NEW MEXICO OIL CONSERVATION COMMISSION
EXAMINER HEARING
WEDNESDAY, SEPTEMBER 13, 1972

CASE 4818

APPLICATION OF TIPPERARY LAND AND EXPLORATION CORPORATION FOR A WATERFLOOD PROJECT IN THE NORTH BAGLEY (PENN) FIELD, LEA COUNTY, NEW MEXICO

Tipperary Land and Exploration Corporation requests authority to institute a pilot waterflood in the North Bagley (Penn) Field. Specifically, applicant seeks permission to inject produced water from the North Bagley Field into the "F" zone of the Strawn Formation in its Bess No. 1 well through perforations at 10,177' and 10,179' with permission to also inject into other zones in this well if it appears desirable.

The North Bagley (Penn) Field has been a prolific producer with total oil production of about 30 million barrels to date. However, the oil rate for the field has been declining for the past 3 years, and it now appears that more than 70% of the ultimate primary production for the field has already been recovered. Applicant feels that it is now time to give serious consideration to possible secondary recovery methods that might be used to obtain additional oil from this field. For this reason applicant is proposing this pilot operation to obtain information that will aid in evaluating the waterflood potential of this field.

Exhibit 1 is a lease plat showing a portion of the North Bagley (Penn) Field in the area of the proposed injector. The proposed injector is located 660' FNL and 1980' FEL of Section 20, T-11-S, R-33-E. Wells having the "F" zone of the Strawn open to production are encircled on the lease plat. Applicant is operator of all wells directly offsetting the proposed injector. Each of the offset wells is equipped with an individual tank battery which will permit close monitoring of fluid rates on the wells.

Exhibit 2 is a portion of the Gamma Ray-Acoustic log run on the Bess No. 1 which shows the producing interval in the well. The well is perforated in 14 or more porosity zones ranging in depths from 9,308' to 10,179'. Also shown on this log is the applicant's designation of the various porosity zones in the Strawn Formation. The proposed zone of injection is the lowermost producing interval designated as the "F" zone on the log. Based on log calculations, it is estimated that the "F" zone contained about 12.5% of the total oil-in-place for this well.

Exhibit 3 is a graph showing the production history for the Bess No. 1. This well was completed on December 23, 1967, and to July 1, 1972, had recovered 329,816 barrels of oil. Production on the well has been declining for the past 2-1/2 years with the June, 1972, rate being only 27% of the peak rate observed in December 1969. Based on the projected decline to an economic limit of 200 barrels monthly, it appears this well will recover about 384,800 barrels of oil. This indicates that the well has already recovered more than 85% of its ultimate primary production.

Exhibit 4 is a graph showing the combined production of the Bess No. 1 and nine offsetting wells in the pilot area. These wells, which are colored on the map insert, are the ones most likely to be affected by water injection into the Bess No. 1. The combined performance of wells in the pilot area is very similar to that of the Bess No. 1. Current rate is about 30% of the peak rate observed. Cumulative production to July 1, 1972, was 3,084,405 barrels with indicated ultimate of 3,786,400 barrels. This indicates that these wells have now recovered more than 81% of their ultimate primary recovery. Production figures used in the preparation of Exhibits 3 and 4 were taken from the annual and monthly reports of the New Mexico Oil & Gas Engineering Committee.

Exhibit 5 is a diagramatic sketch of the proposed completion assembly for the Bess No. 1. Applicant proposes to set a permanent packer between the "E" and "F" zones of the Strawn and injected produced water from the field down the tubing. About 15 feet of vertical separation exists between the top of the porosity in the "F" zone and the bottom of the porosity in the "E" zone. One reason the applicant desires permission to inject into other zones in this well is the possibility of communication developing between these two zones. If this should occur, applicant would then want to set a packer above the "E" zone and inject into both zones. It is also possible applicant will want to expand the injection interval at some later date to evaluate the waterflood potential of some of the upper zones. Since the proposed pilot test is expected to be of limited duration, applicant does not plan to internally coat the tubing string unless required to do so.

Exhibit 6 is a copy of a recent analysis of water produced in the Bess No. 1 This should be typical of the water that will be used for injection purposes. No individual production or injection tests are available on the "F" zone in the Bess No. 1 on which to base estimates of injection rates. It was observed at the time of the tracer survey that the zone took water readily on a vacuum. Based on a comparison with other intervals that were drill stem tested, it is estimated that the zone will take water at about 1,400 barrels per day. At this time, there is ample produced water

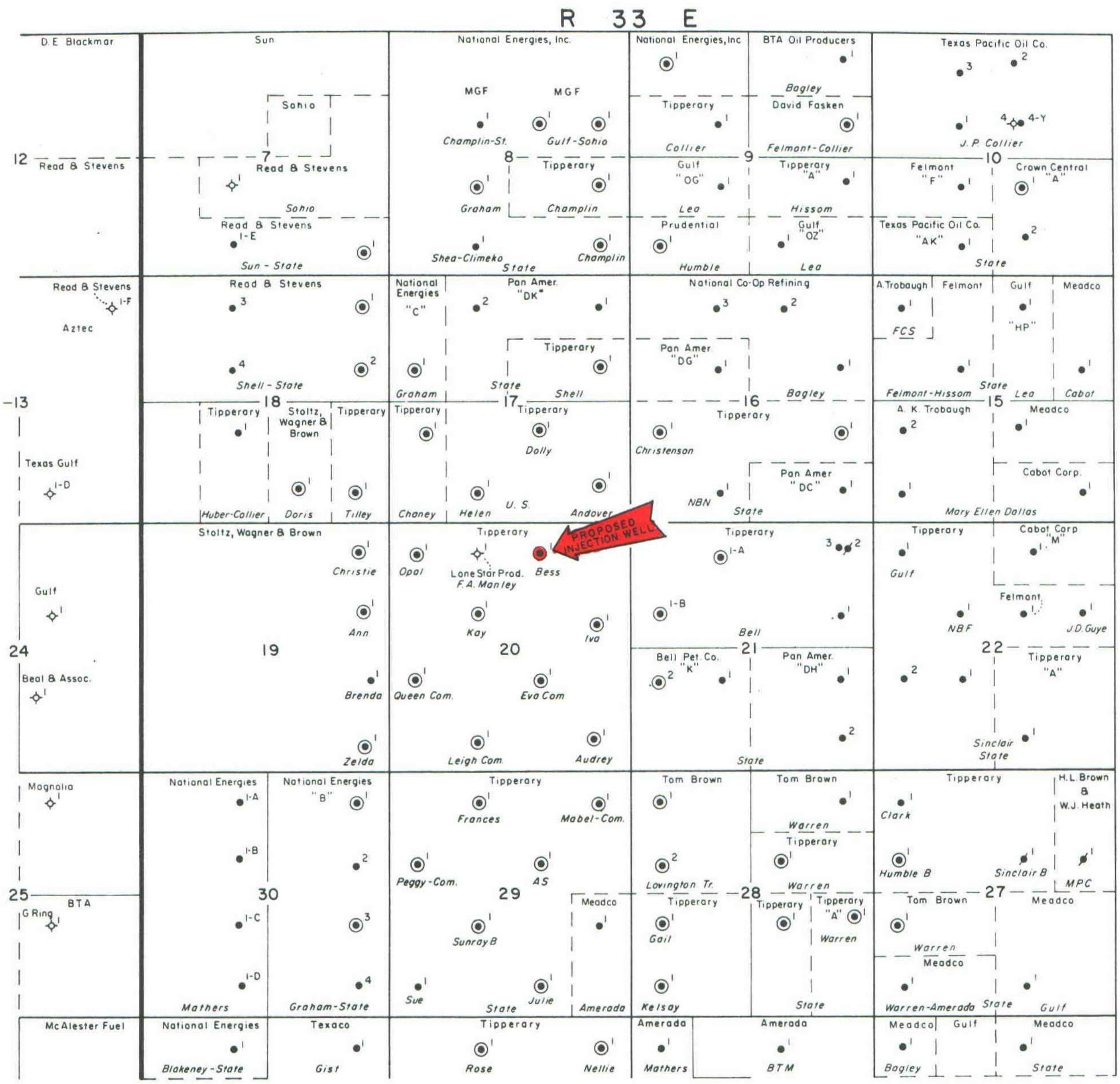
in the field to support a pilot injection program of limited extent. However, water production, like the oil rate, is declining, and water volume might not be sufficient at a later date.

At this time most wells in the North Bagley Field are equipped with hydraulic pumping equipment that is capable of handling large fluid volumes. This type of equipment would be desirable in the waterflood project. However, unless the likelihood of a flood becomes evident soon, it is likely that most operators will convert to rod pumping installations that are less expensive to operate.

In summary, it is the applicant's opinion that an evaluation of the secondary recovery potential of this field is needed as soon as possible. While any estimates of the possible recovery by secondary recovery would be speculative at this time, it is apparent from the large primary recovery that the additional recovery could be very significant. The applicant respectfully requests that this application be approved.

EXHIBITS

EXHIBIT 1	Lease Plat
EXHIBIT 2	Log of Proposed Injection Well
EXHIBIT 3	Production Graph of Proposed Injection Well
EXHIBIT 4	Production Graph of Wells in Pilot Area
EXHIBIT 5	Diagramatic Sketch of Completion Assembly for Proposed Injection Well
EXHIBIT 6	Water Analysis



LEGEND

◉ Well Known Open To Production In STRAWN "F" ZONE

A PORTION OF

NORTH BAGLEY (PENN) FIELD

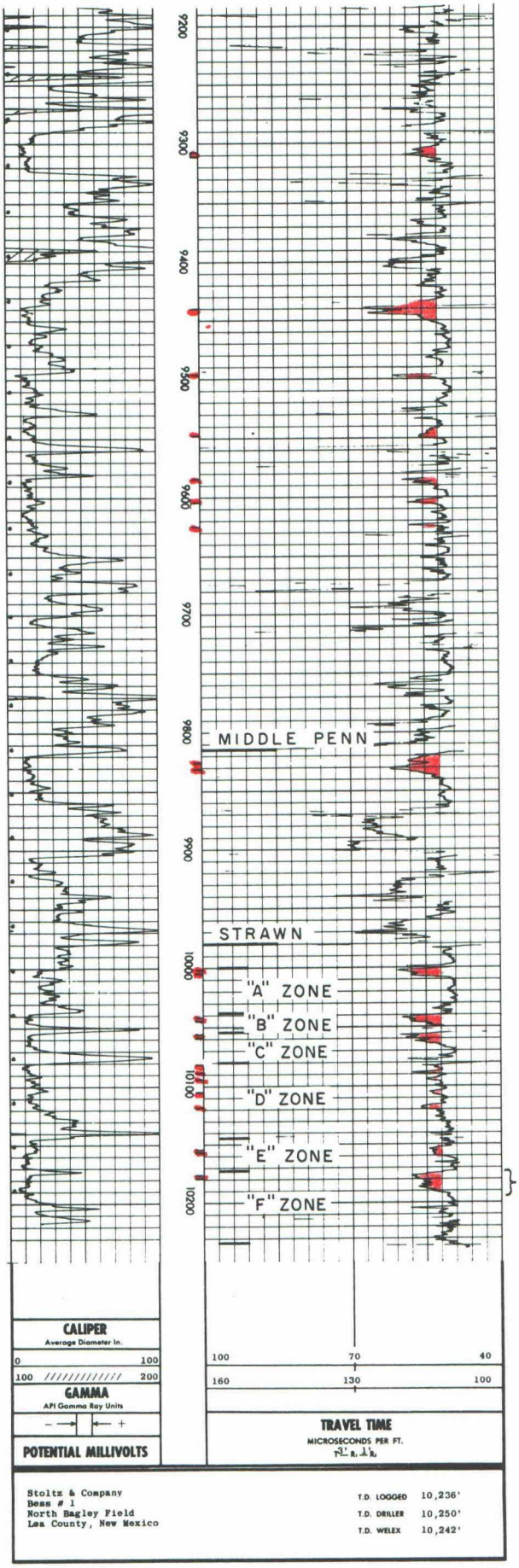
LEA COUNTY, NEW MEXICO

LEASE PLAT

RALPH H. VINEY & ASSOCIATES — MIDLAND, TEXAS

EXHIBIT 1

TIPPERARY LAND AND EXPLORATION CORP.
BESS NO. 1
NORTH BAGLEY (PENN) FIELD
LEA COUNTY, NEW MEXICO



PERFS. 9308' - 9311'

PERF. 9440'

PERF. 9497'

PERF. 9548'

PERF. 9585'
PERF. 9604'
PERF. 9624'

PERFS. 9825' & 9831'

PERFS. 10,002' & 10,004'

PERFS. 10,042' & 10,044'
PERFS. 10,057' & 10,059'

PERFS. 10,082', 10,088',
10,099', 10,105' & 10,118'

PERFS. 10,154' & 10,156'

} PROPOSED ZONE OF INJECTION
PERFS. 10,177' & 10,179'

Stoltz & Company
Bess # 1
North Bagley Field
Lea County, New Mexico

T.D. LOGGED 10,236'
T.D. DRILLER 10,250'
T.D. WELEX 10,242'

EXHIBIT 2

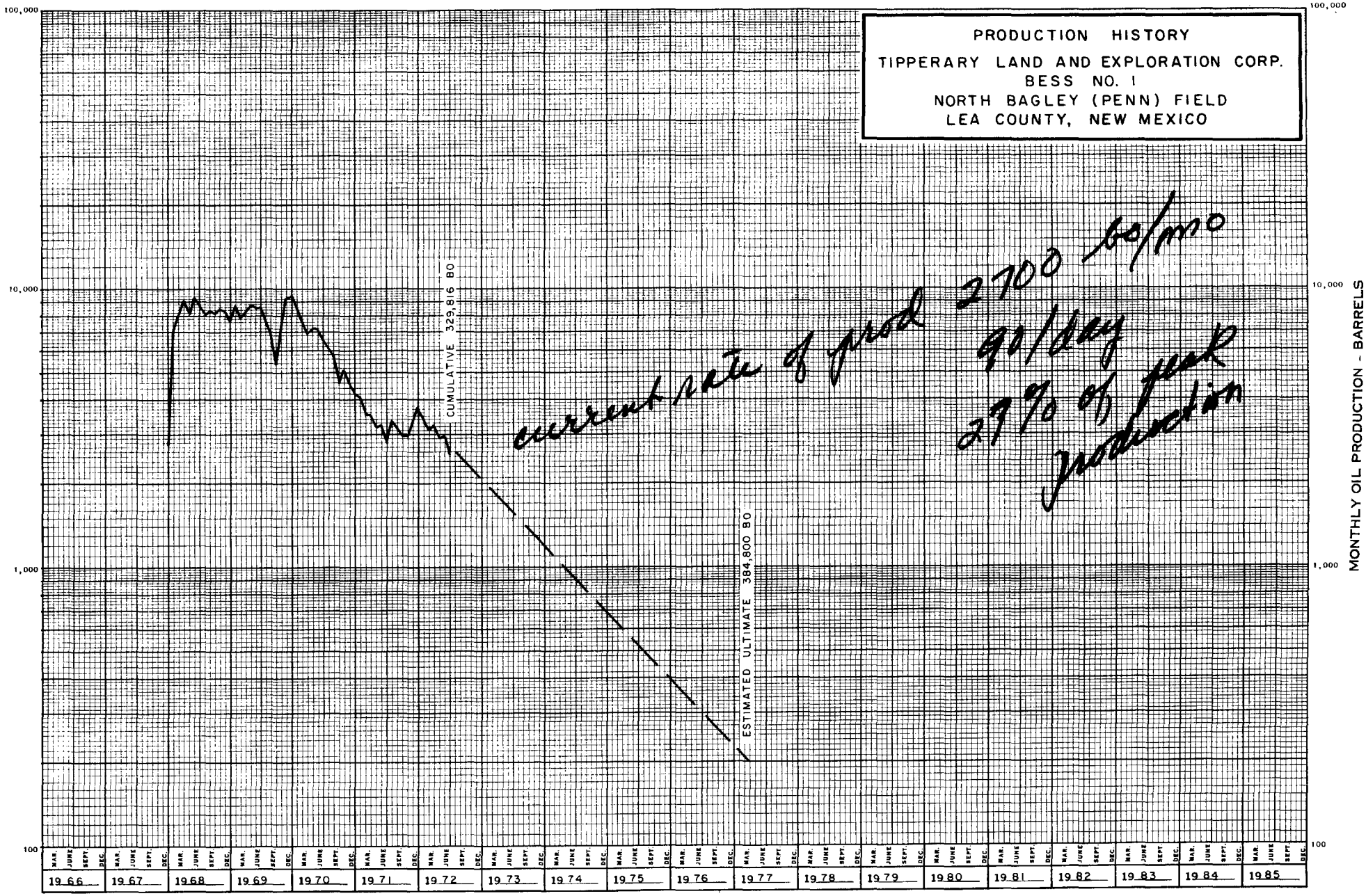

PRODUCTION HISTORY
TIPPERARY LAND AND EXPLORATION CORP.
BESS NO. 1
NORTH BAGLEY (PENN) FIELD
LEA COUNTY, NEW MEXICO
MONTHLY OIL PRODUCTION - BARRELS
100,000
10,000
1,000
100
CUMULATIVE 329,816 BO
ESTIMATED ULTIMATE 384,800 BO
current rate of prod 2700 bo/mo
90 b/day
27% of peak production
MAR.
JUNE
SEPT.
DEC.
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985

EXHIBIT 3

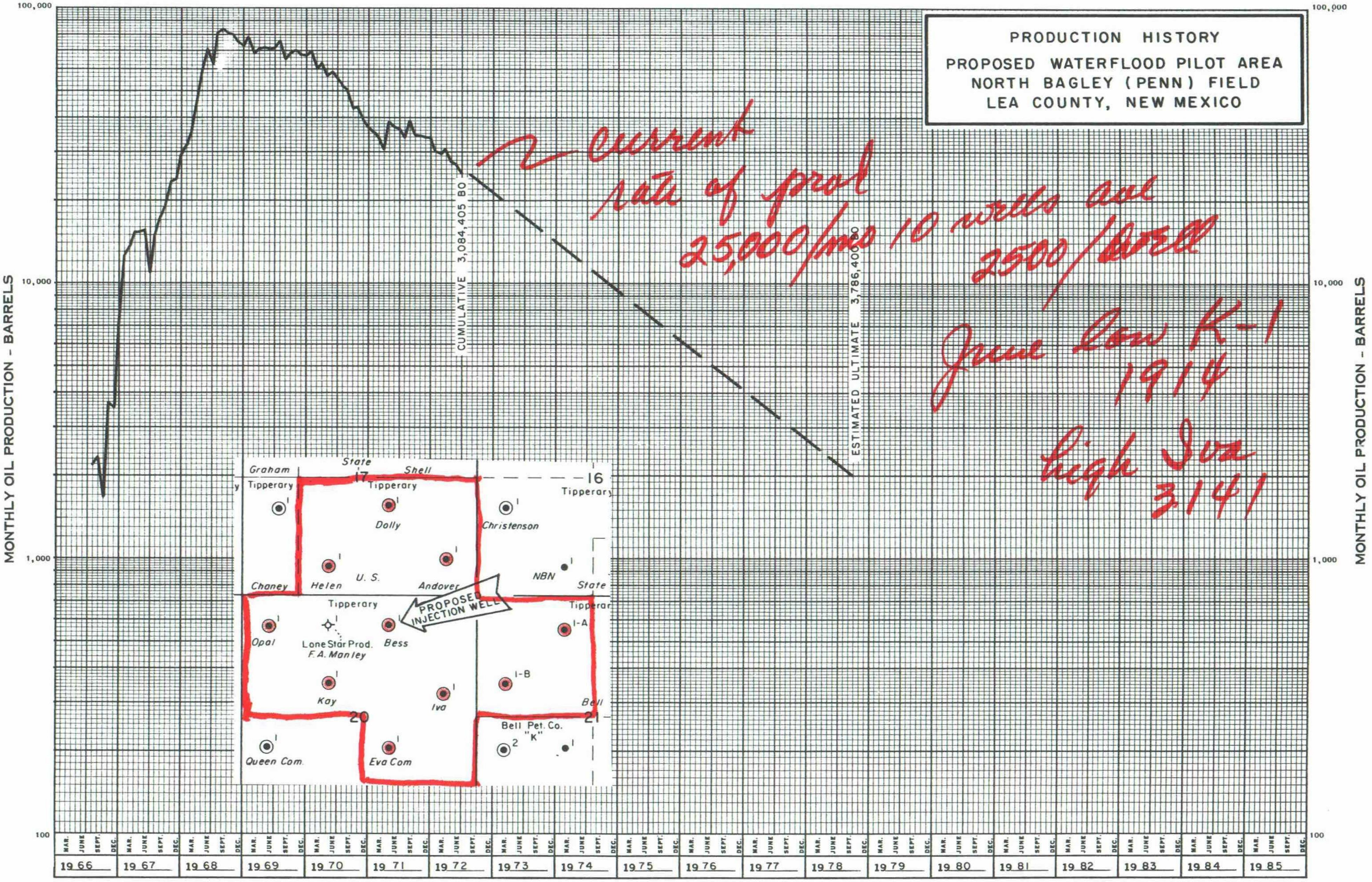
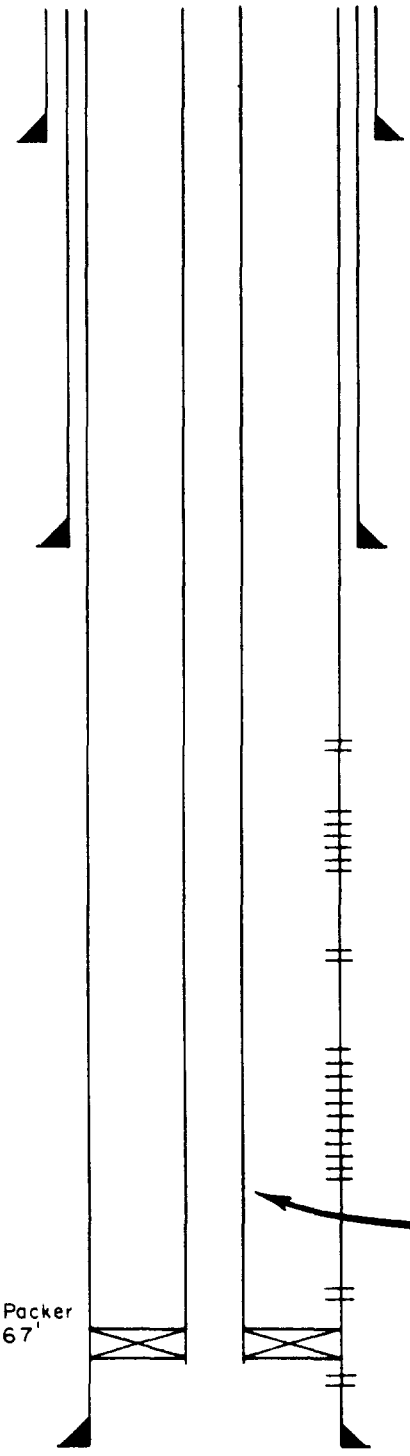

PRODUCTION HISTORY
PROPOSED WATERFLOOD PILOT AREA
NORTH BAGLEY (PENN) FIELD
LEA COUNTY, NEW MEXICO
MONTHLY OIL PRODUCTION - BARRELS
100,000
10,000
1,000
100
CUMULATIVE 3,084,405 BO
ESTIMATED ULTIMATE 3,786,400 BO
current
rate of prod
25,000/mo 10 wells ave
1914
3141
MAR. JUNE SEPT. DEC.
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
Graham
State
Shell
Tipperary
17
16
Dolly
Christenson
Helen
U. S.
Andover
NBN
Chaney
State
PROPOSED INJECTION WELL
Opal
Lone Star Prod.
F.A. Manley
Bess
I-A
I-B
Kay
Iva
Bell
20
21
Bell Pet. Co.
"K"
Queen Com.
Eva Com

EXHIBIT 4

BESS No. 1



13 3/8" 48# Casing Set at 374'
Cemented with 400 sacks – cement circulated

8 5/8" 24# & 32# Casing Set at 3730'
Cemented with 200 sacks – Est. Top 2700'

Perfs. 9308' – 9311' 2 Shots/ft.

Perfs. 9440', 9497', 9548', 9585', 9604', 9624', 9825', 9831', 10002', 10004', 10042', 10044', 10057', 10059', 10082', 10088', 10094', 10105', 10118', 10154', 10156' 2 Shots / Interval

2 3/8" 4.7# J-55 Tubing at 10,167'

Permanent Packer
Set at 10,167'

Perfs. 10177', 10179' 2 Shots/Interval

4 1/2" 11.6# Casing Set at 10,250'
Cemented with 500 sacks – Top Cement 8060'

DIAGRAMATIC SKETCH
TIPPERARY LAND AND EXPLORATION CORP.
BESS No. 1
PROPOSED INJECTION WELL
B-20-11S-33E
NORTH BAGLEY (PENN) FIELD
LEA COUNTY, NEW MEXICO

RALPH H. VINEY & ASSOCIATES MIDLAND, TEXAS

EXHIBIT 5

BARODID DIVISION
N L Industries, Inc.
P.O. Box 1675 Houston, Texas 77001
BAROID TREATING CHEMICALS

WATER ANALYSIS TEST REPORT

not from Bess only. from a number of wells.

COMPANY				SHEET NUMBER
Tipperary Land & Exploration				DATE 9/6/72
FIELD: Bagley		COUNTY OR PARISH		STATE
LEASE OR UNIT: Bess	WELL(S) NAME OR NO.: #1	WATER SOURCE (FORMATION)		
DEPTH, FT.	BHT, F	SAMPLE SOURCE	TEMP, F	WATER, BBL/DAY	OIL, BBL/DAY	GAS, MMCF/DAY
TYPE OF OIL	API GRAVITY °	TYPE OF WATER ☐ PRODUCED WATER ☐ INJECTION WATER OTHER		

WATER ANALYSIS PATTERN
(NUMBER BESIDE ION SYMBOL INDICATES me/l* SCALE UNIT)

Na⁺ 20 15 10 5 0 5 10 15 20 Cl⁻
Ca^{++} — HCO_3^-
Mg^{++} — $SO_4^=$
Fe^{+++} — $CO_3^=$

DISSOLVED SOLIDS

CATIONS	me/l*	mg/l*
Total Hardness	244	
Sodium, Na^+ (calc.)	1027	23611
Calcium, Ca^{++}	184	3680
Magnesium, Mg^{++}	60	750
Iron (Total), Fe^{+++}	1.1	19
ANIONS		
Chloride, Cl^-	1267	45,000
Sulfate, $SO_4^=$	2.6	125
Carbonate, $CO_3^=$		
Bicarbonate, HCO_3^-	11.8	719.8
Hydroxyl, OH^-		
Sulfide, $S^=$		2
Phosphate-Meta, PO_3^-		
Phosphate-Ortho, $PO_4^{\equiv}$		

DISSOLVED GASES

Hydrogen Sulfide, H_2S		mg/l *
Carbon Dioxide, CO_2		mg/l *
Oxygen, O_2		mg/l *

PHYSICAL PROPERTIES

pH		7.9	
Eh (Redox Potential)			MV
Specific Gravity			
Turbidity, JTU Units			
Total Dissolved Solids (Calc.)			mg/l *
Stability Index	@ 68 F	1.88	
	@ 104 F	2.28	
$CaSO_4$ Solubility	@ 68 F	55.0	~~mg/l~~ mc/l
	@ 104 F	56.6	~~mg/l~~ mc/l
Max. $CaSO_4$ Possible (Calc.)		2.6	mg/l *
Max. $BaSO_4$ Possible (Calc.)			mg/l *
Residual Hydrocarbons		350	ppm (Vol/Vol)

SUSPENDED SOLIDS (QUALITATIVE)

Iron Sulfide ☐ Iron Oxide ☐ Calcium Carbonate ☐ Acid Insoluble ☐

REMARKS AND RECOMMENDATIONS:

The stability index shows a Calcium Carbonate scaling tendency however, the Calcium Sulfate solubility shows no possibility of Calcium Sulfate scale developing.

* NOTE: me/l and mg/l are commonly used interchangeably for epm and ppm respectively. Where epm and ppm are used, corrections should be made for specific gravity.

BTC ENGINEER	DIST. NO.	ADDRESS	OFFICE PHONE	HOME PHONE
H. Fischer	22	P.O.Box 311 Midland, Texas	682-4381	
TESTED BY	DATE 9/6/72	DISTRIBUTION ☐ CUSTOMER ☐ BTC ENGINEER OR ☐ BTC LAB ☐ AREA OR ☐ DISTRICT OFFICE ☐ BTC SALES SUPERVISOR		

FORM #BR-2149A

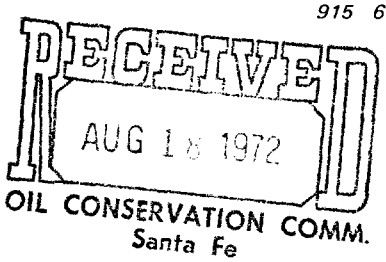
EXHIBIT 6

RALPH H. VINEY & ASSOCIATES

Engineering Consultants

Central Building
MIDLAND, TEXAS 79701
915 682-5346
915 682-8181

August 16, 1972



Case 4818

New Mexico Oil Conservation Commission
Post Office Box 2088
Santa Fe, New Mexico 87501

Gentlemen:

Request for Permit to Inject Water
Bess No. 1 Well, North Bagley (Penn) Field
Lea County, New Mexico

Tipperary Land and Exploration Corporation respectfully requests a hearing before the Commission to consider its application to inject produced water from the North Bagley (Penn) Field into the captioned well.

Purpose of the planned injection is a pilot waterflood to obtain information that will aid in evaluating the secondary recovery potential of the North Bagley Field. Initial injection is planned into the "F" zone of the Strawn Formation through perforations at 10,177' and 10,179'. However, Tipperary requests permission also to inject into other zones of the Penn Formation without the necessity of another hearing if additional testing appears desirable. The "F" zone of the Strawn has been selected for injection initially because tracer surveys indicate water can be confined to this zone and also because the zone is open in all offsetting wells.

The proposed injection well, the Tipperary Land and Exploration Corporation Bess No. 1 Well, is located 660' FNL and 1980' FEL of Section 20, Township 11 South, Range 33 East, Lea County, New Mexico. Initial injection rates into the well are estimated at about 1,400 barrels of water daily.

Enclosed are a log and a diagramatic sketch of the proposed injection well along with a plat of this portion of the North Bagley Field.

Tipperary respectfully requests that a hearing be set at the earliest available date.

Yours very truly,

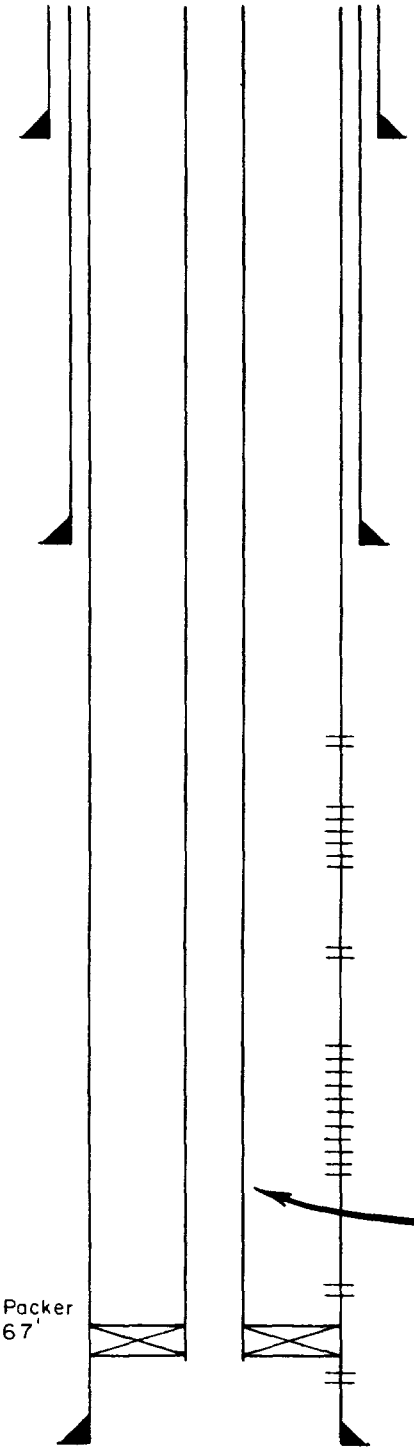
Larry McIntosh

LM:j

cc: Tipperary Land & Exploration
Mr. Jason Kellahin

8-31-72

BESS No. 1



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