

WD/ST/74/16

GROUNDWATER FLOW INVESTIGATION
AT HUNTERSTON

by

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23 July 1974

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GROUNDWATER FLOW INVESTIGATION AT HUNTERSTON

FIRST VISIT

The site was visited for borehole investigation between 14.11.73 and 20.11.73. At the time of the visit the conditions obtaining were as described in Table 1.

A programme of borehole logging was undertaken, a summary of the work being given in Table 2.

An analysis of the temperature/conductivity logs indicates a number of levels of water movement in each of the boreholes and these are shown in Fig.1. Copies of appropriate logs are given in Appendix 1. The results of the flow investigations are also shown in Fig.1. Under the conditions prevailing at the time of the investigation the flow was upwards in all cases. Allowance for the effect of turbulence should be made when evaluating the flow rates.

Closed circuit television inspections were made in Nos.1 and 2 boreholes in axial view only. Unsatisfactory results were obtained with the radial viewing head due to the small borehole diameter. Video tape recordings were made of the downward camera run in both boreholes. Still photographs were taken at selected levels. The tapes and photographs are available at Exhibition Road, together with the point resistance, self-potential and caliper logs. The 16" normal resistivity logs are given in Appendix II.

SECOND VISIT

A second visit to the site was made between 26.4.74 and 2.5.74 to continue the flow and borehole logging investigation started in November 1973. Three new boreholes were available for logging, Nos 4, 5 and 6 (Table 3). No 7 borehole was not completed and due to shortage of lining tubes the casing had been withdrawn in Boreholes 2 and 3.

TABLE 1 BOREHOLE DETAILS APPLYING IN NOVEMBER 1973

	BOREHOLE NO. 1	BOREHOLE NO. 2	BOREHOLE NO. 3	BOREHOLE NO. 4	
GRID REFERENCE	NS 18897 49384	NS 18900 49972	NS 19371 49759	NS 19038 48848	
DEPTH	(DRILLED	100.57m	79.45m	100.10m) In course of) Construction.) Depth on 20.11.73) c.15m
	(PLUMBED	99.55m	79.m	68.70m	
NOMINAL DIAMETER	(CASING	12.2cm	12.2cm	12.2cm	
	(OPEN HOLE	10.5cm	10.5cm	10.5cm	
CASING	(TOP (a.g.l.)	10.0cm	0.0cm	0.0cm	
	(BOTTOM (b.g.l.)	37.93m	36.20m	26.88m	
APPROXIMATE O.D. (m) OF G.L. AT SITE	+18.2	+15.38	+15.00	+18.8	
WATER LEVEL	R.W.L. (15.11.73) 1.595 m.b. top of casing	FLOWING AT 1.22 l/sec (14.11.73)	FLOWING AT c.0.40 l/sec (14.11.73)	R.W.L. (20.11.73) 5.25 m.b.g.l.	

TABLE 2 BOREHOLE LOGGING NOVEMBER 1973

	BOREHOLE NO 1	BOREHOLE NO 2	BOREHOLE NO 3	BOREHOLE NO 4
TEMPERATURE/ (REST CONDUCTIVITY (FLOWING LOGGING (PUMPING	*	*	-	BOREHOLE UNDER CONSTRUCTION
	-	*	*	
	*	-	-	
FLOWMETER (REST (FLOWING (PUMPING	*	-	*	
	-	*	*	
	*	-	-	
CALIPER	*	*	-	
RESISTIVITY (16" NORMAL (P.R. (S.P.	*	*	*	
	*	*	*	
C.C.T.V.	*	*	-	

* Log made

- No log

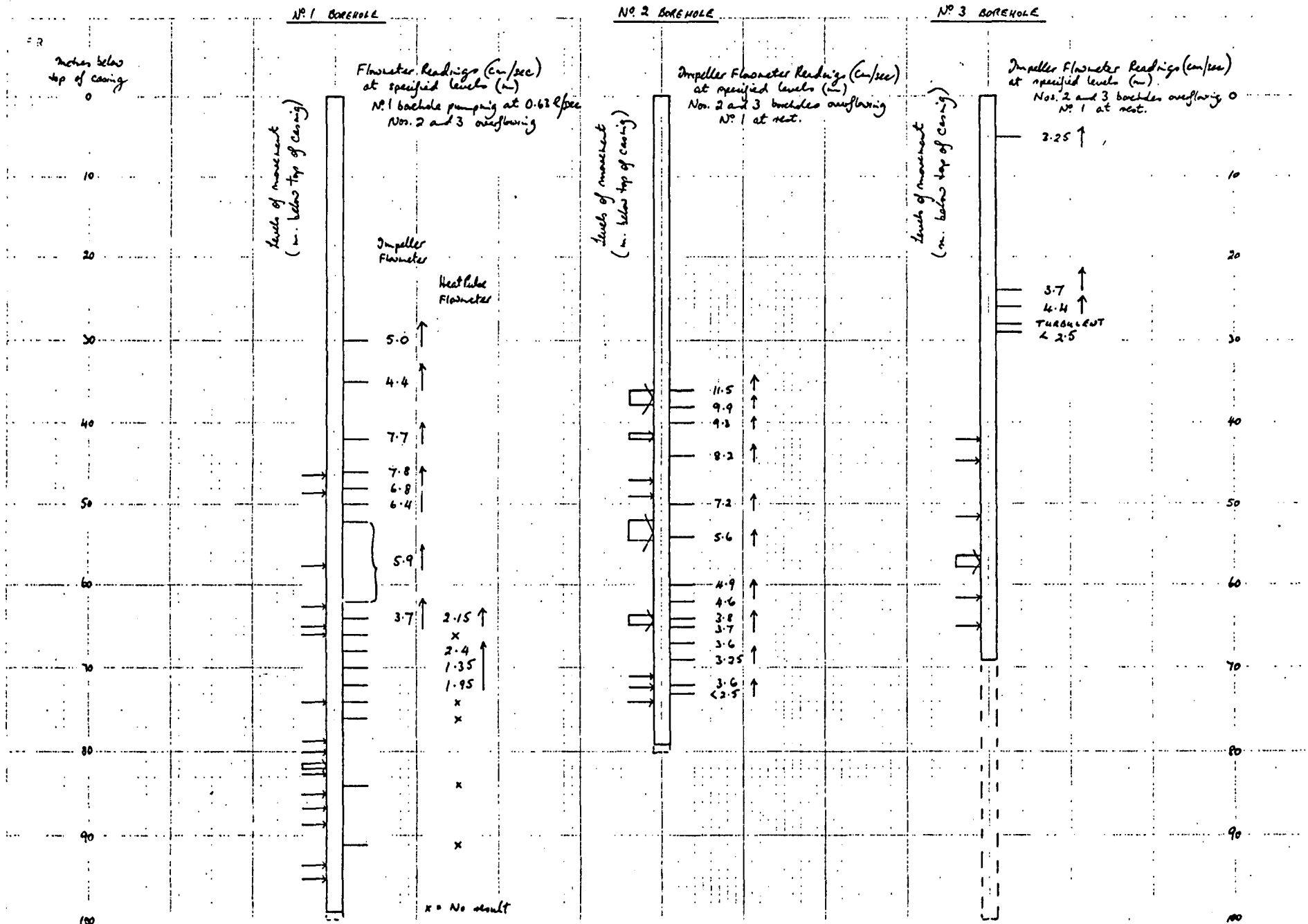


Fig. 1 Hunterston Trial boreholes 1-3. Levels of water movement and flow rates.

TABLE 3 BOREHOLE DETAILS APPLYING IN APRIL-MAY 1974*

TABLE 3 BOREHOLE DETAILS APPLYING IN APRIL-MAY 1974*

	BOREHOLE No 4	BOREHOLE No 5	BOREHOLE No 6	BOREHOLE No 7
GRID REFERENCE	NS 19038 48848	NS 18418 49220	NS 18869 49410	NS 18881 49433
DEPTH (Drilled (Plumbed (b.t.Casing)	97.00 m 96.29 m	95.00 m 93.58 m	91.50 m 90.27 m	94.00 In course of construction
NOMINAL DIAMETER (CASING ((OPEN HOLE	12.2 cm 10.5 cm	12.2 cm 10.5 cm	12.2 cm 10.5 cm	On 28.4.74 depth 12.33 m.b.g.l.
CASING (TOP (a.g.l) ((BOTTOM (b.g.l.)	17.0 cm 23.0 m	0.0 cm 23.0 m	17.0 cm 38.5 m	39.06
APPROXIMATE O.D.(m) OF G.L. AT SITE	18.8 m	20.8 m	17.9 m	17.8 m
WATER LEVEL	R.W.L. (2.5.74 1010h) 2.29 m.b.l.t. top	R.W.L.(28.4.74 1400h) 4.24 m.b.l.t.top	R.W.L (26.4.74) 0.55m.b.l.t.top (28.4.74) Slight overflow R.W.L(1.5.74 1016h) 0.36 m a.l.t.top (in extension piece)	On 28.4.74 water level just brimming at 0.49 m.a.g.l.

* The casing in Nos 2 and 3 boreholes has been pulled and the boreholes allowed to collapse.

* R.W.L. in No 1 Borehole (28.4.74) 0.266 m.b.l.t. top (1.5.74 1055h) 0.054 m.a.l.t.top; within extension piece.

The programme of work undertaken was similar to that on the first visit with the omission of closed-circuit television and caliper.

A summary of the flow logging and formation logging undertaken, is given in Table 4.

The levels of inflow into boreholes 4, 5 and 6 are shown on Fig. 2, together with the flow rates measured under various conditions. A selection of temperature/conductivity logs is given in Appendix III.

The resistivity profiles run during the second visit (Appendix IV) have provided sufficient additional information to permit a tentative correlation between boreholes 1-6. The present interpretation of this correlation (Fig. 3), which it is recognised is not unique, suggests the existence of at least three faults in the area bounded by the boreholes, and a conjuctural plan of the faulting is given in Fig 4.

WATER SAMPLING

During the course of the two visits samples of water were taken from Nos. 1, 2, 3, 4, 5 and 6 boreholes for tritium and mineral analysis. The results of the determinations are given in Table 5.

COMMENTS

1. Until such time as the bores were sealed, artesian discharge occurred from boreholes 2 and 3. Intermittant discharge took place from boreholes 1 and 6.
2. There is a zone of groundwater movement through the site at 62-65m below surface which does not appear to be controlled by structure or lithology. A secondary level occurs at some 74m below surface. Many minor levels of groundwater movement can be identified both above and below these zones.

TABLE 4 BOREHOLE LOGGING APRIL-MAY 1974

	BOREHOLE No 1	BOREHOLE No 4	BOREHOLE No 5	BOREHOLE No 6	BOREHOLE No 7
TEMPERATURE / CONDUCTIVITY LOGGING	(REST - (FLOWING - PUMPING (Recovery)	* - . . *	* - *	* * *	BOREHOLE UNDER CONSTRUCTION
FLOWMETER	(REST * (FLOWING - PUMPING * No 1 PUMPING -	- - * - -	* - * - -	* * * * *	
RESISTIVITY	(16" NORMAL * (P.R. - (S.P. -	* * *	* * *	* * *	
NATURAL GAMMA +	*	*	*	*	

*Log made

- No log

+ See Appendix V

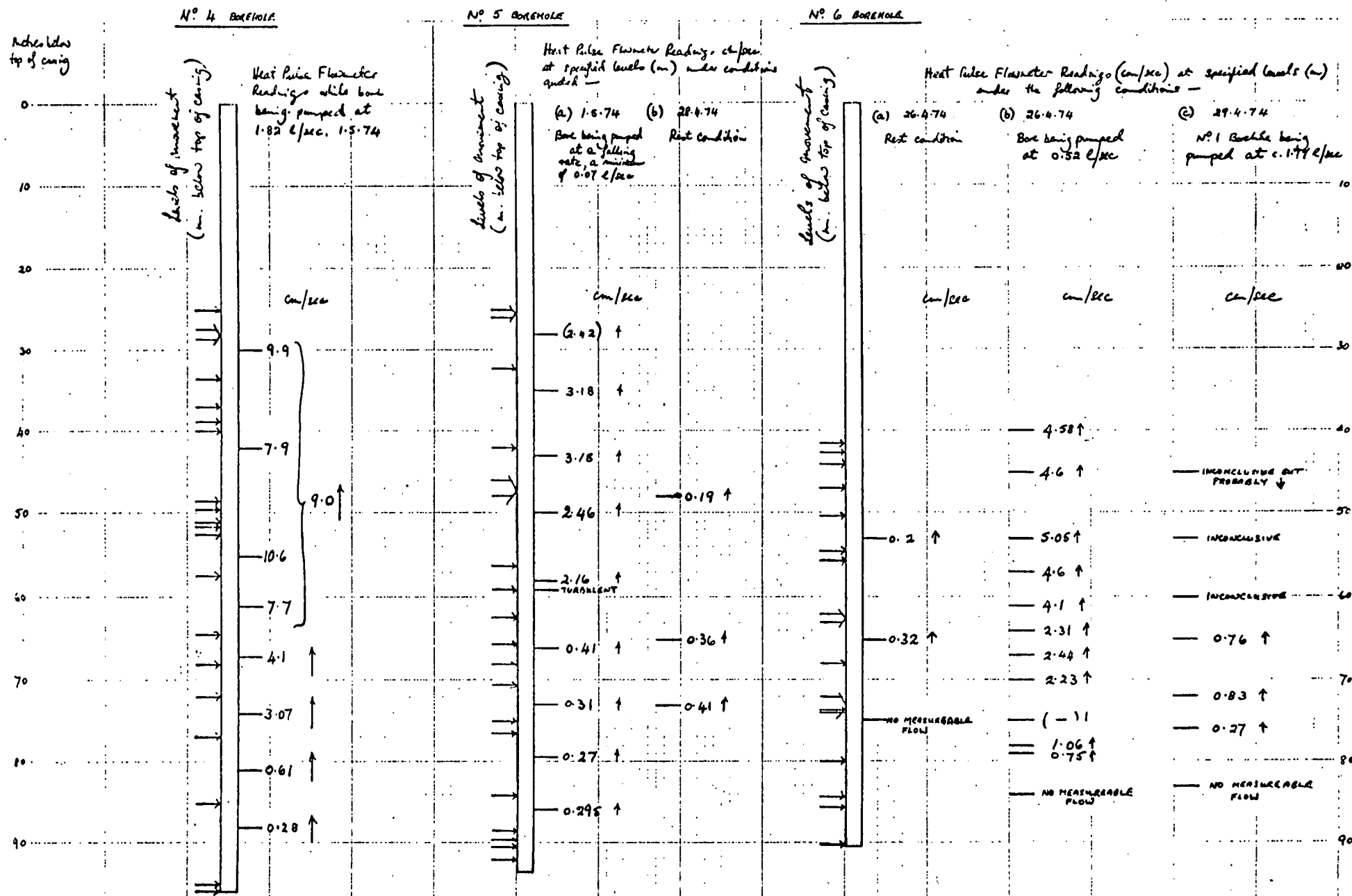


Fig. 2. Hunterston Trial. Boreholes 4-6. Levels of water movement and flow rates.

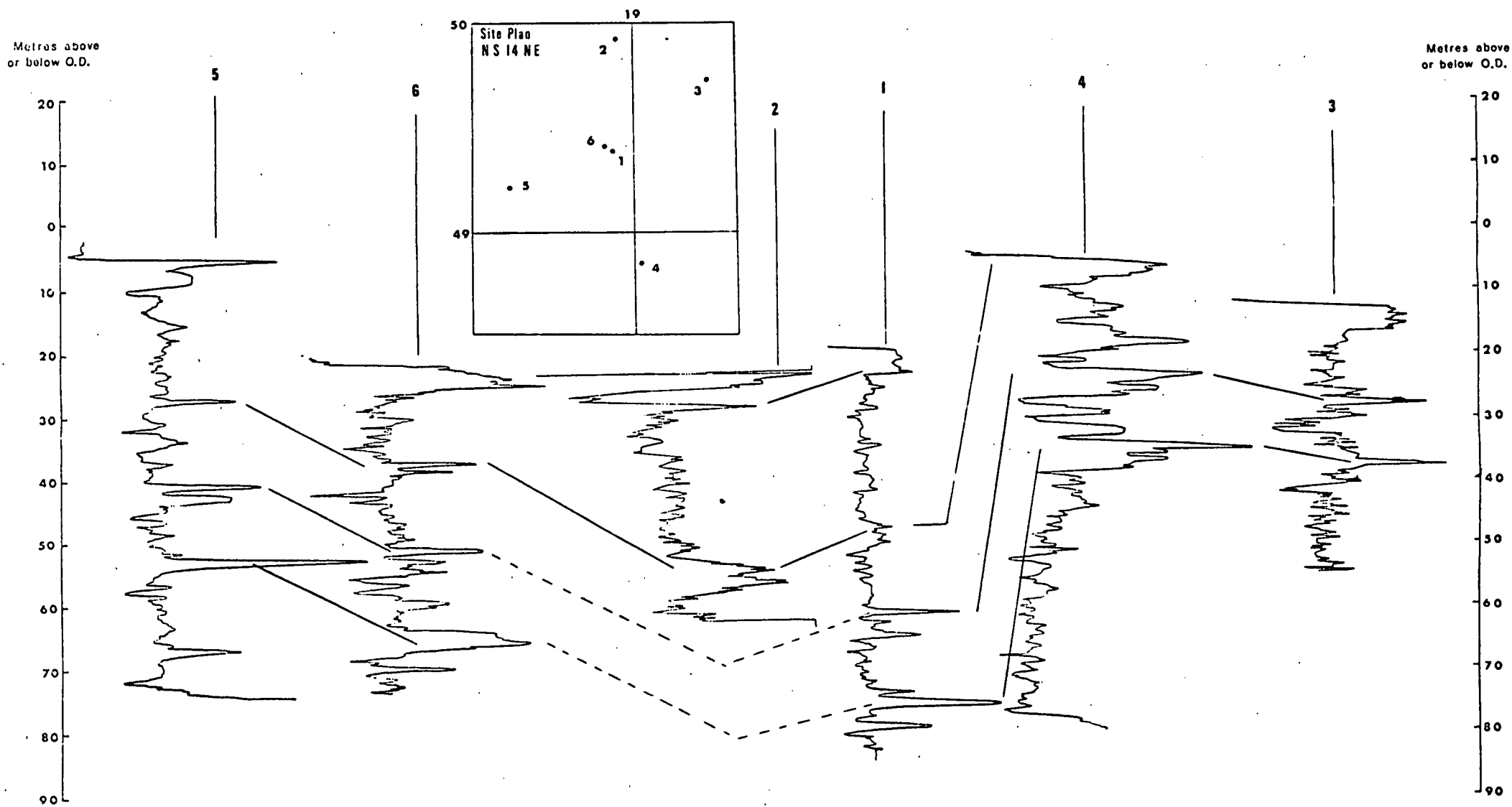
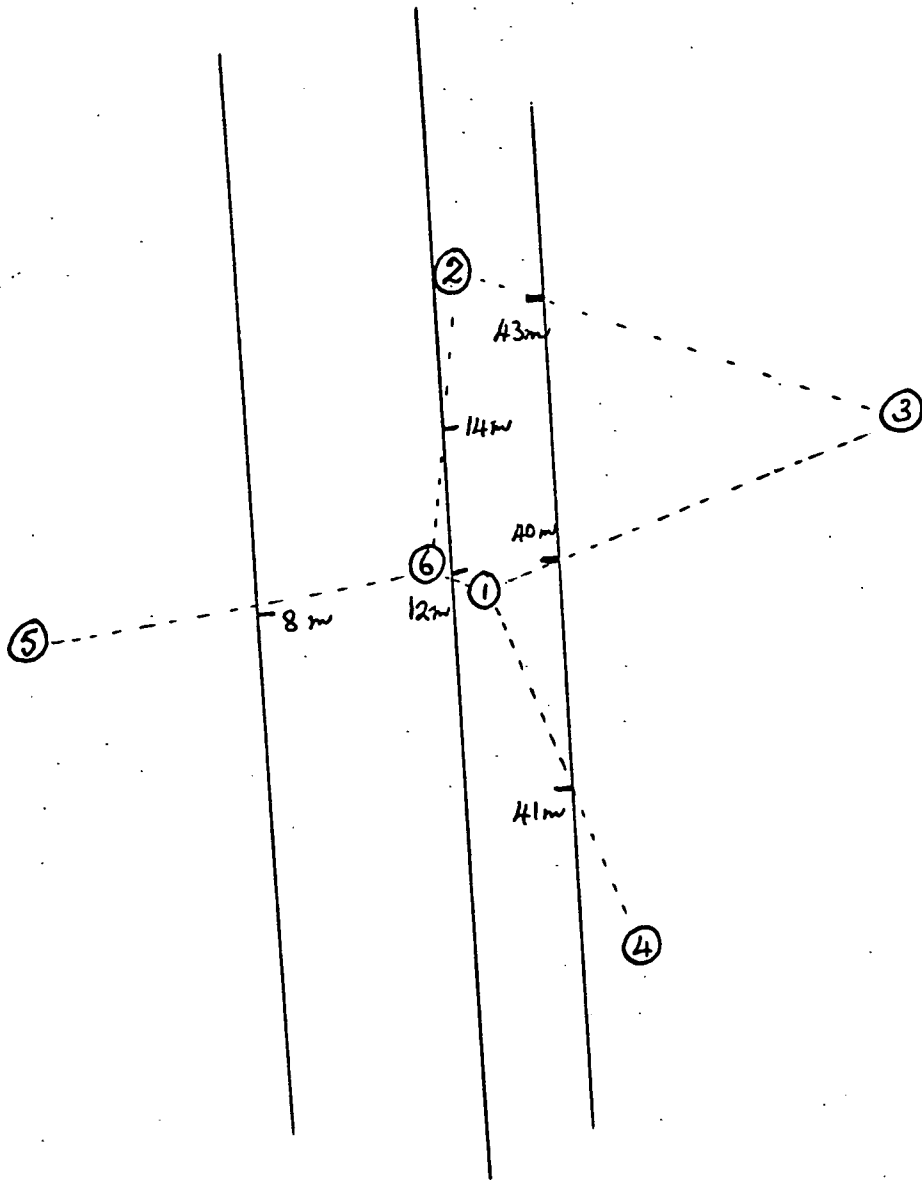


Fig. 3 Suggested correlation of 16" Normal Resistivity logs



N
 ↑
 Not to scale
 ① Boreholes
 — Fault is conjectural position.

Fig. 4. Hunterston. Conjectural faulting

TABLE 5 MINERAL ANALYSIS RESULTS (mg/l) OF WATER SAMPLES

BOREHOLE NO.	SAMPLE SOURCE AND DATE	pH	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	HCO ₃ ⁻	SO ₄ ²⁻	Cl ⁻	Sr ²⁺	TRITIUM T.U.
1	PUMPED 20.11.73	7.63	30.0	11.0	59.0	4.0	229.0	5.0	43.0	3.12	0.2
2	OVERFLOW 19.11.73	7.70	28.0	22.0	41.0	5.7	252.0	14.0	40.0	2.44	-0.7
3	OVERFLOW 20.11.73	7.63	18.0	11.0	57.0	5.0	222.0	6.0	27.0	1.02	4.5
4 DRIFT	DEPTH SAMPLE FROM 6.5m 20.11.73	8.75	11.0	9.1	60.0	3.2	166.0	28.0	33.0	0.24	2.2
* 4 O.R.S.	PUMPED 1.5.74	7.68	28.0	28.0	29.0	18.0	284.0	9.0	30.0	2.40	2.3
5	PUMPED 1.5.74	7.84	20.0	17.0	65.0	7.5	236.0	23.0	44.0	0.86	-1.2
6	OVERFLOW 30.4.74	7.89	35.0	10.0	68.0	5.5	254.0	5.0	40.0	2.72	3.7

* Note Final results obtained on 6.8.74. Consideration is still to be given to the bilinear plots of the chemical results.

3. In the rest condition (bores not artesian) upward flow was observed in boreholes 5 and 6. The majority of this flow was captured at the 62-65m level. The conductivity log made in the rest condition in No 4 Borehole suggests that a similar condition obtains in this bore.
4. Logging in No 6 Borehole while pumping from No 1 confirmed communication between these boreholes at the 62-65m level.
5. The television inspection showed that the levels of contribution are associated with marked bedding plane features.
6. Variations in temperature and conductivity were observed both in depth and time. In general, temperature and conductivity rose with depth but it is not considered that the variations were sufficiently marked to be of significant importance in the present investigation.
7. Further results of the mineral analysis of the water samples are awaited. To date they show an unremarkable series of analyses which would not appear to present any cavity constructional problems. *

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23rd July, 1974.

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* See note on Table 5

Appendix I

No 1 borehole Logs $T_1/G_1, G_2 ; T_3/G_5, G_6$
 No 2 borehole $T_1/G_1, G_2$
 No 3 borehole $T_1/G_1, G_2$

$$36.00 \mu\text{mhos} = 8.41 \text{ }^\circ\text{C}$$

$$37.00 \mu\text{mhos} = 9.26 \text{ }^\circ\text{C}$$

$$38.00 \mu\text{mhos} = 10.05 \text{ }^\circ\text{C}$$

$$39.00 \mu\text{mhos} = 10.87 \text{ }^\circ\text{C}$$

Appendix II

No 1 borehole 16" normal resistivity log
 No 2 borehole 16" " " "
 No 3 borehole 16" " " "

Appendix III

No 4 Borehole Logs G_1, G_2
 No 5 Borehole Logs G_1, G_4
 No 6 Borehole Logs G_1, G_4, G_5, G_8, T_2

$$36.00 \mu\text{mhos} = 9.94 \text{ }^\circ\text{C}$$

$$37.00 \mu\text{mhos} = 10.76 \text{ }^\circ\text{C}$$

$$38.00 \mu\text{mhos} = 11.63 \text{ }^\circ\text{C}$$

$$39.00 \mu\text{mhos} = 12.40 \text{ }^\circ\text{C}$$

Appendix IV

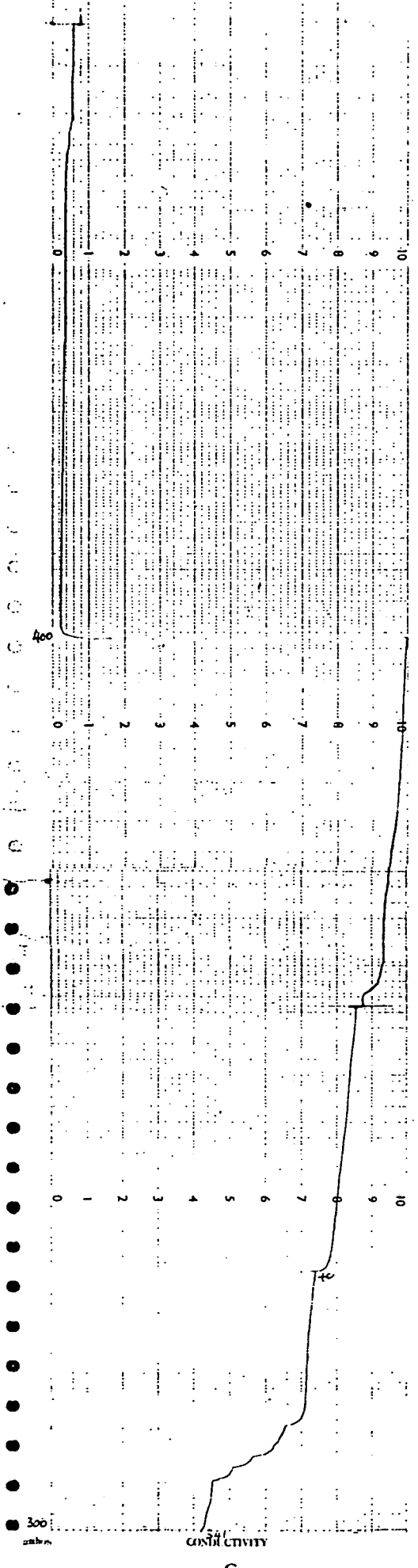
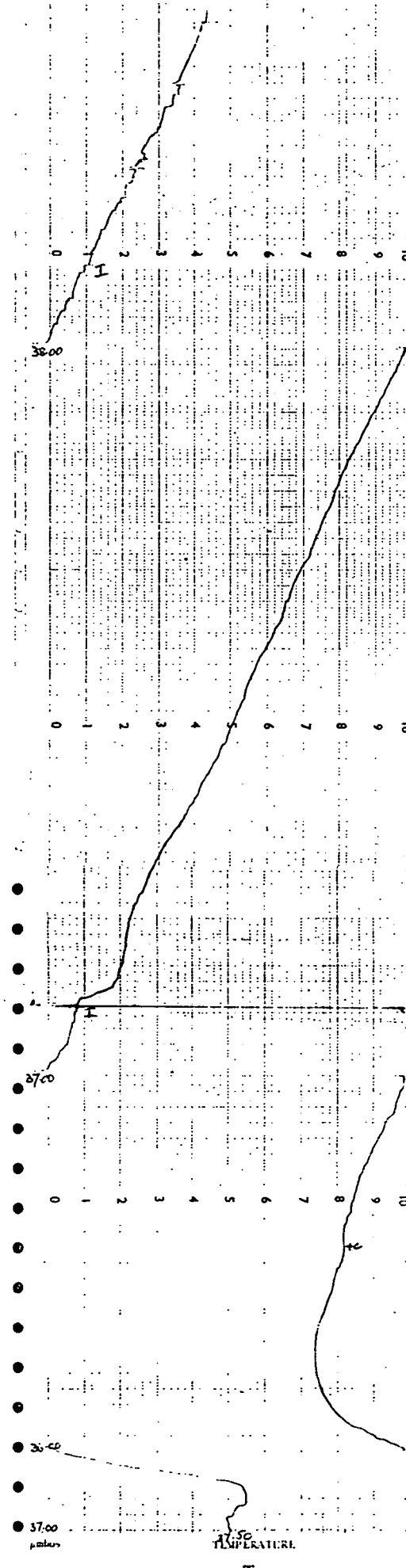
No 4 - 6 Boreholes 16" Normal Resistivity logs.

Appendix V

No 1 Borehole)
) Natural Gamma Logs
No 4 - 6 Boreholes)

APPENDIX I

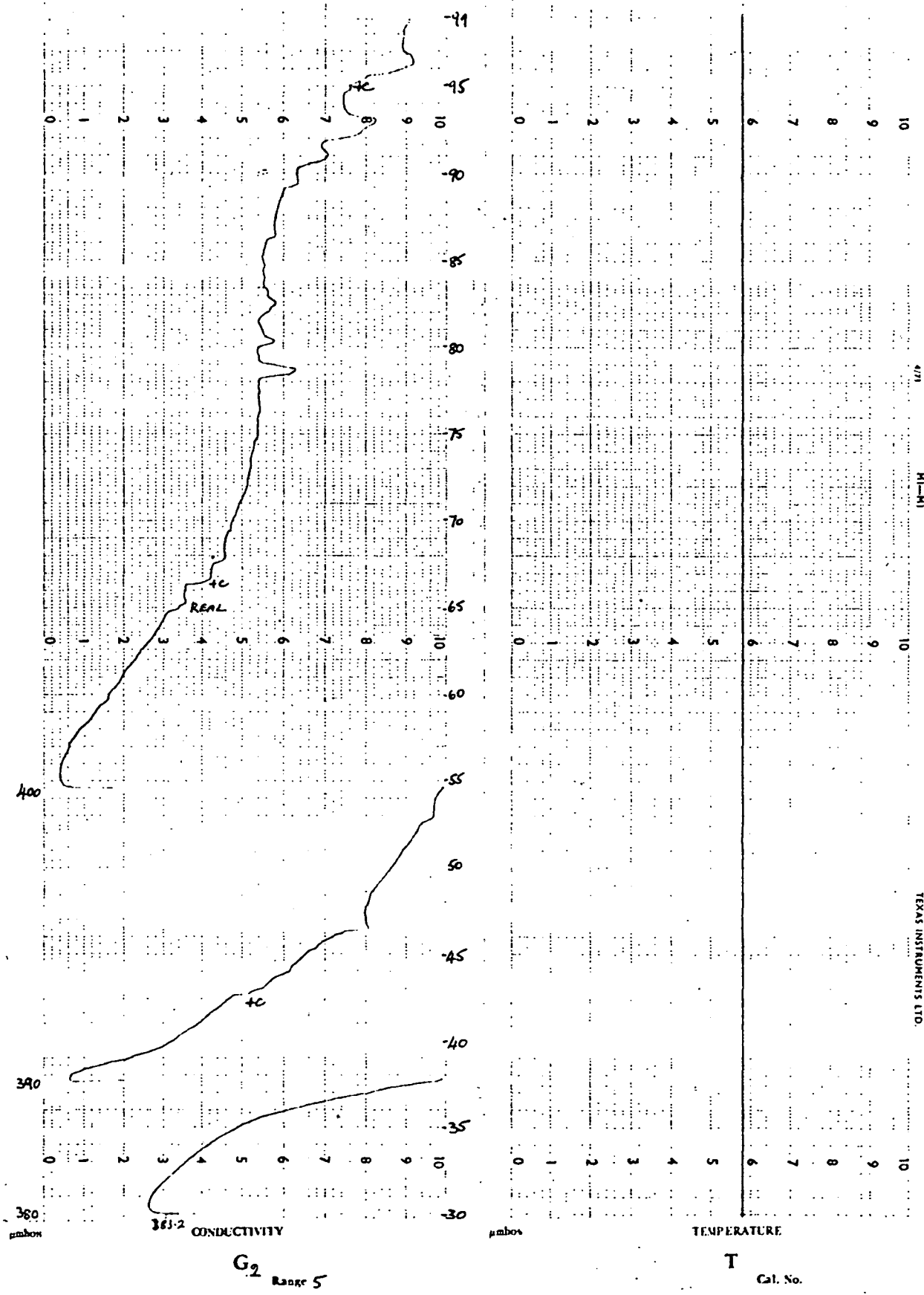
HEAD INSTRUMENTS LTD. 0 10 20 30 40 50 60 70 80 90 100
HEAD INSTRUMENTS LTD. 0 10 20 30 40 50 60 70 80 90 100
HEAD INSTRUMENTS LTD. 0 10 20 30 40 50 60 70 80 90 100
HEAD INSTRUMENTS LTD. 0 10 20 30 40 50 60 70 80 90 100
HEAD INSTRUMENTS LTD. 0 10 20 30 40 50 60 70 80 90 100



G₁ Radar G

T₁ Cal. No. 32

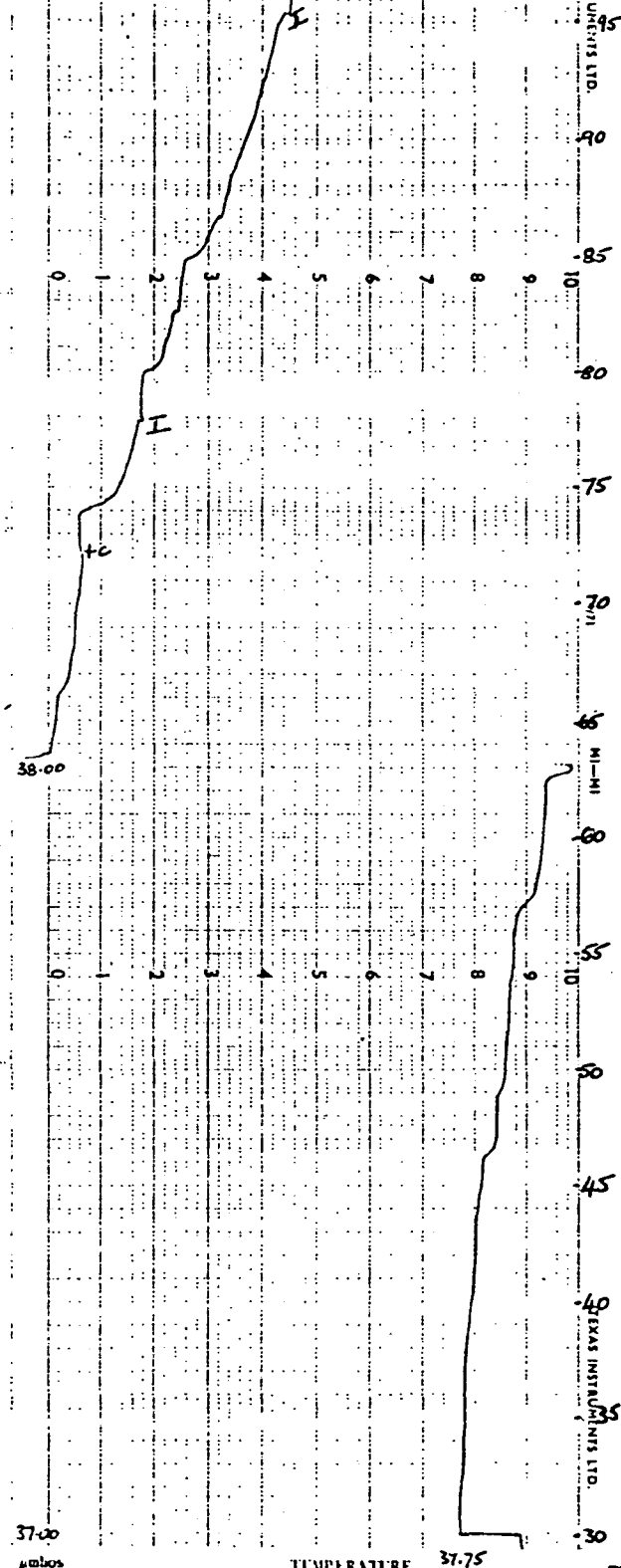
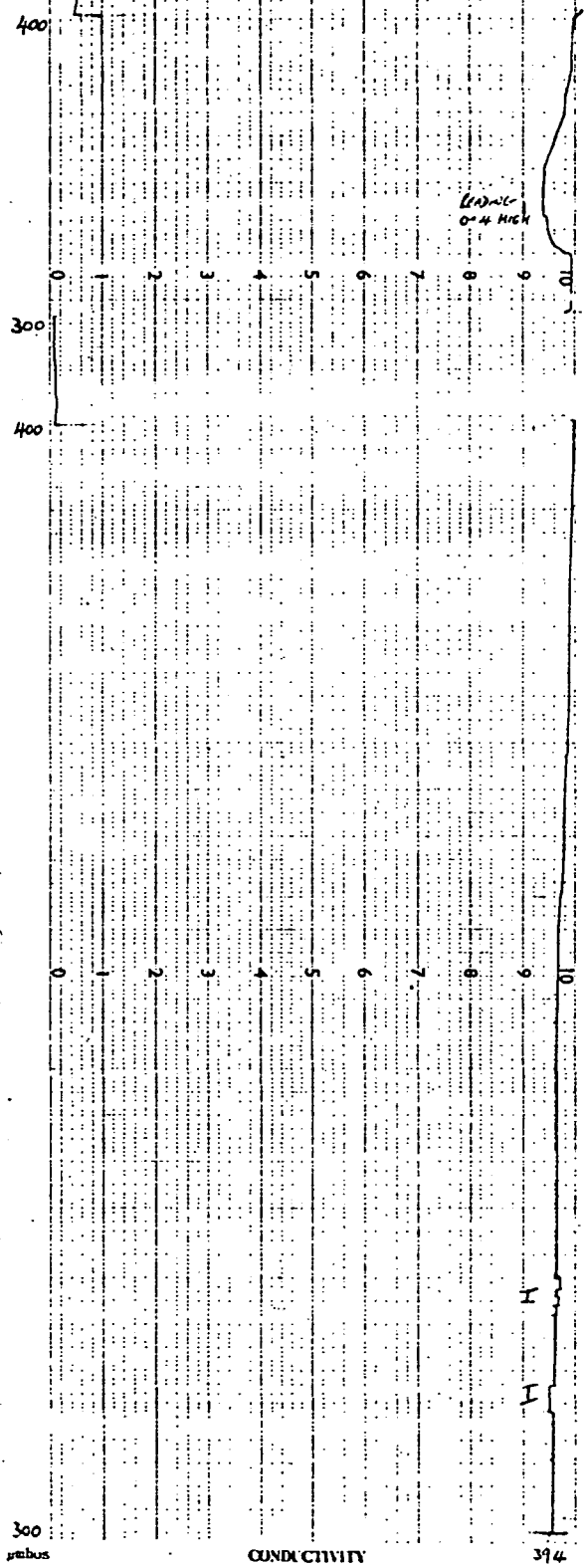
MUSKOGEE N° 1 TRIAL



Pumping rate (l/sec) NIL
 Pumping rate adjust Branches (l/sec) NIL (OVERFLOW)
 Datum TOP OF LINING TUBE
 O.D. of Datum

Date 15.11.73
 Time 0938 - 0945

HUNTERTON NO 1 TRIAL



300 μ mhos CONDUCTIVITY G_5 Range 6 394

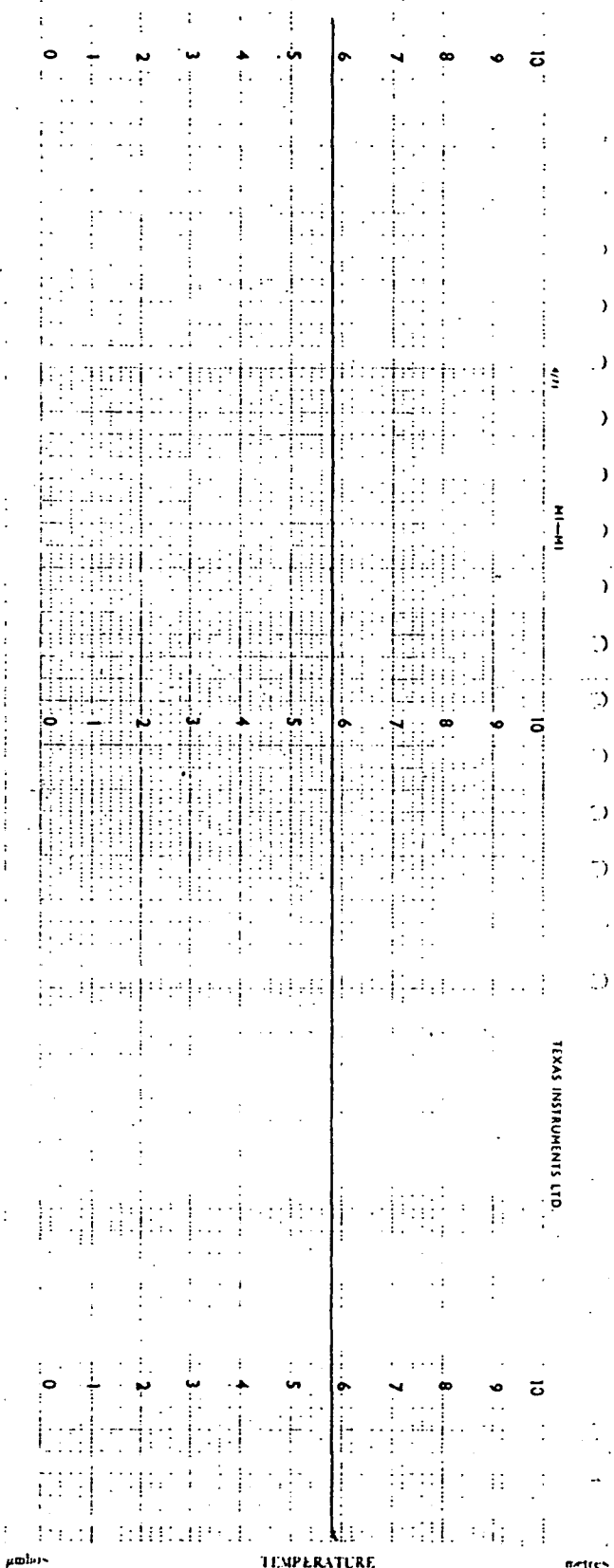
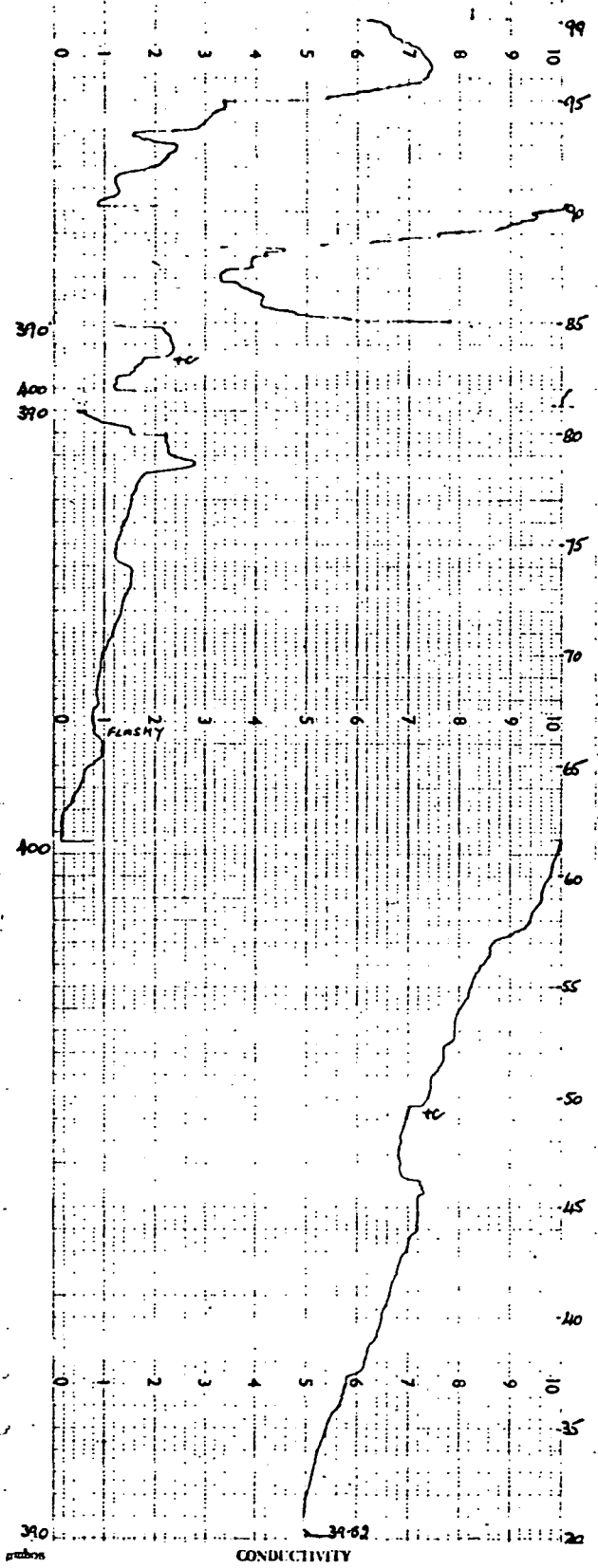
37.00 μ mhos TEMPERATURE T_3 Cal. No. 32 37.75

TEXAS INSTRUMENTS LTD. meters below datum

HUNTERSTON N° 1 TRIAL

Pumping rate (l/sec) c.D. 63 (well loss)
 Pumping rate adjacent Boreholes (l/sec) NIL (OVERFLOWING)
 Datum T.O. L.T.
 O.D. of Datum

Date 15. 11. 73
 Time 1145 - 1151

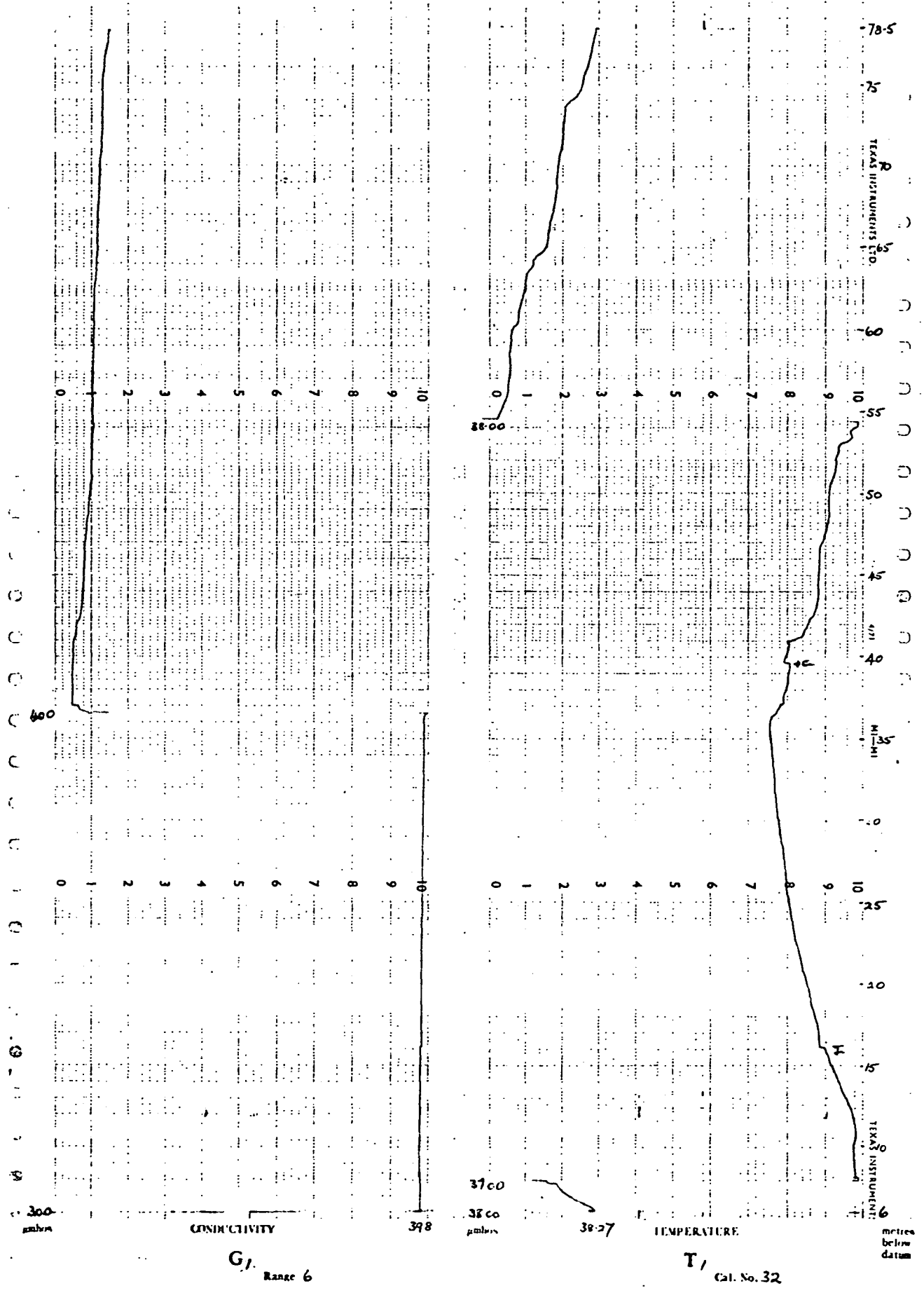


TEXAS INSTRUMENTS LTD.

HUNTERSTON NO 1 TRIAL

Pumping rate (l/sec) 0.63 since 10.35
 Pumping rate adjacent 11.5 (unplanned)
 Barholes (l/sec)
 Datum
 O.D. of Datum

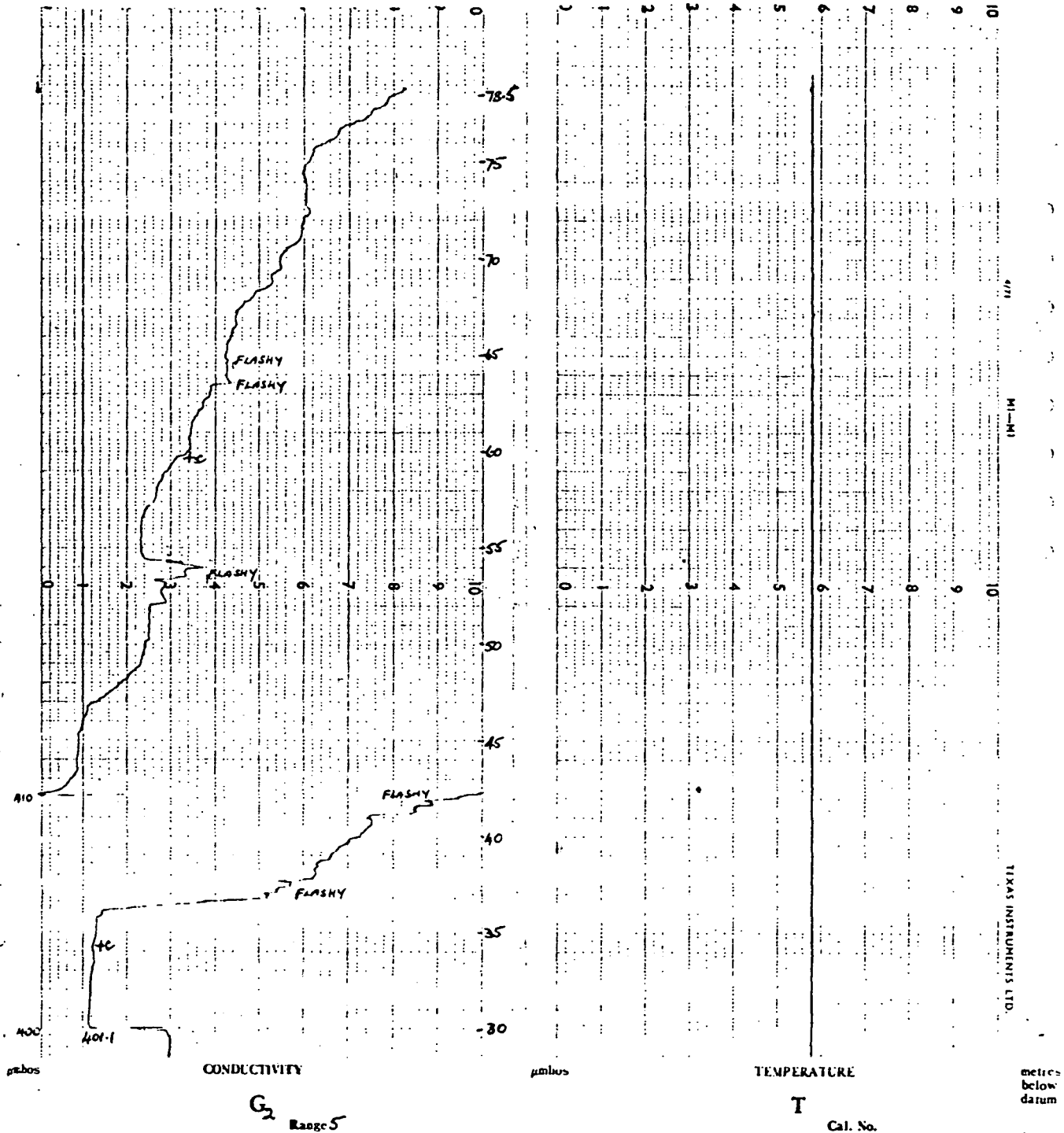
Date 15.11.73
 Time 11.53-12.04



HUNTERSTON NO 2 TRIAL

Pumping rate (l/sec) OVERFLOWING AT G.L.
 Pumping rate adjacent Boreholes (l/sec) NIL
 Datum TO OF LIVING TREES - G.L.
 O.D. of Datum

Date 14. 11. 73
 Time 1040 - 1047

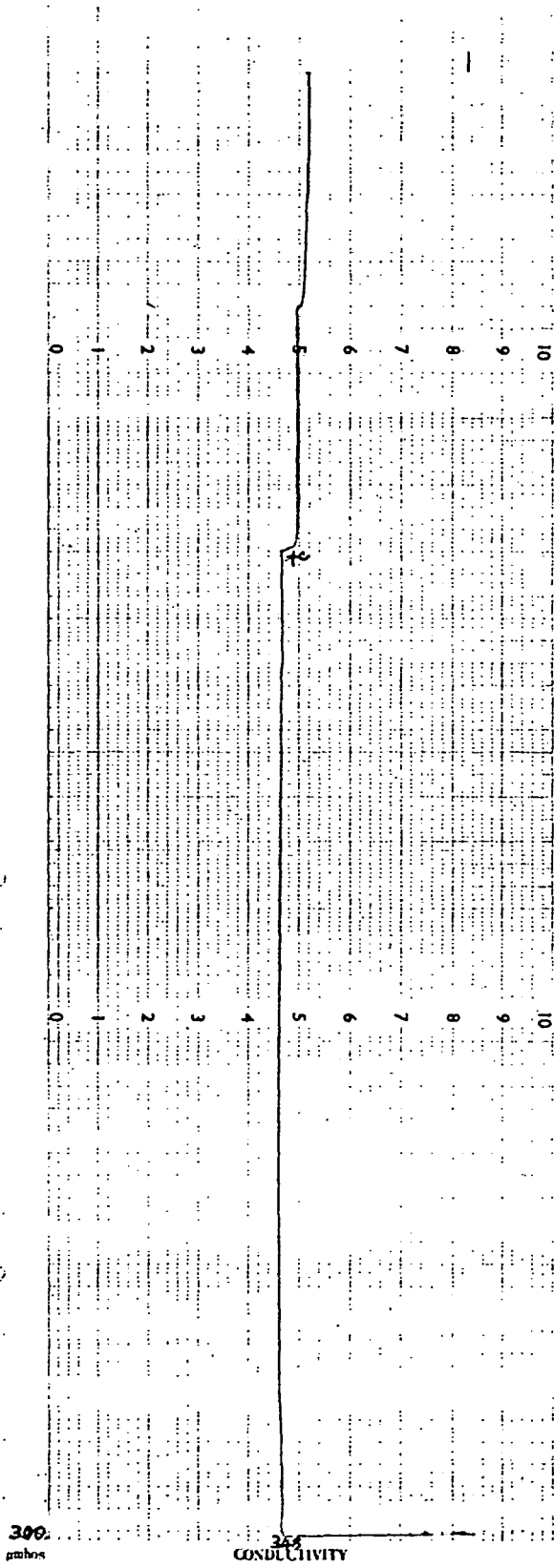


HUNTERSTON N^o. 2 TRIAL

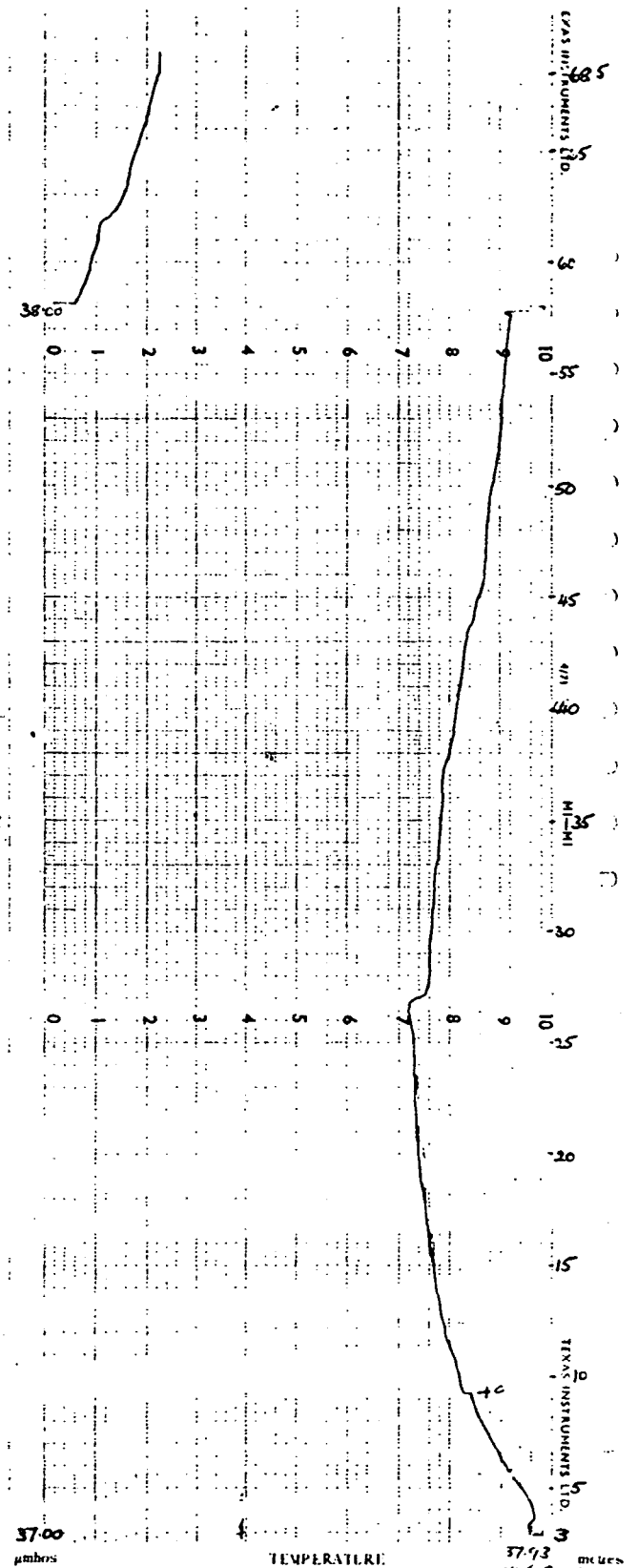
Pumping rate (l/sec) OVERFLOWING AT G.L.
 Pumping rate adjacent Boreholes (l/sec) NIL
 Datum TOP OF LINING TUBE
 O.D. of Datum

Date 14-11-73

Time 1102 - 1110



300. μ mhos
 34.6
 CONDUCIVITY
 G1 Range 6



38.00
 37.93
 TEMP
 T1 Cal. No. 32
 meters below datum

HUNTERSTON N° 3 TRIAL

Pumping rate (l/sec) OVERFLOW AT G.L. and
 Pumping rate adjacent TOP OF TEMPERATURE EXTENSION PIPE
 Boreholes (l./sec) NIL.
 Datum TOP OF EXTENSION PIPE 30 cm. a.g.l.
 O.D. of Datum

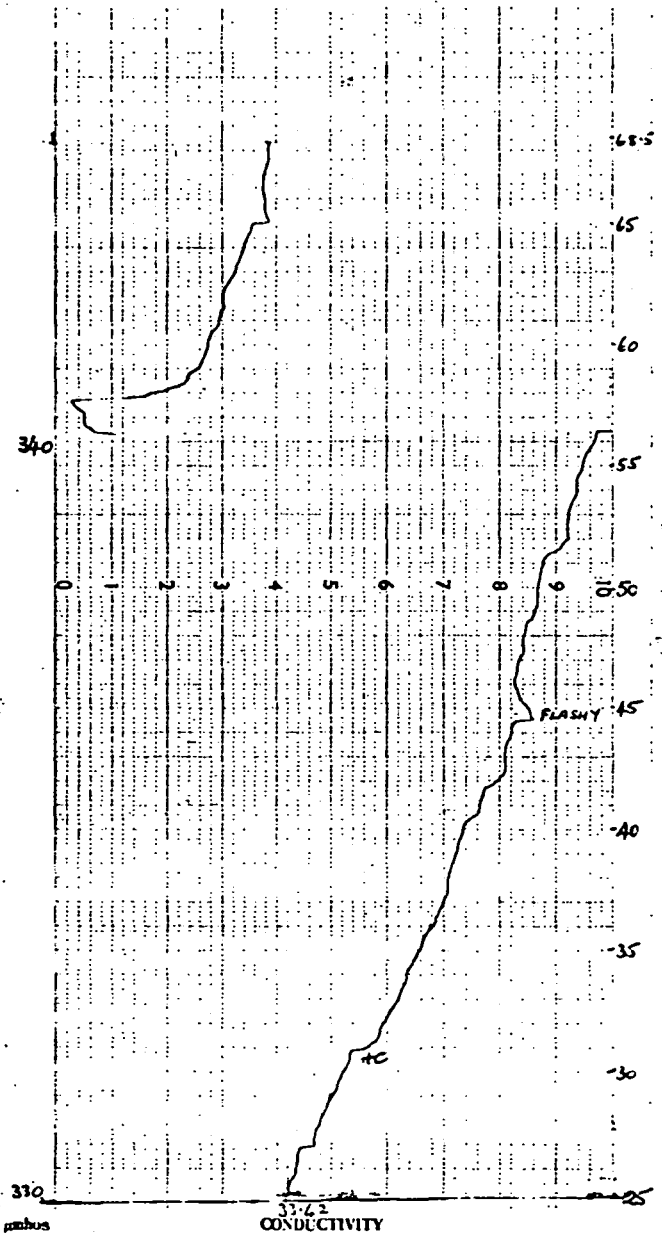
Date 14.11.73
 Time 1156-1205

TEXAS INSTRUMENTS LTD.

4771

MIL-M

metres below datum



CONDUCTIVITY

TEMPERATURE

G₂ Range 5

T Cal. No.

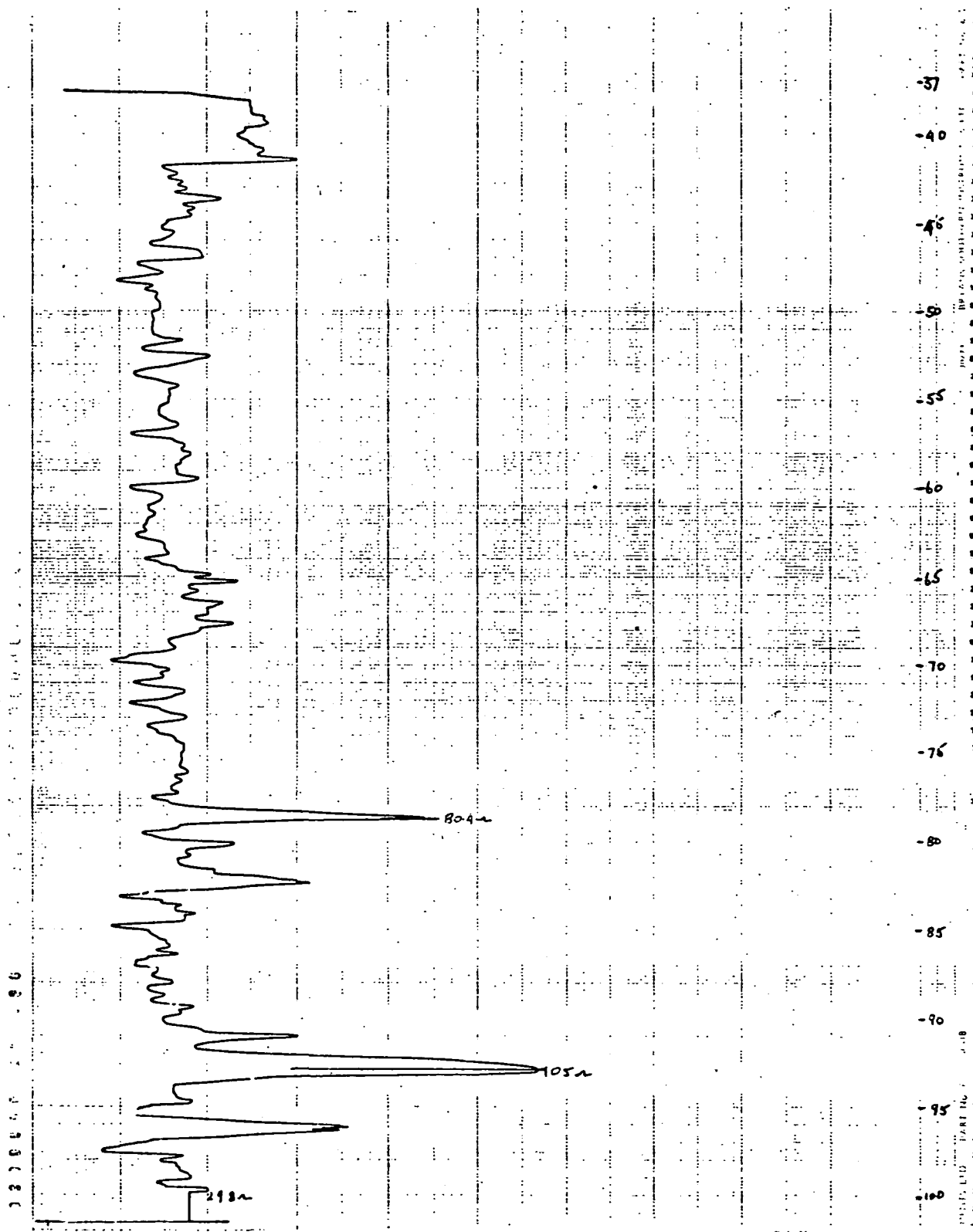
HUNTERSTON N° 3 TRIAL

Pumping rate (l/sec) (GROSS FLOW)
 Pumping rate adjacent boreholes (l/sec)
 Datum TOP OF EXTENSION PIPE
 O.D. of Datum

Date 14.11.73

Time 1221-1226

APPENDIX II



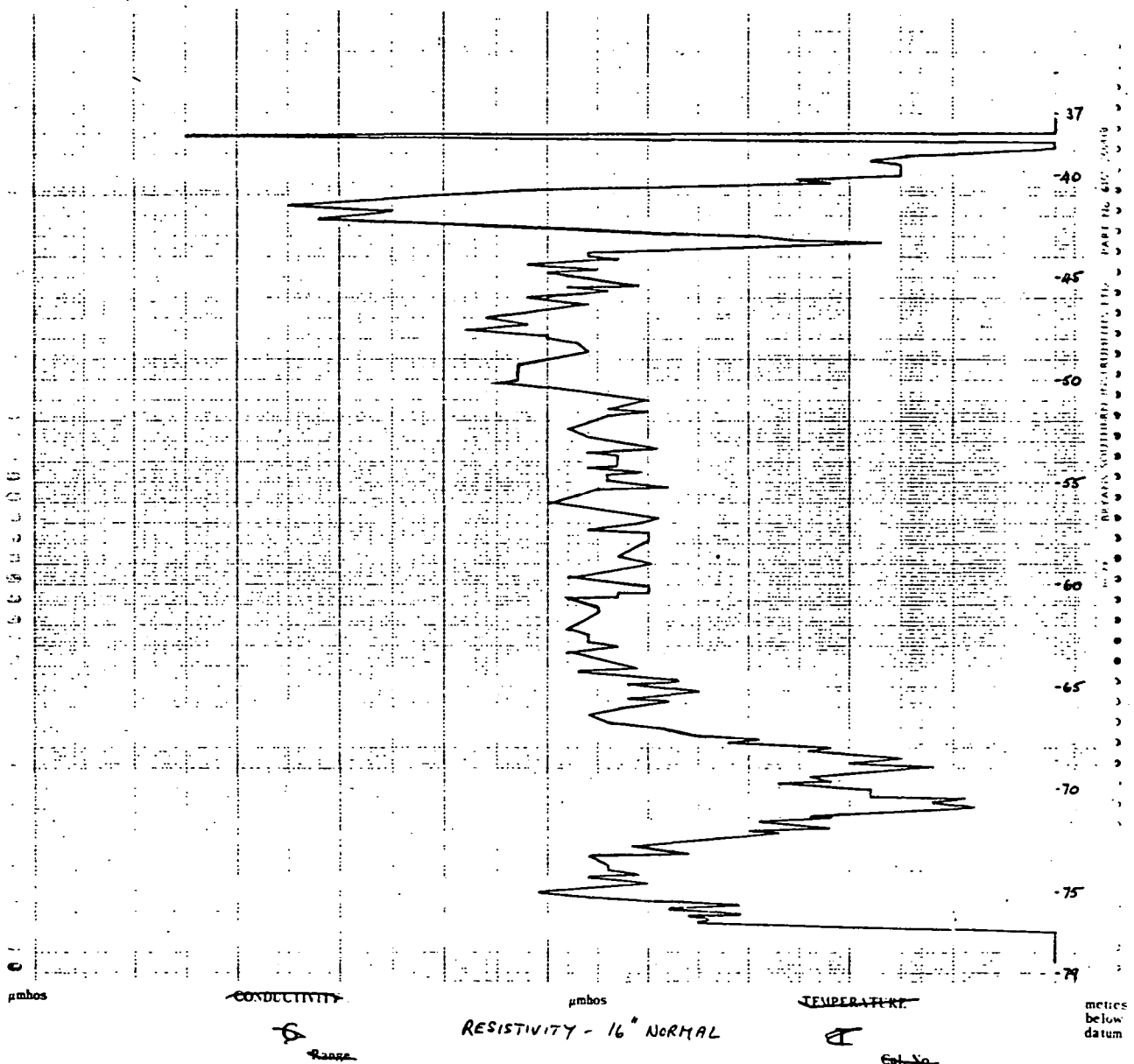
RESISTIVITY 16" NORMAL.

HUNTERSTON N°1

Pumping rate (l/sec) NIL
 Pumping rate adjacent
 Boreholes (l/sec) NIL
 Datum *Top of casing*
 O.D. of Datum

Date 28-4-74.

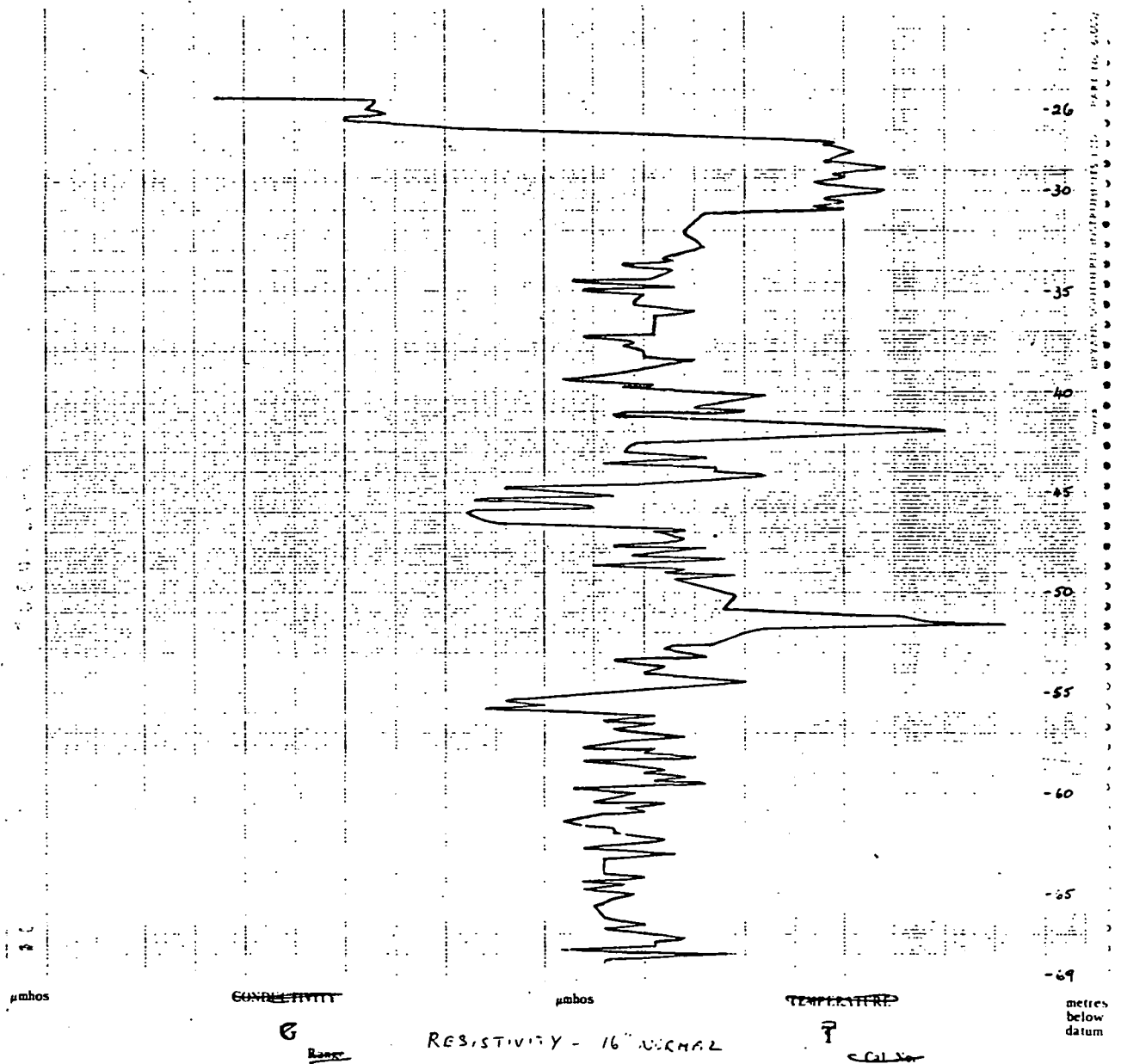
Time 10-55



Pumping rate (l./sec) NIL (OVERFLOWING)
 Pumping rate adjacent Boreholes (l./sec) NIL
 Datum TOP OF CASING
 O.D. of Datum

Date 18.11.73
 Time 1502

HUNTERSTON NO 2

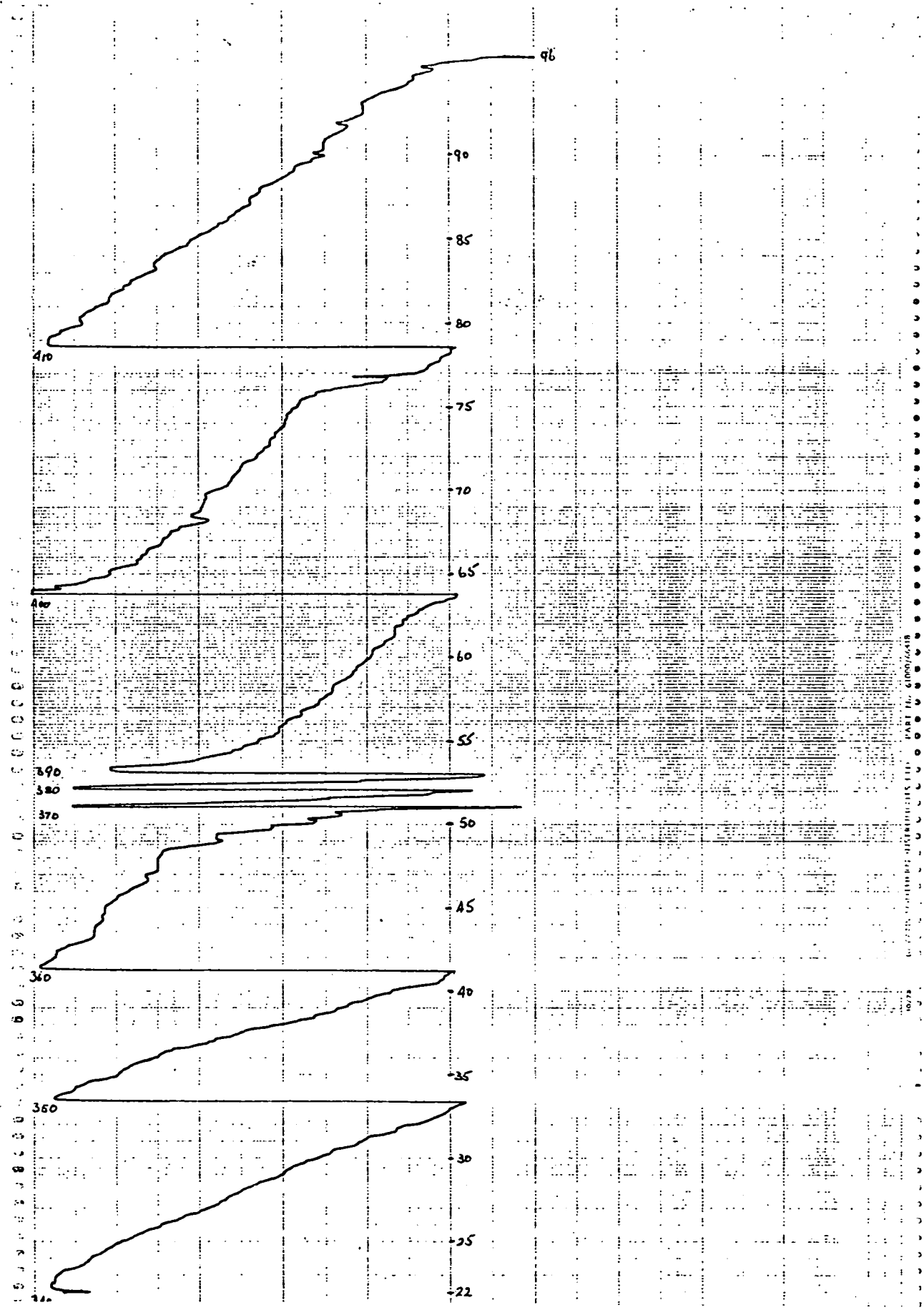


Pumping rate (l/sec) NIL (we flowing)
 Pumping rate adjacent Boreholes (l/sec) NIL
 Datum TOP OF CASING
 O.D. of Datum

Date 18 - 11 - 73
 Time 1435

HUNTERSTON NO 3

APPENDIX III



metres below datum

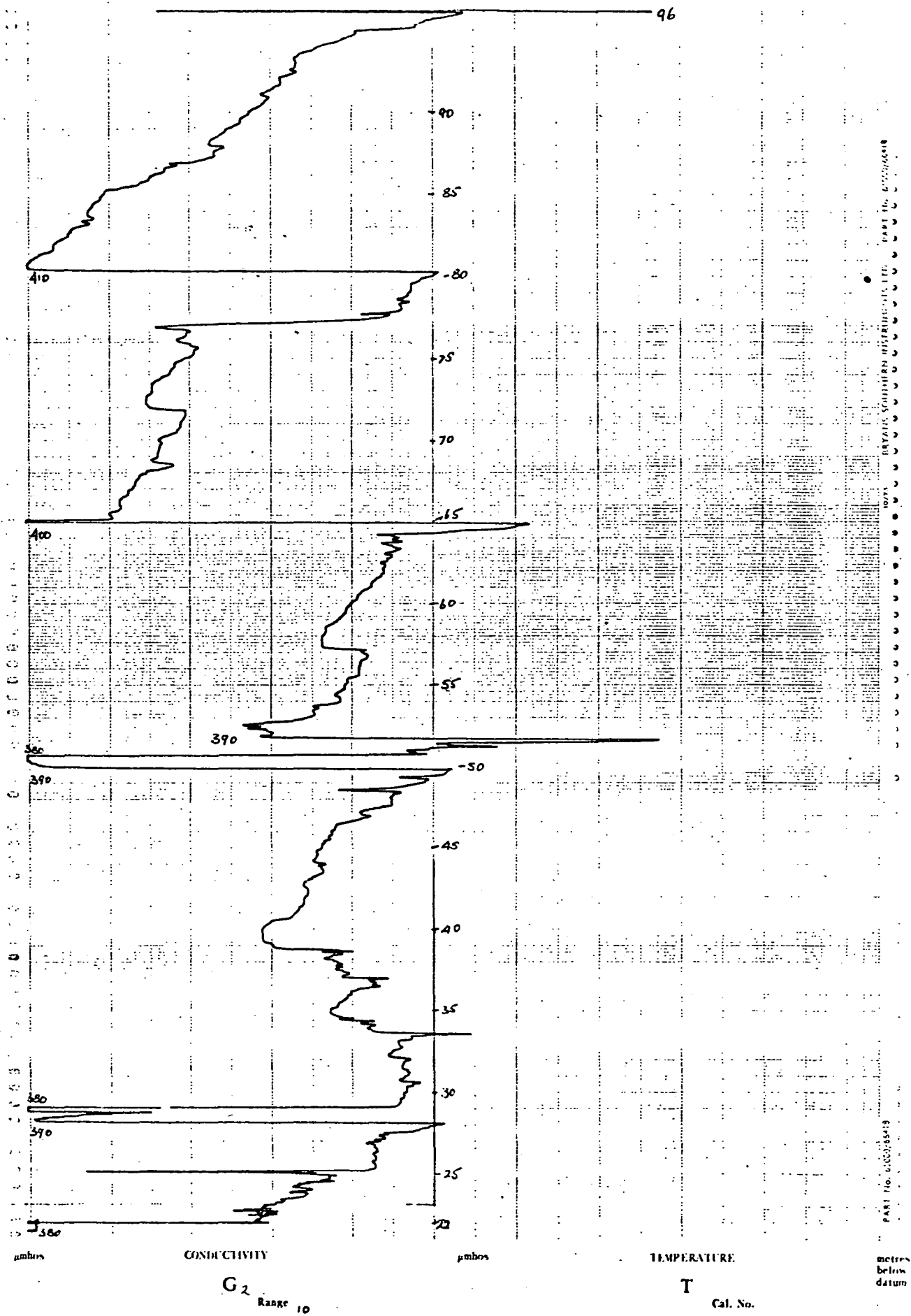
CONDUCTIVITY G_1 Range 10 μmhos

TEMPERATURE T Cal. No.

HUNTRSTON N^o 4.

Pumping rate (l/sec) N16
 Pumping rate adjacent N16.
 Diameter (l/sec)
 Datum *Top of casing*
 O.D. of Datum

Date 1-5-74.
 Time 14.46 - 14.51.

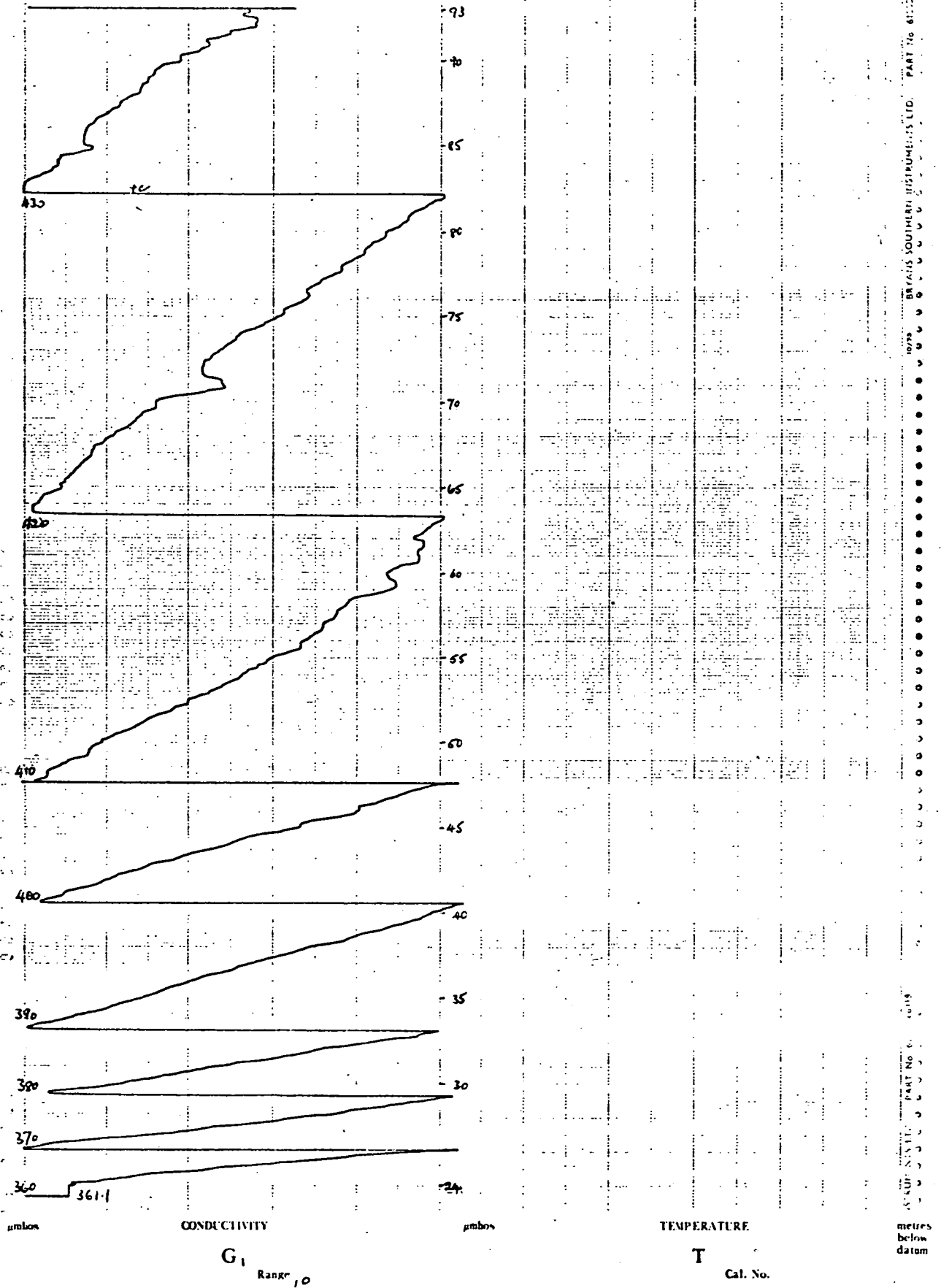


PART No. 0503/85413

HUNTERSTON No 4.

Pumping rate (l/sec) 1.82 from 15.14.
 Pumping rate adjacent Boreholes (l/sec) NIL.
 Datum *1st. of casing*
 O.D. of Datum

Date 1.5.74
 Time 15.20 - 15.30



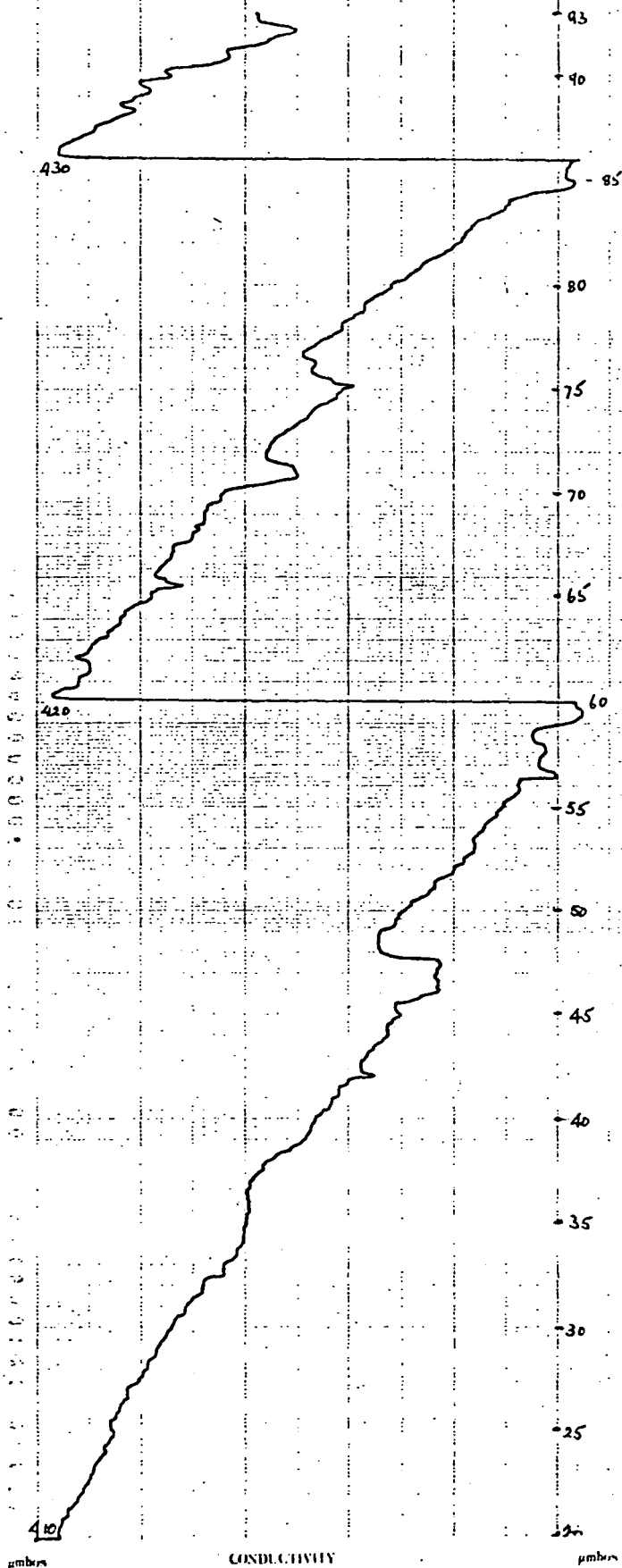
HONTERSTON N^o 5

Pumping rate (l/sec) NIL
 Pumping rate adjacent
 Boreholes (l/sec) NIL
 Datum *Top of casing.*
 O.D. of Datum

Date 28.4.74.

Time 14.58 - 15.01.

BRITISH SOUTHERN INSTRUMENTS LTD. PART 76 6115 500
 PART No. 6115



BUREAU OF OCEANOGRAPHY
PART NO. 6022-5453

PART NO. 6022-5453

NETS
Below
datum

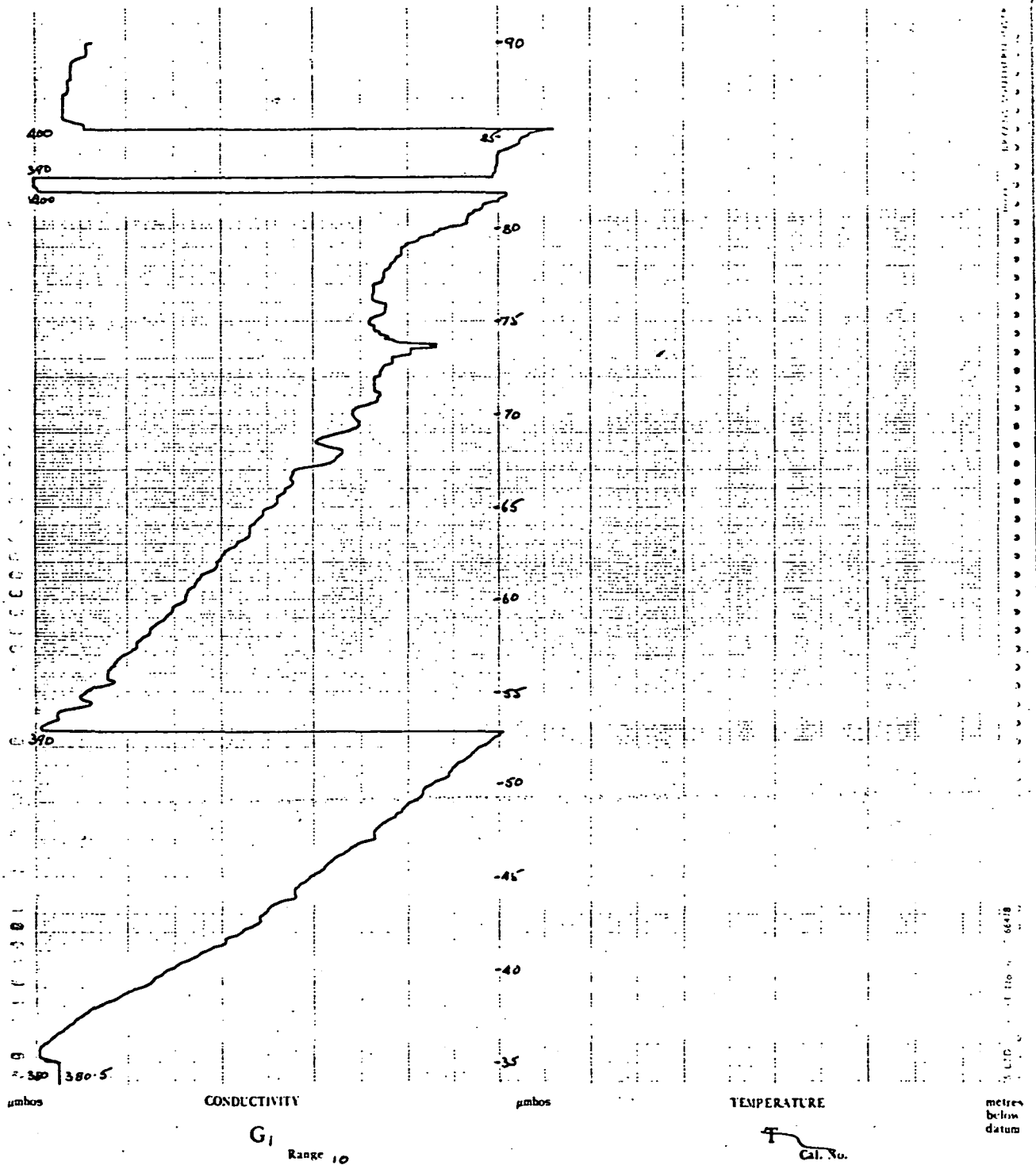
G4
Range 10

T
Cal. No.

HUNTERSTON No. 5

Pumping rate (l/sec) 0.07
Pumping rate adjacent
Boreholes (l/sec) NIL.

Date 1.5.74.
Time 13.48 - 13.54

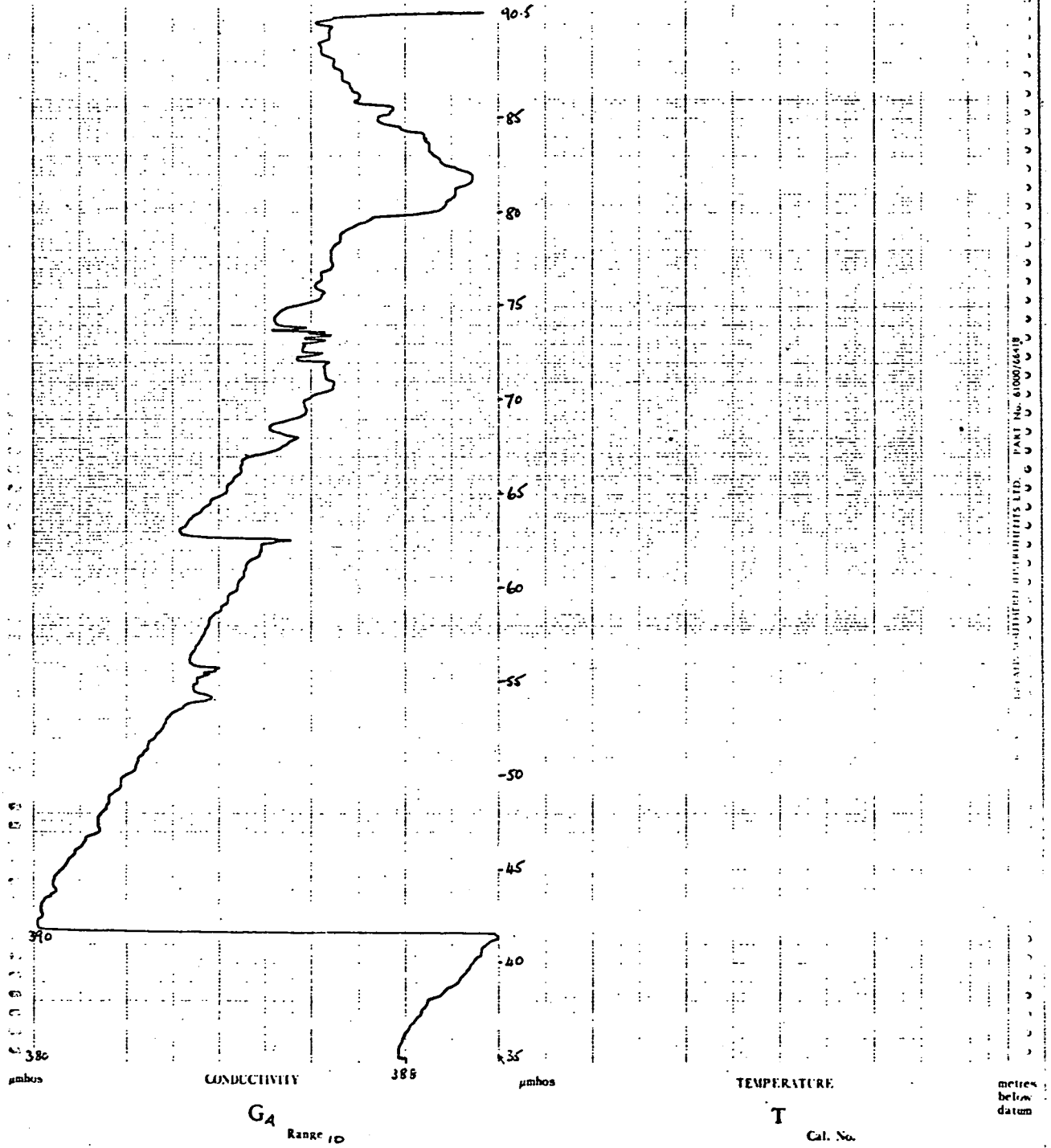


HONTERSTON. N^o6 TRIAL.

Pumping rate (l/sec) NIL
 Pumping rate adjacent
 Boreholes (l/sec) NIL
 Datum 24 of casing.
 (I.D. of Datum

Date 26-4-74.

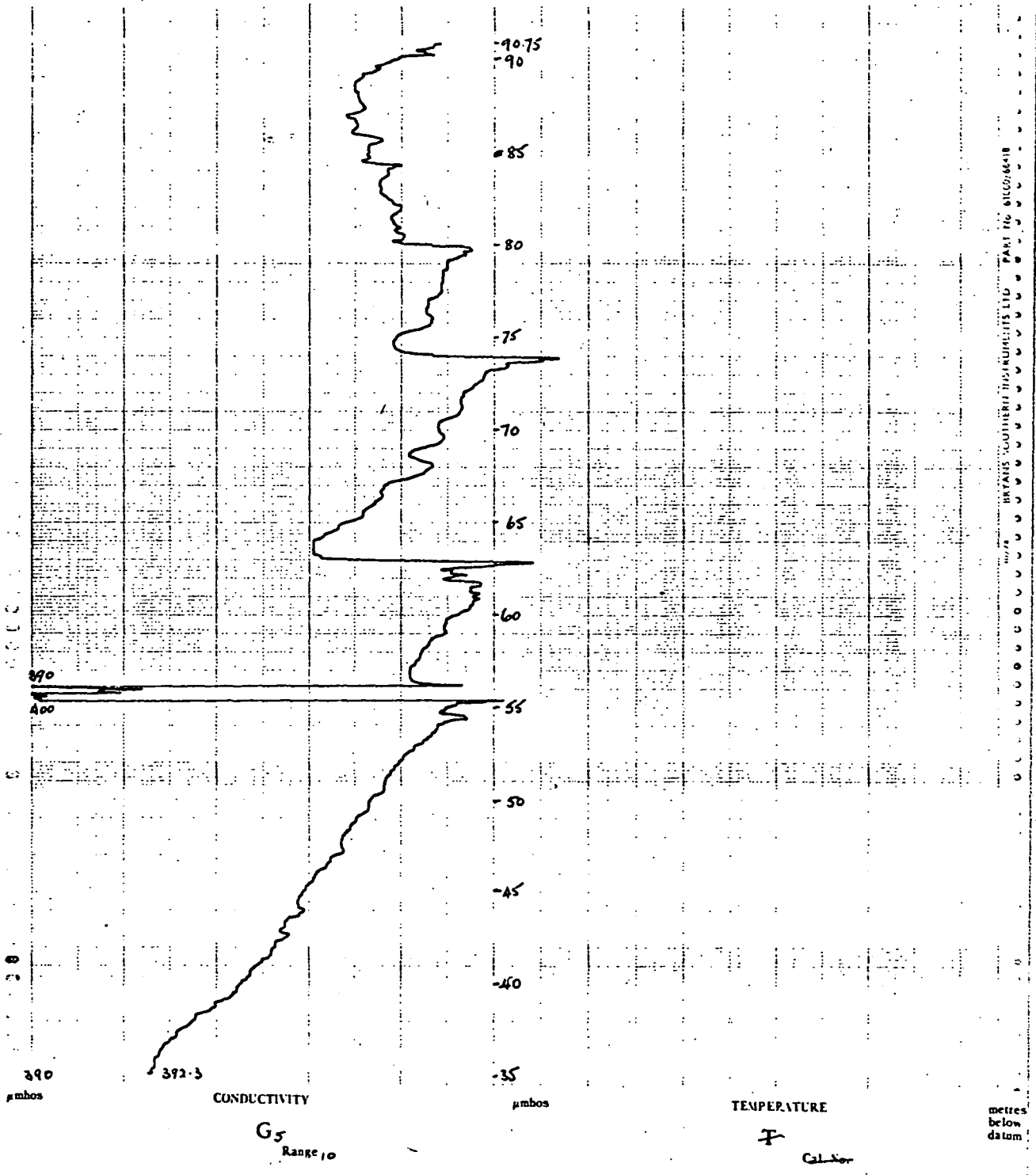
Time 14.08-14.15.



HUNTEASTON N°6 TRIAL.

Pumping rate (l./sec) 0.52
 Pumping rate adjacent
 Boreholes (l./sec) NIL.
 Datum *26.15 casing*
 O.D. of Datum

Date 26-4-74.
 Time 15.03-15.06.

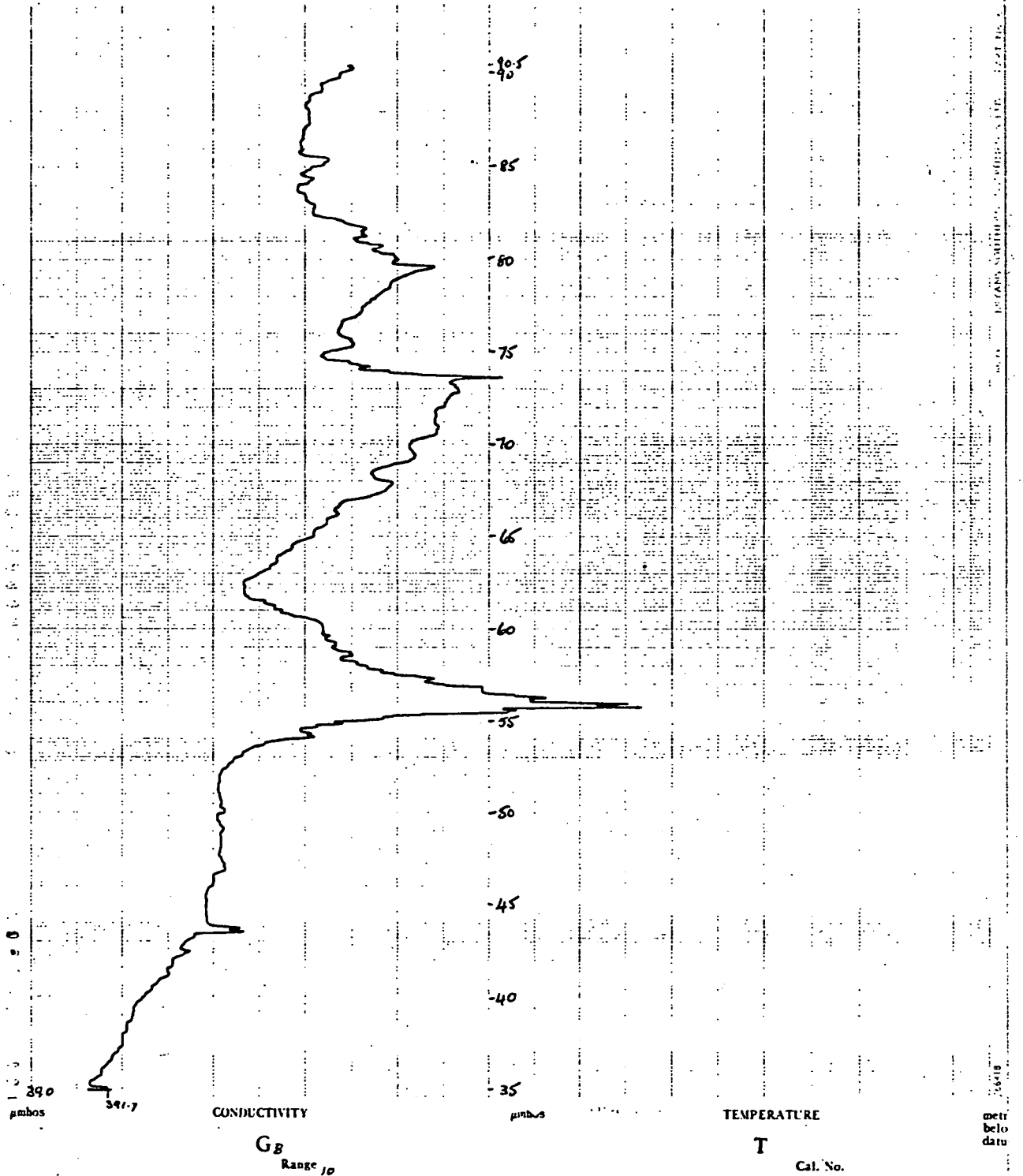


HUNTERSTON N°6

Pumping rate (l/sec) *NIL, but overflowing slightly.*
 Pumping rate adjacent
 Boreholes (l/sec) *NIL*
 Datum *top of casing*
 O.D. of datum

Date 29-4-74.

Time 10.15-10.21

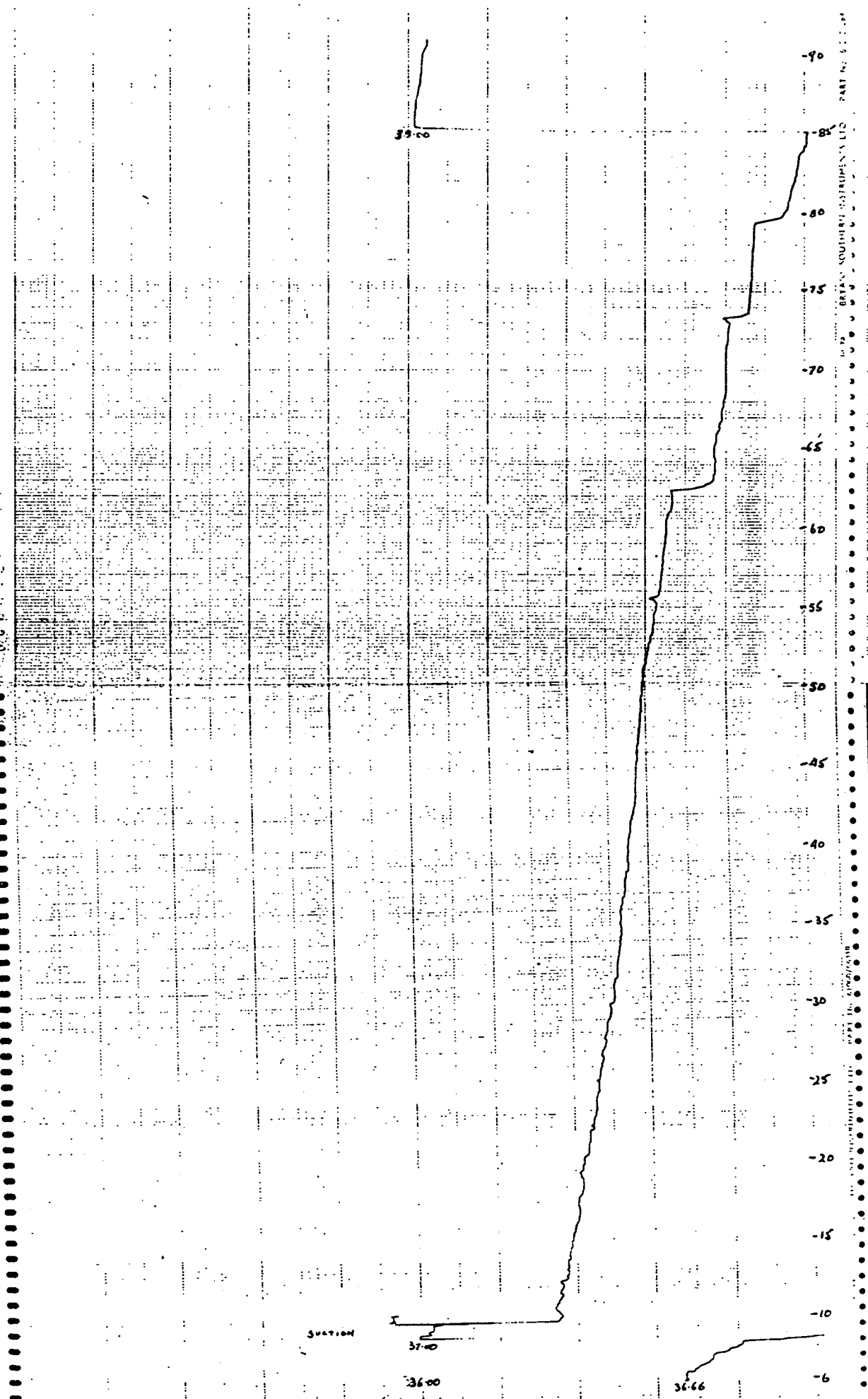


HUNTERSTON NO 6

Pumping rate (l/sec) *NIL*
 Pumping rate adjacent
 Boreholes (l/sec) *NO: at C1-89*
 Datum *2h of casing*
 O.D. of Datum

Date *29-4-7A.*

Time *11:57-12:02.*



CONDUCTIVITY

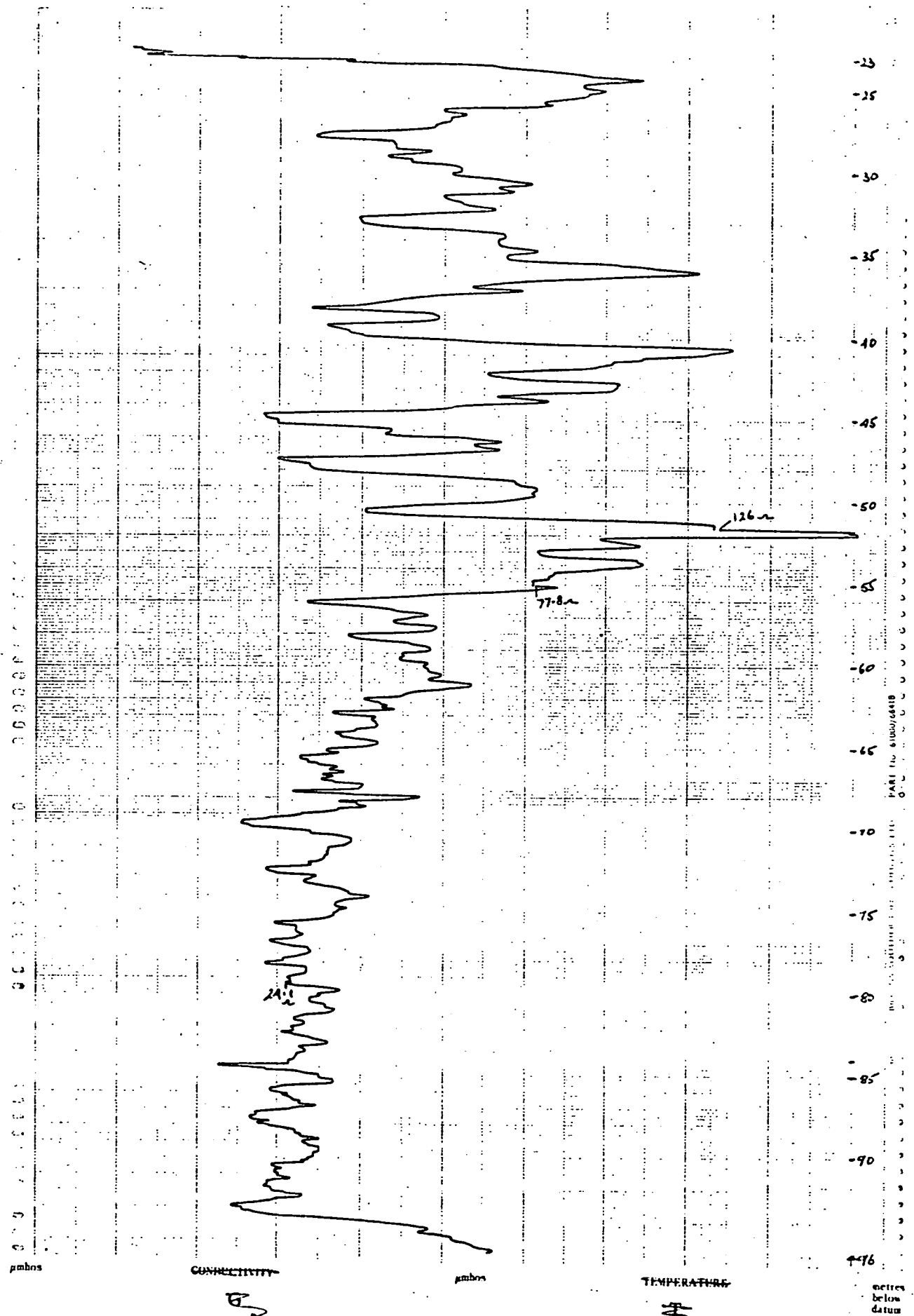
TEMPERATURE

TEMPERATURE

Range

T₂ Cal. No. 33

APPENDIX IV

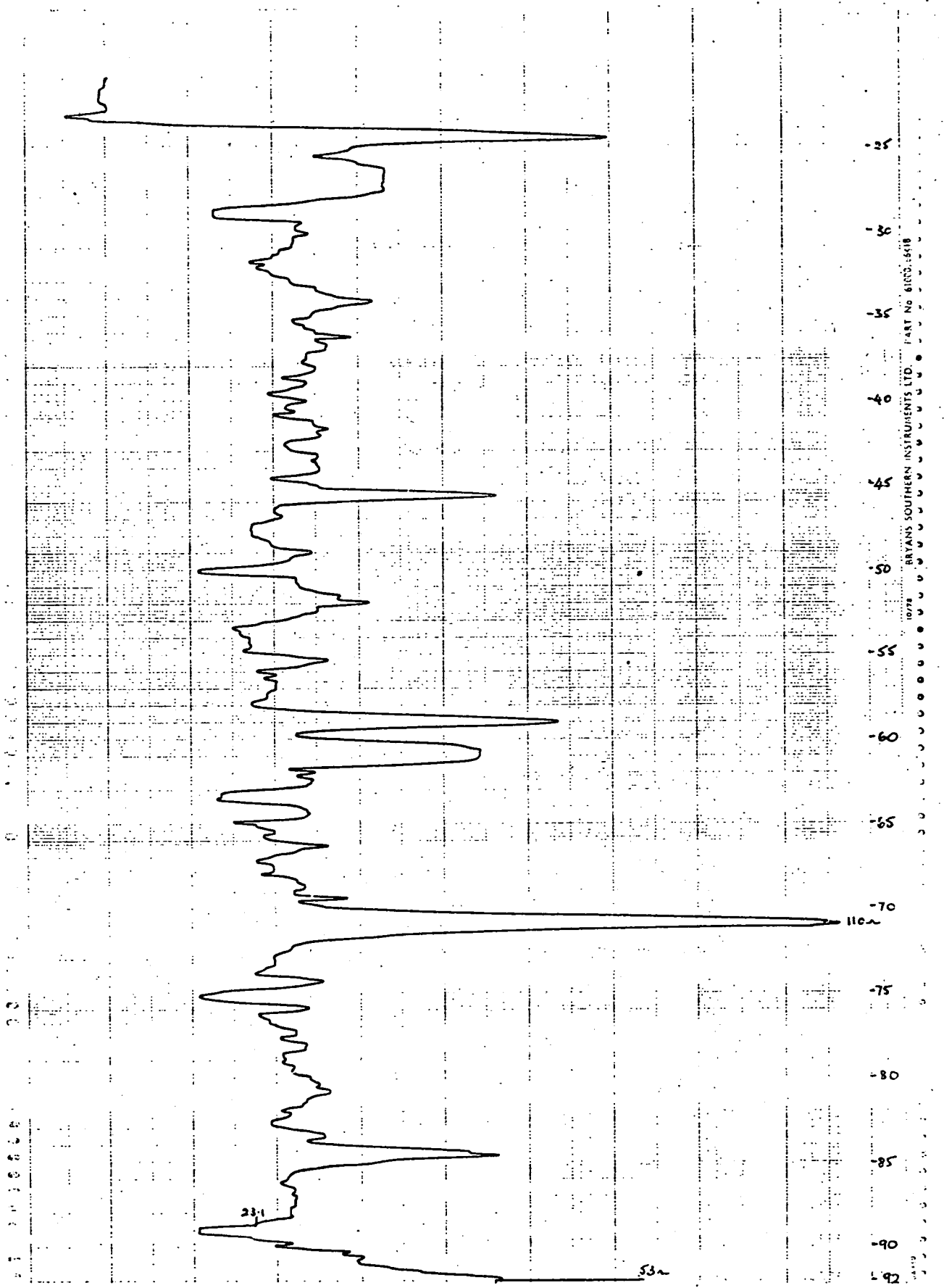


CONDUCTIVITY
 RESISTIVITY
 TEMPERATURE
 metres below datum

RESISTIVITY 16" NORMAL
 HUNTERSTON NO 4.

Pumping rate (l/sec) NIL
 Pumping rate adjacent
 Boreholes (l/sec) NIL
 Datum *Top of casing - NOT RETURN*
 O.D. of Datum

Date 29-4-74.
 Time 17:00



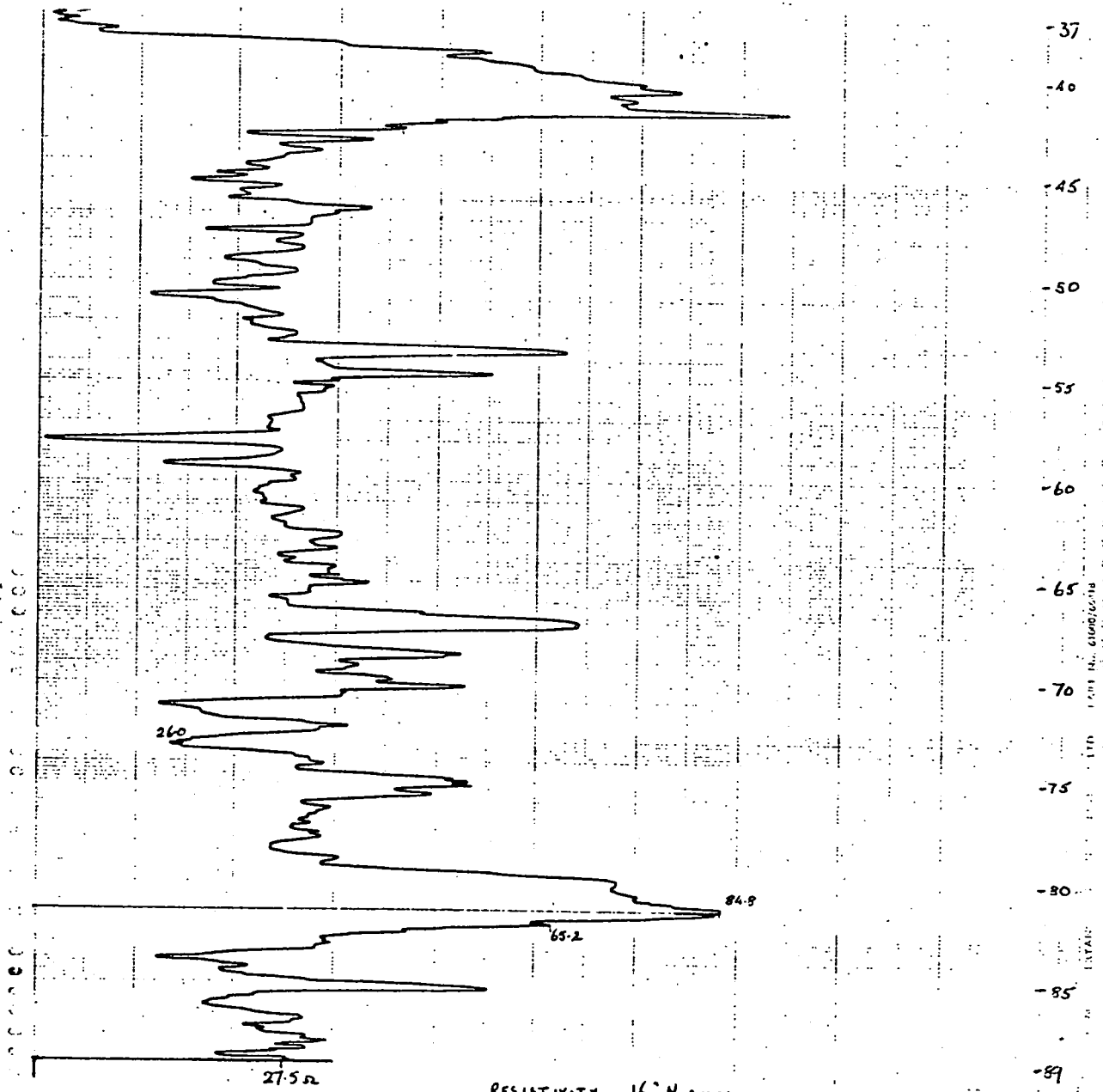
BRYANS SOUTHERN INSTRUMENTS LTD. PART No 6100-1618

μmhos
CONDUCTIVITY
μmhos
TEMPERATURE
metres below datum

RESISTIVITY 16" NORMAL
HUNTERSTON N°5

Pumping rate (l/sec) NIL
 Pumping rate adjacent Boreholes (l/sec) NIL
 Datum *Top of casing*
 O.D. of Datum

Date 28-4-71.
 Time 12-52.



RESISTIVITY 16' NORMAL.
 HUNTERSTON N° 6 TRIAL

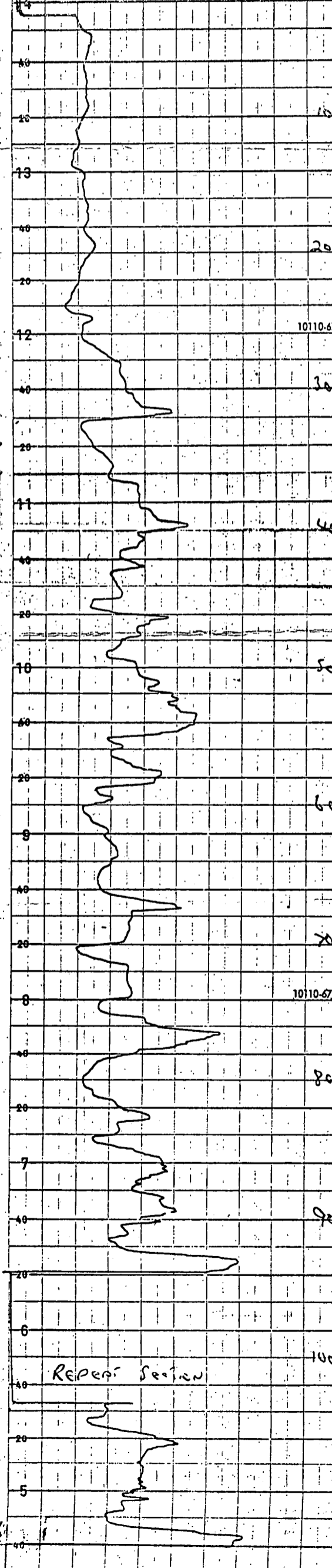
Pumping rate (l/sec) NIL
 Pumping rate adjacent
 Boreholes (l/sec) NIL
 Datum TB1 OF LINING TUBE 17m. c.g.l.
 O.D. of Datum

Date 26.4.74
 Time 1130

Rec. Pot. interval
 250 mV.

APPENDIX V

I.G.S. Well Log (P.L.)		Log of Gomma Ray	WELL IDENTIFICATION No. 4	Country
of Gomma Ray				
WELL IDENTIFICATION No. 4				
Country	Co-ordinates			
District Ayem. cc				
ELEVATION	G.L.			
D.F.	K.B.			
Top of Casing				
Run No.		FLUID		
Date	30.4.72	Nature		
First Reading	94 m.	Density		
Last Reading	3 m.	Viscosity		
Interval Logged	0.1 m.	Rm		
Drillers Datum		Rmf		
Log Datum	Casing top	PH		
T.D. Driller		Circ. Temp.		
T.D. I.G.S.		S.H.T.		
Casing (Driller)		Rm S.H.T.		
Casing (Log)		Fluid level		
Casing Size		Depth scale	1:200	
		Line speed	2 m/min	
Bit size		Time constant	10	
Pump intake		Logged by	K...	
REMARKS C.P.C. 50				



I.G.S. Well Log

Institute of Geological Sciences, Hydrogeological Department, Exhibition Road, London SW7, England

Country

WELL NUMBER: *Gamma Ray*

Log of *Gamma Ray*

of *Gamma Ray*
WELL NUMBER: *Gamma Ray*

Country _____ Co-ordinates _____

District *Agrew AC*

ELEVATION _____ G.L. _____

D.F. _____ K.B. _____

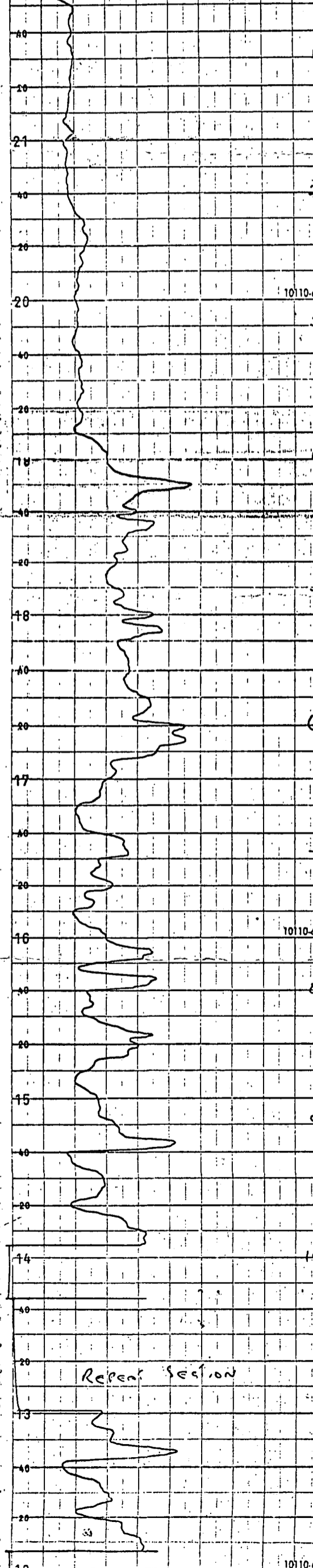
Top of Casing _____

Run No	Date	FLUID
	<i>29-4-74</i>	Nature
	<i>99 m</i>	Density
	<i>4 m</i>	Viscosity
	<i>95 m</i>	Rm
		Rmf
	<i>Casing top</i>	pH
		Circ. Temp.
		B.H.T.
		Rmp B.H.T.
		Fluid level
		Depth scale
		Line speed
		Time constant
		Logged by

Pump Intake _____

REMARKS *C.P.S. 50*

IGS 117 3000 5/71



I.G.S. Well Log (P.L.)

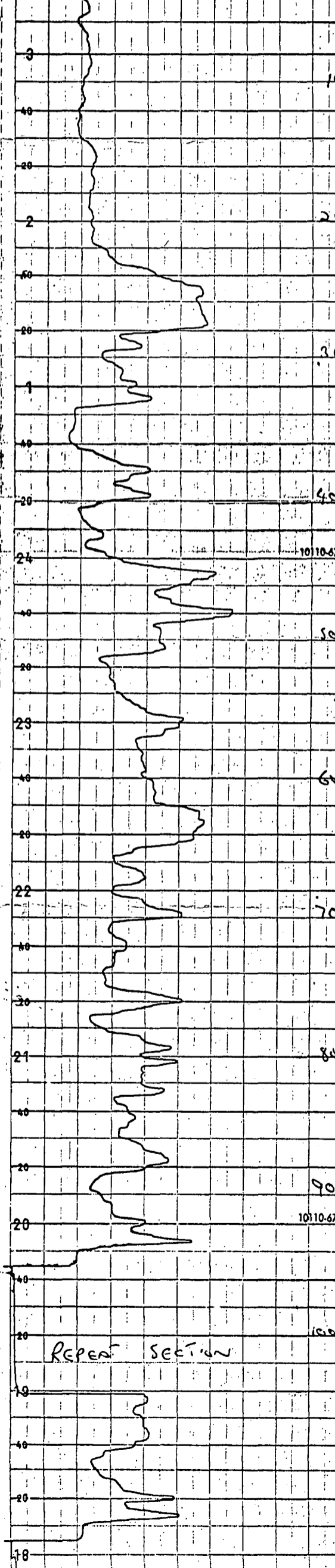
Institute of Geological Sciences, Hydrogeological Department, Exhibition Road, London SW7, England

Country		WELL No. 5	Log No. Gamma Ray
of <u>Gamma Ray</u>			
WELL No. <u>5</u>		WELL No. 5	Log No. Gamma Ray
Co-ordinates			
Country		WELL No. 5	Log No. Gamma Ray
District <u>Ayrshire</u>			
ELEVATION		WELL No. 5	Log No. Gamma Ray
D.F.			
Top of Casing		WELL No. 5	Log No. Gamma Ray
G.L. _____			
K.B. _____		WELL No. 5	Log No. Gamma Ray

Run No.		FLUID	
Date	<u>30-4-76</u>	Nature	
First Reading	<u>95 m</u>	Density	<u>1.0</u>
Last Reading	<u>4 m</u>	Viscosity	<u>1.0</u>
Interval Logged	<u>91 m</u>	Rm	<u>1.0</u>
Drillers Datum		Rmf	<u>1.0</u>
Log Datum	<u>Casing top</u>	pH	
T.D. Driller		Circ. Temp.	<u>1.0</u>
T.D. I.G.S.		B.H.T.	<u>1.0</u>
Casing (Driller)		Rmg B.H.T.	
Casing (Log)		Fluid level	
Casing Size		Depth scale	<u>1.200</u>
		Line speed	<u>2 m/min</u>
Bit size		Time constant	<u>10</u>
Pump Intake		Logged by	<u>Kenn</u>

REMARKS C.P.S. 50

IGS 117 3000 5/71



I.G.S. Well Log (P1)

of Ganna Ray
 WELL Identification No. 6
 Country _____ Co-ordinates _____
 District Dumfries
 ELEVATION _____ G.L. _____
 D.F. _____ K.B. _____
 Top of Casing _____

Country _____
 WELL Identification No. 6
 Log of Ganna Ray

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Run No.	Date	FLUID Nature
	<u>29-4-77</u>	
First Reading	<u>90m</u>	Density
Last Reading	<u>4m</u>	Viscosity
Interval Logged	<u>86m</u>	Rm
Drillers Datum		Rmf
Log Datum	<u>Casing top</u>	pH
T.D. Driller		Circ. Temp.
T.D. I.G.S.		B.H.T.
Casing (Driller)		Rmp B.H.T.
Casing (Log)		Fluid level
Casing Size		Depth scale
		Line speed
Bit size		Time constant
Pump Intake		Logged by

REMARKS C/S 50
Noise - T.C. 5 8mm
T.S. 10 5mm

IGS 117 3000 5/71

