

**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. 11826  
Order No. R-4629-A**

**APPLICATION OF QUAY VALLEY, INC. FOR  
AMENDMENT OF DIVISION ORDER NO. R-4629  
TO AUTHORIZE A TERTIARY RECOVERY  
PROJECT BY THE INJECTION OF CARBON  
DIOXIDE IN ITS NORTH EL MAR UNIT  
WATERFLOOD PROJECT AREA, AND TO  
QUALIFY THIS PROJECT FOR THE  
RECOVERED TAX RATE PURSUANT TO  
THE ENHANCED OIL RECOVERY ACT, LEA  
COUNTY, NEW MEXICO.**

**ORDER OF THE DIVISION**

**BY THE DIVISION:**

This cause came on for hearing at 8:15 a.m. on August 7 and September 4, 1997, at Santa Fe, New Mexico, before Examiner David R. Catanach.

NOW, on this 5<sup>th</sup> day of November, 1997, 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, Quay Valley, Inc., seeks authority to institute a tertiary recovery project in its North El Mar Unit Waterflood Project Area by the injection of combined water, carbon dioxide (CO<sub>2</sub>), and produced gas into the Delaware formation, El Mar-Delaware Pool, through the gross interval from approximately 4,450 feet to 4,765 feet through thirty-one (31) injection wells located within Sections 24, 25, 26, 34, 35 and 36, Township 26 South, Range 32 East, and Sections 30 and 31, Township 26 South, Range 33 East, NMPM, Lea County, New Mexico, all as shown on Exhibit "A" attached hereto.

(3) Applicant further seeks to re-authorize the injection authority for those previously approved injection wells whose authority to inject has terminated pursuant to Division Rule No. 705.C.

(4) Applicant further seeks to qualify the proposed North El Mar Unit Tertiary Recovery Project for the recovered oil tax rate pursuant to the "New Mexico Enhanced Oil Recovery Act", (Laws 1992, Chapter 38, Sections 1 through 5).

(5) By Order No. R-3486 dated September 9, 1968, the Division authorized Continental Oil Company to institute a waterflood project in the El Mar-Delaware Pool by the injection of water into the Delaware formation through two initial injection wells located in Section 26, Township 26 South, Range 32 East. This project was designated the Continental El Mar Wilder Waterflood Project.

(6) By Order No. R-3540 dated October 31, 1968, the Division authorized Continental Oil Company to institute a waterflood project in the El Mar-Delaware Pool by the injection of water into the Delaware formation through two initial injection wells located in Sections 30 and 31, Township 26 South, Range 33 East. This project was designated the Continental El Mar Payne Waterflood Project.

(7) By Order No. R-4629 dated September 13, 1973, the Division, upon application of Continental Oil Company, approved the North El Mar Unit comprising some 2,361.16 acres, of State and Federal lands described as follows:

NORTH EL MAR UNIT AREA  
TOWNSHIP 26 SOUTH, RANGE 32 EAST, NMPM

Section 24: S/2 SE/4  
Section 25: All  
Section 26: NE/4 NE/4, S/2 NE/4, SE/4 NW/4, S/2  
Section 27: SE/4 SE/4  
Section 34: N/2 NE/4, Lots 1 and 2  
Section 35: N/2 N/2, Lots 1 through 4  
Section 36: N/2 N/2, Lots 1 through 4

TOWNSHIP 26 SOUTH, RANGE 33 EAST, NMPM

Section 19: SW/4 SW/4  
Section 30: NW/4 NW/4, S/2 NW/4, SW/4  
Section 31: E/2 NW/4, Lots 1 and 2

(8) Order No. R-4629 further authorized Continental Oil Company to expand its two previously approved waterflood projects in the El Mar-Delaware Pool, as described in Finding Paragraph Nos. (5) and (6) above, by the injection of water into the Delaware formation through an additional twenty-seven wells located within the Unit Area.

(9) Evidence and testimony presented indicates that Quay Valley, Inc. assumed operations of the North El Mar Unit Waterflood Project from Conoco Inc. in June, 1996.

(10) Geologic evidence and testimony presented by the applicant indicates that:

- a) the unitized interval within the North El Mar Unit comprises that portion of the Bell Canyon member of the Delaware formation which occurs from a depth of approximately 4,672 feet to 4,782 feet in the Continental Oil Company Payne Well No. 11 located in Unit N of Section 30, Township 26 South, Range 33 East, as shown on the gamma ray/sonic log run on the well on July 21, 1960;
- b) the unitized interval consists of three separate members, all of which are correlatable and continuous throughout the North El Mar Unit Area;
- c) the upper and lower members of the unitized interval are sand members which are known to be productive of oil and gas. The middle member is a shale member which is not hydrocarbon productive;
- d) the proposed tertiary recovery operations will occur primarily within the upper and lower sand members of the unitized interval; and,
- e) the unitized interval is currently subject to CO<sub>2</sub> injection within the Burlington Resources Oil & Gas Company El Mar Unit which is located directly offset to the south in Loving County, Texas.

(11) The applicant presented engineering evidence and testimony which indicates that:

- a) injection of water for secondary recovery operations commenced in January, 1975 within the North El Mar Unit. Injected water volume peaked in approximately 1978 and has declined since that time;
- b) cumulative production (primary and secondary) within the North El Mar Unit is approximately 6.1 million barrels of oil;

- c) cumulative production since the initiation of secondary recovery operations within the North El Mar Unit is approximately 1.2 million barrels of oil;
- d) current oil production within the North El Mar Unit is approximately 100 barrels of oil per day. Current water injection is approximately 700 barrels of water per day;
- e) applicant proposes to utilize a five-spot injection pattern within the Unit Area and proposes to implement a change in the process used for the displacement of crude oil by initiating water-alternating-gas (WAG) injection (injecting water and carbon dioxide (CO<sub>2</sub>) in alternating slugs of produced gas and CO<sub>2</sub> with slugs of water;
- f) applicant proposes to initially utilize twenty-seven producing wells and twenty-four injection wells within the tertiary recovery project area;
- g) a total of 27.1 BCF of CO<sub>2</sub> will be purchased for injection within the tertiary recovery project area. Ultimately, the applicant anticipates injecting approximately 41 BCF of CO<sub>2</sub> and produced gas over the life of the project, which is expected to be twenty-one years;
- h) the tertiary recovery project costs are estimated to be approximately \$23.25 million dollars; and,
- i) as a result of implementing the proposed tertiary recovery project, the applicant anticipates the recovery of an additional 3.7 million barrels of oil from the Unit Area at a value of approximately \$67.25 million dollars.

(12) The evidence and testimony presented in this case indicates that it is prudent to implement the proposed tertiary recovery project within the North El Mar Unit at this time, and that such implementation will result in the recovery of additional oil and gas from the project area which may otherwise not be recovered, thereby preventing waste.

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- (13) The proposed tertiary recovery project should be approved.
- (14) The injection authority for the wells shown on Exhibit "A" should be reinstated.
- (15) All injection wells or the pressurization system should be initially equipped with a pressure control device or acceptable substitute which will limit the surface injection pressure to no more than 530 psi for water injection and 1160 psi for CO<sub>2</sub> and produced gas injection.
- (16) The applicant testified that there are no "problem wells" within the one-half mile "area of review" and further testified that all plugged and abandoned wells and all producing wells are cemented in a manner adequate to confine the injected fluid to the proposed injection interval.
- (17) The applicant proposes utilizing unlined tubing in its injection wells within the tertiary recovery project.
- (18) Current Division policy dictates that injection should be accomplished through plastic or fiberglass lined tubing.
- (19) Each of the injection wells shown on Exhibit "A" should be equipped with 2 3/8-inch internally coated tubing installed in a packer set within 100 feet of the uppermost injection perforation or casing shoe; the casing-tubing annulus should be filled with an inert fluid; and a gauge or approved leak-detection device should be attached to the annulus in order to determine leakage in the casing, tubing or packer.
- (20) Prior to commencing injection operations into any of the wells shown on Exhibit "A", the casing in each well should be pressure tested throughout the interval from the surface to the proposed packer setting depth to assure the integrity of such casing.
- (21) Each of the wells within the tertiary recovery project area, including active producing or injection wells, and temporarily abandoned producing or injection wells should be equipped so as to confine the injected fluid to the proposed injection interval.
- (22) The operator should give advance notification to the supervisor of the Hobbs District Office of the Division of the date and time of the installation of any new injection equipment and of the mechanical integrity pressure tests in order that the same may be witnessed.
- (23) The application should be approved and the project should be governed by the provisions of Rule Nos. 701 through 708 of the Oil Conservation Division Rules and Regulations.

(24) The evidence presented by the applicant indicates that the proposed tertiary recovery project meets all the criteria for certification by the Division as a qualified "Enhanced Oil Recovery Project" pursuant to the "Enhanced Oil Recovery Act" (Laws 1992, Chapter 38, Sections 1 through 5).

(25) The certified "EOR Project Area" should initially comprise the area described in Finding Paragraph No. (7) above, provided however, the "EOR Project Area" eligible for the recovered oil tax rate may be contracted and reduced dependent upon the evidence presented by the applicant in its demonstration of the occurrence of a positive production response.

(26) To be eligible for the EOR tax credit, the applicant should advise the Division when CO<sub>2</sub> (WAG) injection commences within the "EOR Project Area" and request the Division certify the subject tertiary recovery project to the New Mexico Taxation and Revenue Department.

(27) At such time as a positive production response occurs from CO<sub>2</sub> (WAG) injection operations and within seven years from the date of the Certificate of Qualification, the applicant must apply to the Division for certification of positive production response, which application shall identify the area actually benefitting from tertiary recovery operations. The Division may review the application administratively or set it for hearing. Based upon evidence presented, the Division will certify to the New Mexico Taxation and Revenue Department those lands and wells which are eligible for the tax credit.

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

**IT IS THEREFORE ORDERED THAT:**

(1) Division Order No. R-4629 is hereby amended to authorize Quay Valley, Inc., to institute an EOR tertiary recovery project by means of combined water, carbon dioxide (CO<sub>2</sub>), and produced gas injection (WAG) in its El Mar Unit Area, described as follows, by the injection of water, CO<sub>2</sub> and produced gases into the Delaware formation, El Mar-Delaware Pool, through the gross interval from approximately 4,450 feet to 4,765 feet through thirty-one (31) injection wells located within Sections 24, 25, 26, 34, 35 and 36, Township 26 South, Range 32 East, and Sections 30 and 31, Township 26 South, Range 33 East, NMPM, Lea County, New Mexico, all as shown on Exhibit "A" attached hereto:

NORTH EL MAR UNIT AREA  
TOWNSHIP 26 SOUTH, RANGE 32 EAST, NMPM

- Section 24: S/2 SE/4
- Section 25: All
- Section 26: NE/4 NE/4, S/2 NE/4, SE/4 NW/4, S/2
- Section 27: SE/4 SE/4
- Section 34: N/2 NE/4, Lots 1 and 2
- Section 35: N/2 N/2, Lots 1 through 4
- Section 36: N/2 N/2, Lots 1 through 4

TOWNSHIP 26 SOUTH, RANGE 33 EAST, NMPM

- Section 19: SW/4 SW/4
- Section 30: NW/4 NW/4, S/2 NW/4, SW/4
- Section 31: E/2 NW/4, Lots 1 and 2

(2) Injection authority is hereby reinstated for each of the injection wells shown on Exhibit "A".

(3) WAG injection operations shall be accomplished through 2 3/8 inch internally coated tubing installed in a packer set within approximately 100 feet of the uppermost injection perforations or casing shoe; the casing-tubing annulus shall be filled with an inert fluid and a gauge or approved leak-detection device shall be attached to the annulus in order to determine leakage in the casing, tubing or packer.

(4) All injection wells or the pressurization system should be initially equipped with a pressure control device or acceptable substitute which will limit the surface injection pressure to no more than 530 psi for water injection and 1160 psi for CO<sub>2</sub> and produced gas injection.

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

(6) Prior to commencing injection operations into any of the wells shown on Exhibit "A", the casing in each well shall be pressure tested throughout the interval from the surface to the proposed packer setting depth to assure the integrity of such casing.

(7) Each of the wells within the tertiary recovery project area, including active producing or injection wells, and temporarily abandoned producing or injection wells shall be equipped so as to confine the injected fluid to the proposed injection interval.

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

(9) The operator shall immediately notify the supervisor of the Hobbs District Office of the Division of the failure of the casing in any of the injection wells, the leakage of water, natural gas, CO<sub>2</sub>, or oil from or around any producing well, or the leakage of water, natural gas, CO<sub>2</sub>, or oil from any plugged and abandoned well within the "EOR Project Area", and shall take such steps as may be necessary to correct such failure of leakage.

(10) The subject tertiary recovery project is hereby certified as a qualified "Enhanced Oil Recovery Project" pursuant to the "Enhanced Oil Recovery Act" (Laws 1992, Chapter 38, Sections 1 through 5).

(11) The certified and approved "EOR Project Area" shall include those lands described in Ordering Paragraph No. (1) above, provided however, the "EOR Project Area" eligible for the recovered oil tax rate may be reduced dependent upon the evidence presented by the applicant in its demonstration of the occurrence of a positive production response.

(12) To be eligible for the EOR credit, prior to commencing WAG injection operations, the operator must request from the Division a Certificate of Qualification, which certificate will specify the proposed project area as described above.

(13) At such time as a positive production response occurs and within seven years from the date of the Certificate of Qualification, the operator must apply to the Division for certification of positive production response, which application shall identify the area actually benefitting from enhanced recovery operations. The Division may review the application administratively or set it for hearing. Based upon evidence presented, the Division will certify to the New Mexico Taxation and Revenue Department those lands and wells which are eligible for the credit.

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

(15) The subject tertiary recovery project is hereby designated the North El Mar Unit Tertiary Recovery Project and shall be governed by the provisions of Rules Nos. 701 through 708 of the Oil Conservation Division Rules and Regulations.

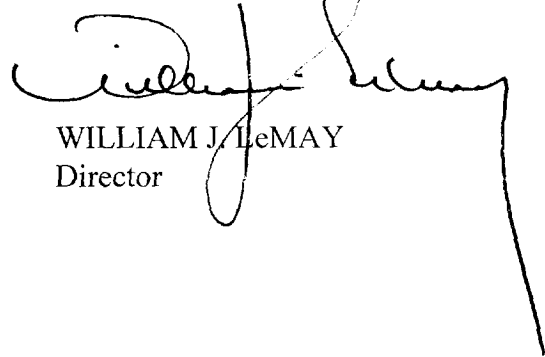


(16) Monthly progress reports of the tertiary recovery project herein authorized shall be submitted to the Division in accordance with Rules 706 and 1115 of the Division Rules and Regulations.

(17) 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. 11826  
ORDER NO. R-4629-A  
NORTH EL MAR UNIT TERTIARY RECOVERY PROJECT  
APPROVED INJECTION WELLS

<u>WELL NAME &amp; NUMBER</u>	<u>API NUMBER</u>	<u>WELL LOCATION</u>	<u>PERFORATED INTERVAL</u>	<u>TUBING SIZE</u>	<u>PACKER DEPTH</u>	<u>MAXIMUM PRESSURE</u>
NEMU No. 2	30-025-08269	660' FSL & 660' FEL (P) 24-26S-32E	4,697'-4,728'	2 3/8"	4,597'	1160 PSIG
NEMU No. 4	30-025-08436	990' FNL & 330' FWL (D) 30-26S-33E	4,682'-4,692'	2 3/8"	4,582'	1160 PSIG
NEMU No. 6	30-025-08280	660' FNL & 2005' FEL (B) 25-26S-32E	4,651'-4,690'	2 3/8"	4,551'	1160 PSIG
NEMU No. 8	30-025-08287	990' FNL & 990' FWL (D) 25-26S-32E	4,639'-4,654'	2 3/8"	4,539'	1160 PSIG
NEMU No. 10	30-025-08299	1980' FNL & 1980' FWL (F) 26-26S-32E	4,529'-4,535'	2 3/8"	4,429'	1160 PSIG
NEMU No. 12	30-025-08294	1980' FNL & 660' FEL (H) 26-26S-32E	4,603'-4,622'	2 3/8"	4,503'	1160 PSIG
NEMU No. 14	30-025-08277	1980' FNL & 1980' FWL (F) 25-26S-32E	4,623'-4,653'	2 3/8"	4,523'	1160 PSIG
NEMU No. 16	30-025-08281	1980' FNL & 660' FEL (H) 25-26S-32E	4,654'-4,677'	2 3/8"	4,554'	1160 PSIG
NEMU No. 18	30-025-08434	1880' FNL & 1650' FWL (F) 30-26S-33E	4,723'-4,732'	2 3/8"	4,623'	1160 PSIG
NEMU No. 20	30-025-08431	1980' FSL & 660' FWL (L) 30-26S-33E	4,672'-4,684'	2 3/8"	4,572'	1160 PSIG

<u>WELL NAME &amp; NUMBER</u>	<u>API NUMBER</u>	<u>WELL LOCATION</u>	<u>PERFORATED INTERVAL</u>	<u>TUBING SIZE</u>	<u>PACKER DEPTH</u>	<u>MAXIMUM PRESSURE</u>
NEMU No. 22	30-025-08278	1980' FSL & 1980' FEL (J) 25-26S-32E	4,625'-4,649'	2 3/8"	4,525'	1160 PSIG
NEMU No. 24	30-025-08275	1980' FSL & 660' FWL (L) 25-26S-32E	4,603'-4,632'	2 3/8"	4,503'	1160 PSIG
NEMU No. 26	30-025-08293	1980' FSL & 1980' FEL (J) 26-26S-32E	4,544'-4,571'	2 3/8"	4,444'	1160 PSIG
NEMU No. 28	30-025-08296	1980' FSL & 660' FWL (L) 26-26S-32E	4,497'-4,536'	2 3/8"	4,397'	1160 PSIG
NEMU No. 29	30-025-08300	330' FSL & 330' FEL (P) 27-26S-32E	4,456'-4,474'	2 3/8"	4,356'	1160 PSIG
NEMU No. 31	30-025-08292	660' FSL & 1980' FWL (N) 26-26S-32E	4,495'-4,527'	2 3/8"	4,395'	1160 PSIG
NEMU No. 33	30-025-08288	660' FSL & 660' FEL (P) 26-26S-32E	4,595'-4,626'	2 3/8"	4,495'	1160 PSIG
NEMU No. 35	30-025-08274	660' FSL & 1980' FWL (N) 25-26S-32E	4,609'-4,643'	2 3/8"	4,509'	1160 PSIG
NEMU No. 37	30-025-08283	660' FSL & 660' FEL (P) 25-26S-32E	4,638'-4,680'	2 3/8"	4,538'	1160 PSIG
NEMU No. 39	30-025-08435	660' FSL & 1650' FWL (N) 30-26S-33E	4,675'-4,765'	2 3/8"	4,575'	1160 PSIG
NEMU No. 41	30-025-08437	660' FNL & 660' FWL (D) 31-26S-33E	4,646'-4,689'	2 3/8"	4,546'	1160 PSIG
NEMU No. 42	30-025-08316	544' FNL & 1448' FEL (B) 36-26S-32E	4,617'-4,638'	2 3/8"	4,517'	1160 PSIG
NEMU No. 46	30-025-08311	660' FNL & 1650' FEL (B) 35-26S-32E	4,566'-4,585'	2 3/8"	4,466'	1160 PSIG
NEMU No. 48	30-025-08309	660' FNL & 660' FWL (D) 35-26S-32E	4,485'-4,516'	2 3/8"	4,385'	1160 PSIG
NEMU No. 50	30-025-08305	330' FSL & 330' FEL (H) 34-26S-32E	4,450'-4,466'	2 3/8"	4,350'	1160 PSIG
NEMU No. 51	30-025-08312	1650' FNL & 2310' FWL (F) 35-26S-32E	4,515'-4,536'	2 3/8"	4,415'	1160 PSIG

<u>WELL NAME &amp; NUMBER</u>	<u>API NUMBER</u>	<u>WELL LOCATION</u>	<u>PERFORATED INTERVAL</u>	<u>TUBING SIZE</u>	<u>PACKER DEPTH</u>	<u>MAXIMUM PRESSURE</u>
NEMU No. 52	30-025-08313	490' FSL & 330' FEL (H) 35-26S-32E	4,569'-4,606'	2 3/8"	4,469'	1160 PSIG
NEMU No. 54	30-025-08318	543' FSL & 2108' FWL (F) 36-26S-32E	4,590'-4,636'	2 3/8"	4,490'	1160 PSIG
NEMU No. 57	30-025-08440	1935' FNL & 2090' FWL (F) 31-26S-33E	4,666'-4,740'	2 3/8"	4,566'	1160 PSIG
NEMU No. 58	30-025-24908	770' FNL & 990' FWL (D) 36-26S-32E	4,598'-4,632'	2 3/8"	4,498'	1160 PSIG
NEMU No. 62	30-025-25422	1829' FNL & 330' FEL (H) 36-26S-32E	4,618'-4,660'	2 3/8"	4,518'	1160 PSIG