APPENDIX 5 FROM WCR
CORE DESCRIPTION
BOGGY CREEK - 1
W1053

APPENDIX-5

Core Description

AMDEL CORE DESCRIPTION

AMDEL
CORE
SERVICES

3 February 1992

Gas & Fuel Exploration N L
11th Floor
151 Flinders Street
MELBOURNE VIC 3000

Attention: Mr J Foster

REPORT: 008/132

CLIENT REFERENCE:	Order No. 1160
MATERIAL:	Whole Core
LOCALITY:	Boggy Creek No. 1
WORK REQUIRED:	Porosity and Permeability, Grain Density

Please direct technical enquiries regarding this work to the signatory below under whose supervision the work was carried out.

RUSSELL R MARTIN
Laboratory Supervisor
Core Analysis/Special Core Analysis
on behalf of Amdel Core Services Pty Ltd

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(Incorporated in South Australia)
ACN: 008 273 005

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1. INTRODUCTION

Core from Gas and Fuel Exploration's Boggy Creek No. 1 well (spanning the interval 1673.00 - 1681.70 metres) was delivered to Amdel Core Services' Adelaide laboratory on 4 January 1992.

Mr J Foster, of Gas and Fuel Exploration, requested the following analyses be carried out:

- Air permeability
- Helium injection porosity
- Calculated grain density

A sample was to be taken, where possible, every 30 cm except in those sections of core which had been preserved in Seal Peel wax. Where possible, a sample was taken adjacent to the preserved sections.

2. SAMPLE PREPARATION

Because the core was very friable all the samples which were to have plugs taken were firstly packed in dry ice. One and one-half inch diameter plugs were drilled using liquid nitrogen as the bit lubricant and coolant and trimmed square. Immediately after the plugs had been trimmed, they were repacked in dry ice prior to being sleeved with aluminium jackets. Stainless steel screens were placed at either end of the sample.

After sleeving, the sample was placed into a hydrostatic cell and a confining pressure of 500 psi applied to conform the sleeving to the sample. This process eliminates any possibility of air passing between the sleeve wall and sample when the permeability measurement was made.

The samples were then placed into a conventional dry oven at temperatures not exceeding 80°C. After drying for 48 hours the samples were removed and placed into a desiccator containing silica gel and allowed to cool to room temperature prior to measurements of permeability to air and helium injection porosity.

3. PERMEABILITY TO AIR

Air permeability was determined on the plug samples. The samples were firstly placed in a Hassler cell with a confining pressure of 250 psi (1720 kPa). The confining pressure was used to prevent bypassing of air around the samples when the measurement was made. To determine permeability a known air pressure was applied to the upstream face of the sample, creating a flow of air through the core plug. Permeability for the samples were calculated using Darcy's Law through knowledge of the upstream pressure, flow rate, viscosity of air and the sample's dimensions.

4. HELIUM INJECTION POROSITY

The porosity of the clean dry core plugs was determined as follows. The plugs were first placed in a sealed matrix cup. Helium held at 100 psi reference pressure was then introduced to the cup. From the resultant pressure change the unknown grain volume was calculated using Boyle's Law (ie, $P_1V_1 = P_2V_2$).

The bulk volume was determined by mercury immersion. The difference between the grain volume and the bulk volume is the pore volume and from this the 'effective' porosity was calculated as the volume percentage of pores with respect to the bulk volume.

5. ROLLING AND SPECIFIED AVERAGES

These averages of both Helium injection porosity and permeability are obtained by using a "rolling" three (3) point method. In the case of porosity a weighted arithmetic average is used:

$$\phi\ av_{(i+1)} = [\phi_i + 2\phi_{(i+1)} + \phi_{(i+2)}]\ /4$$

In the case of permeability a weighted geometric average is used:

$$K\ av_{(i+1)} = 10^{[(\log_{10} K_i + 2\log_{10} K_{(i+1)} + \log_{10} K_{(i+2)})\ /4]}$$

At any sample point, excluding the first and last, a rolling average is obtained by using the value at the specified sample point, the value before it and the value of the sample point after it. In the cases of the first and last sample points, only 2 sample points are used.

Using porosity as an example, the average of the first data point is obtained from the formula:

$$\phi\ av_{(i)} = [2\phi_i + \phi_{(i+1)}]\ /3$$

The average at the final data point is obtained by:

$$\phi\ av_{(f)} = [\phi_{(f-1)} + 2\phi_{(f)}]\ /3$$

The same method is used for permeability averages. At any break in the data the rolling averages are "re-started".

<u>Data Key:</u>

ϕ	=	porosity
K	=	permeability
i	=	initial
av	=	average
f	=	final

Specified averages are normal arithmetic averages which can be taken over any specified section of the core, as well as over the whole core.

3 February 1992

CONVENTIONAL CORE ANALYSIS

Company Gas and Fuel Exploration
Well Boggy Creek No. 1

Table I

Sample Number	Depth (m)	Porosity (%)		Density		Permeability (md)		Summation of Fluids			Remarks
		He Inj	Roll Av	Nat	Grain	Ka	Roll Av Ka	Por %	Oil %	Water %	
1	1673.20	22.9	23.1		2.66	7058	5816				SP
2	1673.40	23.5	21.1		2.66	3950	4793				
3	1673.95	14.5	20.2		2.66						Broken
4	1674.50	28.2	24.7		2.65	6530	6434				
5	1674.78	27.8	27.4		2.65	6245	6215				
6	1675.10	25.6	23.5		2.66	5857	3396				
7	1675.34	14.9	17.6		2.65	621	687				
8	1675.77	14.9	16.0		2.69	99	290				
9	1676.40	19.3	18.0		2.64	1172	566				
10	1676.85	18.5	15.9		2.66	755	227				
11	1677.14	7.3	15.0		2.64	4.0	91				
12	1677.50	26.8	20.4		2.65	5722	649				Fractured
13	1677.80	20.5	22.5		2.66	1363	2595				
14	1678.15	22.2	22.5		2.64	4265	3617				
15	1678.45	25.0	23.7		2.64	6901	5874				
16	1678.78	22.4	22.5		2.66	5860	6282				SP
17	1679.22	20.0	20.9		2.66	6574	5855				
18	1679.42	21.3	22.3		2.66	4639	6080				
19	1679.80	26.4	23.9		2.65	9659	7621				Fractured
20	1680.05	21.5	23.9		2.69	7792	8773				
21	1680.40	26.2	23.7		2.67	10103	8224				
22	1680.70	20.9	23.1		2.66	5751	7337				
23	1680.98	24.2	23.7		2.67	8673	6726				
24	1681.30	25.4	25.0		2.66	4729	5789				

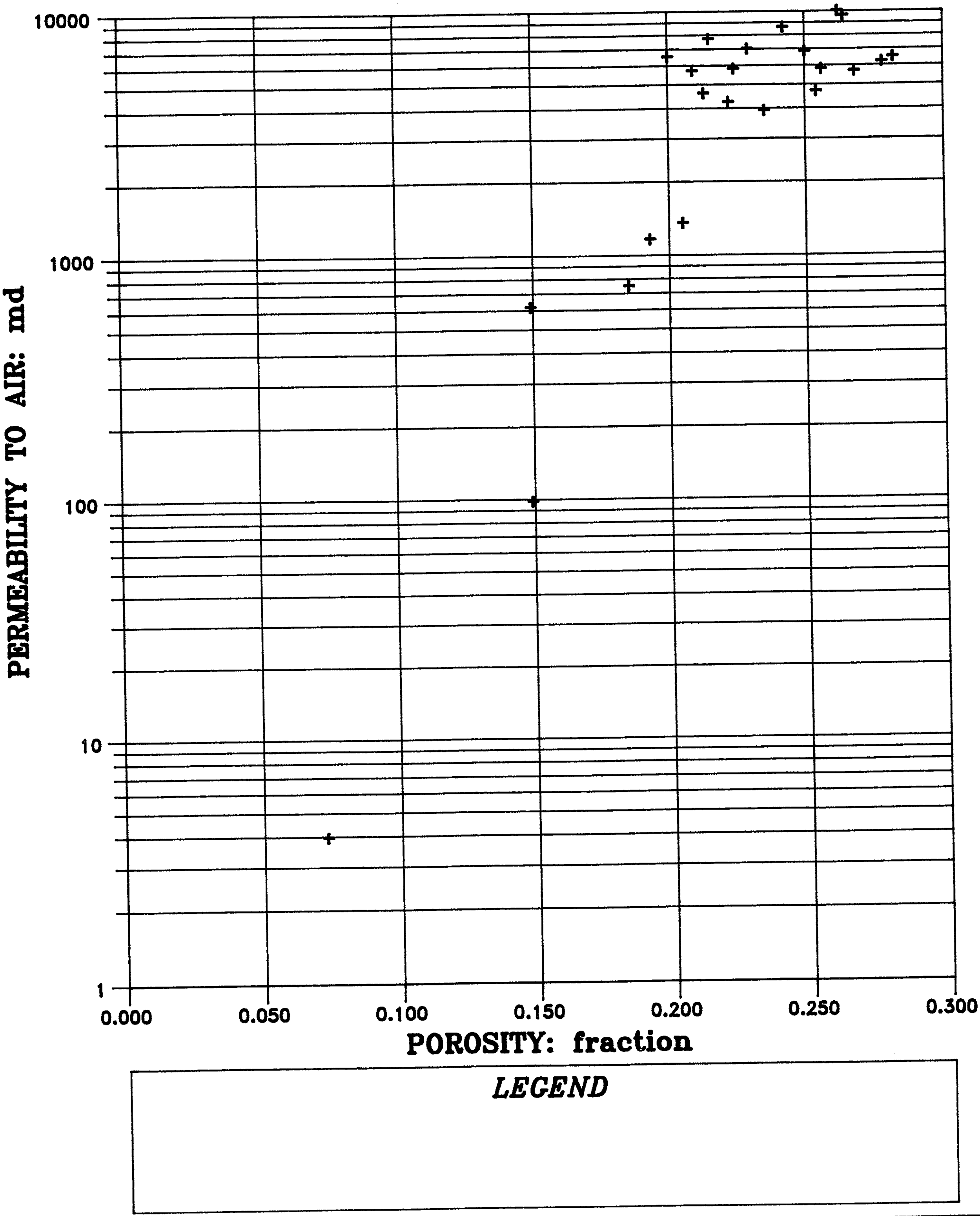
VF = Vertical Fracture; HF = Horizontal Fracture; MP = Mounted Plug; SP = Short Plug;
C# = Top of Core; B# = Bottom of Core; OWC = Probable Oil/Water Contact;
Tr = Probable Transition Zone; GC = Probable Gas Cap

Figure 1

POROSITY Vs PERMEABILITY TO AIR

Company: Gas & Fuel
Well : Boggy Creek No. 1
Formation:

AMBIENT



3 February 1992

CORE PLUG DESCRIPTIONS

Company Gas and Fuel Exploration
Well Boggy Creek No. 1

Table II

Sample Number	Depth (m)	Description	
1	1673.20	SST:	lt gry, med-dom crs gr, ang-sbang, p cmt, mod srt, fri, r carb Spk, mnr arg mtrx, r Qtz o'gths, short plug.
2	1673.40	SST:	lt gry, dom med-occ crs gr, ang-sbang, p cmt, mod srt, fri, carb lam and Spk thru, mnr arg mtrx, r Qtz o'gth.
3	1673.95	SST:	lt gry v crs-gran, ang-sbang, p cmt, fri, p srt, carb Spk thru, arg mtrx, occ Qtz o'gth, broken edge.
4	1674.50	SST:	v lt gry, f-med gr, ang-sbang, p cmt, fri, mod wl srt, carb Spk thru, arg mtrx.
5	1674.78	SST:	v lt gry, f-med gr, sbang-rndd gr, r tr rose Qtz, p cmt, fri, mod wl srt, carb Spk thru, arg mtrx.
6	1675.10	SST:	v lt gry, med-v crs gr, sbang-occ rndd gr, p cmt, fri, p srt, carb Spk thru, tr rose Qtz, arg mtrx.
7	1675.34	SST:	lt gry, f-v crs gr, sbang-occ rndd w/crs, p cmt fri, p srt, carb Spk thru, arg mtrx.
8	1675.77	SST:	lt gry dom vf gr w/ med gr thru, sbang, mod wl cmt, wl srt, carb Spk & lam thru, abd arg mtrx.
9	1676.40	SST/SLTST:	lt gry vf-f gr, sbang, mod wl cmt, wl srt, carb Spk & lam thru, abd arg mtrx, r Pyr Nod.
10	1676.85	SLTST/SST:	interbeds, lt gry, vf-med gr, sbang, mod wl cmt, mod wl srt, carb Spk & lam thru, Sltst lam, abd arg mtrx, r tr Pyr.
11	1677.14	SLTST/SST:	lt gry, vf gr, intbed, wl srt, wl cmt, carb lam thru, abd Slst lam thru, abd arg mtrx.
12	1677.50	SST:	lt gry, med gr, sbang-rndd, p cmt, wl srt, fri, occ carb Spk thru, mr arg mtrx, occ Qtz o'gth, frac.

Table II (continued)

Sample Number	Depth (m)	Description	
13	1677.80	SST:	lt gry, f-r crs gr thru, sbang-occ rndd gr thru, mod cmt, p srt, carb Spk & lam thru, abd arg mtrx, occ Qtz o'gth.
14	1678.15	SST:	lt gry, f w/ crs gr vn thru & abd carb lam, sbang-occ rndd, mod cmt, p srt, carb Spk & lam thru, mnr arg mtrx, occ Qtz o'gth.
15	1678.45	SST:	lt gry, f w/ crs gr vn thru & abd carb lam, sbang-occ rndd, mod cmt, p srt, carb Spk & lam thru, mnr arg mtrx, occ Qtz o'gth.
16	1678.78	SST:	lt gry, f w/ crs gr vn thru & abd carb lam, sbang-occ rndd, mod cmt, p srt, carb Spk & lam thru, mnr arg mtrx, occ Qtz o'gth, short plug.
17	1679.22	SST:	lt gry, f-v crs gr intbed, ang-sbang, p cmt, mod wl srt, carb spk thru, mnr arg mtrx, occ Qtz o'gth.
18	1679.42	SST:	lt gry, f-v crs gr intbed, ang-sbang, p cmt, mod wl srt, carb spk & lam thru, abd arg mtrx, occ Qtz o'gth.
19	1679.80	SST:	med-dk gry, med-occ crs gr thru, ang-sbang, p cmt, fri, wl srt, carb incl thru, p-no mtrx, frac.
20	1680.05	SST:	med gry, med-v crs gr, ang-sbang, p cmt fri, p srt, p-no mtrx, mnr frac, tr dissen Pyr thru.
21	1680.40	SST:	lt gry, dom med gr w/ occ crs gr thru ang-sbang, p cmt, mod wl srt, fri, carb Spk & lam thru, mnr arg mtrx, dom cln sst.
22	1680.70	SST:	lt gry, dom med gr w/ incr in crs gr thru, ang-sbang, p cmt, mod wl srt, fri, carb Spk & lam thru, mnr arg mtrx.
23	1680.98	SST:	lt gry, dom med gr w/ incr in crs gr thru, ang-sbang, p cmt, mod wl srt, fri, carb Spk & lam thru, mnr arg mtrx.
24	1681.30	SST:	lt gry, occ f-dom med gr w/ occ crs gr thru, ang-sbang, p cmt, mod wl srt, fri, carb Spk & lam thru, mnr arg mtrx.

Q.F.E.CORE DESCRIPTION

(Ref:23/AT:gk/M225)

BOGGY CREEK #1 - GAS & FUEL EXPLORATION

CORE DESCRIPTIONS - 1673m-1682m

RECOVERY = 97% DATE: 03-01-92

WELLSITE GEOLOGIST: AHMAD TABASSI

1673.0-1673.1m	CLAYSTONE:	dark green brown, hard, blocky, abundant dard green medium sized glauconitic pellets, common micro-micaceous flakes rare fine lithics.
1673.1-1673.5m	SANDSTONE:	light brown grey, firm, friable in part, medium-very coarse, dominantly coarse to very coarse, granular in part, subangular-subrounded, poor-moderately sorted quartz, trace light grey argillaceous matrix, trace very weak calcareous cement, rare pyrite, rare lithics, fair porosity.
1673.5-1674.0m	SANDSTONE:	as above with; no calcareous cement, common quartz overgrowths, trace pebble.
1674.0-1674.2m	CLAYSTONE:	very dark grey, firm-hard, subfissile, common micro-micaceous flakes, trace very fine quartz grains.
1674.2-1674.6m	SANDSTONE:	light brown grey, friable-firm, fine-medium, subangular-subrounded, fair-well sorted, trace dispersive kaolinitic and other clay matrix, rare lithics, good porosity.
1674.6-1675.0m	SANDSTONE:	as above.
1675.0-1675.5m	SANDSTONE:	as above with; medium granules, dominantly coarse to very coarse, good-very good porosity.
1675.5-1675.8m	SANDSTONE:	as above with; dominantly light-medium grey color, trace coal and carbonaceous laminae.

1675.8-1676.2m	SANDSTONE:	light grey-medium grey in part, rarely light brown grey, friable, fine-coarse, occasionally pebbly, dominantly medium, subangular-subrounded, poorly sorted, common light grey argillaceous matrix, common weak calcareous cement, trace mica, trace fine lithics, rare carbonaceous detrital matter, good visual porosity.
1676.2-1676.5m	SANDSTONE:	light medium grey, off white in part, increasing light-medium grey with depth, firm, friable in part, fine-medium, dominantly medium, subangular-subrounded, fairly well sorted, common off white and light grey argillaceous matrix, trace lithics, rare mica, with occasional carbonaceous laminae, fair-good porosity.
1676.5-1676.75m	SANDSTONE:	as above &; dominantly friable, good porosity interlaminated & interbedded with;
	CLAYSTONE	dark brown grey, firm-hard, subfissile, trace micro-micaceous fine lithics, interlaminated with minor carbonaceous material.
1676.75-1677.3m	SANDSTONE	medium brown grey, friable, medium, occasionally coarse, subangular-subrounded, well sorted, trace-common argillaceous matrix, rare very weak calcareous cement, trace mica & lithics, very fine carbonaceous detritus, good porosity
	CLAYSTONE	dark grey, occasionally dark brown grey, firm-hard, subfissile-fissile, abundant micro-micaceous matter, trace lithics, trace-common carbonaceous laminae.
1677.3-1677.8m	SANDSTONE	light brown grey, friable, medium-coarse, subangular-subrounded, fairly well sorted, trace dispersive argillaceous matrix, good porosity.
1677.8-1678.2m	SANDSTONE	light-medium grey, friable, fine-coarse, dominantly medium, subangular-subrounded, poorly sorted, trace dispersive argillaceous matrix, trace lithics, rare carbonaceous detritus, very good porosity interbedded & interlaminated with;
	CLAYSTONE	medium-dark brown grey, firm, subfissile, micaceous, trace lithics, trace carbonaceous laminae.

1678.2-1678.7m	SANDSTONE	light brown grey, off white in part, friable, medium-granular, dominantly coarse-very coarse, subangular-subrounded, poorly sorted, trace argillaceous matrix, trace lithics, rare carbonaceous detritus, very good porosity.
1678.7-1679.0m	SANDSTONE:	as above with; dominantly light-medium grey color.
1679.0-1679.4m	SANDSTONE:	as above with; dominantly light-medium brown grey color.
1679.4-1679.7m	SANDSTONE:	as above
1679.7-1680.1m	SANDSTONE	as above with; dominantly firm, minor carbonaceous laminae, fair-good porosity.
1680.1-1680.6m	SANDSTONE:	as per 1679.7 - 1680.1.
1680.6-1681.0m	SANDSTONE:	light grey-light brown grey, firm, friable in part, medium-granular with occasional pebble, rarely fine, dominantly coarse to very coarse, subangular-subrounded, poorly sorted, trace argillaceous matrix, rare lithics, fair-good porosity.
	CARBONACEOUS CLAYSTONE:	very dark brown-black, firm, subfissile, trace finely crystallised pyrite laminae in part, grading to;
	COAL:	black, firm, subvitreous, pyritized, block in part.
1681.0-1681.7m	SANDSTONE:	as above grading to;
	CARBONACEOUS CLAYSTONE:	
	COAL:	as above

NOTE: In order to avoid contamination of the core by rig water, etc, no depositional structure analysis was attempted.

AHMAD TABASSI
05/01/92

SPECIAL CORE ANALYSIS

RECEIVED
- 7 AUG 1992
E9008
GAS & FUEL EXPLORATION N.L.

AMDEL CORE SERVICES

JAH
APW
JF

FACSIMILE TRANSMISSION FROM:

AMDEL CORE SERVICES PTY LIMITED
31 FLEMINGTON STREET FREWVILLE SA 5063
FACSIMILE NO: (08) 379 9288
TELEPHONE NO: (08) 379 9888
ACN: 008 273 005

TO: John Foster	
COMPANY: Gas & Fuel Exploration NL	
FAX NO: (03) 652 5245	DATE: 6 August 1992
COPY TO: Bob East	
FROM: Russ Martin	TOTAL PAGES: 11

RE: BOGGY CREEK NO. 1 - SPECIAL CORE ANALYSIS

John,

Please find attached preliminary results subject to confirmation for the following analyses carried out on selected samples from Boggy Creek No. 1.

- Porosity and Air Permeability (ambient and overburden)
- Formation Factor (overburden)
- Resistivity Index (overburden)
- Trapped Gas Saturation (counter current imbibition)
- Dynamic Poisson's Ratio

With respect to the Poisson's Ratio measurement, no difference was noted using either air, carbon dioxide or methane. Please advise if you wish us to carry out the second test on Sample No. 21 (1680.40 m).

If you wish us to carry out Poisson's ratio measurements on Sample 21 there will be a delay as we have to complete the capillary pressure experiment on this sample first.

Regards,

RUSSELL R MARTIN
Laboratory Supervisor
on behalf of Amdel Core Services Pty Ltd

7 August 1992

POROSITY AND AIR PERMEABILITY

Company Gas and Fuel Exploration NL
Well Boggy Creek No. 1

Ambient

Table I

Sample Number	Depth, metres	Permeability to Air, millidarcys	Porosity, fraction	Grain Density (gms/cm^3)
1	1673.20	5859	0.219	2.66
7	1675.34	596	0.151	2.65
13	1677.80	1204	0.236	2.65
15	1678.45	6590	0.255	2.64
17	1679.22	6561	0.241	2.66
21	1680.40	9953	0.267	2.67
22	1680.70	5445	0.214	2.66
24	1681.30	4595	0.262	2.66

7 August 1992

POROSITY AND AIR PERMEABILITY

Company Gas and Fuel Exploration NL
Well Boggy Creek No. 1

Overburden Pressure 2400 psi (16,560 kPa)

Table II

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Grain Density (gms/cm^3)
1	1673.20	3245	0.203	2.66
7	1675.34	482	0.144	2.65
13	1677.80	980	0.226	2.66
15	1678.45	4016	0.246	2.64
17	1679.22	3514	0.226	2.66
21	1680.40	4700	0.258	2.66
22	1680.70	3242	0.203	2.66
24	1681.30	2752	0.250	2.66

7 August 1992

FORMATION FACTOR

Company Gas and Fuel Exploration NL
Well Boggy Creek No. 1

Saturant 18,000 ppm NaCl brine
Rw of Saturant 0.32 ohm-m @ 25°C
Overburden Pressure 2400 psi (16,560 kPa)

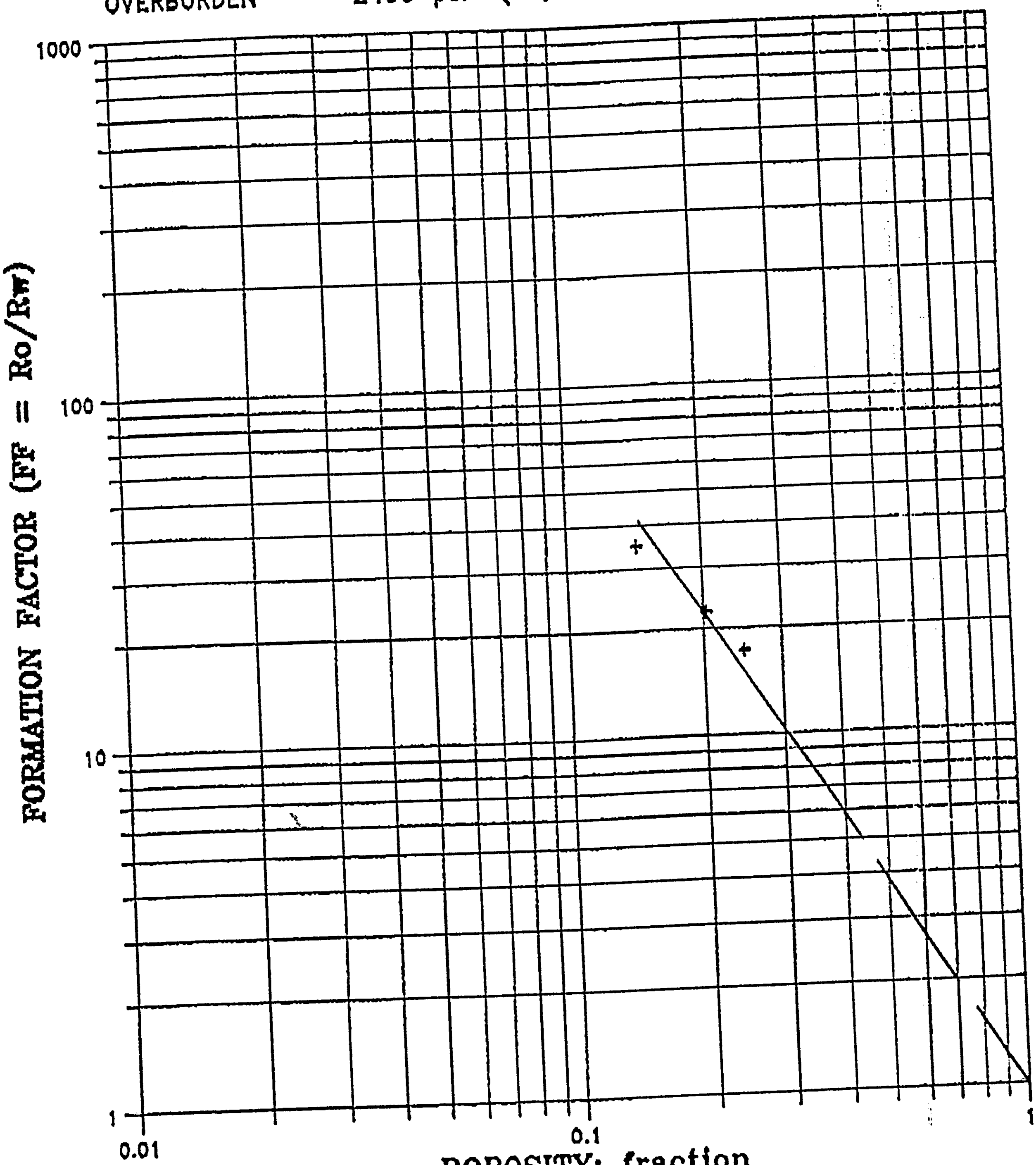
Table III

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Formation Factor (FF)	Cementation Exponent, 'm'	Electrical Tortuosity $\tau = (FF \times \phi)^2$
7	1675.34	482	0.144	34.9	-1.83	25.3
15	1678.45	4016	0.246	17.3	-2.03	18.2
22	1680.70	3242	0.203	22.4	-1.95	20.7

FORMATION FACTOR

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

Rw of Saturant 0.32 ohm-m at 25°C
Saturant: 18,000 ppm NaCl Brine
OVERBURDEN 2400 psi (16,560 kPa)



LEGEND

+++++ FF = $\phi^{-1.94}$ where a = 1.00

7 August 1992

RESISTIVITY INDEX

Company	Gas and Fuel Exploration
Well	Boggy Creek No. 1
Saturant	18,000 ppm NaCl brine
Rw of Saturant	0.32 ohm-m @ 25°C
Overburden Pressure	2400 psi (16,560 kPa)

Table IV

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Formation Factor (FF)	Brine Saturation, fraction	Resistivity Index (RI)
7	1675.34	482	0.144	34.9	1.000	1.00
					0.777	1.50
					0.727	1.66
					0.520	2.74
					0.494	3.12
					0.456	3.59
					0.453	3.73
					0.448	3.78
					0.412	4.63
					0.331	5.84
					0.307	6.81
					0.301	7.09
					0.289	7.76
					0.281	7.89
					0.277	7.90
					0.273	8.17
					0.261	9.10
					0.253	9.45
					0.246	9.72
					0.241	10.18
					0.221	11.74
					0.209	13.33
					0.204	13.89
					0.197	14.98
					0.170	17.61

the saturation exponent 'n' = -1.63

7 August 1992

RESISTIVITY INDEX

Company Gas and Fuel Exploration
Well Boggy Creek No. 1

Saturant 18,000 ppm NaCl brine
Rw of Saturant 0.32 ohm-m @ 25°C
Overburden Pressure 2400 psi (16,560 kPa)

Table V

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Formation Factor (FF)	Brine Saturation, fraction	Resistivity Index (RI)
15	1678.45	4016	0.246	17.3	1.000	1.00
					0.839	1.36
					0.788	1.52
					0.770	1.61
					0.720	1.72
					0.710	1.79
					0.693	1.84
					0.644	2.09
					0.630	2.19
					0.612	2.29
					0.606	2.37
					0.597	2.40
					0.592	2.42
					0.514	3.06
					0.495	3.25
					0.490	3.34
					0.481	3.48
					0.455	3.75
					0.262	9.16
					0.245	10.92
					0.213	13.46
					0.209	14.08
					0.198	15.69
					0.177	19.45
					0.156	23.27
					0.149	25.42
					0.127	34.21
					0.107	41.59

the saturation exponent 'n' = -1.70

7 August 1992

RESISTIVITY INDEX

Company	Gas and Fuel Exploration
Well	Boggy Creek No. 1
Saturant	18,000 ppm NaCl brine
Rw of Saturant	0.32 ohm-m @ 25°C
Overburden Pressure	2400 psi (16,560 kPa)

Table VI

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Formation Factor (FF)	Brine Saturation, fraction	Resistivity Index (RI)
22	1680.70	3242	0.203	22.4	1.000	1.00
					0.781	1.55
					0.772	1.59
					0.753	1.65
					0.750	1.66
					0.732	1.72
					0.699	1.84
					0.655	2.07
					0.557	2.72
					0.529	2.94
					0.514	3.13
					0.504	3.32
					0.486	3.54
					0.477	3.66
					0.459	3.93
					0.448	4.06
					0.309	7.37
					0.287	8.45
					0.274	9.21
					0.260	9.69
					0.236	12.01
					0.224	13.46
					0.191	18.22
					0.176	21.93
					0.168	23.46
					0.161	26.28
					0.135	32.98

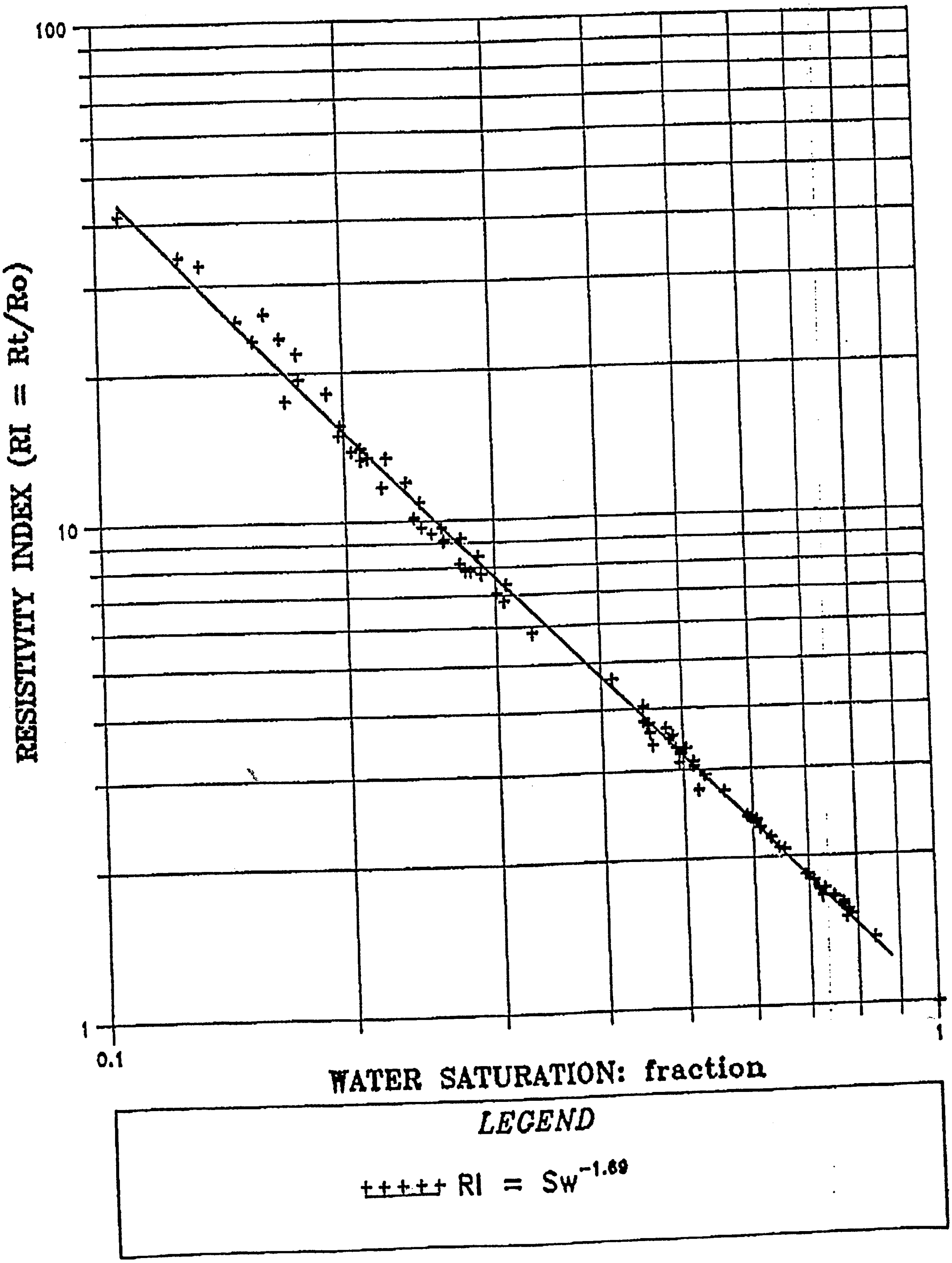
the saturation exponent 'n' = -1.74

RESISTIVITY INDEX

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

Composite

Saturant: 18,000 ppm NaCl Brine
OVERBURDEN 2400 psi (16,560 kPa)



7 August 1992

SIEVE ANALYSIS

Company Gas and Fuel Exploration NL
Well Boggy Creek No. 1

Sample No. 23
Depth 1680.98 m
Initial Weight 23.507 g

Mean 0.73 ϕ (coarse)
Standard Deviation 1.13 ϕ (poorly sorted)

Table VIII

Screen Opening (microns)	Weight Percent Retained	Cumulative Percent Retained
1.7 mm	15.9	15.9
1.18 mm	8.3	24.2
850	13.4	37.6
500	24.2	61.8
355	16.0	77.8
250	9.5	87.3
180	5.4	92.7
150	1.4	94.1
125	1.2	95.3
75	2.2	97.5
53	1.1	98.6
38	1.1	99.7
<38	0.3	100.0

7 August 1992

TRAPPED GAS SATURATION - SUMMARY

Company Gas and Fuel Exploration
Well Boggy Creek No. 1

Ambient

Test Method Counter Current Imbibition

Table IX

				INITIAL CONDITIONS	TERMINAL CONDITIONS		
						Gas Recovered	
Sample Number	Depth, metres	Permeability to Air, millidarcys	Porosity, fraction	Water Saturation, fraction (S_{wc})	Residual Gas Saturation, fraction (S_{rg})	Fraction Pore Space	Fraction Gas in Place
1	1673.20	5859	0.219	0.068	0.369	0.563	0.604
21	1680.40	9953	0.267	0.073	0.324	0.603	0.650
24	1681.30	4595	0.262	0.126	0.315	0.559	0.640

7 August 1992

DYNAMIC ELASTIC MODULI

Company Gas and Fuel Exploration NL
Well Boggy Creek No. 1

Radial Stress 4950 psi (34,155 kPa)
Vertical Stress 4950 psi (34,155 kPa)
Pore Pressure 1900 psi (13,110 kPa)

Table X

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Calculated Grain Density, (gms/cm^3)	Poisson's Ratio	Test Conditions
13	1677.80	980	0.226	2.66	0.21	Pore Fluid = Air
					0.21	Pore Fluid = CO_2
					0.21	Pore Fluid = CH_4

SPECIAL CORE ANALYSIS
OF CORE PLUGS

AMDEL
CORE
SERVICES

SPECIAL CORE ANALYSIS OF CORE PLUGS FROM

BOGGY CREEK NO. 1

REPORT HF/145

Report prepared for Gas & Fuel Exploration NL

by

RUSSELL MARTIN
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September 1992

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Amdel Core Services Pty Limited
(Incorporated in South Australia)
ACN: 008 273 005

9 October 1992

Gas & Fuel Exploration NL
GPO Box 1841Q
MELBOURNE VIC 3001

Attention: Mr J Foster

REPORT: HF/145

CLIENT REFERENCE:	Facsimile 25/2/92
MATERIAL:	Core Plugs
LOCALITY:	Boggy Creek No. 1
WORK REQUIRED:	Porosity and Permeability, Capillary Pressure, Electrical Properties, Counter Current Imbibition, Acoustic Velocity, Sieve Analysis

Please direct technical enquiries regarding this work to the signatory below under whose supervision the work was carried out.

RUSSELL R MARTIN
Laboratory Supervisor
Core Analysis/Special Core Analysis
on behalf of Amdel Core Services Pty Ltd

Adelaide Office: P.O. Box 109, Eastwood, SA 5063 Australia.
Telephone: (08) 379 9888 Facsimile: (08) 379 9288
Amdel Core Services Pty Limited
(Incorporated in South Australia)
ACN: 008 273 005

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Mr John Foster of Gas and Fuel Exploration NL requested a special core analysis study be undertaken on selected samples from Boggy Creek No. 1. Samples were removed from their sleeving and examined. Samples 4, 5 and 9 as originally requested on facsimile dated 25 February were found to be unsuitable. These three samples were replaced with samples 1, 15 and 7 after consultation with Mr John Foster.

2. AIMS AND OBJECTIVES

The principal aims of the study were to refine reserves estimations, assess likely recovery factors and provide input data for production forecasting. To meet these objectives the following analyses were requested:-

- Porosity and Air Permeability at Ambient and Overburden Conditions

  These data were requested at ambient and simulated reservoir overburden stress conditions to refine estimates of volume oil in place and recoverability.

- Formation Factor (FF) and Resistivity Index (RI)

  These data were commissioned on selected core plugs to determine the 'm' cementation exponent , the 'n' saturation exponent, and the 'a' intercept, which data are used to refine calculations of fluid saturation from resistivity log data.

- Capillary Pressures

  Air-water drainage (using the porous plate technique) was requested in order to determine the water saturation distribution in the reservoir prior to production. Full capillary pressure curves were commissioned to determine: (i) the connate water saturation above the transition zone as a function of permeability (irreducible water); and (ii) the connate water saturation distribution within and the height of the transition zone.

- Trapped Gas Saturation - Counter Current Imbibition

  Counter current imbibition data may be used to determine recovery factors from the primary drive mechanism (ie edge water drive).

- Acoustic Velocity

  The data was requested to determine if any difference in Poisson's Ratio could be seen between methane and carbon dioxide, as the pore fluids.

- Sieve Analysis

  These data were requested to determine grain size and sorting.

3. SAMPLE PREPARATION

Prior to any analyses all samples were wrapped in teflon tape and encapsulated in teflon heat shrink tubing. This was done in order to maintain sample integrity during testing. All samples were then extracted using a chloroform/methanol azeotropic mixture to leach any residual pore fluids. Prior to porosity and air permeability measurements, samples were then dried at 50°C and 50% relative humidity. 50% relative humidity was achieved using a saturated solution of sodium nitrite.

4. PERMEABILITY TO AIR

Air permeability was determined on the plug samples. The samples were firstly placed in a Hassler cell with a confining pressure of 250 psi (1720 kPa). The confining pressure was used to prevent bypassing of air around the samples when the measurement was made. To determine permeability a known air pressure was applied to the upstream face of the sample, creating a flow of air through the core plug. Permeability for the samples was calculated using Darcy's Law through knowledge of the upstream pressure, flow rate, viscosity of air and the samples' dimensions.

5. HELIUM INJECTION POROSITY

The porosity of the clean dry core plugs was determined as follows. The plugs were first placed in a sealed matrix cup. Helium held at 100 psi reference pressure was then introduced to the cup. From the resultant pressure change the unknown grain volume was calculated using Boyle's Law (ie, $P_1V_1 = P_2V_2$).

The bulk volume was determined by mercury immersion. The difference between the grain volume and the bulk volume is the pore volume and from this the 'effective' porosity was calculated as the volume percentage of pores with respect to the bulk volume.

6. POROSITY AND PERMEABILITY AT OVERBURDEN PRESSURE

To determine the porosity and air permeability of the core plugs at overburden pressure the samples were first placed in a thick walled rubber sleeve. This assembly was loaded into a hydrostatic cell and the pore volume determined at 'ambient' pressure. An overburden pressure of 2400 psi (16,560 kPa) was then applied to the samples and the pore volume reduction caused by this increase in pressure determined. By this means the actual overburden pore volume and bulk volume was determined. These data are used to derive porosity at the applied overburden pressure. Air permeability at overburden pressure was then measured in the hydrostatic cell as described in Section 4.

7. FORMATION FACTOR (FF)

On completion of porosity and air permeability determinations, samples were evacuated and pressure saturated with a 18,000 ppm brine (consisting of 60% NaCl, 20% $CaCl_2$ and 20% KCl). Resistivity of the brine was measured as 0.32 ohm.m at 25°C. Samples were removed from the pressure saturator and weighed to ensure that 100% brine saturation had been achieved. A quality control check was made on measurements of ambient porosity by determining the porosity of the fully saturated plug by Archimedes' principle.

Samples were then placed on the cell electrodes with a thin silver leaf between the plug endface and electrode to ensure contact. A strongly hydrophilic filter was placed at one end of the sample. This assembly was then loaded into a rubber sleeve and placed into the hydrostatic cell. The cell was pressured to the desired overburden pressure of 2400 psi (16,560 kPa) using a mineral oil.

Brine was slowly flowed through the sample and electrical resistivity readings recorded until stable. The samples were left to stand for a further 24 hours and readings repeated to ensure that ionic equilibrium had been attained.

8. RESISTIVITY INDEX (RI)

After formation factor measurements were completed, deactivated, degassed kerosene was introduced to the samples as a means of establishing the required water saturation[1]. Kerosene was continually injected into the samples using a low rate metering pump. The required displacement rates for each sample were obtained by adjusting the micrometer needle valves at the top of each cell.

Volumes of displaced brine were monitored as a function of time. Resistivity values and temperatures were recorded using a Solartron Imp™ data acquisition unit.

All electrical properties readings were recorded at room temperature and converted to a standard temperature of 25°C using the following equation derived by Hilchie[2].

$$R_T = R_1[(T_1+X)/(T+X)]$$

and $$X = 10^{(-0.340396\log R_1 + 0.641427)}$$

where:

R_T = resistivity at temperature T (ohm.m)

T = temperature (°C) i.e. 25°C

R_1 = resistivity at temperature T_1 (ohm.m)

T_1 = temperature at room conditions (°C)

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1 de Waal et al, J.A., Measurement and Evaluation of Resistivity Index Curves, Koninklijke/Shell Exploratie en Produktie Laboratorium, SPWLA 13th Annual Logging Symposium, June 11-14 1989.

2 Hilchie, D.W., A New Water Resistivity versus Temperature Equation, The Log Analyst, Jul-Aug 1984, pp. 20-22.

9. CAPILLARY PRESSURE - Porous Plate (Air-Water Drainage)

The three samples selected to undergo these analyses had previously been utilised for trapped gas saturation by the counter current imbibition method. After re-cleaning and re-determining the helium injection porosity and permeability to air measurements the samples were firstly pressure saturated with the 18,000 ppm brine. 100% brine saturation was determined gravimetrically and as an additional quality control check, porosity was also determined by Archimedes' principle. Samples were then placed into the porous plate cell. A filter support pod was placed between the sample endface and plate to ensure capillary continuity between the endface and porous plate was maintained.

Humidified air at the first pressure of 1.0 psi was then introduced into the cell. After approximately 14 days the samples were removed and saturations determined gravimetrically. Samples were then replaced in the cell at the same pressure for a further 3 - 5 days and saturations re-determined. This process is necessary at each point to ensure samples reach capillary equilibrium before proceeding to the next pressure.

10. TRAPPED GAS SATURATION - Counter Current Imbibition

The three samples selected to undergo these analyses were firstly pressure saturated as described above and then placed into the porous plate cell. Humidified air at 120 psi was introduced to the samples as a means of establishing the required irreducible (connate) water saturation.

Once the irreducible water saturation had been determined the trapped gas saturation was determined by the counter current imbibition method. This involved suspending the sample from a balance and then submerging the assembly in toluene. Toluene was used because of its strong wetting preference. Changes in weight and thus saturation were recorded continuously via computer.

11. ACOUSTIC VELOCITY (Dynamic Elastic Moduli)

In an additional facsimile 16/7/92 (Order #1623) Mr J Foster requested Poisson's Ratio measurements be determined using both methane and CO_2 as the pore filling fluid. The sample was placed into a thick walled rubber sleeve and placed into the triaxial cell. An external pressure, employed axially, up to the prescribed nett overburden pressure (2450 psi) and a radial pressure was applied to the samples.

Mr Foster requested measurements where possible be carried out under reservoir loading conditions, ie at a pore pressure of 2450 psi. The maximum pore pressure which could be obtained from bottled methane and CO_2 was 1900 psi. After consultation with Mr Foster the experiments were carried out using a pore pressure of 1500 psi and a total confining pressure of 4950 psi. This maintained the difference between the pore pressure (1900 psi) and the total overburden pressure 4950 psi (assuming a normal pressure gradient of 1 psi per foot) the same as the reservoir insitu conditions. That is, pore pressure of 2450 psi and total overburden pressure equal to 5480 psi.

The shear and compressional wave transit times were utilised to calculate Poisson's Ratio from the following equation:-

Poisson's Ratio,

$$\sigma = \frac{1}{2}\frac{(t_S/t_P)^2-2}{(t_S/t_P)^2-1}$$

where: t_s = p-wave transit time (μs)

t_p = s-wave transit time (μs)

12. SIEVE ANALYSIS

Offcuts from samples 6 (1675.10 m) and 23 (1680.98 m) were used for these analyses. The samples were cleaned in a Soxhlet extraction apparatus using chloroform and methanol to remove any residual pore fluids. They were humidity dried at temperatures not exceeding 50°C and 50% relative humidity and then lightly crushed to disaggregate grains. The samples were then screened for a minimum of 10 minutes through "Endicott" certified test sieves.

13. DISCUSSION OF RESULTS

Figure 1 is a schematic representation of the analytical sequence carried out on the selected samples from Gas and Fuel Exploration's Boggy Creek No. 1 well. Figures 2 and 3 are cross-plots of porosity versus air permeability at ambient and applied overburden conditions constructed from the data presented in Tables I and II.

The 'm' cementation exponent tabulated in Table III has been calculated for the three samples assuming the 'a' intercept is equal to 1.00. The graphical presentation (Figure 4) yields an 'm' of 1.94 and an intercept of 1.00 for the three samples studied.

Further evaluation of the formation factor/porosity relationship may be achieved by examining electrical tortuosity (t).

$$t = (FF \times \phi)^2$$

where: t = tortuosity

FF = Formation Factor

ϕ = porosity (fraction)

Where sample suites are large enough, the tortuosity value can be used to determine the petrophysical characteristics of samples which can serve as a useful guide to horizon mapping. Tortuosity typically trends with air permeability; that is, lower permeability samples tend to exhibit a higher electrical tortuosity. This trend is evident for the three samples studied.

Figures 5 through 7 yield values for the 'n' saturation exponent of between 1.63 and 1.74 for the individual samples. The composite plot (Figure 8) yields a value of 'm' of 1.69 for these three samples.

Figures 9 through 11 are plots of saturation versus capillary pressure constructed from the results presented in Table VII. Figure 12 is a plot of saturation versus the J function value. The data presented in Table VII has been evaluated using the Leverett J Function[3] approach. The J Function can sometimes be used to characterise a particular reservoir by the relationship which affects capillary pressure fluid saturation, namely, permeability. From this relationship a universal capillary pressure curve may be constructed for the reservoir under investigation. The Leverett J Function is expressed as follows:-

$$J(S_W) = \left(\frac{P_C}{\sigma\cos\theta}\right)\left(\frac{K}{\phi}\right)^{\frac{1}{2}}$$

where: P_c = capillary pressure, (dynes/cm^2)

σ = interfacial tension, (dynes/cm)

K = permeability, (cm^2)

ϕ = porosity (fractional)

θ = contact angle

In this case there appears to be a good correlation between water saturation and the J value for the three samples investigated. Because the data base used to establish this correlation is relatively small (3 samples) I would suggest discretion be used if applying this correlation to the remaining reservoir section.

Figures 13 through 15 are plots at the trapped gas saturation whereby the summary data is presented in Table VIII. The final saturation values for trapped gas may have been influenced marginally by the fact that the sample was sleeved. Although the results trend normally; that is, the sample which exhibits the highest initial gas saturation (Sample No. 1) also exhibits the highest trapped gas.

Table IX presents the results of the Poisson's Ratio measurements carried out on Sample No. 13. The aim here was to see if any discernible difference could be distinguished between CO_2 and methane pore fluids to aid log interpretation. In order to quantify this we firstly determined a Poisson's Ratio using air as the pore fluid. This would then serve as

[3] Leverett, Capillary Behaviour in Porous Solids, Trans. AIME, 1941.

a base from which to compare the Poisson's Ratio determined using CO_2 and methane. No difference was noted in Poisson's Ratio between any of the three gaseous mediums used as pore fluid.

Tables X and XI present the results of the sieve analysis carried out on Sample No. 6 (1675.10 m) and 23 (1680.98 m). The mean and standard deviation have been reported in phi units and have been calculated as described by Folk[4].

Should you have any questions concerning the data presented in this Report, please do not hesitate to contact the Laboratory Supervisor, Mr Russell Martin to discuss.

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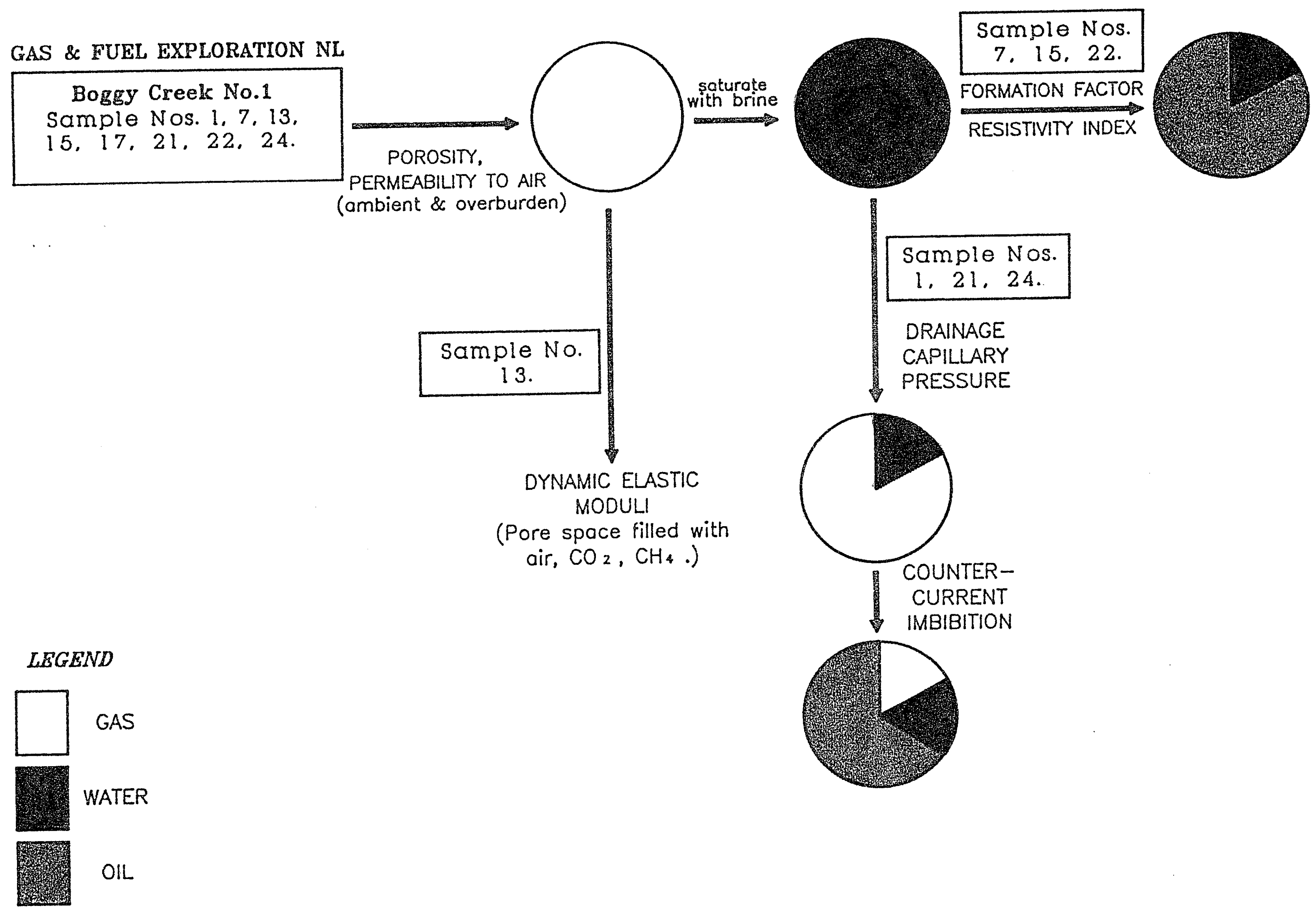
4 Folk, R.L., Petrology of Sedimentary Rocks, Hemphill Publishing Company, 1974, p.47.

Figure 1

Analysis Schematic



9 October 1992

POROSITY AND AIR PERMEABILITY

Company Gas and Fuel Exploration NL
Well Boggy Creek No. 1

Ambient

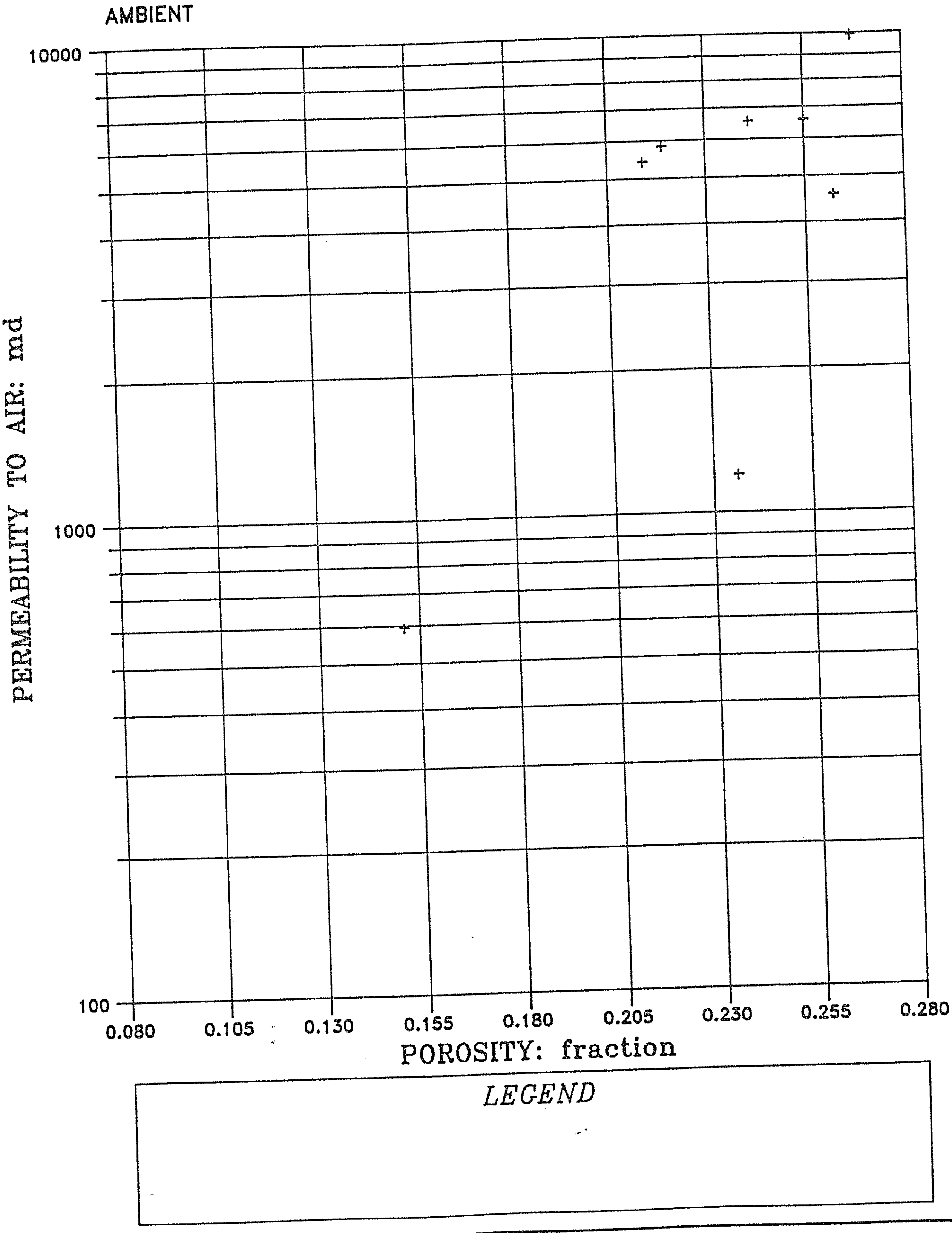
Table I

Sample Number	Depth, metres	Permeability to Air, millidarcys	Porosity, fraction	Grain Density (gms/cm^3)
1	1673.20	5859	0.219	2.66
7	1675.34	596	0.151	2.65
13	1677.80	1204	0.236	2.65
15	1678.45	6590	0.255	2.64
17	1679.22	6561	0.241	2.66
21	1680.40	9953	0.267	2.67
22	1680.70	5445	0.214	2.66
24	1681.30	4595	0.262	2.66

Figure 2

POROSITY Vs PERMEABILITY TO AIR

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1



9 October 1992

POROSITY AND AIR PERMEABILITY

Company Gas and Fuel Exploration NL
Well Boggy Creek No. 1

Overburden Pressure 2400 psi (16,560 kPa)

Table II

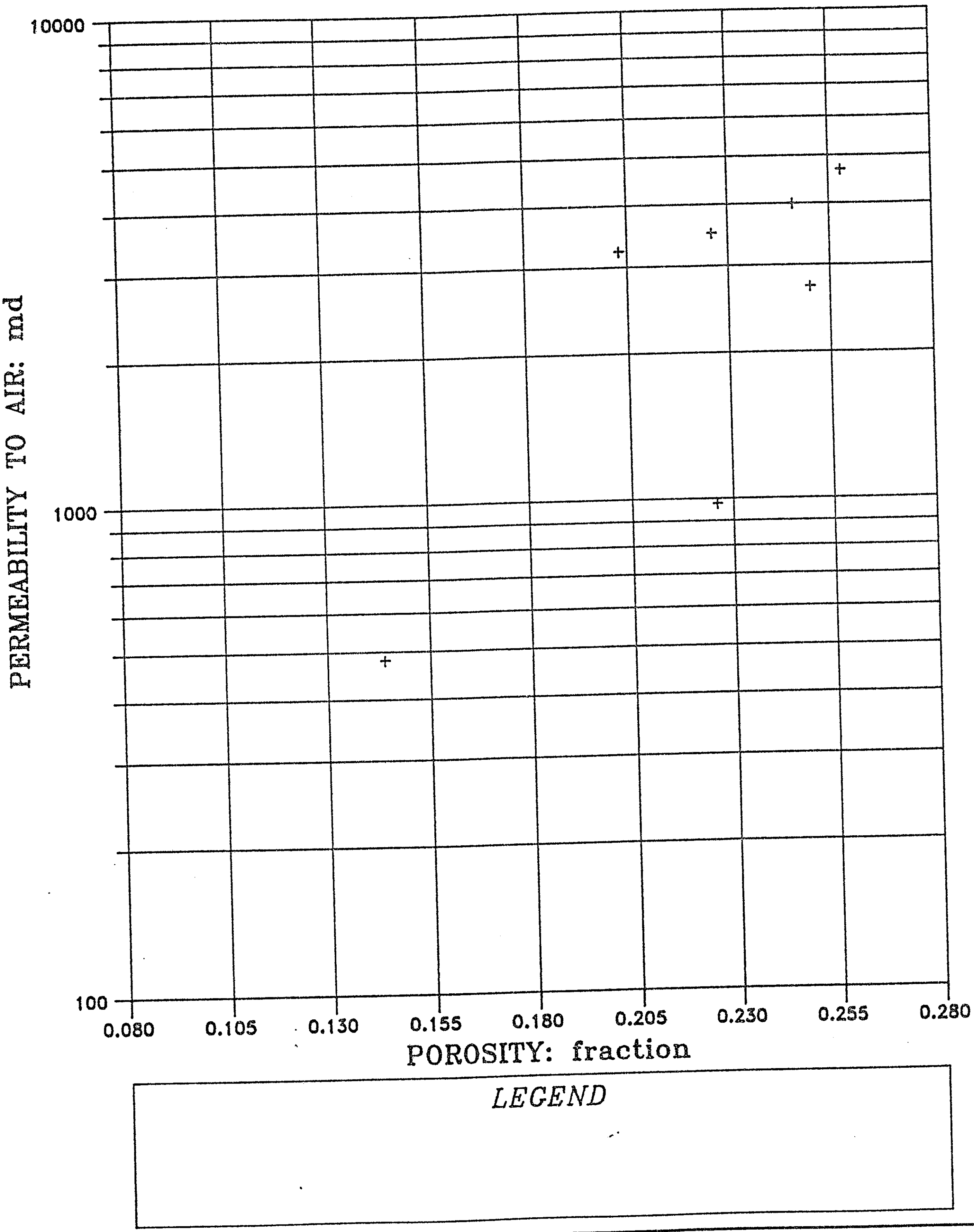
Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Grain Density (gms/cm^3)
1	1673.20	3245	0.203	2.66
7	1675.34	482	0.144	2.65
13	1677.80	980	0.226	2.66
15	1678.45	4016	0.246	2.64
17	1679.22	3514	0.226	2.66
21	1680.40	4700	0.258	2.66
22	1680.70	3242	0.203	2.66
24	1681.30	2752	0.250	2.66

Figure 3

POROSITY Vs PERMEABILITY TO AIR

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

OVERBURDEN PRESSURE 2400 psi (16,560 kPa)



FORMATION FACTOR

Company	Gas and Fuel Exploration NL
Well	Boggy Creek No. 1
Saturant	18,000 ppm NaCl brine
Rw of Saturant	0.32 ohm-m @ 25°C
Overburden Pressure	2400 psi (16,560 kPa)

Table III

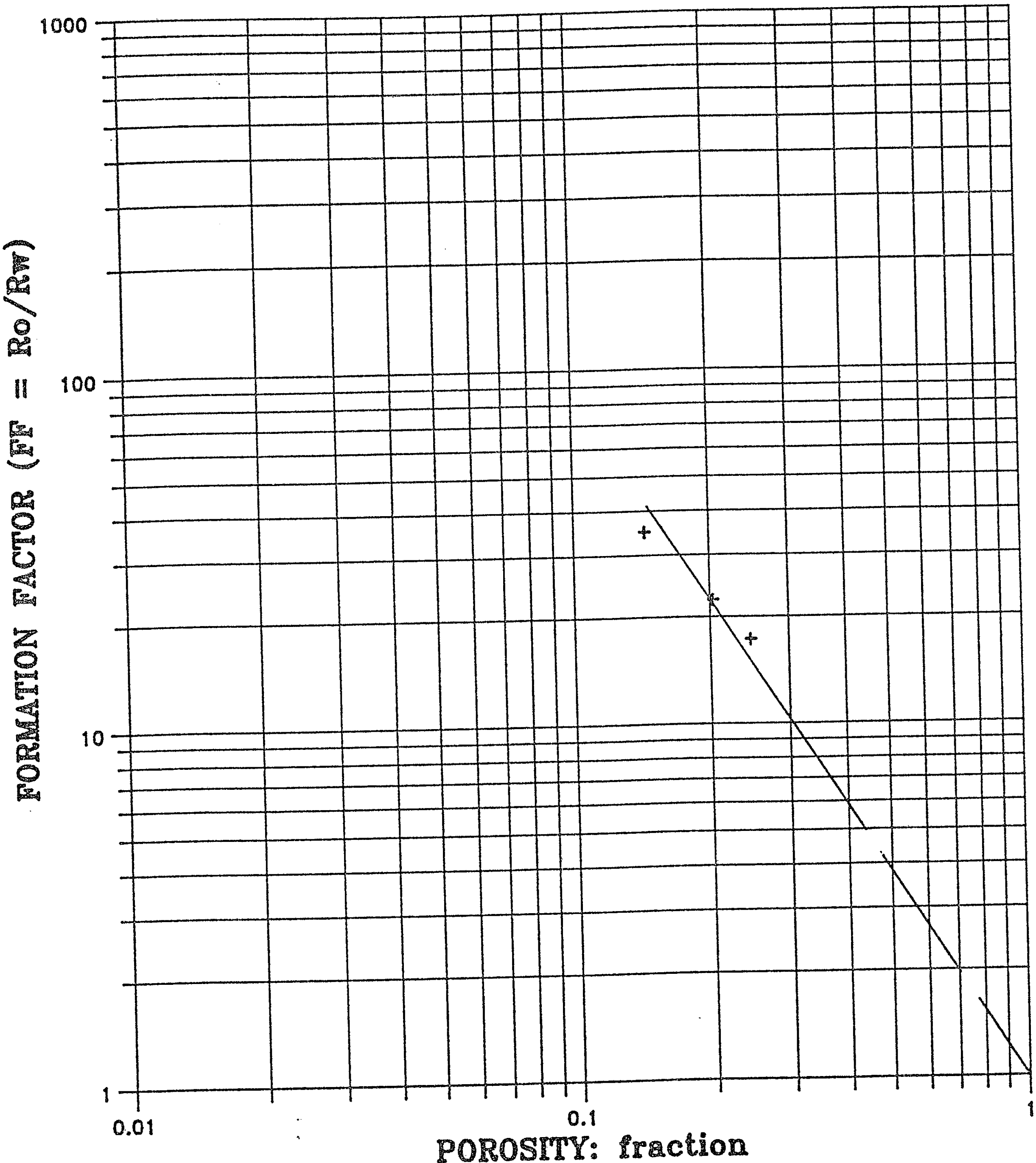
Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Formation Factor (FF)	Cementation Exponent, 'm'	Electrical Tortuosity $\tau = (FF \times \phi)^2$
7	1675.34	482	0.144	34.9	-1.83	25.3
15	1678.45	4016	0.246	17.3	-2.03	18.2
22	1680.70	3242	0.203	22.4	-1.95	20.7

Figure 4

FORMATION FACTOR

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

Rw of Saturant 0.32 ohm-m at 25°C
Saturant: 18,000 ppm NaCl Brine
OVERBURDEN 2400 psi (16,560 kPa)



LEGEND

+++++ FF = $\phi^{-1.94}$ where a = 1.00

RESISTIVITY INDEX

Company	Gas and Fuel Exploration
Well	Boggy Creek No. 1
Saturant	18,000 ppm NaCl brine
Rw of Saturant	0.32 ohm-m @ 25°C
Overburden Pressure	2400 psi (16,560 kPa)

Table IV

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Formation Factor (FF)	Brine Saturation, fraction	Resistivity Index (RI)
7	1675.34	482	0.144	34.9	1.000	1.00
					0.777	1.50
					0.727	1.66
					0.520	2.74
					0.494	3.12
					0.456	3.59
					0.453	3.73
					0.448	3.78
					0.412	4.63
					0.331	5.84
					0.307	6.81
					0.301	7.09
					0.289	7.76
					0.281	7.89
					0.277	7.90
					0.273	8.17
					0.261	9.10
					0.253	9.45
					0.246	9.72
					0.241	10.18
					0.221	11.74
					0.209	13.33
					0.204	13.89
					0.197	14.98
					0.170	17.61

the saturation exponent 'n' = -1.63

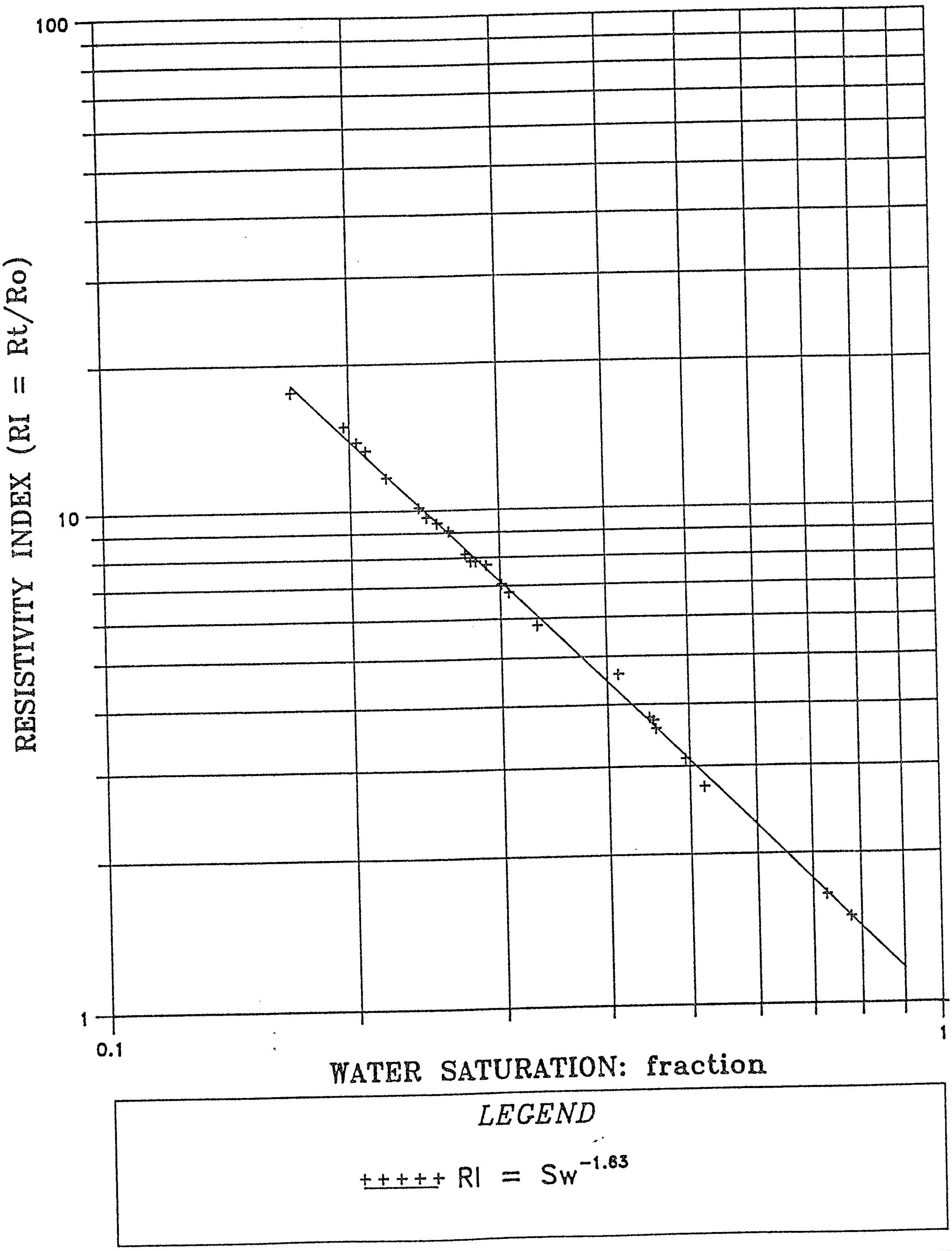
Figure 5

RESISTIVITY INDEX

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

Sample No. 7

Saturant: 18,000 ppm NaCl Brine
OVERBURDEN 2400 psi (16,560 kPa)



9 October 1992

RESISTIVITY INDEX

Company	Gas and Fuel Exploration
Well	Boggy Creek No. 1
Saturant	18,000 ppm NaCl brine
Rw of Saturant	0.32 ohm-m @ 25°C
Overburden Pressure	2400 psi (16,560 kPa)

Table V

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Formation Factor (FF)	Brine Saturation, fraction	Resistivity Index (RI)
15	1678.45	4016	0.246	17.3	1.000	1.00
					0.839	1.36
					0.788	1.52
					0.770	1.61
					0.720	1.72
					0.710	1.79
					0.693	1.84
					0.644	2.09
					0.630	2.19
					0.612	2.29
					0.606	2.37
					0.597	2.40
					0.592	2.42
					0.514	3.06
					0.495	3.25
					0.490	3.34
					0.481	3.48
					0.455	3.75
					0.262	9.16
					0.245	10.92
					0.213	13.46
					0.209	14.08
					0.198	15.69
					0.177	19.45
					0.156	23.27
					0.149	25.42
					0.127	34.21
					0.107	41.59

the saturation exponent 'n' = -1.70

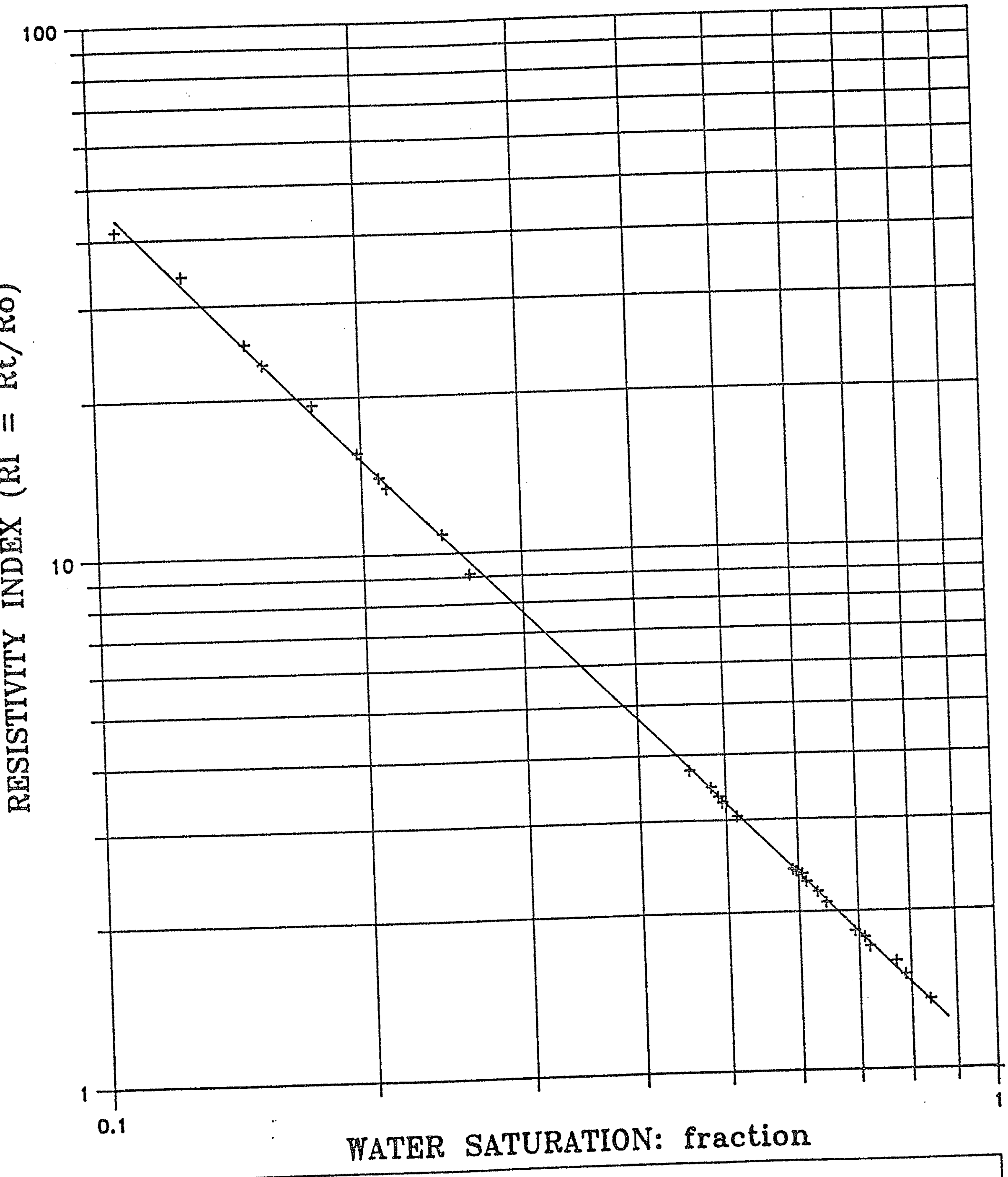
Figure 6

RESISTIVITY INDEX

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

Sample No. 15

Saturant: 18,000 ppm NaCl Brine
OVERBURDEN 2400 psi (16,560 kPa)



LEGEND

+++++ RI = $Sw^{-1.70}$

9 October 1992

RESISTIVITY INDEX

Company — Gas and Fuel Exploration
Well — Boggy Creek No. 1

Saturant — 18,000 ppm NaCl brine
Rw of Saturant — 0.32 ohm-m @ 25°C
Overburden Pressure — 2400 psi (16,560 kPa)

Table VI

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Formation Factor (FF)	Brine Saturation, fraction	Resistivity Index (RI)
22	1680.70	3242	0.203	22.4	1.000	1.00
					0.781	1.55
					0.772	1.59
					0.753	1.65
					0.750	1.66
					0.732	1.72
					0.699	1.84
					0.655	2.07
					0.557	2.72
					0.529	2.94
					0.514	3.13
					0.504	3.32
					0.486	3.54
					0.477	3.66
					0.459	3.93
					0.448	4.06
					0.309	7.37
					0.287	8.45
					0.274	9.21
					0.260	9.69
					0.236	12.01
					0.224	13.46
					0.191	18.22
					0.176	21.93
					0.168	23.46
					0.161	26.28
					0.135	32.98

the saturation exponent 'n' = -1.74

Figure 7

RESISTIVITY INDEX

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

Sample No. 22

Saturant: 18,000 ppm NaCl Brine
OVERBURDEN 2400 psi (16,560 kPa)

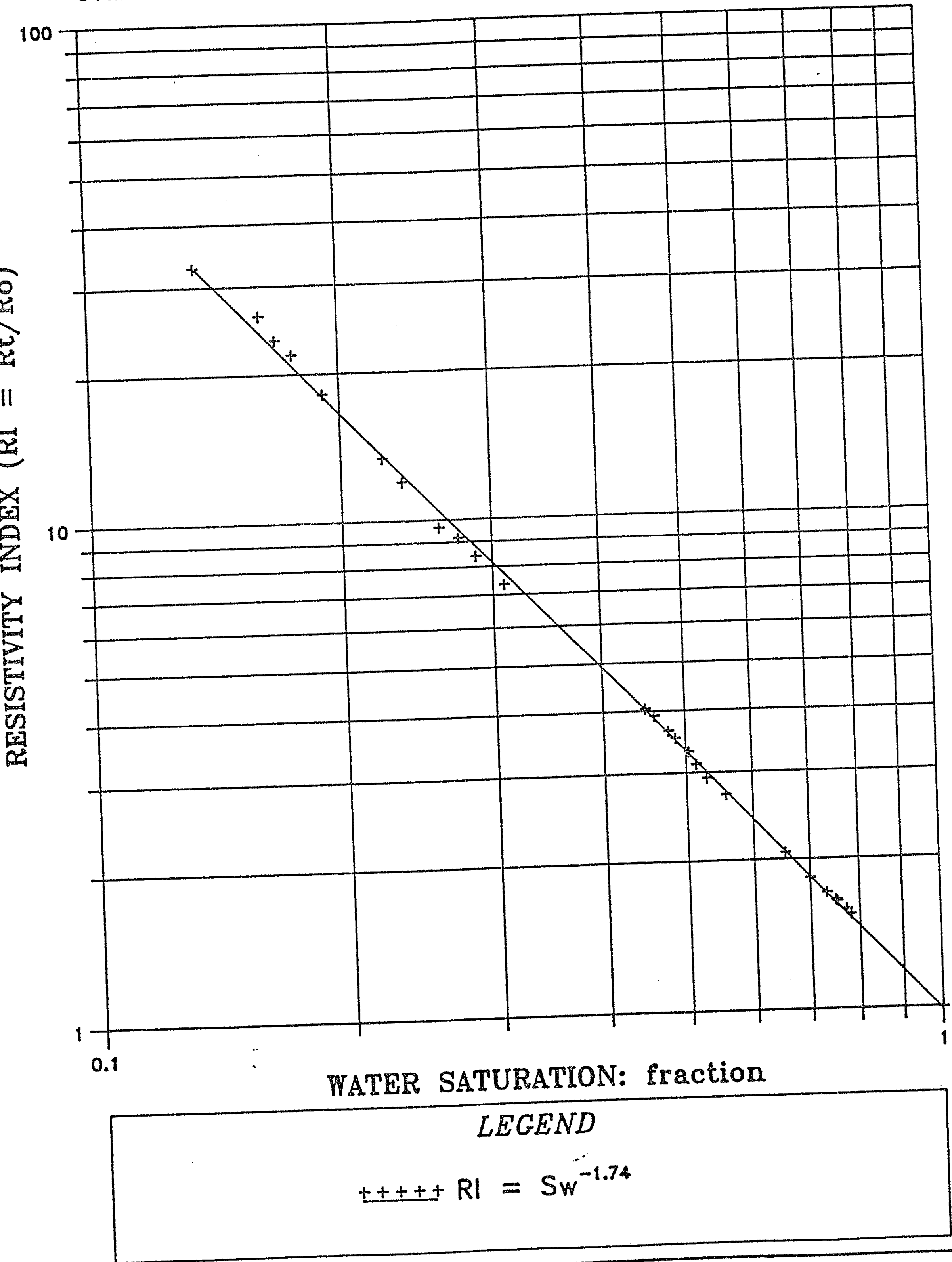


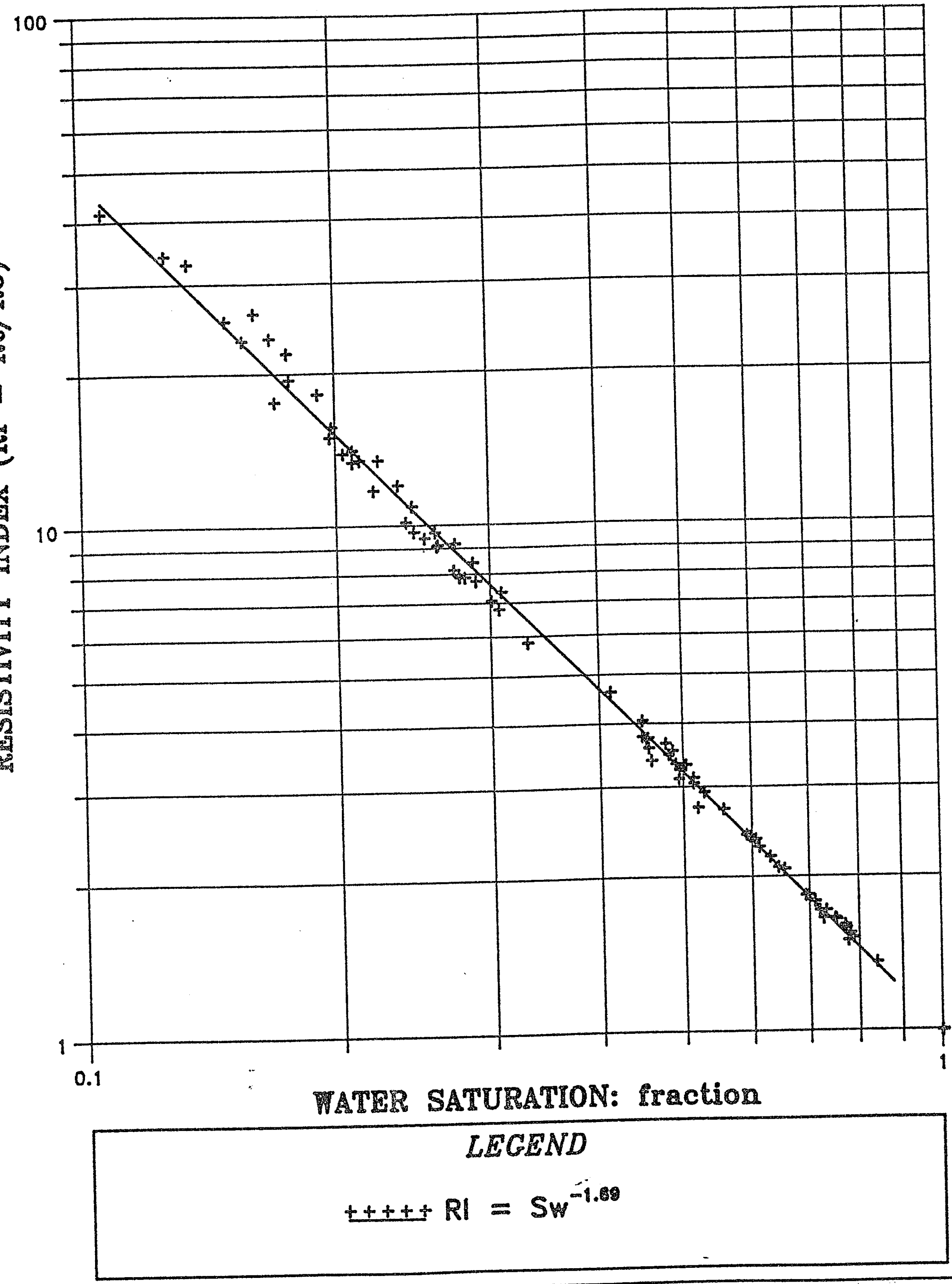
Figure 8

RESISTIVITY INDEX

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

Composite

Saturant: 18,000 ppm NaCl Brine
OVERBURDEN 2400 psi (16,560 kPa)



9 October 1992

CAPILLARY PRESSURE

Company Gas & Fuel Exploration NL
Well Boggy Creek No. 1

Test Method Air-Water Drainage
Porous Plate Cell

Ambient

Table VII

Sample Number	Depth, metres	Permeability to air, millidarcys	Porosity, fraction	Pressure (psi) 1.0	2.0	4.0	8.0	15.0	35.0
				Saturation, fraction					
1	1673.20	5859	0.219	0.654	0.336	0.211	0.153	0.083	0.066
21	1680.40	9953	0.267	0.765	0.283	0.197	0.102	0.085	0.083
24	1681.30	4595	0.262	0.851	0.401	0.276	0.151	0.131	0.125

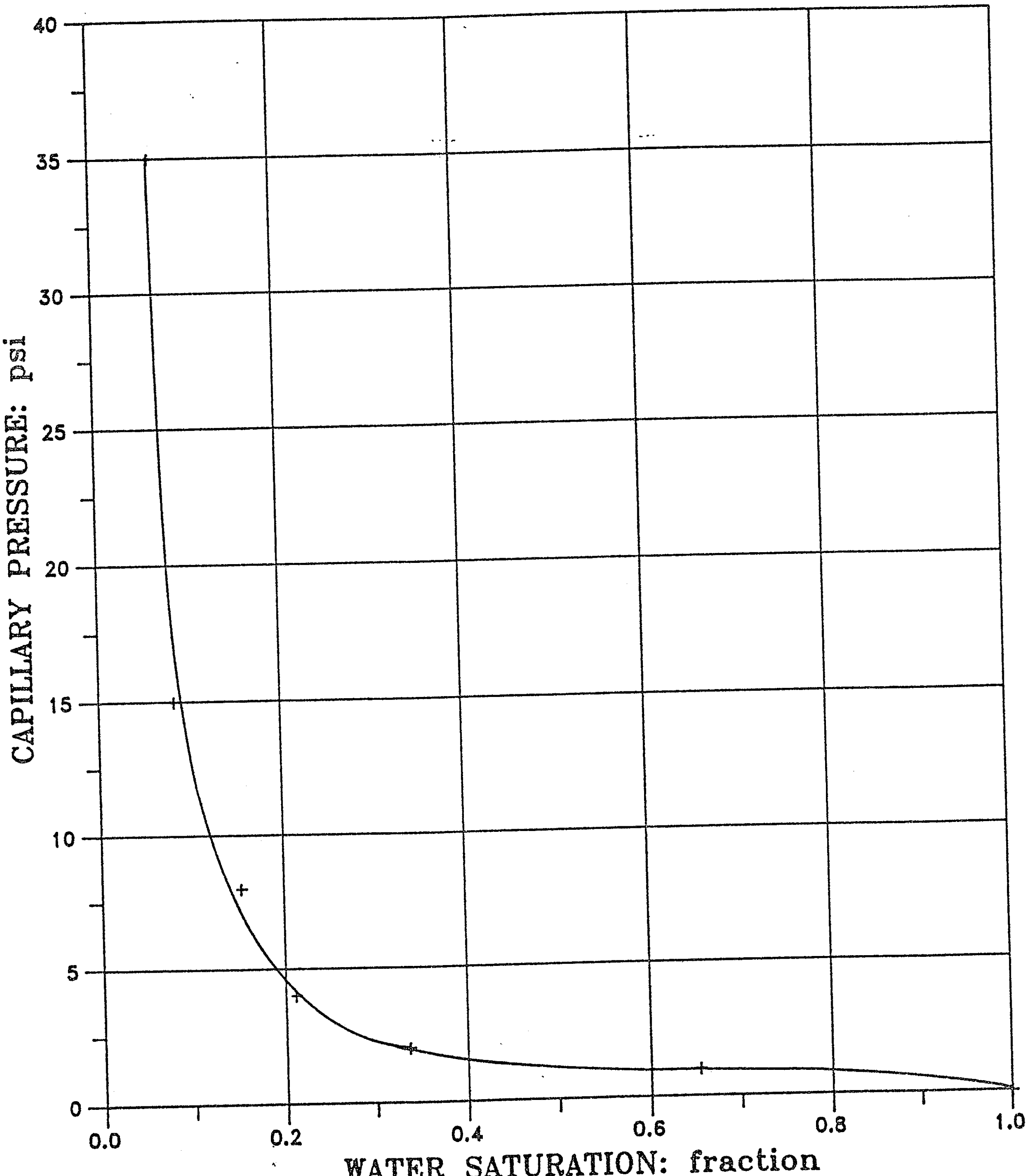
Figure 9

DRAINAGE CAPILLARY PRESSURE

Company Gas & Fuel Exploration NL
Well Boggy Creek No. 1

Sample No. 1
Depth: 1673.20 m
Porosity 0.219 fraction
Permeability 5859 md

AMBIENT



LEGEND

Test Method: Air – Water Porous Plate

+++++ Saturation

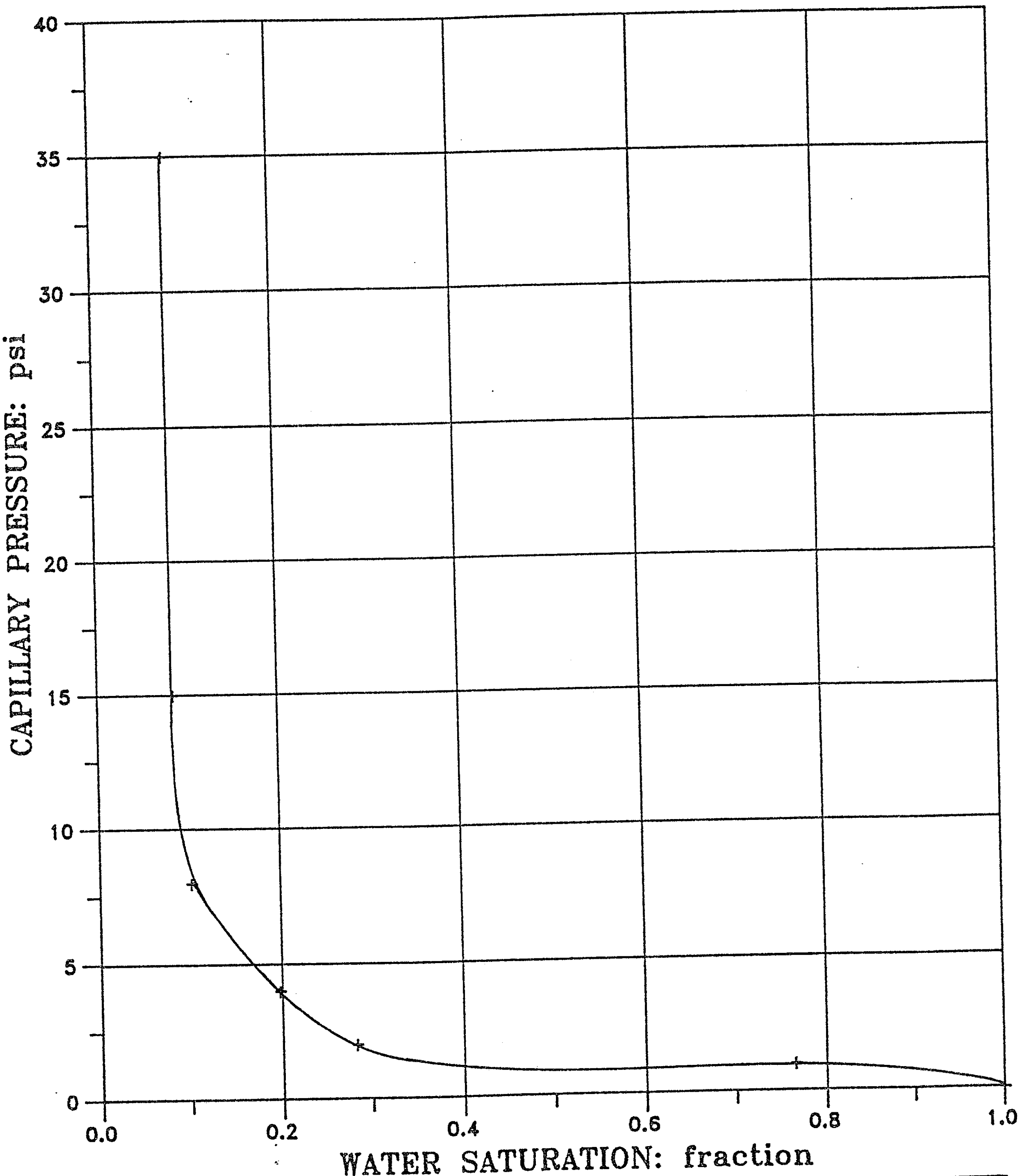
Figure 10

DRAINAGE CAPILLARY PRESSURE

Company Gas & Fuel Exploration NL
Well Boggy Creek No. 1

Sample No. 21
Depth: 1680.40 m
Porosity 0.267 fraction
Permeability 9953 md

AMBIENT



LEGEND

Test Method: Air – Water Porous Plate

+++++ Saturation

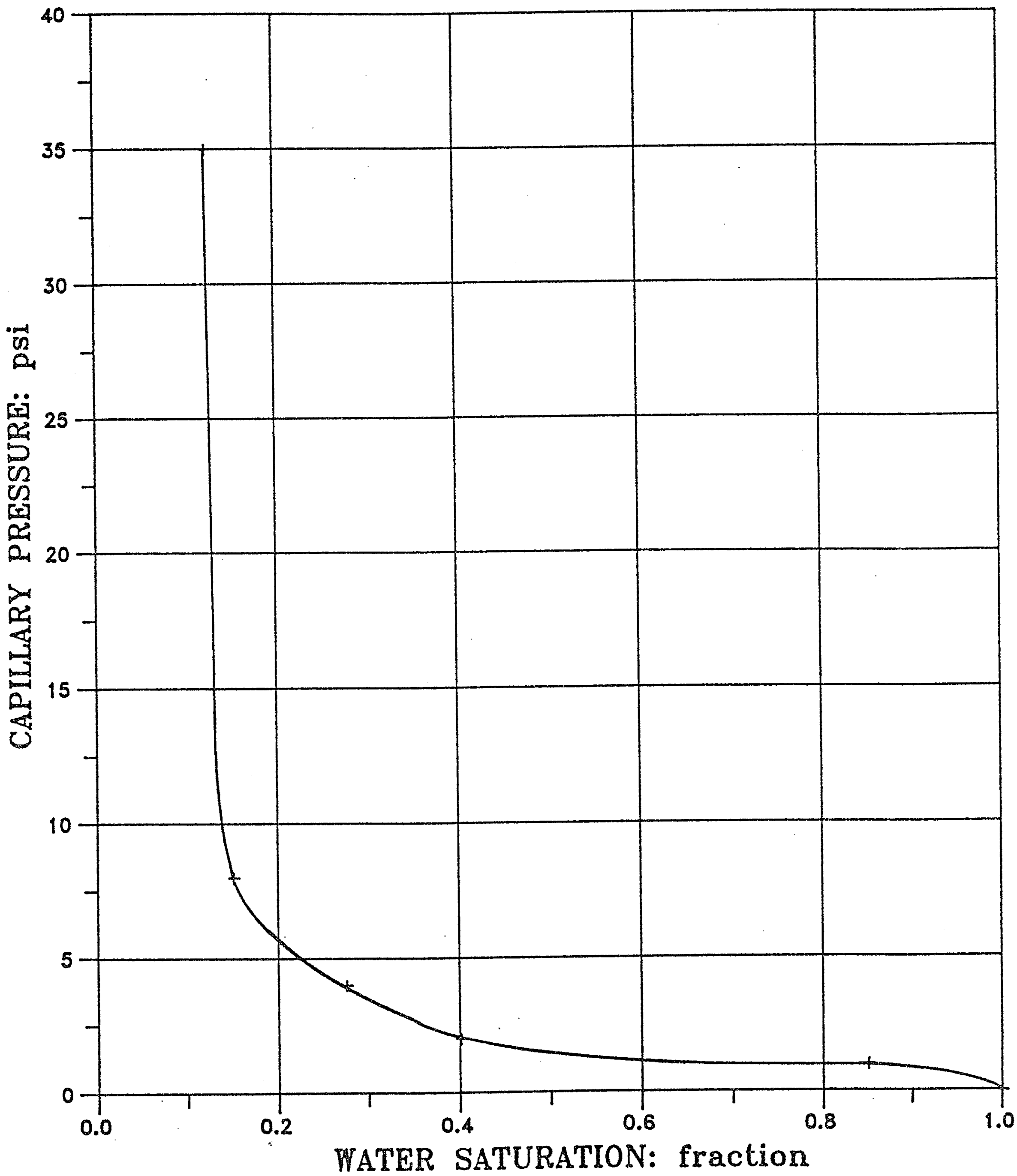
Figure 11

DRAINAGE CAPILLARY PRESSURE

Company Gas & Fuel Exploration NL
Well Boggy Creek No. 1

Sample No. 24
Depth: 1681.30 m
Porosity 0.262 fraction
Permeability 4595 md

AMBIENT



LEGEND

Test Method: Air – Water Porous Plate

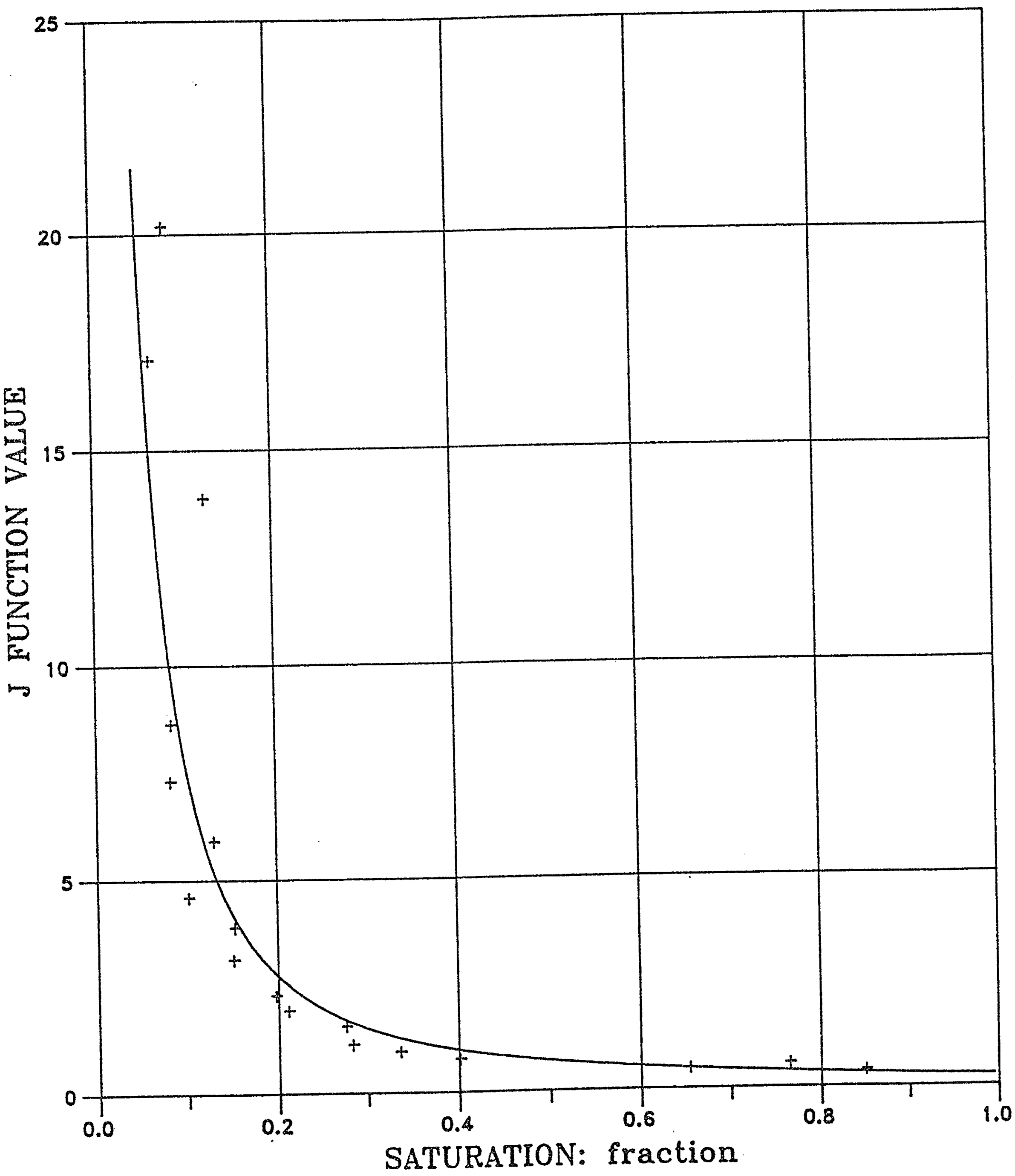
+++++ Saturation

Figure 12

LEVERETT J FUNCTION

Company: Gas & Fuel Exploration NL
Well : Boggy Creek No. 1

Samples 1, 21 & 24



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TRAPPED GAS SATURATION - SUMMARY

Company Gas and Fuel Exploration
Well Boggy Creek No. 1

Ambient

Test Method Counter Current Imbibition

Table VIII

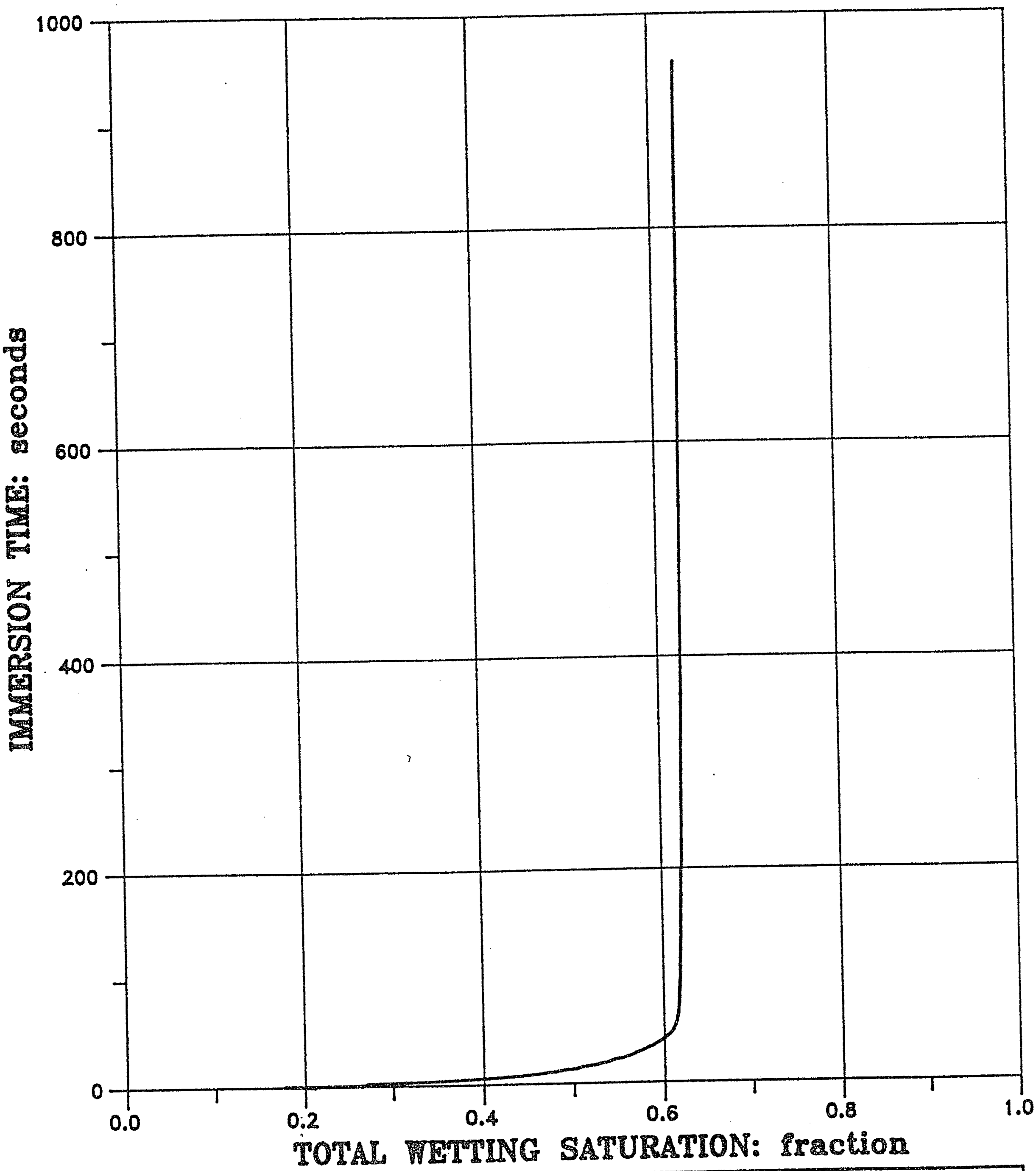
				INITIAL CONDITIONS	TERMINAL CONDITIONS		
						Gas Recovered	
Sample Number	Depth, metres	Permeability to Air, millidarcys	Porosity, fraction	Water Saturation, fraction (S_{wc})	Residual Gas Saturation, fraction (S_{rg})	Fraction Pore Space	Fraction Gas in Place
1	1673.20	5859	0.219	0.068	0.369	0.563	0.604
21	1680.40	9953	0.267	0.073	0.324	0.603	0.650
24	1681.30	4595	0.262	0.126	0.315	0.559	0.640

Figure 13

COUNTER CURRENT IMBIBITION

Company: Gas and Fuel
Well : Boggy Creek No. 1

Sample No 1
Depth 1673.2 m



LEGEND

Figure 14

COUNTER CURRENT IMBIBITION

Company: Gas and Fuel
Well : Boggy Creek No. 1

Sample No 21
Depth 1680.4 m

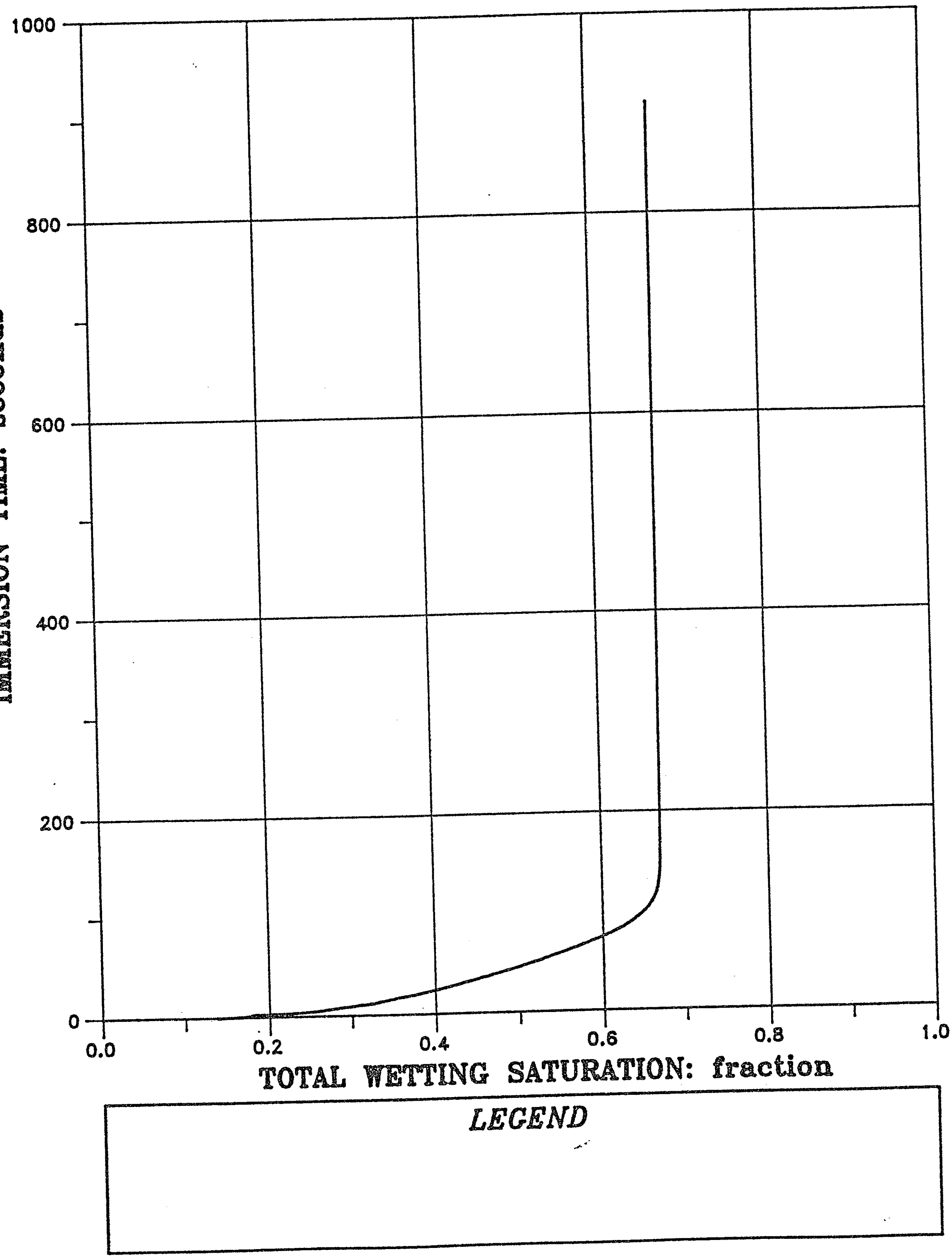
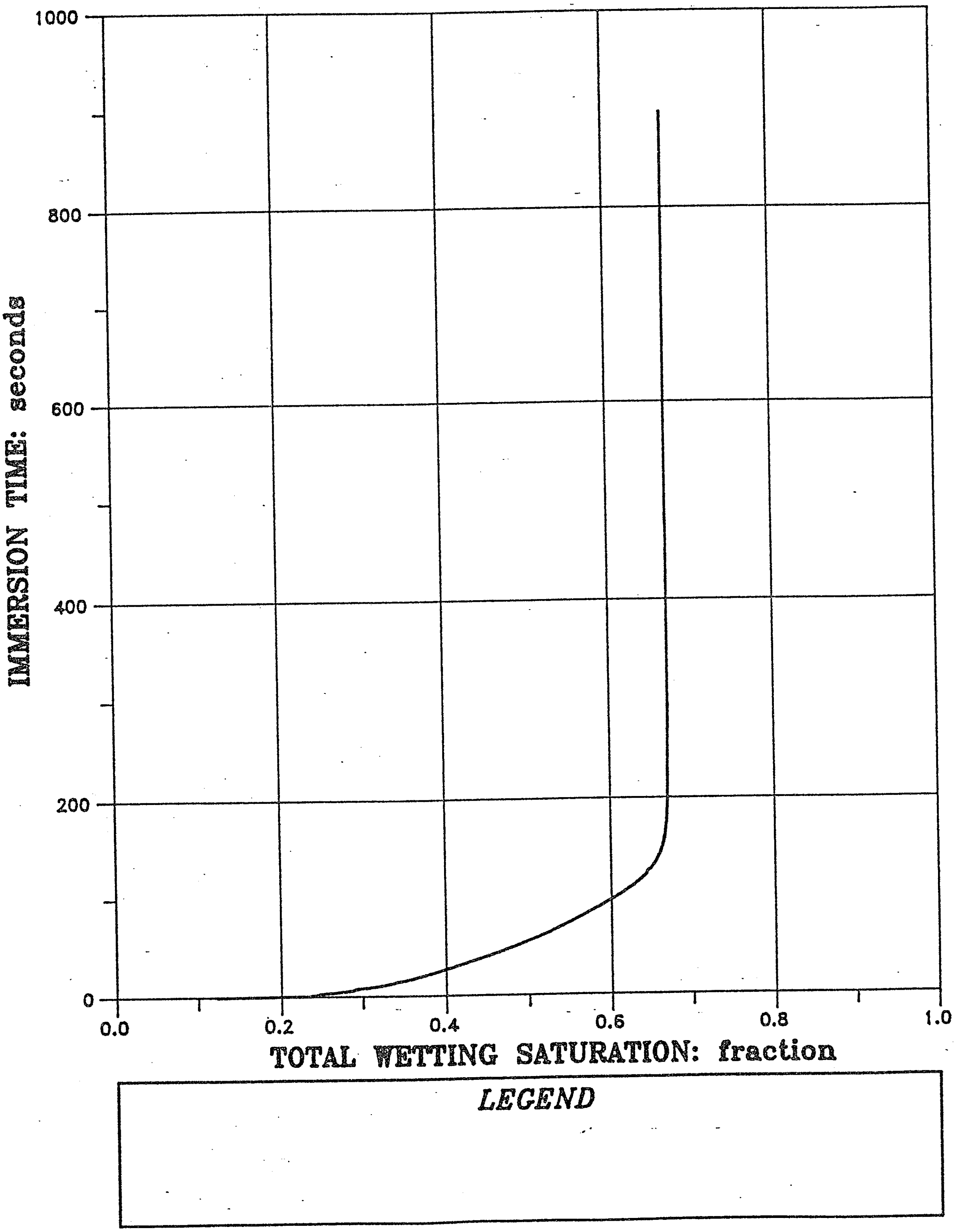


Figure 15

COUNTER CURRENT IMBIBITION

Company: Gas and Fuel
Well : Boggy Creek No. 1

Sample No 24
Depth 1681.3 m



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DYNAMIC ELASTIC MODULI

Company	Gas and Fuel Exploration NL
Well	Boggy Creek No. 1
Radial Stress	4950 psi (34,155 kPa)
Vertical Stress	4950 psi (34,155 kPa)
Pore Pressure	1900 psi (13,110 kPa)

Table IX

Sample Number	Depth, metres	Overburden Permeability to Air, millidarcys	Overburden Porosity, fraction	Calculated Grain Density, (gms/cm^3)	Poisson's Ratio	Test Conditions
13	1677.80	980	0.226	2.66	0.21	Pore Fluid = Air
					0.21	Pore Fluid = CO_2
					0.21	Pore Fluid = CH_4

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SIEVE ANALYSIS

Company	Gas and Fuel Exploration NL
Well	Boggy Creek No. 1
Sample	No. 1 Plug No. 6
Depth	1675.10 m
Initial Weight	38.928 g
Mean	1.05 ϕ (medium)
Standard Deviation	1.09 ϕ (poorly sorted)

Table X

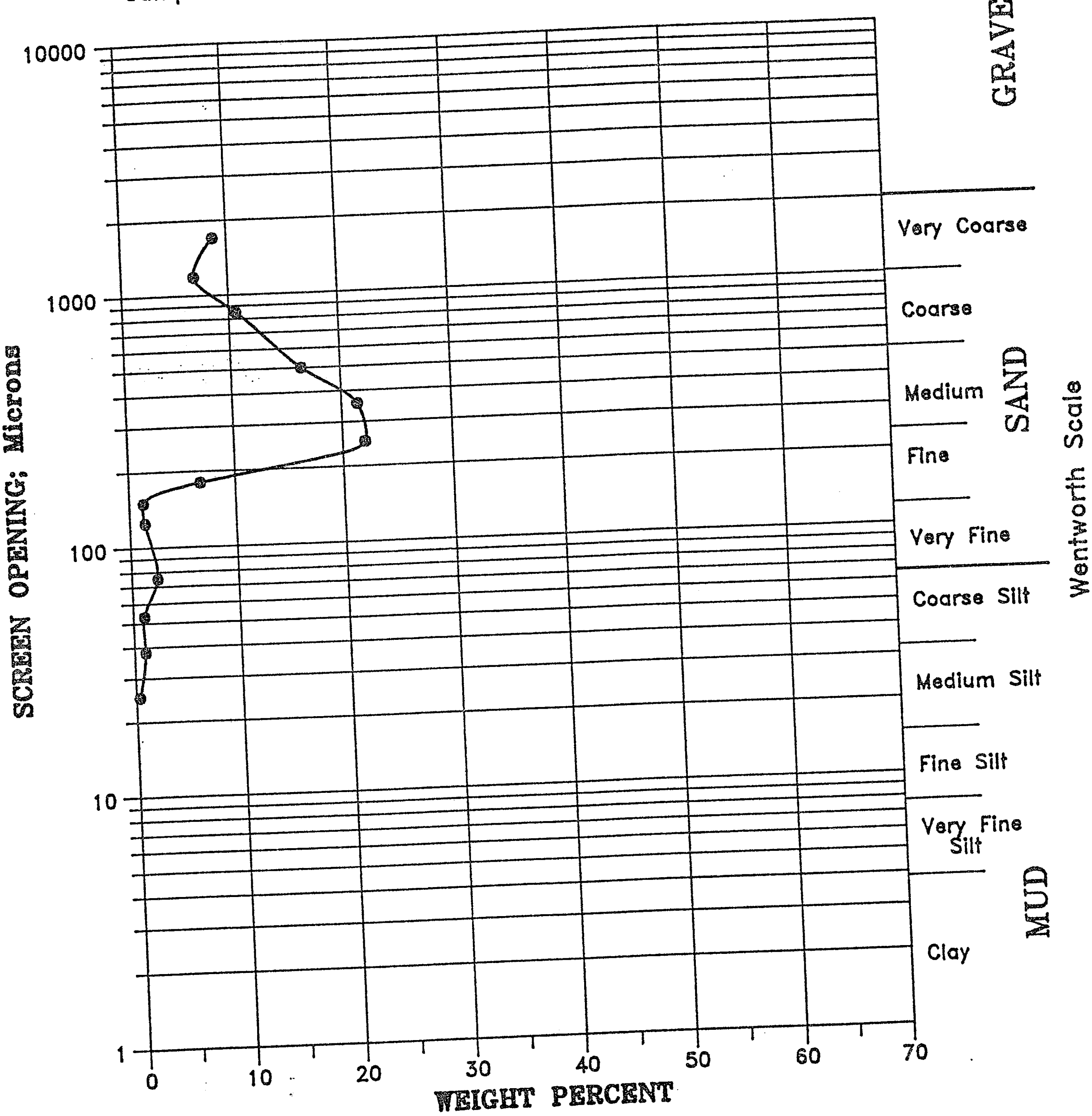
Screen Opening (microns)	Weight Percent Retained	Cumulative Percent Retained
1.7 mm	8.7	8.7
1.18 mm	6.8	15.5
850	10.6	26.1
500	16.4	42.5
355	21.4	63.9
250	22.0	85.9
180	6.7	92.6
150	1.3	93.9
125	1.4	95.3
75	2.4	97.7
53	1.0	98.7
38	1.0	99.7
<38	0.3	100.0

Figure 16

SIEVE ANALYSIS

Company: Gas And Fuel Exploration N.L.
Well: Boggy Creek No. 1

Sample No. 1, Plug 6, 1675.10m



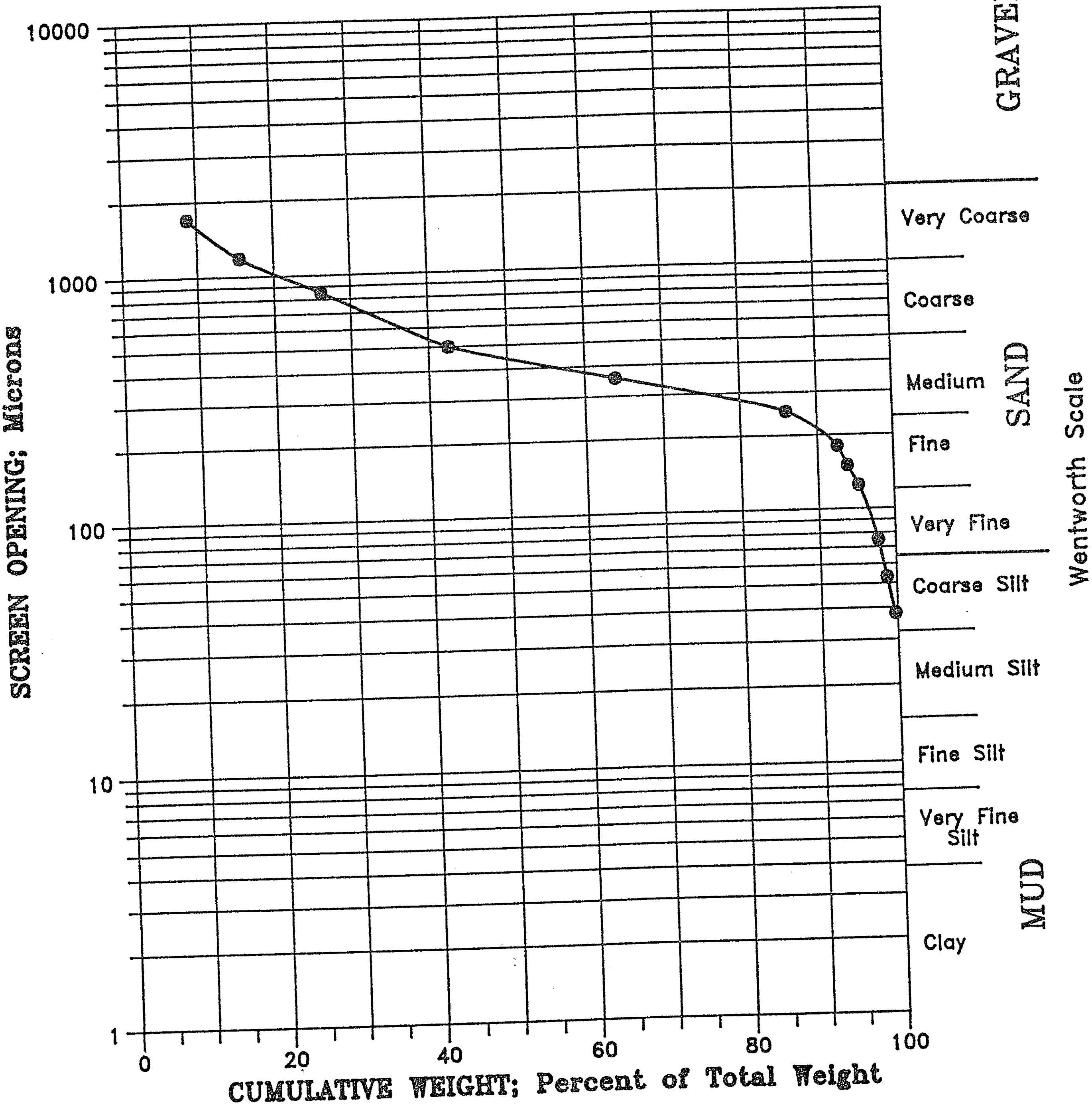
Amdel Core Services Pty Limited (Incorporated in South Australia)

Figure 17

SIEVE ANALYSIS

Company: Gas And Fuel Exploration N.L.
Well: Boggy Creek No. 1

Sample No. 1, Plug 6, 1675.10m



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SIEVE ANALYSIS

Company	Gas and Fuel Exploration NL
Well	Boggy Creek No. 1
Sample	No. 2 Plug No. 23
Depth	1680.98 m
Initial Weight	23.507 g
Mean	0.73 ϕ (coarse)
Standard Deviation	1.13 ϕ (poorly sorted)

Table XI

Screen Opening (microns)	Weight Percent Retained	Cumulative Percent Retained
1.7 mm	15.9	15.9
1.18 mm	8.3	24.2
850	13.4	37.6
500	24.2	61.8
355	16.0	77.8
250	9.5	87.3
180	5.4	92.7
150	1.4	94.1
125	1.2	95.3
75	2.2	97.5
53	1.1	98.6
38	1.1	99.7
<38	0.3	100.0

Figure 18

SIEVE ANALYSIS

Company: Gas And Fuel Exploration N.L.
Well: Boggy Creek No. 1

Sample No. 2, Plug 23, 1680.98m

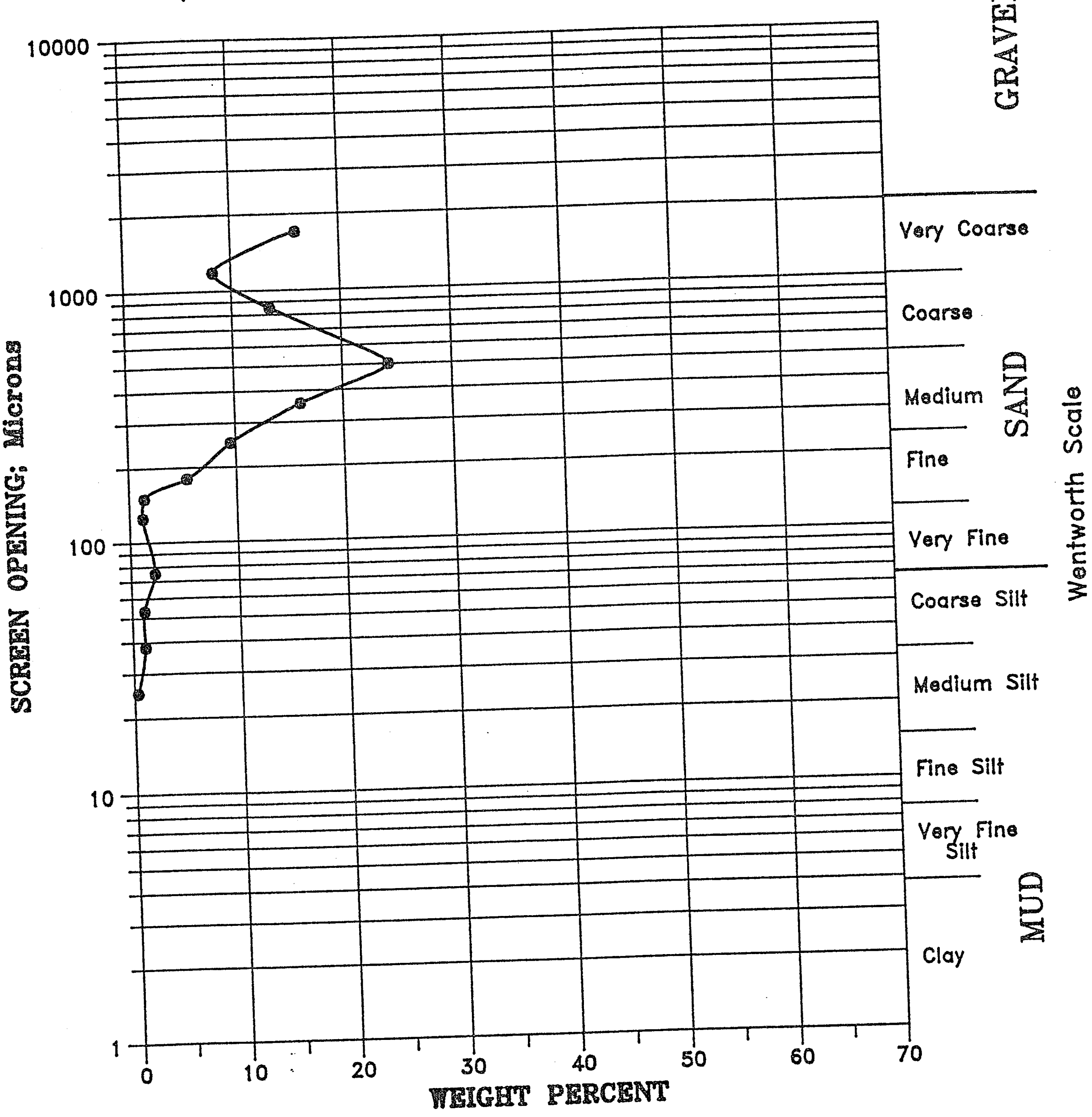
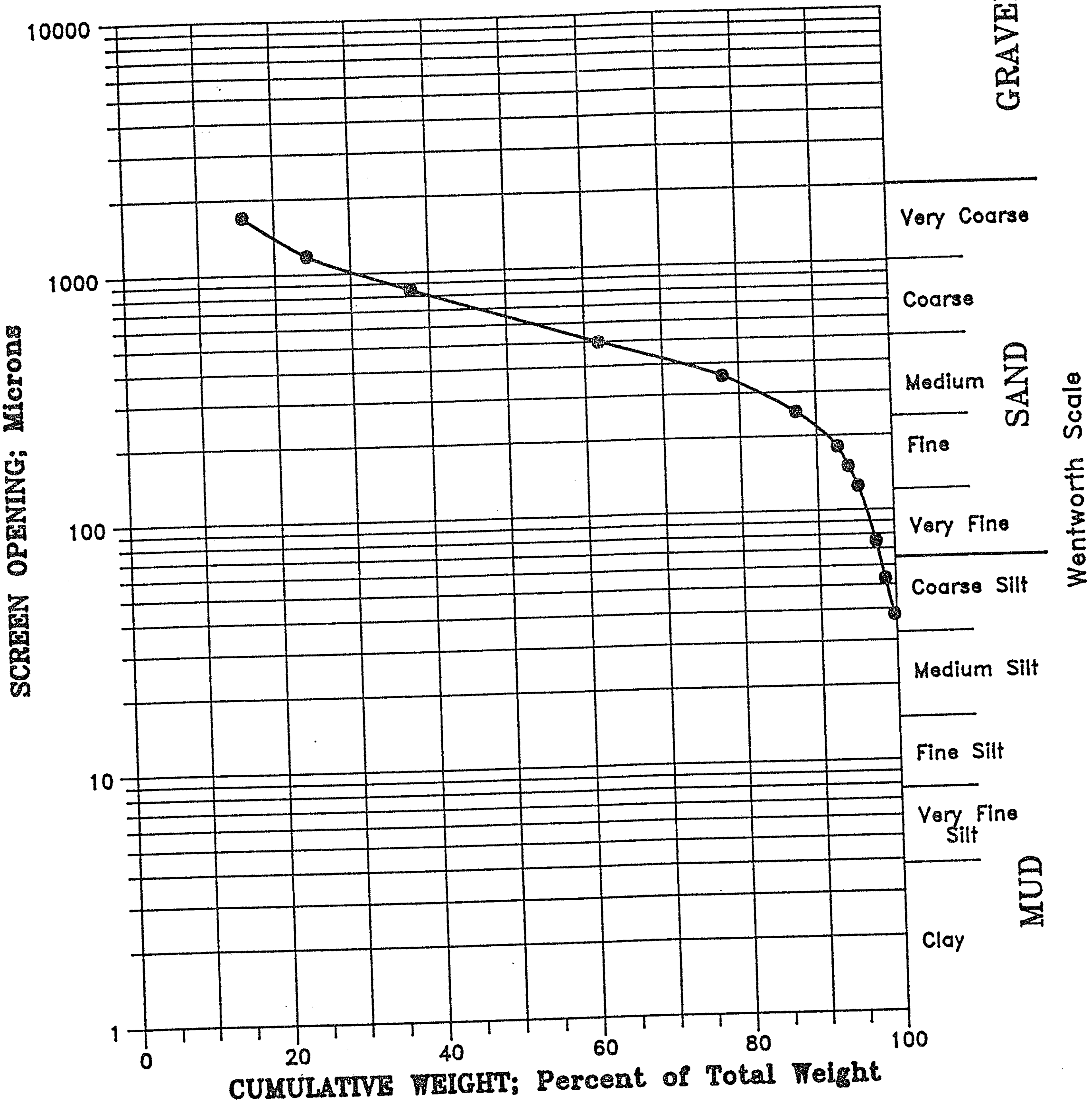


Figure 19

SIEVE ANALYSIS

Company: Gas And Fuel Exploration N.L.
Well: Boggy Creek No. 1

Sample No. 2, Plug 23, 1680.98m



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CORE PLUG DESCRIPTIONS

Company Gas and Fuel Exploration
Well Boggy Creek No. 1

Table XII

Sample Number	Depth (m)		Description
1	1673.20	SST:	lt gry, med-dom crs gr, ang-sbang, p cmt, mod srt, fri, r carb Spk, mnr arg mtrx, r Qtz o'gths, short plug.
7	1675.34	SST:	lt gry, f-v crs gr, sbang-occ rndd w/crs, p cmt fri, p srt, carb Spk thru, arg mtrx.
13	1677.80	SST:	lt gry, f-r crs gr thru, sbang-occ rndd gr thru, mod cmt, p srt, carb Spk & lam thru, abd arg mtrx, occ Qtz o'gth.
15	1678.45	SST:	lt gry, f w/ crs gr vn thru & abd carb lam, sbang-occ rndd, mod cmt, p srt, carb Spk & lam thru, mnr arg mtrx, occ Qtz o'gth.
17	1679.22	SST:	lt gry, f-v crs gr intbed, ang-sbang, p cmt, mod wl srt, carb spk thru, mnr arg mtrx, occ Qtz o'gth.
21	1680.40	SST:	lt gry, dom med gr w/ occ crs gr thru ang-sbang, p cmt, mod wl srt, fri, carb Spk & lam thru, mnr arg mtrx, dom cln sst.
22	1680.70	SST:	lt gry, dom med gr w/ incr in crs gr thru, ang-sbang, p cmt, mod wl srt, fri, carb Spk & lam thru, mnr arg mtrx.
24	1681.30	SST:	lt gry, occ f-dom med gr w/ occ crs gr thru, ang-sbang, p cmt, mod wl srt, fri, carb Spk & lam thru, mnr arg mtrx.

CORE PHOTOGRAPHS

PE905705

This is an enclosure indicator page.
The enclosure PE905705 is enclosed within the container PE905693 at this location in this document.

The enclosure PE905705 has the following characteristics:

ITEM_BARCODE =	PE905705
CONTAINER_BARCODE =	PE905693
NAME =	Core Photograph
BASIN =	OTWAY
PERMIT =	PEP 104
TYPE =	WELL
SUBTYPE =	CORE_PHOTOS
DESCRIPTION =	Well Core Photograph, 1673m-1677m, (from Appendix 5 of WCR) for Boggy Creek-1
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	
W_NO =	W1053
WELL_NAME =	BOGGY CREEK-1
CONTRACTOR =	
CLIENT_OP_CO =	GAS AND FUEL EXPLORATION N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

PE905706

This is an enclosure indicator page.
The enclosure PE905706 is enclosed within the container PE905693 at this location in this document.

The enclosure PE905706 has the following characteristics:

ITEM_BARCODE =	PE905706
CONTAINER_BARCODE =	PE905693
NAME =	Core Photograph
BASIN =	OTWAY
PERMIT =	PEP 104
TYPE =	WELL
SUBTYPE =	CORE_PHOTOS
DESCRIPTION =	Well Core Photograph, 1678m-1681m, (from Appendix 5 of WCR) for Boggy Creek-1
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	
W_NO =	W1053
WELL_NAME =	BOGGY CREEK-1
CONTRACTOR =	
CLIENT_OP_CO =	GAS AND FUEL EXPLORATION N.L.

(Inserted by DNRE - Vic Govt Mines Dept)