Entered November 30, 1979

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION COMMISSION

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

CASE NO. 6653
Order No. R-6199

APPLICATION OF SHELL OIL COMPANY
FOR A PRESSURE MAINTENANCE PROJECT,
LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This case and cause of action came on for hearing at 9 a.m. on October 3, 1979, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 30th day of November, 1979, the Commission, a quorum having been present, having considered the testimony and the record, and being otherwise fully advised in the premises,

FINDS:

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

(2) That by Commission Order No. R-6198 dated November 1979, statutory unitization was approved for the North Hobbs Grayburg-San Andres Unit Area, Lea County, New Mexico.

(3) That the applicant herein, Shell Oil Company, seeks authority to institute a pressure maintenance project for the aforesaid North Hobbs Grayburg-San Andres Unit Area within the Hobbs Grayburg-San Andres Pool, Lea County, New Mexico, by the injection of water into the Grayburg-San Andres formation through 70 wells at orthodox and unorthodox locations, 52 of which are producing wells which will be converted to injection wells in 1980.

(4) That during 1980 for the pressure maintenance project, applicant proposes to drill five producing wells and 18 injection wells at orthodox and unorthodox locations as specified below:

Township 18 South, Range 37 East, NMPM

Sec.	Unit Well No.	Unit Letter	Well Location
24	242	N	1220' FSL & 2540' FWL
25	412	A	1220' FNL & 1220' FEL

Township 18 South, Range 38 East, NMPM

Sec.	Unit Well No.	Unit Letter	Well Location
18	242	N	1220' FSL & 2540' FWL
19	142	M	1220' FSL & 100' FWL
19	242	N	1220' FSL & 2540' FWL
28	242	N	990' FSL & 1330' FWL
29	112	D	330' FNL & 1000' FWL
29	142	M	1220' FSL & 100' FWL
29	242	N	1220' FSL & 1650' FWL
30	222	F	2540' FNL & 1420' FWL
31	432	I	2540' FSL & 1220' FEL
31	442	P	100' FSL & 1220' FEL
32	122	E	2310' FNL & 1220' FWL
32	242	N	100' FSL & 1420' FWL
32	412	A	1220' FNL & 1220' FEL
32	432	I	2310' FSL & 1310' FEL
32	442	P	100' FSL & 1220' FEL
33	112	D	1220' FNL & 100' FWL
33	212	C	1220' FNL & 1440' FWL
33	232	K	1420' FSL & 1420' FWL
33	242	N	100' FSL & 1420' FWL
33	332	J	2540' FSL & 2540' FEL
33	342	O	100' FSL & 1420' FEL

(5) That all of the wells referred to in Findings Nos. (3) and (4) above, being the 70 injection wells and the five producing wells, together with wells currently completed in the Grayburg-San Andres formation, will provide a thorough and efficient sweep of hydrocarbons throughout the unit area, and will result in the recovery of otherwise unrecoverable oil and gas, thereby preventing waste.

(6) That the above-described injection and producing wells, some of which will be at unorthodox locations along the unit boundary in accordance with lease-line agreements with operators of offsetting lands, will not impair but will protect correlative rights.

(7) That the applicant further seeks the designation of a project area for said pressure maintenance project for the North Hobbs Grayburg-San Andres Unit, and for the promulgation of special rules and regulations governing said project, including special allowable provisions, which is in the interest of conservation and should be approved, subject to certain provisions set forth herein.

(8) That the project area should consist of all those proration units within the boundary of the North Hobbs Grayburg-San Andres Unit Area as described in Order R-6198 upon which are located wells completed in the Hobbs Grayburg-San Andres Pool.

(9) That the project area allowable should be equal to the sum of the basic project area allowable plus the water injection credit allowable as hereinafter defined.

(10) That the basic project area allowable should be equal to 80 barrels of oil per day times the number of 40-acre proration units in the North Hobbs Grayburg-San Andres Unit Area upon which are located wells completed in the Hobbs Grayburg-San Andres Pool.

(11) That the water injection credit allowable should be based upon the following formula:

$$\text{Water Injection Credit Allowable} = \left[\frac{\text{Net Water Injected}}{\text{Basic Project Area Allowable Reservoir Voidage}} - 1 \right] \times \text{Basic Project Area Allowable}$$

and should be calculated in accordance with this formula using the formula and data set forth on Exhibits "A" and "B" attached hereto.

(12) That a weighted average project area reservoir pressure should be determined prior to commencement of injection of water into the reservoir and at least annually thereafter.

(13) That the project area allowable should be permitted to be produced from the wells within the project area in any proportion.

(14) That the Director of the Oil Conservation Division should have authority to approve, without notice and hearing, the drilling of wells at unorthodox locations anywhere within the boundary of the North Hobbs Grayburg-San Andres Unit Area, provided however, no unorthodox location shall be closer than

ten feet to any quarter-quarter section line, and provided further, that no such unorthodox location shall be closer than 330 feet to the boundary of the unit area, unless such well is covered by a lease-line agreement with the operator of the lands offsetting such well, and a copy of the lease-line agreement accompanies the application for such unorthodox location, or unless such offset operator has waived objection to the proposed unorthodox location in writing, and his waiver accompanies the application.

(15) Application for approval of additional wells to be used for injection should be filed in accordance with Rule 701 of the Division Rules and Regulations and provision should be made whereby the same could be approved administratively by the Division Director without notice and hearing.

(16) That each newly drilled injection or producing well should be equipped as follows:

a. Minimum of 350 feet of surface casing and production casing run to total depth (approximately 4500 feet), or

b. Surface casing cemented below the "red beds" (approximately 1600 feet) and production casing run to total depth (approximately 4500 feet).

c. The Division Director should have authority to approve exceptions to the aforesaid casing programs for good cause shown.

All casing strings should be cemented to the surface except that in any well in which an intermediate casing string has been run and cemented to the surface, the production string may be cemented back into the base of the intermediate casing.

(17) That injection should be accomplished through tubing installed in a packer set within 100 feet of the uppermost perforation, or in the case of an open hole completion, 100 feet above the casing shoe. The injection tubing should be corrosion protected by a non-reactive internal lining or coating. The casing-tubing annulus in each injection well should be filled with an inert fluid and a surface pressure gauge or approved leak detection device should be attached to the annulus.

(18) That the injection wells or system should be equipped with a pressure control device or acceptable substitute which will limit the surface injection pressure to no more than 0.2 psi per foot of depth to the injection zone. The Division Director should have authority to administratively authorize a pressure

limitation in excess of the above upon a showing by the Unit Operator that such higher pressure will not result in fracturing of the confining strata.

(19) That all wells within the unit area should be equipped with risers or in some other acceptable manner so as to facilitate the periodic testing of the bradenhead for pressure or fluid production.

(20) That there are a number of wells within the North Hobbs Grayburg-San Andres Unit Area and on lands offsetting the unit area which have previously been plugged and abandoned in a manner which may permit waters injected into the Grayburg-San Andres formation to escape into other formations, including the Salado formation and threaten the shallow fresh water-bearing formations unless remedial action is taken on said wells prior to injection in their near vicinity.

(21) That there are a number of wells within the North Hobbs Grayburg-San Andres Unit Area and on lands offsetting the unit area which penetrate the Hobbs Grayburg-San Andres Pool and are completed in deeper pay zones, but which are cased and cemented in such a manner as may permit the escape of waters injected into the Grayburg-San Andres formation into other formations as described in the preceding paragraph.

(22) That those wells referred to in Findings Nos. (20) and (21) above which are inadequately plugged and abandoned or are inadequately cased and cemented, or are suspected of being so, include, but are not necessarily limited to, the wells listed in Exhibit "C" attached hereto.

(23) That no injection at greater than hydrostatic pressure should be made into the Grayburg-San Andres formation in any well in the North Hobbs Grayburg-San Andres Unit Area within one-half mile of any well listed on Exhibit "C" until remedial action has been taken on such well to ensure that it will not serve as an avenue of escape for injected waters, or until tests have been conducted on such well or until other evidence concerning such well has been presented establishing to the satisfaction of the Supervisor of the Hobbs District Office of the Division that remedial work on such well is unnecessary.

IT IS THEREFORE ORDERED:

(1) That the applicant, Shell Oil Company, is hereby authorized to institute and operate a pressure maintenance project in the North Hobbs Grayburg-San Andres Unit Area within

the Hobbs Grayburg-San Andres Pool, Lea County, New Mexico, by the injection of water into the Grayburg-San Andres formation through certain wells which will be administratively approved for water injection by the Division Director.

(2) That said project shall be designated the North Hobbs Grayburg-San Andres Unit Pressure Maintenance Project.

(3) That the following orthodox and unorthodox locations are hereby approved for the drilling of new injection and producing wells:

Township 18 South, Range 37 East, NMPM

Sec.	Unit Well No.	Unit Letter	Well Location
24	242	N	1220' FSL & 2540' FWL
25	412	A	1220' FNL & 1220' FEL

Township 18 South, Range 38 East, NMPM

Sec.	Unit Well No.	Unit Letter	Well Location
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33	112	D	1220' FNL & 100' FWL
33	212	C	1220' FNL & 1440' FWL
33	232	K	1420' FSL & 1420' FWL
33	242	N	100' FSL & 1420' FWL
33	332	J	2540' FSL & 2540' FEL
33	342	O	100' FSL & 1420' FEL

(4) That Special Rules and Regulations governing the North Hobbs Grayburg-San Andres Unit Pressure Maintenance Project are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS
FOR THE
NORTH HOBBS GRAYBURG-SAN ANDRES UNIT
PRESSURE MAINTENANCE PROJECT

RULE 1. That the project area shall consist of all those proration units within the boundary of the North Hobbs Grayburg-San Andres Unit Area upon which is completed a well in the Hobbs Grayburg-San Andres Pool.

RULE 2. The project area shall receive a project area allowable, and said project area allowable shall be the sum of the basic project area allowable plus the water injection credit allowable.

RULE 3. The basic project area allowable shall be equal to 80 barrels of oil per day times the number of developed 40-acre proration units in the project area.

RULE 4. The water injection credit allowable shall be based upon the following formula:

$$\text{Water Injection Credit Allowable} = \left[\frac{\text{Net Water Injected}}{\text{Basic Project Area Allowable Reservoir Voidage}} - 1 \right] \times \text{Basic Project Area Allowable}$$

The water injection credit allowable shall be calculated in accordance with this formula using the formula and data set forth on Exhibits "A" and "B" attached hereto and incorporated herein by reference. In no event shall the water injection credit allowable be less than zero. Therefore, negative numbers derived from the application of the above formula shall be ignored.

RULE 5. A weighted average project area reservoir pressure shall be determined prior to commencement of injection of water into the reservoir and at least annually thereafter.

RULE 6. The project area allowable may be produced from the wells within the project area in any proportion.

RULE 7. The Director of the Oil Conservation Division shall have authority to approve, without notice and hearing, the drilling of wells at unorthodox locations anywhere within

the boundary of the North Hobbs Grayburg-San Andres Unit Area, provided however, no unorthodox location shall be closer than ten feet to any quarter-quarter section line, and provided further, that no such unorthodox location shall be closer than 330 feet to the boundary of the unit area, unless such well is covered by a lease-line agreement with the operator of the lands offsetting such well, and a copy of the lease-line agreement accompanies the application for such unorthodox location, or unless such offset operator has waived objection to the proposed unorthodox location in writing, and his waiver accompanies the application.

RULE 8. Application for approval of additional wells to be used for injection shall be filed in accordance with Rule 701 of the Division Rules and Regulations and may be approved administratively by the Division Director without notice and hearing.

RULE 9. Each newly drilled injection or producing well shall be equipped as follows:

a. Minimum of 350 feet of surface casing and production casing run to total depth (approximately 4500 feet), or

b. Surface casing cemented below the "red beds" (approximately 1600 feet) and production casing run to total depth (approximately 4500 feet).

c. Exceptions to the aforesaid casing programs may be granted by administrative approval of the Division Director upon good cause shown.

All casing strings shall be cemented to the surface except that in any well in which an intermediate casing string has been run and cemented to the surface, the production string may be cemented back into the base of the intermediate casing.

RULE 10. Injection shall be accomplished through tubing installed in a packer set within 100 feet of the uppermost perforation, or in case of an open hole completion, 100 feet above the casing shoe. The injection tubing shall be corrosion protected by a non-reactive internal lining or coating. The casing-tubing annulus in each injection well shall be filled with an inert fluid and a surface gauge or approved leak detection device shall be attached to the annulus.

RULE 11. The injection wells or system shall be equipped with a pressure control device or acceptable substitute which

will limit the surface injection pressure to no more than 0.2 psi per foot of depth to the injection zone. The Division Director may administratively authorize a pressure limitation in excess of the above upon a showing by the Unit Operator that such higher pressure will not result in fracturing of the confining strata.

RULE 12. All wells within the unit area shall be equipped with risers or in some other acceptable manner so as to facilitate the periodic testing of the bradenhead for pressure or fluid production.

RULE 13. The Unit Operator shall immediately notify the Supervisor of the Hobbs District Office of the Division of the failure of the tubing or packer in any of the injection wells, the leakage of water or oil from or around any producing well, the leakage of water or oil from or around any plugged and abandoned well within the unit area, or any other evidence of fluid migration from the injection zone, and shall take such timely steps as may be necessary or required to correct such failure or leakage.

RULE 14. Prior to placing any well on injection, a cement bond log shall be run on said well; also at any time the tubing is pulled from any producing well in the unit area, a cement bond log shall be run on said well. Copies of all cement bond logs shall be sent to the Hobbs District Office of the Division. If any well is found to have an inadequate casing-cement bond, such measures as may be necessary to prevent leakage or migration of fluids within the wellbore shall be taken before placing the well on injection or restoring it to production.

Where multiple casing strings prevent technical interpretation of bonding, the cement bond shall be deemed adequate when the log shows acoustic coupling with the formation. In addition, radioactive tracer surveys, or any other acceptable survey presently available or developed in the future, that show no fluid migration out of the Grayburg-San Andres formation shall be acceptable evidence of bonding.

RULE 15. Each month the Unit Operator shall submit to the Division a Pressure Maintenance Project Operator's Report, on a form prescribed by the Division, outlining thereon the data required and requesting a project area allowable.

RULE 16. The Division shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for the project area for the next succeeding month in accordance

with these rules. The allowable so calculated shall be assigned to the unit area and may be produced from the wells in the project area in any proportion.

IT IS FURTHER ORDERED:

(1) That no injection at greater than hydrostatic pressure shall be made into the Grayburg-San Andres formation in any well in the North Hobbs Grayburg-San Andres Unit Area within one-half mile of any well listed on Exhibit "C" attached hereto and by reference herein incorporated, until remedial action has been taken on such well to ensure that it will not serve as an avenue of escape for injected waters, or until tests have been conducted on such well, or until other evidence concerning such well has been presented establishing to the satisfaction of the Supervisor of the Hobbs District Office of the Division that remedial work on such well is unnecessary.

(2) That the rules in this order concerning project allowables and the transfer thereof shall not be applicable until actual water injection begins in the North Hobbs Grayburg-San Andres Unit Area, provided however, that pending commencement of water injection activities, those wells in said unit area which directly or diagonally offset injection wells in any other water injection project in the Hobbs Pool or which directly or diagonally offset producing wells in any other water injection project in the Hobbs Pool, which producing wells are receiving transferred allowable and are producing at a rate in excess of top unit allowable for the pool, shall be eligible to receive and produce transferred allowable.

(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

ALEX J. ARMIJO, Member

EMERY C. ARNOLD, Member

JOE D. RAMEY, Member & Secretary

S E A L
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NORTH HOBBS GRAYBURG-SAN ANDRES UNIT AREA
PRESSURE MAINTENANCE PROJECT

HOBBS GRAYBURG-SAN ANDRES POOL

LEA COUNTY, NEW MEXICO

Water Injection Credit Allowable Calculation Data

$$\text{Water Injection Credit Allowable} = \left[\frac{W_i - W_p}{\text{BPAA} \left(B_o + \frac{R_p - R_s}{1{,}000} B_g \right)} \right] - 1 \times \text{BPAA}$$

W_i = Average daily water injection during previous month, barrels per day unit area

W_p = Average daily water produced during previous month, barrels per day unit area

BPAA = Basic project area allowable, 80 bopd x _____(number of developed 40-acre proration units in unit area)

P = Weighted average unit area reservoir pressure, psig, from _____, 19___, survey data

B_o = Oil formation volume factor, reservoir barrels per stock tank barrel (Exhibit B)

R_p = Producing gas-oil ratio, cubic feet per barrel for previous month

R_s = Solution gas-oil ratio, cubic feet per barrel (Exhibit B)

B_g = Gas formation volume factor, reservoir barrels per Mcf (Exhibit B)

Water injection credit allowable for _____, 19___, = _____ barrels of oil per day

EXHIBIT "A"

OIL (B_o) AND GAS (B_g) FORMATION VOLUME FACTORS
AND GAS SOLUBILITY VS RESERVOIR PRESSURE

GRAYBURG–SAN ANDRES RESERVOIR
HOBBS FIELD
LEA COUNTY, NEW MEXICO

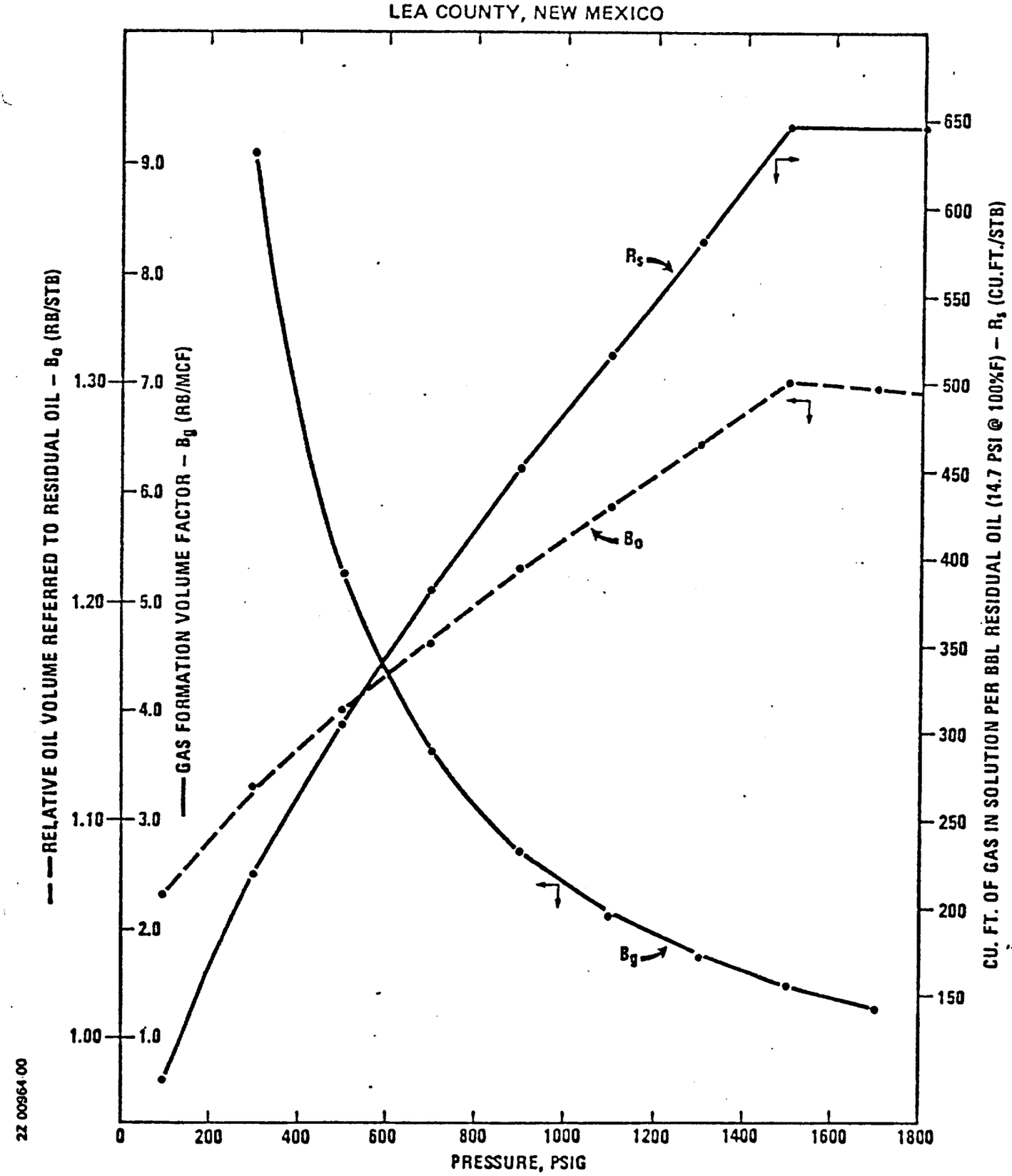

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EXHIBIT "B"

WELLS SUSPECTED OF BEING INADEQUATELY
PLUGGED AND ABANDONED OR INADEQUATELY
CASED AND CEMENTED

Operator	Lease	Well No.	Unit	Sec-Twp-Rge
Amoco	"G" State	6	F	33-18S-38E
Chevron	"A" State	5	O	29-18S-38E
Continental	"A-29" State	7	N	29-18S-38E
Continental	"A-29" State	8	K	29-18S-38E
Continental	"A-33" State	12	L	33-18S-38E
Exxon	USA Bowers	28	M	29-18S-38E
Exxon	Boon Hardin	1	E	18-18S-38E
Getty	Grimes	2	H	29-18S-38E
Getty	Grimes	5	H	29-18S-38E
Gulf	Morris	1	B	21-18S-38E
Gulf	North Grimes	4	K	21-18S-38E
Hobbs-High Inc.	Tatums	1	M	35-18S-38E
Landreth Production	State	1A	O	7-18S-38E
Pontotoc	"B" Hobbs State	1	F	29-18S-38E
Pontotoc	"B" Hobbs State	2	G	29-18S-38E
C. H. Sweet	Grimes	1	I	20-18S-38E

EXHIBIT "C"