

SIPES, WILLIAMSON, RUNYAN & AYCOCK, INC.

CONSULTING ENGINEERS

1100 GIBBS TOWER WEST
MIDLAND, TEXAS 79701
915 683-1841

Midland, Texas

May 9, 1973

800 MAIN BUILDING
HOUSTON, TEXAS 77002
713 228-8146

New Mexico Oil Conservation Commission
State Land Office Building
Santa Fe, New Mexico 87501

Gentlemen:

Subject: Case 4960, Application of
Tamarack Petroleum Company, Inc. for a
Waterflood Project, Bronco (Wolfcamp) Unit Area
Bronco (Wolfcamp) Pool, Lea County, New Mexico

The subject field is located in southeastern Lea County, New Mexico, and produces from the Wolfcamp pay at an approximate depth of 9,050 feet. The proposed unit area encompasses development in the northern part of the field in Section 2, Township 13 South, Range 38 East and in Section 35, Township 12 South, Range 38 East. Exhibit No. 1 shows the proposed unit outline. The Wolfcamp wells in the southern part of the field were not included in this unit because it is not feasible for the two areas of the field to be flooded together.

The remaining primary oil reserves were determined by extrapolation of the decline trends exhibited by the rate versus time production curves prepared for the wells in the proposed unit area. The estimated primary ultimate oil recovery for the nine wells in the proposed unit area is 1,182,849 barrels. The cumulative oil production as of March 1, 1973 was 1,020,766 barrels, leaving oil reserves of 162,083 barrels. Production for February, 1973 was 1,202 barrels of oil, 1,275 MCF of gas and 1,014 barrels of water.

A secondary to primary oil recovery ratio under waterflood operations was calculated to be approximately 0.39/1.00. The additional oil recovery under secondary recovery operations is therefore estimated to be 461,255 barrels. The total future recoverable oil from April 1, 1973, remaining primary plus incremental secondary reserves, equals 623,338 barrels.

Secondary recovery plans call for the injection of water into the Wolfcamp reservoir through three wells as depicted on Exhibit No. 1. These wells are the Texaco - Harris No. 3, the Tamarack-Lipscomb Estate "Harris" No. 1, and the Tamarack - Harris No. 1.

Exhibits No. 2, 3 and 4 are schematic diagrams showing the casing and cementing program for each of the proposed injection wells. Also shown

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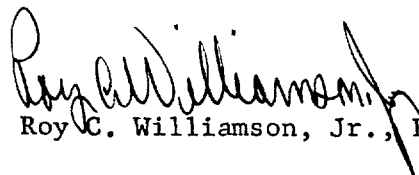
are perforations, total and plugged back depths, and planned injection packer settings.

Proposed water injection rates are 1,000 barrels per well per day for a total of 3,000 barrels per day for the project. Reservoir void fillup calculations indicate that a production response should occur fifteen months after initiation of water injection.

Amerada has indicated they will furnish water from Devonian wells in Section 11, Township 13 South, Range 34 East, for use in the proposed unit. A water compatibility test was made between the Devonian and the Wolfcamp waters, as shown by Attachment No. 1, a letter from Mr. Waylan C. Martin of the Martin Water Laboratories, Monahans, Texas. The Devonian water contains hydrogen sulfide and the Wolfcamp water contains soluble iron. Mr. Martin states: "the mixing of these waters in equal quantities would result in the precipitation of essentially all of the iron and sulfide from the waters." Suitable surface facilities will be provided to eliminate this incompatibility. Surface water injection pressures are not expected to exceed 1,500 psig.

Yours very truly,

SIPES, WILLIAMSON, RUNYAN & AYCOCK, INC.


Roy C. Williamson, Jr., P. E.

/kp

attachments

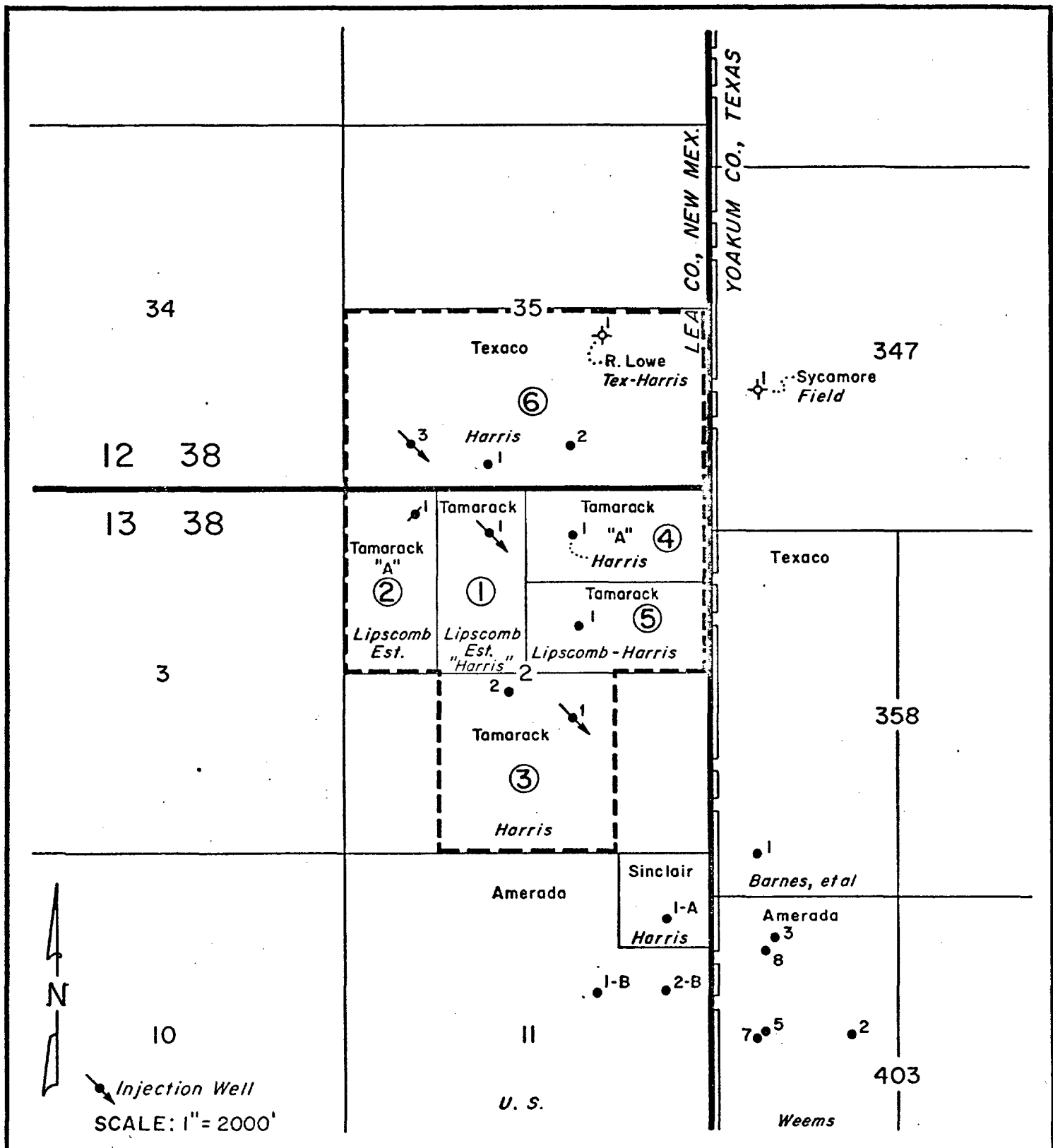


EXHIBIT 1

TO UNIT AGREEMENT

BRONCO (WOLFCAMP) UNIT

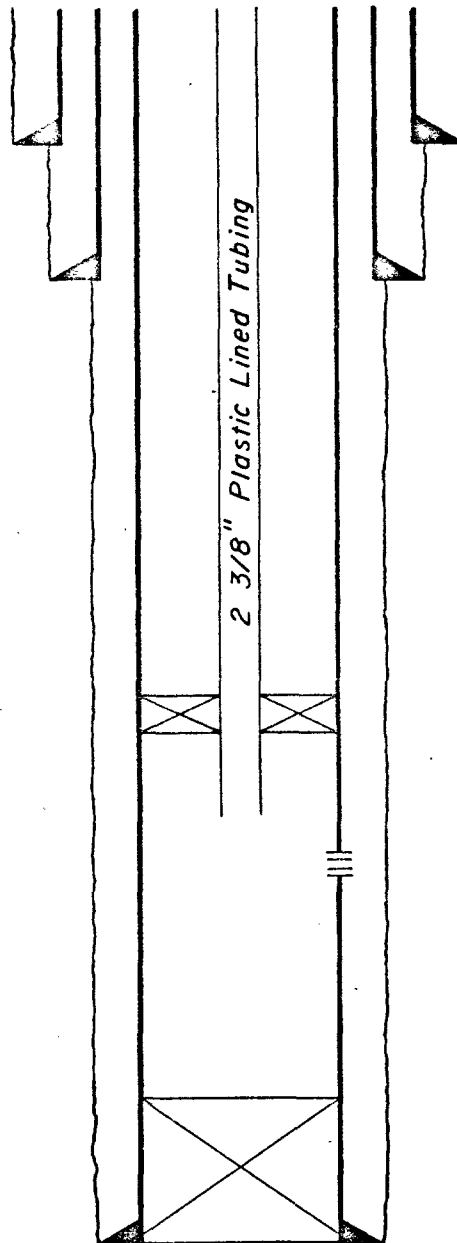
BRONCO (Wolfcamp) FIELD

LEA COUNTY, NEW MEXICO

Tamarack — No. 1
Harris

13 3/8" at 325'
with 260 sx.

8 5/8" at 4572'
with 200 sx.



Set Packer at 9018'

Perfs. 9068'-9100'

P.B. 9154'

T.D. 9700'

5 1/2" at 9700'
with 370 sx.

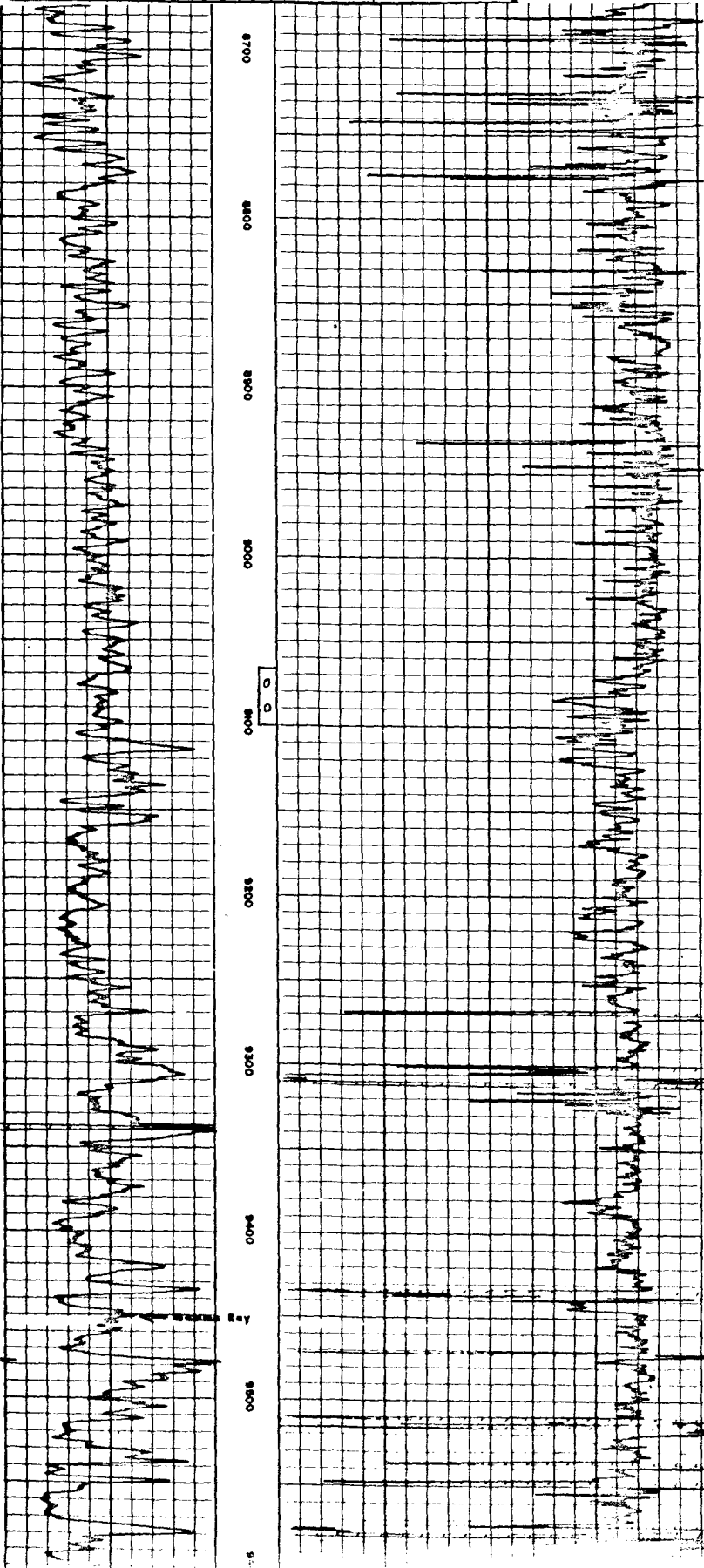
EXHIBIT 2

INJECTION WELL

BRONCO (WOLFCAMP) UNIT

BRONCO (Wolfcamp) FIELD
LEA COUNTY, NEW MEXICO

SCHLUMBERGER		
COUNTY LEA FIELD or LOCATION BRONCO WELL HARRIS # 1 COMPANY JAMES G. BROWN AND ASSOCIATES	COMPANY JAMES G. BROWN AND ASSOCIATES	Other Surveys ES ML F.T.
	WELL HARRIS # 1	Location of Well 1813 FROM E/L 2110 FROM S/L
	FIELD BRONCO	
	LOCATION SEC. 2-13S-38E	
	COUNTY LEA STATE NEW MEXICO	Elevation: K.B., 3810 D.F., 1809 or G.L., 3299
Log Depths Measured From KB 11 Ft. above GL		
RUN No. ONE		
Date 4-4-62		
First Reading 9696		
Last Reading 4580		
Feet Measured 5116		
Csg. Schlum. 4580		
Csg. Driller 4575		
Depth Reached 9703		
Bottom Driller 9700		
Mud Mat. GEL CAUSTIC SODA ASH DRISCOE		
Dens. Visc. 9.3 @ 75 °F		
Mud Resist. .33 @ 158 °F		
" Res. BHT .16 @ 158 °F		
" pH 8.5 @ CC 30 min		
" Wtr. Loss 14.8 @ CC 30 min		
" Rmf .28 @ 76 °F		
Bit Size 7 7/8"		
Spacing: T.S.R. 1 R. 9696 To 8496 To To		
T.S.R. 2 R. 8496 To CSG. To To		
Opr. Rig Time		
Truck No. 1701-HOBBS		
Recorded By OWEN-BROWN		
Witness WYNN		

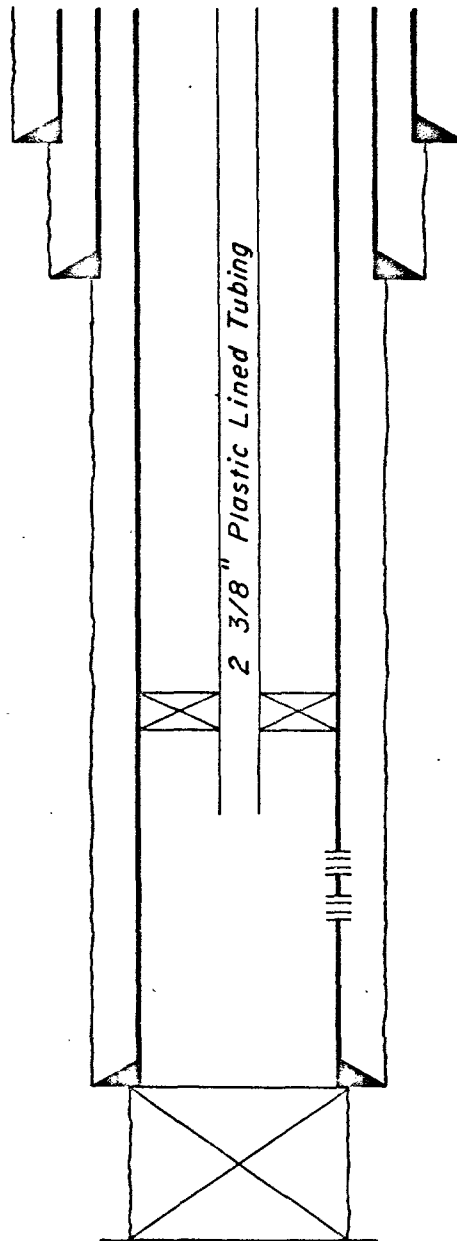


Tamarack - No. 1
Lipscomb Est.

13 3/8" at 363'
with 350 sx.

8 5/8" at 4575'
with 2400 sx.

5 1/2" at 9465'
with 200 sx.



Set Packer at 8997'

Perfs. 9047' - 64'

Perfs. 9072' - 90'

P. B. 9465'

T. D. 11,918'

EXHIBIT 3

INJECTION WELL
BRONCO (WOLFCAMP) UNIT

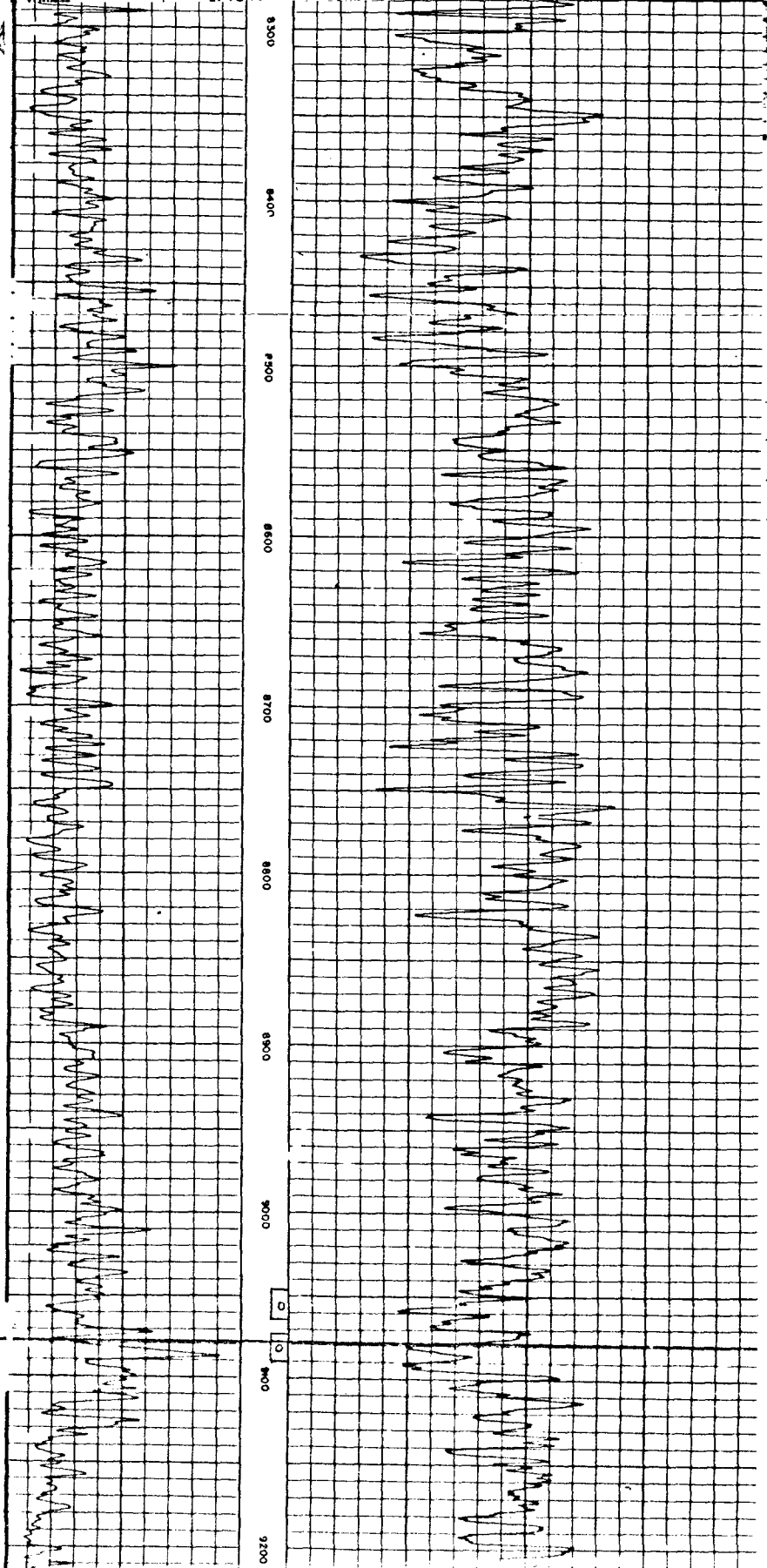
BRONCO (Wolfcamp) FIELD
LEA COUNTY, NEW MEXICO.

SURFACE WELL LOGGING CORPORATION

COUNTY LEA FIELD or LOCATION WELL COMPANY R.C. Lipscomb	COMPANY R.C. LIPSCOMB	Other Surveys ES
	WELL HARRIS # 1	Location of Well
	FIELD WILDCAT	±60' f W/L ±980' f W/L
	LOCATION SEC. 2-13S-30E	Elevation D.F. K.B. 3803 or G.L.
	COUNTY LEA	FILING No.
STATE NEW MEXICO		

Log Depths Measured From KB 15.0 Ft. above GL

RUN NO.	
Date	10-29-57
First Reading	11922
Last Reading	73
Footage Measured	849
Max. Depth Reached	923
Bottom Gravel	1918
Maximum Temp. °F.	160
Fluid Nature	Chem-Gel
Fluid Level	73
Casing Size	8.58 in. 0 to 4575
Casing Weight	in. lb. f to
Casing Size	in. lb. f to
Casing Weight	in. lb. f to
Bit Size	7.78 in. CSG to TD
Bit Size	in. to
No. Counters Used	
Type Equipment	GNAM-4
Type Panel	GNP-C
Op. Rig Time	4 Hrs.
Truck No.	1762-Hobbs
Observer	Howe
Witness	Wright

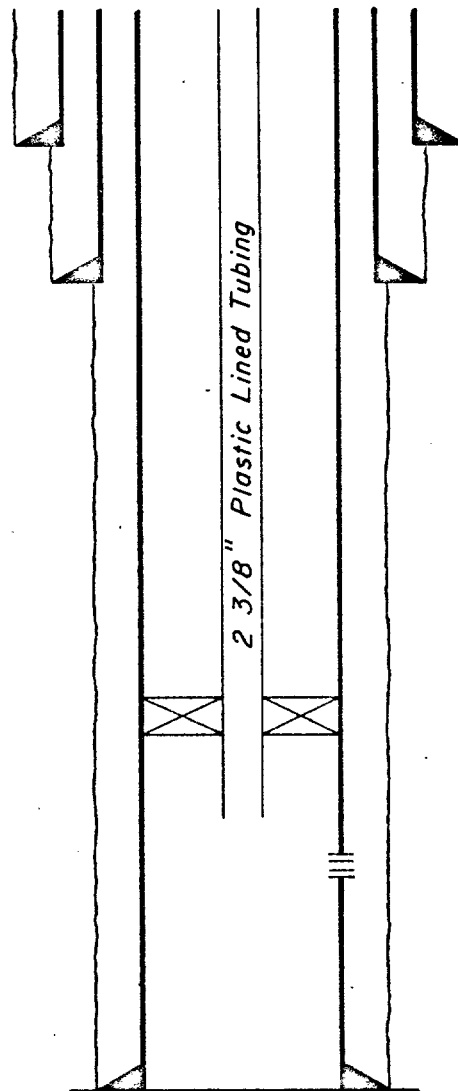


Texaco — No. 3
Harris

13 3/8" at 454'
with 450 sx.

8 5/8" at 4520'
with 1500 sx.

5 1/2" at 9168'
with 400 sx.



Set Packer at 9027'

Perfs. 9077' - 90'

T. D. 9168'

EXHIBIT 4

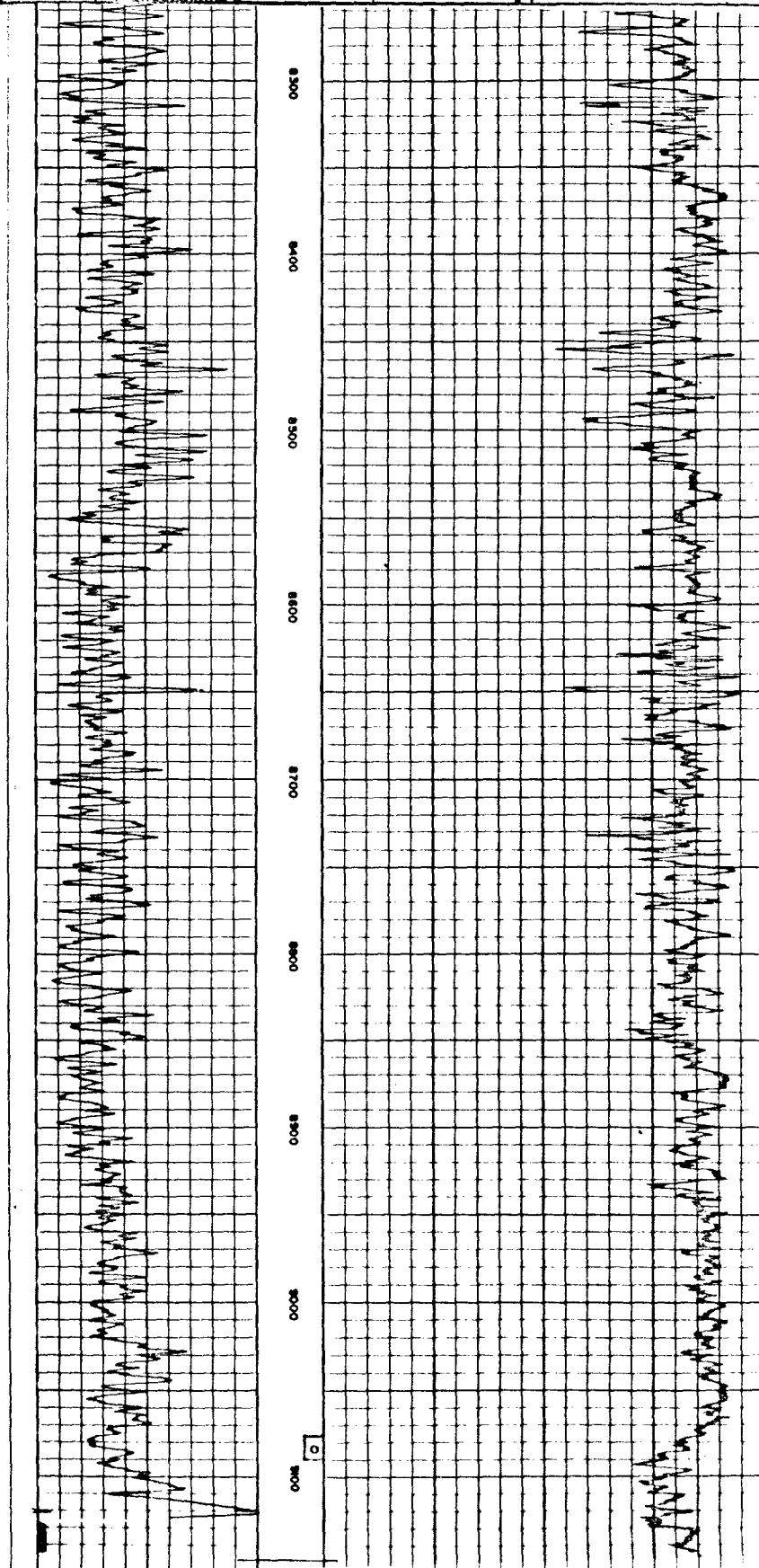
INJECTION WELL
BRONCO (WOLFCAMP) UNIT

BRONCO (Wolfcamp) FIELD
LEA COUNTY, NEW MEXICO

SCOTT WELLS WELL SURVEYING CORPORATION

COUNTY LEA FIELD or LOCATION N. W. BRONCO WELL H. H. HARRIS # 1 COMPANY WHITEHALL OIL CO.	COMPANY WHITEHALL OIL COMPANY	Other Surveys IES, ML
	WELL H. H. HARRIS # 1	Location of Well 990' FWL 660' FSL
	FIELD N. W. BRONCO	
	LOCATION SEC. 35, 12S-38E	
	COUNTY LEA	Elevation: K.B.: D.F.: or G.L.: 3790
STATE NEW MEXICO		

Log Depths Measured From KB		14.5 Ft. above GL	
RUN No.	12-18-59		
Date	12-18-59		
First Reading	9145		
Last Reading	4518		
Feet Measured	4627		
Csg. Schlum.	4518		
Csg. Driller	4520		
Depth Reached	9148		
Bottom Driller	9150		
Mud Nat.	CHEM. GEL		
Dens. Visc.	8.7 @ 44		
Mud Resist.	45 @ 90 °F	@	°F
" Res. BHT	25 @ 153 °F	@	°F
" pH	8.5 @ 153 °F	@	°F
" Wtr. Loss	7.8 @ CC 30 min	@	CC 30 min
" Rmf	14 @ 153 °F	@	°F
Bit Size	7 7/8"		
Span:	3' CSG. To TD	To	To
Oper. Rig Time	4 HRS.	To	To
Truck No.	554 LHR		
Recorded By	B. J. CHASE		
Witness	S. R. CHASE		



June 22, 1971

Mr. J. L. Davis
Enjay Chemical Company
P. O. Box 2100
Hobbs, New Mexico

Subject: Recommendations relative to analyses #671120 and #671121 (6-21-71),
Tamarack Oil's Wolfcamp water & Amerada-Hess's Devonian water.

Dear Mr. Davis:

The attached analytical study was primarily designed to establish compatibilities between these two waters. The interpretations of these results are as follows:

1. Neither of the individual waters show evidence of either calcium carbonate or calcium sulfate scaling tendencies. In like manner, any mixture of these waters should not have any problem in this regard.
2. It is noted that the Wolfcamp water contains a moderate amount of soluble iron and the Devonian water contains a mild amount of hydrogen sulfide. The mixing of these waters in equal quantities would result in the precipitation of essentially all the iron and sulfide from the waters. The equal mixture of these two waters would result in the precipitation of approximately 7.85 mg/l or 2.75 pounds of iron sulfide per 1,000 barrels of the mixed water. We generally classify this as a significant incompatibility, in that this would result in a water quality that would be undesirable for injection or disposal.
3. Other than the above item #2, we find no evidence of any significant detrimental condition resulting from the mixing of these two waters.

Yours very truly,

Waylan C. Martin

WCM/sb

cc: Mr. J. P. Kindle