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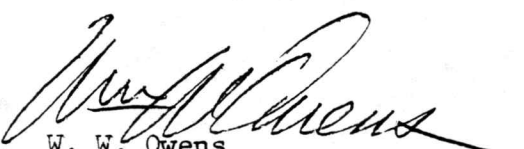
J. A. Momper
Research Center

Subject: Effects of Confining Pressure on the Permeabilities of Council
Groves Formation Samples, Amoco Miles Unit "B" No. 2, Panoma
Field, Kansas

This presents the results of the subject tests requested in your Technical
Service Work Order of December 5, 1975, T.S. 5588X.

Permeabilities to air of eight 3/4 inch diameter x 1 inch long plug
samples were measured at increasing confining pressures from 500 to 10,000
psi. Permeabilities were measured again at 500, 5,000, and 10,000 psi as
requested. Hysteresis occurred as is commonly observed in fractured cores.
Three samples contained no fractures, three companions to these contained
fabricated planar fractures, and two contained natural fractures. The
results are given in tabular form as requested by Ron Nelson.

Inspection of the data shows that confining pressure had significant effects
on permeability. At 10,000 psi confining pressure permeability was reduced
47% to 99%. Also of interest is that both fractured and unfractured samples
show a linear decrease in the cube root of permeability with the logarithm
of increasing confining pressure. This linear relationship, first found in
a study of fractured carbonate rocks several years ago, has also been found
to apply to the majority of samples, both sand and carbonate, fractured or
unfractured, which have been investigated since.


W. W. Owens

FJ:hmc
0646
Attachment

cc: M. S. Kraemer
Ron Nelson

Amoco Production Company

AUG 20 1976

15-093-2024

1 DGL
2 RTB
3 MGH

TABLE 1

EFFECT OF CONFINING PRESSURE ON AIR PERMEABILITY

Council Groves Formation
Miles Unit "B" No. 2
Panoma Field, Kansas

A. Unfractured Samples

Confining Pressure, psi	2956-57		3007-08		3093-94	
	Sample 72		Sample 123a		Sample 201b	
	Perm, md	% Perm. Remaining	Perm, md	% Perm. Remaining	Perm, md	% Perm. Remaining
500	0.000845	100.0	0.159	100.0	0.00123	100.0
1,000	0.000380	45.0	0.138	86.8	0.000435	35.4
1,500	0.000212	25.1	0.128	80.5	0.000181	14.7
2,500	0.000168	19.9	0.114	71.7	0.0000641	5.21
5,000	0.000119	14.1	0.101	63.5	0.0000270	2.20
7,500	0.0000972	11.5	0.091	57.2	0.0000205	1.67
10,000	0.0000817	9.7	0.084	52.8	0.0000143	1.16
500	0.00116	-	0.165	-	0.00149	-
5,000	0.000108	-	0.104	-	0.0000283	-
10,000	0.0000806	-	0.089	-	0.0000200	-

TABLE 1, (cont'd)

B. Samples with Artificial Fractures

Confining Pressure, psi	2986-57		3007-08		3093-94	
	Sample 72		Sample 123		Sample 201	
	<u>Perm, md</u>	<u>% Perm. Remaining</u>	<u>Perm, md</u>	<u>% Perm. Remaining</u>	<u>Perm, md</u>	<u>% Perm. Remaining</u>
500	22.6	100.0	115.5	100.0	6.01	100.0
1,000	18.3	81.0	74.2	64.2	3.92	65.2
1,500	13.8	61.1	54.7	47.4	2.93	48.8
2,500	10.6	46.9	35.0	30.3	1.98	32.9
5,000	6.24	27.6	15.6	13.5	1.034	17.2
7,500	4.12	18.2	8.36	7.24	0.634	10.6
10,000	2.90	12.8	4.85	4.20	0.425	7.07
500	9.84	-	13.03	-	4.00	-
5,000	3.57	-	5.56	-	0.935	-
10,000	2.03	-	3.65	-	0.346	-

TABLE 1, (cont'd)

C. Samples with Natural Fractures

<u>Confining Pressure, psi</u>	<u>3008-09</u> Sample 124a		<u>3093-94</u> Sample 201	
	<u>Perm, md</u>	<u>% Perm. Remaining</u>	<u>Perm, md</u>	<u>% Perm. Remaining</u>
500	8.16	100.0	2.60	100.0
1,000	5.88	72.1	1.300	50.0
1,500	4.31	52.8	0.760	29.2
2,500	2.45	30.0	0.348	13.4
5,000	0.828	10.1	0.102	3.92
7,500	0.358	4.39	0.0418	1.61
10,000	0.175	2.14	0.0209	0.804
500	1.514	-	0.386	-
5,000	0.245	-	0.0341	-
10,000	0.146	-	0.0178	-