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

APPLICATION FOR AUTHORIZATION TO INJECT

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

II. Operator: Tenneco Oil Company

Address: 7990 IH 10 West, San Antonio, Tx 78230

Contact party: Leticia Samudio Phone: (512) 366-8003

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? [X] yes [ ] no
If yes, give the Division order number authorizing the project R-5675.

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.

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MAR 27 1984
OIL CONSERVATION DIVISION
SANTA FE

* 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

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

Name: Leticia Samudio Title Production Engineer

Signature: Leticia Samudio Date: February 22, 1984

* 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.

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

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

(1) Lease name; Well No.; location by Section, Township, and Range; and footage location within the section.

(2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.

(3) A description of the tubing to be used including its size, lining material, and setting depth.

(4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

(1) The name of the injection formation and, if applicable, the field or pool name.

(2) The injection interval and whether it is perforated or open-hole.

(3) State if the well was drilled for injection or, if not, the original purpose of the well.

(4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.

(5) Give the depth to and name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

(1) The name, address, phone number, and contact party for the applicant;

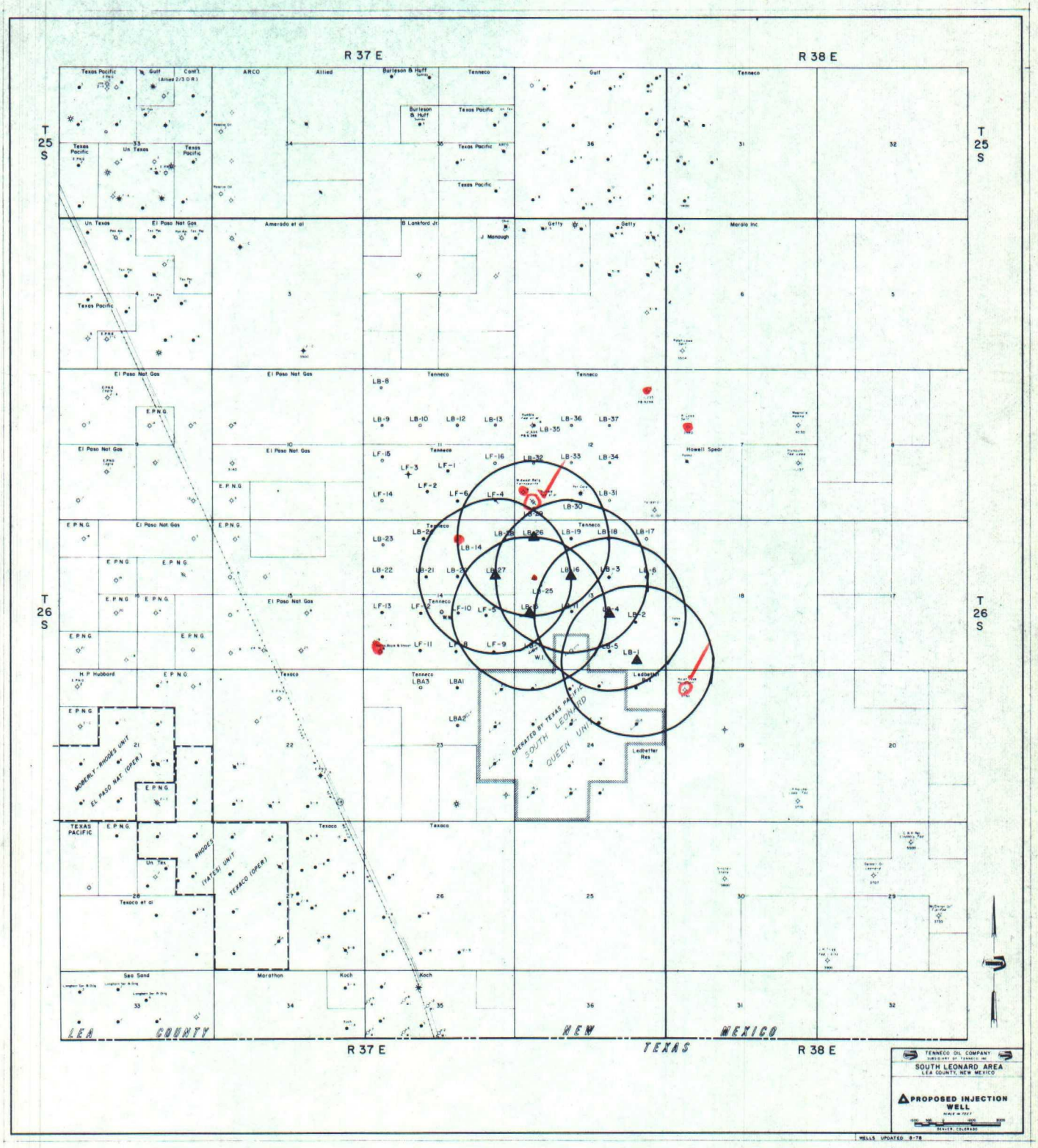
(2) the intended purpose of the injection well; with the exact location of single wells or the section, township, and range location of multiple wells;

(3) the formation name and depth with expected maximum injection rates and pressures; and

(4) a notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, P. O. Box 2088, Santa Fe, New Mexico 87501 within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.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OPERATED BY TEXAS PACIFIC
SOUTH LEONARD
QUEEN UNIT
MOBERLY - RHODES UNIT
EL PASO NAT. (OPER.)
RHODES (YATES) UNIT
TEXACO (OPER.)
LEA COUNTY
NEW MEXICO
TEXAS
TENNECO OIL COMPANY
SOUTH LEONARD AREA
LEA COUNTY, NEW MEXICO
PROPOSED INJECTION WELL
DENVER, COLORADO
WELLS UPDATED 8-78

Tenneco Oil
Exploration and Production
A Tenneco Company

Southwestern Division

6800 Park Ten Blvd. • Suite 200 North
San Antonio, Texas 78213
(512) 734-8161

March 19, 1984

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Gentlemen:

On March 21, 1978 a hearing was held at Santa Fe, New Mexico, Case No. 6161 requesting approval of two waterflood projects and an administrative procedure. The resulting order No. R-5675 is attached.

Tenneco Oil requests administrative approval to convert six more producers to water injection in order to extend the flood to the east half of the field.

The six proposed injection wells are Leonard Brothers Nos. 1, 4, 15, 16, 26 and 27. Before injection begins in the six wells for which approval is requested, the following work will be completed:

1. Internally plastic coated tubing and packer will be run in each well and set at approximately 100 feet above the perforations.

2. The casing-tubing annulus in each well will be filled with an inert fluid and a connection for pressure gauge will be installed to permit determination of leakage.

3. The surface injection pressure will be limited to 680 psi until such time approval is obtained for a higher pressure.

4. The wells will be equipped to facilitate periodic testing of the bradenhead for pressure or fluid production.

In support of this application, we have enclosed a Form C-108 and all supporting materials.

An archaeological clearance report will be submitted to the Bureau of Land Management for the approval to lay surface injection lines.

Upon your approval of conversion of the six wells to water injection, we will commence laying the injection lines.

Yours very truly,

TENNECO OIL COMPANY

for J. G. STROTHER
Div. Prod. Manager

JGS/rnb
Enclosures

APPLICATION FOR AUTHORIZATION TO INJECT INTO
LEONARD BROTHERS # 1, 4, 15, 16, 26, & 27

I. Form C-108

II. Map Identifying Proposed Injection Wells and Surrounding Wells

III. Data on All Wells Within Area of Review

IV. Schematics of P&A'd Well In Area

V. Miscellaneous Injection Information.

VI. Water Analysis

VII. Geological Data

VIII. Stimulation Program

IX. Tabular Information on Proposed Injection Wells

X. Schematics of Proposed Injection Wells.

XI. Proof of Notice

XII. Proof of Publication

LS/dt/1704F/1

Area of Review

Proposed Injection Well: Leonard Brothers #1
Section 13, T26S, R37E
Lea County, New Mexico

Wells within one-half mile radius of proposed injector:

1. Jay Federal #1 — 660' FN and 990 FE
Section 24, T26S, R37E
Lea County, New Mexico

Type: Oil Well TD: 3692" (Queen)
Casing: 8 5/8" @ 300' w/125 sacks cement
4 1/2" @ 3687' w/500 sacks cement
Spud Date: 1/31/77
Completion: Perforated 3460-3576'
Acidized 3460-3576 w/2500 gals
Frac'd 3460-3576 w/60,000 gals/60,000# SD
Operator: Herman J. Ledbetter

2. South Leonard TR 4 WI 10 — 1980 FN & 990 FE
Section 24, T26S, R37E
Lea County, New Mexico

Type: Water Injection TD: 3620'
Casing: 7 5/8" @ 1005' w/350 sacks cement
4 1/2" @ 3620' w/300 sacks cement
Spud Date: 10/12/68
Completion: Perforated 3495-3612'
Acidized 3495-3612' with 4000 gals
Operator: Sun Oil Company

3. South Leonard TR 4 #9 — 1980 FN & 2310 FE
Section 24, T26S, R37E
Lea County, New Mexico

Type: Oil Well TD: 3573'
Casing: 8 5/8" @ 295' w/1150 sacks cement
5 1/2" @ 3250' w/200 sacks cement
Spud Date: 7/6/50 Recompleted: 10/7/70
Completion: Open hole 3250-3573'
Frac'd: 3250-3573' w/10,000 gals/10,000# SD
Operator: Sun Oil Company

4. South Leonard TR 4 #5 — 660' FN & 2310' FE, Section 24, T26S, R37E, Lea County, New Mexico

Type: Oil Well TD: 3477'
Casing: 8 5/8" @ 300' w/200 sacks cement
5 1/2" @ 3245' w/400 sacks cement
Spud Date: 9/17/50
Completion: Open hole 3245-3477' XPLO - 110 quarts
Operator: Sun Oil Company

5. Leonard Brothers #4 — 1980' FS & 1980' FE, Section 13, T26S, R37E, Lea County, New Mexico

Type: Oil Well TD: 3560'
Casing: 8 5/8" @ 513' w/400 sacks cement
4 1/2" @ 3557' w/1140 sacks cement
Spud Date: 8/24/77 Recompleted: 2/2/81
Completion: Perforated 3477-3524' (9/77)
Acidized 3477-3524' w/4000 gals (11/81)
Frac'd 3477-3524' w/20,000 gals/ 30,000# SD 11/81
Operator: Tenneco Oil Company

6. Leonard Brothers #5 — 660' FS & 1980' FE, Section 13, T26S, R37E, Lea County, New Mexico

Type: Oil Well TD: 3608'
Casing: 8 5/8" @ 512' w/520 sacks cement
5 1/2" @ 3608' w/950 sacks cement
Spud Date: 9/4/77
Completion: Perforated 3480-3553'
Operator: Tenneco Oil Company

7. Leonard Brothers #2 — 1650' FS & 990' FE, Section 13, T26S, R37E, Lea County, New Mexico

Type: Oil Well TD: 3595'
Casing: 8 5/8" @ 510' w/400 sacks cement
4 1/2" @ 3595' w/1850 sacks cement
Spud Date: 2/15/77
Completion: Perforated 3446-3466'
Frac'd 3446-3466' w/4000 gals/20,000# SD
Operator: Tenneco Oil Company

8. South Leonard TR 1 WI 1 — 660 FS & 1980 FW, Section 13, T26S, R37E, Lea County, New Mexico

Type: Injection Well TD: 4000' PBTD: 3483'
Casing: 10 3/4" @ 292' w/100 sacks cement
7" liner 3250-3486' w/200 sacks cement (7/72)
Spud Date: 6/28/50 Recompleted: 7/72
Completion: Open Hole: 3250-4000' PBTD: 3483' (10/50)
XPLO 3423-3483 w/300 quarts (10/50)
Perforated 3381-3466' (7/72)
Acidized 3381-3466' w/1000 gals
Operator: Sun Oil Company

9. Ed Powell Fed/IG/#1 — 1650' FS & 330' FW, Section 18, T26S, R38E, Lea County, New Mexico

Type: Oil Well TD: 3750'
Casing: 8 5/8" @ 398' w/250 sacks cement
5 1/2" 3733' w/125 sacks cement
Spud Date: 6/28/77
Completion: Perforated 3596-3637'
Acidized 3596-3637' w/2000 gals
Frac'd 3596-3637' w/23,725 gals/23,500# sand
Operator: Yates Petroleum

✓10. Magnolia Federal #1 — 660' FN & 660' FN, Section 19, T26S, R38E, Lea County, New Mexico

Type: D & A TD: 3750'
Casing: 13 3/8" @ 110'
10 3/4" @ 693' w/200 sacks cement
Spud Date: 2/23/50
Operator: Ralph Lowe

1641F/dt

Area of Review

Proposed Injection Well: Leonard Brothers #4
Sec. 13, T26S, R37E
Lea Co., New Mexico

Wells within one-half mile radius of proposed injector:

1. Leonard Brothers #16 — 1980' FN and 1980' FE
Section 13, T26S, R37E
Lea County, New Mexico

Type:	Oil Well TD: 3617'
Casing:	8 5/8" @ 500' w/500 sacks cement
	5 1/2" @ 3615' w/1100 sacks cement
Spud Date:	4/9/78
Completion:	Perforated 3384-3524'
Operator:	Tenneco Oil Company

2. Leonard Brothers #3 — 1980' FN & 1980' FE
Section 13, T26S, R37E
Lea County, New Mexico

Type:	Oil Well TD: 9861' PBTD: 3713'
Casing:	13 3/8" @ 428' w/410 sacks cement
	9 5/8" @ 4199' w/4000 sacks cement
Spud Date:	12/18/44 (D&A) Recompleted: 8/11/77
Completion:	Perforated 3399-3480'
Frac'd:	3399-3480' w/36,634 gals/47,750# SD
Operator:	Tenneco Oil Company

3. Leonard Brothers #25 — 2280' FN & 900' FW
Section 13, T26S, R37E
Lea County, New Mexico

Type:	Oil Well TD: 3600'
Casing:	8 5/8" @ 510' w/200 sacks cement
	5 1/2" @ 3600' w/1300 sacks cement
Spud Date:	7/1/78
Completion:	Perforated 3384-3556'
Frac'd:	3384-3556' w/41,832 gals/88,000# SD
Operator:	Tenneco Oil Company

1641F/4/dt

4. Leonard Brothers #11 — 1980' FS & 1980' FW
Section 13, T26S, R37E
Lea County, New Mexico

Type:	Oil Well TD: 3812' PBTD: 3778'
Casing:	8 5/8" @ 513' w/500 sacks cement
	5 1/2" @ 3812' w/800 sacks cement
Spud Date:	10/28/77 Recompleted: 3/81
Completion:	Perforated 3509-3551'
Acidized	3509-3551' w/2000 gals
Frac'd:	3509-3551' w/150,000 gals/25,500# SD
Perforated	3377-3428' (3/81)
Acidized	3377-3551' w/ 4000 gals
Frac'd	3377-3551' w/20,000 gals/30,200# SD
Operator:	Tenneco Oil Company

5. Leonard Brothers #2 - Previously described in area of review for proposed injector Leonard Brothers #1.

6. Ed Powell Federal/IG/#1 - Previously described in area of review for proposed injector Leonard Brothers #1.

7. South Leonard TR 1 WI 1 - Previously described in area of review for proposed injector Leonard Borthers #1.

8. Leonard Brothers #5 - Previously described in area of review for proposed injector Leonard Brothers #1.

9. Leonard Brothers #1 — 330' FS & 990' FE
Section 13, T26S, R37E
Lea County, New Mexico

Type:	Oil Well TD: 3627'
Casing:	8 5/8" @ 505' w/310 sacks cement
	5 1/2" @ 3620' w/900 sacks cement
Spud Date:	9/13/76
Completion:	Perforated 3532-3546'
Acidized	3532-3546' w/1500 gals
Perforated	3470-3480'
Acidized	3470-3480'-w/ 1000 gals
Perforate	3454-3546'
Acidized	3454-3497'-w/ 1000 gals
Frac'd	3454-3546' w/20,000 gals/30,000# SD
Operator:	Tenneco Oil Company

10. South Leonard TR 4 #5 - Previously described in area of review for proposed injector Leonard Brothers #1.

1641F/5/dt

Area of Review

Proposed Injection Well: Leonard Brothers #15
Section 13, T26S, R37E
Lea County, New Mexico

Wells within one-half mile radius of proposed injector:

1. South Leonard TR 4 #3 660' FN and 990 FE
Section 24, T26S, R37E
Lea County, New Mexico

Type: Oil Well TD: 3457'
Casing: 8 5/8" @ 307' w/125 sacks cement
5 1/2" @ 3250' w/400 sacks cement
Spud Date: 8/17/50
Completion: Open Hole 3250-3457'
Operator: Sun Oil Company

2. Leonard Brothers #9 660' FS and 660' FE
Section 14, T26S, R37E
Lea County, New Mexico

Type: Water Inj Well TD: 3555' PTD: 3534'
Casing: 8 5/8" @ 505' w/520 sacks cement
5 1/2" @ 3551' w/1100 sacks cement
Spud Date: 7/31/77 Recompleted 6/80
Completion: Perforated 3380-3440' (Queens)
Acidized 3380-3440' w/1000 gals
Frac'd 3380-3440' w/15,000 gals/25,500# SD
Squeezed Queen Perfs (3380-3440) (6/80)
Perforated 3487-3530' (Penrose) (6/80)
Acidized 3487-3530' with 1800 gals (6/80)
Operator: Tenneco Oil Company

1641F/9/dt

3. Leonard Brothers #7 660' FS and 660' FE
Section 13, T26S, R37E
Lea County, New Mexico

Type: Water Inj Well TA'd TD: 3834'
Casing: 8 5/8" @ 517' w/500 sacks cement
5 1/2" @ 3832' w/1010 sacks cement
Spud Date: 10/17/77 Recompleted 2/78
Completion: Perforated 3368-3412' (Queen)
Acidized 3368-3412' w/2000 gals
Frac'd 3368-3412' w/17,000 gals/22,500# SD
Set scab liner over Queen (2/78)
Perforated 3462-3506' (Penrose)
Acidized 3462-3530' with 3000 gals
Frac'd 3462-3506' w/18,000 gals/52,000# SD
Converted to water injection (4/7)
Perforated 3368-3419' (Through liner)
TA'd (3/83)
Bride plug set at 3316'
Operator: Tenneco Oil Company

4. South Leonard TR 1 WI1 - Previously described in area of review for proposed injector Leonard Brothers #1.

5. Leonard Brothers #11 - Previously described in area of review for proposed injector Leonard Brothers #4.

6. Leonard Federal #5 1650' FS and 990' FE
Section 14, T26S, R37E
Lea County, New Mexico

Type: Oil Well TD: 3437'
Casing: 10 3/4" @ 209' w/120 sacks cement
8 5/8" @ 1115' w/75 sacks cement
7" @ 3369' w/75 sacks cement
Spud Date: 3/6/53 Recompleted 5/78
Completion: Open Hole 3369-3437'
Frac'd 3369-3437' w/15,000 gals
Deepened to 3674' PBTD: 3634 (5/78)
4 1/2" Liner 3181-3674'
Perforated 3356-3580'
Acidized 3356-3580' with 2520 gals
Frac'd 3356-3580' w/64,000 gals/140,000# SD
Operator: Tenneco Oil Company

1641F/10/dt

7. Leonard Federal #10 — 1980' FS and 1980' FE
Section 14, T26S, R37E
Lea County, New Mexico

Type:	Water Injection	TD: 3597'	PBTD: 3580'
Casing:	8 5/8" @ 471' w/520 sacks cement		
	5 1/2" @ 3595' w/1200 sacks cement		
	7" @ 3369' w/75 sacks cement		
Spud Date:	8/14/77 Converted to WIW: 12/79		
Completion:	Perforated 3379-3447' (Queen) (8/77)		
	Acidized 3379-3447' w/5000 gals		
	Frac'd 3379-3447' w/30,000 gals/51,000# SD		
	Perforated 3489-3547' (Penrose) (12/79)		
	Acidized 3489-3547' with 1500 gals		
	Frac'd Queen & Penrose w/30,000 gals/51,000# SD		
Operator:	Tenneco Oil Company		

8. Leonard Federal #1 — 1980' FS and 660' FW
Section 13, T26S, R37E
Lea County, New Mexico

Type:	D & A	TD: 9772'	PBTD: 5805'
Casing:	13 3/8" @ 422' w/350 sacks cement		
	8 5/8" @ 3790 w/2000 sacks cement		
	5 1/2 Liner 3500-6980' w/700 sacks		
Spud Date:	10/19/57		
Completion:	Perforated 6456-6614'		
	Acidized 6456-6614' w/1000 gals		
	Squeezed 6592-6614'		
Operator:	Joe Champlin		

9. Leonard Brothers #25 - Previously described in area of review for porposed injector Leonard Brothers #4.

10. Leonard Brothers #16 - Previously described in area of review for porposed injector Leonard Brothers #4.

1641F/11/dt

11. Leonard Federal #27 — 1980' FN and 660' FE
Section 14, T26S, R37E
Lea County, New Mexico

Type:	Oil Well	TD: 3600'	PBTD: 3577'
Casing:	8 5/8" @ 511' w/500 sacks cement		
	5 1/2" @ 3595' w/1200 sacks cement		
	7" @ 3600' w/1050 sacks cement		
Spud Date:	7/9/78		
Completion:	Perforated 3398-3508'		
	Acidized 3398-3508' w/1260 gals		
	Frac'd 3398-3508' w/32,000 gals/70,000# SD		
Operator:	Tenneco Oil Company		

12. Leonard Federal #26 — 660' FN and 660' FW
Section 13, T26S, R37E
Lea County, New Mexico

Type:	Oil Well	TD: 3600'	PBTD: 3545'
Casing:	8 5/8" @ 500' w/500 sacks cement		
	5 1/2" @ 3570' w/850 sacks cement		
Spud Date:	6/22/78		
Completion:	Perforated 3442-3524'		
	Acidized 3442-3524' w/2100 gals acid		
	Frac'd 3442-3524' w/27,762 gals/51,000# SD		
Operator:	Tenneco Oil Company		

1641F/12/dt

Area of Review

Proposed Injection Well: Leonard Brothers #16
Section 13, T26S, R37E
Lea County, New Mexico

Wells within one-half mile radius of proposed injector:

1. Leonard Brothers #28 660' FN and 330 FE
Section 14, T26S, R37E
Lea County, New Mexico

Type: Oil Well TD: 3600' PBTD: 3558'
Casing: 8 5/8" @ 515' w/500 sacks cement
5 1/2" @ 3600' w/1050 sacks cement
Spud Date: 7/23/78
Completion: Perforated 3452-3494'
Acidized 3452-3494 w/1500 gals
Frac'd 3452-3494 w/20,000 gals/36,800# SD
Operator: Tenneco Oil Company

2. Leonard Brothers #26 - Previously described in area of review for proposed injector Leonard Brothers #15.

3. Leonard Brothers #19 660' FN and 1980 FW
Section 14, T26S, R37E
Lea County, New Mexico

Type: Oil Well TD: 3642'
Casing: 8 5/8" @ 506' w/500 sacks cement
5 1/2" @ 3642' w/1000 sacks cement
Spud Date: 5/14/78
Completion: Perforated 3386-3552'
Acidized 3386-3552 w/2520 gals
Frac'd 3386-3552 w/64,000 gals/40,000# SD
Operator: Tenneco Oil Company

4. Leonard Brothers #3 - Previously described in area of review for proposed injector Leonard Brothers #4.

5. Leonard Brothers #27 - Previously described in area of review for proposed injector Leonard Brothers #15.

6. Leonard Federal #1 - (Joe Chlmplin, Operator) - Previously described in area of review for proposed injector Leonard Brothers #15.

7. Leonard Brothers #25 - Previously described in area of review for proposed injector Leonard Brothers #4.

8. Leonard Brothers #4 - Previously described in area of review for proposed injector Leonard Brothers #1.

9. Leonard Brothers #11 - Previously described in area of review for proposed injector Leonard Brothers #4.

10. Leonard Brothers #15 1980' FS and 660' FW
Section 14, T26S, R37E
Lea County, New Mexico

Type:	Oil Well TD: 3589' PBTD: 3547'
Casing:	8 5/8" @ 545' w/550 sacks cement
	5 1/2" @ 3585' w/1260 sacks cement
Spud Date:	3/78
Completion:	Perforated 3330-3506'
	Acidized 3330-3506 w/4410 gals
	Frac'd 3330-3506 w/72,000 gals/196,000# SD
Operator:	Tenneco Oil Company

11. South Leonard TR 1 WI 1 - Previously described in area of review for proposed injector Leonard Brothers #1.

TENNECO OIL COMPANY

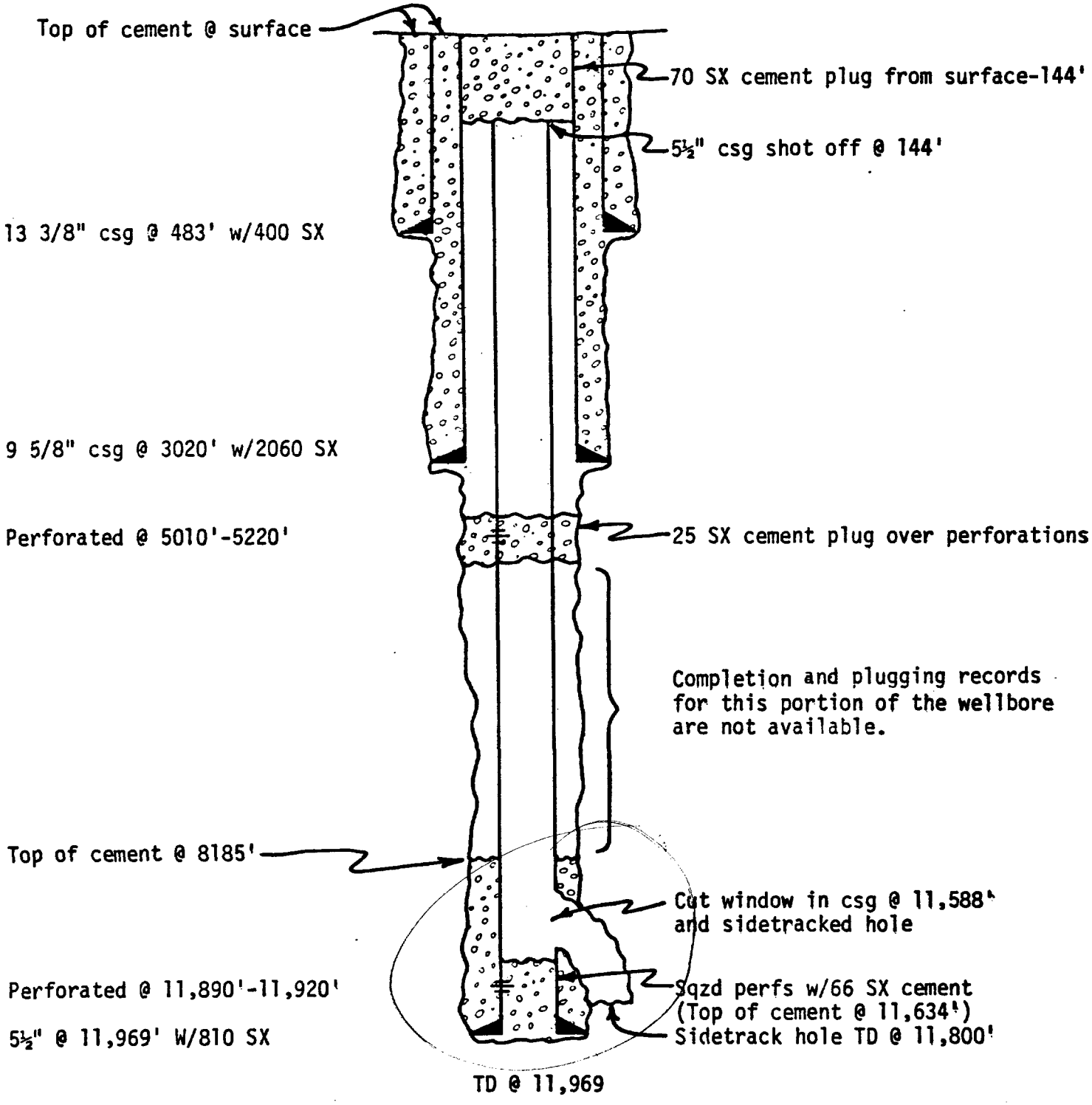
SOUTH LEONARD AREA

WELL SCHEMATICS

HUMBLE OIL & REFINING CO.

LEONARD FEDERAL 1-M

SEC. 12, T26S R37E



Area of Review

Proposed Injection Well: Leonard Brothers #26
Section 13, T26S, R37E
Lea County, New Mexico

Wells within one-half mile radius of proposed injector:

1. Leonard Federal #7 — 660' FS and 660' FE
Section 11, T26S, R37E
Lea County, New Mexico

Type: Abandoned Oil Well TD: 12065' PBTD: 9530'
Casing: 13 3/8" @ 487' w/575 sacks cement
9 5/8" @ 3227' w/1200 sacks cement
7" @ 9410' w/200 sacks cement
Spud Date: 1/12/49
Completion: Open Hole 9410-9530'
Acidized 9400-9530 w/25,000 gals
Operator: Bettis, Boyle & Stovall

2. Federal Leonard Oil #1 — 660' FS and 660' FW
Section 12, T26S, R37E
Lea County, New Mexico

Type: P & A'd 1/23/47 TD: 11969'
Casing: 13 3/8" @ 483' w/400 sacks cement
9 5/8" @ 3021' w/2060 sacks cement
5 1/2" @ 11964' w/810 sacks cement
Spud Date: 7/43
Completion: Perforated 11890-11928'
Acidized 11890-11928 w/800 gals
Operator: Humble Oil & Refining

3. Farnsworkth Petroleum A-19 — 990' FS and 330' FW
Section 12, T26S, R37E
Lea County, New Mexico

Type: D & A TD: 4114'
Casing: 13" @ 530'
12 1/2" @ 1050'
10" @ 2800
8 11/4" @ 3792' w/90 sacks cement
Liner 6" 3833-3970'
Spud Date: 6/18/29
Operator: Midwest Refining Co.

4. Tenneco Federal #1 — 990' FS and 2310' FN
Section 12, T26S, R37E
Lea County, New Mexico

Type: Gas Well TD: 11854'
Casing: 11 3/4" @ 390' w/350 sacks cement
8 5/8" @ 3790' w/500 sacks cement
5 1/2" @ 11852' w/700 sacks cement
Spud Date: 21/12/71
Completion: Perforated 11634-11828'
Acidized 11634-11828 w/2000 gals
Operator: Petroleum Corporation

5. Leonard Federal #6 — 660' FN and 1980' FE
Section 14, T26S, R37E
Lea County, New Mexico

Type: D & A TD: 3453'
Casing: 8 5/8" @ 265' w/225 sacks cement
Spud Date: 11/5/58
Operator: Petroleum Corporation

6. Leonard Brothers #14 — 657' FN and 1983' FE
Section 14, T26S, R37E
Lea County, New Mexico

Type: Water Injection Well TA'd TD: 3600'
Casing: 8 5/8" @ 265' w/225 sacks cement
5 1/2" @ 3600' w/1200 sacks cement
Spud Date: 11/5/58 Recompleted: 1/18/80
Completion: Perforated 3382-3520'
Acidized 3382-3520' w/6000 gals
Frac'd 3382-3520' w/30,000 gals/51,000# SD
Temporarily Abandoned w/BP @ 3300' (12/82)
Operator: Tenneco Oil Company

7. Leonard Brothers #28 - Previously described in area of review for proposed injector Leonard Brothers #16.

8. Leonard Brothers #19 - Previously described in area of review for proposed injector Leonard Brothers #16.

9. Leonard Brothers #16 - Previously described in area of review for proposed injector Leonard Brothers #4.

10. Leonard Brothers #25 - Previously described in area of review for proposed injector Leonard Brothers #4.

11. Leonard Federal #1 - (Joe Champlin, Operator) Previously described in area of review for proposed injector Leonard Brothers #15.

12. Leonard Brothers #15 - Previously described in area of review for proposed injector Leonard Brothers #16.

13. Leonard Brothers #27 - Previously described in area of review for proposed injector Leoanrd Brothers #15.

1641F/dt

Area of Review

Proposed Injector: Leonard Brothers #27
Section 14, T26S, R37E
Lea County, New Mexico

Wells within one-half mile radius of proposed injector:

1. Leonard Federal #7 (Operator, Bettis, Boyle & Stovall) - Previously described in area of review for proposed injector Leonard Brothers #26.

2. Leonard Federal #6 (Operator, Leonard Oil Company) - Previously described in area of review for proposed injector Leonard Brothers #26.

3. Leonard Brothers #14 - Previously described in area of review for proposed injector Leonard Brothers #26.

4. Leonard Brothers #28 - Previously described in area of review for proposed injector Leonard Brothers #26.

5. Leonard Brothers #26 - Previously described in area of review for proposed injector Leonard Brothers #15.
6. Leonard Brothers #16 - Previously described in area of review for proposed injector Leonard Brothers #14.

7. Leonard Federal #1 (Joe Champlin, Operator) - Previously described in area of review for proposed injector Leonard Brothers #15.

8. Leonard Brothers #25 - Previously described in area of review for proposed injector Leonard Brothers #4.

9. Leonard Brothers #20 1980' FN and 1980' FE
Section 14, T26S, R37E
Lea County, New Mexico

Type: Oil Well TD: 3650' PBTD: 3609
Casing: 8 5/8" @ 500' w/500 sacks cement
5 1/2" @ 3650' w/900 sacks cement
Spud Date: 5/23/78
Completion: Perforated 3404-3586'
Acidized 3404-3586 w/2500 gals
Frac'd 3404-3586 w/64,000 gals/140,000# SD
Operator: Tenneco Oil Company

10. Leonard Brothers #21 1980' FN and 2180' FW
Section 14, T26S, R37E
Lea County, New Mexico

Type: Watr Inj. TA'd TD: 3640'
Casing: 8 5/8" @ 502' w/500 sacks cement
5 1/2" @ 3640' w/1025 sacks cement
Spud Date: 4/27/78
Completion: Perforated 3412-3570'
Acidized 3412-3570 w/2500 gals
Frac'd 3412-3570 w/64,000 gals/140,000# SD
Temporarily abandoned (12/82) by setting
Bridge plug at 3300'.
Operator: Tenneco Oil Company

11. Leonard Brothers WS-1 2068' FS and 2514' FE
Section 14, T26S, R37E
Lea County, New Mexico

Type: Water Supply Well TD: 4600'
Casing: 9 5/8" @ 520' w/440 sacks cement
7" @ 4600' w/1880 sacks cement
Spud Date: 11/29/78
Completion: Perforated 4394-4500' (San Andres)
Acidized 4394-4500 w/10,000 gals
Frac'd 3404-3586 w/64,000 gals/140,000# SD
Operator: Tenneco Oil Company

12. Leonard Federal #10 - Previously described in area of review for proposed injector Leonard Brothers #15.

13. Leonard Federal #5 - Previously described in area of review for proposed injector Leonard Brothers #15.

14. Leonard Federal #15 - Previously described in area of review for proposed injector Leonard Brothers #16.

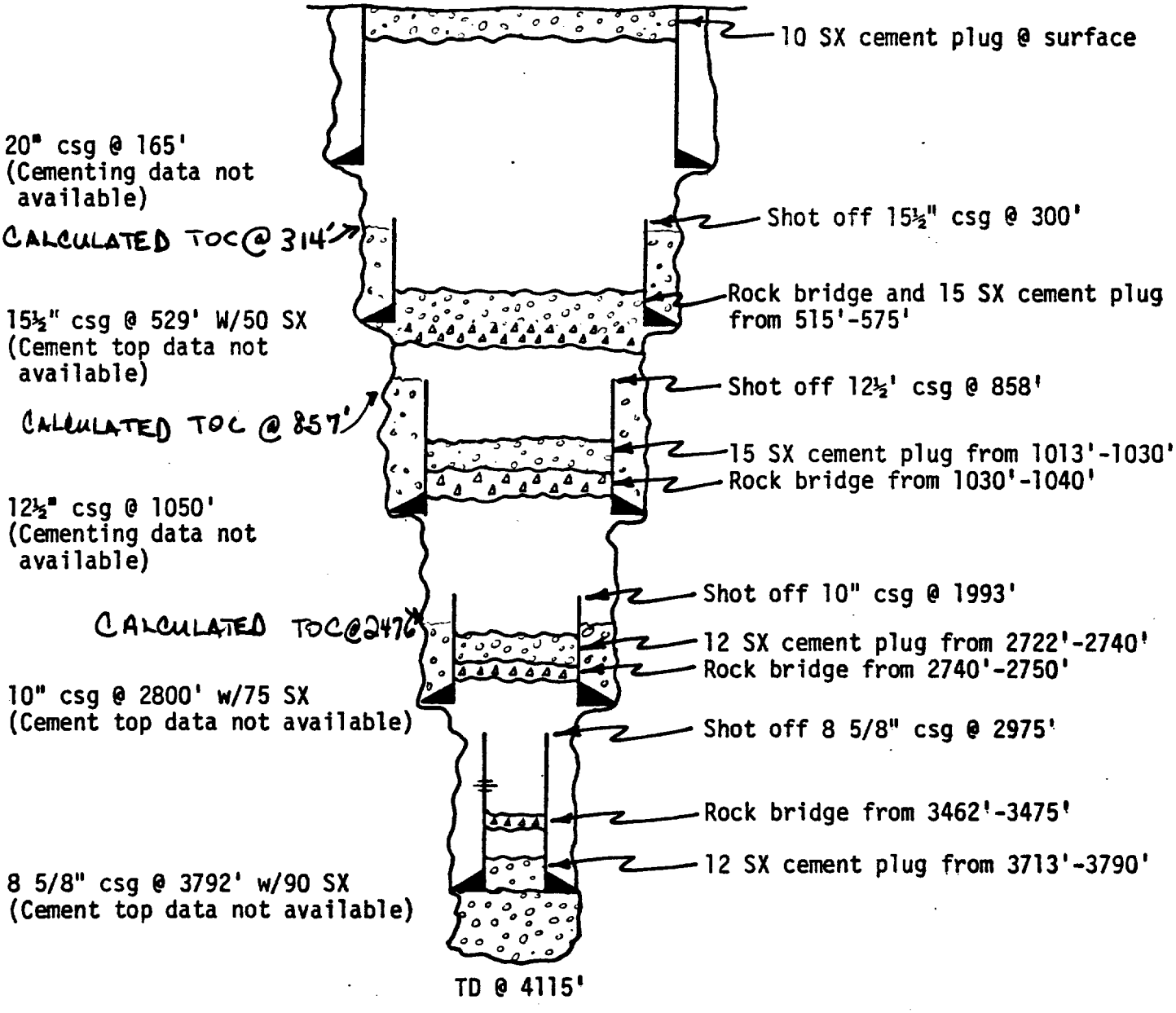
15. Leonard Federal #9 - Previously described in area of review for proposed injector Leonard Brothers #15.

TENNECO OIL COMPANY

SOUTH LEONARD AREA

WELL SCHEMATICS

MIDWEST REFINING
FARNSWORTH 19-M
SEC. 12, T26S R37E



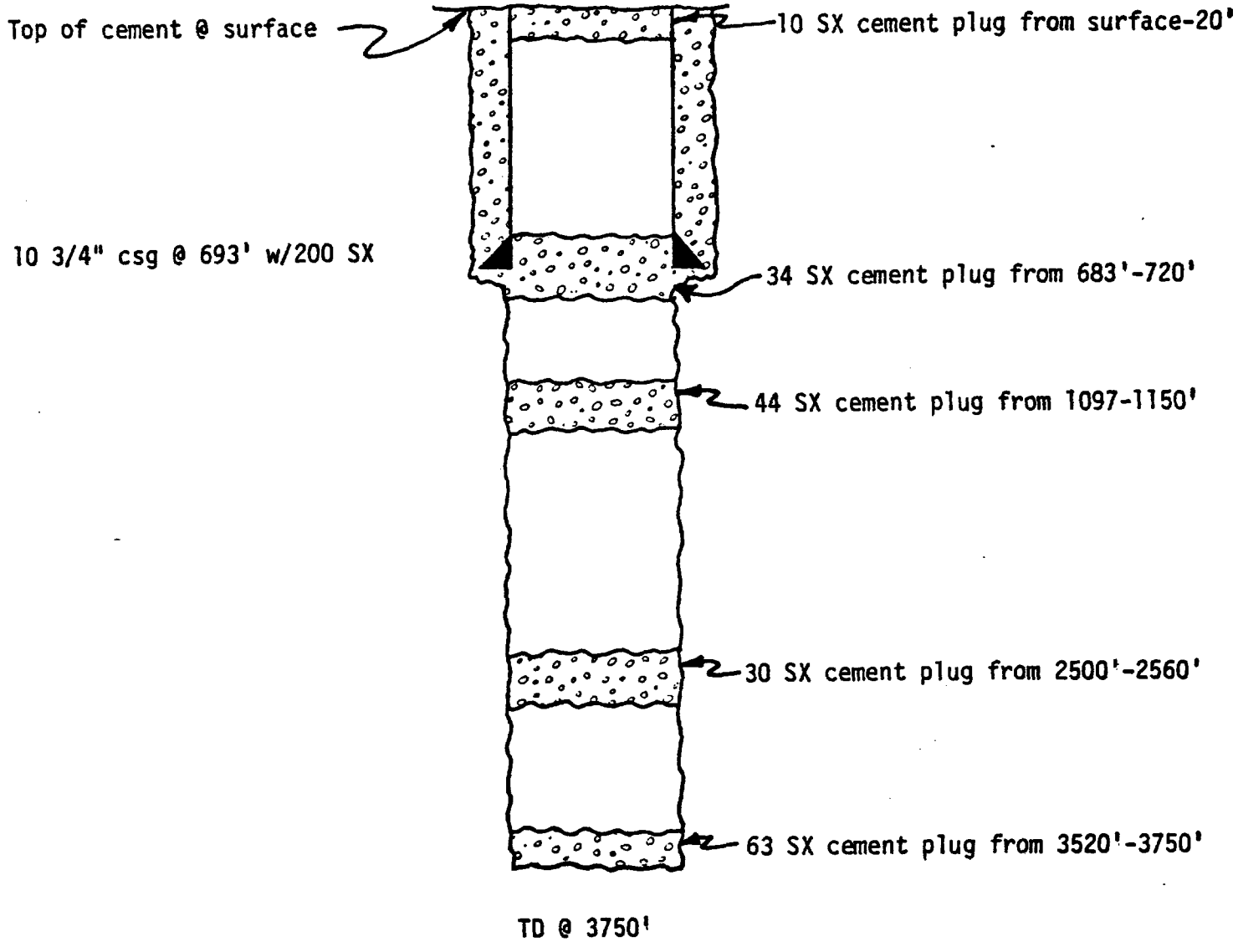
Note: Mud was placed between all cement plugs.

TENNECO OIL COMPANY

SOUTH LEONARD AREA

WELL SCHEMATICS

RALPH LOWE
HARALSON 1-D ✓
SEC. 19, T26S R38E



Note: Mud was placed between all cement plugs.

TENNECO OIL COMPANY

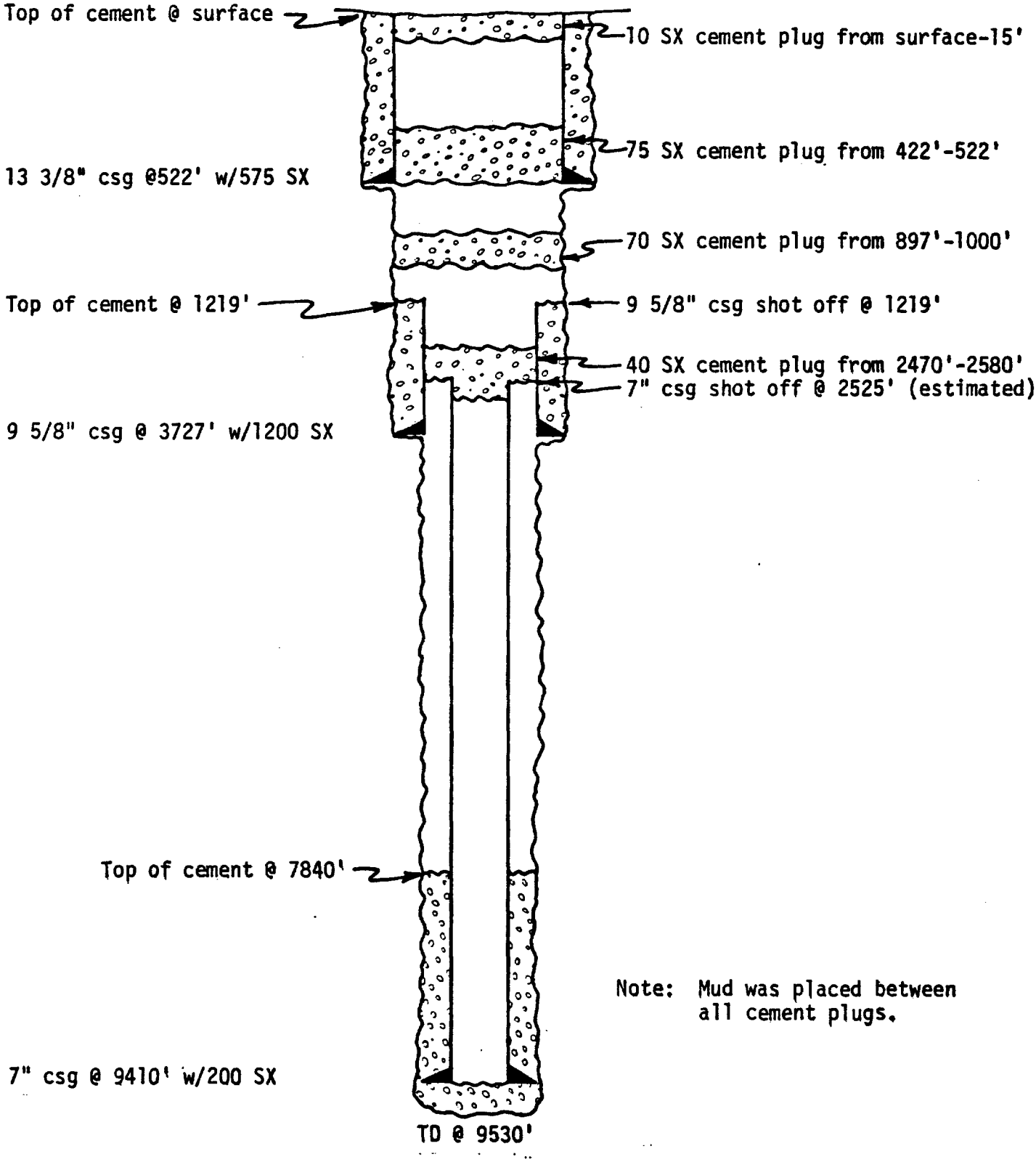
SOUTH LEONARD AREA

WELL SCHEMATICS

BETTIS, BOYLE & STOVALL

LEONARD FEDERAL 7-P

SEC. 11, T26S R37E



Note: Mud was placed between all cement plugs.

MISCELLANEOUS INJECTION INFORMATION

I. Injection Zones

Name	Queen	Penrose
Depth	3400'	3500'

II. Injection Fluid

Type: Salt Water

Sources:

1. Produced water from Queen and Penrose formations.
2. Salt water from the San Andres formation in the interval 3900 - 4000'.

III. Injection Data

Anticipated injection pressure: 600 psi
Anticipated injection volume
Maximum per well: 700 BWPD
Average per well: 500 BWPD

IV. Water Analysis

Water analysis for the water supply well and produced water are included.

V. System is closed.

LS/wr/1704F

TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis, Missouri 63119
(314) WO 1-3500/TWX 910-760-1660/Telex 44-2417

WATER ANALYSIS REPORT

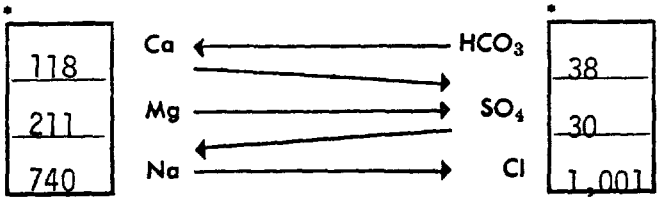
COMPANY Tenneco Oil Company ADDRESS Jal, New Mexico DATE: 1-25-82

SOURCE Leonard Fed 1500 bbl Injection Tank DATE SAMPLED 1-21-82 ANALYSIS NO. 55

Analysis	Produced Water	Mg/L		*Meq/L	
1. pH	6.5				
2. H_2S (Qualitative)	50 ppm				
3. Specific Gravity	1.040				
4. Dissolved Solids		61,205			
5. Suspended Solids					
6. Phenolphthalein Alkalinity ($CaCO_3$)					
7. Methyl Orange Alkalinity ($CaCO_3$)		1,880			
8. Bicarbonate (HCO_3)		HCO_3 2,294	÷61	38	HCO_3
9. Chlorides (Cl)		Cl 35,552	÷35.5	1,001	Cl
10. Sulfates (SO_4)		SO_4 1,425	÷48	30	SO_4
11. Calcium (Ca)		Ca 2,360	÷20	118	Ca
12. Magnesium (Mg)		Mg 2,576	÷12.2	211	Mg
13. Total Hardness ($CaCO_3$)		16,500			
14. Total Iron (Fe)		0			
15. Barium (Qualitative)					
16. Strontium					

*Milli equivalents per liter

PROBABLE MINERAL COMPOSITION



Saturation Values	Distilled Water 20°C
$CaCO_3$	13 Mg/L
$CaSO_4 \cdot 2H_2O$	2,090 Mg/L
$MgCO_3$	103 Mg/L

Compound	Equiv. Wt.	X Meq/L	= Mg/L
$Ca(HCO_3)_2$	81.04	38	3,080
$CaSO_4$	68.07	30	2,042
$CaCl_2$	55.50	50	2,775
$Mg(HCO_3)_2$	73.17		
$MgSO_4$	60.19		
$MgCl_2$	47.62	211	10,048
$NaHCO_3$	84.00		
Na_2SO_4	71.03		
NaCl	58.46	740	43,260

REMARKS O. Roberts (3) - Knorr - M. Roberts - File

Respectfully submitted,
TRETOLITE COMPANY

Jack Turner

369 Marshall Avenue / Saint Louis, Missouri 63119
(314) WO 1-3500/TWX 910-760-1660/Telex 44-2417

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
$CaCO_3$ Scaling Tendency

SAMPLE

Sample Test No. 55

Company Tenneco Oil Company — Sample Date 1-21-82

Address Jal, New Mexico — Submitted by

Sample 1500 bbl Injection Tank Produced Water — Field Leonard Fed

S. I. = pH - pCa - pAlk - K

where S. I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
pAlk = negative logarithm of total alkalinity
K = constant, depends upon temperature and salt content

pH = 6.50 pCa = 1.23 pAlk = 1.43

CALCULATION OF IONIC STRENGTH AND K VALUE

Na	(17,020) X (2.2×10^{-5}) =	0.3744
Ca	(2,360) X (5.0×10^{-5}) =	0.1180
Mg	(2,576) X (8.2×10^{-5}) =	0.2112
Cl	(35,552) X (1.4×10^{-5}) =	0.4977
HCO_3	(2,294) X (0.8×10^{-5}) =	0.0184
SO_4	(1,425) X (2.1×10^{-5}) =	0.0299

TOTAL IONIC STRENGTH = 1.2496

K = 3.45 @ 80 °F.

K = 2.90 @ 120 °F.

SI at (80)° = (6.50) - (1.23) - (1.43) - (3.45) or + 0.39

SI at (120)° = (6.50) - (1.23) - (1.43) - (2.90) or + 0.94

SI = O or water is relatively stable at _____ °F.

Remarks: Mild Calcium carbonate scaling tendencies at 80°F

Severe Calcium carbonate scaling tendencies at 120°F

CORPORATION
TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis, Missouri 63119
(314) 961-3500 / TWX 910-760-1660 / Telex 44-2417

SCALING TENDENCY CALCULATIONS

CALCIUM SULFATE

(Skillman-McDonald-Stiff Method)

Company Tenneco Oil Company — Water Analysis No. 55

Address Jal, New Mexico — Date 1-25-82

Source 1500 bbl Inj. Tank Produced Water — Field Leonard Fed

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess common ion factor
K = Constant dependent on ionic strength, U, and temperature

CALCULATION OF IONIC STRENGTH AND K VALUE

	mg/l	X	factor	=	Ionic Strength
Na	(17,020)	X	(2.2×10^{-5})	=	0.3744
Ca	(2,360)	X	(5.0×10^{-5})	=	0.1180
Mg	(2,576)	X	(8.2×10^{-5})	=	0.2112
Cl	(35,552)	X	(1.4×10^{-5})	=	0.4977
HCO_3	(2,294)	X	(0.8×10^{-5})	=	0.0184
SO_4	(1,425)	X	(2.1×10^{-5})	=	0.0299
			TOTAL IONIC STRENGTH	=	1.2496

K = 21.36×10^{-4} @ 70 ^{o}F

K = 20.77×10^{-4} @ 130 ^{o}F

CALCULATION OF EXCESS COMMON ION FACTOR

$$X = \left| (2.5\ Ca - 1.04\ SO_4) \right| \times 10^{-5}$$

where Ca and SO_4 are expressed in mg/l

$$X = \left| \left[2.5 \left(\quad 2,360 \quad \right) - 1.04 \left(\quad 1,425 \quad \right) \right] \right| \times 10^{-5}$$

$$X = \left| \left(\quad 5,900 \quad - \quad 1,482 \quad \right) \right| \times 10^{-5}$$

$$X = \quad 4.42 \times 10^{-2} \quad X^2 \quad 19.54 \times 10^{-4}$$

CALCULATION OF SOLUBILITY

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

$$S = 1000 \left[\sqrt{\left(\quad 19.54 \times 10^{-4} \quad + 4 \left(\frac{21.36 \times 10^{-4}}{20.77 \times 10^{-4}} \right) \right)} - \left(\quad 4.42 \times 10^{-2} \quad \right) \right]$$

$$S = 1000 \left[\sqrt{\frac{104.98 \times 10^{-4}}{102.62 \times 10^{-4}}} - \left(\quad 4.42 \times 10^{-2} \quad \right) \right]$$

$$S = 1000 \left[\left(\frac{10.25 \times 10^{-2}}{10.13 \times 10^{-2}} \right) - \left(\quad 4.42 \times 10^{-2} \quad \right) \right]$$

$$S = \frac{58.30}{57.10} \text{ meq/l}$$

$$S = \frac{58.30}{57.10} (68.07) = \frac{3,968}{3,887} \text{ mg/l @ } \frac{70}{130}\ ^{\circ}F$$

REMARKS

[illegible]

365 Marsha[illegible] [illegible] Louis, Missouri 63[illegible]
(314 WO [illegible] [illegible] [illegible]/Telex 44-2417

[illegible]

COMPANY Tenneco Oil Company ADDRESS Jal, New Mexico DATE: 1-25-82

SOURCE Leonard Bro. WSW #1 Make-up Water DATE SAMPLED 1-21-82 ANALYSIS NO. 56

Analysis			Mg/L		*Meq/L	
1. pH	6.2					
2. H_2S (Qualitative)	220 ppm					
3. Specific Gravity	1.085					
4. Dissolved Solids			122,854			
5. Suspended Solids						
6. Phenolphthalein Alkalinity ($CaCO_3$)						
7. Methyl Orange Alkalinity ($CaCO_3$)			540			
8. Bicarbonate (HCO_3)		HCO_3	659	÷61	11	HCO_3
9. Chlorides (Cl)		Cl	75,881	÷35.5	2,109	Cl
10. Sulfates (SO_4)		SO_4	1,175	÷48	24	SO_4
11. Calcium (Ca)		Ca	8,200	÷20	410	Ca
12. Magnesium (Mg)		Mg	2,090	÷12.2	171	Mg
13. Total Hardness ($CaCO_3$)			29,100			
14. Total Iron (Fe)			0			
15. Barium (Qualitative)						
16. Strontium						

*Milli equivalents per liter

PROBABLE MINERAL COMPOSITION

*			*
410	Ca	HCO_3	11
171	Mg	SO_4	24
1,563	Na	Cl	2,109

Saturation Values / Distilled Water 20°C

$CaCO_3$	13 Mg/L
$CaSO_4 \cdot 2H_2O$	2,090 Mg/L
$MgCO_3$	103 Mg/L

Compound	Equiv. Wt.	X	Meq/L	=	Mg/L
$Ca(HCO_3)_2$	81.04		11		891
$CaSO_4$	68.07		24		[illegible]
$CaCl_2$	55.50		375		[illegible]
$Mg(HCO_3)_2$	73.17				
$MgSO_4$	60.19				
$MgCl_2$	47.62		171		8,[illegible]
$NaHCO_3$	84.00				
Na_2SO_4	71.03				
NaCl	58.46		1,563		[illegible]

REMARKS O. Roberts (3) - Knorr - M. Roberts - File

Respectfully submitted
TRETOLITE COMPANY

Jack [illegible]

369 Marshall Avenue / Saint Louis, Missouri 63119
(314) WO 1-3500/TWX 910-760-1660/Telex 44-2417

STABILITY INDEX CALCULATIONS
(Stiff-Davis Method)
$CaCO_3$ Scaling Tendency

SAMPLE

Sample Test No. 56

Company Tenneco Oil Company — Sample Date 1-21-82

Address Jal, New Mexico — Submitted by

Sample W.S.W. #1 Make-up Water — Field Leonard Bro.

S. I. = pH - pCa - pAlk - K

where S. I. = stability index
pH = pH as measured on fresh sample
pCa = negative logarithm of calcium concentration
pAlk = negative logarithm of total alkalinity
K = constant, depends upon temperature and salt content

pH = 6.2 pCa = 0.70 pAlk = 1.97

CALCULATION OF IONIC STRENGTH AND K VALUE

Na	(35,494) X (2.2×10^{-5}) =	0.7909
Ca	(8,200) X (5.0×10^{-5}) =	0.4100
Mg	(2,090) X (8.2×10^{-5}) =	0.1714
Cl	(74,881) X (1.4×10^{-5}) =	1.0483
HCO_3	(659) X (0.8×10^{-5}) =	0.0053
SO_4	(1,175) X (2.1×10^{-5}) =	0.0268

TOTAL IONIC STRENGTH = 2.4527

K = 3.17 @ 80 °F.

K = 2.65 @ 120 °F.

SI at (80)° = (6.2) - (0.70) - (1.97) - (3.17) or + 0.36

SI at (120)° = (6.2) - (0.70) - (1.97) - (2.65) or + 0.88

SI = O or water is relatively stable at _____ °F.

Remarks: Mild Calcium carbonate scaling tendencies at 80°F

Severe Calcium carbonate scaling tendencies at 120°F

369 Marshall Avenue / Saint Louis, Missouri 63119
(314) 961-3500 / TWX 910-760-1660 / Telex 44-2417

SCALING TENDENCY CALCULATIONS

CALCIUM SULFATE

(Skillman-McDonald-Stiff Method)

Company Tenneco Oil Company — Water Analysis No. 56

Address Jal, New Mexico — Date 1-25-82

Source W.S.W. #1 Make-up Water — Field Leonard Bro.

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right)$$

where S = Solubility of Calcium Sulfate under given conditions
X = Excess common ion factor
K = Constant dependent on ionic strength, U, and temperature

CALCULATION OF IONIC STRENGTH AND K VALUE

	mg/l	X	factor	=	Ionic Strength
Na	35,949	X	(2.2×10^{-5})	=	0.7909
Ca	8,200	X	(5.0×10^{-5})	=	0.4100
Mg	2,090	X	(8.2×10^{-5})	=	0.1714
Cl	74,881	X	(1.4×10^{-5})	=	1.0483
HCO_3	659	X	(0.8×10^{-5})	=	0.0053
SO_4	1,175	X	(2.1×10^{-5})	=	0.0268
			TOTAL IONIC STRENGTH	=	2.4527

K = 29.88×10^{-4} @ 70 °F

K = 29.14×10^{-4} @ 130 °F

CALCULATION OF EXCESS COMMON ION FACTOR

$$X = \left| (2.5\ Ca - 1.04\ SO_4) \right| \times 10^{-5}$$

where Ca and SO_4 are expressed in mg/l

$$X = \left| \left[2.5 \left(\quad 8,200 \quad \right) - 1.04 \left(\quad 1,175 \quad \right) \right] \right| \times 10^{-5}$$

$$X = \left| \left(\quad 20,500 \quad - \quad 1,222 \quad \right) \right| \times 10^{-5}$$

$$X = \quad 19.28 \times 10^{-2} \quad X^2 \quad 371.72 \times 10^{-4}$$

CALCULATION OF SOLUBILITY

$$S = 1000 \left(\sqrt{X^2 + 4K} - X \right.$$

$$S = 1000 \left[\sqrt{\left(\frac{371.72 \times 10^{-4}}{29.14 \times 10^{-4}} + 4 \left(\frac{29.88 \times 10^{-4}}{29.14 \times 10^{-4}} \right) \right)} - \left(\frac{19.28 \times 10^{-2}}{29.14 \times 10^{-4}} \right) \right.$$

$$S = 1000 \left[\sqrt{\frac{491.24 \times 10^{-4}}{488.38 \times 10^{-4}}} - \left(\frac{19.28 \times 10^{-2}}{29.14 \times 10^{-4}} \right) \right]$$

$$S = 1000 \left[\left(\frac{22.16 \times 10^{-2}}{22.10 \times 10^{-2}} \right) - \left(\frac{19.28 \times 10^{-2}}{29.14 \times 10^{-4}} \right) \right]$$

$$S = \frac{28.80}{28.20} \text{ meq/l}$$

$$S = \frac{28.80}{28.20} (68.07) = \frac{1,960}{1,920} \text{ mg/l @ } \frac{70}{130}^{\circ}$$

REMARKS

Attached you will find the appropriate geological data on the injection zone. This data includes the following:

1. A type log section showing the relationship of the Queen and Penrose formations. As shown on this type log the Queen formation lies at a depth of approximately 3300' to 3500' for a gross thickness of 200'. The Penrose formation lies at a depth from approximately 3520' to 3650' for a total thickness of 130'.

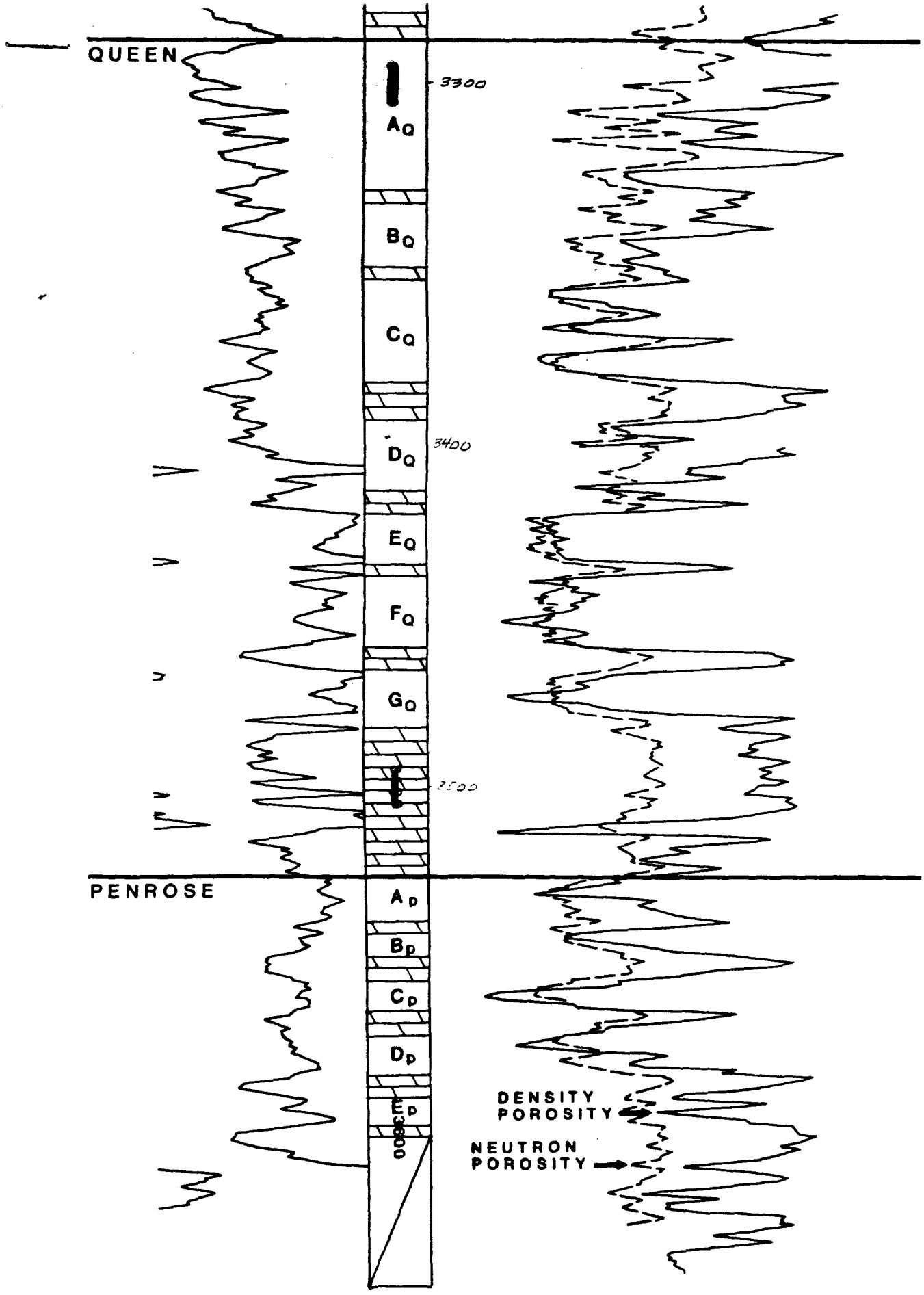
2. Lithologic detail for the Queen and Penrose is attached in a detailed core analysis of the Leonard Federal #11.

3. Structure maps on the top of the Queen formation and the Penrose formation.

4. A letter dated January 9, 1978, from James I. Wright of the State of New Mexico's State Engineer's office in regards to fresh water zones in the Leonard Queen Pool in T26S, R37E, Lea County, New Mexico.

Mark Kemper
Geological Engineer

1706F/dt



TYPE LOG
SOUTH LEONARD FIELD
LEA COUNTY, NEW MEXICO

5-'79 DLH

ROTARY ENGINEERS LABORATORIES

CORE ANALYSIS TABULAR DATA

COMPANY Tenneco Oil Company	WELL Leonard Federal #11	FIELD Leonard (Queen, S.)
COUNTY Lea	STATE New Mexico	DATE 3-2-78 ANALYST AM
FORMATION Queen	TYPE ANALYSIS Whole Core - Density Plugs	JOB NO. R-558
REMARKS LITHOLOGICAL ABBREVIATIONS-PAGE (4)	*PLUG POROSITIES - NO CHARGE	

SAMPLE NUMBER	DEPTH	RATING	POROSITY %	WHOLE CORE PERMEABILITY MAX	90°	TOTAL WATER SATURATION % P. V.	RESIDUAL OIL SATURATION % P. V.	GRAIN DENSITY	% ROCK OIL FLUO	REMARKS
			Core #(1) 3450-3485, Recovered 29'							
1	3450-3451		2.5*	<.1	Plug			2.80	0	Dolo,Scat.Sh/Ptgs.
2	-52	P	4.7	0.1	Plug	85.5	Tr.	2.80	Tr.	Dolo,Scat.Sh/Ptgs.
3	-53	F	11.2	5.0	Plug	88.7	2.4	2.71	50	50%Sd,50%Dolo.
**4	-54	F	12.5	0.8	Plug	75.5	5.5	2.72	100	Sd,Fine Grain
5	3454-3455	P	11.7	7.1	3.2	89.0	2.8	2.76	100	Sd,Fine Grain
6	-56	VP	11.5	0.6	0.1	92.0	2.6	2.77	100	Sd,Fine Grain
7	-57		0.8*	<.1	Plug			2.81	0	Silty Dolo,Dolo,S/P
8	-58		3.1*	<.1	Plug			2.84	0	Silty Dolo,Dolo,S/P
9	-59		1.1*	<.1	Plug			2.81	0	Dolo,Sh/Ptgs.
10	3459-3460		1.3*	<.1	Plug			2.80	0	SiltyDolo,Shy,Vug,S/
11	-61		2.8*	<.1	Plug			2.82	0	Dolo,S/P,Scat.Vuggs
12	-62		3.4*	<.1	Plug			2.82	0	Dolo,Sh/Ptgs.
13	-63		2.4*	<.1	Plug			2.85	0	Dolo,Lrg.Shale,Fr.
14	-64		2.7*	<.1	Plug			2.83	0	Dolo,Lrg.Shale,Fr.
15	3464-3465		5.0*	<.1	Plug			2.81	0	Dolo,S/P,Sh/Strgs.
16	-66		12.2*	<.1	Plug			2.79	0	Dolo,S/P,Sh/Strgs.
17	-67		5.3*	<.1	Plug			2.74	0	Dolo,S/P,Sh/Strgs.
18	-68	VP	3.3	<.1	<.1	93.0	0.0	2.76	0	Dolo,S/P,Sh/Strgs.
19	-69	P	13.2	0.1	Plug	95.0	Tr.	2.74	100	Sd,Fine Grain
20	3469-3470	F	13.7	0.4	0.4	77.0	5.4	2.70	100	Sd,Fine Grain
21	-71	VP	4.8	0.6	Plug	95.0	Tr.	2.71	30	Sd,SiltyDolo,Lam.Dol
22	-72	VP	4.2	<.1	Plug	94.0	0.0	2.80	10	Dolo,Silty Dolo.
23	-73	P	9.1	9.1	Plug	80.0	4.1	2.67	50	50%Sd,F.G,50%Lam.Dol
24	-74	VP	4.7	<.1	<.1	94.2	0.0	2.82	Tr.	Lam.Dolo,Shale
25	3474-3475	VP	1.6	<.1	Plug	91.0	0.0	2.81	Tr.	Dolo,Sh/Ptgs.
26	-76	VP	5.5	<.1	Plug	90.2	4.8	2.83	Tr.	Dolo,Sh/Ptgs.
*27	-77	F	14.4	0.3	<.1	76.5	8.9	2.74	100	Sd,Fine Grain
28	-78	VP	12.7	0.2	Plug	92.5	3.6	2.75	50	SiltyDolo,V.Brkn,Fr.
	3478-3479		No Analysis (Too Broken for Analysis,Silty Dolo,Show)							
	3479-3485		Lost Core							
			Core #(2) 3485-3545', Recovered 54'							
29	3485-3486	F	10.2	<.1	<.1	83.5	Tr.	2.85	0	Silty,Shaly,Dolo.
30	-87		1.6*	<.1	Plug			2.87	0	Silty,Very Shy,Dolo.
31	-88		1.7*	<.1	Plug			2.85	0	Dolo,Sh/Ptgs,Fr.
32	-89		7.8*	<.1	Plug			2.82	0	Dolo,Sh/Ptgs,Fr.
33	3489-3490	VP	7.2	<.1	<.1	92.0	Tr.	2.91	0	Silty,Shaly,Dolo.
34	-91	P	9.4	0.7	0.6	87.0	Tr.	2.82	0	Silty,Shaly,Dolo.
35	-92	VP	7.6	<.1	<.1	91.2	Tr.	2.79	0	Silty,Dolo.
36	-93	VP	4.7	<.1	<.1	95.5	Tr.	2.98	0	50%SiltyShly,50%Dolo
37	-94		3.0*	<.1	Plug			2.82	0	Dolo,Sh/Ptgs
	3494-3495		2.5*	<.1	Plug			2.88	Sh.	Dolo,Sh/Ptgs,Fr.
39	-96		0.6*	<.1	Plug			2.83	Sh.	Dolo,Sh/Ptgs,Fr.
40	-97		1.8*	<.1	Plug			2.84	Sh.	Dolo,Sh/Ptgs,Fr.
41	-98		2.6*	0.1	Plug			2.86	Sh.	Shaly Dolo,Sh/Ptgs,F
42	-99		6.7*	0.2				2.71	Sh.	Shaly Dolo,Fr.
43	3499-3500		12.5*	0.7	Plug			2.70	0	Silty,Shaly,Dolo.

Leonard Federal #11
Lea County, New Mexico

CORE ANALYSIS TABULAR DATA

SAMPLE NUMBER	DEPTH	RATING	POROSITY %	WHOLE CORE PERMEABILITY MAX.	WHOLE CORE PERMEABILITY 90°	TOTAL WATER SATURATION % P. V.	RESIDUAL OIL SATURATION % P. V.	GRAIN DENSITY	% ROCK OIL FLUO	REMARKS
44	3500-3501	F	13.3	0.7	Plug	75.3	3.5	2.76	100	Silty,Shaly Dolo.
45	-02	F	16.4	1.0	Plug	74.8	3.5	2.77	100	Sd,Dolo,Fine Grain
**46	-03	F	21.8	18.0	Plug	68.2	4.0	2.77	100	Sd,Dolo,F.G,Brkn,Fr
47	-04	F	15.5	0.1	Plug	74.0	5.5	2.72	100	Sd,Dolo,F.G,Brkn,Fr
48	3504-3505	F	15.7	4.0	Plug	70.7	4.4	2.63	100	Sd,Dolo,F.G,Brkn,Fr
**49	-06	F	14.2	0.5	Plug	77.0	5.0	2.76	100	Sd,Dolo,F.G,Fr.
50	-07	F	13.8	1.0	0.3	71.8	2.9	2.78	0	Sand,Fine Grain
51	-08	VP	6.1	<.1	<.1	89.5	3.0	2.78	0	Sand,Fine Grain
52	-09	F	14.4	50.5	<.1	86.5	1.4	2.69	Tr.	Sand,Fine Grain
53	3509-3510	VP	7.1	0.1	<.1	89.5	Tr.	2.79	Tr.	Sand,Fine Grain
54	-11	VP	8.9	0.2	0.2	93.2	4.1	2.84	Tr.	Sand,Fine Grain
55	-12	VP	4.0	0.1	Plug	94.8	0.0	2.85	Tr.	Sand,Fine Grain
56	-13		2.9*	<.1	Plug			2.79	Tr.	Shaly Dolo,Sh/Ptgs.
57	-14		3.5*	<.1	Plug			2.87	Tr.	Shaly Dolo,Sh/Ptgs.
58	3514-3515		5.9*	<.1	Plug			2.77	Tr.	Shaly Dolo,Sh/Ptgs,
59	-16		4.5*	<.1	Plug			2.94	Tr.	Shaly Dolo,Sh/Ptgs,
60	-17		3.9*	<.1	Plug			2.87	0	Shaly Dolo,Sh/Ptgs,
61	-18		4.1*	<.1	Plug			2.85	0	Silty Dolo,Vugy,Brk
62	-19		1.7*	<.1	Plug			2.90	0	Dolo,Vugy,Fr.
63	3519-3520	VP	3.0*	<.1	<.1	92.5	Tr.	2.87	0	Dolo,Vugy,Fr.
64	-21		7.4*	<.1	Plug			2.86	0	Sh,Sm.Lam.Dolo.
65	-22		2.2*	<.1	Plug			2.85	0	Sh,Sm.Lam.Dolo.
66	-23		2.9*	<.1	Plug			2.87	0	Dolo,Fr.
67	-24		3.2*	<.1	Plug			2.83	0	Dolo,Vugy,Fr.
68	3524-3525		1.4*	<.1	Plug			2.81	0	Dolo,Sh/Ptgs,Vugy
69	-26		3.7*	<.1	Plug			2.82	0	Shly.Dolo,Sh/Ptgs.
70	-27		5.3*	<.1	Plug			2.97	0	Dolo,Sh/Ptgs.
71	-28		3.4*	<.1	Plug			2.81	0	Dolo,Sh/Ptgs.
72	-29		0.9*	<.1	Plug			2.83	0	Dolo,Sh/Ptgs,Fr.
73	3529-3530		0.8*	<.1	Plug			2.84	0	Dolo,Sh/Ptgs,Fr.
74	-31		1.1*	<.1	Plug			2.82	0	Dolo,Large Sh/Ptgs.
75	-32		1.2*	<.1	Plug			2.84	0	Dolo,Sh/Ptgs.
76	-33		0.8*	<.1	Plug			2.82	0	Dolo,Sh/Ptgs.
77	-34		2.3*	<.1	Plug			2.81	0	Shly.Dolo,Sh/Ptgs,F
78	3534-3535		2.6*	<.1	Plug			2.82	0	Shly,Dolo,Sh/Ptgs,F
79	-36		0.6*	<.1	Plug			2.82	0	Shly,Dolo,Sh/Ptgs,F
80	-37		1.2*	<.1	Plug			2.83	0	V.Shly.Dolo,Sh/Ptgs
81	-38		4.0*	<.1	Plug			2.82	0	Dolo,Sh/Ptgs,Fr.
82	-39		2.7*	<.1				2.82	0	Dolo,Sh/Ptgs,Fr.
	3539-3545		Lost Core							
			Core #(3) 3545-3576', Recovered 30'							
83	3545-3546		4.3*	0.2	Plug			2.84	0	Dolo,Shaly
84	-47		1.7*	<.1	Plug			2.83	0	Dolo,Shaly
85	-48	VP	1.3	<.1	<.1	82.8	0.0	2.87	0	Dolo,Stylolite,Fr.
86	-49		1.7*	<.1	Plug			2.87	0	Dolo.
87	3549-3550		2.1*	<.1	Plug			2.91	0	Dolo,30%Shale
88	-51		2.3*	<.1	Plug			2.91	0	Dolo,Sh/Ptgs.
89	-52	VP	4.0	<.1	<.1	95.0	Tr.	2.81	0	Dolo,Silty,Shaly
90	-53	VP	3.6	<.1	<.1	94.5	Tr.	2.84	0	Dolo,Silty,Shaly
91	-54	VP	5.7	<.1	<.1	96.0	Tr.	2.75	0	Dolo,Silty,Shaly
92	3554-3555	VP	9.3	<.1	<.1	95.5	Tr.	2.79	0	Sand,Silty,Shaly
93	-56	VP	3.1	<.1	Plug	94.0	Tr.	2.83	0	Dolo,Shale,Fr.
94	-57		1.5*	<.1	Plug			2.86	0	Dolo,O/F,TooBrkn W.
95	-58		5.3*	<.1	Plug			2.81	0	Dolo,O/F,TooBrkn W.
96	-59		3.6*	<.1	Plug			2.88	0	Dolo,Silty,Shy,I/B
97	3559-3560		7.7*	<.1	Plug			2.82	0	Dolo,Shaly

TennECO Oil Company
Leonard Federal #11
Lea County, New Mexico

CORE ANALYSIS TABULAR DATA

SAMPLE NUMBER	DEPTH	RATING	POROSITY %	WHOLE CORE PERMEABILITY MAX.	WHOLE CORE PERMEABILITY 90°	TOTAL WATER SATURATION % P. V.	RESIDUAL OIL SATURATION % P. V.	GRAIN DENSITY	% ROCK OIL FLUO	REMARKS
98	3560-3561		10.5*	<.1	Plug			2.89	0	Dolo,Shaly
99	-62		5.7*	<.1	Plug			2.79	0	Sand,Dolomitic
100	-63	VP	8.6	<.1	<.1	91.7	0.0	2.72	0	Sand,Dolomitic
101	-64	VP	6.9	7.8	0.2	89.2	0.0	2.82	0	Dolo,Vt.Fr.
102	3564-3565	VP	2.4	27.7	<.1	92.5	0.0	2.83	0	Dolo,Vt.Fr.
103	-66	VP	4.7	<.1	<.1	84.5	Tr.	2.81	0	Dolo,Vugy,Frs.
104	-67	VP	8.3	0.2	<.1	89.0	Tr.	2.74	0	Sand,Dolomitic
*105	-68	VP	8.3	<.1	<.1	92.3	Tr.	2.77	0	Sand,Dolomitic
106	-69	VP	8.8	0.1	0.1	96.5	0.0	2.75	0	Sand,Dolomitic
*107	3569-3570	VP	13.0	2.2	1.5	68.8	10.2	2.75	10	Sand,Silty
108	-71	P	11.3	0.4	0.2	85.7	Tr.	2.79	Tr.	Sand,Silty
109	-72	VP	9.5	0.2	Plug	97.5	0.0	2.76	0	Sand,Silty,Shaly,V.F
110	-73	VP	11.4	1.0	Plug	92.5	0.0	2.74	0	Sand,Silty,Shaly,V.F
111	-74	VP	9.0	0.1	Plug	95.5	0.0	2.75	0	Sand,Silty,Shaly,V.F
112	3574-3575		11.1*	0.1	Plug			2.73	0	Sand,Silty,Shaly,V.F
	3575-3576		Lost Core							
			Core #(4) 3576-3631', Recovered 55'							
113	3576-3577		2.1*	<.1	Plug			2.81	0	Dolo.
114	-78	P	9.9	0.2	Plug	90.5	0.0	2.76	0	Sand,Silty,Shaly
115	-79	P	13.9	0.6	Plug	92.0	0.0	2.76	0	Sand,Silty,Shaly
116	3579-3580	F	16.3	2.6	1.3	84.2	Tr.	2.76	0	Sd,Silty,50%Sd,N.S.
*117	-81	F	14.9	0.8	0.2	84.8	5.6	2.74	50	Sand,Silty
118	-82	VP	11.4	0.3	0.3	94.3	Tr.	2.75	0	Sand,Silty,Shaly
119	-83	VP	6.5	1.2	1.0	97.5	0.0	2.77	0	Sand,Silty,Shaly
120	-84	VP	7.0	0.3	0.2	96.5	0.0	2.74	0	Dolo,Silty,Shaly
121	3584-3585	VP	9.5	<.1	<.1	93.5	0.0	2.69	0	Dolo,Silty,Shaly
122	-86		4.0*	<.1	Plug			2.74	0	Dolo,Silty,Shaly
123	-87		2.9*	<.1	Plug			2.83	0	Dolo.
124	-88		4.7*	<.1	Plug			2.80	0	Dolo.
125	-89	VP	3.0	<.1	<.1	90.5	0.0	2.77	0	Dolo,Lrg.Vugs
126	3589-3590	VP	3.6	<.1	Plug	88.0	0.0	2.74	0	Dolo,Lrg.Vugs,Open V
*127	-91	P	9.1	0.6	Plug	88.0	0.0	2.66	0	Sand,Silty,Shaly
128	-92	F	12.5	2.1	2.1	82.5	7.1	2.74	40	Sd,Silty,60%Sd,N.S.
129	-93	F	14.9	3.7	3.6	69.5	9.0	2.65	50	Sd,Silty,50%Sd,N.S.
130	-94	F	15.6	0.6	0.3	75.5	7.2	2.49	50	Sd,Silty,50%Sd,N.S.
131	3594-3595	P	11.5	<.1	<.1	92.8	0.0	2.67	0	Sand,Silty,Shaly
132	-96	P	12.6	3.0	0.6	90.5	0.0	2.65	0	Sand,Silty,Shaly
133	-97		1.7*	<.1	Plug			2.79	0	Dolo,Stylolites
134	-98		1.1*	<.1	Plug			2.80	0	Dolo,Stylolites
135	-99		1.9*	<.1	Plug			2.79	0	Dolo,Stylolites
136	3599-3600	VP	6.7	0.7	0.5	92.5	0.0	2.82	0	Sand,Silty,Shaly
137	-01	P	10.2	1.1	1.0	91.2	0.0	2.73	0	Sand,Silty
138	-02	VP	7.1	<.1	<.1	94.0	0.0	2.73	0	Sand,Silty
139	-03	F	14.8	0.6	0.1	86.8	3.7	2.65	30	Sand,Silty,70% Sd,N.
140	-04	P	10.9	0.2	0.2	88.2	2.0	2.64	60	Sand,Silty,40% Sd,N.
141	3604-3605	VP	8.9	<.1	<.1	92.2	Tr.	2.62	0	Sand,Silty,Shaly
142	-06	VP	6.8	<.1	<.1	92.5	0.0	2.70	0	Sand,Silty
143	-07	VP	8.8	<.1	<.1	96.0	0.0	2.68	0	Sand,Silty,Shaly
144	-08	VP	7.1	<.1	<.1	96.2	0.0	2.87	0	Sand,Silty,Shaly
	-09	VP	5.0	7.6	0.4	94.5	0.0	2.74	0	Sd,Silty,Shaly,50%D
146	3609-3610	VP	4.6	<.1	<.1	93.5	0.0	2.69	0	Dolo,Vuggs
147	-11		2.2*	<.1	Plug			2.79	0	Dolo,Stylo,Open V/F
148	-12		2.9*	<.1	Plug			2.78	0	Dolo,Stylo,Open V/F
149	-13		2.7*	<.1	Plug			2.79	0	Dolo,Stylo,Open V/F
150	3613-3614		1.9*	<.1	Plug			2.77	0	Dolo,Stylo,Open V/F

CORE ANALYSIS TABULAR DATA

SAMPLE NUMBER	DEPTH	RATING	POROSITY %	WHOLE CORE PERMEABILITY MAX.	90°	TOTAL WATER SATURATION % P. V.	RESIDUAL OIL SATURATION % P. V.	GRAIN DENSITY	% ROCK OIL FLUO	REMARKS
151	3614-3615		2.1*	<.1	Plug			2.63	0	Dolo,Shaly
152	-16		11.9*	<.1	Plug			2.64	0	Dolo,Shaly
153	-17		1.8*	<.1	Plug			2.80	0	Dolo,Stylo,Horiz.Fr
154	-18		7.9*	<.1	Plug			2.66	0	Dolo,Silty,Shaly
155	-19		7.9*	<.1	Plug			2.70	0	Dolo,Silty,Shaly
156	3619-3620		2.1*	<.1	Plug			2.77	0	Dolo,Sh/Ptgs.
157	-21		16.2*	<.1	Plug			2.75	0	Dolo,Sh/Ptgs.
158	-22		3.5*	<.1	Plug			2.80	0	Dolo,S/P,Stylo,Open
159	-23		2.5*	<.1	Plug			2.78	0	Dolo,S/P,Stylo,Open
160	-24		2.0*	<.1	Plug			2.80	0	Dolo,S/P,Stylo,Open
161	3624-3625		1.9*	<.1	Plug			2.78	0	Dolo,S/P,Stylo,Open
162	-26		1.5*	<.1	Plug			2.78	0	Dolo,S/P,Stylo,Open
163	-27		3.1*	<.1	Plug			2.76	0	Dolo,S/P,Stylo,Open
164	-28		5.4*	<.1	Plug			2.70	0	Dolo,S/P,Stylo,Open
165	-29		1.8*	<.1	Plug			2.76	0	Dolo,Thin Sh/Ptgs.
166	3629-3630		1.7*	<.1	Plug			2.77	0	Dolo,Thin Sh/Ptgs.
167	3630-3631		2.2*	<.1	Plug			2.78	0	Dolo,Shale,Red

* Plug Porosities (NO CHARGE)

** Samples Sent to Caprock Laboratory, Inc.

LITHOLOGICAL ABBREVIATIONS

Brkn.----------Broken
Dolo.----------Dolomite
F.G.----------Fine Grain
Fr.----------Fracture
Lam.----------Laminated
Horiz.----------Horizontal
Lrg.----------Large
N.S.----------No Show
Scat.----------Scattered
Sd.----------Sand
Sh.----------Shale
Sh.----------Show (Under Heading of Oil Fluo)
S/P----------Shale Partings
Sh/Ptgs,----------Shale Partings
Sh/Strgs.----------Shale Stringers
Shly.----------Shaly
Shy.----------Shaly
Sm.----------Small
Stylo.----------Stylolites
T/B W.C.----------Too Broken for Whole Core
Tr.----------Trace
V.Brkn.----------Very Broken
V.Shly.----------Very Shaly
V/F----------Vertical Fracture
V.F.----------Vertical Fracture
Vt.Fr.----------Vertical Fracture
W.C.----------Whole Core

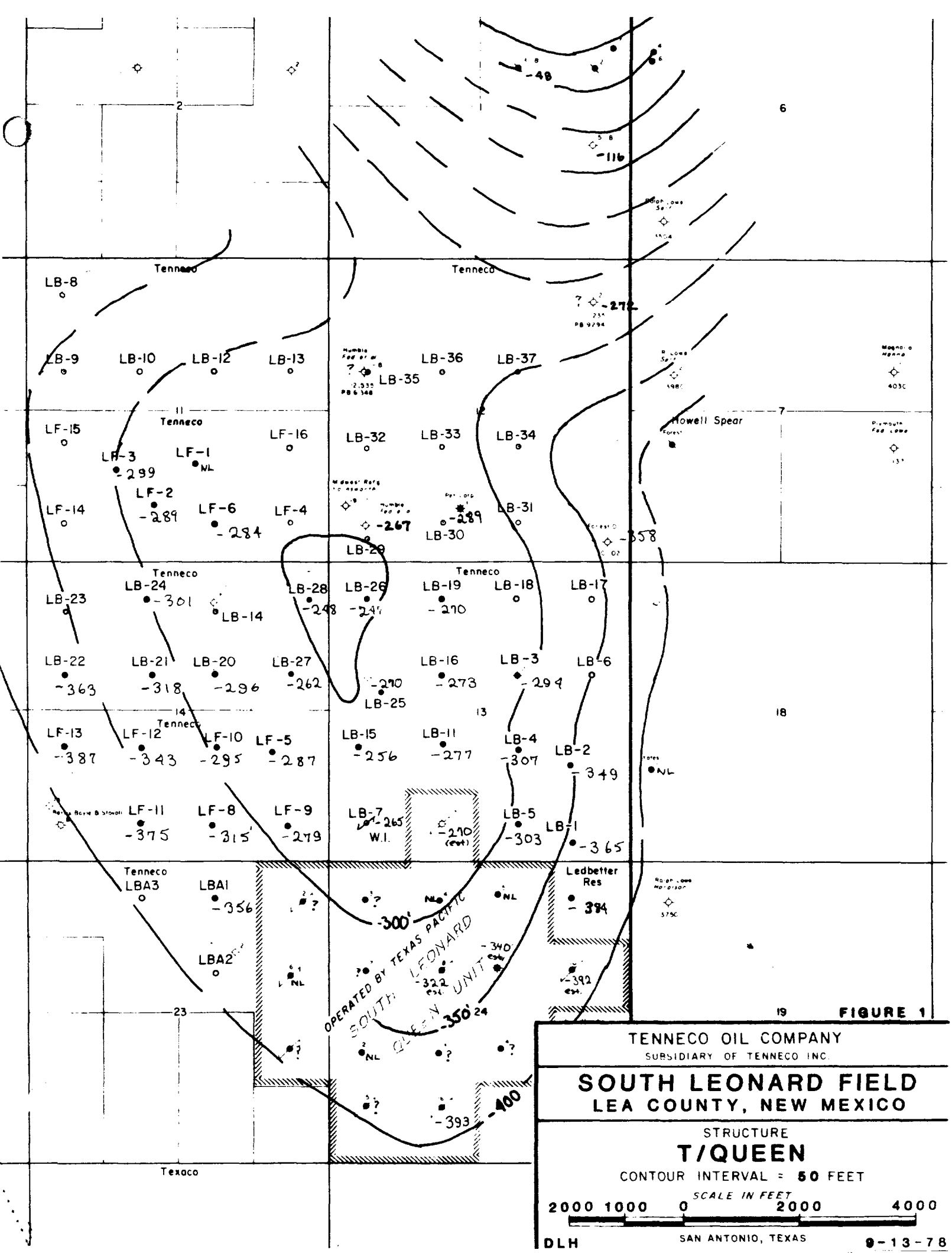


FIGURE 1

TENNECO OIL COMPANY
SUBSIDIARY OF TENNECO INC.

SOUTH LEONARD FIELD
LEA COUNTY, NEW MEXICO

STRUCTURE
T/QUEEN
CONTOUR INTERVAL = **50** FEET

SCALE IN FEET
2000 1000 0 2000 4000

DLH SAN ANTONIO, TEXAS 9-13-78

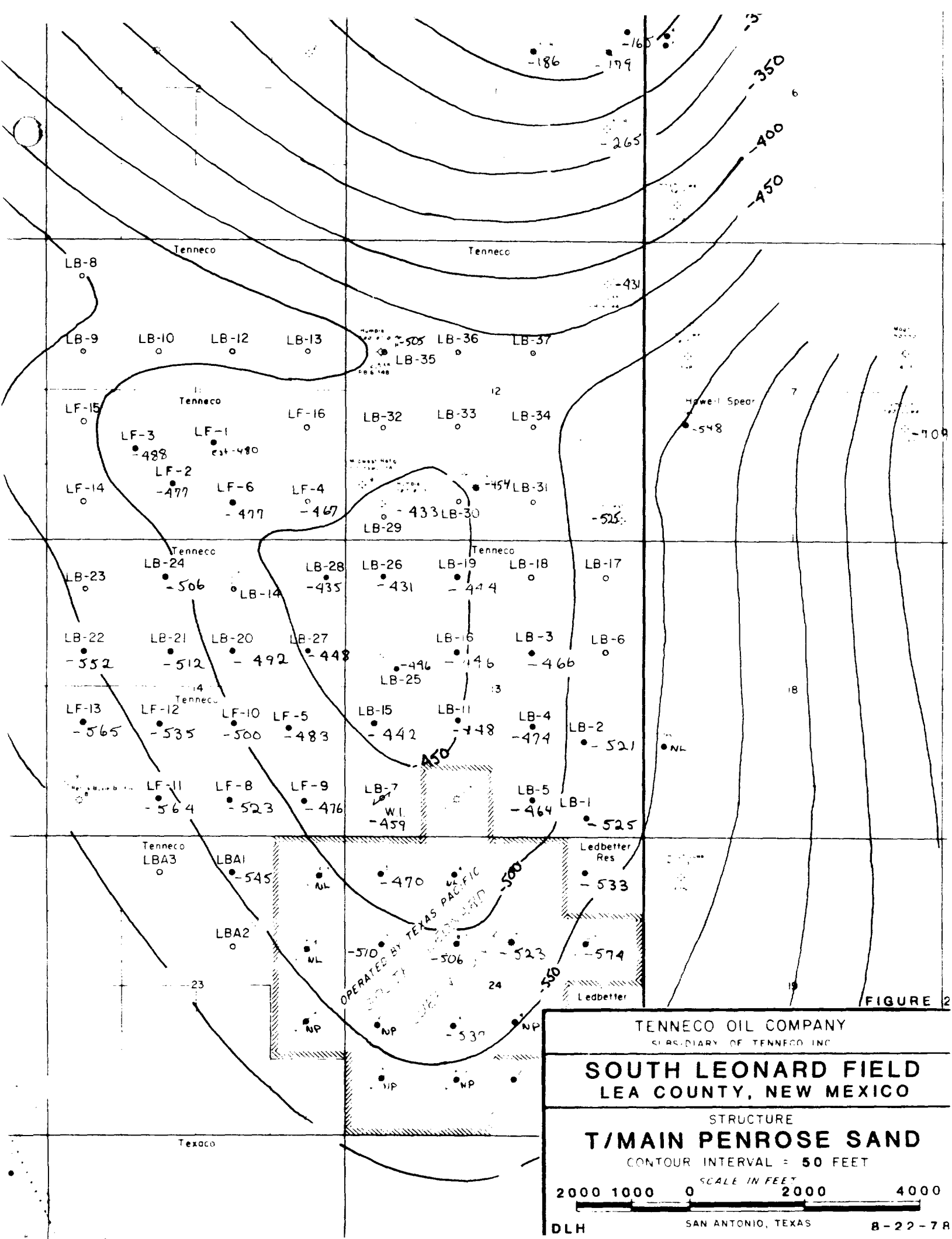


FIGURE 2

TENNECO OIL COMPANY
SUBSIDIARY OF TENNECO INC

SOUTH LEONARD FIELD
LEA COUNTY, NEW MEXICO

STRUCTURE

T/MAIN PENROSE SAND

CONTOUR INTERVAL = 50 FEET

SCALE IN FEET

2000 1000 0 2000 4000

DLH SAN ANTONIO, TEXAS 8-22-78

EXHIBIT 9

STATE OF NEW MEXICO

STATE ENGINEER OFFICE

ROSWELL

S. E. REYNOLDS
STATE ENGINEER

ADDRESS CORRESPONDENCE TO:
P. O. BOX 1717
ROSWELL, NEW MEXICO
88201

January 9, 1978

Tenneco Oil Company
Penthouse 720 South Colorado Blvd.
Denver, Colorado 80222

Attention Mr. Hugh Wilbanks:

Dear Mr. Wilbanks:

In accordance with our telephone conversation of January 5, 1978 regarding the fresh water zones in the Leonard Queen pool in Township 26 South, Range 37 East of Lea County, New Mexico, please be advised that in this area fresh water is produced from the alluvium, the Triassic and in some sections the Rustler. The deepest formation producing fresh water is the Rustler formation which produces from about 1050 feet. Based on records available to me there is no water below the salt section in the area which contains water with less than 10,000 ppm total dissolved solids.

Yours truly,

James I. Wright
Asst. District Supervisor

JIW*td

UGI STIMWELL SERVICES COMPANY

Stimulation Recommendation

DATE: February 1, 1984
WELL: Leonard Bros. #1, 4, 15, 16, 26, 27
FIELD: S. Leonard
COUNTY, STATE: Lea, New Mexico

Well Information

Depth (ft):	3580±
Casing (in):	5 1/2", 15.5, 17 & 20# K-55, N-80
Treating String (in):	2 3/8"
Perforated Interval (ft):	3454 - 3497 (Queen) 3532 - 3562 (Penrose)

Recommendation

To facilitate the conversion of Leonard Brothers #1, 4, 15, 16, 26, and 27 to water injection wells, Stimwell Services recommends treating each well with 500 gallons of Xylene containing 10 gallons Parasupreme dispersant. If conditions permit, the Xylene and additives should be washed across the perforated interval for 24 hours.

The follow-up acid treatment should be 5000 gallons of 15% inhibited, non-emulsifying, iron-sequestering hydrochloric acid. The acid should be diverted with 50% excess perforation ball sealers. To meet the additives requirements in the acid, Stimwell recommends 1 gpt AI-1 acid corrosion inhibitor, 3 gpt CS-1 non-emulsifier, and 5 gpt OA-3L iron-sequestering agent. The acid should be pumped at 4 - 5 BPM at an anticipated surface treating pressure of 2500 psi, requiring 300 hhp.

Discussion

Stimwell Services' AI-1 acid corrosion inhibitor is a blend of surfactants, aromatics, and acetylenic alcohols designed to inhibit against acid corrosion in low temperature (under 150° F) wells. AI-1 is formulated so as to not harm refinery catalysts or production equipment.

505 N. Big Spring, Suite 201
Midland, TX 79701
915-686-7617

Discussion cont

Stimwell Services' CS-1 is a cationic surfactant/de-mulsifier designed to prevent and/or treat oil/water emulsions that might occur when aqueous treating fluids come into contact with crude oil. CS-1 has been widely used in the Permian Basin in concentrations of 1 - 5 gpt. Emulsion testing has been performed on crude oil samples taken from Leonard Brother #1 and #16 and 3 gpt CS-1 was found most effective in preventing emulsions.

Stimwell Services' OA-3L is a organic acid/iron-sequestering agent designed to bond with dissolved iron. This bonding prevents the re-precipitation of the iron as the acid spends and the pH of the treating fluid begins to rise.

Stimwell's Parasperse is an "intensifier" placed in hydrocarbon solutions, such as Xylene, designed for paraffin removal. Parasperse accents the activity of the solvent on the paraffin and suspends paraffinic and asphaltic particles not easily dissolved. Parasperse is most often used at concentrations of 5 - 20 gpt of Xylene.

Recommended Procedure

1. Rig up to spot Xylene + dispersant via 2 3/8" tubing.
2. Set Xylene + dispersant across perforated interval.
3. Let soak, circulate (if possible) over-night.
4. Recover Xylene.
5. Rig up to acidize.
6. Acidize Queen and Penrose formation with 5000 gallons 15% HCl + additives. Divert with 50% excess ball sealers.
7. Displace acid to bottom perforation.
8. Rig up to recover load.

Tabular Well Data

Lease: Leonard Brothers
(All Originally Drilled As Oil Wells)

Well #	Location	Surface Casing	Production Casing	Tubing	Packer
1	330' FSL & 990' FEL Sec. 13, T26S, R37E	8 5/8" @ 507' w/310 sx 12 1/4" Hole TOC: Surface (CALC)	5 1/2" @ 3620' w/1400 sx 7 7/8" Hole TOC: Surface (CIRC)	2 3/8" 8RD EUE Plastic Coated	Guiberson UNI-Pack I PSA: ± 3350'
4	1980' FSL & 1980' FEL Sec 13, T26S, R37E	8 5/8" @ 513' w/550 sx 12 1/4" Hole TOC: Surface (CIRC)	5 1/2" @ 3557 w/1140 sx 7 7/8" Hole TOC: Surface (CIRC)	2 7/8" 8rd EUE Plastic Coated	Guiberson UNI-Pack I PSA: ± 3300'
15	1980' FSL & 660' FWL Sec 13, T26S, R37E	8 5/8" @ 545' w/550 sx 12 1/4" Hole TOC: Surface (CIRC)	5 1/2" @ 3585 w/1260 sx 7 7/8" Hole TOC: Surface (CIRC)	2 7/8" 8rd EUE Plastic Coated	Guiberson UNI-Pack I PSA: ± 3200'
16	1980' FNL & 1980' FWL Sec 13, T26S, R37E	8 5/8" @ 505' w/500 sx 12 1/4" Hole TOC: Surface (CIRC)	5 1/2" @ 3615 w/1300 sx 7 7/8" Hole TOC: Surface (CIRC)	2 7/8" 8rd EUE Plastic Coated	Guiberson UNI-Pack I PSA: ± 3284'
26	660' FNL & 660' FWL Sec 13, T26S, R37E	8 5/8" @ 500' w/500 sx 12 1/4" Hole TOC: Surface (CIRC)	5 1/2" @ 3570 w/850 sx 7 7/8" Hole TOC: Surface (CIRC)	2 7/8" 8rd EUE Plastic Coated	Guiberson UNI-Pack I PSA: ± 3342'
27	1980' FNL & 660' FEL Sec 14, T26S, R37E	8 5/8" @ 511' w/500 sx 12 1/4" Hole TOC: Surface (CIRC)	5 1/2" @ 3600 w/1050 sx 7 7/8" Hole TOC: Surface (CIRC)	2 7/8" 8rd EUE Plastic Coated	Guiberson UNI-Pack I PSA: ± 3298'

1759F/dt

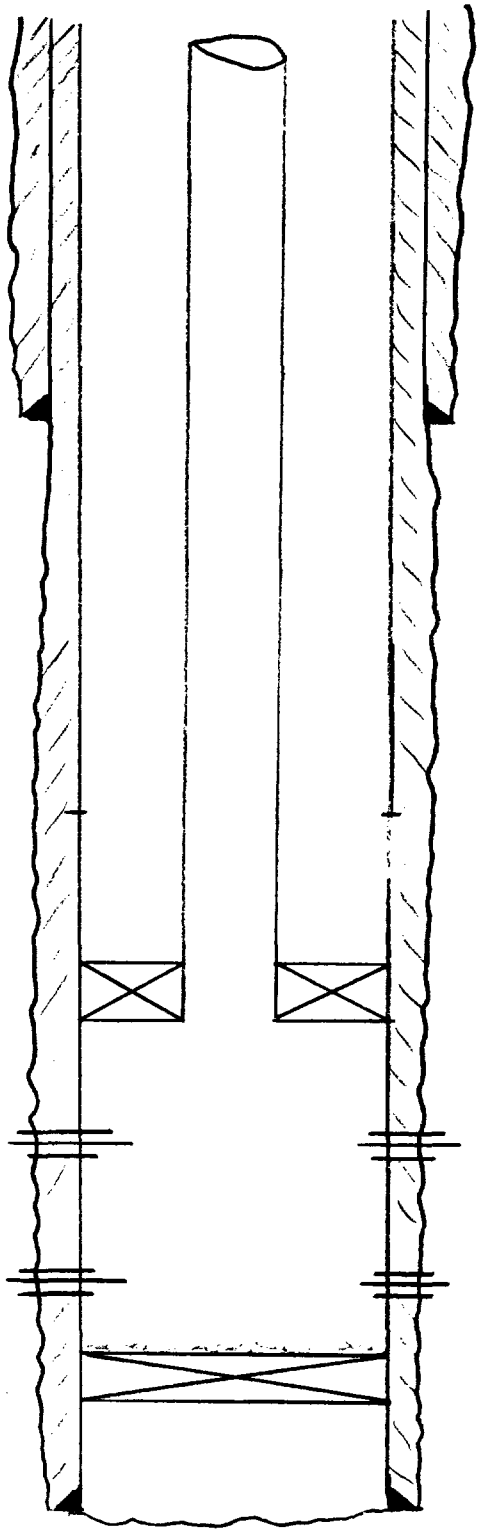
LEONARD BROTHERS

2/21/84

330 FSL + 990 FEL

SEC 13, T26S, R37E

TYPE: OIL WELL (ORIGINALLY)



TUBING: 2 3/8" 8RD EUE
PLASTIC COATED

PACKER: GUIBERSON
UNI-PACK I

PSA: ± 3350'

8 5/8" @ 507' w/ 310 SX
12 1/4" HOLE
CALC. TOC @ SURFACE

PERF'D 2 HOLES @ 1600'
CMT'D w/ 750 SX. CIRCULATED

QUEEN: 3454-3460
3464-3466
3470-3480
3484-3486, 3492-3497

PENROSE: 3532-3548
3556-3562,

EZ DRILL BP - 3586'

SAND FILL 3581-86'

DV TOOL AT 2512'
CMT'D w/ 650 SX
DID NOT CIRCULATE

5 1/2" @ 3620'
7 7/8" HOLE

TD: 3620'
PBTD: 3581'

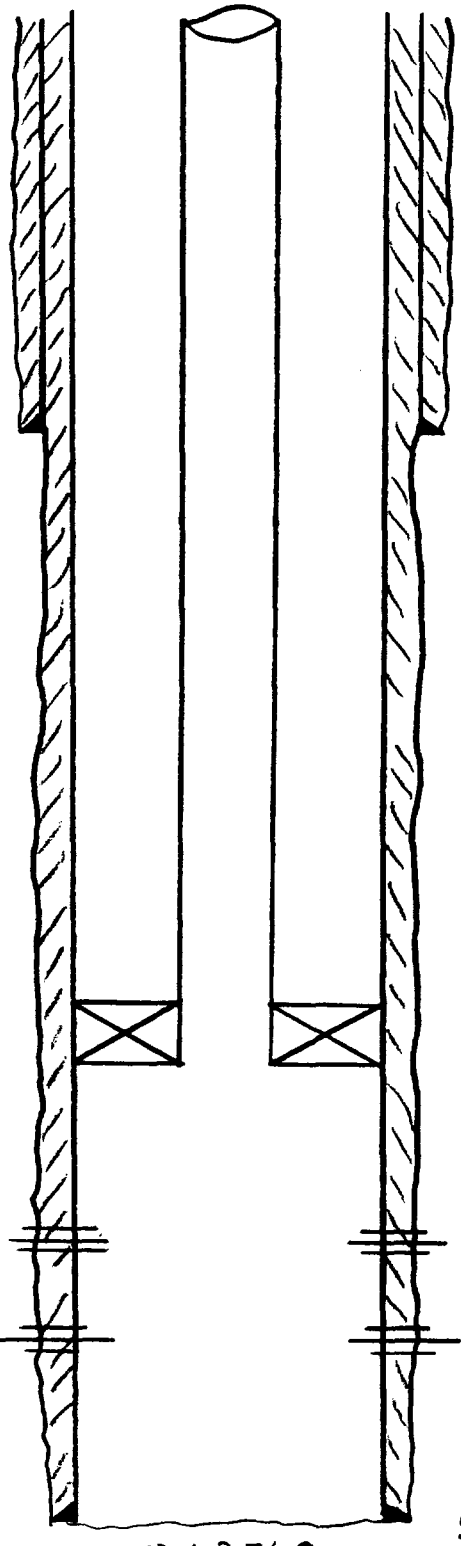
LEONARD BROTHERS # 4

2/21/84

1980 FSL & 1980 FEL

SEC 13, T26S, R37E

TYPE: OIL WELL (ORIGINALLY)



TUBING: 2 7/8 8RD EUE
PLASTIC COATED

PACKER: GUIBERSON
UNI-PACK I

PSA: ± 3300'

8 5/8" @ 513' w/ 550 SX
12 1/4" HOLE
TOC @ SURFACE (CIRC)

QUEEN PERFS: 3397-3414
3416-3420
3422-3430
3432-3434
3440-3444

PENROSE PERFS: 3477-3498
3502-3510
3514-3527

TD: 3560
PBTD: 3557

5 1/2" @ 3557' w/ 1140 SX
7 7/8" HOLE
TOC: CMT CIRC.

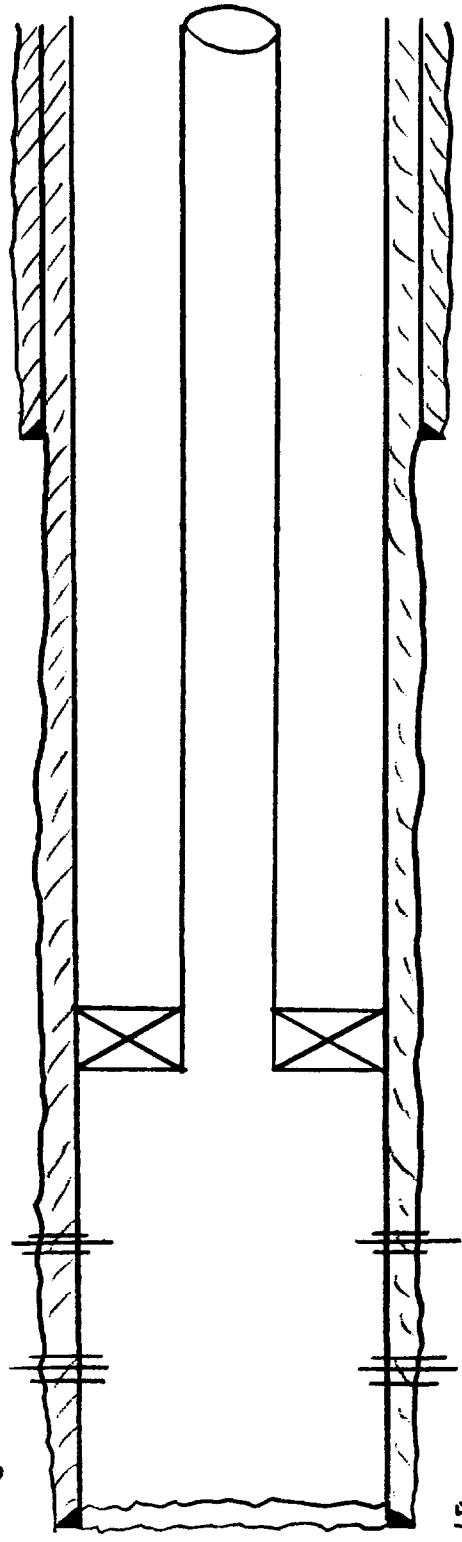
LEONARD BROTHERS #15

1980 FSL & 660 FWL

SEC. 13, T26S, R37E

TYPE: OIL WELL (ORIGINALLY)

2/22/84



TUBING: 2 7/8" 8RD EUE
PLASTIC COATED

PACKER: GUIBERSON
UNI-PACK I

PSA: ± 3200'

8 5/8" @ 545' w/ 550 sx
12 1/4" HOLE
TOC: SURFACE (CIRC.)

QUEEN PERFS: 3330-3348
3362-3414

PENROSE PERFS: 3442-3444
3456-3496
3496-3506

5 1/2" @ 3585' w/ 1260 sx
7 7/8" HOLE
TOC: CMT CIRC.

TD: 3589
PBTD: 3547

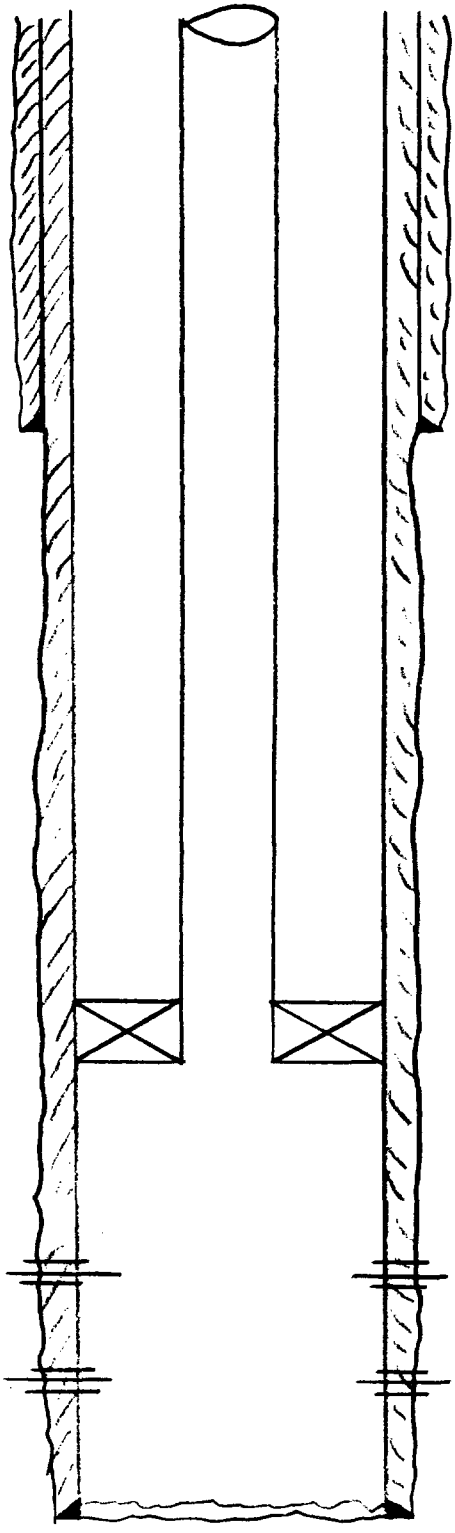
LEONARD OKOTHERS #16

2/22/84

1980 FNL & 1980 FWL

SEC. 13, T26S, R37E

TYPE: OIL WELL (ORIGINALLY)



TUBING: 2 7/8" 8RD EUE
PLASTIC COATED

PACKER: GUIBERSON
UNI-PACK I

PSA: ± 3284'

8 5/8" @ 505' w/ 500 sx
12 1/4" HOLE
TOC: SURFACE (CIRC.)

QUEEN PERFS: 3384-3420

PENROSE PERFS: 3450-3454
3462-3482
3490-3514
3520-3524

TD: 3617
PBTD: 3583

5 1/2" @ 3615' w/ 1300 sx
7 7/8" HOLE
CIRC. OUT 60 sx

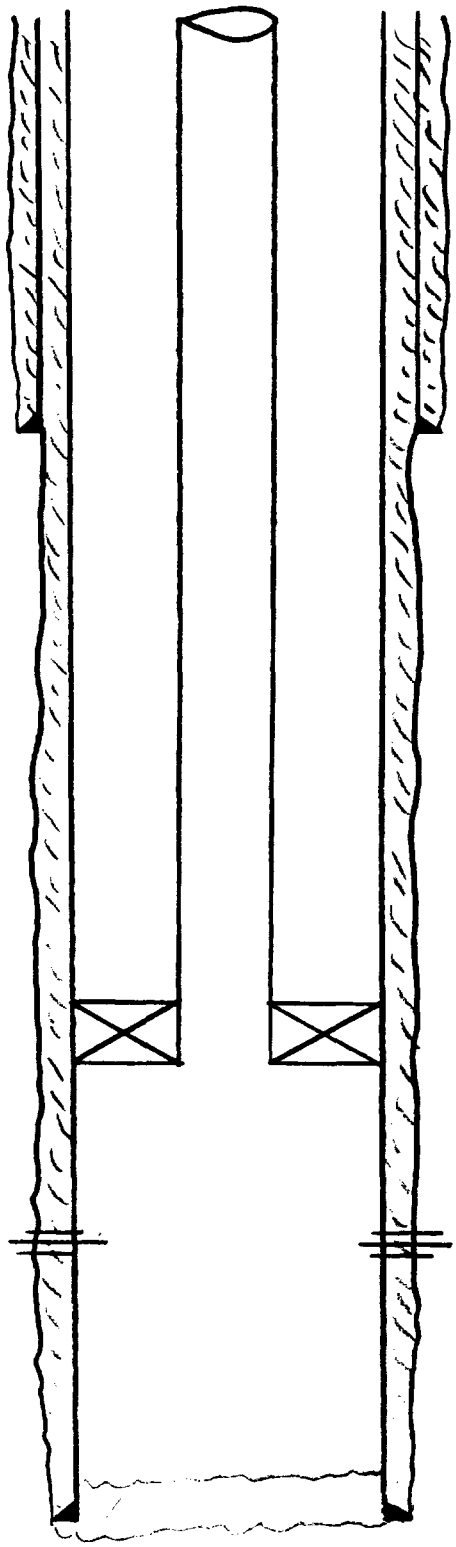
LEONARD BROTHERS #24

2/22/84

660 FNL + 660 FWL

SEC. 13, T 26S, R 37E

TYPE: OIL WELL (ORIGINALLY)



TUBING: 2 7/8" 8RD EUE

PLASTIC COATED

PACKER: GUIBERSON
UNI-PACK I

PSA: ± 3342

8 5/8" @ 500' w/ 500 sx
12 1/4" HOLE
TOC: SURFACE (CIRC)

ENROSE PERFS: 3442-3458
3466-3486
3516-3524

TD: 3600
PBTD: 3545

5 1/2" @ 3570' w/ 850 sx
7 7/8" HOLE
TOC: SURFACE (CIRC)

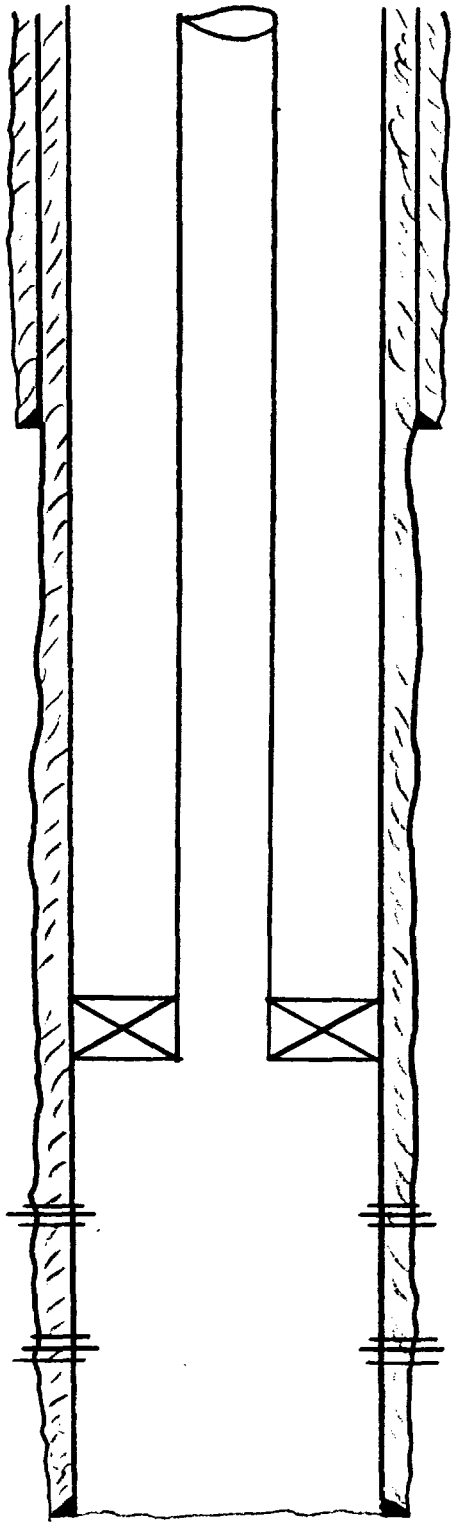
LEONARD BROTHERS #21

2/22/84

1980 FNL & 660 FEL

SEC. 14, T26S, R37E

TYPE: OIL WELL (ORIGINALLY)



TUBING: 2 7/8" 8RD EUE
PLASTIC COATED

PACKER: GUIBERSON
UNI-PACK I

PSA: ± 3298'

8 5/8" @ 511' w/ 500 SX
12 1/4" HOLE
TOC: SURFACE (CIRC)

QUEEN PERFS: 3398-3404
3413-3428

PENROSE PERFS: 3470-3484
3492-3497
3503-3508

TD: 3600
PBTD: 3577

5 1/2" @ 3600' w/ 1050 SX
7 7/8" HOLE
TOC: CIRC, 75 SX

Form 3811, July 1982

● **SENDER:** Complete items 1, 2, 3, and 4.
Add your address in the "RETURN TO" space on reverse.

(CONSULT POSTMASTER FOR FEES)

1. The following service is requested (check one).
   - ☑ Show to whom and date delivered ..... ____¢
   - ☐ Show to whom, date, and address of delivery .. ____¢
2. ☐ RESTRICTED DELIVERY..... ____¢
   (The restricted delivery fee is charged in addition to the return receipt fee.)

TOTAL $____

3. ARTICLE ADDRESSED TO:
   PETROLEUM CORPORATION OF DELAWARE
   3303 LEE PARKWAY
   DALLAS, TEXAS 75219

4. TYPE OF SERVICE:
   - ☐ REGISTERED ☐ INSURED
   - ☑ CERTIFIED ☐ COD
   - ☐ EXPRESS MAIL

   ARTICLE NUMBER: P 650 632 873

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☐ Addressee ☑ Authorized agent

Barbara Montgomery

5. DATE OF DELIVERY: 3/12/84

   POSTMARK (may be on reverse side)

6. ADDRESSEE'S ADDRESS *(Only if requested)*

7. UNABLE TO DELIVER BECAUSE:

   7a. EMPLOYEE'S INITIALS

RETURN RECEIPT

☆ GPO: 1982-379-593

Form 3811, July 1982

● **SENDER:** Complete items 1, 2, 3, and 4.
Add your address in the "RETURN TO" space on reverse.

(CONSULT POSTMASTER FOR FEES)

1. The following service is requested (check one).
   - ☑ Show to whom and date delivered ..... ____¢
   - ☐ Show to whom, date, and address of delivery .. ____¢
2. ☐ RESTRICTED DELIVERY..... ____¢
   (The restricted delivery fee is charged in addition to the return receipt fee.)

TOTAL $____

3. ARTICLE ADDRESSED TO:
   MINERALS MANAGEMENT SERVICE
   P.O. DRAWER 1857
   ROSWELL, NEW MEXICO 88201

4. TYPE OF SERVICE:
   - ☐ REGISTERED ☐ INSURED
   - ☑ CERTIFIED ☐ COD
   - ☑ EXPRESS MAIL

   ARTICLE NUMBER: P 650 632 874

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☐ Addressee ☐ Authorized agent

Debi C Walker

5. DATE OF DELIVERY: 3-9-84

   POSTMARK (may be on reverse side)

6. ADDRESSEE'S ADDRESS *(Only if requested)*

7. UNABLE TO DELIVER BECAUSE:

   7a. EMPLOYEE'S INITIALS

RETURN RECEIPT

☆ GPO: 1982-379-593

PS Form 3811, July 1982

● **SENDER:** Complete items 1, 2, 3, and 4.
Add your address in the "RETURN TO" space on reverse.

(CONSULT POSTMASTER FOR FEES)

1. The following service is requested (check one).
   - ☑ Show to whom and date delivered ..... ____¢
   - ☐ Show to whom, date, and address of delivery .. ____¢
2. ☐ RESTRICTED DELIVERY..... ____¢
   (The restricted delivery fee is charged in addition to the return receipt fee.)

TOTAL $____

3. ARTICLE ADDRESSED TO:
   COLBY OSBORN
   SUN PRODUCTION
   BOX 1861 MIDLAND TX 79702

4. TYPE OF SERVICE:
   - ☐ REGISTERED ☐ INSURED
   - ☑ CERTIFIED ☐ COD
   - ☐ EXPRESS MAIL

   ARTICLE NUMBER: P 650 632 872

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☐ Addressee ☐ Authorized agent

5. DATE OF DELIVERY

   POSTMARK (may be on reverse side)
   9 1984

6. ADDRESSEE'S ADDRESS *(Only if requested)*

7. UNABLE TO DELIVER BECAUSE:

   7a. EMPLOYEE'S INITIALS

RETURN RECEIPT

☆ GPO: 1982-379-593

PS Form 3811, July 1982

● **SENDER:** Complete items 1, 2, 3, and 4.
Add your address in the "RETURN TO" space on reverse.

(CONSULT POSTMASTER FOR FEES)

1. The following service is requested (check one).
   - ☑ Show to whom and date delivered ..... ____¢
   - ☐ Show to whom, date, and address of delivery .. ____¢
2. ☐ RESTRICTED DELIVERY..... ____¢
   (The restricted delivery fee is charged in addition to the return receipt fee.)

TOTAL $____

3. ARTICLE ADDRESSED TO:
   PENASCO CORPORATION
   ATTN HERMAN LEDBETTER
   1002 SAYLES
   ABILENE TEXAS 79605

4. TYPE OF SERVICE:
   - ☐ REGISTERED ☐ INSURED
   - ☑ CERTIFIED ☐ COD
   - ☐ EXPRESS MAIL

   ARTICLE NUMBER: P 650 632 875

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☐ Addressee ☑ Authorized agent

Pamela N. Ledbetter

5. DATE OF DELIVERY: 3-12-84

   POSTMARK (may be on reverse side)

6. ADDRESSEE'S ADDRESS *(Only if requested)*

7. UNABLE TO DELIVER BECAUSE:

   7a. EMPLOYEE'S INITIALS

RETURN RECEIPT

☆ GPO: 1982-379-593

AFFIDAVIT OF PUBLICATION

State of New Mexico,

County of Lea.

1, ____________________

Robert L. Summers

of the Hobbs Daily News-Sun, a daily newspaper published at Hobbs, New Mexico, do solemnly swear that the clipping attached hereto was published once a week in the regular and entire issue of said paper, and not in a supplement thereof for a period

of ____________________

One day ~~weeks~~.

Beginning with the issue dated

February 29, 19 84

and ending with the issue dated

February 29, 19 84

Robert L. Summers
Publisher.

Sworn and subscribed to before

me this 1 day of

March, 19 84

Jane Paulowsky
Notary Public.

My Commission expires

3-24, 19 87

(Seal)

This newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Laws of 1937, and payment of fees for said publication has been made.

OFFICIAL SEAL
Signature *Jane Paulowsky*
JANE PAULOWSKY
NOTARY PUBLIC - NEW MEXICO
NOTARY BOND FILED WITH SECRETARY OF STATE
My Commission Expires 3-24-87

(31)

LEGAL NOTICE
FE[illegible]Y 29, 19[illegible]4
"N[illegible] Injection"

[illegible] intends to convert [illegible] Brothers #[illegible], 4, 15, [illegible] and 27 to saltwater [illegible] wells. The wells are located at [illegible] Sections 13 and 14.

The injection formation is the [illegible] at an average depth of 3400'. The maximum injection rate is [illegible] BWPD at a maximum [illegible] psi.

All [illegible] parties need to file [illegible] Requests for [illegible] Oil Conservation Division, P. O. Box [illegible] Fe, New Mexico [illegible] 15 days. [illegible] pro[illegible] to [illegible].

T[illegible] Company
Explo[illegible] Production
7[illegible]
San [illegible] 78230
([illegible])
Attn: Letty Samudio

OIL CONSERVATION DIVISION
DISTRICT I

OIL CONSERVATION DIVISION
P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

DATE April 3, 1984

RE: Proposed MC
Proposed DHC
Proposed NSL
Proposed NSP
Proposed SWD
Proposed WFX X
Proposed PMX

Gentlemen:

I have examined the application for the:

Tenneco Oil Corp. Leonard Bros. Nos. 1, 4, 15, 16, 26 & 27
Operator Lease and Well No. Unit, S - T - R

and my recommendations are as follows:

Several of the P & A wells need to be replugged. I would recommend these be looked at--J.S.

Yours very truly,

/mc