

**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. 11580  
Order No. R-10663**

**APPLICATION OF DEVON ENERGY  
OPERATING CORPORATION FOR  
WATERFLOOD EXPANSION, EDDY  
COUNTY, NEW MEXICO.**

**ORDER OF THE DIVISION**

**BY THE DIVISION:**

This cause came on for hearing at 8:15 a.m. on July 25, 1996, at Santa Fe, New Mexico, before Examiner David R. Catanach.

NOW, on this 9th day of September, 1996, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

**FINDS THAT:**

(1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) The applicant, Devon Energy Operating Corporation, is the current operator of the Keel-West Waterflood Project which was originally approved by Division Order No. R-2268, as amended, and which encompasses, in part, Sections 3 through 10, Township 17 South, Range 31 East, NMPM, Grayburg-Jackson Pool, Eddy County, New Mexico.

(3) The applicant seeks authority to expand the Keel-West Waterflood Project by converting seven existing producing wells, described as follows, to injection wells:

<u>WELL NUMBER</u>	<u>WELL LOCATION</u>	<u>INJECTION INTERVAL</u>	<u>PACKER DEPTH</u>
J.L. Keel "B" No. 12	660' FNL & 660' FEL A-8-17S-31E	2,950'-3,730'	3,000'
J.L. Keel "B" No. 27	1980' FSL & 1980' FEL J-8-17S-31E	2,900'-3,728'	2,900'
J.L. Keel "B" No. 29	1980' FSL & 1980' FWL K-8-17S-31E	2,800'-3,697'	2,800'
J.L. Keel "B" No. 46	660' FSL & 660' FEL P-8-17S-31E	2,900'-3,751'	3,000'
J.L. Keel "B" No. 76	2030' FNL & 1980' FEL G-8-17S-31E	2,900'-3,820'	3,000'
J.L. Keel "B" No. 77	1930' FNL & 714' FEL H-8-17S-31E	3,000'-3,850'	3,050'
H.E. West "B" No. 35	1980' FSL & 860' FWL L-9-17S-31E	3,050'-3,950'	3,050'

(4) Applicant proposes to inject into the Grayburg-San Andres formation through the gross interval from approximately 2,800 feet to 3,950 feet.

(5) Applicant further proposes to inject into the subject wells through 2 3/8-inch or 2 7/8-inch tubing set in a packer located within 100 feet of the uppermost injection perforations at a rate of approximately 500 barrels of water per day.

(6) Applicant requests that the subject wells be allowed to inject at a maximum surface injection pressure of 2,500 psi. Applicant further testified that it is currently injecting into this waterflood project at an average pressure of approximately 2,000-2,100 psi under authority previously granted by the Division.

(7) Applicant testified that it has been unable to identify any fresh water wells or sources within one mile of the proposed injection wells.

(8) The applicant submitted data on the proposed injection wells and all other wells which penetrate the zone of interest within 1/2 mile thereof.

(9) This evidence indicates that there is a plugged and abandoned well located within ½ mile of the proposed injection wells which is not adequately plugged and abandoned so as to confine injected fluid to the proposed injection interval, this being the Keel "B" Well No. 28 located 1980 feet from the South line and 660 feet from the East line (Unit I) of Section 8, Township 17 South, Range 31 East, NMPM.

(10) It is the current policy of the Division not to allow injection within ½ mile of any well which is not adequately cased, cemented or plugged and abandoned so as to confine injection fluid to the injection interval.

(11) Applicant testified that due to the current condition of the wellbore, re-entry of the Keel "B" Well No. 28 for the purpose of re-plugging is not feasible.

(12) In lieu of a requirement to re-enter and re-plug the Keel "B" Well No. 28, applicant proposed that it be allowed to implement a phased injection and monitor program described as follows:

#### **PHASE I**

- a) immediately convert the J.L. Keel "B" Well Nos. 12, 29 and 76 to injection;
- b) utilize the J.L. Keel "B" Well Nos. 27, 46, 57, 77, 92 and 94 and the West "B" Well Nos. 35, 80 and 89 as monitor wells to evaluate reservoir performance around the Keel "B" Well No. 28. Parameters to be monitored include fluid levels and waterflood response. As response is experienced in any monitor well the rates in the adjacent injection wells will be adjusted as necessary to maintain the producing wells in a pumped off condition;

#### **PHASE II**

- c) after sufficient data is gathered to show that low fluid levels can be maintained in the producing wells by adjusting offset injection rates, the J.L. Keel "B" Well Nos. 27, 46 and 77 and the West "B" Well No. 35 will be converted to injection;

- d) utilize the J.L. Keel "B" Well Nos. 57, 92 and 94 and the West "B" Well Nos. 80 and 89 as monitor wells to evaluate reservoir performance around the Keel "B" Well No. 28. Parameters to be monitored include fluid levels and waterflood response. As response is experienced in any monitor well the rates in the adjacent injection wells will be adjusted as necessary to maintain the producing wells in a pumped off condition;
- e) continue to utilize the J.L. Keel "B" Well No. 57, which is located 80 feet east of the Keel "B" Well No. 28 at a location 1980 feet from the South line and 580 feet from the East line (Unit I) of Section 8, as a monitor well throughout the life of the project.

(13) Applicant contends that the proposed monitoring program will provide sufficient data necessary to control the reservoir pressure and therefore prevent fluid migration within the Keel "B" Well No. 28.

(14) The evidence and testimony presented in this case indicates that:

- a) the Keel "B" Well No. 28 contains Grayburg/San Andres perforations open in the tubing/casing annulus from a depth of 3,118 feet to 3,347 feet, and perforations open below the packer at a depth of 3,613 feet to 3,800 feet;
- b) there are no cement plugs in the wellbore between the depths of 1,230 feet and 3,800 feet (T.D.);
- c) attempted plugging operations by ARCO Oil & Gas Company on the Keel "B" Well No. 28 revealed the presence of a "void" or "cavern" in the salt section at a depth of 1,134 feet to 1,224 feet which may reportedly extend horizontally away from the wellbore a distance of approximately 4,400 feet;

- d) by authority of Division Order No. R-2268-C, applicant is currently injecting within the project at a surface injection pressure which exceeds the fracture pressure of the Grayburg-San Andres formation. Applicant further testified that it cannot conduct effective waterflood operations in this portion of the field at a reduced injection pressure;
- e) applicant testified that it has encountered waterflows in the salt section within the southern portion of Section 7, approximately one mile away from the proposed injection wells;
- f) the proposed monitoring program will not allow the applicant to detect fluid entry into the Keel "B" Well No. 28; and,
- g) the absence of fresh water wells in this area does not definitively indicate the absence of fresh water sources;

(15) Applicant's proposed Phase I injection and monitoring program is sufficient to ensure that injected fluid will not reach the Keel "B" Well No. 28 provided that the applicant utilize the J.L. Keel "B" Well Nos. 15, 27 and 92 as producing wells throughout the life of the project.

(16) Applicant's proposed Phase II injection and monitoring program does not adequately protect against the possibility of injected fluid reaching the Keel "B" Well No. 28 and migrating up-hole to other formations.

(17) Applicant should be authorized to convert the J.L. Keel "B" Well Nos. 12, 29 and 76 to injection wells within the Keel-West Waterflood Project as proposed, provided however, continued use of these wells as injection wells should be contingent upon continued utilization of the J.L. Keel "B" Well Nos. 15, 27 and 92 as producing wells.

(18) Applicant's proposed conversion of the J.L. Keel "B" Well Nos. 27, 46 and 77 and the West "B" Well No. 35 to injection wells (Phase II) should be denied.

(19) The operator should take all steps necessary to ensure that the injected fluid enters only the proposed injection interval and is not permitted to escape into other formations or onto the surface from injection, production or plugged and abandoned wells.

(20) The casing-tubing annulus within the J.L. Keel "B" Well Nos. 12, 29 and 76 should be filled with an inert fluid and a gauge or approved leak-detection device should be attached to the annulus in order to determine leakage in the casing, tubing or packer.

(21) Prior to commencing injection operations into the J.L. Keel "B" Well Nos. 12, 29 and 76, the casing in each well should be pressure tested throughout the interval from the surface down to the proposed packer setting depth, to assure the integrity of such casing.

(22) The injection wells or pressurization system should be initially equipped with a pressure control device or acceptable substitute which will limit the surface injection pressure to no more than 2,100 psi.

(23) The Division Director should have the authority to administratively authorize a pressure limitation in excess of the pressure limitation described above upon a showing by the operator that such higher pressure will not result in the migration of fluid from the injection formation.

(24) The operator should give advance notification to the supervisor of the Artesia District Office of the Division of the date and time of the installation of injection equipment and of the mechanical integrity pressure tests in order that the same may be witnessed.

(25) The injection authority granted herein for the subject injection wells should terminate one year after the effective date of this order if the operator has not commenced injection operations into the wells, provided however, the Division, upon written request by the operator, may grant an extension thereof for good cause shown.

**IT IS THEREFORE ORDERED THAT:**

(1) The applicant, Devon Energy Corporation, is hereby authorized to convert the following described wells to injection wells within its Keel-West Waterflood Project in Section 8, Township 17 South, Range 31 East, NMPM, Grayburg-Jackson Pool, Eddy County, New Mexico:

<u>WELL NUMBER</u>	<u>WELL LOCATION</u>	<u>INJECTION INTERVAL</u>	<u>PACKER DEPTH</u>
J.L. Keel "B" No. 12	660' FNL & 660' FEL A-8-17S-31E	2,950'-3,730'	3,000'
J.L. Keel "B" No. 29	1980' FSL & 1980' FWL K-8-17S-31E	2,800'-3,697'	2,800'
J.L. Keel "B" No. 76	2030' FNL & 1980' FEL G-8-17S-31E	2,900'-3,820'	3,000'

PROVIDED HOWEVER THAT, injection into the aforesaid wells shall occur only at such time as the J.L. Keel "B" Well Nos. 15, 27 and 92 are utilized as producing wells. If production operations within the J.L. Keel "B" Well Nos. 15, 27 and 92 are discontinued for any reason, injection into the subject injection wells shall cease as well.

(2) The applicant's proposed conversion of the J.L. Keel "B" Well Nos. 27, 46 and 77 and the West "B" Well No. 35 to injection within the Keel-West Waterflood Project is hereby denied.

(3) The operator shall take all steps necessary to ensure that the injected fluid enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface from injection, production, or plugged and abandoned wells.

(3) Injection shall be accomplished through 2 3/8 or 2 7/8 inch tubing installed in a packer set within 100 feet of the uppermost injection perforations; the casing-tubing annulus shall be filled with an inert fluid and equipped with an approved pressure gauge or attention-attracting leak detection device.

(4) The injection wells or pressurization system shall be equipped with a pressure control device or acceptable substitute which will limit the surface injection pressure to no more than 2,100 psi.

(5) The Division Director shall have the authority to administratively authorize a pressure limitation in excess of the above upon a showing by the operator that such higher pressure will not result in the migration of injection fluid from the injection formation.

(6) Prior to commencing injection operations, the casing in each well shall be pressure-tested throughout the interval from the surface down to the proposed packer setting depth, to assure the integrity of such casing.

(7) The operator shall give advance notification to the supervisor of the Artesia District Office of the Division of the date and time of the installation of injection equipment and of the mechanical integrity pressure tests in order that the same may be witnessed.

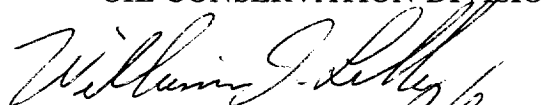
(8) The operator shall immediately notify the supervisor of the Artesia District Office of the Division of the failure of the tubing, casing or packer in the injection wells, the leakage of water, oil or gas from or around any producing well, or the leakage of water, oil or gas from any plugged and abandoned well within the project area, and shall take such steps as may be timely and necessary to correct such failure or leakage.

(9) The injection authority granted herein for the subject injection wells shall terminate one year after the effective date of this order if the operator has not commenced injection operations into the wells, provided however, the Division, upon written request by the operator, may grant an extension thereof for good cause shown.

(10) Jurisdiction of this cause 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



WILLIAM J. LeMAY  
Director

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