06	17,438
Cimarex	Mescalero 30 Fed. 1	P-30-19S-34E	8/85	339,144
Fasken	Ling Fed. 3	B-31-19S-34E	4/08	.....
Asher	Bass 32 State 1	C-32-19S-33E	10/91	1,807
Bass	Redhawk 32 State 1	L -32-19S-33E	12/02	864
Matador	Fed. 6 Com. 1	C-6-20S-34E	6/02	4,646

(d) Cimarex has seven more wells planned or permitted, and Fasken has two more wells planned or permitted in the Pool.

(e) The most prolific producing zone is the Upper Airstrip Dolomite, but productivity varies from zone-to-zone and from well-to-well.

(f) The drive mechanism in the Pool is solution gas drive. Ultimate recovery in a solution gas drive reservoir is unaffected by rate of withdrawal.

(g) The gas-oil ratio may affect ultimate recovery when a gas cap is created by the rapid ascent of gas to the top of the reservoir due to high vertical permeability. However, in this reservoir wells lower on structure have higher gas-oil ratios than wells higher on structure, as shown below:

Well	Airstrip Dolomite Top (SSD)	GOR (cf/BO)
Pennzoil B 36 State 7	-5,945 feet	15,793 (from prod log)
Pennzoil 36 State 1	-5,921 feet	6,000
Pennzoil B 36 State 2	-5,879 feet	2,200
Pennzoil B 36 State 1	-5,877 feet	2,100

(h) There is no evidence of a gas cap in Section 36, where the bulk of development in the Pool has occurred.

(i) The gas-oil ratios increase over time in a solution gas drive reservoir as the natural result of depletion and lower bottomhole pressure, and are common in other Bone Spring Pools in this area.

(j) Bottomhole pressure data reflects pressure communication across the Pool. However, there is high variability in production and geological characteristics across the Pool.

(k) Conventional drainage calculations are not valid in this reservoir. This is shown by the wells immediately offsetting the most prolific producers in the Pool:

(1) Pennzoil 36 St. Well No. 1 (Unit I of Section 36): While drainage calculations indicate this well has drained over 370 acres the offsets are unaffected: (i) the Pennzoil B 36 St. Well No. 1, in

Unit H of Section 36, will ultimately produce in excess of 150,000 BO, and (ii) the Pennzoil B 36 St. Well No. 2, in Unit J of Section 36, will ultimately produce in excess of 200,000 BO.

(2) Mescalero 30 Fed. Well No. 1 (Unit P of Section 30): While drainage calculations indicate this well has drained over 160 acres, the offsets are unaffected: (i) the Mescalero 30 Fed. Well No. 6, in Unit O of Section 30, will ultimately produce in excess of 80,000 BO, and (ii) the Ling Fed. Well No. 3, in Unit B of Section 31, is currently producing 250 barrels of oil per day (BOPD).

(l) The Pennzoil B 36 State Well No. 7, in Unit A of Section 36, and the Pennzoil B 36 State Well No. 2, in Unit J of Section 36, are capable of producing in excess of 1,300 barrels of oil per day (BOPD). The producing interval in these wells, capable of producing at rates above the current pool allowable, is not present in offsetting Section 31, operated by Fasken.

(m) Cimarex filed an application in September 2007 (Division Case No. 14012), which sought the same relief as in this case, after the Pennzoil B 36 State No. 2 well was completed. That was the first well in the Pool which produced from the Upper Airstrip at high rates. Cimarex subsequently dismissed the case because it wanted to drill more wells to verify Upper Airstrip production.

(n) Original oil in place ("OOIP") for the entire Pool, using the volumetric method, is 35.5 MMBO. OOIP for Section 36 alone is 8.8 MMBO. The current cumulative production from Section 36 is 746.9 MBO, which represents an 8.5% recovery factor of OOIP.

(8) The Cimarex witness testified that the claim by Fasken that it did not know of development in the Pool until this application was filed is unfounded because public records show the following:

(i) The Pool was discovered in 1985 by the Mescalero 30 Fed. Well No. 1, which has since produced over 300,000 BO. The completion report was filed in September 1985, and all production from this well was reported.

(ii) The Pennzoil 36 St. Well No. 1 was completed in 1997 and has since produced over 500,000 BO. All production from this well was reported.

(iii) The first well which Cimarex drilled in the Pool, the Pennzoil B 36 State No. 1, which had initial oil rate of over 180 BOPD, had a completion report filed in January 2007.

(9) Fasken presented geological and engineering evidence that demonstrates that:

- (a) The Bone Spring formation in this reservoir is comprised of many different sand and carbonate free flows that correlate across the pool, and all appear to be in communication with each other.
- (b) The dolomite zones are most prolific in this reservoir and the sands are tighter where higher porosity is needed to produce the reserves from the reservoir.
- (c) Pressure information from the wells in the pool shows that it is a large reservoir that is in communication across the pool.
- (d) When Fasken correlated the reported Bone Spring producing interval in the Pennzoil No. 1, it was not present in the Fasken operated acreage in Section 31.
- (e) In January and February 2008 Fasken drilled the Ling Federal Well No. 3 in Section 31 to a depth of 10,706 feet to test the zone reported to be the producing interval in the Pennzoil No. 1.
- (f) The Pennzoil 36 State Well No. 1 first produced in 1997 with a sustained very flat decline curve indicating a large drainage area. It produced for 10 years from this dolomite zone before the Mescalero 30 Fed. Well No. 1 came on line. Pressure buildup analysis shows that this well has a radius of investigation of 1680 feet which is well beyond a 160-acre drainage area. It has produced 536,000 barrels of oil, and experienced an increase in GOR since 2007 from about 1200 to about 3000, indicating reduced reservoir pressure. Its bottomhole pressure has declined from 1988 to 2007 from 3424 Psi to 1638 Psi. It is over produced by 5,692 barrels.
- (g) Material balance decline curve analysis shows that wells in this pool are draining in excess of 160 acres and the Pennzoil No. 1 has drained in excess of 640 acres.
- (h) The Mescalero No. 1 has produced 296,000 barrels and experienced a recent increase in GOR from 1500 to 4000, indicating reduced reservoir pressure and increased gas production. It has drained 115 acres and is over produced by 10,191 barrels.
- (i) Dolomite zones in the Apache Ridge-Bone Spring Pool are capable of efficiently draining over 160 acres per well.

- (j) Multiple engineering methods, including volumetric calculations, show that there are 9 million barrels of oil in place and at a 19% recovery factor reservoir recovery will be 1.7 million barrels.
  - (k) Reservoir analysis using material balance decline type curve methodology shows that Cimarex' production has exceeded the estimated ultimate recovery (EUR) from an expected 19% to 25% with all production greater than 19% coming from the adjacent tracts.
  - (l) Bottomhole pressure data shows that reservoir pressure was depleted from 3800 PSI to 2000 PSI or less by the two first wells in the pool which confirms that drainage occurs over a large area and results in pressure depletion and reduced production pressure in the total reservoir.
  - (m) Similar pressure exists across the field from the Pennzoil No.1 to the Mescalero No. 1 in the direction that is across the Fasken tract in Section 31.
  - (n) Since assuming operations of properties in the Apache Ridge-Bone Spring Pool, Cimarex has drilled the Pennzoil B 36 State Well No. 2 which is 19,440 barrels overproduced and the Pennzoil B 36 state Well No. 7 that is 13,317 barrels overproduced.
- (10) Fasken argued that granting the application of Cimarex will accelerate the drainage of offsetting acreage operated by Fasken, rapidly deplete the reservoir and adversely affect future recoverable oil from the offsetting Fasken acreage.

**The Division concludes the following:**

- (11) The Apache Ridge Bone Springs reservoir is a solution gas drive reservoir. However, there is no gas cap present in this reservoir because the reservoir consists of thinly laminated sections, and does not have very good vertical permeability.
- (12) The initial pressure in the reservoir is approximately 3,800 pounds per square inch (psi), and the bubble point pressure lies between 2,500 to 3,000 psi. At the current reservoir pressures of 1,800 to 2,000 psi, the wells are now producing below the bubble point of the reservoir, thereby leading to increases in the high gas-oil ratios found in the wells.
- (13) From the testimony presented by both parties, the Division believes that there are four (4) producing intervals in the zone of interest, namely: (i) the First Bone Spring Sand; (ii) the Upper Airstrip; (ii) the Airstrip Dolomite; and (iv) the Basal Bone Spring Sand. Each of these intervals contributes to the overall production from each well. However, in some zones of the reservoir, all the four producing intervals may not be present.

(14) The most prolific producing zone is the Upper Airstrip Dolomite, but productivity varies from zone-to-zone and from well-to-well.

(15) At the present time, only the Pennzoil B 36 State Well Nos. 2 and 7 are capable of producing in excess of their allowable of 275 barrels of oil per day.

(16) The Apache Ridge Bone Spring reservoir is a complex reservoir that is not yet quite understood from the current development. Further development is needed to fully understand the geology of this reservoir. It appears that these reservoirs are in pressure communication, even though they do not seem to correlate stratigraphically. Few wells are quite good wells, many others are not very good wells even though all the wells are producing from the same reservoir.

(17) In a solution gas drive reservoir of this type, ultimate oil recovery is essentially independent of individual well production rates and well spacing and proration units. Therefore producing the few prolific wells at high production rates would not induce waste or harm the reservoir; however, Correlative Rights may be impaired.

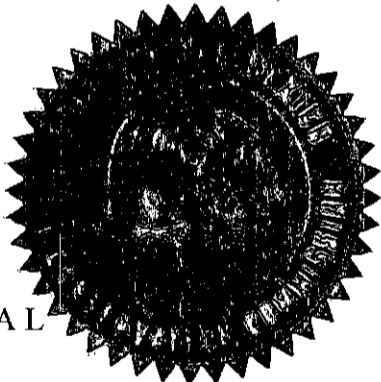
(18) The application of Cimarex Energy Company of Colorado requesting special pool rules and regulations including a depth bracket allowable of 1,300 barrels of oil per day with a limiting gas oil ratio of 3,000 cubic feet of gas per barrel of oil for the Apache Ridge-Bone Spring Pool should be **denied**.

**IT IS THEREFORE ORDERED THAT:**

(1) The application of Cimarex Energy Company of Colorado for an order establishing special rules and regulations for the Apache Ridge-Bone Spring Pool is hereby **denied**.

(2) Jurisdiction of this case is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.



SEAL

STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION

A handwritten signature in black ink, appearing to read "Mark E. Fesmire".

MARK E. FESMIRE, P.E.  
Director