Core
Petrophysics, Inc.

AMOCO PRODUCTION CO.

ESSER NO. 1

UNAMED FIELD

STANTON COUNTY, KANSAS

2400 WEST INDIANA • MIDLAND, TEXAS 79701 • (915) 684-5861 • FAX (915) 685-3678

Core
Petrophysics, Inc.

October 07, 1993

Mr. Marty Williams
Amoco Production Company
P. O. Box 800
Denver, Colorado 80201

RE: ESSER NO.1
UNNAMED FIELD
STANTON CO., KANSAS

Dear Mr. Williams:

Ninety-four full diameter samples from the above referenced well were submitted to Core Petrophysics, Inc. on August 05 for whole core analysis utilizing low temperature extraction and drying procedures.

Initial weights were measured and then the entire suite of samples were placed in a Soxhlet cleaner on August 06 for low temperature extraction using a 60/40 mixture of chloroform/methanol at a maximum temperature of approximately 140 degrees Fahrenheit.

Sixty-four samples were removed from the Soxhlet cleaner and allowed to air dry for approximately twelve hours prior to drying in vacuum ovens. The samples were vacuum oven dried at approximately 126 degrees Fahrenheit beginning August 27. Control samples were removed every other day following the first ten days of drying for weight stabilization. Weight stabilization occurred on September 07.

Samples removed from the drying ovens were allowed to reach room temperature prior to porosity and permeability measurements. Samples remaining in the Soxhlet cleaner were removed, air dried for twelve hours and placed in an oven for drying as noted above as space became available.

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Additional samples were removed from the ovens as soon as possible and with prudence to prevent possible re-hydration.

Permeability measurements were determined at a net confining stress of 350 psi and a flow rate of 4 psi. Porosity measurements were determined by Boyles Law technique using helium. Twenty samples were selected for quality control with permeability and/or porosity re-measured. Water saturations were determined based on total weight loss assuming a water density of 1.0 g/cc. The final core analysis report is presented in tabular and graphical format. Three copies of the report are included.

The core samples have been returned to your location as of October 06, 1993.

We appreciate the opportunity to be of service to you and Amoco Production Company. If you have question concerning this report or if we can be of further help please contact us at your convenience.

Sincerely,

Donnie Leaton

Donnie Leaton

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STANTON COUNTY, KANSAS

FORMATION :
DRLG FLUID : Chemical
ELEVATION : GL 3212', DF 3222', KB 3223'
LOCATION : 1280' FNL, 660' FWL, SECT. 16, T29S, R39W

FILE NO. : 5-930802-1
DATE : September 24, 1993
API NO. : 15-187-20676
ANALYSTS : DL, HP, MH

MODIFIED DEAN STARK EXTRACTION

FULL DIAMETER CORE ANALYSIS

SAMPLE NO.	DEPTH (ft)	PERMEABILITY (mD) Kmax	K90°	Kavg	Kv	K/Phi Sq rt	G DEN (g/cc)	POR (%)	Sw (%)	So (%)	FLU	LITHOLOGY
1	2600.2 – 2600.6	0.35	0.25	0.30	0.15	2.1	2.70	7.0	13.4	0.0	0	Ls sslty gyp foss sty
2	2601.9 – 2602.2	2.01	1.80	1.90	1.03	5.0	2.78	7.5	8.6	0.0	0	Ls sslty gyp foss
3	2603.4 – 2604.0	1.17	0.74	0.93	0.17	3.6	2.76	7.3	14.5	0.0	0	Ls sslty gyp foss
4	2604.4 – 2605.0	0.29	0.14	0.20	0.09	1.7	2.76	7.3	16.9	0.0	0	Ls sslty gyp foss
5	2605.4 – 2605.8	0.46	0.36	0.41	0.14	2.6	2.74	5.9	17.0	0.0	0	Ls sslty gyp foss
6	2606.2 – 2606.8	0.20	0.02	0.07	0.05	1.0	2.71	6.6	14.4	0.0	0	Ls sslty gyp foss
7	2607.0 – 2607.5	0.22	0.18	0.20	0.09	2.6	2.71	3.0	27.0	0.0	0	Ls sslty gyp foss
8	2613.1 – 2613.6	0.10	0.05	0.08	0.03	2.0	2.68	1.8	36.8	0.0	0	Ls slty shy foss s/p
9	2614.7 – 2615.2	0.32	0.24	0.28	0.11	2.7	2.69	3.7	39.7	0.0	0	Ls sdy shy foss gyp
10	2618.3 – 2618.8	1.33	0.24	0.57	2.38	3.6	2.65	4.3	23.1	0.0	0	Ls sslty cht incl vt frac
11	2620.0 – 2620.6	1.85	0.71	1.14	0.02	4.2	2.69	6.4	26.3	0.0	0	Ls slty ssdy foss frac
12	2630.1 – 2630.7	7.63	2.27	4.16	0.04	10.7	2.67	3.6	49.9	0.0	0	Ls sdy shy gyp foss s/p
13	2651.7 – 2652.3	0.21	0.15	0.17	0.05	2.1	2.67	3.9	39.4	0.0	0	Sd vfg slty lmy gyp
14	2652.7 – 2653.3	0.12	0.10	0.11	0.03	1.7	2.68	3.7	23.1	0.0	0	Sd vfg slty lmy gyp
15	2653.7 – 2654.3	0.56	0.51	0.53	0.28	2.6	2.67	7.7	27.5	0.0	0	Sd vfg shy Ls incl s/p
16	2655.6 – 2656.1	14.94	14.31	14.62	0.70	11.2	2.64	11.7	27.5	0.0	0	Sd vfg shy ls incl s/p lrg sd rd strgr
17	2656.8 – 2657.4	2.40	1.81	2.09	0.24	4.3	2.66	11.1	44.7	0.0	0	Sd vfg shy Ls incl s/p
18	2658.0 – 2658.6	13.35	8.22	10.48	0.30	9.6	2.66	11.3	36.7	0.0	0	Sd vfg shy Ls incl s/p
19	2659.1 – 2659.7	16.81	13.77	15.21	0.29	12.6	2.66	9.6	62.9	0.0	0	Sd vfg shy Ls incl s/p
20	2660.1 – 2660.7	2.28	1.93	2.10	0.35	4.2	2.66	12.1	52.9	0.0	0	Sd vfg shy Ls incl sc lam s/p
21	2661.1 – 2661.7	3.04	2.75	2.89	0.19	5.0	2.67	11.5	66.1	0.0	0	Sd vfg shy Ls incl sc lam s/p
22	2665.1 – 2665.7	6.58	5.30	5.91	0.06	8.1	2.66	9.1	73.8	0.0	0	Sd vfg shy Ls incl sc lam s/p
23	2666.1 – 2666.7	0.44	0.33	0.38	0.07	2.0	2.66	9.3	16.0	0.0	0	Sd vfg slty sshy lmy sc lam s/p
24	2667.1 – 2667.7	0.57	0.40	0.48	0.07	2.3	2.66	9.1	14.0	0.0	0	Sd vfg slty sshy lmy sc lam s/p
25	2667.9 – 2668.6	0.29	0.21	0.24	0.05	1.7	2.67	8.3	14.3	0.0	0	Sd vfg slty sshy lmy sc lam s/p
26	2669.2 – 2669.8	0.16	0.12	0.14	0.04	2.0	2.71	3.5	26.4	0.0	0	Ls slty ssdy gyp foss sty
27	2671.7 – 2672.3	0.14	0.09	0.11	0.03	2.0	2.68	2.7	72.8	0.0	0	Sd vfg gry-rd shy sc s/p
28	2691.1 – 2691.6	0.38	0.31	0.34	0.09	1.9	2.72	9.4	5.7	0.0	0	Ls slty gyp foss sty

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API NO. : 15-187-20676
ANALYSTS : DL, HP, MH

MODIFIED DEAN STARK EXTRACTION

FULL DIAMETER CORE ANALYSIS

SAMPLE NO.	DEPTH (ft)	PERMEABILITY (mD) Kmax	K90°	Kavg	Kv	K/Phi Sq rt	G DEN (g/cc)	POR (%)	Sw (%)	So (%)	FLU	LITHOLOGY
29	2692.0 – 2692.5	0.30	0.18	0.23	0.09	1.7	2.72	7.8	11.7	0.0	0	Ls slty gyp foss
30	2693.0 – 2693.6	0.58	0.11	0.25	7.47	2.4	2.72	4.3	25.6	0.0	0	Ls slty gyp foss vt frac sty
31	2696.0 – 2696.6	0.13	0.12	0.12	0.04	2.1	2.70	2.9	38.1	0.0	0	Ls slty gyp foss sty s/p
32	2696.9 – 2697.5	0.03	Plug	0.03	0.02	1.0	2.69	2.8	30.2	0.0	0	Ls slty gyp foss lam s/p
33	2698.4 – 2699.0	0.40	0.32	0.36	0.04	1.7	2.73	11.8	50.1	0.0	0	Sd vfg rd shy
34	2699.4 – 2700.0	0.16	0.15	0.15	0.03	1.1	2.75	13.0	54.9	0.0	0	Sd vfg rd shy
35	2701.4 – 2702.0	0.62	Plug	0.62	0.28	2.2	2.68	13.2	88.0	0.0	0	Sd vfg rd shy
36	2709.4 – 2710.0	0.13	0.10	0.12	0.04	1.3	2.69	6.6	50.4	0.0	0	Sd vfg rd shy lmy
37	2715.3 – 2715.8	0.32	0.15	0.22	0.10	2.0	2.73	5.5	39.7	0.0	0	Ls shy ssdy gyp foss sc lam s/p sty
38	2716.4 – 2717.0	0.35	0.28	0.31	0.18	1.8	2.76	9.4	34.7	0.0	0	Sd vfg rd shy lmy gyp foss
39	2720.4 – 2721.0	0.63	Plug	0.63	0.26	2.6	2.69	9.5	68.8	0.0	0	Sd vfg rd shy slmy gyp foss
40	2721.4 – 2722.0	0.37	0.22	0.28	0.04	1.6	2.73	10.8	52.0	0.0	0	Sd vfg rd shy gyp foss
41	2722.7 – 2723.3	0.30	0.21	0.25	0.04	1.4	2.70	13.7	60.6	0.0	0	Sd vfg rd shy gyp foss
42	2728.1 – 2728.7	0.54	0.54	0.54	0.25	2.0	2.68	13.8	64.1	0.0	0	Sd vfg rd shy gyp foss
43	2731.4 – 2732.0	3.62	2.89	3.24	2.12	5.9	2.71	9.3	17.5	0.0	0	Ls sdy gyp foss
44	2732.1 – 2732.5	5.53	5.44	5.48	3.59	7.4	2.76	10.1	12.9	0.0	0	Ls sdy gyp foss
45	2732.7 – 2733.1	1.32	0.37	0.70	0.29	3.8	2.81	4.8	22.7	0.0	0	Ls sdy gyp foss
46	2733.7 – 2734.3	0.90	0.48	0.66	0.03	4.9	2.71	2.7	72.1	0.0	0	Ls sdy sshy gyp foss sc lam s/p sty
47	2746.4 – 2746.9	1.25	1.07	1.15	0.97	4.1	2.73	7.0	25.1	0.0	0	Ls ssdy sc ppp gyp
48	2747.4 – 2748.1	74.90	50.38	61.43	100.00	19.1	2.72	16.8	26.9	0.0	0	Ls ssdy sc ppp gyp vt frac
49	2748.5 – 2749.0	7.13	6.40	6.75	8.21	6.5	2.74	15.9	49.0	0.0	0	Ls ssdy sc ppp gyp
50	2749.1 – 2749.6	5.98	5.92	5.95	4.13	6.3	2.74	15.2	54.3	0.0	0	Ls ssdy sc ppp gyp
51	2750.5 – 2751.0	7.35	7.23	7.29	8.86	6.6	2.75	16.8	49.1	0.0	0	Ls ssdy sc ppp gyp
52	2751.0 – 2751.6	6.16	5.58	5.86	6.33	5.9	2.72	17.1	54.8	0.0	0	Ls ssdy sc ppp gyp
53	2751.9 – 2752.4	0.45	0.44	0.44	0.29	2.3	2.75	8.7	19.2	0.0	0	Ls slty foss
54	2752.8 – 2753.4	0.29	0.26	0.28	0.07	2.4	2.74	5.0	31.4	0.0	0	Ls slty foss sty
55	2754.1 – 2754.7	43.26	0.16	2.61	142.85	6.9	2.72	5.5	26.3	0.0	0	Ls slty foss vt frac sty
56	2755.1 – 2755.7	0.22	0.12	0.16	0.10	1.5	2.72	7.1	43.2	0.0	0	Ls slty foss

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57	2755.7 – 2756.1	0.34	0.20	0.26	4.49	1.8	2.73	8.3	44.4	0.0	0	Ls slty foss vt frac
58	2757.3 – 2757.9	0.06	0.05	0.05	0.03	1.2	2.74	3.5	38.6	0.0	0	Ls slty foss vt frac s/p sty
59	2782.5 – 2782.8	0.54	0.45	0.49	0.11	2.9	2.70	6.0	41.8	0.0	0	Ls slty ppp gyp foss frac
60	2783.7 – 2784.1	13.44	11.83	12.61	4.29	9.6	2.73	13.8	31.0	0.0	0	Ls slty ppp gyp foss
61	2784.3 – 2784.9	34.39	0.67	4.78	5.35	8.2	2.71	7.2	38.0	0.0	0	Ls slty sc ppp gyp vt frac s/p lss
62	2785.4 – 2785.9	1.44	1.11	1.27	0.04	6.9	2.70	2.7	56.4	0.0	0	Ls slty shy gyp foss sty lrg sh incl
63	2792.6 – 2793.1	0.10	0.10	0.10	0.02	2.1	2.69	2.2	53.8	0.0	0	Ls slty foss lrg sh incl
64	2794.1 – 2794.7	0.09	0.09	0.09	0.02	1.5	2.74	3.6	48.3	0.0	0	Ls slty s/p
65	2795.5 – 2796.1	0.07	0.07	0.07	0.02	1.2	2.72	4.8	41.0	0.0	0	Ls slty s/p
66	2796.9 – 2797.5	0.08	0.07	0.07	0.03	1.4	2.72	3.7	49.8	0.0	0	Ls slty sc lam s/p
67	2798.5 – 2799.1	0.33	0.06	0.14	0.02	1.9	2.70	3.8	42.1	0.0	0	Ls slty s/p
68	2799.5 – 2800.0	0.42	0.07	0.17	0.03	2.1	2.65	4.1	44.2	0.0	0	Ls slty ppp
69	2800.0 – 2800.5	0.05	0.04	0.04	0.01	1.4	2.69	2.2	42.9	0.0	0	Ls slty sshy sc lam s/p
70	2802.1 – 2802.5	0.24	0.16	0.20	<.01	2.5	2.68	3.2	58.6	0.0	0	Ls shy foss
71	2803.2 – 2803.8	0.11	0.07	0.09	0.05	2.5	2.66	1.4	47.6	0.0	0	Ls slty shy foss frac s/p
72	2804.4 – 2804.9	0.25	0.25	0.25	0.01	3.9	2.64	1.6	62.1	0.0	0	Ls slty shy foss frac s/p cht incl
73	2806.9 – 2807.4	2.92	1.34	1.98	0.02	12.6	2.67	1.2	63.4	0.0	0	Ls slty shy foss
74	2809.4 – 2809.8	21.54	17.55	19.45	0.02	24.1	2.71	3.4	48.9	0.0	0	Ls shy lam s/p
75	2814.8 – 2815.4	2.17	0.09	0.45	16.35	4.0	2.71	2.8	48.5	0.0	0	Ls slty vt frac sty
76	2817.0 – 2817.6	8.25	3.24	5.17	0.68	7.9	2.71	8.4	46.5	0.0	0	Ls slty shy sc lrg s/p sty
77	2838.2 – 2838.8	15.26	10.99	12.95	1.10	9.0	2.77	15.8	58.2	0.0	0	Ls slty ppp s/p
78	2839.4 – 2840.0	0.31	0.27	0.29	0.12	3.1	2.73	3.0	57.7	0.0	0	Ls slty sshy gyp frac lss
79	2840.6 – 2841.1	25.87	24.27	25.06	1.07	18.7	2.73	7.2	72.1	0.0	0	Ls slty frac s/p sty
80	2843.6 – 2844.2	0.06	0.04	0.05	0.02	1.5	2.71	2.1	62.6	0.0	0	Ls vt frac sty
81	2846.5 – 2847.1	0.36	0.26	0.31	0.16	2.8	2.72	4.0	48.6	0.0	0	Ls vt gyp frac sty
82	2847.7 – 2848.3	1.18	0.18	0.46	12.18	2.8	2.73	5.8	53.0	0.0	0	Ls gyp foss vt frac sty
83	2848.8 – 2849.2	0.19	0.11	0.15	0.05	1.8	2.73	4.5	51.6	0.0	0	Ls slty vt frac s/p
84	2850.7 – 2851.2	0.38	0.11	0.20	0.02	2.8	2.70	2.6	67.6	0.0	0	Ls slty shy foss s/p sty

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85	2851.9 – 2852.5	0.64	0.61	0.62	0.26	3.0	2.68	6.8	54.0	0.0	0	Ls frac sty cht incl
86	2853.3 – 2853.8	0.26	0.24	0.25	0.10	2.0	2.68	6.4	51.2	0.0	0	Ls frac foss sty cht incl
87	2855.1 – 2855.7	0.05	0.05	0.05	0.01	1.2	2.70	3.4	54.6	0.0	0	Ls slty shy gyp foss sc lam s/p
88	2856.2 – 2856.8	0.13	0.09	0.11	0.04	1.4	2.69	5.4	36.8	0.0	0	Ls slty gyp foss frac s/p cht incl
89	2858.4 – 2859.0	0.08	0.05	0.06	0.02	1.0	2.69	6.6	50.8	0.0	0	Ls gyp foss
90	2861.2 – 2861.8	0.10	0.07	0.08	0.03	1.3	2.68	4.7	55.9	0.0	0	Ls shy gyp foss lss
91	2865.4 – 2866.0	0.25	0.19	0.21	0.03	2.4	2.68	3.7	55.0	0.0	0	Ls shy foss sc lam s/p
92	2866.7 – 2867.3	0.02	Plug	0.02	0.01	0.7	2.69	3.9	58.5	0.0	0	Ls shy foss
93	2868.0 – 2868.6	0.88	Plug	0.88	0.01	4.3	2.68	4.7	58.5	0.0	0	Ls shy foss
94	2869.3 – 2869.8	81.11	0.18	3.81	4.80	9.7	2.65	4.1	61.3	0.0	0	Ls shy foss vt frac

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LITHOLOGICAL ABBREVIATIONS

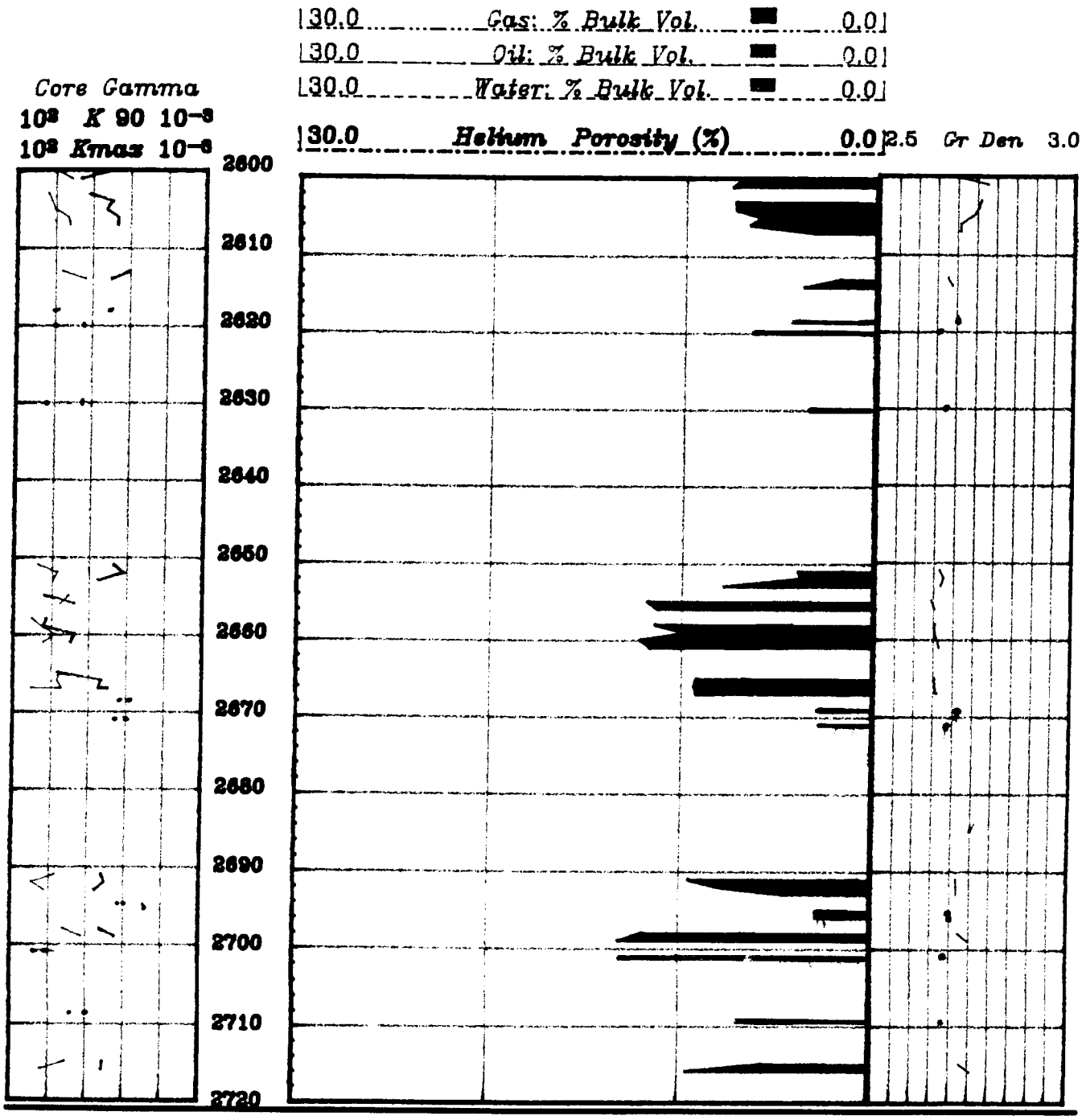
Anhydrite (–ic)	Anhy, anhyd	Fluorescence	Flu	Quartz (–itic)	Qtz, qtzt
Anhydrite inclusion	A/I	Fossil (–iferous)	Foss, foss	Residual Oil	So
Bentonite (–ic)	Bent, bent	Fracture	Frac, frac	Residual Water	Sw
Black (–ish)	blk, blksh	Friable	fri	Sample	Spl
Bleeding Oil	B/O	Fusulinid	Fus	Sandstone	Sd
Bright	brt	Gilsonite	Gil	Sandy	Sdy
Brittle	brit	Gold	Gld	Scattered	Sc
Brown	brn	Good	gd	Shaly	Shy
Calcite (–ic)	Calc, calctc	Grain (–s)	G, gr	Shale	Sh, sh
Calcareous	calc	Granular	Gran, gran	Shale parting	S/P
Carbonaceous	carb	Gray	Gry	Silt (–y)	Slt, slty
Cement	Cmt, cmt	Gypsum	Gyp, gyp	Slight (–ly)	Sli, S
Chalk (–y)	Chk, chky	Halite	Hal, hal	Small	Sml
Chert	Cht, cht	Inclusion	Incl, incl	Spotted (–y)	Sp
Clay	Cl, cl	Laminations (ated)	Lam, lam	Stringer	Strgr
Coal	C	Large	Lrg	Stylolite (–itic)	Sty, Styl
Coarse	crs	Large Shale Stringer	Lss	Sucrosic	Suc
Conglomerate	Cgl, cgl	Limestone	Ls, ls	Sulphur	Su
Crinoid (–al)	Crin, crinal	Limy	Lmy	Tan	Tn
Cross–bedded	x–bd	Lithology	Lith	Too broken (for Analysis)	TBA
Crystal (–line)	Xl, xln	Maximum	Max		
Dense	dns	Mineral Fluorescence	MF	Thin	Thn
Diameter	Dia	No Show	N/S	Trace	Tr
Dolomite (ic)	Dol, dolm	Oolite (–itic)	Ool, ool	Very	V
Dull	DL, dl	Permeability	Perm, K	Vertical	Vert, vt
Fair	fr	Pin–Point Porosity	PPP	Vug (–gy)	Vug, vug
Fine (–ly)	f, fnly	Pyrite	Pyr, pyr	Yellow	Yl

2400 WEST [illegible] · [illegible]ND, TEXAS 79701 · (915) 684-[illegible] · FAX (915) 685-3678

CORE PETROPHYSICS, INC.

AMOCO PRODUCTION CO. **UNNAMED FIELD**
ESSER 1 **STANTON COUNTY, KANSAS**

Core / Log Correlation

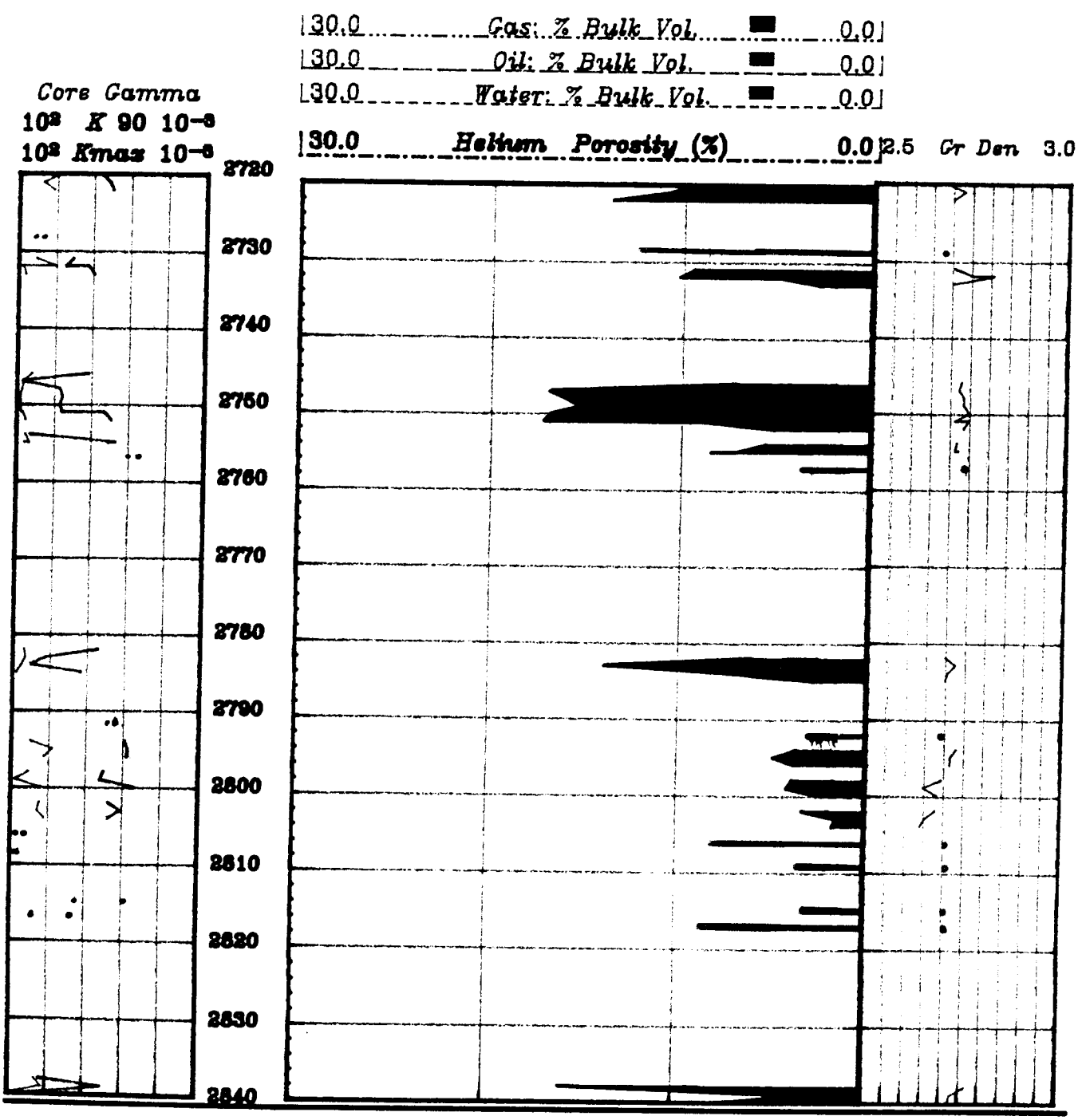


CORE PETROPHYSICS, INC.

AMOCO PRODUCTION CO.
ESSER 1

UNNAMED FIELD
STANTON COUNTY, KANSAS

Core / Log Correlation

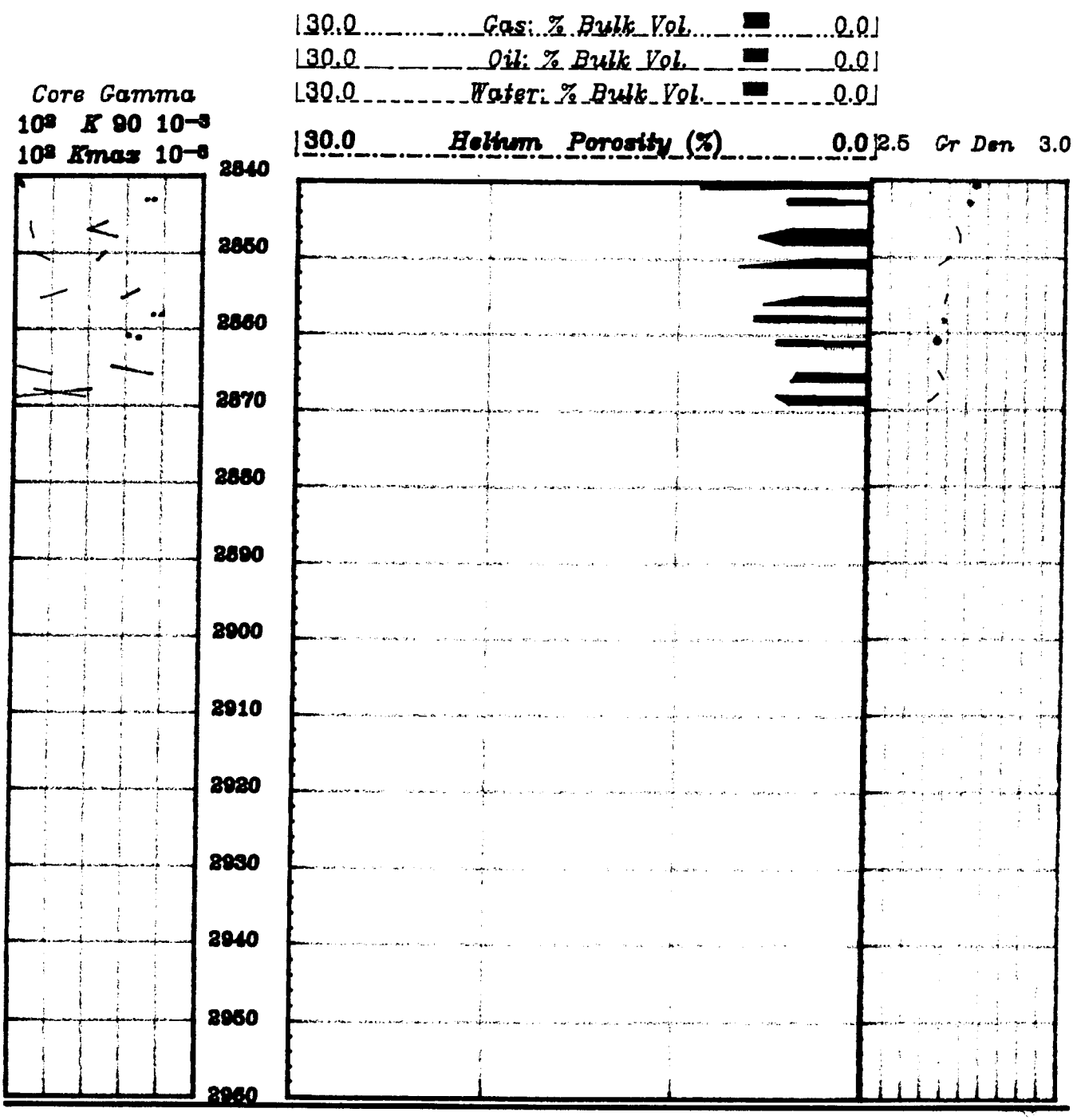


CORE PETROPHYSICS, INC.

AMOCO PRODUCTION CO.
ESSER 1

UNNAMED FIELD
STANTON COUNTY, KANSAS

Core / Log Correlation



CORE ANALYSIS REPORT

FOR

AMOCO PRODUCTION COMPANY

QC TEST

Amoco - Esser

Western Atlas International
A Litton/Dresser Company

CORE LABORATORIES

November 8, 1993

AMOCO PRODUCTION COMPANY
Box 800
1670 Broadway
Denver, Colorado 80201
Attention: Marty Williams

File No.: 57181-16950
Subject: Core Analysis
QC Test

Gentlemen:

Ten four inch diameter core samples were received from Amoco in Denver, Colorado. Samples were dried at 120°F. until stabilization of dry weight. Porosity was determined by direct pore volume measurement using Boyle's Law helium expansion. Bulk volume was measured by Archimedes Principle.

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

The core samples were returned to Amoco in Denver, Colorado.

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, INC.

Dean Olson
Laboratory Supervisor

DO/yn

CORE LABORATORIES

Company : AMOCO PRODUCTION COMPANY
Well : QC TEST
Location :
Co,State :

Field :
Formation :
Coring Fluid :
Elevation :

File No.: 57181-16950
Date : 11-8-93
API No. :
Analysts: OLSON

CORE ANALYSIS RESULTS

SAMPLE NUMBER	PERMEABILITY (MAXIMUM) Kair md	PERMEABILITY (90 DEG) Kair md	PERMEABILITY (VERTICAL) Kair md	LOW TEMP POROSITY	GRAIN DENSITY gm/cc
2	1.83	1.36	0.99	8.5	2.79
7	0.41	0.16	<.01	3.8	2.73
14	0.10	0.04	0.03	4.6	2.68
22	7.04	2.24	0.03	10.4	2.67
26	0.15	0.15	0.03	4.5	2.73
28	0.72	0.59	0.05	10.1	2.72
30	3.34	0.01	4.97	5.0	2.73
33	0.20	0.10	0.03	13.8	2.75
49	6.51	6.44	8.14	17.1	2.77
51	6.50	6.36	8.94	17.7	2.76