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CORE ANALYSIS REPORT

FOR

AMOCO PRODUCTION COMPANY

LUKE GU NO. 4

STANTON COUNTY, KANSAS

API #15-187-20661

RELEASED

NOV 2 6 1993

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STATE CORPORATION COMMISSION

NOV 1 8 1993

CONSERVATION DIVISION
Wichita, Kansas

Western Atlas International
A Litton/Dresser Company

CORE LABORATORIES

June 8, 1993

AMOCO PRODUCTION COMPANY
Box 800
1670 Broadway
Denver, Colorado 80201

File No.: 57181-16824
Subject: Core Analysis
Luke GU No. 4
Stanton County, Kansas

Gentlemen:

Core samples were received via motor freight from Amoco in Denver, Colorado.

Core analysis was made on full diameter samples.

Fluid removal was achieved using a 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.

The core samples were reboxed and returned via motor freight to Amoco in Denver, Colorado.

Core analysis data is presented in tabular and graphical form for your convenience. A porosity vs. permeability plot and porosity and permeability histograms were prepared for statistical evaluation.

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
Laboratory Supervisor

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NOV 18 1993
CONSERVATION DIVISION
Wichita, Kansas

CORE LABORATORIES

Company : AMOCO PRODUCTION COMPANY
Well : LUKE GU NO. 4
Location : SEC 8, T30S, R39W
Co,State : STANTON COUNTY, KANSAS

Field :
Formation :
Coring Fluid :
Elevation :

File No.: 57181-16824
Date : JUNE 2, 1993
API No. :
Analysts: OLSON

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY (MAXIMUM) Kair md	PERMEABILITY (90 DEG) Kair md	PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	GRAIN DENSITY gm/cc
1	2601.0- 02.0	0.01	0.01	0.03	6.1	2.76
2	2604.0- 05.0	0.03	0.01	<.01	7.1	2.73
3	2607.0- 08.0	0.02	0.01	<.01	6.8	2.72
4	2609.0- 10.0	0.16	0.14	0.16	7.4	2.77
5	2623.0- 24.0	0.07	0.05	<.01	7.4	2.70
6	2626.0- 27.0	0.30	0.20	0.23	11.7	2.69
7	2628.0- 29.0	0.20	0.20	0.07	10.5	2.70
8	2639.0- 40.0	0.01	0.01	0.03	5.5	2.73
9	2640.0- 41.0	0.02	0.01	0.02	4.6	2.78
10	2641.0- 42.0	0.03	0.01	0.07	2.6	2.70
11	2682.0- 83.0	0.13	0.09	0.03	9.2	2.67
12	2690.0- 91.0	0.01	0.01	<.01	1.7	2.69
13	2715.0- 16.0	1.64	1.62	1.73	12.4	2.71
14	2717.0- 18.0	0.38	0.38	0.10	8.0	2.73
15	2720.0- 21.0	0.04	0.04	0.03	7.1	2.70
16	2738.0- 39.0	0.44	0.35	0.41	8.9	2.70
17	2739.0- 40.0	0.28	0.26	0.06	8.8	2.71
18	2755.0- 56.0	<.01	<.01	6.86	2.8	2.71
19	2756.0- 57.0	0.01	0.01	6.25	4.0	2.73
20	2766.0- 67.0	54.9	50.1	1.97	12.0	2.74
21	2767.0- 68.0	5.64	5.42	2.96	17.1	2.75
22	2770.0- 71.0	5.14	4.92	1.24	16.1	2.83
23	2773.0- 74.0	6.34	5.42	1.96	14.0	2.80
24	2776.0- 77.0	5.16	4.78	0.23	11.8	2.78
25	2777.0- 78.0	3.21	2.97	2.55	15.8	2.74
26	2779.0- 80.0	987.	0.01	70.3	6.9	2.73
27	2810.0- 11.0	0.03	<.01	0.07	4.8	2.74

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CONSERVATION DIVISION
Wichita, Kansas

CORE LABORATORIES

Company : AMOCO PRODUCTION COMPANY
Well : LUKE GU NO. 4

Field :
Formation :

File No.: 57181-16824
Date : JUNE 2, 1993

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY (MAXIMUM) Kair md	PERMEABILITY (90 DEG) Kair md	PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	GRAIN DENSITY gm/cc
28	2830.0- 31.0	0.13	<.01	<.01	1.4	2.67
29	2841.0- 42.0	<.01	<.01	<.01	0.4	2.72
30	2872.0- 73.0	0.04	0.02	0.10	7.7	2.74
31	2874.0- 75.0	0.01	0.01	0.54	4.5	2.72
32	2880.0- 81.0	0.08	0.08	0.03	6.6	2.71
33	2883.0- 84.0	0.54	0.49	0.19	12.4	2.69
34	2884.0- 85.0	0.46	0.44	0.06	13.1	2.67
35	2886.0- 87.0	1.35	1.12	0.63	9.4	2.63
36	2889.0- 90.0	0.01	<.01	<.01	3.8	2.65
37	2918.0- 19.0	0.96	0.78	0.30	10.3	2.72
38	2920.0- 21.0	0.11	0.02	0.03	12.0	2.76
39	2922.0- 23.0	0.29	0.20	<.01	14.4	2.74
40	2923.0- 24.0	0.79	0.56	0.10	14.0	2.70
41	2925.0- 26.0	0.30	0.14	0.03	15.1	2.70
42	2927.0- 28.0	0.24	0.15	0.02	12.9	2.72
43	2928.0- 29.0	0.06	0.04	0.06	11.8	2.65
44	2931.0- 32.0	0.03	0.02	<.01	9.3	2.62
45	2958.0- 59.0	0.03	0.02	<.01	1.9	2.67
46	2970.0- 71.0	0.41	0.20	0.06	8.4	2.67
47	2972.0- 73.0	0.98	0.61	0.12	9.1	2.74
48	2975.0- 76.0	0.02	0.01	<.01	5.2	2.70
49	2977.0- 78.0	0.07	0.04	0.03	9.2	2.69
50	2979.0- 80.0	0.48	0.45	0.06	12.2	2.69
51	2980.0- 81.0	1.36	1.31	0.17	17.0	2.69
52	2981.0- 82.0	2.86	2.79	0.34	18.1	2.68
53	2982.0- 83.0	2.36	2.23	0.07	16.3	2.68
54	2983.0- 84.0	0.16	0.09	0.03	12.8	2.69
55	2984.0- 85.0	0.08	0.04	<.01	12.9	2.67
56	2985.0- 86.0	0.02	<.01	0.03	7.0	2.61

CORE LABORATORIES

Company : AMOCO PRODUCTION COMPANY
Well : LUKE GU NO. 4

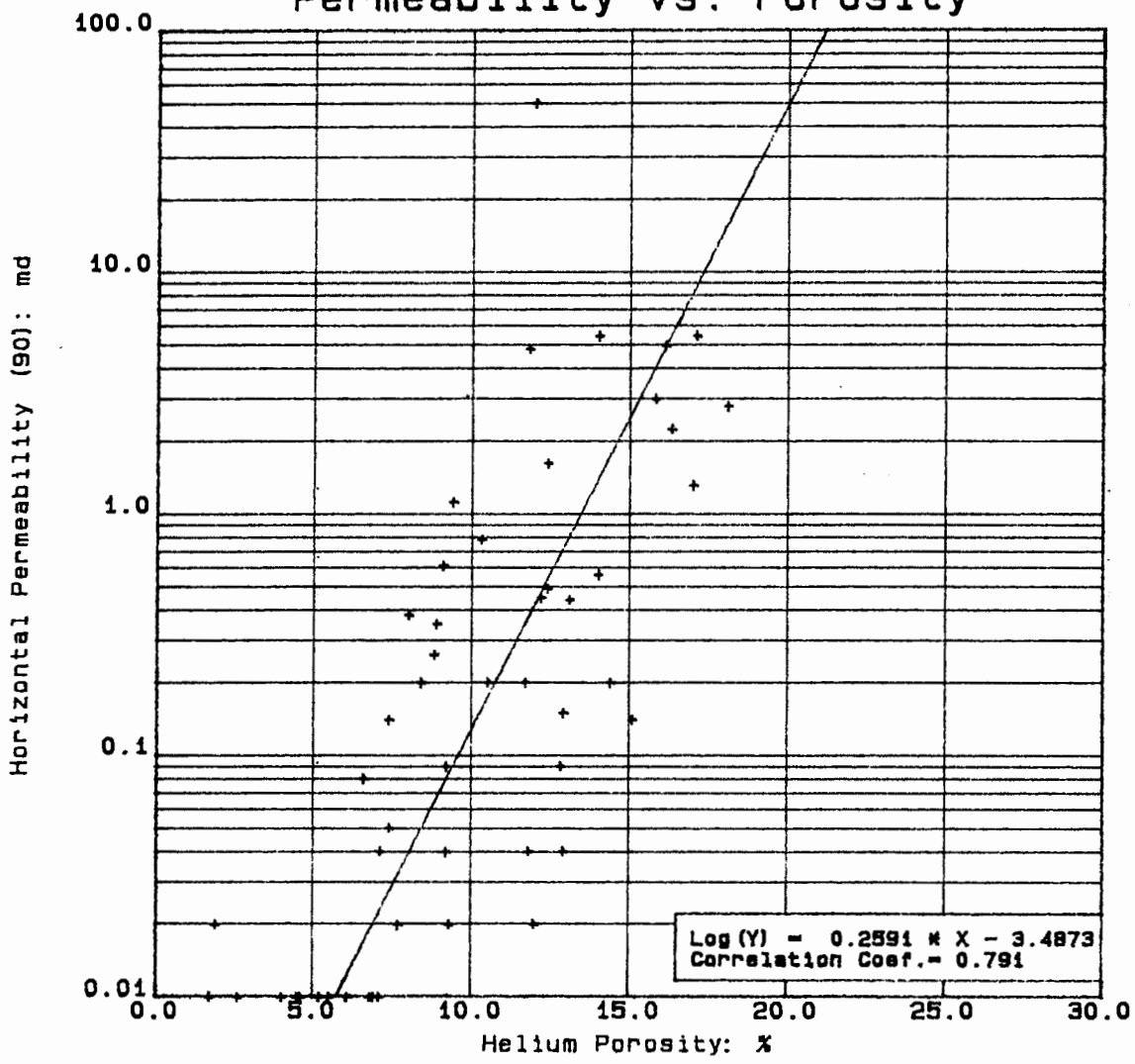
Field :
Formation :

File No.: 57181-16824
Date : JUNE 2, 1993

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY (MAXIMUM) Kair md	PERMEABILITY (90 DEG) Kair md	PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	GRAIN DENSITY gm/cc
57	2986.0- 87.0	0.01	<.01	0.03	7.3	2.61

Permeability vs. Porosity



AMOCO PRODUCTION COMPANY
LUKE GU NO. 4

Not Specified (2601-2987 feet)

Core Laboratories JUNE 2, 1993

- LEGEND -
Not Specified

CORE LABORATORIES

Company : AMOCO PRODUCTION COMPANY
Well : LUKE GU NO. 4

Field :
Formation :

File No.: 57181-16824
Date : JUNE 2, 1993

TABLE I

SUMMARY OF CORE DATA

ZONE AND CUTOFF DATA

ZONE:
- Identification --------- NOT SPECIFIED
- Top Depth ---------- 2601.0 ft
- Bottom Depth ---------- 2987.0 ft
- Number of Samples -------- 57

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 -----	50
Thickness Represented -	50.0 ft

POROSITY:

Storage Capacity ------	500.1 ϕ-ft
Arithmetic Average ----	10.0 %
Minimum ----------	1.7 %
Maximum ----------	18.1 %
Median ----------	9.4 %
Standard Deviation ----	±4.1 %

GRAIN DENSITY:

Arithmetic Average ----	2.71 gm/cc
Minimum ----------	2.62 gm/cc
Maximum ----------	2.83 gm/cc
Median ----------	2.70 gm/cc
Standard Deviation ----	±0.04 gm/cc

PERMEABILITY:

Flow Capacity ---------	88.9 md-ft
Arithmetic Average ----	1.78 md
Geometric Average -----	0.15 md
Harmonic Average ------	0.03 md
Minimum ----------	0.01 md
Maximum ----------	50.1 md
Median ----------	0.15 md
Standard Dev. (Geom) --	$K \cdot 10^{\pm 0.964}$ md

HETEROGENEITY (Permeability):

Dykstra-Parsons Var. --	0.931
Lorenz Coefficient ----	0.828

AVERAGE SATURATIONS (Pore Volume):

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

DISTRIBUTION OF FINAL REPORT

5 COPIES

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DENVER CO 80201