4/26/93

CORE ANALYSIS REPORT

FOR

AMOCO PRODUCTION COMPANY

SHANKLE NO. 2-9
HUGOTON FIELD
KEARNY COUNTY, KANSAS

Western Atlas International
A Litton/Dresser Company

CORE LABORATORIES

March 26, 1993

AMOCO PRODUCTION COMPANY
Box 800
1670 Broadway
Denver, Colorado 80201

File No.: 57181-16763
Subject: Core Analysis
Shankle No. 2-9
Hugoton Field
Kearny County, Kansas

Gentlemen:

Full diameter core analysis was performed on 34 sample

Fluid removal was achieved using a low temperature gas solvent extraction method.

Porosity was determined by direct pore volume measurement using Boyle's law helium expansion. Bulk volume was measured by Archimedes Principle. Grain density was calculated from dry weight, bulk volume and pore volume measurements.

$$\text{Grain Density} = \frac{\text{Dry Weight}}{\text{Bulk Vol.} - \text{Pore Vol.}}$$

Steady State Air Permeability was measured in two horizontal directions and vertically while the core was confined in a Hassler rubber sleeve.

Core analysis data is presented in tabular and graphical form for your convenience.

The core will remain at our Midland facility (thirty days free of charge) as we await further disposition instructions.

We trust these data will be useful in the evaluation of your property and thank you for the opportunity of serving you.

Very truly yours,
CORE LABORATORIES, a division of
WESTERN ATLAS INTERNATIONAL, INC.

Dean Olson

Dean Olson
Laboratory Manager

DO/yn

2001 Commerce Drive, P.O. Box 4337, Midland, Texas 79704, (915) 694-7761

[redacted]

CORE LABORATORIES

Company : AMOCO PRODUCTION COMPANY
Well : SHANKLE NO. 2-9
Location :
Co,State : KEARNY COUNTY, KANSAS

Field : HUGOTON FIELD
Formation :
Coring Fluid :
Elevation :

File No.: 57181-16763
Date : 3-9-93
API No. :
Analysts: OLSON

C O R E A N A L Y S I S R E S U L T S

SAMPLE NUMBER	DEPTH ft	PERMEABILITY (MAXIMUM) Kair md	PERMEABILITY (90 DEG) Kair md	PERMEABILITY (VERTICAL) Kair md	LOW TEMP POROSITY	GRAIN DENSITY gm/cc	
1	2467.8- 68.3	2.67	2.52	0.02	13.2	2.68	
2	2514.5- 14.8	1.45	1.42	0.12	13.0	2.70	
3	2542.4- 42.8	1.60	1.05	0.17	13.9	2.70	Herington
4	2546.9- 47.5	1.11	1.00	0.27	11.7	2.70	
5	2550.9- 51.3	0.59	0.56	0.15	10.4	2.72	
6	2558.8- 59.3	1.85	0.69	<.01	9.2	2.72	Odell
7	2588.4- 88.9	0.63	0.55	0.03	11.3	2.79	
8	2591.7- 92.2	2.52	2.50	1.89	12.3	2.74	
9	2606.3- 06.7	1.24	1.15	0.69	13.8	2.71	
10	2633.5- 34.0	1.33	1.29	0.32	12.8	2.72	Gage
11	2656.3- 56.7	0.13	0.11	<.01	9.9	2.75	Towanda
12	2694.0- 94.5	3.40	3.18	2.84	17.3	2.88	
13	2698.8- 99.2	0.65	0.64	0.28	13.8	2.79	
14	2714.9- 15.3	16.6	16.4	7.23	22.7	2.83	
15	2724.6- 25.0	10.5	10.1	8.12	19.0	2.69	
16	2729.1- 29.5	2.00	1.98	1.47	17.1	2.70	
17	2761.1- 61.6	0.78	0.74	0.17	14.4	2.69	
18	2772.5- 72.9	8.99	8.71	3.84	27.8	2.80	
19	2789.9- 90.2	1.57	1.54	1.48	14.5	2.68	
20	2814.6- 15.0	0.12	0.11	0.02	9.5	2.71	
21	2880.0	0.34	0.29	0.19	10.6	2.68	
22	2853.0	1.86	1.81	0.58	12.3	2.72	BSN
23	2893.7- 94.2	1.20	1.17	1.52	16.8	2.70	
24	2915.7- 16.2	0.51	0.51	0.28	10.8	2.71	DX
25	2936.0	8.15	7.83	5.83	25.2	2.86	
26	2937.0	8.13	7.93	2.45	24.8	2.84	F
27	2942.8- 43.3	0.64	0.63	0.70	9.6	2.73	

CORE LABORATORIES

Company : AMOCO PRODUCTION COMPANY
Well : SHANKLE NO. 2-9

Field : HUGOTON FIELD
Formation :

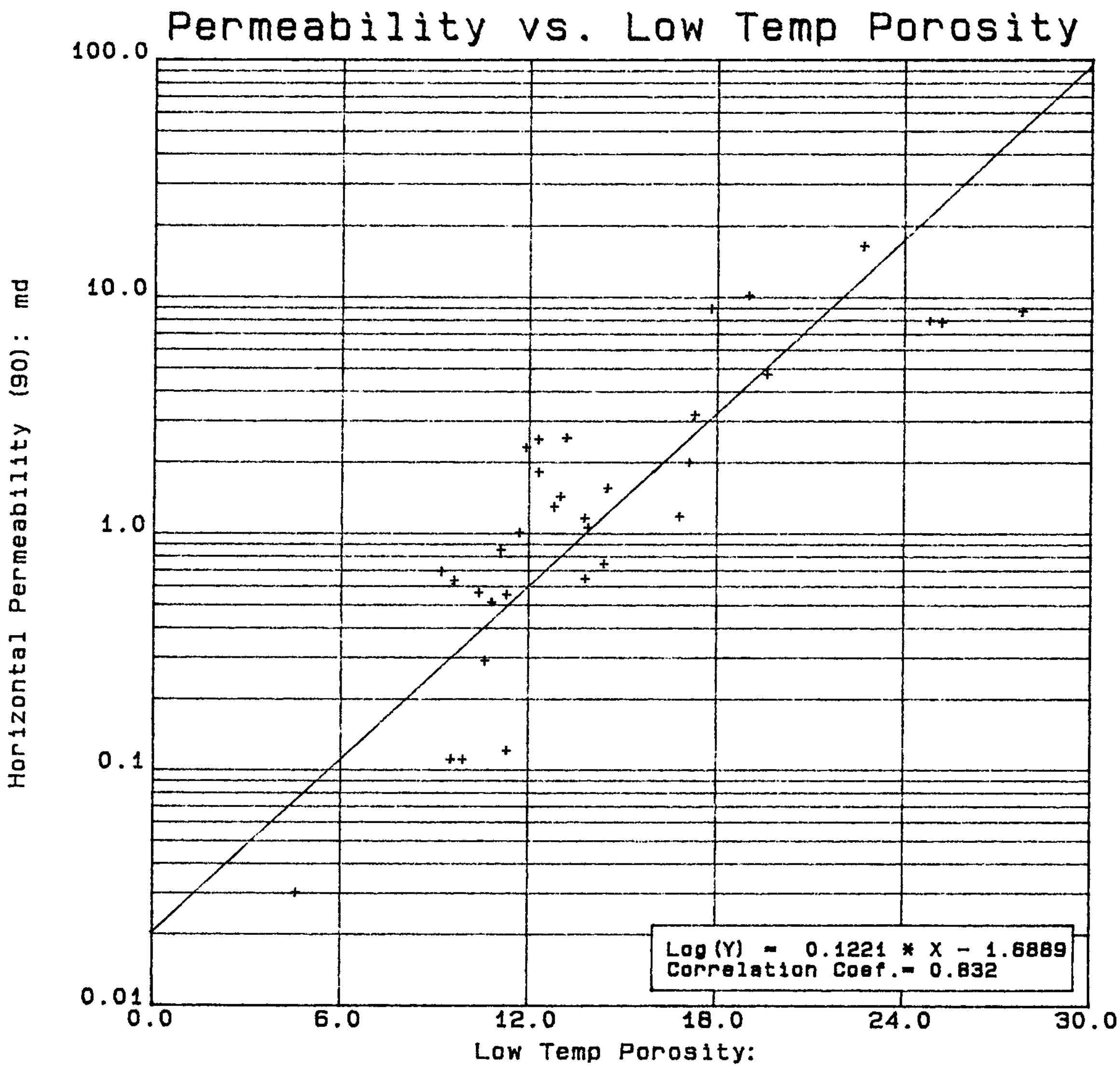
File No.: 57181-16763
Date : 3-9-93

C O R E   A N A L Y S I S   R E S U L T S

SAMPLE NUMBER	DEPTH ft	PERMEABILITY (MAXIMUM) Kair md	PERMEABILITY (90 DEG) Kair md	PERMEABILITY (VERTICAL) Kair md	LOW TEMP POROSITY	GRAIN DENSITY gm/cc
28	2981.0	0.12	0.12	<.01	11.3	2.72
29	2986.0	0.03	0.03	<.01	4.6	2.68
30	3041.0	0.85	0.85	0.76	11.1	2.72
31	3103.8- 04.3	2.33	2.31	0.25	11.9	2.75
32	3106.0	9.70	8.94	7.08	17.8	2.74
33	3109.0	4.70	4.70	2.99	19.6	2.72
34	3110.0	0.29	0.21	<.01	8.3	2.70

DISTRIBUTION OF FINAL REPORT

5 COPIES	AMOCO PRODUCTION COMPANY ATTN: MR. MARTY WILLIAMS BOX 800 1670 BROADWAY DENVER CO 80201



AMOCO PRODUCTION COMPANY
SHANKLE NO. 2-9
HUGOTON FIELD

(2468.6-3110 feet)

Core Laboratories 3-9-93

- LEGEND -
Not Specified

CORE LABORATORIES

Company : AMOCO PRODUCTION COMPANY
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TABLE I

SUMMARY OF CORE DATA

ZONE AND CUTOFF DATA

ZONE:

Identification ---------	NOT SPECIFIED
Top Depth ----------------	2467.8 ft
Bottom Depth -------------	3110.0 ft
Number of Samples --------	33

DATA TYPE:

Porosity --------------	(HELIUM)
Permeability -----------	(90 DEG) Kair

CUTOFFS:

Porosity (Minimum) -------	0.0 %
Porosity (Maximum) -------	100.0 %
Permeability (Minimum) ---	0.0100 md
Permeability (Maximum) ---	1000. md
Water Saturation (Maximum)	
Oil Saturation (Minimum) -	
Grain Density (Minimum) --	2.00 gm/cc
Grain Density (Maximum) --	3.00 gm/cc
Lithology Excluded -------	NONE

CHARACTERISTICS REMAINING AFTER CUTOFFS

ZONE:

Number of Samples -----	33
Thickness Represented -	19.7 ft

POROSITY:

Storage Capacity ------	285.5 ϕ-ft
Arithmetic Average ----	14.5 %
Minimum ---------------	4.6 %
Maximum ---------------	27.8 %
Median ----------------	13.0 %
Standard Deviation ----	±5.1 %

GRAIN DENSITY:

Arithmetic Average ----	2.74 gm/cc
Minimum ---------------	2.68 gm/cc
Maximum ---------------	2.88 gm/cc
Median ----------------	2.72 gm/cc
Standard Deviation ----	±0.05 gm/cc

PERMEABILITY:

Flow Capacity ---------	58.4 md-ft
Arithmetic Average ----	2.96 md
Geometric Average -----	1.20 md
Harmonic Average ------	0.31 md
Minimum ---------------	0.03 md
Maximum ---------------	16.4 md
Median ----------------	1.17 md
Standard Dev. (Geom) --	$K \cdot 10^{\pm 0.629}$ md

HETEROGENEITY (Permeability):

Dykstra-Parsons Var. --	0.670
Lorenz Coefficient ----	0.465

AVERAGE SATURATIONS (Pore Volume):

Oil -------------------	
Water -----------------	