

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 15<sup>th</sup> 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.

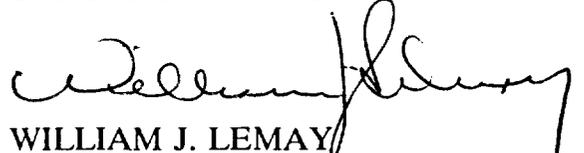
(8) Monthly progress reports of the pressure maintenance project herein authorized shall be submitted to the Division in accordance with Rules 706 and 1115 of the Division Rules and Regulations.

(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

BEFORE THE OIL CONSERVATION COMMISSION  
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF NEW MEXICO FOR  
THE PURPOSE OF CONSIDERING:

CASE NO. 5213  
Order No. R-4808

APPLICATION OF CITIES SERVICE  
OIL COMPANY FOR A PRESSURE  
MAINTENANCE PROJECT, EDDY COUNTY,  
NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on April 10, 1974, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 11th day of June, 1974, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Cities Service Oil Company, seeks authority to institute a pressure maintenance project in the Empire-Abo Pool in its Citgo Empire-Abo Unit Area, Eddy County, New Mexico, by the injection of gas into the Abo formation through a well to be drilled at an unorthodox location 990 feet from the South line and 2635 feet from the East line of Section 35, Township 17 South, Range 27 East.

(3) That the applicant further seeks the designation of the project area and the promulgation of special rules and regulations governing said project, including provision for the operation of the project under a net GOR rule and the establishment of a gas injection credit "bank" against which injection credit could be drawn in order to maintain full allowables during such times as injection plant shut-downs and similar problems.

(4) That initially the project area should comprise the following described area:

EDDY COUNTY, NEW MEXICO  
TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM  
Section 35: SE/4, S/2 SW/4, and NE/4 SW/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM  
Section 2: NE/4 NW/4 and NW/4 NE/4

(5) That the applicant is the operator of the Citgo Empire-Abo Unit, which embraces the above-described lands.

(6) That the Citgo Empire-Abo Unit embraces lands immediately adjacent to the Atlantic Richfield Empire-Abo Unit Area, which area is also under pressure maintenance by the injection of gas, and injection of gas in the Citgo Empire-Abo Unit Area is in the interest of more efficient operation of the pool as a whole.

(7) That the production permitted the Atlantic Richfield Empire-Abo Pressure Maintenance Project is limited to reservoir voidage equal to or less than the average reservoir voidage for the project area for the calendar year 1972.

(8) That the evidence indicates that the portion of the Empire-Abo Pool underlying the Citgo Empire-Abo Unit Area will be more efficiently produced by operating under a reservoir voidage formula similar to that used for said Atlantic Richfield project.

(9) That reinjection of produced gas at a location 990 feet from the South line and 2635 feet from the East line of Section 35, Township 17 South, Range 27 East, will efficiently aid in maintaining pressures in the Abo formation in the unit area, and an injection well at that location should be approved.

(10) That the production from the project area should be limited to the average reservoir voidage for the project area for the calendar year 1972 (2213 reservoir barrels) or 852 barrels of oil per day, whichever is less.

(11) That special rules and regulations for the operation of the Citgo Empire-Abo Unit Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project area in any proportion, provided that no well in the project area which directly or diagonally offsets a well not committed to said unit producing from the same common source of supply should be allowed to produce more than two top unit allowables for the Empire-Abo Pool.

(12) That an administrative procedure should be established whereby said project area may be contracted or expanded for good cause shown, and whereby additional injection wells and producing wells at orthodox and unorthodox locations in the project area may be approved without the necessity of notice and hearing.

(13) That approval of the application for a pressure maintenance project and the proposed special rules therefor is in the interest of sound conservation practices and will not cause waste nor harm correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Cities Service Oil Company, is hereby authorized to institute a pressure maintenance project in the Empire-Abo Pool in the Citgo Empire-Abo Unit Area, Eddy County, New Mexico, to be designated the Citgo Empire-Abo Unit Pressure Maintenance Project, by the shutting in or curtailment of production from less efficient wells and/or the reinjection of produced gas as raw gas or plant residue gas into the Abo formation.

(2) Initial injection of gas shall be through a well to be drilled at an unorthodox location 990 feet from the South line and 2635 feet from the East line of Section 35, Township 17 South, Range 27 East, NMPM, which location is hereby approved.

(3) That the injection should be through 2 3/8-inch internally coated tubing installed in a packer set within 100 feet of the uppermost perforations, and that the casing-tubing annulus should be fitted with a pressure gauge in order to determine leakage in the casing, tubing, or packer.

(4) That Special Rules and Regulations governing the operation of the Citgo Empire-Abo Unit Pressure Maintenance Project, Eddy County, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS  
FOR THE  
CITGO EMPIRE-ABO PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the Citgo Empire-Abo Unit Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area described as follows:

EDDY COUNTY, NEW MEXICO  
TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM  
Section 35: SE/4, S/2 SW/4, and NE/4 SW/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM  
Section 2: NE/4 NW/4 and NW/4 NE/4

RULE 2. The allowable for the project shall be computed monthly based on the estimated net reservoir voidage for the succeeding month.

RULE 3. The maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage for the project area for the calendar year 1972 (2213 reservoir barrels) or 852 barrels of oil per day, whichever is less.

RULE 4. The allowable assigned to the project area may be produced from any well or wells within the project area in any proportion, provided that no producing well in the project area which directly or diagonally offsets a well not committed to the Unit and producing from the same common source of supply, shall produce in excess of two times top unit allowable for the pool and provided that individual well allowables have been requested in accordance with Rule 5 below.

RULE 5. Each month the project operator shall submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 6. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules.

RULE 7. That the volume of gas required to be injected in any month to maintain average daily reservoir voidage in the project area at 2213 reservoir barrels shall be known as "Reservoir Voidage Balance Gas."

RULE 8. That all calculations of reservoir voidage shall be in accordance with the formula set out in Attachment "A" to this order utilizing the Table of Fluid Properties set out in Attachment "B" to this order.

RULE 9. A gas "bank" shall be established for the project against which injection credit may be drawn in order to maintain allowable production during such times as injection compressor shutdowns and similar problems. The gas bank shall operate under and be subject to the following provisions:

- (a) That volume of gas injected in the project in any month in excess of Reservoir Voidage Balance Gas shall be credited to the gas bank and be carried cumulatively forward.
- (b) The gas bank balance shall not exceed a maximum of the average monthly total Reservoir Voidage Balance Gas volumes for the previous three (3) months, not including the month being reported.
- (c) The operator shall report monthly to the Commission the status of the gas bank in a form acceptable to the Commission. The report shall be designed to show the status of the gas bank over a twelve (12) month period and shall be revised monthly to a current basis.

- (d) The accumulated gas bank may be applied to the injection volume during any future month in which the gas injection volume is less than the Reservoir Voidage Balance Gas volume.
- (e) In the event there are insufficient credits accrued to the gas bank to bring actual injection plus applied credits up to the Reservoir Voidage Balance Gas requirement during any given production month, production for that month shall be reduced to an amount commensurate with the average daily reservoir voidage set forth in Rule 3 above. Production beyond this amount shall be considered overproduction and shall be compensated for by underproduction during the following month.

RULE 10. The Secretary-Director of the Commission is hereby authorized to approve such additional producing wells and injection wells at orthodox and unorthodox locations within the boundaries of the Citgo Empire-Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided said producing wells are drilled no closer than 660 feet to the outer boundary of said unit nor closer than 10 feet to any quarter-quarter section or subdivision inner boundary and provided that no well shall be approved for gas 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. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(a) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(b) A schematic drawing of the proposed well which fully describes the casing, tubing, perforated interval, and depth.

(c) A letter stating that all offset operators to the proposed well have been furnished a complete copy of the application and the date of notification.

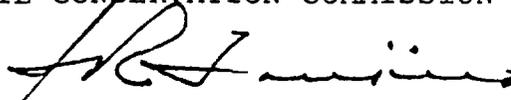
The Secretary-Director may approve the proposed well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

RULE 11. Expansion or contractions of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

(5) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION



I. R. TRUJILLO, Chairman



ALEX J. ARMIJO, Member



A. L. PORTER, JR., Member & Secretary

S E A L

CITGO EMPIRE ABO UNIT AREA

Table of Fluid Properties

$P_{base} = 15.025 \text{ psia}$

$P_{bp} = 2231 \text{ psia}$

$T_{res} = 109^{\circ}\text{F} (569^{\circ}\text{R})$

$P_r$ (PSIA)	$B_o$ (RUBO/STBO)	$B_g$ (RUB/MCF)	$R_s$ (MCF/BBL)	$Z$
15.025	1.000	194.696	0	1.0
100	1.125	28.229	.180	.965
200	1.163	13.749	.235	.940
300	1.193	8.970	.290	.920
400	1.218	6.692	.345	.915
500	1.244	5.236	.395	.895
600	1.263	4.276	.445	.877
700	1.285	3.644	.495	.872
800	1.304	3.108	.540	.850
900	1.325	2.746	.585	.845
1000	1.344	2.437	.625	.833
1100	1.364	2.178	.675	.819
1200	1.384	1.962	.725	.805
1300	1.404	1.790	.775	.795
1400	1.425	1.649	.825	.789
1500	1.445	1.516	.875	.777
1600	1.465	1.404	.925	.768
1700	1.485	1.304	.975	.758
1800	1.505	1.220	1.025	.751
1900	1.525	1.147	1.075	.745
2000	1.548	1.053	1.125	.720
2100	1.573	1.000	1.175	.718
2200	1.597	.953	1.225	.717
2231	1.606	.939	1.250	.716

$P_r$  = Reservoir average pressure at datum -2264' subsea, lbs/in absolute

$B_o$  = Oil formation volume factor, reservoir volumetric bbls/stock tank bbl.

$B_g$  = Gas formation volume factor, reservoir volumetric bbls/thousand std. cu. ft.

$R_s$  = Solution Gas/Oil Ratio, Thousand std. cu. ft./stock tank bbls. oil.

$Z$  = Gas Compressibility Factor

CITGO EMPIRE ABO UNIT AREA

Reservoir Voidage Formula - Gas Injection Credit

Equation 1:  $V_{rvb} = Q_o [B_o + (R_{pn} - R_s) B_g]$

Where:

$V_{rvb}$  = Reservoir voidage, bbls. per day  
 $Q_o$  = Oil Production rate, Stock tank bbls. per day  
 $B_o$  = Oil formation volume factor (1), reservoir  
volumetric bbls/stock tank bbl.  
 $R_{pn}$  = Net producing gas-oil ratio, NCF/S.T.B.O.

$$R_{pn} = R_p \left( 1.0 - \frac{G_i}{G_p} \right)$$

Where:

$R_p$  = producing gas-oil ratio, MCF/BO  
 $G_i$  = daily volume of gas injected  
MCF/Day  
 $G_p$  = daily volume of gas produced,  
MCF/Day

$R_s$  = Solution gas-oil ratio (2), MCF/STBO  
 $B_g$  = Gas formation volume factor (3), RVB/MCF

(1), (2), (3): These values calculated from  
Table of Fluid Properties,  
Attachment "B".

Attachment "A" Order No. R-4808

BEFORE THE OIL CONSERVATION COMMISSION  
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF NEW MEXICO FOR  
THE PURPOSE OF CONSIDERING:

CASE NO. 4953  
Order No. R-4549

APPLICATION OF ATLANTIC RICHFIELD  
COMPANY FOR A PRESSURE MAINTENANCE  
PROJECT, EDDY COUNTY, NEW MEXICO.

*Also see*  
*R-4549-A and*  
*R-4549-B*  
*R-4549-C*  
*R-4549-D*  
*R-4549E*  
*R-4549F*

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on April 25, 1973,  
at Santa Fe, New Mexico, before Examiner Richard L. Stamets. *R-4549E*

NOW, on this 15th day of June, 1973, the Commission, a  
quorum being present, having considered the testimony, the  
record, and the recommendations of the Examiner, and being  
fully advised in the premises,

*Also see*  
*Composite rules*  
*at end of R-4549-E*

FINDS:

- (1) That due public notice having been given as required  
by law, the Commission has jurisdiction of this cause and the  
subject matter thereof.
- (2) That the applicant, Atlantic Richfield Company, seeks  
authority to institute a pressure maintenance project in the  
Empire-Abo Pool in its Empire-Abo Unit Area, Eddy County, New  
Mexico, by initially limiting reservoir voidage, and within  
one year by reinjection of approximately 70 percent of the  
produced gas, as plant residue gas, into the Abo formation  
through eight wells in Section 36, Township 17 South, Range 27  
East, Sections 3, 4, and 9, Township 18 South, Range 27 East,  
and Sections 26, 31, 32, and 33, Township 17 South, Range 28  
East.
- (3) That the applicant further seeks the designation of  
the project area and the promulgation of special rules and  
regulations governing said project, including provision for  
the assignment of special allowables to wells in the project  
area based on reservoir voidage factors, net gas-oil ratios,  
the shutting in or curtailment of less efficient wells, and  
allowable credit for gas injection wells.
- (4) That initially the project area should comprise only  
the following described area:

160  
40.13  
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200.13 *corro*

EDDY COUNTY, NEW MEXICO

TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM

Section 34: S/2 SE/4  
Section 36: S/2

*no new cuts*

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM

Section 25: S/2 and S/2 N/2  
Section 26: S/2, S/2 NE/4, and SE/4 NW/4 (N9)  
Section 27: N/2 S/2, SE/4 SE/4, and SW/4 SW/4 SW SE  
Section 31: S/2 and S/2 N/2  
Section 32: S/2, NE/4, S/2 NW/4, and NE/4 NW/4  
Section 33: S/2, NE/4, S/2 NW/4, and NE/4 NW/4  
Section 34: N/2, SW/4, and N/2 SE/4 S/2 SE/4 (73-C)  
Section 35: N/2 and N/2 S/2  
Section 36: N/2 NW/4 and SW/4 NW/4

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM

Section 29: S/2 NW/4 and N/2 SW/4  
Section 30: SW/4, S/2 N/2, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM

Section 1: All  
Section 2: S/2, NE/4 NE/4, SW/4 NE/4, S/2 NW/4, and NW/4 NW/4  
Section 3: All  
Section 4: SE/4, S/2 NE/4, S/2 SW/4, and NE/4 SW/4  
Section 8: E/2 SE/4 and SE/4 NE/4  
Section 9: All  
Section 10: W/2 and NE/4  
Section 11: NW/4, W/2 NE/4, and NE/4 NE/4  
Section 15: N/2 NW/4 and SW/4 NW/4  
Section 16: N/2, SW/4, N/2 SE/4, and SW/4 SE/4  
Section 17: S/2 NE/4, NE/4 NE/4, SE/4 NW/4, NE/4 SW/4, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM

Section 4: N/2 NW/4, SW/4 NW/4, and NW/4 NE/4  
Section 5: NE/4 and N/2 NW/4  
Section 6: NW/4, N/2 SW/4, N/2 SE/4, SW/4 SE/4, S/2 NE/4, and NE/4 NE/4 NWNE 77 40.13  
SE SW 95-A

(5) That the applicant has been a major operator in the Empire-Abo Pool and that with a majority of the other operators in said pool has conducted extensive reservoir evaluations and studies in and of said pool.

(6) That said evaluations and studies show that the Empire-Abo Pool will be more efficiently produced through the curtailment of production from high gas-oil ratio wells or by reinjection of plant residue gas or both, and operation of the pool on a net reservoir voidage basis.

(7) That said evaluations and studies show that production from the project area as described in Finding (4) of this order should be limited to the average reservoir voidage for the project area for the calendar year 1972 or 30,000 barrels of oil per day, whichever is less, except that after reinjection of approximately 70 percent of the produced gas has been achieved, the production from said project area should be limited to the average reservoir voidage for the calendar year 1972 or 40,192 barrels of oil per day, whichever is less.

(8) That to provide incentive for the reinjection of produced gas prior to achievement of the full 70 percent reinjection planned, production in excess of the aforementioned 30,000 barrels per day should be permitted within the project area. Said excess production should be computed in accordance with the following formula and should be limited to 10,192 barrels per day:

$$\begin{aligned} \text{Additional Allowable in} \\ \text{Excess of 30,000 BOPD} = 97.07 \left[ 2 \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF gas prod. previous month}} \right)^2 \right. \\ \left. + \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF gas prod. previous month}} \right) \right] \end{aligned}$$

(9) That the aforesaid pressure maintenance project, designated the ARCO Empire-Abo Unit Pressure Maintenance Project, and comprising the above-described area, is in the interest of conservation and should result in the recovery of approximately thirty million barrels of additional oil from said reservoir.

(10) That an administrative procedure should be established whereby said project area may be contracted or expanded for good cause shown and whereby additional injection wells and producing wells at orthodox and unorthodox locations in the project area may be approved without the necessity of notice and hearing.

(11) That special rules and regulations for the operation of the ARCO Empire-Abo Unit Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project area in any proportion, provided that no well in the project area which directly or diagonally offsets a well not committed to said unit producing from the same common source of supply should be allowed to produce more than two top unit allowables for the Empire-Abo Pool.

(12) That approval of the application for a pressure maintenance project and the proposed special rules therefore is in the interest of sound conservation practices and will not cause waste or harm correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Atlantic Richfield Company, is hereby authorized to institute a pressure maintenance project in the Empire-Abo Pool in its Empire-Abo Unit Area, Eddy County, New Mexico, to be designated the ARCO Empire-Abo Unit Pressure Maintenance Project, initially by the shutting in or curtailment of production from less efficient wells within the project and within 12 months after the effective date of this order by the reinjection of approximately 70 percent of the produced gas, as plant residue gas, into the Abo formation, through the following described wells:

<u>OPERATOR</u>	<u>LEASE NAME</u>	<u>WELL NO.</u>	<u>SECTION</u>	<u>LOCATION</u>
Amoco	Malco "H" Federal	2	9	H C
Amoco	Windfuhr Federal	4	4	J
Exxon	Chalk Bluff Draw Unit "A"	4	9	C

*will be substituted*

All in Township 18 South, Range 27 East, NMPM.

M. Yates III	Dooley Abo State	2	36	J
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In Township 17 South, Range 27 East, NMPM.

Hondo	State "A"	21	26	K
Amoco	State "BM"	1	31	K
Amoco	State "BV"	1	32	F
Arco	M. Yates B (ARC)	8	33	G

All in Township 17 South, Range 28 East, NMPM.

(2) That the injection should be through 2 3/8-inch internally coated tubing installed in a packer set within 100 feet of the uppermost perforations, and that the casing-tubing annulus should be fitted with a pressure gauge in order to determine leakage in the casing, tubing, or packer.

(3) That Special Rules and Regulations governing the operation of the ARCO Empire-Abo Unit Pressure Maintenance Project, Eddy County, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS  
FOR THE  
EMPIRE-ABO PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the ARCO Empire-Abo Unit Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area described as follows:

EDDY COUNTY, NEW MEXICO

TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM

Section 34: S/2 SE/4  
Section 36: S/2

R4549A

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM

Section 25: S/2 and S/2 N/2  
Section 26: S/2, S/2 NE/4, and SE/4 NW/4  
Section 27: N/2 S/2, SE/4 SE/4, and SW/4 SW/4 SW/4 SE/4  
Section 31: S/2 and S/2 N/2  
Section 32: S/2, NE/4, S/2 NW/4, and NE/4 NW/4  
Section 33: S/2, NE/4, S/2 NW/4, and NE/4 NW/4  
Section 34: N/2, SW/4, and N/2 SE/4 and S/2 SE/4  
Section 35: N/2 and N/2 S/2  
Section 36: N/2 NW/4 and SW/4 NW/4

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM

Section 29: S/2 NW/4 and N/2 SW/4  
Section 30: SW/4, S/2 N/2, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM

Section 1: All  
Section 2: S/2, NE/4 NE/4, SW/4 NE/4, S/2 NW/4, and NW/4 NW/4  
Section 3: All  
Section 4: SE/4, S/2 NE/4, S/2 SW/4, and NE/4 SW/4  
Section 8: E/2 SE/4 and SE/4 NE/4  
Section 9: All  
Section 10: W/2 and NE/4  
Section 11: NW/4, W/2 NE/4, and NE/4 NE/4  
Section 15: N/2 NW/4 and SW/4 NW/4  
Section 16: N/2, SW/4, N/2 SE/4, and SW/4 SE/4  
Section 17: S/2 NE/4, NE/4 NE/4, SE/4 NW/4, NE/4 SW/4, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM

Section 4: N/2 NW/4, SW/4 NW/4, and NW/4 NE/4  
Section 5: NE/4 and N/2 NW/4  
Section 6: NW/4, N/2 SW/4, N/2 SE/4, SW/4 SE/4, S/2 NE/4, and NE/4 NE/4 and NW/4 NE/4 (Lot 2) and SE/4 SW/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. That the maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage in the project

area for the calendar year 1971 or ~~30,000~~<sup>33,000</sup> barrels of oil per day, whichever is less, except that after reinjection of approximately 70 percent of the produced gas has been achieved the maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage for the project area for the year 1972 or 40,192 barrels of oil per day, whichever is less.

RULE 4. That after gas reinjection ~~has~~<sup>33000</sup> commenced but before the full 70 percent reinjection has been achieved, allowable in addition to the above-described ~~30,000~~ barrels per day may be assigned to the project area, provided that said allowable shall be based on gas produced and injected in the project area and shall be computed in accordance with Rule 10 below and the following formula and shall not exceed 10,192 barrels of oil per day:

$$\begin{aligned} \text{Additional/Allowable in} & \quad \text{33000} \\ \text{Excess of } \text{30,000} \text{ BOPD} & = 97.07 \left[ 2 \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF gas prod. previous month}} \right)^2 \right. \\ & \quad \left. + \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF gas prod. previous month}} \right) \right] \end{aligned}$$

RULE 5. That all calculations of reservoir voidage shall be in accordance with the formula set out in Attachment "A" to this order utilizing the Table of Fluid Properties set out in Attachment "B" of this order.

RULE 6. Allowable credit for injection wells may be transferred to producing wells within the project area, as may the allowable credit for producing wells which, in the interest of more efficient operation of the Project, are shut in or curtailed because of high gas-oil ratio or are shut in for any of the following reasons: Pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 7. The allowable credit assigned to any well which is shut in or which is curtailed in accordance with the provisions of Rule 6 which allowable credit is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 9 below or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 8. The allowable credit assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the Empire-Abo Pool.

RULE 9. The allowable credit assigned to any well which is shut in or curtailed in accordance with Rule 6, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 10. The allowable credit for residue gas injection shall be calculated in accordance with the appropriate fluid properties current in the reservoir (as determined in accordance with Attachment "B" to this Order) and shall be shown on the Pressure Maintenance Project Operator's Monthly Report.

RULE 11. The basic allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the pool, whichever is less. Wells capable of producing more than top unit allowable may also receive transfer allowable, provided however, that no producing well in the project area which directly or diagonally offsets a well not committed to the unit producing from the same common source of supply shall receive an allowable or produce in excess of two times top unit allowable for the pool.

RULE 12. Each month the project operator shall submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 13. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well not committed to the unit producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

RULE 14. The Secretary-Director of the Commission is hereby authorized to approve such additional producing wells and injection wells at orthodox and unorthodox locations within the boundaries of the ARCO Empire-Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided

said wells are drilled no closer than 660 feet to the outer boundary of said unit nor closer than 10 feet to any quarter-quarter section or subdivision inner boundary and provided that no well shall be approved for gas 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. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(1) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(2) A schematic drawing of the proposed well which fully describes the casing, tubing, perforated interval, and depth.

(3) A letter stating that all offset operators to the proposed well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

RULE 15. Expansion or contractions of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

I. R. TRUJILLO, Chairman

ALEX J. ARMIJO, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

dr/

EMPIRE ABO UNIT

Reservoir Voidage Formula:

$$\text{Equation 1: } V_{rvb} = Q_o \left[ B_o + (R_{pn} - R_s) B_g \right] + (Q_{wp} - Q_{we}) B_w$$

Where:

- $V_{rvb}$  = Reservoir voidage, bbls. per day
- $Q_o$  = Oil production rate, Stock tank bbls. per day
- $B_o$  = Oil formation volume factor (1), reservoir  
.volumetric bbls/stock tank bbl.
- $R_{pn}$  = Net producing gas-oil ratio, MCF/S.T.B.O.

$$R_{pn} = R_p \left( 1.0 - \frac{G_i}{G_p} \right)$$

- Where:  $R_p$  = producing gas-oil ratio, MCF/BO  
 $G_i$  = daily volume of gas injected, MCF/Day  
 $G_p$  = daily volume of gas produced, MCF/Day

- $R_s$  = Solution gas-oil ratio(2), MCF/STBO
- $B_g$  = Gas formation volume factor(3), RVB/MCF
- $Q_{wp}$  = Water production rate, S.T.B.W./Day
- $Q_{we}$  = Aquifer water influx rate, S.T.B.W./Day, determined  
from reservoir numeric model runs to be 1950 BWPD
- $B_w$  = Water formation volume factor, RVBW/STBW, use 1.0

(1), (2), (3): These values calculated from Table of Fluid Properties,  
Attachment "B".

ATTACHMENT "A"

EMPIRE ABO UNIT AREA

Table of Fluid Properties (P Base = 15.025 P<sub>bp</sub> = 2231)

Tres. = 109°F (569° R)

<u>P<sub>r</sub>(PSIA)</u>	<u>B<sub>O</sub> (RVBO/STBO)</u>	<u>B<sub>g</sub> RVB/MCF</u>	<u>R<sub>s</sub> (MCF/BBL)</u>	<u>Z</u>
15.025	1.000	194.696	0	1.0
100	1.125	28.229	.180	.965
200	1.163	13.749	.235	.940
300	1.193	8.970	.290	.920
400	1.218	6.692	.345	.915
500	1.244	5.236	.395	.895
600	1.263	4.276	.445	.877
700	1.285	3.644	.495	.872
800	1.304	3.108	.545	.850
900	1.325	2.746	.595	.845
1000	1.344	2.437	.625	.833
1100	1.364	2.178	.675	.819
1200	1.384	1.962	.725	.805
1300	1.404	1.790	.775	.795
1400	1.425	1.649	.825	.789
1500	1.445	1.516	.875	.777
1600	1.465	1.404	.925	.768
1700	1.485	1.304	.975	.758
1800	1.505	1.220	1.025	.751
1900	1.525	1.147	1.075	.745
2000	1.548	1.053	1.125	.720
2100	1.573	1.000	1.175	.718
2200	1.597	.953	1.225	.717
2231	1.606	.939	1.250	.716

P<sub>r</sub> = Reservoir average pressure at datum -2254' subsea, lbs/in<sup>2</sup> absolute.

B<sub>O</sub> = Oil formation volume factor, reservoir volumetric bbls/stock tank bbl.

B<sub>g</sub> = Gas formation volume factor, reservoir volumetric bbls/thousand std. cu. ft.

R<sub>s</sub> = Solution Gas/Oil Ratio, Thousand std. cu. ft./stock tank bbls. oil.

Z = Gas Compressibility Factor.

ATTACHMENT "B"

dr/

BEFORE THE OIL CONSERVATION COMMISSION  
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF NEW MEXICO FOR  
THE PURPOSE OF CONSIDERING:

CASE NO. 5135  
Order No. R-4549-A

APPLICATION OF ATLANTIC RICHFIELD  
COMPANY FOR AMENDMENT OF ORDER  
NO. R-4945, EDDY COUNTY, NEW  
MEXICO.

*See Also Order Nos.*

R-4549  
R-4549-B  
R-4549-C  
R-4549-D  
R-4549-E  
R-4549-F

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on January 3, 1974, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 15th day of January, 1974, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- (1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.
- (2) That by Order No. R-4548, dated June 15, 1973, the Commission granted approval of the Empire-Abo Unit Agreement.
- (3) That by Order No. R-4549, dated June 15, 1973, the applicant, Atlantic Richfield Company, was authorized to institute a pressure maintenance project in the Empire-Abo Pool in its Empire-Abo Unit Area, Eddy County, New Mexico, designated the ARCO Empire-Abo Unit Pressure Maintenance Project.
- (4) That Order No. R-4549 further promulgated Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project.
- (5) That Finding (7) of Order No. R-4549 limits production from the project area as described in Finding (4) of said order to the average reservoir voidage for the calendar year 1972 or 30,000 barrels of oil per day, whichever is less, during the period prior to the start of gas injection.
- (6) That the allowable figure of 30,000 barrels of oil per day was based on assumptions as to the future size of the unitized project area and the estimated gas and water production expected after unitization.

(7) That since the formation of the Empire-Abo Unit Pressure Maintenance Project the following additional tracts, comprising 200.13 acres of land, within the Empire-Abo Unit Area have been committed to the unit:

EDDY COUNTY, NEW MEXICO  
TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM  
Section 27: SW/4 SE/4  
Section 34: S/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM  
Section 6: NW/4 NE/4 (Lot 2) and  
SE/4 SW/4

(8) That these additional tracts were not considered in arriving at the 30,000 barrels of oil per day project allowable provided for in Order No. R-4549.

(9) That the actual production of gas and water has been less than was anticipated under unitized operations.

(10) That due to more unit area wells and greater efficiency than was expected, an increased allowable can be produced while continuing to limit reservoir voidage to the average voidage set for calendar year 1972 in Order No. R-4945.

(11) That the project allowable should be increased to 33,000 barrels of oil per day effective retroactively to January 1, 1974.

(12) That increasing the project allowable to 33,000 barrels of oil per day is in the interest of conservation, prevention of waste and protection of correlative rights.

IT IS THEREFORE ORDERED:

(1) That Order No. R-4945 is hereby amended to include within the Empire-Abo Unit Pressure Maintenance Project the following tracts which comprise 200.13 acres:

EDDY COUNTY, NEW MEXICO  
TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM  
Section 27: SW/4 SE/4  
Section 34: S/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM  
Section 6: NW/4 NE/4 (Lot 2) and  
SE/4 SW/4

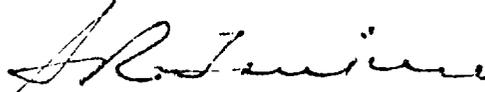
(2) That the project allowable is increased to 33,000 barrels of oil per day effective retroactively to January 1, 1974.

-3-  
Case No. 5135  
Order No. R-4549-A

(3) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION



I. R. TRUJILLO, Chairman



ALEX J. ARMIJO, Member



A. L. PORTER, Jr., Member & Secretary

S E A L

dr/

BEFORE THE OIL CONSERVATION COMMISSION  
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF NEW MEXICO FOR  
THE PURPOSE OF CONSIDERING:

CASE NO. 5177  
Order No. R-4549-B

APPLICATION OF ATLANTIC RICHFIELD  
COMPANY FOR THE AMENDMENT OF ORDER  
NO. R-4549, EDDY COUNTY, NEW MEXICO.

*See Also Order Nos.*

R-4549  
R-4549-A  
R-4549-C  
R-4549-D  
R-4549-E  
R-4549-F

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on February 27, 1974, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 30th day of April, 1974, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- (1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.
- (2) That the applicant, Atlantic Richfield Company, is the operator of the Empire-Abo Pressure Maintenance Project, Empire-Abo Pool, Eddy County, New Mexico, which project was authorized by Commission Order No. R-4549, and is governed by operating rules included in said order as amended by Order No. R-4549-A.
- (3) That the applicant seeks the amendment of said Order No. R-4549, as amended, to include an increase in the maximum project allowable from 40,192 barrels of oil per day to 40,555 barrels of oil per day because of additional lands committed to the unit and participating in the project and to provide that the maximum project allowable of 40,555 barrels of oil per day would be achieved upon injection of "all available residue gas" rather than "70 percent of the produced gas," as now provided in the project rules.
- (4) That the applicant further seeks the amendment of Order No. R-4549, as amended, to include a provision for administrative approval for water injection wells and to include a reservoir voidage replacement credit for water injected into the Abo formation within the project area, and to provide for the establishment of a gas injection credit "bank", against which

injection credit could be drawn in order to maintain full allowables during such times that full gas injection cannot be maintained because of injection plant shutdowns or other mechanical problems.

(5) That the increase in maximum allowable for the Empire-Abo Pressure Maintenance Project from 40,192 barrels of oil per day to 40,555 barrels of oil per day is justified inasmuch as the original 40,192 barrels was based on numeric model studies of the reservoir assuming only those tracts actually committed to the unit at the time of the original hearing would participate; that additional tracts have now been committed to the unit and the maximum permissible allowable should therefore be increased accordingly to 40,555 barrels of oil per day.

(6) That the aforesaid maximum allowable should be made available upon injection of 95 percent of all available residue gas rather than upon injection of 70 percent of the produced gas as is presently provided by Rule 3 of the Project Rules as promulgated by Order No. R-4549, as amended by Order No. R-4549-A; that "Available Residue Gas" should be defined as being all gas produced from the unitized formation less plant shrinkage and plant fuel and lease fuel required for operations; that there should be a prohibition against the sale of gas from the project except during emergency situations of temporary nature.

(7) That in addition to the administrative procedure currently in effect pursuant to Order No. R-4549 for approval of the injection of gas into the Abo formation without notice and hearing, an administrative procedure should be adopted whereby approval could be given for the injection of water into said formation within the project area without notice and hearing, provided certain restrictions regarding proximity to non-participating tracts are observed.

(8) That credit should be allowed in the project's Reservoir Voidage Formula for water injected into the reservoir as well as for gas, as now provided.

(9) That in order to allow for the maintenance of full allowables and full production schedules during such times as injection well failures, injection plant shutdowns, and other temporary conditions of unforeseen nature which prevent the injection of 95 percent of all available residue gas, a provision should be made in the project rules for the establishment of a system for the accumulation of gas injection credits which could be applied in the "Additional Allowable" formula contained in Rule 4 of the project rules; that monthly gas injection credits which may be accumulated should be limited to the volume of gas injected which exceeds 95 percent of the residue gas available for injection during any given month; and that the maximum amount of gas injection credits which should be permitted to

accrue to the gas injection credit bank should be equal to 100 percent of the average of the total monthly injection volumes for the previous three months, not including the month being reported.

IT IS THEREFORE ORDERED:

(1) That Rule 3 of the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project as promulgated by Order No. R-4549, as amended by Order No. R-4549-A, is hereby amended to read in its entirety as follows:

"RULE 3. That the maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage in the project area for calendar year 1972 (56,513 reservoir barrels) or 33,000 barrels of oil per day, whichever is less, except that when injection of 95 percent of all available residue gas is achieved, the maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage in the project area for calendar year 1972 (56,513 reservoir barrels) or 40,555 barrels of oil per day, whichever is less."

(2) That Rule 4 of the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project is hereby amended to read in its entirety as follows:

"RULE 4. That upon commencement of gas injection and for as long thereafter as such injection continues, extra allowable in addition to the 33,000 barrels per day described above may be assigned to the project area, provided that such additional allowable shall be based upon the proportion of residue gas available for injection which is actually injected into the unitized formation and shall be computed in accordance with the following formula:

$$\begin{aligned} \text{Additional Allowable} \\ \text{in Excess of 33,000} \\ \text{BOPD} \end{aligned} = 39.76 \left[ 2 \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF residue gas available prev. month}} \right)^2 + \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF residue gas available previous month}} \right) \right]$$

That the maximum additional allowable which may be earned by gas injection shall be 7,555 barrels per day. That this maximum may be earned by the injection of 95 percent of the available residue gas into the unitized formation; that gas volumes in excess of said 95 percent which are injected into the unitized formation shall be credited each month to a gas injection bank account which shall be permitted to accrue such gas injection credits up to 100 percent of the average of the total monthly injection volumes for the three previous months, not including the month being reported; that during such times as injection well failures, injection plant shutdowns, and other temporary conditions of unforeseen nature which prevent the injection of at least 95 percent of the available residue gas, said gas injection bank account may be charged a sufficient volume to add to the actual volume of injection achieved to equal 95 percent of the available residue gas for the month. In the event there are insufficient credits accrued to the gas injection bank account to bring actual injection plus applied credits up to 95 percent of available residue gas, production shall be reduced to 33,000 barrels of oil per day plus the amount which the actual injection plus the accrued credits will actually earn. Production beyond this amount shall be considered overproduction and shall be compensated for by underproduction during the following month.

For the purpose of these rules, "Available Residue Gas" shall be defined as being all gas produced from the unitized formation less plant shrinkage, plant fuel, and lease fuel required for operation of the lease.

No raw gas nor plant residue gas attributable to the project shall be sold or otherwise disposed of by any means other than injection into the unitized formation except during emergency situations of temporary nature."

(3) That Rule 5 of the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project is hereby amended to read in its entirety as follows:

"RULE 5. That all calculations of reservoir voidage shall be made in accordance with the formula set forth in Attachment "A" to this order entitled "EMPIRE-ABO UNIT AREA-Reservoir Voidage Formula - Gas and Water Injection Credit" utilizing the reservoir and fluid data set forth in Attachment "B" to this order entitled EMPIRE-ABO UNIT AREA - Table of Fluid Properties."

(4) That Rule 14 of the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project is hereby amended to read in its entirety as follows:

"RULE 14. The Secretary-Director of the Commission is hereby authorized to approve such additional producing wells and gas injection and water injection wells at orthodox and unorthodox locations within the boundaries of the ARCO Empire-Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided said wells are drilled no closer than 660 feet to the outer boundary of said unit nor closer than 10 feet to any quarter-quarter section or subdivision inner boundary and provided 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. To obtain such approval, the project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(1) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(2) A schematic drawing of the proposed well which fully describes the casing, tubing, perforated interval, and depth.

(3) A letter stating that all offset operators to the proposed well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators."

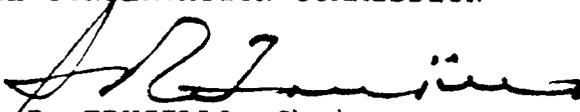
(5) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

-6-

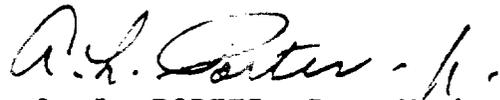
Case No. 5177  
Order No. R-4549-B

DONE at Santa Fe, New Mexico, on the day and year herein-  
above designated.

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

  
I. R. TRUJILLO, Chairman

ALEX J. ARMIJO, Member

  
A. L. PORTER, Jr., Member & Secretary

S E A L

dr/

EMPIRE ASO UNIT AREA

Reservoir Voidage Formula - Gas and Water Injection Credit

$$\text{Equation 1: } V_{rvb} = Q_o \left[ B_o + (R_{pn} - R_s) B_g \right] + \left[ Q_{wp} - (Q_{we} + Q_{wi}) \right] B_w$$

Where:

- $V_{rvb}$  = Reservoir voidage, bbls. per day
- $Q_o$  = Oil Production rate, Stock tank bbls. per day
- $B_o$  = Oil formation volume factor (1), reservoir volumetric bbls/stock tank bbl.
- $R_{pn}$  = Net producing gas-oil ratio, MCF/S.T.B.O.

$$R_{pn} = R_p \left( 1.0 - \frac{G_i}{G_p} \right)$$

Where:

- $R_p$  = producing gas-oil ratio, MCF/BO
- $G_i$  = daily volume of gas injected, MCF/Day
- $G_p$  = daily volume of gas produced, MCF/Day

- $R_s$  = Solution gas-oil ratio (2), MCF/STBO
- $B_g$  = Gas formation volume factor (3), RVB/MCF
- $Q_{wp}$  = Water production rate, S.T.B.W./Day
- $Q_{we}$  = Aquifer water influx rate, S.T.B.W./Day, determined from reservoir numeric model runs to be 1950 BWP
- $Q_{wi}$  = Daily volume of water injected, S.T.B.W./Day
- $B_w$  = Water formation volume factor, RVBW/STBW, use 1.0

(1), (2), (3): These values calculated from Table of Fluid Properties, Attachment "B".

EMPIRE ABO UNIT AREA

Table of Fluid Properties

$P_{base} = 15.025 \text{ psia}$ ,  $P_{bp} = 2231 \text{ psia}$ ,  $T_{res} = 109^\circ \text{ F}$  ( $569^\circ \text{ R}$ )

$P_r$ (PSIA)	$B_o$ (RVBO/STBO)	$B_g$ RVB/MCF	$R_s$ (MCF/BBL)	Z
15.025	1.000	194.696	0	1.0
100	1.125	28.229	.180	.965
200	1.163	13.749	.235	.940
300	1.193	8.970	.290	.920
400	1.218	6.692	.345	.915
500	1.244	5.236	.395	.895
600	1.263	4.276	.445	.877
700	1.285	3.644	.495	.872
800	1.304	3.108	.540	.850
900	1.325	2.746	.585	.845
1000	1.344	2.437	.625	.833
1100	1.364	2.178	.675	.819
1200	1.384	1.962	.725	.805
1300	1.404	1.790	.775	.795
1400	1.425	1.649	.825	.789
1500	1.445	1.516	.875	.777
1600	1.465	1.404	.925	.768
1700	1.485	1.304	.975	.758
1800	1.505	1.220	1.025	.751
1900	1.525	1.147	1.075	.745
2000	1.548	1.053	1.125	.720
2100	1.573	1.000	1.175	.718
2200	1.597	.953	1.225	.717
2231	1.606	.939	1.250	.716

$P_r$  = Reservoir average pressure at datum -2264' subsea, lbs/in<sup>2</sup> absolute.

$B_o$  = Oil formation volume factor, reservoir volumetric bbls/stock tank bbl.

$B_g$  = Gas formation volume factor, reservoir volumetric bbls/thousand std. cu. ft.

$R_s$  = Solution Gas/Oil Ratio, Thousand std. cu. ft./stock tank bbls. oil.

Z = Gas Compressibility Factor.

BEFORE THE OIL CONSERVATION COMMISSION  
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF NEW MEXICO FOR  
THE PURPOSE OF CONSIDERING:

CASE NO. 5505  
Order No. R-4549-C

THE APPLICATION OF THE ATLANTIC  
RICHFIELD COMPANY FOR PRESSURE  
MAINTENANCE PROJECT EXPANSION,  
EDDY COUNTY, NEW MEXICO.

*See Also Order Nos.*

*R-4549  
R-4549-A  
R-4549-B  
R-4549-D  
R-4549-E  
R-4549-F*

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on June 10, 1975, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 1st day of July, 1975, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, The Atlantic Richfield Company, is the operator of the Empire-Abo Pressure Maintenance Project, Empire-Abo Pool, Eddy County, New Mexico, which project was authorized by Commission Order No. R-4549, expanded by Order No. R-4549-A, and is operated pursuant to Special Rules and Regulations promulgated by Order No. R-4549, as amended by Orders Nos. R-4549-A and R-4549-B.

(3) That the applicant seeks the further expansion of the pressure maintenance project area as defined by said Order No. R-4549 and expanded by said Order No. R-4549-A by the inclusion of the following described lands, which are to be committed to the Empire Abo Unit Area:

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM  
Section 27: SE/4 SW/4, being 40.00 acres

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM  
Section 4: NE/4 NE/4, being 40.03 acres  
Section 5: SE/4 NW/4, being 40.00 acres

(4) That in conjunction with the expansion of said project area, applicant also seeks the amendment of Rule 3 of the Special Rules and Regulations for the Empire Abo Pressure Maintenance Project as promulgated by Order No. R-4549 and amended by Orders Nos. R-4549-A and R-4549-B to provide that the maximum daily project allowable will result in average daily reservoir voidage no greater than the reservoir voidage in the project area, as expanded, for calendar year 1972 (56,912 reservoir barrels) or 33,242 barrels of oil per day, whichever is less, except that when injection of 95 percent of all available residue gas is achieved, the project allowance would be an amount of oil no greater than would result in average daily reservoir voidage in the project area, as expanded, for calendar year 1972 (56,912 reservoir barrels) or 41,041 barrels of oil per day, whichever is less.

(5) That to accomplish the aforesaid increase in project base allowable and maximum project allowable, certain modifications to Rule 4 of the project rules would be necessary.

(6) That the proposed expansion of the Empire-Abo Pressure Maintenance Project Area and the concurrent increase in base allowable and maximum project allowable is in the interest of increased recovery of oil and gas, will prevent waste and will not violate correlative rights, and should be approved.

IT IS THEREFORE ORDERED:

(1) That the project area for the Empire-Abo Pressure Maintenance Project is hereby expanded to include therein:

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM  
Section 27: SE/4 SW/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM  
Section 4: NE/4 NE/4  
Section 5: SE/4 NW/4

being 120.03 acres, all in Eddy County, New Mexico.

(2) That Rule 3 of the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project as promulgated by Order No. R-4549, as amended by Orders Nos. R-4549-A and R-4549-B, is hereby amended to read in its entirety as follows:

"RULE 3. That the maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage in the project area for calendar year 1972 (56,912 reservoir barrels) or 33,242 barrels of oil per day,

whichever is less, except that when injection of 95 percent of all available residue gas is achieved, the maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage in the project area for calendar year 1972 (56,912 reservoir barrels) or 41,041 barrels of oil per day, whichever is less."

(3) That Rule 4 of the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project is hereby amended to read in its entirety as follows:

"RULE 4. That upon commencement of gas injection and for as long thereafter as such injection continues, extra allowable in addition to the 33,242 barrels per day described above may be assigned to the project area, provided that such additional allowable shall be based upon the proportion of residue gas available for injection which is actually injected into the unitized formation and shall be computed in accordance with the following formula:

Additional Allowable  
in Excess of 33,242 = 41.05  
BOPD

$$\left[ 2 \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF residue gas available prev. month}} \right) \right]^2 + \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF residue gas available previous month}} \right)$$

That the maximum additional allowable which may be earned by gas injection shall be 7,799 barrels per day. That this maximum may be earned by the injection of 95 percent of the available residue gas into the unitized formation; that gas volumes in excess of said 95 percent which are injected into the unitized formation shall be credited each month to a gas injection bank account which shall be permitted to accrue such gas injection credits up to 100 percent of the average of the total monthly injection volumes for the three previous months, not including the month being reported; that during such times as injection well failures, injection plant shutdowns, and other temporary conditions of unforeseen nature which prevent the injection of at least 95 percent of the available residue gas, said gas injection bank account may be charged a sufficient volume to add to the actual volume of injection achieved to equal 95 percent of the available residue gas for the month. In the event there are insufficient credits accrued to the

gas injection bank account to bring actual injection plus applied credits up to 95 percent of available residue gas, production shall be reduced to 33,242 barrels of oil per day plus the amount which the actual injection plus the accrued credits will actually earn. Production beyond this amount shall be considered overproduction and shall be compensated for by underproduction during the following month.

For the purpose of these rules, "Available Residue Gas" shall be defined as being all gas produced from the unitized formation less plant shrinkage, plant fuel, and lease fuel required for operation of the lease.

No raw gas nor plant residue gas attributable to the project shall be sold or otherwise disposed of by any means other than injection into the unitized formation except during emergency situations of temporary nature."

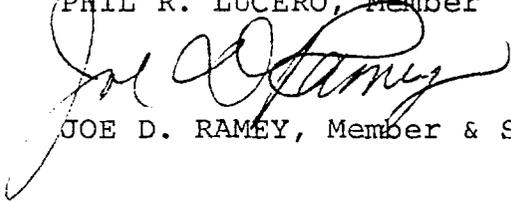
(4) That the effective date of this order shall be the effective date of ratification of the unit agreement by the parties concerned.

(5) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

  
PHIL R. LUCERO, Member

  
JOE D. RAMEY, Member & Secretary

S E A L

dr/

BEFORE THE OIL CONSERVATION COMMISSION  
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
COMMISSION OF NEW MEXICO FOR  
THE PURPOSE OF CONSIDERING:

CASE NO. 5577  
Order No. R-4549-D

APPLICATION OF ATLANTIC RICHFIELD  
COMPANY FOR AMENDMENT OF ORDER NO.  
R-4549, AS AMENDED, EDDY COUNTY,  
NEW MEXICO.

*See Also Order Nos.*

R-4549  
R-4549-A  
R-4549-B  
R-4549-C  
R-4549-E  
R-4549-F

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on October 22, 1975, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 17th day of November, 1975, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That pursuant to Commission Order No. R-4549, dated June 15, 1973, as amended by Orders Nos. R-4549-A, R-4549-B, and R-4549-C, dated January 15, 1974, April 30, 1974, and July 1, 1975, respectively, the applicant Atlantic Richfield Company is conducting pressure maintenance operations in the Empire Abo Unit Area, Empire-Abo Pool, Eddy County, New Mexico.

(3) That said pressure maintenance operations include the reinjection of casinghead gas produced from said Empire-Abo Pool back into the reservoir from which it came.

(4) That even with the reinjection of all available casinghead gas produced from said pool, there still remains considerable reservoir voidage resulting from the production of liquid hydrocarbons from the reservoir.

(5) That the applicant seeks to minimize this reservoir voidage by the injection into the Abo formation of extraneous gas brought in from other sources.

(6) That the injection of from 25 million to 35 million cubic feet of extraneous gas per day into the Abo formation will virtually eliminate the net voidage of the reservoir underlying the Empire Abo Unit Area, will result in the recovery of additional oil, thereby enhancing the recovery of oil from the reservoir and otherwise prevent waste, will not impair correlative rights, and should be approved.

IT IS THEREFORE ORDERED:

(1) That the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project, as promulgated by Commission Order No. R-4549, and as amended by Commission Order Nos. R-4549-A, R-4549-B, and R-4549-C, are hereby further amended by the addition of the following Rule 4(A):

"RULE 4(A).

That in addition to the injection of available residue gas and the establishment of an available residue gas injection bank as described in Rules 3 and 4 above, the project operator may inject up to and including 35 million cubic feet of extraneous gas per day into the Abo formation underlying the project area; further, that withdrawals of said extraneous gas may be made, but pending reservoir blow-down, during not more than 30 days in any one 180-day period; provided however, that pending blow-down, the daily rate of withdrawal shall not exceed the average daily rate of injection of such extraneous gas during the preceding 180-day period; provided further, that the project operator shall establish and maintain an "Extraneous Gas Bank Statement" which shall be filed with the Commission each month concurrently with the project operator's "Empire-Abo Pressure Maintenance Project Monthly Report" and "Abo Gas Bank Statement", and which shall show thereon each month the volume of extraneous gas injected, the cumulative volume of such gas injected, the volume of gas delivered back to the supplier of extraneous gas, the cumulative volume of gas delivered back to the supplier, and the net cumulative extraneous gas bank."

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

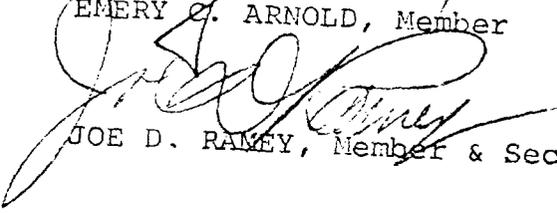
-3-  
Case No. 5577  
Order No. R-4549-D

DONE at Santa Fe, New Mexico, on the day and year herein-  
above designated.

STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION

  
PHIL R. LUCERO, Chairman

  
EMERY C. ARNOLD, Member

  
JOE D. RAMEY, Member & Secretary

S E A L

dr/

Composite Areas R-4549 thru R-4549-D

SPECIAL RULES AND REGULATIONS  
FOR THE  
EMPIRE-ABO PRESSURE MAINTENANCE PROJECT

RULE 1. The project area of the ARCO Empire-Abo Unit Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area described as follows:

EDDY COUNTY, NEW MEXICO

TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM

Section 34: S/2 SE/4  
Section 36: S/2

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM

Section 25: S/2 and S/2 N/2  
Section 26: S/2, S/2 NE/4, and SE/4 NW/4  
Section 27: ~~N/2 S/2, SE/4 SE/4, and SW/4 SW/4~~ <sup>S/2</sup> SW/4 SE/4 SE/4 SW/4  
Section 31: S/2 and S/2 N/2  
Section 32: S/2, NE/4, S/2 NW/4, and NE/4 NW/4  
Section 33: S/2, NE/4, S/2 NW/4, and NE/4 NW/4  
Section 34: N/2, SW/4, and N/2 SE/4 S/2 SE/4  
Section 35: N/2 and N/2 S/2  
Section 36: N/2 NW/4 and SW/4 NW/4

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM

Section 29: S/2 NW/4 and N/2 SW/4  
Section 30: SW/4, S/2 N/2, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM

Section 1: All  
Section 2: S/2, NE/4 NE/4, SW/4 NE/4, S/2 NW/4, and NW/4 NW/4  
Section 3: All  
Section 4: SE/4, S/2 NE/4, S/2 SW/4, and NE/4 SW/4  
Section 8: E/2 SE/4 and SE/4 NE/4  
Section 9: All  
Section 10: W/2 and NE/4  
Section 11: NW/4, W/2 NE/4, and NE/4 NE/4  
Section 15: N/2 NW/4 and SW/4 NW/4  
Section 16: N/2, SW/4, N/2 SE/4, and SW/4 SE/4  
Section 17: S/2 NE/4, NE/4 NE/4, SE/4 NW/4, NE/4 SW/4, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM

Section 4: N/2 NW/4, SW/4 NW/4, and NW/4 NE/4 NE/4 NE/4  
Section 5: NE/4 and N/2 NW/4 SE/4 SW/4  
Section 6: NW/4, N/2 SW/4, N/2 SE/4, SW/4 SE/4, S/2 NE/4, and NE/4 NE/4 NW/4 NE/4 (Lot 2) SE/4 SW/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

R4549-C  
"RULE 3. That the maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage in the project area for calendar year 1972 (56,912 reservoir barrels) or 33,242 barrels of oil per day,

whichever is less, except that when injection of 95 percent of all available residue gas is achieved, the maximum daily project allowable shall be an amount of oil which will result in reservoir voidage no greater than the average daily reservoir voidage in the project area for calendar year 1972 (56,912 reservoir barrels) or 41,041 barrels of oil per day, whichever is less."

"RULE 4. That upon commencement of gas injection and for as long thereafter as such injection continues, extra allowable in addition to the 33,242 barrels per day described above may be assigned to the project area, provided that such additional allowable shall be based upon the proportion of residue gas available for injection which is actually injected into the unitized formation and shall be computed in accordance with the following formula:

R4549.C

$$\begin{aligned} \text{Additional Allowable} \\ \text{in Excess of 33,242} &= 41.05 \left[ 2 \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF residue gas available prev. month}} \right) \right] \\ \text{BOPD} &+ \left( \frac{\text{MCF gas inj. previous month} \times 10}{\text{MCF residue gas available previous month}} \right) \end{aligned}$$

2

That the maximum additional allowable which may be earned by gas injection shall be 7,799 barrels per day. That this maximum may be earned by the injection of 95 percent of the available residue gas into the unitized formation; that gas volumes in excess of said 95 percent which are injected into the unitized formation shall be credited each month to a gas injection bank account which shall be permitted to accrue such gas injection credits up to 100 percent of the average of the total monthly injection volumes for the three previous months, not including the month being reported; that during such times as injection well failures, injection plant shutdowns, and other temporary conditions of unforeseen nature which prevent the injection of at least 95 percent of the available residue gas, said gas injection bank account may be charged a sufficient volume to add to the actual volume of injection achieved to equal 95 percent of the available residue gas for the month. In the event there are insufficient credits accrued to the gas injection bank account to bring actual injection plus applied credits up to 95 percent of available residue gas, production shall be reduced to 33,242 barrels of oil per day plus the amount which the actual injection plus the accrued credits will actually earn. Production beyond this amount shall be considered overproduction and shall be compensated for by underproduction during the following month.

For the purpose of these rules, "Available Residue Gas" shall be defined as being all gas produced from the unitized formation less plant shrinkage, plant fuel, and lease fuel required for operation of the lease.

No raw gas nor plant residue gas attributable to the project shall be sold or otherwise disposed of by any means other than injection into the unitized formation except during emergency situations of temporary nature."

"RULE 4 (A).

R-4549-D

That in addition to the injection of available residue gas and the establishment of an available residue gas injection bank as described in Rules 3 and 4 above, the project operator may inject up to and including 35 million cubic feet of extraneous gas per day into the Abo formation underlying the project area; further, that withdrawals of said extraneous gas may be made, but pending reservoir blow-down, during not more than 30 days in any one 180-day period; provided however, that pending blow-down, the daily rate of withdrawal shall not exceed the average daily rate of injection of such extraneous gas during the preceding 180-day period; provided further, that the project operator shall establish and maintain an "Extraneous Gas Bank Statement" which shall be filed with the Commission each month concurrently with the project operator's "Empire-Abo Pressure Maintenance Project Monthly Report" and "Abo Gas Bank Statement", and which shall show thereon each month the volume of extraneous gas injected, the cumulative volume of such gas injected, the volume of gas delivered back to the supplier of extraneous gas, the cumulative volume of gas delivered back to the supplier, and the net cumulative extraneous gas bank."

R-4549-B

"RULE 5. That all calculations of reservoir voidage shall be made in accordance with the formula set forth in Attachment "A" to this order entitled "EMPIRE-ABO UNIT AREA-Reservoir Voidage Formula - Gas and Water Injection Credit" utilizing the reservoir and fluid data set forth in Attachment "B" to this order entitled EMPIRE-ABO UNIT AREA - Table of Fluid Properties."

RULE 6. Allowable credit for injection wells may be transferred to producing wells within the project area, as may the allowable credit for producing wells which, in the interest of more efficient operation of the Project, are shut in or curtailed because of high gas-oil ratio or are shut in for any of the following reasons: Pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 7. The allowable credit assigned to any well which is shut in or which is curtailed in accordance with the provisions of Rule 6 which allowable credit is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 9 below or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 8. The allowable credit assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the Empire-Abo Pool.

RULE 9. The allowable credit assigned to any well which is shut in or curtailed in accordance with Rule 6, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 10. The allowable credit for residue gas injection shall be calculated in accordance with the appropriate fluid properties current in the reservoir (as determined in accordance with Attachment "B" to this Order) and shall be shown on the Pressure Maintenance Project Operator's Monthly Report.

RULE 11. The basic allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the pool, whichever is less. Wells capable of producing more than top unit allowable may also receive transfer allowable, provided however, that no producing well in the project area which directly or diagonally offsets a well not committed to the unit producing from the same common source of supply shall receive an allowable or produce in excess of two times top unit allowable for the pool.

RULE 12. Each month the project operator shall submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 13. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well not committed to the unit producing from the same common source of supply shall produce in excess of two times top unit allowable for the pool.

~~RULE 14. The Secretary-Director of the Commission is hereby authorized to approve such additional producing wells and gas injection and water injection wells at orthodox and unorthodox locations within the boundaries of the ARCO Empire-Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided said wells are drilled no closer than 660 feet to the outer boundary of said unit nor closer than 10 feet to any quarter-quarter~~

R-4549-B

Rule 14  
Amended  
by  
R-4549E  
now has  
14-A  
14-B  
14-C and  
14-D

EXHIBIT "A"  
ORDER NO. R-4549-E

RULE 14 A. The Director of the Division is hereby authorized to approve such additional producing wells and gas injection and water injection wells at orthodox and un-orthodox locations within the boundaries of the ARCO Empire Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided said wells are drilled no closer than 660 feet to the outer boundary of said unit nor closer than 10 feet to any quarter-quarter section or subdivision inner boundary and provided 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. To obtain such approval, the project operator shall file proper application with the Division Director, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(1) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(2) A schematic drawing of the proposed well which fully describes the casing, tubing, perforated interval, and depth.

(3) A letter stating that all offset operators to the proposed well have been furnished a complete copy of the application and the date of notification.

RULE 14 B. The Director of the Division is hereby authorized to approve the drilling of "horizontal drainholes" for the purposes of production or injection within the boundaries of the ARCO Empire Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided no perforated or openhole portion of said wells shall be closer than 330 feet to the outer boundary of said unit or to any tract not committed to such unit nor, in the case of a well to be used for injection closer than 1650 feet to such boundary or tract. To obtain such approval, the project operator shall file proper application with the Division Director, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(1) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(2) Schematic drawings of the proposed well which fully describes the casing, tubing, perforated or open-hole interval, kick-off point, and proposed trajectory of the drainhole section.

(3) A letter stating that all offset operators to the proposed well have been furnished a complete copy of the application and the date of notification.

RULE 14 C. The Director may approve the proposed well if, within 20 days after receiving the application, no objection to the proposal is received. The Director may grant immediate approval, provided waivers of objection are received from all offset operators.

RULE 14 D. Within 20 days following completion of any horizontal drainhole the operator shall submit a report to the Division Director with sufficient detail to locate the kick-off point and the trajectory of the deviated portion of the well bore with respect to any quarter-quarter section(s) penetrated by such well and any 40-acre tract directly or diagonally offsetting such quarter-quarter section(s).

The Director may approve the final location of the horizontal drainhole by acceptance of such report.

The Director may rescind the authority for any horizontal drainhole if the perforated or openhole portion of such hole is located closer to the unit boundary or any uncommitted tract than permitted by these rules or if it should appear that such rescission is necessary to prevent waste or protect correlative rights.

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RULE 15. Expansion or contractions of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

Attachment "A" Order R-4549-B

Attachment "B" Order R-4549-B

STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

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

CASE NO. 6742  
Order No. R-4549-E

APPLICATION OF ARCO OIL AND GAS  
COMPANY FOR AN ADMINISTRATIVE  
PROCEDURE, EDDY COUNTY, NEW MEXICO.

*See Also Order Nos.*

R-4549  
R-4549-A  
R-4549-B  
R-4549-C  
R-4549-D  
R-4549-F

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on November 28, 1979, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 28th day of January, 1980, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, ARCO Oil and Gas Company, is the operator of the Empire Abo Pressure Maintenance Project, Empire-Abo Pool, Eddy County, New Mexico, which project was authorized by Division Order No. R-4549, and is governed by operating rules included in said order as amended by Orders Nos. R-4549-A through R-4549-D.

(3) That the applicant seeks the amendment of Rule 14 of the Special Rules and Regulations for said project adopted by Order No. R-4549, as amended, to additionally provide for an administrative procedure for authorizing the drilling, for production or injection purposes, of "horizontal drainholes" within such project.

(4) That the drilling of said horizontal drainholes within the boundaries of said project should result in the recovery of oil and gas therefrom which might not otherwise

-2-

Case No. 6742  
Order No. R-4549-E

be produced thereby preventing waste.

(5) That correlative rights will not be violated provided that no perforated or openhole portion of any horizontal drainhole shall be closer than 330 feet to the outer boundary of the Empire Abo Unit or any tract not committed to said unit nor, in the case of a well to be used for injection, closer than 1650 feet to such boundary or tract.

(6) That the application for administrative procedure should be approved by amending said Rule 14 to read in its entirety as shown on Exhibit "A" attached to this order.

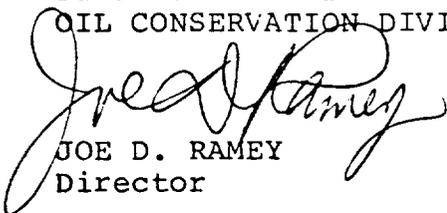
IT IS THEREFORE ORDERED:

(1) That Rule 14 of the Special Rules and Regulations for the Empire Abo Pressure Maintenance Project is hereby amended to read in its entirety as shown on Exhibit "A" to this order.

(2) That 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

  
JOE D. RAMEY  
Director

S E A L

fd/

EXHIBIT "A"  
ORDER NO. R-4549-E

RULE 14 A. The Director of the Division is hereby authorized to approve such additional producing wells and gas injection and water injection wells at orthodox and unorthodox locations within the boundaries of the ARCO Empire Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided said wells are drilled no closer than 660 feet to the outer boundary of said unit nor closer than 10 feet to any quarter-quarter section or subdivision inner boundary and provided 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. To obtain such approval, the project operator shall file proper application with the Division Director, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(1) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(2) A schematic drawing of the proposed well which fully describes the casing, tubing, perforated interval, and depth.

(3) A letter stating that all offset operators to the proposed well have been furnished a complete copy of the application and the date of notification.

RULE 14 B. The Director of the Division is hereby authorized to approve the drilling of "horizontal drainholes" for the purposes of production or injection within the boundaries of the ARCO Empire Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided no perforated or openhole portion of said wells shall be closer than 330 feet to the outer boundary of said unit or to any tract not committed to such unit nor, in the case of a well to be used for injection closer than 1650 feet to such boundary or tract. To obtain such approval, the project operator shall file proper application with the Division Director, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(1) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(2) Schematic drawings of the proposed well which fully describes the casing, tubing, perforated or open-hole interval, kick-off point, and proposed trajectory of the drainhole section.

(3) A letter stating that all offset operators to the proposed well have been furnished a complete copy of the application and the date of notification.

RULE 14 C. The Director may approve the proposed well if, within 20 days after receiving the application, no objection to the proposal is received. The Director may grant immediate approval, provided waivers of objection are received from all offset operators.

RULE 14 D. Within 20 days following completion of any horizontal drainhole the operator shall submit a report to the Division Director with sufficient detail to locate the kick-off point and the trajectory of the deviated portion of the well bore with respect to any quarter-quarter section(s) penetrated by such well and any 40-acre tract directly or diagonally offsetting such quarter-quarter section(s).

The Director may approve the final location of the horizontal drainhole by acceptance of such report.

The Director may rescind the authority for any horizontal drainhole if the perforated or openhole portion of such hole is located closer to the unit boundary or any uncommitted tract than permitted by these rules or if it should appear that such rescission is necessary to prevent waste or protect correlative rights.

STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

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

CASE NO. 8060  
Order No. R-4549-F

APPLICATION OF ARCO OIL & GAS  
COMPANY FOR AMENDMENT OF ORDER  
NO. R-4549, AS AMENDED, EDDY  
COUNTY, NEW MEXICO.

*See Also Order Nos.*

R-4549  
R-4549-A  
R-4549-B  
R-4549-C  
R-4549-D  
R-4549-E

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:00 a.m. on February 1, 1984, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 20th day of April, 1984, the Division Director having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- (1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.
- (2) That the applicant, Arco Oil & Gas Company, is the operator of the Empire-Abo Pressure Maintenance Project, Empire-Abo Pool, Eddy County, New Mexico, which project was authorized by Division Order No. R-4549 and is governed by operating rules contained in the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project included in said Order as amended by Orders Nos. R-4549-A through R-4549-E.
- (3) That said special rules and regulations provide for well allowables based upon reservoir voidage.
- (4) That the applicant seeks the rescision of such rules for setting allowables and the establishment of a maximum daily project allowable of 65 MMCFD.
- (5) That the evidence presented in this case established that this proposed method of setting allowables will result in the greater recovery of liquid hydrocarbons from such project.

(6) That the proposed amendment of said special rules will not result in violation of correlative rights.

(7) That the application for amendment of said special rules should be approved.

IT IS THEREFORE ORDERED:

(1) That Rules 3, 4, 4(A), 5, 6, 7, 8, 9, 10, 11, 12, and 13 of the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project contained in Division Order No. R-4549, as amended, are hereby rescinded.

(2) That said special rules are hereby amended by the adoption of new Rules 3, 4, 5, and 6 which read in their entirety as follows:

"RULE 3: That the maximum daily project allowable shall be an amount of oil which will result in monthly average associated gas production of no more than 65 MMCF per day.

For the purpose of these rules, "Available Residue Gas" shall be defined as being all gas produced from the unitized formation less plant shrinkage, plant fuel, and lease fuel required for operation of the lease.

"RULE 4: That all available unit residue gas shall be reinjected. No raw gas nor plant residue gas attributable to the project shall be sold or otherwise disposed of by any other means. That in addition to the injection of available residue gas, the project operator may inject up to and including 35 million cubic feet of extraneous gas per day into the Abo formation underlying the project area; further, that withdrawals of said extraneous gas may be made, but pending reservoir blow-down, during not more than 30 days in any one 180-day period; provided however, that pending blow-down, the daily rate of withdrawal shall not exceed the average daily rate of injection of such extraneous gas during the preceding 180-day period; provided further, that the project operator shall establish and maintain an "Extraneous Gas Bank Statement" which shall be filed with the Division each month concurrently with the project operator's "Empire-Abo Pressure Maintenance Project Monthly Report", and which shall show thereon each month the volume of extraneous gas injected, the cumulative volume of such gas injected, the volume of gas

delivered back to the supplier of extraneous gas, the cumulative volume of gas delivered back to the supplier, and the net cumulative extraneous gas bank.

"RULE 5. Allowables shall be assigned to unit wells in accordance with nominations submitted by the unit operator during the months of March, July, and November of each year. That such nominations shall accompany the Pressure Maintenance Project Operator's Report filed for that month.

The allowables assigned shall result in production of casinghead gas averaging not more than 65 MMCF per day for the month, provided however, that on a cumulative basis, the unit operator may carry gas overproduction of 325 MMCF.

That no producing well in the project area which directly or diagonally offsets a well not committed to the unit, and producing from the same common source of supply, shall receive an allowable or produce in excess of two times the top unit allowable for the pool.

"RULE 6. Each month the project operator shall submit to the Division a Pressure Maintenance Project Operator's Report on a form prescribed by the Division. The report shall show all project wells, production of oil, gas, and water; volumes of water, residue gas, and extraneous gas injected; total production of oil, gas, and water, and such other data as the Division may require"

(3) That Rule 14A, 14B, 14C, and 14D of said Special Rules are hereby redesignated Rule 7A, 7B, 7C and 7D, respectively.

(4) That Rule 15 of said Special Rules is hereby redesignated Rule 8 and is amended to read in its entirety as follows:

"RULE 8. Expansion or contraction of the project area may be approved by the Director of the Division administratively when good cause is shown therefor."

(5) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

-4-

Case No. 2060

Order No. P-4549-F

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

STATE OF NEW MEXICO  
WILDLIFE CONSERVATION DIVISION

  
JOE D. RAMEY,  
Director

S E A L

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. 10138  
Order No. R-4549-G

APPLICATION OF ARCO OIL & GAS COMPANY  
FOR AMENDMENT OF THE SPECIAL RULES AND  
REGULATIONS FOR THE EMPIRE-ABO PRESSURE  
MAINTENANCE PROJECT, EDDY COUNTY, NEW MEXICO.

**ORDER OF THE DIVISION**

**BY THE DIVISION:**

This cause came on for hearing at 8:15 a.m. on October 31, 1990, at Santa Fe, New Mexico, before Examiner Michael E. Stogner.

NOW, on this 7th day of November, 1990, 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 over this cause and the subject matter thereof.

(2) The applicant, ARCO Oil & Gas Company, is the operator of the Empire-Abo Pressure Maintenance Project, Empire-Abo Pool, Eddy County, New Mexico, which project was authorized by Division Order No. R-4549 and is governed by operating rules contained in the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project, included in said Order as amended by Orders Nos. R-4549-A through R-4549-F.

(3) Said rules provide for the injection of extraneous gas into the Abo formation and for the withdrawal of this extraneous gas at certain specified times and rates.

(4) The applicant seeks the amendment of the rules governing withdrawal of the extraneous gas to permit the withdrawal of certain volumes during winter months and the make-up of the amounts withdrawn by reinjection of gas during the succeeding summer months, plus an additional volume of gas to compensate the Empire-Abo Unit for any fuel use, shrinkage or metering errors.

(5) During recent winters, the Division has authorized emergency withdrawals of volumes of extraneous gas from this unit to meet consumer demands for this gas and the withdrawal volumes have been subsequently replaced by the reinjection into the unit of additional extraneous gas.

(6) The evidence presented in this case established that the withdrawal and reinjection of gas into the unit has not had an adverse impact on the recovery of hydrocarbons from the unit and has not resulted in waste.

(7) At the time of the hearing, Gas Company of New Mexico, who owns the extraneous gas in question, presented additional supporting testimony in this matter.

(8) Also, at the hearing, a representative from OXY USA, Inc. and Marathon Oil Company appeared at the hearing, but did not present any evidence.

(9) Approval of the application will establish a procedure for the withdrawal of extraneous gas from the unit during periods of high demand for natural gas.

(10) Reinjection of the withdrawn gas during the succeeding summer season plus the injection of an additional 12% to cover fuel usage, shrinkage, and metering errors, will assure that the ultimate recovery of hydrocarbons from the project will not be reduced.

(11) The proposed amendment of said special rules will not result in a violation of correlative rights.

(12) The application for amendment of said rules should be approved.

**IT IS THEREFORE ORDERED THAT:**

(1) Rule 4 of the Special Rules and Regulations for the Empire-Abo Pressure Maintenance Project contained in Division Order No. R-4549, as Amended, is hereby rescinded.

(2) Said special rules are amended by the adoption of a new Rule 4 which reads in its entirety as follows:

**"RULE 4:** All Available Residue Gas from the unit shall be reinjected. No raw gas nor plant residue gas attributable to the project shall be sold or otherwise disposed of by any other means.

In addition to the injection of Available Residue Gas, the project operator may inject up to and including 35 million cubic feet of extraneous gas per day into the Abo formation underlying the project area.

Withdrawals of said extraneous gas may be made, pending reservoir blow down, as follows:

(A) During each of the winter seasons (November 1 through March 31) of 1990 through 1996, a volume of gas not to exceed 300,000 MCF may be withdrawn, provided that the volume of extraneous gas withdrawn shall be replaced during the next succeeding summer season (April 1 through October 31) at a rate not to exceed 2,300 MCFD.

(B) During each of the winter seasons (November 1 through March 31) of 1996 through 1998, a volume of gas not to exceed 800,000 MCF may be withdrawn, provided that the volume of extraneous gas withdrawn shall be replaced during the next succeeding summer season (April 1 through October 31) at a rate not to exceed 5,500 MCFD.

(C) In addition to complete replacement of the volumes of extraneous gas withdrawn during the immediately preceding winter season, an additional volume of gas shall be injected during each summer season equal to 12% of the volume withdrawn during the immediately preceding winter season to compensate the Empire Abo Unit for any fuel used, shrinkage or metering errors.

(D) No extraneous gas may be withdrawn during a winter season until all gas withdrawn during preceding winter seasons is replaced plus the additional 12% volume required by paragraph C of this rule.

(E) The provisions of Paragraphs 4 (A) through 4 (D) shall be of no further effect on the date the Pressure Maintenance Project ceases or November 1, 1998, whichever occurs first.

The project operator shall establish and maintain an "Extraneous Gas Bank Statement" which shall be filed with the Division each month concurrently with the project operators "Empire-Abo Pressure Maintenance Project Monthly Report", and which shall show thereon each month the volume of extraneous gas injected, the cumulative volume of such gas injected, the volume of gas withdrawn and delivered back to the supplier of extraneous gas and the net cumulative extraneous gas bank."

(3) 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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