

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:

APPLICATION OF LIME ROCK RESOURCES A, L.P. TO INSTITUTE A  
COOPERATIVE WATERFLOOD PROJECT IN THE SAN ANDRES  
FORMATION, EDDY COUNTY, NEW MEXICO

CASE NO. 14563  
ORDER NO. R-13458

ORDER OF THE DIVISION

BY THE DIVISION:

This case came on for hearing at 8:15 a.m. on October 28, 2010 at Santa Fe, New Mexico, before Examiner David K. Brooks.

NOW, on this 19<sup>th</sup> day of September, 2011, the Division Director, having considered the testimony, the record and the recommendations of the Examiners,

FINDS THAT:

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

(2) The applicant, Lime Rock Resources A, L.P. ("Lime Rock") seeks approval to institute a cooperative waterflood project by the injection of produced water into the San Andres formation at the approximate depths of 2400 feet to 3400 feet below the surface, through ten (10) initial injection wells located within the project. Lime Rock proposes that the project be designated the Northwest State Cooperative Waterflood Project.

(3) Alamo Permian Resources appeared at the hearing through counsel but presented no evidence or testimony.

(4) The proposed cooperative waterflood project area ("cooperative project area"), as advertised, was to comprise the following-described acreage in Eddy County, New Mexico:

**Township 17 South, Range 28 East, NMPM**

Section 29: SE/4 SE/4

Section 31: E/2 E/2

Section 32: NE/4, S/2, W/2 NW/4 (see below)

**Township 18 South, Range 28 East, NMPM**

Section 6: NE/4 NE/4

(5) Subsequent to the hearing, Lime Rock advised the Division that the cooperative project area as advertised does not properly describe the acreage Lime Rock seeks to include within this secondary recovery project. Supplemental information provided by Lime Rock subsequent to the hearing demonstrates that the SW/4 NW/4 of Section 32, Township 17 South, Range 28 East, NMPM, was inadvertently placed within the advertisement for this case, and is not to be included in the proposed cooperative project area.

(6) Land evidence and testimony presented by Lime Rock at the hearing, and supplemental evidence submitted by Lime Rock subsequent to the hearing, demonstrate that the cooperative project area is comprised of five separate State of New Mexico oil and gas leases, insofar as they comprise the following area:

<b><u>State of New Mexico Lease No.</u></b>	<b><u>Acreage Description</u></b>
XO-0647-0405	SE/4 SE/4 of Section 29, T-17S, R-28E E/2 E/2 of Section 31, T-17S, R-28E NE/4 & SW/4 of Section 32, T-17S, R-28E NE/4 NE/4 of Section 6, T-18S, R-28E
B-11538-17	SW/4 SE/4 of Section 32, T-17S, R-28E
B-2071-29	E/2 SE/4 of Section 32, T-17S, R-28E
B-5862-21	NW/4 NW/4 of Section 32, T-17S, R-28E
E-1717-3	NW/4 SE/4 of Section 32, T-17S, R-32E

(7) Lime Rock owns 100% of the working interest in the leases and lands described above as to depths from 2400 feet to 2950 feet measured depth as seen on logs, except in the NW/4 NW/4 of Section 32. In the NW/4 NW/4, Lime Rock owns 87.5% of the working interest and Read & Stevens, Inc. owns the remaining 12.5% working interest. Notice of this application was not provided to Read & Stevens, Inc., however, subsequent to the hearing, Lime Rock obtained a waiver of objection from Read & Stevens, Inc.

(8) Subsequent to the hearing, Lime Rock requested that due to its depth ownership position within the cooperative project area, injection into the ten proposed injection wells be limited to the Upper San Andres interval from depths of 2400 feet to 2950 feet measured depth as seen on logs.

(9) The amended proposed secondary recovery project therefore consists of 760.17 acres, more or less, described as follows:

**Township 17 South, Range 28 East, NMPM**

Section 29: SE/4 SE/4

Section 31: E/2 E/2

Section 32: NE/4, S/2, NW/4 NW/4

**Township 18 South, Range 28 East, NMPM**

Section 6: NE/4 NE/4

(10) Within these horizontal boundaries, Lime Rock also operates the Northwest Artesia Unit. The Unitized Interval within the Northwest Artesia Unit, however, comprises the Grayburg (Premier) formation between the depth interval of 1180 feet and 2100 feet and does not include any part of the depth interval for the project proposed in this case.

(11) The applicant plans to operate and produce the Northwest Artesia Unit (Grayburg formation) and the proposed project as two separate and distinct secondary recovery projects.

(12) Although this Order does not approve the application, it is not intended to discourage a future application to establish a waterflood project for this reservoir. Accordingly, for the guidance of applicant and Division examiners in connection with any future application, the Division makes the following findings of fact concerning matters that should be required or implemented in approving any waterflood or similar project covering these lands:

a. Records indicate there are wells being proposed for use that do not have logs available on the Division's web site. Lime Rock should review its records and supply the Division with electric logs missing from the Division's web site for all producing and injection wells within the project area, including those logs run on the NW State Well No. 16 (API No. 30-015-20019).

b. One Area of Review ("AOR") well of concern was the Tigner State Well No. 2 (API No. 30-015-01601) located in Unit N of Section 28, Township 17 South, Range 28 East, NMPM. The NW State Well No. 20 proposed for injection is located within 1/2 mile of this well. Well file and electric log data are non-existent on the Division's web site for the Tigner State Well No.

2. However, all other wells drilled near that well in the 1920's and early 1930's were drilled to the Grayburg (Premier) formation sands and only to approximately 2000 feet. In addition, lands located between the Tigner State Well No. 2 and the NW State No. 20 have been tested as wet and relatively tight over the San Andres formation. The Tigner State Well No. 2 is not a cause for concern for any proposed San Andres formation waterflood.

c. The investigation of the well records for over 100 wells, all located within the AOR's for these proposed injection wells, indicate only two wells appear to be inadequately cased and cemented in order to confine injection to the proposed Upper San Andres waterflood interval:

<u>Operator/API Number</u>	<u>Well Name &amp; Number</u>	<u>Well Location</u>
Three Rivers Operating Co. State "B" Gas Com No. 1 API No. 30-015-01611		1980' FSL & 1980' FEL (Unit J) Section 29-17S-28E
Apache Corporation API No. 30-015-02614	Empire Abo Unit No. 23B	1980' FNL & 1980' FEL (Unit G) Section 6-18S-28E

d. Proposed injection Well Nos. 14 and 15 are within ½ mile of these inadequately cemented wells. The State "B" Gas Com No. 1 is within the AOR of the NW State Well No. 14, and the Empire Abo Unit Well No. 23B is within the AOR of the NW State Well No. 15.

e. Because the two inadequately cemented AOR wells are actively producing from other Pools and are not operated by Lime Rock, the NW State Well Nos. 14 and 15 should not be approved for injection until issues concerning these wells are resolved.

f. All of the proposed injection wells are currently completed (perforated) within the proposed injection interval of 2400 feet to 2950 feet, with the exception of the NW State Well No. 28, which is currently completed in the interval from 2286 to 2548 feet. Prior to commencing injection operations into the NW State Well No. 28, Lime Rock should be required to cement squeeze or otherwise isolate the perforations from 2286 feet to 2399 feet in this well in order to confine injection to the requested interval.

g. The revised cooperative project area for the proposed Northwest State Cooperative Waterflood Project is fully contained within the Artesia-Queen-Grayburg-San Andres Pool (3230), with the exception of the NE/4 NE/4 of Section 31, that tract being contained within the Red Lake-Queen-Grayburg-San Andres Pool (51300).

(13) Lime Rock appeared at the hearing through counsel and presented testimony from an engineer and from a landman. The engineer presented the

construction of the C-108 form and the landman presented the ownership of the leases. The engineer also presented geologic cross-sections constructed by Lime Rock geologists and production rate vs. time projection plots generated by Lime Rock reservoir engineers. Lime Rock did not present direct testimony from a geologist or a reservoir engineer. The following was presented and is concluded from this testimony:

- a. The geologic evidence presented demonstrates that the San Andres formation is continuous throughout the proposed cooperative project area. The logs and the limit of successful completions indicate there are variations in the quality of the reservoir vertically and laterally. This reservoir has been adequately defined by drilling and attempted completions.
- b. The rate vs. time projections indicate there is little remaining primary production, the wells within the proposed cooperative project area are in an advanced state of depletion, and some sort of enhanced recovery is warranted if the reservoir is capable of this.
- c. Lime Rock predicted that implementing waterflood operations would result in an estimated additional 258,000 barrels of oil that would otherwise not be recovered by the existing wells under primary production. However, Lime Rock did not show a sound basis for this rate vs. time prediction.
- d. Volumetric or pressure data was not presented or compared to the reserves prediction obtained by an assumed rate vs. time plot. Results from analogous waterfloods in other marginal San Andres formation reservoirs were not presented or compared. Relative mobility ratio data was not presented – or other data to indicate waterflooding would be successful. The San Andres is a commonly waterflooded reservoir, but it is not always successful and, even if responsive to waterflooding, that response varies.
- e. Lime Rock's engineer testified that the proposed waterflood patterns were obtained in the best possible way *while considering the positioning of non-participating tracts within Section 32*. The indication is that those tracts hampered in some part the optimal positioning of water injection wells.
- f. Lime Rock speculated that these non-participating tracts would benefit from the offsetting injection in the proposed cooperative waterflood. It is also most probable, however, that the non-participating tracts within Section 32 will see an increase in water production due to the proposed waterflood – causing an increase in operating costs. The hope is that this increased water may bring in more oil – but the ability of this reservoir to be successfully waterflooded was not explored in detailed petroleum engineering evidence in this case, nor does the evidence convincingly demonstrate that the net effect on excluded tracts will not be unfavorable.

- g. Implementing a less than optimum waterflood pattern within this reservoir will lessen the ultimate possible recovery, causing waste and unnecessary expense.
- h. There are nine overriding royalty interest owners within the proposed cooperative project area, and the overrides are not uniform throughout the proposed project area. Lime Rock's evidence shows that it did not provide notice of this application to these overriding royalty interest owners. Lime Rock contends that because this is a proposed cooperative project, that notice of this application is not required to overriding royalty interest owners pursuant to Division rules and according to precedent established in prior Division orders.
- i. The presence of different state leases with various and differing overriding royalty owners did not prompt Lime Rock to attempt to form a voluntary unit or propose a Unit Agreement. No evidence was presented at this hearing of any attempt or intention to do this.
- j. Lime Rock testified that the nonparticipating tracts will likely benefit - implying oil may be swept from participating tracts to those nonparticipating tracts. Despite this, Lime Rock did not indicate any attempt was made to utilize the Division's statutory unitization powers to form a more favorable contiguous geographic area in which to implement waterflooding.

The Division concludes that:

(14) Lime Rock has shown that the San Andres wells in this area are depleted with a very short remaining primary recovery life. Lime Rock has assumed this reservoir can be waterflooded successfully and is rightfully attempting to extend the life of these wells.

(15) It is reasonably probable that implementation of a secondary recovery project within this reservoir is necessary in order to recover additional oil and gas reserves from the Upper San Andres interval in these lands.

(16) However, Lime Rock has not demonstrated that the proposed project area constitutes the optimal area for waterflooding this reservoir, nor has it demonstrated that the owners of the excluded tracts within Section 32 will not be adversely affected.

(17) Lime Rock also has not demonstrated that the overriding royalty interests, which are not uniform throughout the project area, will not be differentially or adversely affected by implementation of the proposed project.

(18) Although the entire project area is State land, it includes numerous different State leases. Since the Commissioner of Public Lands administers several

distinct land trusts for which different accounting is required, in the absence of preliminary approval by the Commissioner, the Division cannot assume that no State land interest will be adversely affected.

(19) Lime Rock should assess all lands within this well defined San Andres reservoir, should better predict the recovery from each tract of land to be included in its project, and, after securing preliminary approval from the Commissioner of Public Lands, should undertake to form a voluntary or statutory Unit including contiguous lands best amenable to waterflooding, and providing an appropriate formula to equitably allocate production among all included tracts.

(20) Approval of the lease cooperative waterflood over the lands as proposed could cause waste of oil and gas and impair correlative rights of overriding royalty owners, and/or owners of omitted, contiguous tracts, and should be denied in the absence of evidence that unitization is not feasible.

**IT IS THEREFORE ORDERED THAT:**

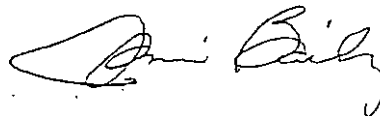
(1) The application of Lime Rock Resources A, L.P., ("Lime Rock" or "Operator") to inject for waterflood purposes into the Upper San Andres formation, over the cooperative lands detailed in findings above, is hereby denied.

(2) This denial is without prejudice to any future application to establish a waterflood project within this well defined San Andres reservoir, if, in connection with such future application, Lime Rock demonstrates that it has unitized the area to be included in the project by voluntary unit agreement, or has complied with the prerequisites for statutory unitization.

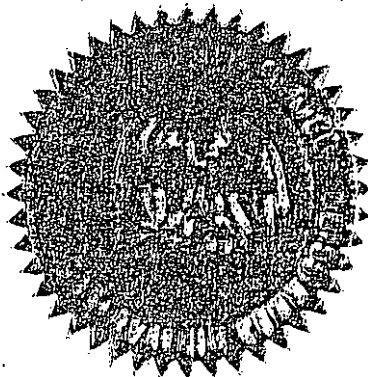
(3) Jurisdiction of this case is retained for the entry of such further orders as the Division may deem necessary.

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

STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION



JAMI BAILEY  
Director



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