

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. 8324  
Order No. R-7821

APPLICATION OF YATES PETROLEUM  
CORPORATION FOR A CARBON DIOXIDE  
INJECTION PILOT PROJECT AND  
UNORTHODOX LOCATIONS, EDDY COUNTY,  
NEW MEXICO

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8 a.m. on September 19 and October 17, 1984, at Santa Fe, New Mexico, before Examiners Michael E. Stogner and Gilbert P. Quintana, respectively.

NOW, on this 21st day of February, 1985, 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, Yates Petroleum Corporation, seeks authority to initiate and conduct a pilot carbon dioxide/water injection project to be known as the Yates Petroleum Loco Hills CO<sub>2</sub> Pilot Injection Project, hereinafter referred to as "pilot project", for tertiary recovery purposes and to test the CO<sub>2</sub> miscible process in the Fourth Sand Member of the Grayburg<sup>2</sup> formation underlying the E/2 of Section 12, Township 18 South, Range 29 East, NMPM, and the W/2 of Section 7, Township 18 South, Range 30 East, NMPM, both sections located in the Loco Hills Queen Grayburg San Andres Pool, West Loco Hills Grayburg No. 4 Sand Unit, Eddy County, New Mexico.

(3) The applicant proposes to initially develop its proposed pilot project on a 22 1/2-acre (approximate) inverted five-spot injection pattern and would require the drilling of

two carbon dioxide/water injection wells at unorthodox locations, the West Loco Hills G4S Unit Tract 13 Well No. 12 to be located 1980 feet from the North line and 10 feet from the East line (Unit H) and the West Loco Hills G4S Unit Tract 6 Well No. 5 to be located 2475 feet from the South line and 10 feet from the East line (Unit I), both wells in said Section 12, Township 18 South, Range 29 East.

(4) The operator of the above-described injection wells should take all steps necessary to ensure that the injected fluids enter only the proposed injection interval and are not permitted to escape to other formations or onto the surface via surrounding injection, production, and/or plugged and abandoned wells.

(5) To fully develop and complete the above-described inverted five-spot injection pattern, an additional producing well will be required to be drilled at an undetermined and possible unorthodox location in the SW/4 NE/4 (Unit H) of said Section 12, Township 18 South, Range 29 East. Also, the following existing wells will be utilized as production wells:

West Loco Hills G4S Unit Tract 13 Well No. 11 located 2310 feet from the North line and 1175 feet from the East line (Unit H);

West Loco Hills G4S Unit Tract 6 Well No. 1 located 1980 feet from the South line and 660 feet from the East line (Unit I);

both wells located in said Section 12, Township 18 South, Range 29 East;

West Loco Hills G4S Unit Tract 1 Well No. 2 located 1650 feet from the North line and 330 feet from the West line (Unit E);

West Loco Hills G4S Unit Tract 1 Well No. 8 located 2310 feet from the North line and 330 feet from the West line (Unit E);

West Loco Hills G4S Unit Tract 1 Well No. 3 located 1980 feet from the South line and 660 feet from the West line (Unit L);

the three above-described wells all located in said Section 7, Township 18 South, Range 30 East.

(6) At the time of the hearing the applicant requested that upon an analysis of the reservoir and fluid

characteristics from any of the wells that make up the aforesaid 22 1/2-acre inverted five-spot injection pattern, it is shown that the area is not suitable for a pilot carbon dioxide/water injection project, the operator should then have the flexibility to drill and/or convert existing wells to be utilized as either carbon dioxide/water injection wells and/or producing wells at locations other than those described in Finding Paragraphs Nos. (3) and (5) above, provided, however, that no such well would be located outside the project area as described in Finding Paragraph No. (2) above.

(7) There are several wells that lie between the outside of the aforesaid 22 1/2-acre inverted five-spot injection pattern and within a half mile radius of the aforesaid proposed injection wells which may or may not have been plugged and abandoned or completed in such a manner as to ensure that they do not provide an avenue of escape for the injected fluids from the proposed zone of interest.

(8) The evidence presently available indicates that said wells should not be adversely affected by the injected fluids since migration of such fluids outside the pilot project area should not occur.

(9) To assure that the injected fluid does not escape the injection interval through or around any of the wells referenced in Finding Paragraph No. (7) above, the pilot project should be confined to only those wells as described in Finding Paragraphs Nos. (3) and (5), above, and the applicant's request for administrative expansion of the pilot project area should be denied.

(10) The area of the pilot project with which this order will hereinafter be concerned is described as follows:

EDDY COUNTY, NEW MEXICO

TOWNSHIP 18 SOUTH, RANGE 29 EAST, NMPM

Section 12: SE/4 NE/4 and NE/4 SE/4

TOWNSHIP 18 SOUTH, RANGE 30 EAST, NMPM

Section 7: SW/4 NW/4 and NW/4 SW/4

(11) The pilot project is in an area where extensive primary and secondary recovery operations have been conducted, (see Division Order No. R-2178, as amended), and is of an experimental nature in order to evaluate the effectiveness of carbon dioxide injection into the subject reservoir and to

provide a study of zone isolation, vertical heterogeneity, reservoir directional variation, and the carbon dioxide displacement process.

(12) Prior to commencing injection operations, the casing in the injection wells in the pilot project should be pressure-tested throughout the interval from the surface down to the proposed packer setting depth, to assure the integrity of such casing.

(13) The injection into each of the injection wells, as described in Finding Paragraph No. (3) above, should be accomplished through either 2 7/8-inch or 2 3/8-inch plastic lined tubing installed in a packer set not more than 100 feet above the uppermost perforation; the casing-tubing annulus of each injection well 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.

(14) Said injection wells herein authorized and/or the injection pressurization system should be so equipped as to limit injection pressure at the wellhead to no more than 0.2 psi per foot of depth to the uppermost perforations, provided however, the Division Director may authorize a higher surface injection pressure upon satisfactory showing that such pressure will not result in fracturing of the confining strata.

(15) The operator shall notify 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 on each of the proposed injection wells so that the same may be inspected.

(16) The evidence presently available indicates that there is no fresh water within the area of interest.

(17) In the event the pilot project is successful and indicates the desirability and economic feasibility of the process, the pilot project could be expanded to include additional lands and wells, and could result in the production of otherwise unrecoverable oil, thereby preventing waste.

(18) The pilot project is to be conducted well within the boundaries of the West Loco Hills Grayburg No. 4 Sand Unit Area, a unitized area, and will therefore not impair correlative rights.

(19) The proposed pilot project should be approved, as well as the requested unorthodox injection and oil well

locations as described in Finding Paragraphs Nos. (3) and (5), respectively, above.

IT IS THEREFORE ORDERED THAT:

(1) The applicant, Yates Petroleum Corporation, is hereby authorized to initiate and conduct a pilot carbon dioxide/water injection project known as the Yates Petroleum Corporation Loco Hills CO<sub>2</sub> Pilot Injection Project, hereinafter referred to as "pilot project" in the Fourth Sand Member of the Grayburg formation underlying the SE/4 NE/4 and NE/4 SE/4 (Units H and I, respectively) of Section 12, Township 18 South, Range 29 East, NMPM, and the SW/4 NW/4 and NW/4 SW/4 (Units E and L, respectively) of Section 7, Township 18 South, Range 30 East, NMPM, both portions of said sections located in the Loco Hills Queen Grayburg San Andres Pool, West Loco Hills Grayburg No. 4 Sand Unit, Eddy County, New Mexico.

(2) The applicant is hereby authorized to initially develop the above-described pilot project on a 22 1/2-acre (approximate) inverted five-spot injection pattern utilizing the following wells to be drilled as carbon dioxide/water injection wells at unorthodox locations hereby approved:

West Loco Hills G4S Unit Tract 13 Well No. 12 to be located 1980 feet from the North line and 10 feet from the East line (Unit H);

West Loco Hills G4S Unit Tract 6 Well No. 5 to be located 2475 feet from the South line and 10 feet from the East line (Unit I);

both in said Section 12, Township 18 South, Range 29 East.

(3) Injection into each of the above-described injection wells shall be accomplished through either 2 7/8-inch or 2 3/8-inch tubing installed in a packer set not more than 100 feet above the uppermost perforation;

PROVIDED HOWEVER THAT, the tubing shall be internally plastic-lined; the casing-tubing annulus of each injection well 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, and/or packer.

PROVIDED FURTHER THAT, prior to commencing injection operations, the casing in the subject wells shall be pressure-tested to assure the integrity of such casing in a

manner that is satisfactory to the supervisor of the Division's district office at Artesia.

(4) The injection wells herein authorized and/or the injection pressurization system shall be so equipped as to limit injection pressure at the wellhead to no more than 0.2 psi per foot of depth to the uppermost perforations therein, provided however, the Division Director may authorize a higher surface injection pressure upon satisfactory showing that such pressure will not result in fracturing of the confining strata.

(5) The operator shall notify 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.

(6) To further develop the above-described inverted five-spot injection pattern, the applicant is hereby authorized to drill an additional producing well at an undetermined and possible unorthodox location in the SE/4 NE/4 (Unit H) of said Section 12, Township 18 South, Range 29 East, provided said well shall be located not closer than 10 feet to any boundary of said quarter-quarter section.

(7) The following existing wells are hereby approved as production wells within the pilot project to fully develop and complete the aforesaid inverted five-spot injection pattern:

West Loco Hills G4S Unit Tract 13 Well No. 11 located 2310 feet from the North line and 1175 feet from the East line (Unit H);

West Loco Hills G4S Unit Tract 6 Well No. 1 located 1980 feet from the South line and 660 feet from the East line (Unit I);

both wells being located in said Section 12, Township 18 South, Range 29 East;

West Loco Hills G4S Unit Tract 1 Well No. 2 located 1650 feet from the North line and 330 feet from the West line (Unit E);

West Loco Hills G4S Unit Tract 1 Well No. 8 located 2310 feet from the North line and 330 feet from the West line (Unit E);

West Loco Hills G4S Unit Tract 1 Well No. 3 located 1980 feet from the South line and 660 feet from the

West line (Unit L);

The three above described wells being located in said Section 7, Township 18 South, Range 30 East.

(8) The operator shall immediately notify the Supervisor of the Artesia district office of the Division of the failure of the tubing, casing, packer, or cement in any well in the pilot project, or of the leakage of fluid from or around any of said wells and shall take such timely steps as may be necessary to correct such failure or leakage.

(9) Any such time that any of the producing wells in the pilot project are shut-in for over 90 consecutive days, the Supervisor of the Artesia district office shall be notified, at which time it shall be demonstrated that any wells that lie between the outside of the aforesaid inverted five-spot injection pattern and within a half mile radius of the aforesaid injection wells will not be adversely affected by the carbon dioxide/water injection operations.

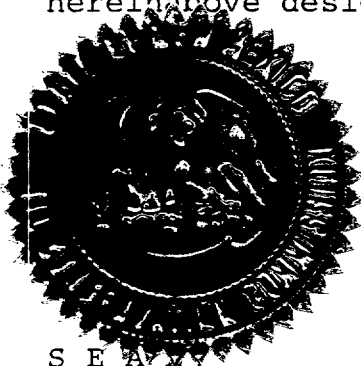
(10) The Yates Petroleum Loco Hills CO<sub>2</sub> Pilot Injection Project shall be governed by this order and the rules contained herein and by the provisions of Rules 701 through 708 of the Division Rules which are not in conflict with this order.

(11) Monthly project reports of the project herein authorized shall be submitted to the Division in accordance with Rule 706 of the Division Rules, separately designating volumes of carbon dioxide and water injected.

(12) The application for administrative approval for the expansion of the pilot project area is hereby denied.

(13) 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

*R. L. Stamets*  
R. L. STAMETS,  
Director

STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

CASE NO. 8324  
Order No. R-7821-A

APPLICATION OF YATES PETROLEUM  
CORPORATION FOR A CARBON DIOXIDE  
INJECTION PILOT PROJECT AND UNORTHODOX  
LOCATIONS, EDDY COUNTY, NEW MEXICO

NUNC PRO TUNC ORDER

BY THE DIVISION:

It appearing to the Division that Order No. R-7821, dated February 21, 1985, does not correctly state the intended order of the Division,

IT IS THEREFORE ORDERED THAT:

(1) The reference to the " SW/4 NE/4 (Unit H) of Section 12" in lines 4 and 5 of Finding Paragraph No. (5) on page 2 of Division Order No. R-7821, dated February 21, 1985, is incorrect and is hereby amended to show "the SE/4 NE/4 (Unit H) of Section 12."

(2) The well described as the,

" West Loco Hills G4S Unit Tract 13 Well No. 11  
located 2310 feet from the North line and 1175 feet  
from the East line (Unit H);"

appearing, in part, in Finding Paragraph No. (5) on page 2 and in Ordering Paragraph No. (7) on page 6 of said Order No. R-7821, is hereby amended to read as follows:

"West Loco Hills G4S Unit Tract 13 Well No. 4 located  
1650 feet from the North line and 330 feet from the  
East line (Unit H);"

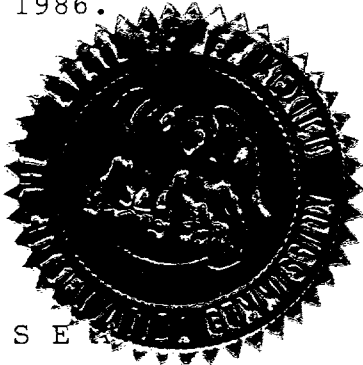
(3) The corrections set forth in this order be entered nunc pro tunc as of February 21, 1985.

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Case No. 8324

Order No. R-7821-A

DONE at Santa Fe, New Mexico, on this 8th day of May,  
1986.



STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION

*R. L. Stamets*  
R. L. STAMETS  
Director