EXHIBIT NO. 1

DATA FOR

PROPOSED NORTH HACKBERRY YATES UNIT

WATERFLOOD PROJECT

OIL CONSERVATION COMMISSION HEARING

CASE NUMBER 3676

on OCTOBER 25, 1967

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 1
CASE NO. Cases 3676 and 3677

Gulf Oil Corporation

Roswell District

Case Number 3676
Date October 25, 1967

G E N E R A L

	Pertinent Exhibit(s)
OPERATOR Gulf Oil Corporation	
PROJECT North Hackberry Yates Unit Waterflood	
POOL North Hackberry Yates	
LOCATION OF PROJECT Sections 23 and 24, Township 19 South, Range 30 East, Eddy County, New Mexico, approximately 24 miles northeast of Carlsbad.	1-A
NUMBER OF WELLS IN PROJECT 16 producing wells and one dry hole	1-A
UNIT AND PROJECT AREA 720 acres	1-A
OTHER WATERFLOOD PROJECTS IN POOL None. The nearest flood project is Hondo Oil and Gas Company's Culwin Queen Unit flood about 3 miles north in the Shugart Yates Pool.	

G E O L O G I C A L A N D R E S E R V O I R D A T A

RESERVOIR Yates formation ✓	1-B
DEPTH 1750 to 2050 feet below the surface	1-B
PRODUCTIVE ZONES Two sandstone stringers in the upper part of the Yates formation. The upper zone is the main productive zone and covers the entire project area. The lower zone covers less than half the project area and contains only about 10% of the total reservoir volume.	1-B,D,E
NET PAY Ranges from 3 to 24 feet in the upper zone and from 0 to 8 feet in the lower zone in the 16 producing wells.	1-B,D,E

Pertinent Exhibit(s)

DESCRIPTION OF RESERVOIR ROCK A tan to brown, fine to medium grained sandstone which is slightly dolomitic and argillaceous. In some parts of the reservoir this rock is very friable.

STRUCTURE Anticlinal nose plunging to the east at approximately 100 feet per mile. 1-C

RESERVOIR LIMITS An oil-water contact at approximately + 1395 feet defines the down-dip productive limit to the northeast. Deterioration of porosity and permeability generally limits production in other directions. 1-C,D,E

AVERAGE POROSITY OF NET PAY 21.05% in upper zone and 18.45% in lower zone.

AVERAGE PERMEABILITY OF NET PAY 14.3 millidarcies in the upper zone and 13.3 millidarcies in the lower zone. Permeability ranges from the 5 millidarcy cutoff to as high as 467 millidarcies in the upper zone and 364 millidarcies in the lower.

PRIMARY OPERATIONS

DATE OF FIRST PRODUCTION December, 1960 1-F

TOTAL NUMBER OF WELLS DRILLED 17, including a dry hole in SW/4 NE/4 Section 23, Township 19 South, Range 30 East 1-A,F

CUMULATIVE PRODUCTION, 8-1-67 710,585 barrels

AVERAGE DAILY OIL PRODUCTION PER WELL, JULY 1967 10 barrels 1-F

Pertinent Exhibit(s)

DRIVE MECHANISM Solution-gas-drive

STAGE OF DEPLETION Moderately late. The reservoir in the project area is approximately 75% depleted of primary oil reserves. — 1-F

ESTIMATED OIL RECOVERY THROUGH PRIMARY OPERATIONS 939,000 barrels, or 14.4% of the estimated original oil-in-place.

W A T E R F L O O D O P E R A T I O N S

PROPOSED PATTERN 80-acre 5-spot — 1-A,D,E

NUMBER OF INPUT WELLS Eight — 1-A,D,E,G

INITIAL INJECTION RATES Up to 500 barrels of water per day per input well

ESTIMATED INJECTION PRESSURES Maximum of 1000 psi at the well head. Injection plant will be designed for 2000 psi maximum pressure.

PLAN OF INJECTION Batch inject into both pay zones simultaneously through plastic coated tubing and below a packer. — 1-G

SOURCE OF INJECTION WATER Shallow wells in the project area to the Rustler formation 300-500 feet below the surface. (Applications to Appropriate Groundwater, CP-357, CP-357-X and CP-357-X-2, have been approved by the State Engineer.)

TYPE OF WATER Saline. Tests indicate the Rustler water contains approximately 60,000 ppm chloride in this area.

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Date October 25, 1967

Pertinent
Exhibit(s)

TREATMENT OF WATER None is anticipated; however, if later in the life of the project treatment is deemed necessary, appropriate action will be taken.

ADDITIONAL OIL RECOVERY ANTICIPATED 939,000 barrels, an amount equal to the estimated primary oil recovery.

INCREASE IN LIFE OF UNIT WELLS 4-1/2 years beyond estimated primary life

C O N C L U S I O N S A N D R E C O M M E N D A T I O N S

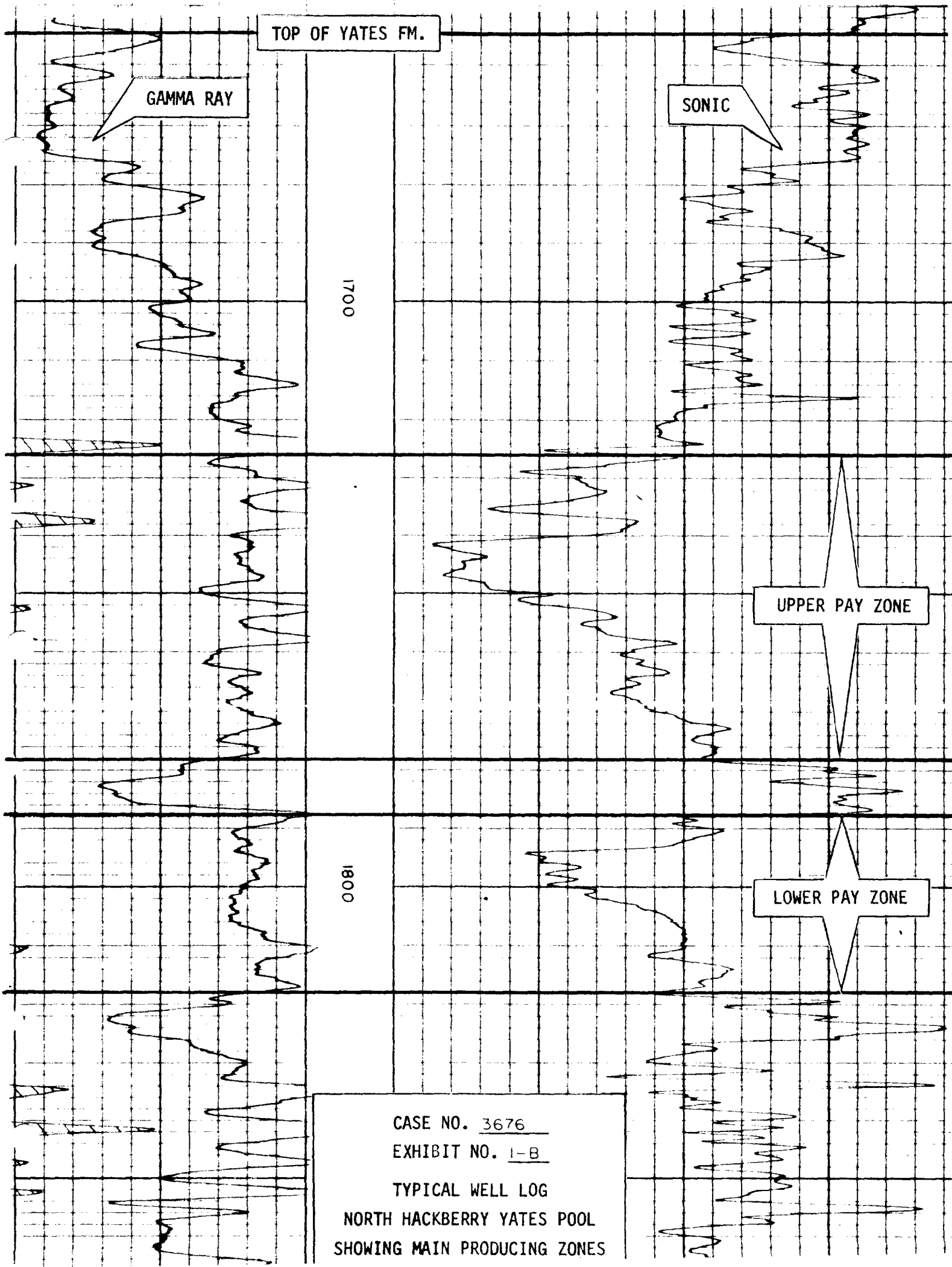
The North Hackberry Yates Pool produces by solution-gas-drive and as a result less than 15% of the original oil-in-place beneath the proposed unit and project area will be recovered through primary operations.

This portion of the Pool is 75% depleted of primary oil and daily oil production averages only 10 barrels per well.

Engineering and geological studies indicate the Yates reservoir under the unit and project area can be successfully waterflooded, thereby increasing the life and ultimate oil recovery of wells in the North Hackberry Yates Unit.

Gulf Oil Corporation, in association with Union Oil Company of California, concludes that unitization of the 16 producing wells and 720 acres outlined in Exhibit No. 1-A for the purpose of waterflooding the Yates formation is in the best interest of conservation and prevention of waste.

Gulf, as Operator of the North Hackberry Yates Unit, respectfully requests that the Oil Conservation Commission approve the proposed waterflood project and grant a unit oil allowable for the 16 producing wells in the waterflood area as provided under Rule 701 of the Commission Rules and Regulations.



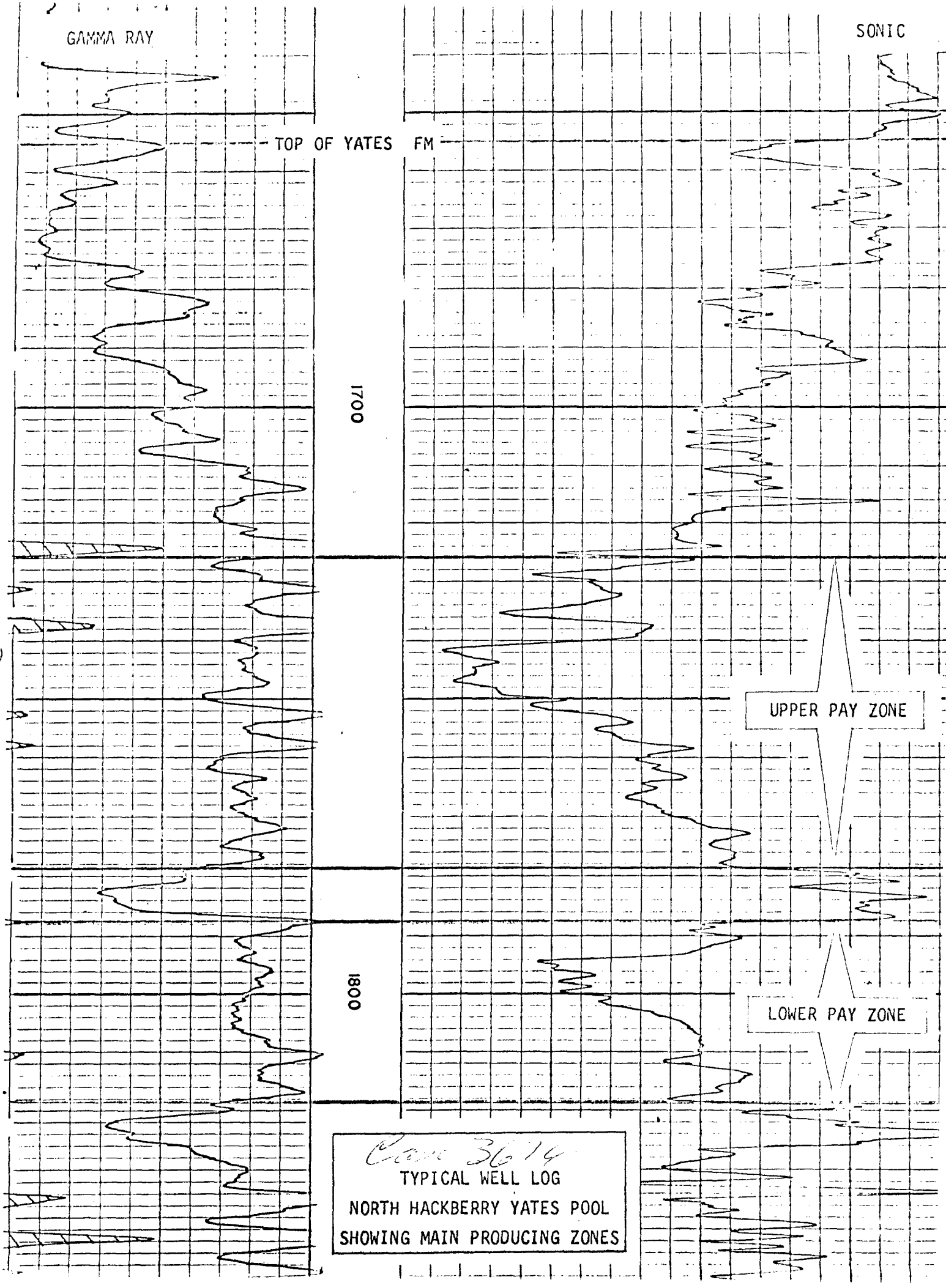
CASE NO. 3676

EXHIBIT NO. 1-B

TYPICAL WELL LOG

NORTH HACKBERRY YATES POOL

SHOWING MAIN PRODUCING ZONES



Case 3614

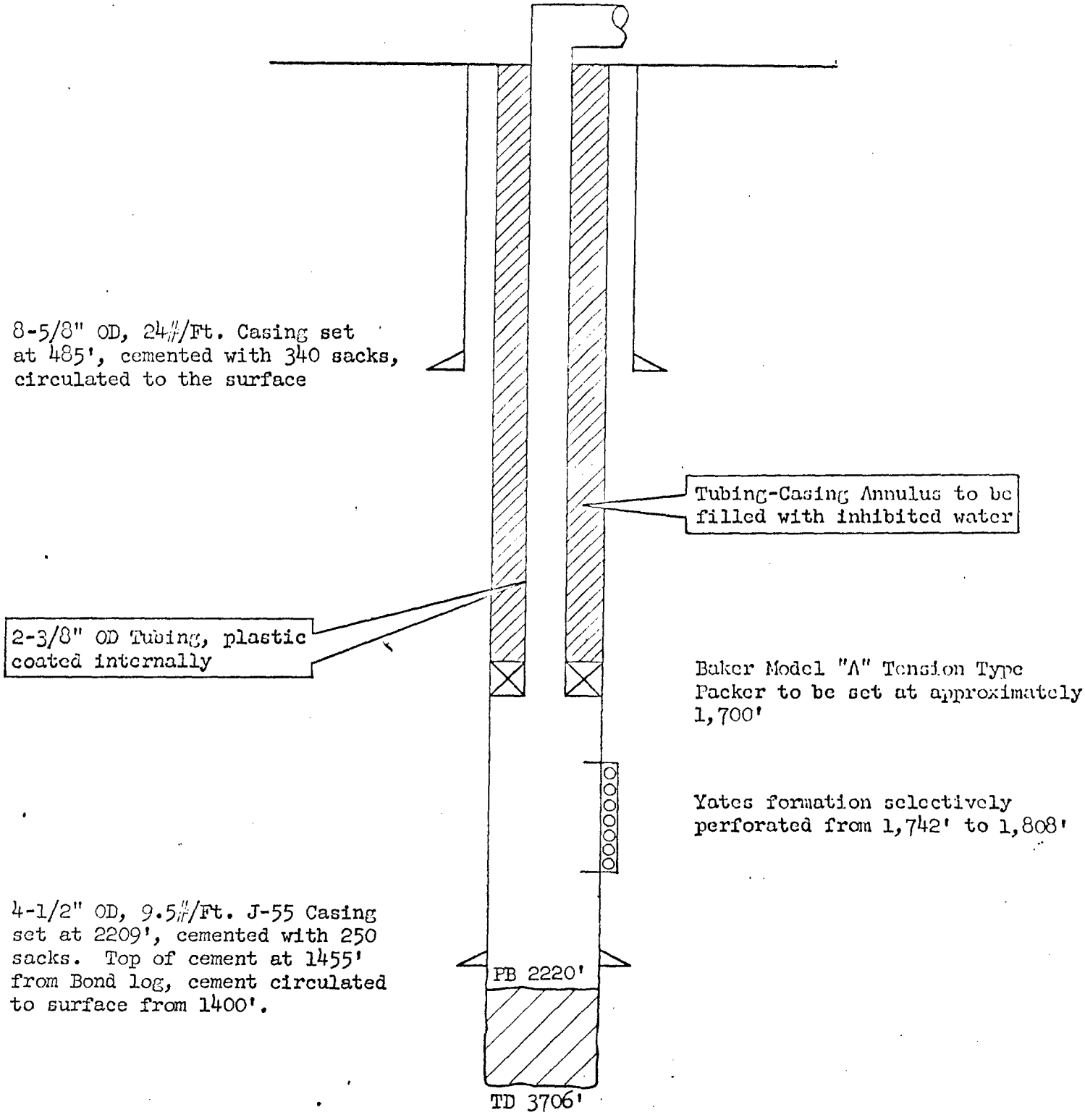
TYPICAL WELL LOG
NORTH HACKBERRY YATES POOL
SHOWING MAIN PRODUCING ZONES

NORTH HACKBERRY YATES UNIT

Diagrammatic Sketch
Proposed Injection Well

GULF OIL CORPORATION
UNION-FEDERAL WELL NO. 1

Located 660' FSL, 660' FEL, Section 23-19S-30E
Eddy County, New Mexico

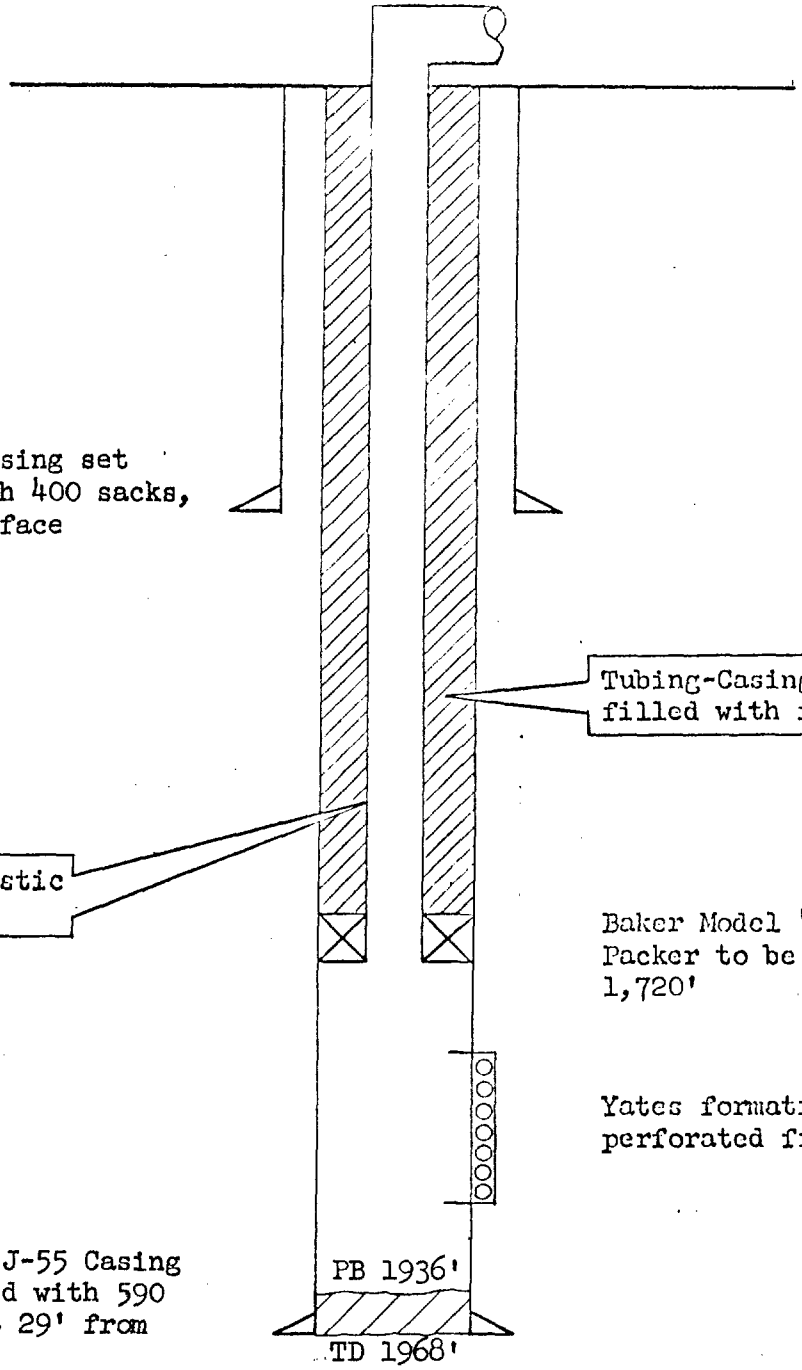


NORTH HACKBERRY YATES UNIT

Diagrammatic Sketch
Proposed Injection Well

GULF OIL CORPORATION
UNION-FEDERAL WELL NO. 2

Located 1980' FSL, 1980' FEL, Section 23-19S-30E
Eddy County, New Mexico

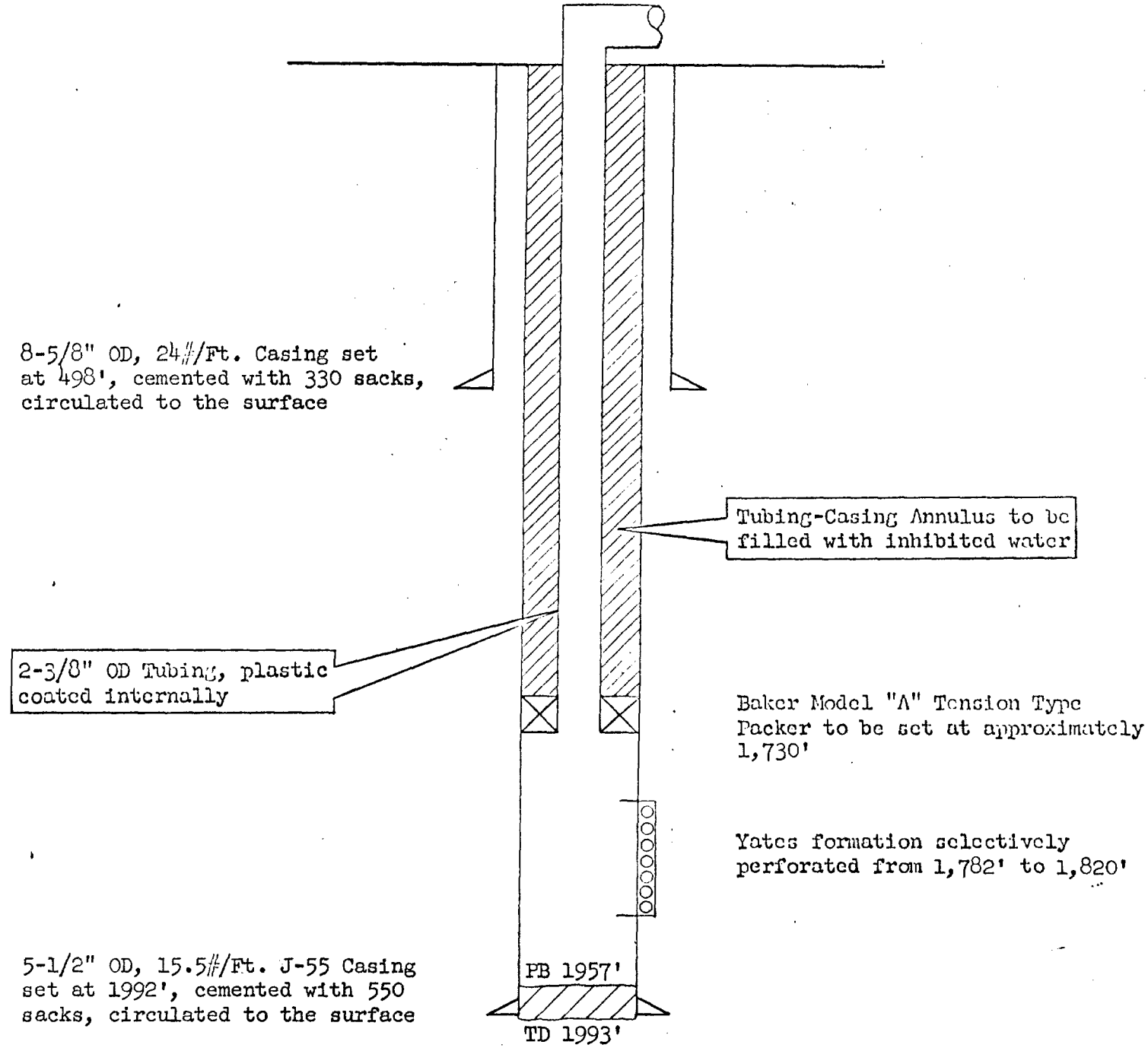


NORTH HACKBERRY YATES UNIT

Diagrammatic Sketch
Proposed Injection Well

GULF OIL CORPORATION
UNION-FEDERAL WELL NO. 3

Located 2310' FNL, 990' FEL, Section 23-19S-30E
Eddy County, New Mexico

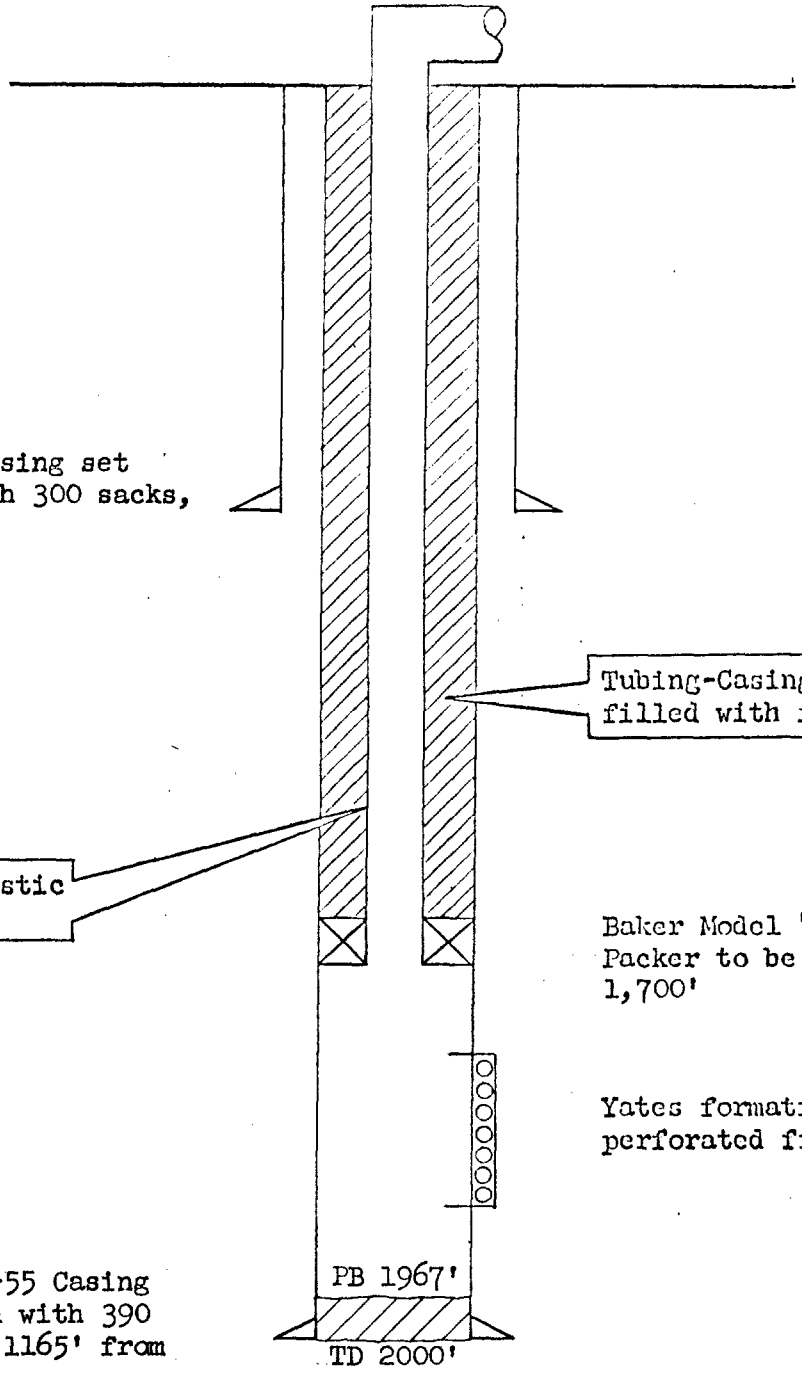


NORTH HACKBERRY YATES UNIT

Diagrammatic Sketch
Proposed Injection Well

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 1

Located 1980' FSL, 330' FWL Section 24-19S-30E
Eddy County, New Mexico

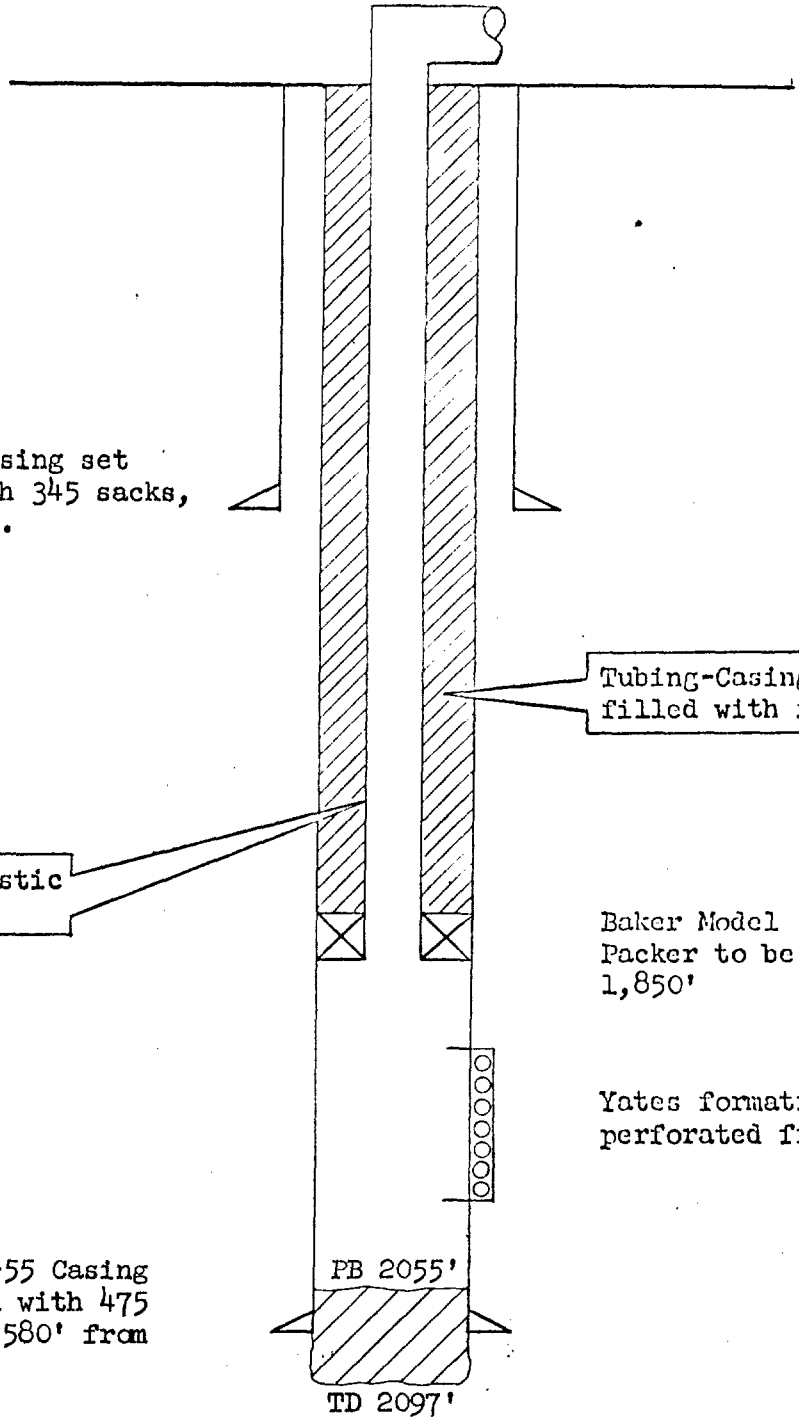


NORTH HACKBERRY YATES UNIT

Diagrammatic Sketch
Proposed Injection Well

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 5

Located 1650' FSL, 2310' FEL Section 24-19S-30E
Eddy County, New Mexico



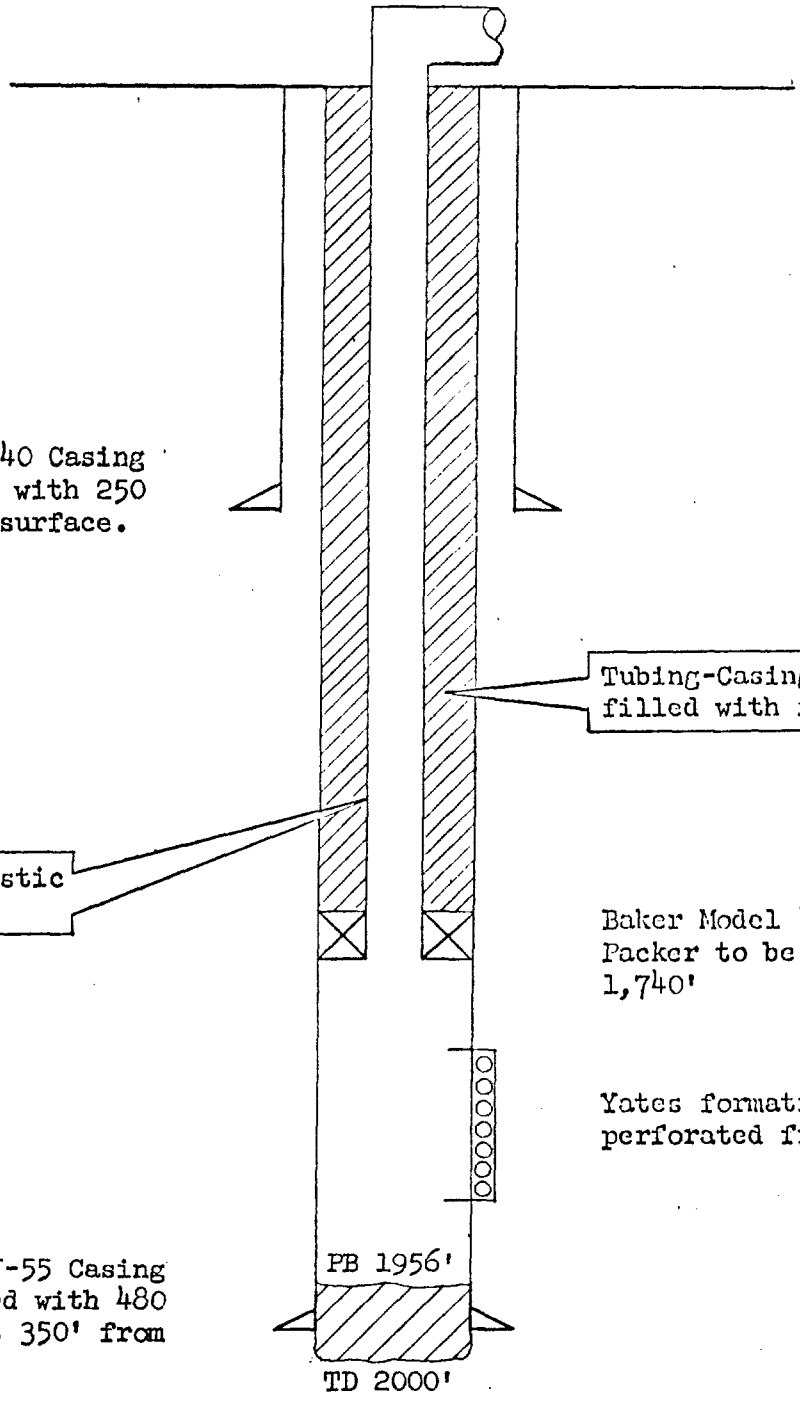
Case 3476

NORTH HACKBERRY YATES UNIT

Diagrammatic Sketch
Proposed Injection Well

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 6

Located 940' FSL, 1725' FWL Section 24-19S-30E
Eddy County, New Mexico

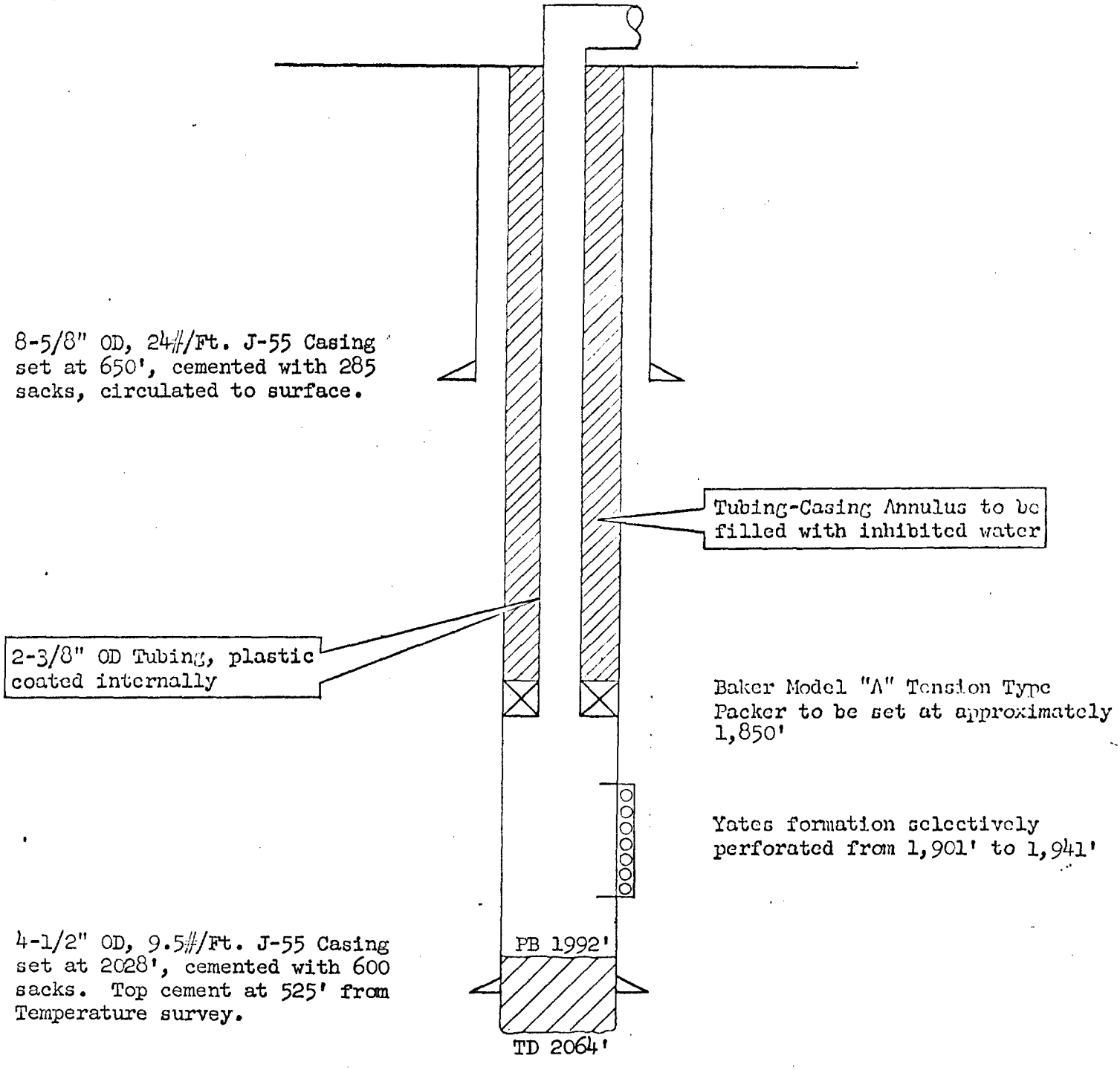


NORTH HACKBERRY YATES UNIT

Diagrammatic Sketch
Proposed Injection Well

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 8

Located 2310' FNL, 1980' FWL Section 24-19S-30E
Eddy County, New Mexico

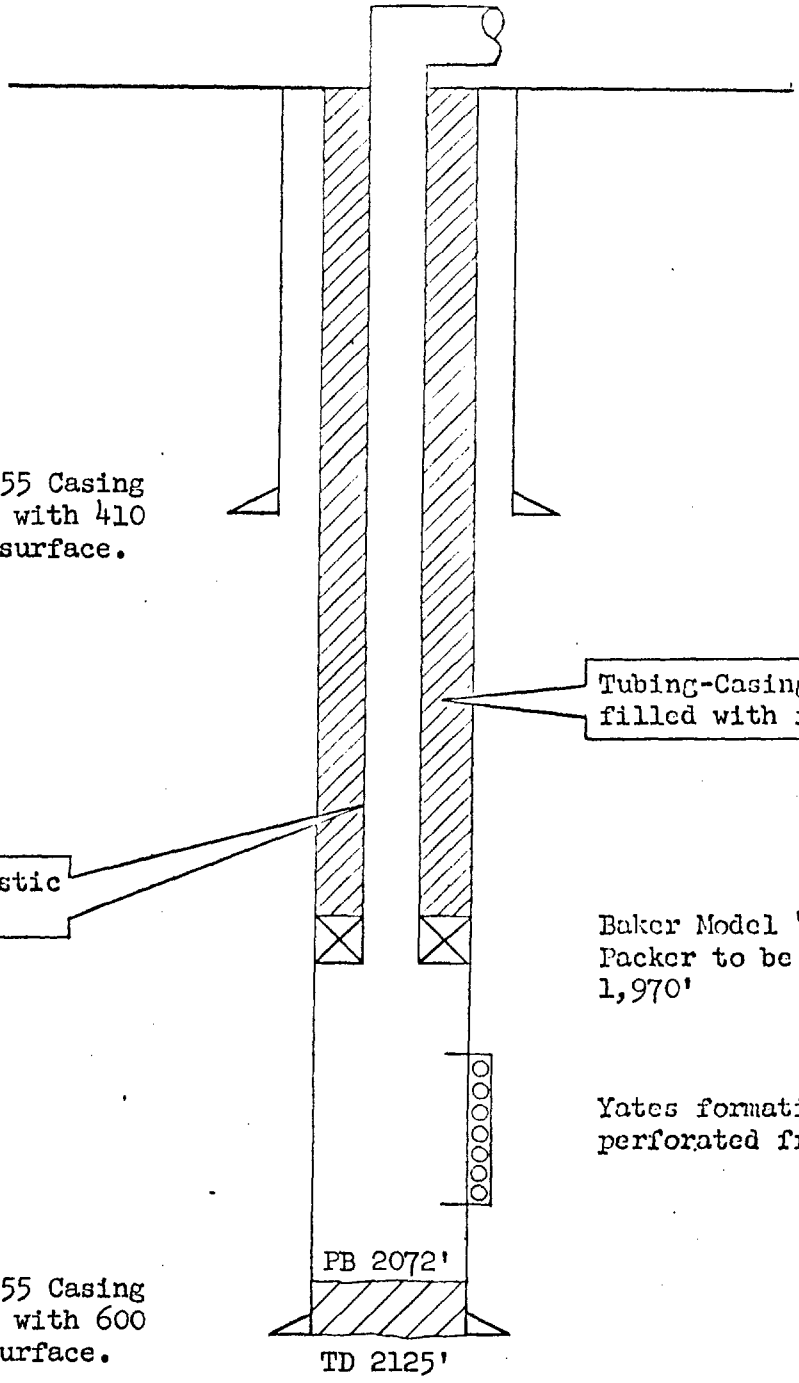


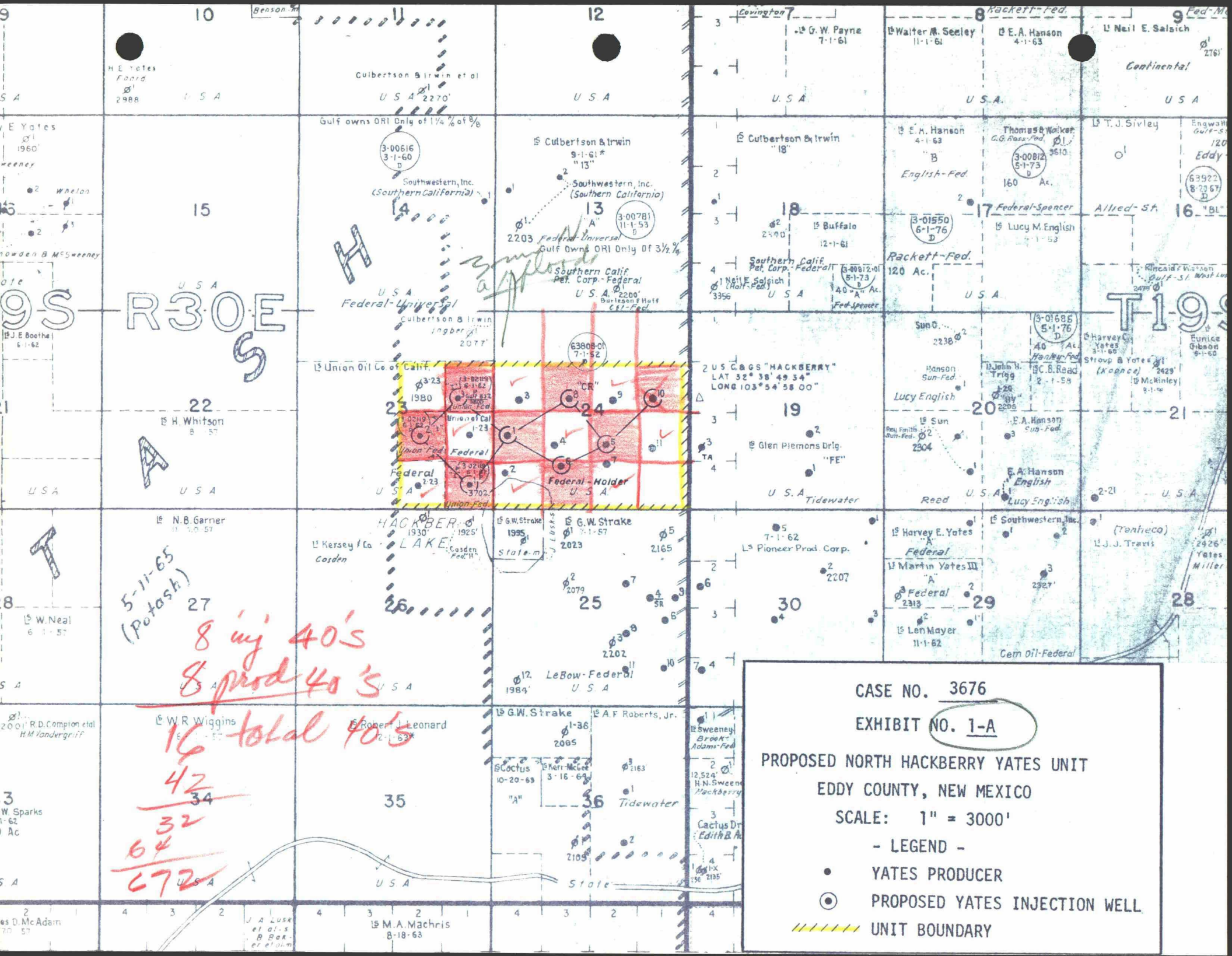
NORTH HACKBERRY YATES UNIT

Diagrammatic Sketch
Proposed Injection Well

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 10

Located 2310' FNL, 990' FEL Section 24-19S-30E
Eddy County, New Mexico




T19S
R30E
HACKBERRY LAKE
Union Oil Co of Calif.
Federal-Universal
Southwestern, Inc. (Southern California)
Federal-Holder
LeBow-Federal
Tidewater
Southern Calif. Pet. Corp.-Federal
Rackett-Fed.
Cem Oil-Federal
Allied-St.
Continental
Gulf owns ORI Only of 1¼ % of 8/8
Gulf owns ORI Only Of 3½ %
5-11-65 (Potash)
8 inj 40's
8 prod 40's
total 40's
16
42
34
32
64
672
CASE NO. 3676
EXHIBIT NO. 1-A
PROPOSED NORTH HACKBERRY YATES UNIT
EDDY COUNTY, NEW MEXICO
SCALE: 1" = 3000'
- LEGEND -
• YATES PRODUCER
⊙ PROPOSED YATES INJECTION WELL
UNIT BOUNDARY

Case 3676

USA

Burleson & Huff
C&I-Federal
2200 ϕ1

USA

Neil E Salsich
Holt-Federal
3356 ϕ1

USA

Culbertson-Irwin
Ingber
2077 ϕ1

Ls Gulf
"C R"

Ls Martin, Williams & Judson
"F E"

T 19 S R 30 E

T 19 S R 31

Union Oil Co. of California

Ls Gulf

1980 ϕ2-23

Union-Federal

23

Ls Gulf

Ls Union O. of Calif.

1-23

Union-Federal

Federal

Ls Gulf

2-23

24

19

TA

Tidewater

U S A

Federal

Union-Federal

Federal-Holder

Kersey & Co.
Cosden
1930' ϕ1

Cosden "H"
Federal
1925 ϕ1

Ls G.W. Strake

1995 ϕ1

State

Ls G.W. Strake

2023 ϕ1

2165 ϕ5

2079 ϕ2

2202 ϕ3

Ls Paul E. Haskins

26

25

Examiner _____

Case No. 3676

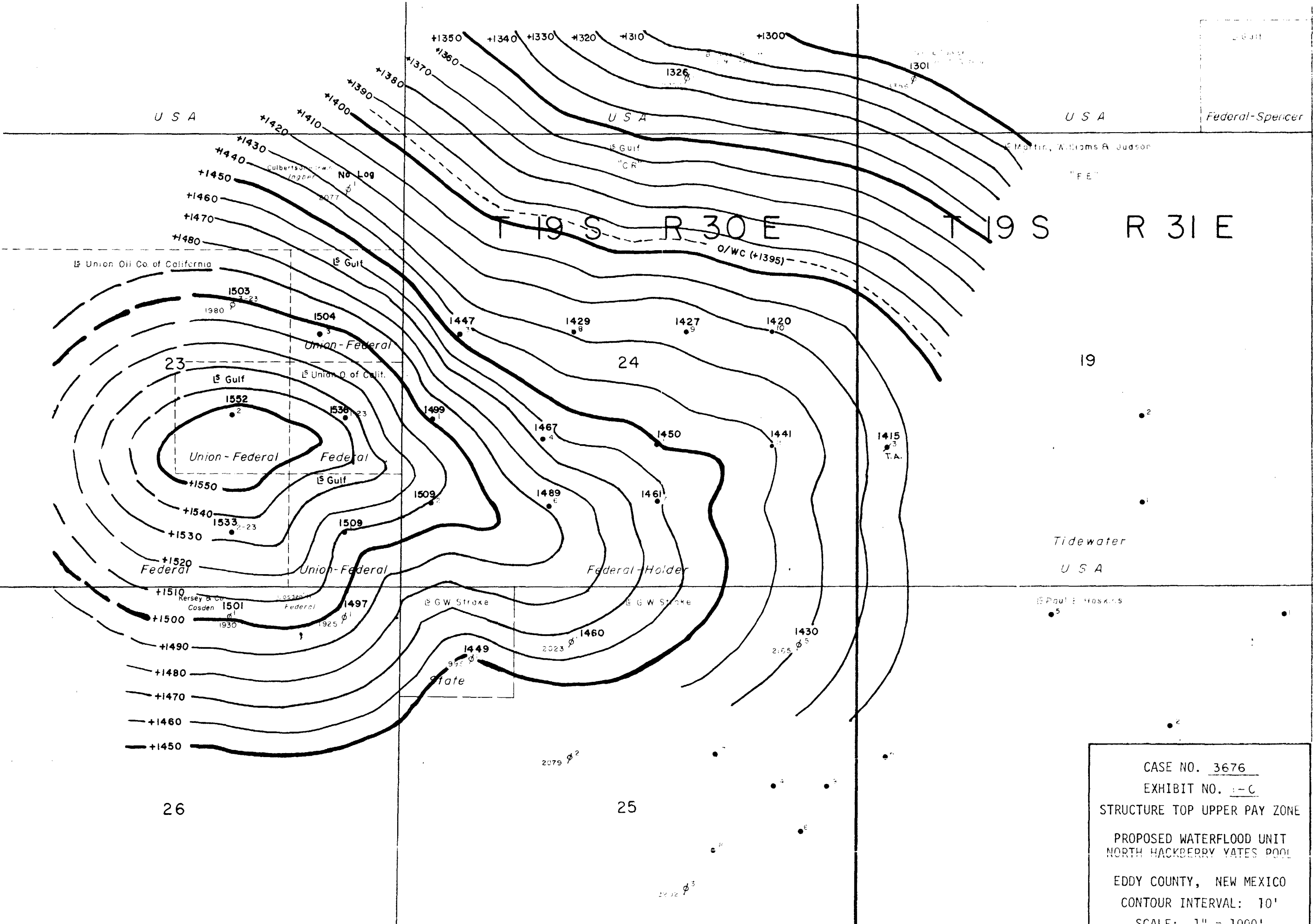
EXHIBIT NO. 1-B

PROPOSED WATERFLOOD UNIT
NORTH HACKBERRY YATES POOL
EDDY COUNTY, NEW MEXICO

SCALE: 1" = 1000'

- LEGEND -

- YATES PRODUCER
- PROPOSED INJ. WELL
- PROPOSED RUSTLER WSW
- PROPOSED UNIT BOUNDARY



CASE NO. 3676
EXHIBIT NO. 1-C
STRUCTURE TOP UPPER PAY ZONE

PROPOSED WATERFLOOD UNIT
NORTH HACKBERRY YATES POOL

EDDY COUNTY, NEW MEXICO
CONTOUR INTERVAL: 10'
SCALE: 1" = 1000'

U S A

U S A

U S A

Lˢ Gulf

Federal-Spencer

Lˢ Gulf

"C R"

Lˢ Martin, Williams & Judson

"F E"

T 19 S R 30 E

T 19 S R 31 E

O/WC

n Oil Co of California

Lˢ Gulf

Lˢ Union O. of Calif.

Union - Federal

Federal

Union - Federal

Federal

Federal - Holder

Tidewater

U S A

O/WC

Kersey & Co
Cosden

Cosden "H"
Federal

Lˢ G W Strake

Lˢ G W Strake

State

Lˢ Paul E. Hoskins

19

26

25

30

CASE NO. 3676
EXHIBIT NO. 1-D

ISOPACH MAP - UPPER ZONE
NET FEET OF PAY

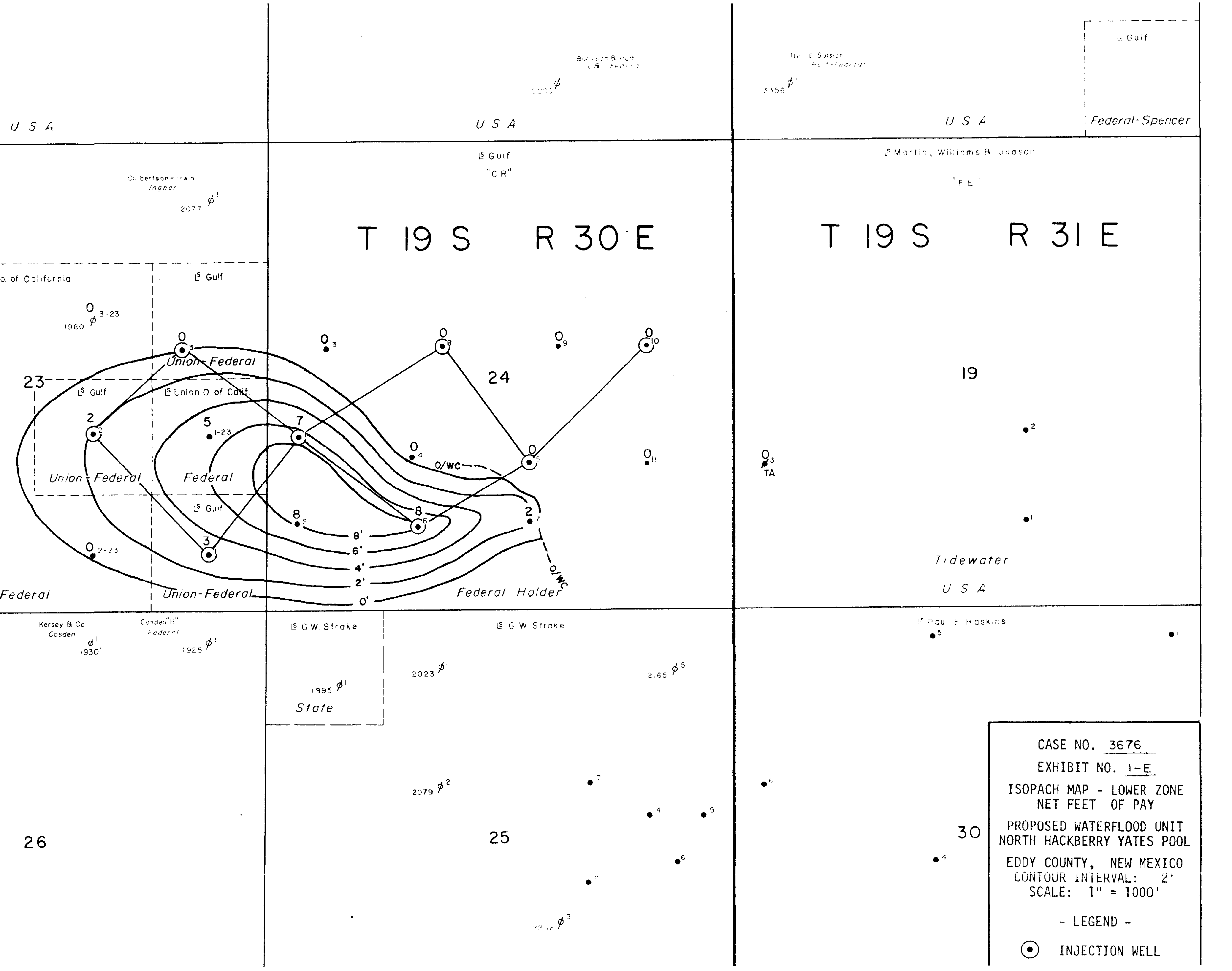
PROPOSED WATERFLOOD UNIT
NORTH HACKBERRY YATES POOL

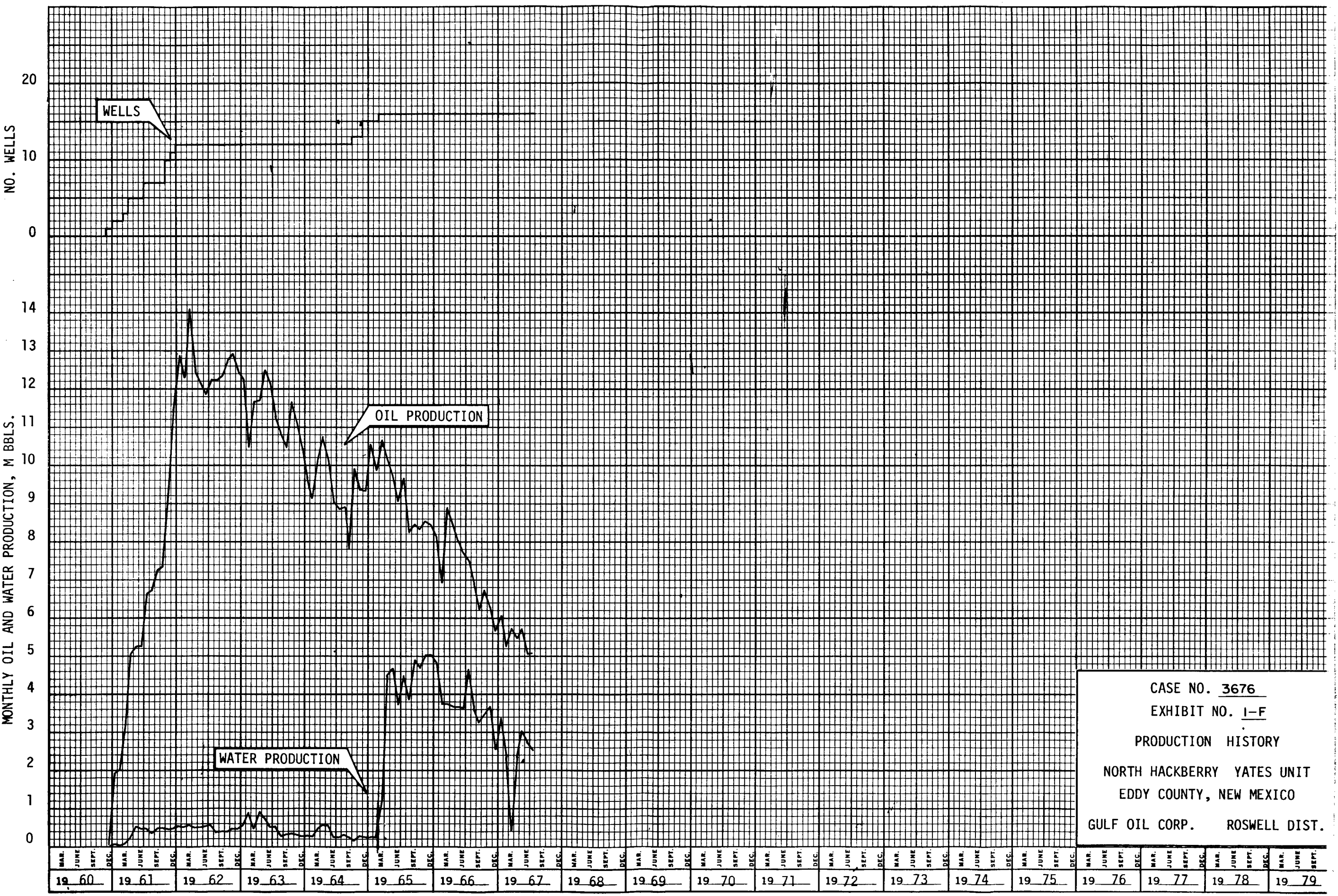
EDDY COUNTY, NEW MEXICO

CONTOUR INTERVAL: 5'
SCALE: 1" = 1000'

- LEGEND -

⊙ INJECTION WELL


CASE NO. 3676
EXHIBIT NO. 1-E
ISOPACH MAP - LOWER ZONE
NET FEET OF PAY
PROPOSED WATERFLOOD UNIT
NORTH HACKBERRY YATES POOL
EDDY COUNTY, NEW MEXICO
CONTOUR INTERVAL: 2'
SCALE: 1" = 1000'
- LEGEND -
INJECTION WELL
T 19 S R 30 E
T 19 S R 31 E
U S A
Federal-Spencer
Gulf "CR"
Martin, Williams & Judson "F E"
Culbertson-Irwin Ingber
Union O. of Calif.
Union-Federal
Federal
Federal-Holder
Tidewater
Paul E. Haskins
G W Strake
State
Kersey & Co Cosden
Cosden "H" Federal
8'
6'
4'
2'
0'
O/WC
23
24
19
26
25
30



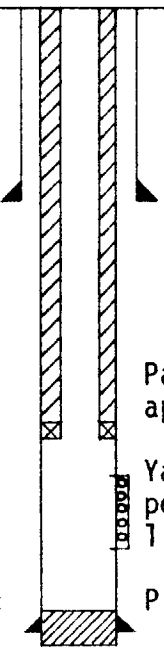
CASE NO. 3676
EXHIBIT NO. I-F

PRODUCTION HISTORY

NORTH HACKBERRY YATES UNIT
EDDY COUNTY, NEW MEXICO

GULF OIL CORP. ROSWELL DIST.

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 5
LOCATED 1650' FSL, 2310' FEL
SEC. 24-19S-30E



8-5/8" OD, 24# / Ft. Casing set @ 594', cemented with 345 sacks, circulated to surface.

Packer to be set @ approx. 1,850'

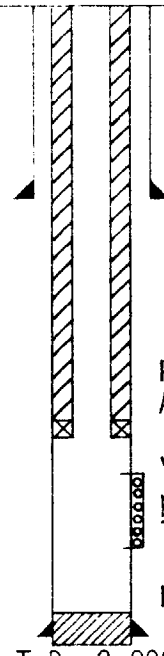
Yates formation selectively perforated from 1,896' to 1,927'

4-1/2" OD,9.5#/Ft.J-55 Casing set @ 2075',cemented with 475 sacks. Top cement @ 580' from Temperature survey

P.B. 2,055'

T.D. 2,097'

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 6
LOCATED 940' FSL, 1725' FWL
SEC. 24-19S-30E



8-5/8" OD, 32#/Ft.H-40 Casing set @ 595', cemented with 250 sacks, circulated to surface.

Packer to be set @ Approx. 1,740'

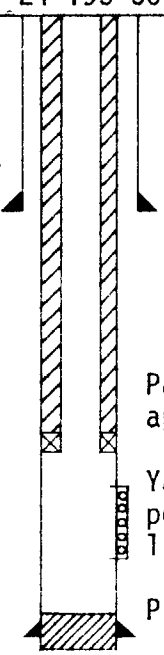
Yates formation selectively perforated from 1,789' to 1,903'

4-1/2" OD,9.5#/Ft.J-55 Casing set @ 1993',cemented with 480 sacks. Top cement @ 350' from Temperature survey

P.B. 1,956'

T.D. 2,000'

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 8
LOCATED 2310' FNL, 1980' FWL
SEC. 24-19S-30E



8-5/8" OD, 24#/Ft.J-55 Casing set @ 650', cemented with 285 sacks, circulated to surface.

Packer to be set @ approx. 1,850'

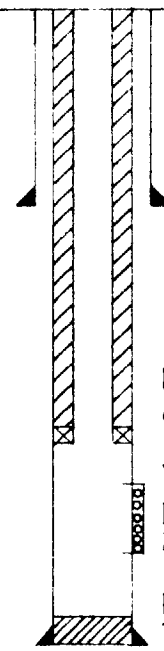
Yates formation selectively perforated from 1,901' to 1,941'

4-1/2" OD,9.5#/Ft.J-55 Casing set @ 2028', cemented with 600 sacks. Top cement @ 525' from Temperature survey

P.B. 1,992'

T.D. 2,064'

GULF OIL CORPORATION
FEDERAL-HOLDER "CR" WELL NO. 10
LOCATED 2310' FNL, 990' FEL
SEC. 24-19S-30E



8-5/8" OD, 24#/Ft.J-55 Casing set @ 743', cemented with 410 sacks, circulated to surface.

Packer to be set @ approx. 1,970'

Yates formation selectively perforated from 2,022' to 2,050'

4-1/2" OD,9.5#/Ft.J-55 Casing set @ 2125',cemented with 600 sacks, circulated to surface.

P.B. 2,072'

T.D. 2,125'

NOTE: 2-3/8" OD 4.70# EUE 8 RT J-55 Tubing Plastic-Coated Internally, Baker Model "A" Tension Type Retrievable HW Injection Packer (or equivalent), Casing-Tubing Annulus to be filled with Inhibited Water.

CASE NO. 3676
EXHIBIT 1-G (Cont.)
SCHEMATIC DIAGRAM
PROPOSED WATER INJECTION WELLS
NORTH HACKBERRY YATES UNIT
EDDY COUNTY, NEW MEXICO