

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. 9931
ORDER NO. R-9466*

**APPLICATION OF ARCO OIL AND GAS COMPANY
FOR A PRESSURE MAINTENANCE EXPANSION AND AN
UNORTHODOX GAS INJECTION WELL, EDDY COUNTY,
NEW MEXICO**

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on June 13, 1990 at Santa Fe, New Mexico, before Examiner Michael E. Stogner.

NOW, on this 15th day of March, 1991 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, ARCO Oil and Gas Company (ARCO), seeks authority to expand its Empire-Abo Unit Pressure Maintenance Project, authorized by Division Order No. R-4549, as amended, by converting its Empire-Abo Unit "J" Well No. 10, located 2310 feet from the North and West lines (Unit F) of Section 3 and Empire-Abo Unit "J" Well No. 13 located 1980 feet from the North line and 660 feet from the West line (Unit E) of Section 2, both in Township 18 South, Range 27 East, Empire-Abo Pool, Empire-Abo Unit Pressure Maintenance Project Area, NMPM, Eddy County, New Mexico, from producing oil wells to gas injection wells.

(3) Further, the applicant also seeks an exception to Rule 7-A of the Special Rules and Regulations for the Empire-Abo Unit Pressure Maintenance Project, as promulgated by said Order No. R-4549, as amended, for the "J" Well No. 13 which is located at an unorthodox gas injection well location.

(4) Rule 7-A of the Special Rules and Regulations for said project provides, in part, "that no well shall be approved for gas or water injection when such well is located closer than 1650 feet to a tract which is not committed to the unit and on which is located a well producing from the same common source of supply."

(5) By Division Order No. R-4808, dated June 11, 1974, OXY USA, Inc. (OXY), formerly Cities Service Oil Company, was authorized to institute a gas injection pressure maintenance project designated the Citgo Empire-Abo Unit Pressure Maintenance Project in the Empire-Abo Pool located in portions of Section 35, Township 17 South, Range 27 East, and comprising the NW/4 NE/4 and NE/4 NW/4 of Section 2, Township 18 South, Range 27 East, NMPM, Eddy County, New Mexico.

(6) The ARCO Empire-Abo Unit "J" Well No. 13 proposed new gas injector is located 933 feet from the southwest corner of the spacing unit on which OXY continues to produce oil and liquid saturated gas (through perforations from 5627 feet to 5731 feet) from its Citgo Empire-Abo Unit Tract No. 3 Well No. 5 which is located 990 feet from the North line and 1980 feet from the West line (Unit C) of said Section 2.

(7) OXY appeared in opposition to ARCO's application for conversion of the Empire-Abo Unit "J" Well No. 13 to gas injection and seeks the enforcement of Rule 7-A to said Special Rules in order to protect its correlative rights, asserting that said injection would cause its Citgo Empire-Abo Unit Well No. 5 to produce natural gas at higher rates thereby causing waste by allowing the loss of production of oil and other liquid hydrocarbons. OXY raised no objection to the conversion to injection of the Empire-Abo Unit "J" Well No. 10.

(8) The Empire-Abo Pool is a massive reef structure with variable thickness trending east-northeast and west-southwest over approximately nine miles. Both the ARCO and OXY projects are within the Empire-Abo Pool and involve a similar plan of operation where reservoir voidage is controlled, the gas and liquids are produced by production wells located downstructure on the reef and the produced gas is then stripped of natural gas liquids (NGL) and the "dry" gas reinjected into gas injection wells located high on the reef structure thereby forcing the oil down preventing premature gas coning in the producing wells.

(9) ARCO's testimony indicates that in the 16 years that the above-described operations have been in effect, they have resulted in:

- 1) a very large column of gas on top of a relatively thin column of oil; and
- 2) an associated stripping pattern between wells whereby the injected gas in the top of the reef has also channeled across the top of the reef and down to the producers.

(10) It is ARCO's intent to inject gas in the subject wells through perforations located lower in the structure than had previously been utilized in order to provide a more efficient sweep of any remaining NGLs from the reservoir:

- Empire-Abo Unit "J" Well No. 10
Proposed injection interval - 5564 feet to 5630 feet
- Empire-Abo Unit "J" Well No. 13
Proposed injection interval - 5710 feet to 5784 feet.

(11) The geological evidence presented by both parties indicates the presence of natural fractures in the reservoir which are oriented in a northeast-southwest direction. The evidence also indicates that said fractures have provided pressure communication between wells in close proximity of this immediate area.

(12) There are indications from the evidence presented that the "dry" gas injected into the ARCO Empire-Abo Unit "J" Well No. 13 would migrate horizontally to the northeast by way of these fractures and cause OXY's Citgo Empire-Abo Unit No. 5 to experience premature loss of NGL and oil production.

(13) It was the original intent by the applicant when the Empire-Abo Unit Pressure Maintenance Project was initiated and is further confirmed at this time by all parties concerned that the purpose of said Rule 7-A was to locate gas injection wells far enough away from non-unit participants so the correlative rights of said non-unit owners would be protected.

(14) ARCO's testimony was insufficient to show that any influence or disturbance to the Empire-Abo Pool from gas injection into its "J" Well No. 13 would be confined only to its Project Area, therefore approval of the Empire-Abo Unit "J" Well No. 13 to be utilized as a gas injection well should be **denied**.

(15) The location of the ARCO Empire-Abo Unit "J" Well No. 10 is such that no parties outside the Empire-Abo Unit would be adversely affected in any way and fully conforms to Rule 7-A of the Special Rules and Regulations of the Empire-Abo Unit Pressure Maintenance Project.

(16) Approval for the conversion of the No. 10 well from a producing oil well to a gas injection well is in the best interest of conservation, will serve to protect correlative rights and will result in the increased recovery of the Empire-Abo Unit Pressure Maintenance Project thereby preventing the waste of hydrocarbons.

(17) The operator should take all steps necessary to ensure that the injected gas 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.

(18) At the time of the hearing the applicant requested that it be allowed to inject gas into the Empire-Abo Unit into the Empire-Abo Unit "J" Well No. 10 up to a maximum surface pressure of 2000 psi which is greater than the Division's recommended guideline of 0.2 psi per foot of depth from the surface to the uppermost perforation.

(19) Prior to the approval of such higher injection pressure, the applicant should conduct a step-rate test on the proposed injection well to ensure that said higher pressure will not result in the fracturing of the injection formation or confining strata. Further, the Director of the Division should be authorized to administratively approve such an increase in the injection pressure.

(20) The Empire-Abo Unit "J" Well No. 10 should therefore initially be equipped as to limit the injection pressure at the wellhead to no more than 1113 psi.

(21) Injection should be accomplished through 2 3/8-inch plastic coated tubing installed in a packer set at approximately 5450 feet; the casing-tubing annulus should be filled with an inert fluid; and a pressure gauge or approved leak-detection device should be attached to the annulus in order to determine leakage in the casing, tubing or packer.

(22) Prior to commencing injection operations, the casing of the Empire-Abo Unit "J" Well No. 10 should be pressure-tested throughout the interval, from the surface down to the proposed packer-setting depth, to assure integrity of such casing.

(23) 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-test in order that the same may be witnessed.

(24) The subject application should be approved and the project should be governed by the provisions of Rules 702 through 708 of the Division Rules and Regulations.

IT IS THEREFORE ORDERED THAT:

(1) The portion of the application by ARCO Oil and Gas Company to convert its Empire-Abo Unit "J" Well No. 13 located 1980 feet from the North line and 660 feet from the West line (Unit E) of Section 2, Township 18 South, Range 27 East, Empire-Abo Pool, Empire-Abo Unit Pressure Maintenance Project Area, NMPM, Eddy County, New Mexico from its present status to a gas injection well is hereby **denied**.

(2) The applicant, however, is authorized to expand said Empire-Abo Unit Pressure Maintenance Project by converting its "J" Well No. 10 located 2310 feet from the North and West lines (Unit F) of Section 3, Township 18 South, Range 27 East, Empire-Abo Pool, NMPM, Eddy County, New Mexico from a producing oil well to a gas injection well.

(3) Injection into the Empire-Abo Unit "J" Well No. 10 shall be accomplished through 2 3/8-inch internally plastic-coated tubing installed in a packer set at approximately 5450 feet, with injection into the perforated interval from approximately 5564 feet to 5630 feet;

PROVIDED HOWEVER THAT, the casing-tubing annulus shall be filled with an inert fluid; and a pressure gauge shall be attached to the annulus or the annulus shall be equipped with an approved leak-detection device in order to determine leakage in the casing, tubing or packer.

PROVIDED FURTHER THAT, prior to commencing injection operations, the casing in the subject well shall be pressure-tested to assure the integrity of such casing in a manner that is satisfactory to the supervisor of the Division's Artesia District Office.

(4) The injection well or system shall be equipped with a pressure-limiting switch or other acceptable device which will limit the wellhead pressure on the injection well to no more than 1113 psi.

(5) The Director of the Division may authorize an increase in injection pressure upon a proper showing by the operator of said well that such higher pressure will not result in migration of the injected fluid from the Abo formation.

(6) The operator shall notify the supervisor of the Artesia District Office of the Division in advance of the date and time of the installation of injection equipment and of the mechanical integrity pressure-test in order that the same may be witnessed.

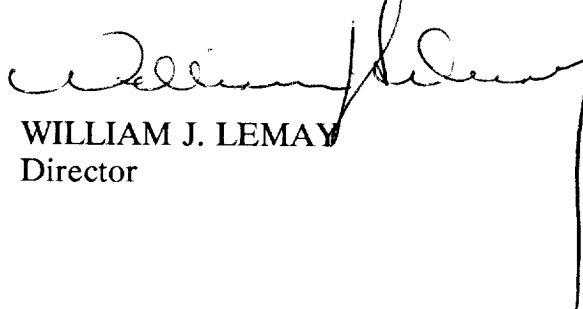
(7) The operator shall immediately notify the supervisor of the Division's Artesia District Office of the failure of the tubing, casing or packer in said well or the leakage of gas or liquids from or around said well and shall take such steps as may be timely and necessary to correct such failure or leakage.

(8) Monthly progress reports of the pressure maintenance project herein authorized shall be submitted to the Division in accordance with Rules 706 and 1115 of the Division Rules and Regulations.

(9) 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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