

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. 10290
Order No. R-3528-A

APPLICATION OF AVON ENERGY CORPORATION
FOR AMENDMENT OF DIVISION ORDER NOS.
R-3185, R-3185-A AND R-3528 TO EXPAND
THE VERTICAL LIMITS AND TO ESTABLISH
AN INJECTION PRESSURE LIMITATION FOR
THE TURNER "B" LEASE WATERFLOOD PROJECT,
EDDY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on August 8, 1991, at Santa Fe, New Mexico, before Examiner David R. Catanach.

NOW, on this 23rd day of September, 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) By Order No. R-3185, dated February 1, 1967, the Division authorized Sinclair Oil & Gas Company to institute three waterflood projects, the Russel Grayburg-Jackson Waterflood Project, Turner "A" Grayburg-Jackson Waterflood Project, and the Turner "B" Grayburg-Jackson Waterflood Project, said projects comprising all or portions of Sections 17, 18, 19, 20, 29 and 30, Township 17 South, Range 31 East, NMPM, Grayburg-Jackson Pool, Eddy County, New Mexico, by the injection of water into the Grayburg-San Andres formation through two, eight and nine injection wells located within said projects, respectively.

(3) By Nunc Pro Tunc Order No. R-3185-A, dated February 19, 1968, the Division corrected certain injection well locations authorized by said Order No. R-3185.

(4) By Order No. R-3528, dated October 9, 1968, the Division authorized Sinclair Oil Corporation to expand its Turner "B" Grayburg-Jackson Waterflood Project by the injection of water into the Premier Sand member of the Grayburg formation through twelve injection wells located in Sections 20, 29 and 30, Township 17 South, Range 31 East, NMPM, Eddy County, New Mexico, hereinafter referred to as the "Expansion Area".

(5) The current boundaries of the Russel Grayburg-Jackson Waterflood Project, Turner "A" Grayburg-Jackson Waterflood Project, Turner "B" Grayburg-Jackson Waterflood Project (including the "Expansion Area"), and the Grayburg-Jackson Friess-Fren Waterflood Project (also located in said Sections 19 and 30 and approved by Division Order No. R-4306) are as follows:

Russel Grayburg-Jackson Waterflood Project
TOWNSHIP 17 SOUTH, RANGE 31 EAST, NMPM

Section 18: NW/4, W/2 NE/4

Turner "A" Grayburg-Jackson Waterflood Project
TOWNSHIP 17 SOUTH, RANGE 31 EAST, NMPM

Section 18: S/2
Section 19: N/2

Turner "B" Grayburg-Jackson Waterflood Project
TOWNSHIP 17 SOUTH, RANGE 31 EAST, NMPM

Section 17: NW/4 SW/4, S/2 S/2
Section 20: All
Section 29: All
Section 30: SE/4

Grayburg-Jackson Friess-Fren Waterflood Project
TOWNSHIP 17 SOUTH, RANGE 31 EAST, NMPM

Section 19: E/2 SW/4, SE/4
Section 30: NE/4

(6) The Russel Grayburg-Jackson, Turner "A" Grayburg-Jackson, Grayburg-Jackson Friess-Fren and portions of the Turner "B" Grayburg-Jackson Waterflood Projects are currently owned and operated by Socorro Petroleum Company.

(7) The applicant, Avon Energy Corporation, a 50% owner of Socorro Petroleum Company, currently operates a portion of the Turner "B" Grayburg-Jackson Waterflood Project comprising the following described acreage:

TOWNSHIP 17 SOUTH, RANGE 31 EAST, NMPM

Section 20: S/2 N/2, S/2

Section 29: All

Section 30: E/2 SE/4

(8) The applicant in this case, Avon Energy Corporation, seeks the following:

- 1) The amendment of Division Order No. R-3528 by expanding the injection interval in the twelve injection wells approved by said order to include the entire Grayburg-San Andres formation;
- 2) The establishment of an injection pressure limitation of 450 psi above the formation fracture pressure as determined from step rate tests for those twelve injection wells located within the "Expansion Area".
- 3) The establishment of an administrative procedure whereby acreage currently contained within the Russel Grayburg-Jackson, Turner "A" Grayburg-Jackson, Turner "B" Grayburg-Jackson, and Grayburg-Jackson Friess-Fren Waterflood Projects may be transferred to Avon Energy Corporation and operated as a single waterflood project.

(9) According to applicant's evidence, Avon Energy Corporation currently has a farmout agreement with Socorro Petroleum Company whereby Avon earns acreage from Socorro as said acreage is drilled or otherwise further developed.

(10) Further evidence presented indicates that all of the acreage within the subject waterflood projects is Federal lands.

(11) The transfer and operation of such acreage should result in a more efficient operation, will result in the recovery of additional oil within the projects, and will not violate correlative rights.

(12) According to applicant's evidence and testimony, expansion of the injection interval within those wells located in the "Expansion Area" will result in the recovery of an additional 2.3 million barrels of oil which would not otherwise be recovered, thereby preventing waste.

(13) The proposed expansion of the injection interval within those wells located in the "Expansion Area" should be approved.

(14) The Division has determined, after consultation with the applicant prior to the hearing, that certain "Area of Review" wells located within the "Expansion Area" are not completed in such a manner which will assure that their wellbores will not serve as a conduit for migration of the injected fluid from the proposed injection zone.

(15) Prior to commencing injection operations within one-half mile of any of the following described wells, or prior to injecting into the Turner "B" Well No. 56 located in Unit J of said Section 30, the applicant should be required to perform remedial cement operations or take other action as may be necessary in order to assure that these wellbores will not serve as a conduit for migration of injected fluid to the satisfaction of the supervisor of the Artesia district office of the Division:

| | |
|-------------------|----------------------------------|
| Turner "B" No. 55 | Unit H, Section 29, T-17S, R-31E |
| Turner "B" No. 60 | Unit K, Section 29, T-17S, R-31E |
| Turner "B" No. 68 | Unit P, Section 29, T-17S, R-31E |
| Turner "B" No. 71 | Unit M, Section 29, T-17S, R-31E |

(16) No injection pressure limitation currently exists on any of the injection wells in the subject waterflood projects, however, by virtue of amending the injection interval in those injection wells located within the "Expansion Area", the Division would normally impose a surface injection pressure limitation on those wells equal to 0.2 psi per foot of depth to the uppermost perforations.

(17) The applicant presented the results of step-rate tests conducted on three injection wells within the "Expansion Area". The results of these step rate tests show an average formation fracture pressure of 1208 psi.

(18) The applicant's engineering study of pressure limits based upon Frac Hite, Frac Migration, and After Frac Logs (submitted as evidence in this case) provides substantial evidence to demonstrate that injection at 1650 psi (450 psi above the formation parting pressure) will not propagate fractures outside of the vertical limits of the Grayburg-Jackson Pool.

(19) The requested increase in surface pressure limitations for the "Expansion Area" will approximate the surface injection pressure for the original injection wells for which no pressure limit was imposed.

(20) Engineering studies conducted on behalf of the applicant have demonstrated that the water injected into the original injection wells at pressures up to an average of 1870 psi remained confined to the Grayburg-Jackson Pool.

(21) There is no indication that water injected into the original injection wells at pressures higher than those sought by the applicant in this case has moved water outside of the vertical limits of the Grayburg-Jackson Pool.

(22) Applicant's request is similar to the request previously approved by the Division Order R-2268-C for Socorro Petroleum Company and for which no adverse effects have been reported.

(23) Injection into the twelve subject injection wells at a surface injection pressure of approximately 450 psi above formation fracture pressure will allow the recovery of additional oil reserves within the Grayburg-Jackson Pool, thereby preventing waste, will not endanger any fresh water aquifers, and should therefore be approved.

(24) As the reservoir pressure in the "Expansion Area" increases as a result of the injection of water, it will be necessary to periodically increase the surface pressure limitation for the project which should be authorized administratively.

(25) The applicant should be required to submit a request to the Santa Fe and Artesia offices of the Division and to the United States Bureau of Land Management (BLM) for transfer of acreage from the Socorro Petroleum Company operated Turner "A" Grayburg-Jackson, Turner "B" Grayburg-Jackson, Grayburg-Jackson Friess-Fren and Russel Grayburg-Jackson Waterflood Projects into the Avon operated Turner "B" Grayburg-Jackson Waterflood Project. Such request should be in general letter form along with a plat of the projects showing the requested acreage to be transferred.

IT IS THEREFORE ORDERED THAT:

(1) Division Order Nos. R-3185, R-3185-A and R-3528 are hereby amended authorizing Avon Energy Corporation to inject water into the Grayburg-San Andres formation, Grayburg-Jackson Pool, through the twelve injection wells (previously approved for injection by Order No. R-3528) shown on Exhibit "A" attached hereto located within the "Expansion Area" of the Turner "B" Grayburg-Jackson Waterflood Project comprising all or portions of Sections 20, 29 and 30, Township 17 South, Range 31 East, NMPM, Eddy County, New Mexico.

(2) The twelve subject injection wells or pressurization system shall be equipped with a pressure limiting device which will limit the surface injection pressure on said wells to no more than 1650 psi.

(3) The Division Director shall have the authority to administratively approve subsequent pressure increases on said wells to 450 psi above fracture pressure, provided, however, that step-rate tests, temperature surveys, tracer surveys or other supporting data the Division may deem necessary accompany such requests.

(4) The Division Director shall also have the authority to reduce or rescind said injection pressures should it become apparent that the injected fluid is not being adequately confined to the Grayburg-Jackson Pool.

(5) Prior to commencing injection operations within one-half mile of any of the following described wells, or prior to injecting into the Turner "B" Well No. 56 located in Unit J of said Section 30, the applicant shall perform remedial cement operations or take other action as may be necessary in order to assure that these wellbores will not serve as a conduit for migration of injected fluid to the satisfaction of the supervisor of the Artesia district office of the Division:

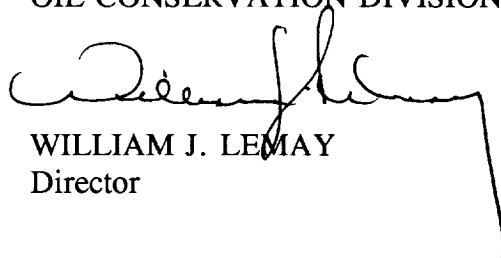
| | |
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| Turner "B" No. 68 | Unit P, Section 29, T-17S, R-31E |
| Turner "B" No. 71 | Unit M, Section 29, T-17S, R-31E |

(6) The Division Director may authorize the transfer of acreage currently contained within the Socorro Petroleum Company operated Turner "A" Grayburg-Jackson, Turner "B" Grayburg-Jackson, Grayburg-Jackson Friess-Fren and Russel Grayburg-Jackson Waterflood Projects into the Avon operated Turner "B" Grayburg-Jackson Waterflood Project provided a request for such transfer of acreage is submitted to the Santa Fe and Artesia offices of the Division and to the United States Bureau of Land Management (BLM). Such request shall be in general letter form along with a plat of the projects showing the requested acreage to be transferred.

(7) Jurisdiction is hereby 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

S E A L

EXHIBIT "A"
CASE NO. 10290
DIVISION ORDER NO R-3528-A
TURNER "B" GRAYBURG-JACKSON WATERFLOOD PROJECT

| <i>Well Number</i> | <i>Location</i> | <i>Unit</i> | <i>S-T-R</i> | <i>Injection Perforations</i> | <i>Packer Depth</i> | <i>Tubing Size</i> | <i>Injection Pressure</i> |
|--------------------|-----------------------|-------------|--------------|-------------------------------|---------------------|--------------------|---------------------------|
| Turner "B" No. 44 | 660' FSL & 2055' FWL | N | 20-17S-31E | TBD* | TBD* | 2 3/8 | 1650 |
| Turner "B" No. 46 | 660' FSL & 760' FEL | P | 20-17S-31E | TBD* | TBD* | 2 3/8 | 1650 |
| Turner "B" No. 47 | 560' FNL & 1980' FEL | B | 29-17S-31E | 3045' - 3412' | 2945' | 2 3/8 | 1650 |
| Turner "B" No. 50 | 660' FNL & 660' FWL | D | 29-17S-31E | 2978' - 3330' | 2878' | 2 3/8 | 1650 |
| Turner "B" No. 54 | 1980' FNL & 1980' FWL | F | 29-17S-31E | 3108' - 3404' | 3008' | 2 3/8 | 1650 |
| Turner "B" No. 55 | 1980' FNL & 660' FEL | H | 29-17S-31E | TBD* | TBD* | 2 3/8 | 1650 |
| Turner "B" No. 56 | 1980' FSL & 1980' FEL | J | 30-17S-31E | TBD* | TBD* | 2 3/8 | 1650 |
| Turner "B" No. 61 | 1980' FSL & 1980' FEL | J | 29-17S-31E | 3254' - 3646' | 3154' | 2 3/8 | 1650 |
| Turner "B" No. 64 | 1980' FSL & 660' FWL | L | 29-17S-31E | 3146' - 3557' | 3046' | 2 3/8 | 1650 |
| Turner "B" No. 66 | 660' FSL & 1980' FWL | N | 29-17S-31E | 3281' - 3678' | 3181' | 2 3/8 | 1650 |
| Turner "B" No. 68 | 660' FSL & 660' FEL | P | 29-17S-31E | TBD* | TBD* | 2 3/8 | 1650 |
| Turner "B" No. 76 | 660' FSL & 660' FEL | P | 30-17S-31E | TBD* | TBD* | 2 3/8 | 1650 |
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*TBD - To Be Determined