SPECIAL CORE ANALYSIS

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
and
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739
SRS1654/RSH 2744

Trapped Gas – Relative Permeability

Formation Resistivity Factor

Formation Resistivity Index

Mercury Injection – Pore Size Distribution

March 31, 1993

Mr. Kirk Malinowsky
Anadarko Petroleum Corporation
17001 Northchase Drive
Houston, Texas   77060

Dear Mr. Malinowsky:

Core material from the CYR "A" No. 1 Well and the Snyder "A" No. 3 Well were conventionally analyzed and the test results electronically transmitted on November 24, 1992 and December 10, 1992, respectively.

On December 10, 1992, you requested trapped gas-relative permeability tests and mercury injection tests to be performed on core plug samples U 222 (2138.80 ft.) and U 218 (2137.00 ft.). Electrical property tests were approved on December 17, 1992 with Keith Hudson (Reservoirs, Inc.). Sample U 218 fractured during saturation and was replaced with Sample U 210 (2132.75 ft.). All of the core plug samples were from the CYR "A" No. 1 Well.

The trapped gas test results were electronically transmitted to you on December 31, 1992. The formation resistivity factors, cementation exponents, formation resistivity indices and the saturation exponents were electronically transmitted to you on January 19, 1993. The mercury injection test results were forwarded on January 29, 1993.

The end-trims and remnants of the core plug samples from both wells had been forwarded to the geological department of Reservoirs, Inc. for thin section, x-ray diffraction and scanning electron microscopy analyses per your request. On January 26, 1993, Keith Hudson discovered an apparent misunderstanding that the four samples from the Snyder "A" No. 3 Well identified for geological analysis were to be tested in the same manner as the special core analysis samples from the CYR "A" No. 1 Well.

The four samples were immediately saturated with the simulated formation brine in preparation for the requested tests. On February 8, 1993, the core plug sample U 278 (2150.9 ft.) broke in an irregular manner and no replacement was designated by you.

The test results obtained on the core plug samples from the Snyder "A" No. 3 Well have been forwarded to you as they were

completed and a complete set of tables and figures for both wells
have been delivered to you by Mr. Keith Hudson on March 29, 1993.

The test results for both wells are presented in this report
with sections entitled "Table of Contents", "Laboratory Procedures"
and "Discussion of Results."

The core plug samples from each well were selected on the
basis of porosity and specific permeability to gas. Large
differences were present for the core plug samples selected from
both wells and this is evident in some of the test results. The
core plug samples having the lowest porosity and permeability had
the least efficient displacement of water by gas, the least
efficient intrusion of mercury into the samples at comparable
pressures, and the pore size distributions with the smallest pore
entries. However, all of the test results are considered valid for
the prediction of reservoir performance or formation evaluation.

During the initial stages of the testing program, two samples
were subjected to return permeability tests for Mr. Todd
Montgomery. These tests were performed on a "rush" basis and the
results electronically transmitted to him with no charge to
Anadarko Petroleum Corporation. See Appendix "A" of this letter.

We at Reservoirs, Inc. would like to thank you and Anadarko
Petroleum Corporation for selecting us to perform these analyses
for you. If you have any questions, please call Mr. Paul Delacoe
at (713)932-9670 or me at (713)932-6619.

I have included an unbound copy of this report with the five
bound copies for your use in making copies; however, if you need
additional bound copies, please let me know and I will provide
them.

Sincerely,

Duane L. Archer
Vice President
RESERVOIRS, INC.

DA:ls

Appendix A

REGAINED PERMEABILITY TESTS

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

The following test results were requested by Mr. Todd Montgomery of Anadarko Petroleum Corporation in December, 1992. The test results were electronically transmitted on January 6, 1993. It should be noted that these tests were performed on a "rush" basis at no charge to Anadarko Petroleum Corporation.

Sample	Depth (ft.)	Permeability To Gas (md)	Porosity (%BV)	Grain Density (g/cc)	Perm. to Sim. Form. Brine Before 2% KCl (md)	After 2% KCl (md)
U 211	2133.40	11.1	22.0	2.67	6.11	5.58
U 220	2137.75	30.8	22.7	2.65	20.5	20.5

Sample U 211 indicated a reduction of 8.7% from the original permeability to simulated formation brine determined prior to the injection of the 2% potassium chloride (KCl) brine. Sample U 220 did not indicate any reduction in permeability after the injection of the 2% KCl brine.

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LABORATORY PROCEDURES

Introduction:

Core material from the CYR "A" No. 1 Well and the Snyder "A" No. 3 Well were conventionally analyzed by Reservoirs, Inc. The conventional core analyses were reported on December 29, 1992 and December 30, 1992, respectively. Special core analyses were requested on a total of six core plug samples from the two wells. The requested tests and the sample identification with corresponding depths were as follows:

Well Name	Sample Ident.	Depth ft.	Trapped Gas Rel. Perm.	Electrical Properties	Mercury Injection
CYR "A" No. 1	U 210	2137.7	X	X	X
	U 222	2138.8	X	X	X
Snyder "A" No. 3	U 263	2143.3	X	X	X
	U 271	2147.2	Alternate	X	X
	* U 278	2150.9	Alternate	X	X
	U 295	2159.5	X	X	X

* Sample U 278 broke irregularly after saturating with brine and prior to the electrical property determinations. No replacement was selected.

Basic Rock Properties:

The bulk volume of each core plug sample was determined by mercury immersion (Archimedes' principle) and confirmed by measuring the length and diameter of the core plug sample with calipers and calculating the bulk volume.

The porosity and grain density of each core plug sample was determined using the Boyle's law method and helium as the gaseous phase. The core plug sample was placed in a matrix cup (sealed chamber) of known volume. Another chamber of known volume containing helium at a preselected pressure was connected to the matrix cup. The helium expanded into the matrix cup, and an equilibrium pressure was recorded. Using Boyle's law, the grain

Reservoirs Inc.

volume of the core plug sample being tested can be determined. The grain volume subtracted from the bulk volume of the core plug sample results in the pore volume of the core plug sample. Porosity is the pore volume expressed as a percent of the bulk volume.

The grain density is the weight of the core material per unit volume of the core material (grain volume). The weight of the core material is determined by weighing the clean and dry core plug sample on a pan-balance at ambient conditions. The grain volume is obtained from the Boyle's law calculation.

The specific permeability to gas was determined by placing each core plug sample in a Hassler-type core holder and applying a confining pressure of 300 psig to the system to prevent bypassing of the gas around the core plug sample. Nitrogen gas was injected into the core plug sample at a constant pressure until a constant flow rate of gas through the core plug sample was attained (steady-state conditions). The specific permeability to gas was calculated using the Darcy Equation.

Saturation of the Samples:

The clean and dry core plug samples were weighed and placed in a vacuum-pressure chamber and evacuated for approximately twelve hours to 50 microns of pressure. This removes any gases from the core plug samples. Simulated formation brine was prepared on the basis of an analysis furnished from the Tucker 3-19 well. The brine was injected into the chamber until all of the core plug samples were submerged in the brine. The pressure inside the chamber was increased to 1200 psig and maintained for an additional twelve hours. The chamber was depressured to atmospheric pressure and each core plug sample was weighed. The pore volume was determined gravimetrically and compared to the pore volume determined using the Boyle's Law Method. All core plug samples were saturated completely (100%).

Formation Resistivity factor at Confining Pressure:

Each core plug sample was placed in a resistivity core holder with a capillary pressure porous plate between the downstream end face of the core plug and the silver electrode/distribution platen.

A net confining pressure of 300 psig was applied to the periphery of the core sample. The sample was flushed with the simulated formation brine to insure complete saturation of the silver electrodes, sample, porous plate and tubing. The resistance of each sample was determined using an alternating current at a frequency of 1000 Hz. Several days were required to attain stable resistances which is an indication that ionic equilibrium had been achieved. The formation resistivity factor (F) and the cementation exponent (m) were calculated from the test results.

Formation Resistivity Index at Confining Pressure:

Immediately following the formation resistivity factor tests, nitrogen gas was injected into each core plug sample to displace the simulated formation brine through the capillary pressure porous plate. As the nitrogen gas desaturated the core plug sample, the resistance of the sample was determined as a function of the volume of simulated formation brine produced. An alternating current and a frequency of 1000 Hz was used to determine the resistances. The formation resistivity index (I), saturation exponent (n), and the corresponding water saturations were calculated from the test results and are presented in both tabular and graphical formats.

The water saturations determined by the fluid produced volumetrically were confirmed by weighing each core plug sample immediately following the test and calculating the water saturations gravimetrically. In addition, each sample was extracted and leached by the Dean-Stark method to determine the volume of water remaining in the core plug samples at the conclusion of the tests.

Dean-Stark Distillation/Extraction:

Each core plug sample was placed in a Dean-Stark apparatus with toluene in the boiling flask. The toluene had been pre-boiled to remove the absorbed water. The apparatus was sealed and the temperature increased to the boiling temperature of the toluene. The toluene vapors flow upward around the core plug sample and into the condenser with the water vapors distilled from the sample. The condensed water is trapped in a calibrated receiving tube where the volumes are read to the nearest 0.01 ml. In addition to the

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toluene distilling the water from the pore spaces, the toluene is a solvent for hydrocarbons residing in the core plug sample. When all of the water has been produced and the hydrocarbons are extracted from the core plug sample, the toluene is replaced with methanol to remove any salt present in the pore spaces.

After thoroughly cleaning the core plug sample, the sample was placed in a temperature controlled chamber and dried at 160 °F. The core plug sample was allowed to cool to room temperature in a desiccator containing silica-gel.

The core plug sample was weighed at various stages of the distillation/extraction. The fluid saturations were calculated from the gravimetric measurements and the volume of water produced during the Dean-Stark extractions.

Mercury Injection - Pore Size Distribution:

Each core plug sample was placed in the pycnometer (injection chamber) of the mercury injection apparatus, and evacuated to 50 microns of pressure. Mercury was injected at a predetermined pressure and maintained at that pressure until capillary equilibrium was achieved (mercury intrusion into the sample ceased). The pressure and the volume of mercury injected into the sample were recorded. The pressure was then increased and the procedure repeated. The range of pressure selected for the mercury injection test was 0-2000 psia.

The pore size distribution was derived from the mercury injection capillary pressure data using the following equation:

$$Ri = \frac{2 \ \gamma \ \text{Cos} \ \theta \ C}{P_c}$$

Where:
Ri	=	Pore Radii (microns)
P_c	=	Capillary Pressure in laboratory (psia)
γ	=	Interfacial Tension (dynes/cm)
θ	=	Contact Angle (degrees)
C	=	Conversion Constant equal to 145×10^{-3}

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Leverett's J-Function was derived from the mercury injection capillary pressure data using the following equation:

$$J(S_w) = \frac{P_c}{\gamma \; \mathrm{Cos}\; \theta} \left(\frac{k}{\phi}\right)^{\frac{1}{2}}$$

Where:
P_c = Capillary pressure in laboratory (dynes/cm²)
γ = Interfacial tension (dynes/cm)
θ = Contact angle (degrees)
k = Permeability (cm²)
ϕ = Fractional porosity

For Air-Mercury System:
γ = 480 dynes/cm
Contact angle, θ = 140°
Cosine 140° = 0.766

Gas-Water Relative Permeability:

The core plug samples were saturated with simulated formation brine (water) using the vacuum-pressure method described previously. Each core plug sample was placed in a hydrostatic core holder and a net confining pressure of 300 psig was applied to the periphery of the sample. The specific permeability to water was determined and used as the "base permeability" to calculate the "relative" permeabilities to gas and to water.

Nitrogen gas was injected into each core plug sample at a constant pressure at the inlet of the samples to displace the water. The incremental productions of water and gas were monitored and recorded as a function of time. The gas-water relative permeability relationships were calculated from the laboratory data. The test results are presented in tabular and graphical formats.

Trapped Gas-Flowing Gas:

At the conclusion of the gas-water relative permeability tests, water was injected into the core plug samples at a rate approximating a normal reservoir imbibition rate or slower, (six inches per day). The water displaced some of the "flowing gas" and trapped the remainder. The "trapped gas" saturations were determined from the volumetric data.

The core plug sample was saturated with water by injecting water into the sample using a back-pressure to aid in collapsing the gas and dissolving it in the water. After several pore volumes of water had been injected into the sample, the back-pressure was removed and a specific permeability to water was determined.

Gas was injected into the saturated core plug sample at the same test conditions as the gas-water relative permeability test. The volume of gas injected (volume of water produced) was monitored until the desired "flowing gas" saturation was attained. The gas injection was discontinued and water injection initiated to "trap" the gas. This procedure was repeated several times for each core plug sample until a relationship between flowing gas saturation and trapped gas saturation could be adequately defined.

The trapped gas-flowing gas saturation test results are presented in tabular and in graphical format for each core plug sample. In addition, the test results have been included in the graphical presentation of the gas-water relative permeability test results. Tie-lines (dashed) have been drawn between the flowing gas relative permeability and the trapped gas saturation which has been arbitrarily placed on the bottom axis of the graph.

DISCUSSION OF RESULTS

CYR "A" NO. 1 WELL

Trapped Gas-Relative Permeability (Pages 11 to 20)

The two core samples (U 210 and U 222) selected for the trapped gas-relative permeability test vary considerably in porosity and specific permeability to gas. Core plug sample U 210 (2132.75 ft.) has a porosity of 17.4% BV and a permeability to gas of 3.76 md. Core plug sample U 222 (2138.80 ft.) has a porosity of 25.0% BV and a permeability to gas of 57.6 md.

In a comparison of the trapped gas-flowing gas relationships, Figures 1 and 4 indicate very similar test results. However, the gas water relative permeability test results are very different. The test results obtained on core plug sample U 210 (2132.75 ft.) indicate a very inefficient displacement of water by gas (Figure 2) and the test results obtained on core plug sample U 222 (2138.80 ft.) have a very high displacement efficiency of water by gas (Figure 5).

The trapped gas-flowing gas test results have been added to the gas-water relative permeability-saturation relationships. "Tie-lines" have been added to indicate the relative permeability to gas during the imbibition cycle where water is displacing the gas phase.

All of the test results are very similar to test results obtained previously on core material from other formations. The trapped gas-relative permeability test results are considered applicable to the prediction of reservoir performance for those portions of the formation represented by these core plug samples.

Formation Resistivity Factor (Pages 21 to 22)

The two core plug samples were saturated with a simulated formation brine and allowed to achieve ionic equilibrium. Equilibrium was determined by the stabilized resistance measurements of the saturated core plug sample. Several days were required for equilibrium to be achieved.

The test results are presented in Table 5 and Figure 7. The cementation factors determined for the two core plug samples were 1.94 and 1.91. The average was 1.925.

Formation Resistivity Index (Pages 23 to 29)

After the two core plug samples U 210 (2132.75 ft.) and U 222 (2138.80 ft.) had achieved ionic equilibrium, they were desaturated using a humidified nitrogen gas with a net confining pressure of 300 psig applied to the periphery of the samples.

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The test results obtained on the core plug samples are presented in Tables 6 and 7. The formation resistivity index-saturation relationships are presented in Figures 8 through 11. Figure 12 presents a "composite" of the test results for both core plug samples. The graphical presentations have been presented using one-cycle and two-cycle semi-log graphs for your use in determining the test results.

The saturation exponent determined for sample U 210 was 1.99 and for sample U 222 was 2.01.

The formation resistivity factor and the formation resistivity index test results are considered applicable to formation evaluations or well-log interpretation for those portions of the reservoir represented by the core plug samples.

Mercury Injection-Pore Size Distribution (Pages 30 to 35)

After all of the requested tests were completed and evaluated, the two selected core plug samples were subjected to mercury injection tests. The test results obtained on sample U 210 are presented in Table 8 and graphically in Figures 13 and 14. The results obtained on sample U 222 are presented in Table 9 and Figures 15 and 16.

The capillary pressure-saturation relationships presented in Figures 13 and 15 are very different because the pore size distributions of the two core plug samples are considerably different, as shown in Figures 14 and 16. The test results are considered applicable to reservoir performance calculations.

It should be noted that the "J-function" suggested in the literature by J. C. Leverett has been presented with the tabulated results for your possible use.

SNYDER "A" NO. 3 WELL

Trapped Gas-Relative Permeability (Pages 36 to 45)

Two core plug samples were selected from the Snyder "A" No. 3 Well for special core analyses. The two samples were U 263A (2143.4 ft.) and U 295 (2159.5 ft.). The samples were selected on the basis of differences in porosity (17.3% BV and 20.7% BV) and specific permeability to gas (1.10 md and 31.0 md). This selection is similar to the selection made from the CYR "A" No. 1 Well.

The trapped gas-flowing test results are presented in Tables 10 and 12 and in Figures 17 and 20. A comparison of the test results indicates the relationships are very similar. A comparison of these relationships with those obtained on the two core plug samples from the CYR "A" No. 1 Well indicate all four relationships are very similar. This may indicate that one trapped gas-flowing gas relationship can be used to represent the formation.

The gas-water relative permeability test results are presented in Table 11 and Figures 18 and 19 for sample U 263A and in Table 13 and Figures 21 and 22 for sample U 295. The test results are similar to the results obtained on the CYR "A" No. 1 Well. The test results obtained on the low permeability sample U 263A indicate very low efficiency of water displacement by gas, and sample U 295 indicated a high efficiency of displacement of water by gas. The trapped gas-flowing gas test results have been added to the gas-water relative permeability-saturation relationship. "Tie-lines" have been added to indicate the relative permeability to gas during the imbibition or trapping cycle where water is displacing the gas phase.

The test results obtained on the two samples from the Snyder "A" No. 3 Well are considered applicable to the prediction of reservoir performance.

Formation Resistivity Factor (Pages 46 to 47)

Four core plug samples were selected for electrical property measurements and mercury injection tests. They were core plug samples U 263 (2143.3 ft.), U 271 (2147.2 ft.), U 278 (2150.0 ft.) and U 295 (2159.5 ft.). After the core plug samples were saturated with brine, one sample, U 278, broke in an irregular manner indicating internal stress. Mr. Kirk Malinowsky was contacted and decided that no replacement would be selected. The three remaining core plug samples were allowed to proceed with the testing procedure.

The resistance of each saturated sample was determined at regular intervals during the next several days until the resistances stabilized. The stabilization indicated ionic equilibrium had been achieved. The equilibrated test results are presented in Table 14 and Figure 23. The calculated cementation factors (m) were 1.91, 1.95 and 2.01. The average was 1.96 as

shown in the composite graphical presentations (Figure 23). These test results are very similar to those obtained on the two core plug samples from the CYR "A" No. 1 Well. All of the test results from both wells are considered applicable to the evaluation of well logs and formation evaluations.

Formation Resistivity Index (Pages 48 to 56)

The formation resistivity index (I) and the corresponding saturations for the three core plug samples are presented in Tables 15, 16 and 17. The formation resistivity index-saturation relationships are presented in Figures 24 through 28. Some of the graphical presentations are presented in both one-cycle and two-cycle semi-log graphs. Figure 29 presents a composite of all the test results. The saturation exponents (n) were 1.75, 1.79 and 2.02. The average was 1.85. Comparing these test results with similar test results obtained from the core plug samples from the CYR "A" No. 1 Well indicates the saturation exponents are different and may be sufficient to be accounted for when evaluating various portions of the reservoir.

Mercury Injection-Pore Size Distributions (Pages 57 to 65)

The mercury injection test results are presented in Tables 18, 19 and 20. Included in the tables are the pore entry radii that correspond to the capillary pressure (injection pressure) based on the bundle of capillary tube theory. Also, the "J-function" proposed by J. C. Leverett in the literature has been included for your use if this is a correlating method for your particular reservoir. The capillary pressure-saturation relationships are presented in Figures 30, 32 and 34. The pore size distributions are presented in Figures 31, 33 and 35. Examination of the test results indicates a different pore size distribution for U 295 than is indicated for samples U 263 and U 271. This is evident in the capillary pressure relationship. The test results are considered applicable to the prediction of reservoir performance.

Table 1

TRAPPED GAS-FLOWING GAS
RELATIONSHIP AT 300 psig NET CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 210   Porosity, (%BV):   17.4
Depth, ft.:   2132.75   Perm. to Gas, (md):   3.76
                                Perm. to Water, (md):   2.69

Flowing Gas Saturation, %PV	Trapped Gas Saturation, %PV
50.2	33.7
41.8	30.0
33.7	22.9
20.2	15.6
13.9	12.5

RESERVOIRS
Inc.

Figure 1

TRAPPED GAS-FLOWING GAS RELATIONSHIP

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 210
Depth, ft: 2132.75

Porosity, %BV: 17.4
Permeability, md: 3.76

TRAPPED GAS SATURATION (%PV)

FLOWING GAS SATURATION (%PV)

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Reservoirs
Inc.

Table 2

GAS-WATER RELATIVE PERMEABILITY

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample No.:	U 210	Porosity, (%BV):	17.4
Depth (ft.):	2132.75	Perm. to Gas (md):	3.76
		Perm. to Water, (md):	2.69

Gas Saturation (%PV)	Relative Permeability (Fraction) Gas(Krg)	Relative Permeability (Fraction) Water(Krw)	Gas-Water Ratio (Kg/Kw)
0.0	--	1.0000	--
7.3	0.0835	0.4743	0.18
8.1	0.1069	0.4456	0.24
9.5	0.1412	0.3732	0.38
10.8	0.1689	0.3285	0.51
12.8	0.1967	0.2368	0.83
14.5	0.2269	0.1822	1.25
16.5	0.2883	0.1511	1.91
18.3	0.3385	0.1282	2.64
22.2	0.4053	0.0798	5.08
27.9	0.5050	0.0406	12.4
33.5	0.6022	0.0208	29.0
35.2	0.6702	0.0186	36.1
37.7	0.7330	0.0147	49.7

Figure 2

GAS-WATER RELATIVE PERMEABILITY

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

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Figure 3

GAS–WATER RELATIVE PERMEABILITY RATIO

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 210
Depth, ft: 2132.75

Porosity, %BV: .17.4
Perm to gas, md: 3.76

RELATIVE PERMEABILITY RATIO (Kg/Kw)

GAS SATURATION (% PV)

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Table 3

TRAPPED GAS-FLOWING GAS
RELATIONSHIP AT 300 psig NET CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample:	U 222	Porosity, (%BV): 25.0
Depth, (ft.):	2138.80	Perm. to Gas, (md): 57.6
		Perm. to Water, (md): 57.5

Flowing Gas Saturation, %PV	Trapped Gas Saturation, %PV
61.0	42.3
49.7	35.3
43.6	28.5
24.1	20.6
13.4	12.0

Figure 4

TRAPPED GAS-FLOWING GAS RELATIONSHIP

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 222
Depth, ft: 2138.8

Porosity, %BV: 25.0
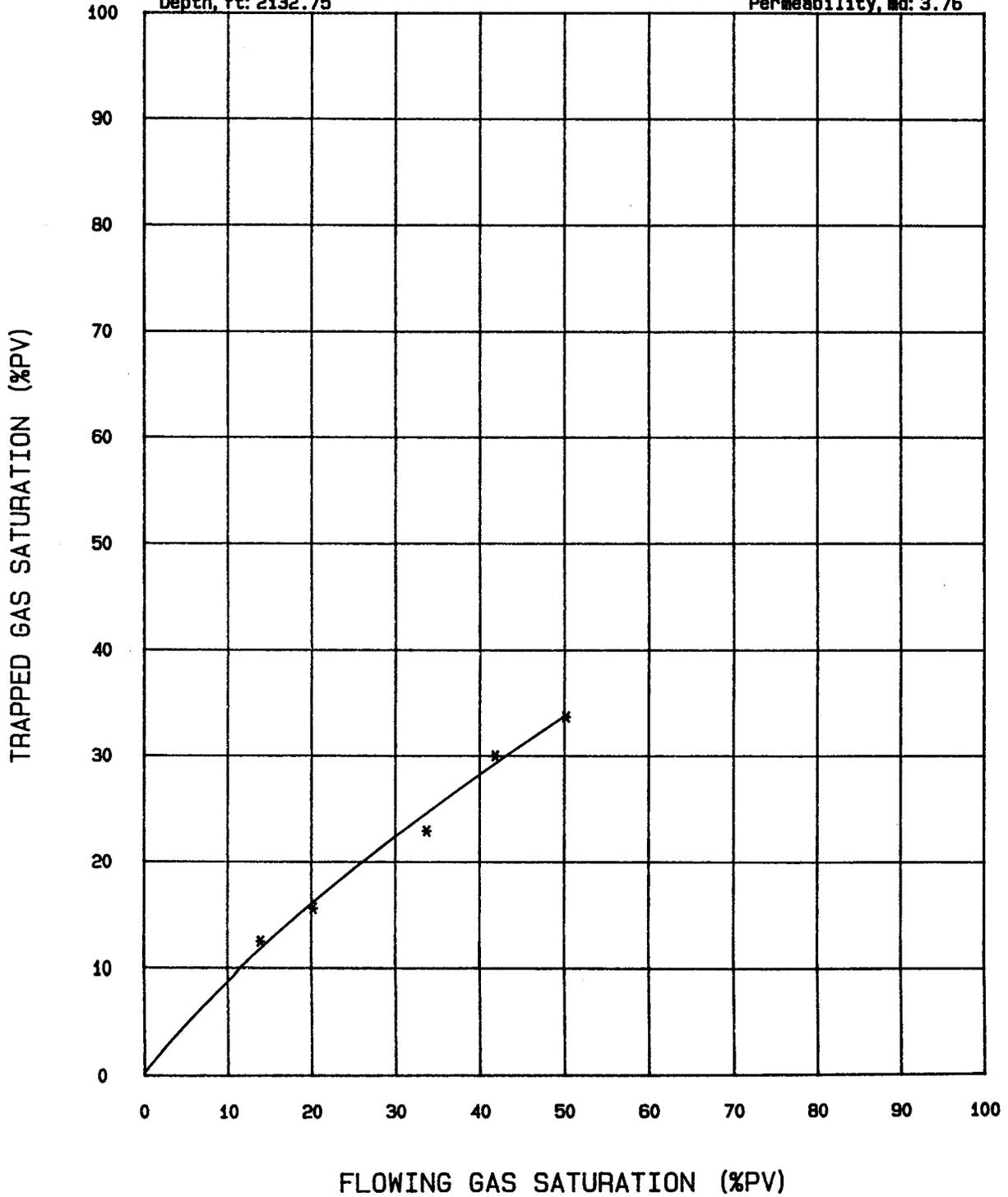Permeability, md: 57.6

FLOWING GAS SATURATION (%PV)

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Table 4

GAS-WATER RELATIVE PERMEABILITY

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample No.:	U 222	Porosity, (%BV):	25.0
Depth (ft.):	2138.8	Perm. to Gas, (md):	57.6
		Perm. to Water, (md):	57.5

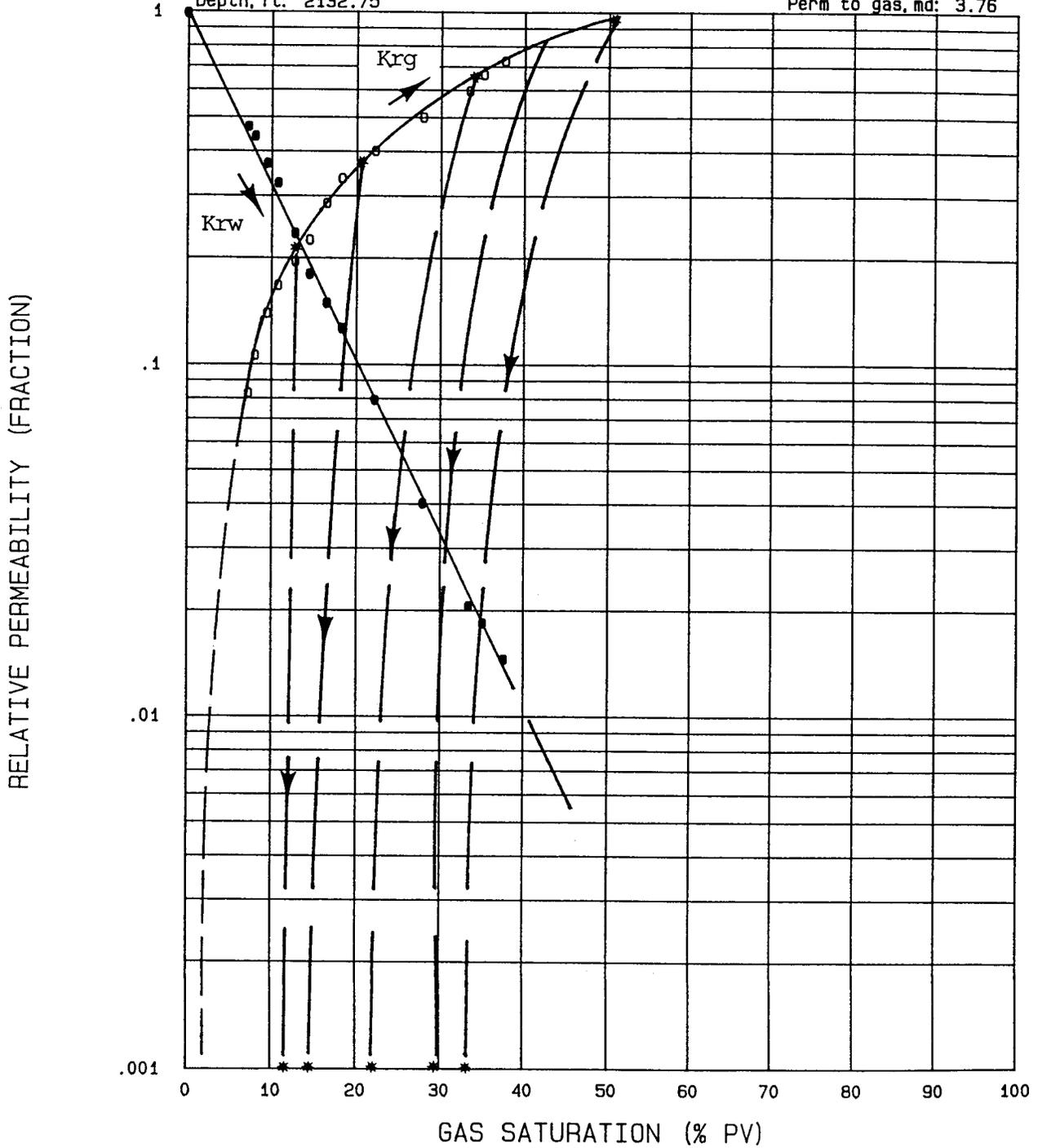| Gas Saturation (%PV)	Relative Permeability (Fraction) Gas(Krg)	Water(Krw)	Gas-Water Ratio (Kg/Kw)
0.0	--	1.0000	--
7.5	0.0039	0.5939	0.007
11.2	0.0184	0.4738	0.039
16.0	0.0377	0.2770	0.140
18.3	0.0531	0.2616	0.200
22.4	0.0752	0.1882	0.400
24.8	0.0867	0.1494	0.580
26.7	0.0991	0.1297	0.760
28.3	0.1084	0.1134	0.960
31.4	0.1220	0.0789	1.55
35.2	0.1506	0.0544	2.77
39.2	0.1720	0.0322	5.34
41.3	0.1871	0.0234	8.01
42.8	0.2064	0.0199	10.4
43.9	0.2229	0.0173	12.9
44.7	0.2381	0.0162	14.7
46.4	0.2492	0.0127	19.6
48.0	0.2596	0.0097	26.7
49.5	0.2740	0.0075	36.7
50.2	0.2895	0.0066	43.5

Figure 5

GAS–WATER RELATIVE PERMEABILITY

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 222
Depth, ft: 2138.80

Porosity, %BV: 25.0
Perm to gas, md: 57.6

Krg

Krw

RELATIVE PERMEABILITY (FRACTION)

GAS SATURATION (% PV)

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Inc.
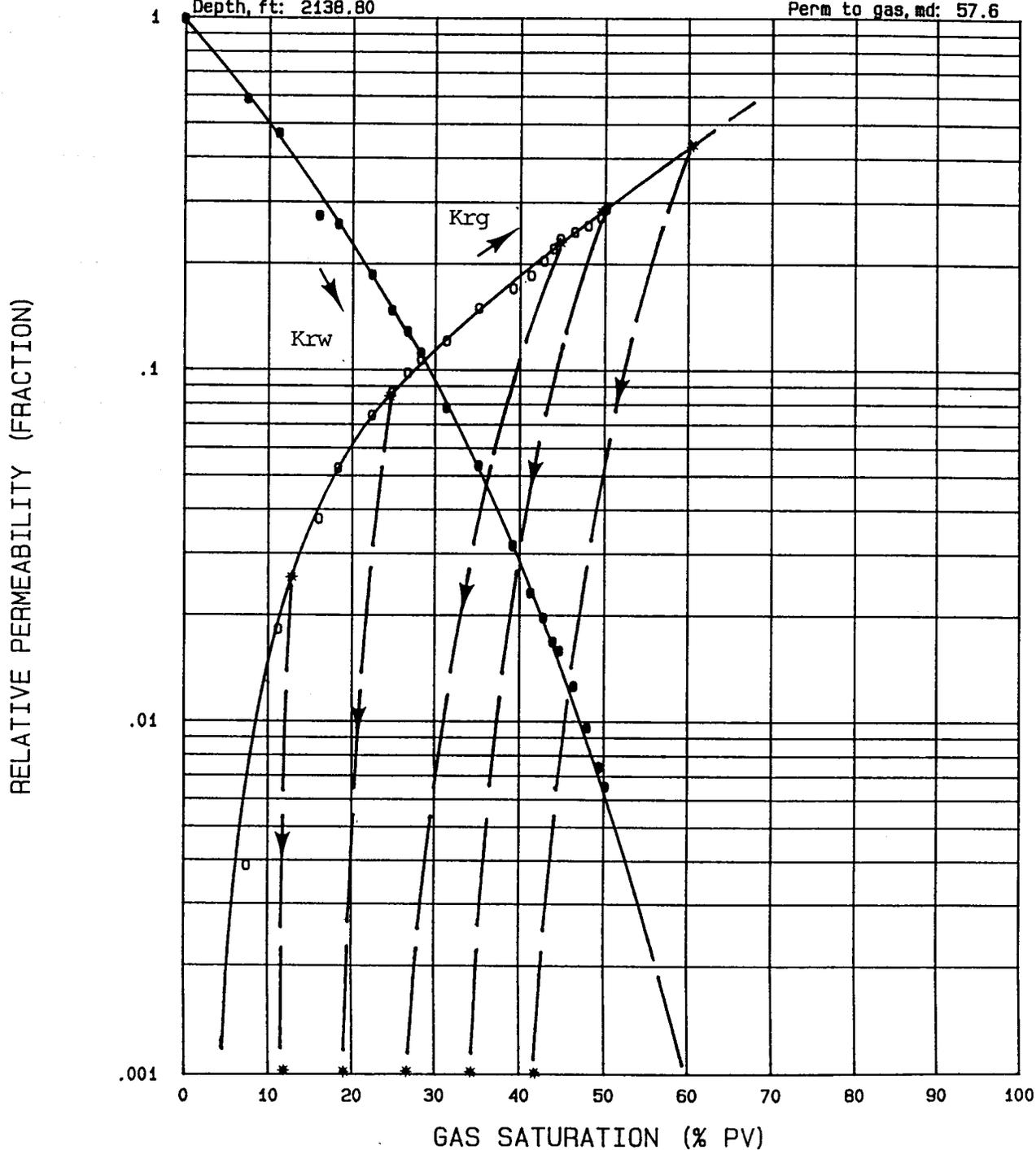
Figure 6

GAS–WATER RELATIVE PERMEABILITY RATIO

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 222
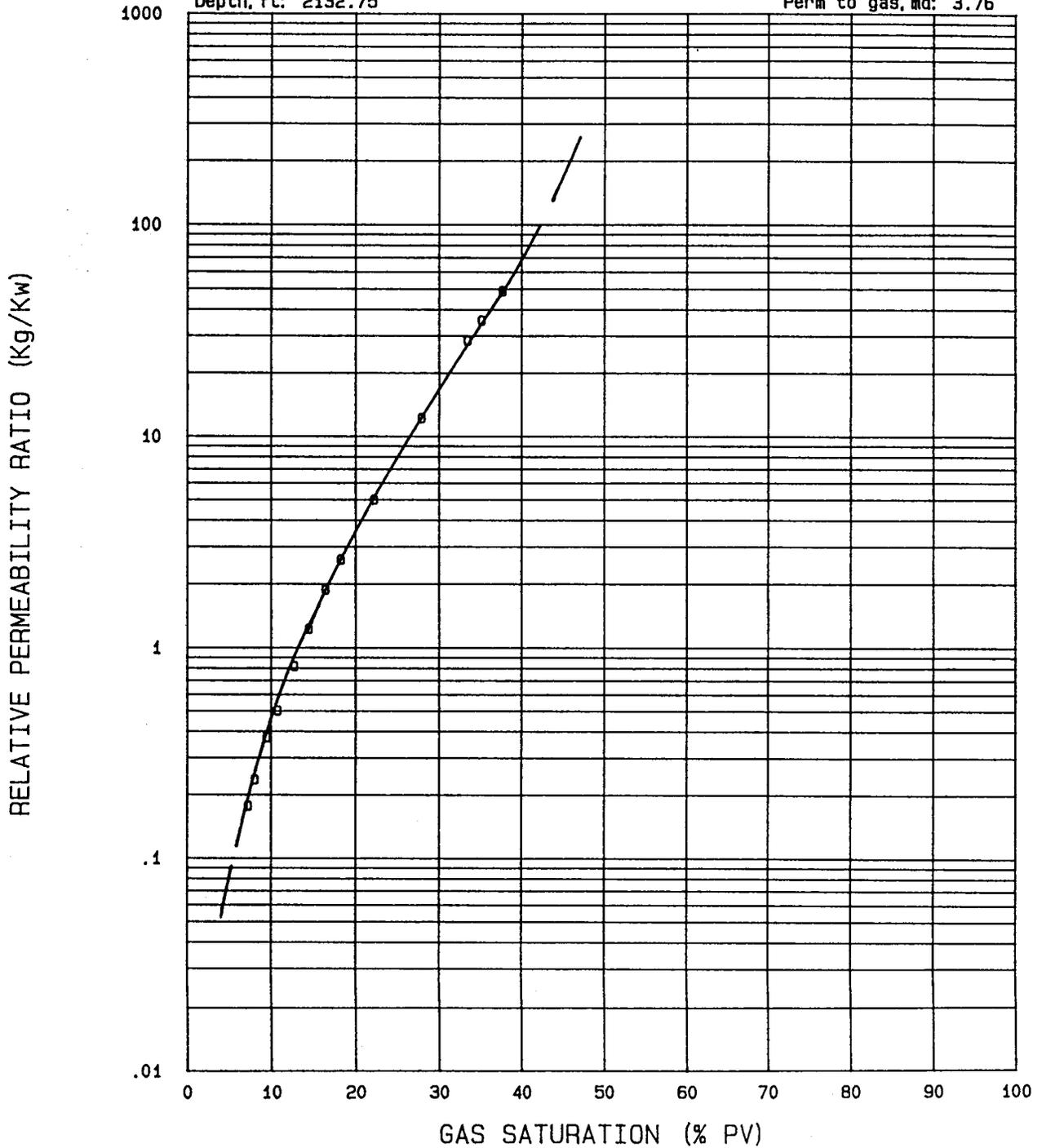Depth, ft: 2138.80

Porosity, %BV: 25.0
Perm to gas, md: 57.6

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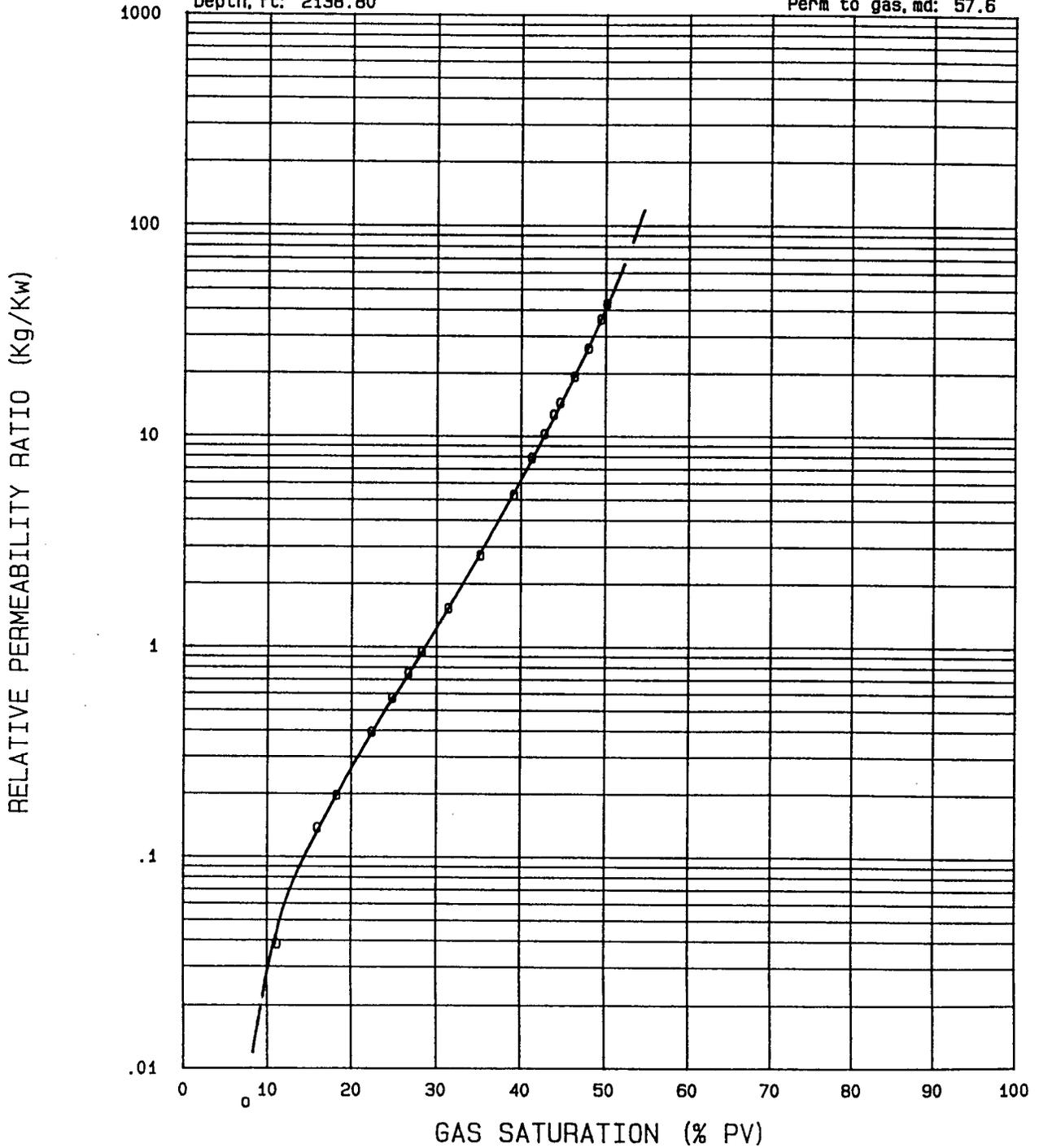
Table 5

FORMATION RESISTIVITY FACTOR - POROSITY RELATIONSHIP

AT CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample	Depth (ft.)	Confining Pressure (psig)	Formation Resistivity Factor (F)	Porosity (% BV)	Cementation Exponent(m)
U 210	2132.75	300	29.63	17.4	1.94
U 222	2138.80	300	14.20	25.0	1.91

Rw = 0.046 ohm-meters @ 76 degrees Fahrenheit

Figure 7

FORMATION RESISTIVITY FACTOR — POROSITY RELATIONSHIP
AT CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Composite

m = 1.925
a = 1.00

FORMATION RESISTIVITY FACTOR (F)

POROSITY (% BV)

Table 6

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 300 psig CONFINING PRESSURE
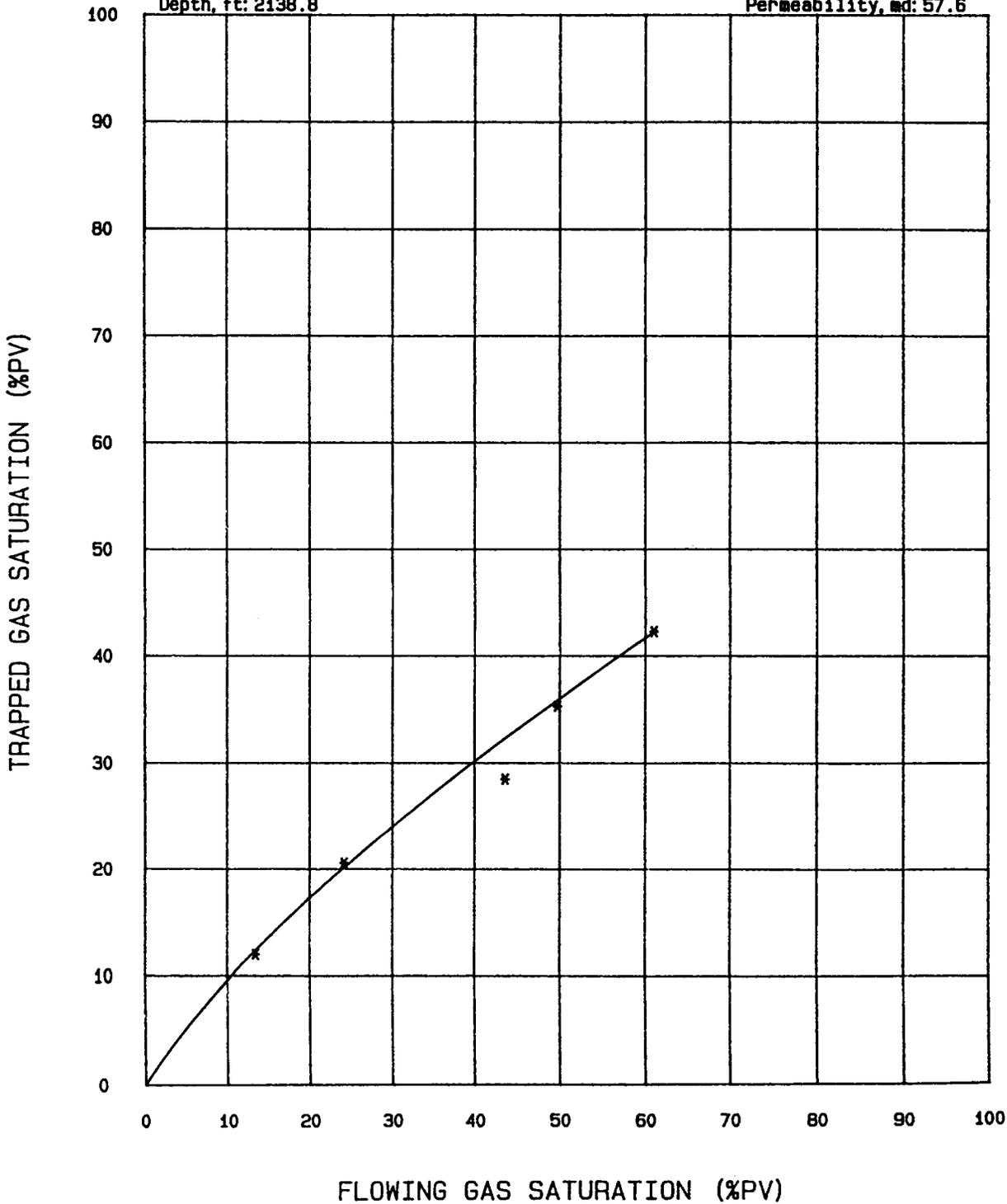
Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Saturation (% PV)
U 210	2132.75	3.76	17.4	1.00	100.0
				1.04	98.1
				1.25	89.4
				1.52	81.0
				1.66	77.4
				1.73	75.8
				2.01	70.7
				2.42	64.2
				2.51	63.0

$Rw = 0.046$ ohm-meters @ 76 degrees Fahrenheit

Reservoirs Inc.

Figure 8

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample : U 210
Depth, ft : 2132.75

n = 1.99

WATER SATURATION (%PV)

24

RESERVOIRS
Inc.

Figure 9

FORMATION RESISTIVITY INDEX — SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample : U 210
Depth, ft : 2132.75

n = 1.99

FORMATION RESISTIVITY INDEX (I)
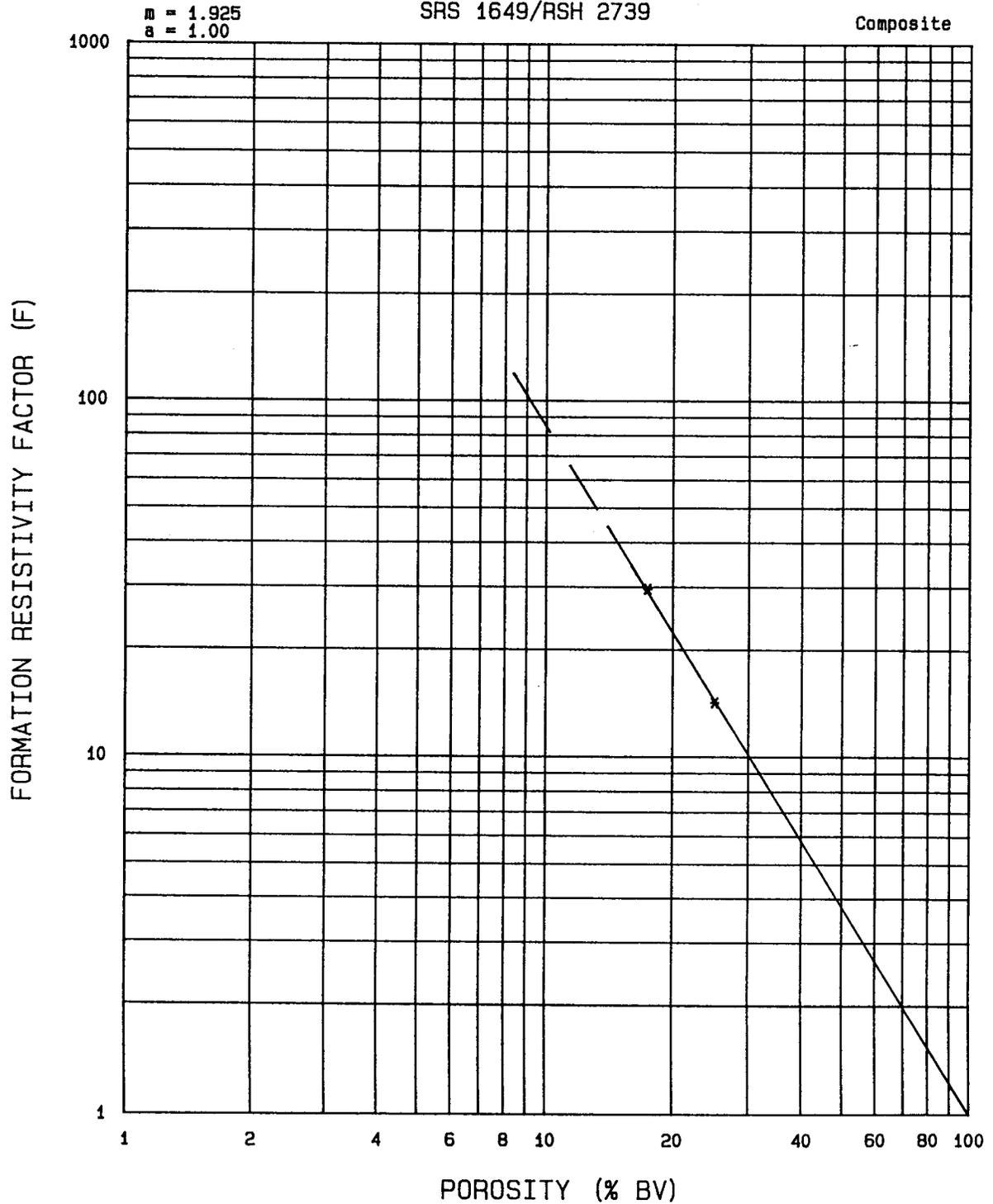
WATER SATURATION (%PV)

25

Table 7

<u>FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP</u>

<u>AT 300 psig CONFINING PRESSURE</u>

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

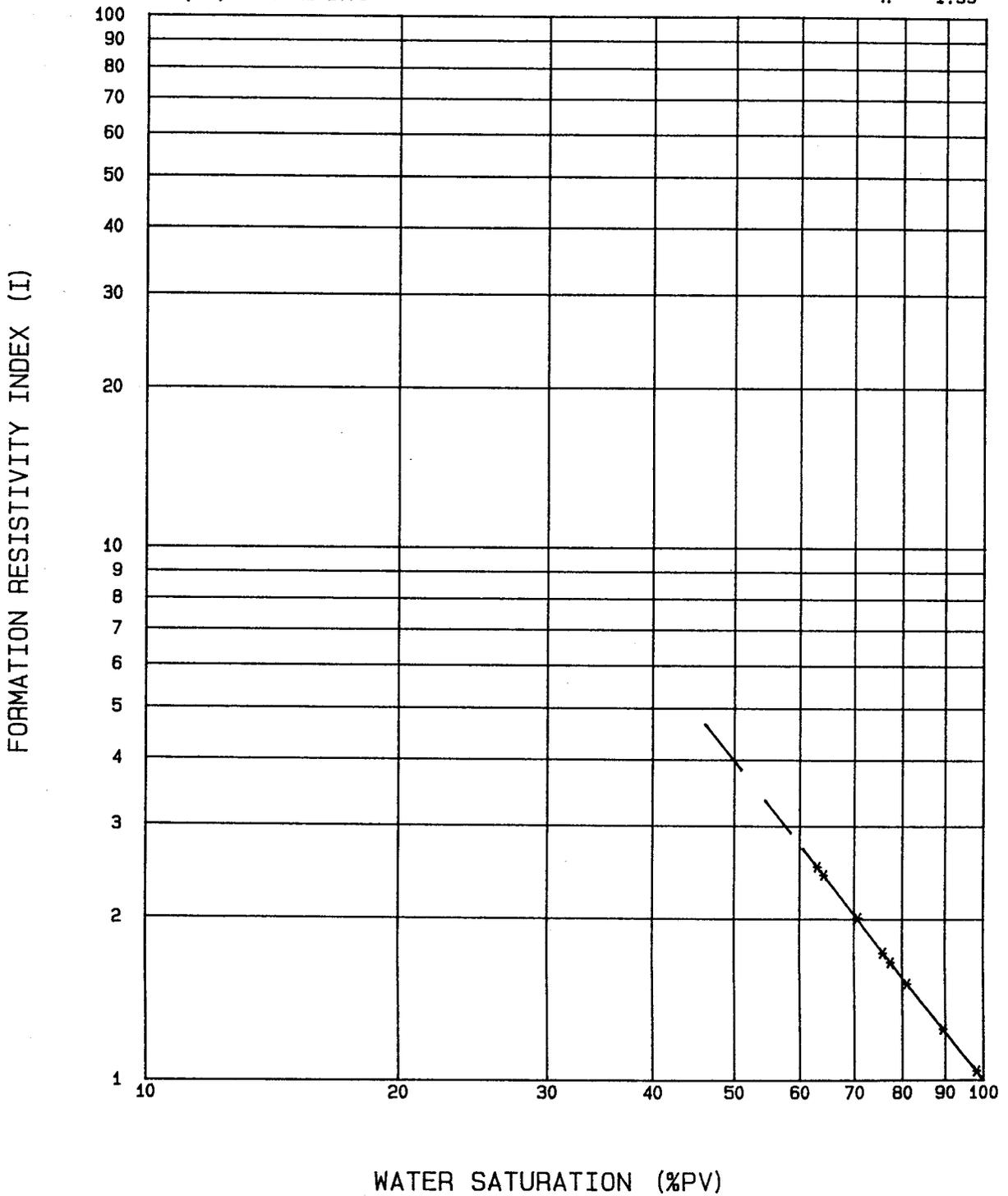| Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Saturation (% PV)
U 222	2138.80	57.6	25.0	1.00	100.0
				1.11	95.0
				1.54	80.7
				1.95	71.8
				2.57	62.5
				2.84	59.5
				4.32	48.0
				5.99	40.8
				6.20	39.7

Rw = 0.046 ohm-meters @ 76 degrees Fahrenheit

26

Figure 10

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample : U 222
Depth, ft : 2138.80

n = 2.01

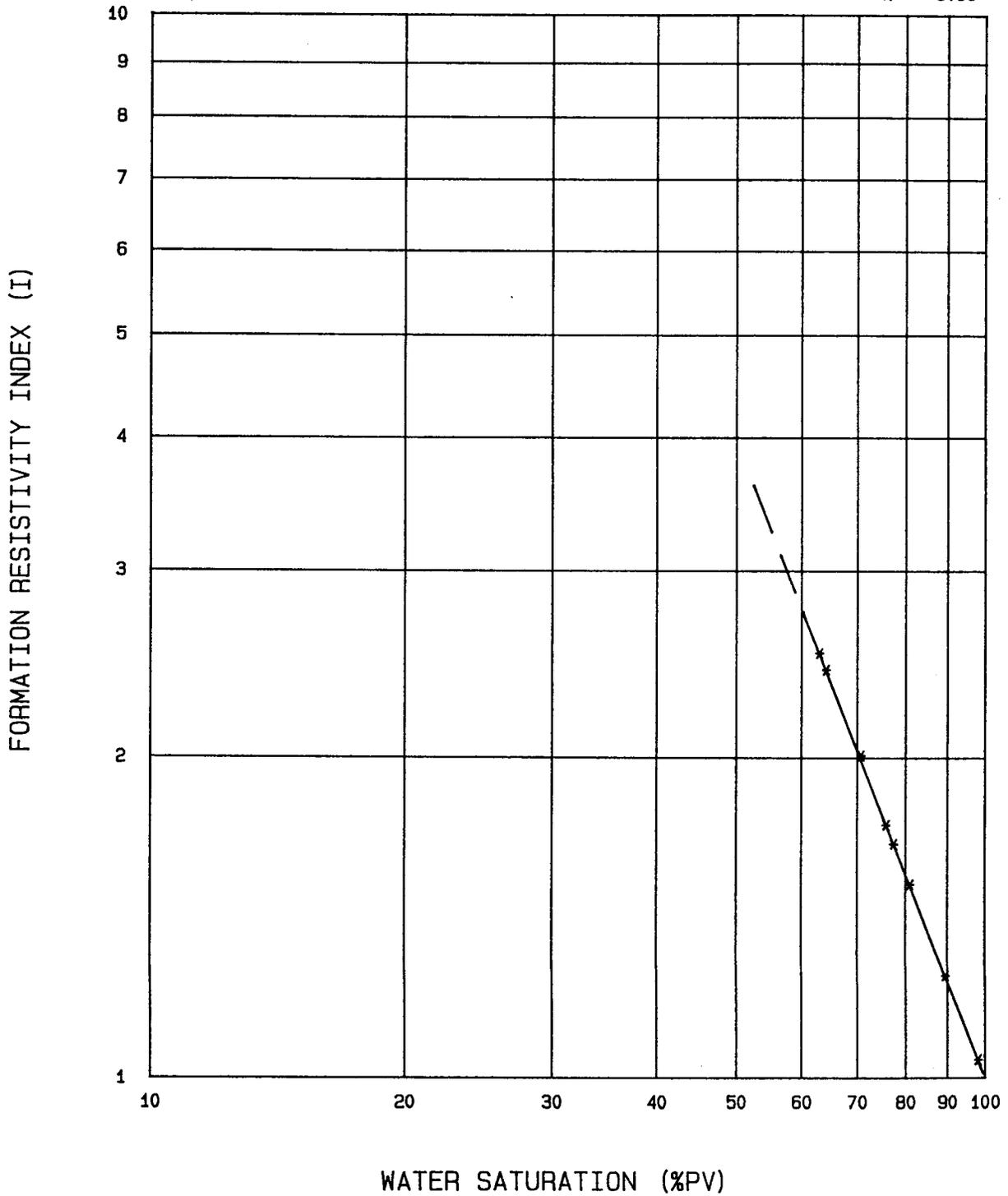FORMATION RESISTIVITY INDEX (I)

WATER SATURATION (%PV)

27

Figure 11

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample : U 222
Depth, ft : 2138.80

n = 2.01

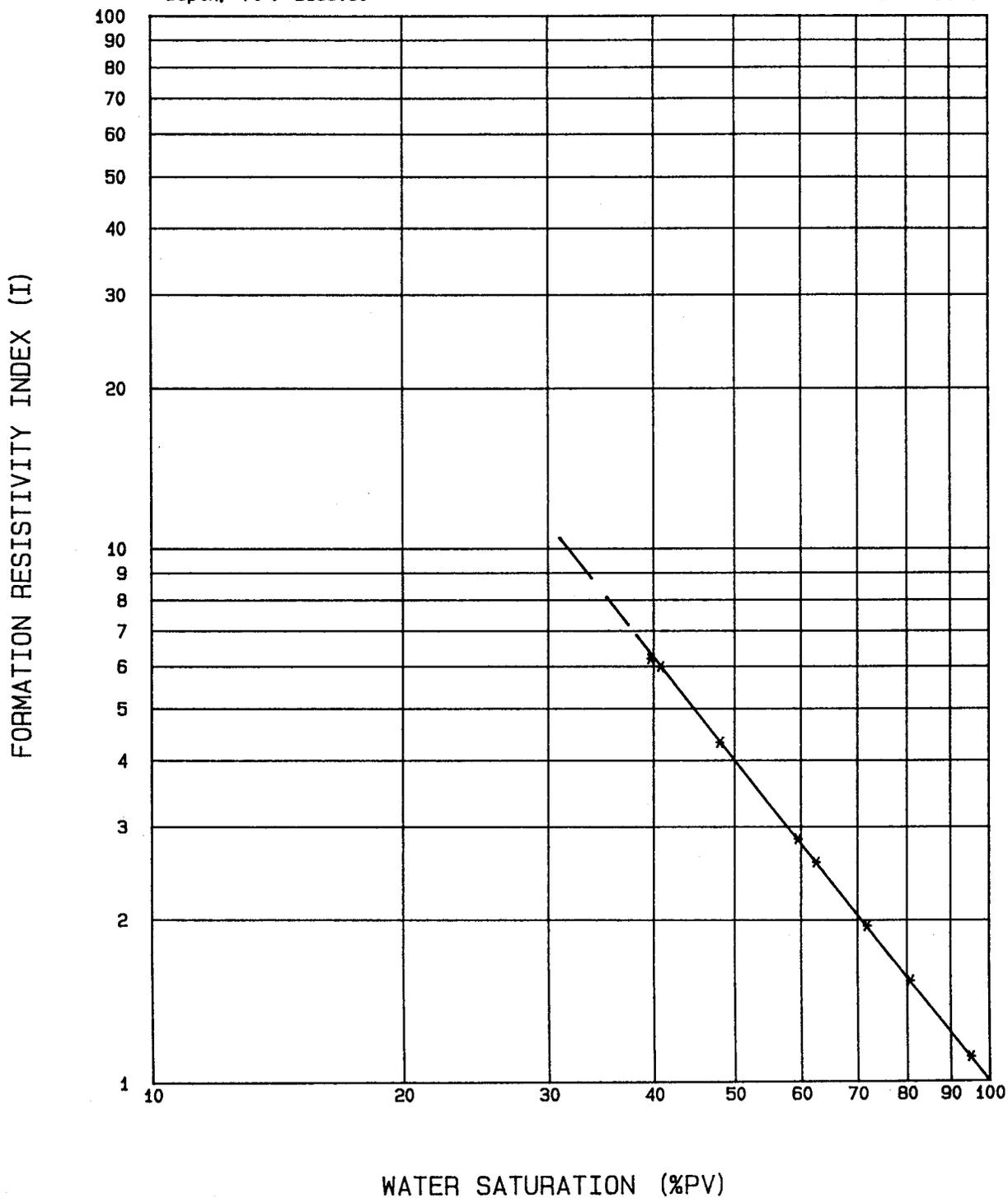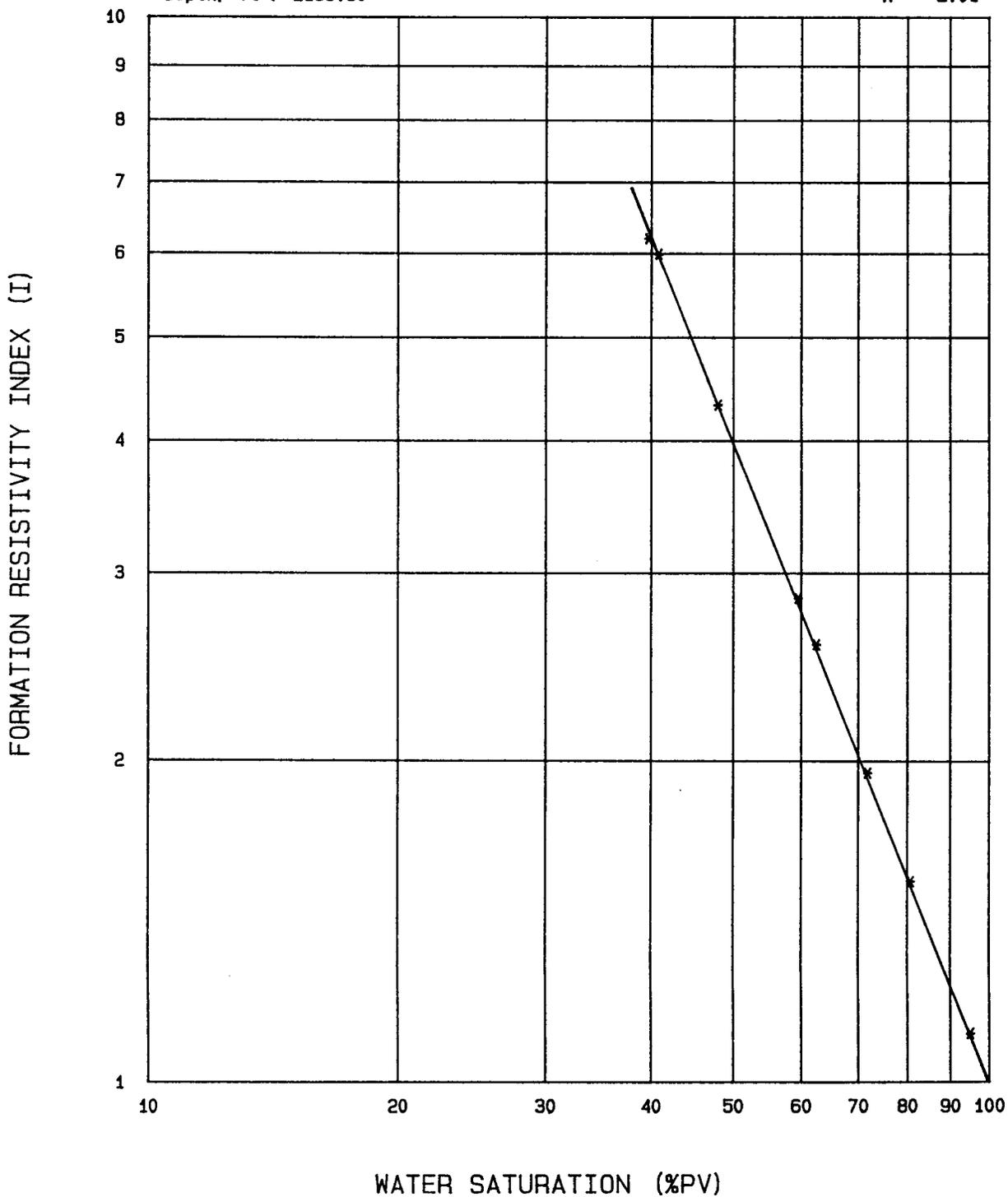WATER SATURATION (%PV)

28

RESERVOIRS
Inc.

Figure 12

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

29

Table 8

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 210   Porosity,% BV: 17.5

Depth, ft: 2132.75   Perm. to Gas, md: 3.76

CAPILLARY PRESSURE (psia)	WETTING PHASE SATURATION (%PV)	PORE ENTRY RADIUS (microns)	LEVERETT'S J-FUNCTION
2.53	100.0	42.10	0.012
4.03	99.9	26.44	0.019
6.53	99.8	16.32	0.031
11.5	99.8	9.24	0.055
16.5	99.8	6.45	0.078
21.5	99.7	4.95	0.102
26.5	99.5	4.02	0.126
31.5	95.5	3.38	0.150
45.5	83.7	2.34	0.216
61.5	74.8	1.73	0.292
75.5	69.7	1.41	0.358
112	61.8	0.96	0.529
162	55.4	0.66	0.766
202	51.1	0.53	0.956
302	41.8	0.35	1.43
402	36.1	0.27	1.91
602	28.1	0.18	2.85
802	23.8	0.13	3.80
1001	21.0	0.11	4.75
1201	18.8	0.09	5.70
1501	17.0	0.07	7.12
2001	14.8	0.05	9.50

Figure 13

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 210
Depth, ft: 2132.75
Porosity, %BV: 17.5
Perm. to gas, md: 3.76

CAPILLARY PRESSURE (psia)

WETTING PHASE SATURATION (%PV)

RESERVOIRS
Inc.

Figure 14

PORE SIZE DISTRIBUTION
Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 210
Depth, ft: 2132.75
Porosity, %BV: 17.5
Perm. to Gas, md: 3.76

Incremental

Cumulative

PORE ENTRY RADIUS (microns)

CUMULATIVE PORE SPACE (%)
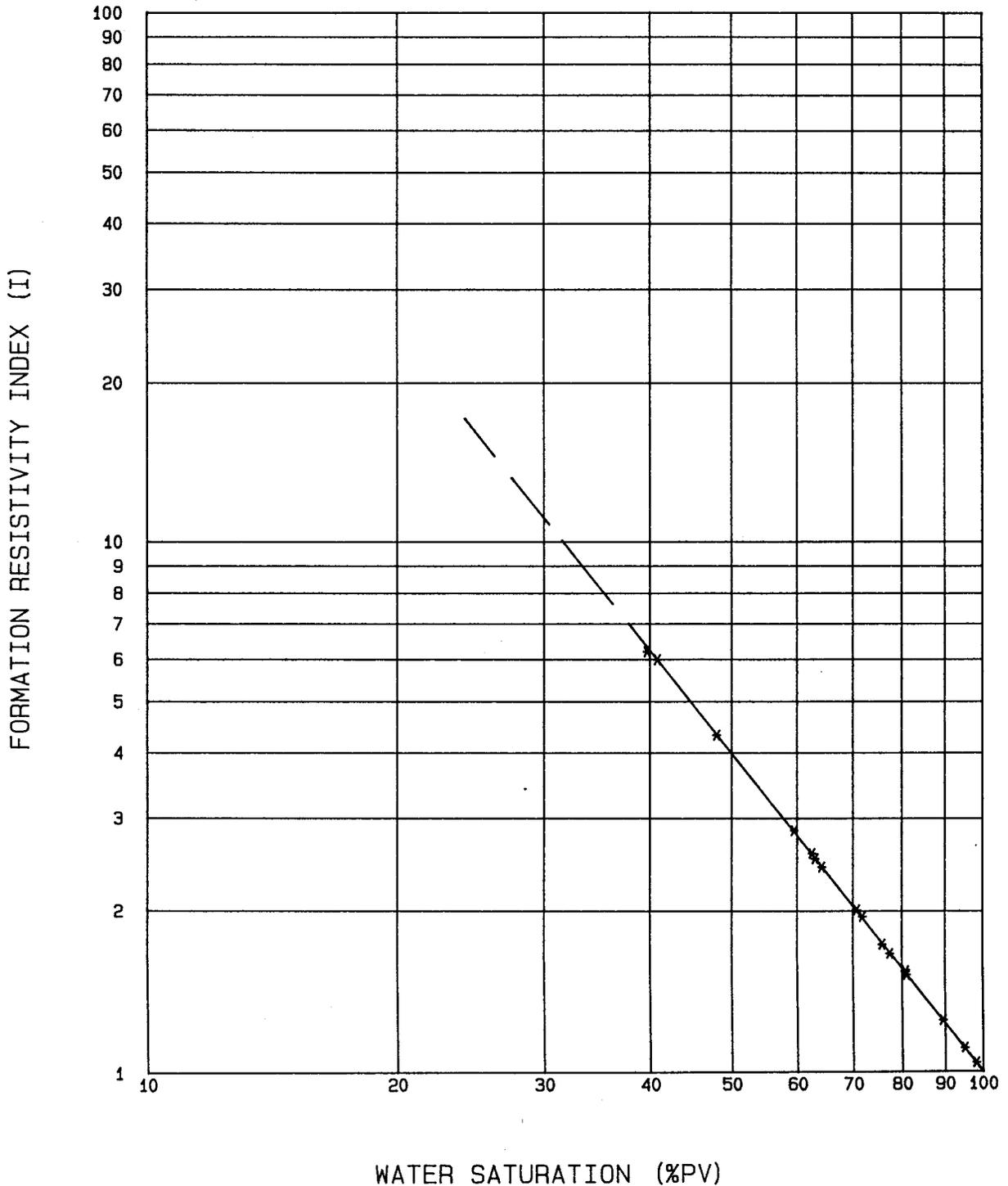
32

Reservoirs
Inc.

Table 9

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 222   Porosity,% BV: 25.0

Depth, ft: 2138.80   Perm. to Gas, md: 57.6

CAPILLARY PRESSURE (psia)	WETTING PHASE SATURATION (%PV)	PORE ENTRY RADIUS (microns)	LEVERETT'S J-FUNCTION
2.23	99.7	47.77	0.020
3.73	99.4	28.57	0.033
6.23	99.3	17.11	0.055
11.2	99.2	9.49	0.099
16.2	99.2	6.57	0.143
21.2	99.0	5.02	0.187
26.2	87.1	4.06	0.231
31.2	50.7	3.41	0.275
45.2	32.4	2.36	0.398
61.2	27.3	1.74	0.538
75.2	25.1	1.42	0.661
111	21.5	0.96	0.978
161	19.7	0.66	1.42
201	18.5	0.53	1.77
301	16.4	0.35	2.65
401	15.0	0.27	3.53
601	13.5	0.18	5.29
801	12.8	0.13	7.04
1000	12.0	0.11	8.80
1200	11.3	0.09	10.56
1500	10.6	0.07	13.20
2000	10.1	0.05	17.59

Figure 15

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
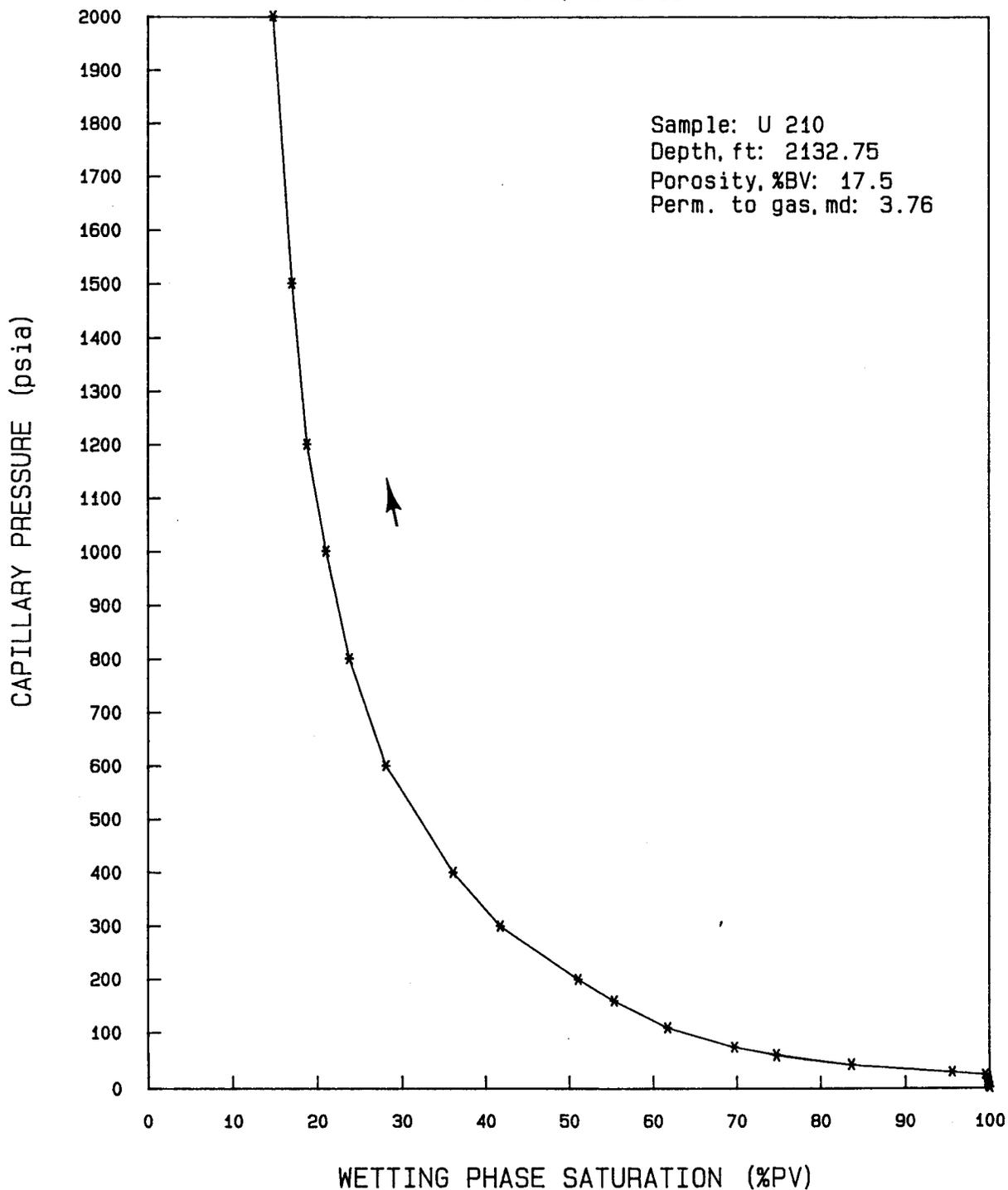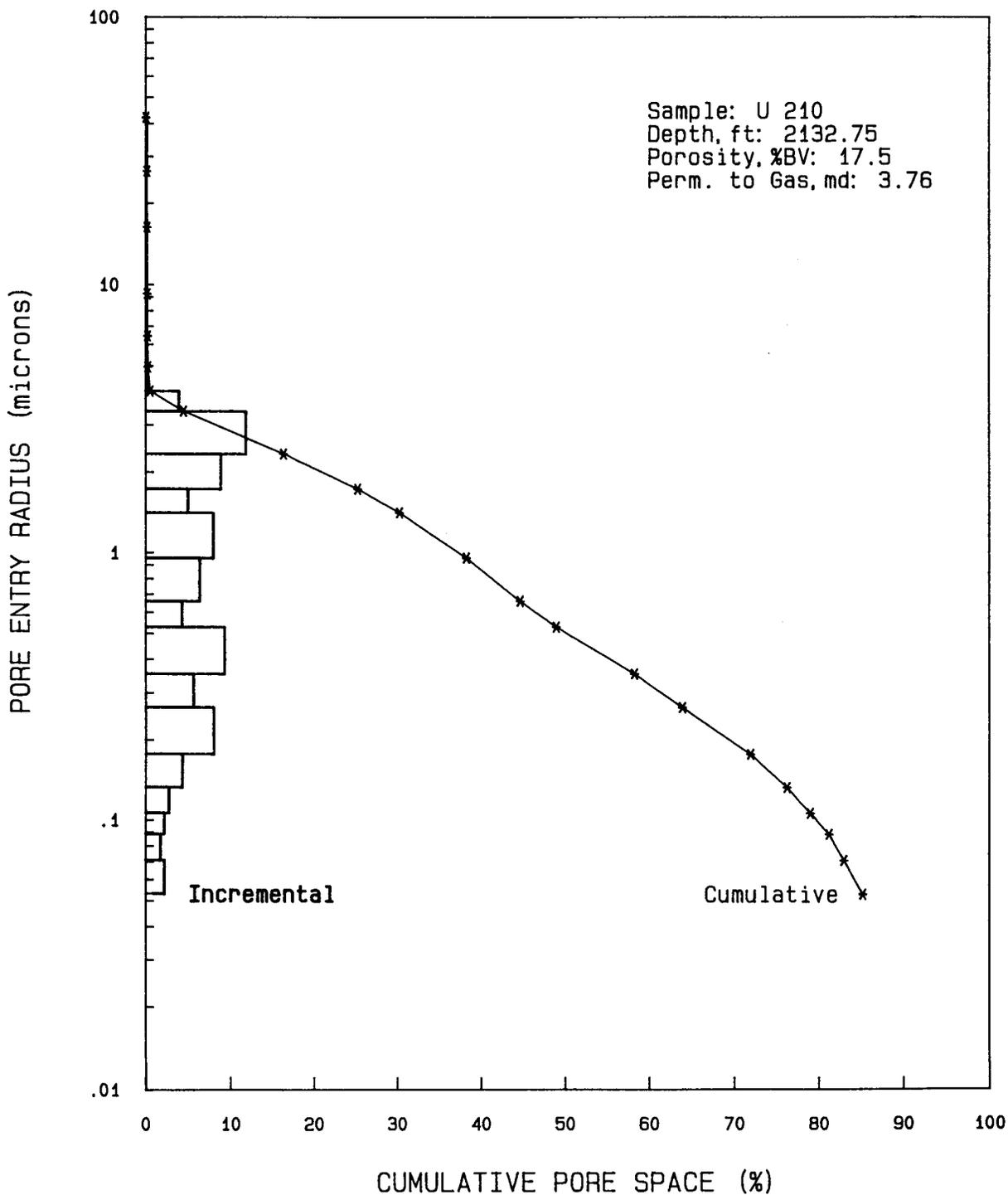Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 222
Depth, ft: 2138.80
Porosity, %BV: 25.0
Perm. to gas, md: 57.6

34
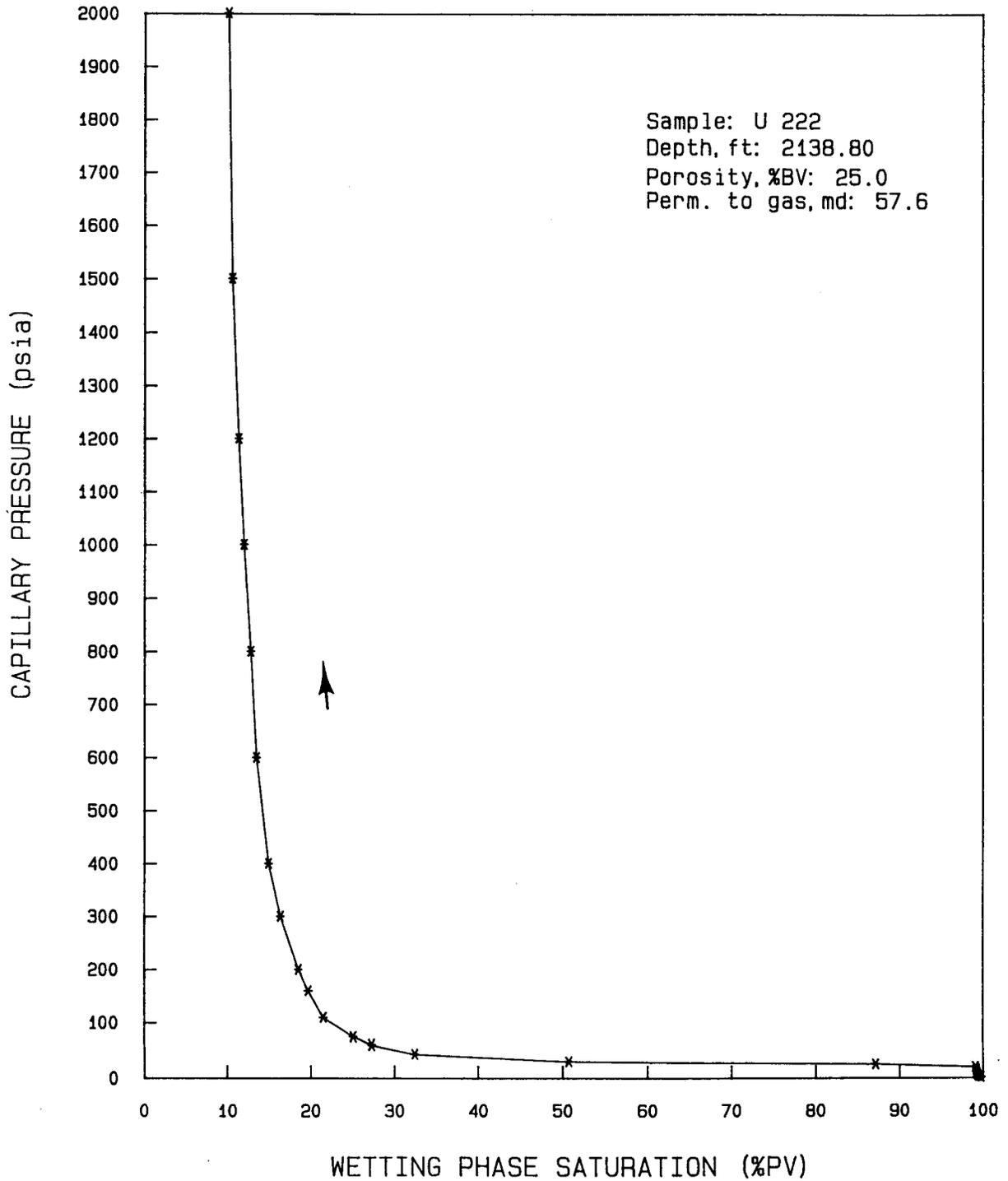
Figure 16

PORE SIZE DISTRIBUTION
Anadarko Petroleum Corporation
CYR "A" No. 1 Well
Hugoton Field
Morton County, Kansas
SRS 1649/RSH 2739

Sample: U 222
Depth, ft: 2138.80
Porosity, %BV: 25.0
Perm. to Gas, md: 57.6

Incremental

Cumulative

CUMULATIVE PORE SPACE (%)

PORE ENTRY RADIUS (microns)

35
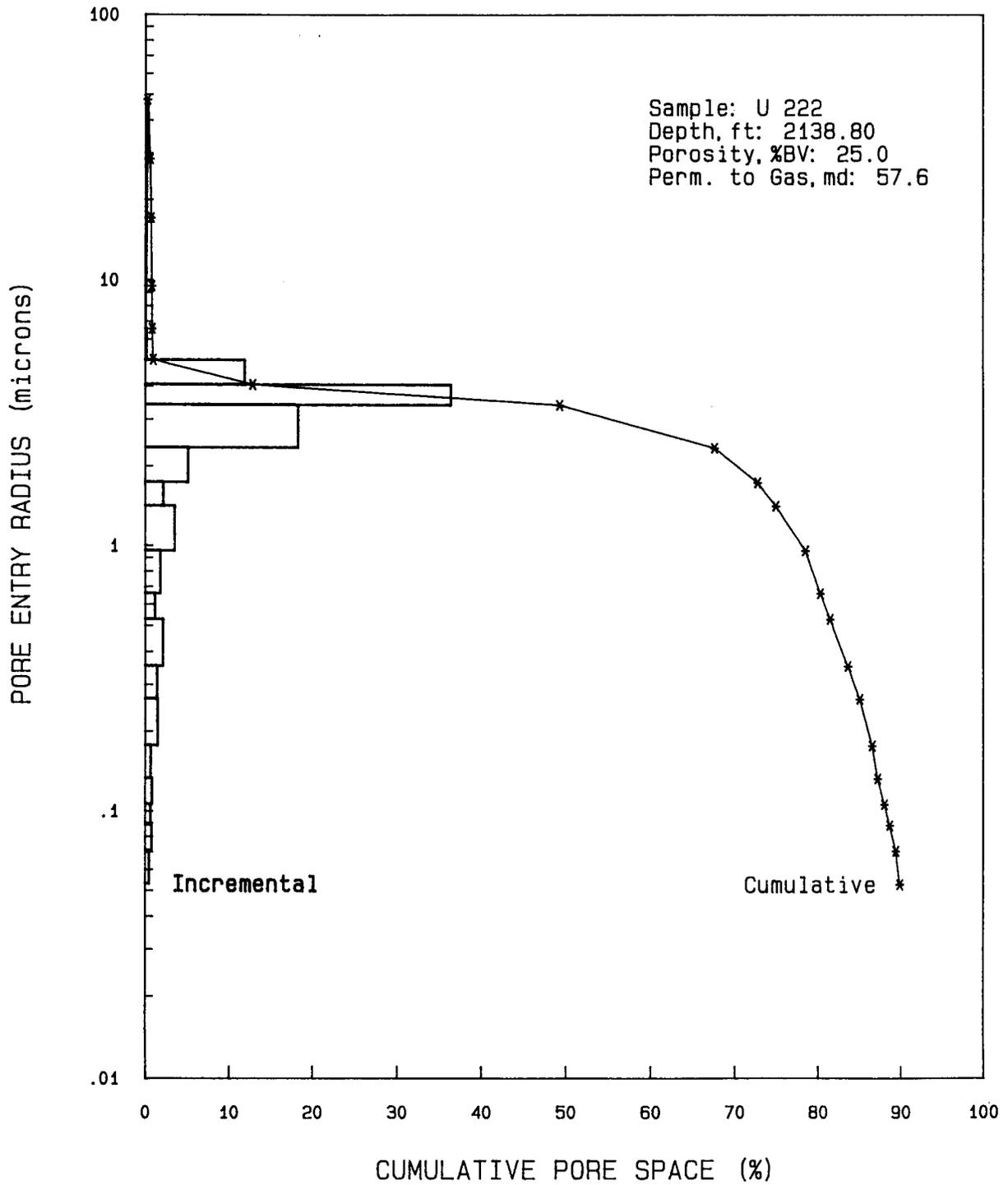
Table 10

TRAPPED GAS-FLOWING GAS
RELATIONSHIP AT 300 psig NET CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample:	U 263A	Porosity, (% BV):	17.3
Depth, (ft.):	2143.4	Perm. to Gas, (md):	1.10
		Perm to Water, (md):	0.59

Flowing Gas Saturation, %PV	Trapped Gas Saturation, %PV
52.1	31.3
30.7	24.0
21.4	17.7
12.7	11.4
2.40	2.20

RESERVOIRS
Inc.

Figure 17

TRAPPED GAS-FLOWING GAS RELATIONSHIP

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas,
SRS 1654/RSH 2744

Sample: U 263A
Depth, ft: 2143.4

Porosity, %BV: 17.3
Permeability, md: 1.10

FLOWING GAS SATURATION (%PV)

TRAPPED GAS SATURATION (%PV)

37

Table 11

GAS-WATER RELATIVE PERMEABILITY

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample:	U 263A	Porosity, (% BV):	17.3
Depth, (ft.):	2143.4	Perm. to Gas, (md):	1.10
		Perm to Water, (md):	0.59

Gas Saturation (%PV)	Relative Permeability (Fraction)		Gas-Water Ratio (Kg/Kw)
	Gas(Krg)	Water(Krw)	
0.0	0.0000	1.0000	0.00
8.0	0.0756	0.5701	0.13
9.2	0.0987	0.4760	0.21
11.5	0.1440	0.3703	0.39
13.4	0.1743	0.2942	0.59
15.7	0.2204	0.2232	0.99
17.2	0.2686	0.2010	1.34
27.4	0.4255	0.0595	7.16
30.2	0.4566	0.0453	10.1
37.5	0.5972	0.0229	26.0
40.7	0.6220	0.0112	55.4

RESERVOIRS
Inc.

Figure 18

GAS-WATER RELATIVE PERMEABILITY

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 263A   Porosity, %BV: 17.3
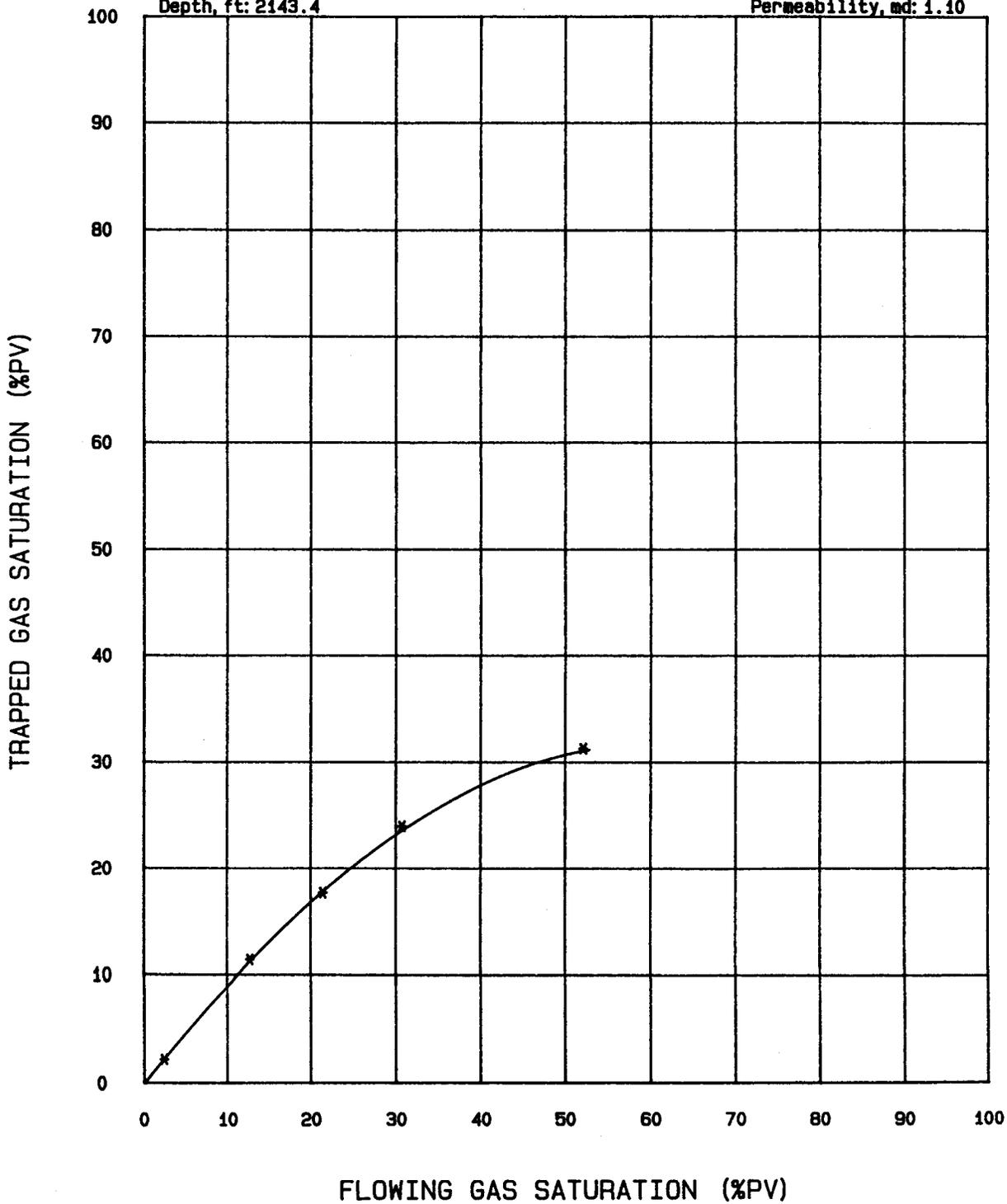Depth, ft: 2143.4   Perm to gas, md: 1.10

39

Figure 19

GAS-WATER RELATIVE PERMEABILITY RATIO

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 263A
Depth, ft: 2143.4

Porosity, %BV: 17.3
Perm to gas, md: 1.10

RELATIVE PERMEABILITY RATIO (Kg/Kw)

GAS SATURATION (% PV)

40

Table 12

<u>TRAPPED GAS-FLOWING GAS</u>
<u>RELATIONSHIP AT 300 psig NET CONFINING PRESSURE</u>

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample:	U 295	Porosity, (% BV):	20.7
Depth, (ft.):	2159.5	Perm. to Gas, (md):	31.0
		Perm to Water, (md):	26.5

Flowing Gas Saturation, %PV	Trapped Gas Saturation, %PV
60.7	39.3
39.8	28.2
28.3	21.6
10.8	9.65
5.60	5.10

Figure 20

TRAPPED GAS-FLOWING GAS RELATIONSHIP

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas,
SRS 1654/RSH 2744

Sample: U 295
Depth, ft: 2159.5

Porosity, %BV: 20.7
Permeability, md: 31.0
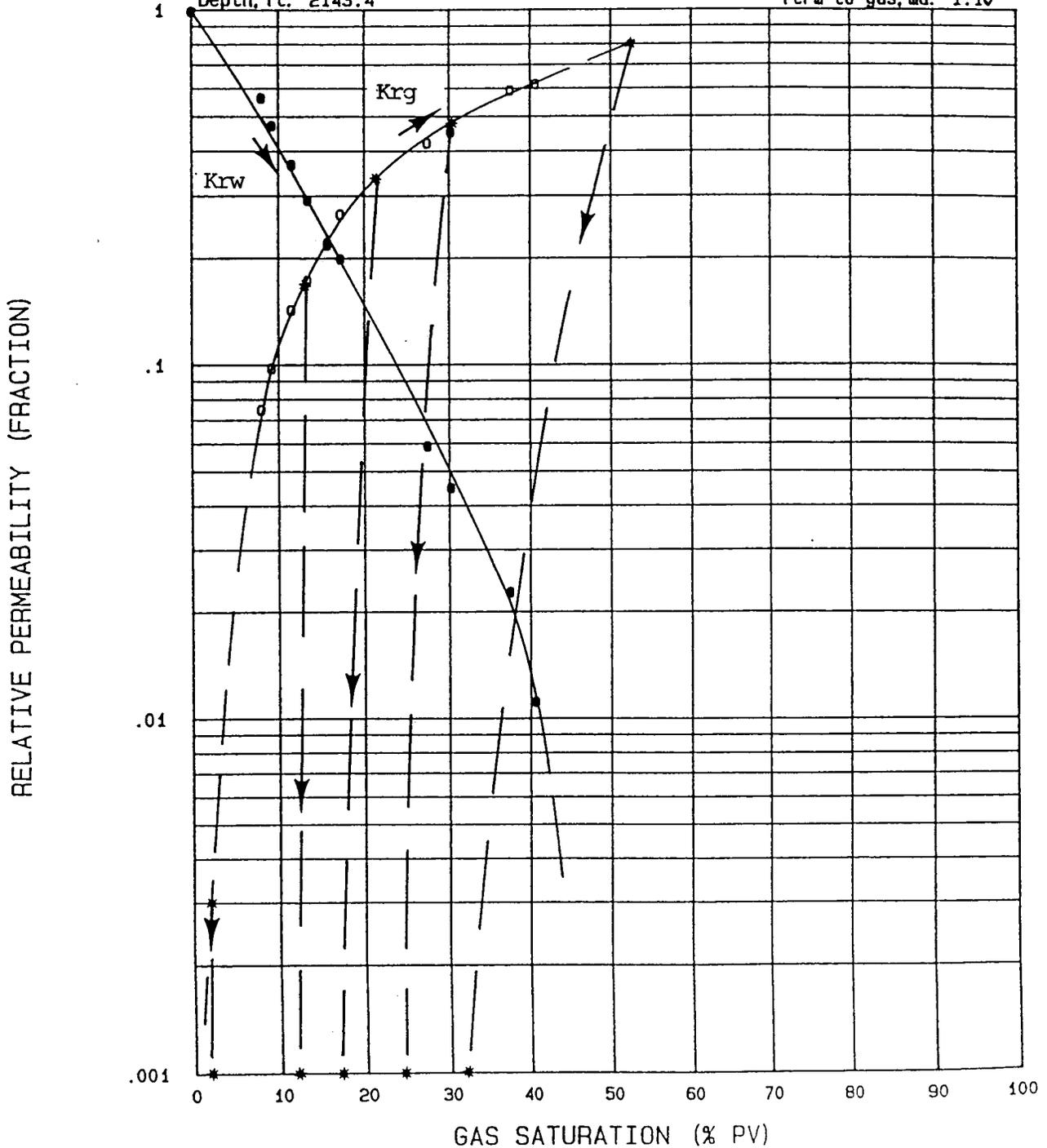
TRAPPED GAS SATURATION (%PV)

FLOWING GAS SATURATION (%PV)

42

Table 13

GAS-WATER RELATIVE PERMEABILITY

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample:	U 295	Porosity, (% BV):	20.7
Depth, (ft.):	2159.5	Perm. to Gas, (md):	31.0
		Perm to Water, (md):	26.5

Gas Saturation (%PV)	Relative Permeability (Fraction)		Gas-Water Ratio (Kg/Kw)
	Gas(Krg)	Water(Krw)	
0.0	0.0000	1.0000	0.00
9.5	0.0156	0.5365	0.029
11.0	0.0244	0.5075	0.048
14.5	0.0465	0.3409	0.14
16.7	0.0614	0.2887	0.21
19.4	0.0869	0.2499	0.35
23.3	0.1183	0.1781	0.66
26.1	0.1473	0.1408	1.05
27.8	0.1655	0.1207	1.37
29.1	0.1723	0.1034	1.67
31.6	0.1957	0.0820	2.39
35.6	0.2339	0.0561	4.17
38.5	0.2652	0.0377	7.02
40.6	0.3058	0.0285	10.7
43.1	0.3296	0.0212	15.6
45.5	0.3617	0.0147	24.7
46.4	0.3961	0.0136	29.1

Figure 21

GAS-WATER RELATIVE PERMEABILITY

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 295
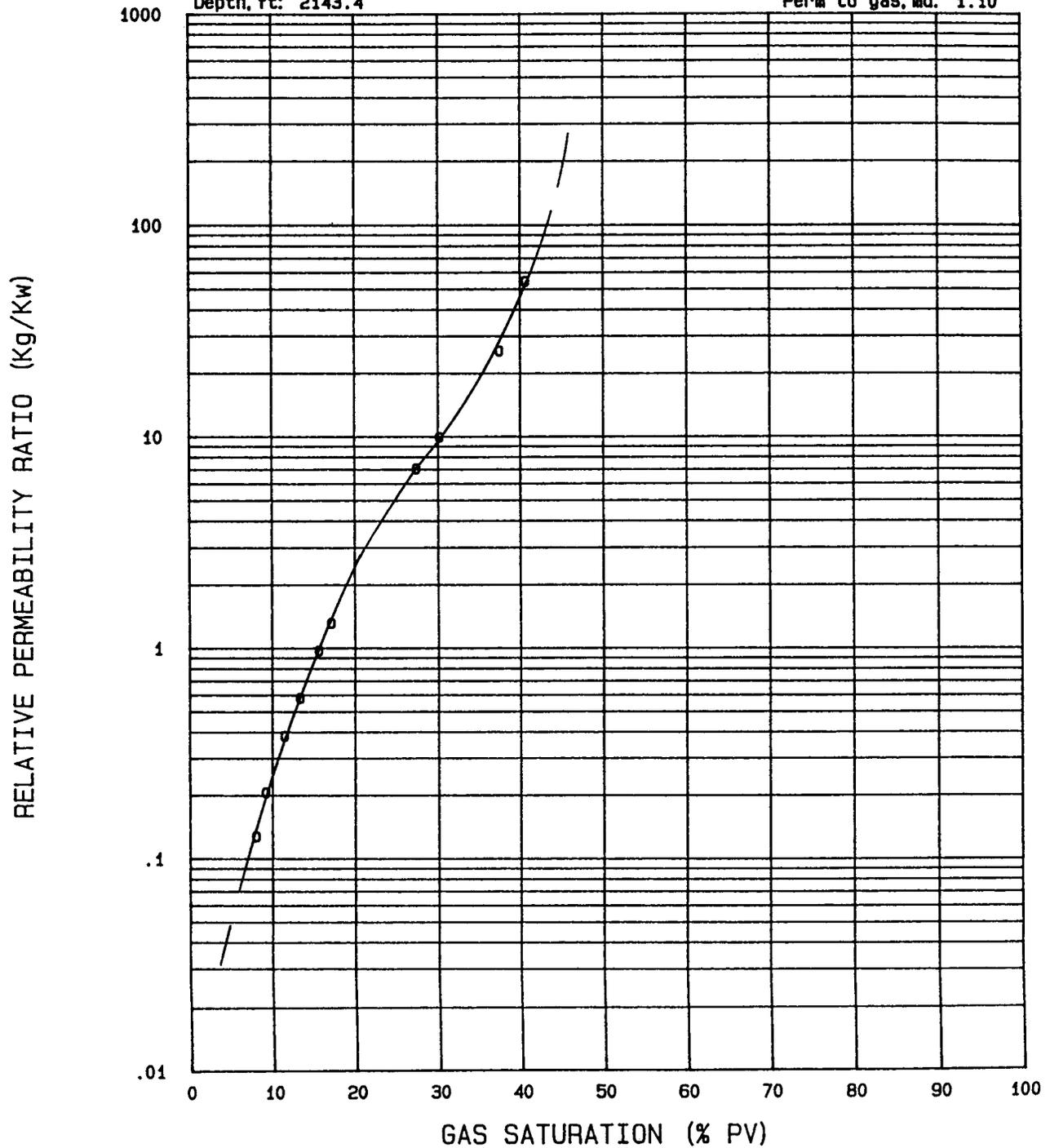Depth, ft: 2159.5

Porosity, %BV: 20.7
Perm to gas, md: 31.0

Krg

Krw

RELATIVE PERMEABILITY (FRACTION)

GAS SATURATION (% PV)

44

RESERVOIRS
Inc.
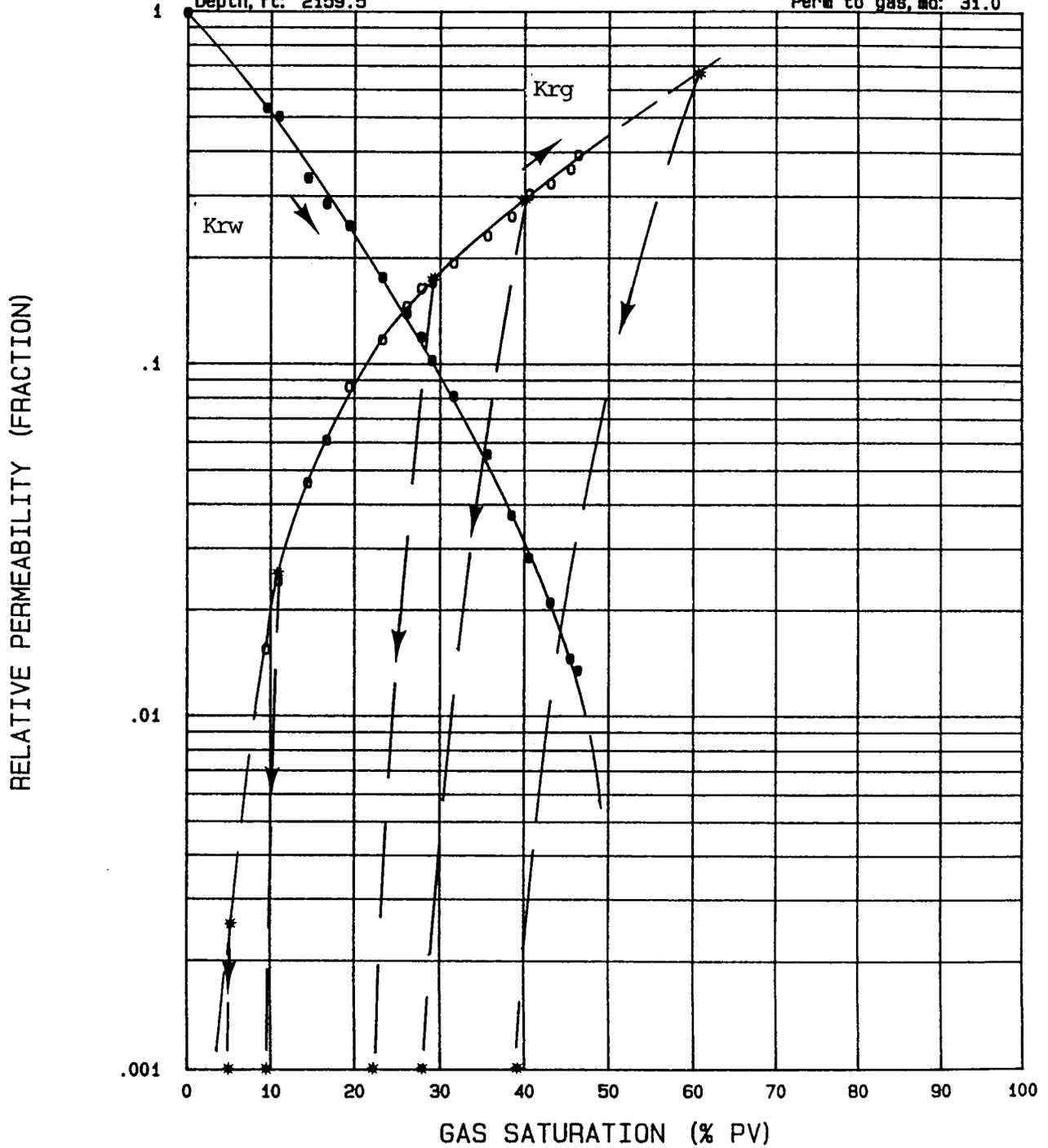
Figure 22

GAS-WATER RELATIVE PERMEABILITY RATIO

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 295
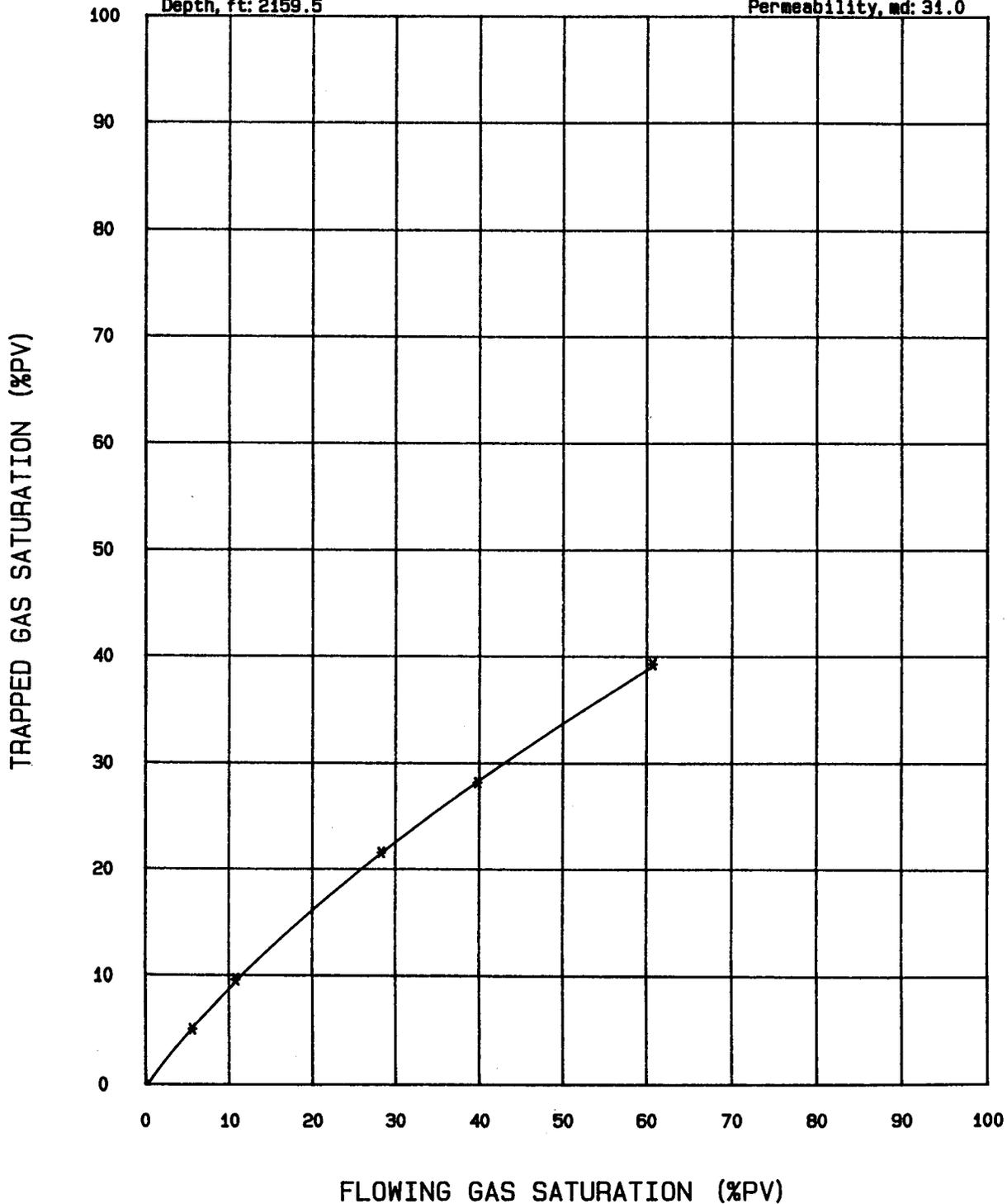Depth, ft: 2159.5

Porosity, %BV: 20.7
Perm to gas, md: 31.0

45
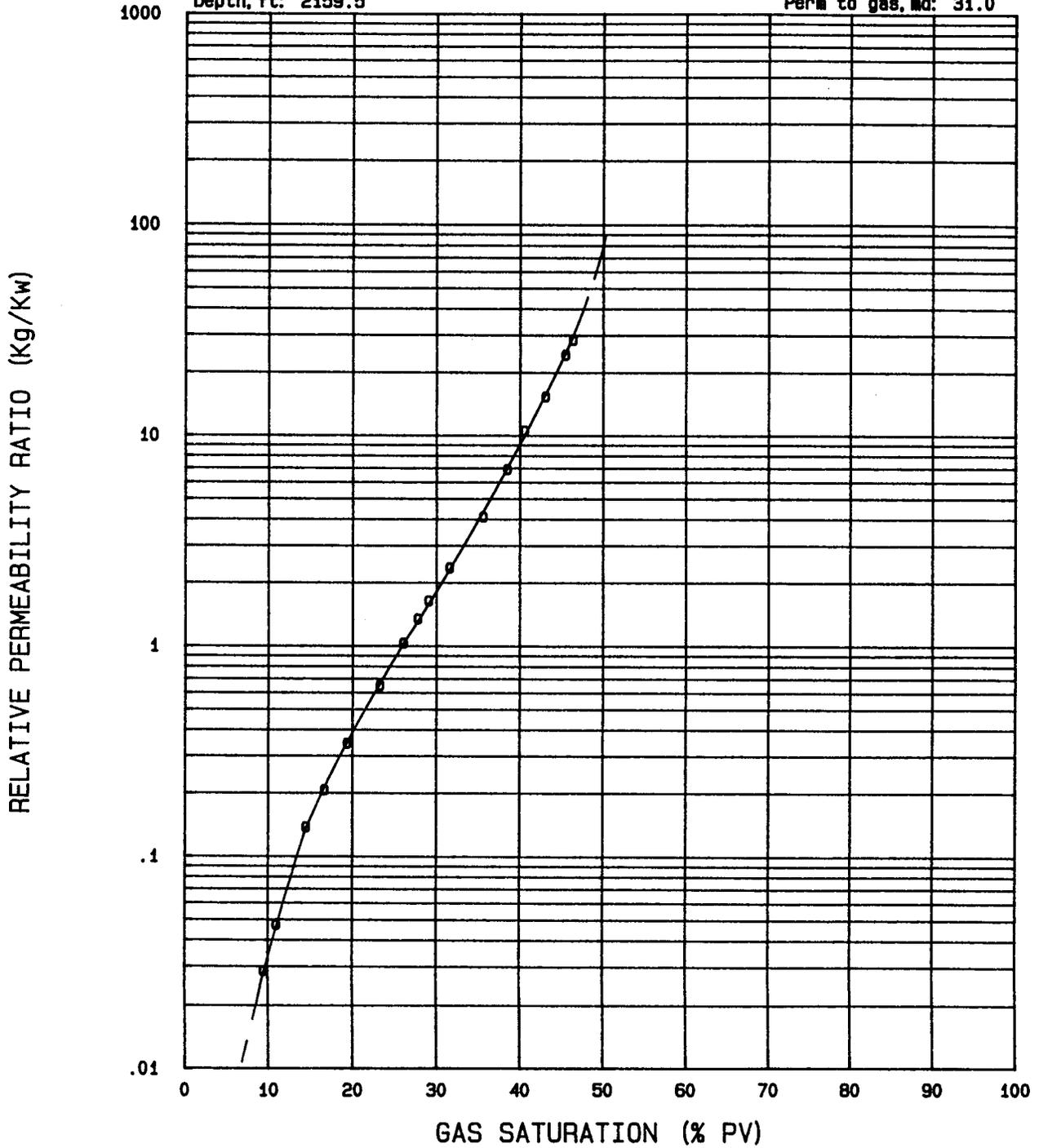
Table 14

FORMATION RESISTIVITY FACTOR – POROSITY RELATIONSHIP

AT CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample	Depth (ft.)	Confining Pressure (psig)	Formation Resistivity Factor (F)	Porosity (% BV)	Cementation Exponent(m)
U 263	2143.3	300	31.76	17.0	1.95
U 271	2147.2	300	25.52	19.9	2.01
U 295	2159.5	300	20.28	20.7	1.91

Rw = 0.046 ohm-meters @ 73 degrees Fahrenheit

RESERVOIRS
Inc.

Figure 23

FORMATION RESISTIVITY FACTOR – POROSITY RELATIONSHIP
AT CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

47

Table 15

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP

AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Saturation (% PV)
U 263	2143.3	1.58	17.0	1.00	100.0
				1.12	94.5
				1.29	88.2
				1.54	80.7
				1.71	76.8
				2.11	68.8
				2.37	65.2
				4.56	47.3
				5.05	43.9

Rw = 0.046 ohm-meters @ 73 degrees Fahrenheit

48

Figure 24

FORMATION RESISTIVITY INDEX − SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample : U 263
Depth, ft : 2143.3

n = 2.02

FORMATION RESISTIVITY INDEX (I)

WATER SATURATION (%PV)

49

Figure 25

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample : U 263
Depth, ft : 2143.3

n = 2.02

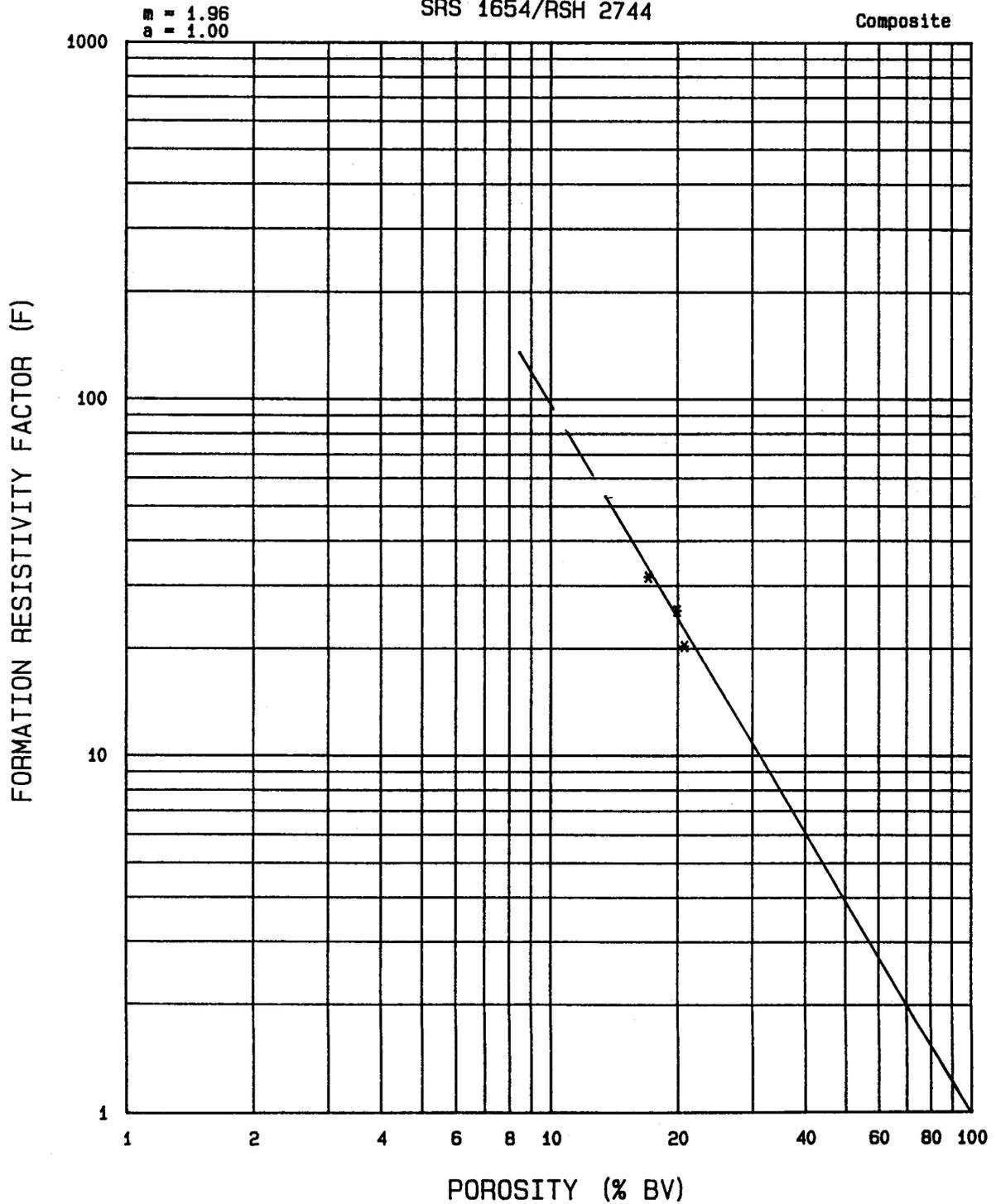FORMATION RESISTIVITY INDEX (I)

WATER SATURATION (%PV)

50

Table 16

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP

AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Saturation (% PV)
T 271	2147.2	0.839	19.9	1.00	100.0
				1.03	98.4
				1.17	91.6
				1.30	86.6
				1.51	79.3
				1.65	75.1

NOTE: Sample broke during testing at 75.1% Sw.   Test aborted.

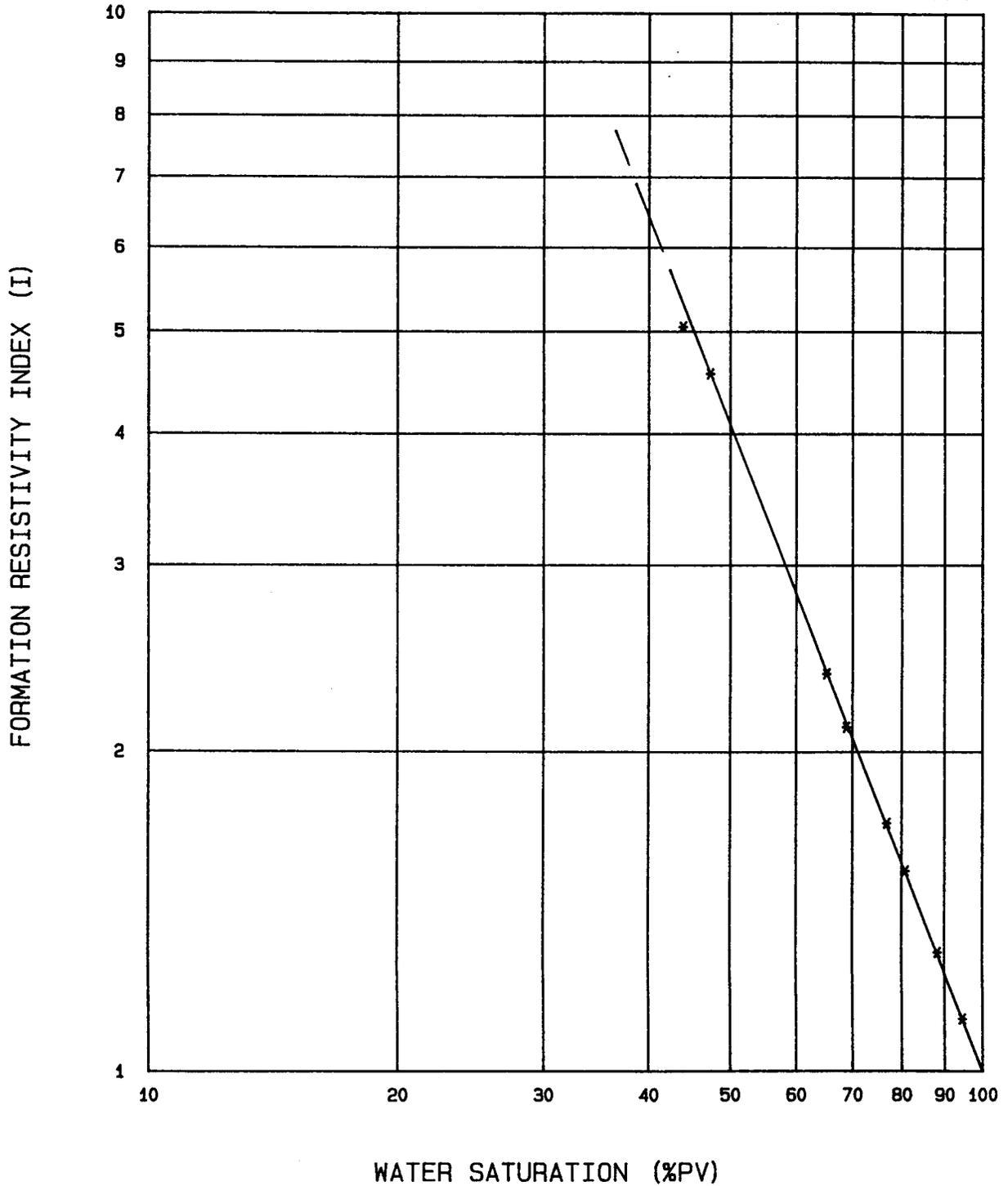Rw = 0.046 ohm-meters @ 73 degrees Fahrenheit

Reservoirs
Inc.

Figure 26

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample : T 271
Depth, ft : 2147.2

n = 1.79

FORMATION RESISTIVITY INDEX (I)
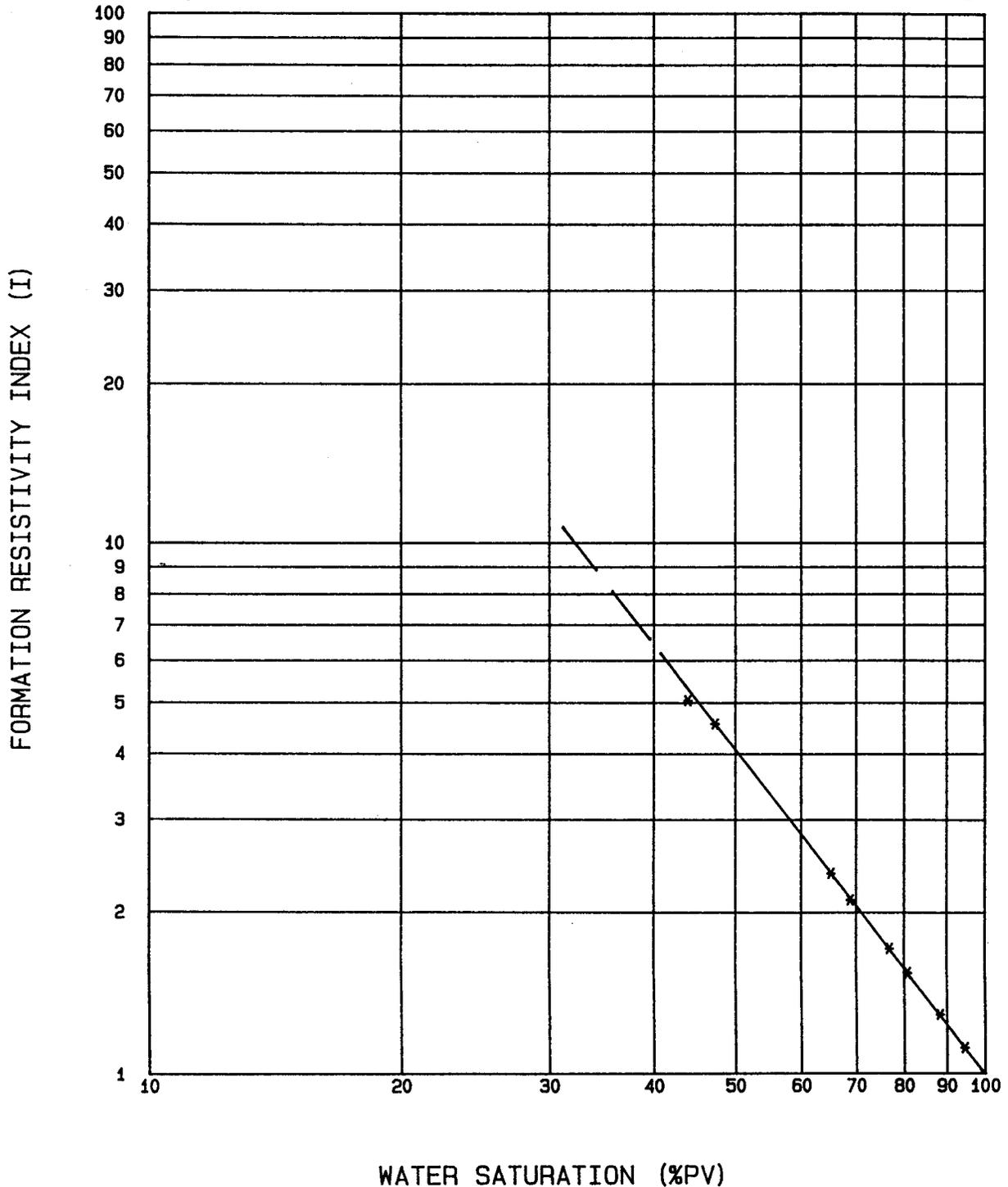
WATER SATURATION (%PV)

52

Figure 27

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample : T 271
Depth, ft : 2147.2

n = 1.79

FORMATION RESISTIVITY INDEX (I)

WATER SATURATION (%PV)

53

RESERVOIRS Inc.

Table 17

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

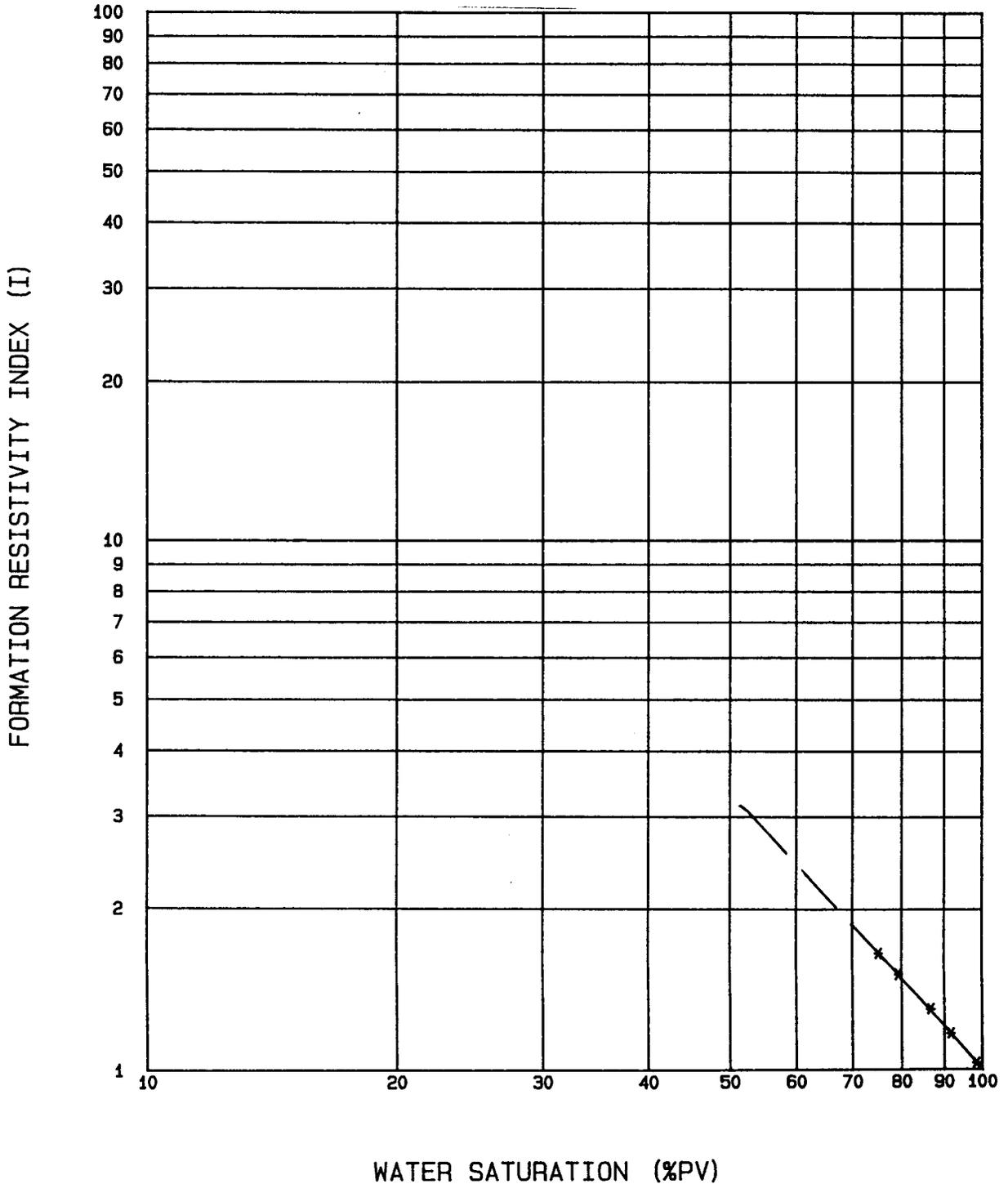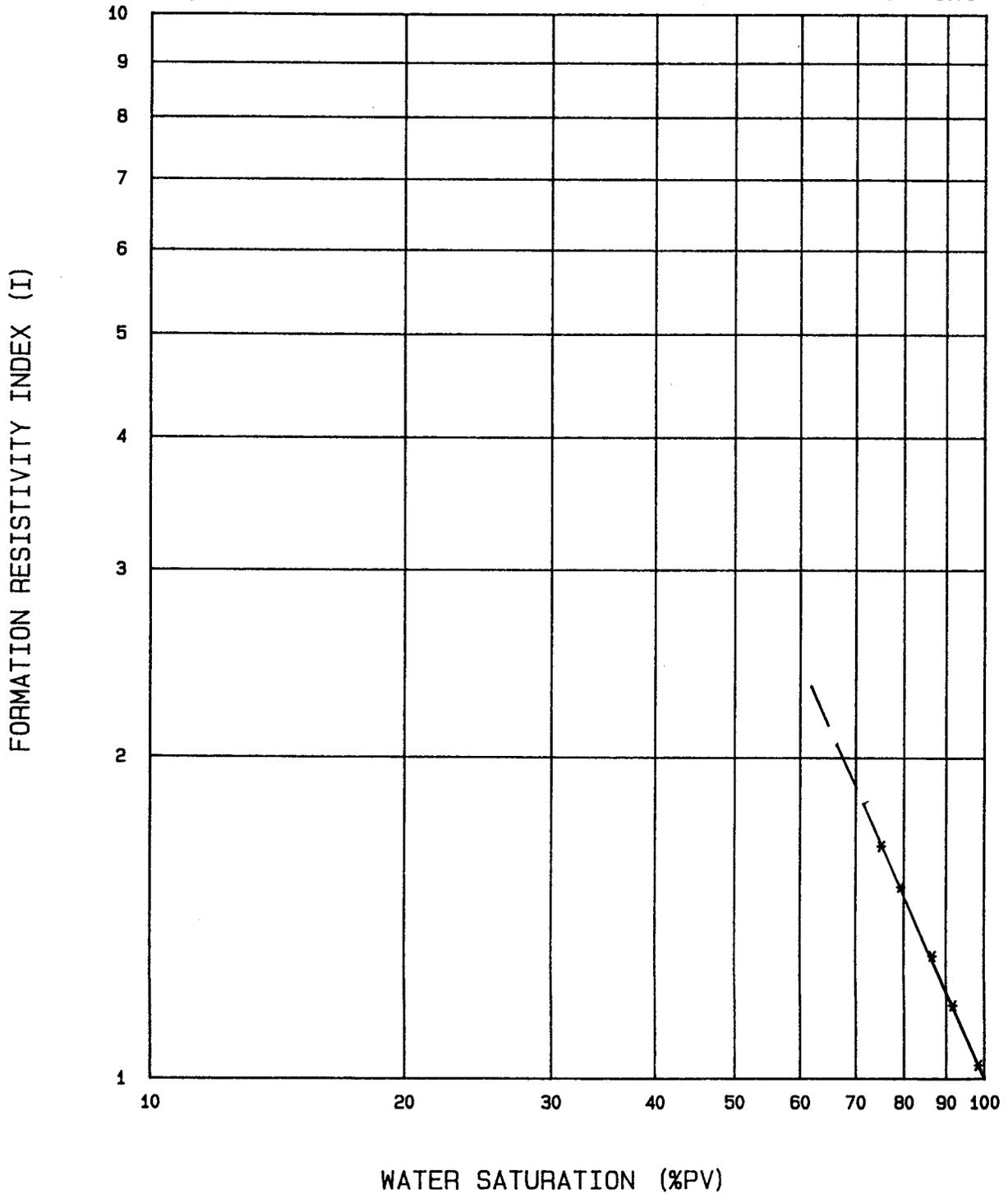| Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Saturation (% PV)
U 295	2159.5	31.0	20.7	1.00	100.0
				1.18	91.1
				1.26	87.7
				1.47	80.5
				1.75	72.6
				2.07	66.1
				2.56	58.6
				2.92	54.2
				3.40	49.3
				4.63	41.1
				6.42	34.1
				12.07	23.1
				16.69	19.2

$Rw = 0.046$ ohm-meters @ 73 degrees Fahrenheit

Figure 28

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample : U 295
Depth, ft : 2159.5

n = 1.75

FORMATION RESISTIVITY INDEX (I)
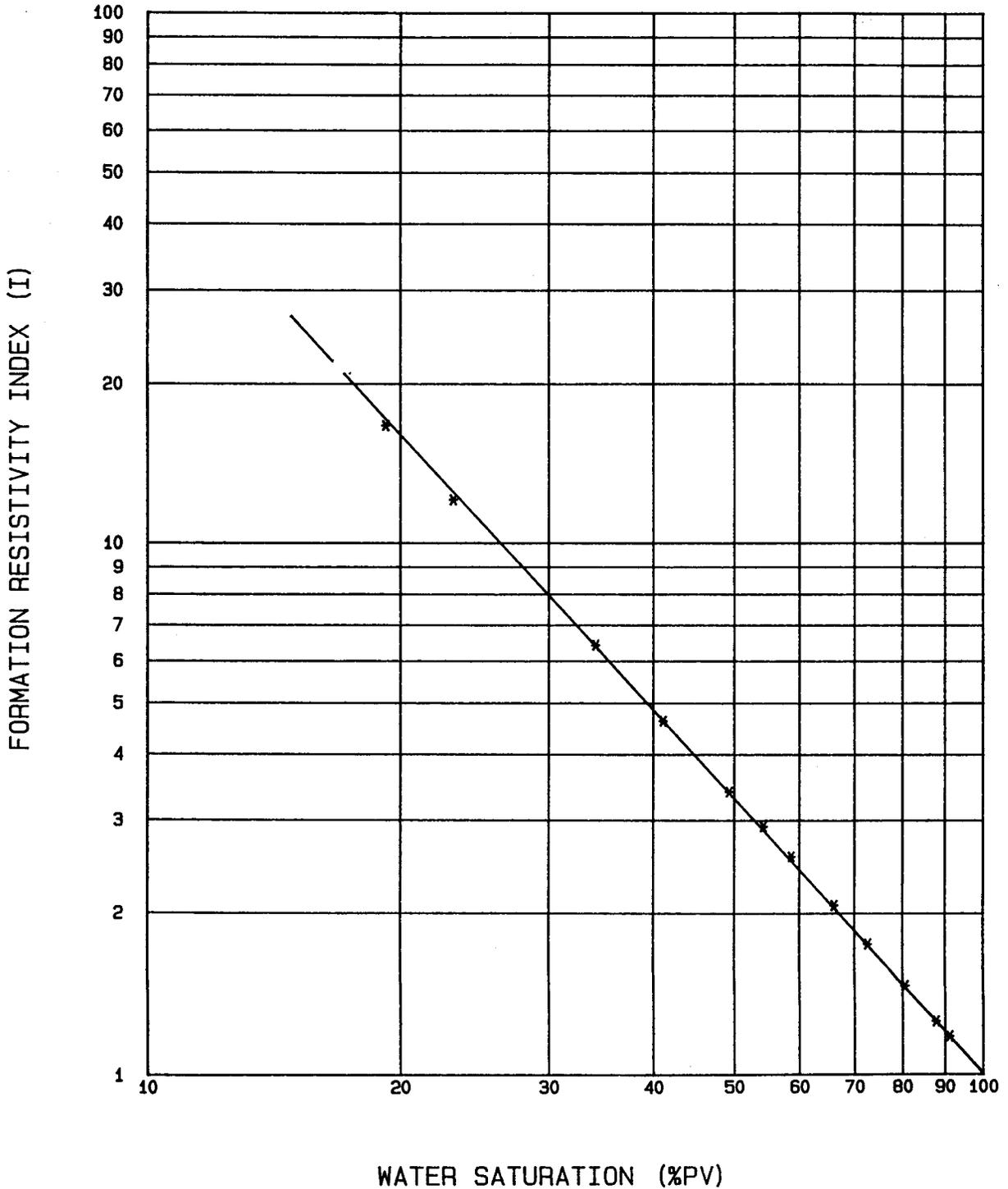
WATER SATURATION (%PV)

55

Figure 29

FORMATION RESISTIVITY INDEX – SATURATION RELATIONSHIP
AT 300 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744
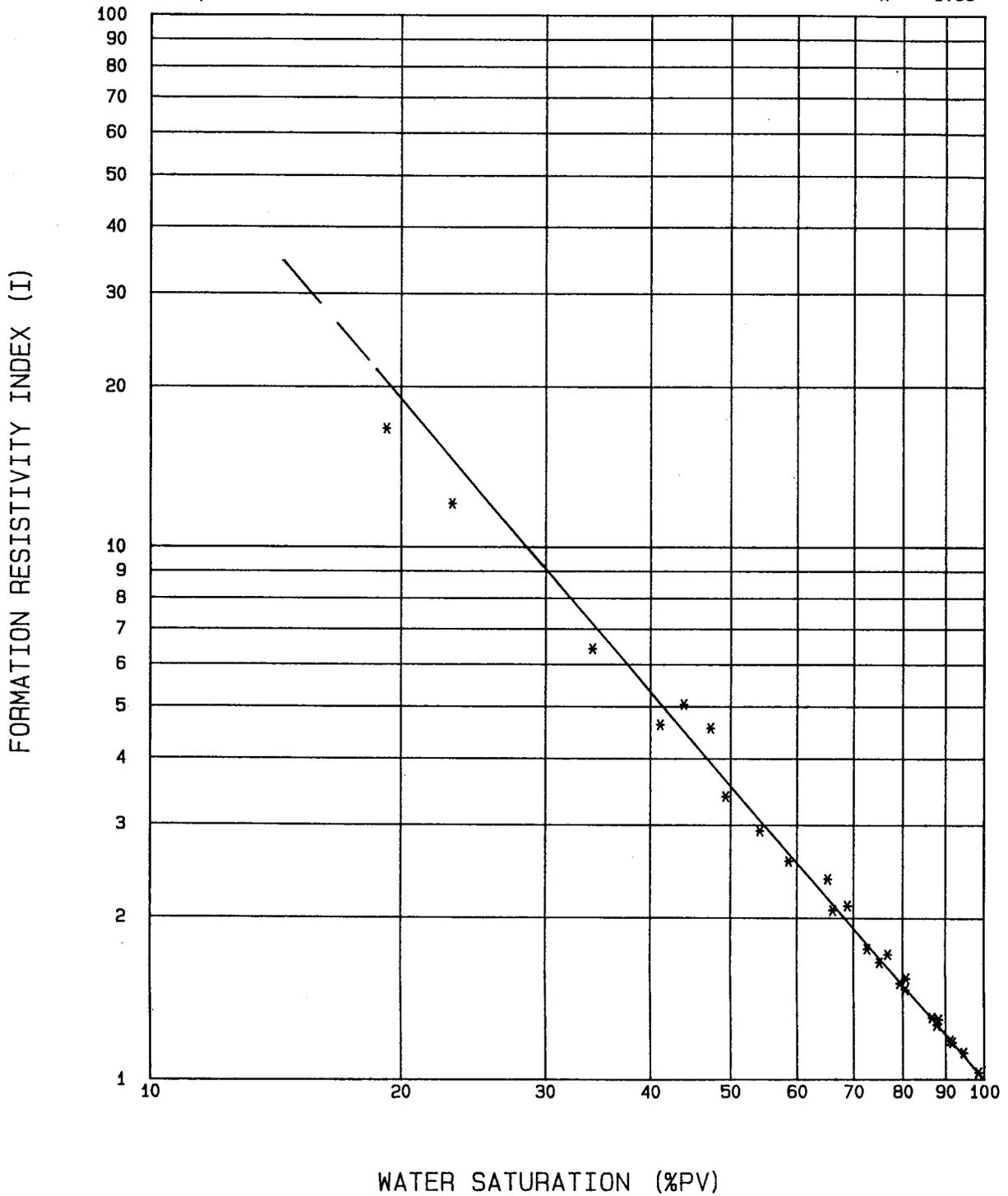

WATER SATURATION (%PV)

56

Table 18

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 263   Porosity,% BV: 17.0

Depth, ft: 2143.3   Perm. to Gas, md: 1.58

CAPILLARY PRESSURE (psia)	WETTING PHASE SATURATION (%PV)	PORE ENTRY RADIUS (microns)	LEVERETT'S J-FUNCTION
2.54	100.0	–	–
4.04	100.0	–	–
6.54	100.0	–	–
11.5	100.0	–	–
16.5	100.0	–	–
21.5	100.0	–	–
26.5	100.0	–	–
31.5	99.8	3.38	0.055
45.5	95.5	2.34	0.080
61.5	85.9	1.73	0.108
75.5	81.0	1.41	0.132
112	71.8	0.96	0.195
162	64.3	0.66	0.283
202	59.4	0.53	0.353
302	51.6	0.35	0.528
402	46.0	0.27	0.703
602	37.6	0.18	1.05
802	31.6	0.13	1.40
1001	27.5	0.11	1.75
1201	24.3	0.09	2.10
1501	21.0	0.07	2.63
2001	17.3	0.05	3.50

Figure 30

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 263
Depth, ft: 2143.3
Porosity, %BV: 17.0
Perm. to gas, md: 1.58

CAPILLARY PRESSURE (psia)

WETTING PHASE SATURATION (%PV)

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Figure 31

PORE SIZE DISTRIBUTION
Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 263
Depth, ft: 2143.3
Porosity, %BV: 17.0
Perm. to Gas, md: 1.58

Incremental   Cumulative

CUMULATIVE PORE SPACE (%)

59

Table 19

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
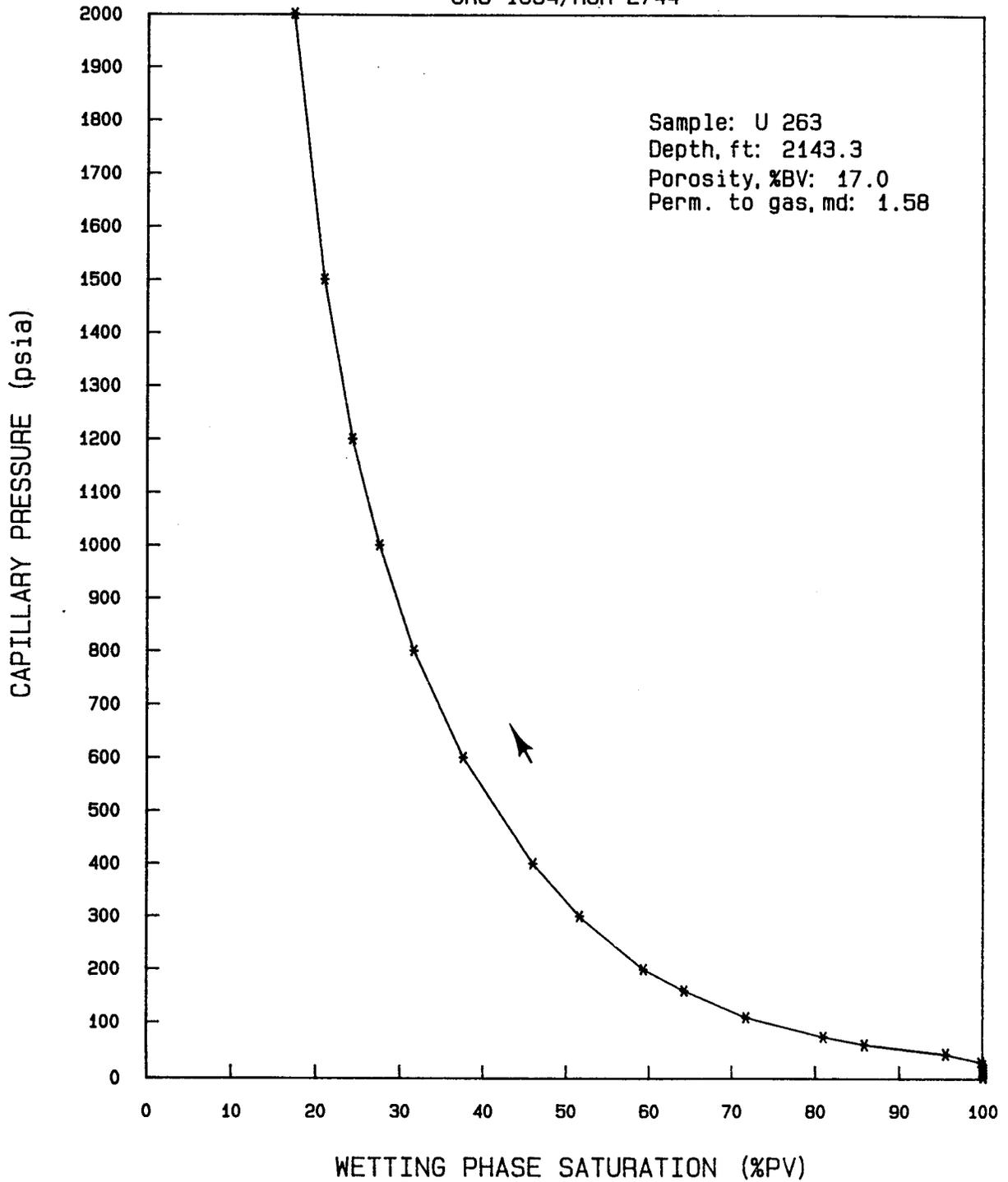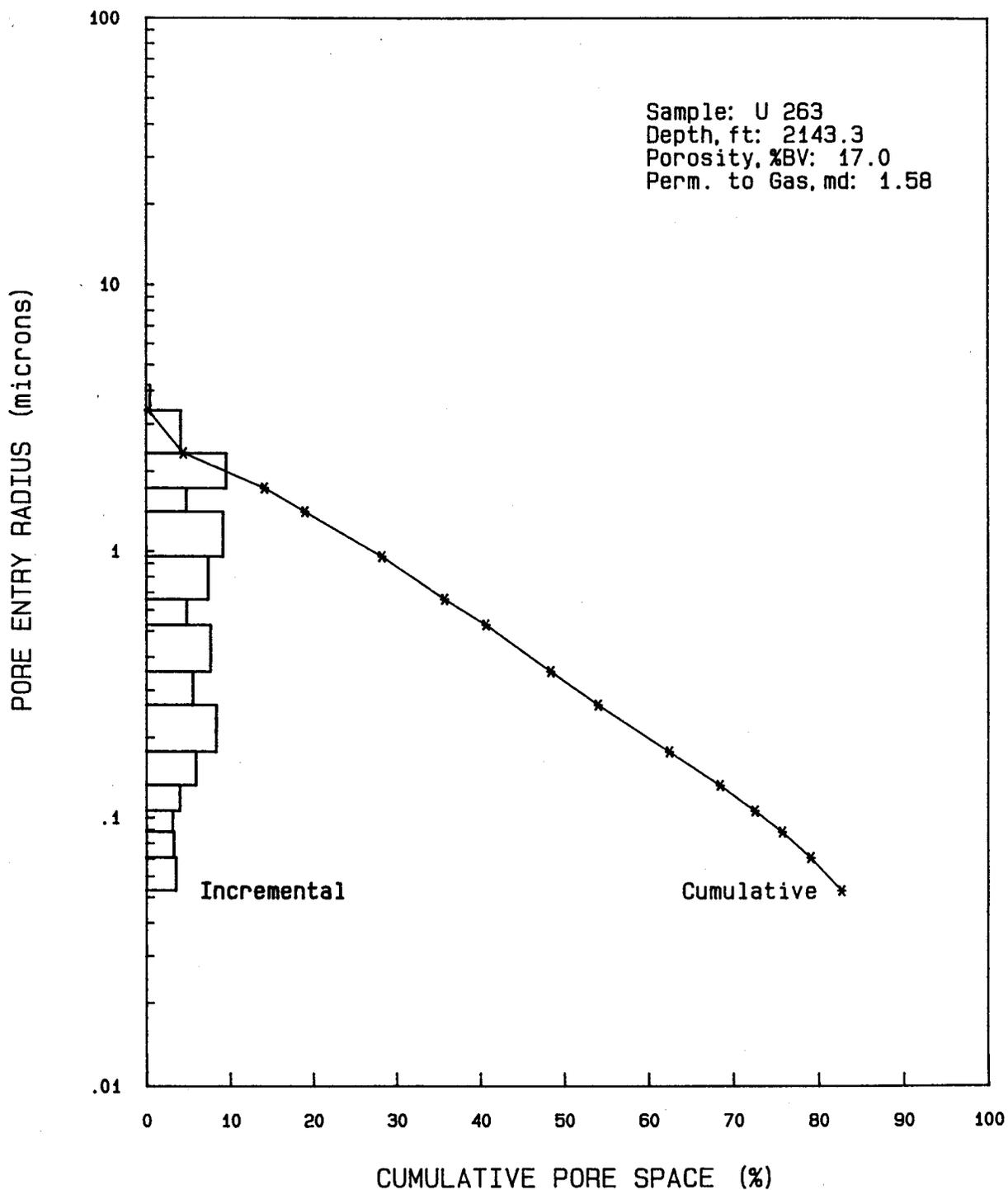Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 271   Porosity,% BV: 20.0

Depth, ft: 2147.2   Perm. to Gas, md: 0.839

CAPILLARY PRESSURE (psia)	WETTING PHASE SATURATION (%PV)	PORE ENTRY RADIUS (microns)	LEVERETT'S J-FUNCTION
2.36	100.0	–	–
3.86	100.0	–	–
6.36	100.0	–	–
11.4	100.0	–	–
16.4	100.0	–	–
21.4	100.0	–	–
26.4	100.0	–	–
31.4	100.0	–	–
45.4	99.5	2.35	0.054
61.4	95.2	1.74	0.073
75.4	89.4	1.41	0.089
111	80.9	0.96	0.132
161	73.9	0.66	0.191
201	69.6	0.53	0.238
301	60.6	0.35	0.356
401	54.5	0.27	0.474
601	45.6	0.18	0.711
801	40.1	0.13	0.947
1000	36.3	0.11	1.18
1200	33.7	0.09	1.42
1500	30.5	0.07	1.77
2000	26.4	0.05	2.36

Figure 32

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 271
Depth, ft: 2147.2
Porosity, %BV: 20.0
Perm. to gas, md: 0.839

CAPILLARY PRESSURE (psia)

WETTING PHASE SATURATION (%PV)

61

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Figure 33

PORE SIZE DISTRIBUTION
Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 271
Depth, ft: 2147.2
Porosity, %BV: 20.0
Perm. to Gas, md: 0.839

Incremental

Cumulative

CUMULATIVE PORE SPACE (%)

PORE ENTRY RADIUS (microns)

62

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Table 20

MERCURY INJECTION CAPILLARY PRESSURE

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
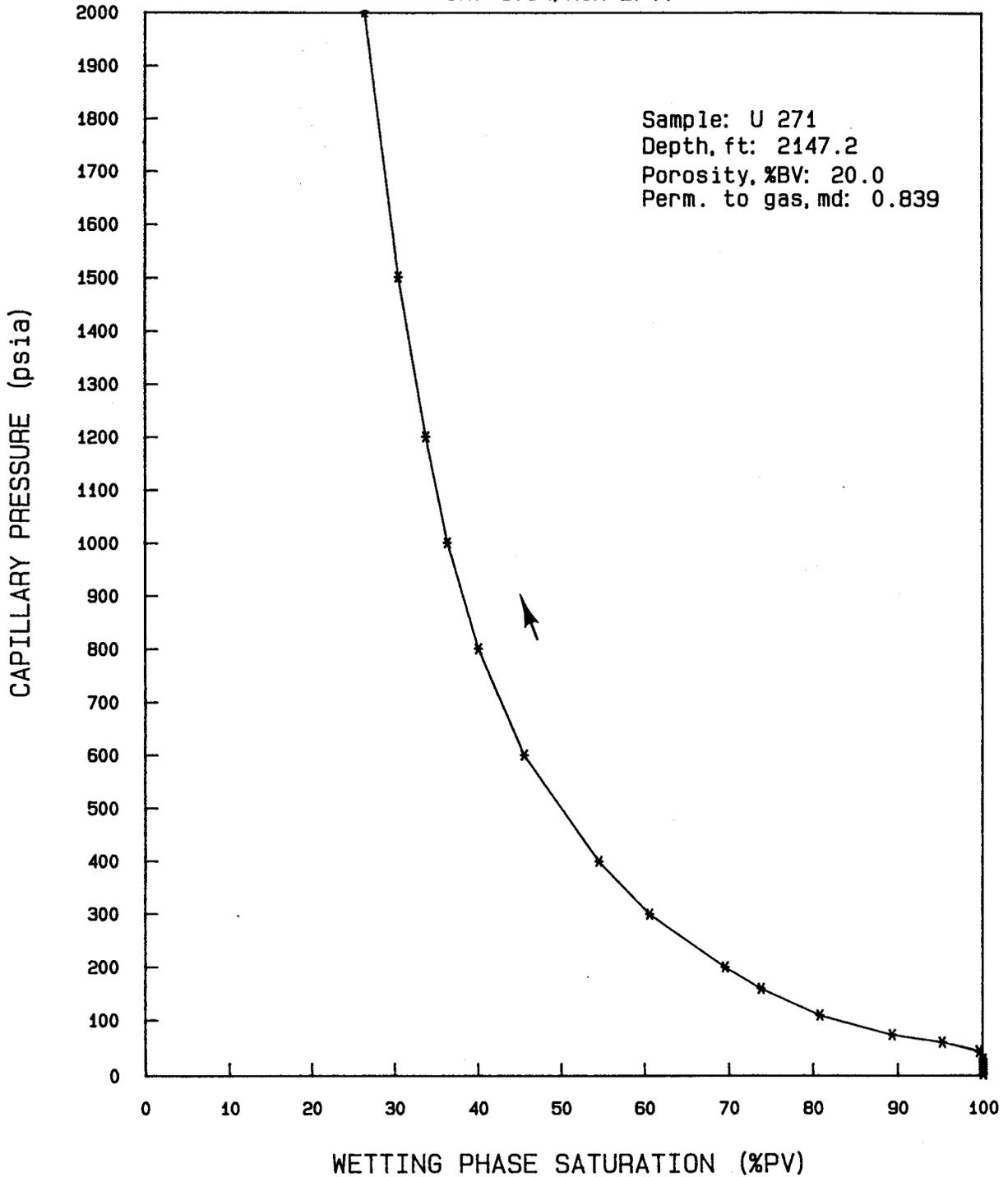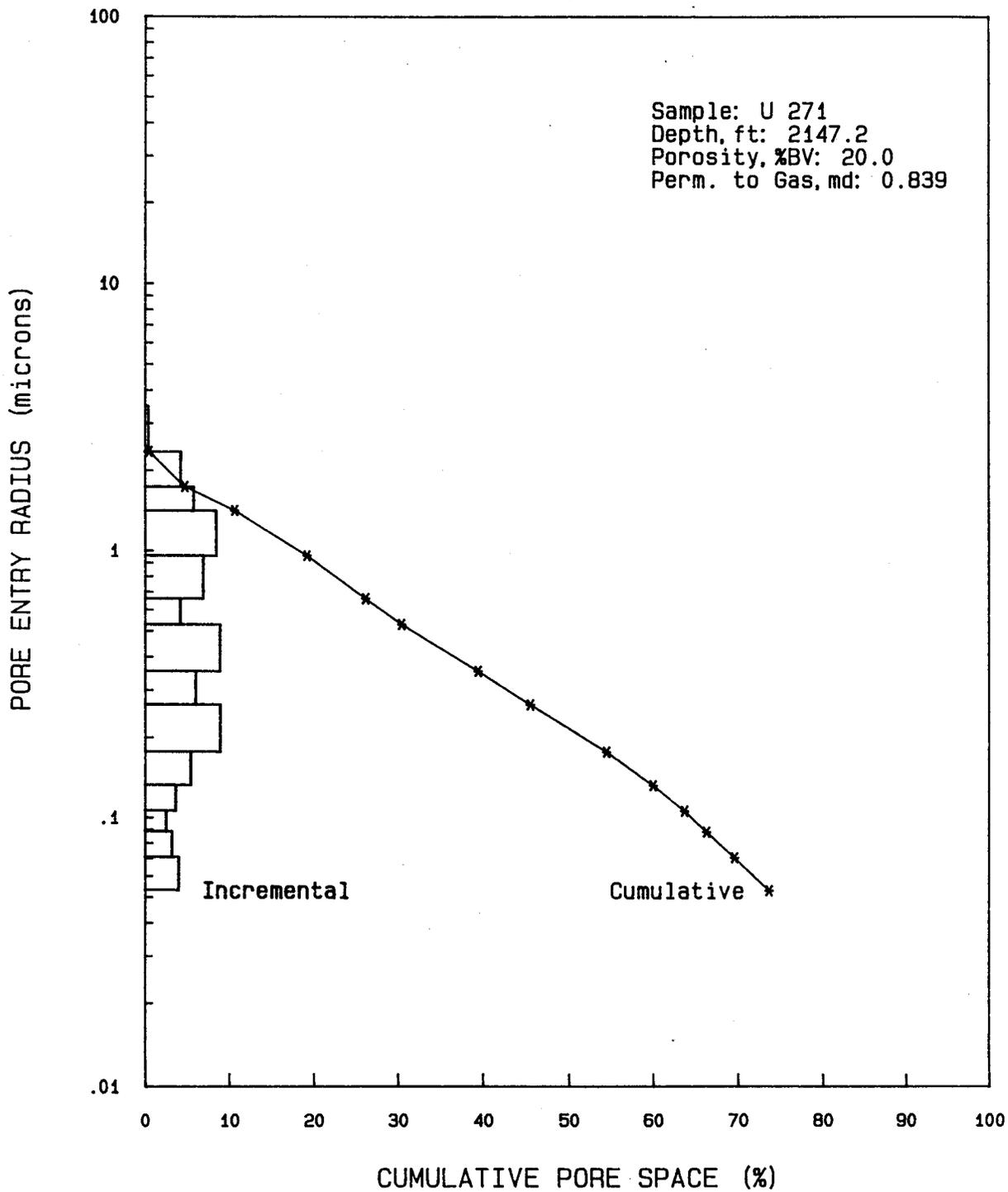Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 295   Porosity,% BV: 20.7

Depth, ft: 2159.5   Perm. to Gas, md: 31.0

CAPILLARY PRESSURE (psia)	WETTING PHASE SATURATION (%PV)	PORE ENTRY RADIUS (microns)	LEVERETT'S J-FUNCTION
2.56	100.0	–	–
4.06	100.0	–	–
6.56	100.0	–	–
11.6	100.0	–	–
16.6	100.0	–	–
21.6	100.0	–	–
26.6	99.4	4.01	0.189
31.6	82.6	3.38	0.225
45.6	40.4	2.34	0.324
61.6	32.0	1.73	0.438
75.6	28.4	1.41	0.538
112	23.9	0.96	0.794
162	21.4	0.66	1.15
202	20.3	0.53	1.44
302	18.4	0.35	2.15
402	17.2	0.27	2.86
602	15.6	0.18	4.28
802	14.6	0.13	5.71
1001	13.8	0.11	7.13
1201	13.2	0.09	8.56
1501	12.4	0.07	10.69
2001	11.6	0.05	14.25

Figure 34

MERCURY INJECTION CAPILLARY PRESSURE
Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 295
Depth, ft: 2159.5
Porosity, %BV: 20.7
Perm. to gas, md: 31.0

CAPILLARY PRESSURE (psia)

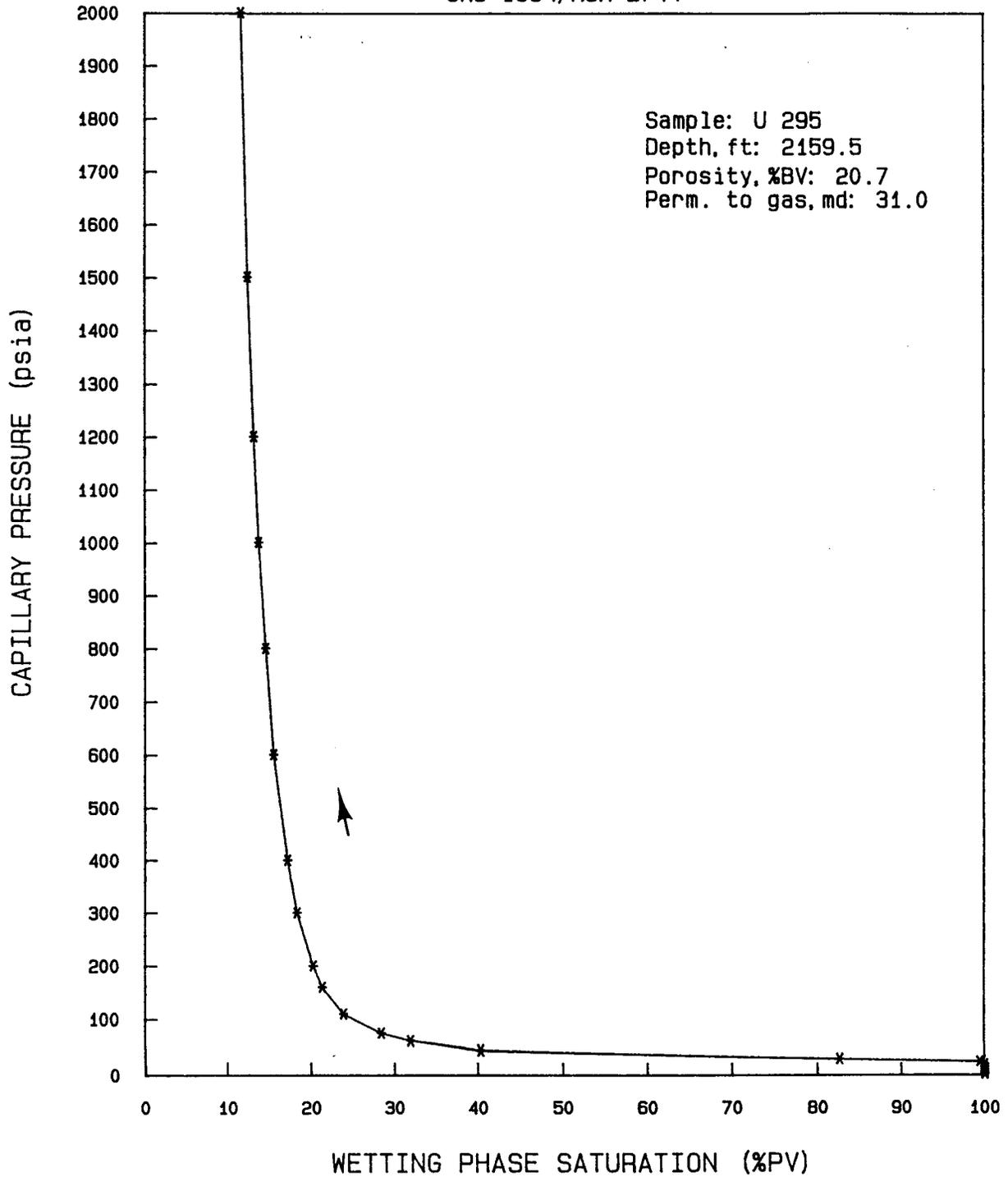WETTING PHASE SATURATION (%PV)

64

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Inc.

Figure 35

PORE SIZE DISTRIBUTION

Anadarko Petroleum Corporation
Snyder "A" No. 3 Well
Hugoton Field
Morton County, Kansas
SRS 1654/RSH 2744

Sample: U 295
Depth, ft: 2159.5
Porosity, %BV: 20.7
Perm. to Gas, md: 31.0

Incremental

Cumulative

PORE ENTRY RADIUS (microns)

CUMULATIVE PORE SPACE (%)

RESERVOIRS Inc.