

GEOLOGICAL ANALYSIS - QUALITY CONTROL
SINGLE WELL / MULTIDIRECTIONAL STUDIES
WELL COMPLETION / STIMULATION STUDIES
ROUTINE AND SPECIAL CORE ANALYSIS

RESERVOIRS, INC.

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DATE: October 19, 1994

TO: Todd Montgomery
Anadarko Petroleum

FAX # 874-3571

FROM: Steve Root
Supervisor
Special Core Analysis Laboratory

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~~PAGES TO FOLLOW:~~ 16

Please find attached, the Formation Resistivity Index data for
samples for the following project:

Anadarko Petroleum Corporation
Youngron 'J' 1-H Well
Stevens County, Kansas
SRS 1007/DCW 2036

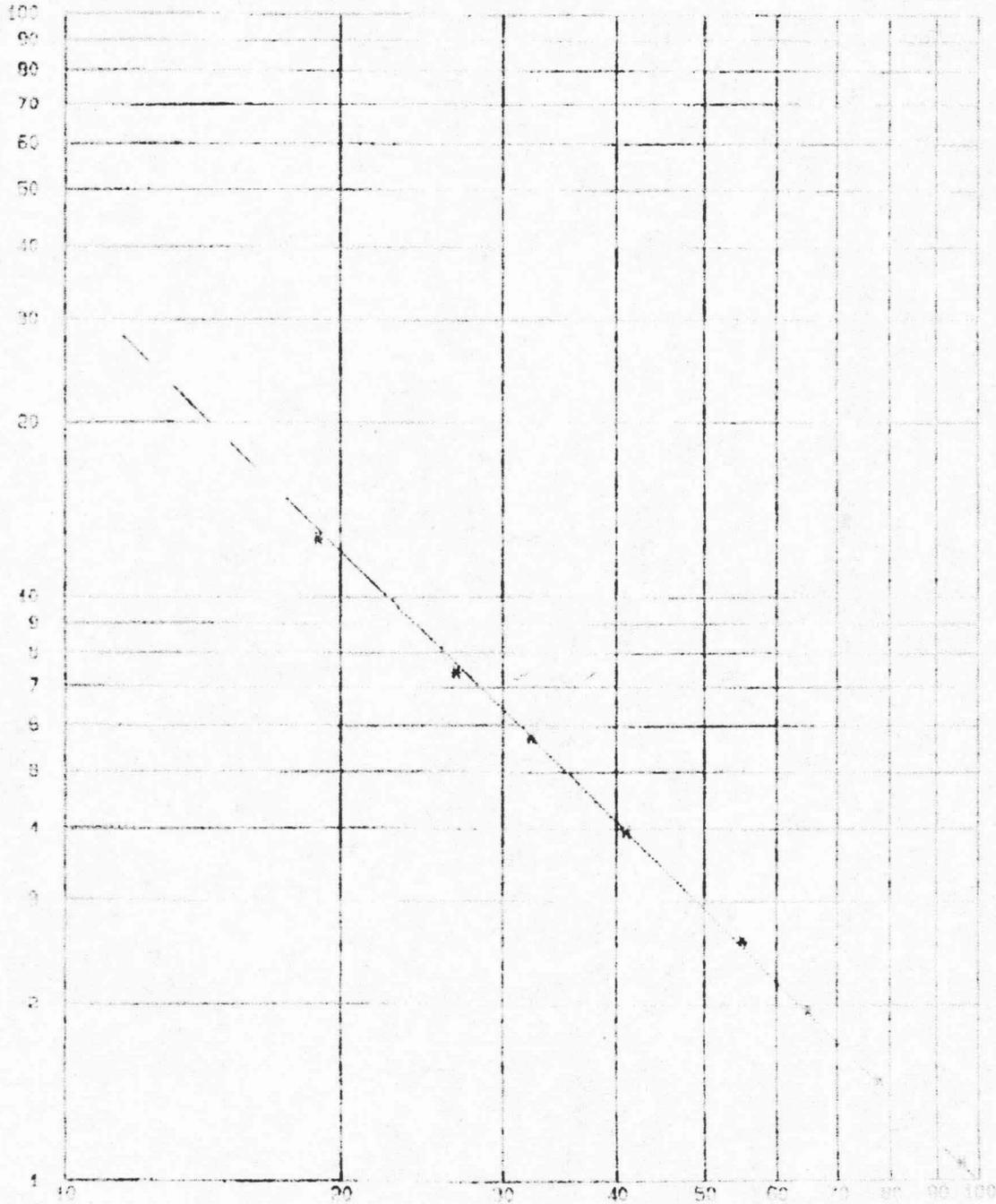
FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngman "J" 1 H Well
Stevens County, Kansas
SRS 1887B/RSR 3036

Sample: C 704
Depth: ft: 2917.3

n = 1.05

FORMATION RESISTIVITY INDEX (I)



WATER SATURATION (%PV)

NS0512000

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psi CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-B Well
Stevens County, Kansas
SRS 1887B/RSH 3030

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Water Saturation (% PV)
C 707	2932.3	0.142*	6.3	1.00	100.0
				1.07	96.0
				1.28	88.3
				2.02	66.3
				2.63	56.0
				2.97	52.5
				3.30	49.0
				3.43	46.3
				3.52	44.4

l_g = 0.047 ohm-meters @ 73 degrees Fahrenheit

* Permeability to gas measured at 400 psi confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1050 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
 Youngren "J" 1-H Well
 Stevens County, Kansas
 GRS 1807B/RSH 3036

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% RV)	Formation Resistivity Index (F)	Water Saturation (% PV)
C 704	2917.3	9.30*	14.1	1.00	100.00
				1.07	95.7
				1.48	77.8
				1.96	64.9
				2.57	53.0
				3.95	41.0
				5.71	32.2
				7.43	26.7
	12.67	18.9			

R₀ = 0.047 ohm-meters @ 73 degrees Fahrenheit

* Permeability to gas measured at 400 psig confining pressure

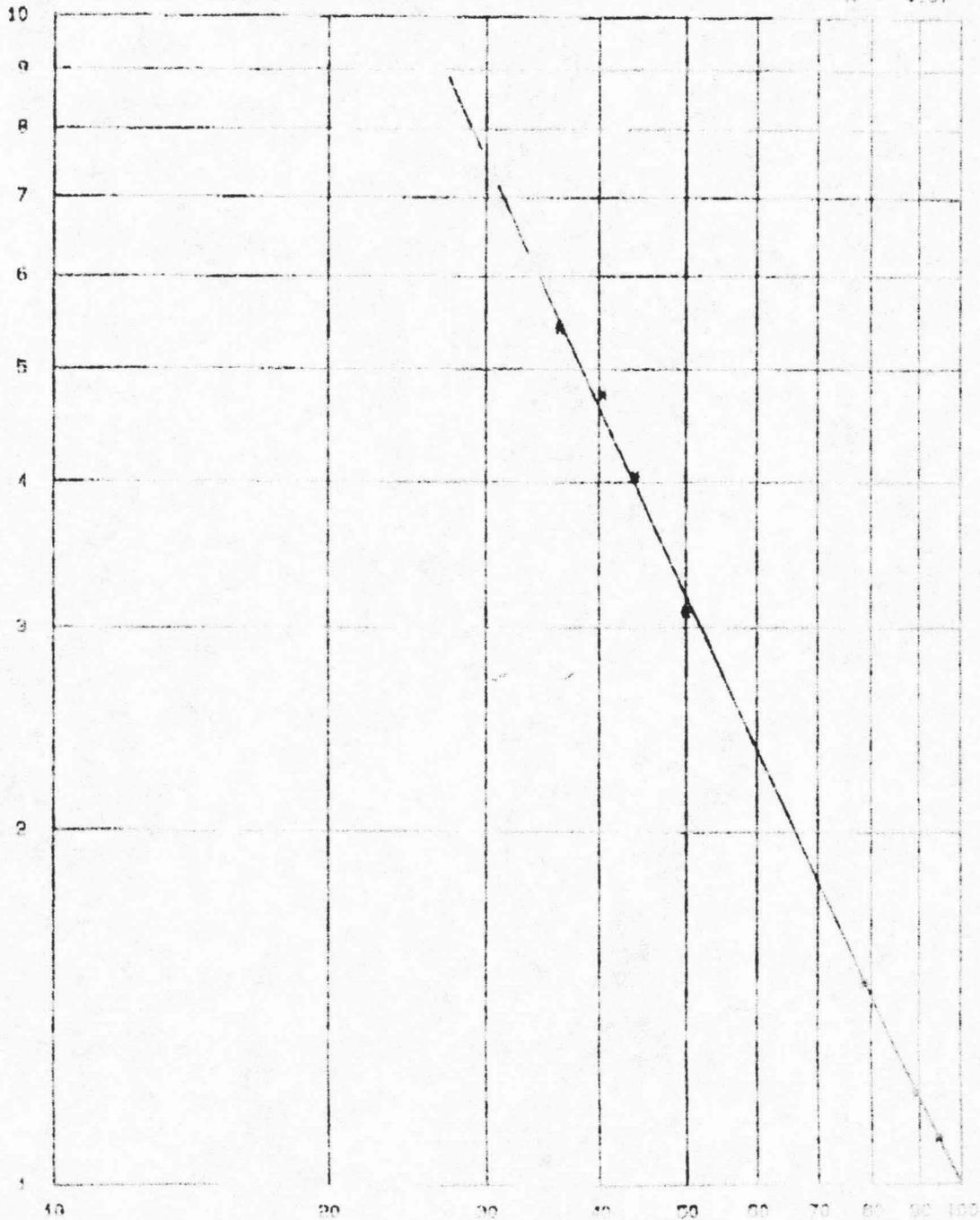
FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 PSIG CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSR 3036

Sample : C 702
Depth, ft : 2897.6

$n = 1.57$

FORMATION RESISTIVITY INDEX (I)



WATER SATURATION (%PV)

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSB 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% BV)</u>
0 702	2897.6	0.065*	8.6	1.00	100.0
				1.10	94.6
				1.20	69.3
				1.49	78.6
				3.10	50.0
				4.05	43.8
				4.76	40.4
				5.42	36.2

Rw = 0.047 ohm meters @ 73 degrees Fahrenheit

* Permeability to gas measured at 400 psig confining pressure.

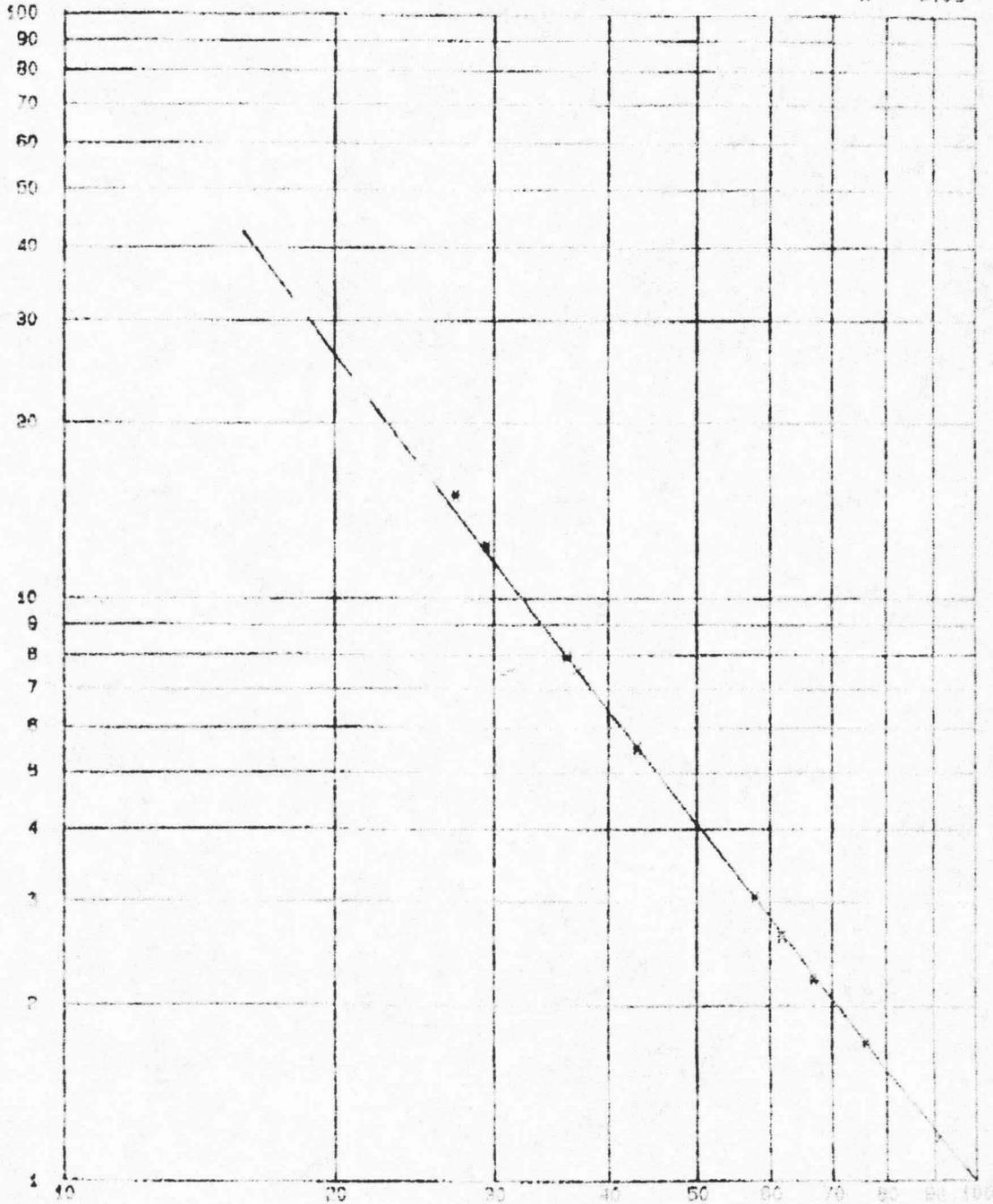
FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSR 3036

Sample : C 698
Depth, ft : 2870.3

$n = 2.03$

FORMATION RESISTIVITY INDEX (I)



WATER SATURATION (Sv)

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
 Youngren "J" 1-B Well
 Stevens County, Kansas
 SRS 1887B/RSH 3036

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Water Saturation (% PV)
C 695	2870.3	10.6*	11.8	1.00	100.0
				1.20	91.3
				1.74	76.1
				2.23	66.8
				2.63	61.7
				3.06	57.8
				5.54	43.0
				7.45	36.0
				12.3	29.4
				15.02	27.2

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

* Permeability to gas measured at 400 psig confining pressure.

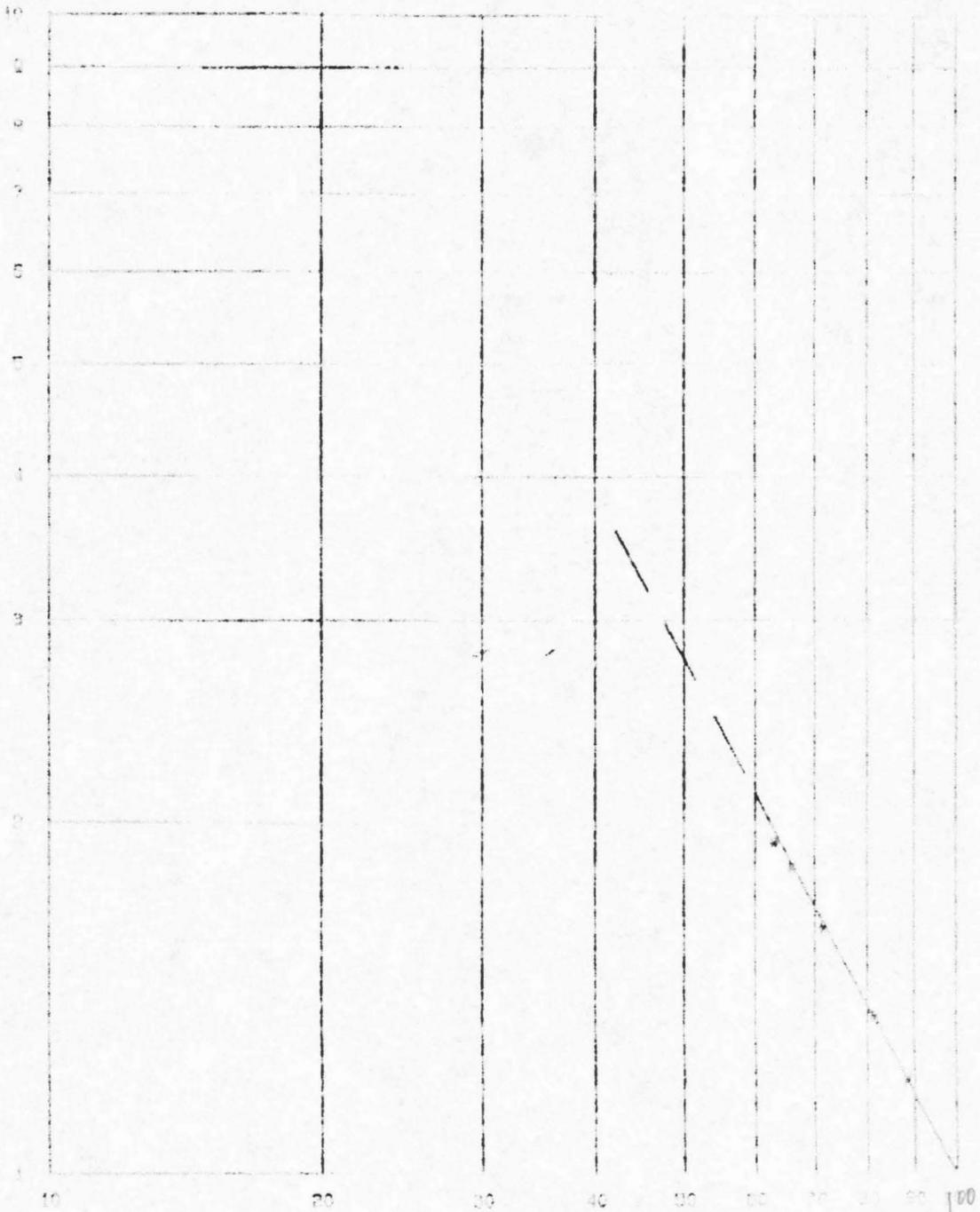
FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Younger "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

Sample : C 691
Depth, ft : 2700 0

W = 1.45

FORMATION RESISTIVITY INDEX (FRI)



WATER SATURATION (%PV)

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1400 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
 Youngren "J" 1-B Well
 Stevens County, Kansas
 SRS 1887B/PSW 3036

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Water Saturation (% BV)
C 691	2768.8	0.014*	6.8	1.00	100.0
				1.20	88.4
				1.36	81.5
				1.62	71.4
				1.83	66.0
				1.93	63.6

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

* Permeability to gas measured at 400 psig confining pressure.

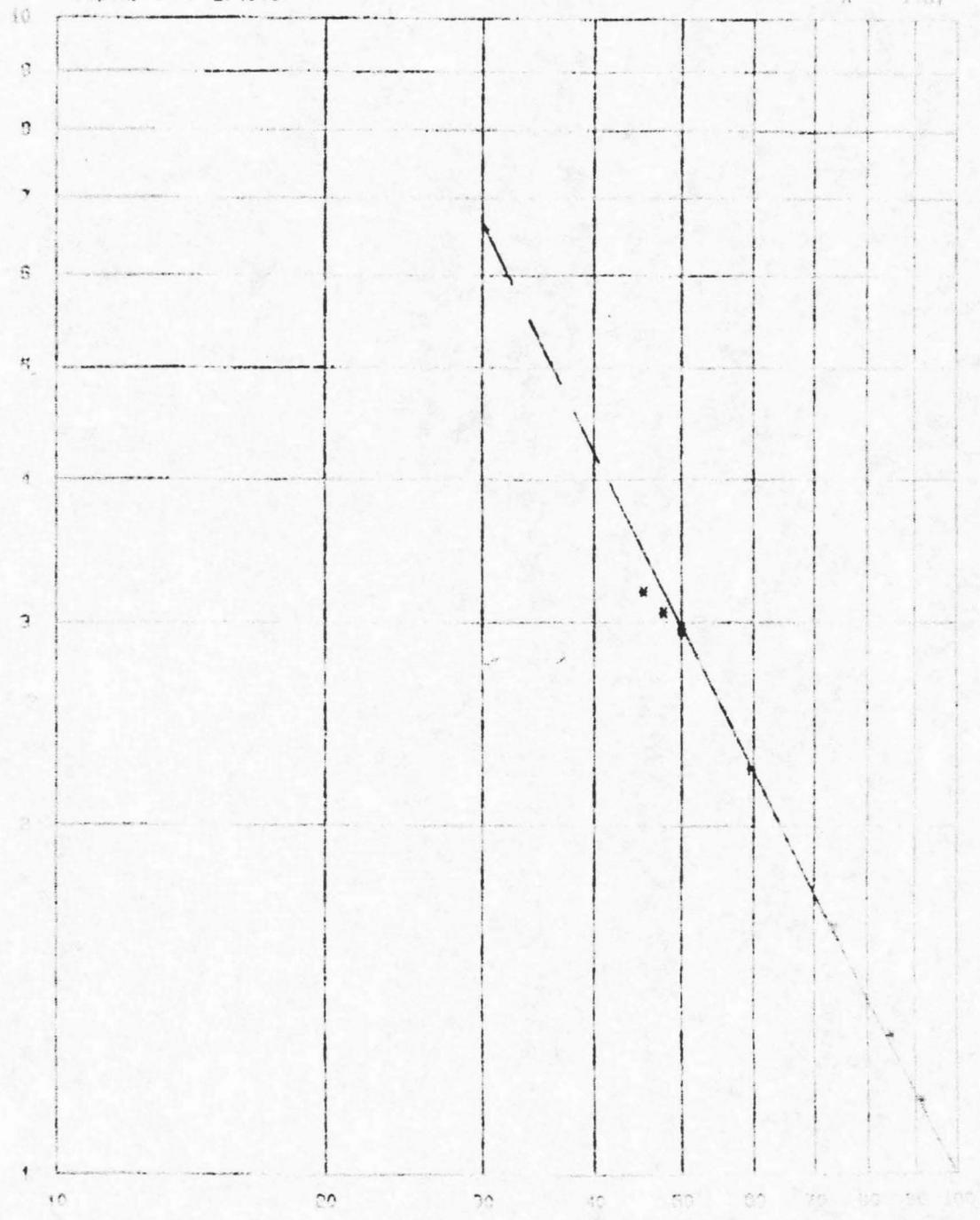
FORMATION RESISTIVITY INDEX - SATURATION RELATIONS
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSR 3036

Sample : C 687
Depth, ft : 2740.1

n = 1.37

FORMATION RESISTIVITY INDEX (I)



WATER SATURATION (%PV)

FORMATION RESISTIVITY INDEX - SATURATED RESISTIVITY

AT 1000 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
 Youngren "J" 1-H Well
 Stevens County, Kansas
 SRS 1987B/BSH 3036

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Water Saturation (* PV)
C 607	2740	0.126*	9.9	1.00	100.0
				1.16	91.6
				1.32	81.7
				1.64	73.6
				2.24	59.6
				2.56	50.6
				3.07	47.8
3.20	45.4				

Rw = 0.047 ohmeters @ 73 degrees Fahrenheit

* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSB 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% PV)</u>
C 687	2740.1	0.126*	9.9	1.00	100.0
				1.16	91.5
				1.32	84.7
				1.64	73.5
				2.24	59.6
				2.96	50.0
				3.07	47.8
				3.20	45.4

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

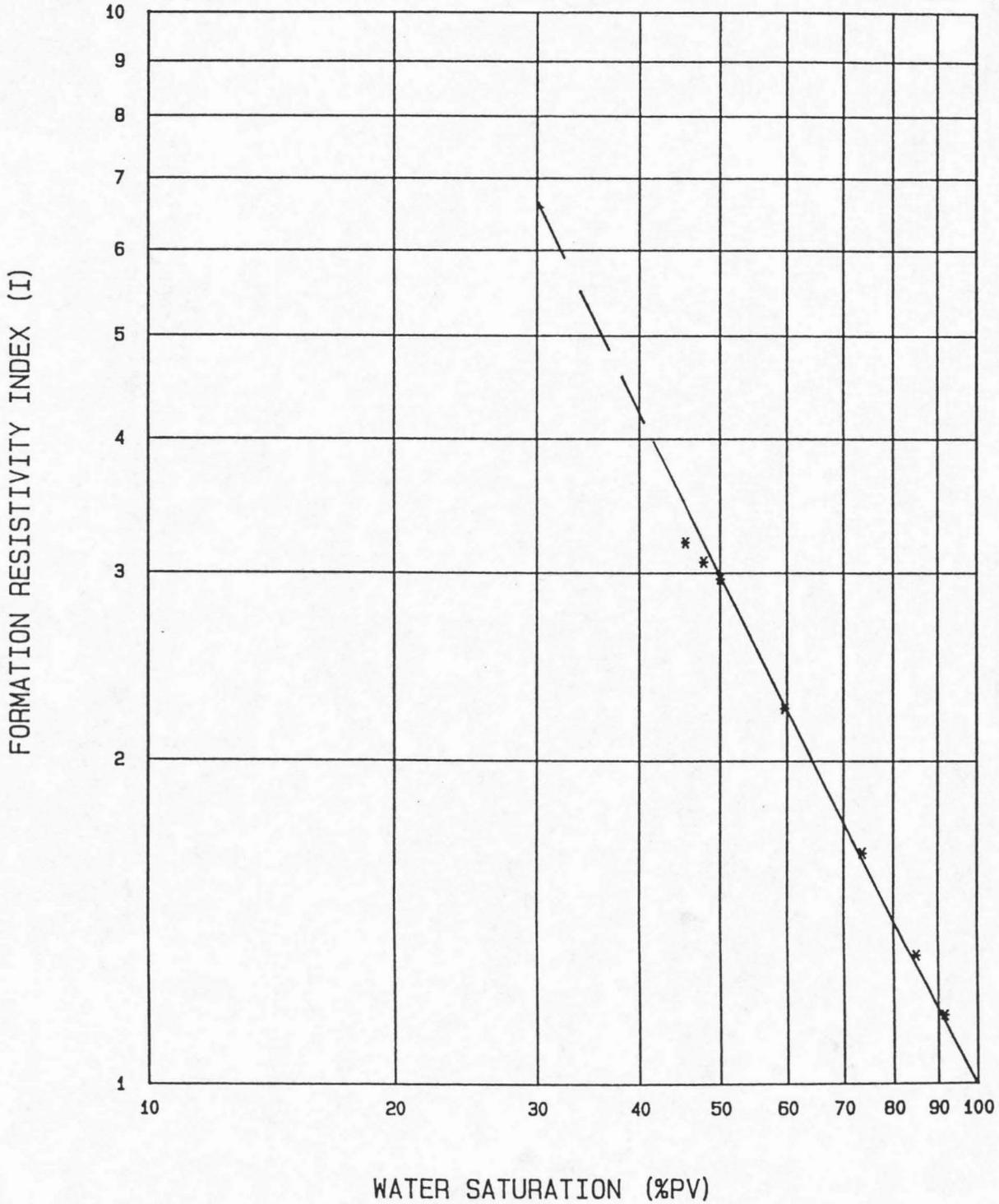
* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSR 3036

Sample : C 687
Depth, ft : 2740.1

n = 1.57



FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% PV)</u>
C 691	2768.8	0.014*	6.8	1.00	100.0
				1.20	88.4
				1.36	81.5
				1.62	71.4
				1.83	66.0
				1.93	63.0

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

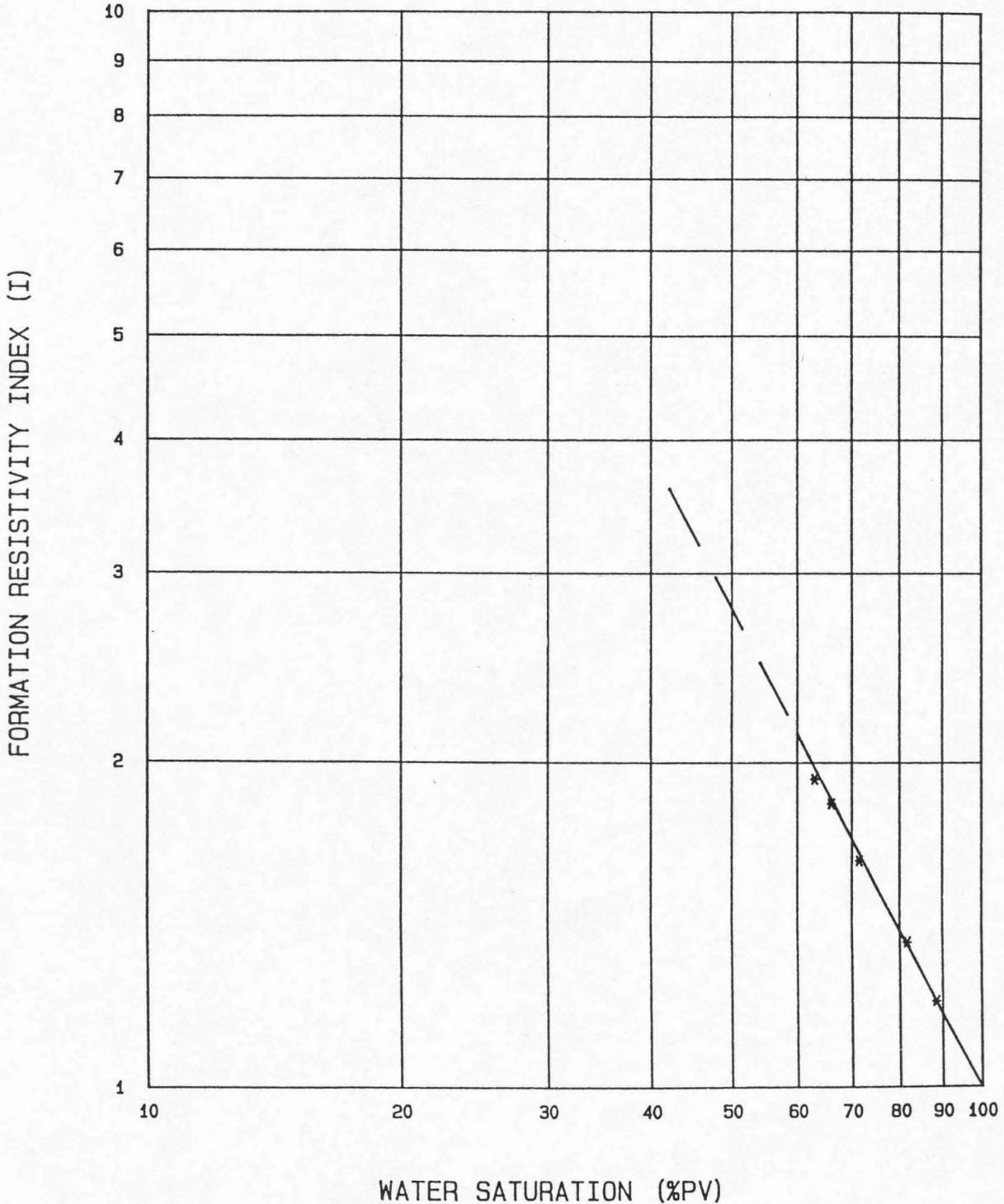
* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSB 3036

Sample : C 691
Depth, ft : 2768.8

n = 1.46



FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% PV)</u>
C 696	2870.3	10.6*	11.8	1.00	100.0
				1.20	91.3
				1.74	76.1
				2.23	66.8
				2.63	61.7
				3.06	57.8
				5.54	43.0
				7.93	36.0
				12.33	29.4
				15.07	27.2

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

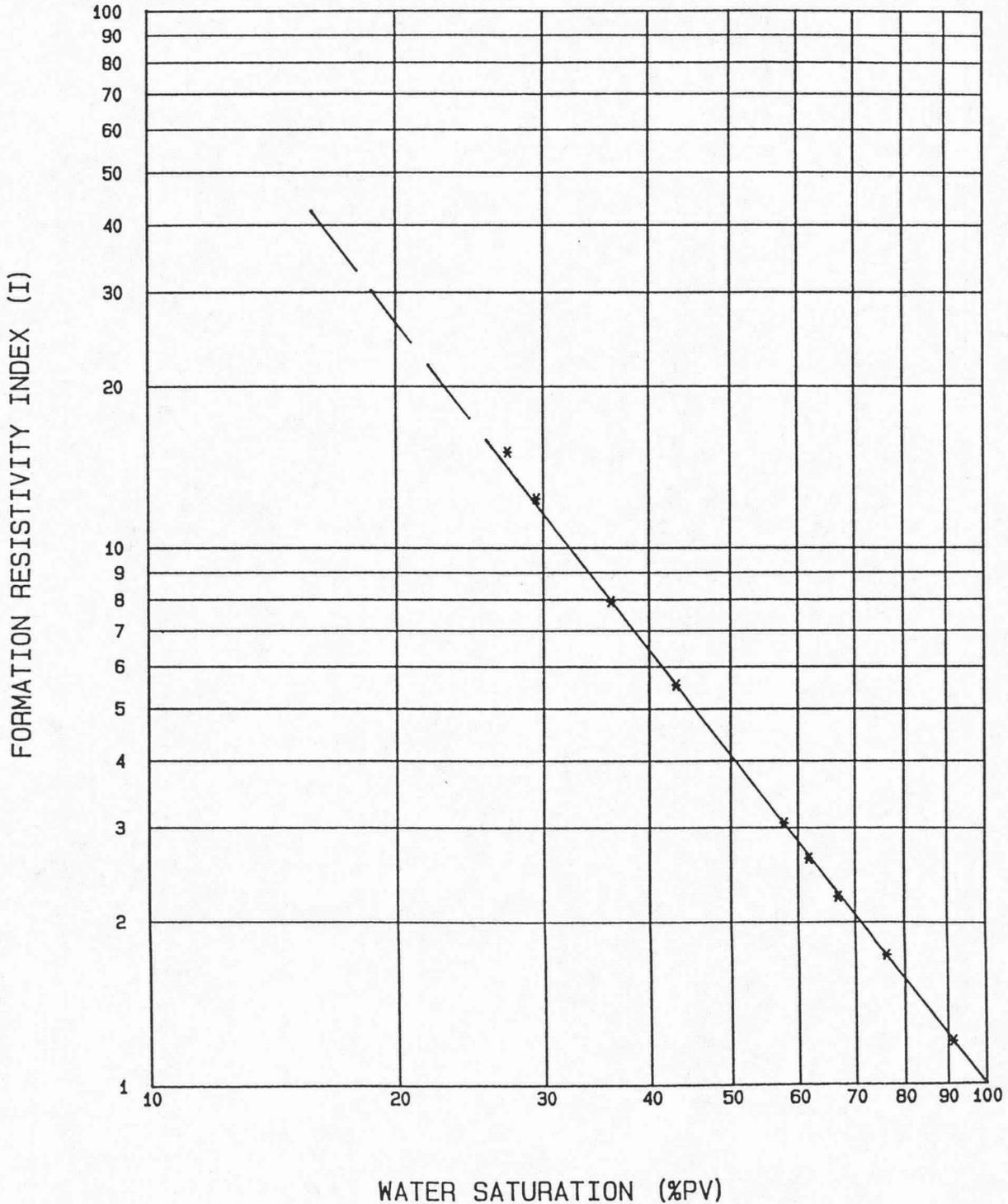
* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

Sample : C 696
Depth, ft : 2870.3

n = 2.03



FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% PV)</u>
C 702	2897.6	0.065*	8.8	1.00	100.0
				1.10	94.6
				1.20	89.3
				1.49	78.6
				3.10	50.0
				4.05	43.8
				4.76	40.4
				5.42	36.2

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

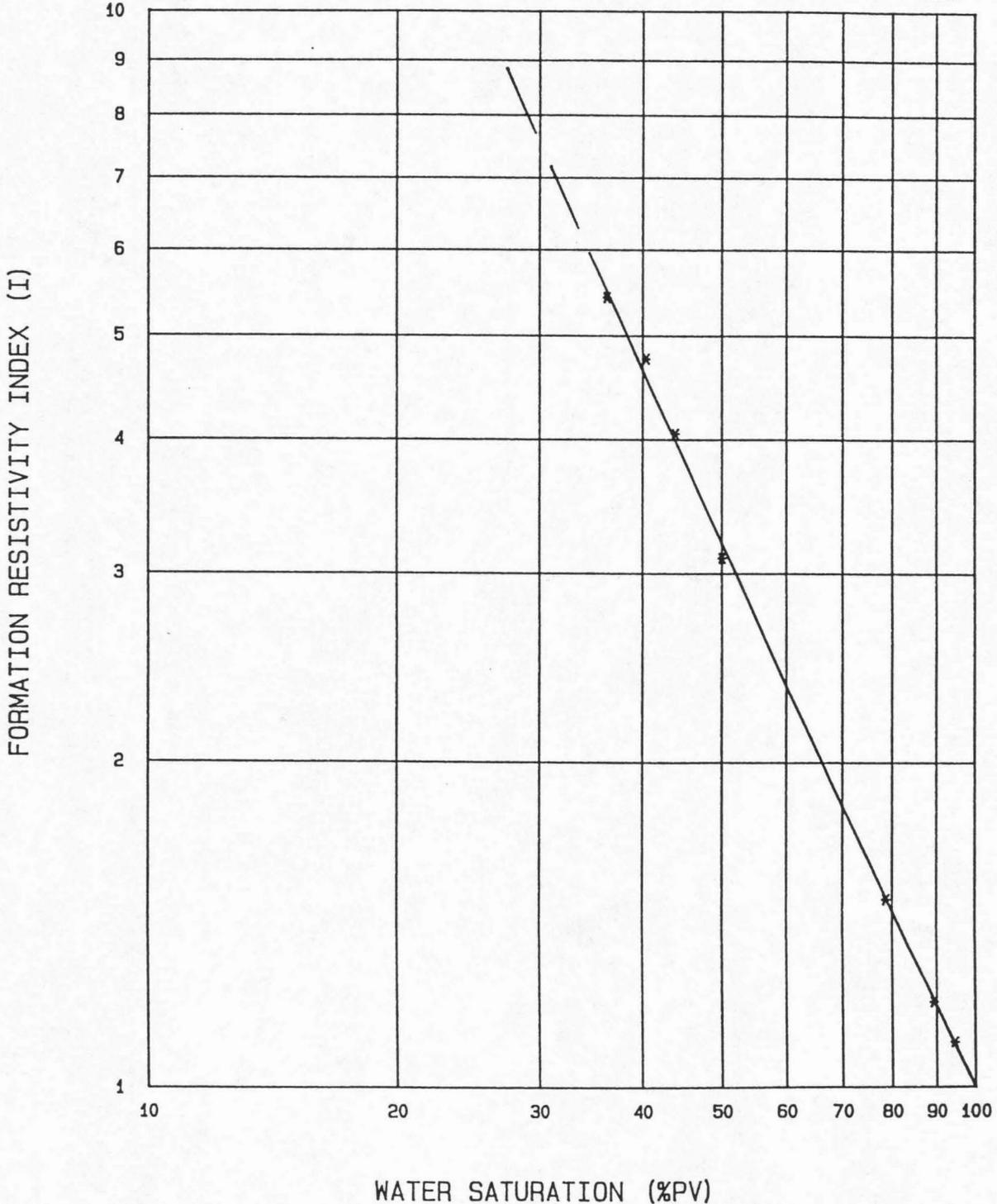
* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

Sample : C 702
Depth, ft : 2897.6

n = 1.67



FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% PV)</u>
C 704	2917.3	9.30*	14.1	1.00	100.0
				1.07	95.7
				1.48	77.8
				1.96	64.9
				2.57	55.0
				3.95	41.0
				5.71	32.2
				7.43	26.7
				12.67	18.9

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

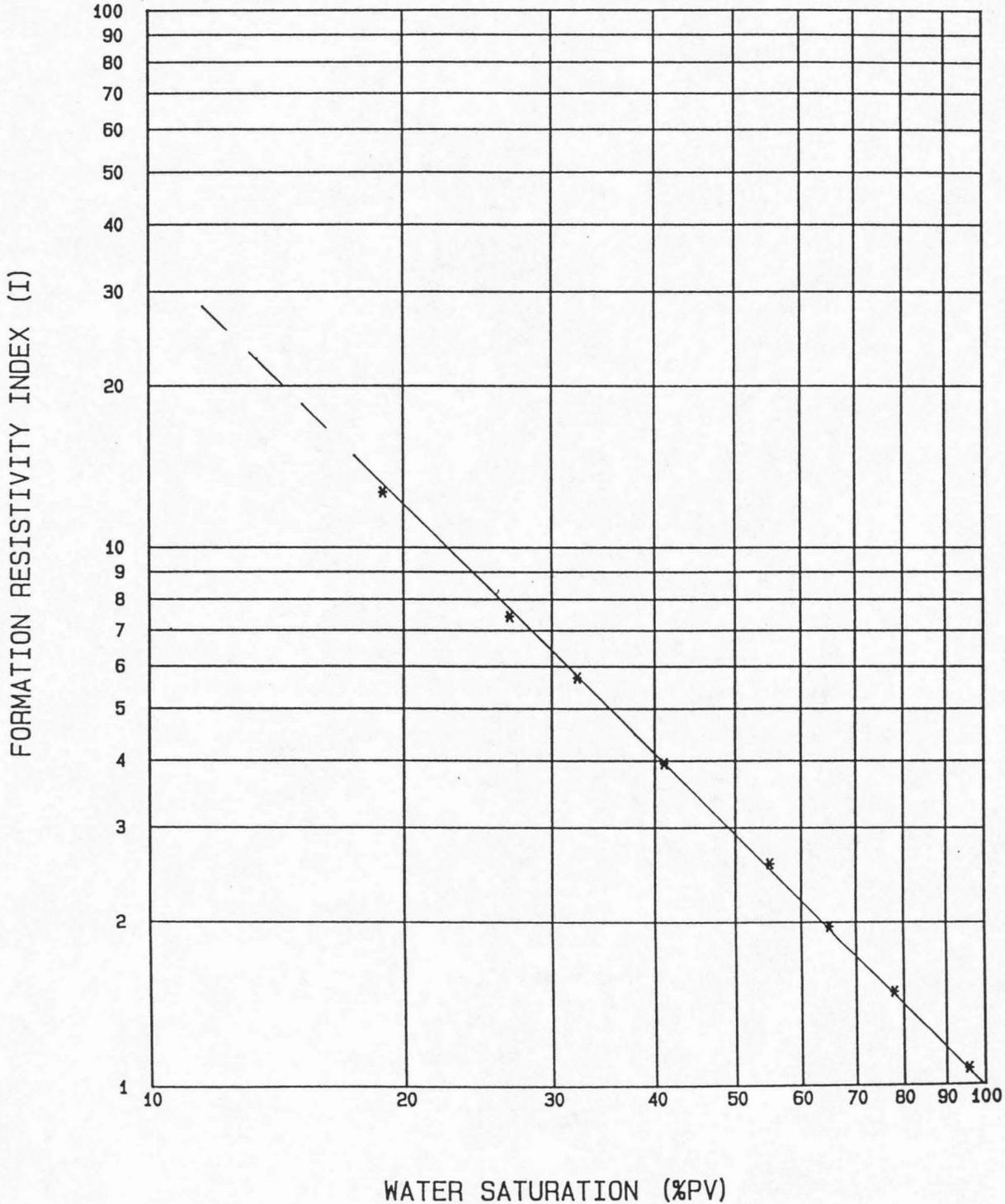
* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

Sample : C 704
Depth, ft : 2917.3

n = 1.55



FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSB 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% PV)</u>
C 707	2932.3	0.142*	6.3	1.00	100.0
				1.07	96.0
				1.23	88.3
				2.02	66.3
				2.63	56.0
				2.97	52.5
				3.30	49.0
				3.43	46.3
				3.52	44.4

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

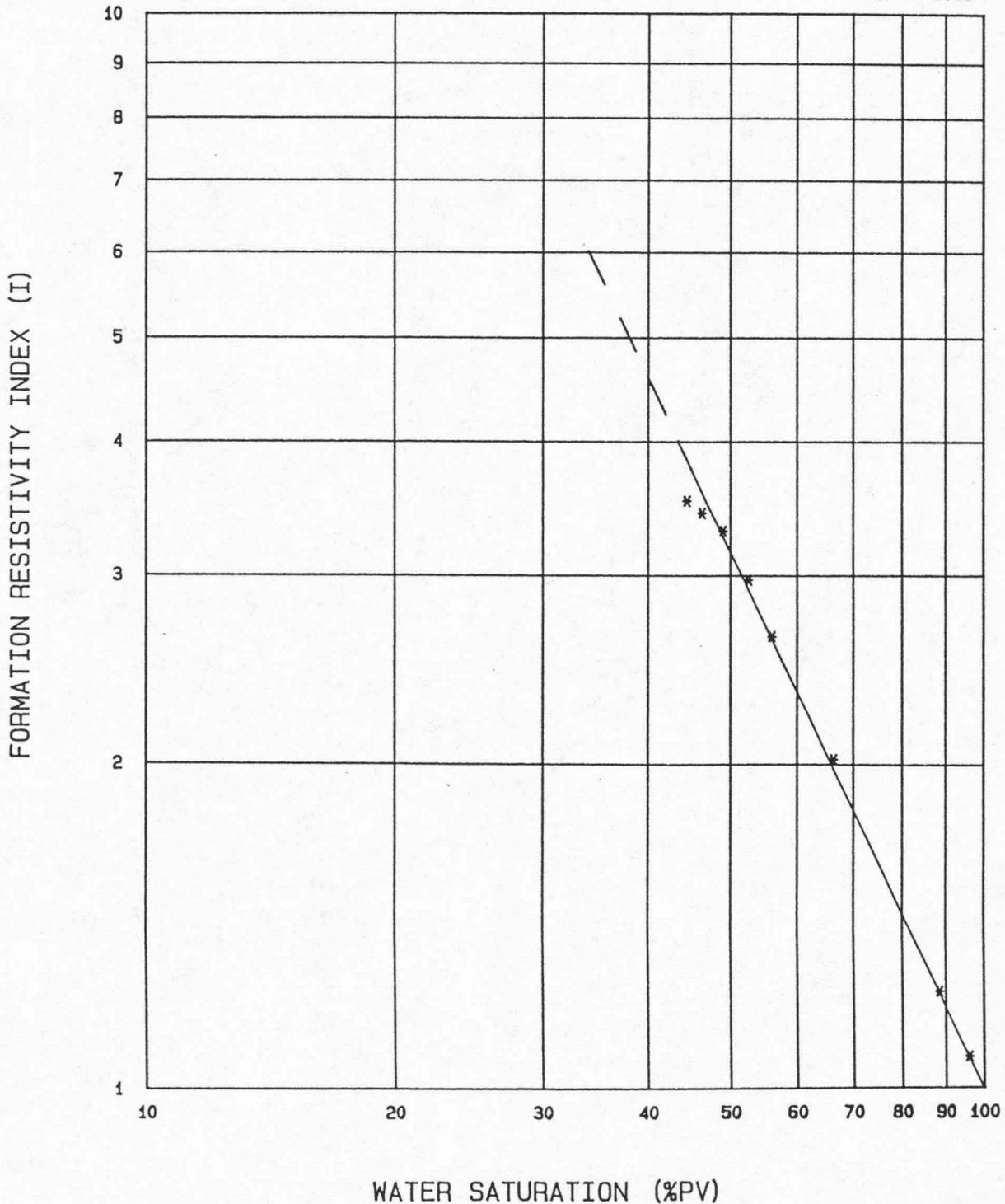
* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

Sample : C 707
Depth, ft : 2932.3

$n = 1.65$



FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% PV)</u>
C 709	2951.5	0.122*	9.5	1.00	100.0
				1.06	96.3
				1.26	86.2
				1.59	74.4
				1.87	67.8
				3.08	48.9
				3.36	45.0
				4.14	37.5
				4.87	32.3
				5.69	27.9
				6.39	24.5

Rw = 0.047 ohm-meters @ 53 degrees Fahrenheit

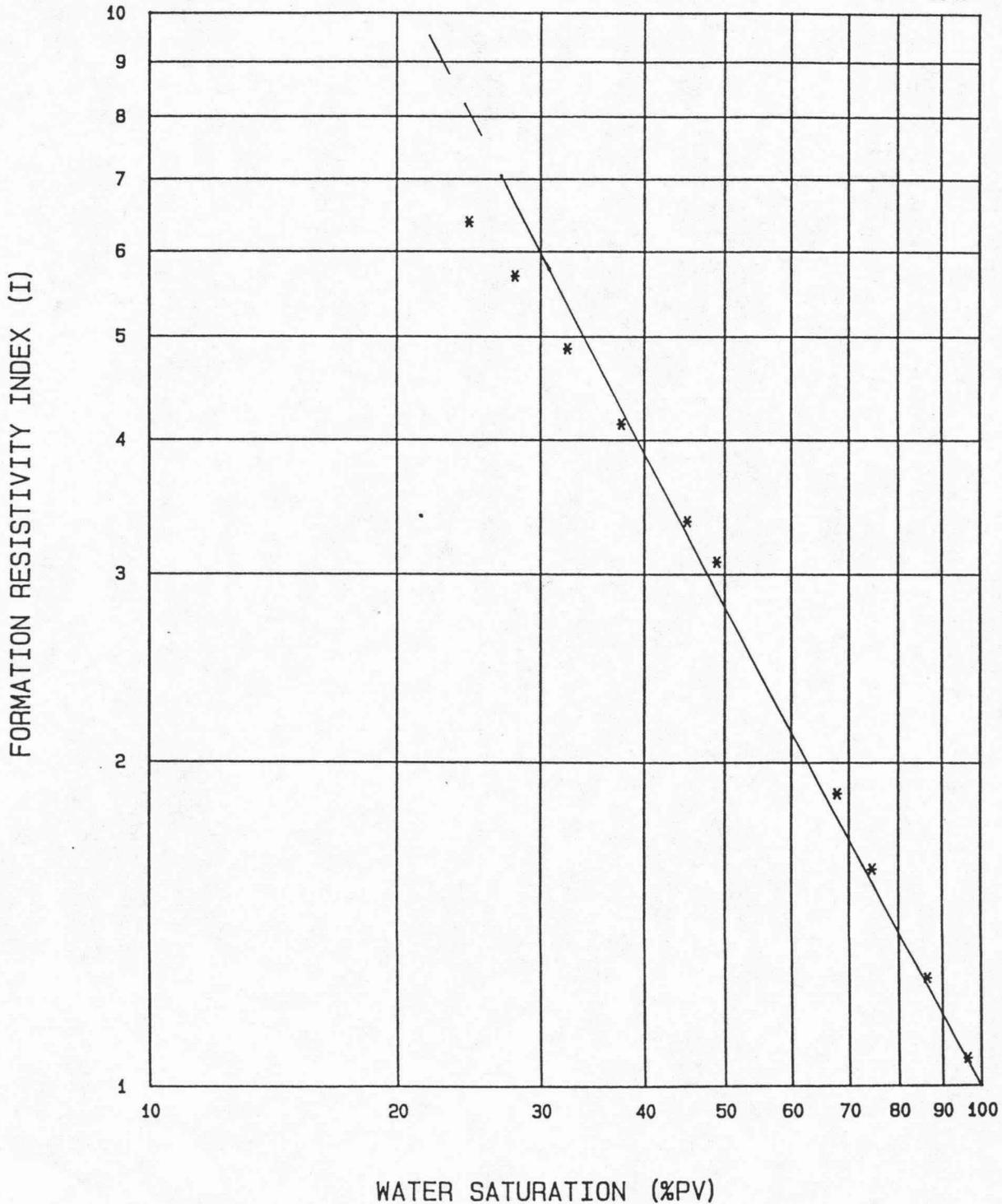
* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887B/RSH 3036

Sample : C 709
Depth, ft : 2951.5

n = 1.49



FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887A/RSH 3036

<u>Sample</u>	<u>Depth (ft)</u>	<u>Permeability To Gas (md)</u>	<u>Porosity (% BV)</u>	<u>Formation Resistivity Index (I)</u>	<u>Water Saturation (% PV)</u>
C 713	2793.5	4.73*	9.3	1.00	100.0
				1.09	94.8
				1.56	74.8
				1.90	65.7
				2.99	49.1
				3.44	44.1
				4.69	37.7
				5.72	33.1
				6.01	31.3

Rw = 0.047 ohm-meters @ 73 degrees Fahrenheit

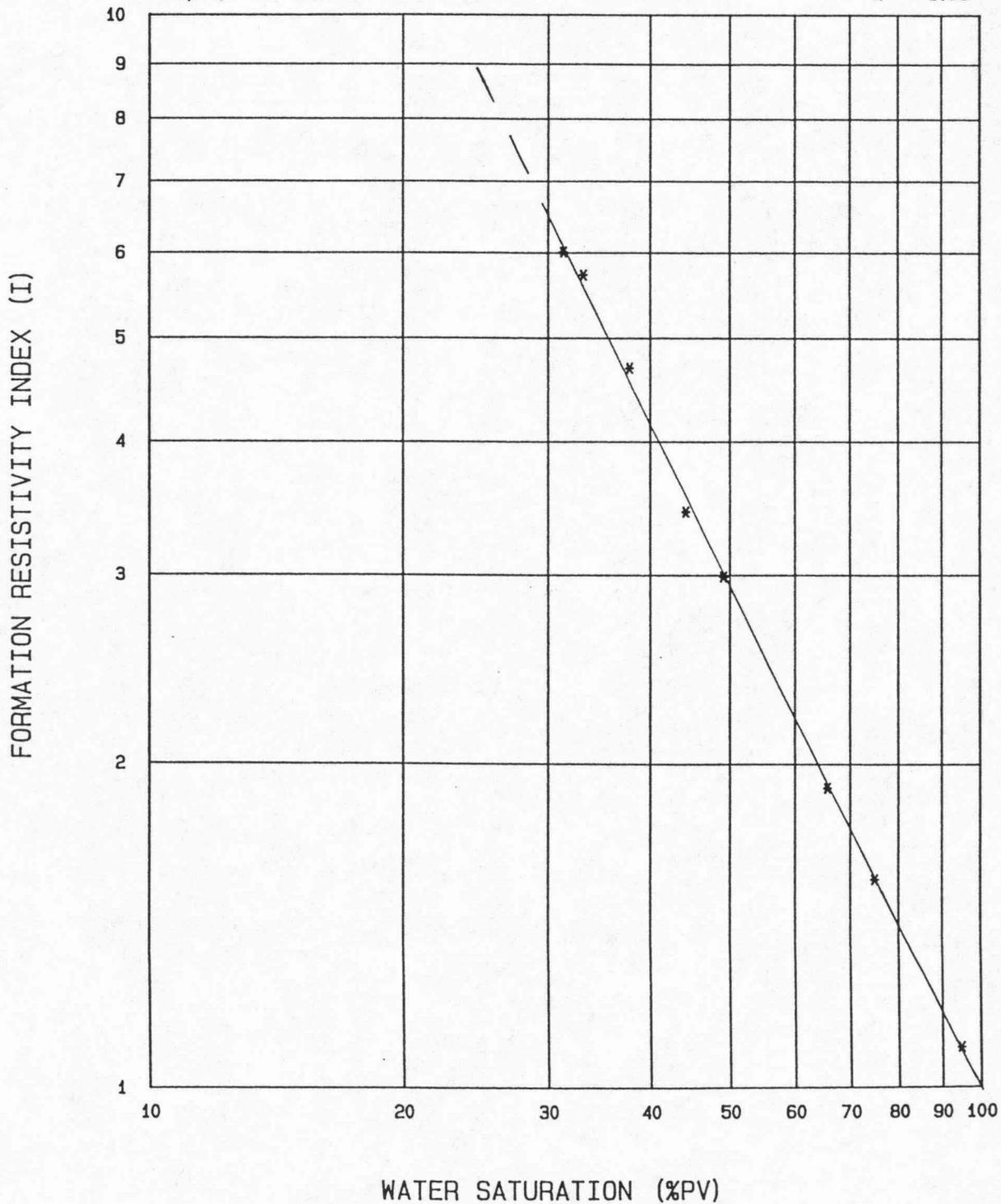
* Permeability to gas measured at 400 psig confining pressure.

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887A/RSR 3036

Sample : C 713
Depth, ft : 2793.5

n = 1.55



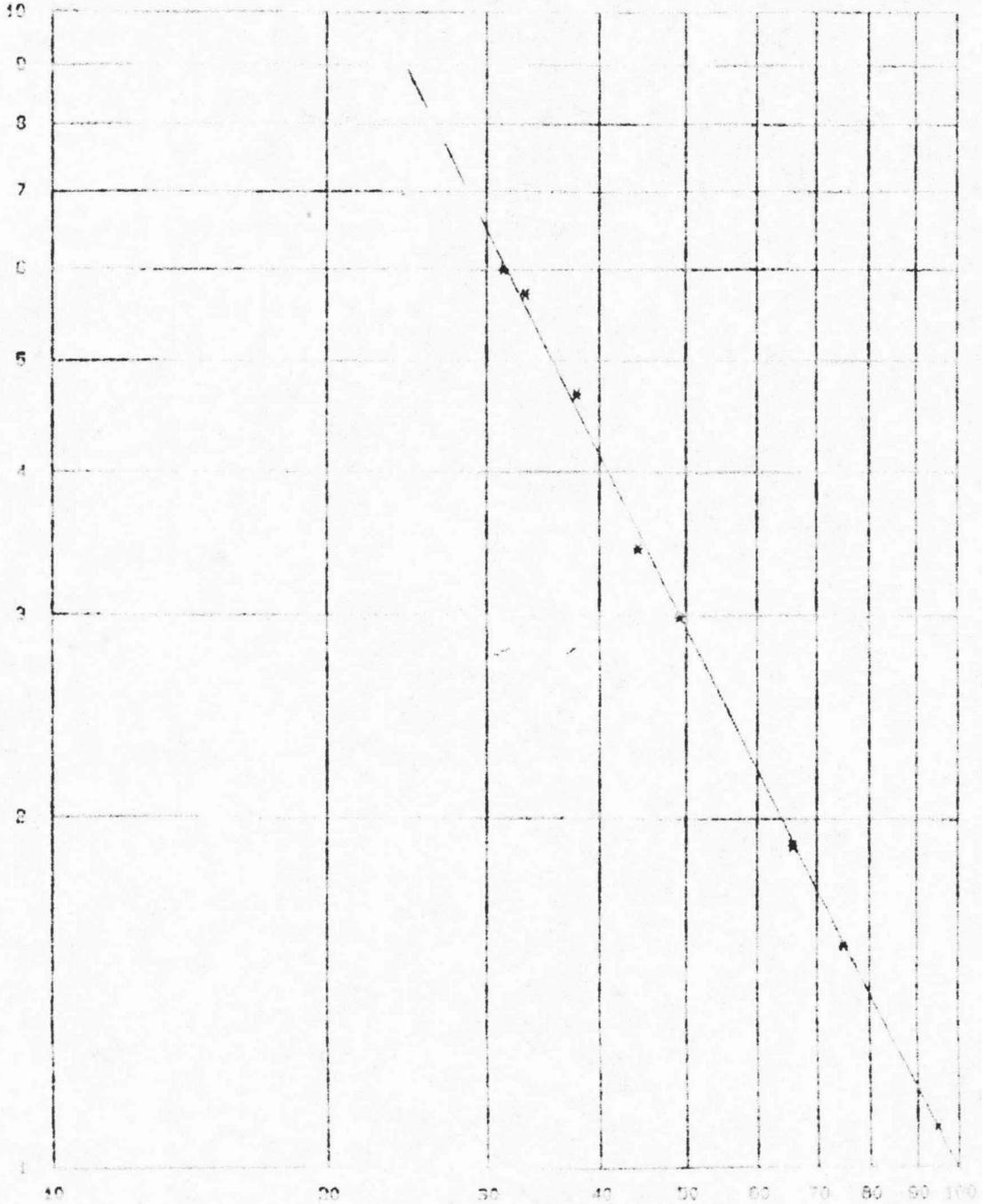
FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 PSIG CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "U" 1-H Well
Clevens County, Kansas
SPS 1887A/RSH 3036

Sample : C 713
Depth : 2703 B

n = 1.00

FORMATION RESISTIVITY INDEX (I)



WATER SATURATION (%PV)

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1850 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
 Youngren "E" 1-H Well
 Stevens County, Kansas
 BR 1887A/BR 2036

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (* BV)	Formation Resistivity Index (I)	Water Saturation (% PV)
C 713	2793.5	4.73*	9.3	1.00	100.0
				1.09	94.8
				1.56	74.8
				1.90	65.7
				2.99	49.2
				3.44	44.1
				4.69	37.7
				5.72	33.1
				6.07	31.3

Rw = 0.047 ohm-meter @ 97.73 degrees Fahrenheit

* Permeability to gas measured at 100 psig confining pressure.

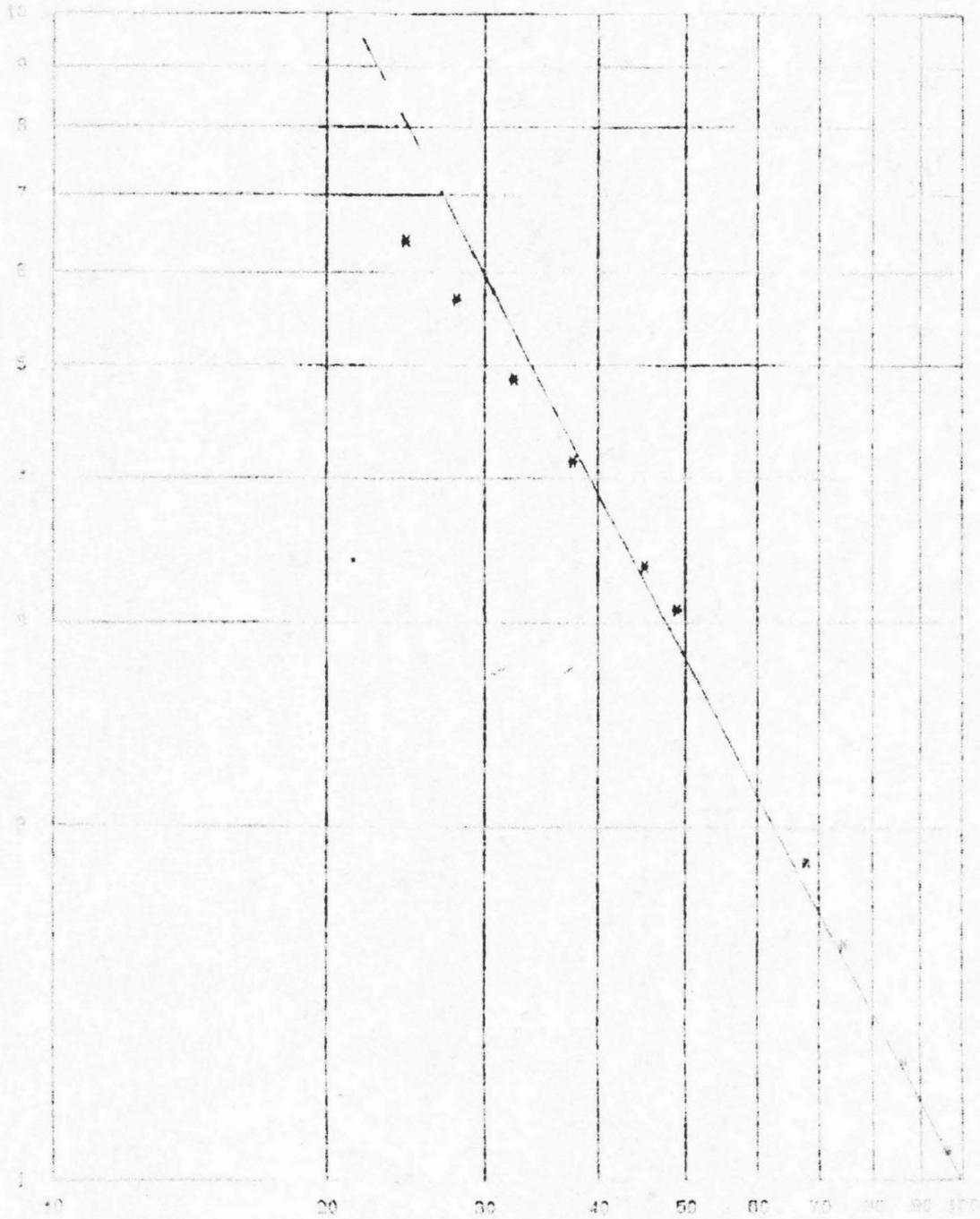
FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "U" 1 H Well
Stevens County, Kansas
SRS 18878/RSH 3036

Sample : G 709
Depth, ft : 2951.5

$n = 1.48$

FORMATION RESISTIVITY INDEX (I)



WATER SATURATION (KRV)

FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP

AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
 Youngren "J" 1-H Well
 Stevens County, Kansas
 SRS 1887B/RSU 3036

Sample	Depth (ft)	Permeability To Gas (md)	Porosity (% BV)	Formation Resistivity Index (I)	Water Saturation (% PV)
C 709	2951.5	0.122*	9.5	1.00	100.0
				1.06	96.3
				1.26	86.2
				1.59	74.4
				3.87	67.8
				3.08	48.9
				3.36	45.0
				4.34	37.5
				4.87	32.3
				5.69	27.9
				6.39	24.6

Rw = 0.047 ohm-meters @ 53 degrees Fahrenheit

* Permeability to gas measured at 400 psi confining pressure.

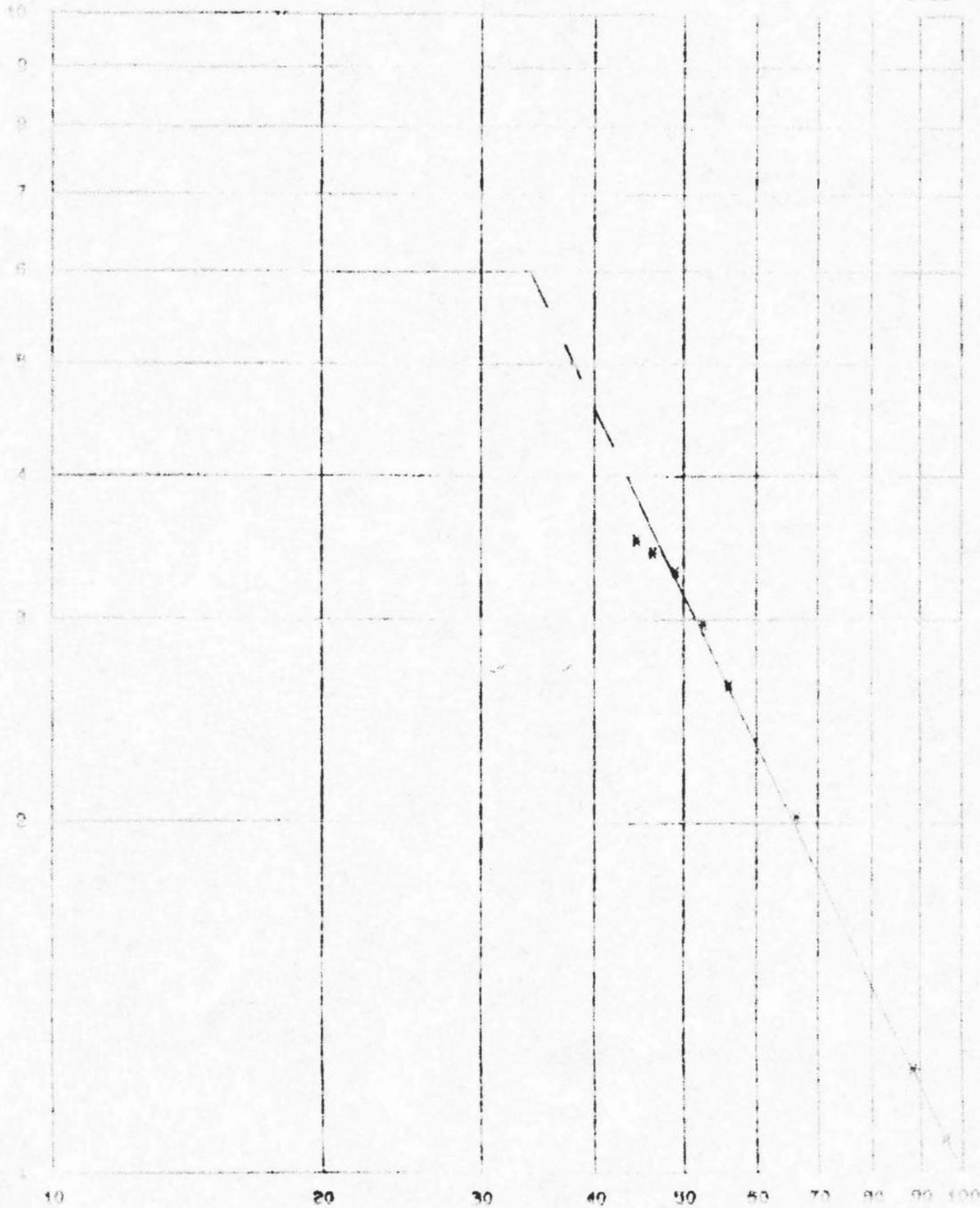
FORMATION RESISTIVITY INDEX - SATURATION RELATIONSHIP
AT 1650 psig CONFINING PRESSURE

Anadarko Petroleum Corporation
Youngren "J" 1-H Well
Stevens County, Kansas
SRS 1887R/RSK 3036

Sample : C 707
Depth, ft : 2932.3

1.00

FORMATION RESISTIVITY INDEX (I)



WATER SATURATION (%PV)