STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501

Form C-108
Revised 7-1-81

BEFORE EXAMINER CATANACH
OIL CONSERVATION DIVISION
PHILLIPS PETROLEUM COMPANY
EXHIBIT NO. 2
CASE NO. 9737

APPLICATION FOR AUTHORIZATION TO INJECT

I. Purpose: [X] Secondary Recovery [ ] Pressure Maintenance [ ] Disposal [ ] Storage
Application qualifies for administrative approval? [X] yes [ ] no

II. Operator: Phillips Petroleum Company

Address: 4001 Penbrook, Odessa, TX 79762

Contact party: L. M. Sanders Phone: 367-1488

III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project? [ ] yes [X] no
If yes, give the Division order number authorizing the project _____.

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

* VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

*VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any.

* X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)

* XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification

revised

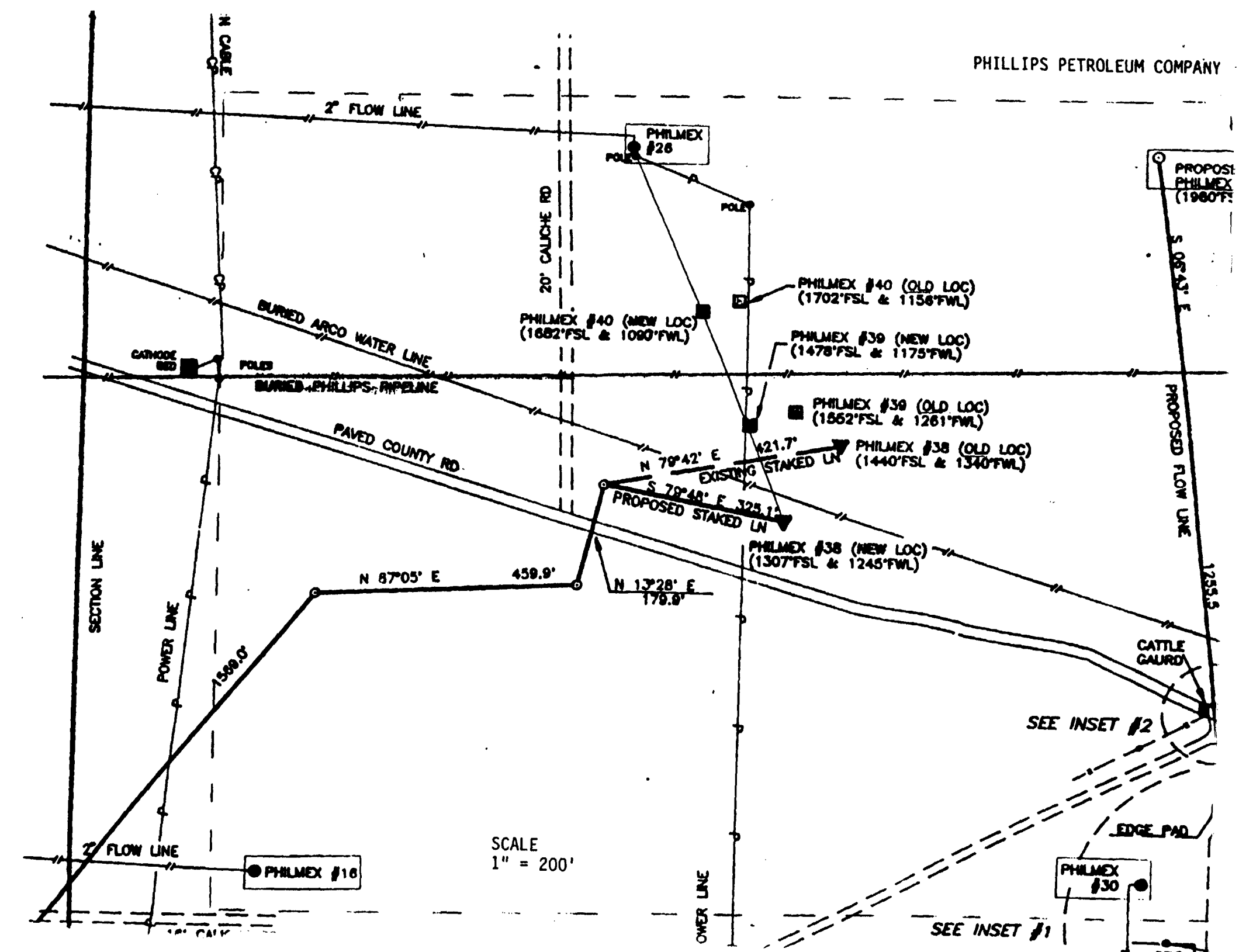
I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: William J. Mueller Title Reservoir Eng. Supervisor

Signature: _____ Date: 17 July 1989

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal. CASE NO. 9678 (Order No. R-3668-A)
Hearing on May 24, 1989

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate Division district office.


PHILLIPS PETROLEUM COMPANY
N CABLE
2" FLOW LINE
PHILMEX #26
POLE
POLE
20' CALICHE RD
PHILMEX #40 (OLD LOC)
(1702'FSL & 1156'FWL)
PHILMEX #40 (NEW LOC)
(1682'FSL & 1090'FWL)
PHILMEX #39 (NEW LOC)
(1478'FSL & 1175'FWL)
BURIED ARCO WATER LINE
CATHODE BED
POLES
BURIED PHILLIPS PIPELINE
PHILMEX #39 (OLD LOC)
(1562'FSL & 1261'FWL)
PAVED COUNTY RD.
421.7'
PHILMEX #38 (OLD LOC)
(1440'FSL & 1340'FWL)
N 79°42' E
EXISTING STAKED LN
S 78°48' E 325.1'
PROPOSED STAKED LN
PHILMEX #38 (NEW LOC)
(1307'FSL & 1245'FWL)
PROPOSED FLOW LINE
S 05°43' E
1255.5
SECTION LINE
POWER LINE
N 87°05' E
459.9'
N 13°28' E
179.9'
1569.0'
CATTLE GAURD
SEE INSET #2
EDGE PAD
2" FLOW LINE
PHILMEX #16
SCALE
1" = 200'
POWER LINE
PHILMEX #30
SEE INSET #1

Application for Authorization to Inject

PHILLIPS PETROLEUM COMPANY
PHILMEX WELL NO. 38

III. WELL DATA
(See Attachment No. 1 - Wellbore Schematic)

A. Injection Well

1. Name and Location	Philmex Well Number 38 1307' FSL and 1245' FWL Section 26, T-17-S, R-33-E Lea County, New Mexico
2. Casing Surface:	8 - 5/8" OD, 24#, K-55 set at 1480' (12 - 1/4" hole). To be cemented with 1000 sxs Class C; calculated TOC** at surface (circulate).
Production:	5 - 1/2" OD, 15.5#, K-55 set at 4800' (7 - 7/8" hole). To be cemented with 1300 sxs Class C; calculated TOC** at surface (circulate).
3. Tubing:	2 - 3/8" OD, 8rd EUE, J-55 set 100' above top perforation (internally plastic coated).
4. Packer:	Guiberson Uni-Pac VI Retrievable Packer set 100' above top perforation.

Observation Wells

1. Names and Locations:	Philmex Well Number 39 1478' FSL and 1175' FWL Section 26, T-17-S, R-33-E Lea County, New Mexico Philmex Well Number 40 1682' FSL and 1090' FWL Section 26, T-17-S, R-33-E Lea County, New Mexico
2. Casing Surface:	9 - 5/8" OD, 32.3#, H-40 set at 1480' (12 - 1/4" hole). To be cemented with 800 sxs Class C; calculated TOC** at surface (circulate).
Production:	5 - 1/2" OD, 15.5#,J-55 set at 4050' AND 5 - 1/2" OD fiberglass from 4050' to 4850' (8 - 1/2" hole). To be cemented based on caliper + 30% excess.

NOTE: two observation wells will be drilled in close proximity to injection well

** actual TOCs will be reported on Form C-105

Application for Authorization to Inject

PHILLIPS PETROLEUM COMPANY
PHILMEX WELL NO. 38

III. **WELL DATA** (con't)

B.	1. Formation:	Maljamar (Grayburg/San Andres)
	2. Interval:	4130' - 4530'**
	3. Original Intent:	Well drilled for CO_2 injection.
	4. Perforated Intervals:	no other perforated intervals; no bridge plugs in wellbore
	5. Productive Zones Higher:	Queen - 3770' (1 1/2 miles southwest)
	Lower:	Corbin Abo Reef - 8200' (1 1/4 miles south)

V. **AREA OF REVIEW**
(See Attachments No. 2 and 3 - Project Map and Detail Map)

VII. **PROPOSED CO_2 INJECTION OPERATIONS**

1.	CO_2 Rates:	estimated average - 400 mcfpd estimated maximum - 500 mcfpd
2.	System:	closed
3.	Pressures:	average - 1400 psi maximum - 1700 psi
4.	Fluid:	CO_2 source from McElmo Dome in Colorado; transported by Shell in the Cortez line and by Big Three in the Llano pipeline. Compatibility with receiving formation is evidenced by Phillips Petroleum East Vacuum Unit and Conoco's MCA (respectively, six miles east and west of Philmex lease).

** actual perforations will be reported on Form C-105

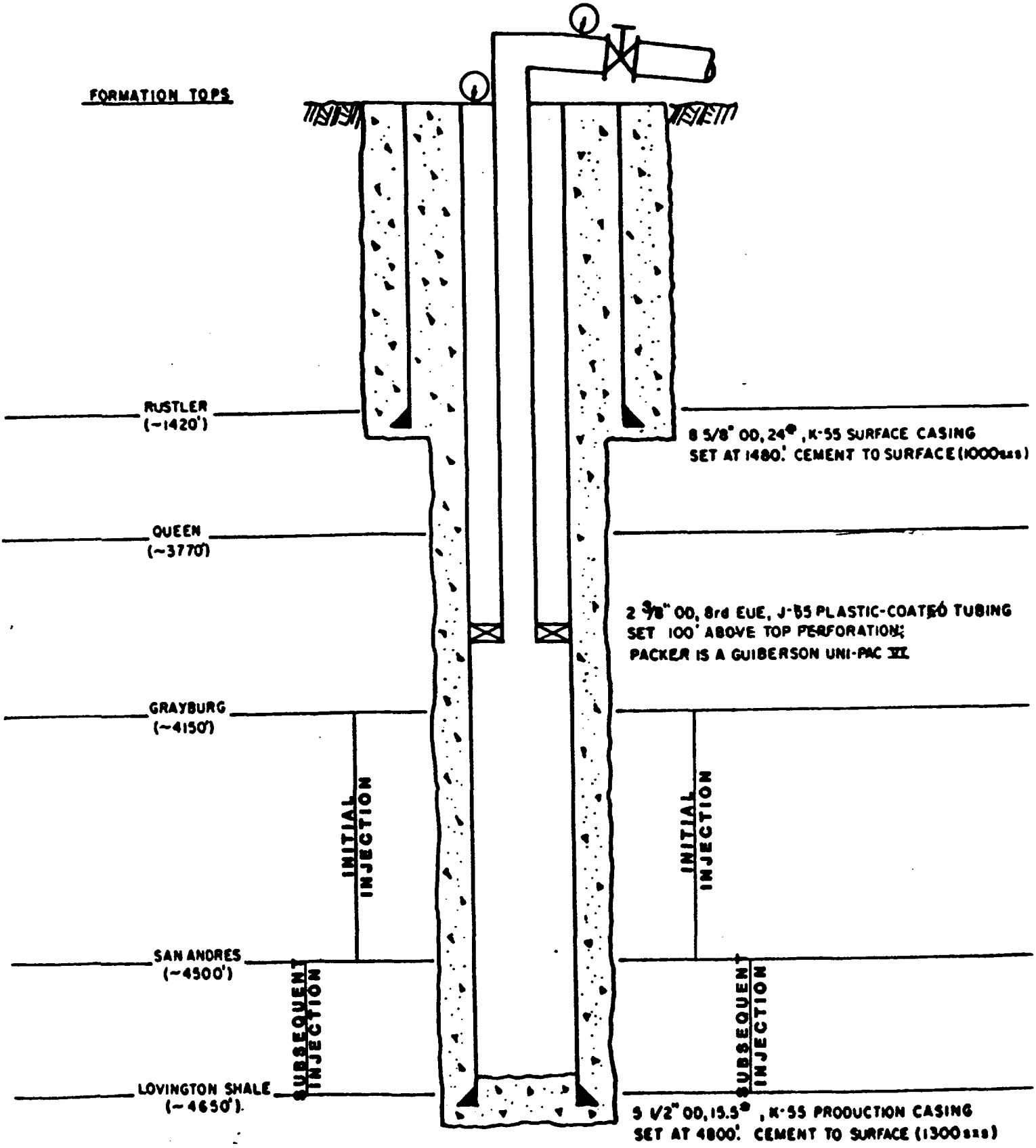
PHILLIPS PETROLEUM COMPANY
PHILMEX WELL NO. 38

IX. PROPOSED STIMULAION PROGRAM

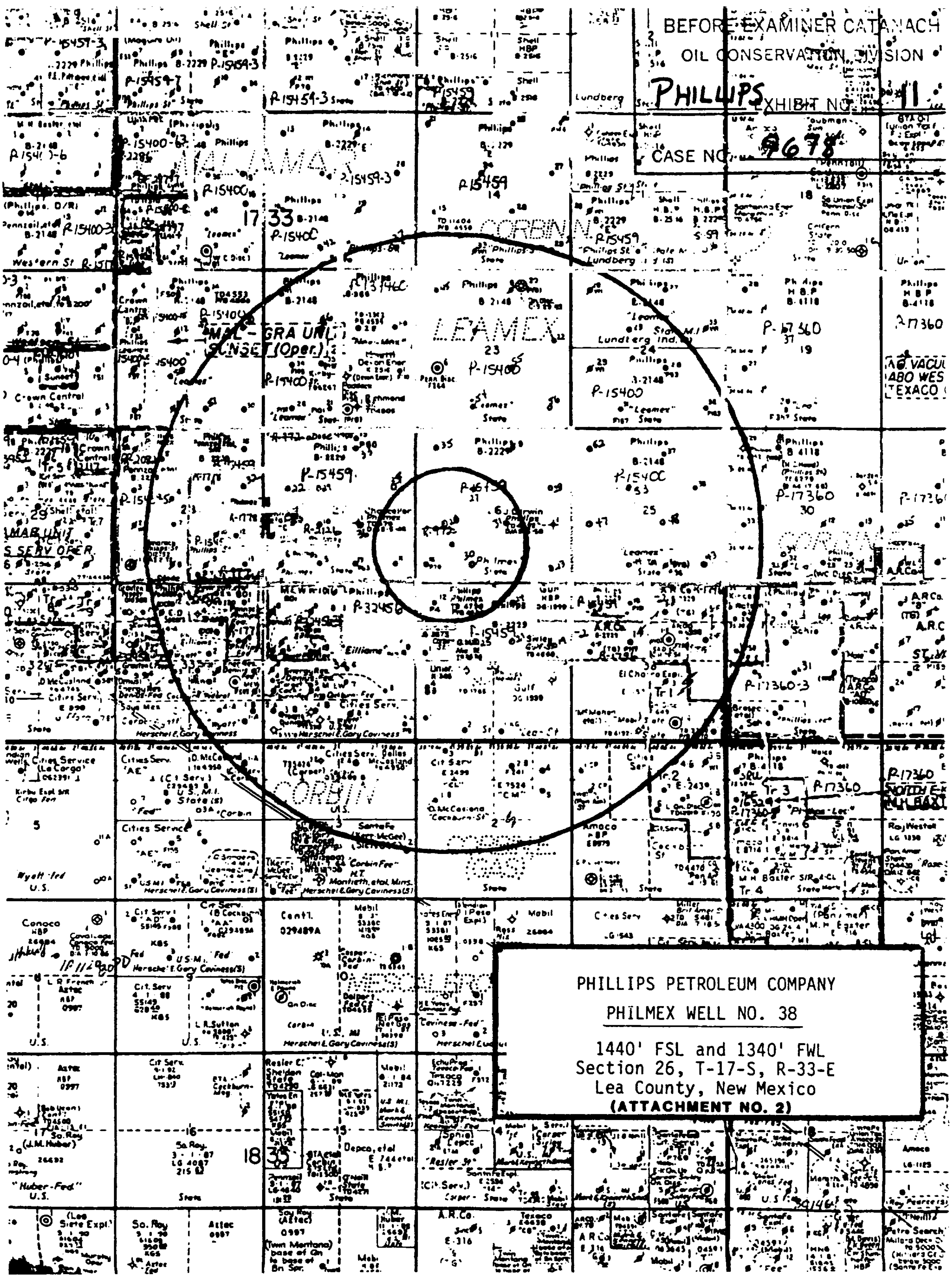
After perforation, well will be acidized with 15% NEFE HCl and fractured with 60-Quality CO_2 Foam. Exact sand volumes will be determined after well logs are available.

PROPOSED INJECTION WELL SCHEMATIC

PHILLIPS PETROLEUM COMPANY
PHILMEX WELL NUMBER 38
1307' FSL & 1245' FWL
SECTION 26, T-17-S, R-33-E
LEA COUNTY, NEW MEXICO



ATTACHMENT NO. 1



BEFORE EXAMINER CATANACH
OIL CONSERVATION DIVISION
PHILLIPS EXHIBIT NO. 11
CASE NO. 9678

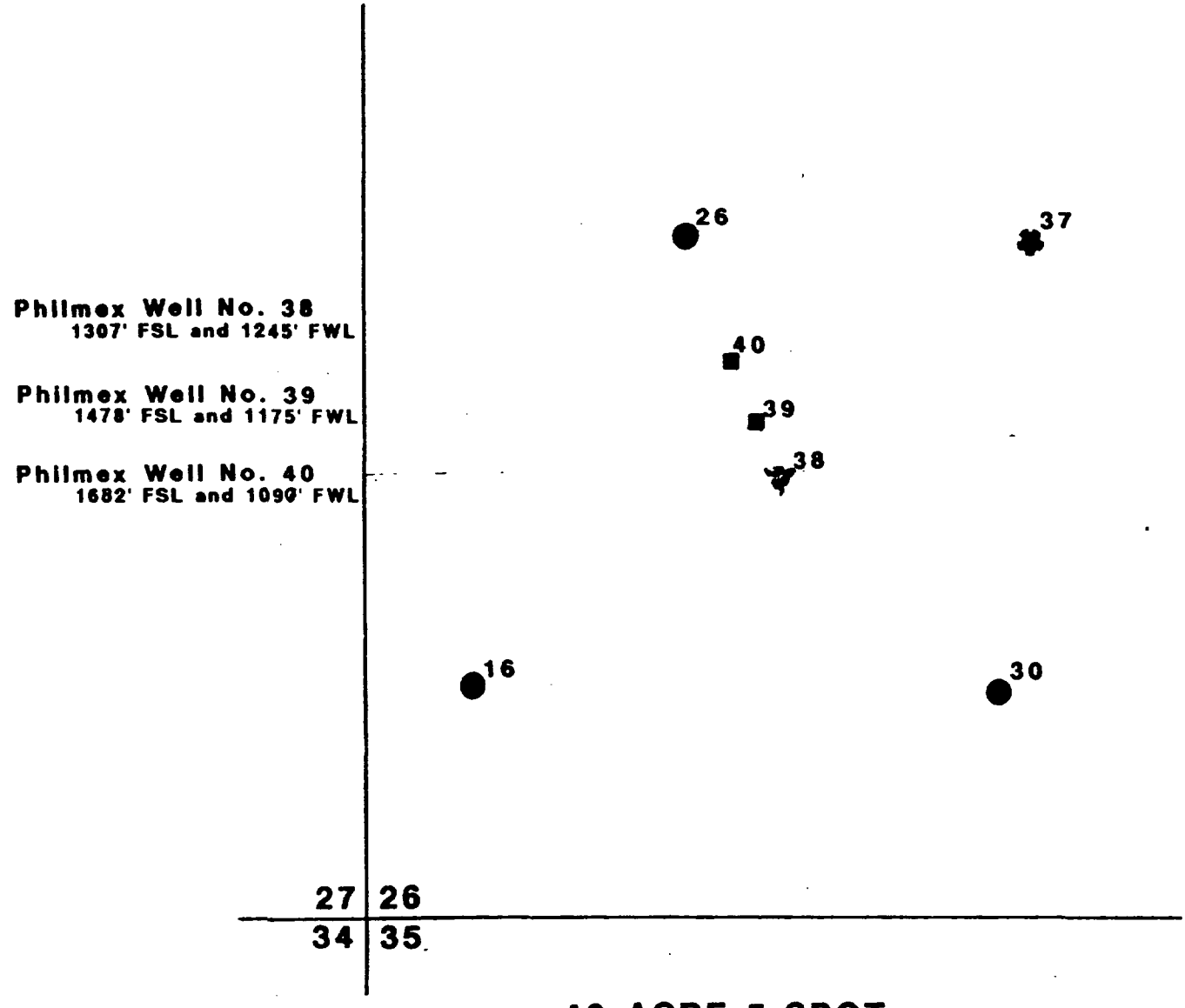
PHILLIPS PETROLEUM COMPANY

PHILMEX WELL NO. 38

1440' FSL and 1340' FWL
Section 26, T-17-S, R-33-E
Lea County, New Mexico
(ATTACHMENT NO. 2)

MALJAMAR CO_2 PILOT PROJECT

MALJAMAR GRAYBURG/SAN ANDRES FIELD



40 ACRE 5-SPOT

PHILMEX LEASE

SW/4 SEC 26-17S-33E

LEA COUNTY, NEW MEXICO

■ OBSERVATION WELL

TO BE DRILLED

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. 9678
Order No. R-3668-A

APPLICATION OF PHILLIPS PETROLEUM COMPANY TO AMEND DIVISION ORDER NO. R-3668 BY AUTHORIZING A CARBON DIOXIDE PILOT PROJECT, LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on May 24, 1989, at Santa Fe, New Mexico, before Examiner David R. Catanach.

NOW, on this 15th day of June, 1989, 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-3668, dated January 24, 1969, the Division authorized the applicant, Phillips Petroleum Company, to institute a waterflood project on its Philmex Lease, comprising all or portions of Sections 26, 27, 28, 34 and 35, Township 17 South, Range 33 East, NMPM, Lea County, New Mexico, by the injection of water into the Grayburg and San Andres formations, Maljamar Grayburg-San Andres Pool, through its Philmex Well No. 5 located in Unit N of said Section 27.

(3) The applicant, Phillips Petroleum Company, seeks to amend said Order No. R-3668 to authorize the injection of carbon dioxide into said previously approved Maljamar Philmex Waterflood Project through its Philmex Well No. 38 to be drilled at an unorthodox location 1440 feet from the South line and 1340 feet from the West line (Unit K) of Section 26, Township 17 South, Range 33 East, NMPM, Lea County, New Mexico.

(4) The applicant further seeks authority to drill two observation wells at unorthodox locations in said Section 26 as follows: Philmex Well No. 39 to be- drilled 1552 feet from the South line and 1261 feet from the West line (Unit L) and Philmex Well No. 40 to be drilled 1702 feet from the South line and 1156 feet from the West line (Unit L).

(5) The applicant proposes initially to inject carbon dioxide only into certain sand members of the Grayburg formation from a depth of approximately 4150 feet to 4500 feet.

(6) Except for the area surrounding the Philmex Well No. 5, the original water injection well in the project, the Philmex Lease, which comprises approximately 1680 acres, has not been subject to secondary recovery operations.

(7) The proposed carbon dioxide pilot project is of an experimental nature to determine the effectiveness of carbon dioxide injection in an area not previously subject to waterflooding, and is further designed to gather sufficient reservoir data to determine the feasibility of a full scale carbon dioxide injection project on the subject lease and on six of the applicant's offsetting leases which comprise some 8600 acres.

(8) Testimony by the applicant further indicates that reservoir conditions within the Maljamar Grayburg-San Andres Pool in this area are especially conducive at the present time to carbon dioxide injection.

(9) The proposed pilot project will occur well within the boundaries of the applicant's Philmex Lease, and as such, will not impair correlative rights.

(10) The producing wells within the Philmex Lease are currently marginally productive, with average production approximately 10 barrels of oil per day.

(11) Approval of the proposed pilot project and unorthodox well locations will allow the applicant to determine the effectiveness of carbon dioxide injection as well as the feasibility of full scale carbon dioxide injection, which, if successful, may ultimately result in the recovery of a substantial amount of otherwise unrecoverable oil, thereby preventing waste.

(12) The applicant further requested the establishment of an administrative procedure whereby the subject pilot project may be expanded by placing additional wells on production and/or injection.

(13) In order for the Division to properly assess the effectiveness of the subject pilot project and potential for waste, said pilot project should be expanded only after notice and hearing.

(14) The injection should be accomplished through 2 3/8-inch ~~plastic-lined tubing installed~~ in a packer set at approximately 4050 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.

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

(16) The injection well or system should 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 1700 psi, provided, however, that the applicant should be required to conduct a step-rate injection test prior to injection in order to accurately determine the fracture pressure of the Grayburg formation.

BEFORE EXAMINER CATANACH
OIL CONSERVATION DIVISION
PHILLIPS PETROLEUM COMPANY
EXHIBIT NO. 3
CASE NO. 9737

(17) The Director of the Division should be authorized to administratively approve an increase in the injection pressure upon a proper showing by the operator that such higher pressure will not result in migration of the injected waters from the Grayburg and San Andres formations.

(18) The operator should notify the supervisor of the Hobbs district office of the Division of the date and time of the installation of injection equipment, of the initial step-rate injection test, and of the mechanical integrity pressure-test in order that the same may be witnessed.

(19) The operator should take all steps necessary to ensure that the injected carbon dioxide enters only the proposed injection interval and is not permitted to escape to other formations or at the surface.

(20) Inasmuch as the proposed application has no direct bearing on Division Order No. R-3668, said order should not be amended at this time and therefore all provisions contained in said order should remain in full force and effect.

IT IS THEREFORE ORDERED THAT:

(1) The applicant, Phillips Petroleum Company, is hereby authorized to initiate and conduct a pilot carbon dioxide injection project in its previously approved Maljamar Philmex Waterflood Project, by the injection of carbon dioxide into the Grayburg formation, Maljamar Grayburg-San Andres Pool, through its Philmex Well No. 38 to be drilled at an unorthodox location 1440 feet from the South line and 1340 feet from the West line (Unit K) of Section 26, Township 17 South, Range 33 East, NMPM, Lea County, New Mexico.

Grayburg/San Andres fm.

Philmex #38
1307' FSL and 1245' FWL
Section 26-17S-33E (Unit M)

(2) The applicant is further authorized to drill two observation wells at unorthodox locations in said Section 26 as follows: Philmex Well No. 39 to be drilled 1552 feet from the South line and 1261 feet from the West line (Unit L) and Philmex Well No. 40 to be drilled 1702 feet from the South line and 1156 feet from the West line (Unit L).

Philmex #39
1478' FSL and 1175' FWL
Section 26-17S-33E (Unit L)

Philmex #40
1682' FSL and 1090' FWL
Section 26-17S-33E (Unit L)

(3) The tubing in the Philmex Well No. 38 shall be internally plastic-lined; 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, and/or packer.

(4) 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 district office at Hobbs.

(5) 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 1700 psi, provided that prior to injection, the applicant shall conduct a step-rate injection test to accurately determine the fracture pressure of the Grayburg formation.

(6) 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 carbon dioxide from the Grayburg formation.

(7) The operator shall notify the supervisor of the Hobbs district office of the Division of the date and time of the installation of disposal equipment, of the initial step rate injection test, and of the mechanical integrity pressure test in order that the same may be witnessed.

injection equipment →

(8) The operator shall immediately notify the supervisor of the Division's Hobbs district office of the failure of the tubing, casing, or packer, in said well or the leakage of carbon dioxide from or around said well and shall take such steps as may be timely and necessary to correct such failure or leakage.

(9) The subject project shall be known as the Maljamar Philmex Pilot CO2 Injection Project, and the initial project area shall consist of the SW/4 of said Section 26.

(10) The pilot project area may be expanded by placing additional wells on production and/or carbon dioxide injection only after notice and hearing.

(11) The subject pilot project shall be governed by the provisions of Rules 701 through 708 of the Division Rules and Regulations, and the operator shall submit monthly reports to the Division in accordance with Rules 706 and 1115.

(12) 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

S E A L