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CORE LABORATORIES

15-187-20602

DALLAS ADVANCED TECHNOLOGY CENTER
1875 MONETARY DRIVE
CARROLLTON, TX, USA 75006
TELEFAX NO.: 214/323-3930

DATE: June 3, 1993
TO: ~~Terrell Olsen~~ 36/4 Marty Williams - Amoco Denver
Gary Potter - Amoco Research
TELEFAX NO.: 303-830-4414
918-660-4163
FROM: Melanie Dunn
DEPARTMENT: RESERVOIR FLOW STUDIES
NUMBER OF PAGES, INCLUDING COVER PAGE: 11
FOR TRANSMISSION PROBLEMS CALL: 214/466-2673

COMMENTS: Re.: Hugoton Gas Field Test Program

Attached are the results of the unsteady-state gas-water displacements for the three selected samples for your review. We are ready to proceed with the next step in the test protocol tomorrow pending your approval.

Regards,

Melanie

SUMMARY OF GAS-WATER RELATIVE PERMEABILITY TEST RESULTS

Amoco Production Company
 Jones G.U.B. #3H Well
 Hugoton Gas Field

Fort Riley Formation
 Stanton County, Kansas

Sample I.D.	Depth, feet	Permeability, to Air, millidarcies	Porosity, percent	Initial Conditions		Terminal Conditions			Water Recovered	
				Water Saturation, percent pore space	Specific Permeability to Water, millidarcies	Gas Saturation, percent pore space	Effective Permeability to Gas, millidarcies	Relative Permeability to Gas,* fraction	percent pore space	percent in place
63B	2299.8	33.9	22.1	100.0	18.4	55.5	9.09	0.494	55.5	55.5
77B	2313.4	10.0	24.9	100.0	1.89	50.5	2.25	1.19	50.5	50.5
284B	2520.0	4.50	16.5	100.0	0.802	50.3	1.00	1.25	50.3	50.3

*Relative to specific permeability to brine.

Gas-Water Relative Permeability Test Results
Unsteady-State Method
Temperature: 72 F

Amoco Production Company
Jones G.U.B. #3HI Well
Hugoton Gas Field
Fort Riley Formation
Stanton County, Kansas

Sample I.D.: 63B
Depth: 2299.8 feet
Permeability to air: 33.9 md
Porosity: 22.1 percent
Initial Water Saturation: 100.0 percent
Specific Permeability to Water: 18.4 md

Water Saturation, percent pore space	Gas-Water Relative Permeability Ratio	Relative Permeability to Gas,* fraction	Relative Permeability to Water,* fraction
0.0	0.000	0.000	1.000
8.8	0.021	0.010	0.470
13.6	0.071	0.022	0.310
19.1	0.211	0.040	0.190
22.6	0.407	0.057	0.140
25.1	0.667	0.072	0.108
29.2	1.42	0.102	0.072
32.8	2.62	0.131	0.050
35.9	4.83	0.169	0.035
38.1	7.52	0.196	0.026
41.3	13.8	0.235	0.017
44.5	28.4	0.290	0.010
47.0	47.9	0.325	0.0068
48.7	69.6	0.359	0.0052
50.7	117	0.385	0.0033
55.5		0.494	

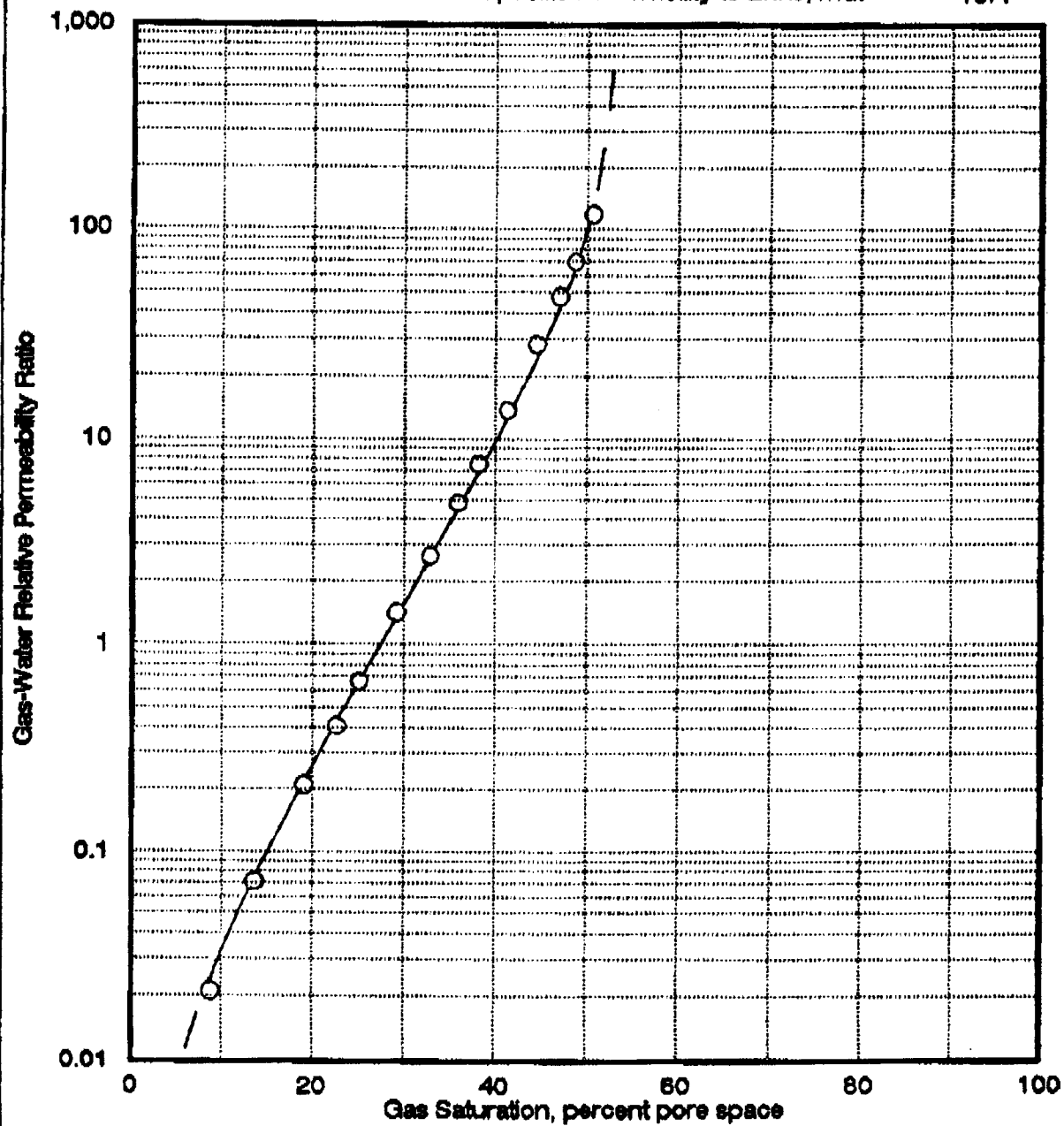
* Relative to the Specific Permeability to Brine

GAS - WATER RELATIVE PERMEABILITY

Unsteady-State Cleaned Sample

Amoco Production Company
Jones G.U.B. #3H1 Well
Hugoton Gas Field
Fort Riley Formation
Stanton County, Kansas

Sample I.D.: 63B
Depth, feet: 2299.8
Permeability to Air, md: 33.9
Porosity, percent: 22.1
Initial Water Saturation, percent: 100.0
Specific Permeability to Brine, md: 18.4



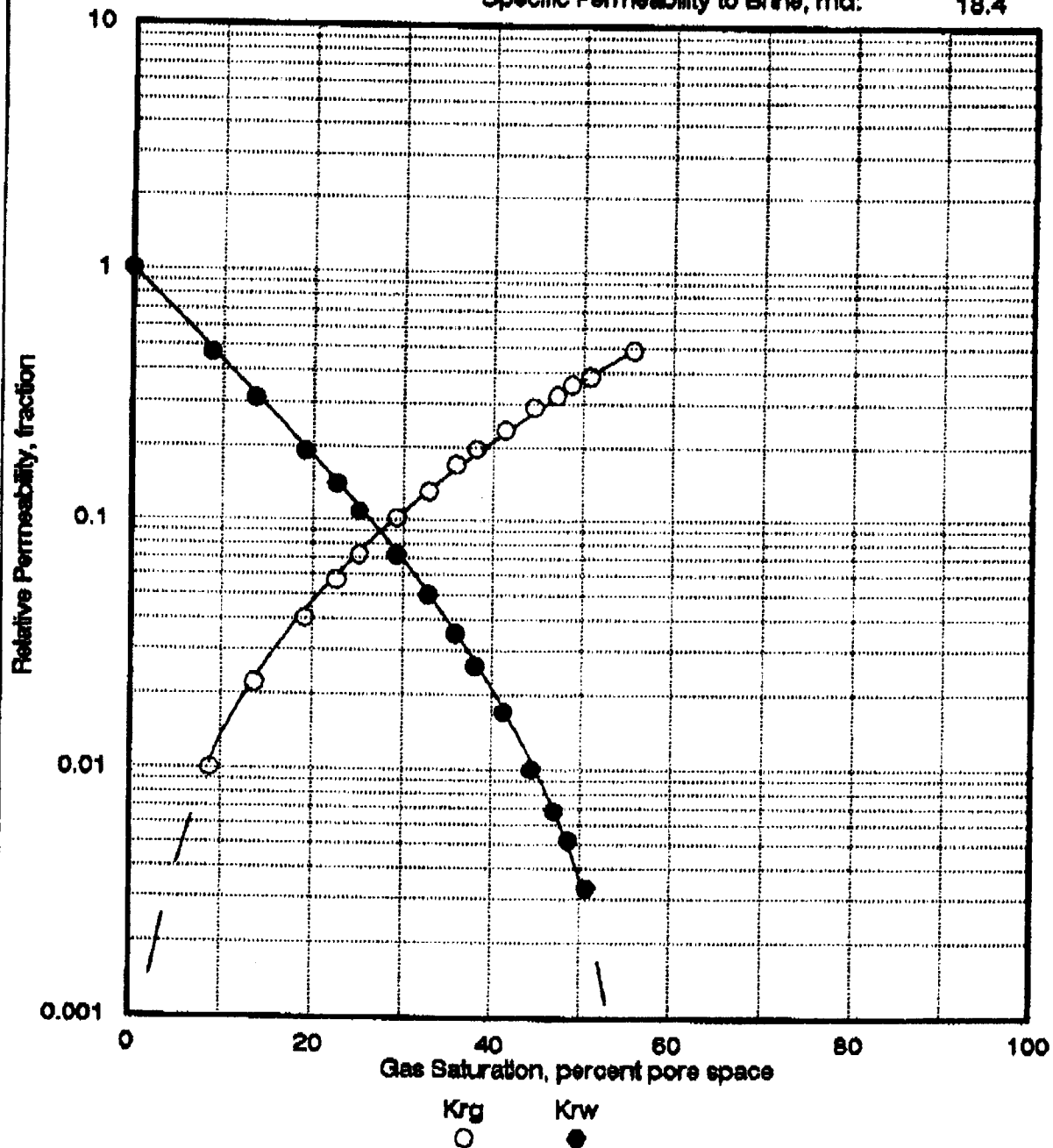
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GAS - WATER RELATIVE PERMEABILITY

Unsteady-State Cleaned Sample

Amoco Production Company
Jones G.U.B. #3HI Well
Hugoton Gas Field
Fort Riley Formation
Stanton County, Kansas

Sample I.D.: 63B
Depth, feet: 2299.8
Permeability to Air, mD: 33.9
Porosity, percent: 22.1
Initial Water Saturation, percent: 100.0
Specific Permeability to Brine, mD: 18.4



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Gas-Water Relative Permeability Test Results
Unsteady-State Method
Temperature: 72 F

Amoco Production Company
 Jones G.U.B. #3HI Well
 Hugoton Gas Field
 Fort Riley Formation
 Stanton County, Kansas

Sample I.D.: 77B
 Depth: 2313.4 feet
 Permeability to air: 10.0 md
 Porosity: 24.9 percent
 Initial Water Saturation: 100.0 percent
 Specific Permeability to Water: 1.89 md

Water Saturation, percent pore space	Gas-Water Relative Permeability Ratio	Relative Permeability to Gas,* fraction	Relative Permeability to Water,* fraction
0.0	0.000	0.000	1.000
2.0	0.012	0.011	0.880
4.2	0.030	0.023	0.772
6.5	0.058	0.038	0.650
9.8	0.126	0.062	0.495
12.1	0.211	0.085	0.404
13.9	0.314	0.107	0.341
17.2	0.617	0.157	0.254
20.3	1.12	0.217	0.193
23.2	1.89	0.280	0.148
25.4	2.75	0.344	0.125
28.8	4.70	0.445	0.095
32.5	8.22	0.550	0.067
35.6	13.4	0.650	0.049
38.2	20.5	0.740	0.036
40.0	28.3	0.800	0.028
42.7	50.3	0.930	0.018
45.6	130	1.03	0.0079
50.5		1.19	

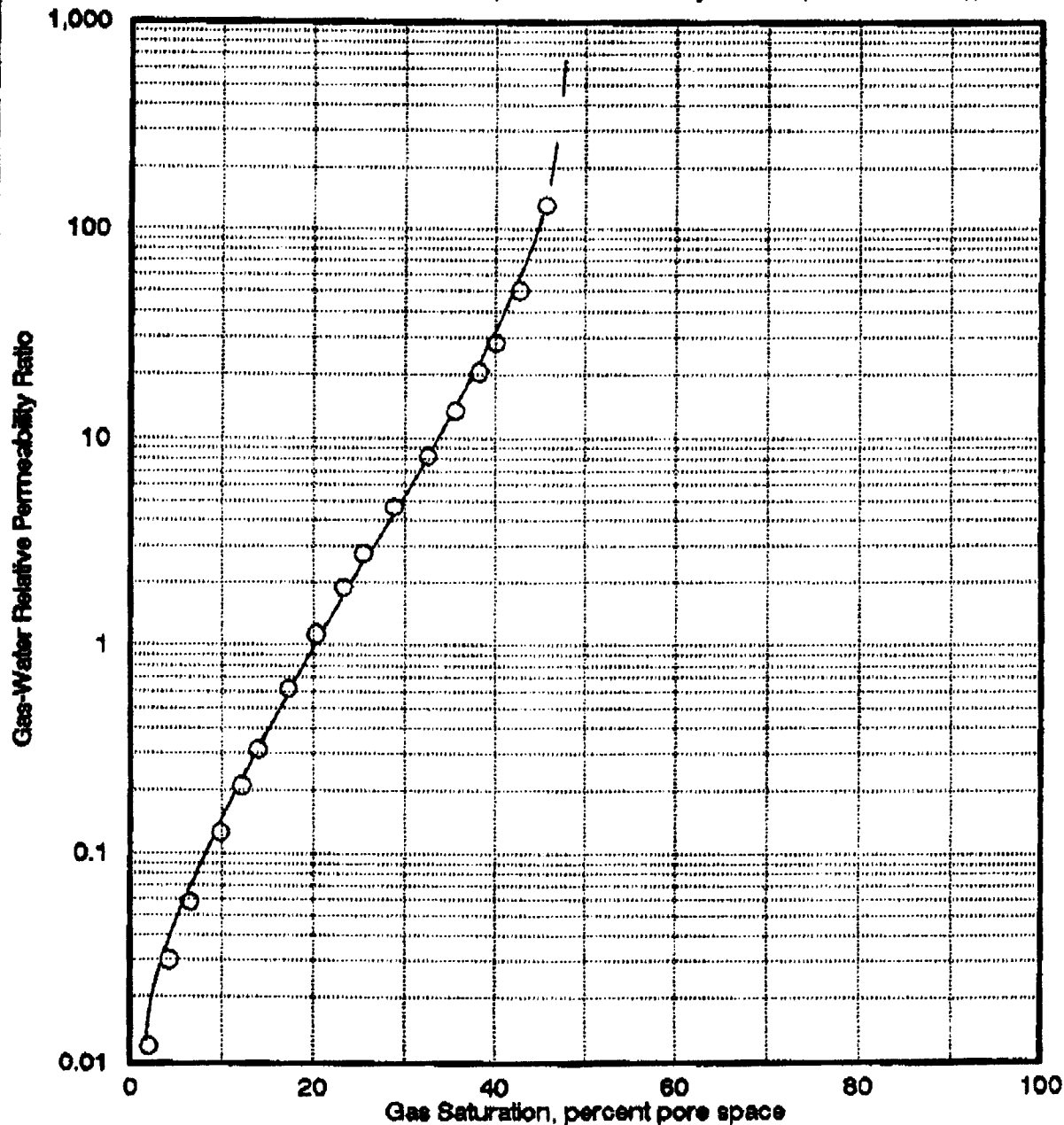
* Relative to the Specific Permeability to Brine

GAS - WATER RELATIVE PERMEABILITY

Unsteady-State Cleaned Sample

Amoco Production Company
Jones G.U.B. #3HI Well
Hugoton Gas Field
Fort Riley Formation
Stanton County, Kansas

Sample I.D.:	77B
Depth, feet:	2313.4
Permeability to Air, md:	10.0
Porosity, percent:	24.9
Initial Water Saturation, percent:	100.0
Specific Permeability to Brine, md:	1.89



Core Laboratories

GAS - WATER RELATIVE PERMEABILITY

Unsteady-State Cleaned Sample

Amoco Production Company

Jones G.U.B. #3H Well

Hugoton Gas Field

Fort Riley Formation

Stanton County, Kansas

Sample I.D.:

Depth, feet:

Permeability to Air, md:

Porosity, percent:

Initial Water Saturation, percent:

Specific Permeability to Brine, md:

77B

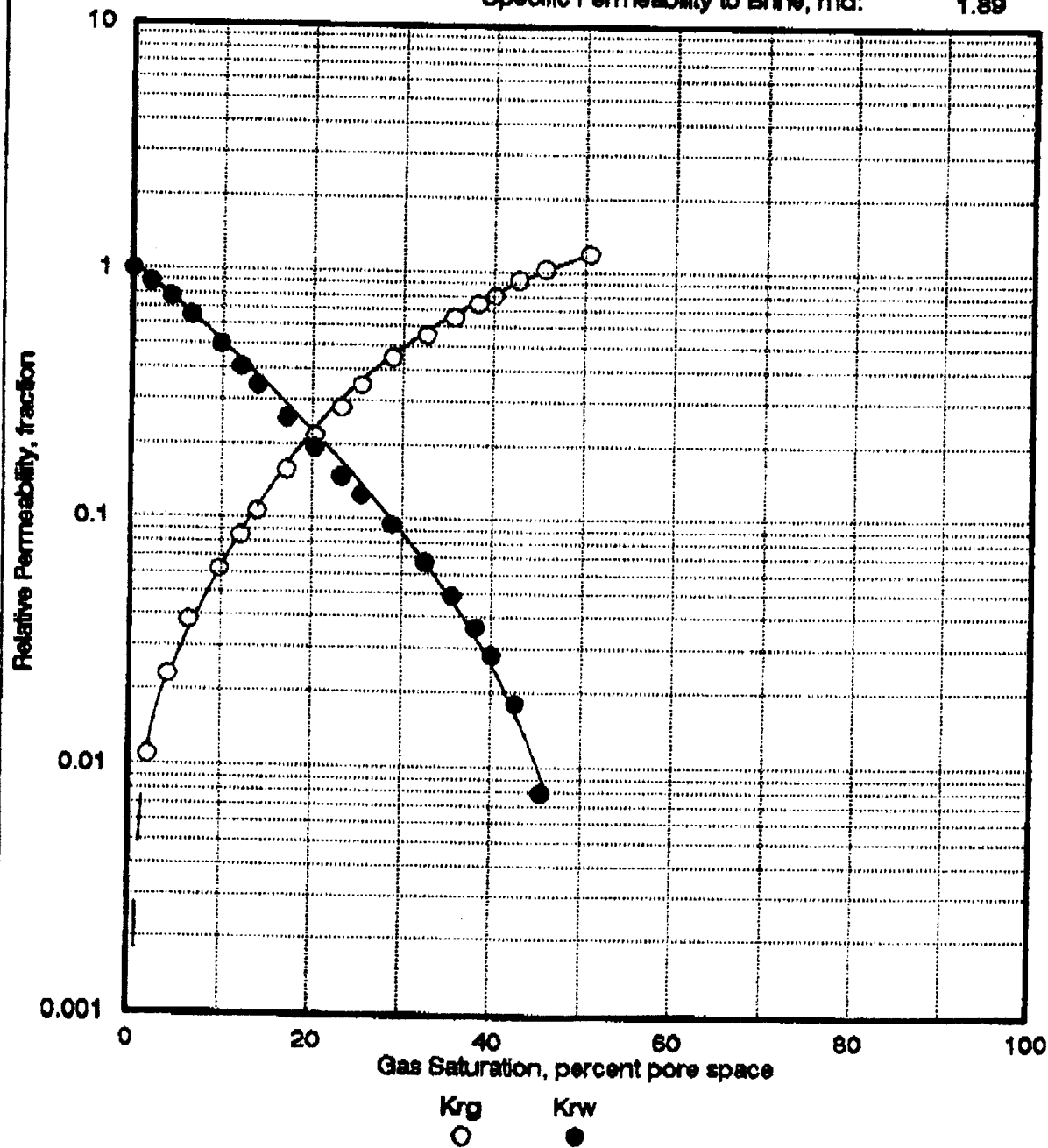
2313.4

10.0

24.9

100.0

1.89



Core Laboratories

Gas-Water Relative Permeability Test Results
Unsteady-State Method
 Temperature: 72 F

Amoco Production Company
 Jones G.U.B. #3HI Well
 Hugoton Gas Field
 Fort Riley Formation
 Stanton County, Kansas

Sample I.D.: 284B
 Depth: 2520.0 feet
 Permeability to air: 4.50 md
 Porosity: 16.5 percent
 Initial Water Saturation: 100.0 percent
 Specific Permeability to Water: 0.802 md

Water Saturation, percent pore space	Gas-Water Relative Permeability Ratio	Relative Permeability to Gas,* fraction	Relative Permeability to Water,* fraction
0.0	0.000	0.000	1.000
2.5	0.018	0.016	0.881
3.9	0.036	0.028	0.763
5.5	0.063	0.042	0.656
7.8	0.123	0.066	0.533
9.5	0.194	0.088	0.453
11.0	0.275	0.109	0.396
13.9	0.514	0.157	0.304
16.8	0.921	0.214	0.232
19.7	1.56	0.277	0.178
22.0	2.28	0.330	0.144
25.3	3.93	0.412	0.105
28.8	6.74	0.500	0.074
32.3	11.6	0.595	0.051
36.1	20.6	0.696	0.034
38.9	33.0	0.774	0.024
41.9	59.4	0.875	0.015
44.0	92.6	0.948	0.010
45.8	165	1.03	0.0062
50.3		1.25	

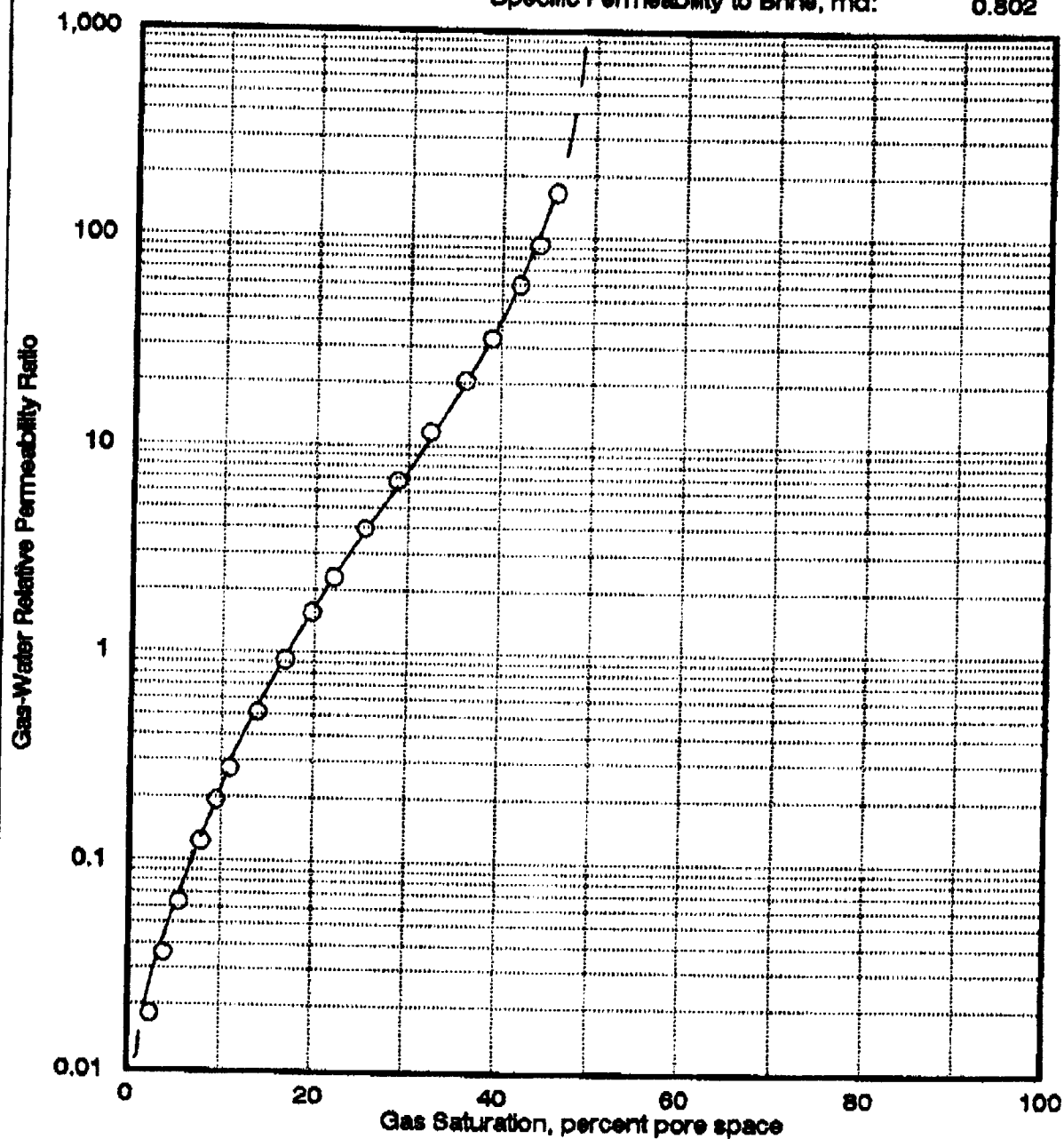
* Relative to the Specific Permeability to Brine

GAS - WATER RELATIVE PERMEABILITY

Unsteady-State Cleaned Sample

Amoco Production Company
Jones G.U.B. #3HI Well
Hugoton Gas Field
Fort Riley Formation
Stanton County, Kansas

Sample I.D.:	284B
Depth, feet:	2520.0
Permeability to Air, md:	4.50
Porosity, percent:	16.5
Initial Water Saturation, percent:	100.0
Specific Permeability to Brine, md:	0.802



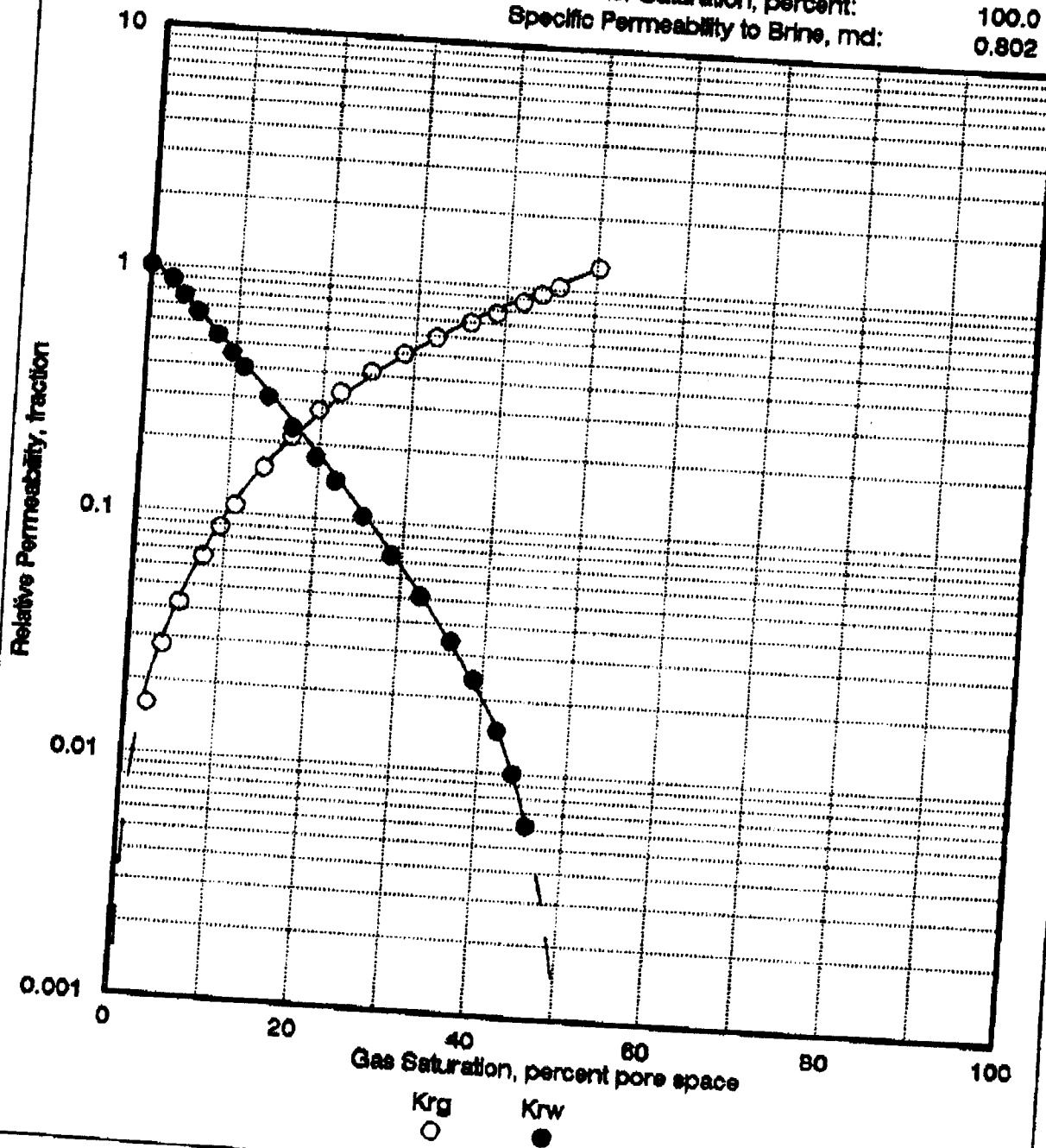
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GAS - WATER RELATIVE PERMEABILITY

Unsteady-State Cleaned Sample

Amoco Production Company
Jones G.U.B. #3HI Well
Hugoton Gas Field
Fort Riley Formation
Stanton County, Kansas

Sample I.D.:	284B
Depth, feet:	2520.0
Permeability to Air, md:	4.50
Porosity, percent:	16.5
Initial Water Saturation, percent:	100.0
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