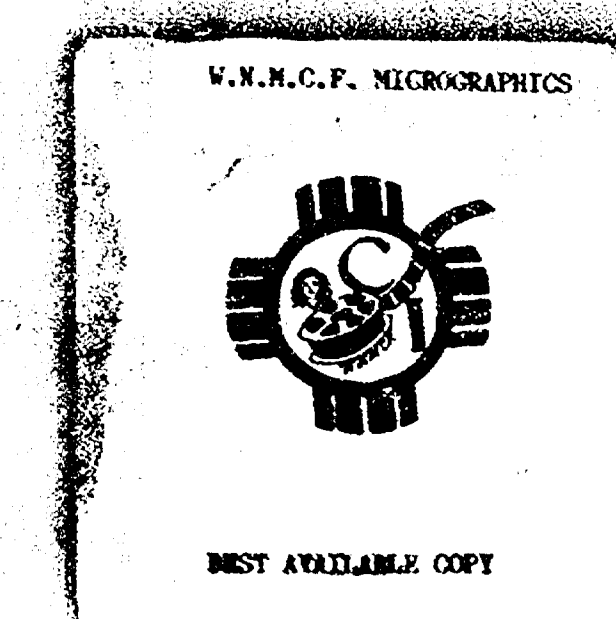


Case No.
2459
Large Exhibits

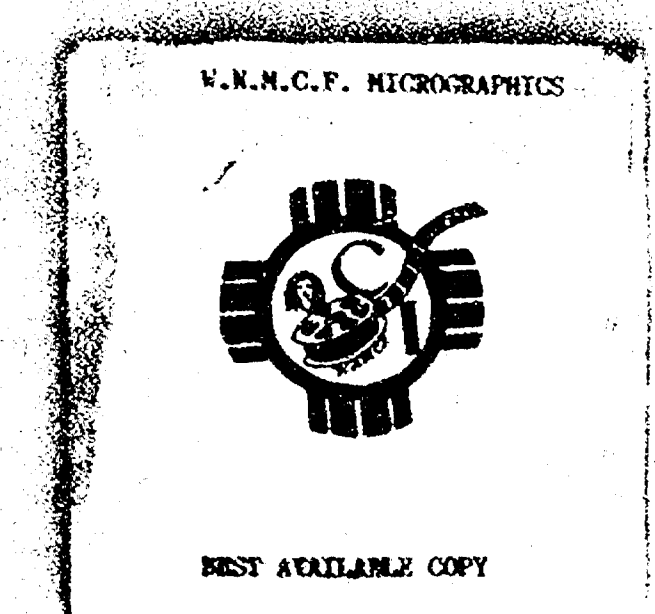


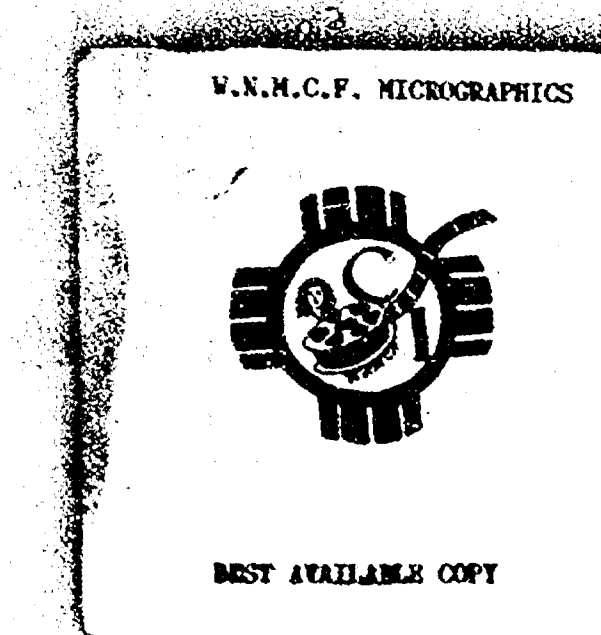
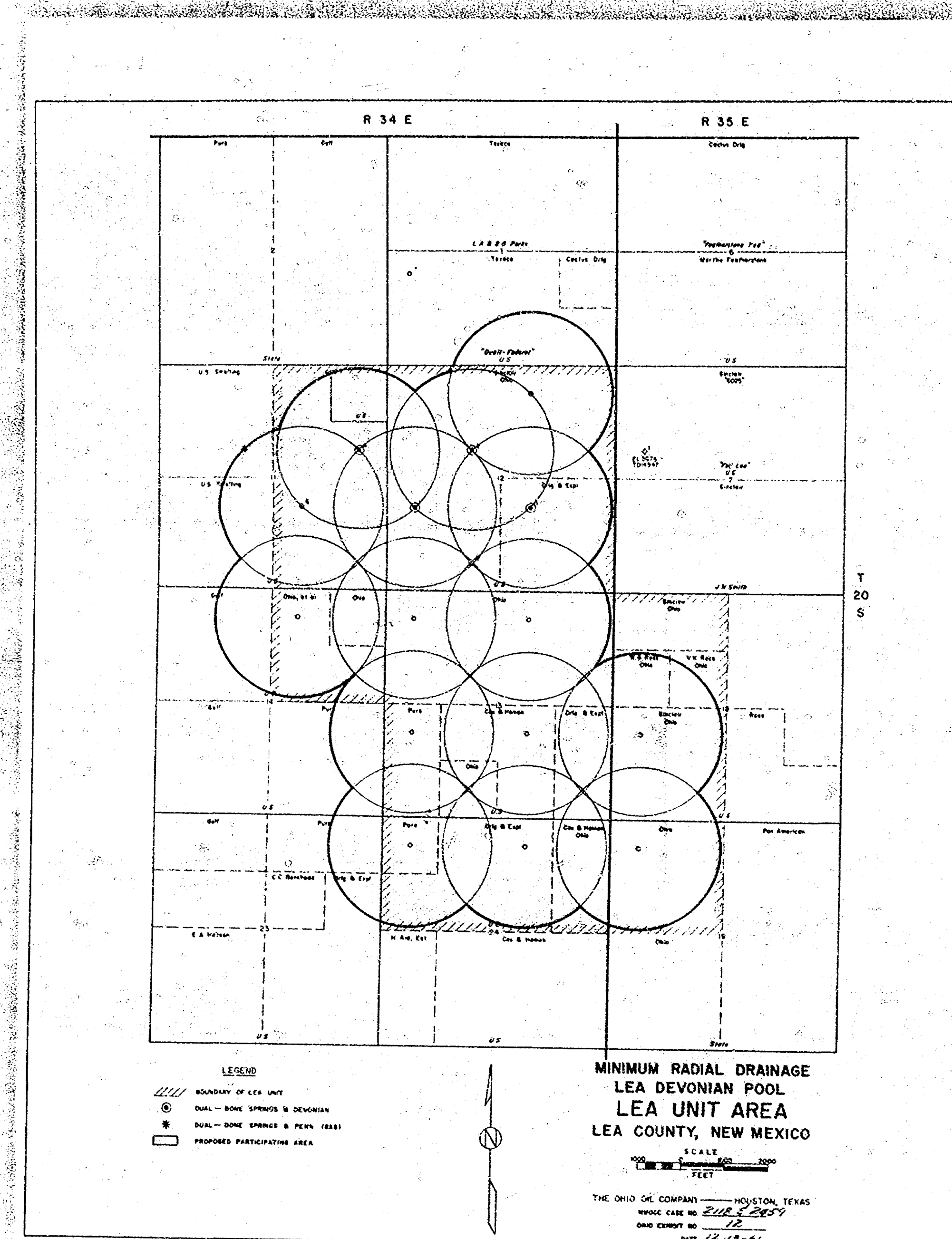
RELATIONSHIP OF TOTAL DAILY WITHDRAWALS
 125 THERMAL TONS
 40-ACRE SPACING VS. 80-ACRE SPACING VS. 160-ACRE SPACING

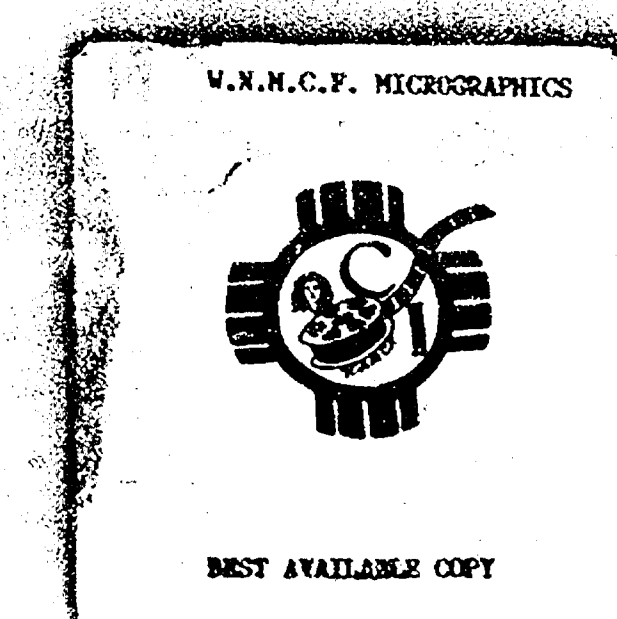
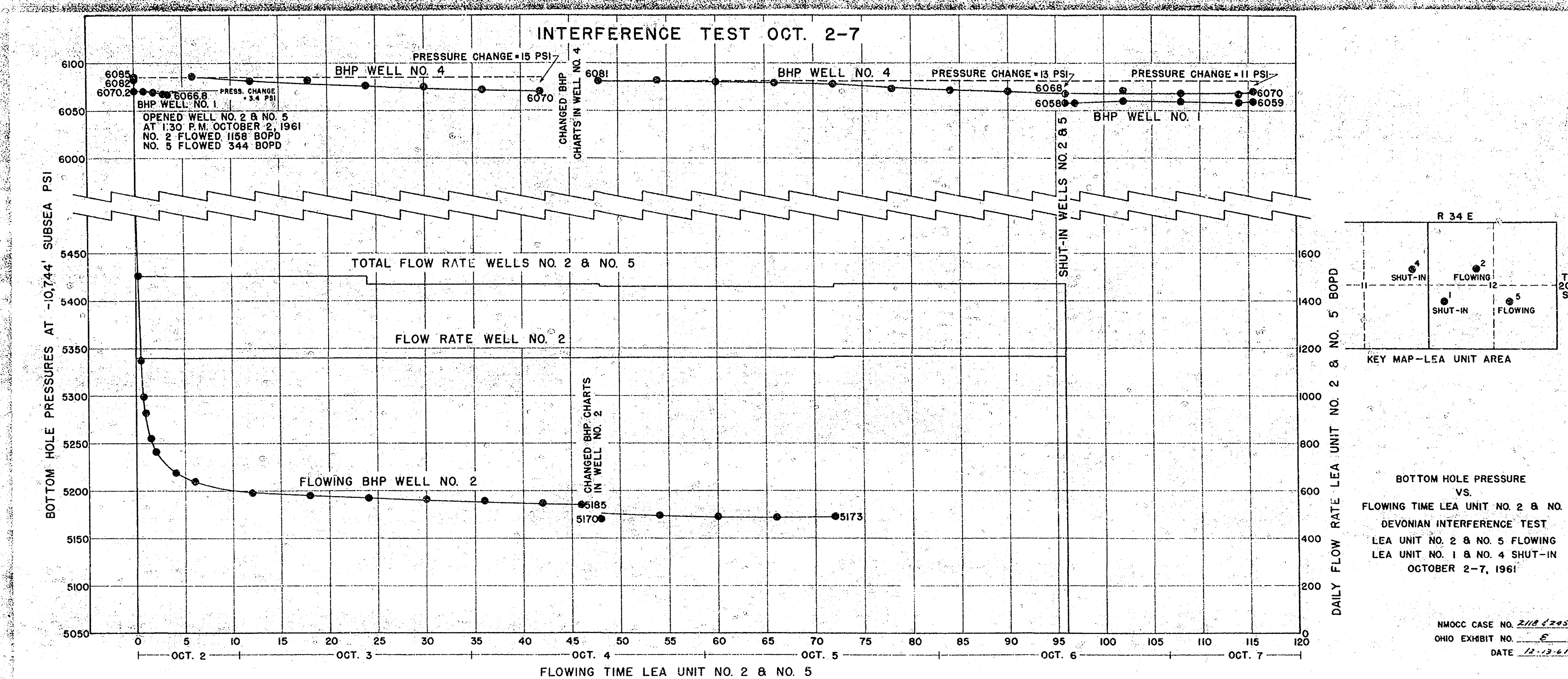
Normal Unit Allowable = 34 BOPD

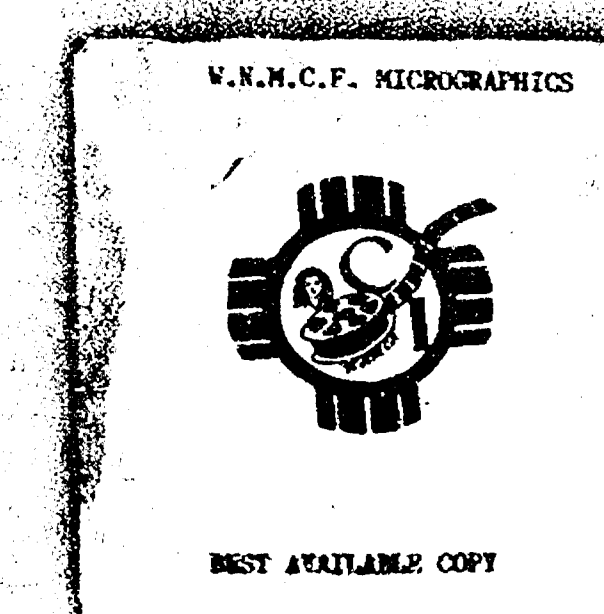
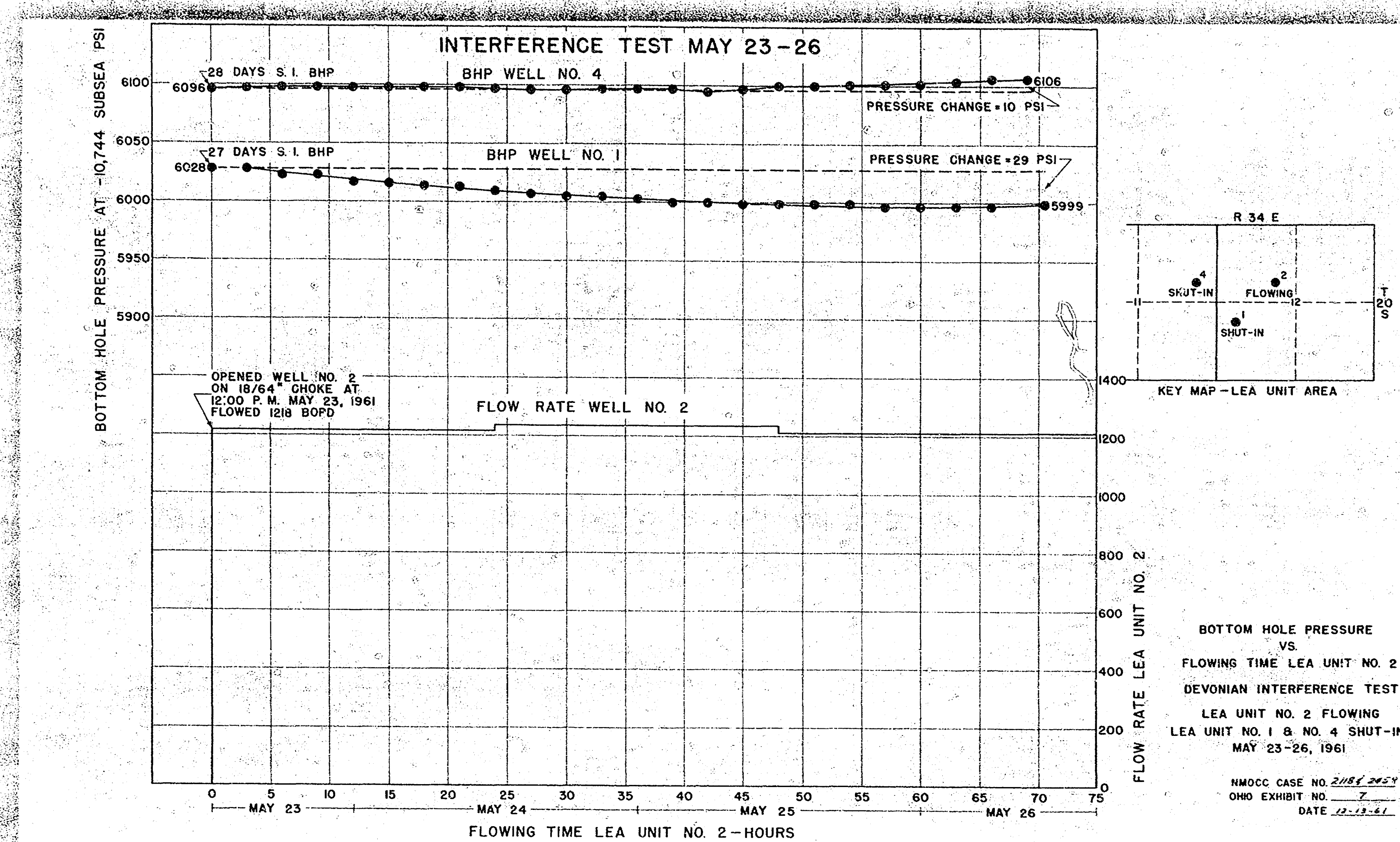
Spacing (Acres)	40	80	160
Allowable Factor 14-15,000'	9.33	10.33	15.50
Top Well Allowable (BOPD)	318	352	587
No. of Wells	57	29	15
Top Field Allowable (BOPD)	18,186	10,208	7,905

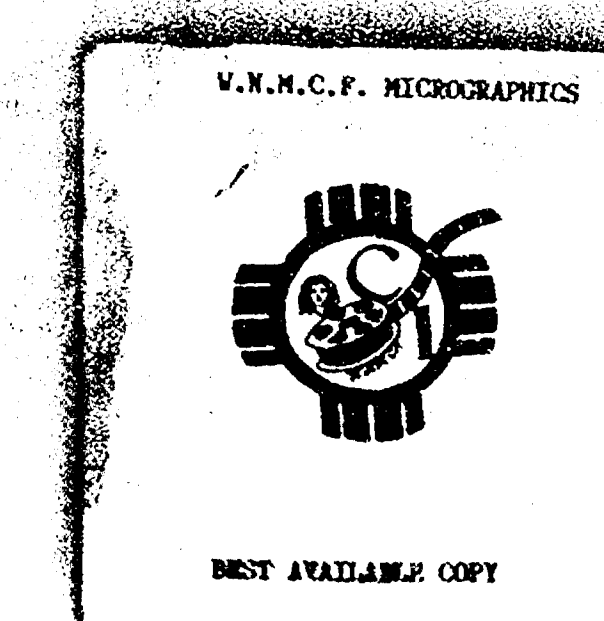
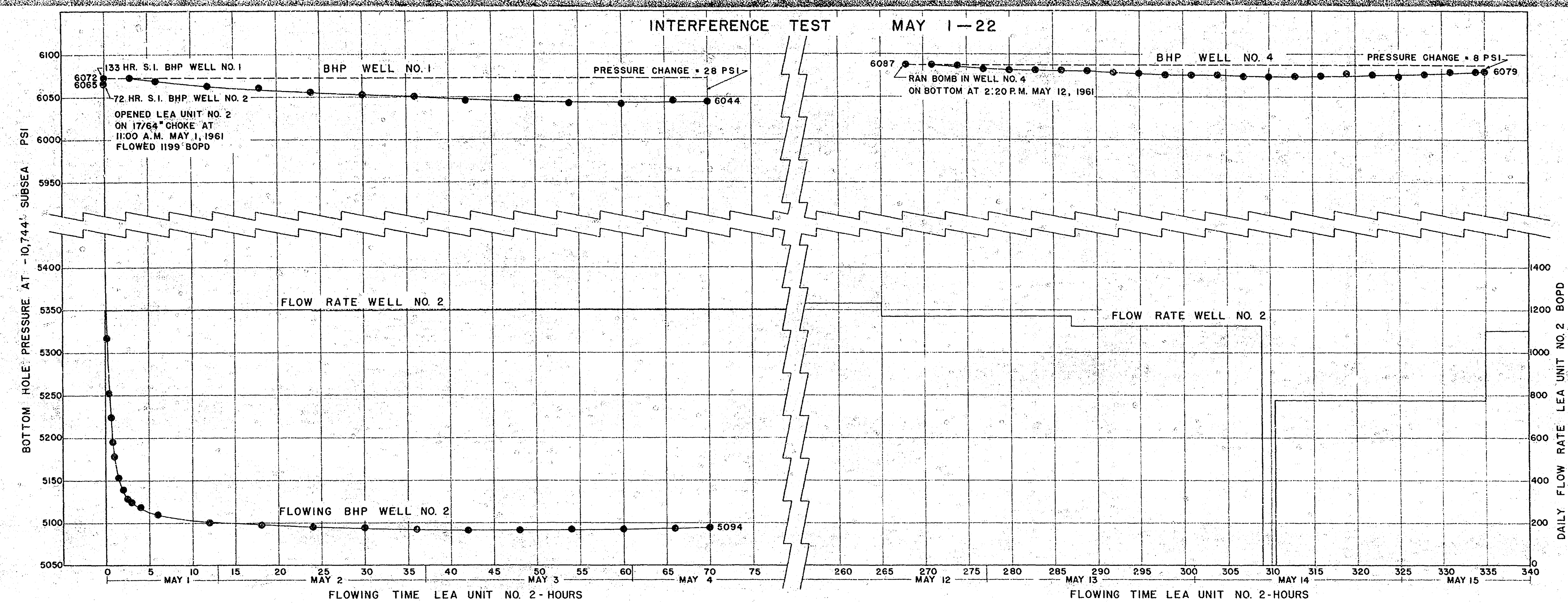
INOCO Case No. 2101-260
 This Exhibit No. 13
 Date 12-1-51

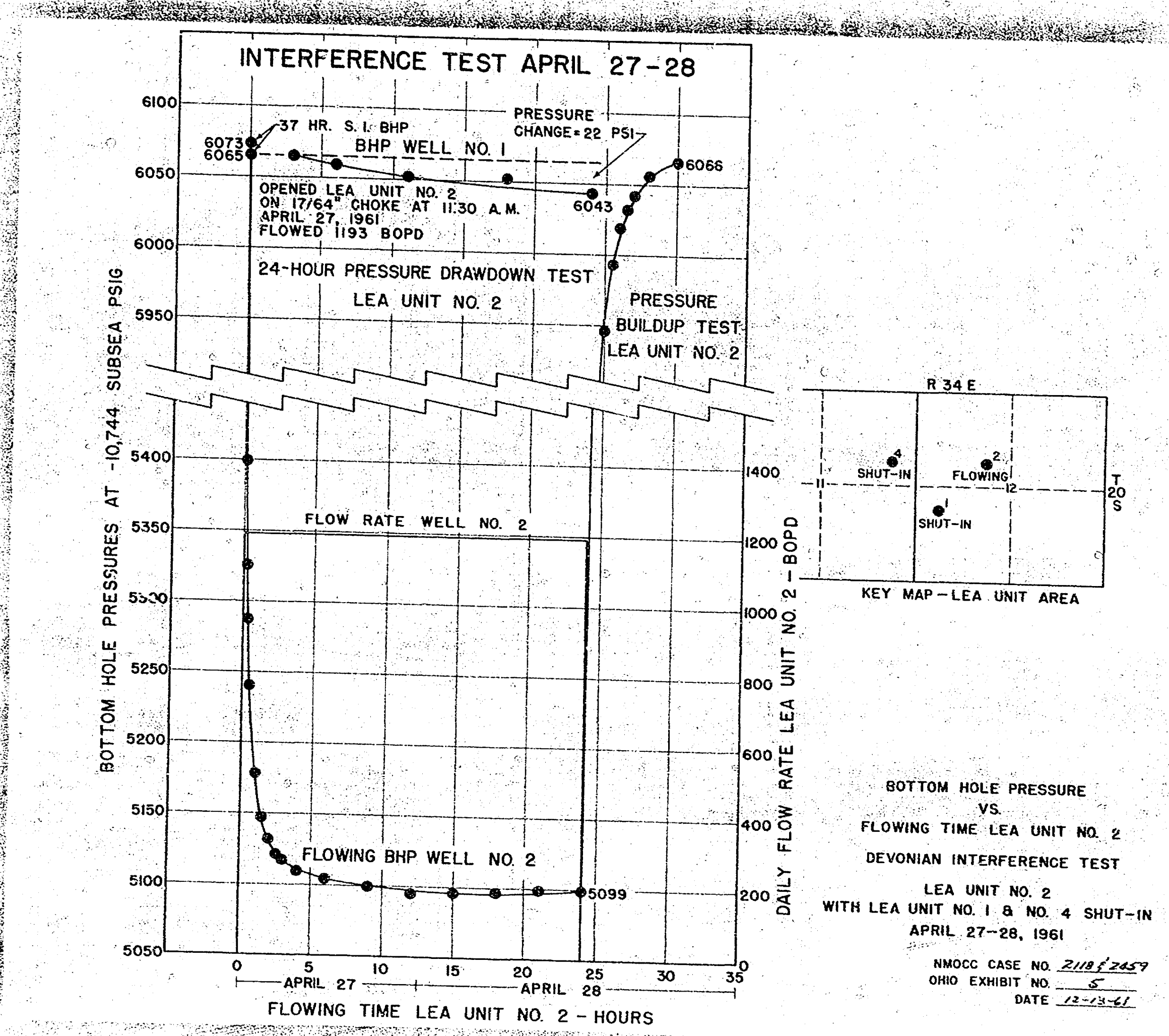




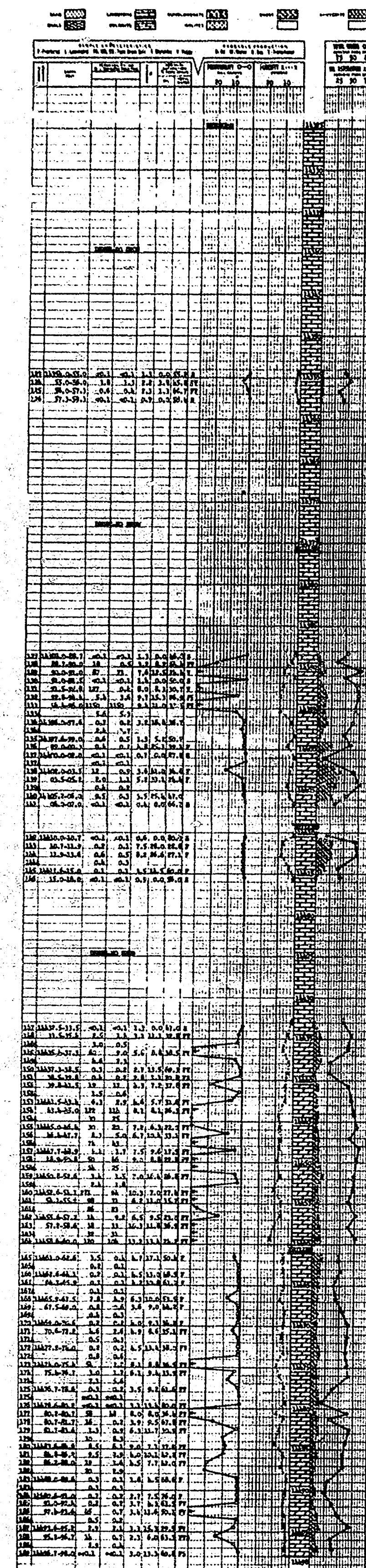






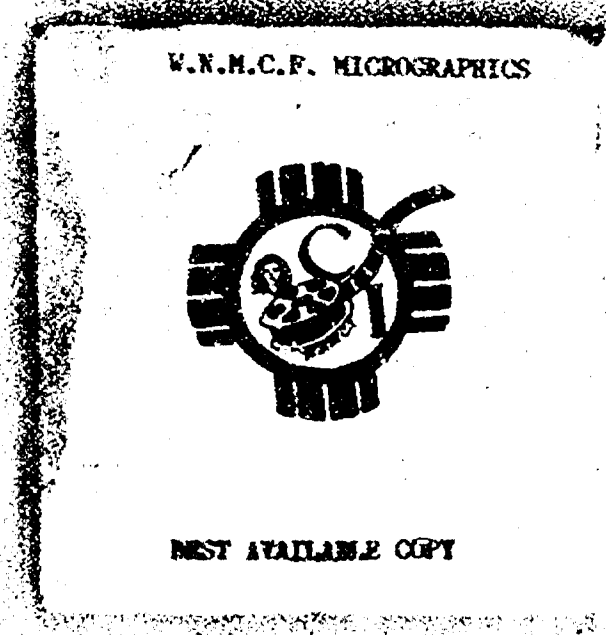
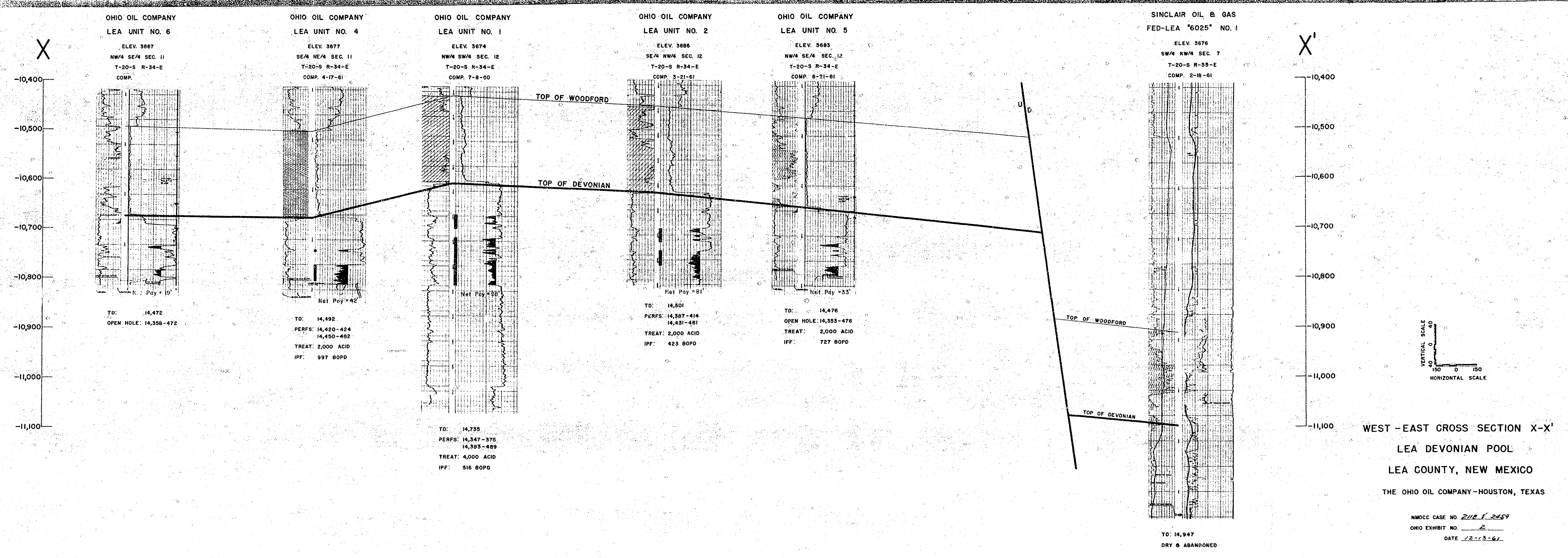


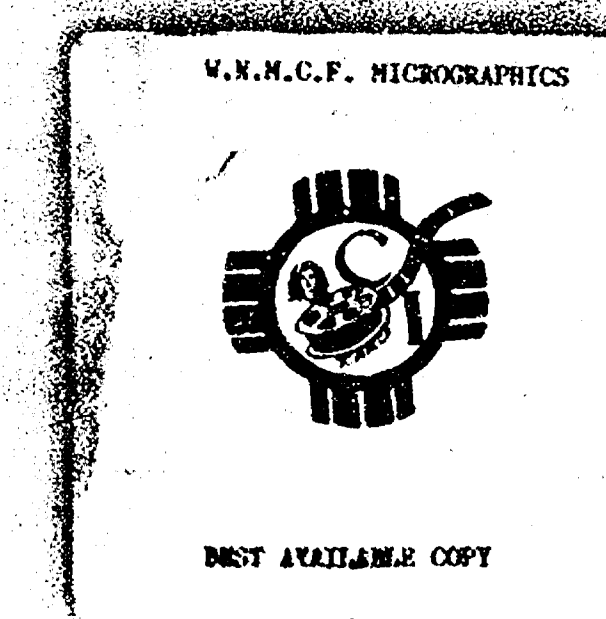
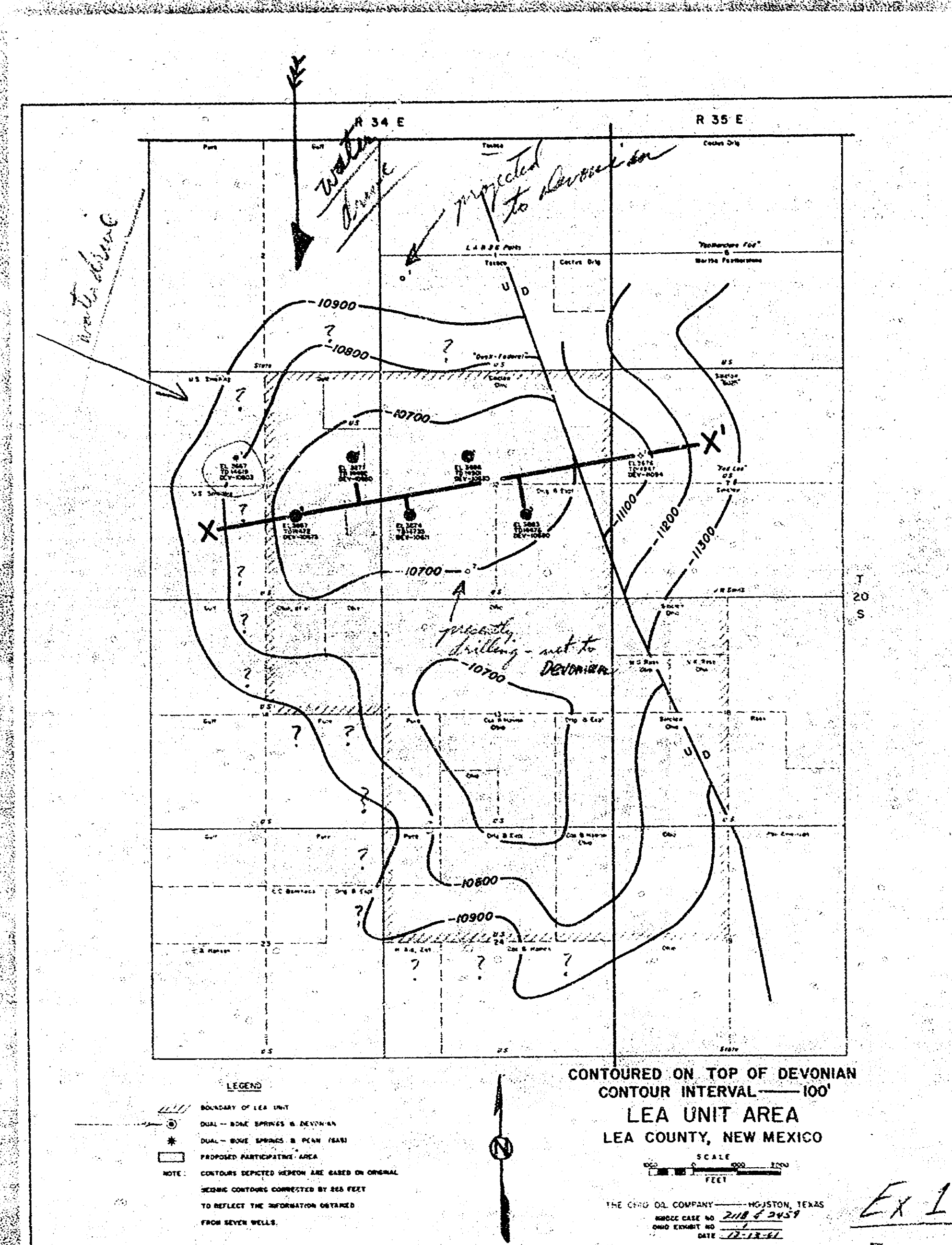
OHIO OIL COMPANY
LEA UNIT FEDERAL WELL NO. 2
ELEV. 3696
SE 1/4 NW 1/4 SEC. 12, T-20-S, R-34-E
COMPLETION COREGRAPH OF DEVONIAN

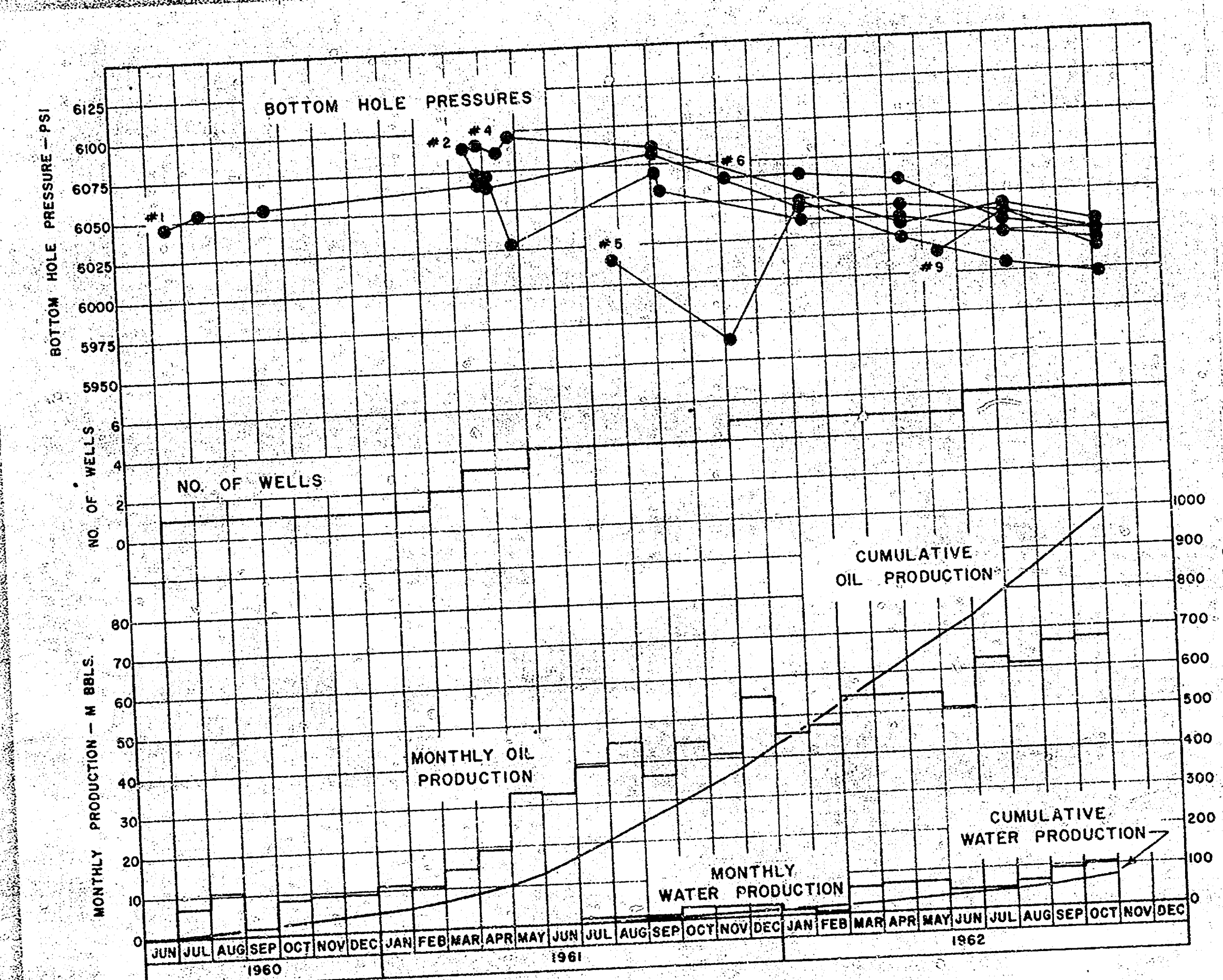


WELL CASE NO. 2087-2659
WELL DEPTH NO. 1
DATE 12-13-61



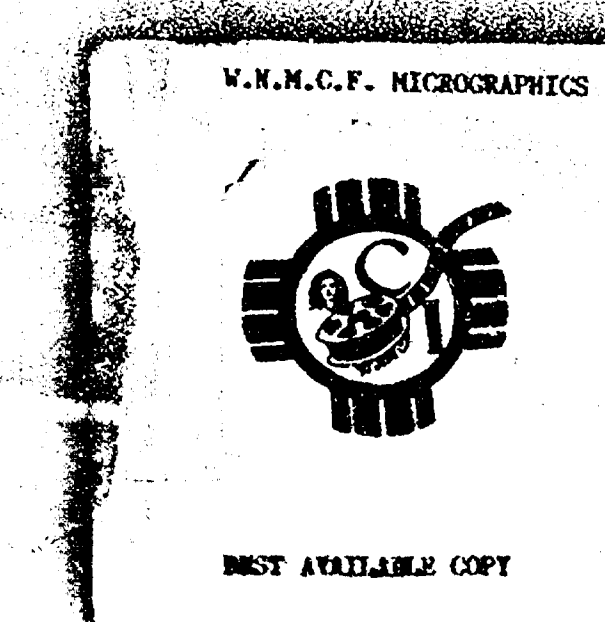






PRODUCTION HISTORY GRAPH
LEA DEVONIAN POOL
LEA COUNTY, NEW MEXICO

NWCC CASE NO. 2484287
MARATHON EXHIBIT NO. 4
DATE 12-11-62



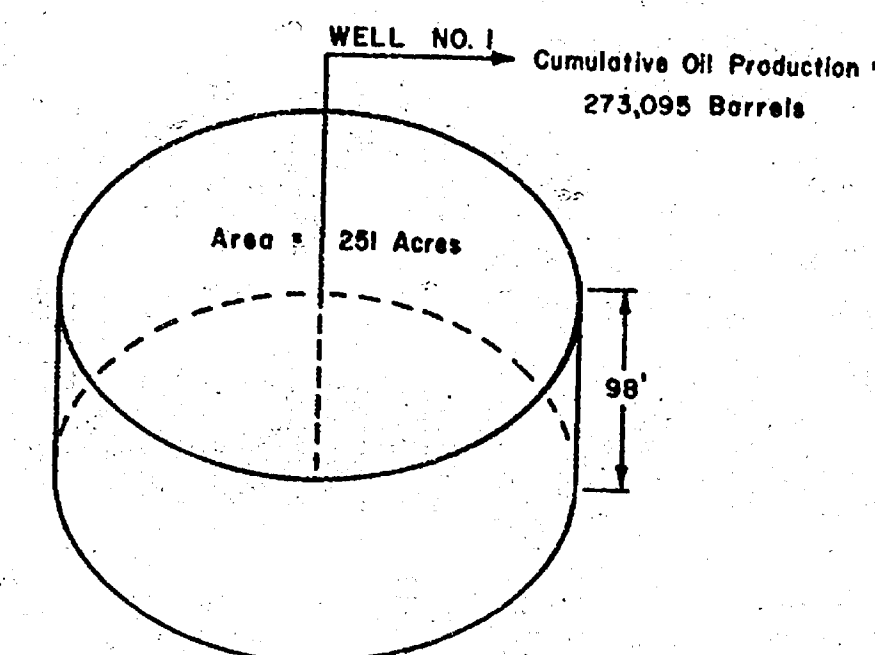
LEA DEVONIAN POOL
WELL NO. 1
WELL NO. 2

NOTE: IN ADDITION TO PRESSURE
WELL NO. 10 - 1011

DATE	WELL NO. 1 Pressure (psi)	WELL NO. 2 Pressure (psi)	WELL NO. 3 Pressure (psi)	WELL NO. 4 Pressure (psi)	WELL NO. 5 Pressure (psi)	WELL NO. 6 Pressure (psi)	WELL NO. 7 Pressure (psi)	WELL NO. 8 Pressure (psi)	WELL NO. 9 Pressure (psi)
7-15-60	181	604							
8-15-60	65	604							
10-13-60	23	607							
4-13-61			19	609					
3-26-61			35	603					
4-29-61		27	605	35	603				
5-1-61		133	602	71	605				
5-12-61				456	607				
5-23-61		648	608		625	605			
6-23-61					25	605			
10-2-61		204	609						
10-6-61		361	609						
12-2-61					24	590	53	605	
2-13-62		24	606	27	604				
2-2-62		16	606	43	604	47	603	31	603
7-13-62									
8-2-62		23	603	24	608	25	601	18	602
11-7-62		24	609	28	604	27	603	27	597
								25	604
								28	605

WCCO Case No. 2118 & 2167
Memorandum Exhibit No. 5
Date 12-17-62

PRESSURE DECLINE CALCULATED FOR LEA UNIT NO. 1
FROM
JULY, 1960 TO NOVEMBER, 1962
BASED ON MAXIMUM RADIAL DRAINAGE OF 251 ACRES



Pressure Decline = $\frac{P_0}{c_{eff}} \times \frac{R_0}{R_{01}}$

Pressure Decline = $\frac{(23.2 \times 10^{-6})(5.04 \times 10^6)}{1.185} \times 1.185$

Pressure Decline = $\frac{338,911}{1.185}$

Pressure Decline = 28438 psi

Measured Pressure Decline from July, 1960
to November, 1962 = 27 psi

WCCO Case No. 2118 & 2167
Memorandum Exhibit No. 6
Date 12-17-62

The Material Balance for an oil reservoir producing when the reservoir pressure is above the bubble point pressure of the reservoir fluid is given by the following equation:

$$N_{01} c_{eff} \Delta p = N_p R_0 + W_e + R_w W_p$$

where:

- N = original oil in place
- N_p = cumulative oil production
- R_0 = oil formation volume factor
- W_e = cumulative water influx
- R_w = water formation volume factor
- W_p = cumulative water production
- Δp = reservoir pressure decline
- R_{01} = initial oil formation volume factor
- c_{eff} = effective fluid compressibility

$$c_{eff} = \frac{R_0 c_o + R_w c_w + c_f}{R_0}$$

- R_0 = oil saturation
- c_o = oil compressibility
- R_w = water saturation
- c_w = water compressibility
- c_f = formation or rock compressibility

For a volumetric reservoir $W_e = 0$ and $W_p = 0$ and the above equation reduces to:

$$N_{01} c_{eff} \Delta p = N_p R_0$$

The reservoir pressure decline at any time is thus given by the following expression:

$$\Delta p = \frac{N_p R_0}{c_{eff} N_{01}}$$

Basic Data for Lea Unit No. 1:

- Porosity (ϕ) = 5.4%
- Water Saturation (R_w) = 4%
- Net Pay (h) = 90 feet
- Area (A) = 251 acres
- Initial Formation Volume Factor (R_{01}) = 1.185
- Oil Compressibility (c_o) = 9.99×10^{-6} vol/vol/psi
- Water Compressibility (c_w) = 3.00×10^{-6} vol/vol/psi
- Rock Compressibility (c_r) = 6.25×10^{-6} vol/vol/psi

Original Oil in Place in 251 Acres Surrounding Lea Unit No. 1

$$N = \frac{7780 Ah \phi (1 - R_w)}{R_{01}}$$

$$N = \frac{(7780)(251)(90)(0.054)(0.96)}{1.185}$$

$$N = 5,040,000 \text{ bbls. of stock tank oil}$$

Effective Fluid Compressibility

$$c_{eff} = \frac{R_0 c_o + R_w c_w + c_f}{R_0}$$

$$c_{eff} = \frac{[(0.97)(9.99) + (0.03)(3.0) + (6.25)] \times 10^{-6}}{(0.97)}$$

$$c_{eff} = 23.2 \times 10^{-6} \text{ vol/vol/psi}$$

LEA DEVONIAN POOL
WELL COST DATA

	DRILLING COST \$	COMPLETION COST \$	DRILLING AND COMPLETION COST \$	SURFACE EQUIPMENT COST \$	GRAND TOTAL \$
Well No. 1	395,096	261,315	657,411	39,740	697,151
Well No. 2	354,201	187,371	541,572	22,840	564,412
Well No. 4	366,761	148,345	515,106	5,981	521,087
Well No. 5	368,523	190,931	559,454	5,948	565,403
Well No. 6	305,286	125,667	430,953	12,113	443,066
TOTAL	1,790,867	973,829	2,764,696	85,622	2,850,319
Average Per Well	358,173	194,766	552,939	17,124	570,264
Average Per Well Including \$1	348,693	178,129	526,821	11,701	538,542
Estimated Cost to Drill			25,000		
Estimated Cost Per Devonian Well			\$ 501,821		
Number of Devonian Wells to Date			1		
Approximate Total Devonian Well Costs to Date			\$3,512,747		

WCCO Case No. 2118 & 2167
Memorandum Exhibit No. 7
Date 12-17-62

