U.S. POLYMERIC

HITCO MATERIALS DIVISION

FM 5834 LOT #2

D-09275

FINGERPRINT TEST DATA REPORT

NAS8-36298 COPY # 9

U.S. Polymeric

FILLER TESTING

NAS8-36298

U.S. POLYMERIC O.E. 71108

Filler Lot for NASA Lot# 2

		SAMPLE			
1. Carbon Content, % QAI-5560		#2A-1	#2A-2	#2A-3	
		99.31	99.18	99.40	
	NASA LOT# 2 AVERAGE			99.30	
2. Ash Content, % PTM-71B		0.0	0.0	0.0	
		0.0	0.0	0.0	
	AVG.	0.0	0.0	0.0	
	NASA LOT# 2 AVERAGE			0.0	
3. Atomic Absorption, ppm CTM-53B (Values are average of 2 determinations)		#2A-1	#2A-2	#2A-3	LOT#2 AVG.
	Na	7.0	7.5	9.0	7.8
	K	1.5	1.0	2.5	1.7
	Ca	2.5	1.5	2.0	2.0
	Mg	0.0	0.0	0.0	0.0
	Li	0.0	0.0	0.0	0.0
	TOTAL	11.0	10.0	13.5	11.5
3a. Moisture Content, % CTM-53B		.041	.034	.039	
		.031	.020	.045	
	AVG.	.036	.027	.042	
	NASA LOT# 2 AVERAGE			.035	
3b. Ash Content, % CTM-53B		0.005	0.000	0.015	
		0.000	0.025	0.000	
	AVG.	0.003	0.013	0.008	
	NASA LOT# 2 AVERAGE			0.008	
4. pH, Units ASTM D1512		4.60	4.40	4.50	
		4.60	4.60	4.70	
	AVG.	4.60	4.50	4.60	
	NASA LOT# 2 AVERAGE			4.57	
5. Particle Size, microns S.E.M. procedure (Average values are of 20 determinations)	AVG.	.56	.57	.52	
	Maximum	.90	1.25	1.17	
	Minimum	.23	.20	.25	
	Std. Dev	.22	.28	.24	
	NASA LOT# 2 AVERAGE SIZE			.55	
6a. TGA, °C at 50% Loss CTM-51		842	850	857	
	NASA LOT# 2 AVERAGE			850	

HITCO MATERIALS DIVISION
700 E. DYER ROAD, SANTA ANA, CALIFORNIA 92707 • (714) 549-1101 • TWX (910) 595-1130 • FAX # (714) 549-2858-5-2437

Filler Lot for NASA Lot# 2

6b. TGA
CTM-51 — See Charts 6A-6C

7. Particle Size Distribution
CTM-72 — See Charts 7A-7C

7a. Particle Size, microns
CTM-72

	#2A-1	#2A-2	#2A-3
	.86	.97	.95
	.85	1.08	.92
AVG.	.86	1.02	.94

NASA LOT# 2 AVERAGE .94

U.S. Polymeric

Hamid M. Quraishi

Hamid M. Quraishi, Manager
Quality Assurance Department

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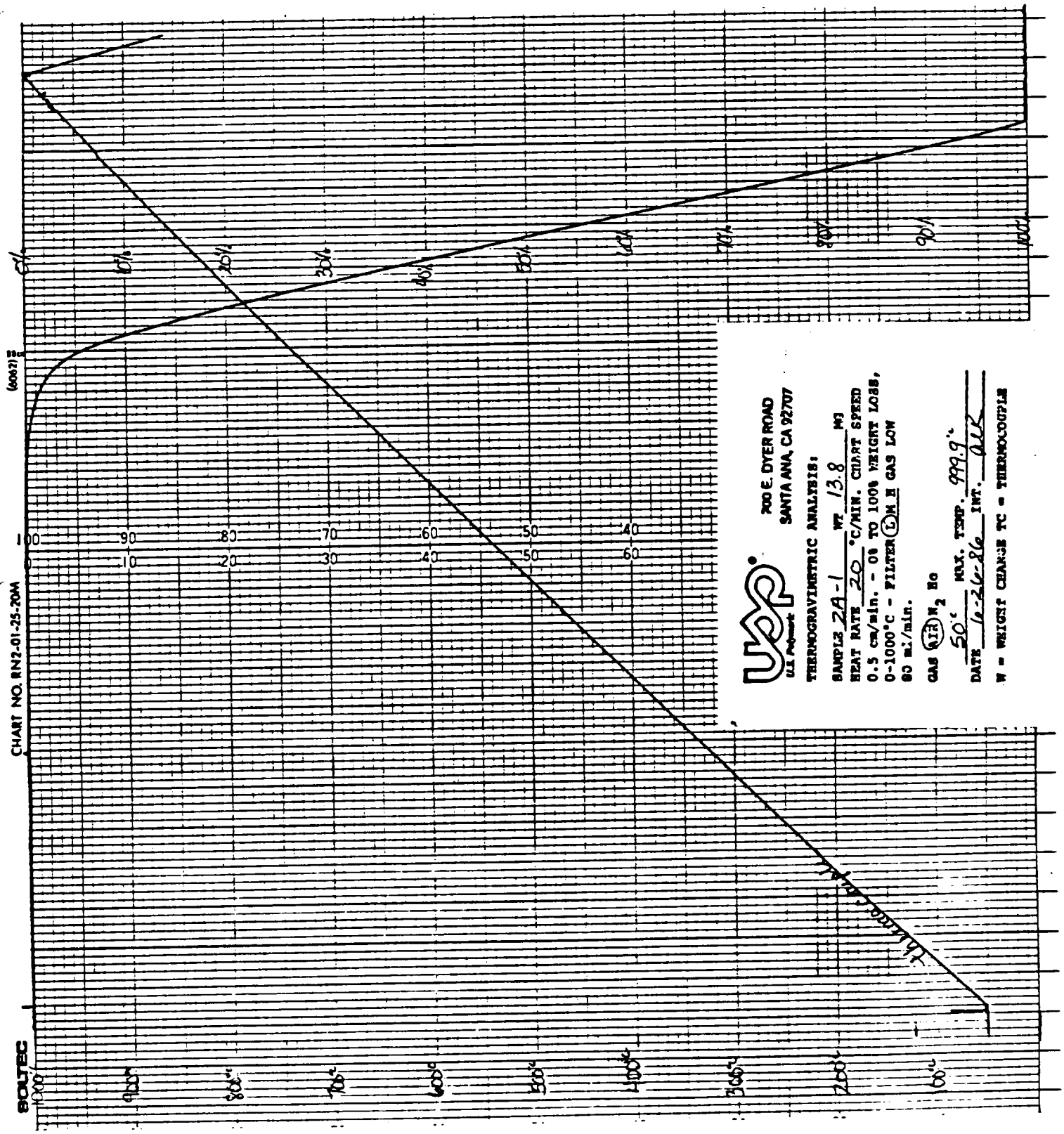

CHART 6B

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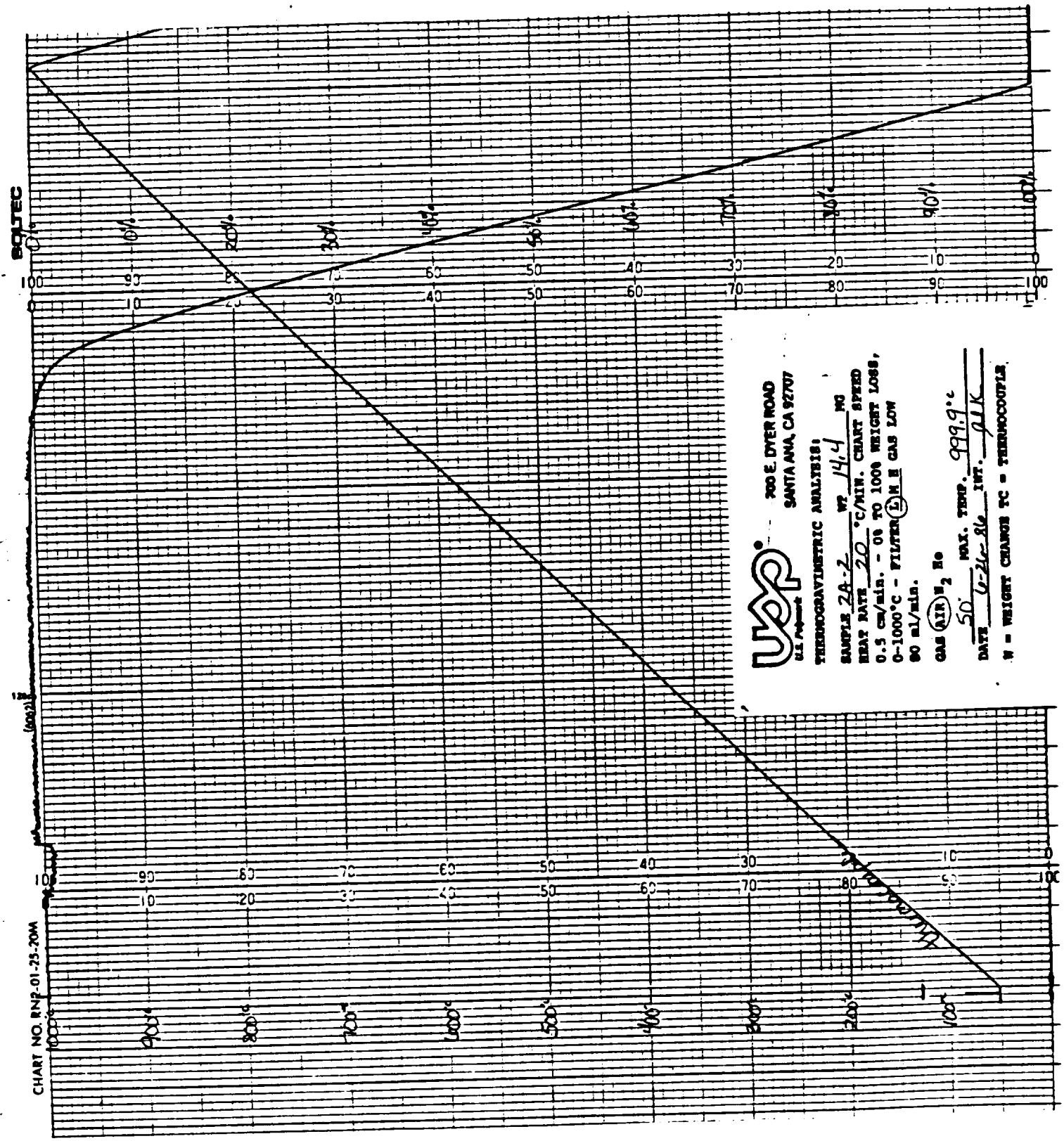

CHART 6C

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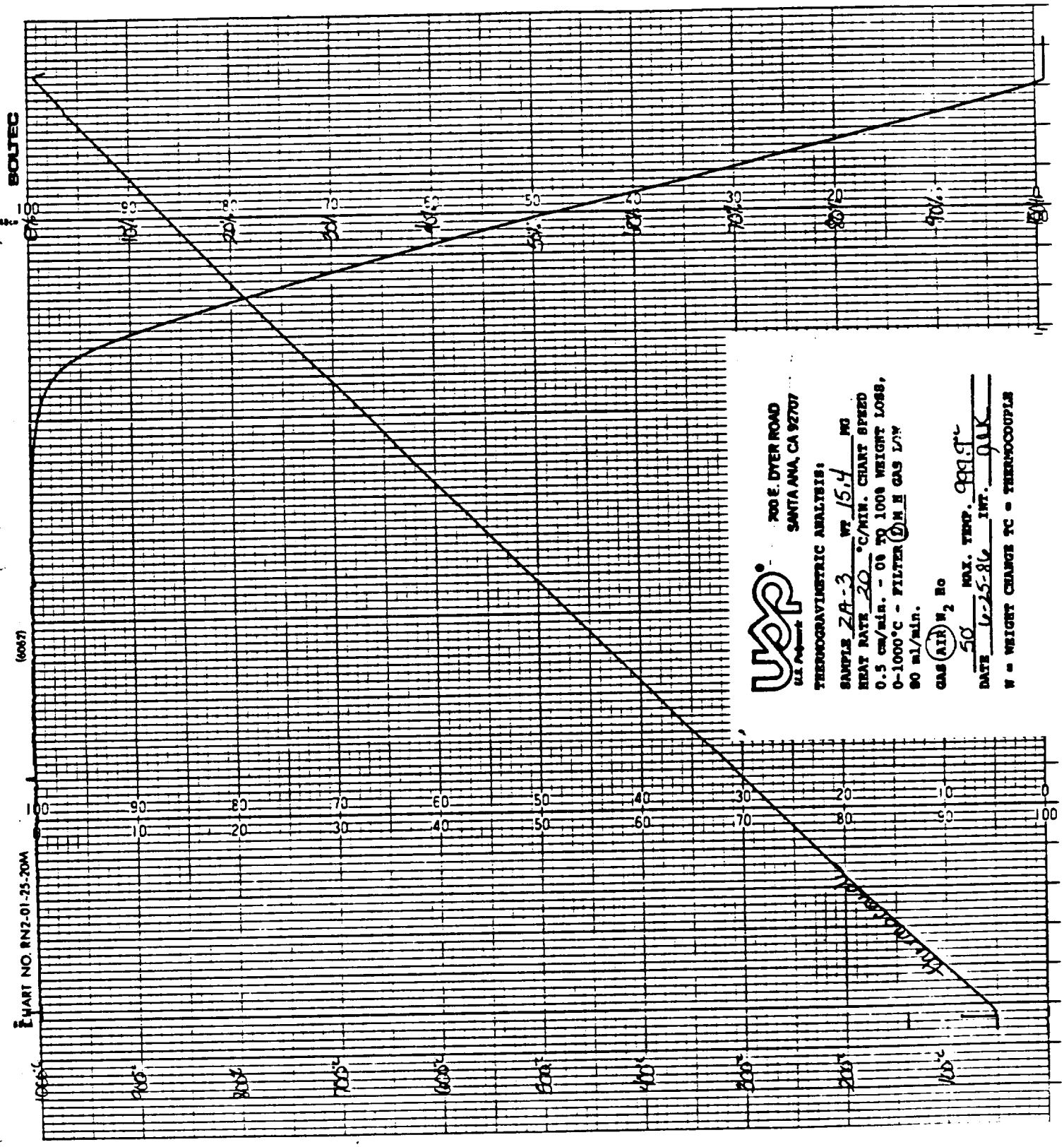


HORIBA CAPA-500
PARTICLE ANALYZER

DATE 5-24-86
#1 SAMPLE NASA LOT#2A-1
SOLVENT ETHYL GLYCOL
C=0.01 mg/ml

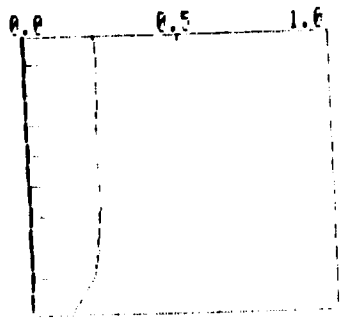
* CONDITIONS

SOLV.VISC	19.90(CP)
SOLV.DENS	1.11(G/CC)
SAMP.DENS	1.90(G/CC)
D(MAX)	5.0 (MM)
D(MIN)	0.01(MM)
D(DIV)	0.50(MM)
SPEED	5000. (RPM)

* TIME 0 H 11 MIN 31 SEC

* DATA

TIME ABSORBANCE

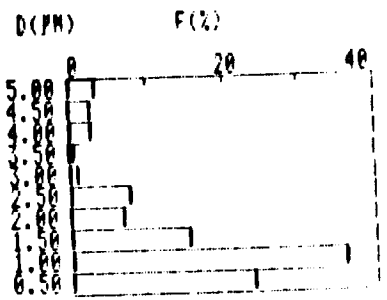


* DISTRIBUTION TABLE (BY VOL.)

D(MM)	F(%)	R(%)
5.00 <	0.0	0.0
5.00-4.50	3.3	3.3
4.50-4.00	2.6	5.9
4.00-3.50	2.7	8.7
3.50-3.00	0.5	9.2
3.00-2.50	0.9	10.0
2.50-2.00	7.8	17.8
2.00-1.50	7.0	24.7
1.50-1.00	15.2	39.9
1.00-0.50	36.1	76.0
0.50-0.00	24.0	100.0

D(AVE) 0.86 (MM)

* DISTRIBUTION GRAPH (BY VOL.)



LOT#2A-1
Sample #1

HORIBA CAPA-500
PARTICLE ANALYZER

DATE 5-24-86
#2 SAMPLE NASA LOT#2A-1
SOLVENT ETHYL GLYCOL
C=0.01 mg/ml

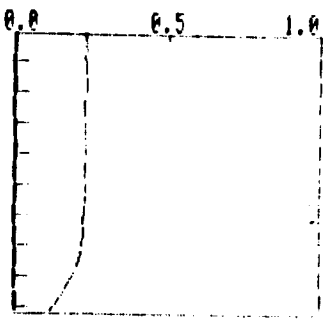
* CONDITIONS

SOLV.VISC	19.90(CP)
SOLV.DENS	1.11(G/CC)
SAMP.DENS	1.90(G/CC)
D(MAX)	5.0 (MM)
D(MIN)	0.01(MM)
D(DIV)	0.50(MM)
SPEED	5000. (RPM)

* TIME 0 H 11 MIN 31 SEC

* DATA

TIME ABSORBANCE

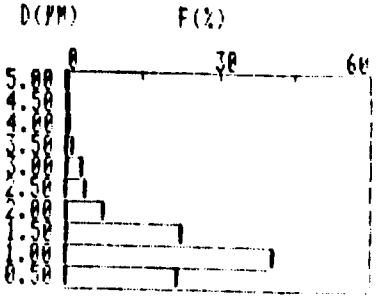


* DISTRIBUTION TABLE (BY VOL.)

D(MM)	F(%)	R(%)
5.00 <	0.0	0.0
5.00-4.50	0.0	0.0
4.50-4.00	0.0	0.0
4.00-3.50	0.0	0.0
3.50-3.00	1.1	1.1
3.00-2.50	3.0	4.1
2.50-2.00	3.8	7.8
2.00-1.50	7.4	15.2
1.50-1.00	22.4	37.6
1.00-0.50	40.8	78.3
0.50-0.00	21.7	100.0

D(AVE) 0.85 (MM)

* DISTRIBUTION GRAPH (BY VOL.)



LOT#2A-1
Sample#2

CHART 7A

HORIBA CAPA-500
PARTICLE ANALYZER

DATE 5-24-86
#1 SAMPLE NASA LOT#2A-2
SOLVENT ETHYL GLYCOL
C=0.01 mg/ml

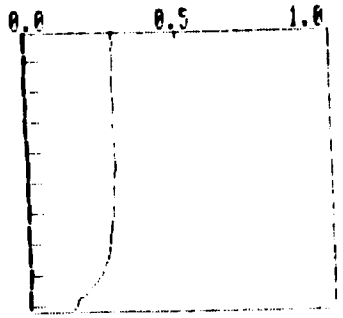
* CONDITIONS

SOLV.VISC	19.90(CP)
SOLV.DENS	1.11(G/CC)
SAMP.DENS	1.90(G/CC)
D(MAX)	5.0 (PM)
D(MIN)	0.01(PM)
D(DIV)	0.50(PM)
SPEED	5000. (RPM)

* TIME 0 H 11 MIN 31 SEC

* DATA

TIME ABSORBANCE

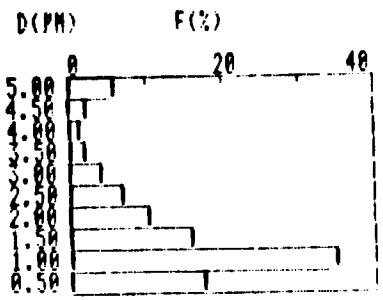


* DISTRIBUTION TABLE (BY VOL.)

D(PM)	F(%)	R(%)
5.00 <	0.0	0.0
5.00-4.50	5.7	5.7
4.50-4.00	2.2	7.9
4.00-3.50	1.2	9.1
3.50-3.00	1.7	10.8
3.00-2.50	4.0	14.8
2.50-2.00	6.7	21.5
2.00-1.50	10.2	31.7
1.50-1.00	16.0	47.7
1.00-0.50	34.8	82.5
0.50-0.00	17.5	100.0

D(AVE) 0.97 (PM)

* DISTRIBUTION GRAPH (BY VOL.)



Lot#2A-2
Sample#1

HORIBA CAPA-500
PARTICLE ANALYZER

DATE 5-24-86
#2 SAMPLE NASA LOT#2A-2
SOLVENT ETHYL GLYCOL
C=0.01 mg/ml

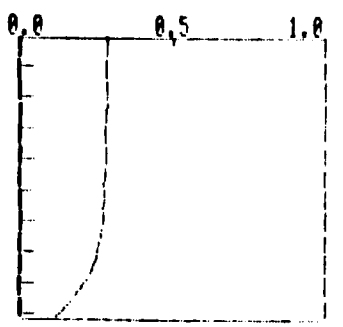
* CONDITIONS

SOLV.VISC	19.90(CP)
SOLV.DENS	1.11(G/CC)
SAMP.DENS	1.90(G/CC)
D(MAX)	5.0 (PM)
D(MIN)	0.01(PM)
D(DIV)	0.50(PM)
SPEED	5000. (RPM)

* TIME 0 H 11 MIN 31 SEC

* DATA

TIME ABSORBANCE

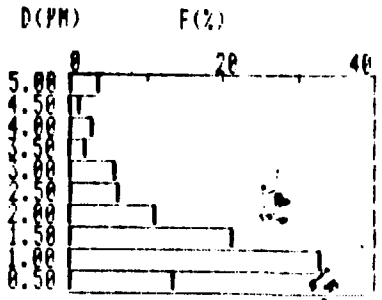


* DISTRIBUTION TABLE (BY VOL.)

D(PM)	F(%)	R(%)
5.00 <	0.0	0.0
5.00-4.50	3.5	3.5
4.50-4.00	1.0	4.5
4.00-3.50	2.8	7.3
3.50-3.00	2.0	9.3
3.00-2.50	5.7	14.9
2.50-2.00	6.1	21.0
2.00-1.50	11.2	32.2
1.50-1.00	21.2	53.5
1.00-0.50	33.0	86.4
0.50-0.00	13.6	100.0

D(AVE) 1.08 (PM)

* DISTRIBUTION GRAPH (BY VOL.)



LOT#2A-2
Sample#2

CHART 7B

HORIBA CAPA-500
PARTICLE ANALYZER

DATE 5-24-86
#1 SAMPLE NASA LOT#2A-3
SOLVENT ETHYL-GLYCOL
C=0.01 mg/ml

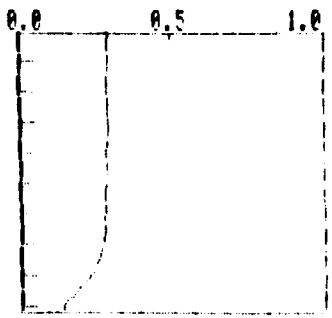
* CONDITIONS

SOLV.VISC	19.90(CP)
SOLV.DENS	1.11(G/CC)
SAMP.DENS	1.90(G/CC)
D(MAX)	5.0 (PM)
D(MIN)	0.01(PM)
D(DIV)	0.50(PM)
SPEED	5000. (PPM)

* TIME 0 H 11 MIN 31 SEC

* DATA

TIME ABSORBANCE

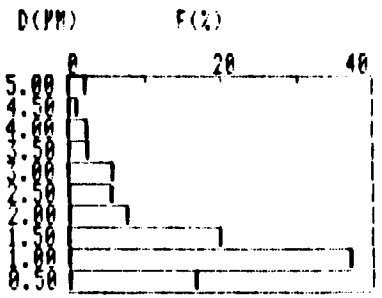


* DISTRIBUTION TABLE (BY VOL.)

D(PM)	F(%)	R(%)
5.00 <	0.0	0.0
5.00-4.50	2.0	2.0
4.50-4.00	0.9	2.9
4.00-3.50	2.3	5.2
3.50-3.00	2.2	7.5
3.00-2.50	5.7	13.2
2.50-2.00	5.6	18.8
2.00-1.50	7.5	26.3
1.50-1.00	19.9	46.2
1.00-0.50	37.2	83.4
0.50-0.00	16.6	100.0

D(AVE) 0.95 (PM)

* DISTRIBUTION GRAPH (BY VOL.)



Lot#2A-3
Sample #1

HORIBA CAPA-500
PARTICLE ANALYZER

DATE 5-24-86
#2 SAMPLE NASA LOT#2A-3
SOLVENT ETHYL-GLYCOL
C=0.01 mg/ml

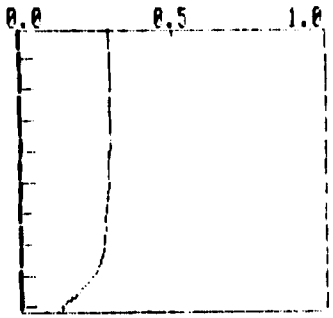
* CONDITIONS

SOLV.VISC	19.90(CP)
SOLV.DENS	1.11(G/CC)
SAMP.DENS	1.90(G/CC)
D(MAX)	5.0 (PM)
D(MIN)	0.01(PM)
D(DIV)	0.50(PM)
SPEED	5000. (RPM)

* TIME 0 H 11 MIN 31 SEC

* DATA

TIME ABSORBANCE

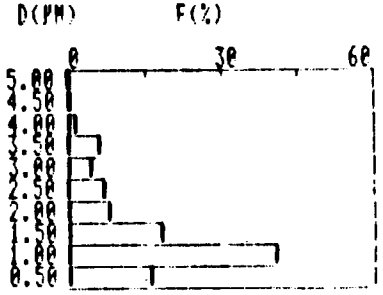


* DISTRIBUTION TABLE (BY VOL.)

D(PM)	F(%)	R(%)
5.00 <	0.0	0.0
5.00-4.50	0.0	0.0
4.50-4.00	0.0	0.0
4.00-3.50	1.1	1.1
3.50-3.00	5.8	6.9
3.00-2.50	4.1	11.1
2.50-2.00	6.9	18.0
2.00-1.50	7.7	25.7
1.50-1.00	17.8	43.4
1.00-0.50	40.7	84.1
0.50-0.00	15.9	100.0

D(AVE) 0.92 (PM)

* DISTRIBUTION GRAPH (BY VOL.)



Lot#2A-3
Samp.#2

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CHART 7C

TABLE OF CONTENTS

RESIN TESTING

NAS8-36298

U.S. Polymeric O.E. 71108

91LD Resin Lot for NASA Lot# 2

CHARTS

U.S. Polymeric

RESIN TESTING

NAS8-36298

U.S. Polymeric O.E. 71108

91LD Resin Lot for NASA Lot# 2

		#2-1	#2-2	#2-3
1. Resin Solids, % PTM-7C		70.8	70.4	71.7
		70.8	70.2	71.2
		71.9	72.0	70.5
	AVG.	71.2	70.9	71.1
	Lot# 2 AVERAGE			71.1
2. Specific Gravity @ 25°C PTM-29C		1.141	1.140	1.139
	Lot# 2 AVERAGE			1.140
3. Viscosity, Brookfield, cps. @ 22.8°C PTM-14C		1250	1250	1500
	Lot# 2 AVERAGE			1333
4. Gel Time, min:sec PTM-47B		3:30	3:38	3:34
	Lot# 2 AVERAGE			3:34

5. Atomic Absorption, ppm CTM-53B	#2-1	#2-2	#2-3	LOT1 AVG
Na	4	4	8	5.3
K	0	0	0	0.0
Ca	3	2	2	2.3
Mg	1	1	1	1.0
Li	0	1	0	0.3
AVG.	8	8	11	9.0

6. Volatiles, Gas Chromatography CTM-55 — See Charts 6A-6C

7. TGA, % Weight Loss at 500°C CTM-51 (AIR)	#2-1	#2-2	#2-3
	39.5	40.1	39.4
Lot# 2 AVERAGE			39.7

See Chart 7A-7C

8. DSC, temperature °C CTM-50A			
	183	191	183
Lot# 2 AVERAGE			186

See Chart 8A-8C

9. HPLC CTM-49A — See Chart 9A-9C

10. GPC, Average molecular wt. CTM-49A			
	1718	1801	1598
Lot# 2 AVERAGE			1706

See Chart 10A-10C

HITCO MATERIALS DIVISION
700 E. DYER ROAD, SANTA ANA, CALIFORNIA 92707 • (714) 549-1101 • TWX (910) 595-1130 • FAX # (714) 549-2858-5-2437

91LD Resin Lot for NASA Lot# 2

11. pH, units
CTM-1B

#2-1	#2-2	#2-3
8.5	8.3	8.4
	Lot# 2 AVERAGE	8.4

12. Phenol Content, %
CTM-55 Appendix 1

	10.04	11.09	11.74
	9.83	10.80	11.88
AVG.	9.94	10.94	11.81
		Lot# 2 AVERAGE	10.90

13. Chang's Index, ml.
CTM-5B

24.2	24.8	25.2
	Lot# 2 AVERAGE	24.7

14. RDS, Minimum Viscosity, cps.
CTM-57A

	Min. Visc.	°C
#2-1	278	107
#2-2	249	111
#2-3	239	113
AVG.	255	110

See Charts 14A-14C

15. NMR
Vendor procedure

See Charts 15A-15C

U. S. Polymeric

Hamid M. Quraishi

Hamid M. Quraishi, Manager
Quality Assurance Department

TYPICAL GAS CHROMATOGRAPH SET-UP

Operator	Q.Z.J.	Date	12/10/86
Column		Detector	FID
Length	6ft.	Voltage	
Dia.	1/4 in.	Sensit.	
Liquid Phase	AT-1000	Flow Rates, ml/min	
Wt. %	0.1	Hydrogen	60 Air 96
Support	GRAPHPAC	Scavenge	
Mesh	80/100	Split	
Carrier Gas	He	Temperature, °C	
Rotameter		Det.	220 Inj. 200
Inlet Press	60 psig	Column Initial	60
Rate	30 ml/min	Final	210
CHART SPEED		Rate	5°C/MIN
SAMPLE	9LD,92-1	Solvent	THF
Size	0.1 ml	Concn.	0.10781 g/ml

GAS CHROMATOGRAPHY STANDARD SOLVENT

TEST METHOD CTM-55

STANDARD SOLVENT/MONOMER	RETENTION TIME (MINS.)
MEOH	.6
ETHANOL	1.18
MECL2	1.28
ACETONE	1.45
IPA	1.83
THF	3.08
ACETONITRILE	3.2
CRESOL	4.03
MEK	4.08
FURFURAL	15.03
TOLUENE	17.98
CHLOROBENZENE	19.6
PHENOL	22.08

NOTE: THF WAS USED TO DILUTE THE RESIN SAMPLES.

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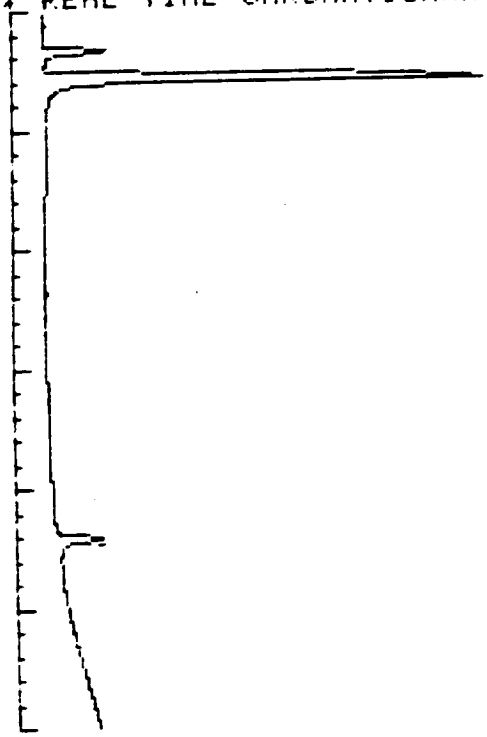
CHART 6A

*** REAL TIME CHROMATOGRAM ***



INAL FULL SCALE MV =1000.00

SAMPLE: 91 LD 2-1
MISC.: C=0.101781 GMS/ML

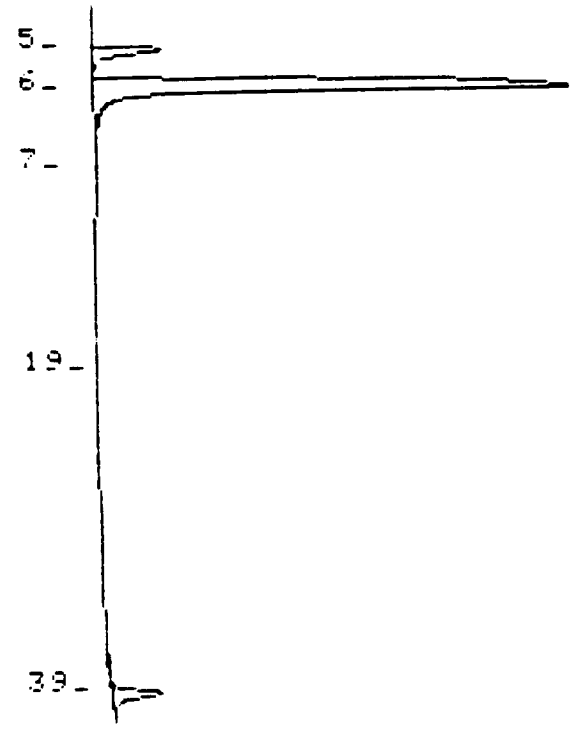
TIME: 11:49
DATE: 12/10/86
OPERATOR: JGZ

RUN TIME: 30.00 MINUTES
DELAY TIME: 0.00
CHAN: 0

PK NO.	RET TIME	PEAK AREA	AREA %	B L	PEAK HT.
2	.65	1789	.075	2	235
5	1.70	204140	8.568	2	11953
6	3.05	2010900	84.397	3	84306
7	5.55	1537	.065	4	127
19	11.90	2214	.093	2	96
39	22.05	162080	6.802	1	8700

TOTAL AREA= 2382661
THRESHOLD= 1
MIN PK WIDTH= 15
AREA REJECT= 1000

VERTICAL SCALE FACTOR 1%



SAMPLE: 91 LD 2-1
MISC.: C=0.101781 GMS/ML

TIME: 11:49
DATE: 12/10/86
OPERATOR: JGZ

RUN TIME: 30.00 MINUTES
DELAY TIME: 0.00
CHAN: 0

PK NO.	RET TIME	PEAK AREA	AREA %	B L	PEAK HT.
5	1.70	204140	8.588	2	11953
6	3.05	2010900	84.594	3	84306
39	22.05	162080	6.818	1	8700

TOTAL AREA= 2377120
THRESHOLD= 1
MIN PK WIDTH= 15
AREA REJECT= 2300

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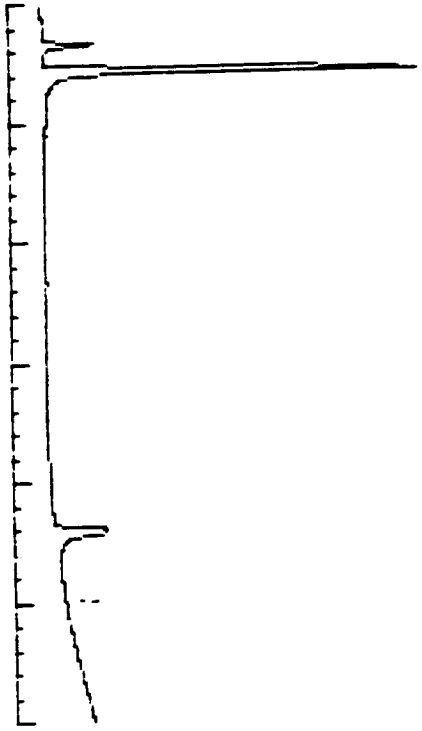
CHART 6B

** REAL TIME CHROMATOGRAM ***



FINAL FULL SCALE MV.=1000.00

SAMPLE: 91 LD 2-2
MISC.: C=0.10137 GMS/ML

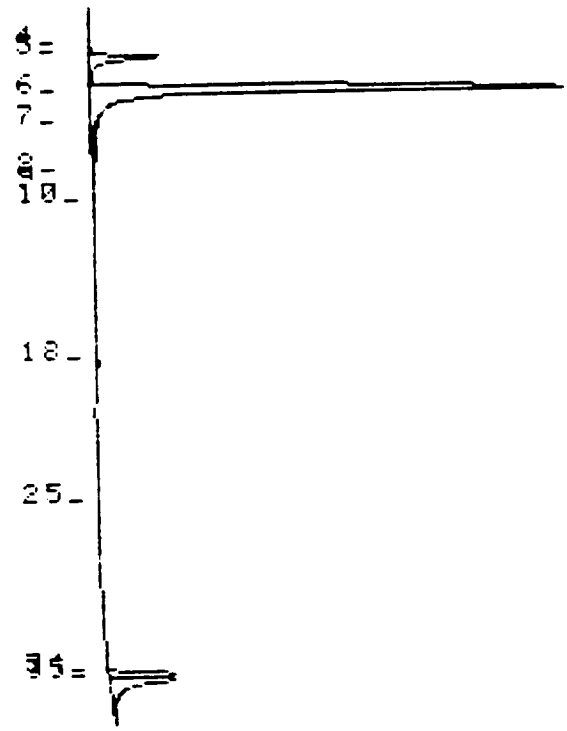
TIME: 16:17
DATE: 12/10/86
OPERATOR: JGZ

RUN TIME: 30.00 MINUTES
DELAY TIME: 0.00
CHAN: 0

PK NO.	RET TIME	PEAK AREA	AREA %	B L	PEAK HT.
2	.68	1634	.095	3	146
4	1.43	1854	.108	2	207
5	1.70	135890	7.939	2	10181
6	2.93	1192800	69.685	3	72100
7	3.95	41333	2.415	4	585
8	5.55	5852	.342	4	354
9	6.03	9425	.551	4	249
10	6.58	9398	.549	4	189
18	11.75	10601	.619	1	547
25	16.45	1194	.070	2	39
34	21.98	104460	6.103	2	10015
35	22.15	197270	11.525	3	9916

TOTAL AREA= 1711710
THRESHOLD= 1
MIN PK WIDTH= 15
AREA REJECT= 1000

VERTICAL SCALE FACTOR: 1X



SAMPLE: 91 LD 2-2
MISC.: C=0.10137 GMS/ML

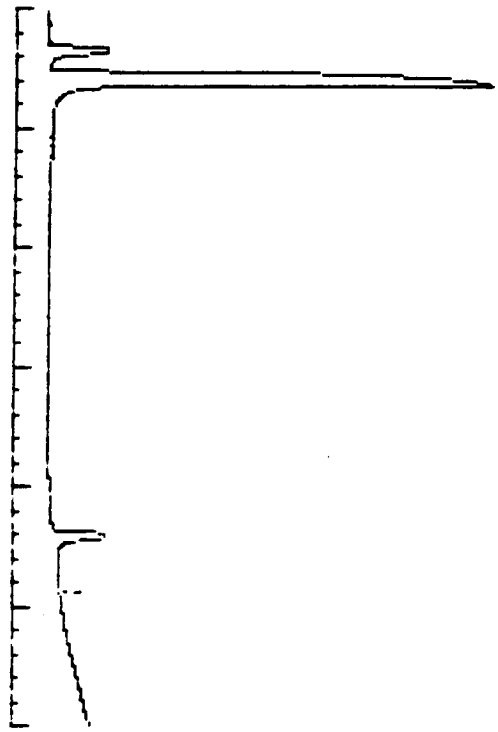
TIME: 16:17
DATE: 12/10/86
OPERATOR: JGZ

RUN TIME: 30.00 MINUTES
DELAY TIME: 0.00
CHAN: 0

PK NO.	RET TIME	PEAK AREA	AREA %	B L	PEAK HT.
5	1.70	135890	8.129	2	10181
6	2.93	1192800	71.350	3	72100
7	3.95	41333	2.472	4	585
34	21.98	104460	6.249	2	10015
35	22.15	197270	11.800	3	9916

TOTAL AREA= 1671753
THRESHOLD= 1
MIN PK WIDTH= 15
AREA REJECT= 11000

*** REAL TIME CHROMATOGRAM ***



FINAL FULL SCALE MV =1000.00

SAMPLE: 91 LD 2-3
MISC.: C=0.10126 GMS/ML

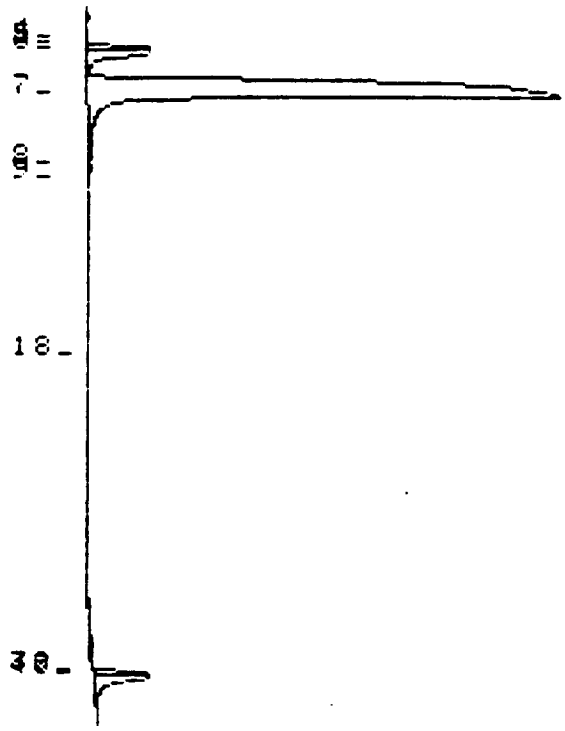
TIME: 16:58
DATE: 12/10/86
OPERATOR: JGZ

RUN TIME: 30.00 MINUTES
DELAY TIME: 0.00
CHAN: 0

PK NO	RET TIME	PEAK AREA	AREA %	B L	PEAK HT.
2	.63	4204	.123	3	435
4	1.45	1258	.037	2	129
5	1.68	81270	2.382	2	11465
6	1.83	196320	5.753	2	11447
7	3.28	2899700	84.980	3	85372
8	5.60	2293	.067	4	251
9	6.03	1464	.043	4	69
18	11.83	6140	.180	3	248
39	22.03	54263	1.590	2	9873
40	22.15	165300	4.844	3	9807

TOTAL AREA= 3412211
THRESHOLD= 1
MIN PK WIDTH= 15
AREA REJECT= 1000

VERTICAL SCALE FACTOR: 1X



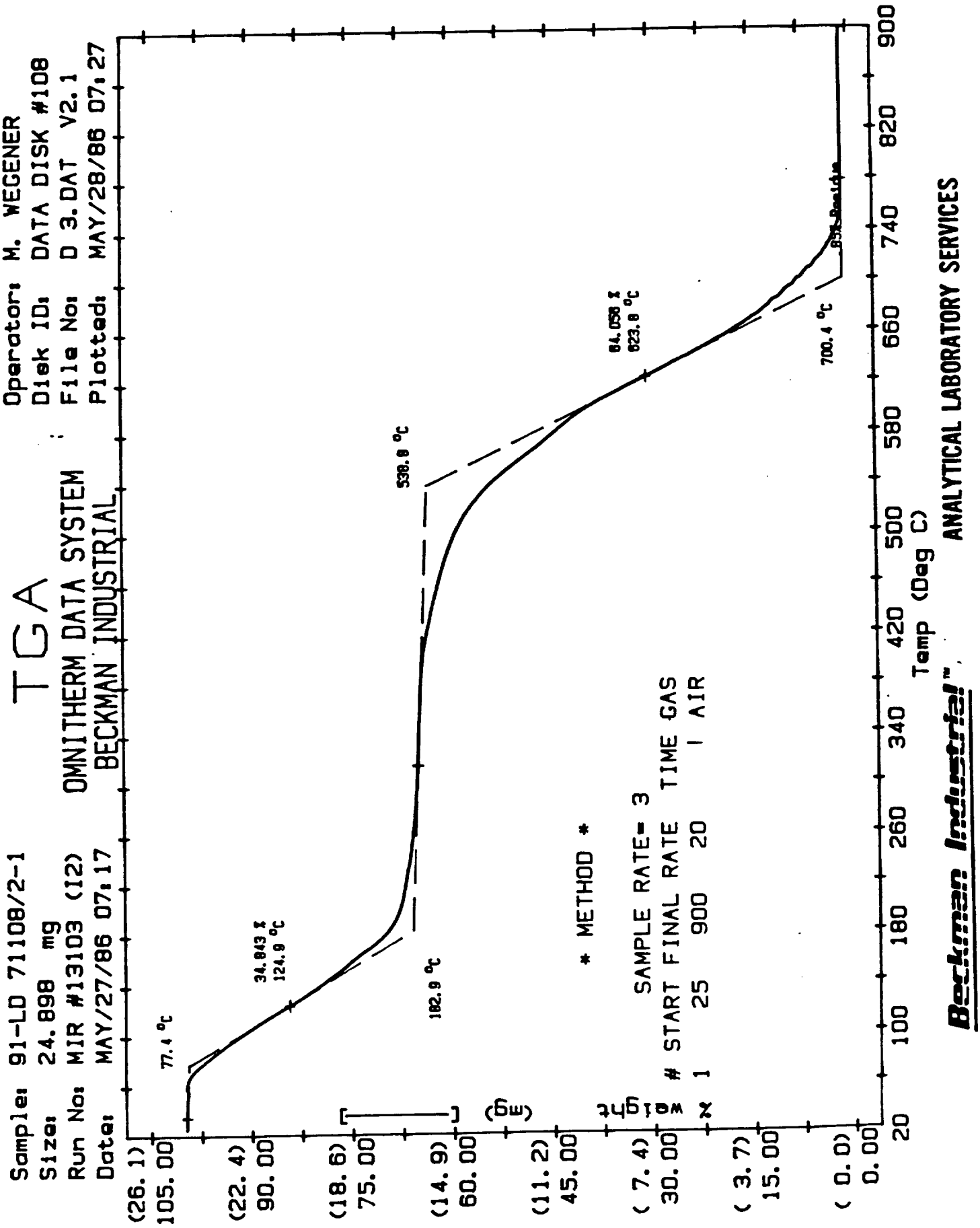
SAMPLE: 91 LD 2-3
MISC.: C=0.10126 GMS/ML

TIME: 16:58
DATE: 12/10/86
OPERATOR: JGZ

RUN TIME: 30.00 MINUTES
DELAY TIME: 0.00
CHAN: 0

PK NO.	RET TIME	PEAK AREA	AREA %	B L	PEAK HT.
5	1.68	81270	2.393	2	11465
6	1.83	196320	5.779	2	11447
7	3.28	2899700	85.364	3	85372
39	22.03	54263	1.597	2	9873
40	22.15	165300	4.866	3	9807

TOTAL AREA= 3396853
THRESHOLD= 1
MIN PK WIDTH= 15
AREA REJECT= 6200

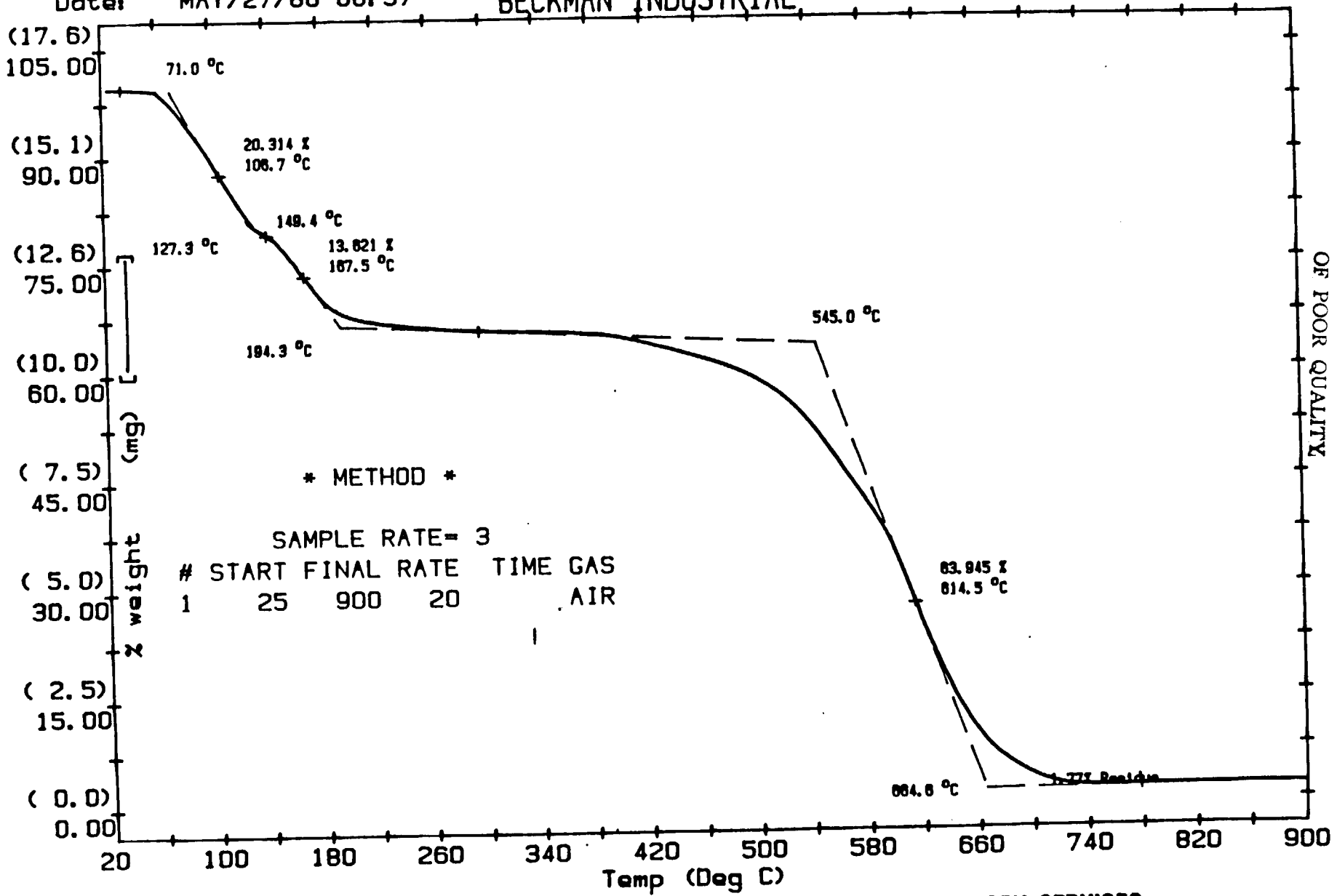


Sample: 91-LD 71108/2-2
Size: 16.807 mg
Run No: MIR #13103 (I2)
Date: MAY/27/86 08:57

TGA

OMNITHERM DATA SYSTEM
BECKMAN INDUSTRIAL

Operator: M. WEGENER
Disk ID: DATA DISK #108
File No: D 4.DAT V2.1
Plotted: MAY/28/86 07:39



Beckman Industrial™ ANALYTICAL LABORATORY SERVICES

CHART 7B

Figure 7

Sample: 91-LD 71108/2-3
Size: 14.963 mg
Run No: MIR #13103 (12)
Date: MAY/27/86 10:57

TGA

OMNITHERM DATA SYSTEM
BECKMAN INDUSTRIAL

Operator: M. WEGENER
Disk ID: DATA DISK #108
File No: D 5.DAT V2.1
Plotted: MAY/28/86 07:56

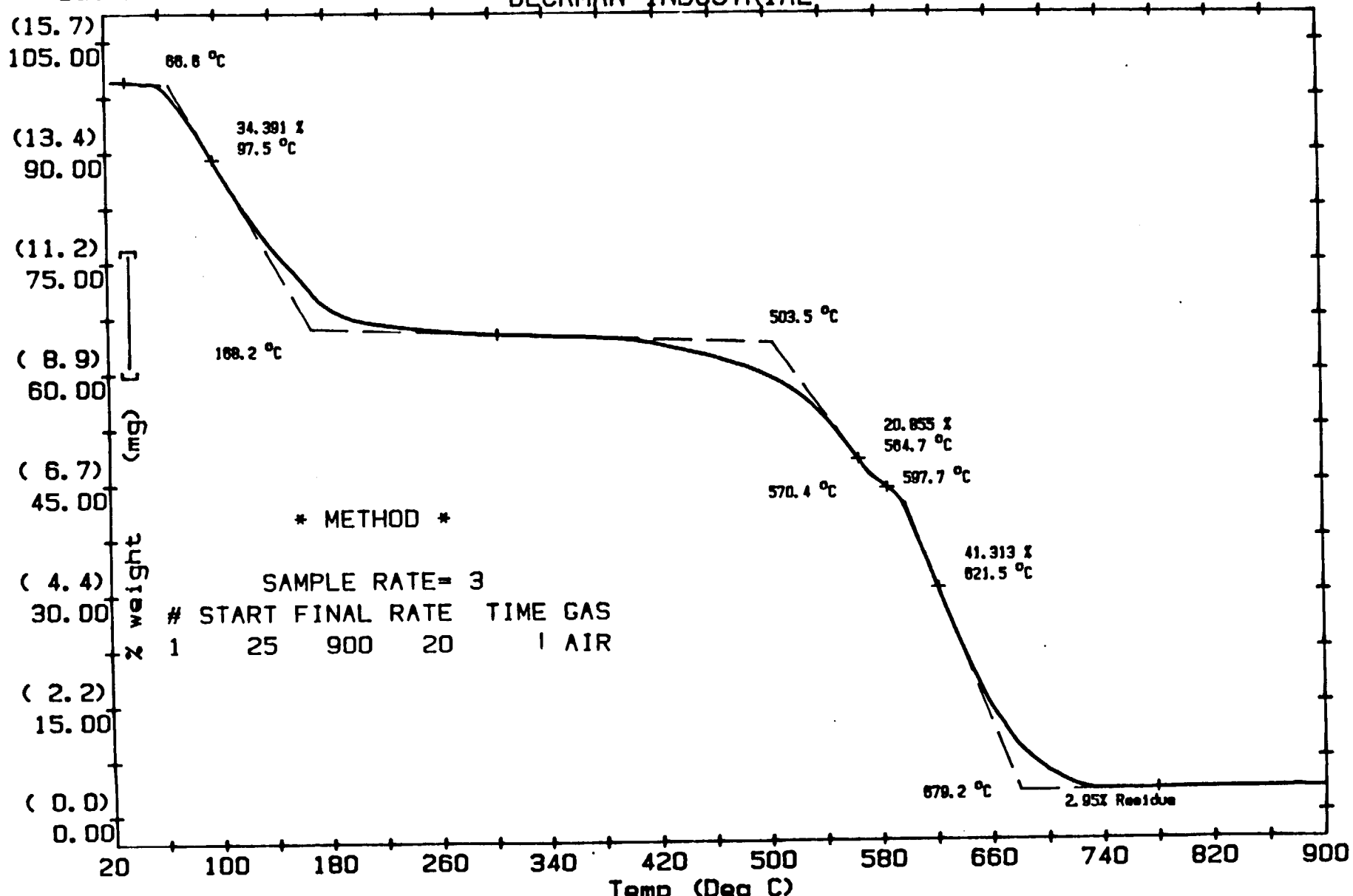


CHART 7C

Beckman Industrial™ ANALYTICAL LABORATORY SERVICES

U.S. POLYMERIC INC.

Sample P140 272 ..... Wt. 5.0 ..... mg
Heat Rate: ..... 20 ..... °C/min; Range ..... 2.0 ..... mcal/sec
Recorder Span: ..... 50 ..... mV Chart speed ..... 10 ..... mm/min
Temp. Limits Lower ..... 50 °C Upper ..... 350 °C
Mode: Hold/Autocool/Cycle Cooling Rate: ..... 150 °C/min
Operator ..... A. Kadley ..... Date 9.5.86

9-2-86 LAST CALIBRATION DATE
1° CALIBRATION DELTA °C

EXOTHERM

19.2
19.1 °C

CHART NO. RN2-6525-20M

CHART 8C

U.S. POLYMERIC DSC-2

Sample 9110 ..... 2.2 ..... Wt. 4.2 ..... mg
Heat Rate ..... 20 ..... °C/min. Range ..... 2.0 ..... mcals/sec.
Recorder Span ..... 50 ..... mV Chart speed ..... 10 ..... mm/min
Temp. Limits: Lower 50 ..... Upper 350 .....
Mode: Manual/Autocool/Cycle Cooling Rate ..... 40 ..... °C/min
Operator ..... A. Kathleen ..... Date 9-5-84

9-2-84 LAST CALIBRATION DATE
-1 CALIBRATION DELTA °C

EXOTHERM

18°
183°

CHART NO. RN2-01-25-20M

SOLTEC

CHART 9A

A FILE A:PHEN039.HDR TAKEN 09-05-1986 16:56:50

********* AREA PERCENT REPORT *********

```
********************************************************************************
* Sample Name: 91LD,2-1,C=6.85                    Operator Initials: JGZ       *
* Date:  09-05-1986 16:56:50 Method:PHENOLIC    DATA FILE: A:PHEN039.PTS       *
* nterface: 4                Cycle#:  39         Channel#: 0    Vial#: N.A.    *
* Starting Peak Width:  10   Threshold:  .01                                   *
********************************************************************************
*  Instrument Type: BECKMAN HPLC          Column Type: MICROBONDAPAK C-18      *
*             Solvent Description: THF/WATER, 2:1 BY WEIGHT                    *
*   Operating Conditions: R.T., FLOWRATE=1.5 ML/MIN                            *
*            Detector 0: 220NM/.5AU          Detector 1:                       *
*     Misc. Information:  LENGTH=25                                            *
********************************************************************************
Starting Delay:   0.00                        Ending Retention Time:   10.00
```

Pk No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height
3	1.78	120482	75.1672	2	5050	100.000	23.9
4	2.05	39804	24.8328	2	4045	33.037	9.8

Total Area: 160286 Area Reject: 1000 One sample per 1.000 sec.

DATA FILE=PHEN038 FROM 0.00 MIN. TO 10.00 MIN. LOW SCALE= 5.426 Mv. HIGH SCALE= 10.712 Mv.
91 LD, 2-1, C=6.85 MG/ML, 9/5/86, JGZ

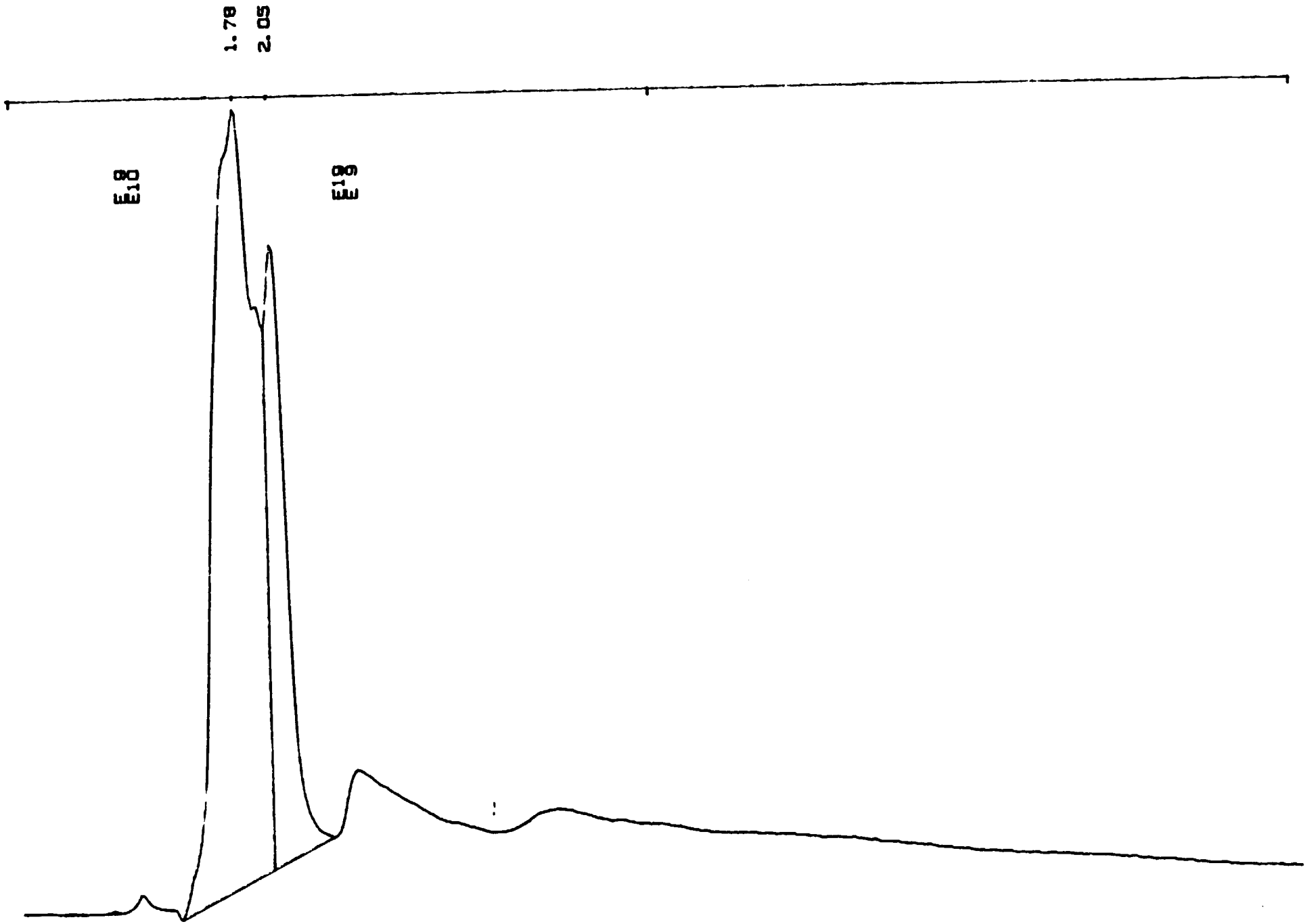


CHART 9B

FILE A:PHEN038.HDR TAKEN 09-05-1986 16:40:05

********* AREA PERCENT REPORT *********

Sample Name: 91LD,2-2,C=6.77 Operator Initials: JGZ
Date: 09-05-1986 16:40:05 Method:PHENOLIC DATA FILE: A:PHEN038.PTS
Interface: 4 Cycle#: 38 Channel#: 0 Vial#: N.A.
Starting Peak Width: 10 Threshold: .01

Instrument Type: BECKMAN HPLC Column Type: MICROBONDAPAK C-18
Solvent Description: THF/WATER, 2:1 BY WEIGHT
Operating Conditions: R.T., FLOWRATE=1.5 ML/MIN
Detector 0: 220NM/.5AU Detector 1:
Misc. Information: LENGTH=25

Starting Delay: 0.00 Ending Retention Time: 10.00

Pl No.	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height
3	1.78	121012	74.9964	2	5109	100.000	23.7
4	2.05	40345	25.0036	2	4092	33.340	9.9

Total Area: 161357 Area Reject: 1000 One sample per 1.000 sec.

DATA FILE=PHEN038 FROM 0.00 MIN. TO 10.00 MIN. LOW SCALE= 5.320 Mv. HIGH SCALE= 10.656 Mv.
91 LD, 2-2, C=6.77 MG/ML, 8/5/86, JGZ

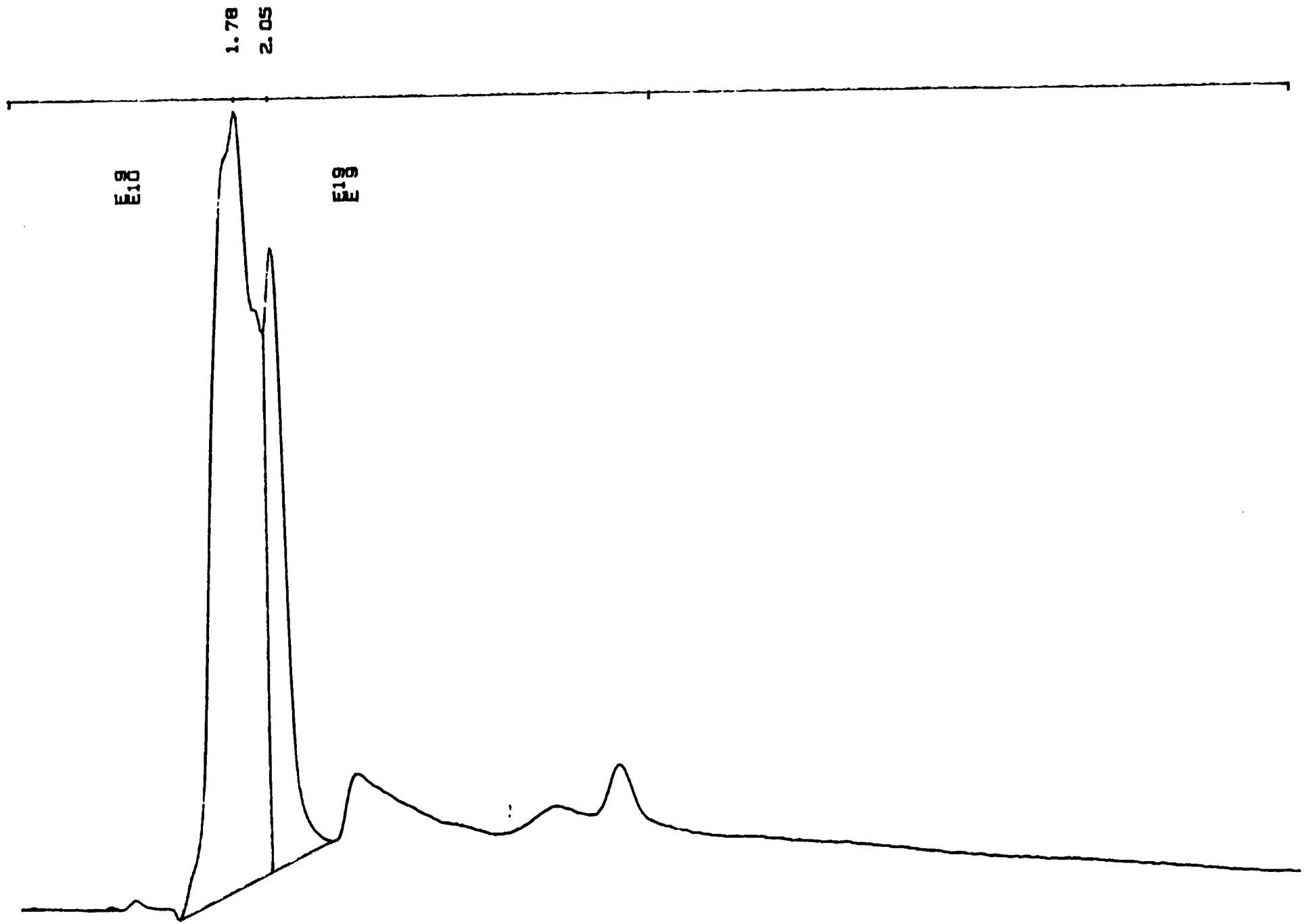


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CHART 9C

r r 67 opening raw data file A:LASTRUN.PTS
- 53 creating file A:PHEN040.PTS at line 4620
FILE A:PHEN037.HDR TAKEN 09-05-1986 16:04:07

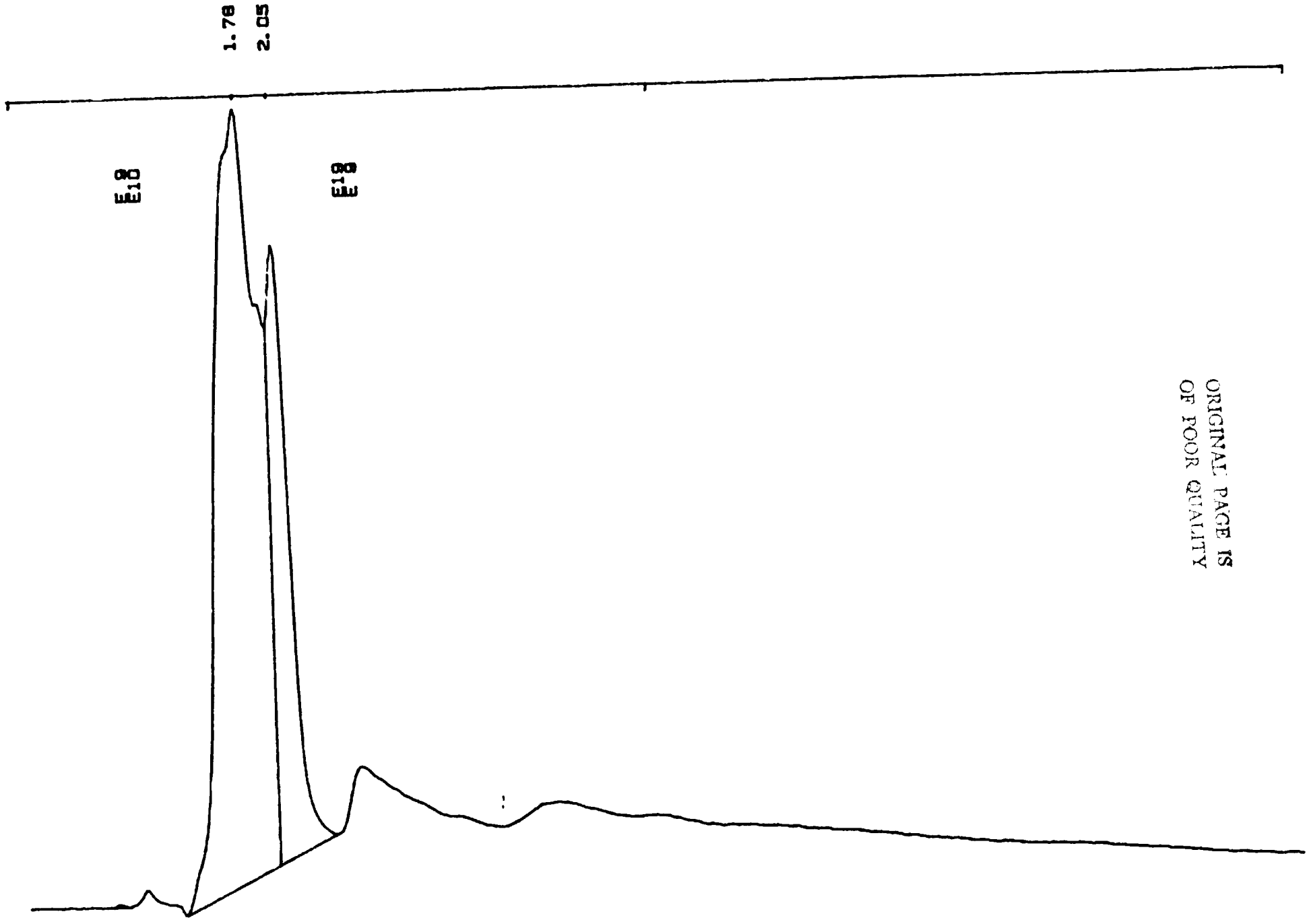
******** AREA PERCENT REPORT ********

Sample Name: 91LD,2-3,C=6.79	Operator Initials: JGZ
Date: 09-05-1986 16:04:07 Method:PHENOLIC	DATA FILE: A:PHEN037.PTS
Interface: 4 Cycle#: 37	Channel#: 0 Vial#: N.A.
Starting Peak Width: 10 Threshold: .01	
Instrument Type: BECKMAN HPLC	Column Type: MICROBONDAPAK C-18
Solvent Description: THF/WATER, 2:1 BY WEIGHT	
Operating Conditions: R.T., FLOWRATE=1.5 ML/MIN	
Detector 0: 220NM/.5AU	Detector 1:
Misc. Information: LENGTH=25	
Starting Delay: 0.00	Ending Retention Time: 10.00

Pk No	Ret Time	Peak Area	Area %	B L	Peak Ht.	Normalized %	Area/ Height
2	1.78	121706	75.2396	2	5098	100.000	23.9
	2.05	40052	24.7604	2	4076	32.909	9.8

Total Area: 161758 Area Reject: 1000 One sample per 1.000 sec.

DATA FILE=PHEN037 FROM 0.00 MIN. TO 10.00 MIN. LOW SC..E= 5.4c+ MV. ..3H ..E= .J.7 MV.
91 LD, 2-3, C=6.78 MG/ML, 8/5/86, JGZ



*** Calibration Data ***
Calibration Name:
Misc Information:

Fit Type: 3
Log Mol Wt = A + Bx + Cx^2 + Dx^3
A= 2.538977 B= 2.115815 C= -.5646824 D= 3.606432E-02
Coefficient of Determination: 0.9902

Ret Time	Molecular Weight	Log Mol Wt
3.50	35000	4.544
4.33	15000	4.176
4.83	3600	3.556
5.09	2350	3.371
6.00	570	2.756
7.17	92	1.964
7.50	72	1.857

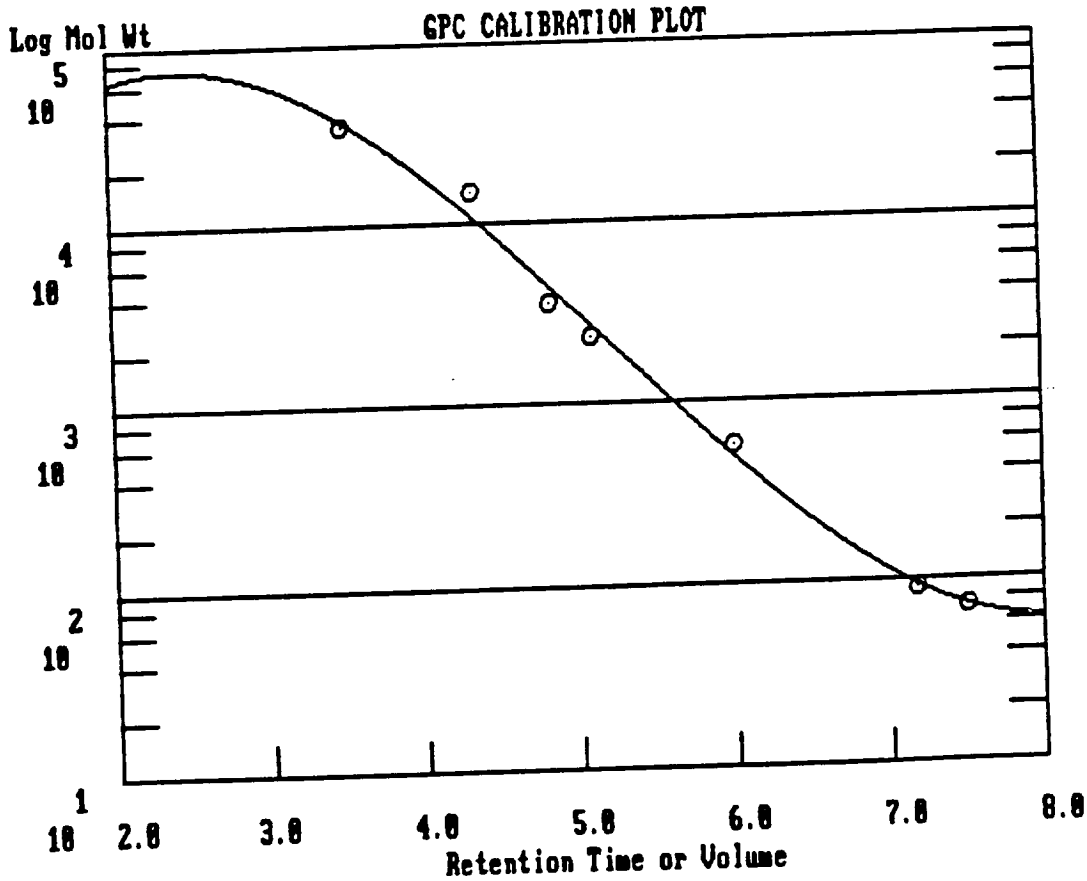


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CHART 10A

A FILE B:GPC28 .HDR TAKEN 08-05-1986 17:13:56

******** GPC REPORT ********

```
* ********************************************************************************
* Sample Name: 91LD 2-1  =2.68                    Operator Initials: GBF        *
* Date:  08-05-1986 14:05:42 Method:              DATA FILE: B:GPC28   .PTS     *
* Interface: 5               Cycle#:  28          Channel#: 0    Vial#: N.A.    *
* Starting Peak Width:  60   Threshold:  0                                      *
********************************************************************************
*  Instrument Type: HPLC/BECKMAN          Column Type: ULTRASTYRAGEL 500A      *
*              Solvent Description: THF                                        *
*   Operating Conditions: T=35C FLOWRATE=2.0ML/MIN                             *
*            Detector 0: 254NM/.1AU          Detector 1:                       *
*     Misc. Information: CALIBRATION/GPC                                       *
********************************************************************************
Starting Delay:    0.00                    Ending Retention Time:    10.00
Calibration file: GPCPHEN
Molecular Weight Distribution Averages
Baseline TIMES:    3.85 to   10.00   MW:      22295 to          2
Process .JIMES:    3.85 to   10.00   MW:      22295 to          2
Total Area:       196902
Mw=                 1718
Mn=                  370
Mw/Mn=            4.6439
Mz=                 4134
                    1501
```

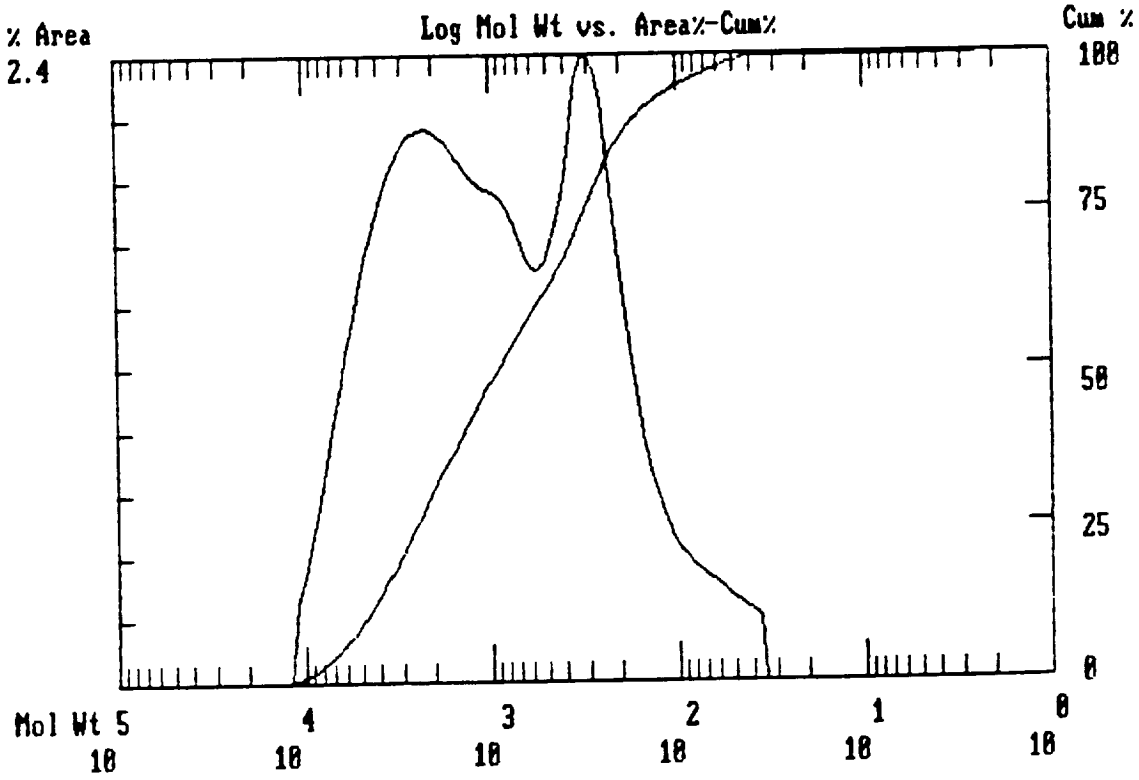
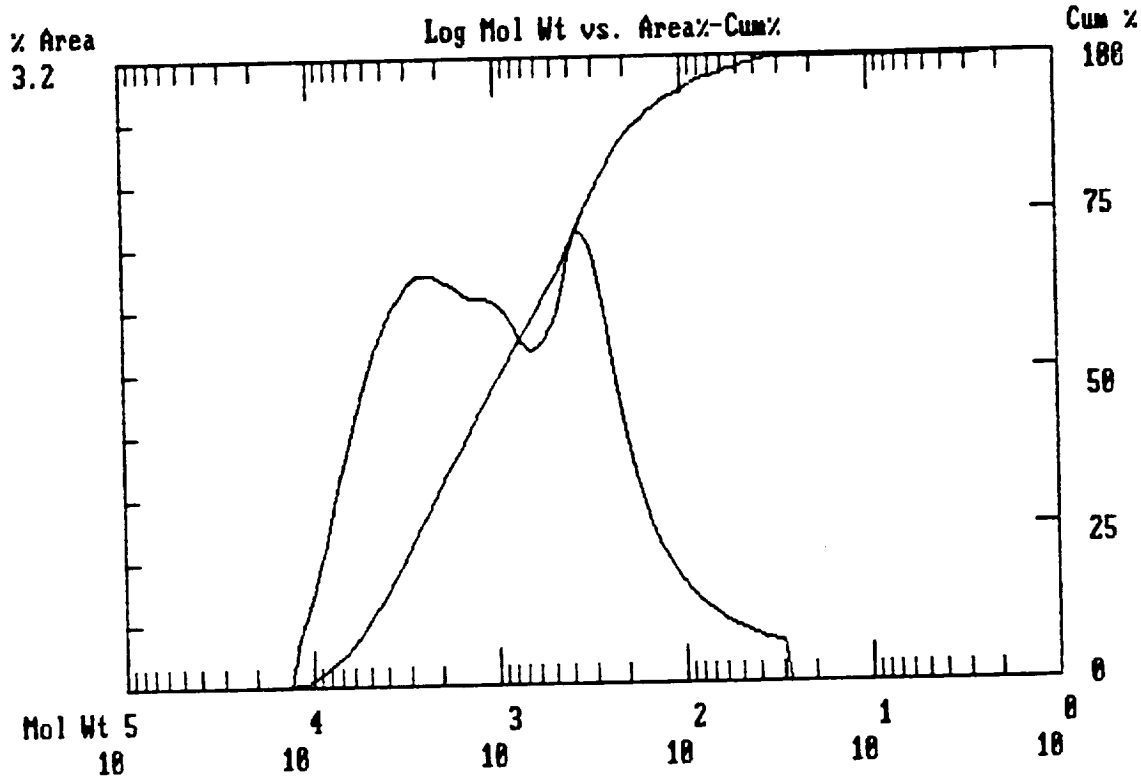


CHART 10B

A FILE B:GPC22 .HDR TAKEN 08-05-1986 17:18:27

******** GPC REPORT ********

```
* ********************************************************************************
 Sample Name: 91LD 2-2 C=2.68                  Operator Initials: GBF          *
 Date:  08-05-1986 11:58:33 Method:            DATA FILE: B:GPC22   .PTS    *
  nterface: 5                 Cycle#:  22      Channel#: 0    Vial#: N.A.    *
  tarting Peak Width:  60     Threshold:  0                                  *
*********************************************************************************
  Instrument Type: HPLC/BECKMAN              Column Type: ULTRASTYRAGEL 500A    *
              Solvent Description: THF                                        *
   Operating Conditions: T=35C FLOWRATE=2.0ML/MIN                             *
            Detector 0: 254NM/.1AU            Detector 1:                     *
     Misc. Information: CALIBRATION/GPC                                       *
** ********************************************************************************
Starting Delay:    0.00                    Ending Retention Time:    10.00
Ca ibration file: GPCPHEN
Mc ecular Weight Distribution Averages
Baseline TIMES:    3.85 to    10.00   MW:      22295 to          2
Process  TIMES:    3.85 to    10.00   MW:      22295 to          2
Tc al Area:       240471
Mw=                 1801
Mn=                  368
Mw Mn=            4.8945
Mz =                4352
M =                 1573
```



******** GPC REPORT ********

```
* ************************************************************************ *
* Sample Name: 91LD 2-3 C=2.68                  Operator Initials: GBF     *
* Date:  08-05-1986 11:28:37 Method:GPC         DATA FILE: A:GPC20.PTS     *
* Interface: 5               Cycle#:  20        Channel#: 0   Vial#: N.A.  *
* Starting Peak Width:  60   Threshold:  .01                               *
* ************************************************************************ *
*  Instrument Type: HPLC/BECKMAN          Column Type: ULTRASTYRAGEL 500A  *
*            Solvent Description: THF                                      *
*   Operating Conditions: T=35C FLOWRATE=2.0ML/MIN                         *
*           Detector 0: 254NM/.1AU          Detector 1:                    *
*     Misc. Information: CALIBRATION/GPC                                   *
* ************************************************************************ *
Starting Delay:   0.00                      Ending Retention Time:   10.00
Calibration file: GPCPHEN
Molecular Weight Distribution Averages
Baseline TIMES:    3.85 to   10.00   MW:     22295 to          2
Process  TIMES:    3.85 to   10.00   MW:     22295 to          2
Total Area:       271362
Mn =                1598
Mn=                  260
Mw/Mn=            6.1449
Mz =                3922
Mv=                 1389
```

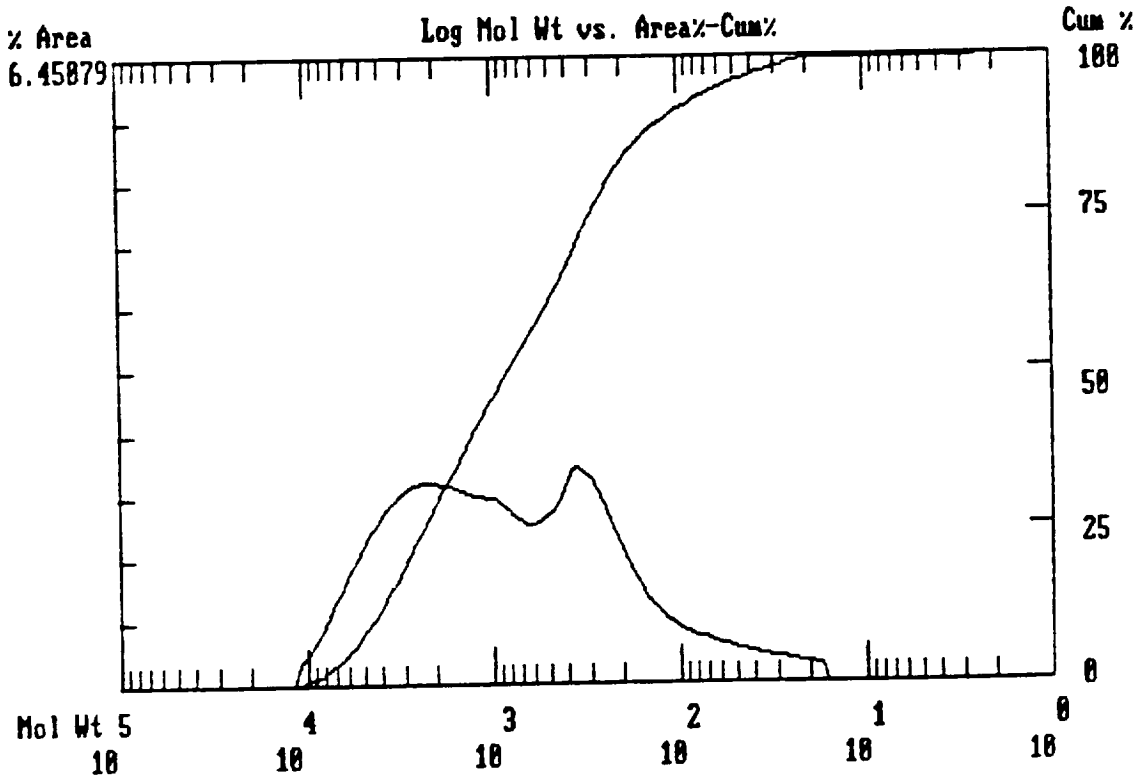
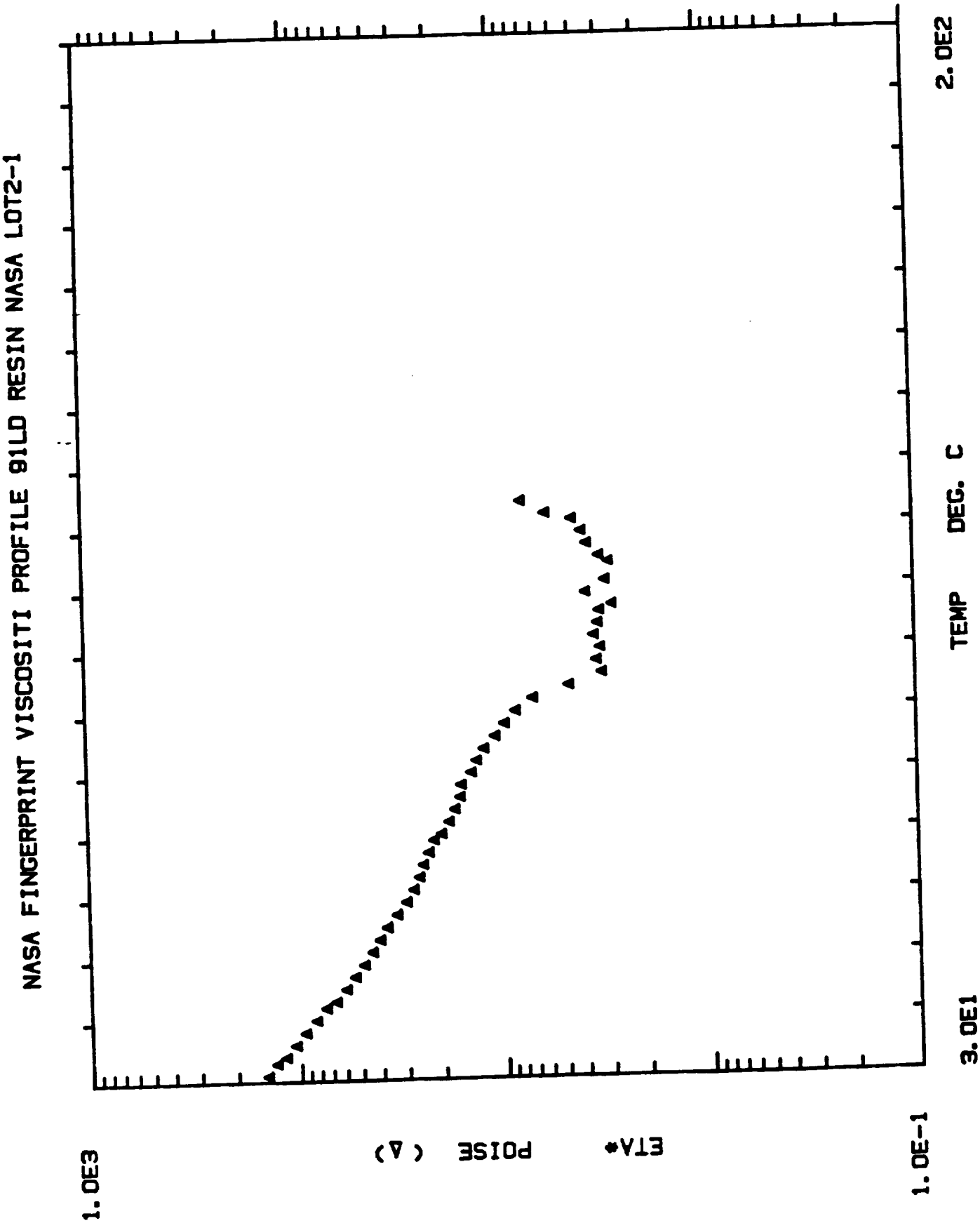


CHART 14A


NASA FINGERPRINT VISCOSITI PROFILE 81LD RESIN NASA LOT2-1
1.0E3
ETA* POISE (Δ)
1.0E-1
3.0E1
TEMP DEG. C
2.0E2

Rheometrics RECAP II

Experiment No. : 12 Sample No. : 1

Name:
DSC4 FINGERPRINT VISCOSITI PROFILE 91LD RESIN NASA LOT2-1

Operator :CP

Date and Time : Tuesday, August 19, 1986 — 13:19:16

Operating Mode : DYNAMIC

Sweep Type : CURE

Geometry : DISK & PLATE
RADIUS : 25.00
GAP : 0.50

Notes :
STRAIN =50%
FREQUENCY =10RAD/SEC

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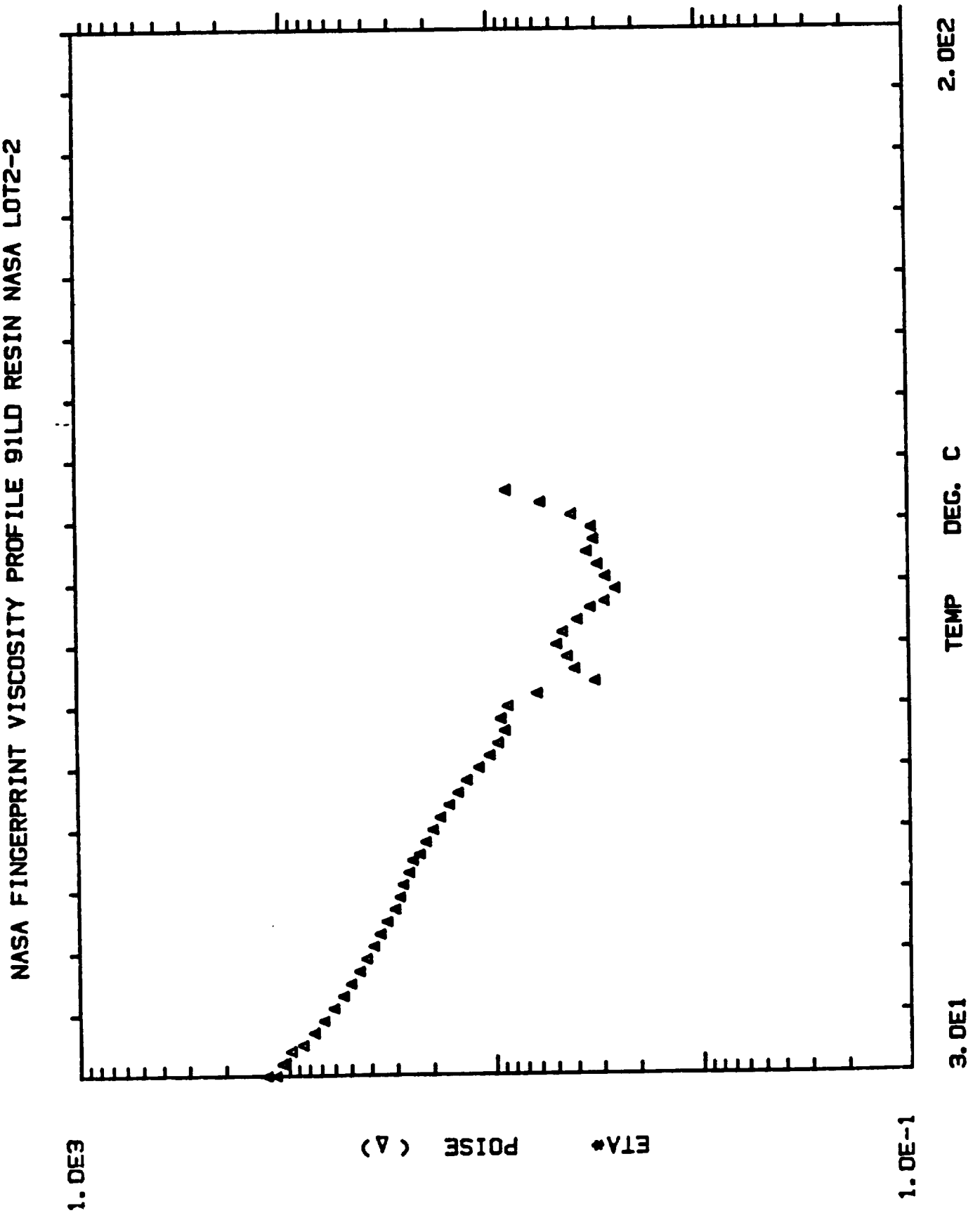
NASA FINGERPRINT VISCOSITI PROFILE 91LD RESIN NASA LOT2-1

NO.	ETA* POISE	ETA' POISE	ETA" POISE	TORQUE GRAMS-CM	TIME MIN.	TEMP DEG. C
1	1.414e+002	1.350e+002	4.203e+001	1.777e+001	2.000e-001	3.100e+001
2	1.414e+002	1.355e+002	4.051e+001	1.778e+001	1.000e+000	3.100e+001
3	1.278e+002	1.226e+002	3.592e+001	1.605e+001	2.000e+000	3.300e+001
4	1.151e+002	1.095e+002	3.557e+001	1.446e+001	3.000e+000	3.490e+001
5	1.031e+002	9.673e+001	3.559e+001	1.295e+001	4.000e+000	3.600e+001
6	9.226e+001	8.526e+001	3.525e+001	1.159e+001	5.000e+000	3.800e+001
7	8.141e+001	7.379e+001	3.440e+001	1.022e+001	6.000e+000	4.000e+001
8	7.292e+001	6.490e+001	3.325e+001	9.160e+000	7.000e+000	4.200e+001
9	6.498e+001	5.671e+001	3.171e+001	8.155e+000	8.000e+000	4.300e+001
10	5.801e+001	4.953e+001	3.019e+001	7.285e+000	9.000e+000	4.500e+001
11	5.231e+001	4.338e+001	2.924e+001	6.563e+000	1.000e+001	4.700e+001
12	4.729e+001	3.833e+001	2.769e+001	5.937e+000	1.100e+001	4.900e+001
13	4.300e+001	3.379e+001	2.660e+001	5.400e+000	1.200e+001	5.100e+001
14	3.949e+001	3.012e+001	2.554e+001	4.956e+000	1.300e+001	5.300e+001
15	3.635e+001	2.747e+001	2.380e+001	4.558e+000	1.400e+001	5.500e+001
16	3.243e+001	2.431e+001	2.146e+001	4.067e+000	1.500e+001	5.700e+001
17	2.909e+001	2.199e+001	1.905e+001	3.653e+000	1.600e+001	5.900e+001
18	2.683e+001	2.087e+001	1.686e+001	3.365e+000	1.700e+001	6.100e+001
19	2.510e+001	1.987e+001	1.535e+001	3.149e+000	1.800e+001	6.300e+001
20	2.395e+001	1.965e+001	1.369e+001	3.002e+000	1.900e+001	6.500e+001
21	2.250e+001	1.889e+001	1.223e+001	2.823e+000	2.000e+001	6.700e+001
22	2.122e+001	1.834e+001	1.068e+001	2.662e+000	2.100e+001	6.900e+001
23	1.947e+001	1.717e+001	9.163e+000	2.440e+000	2.200e+001	7.000e+001
24	1.785e+001	1.615e+001	7.604e+000	2.240e+000	2.300e+001	7.200e+001
25	1.667e+001	1.540e+001	6.381e+000	2.092e+000	2.400e+001	7.400e+001
26	1.569e+001	1.464e+001	5.652e+000	1.969e+000	2.500e+001	7.600e+001
27	1.545e+001	1.467e+001	4.842e+000	1.938e+000	2.600e+001	7.800e+001
28	1.389e+001	1.324e+001	3.880e+000	1.733e+000	2.700e+001	8.000e+001
29	1.298e+001	1.257e+001	3.245e+000	1.629e+000	2.800e+001	8.200e+001
30	1.192e+001	1.164e+001	2.608e+000	1.496e+000	2.900e+001	8.400e+001
31	1.053e+001	1.027e+001	2.330e+000	1.323e+000	3.000e+001	8.600e+001
32	9.440e+000	9.231e+000	1.976e+000	1.185e+000	3.100e+001	8.800e+001
33	8.319e+000	8.201e+000	1.393e+000	1.045e+000	3.200e+001	9.000e+001
34	6.865e+000	6.757e+000	1.215e+000	8.615e-001	3.300e+001	9.200e+001
35	4.581e+000	4.478e+000	9.663e-001	5.754e-001	3.400e+001	9.400e+001
36	3.159e+000	3.125e+000	4.576e-001	3.961e-001	3.500e+001	9.600e+001
37	3.343e+000	3.331e+000	2.837e-001	4.197e-001	3.600e+001	9.800e+001
38	3.199e+000	3.145e+000	5.852e-001	4.013e-001	3.700e+001	1.000e+002
39	3.457e+000	3.414e+000	3.017e-001	4.302e-001	3.800e+001	1.020e+002
40	3.278e+000	3.221e+000	6.071e-001	4.112e-001	3.900e+001	1.040e+002
41	3.200e+000	3.170e+000	4.388e-001	4.014e-001	4.000e+001	1.060e+002
42	2.780e+000	2.734e+000	5.049e-001	3.493e-001	4.100e+001	1.070e+002
43	3.736e+000	3.709e+000	4.453e-001	4.687e-001	4.200e+001	1.090e+002
44	2.993e+000	2.966e+000	4.007e-001	3.758e-001	4.300e+001	1.110e+002
45	2.864e+000	2.836e+000	3.997e-001	3.593e-001	4.400e+001	1.140e+002
46	3.188e+000	3.061e+000	8.930e-001	4.001e-001	4.500e+001	1.150e+002
47	3.646e+000	3.546e+000	8.480e-001	4.571e-001	4.600e+001	1.170e+002
48	3.862e+000	3.705e+000	1.092e+000	4.844e-001	4.700e+001	1.190e+002
49	4.286e+000	4.192e+000	8.894e-001	5.380e-001	4.800e+001	1.210e+002
50	5.749e+000	5.573e+000	1.412e+000	7.210e-001	4.900e+001	1.220e+002

NASA FINGERPRINT VISCOSITI PROFILE 91LD RESIN NASA LOT2-1

NO.	ETA*	ETA'	ETA"	TORQUE	TIME	TEMP
	POISE	POISE	POISE	GRAMS-CM	MIN.	DEG. C
	7.552e+000	7.303e+000	1.925e+000	9.483e-001	5.000e+001	1.240e+002

CHART 14B


NASA FINGERPRINT VISCOSITY PROFILE 91LD RESIN NASA LOT2-2
1.0E3
ETA* POISE (Δ)
1.0E-1
2.0E2
TEMP DEG. C
3.0E1

xperiment No. : 13 Sample No. : 1

i le:
ASA FINGERPRINT VISCOSITY PROFILE 91LD RESIN NASA LOT2-2

- ator :CP

ate and Time : Tuesday, August 19, 1986 - 14:59:08

p- ating Mode : DYNAMIC

wr-p Type : CURE

eometry : DISK & PLATE
RADIUS : 25.00
GAP : 0.50

D' es :
TI IN =50%
REQUENCY =10RAD/SEC

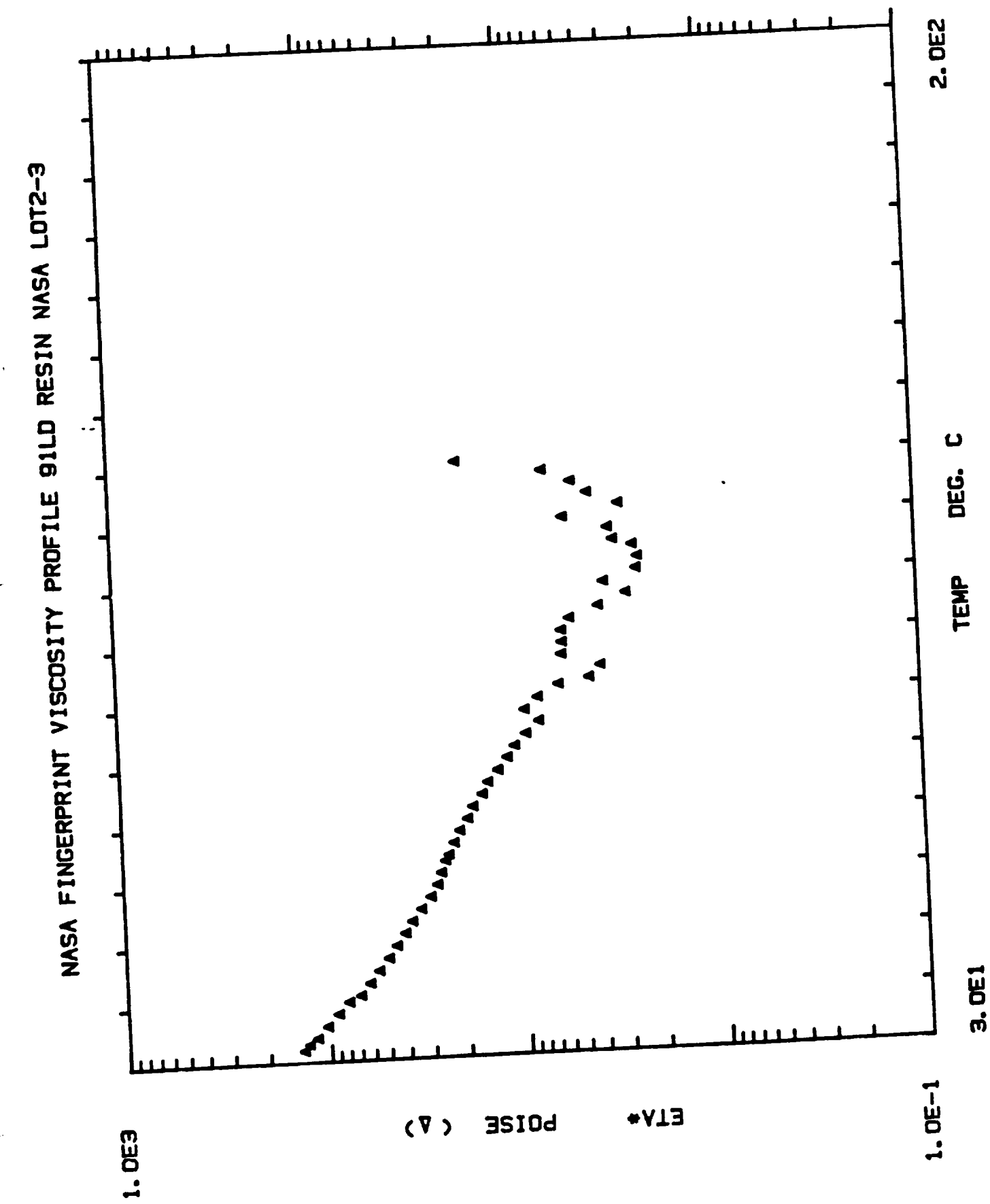
ORIGINAL PAGE IS
OF POOR QUALITY

J.	ETA* POISE	ETA' POISE	ETA" POISE	TORQUE GRAMS-CM	TIME MIN.	TEMP DEG. C
1	1.243e+002	1.142e+002	4.916e+001	1.563e+001	2.000e-001	3.000e+001
2	1.124e+002	1.044e+002	4.176e+001	1.413e+001	1.000e+000	3.000e+001
3	1.050e+002	9.702e+001	4.005e+001	1.319e+001	2.000e+000	3.200e+001
4	9.511e+001	8.625e+001	4.008e+001	1.194e+001	3.000e+000	3.300e+001
5	8.337e+001	7.435e+001	3.771e+001	1.047e+001	4.000e+000	3.500e+001
6	7.319e+001	6.376e+001	3.594e+001	9.186e+000	5.000e+000	3.700e+001
7	6.571e+001	5.591e+001	3.452e+001	8.254e+000	6.000e+000	3.900e+001
8	5.886e+001	4.855e+001	3.328e+001	7.387e+000	7.000e+000	4.100e+001
9	5.277e+001	4.229e+001	3.157e+001	6.628e+000	8.000e+000	4.300e+001
10	4.847e+001	3.784e+001	3.030e+001	6.087e+000	9.000e+000	4.500e+001
11	4.413e+001	3.299e+001	2.932e+001	5.539e+000	1.000e+001	4.700e+001
12	4.070e+001	2.954e+001	2.800e+001	5.108e+000	1.100e+001	4.900e+001
13	3.753e+001	2.622e+001	2.685e+001	4.710e+000	1.200e+001	5.100e+001
14	3.489e+001	2.439e+001	2.495e+001	4.380e+000	1.300e+001	5.300e+001
15	3.229e+001	2.221e+001	2.343e+001	4.047e+000	1.400e+001	5.500e+001
16	2.959e+001	2.080e+001	2.105e+001	3.711e+000	1.500e+001	5.700e+001
17	2.796e+001	2.016e+001	1.936e+001	3.507e+000	1.600e+001	5.900e+001
18	2.691e+001	1.968e+001	1.836e+001	3.375e+000	1.700e+001	6.100e+001
19	2.517e+001	1.887e+001	1.664e+001	3.157e+000	1.800e+001	6.300e+001
20	2.413e+001	1.841e+001	1.561e+001	3.025e+000	1.900e+001	6.500e+001
21	2.235e+001	1.801e+001	1.323e+001	2.803e+000	2.000e+001	6.600e+001
22	2.085e+001	1.751e+001	1.133e+001	2.613e+000	2.100e+001	6.800e+001
23	1.926e+001	1.660e+001	9.773e+000	2.416e+000	2.200e+001	7.000e+001
24	1.769e+001	1.571e+001	8.139e+000	2.220e+000	2.300e+001	7.200e+001
25	1.601e+001	1.443e+001	6.926e+000	2.011e+000	2.400e+001	7.400e+001
26	1.447e+001	1.331e+001	5.670e+000	1.816e+000	2.500e+001	7.600e+001
27	1.317e+001	1.218e+001	5.024e+000	1.654e+000	2.600e+001	7.800e+001
28	1.150e+001	1.079e+001	3.989e+000	1.443e+000	2.700e+001	8.000e+001
29	1.019e+001	9.500e+000	3.674e+000	1.277e+000	2.800e+001	8.200e+001
30	9.266e+000	8.600e+000	3.451e+000	1.163e+000	2.900e+001	8.400e+001
31	8.599e+000	8.114e+000	2.847e+000	1.078e+000	3.000e+001	8.600e+001
32	9.007e+000	8.514e+000	2.937e+000	1.130e+000	3.100e+001	8.800e+001
33	8.291e+000	7.955e+000	2.335e+000	1.040e+000	3.200e+001	9.000e+001
34	5.992e+000	5.836e+000	1.361e+000	7.517e-001	3.300e+001	9.200e+001
35	3.143e+000	3.053e+000	7.494e-001	3.946e-001	3.400e+001	9.400e+001
36	3.942e+000	3.852e+000	8.381e-001	4.946e-001	3.500e+001	9.600e+001
37	4.281e+000	4.123e+000	1.152e+000	5.374e-001	3.600e+001	9.800e+001
38	4.815e+000	4.758e+000	7.412e-001	6.039e-001	3.700e+001	1.000e+002
39	4.494e+000	4.444e+000	6.690e-001	5.640e-001	3.800e+001	1.020e+002
40	3.810e+000	3.739e+000	7.308e-001	4.780e-001	3.900e+001	1.040e+002
41	3.292e+000	3.202e+000	7.622e-001	4.131e-001	4.000e+001	1.060e+002
42	2.810e+000	2.773e+000	4.544e-001	3.524e-001	4.100e+001	1.070e+002
43	2.487e+000	2.463e+000	3.422e-001	3.120e-001	4.200e+001	1.090e+002
44	2.787e+000	2.755e+000	4.215e-001	3.495e-001	4.300e+001	1.110e+002
45	3.037e+000	2.995e+000	5.058e-001	3.811e-001	4.400e+001	1.130e+002
46	3.421e+000	3.377e+000	5.464e-001	4.289e-001	4.500e+001	1.150e+002
47	3.175e+000	3.128e+000	5.477e-001	3.982e-001	4.600e+001	1.170e+002
48	3.242e+000	3.214e+000	4.294e-001	4.069e-001	4.700e+001	1.190e+002
49	4.047e+000	3.913e+000	1.030e+000	5.069e-001	4.800e+001	1.210e+002
50	5.702e+000	5.590e+000	1.128e+000	7.150e-001	4.900e+001	1.230e+002

NASA FINGERPRINT VISCOSITY PROFILE 91LD RESIN NASA LBT2-2

	ETA* POISE	ETA' POISE	ETA" POISE	TORQUE GRAMS-CM	TIME MIN.	TEMP DEG. C
1	8.369e+000	8.150e+000	1.899e+000	1.048e+000	5.000e+001	1.250e+002

CHART 14C


NASA FINGERPRINT VISCOSITY PROFILE 91LD RESIN NASA LOT2-3
ETA* POISE (A)
1.0E3
1.0E-1
TEMP DEG. C
2.0E2
3.0E1

Rheometrics RECAP II

Experiment No. : 14 Sample No. : 1

Title:
NASA FINGERPRINT VISCOSITY PROFILE 91LD RESIN NASA LOT2-3

Operator :CRISTINA P

Date and Time : Tuesday, August 19, 1986 - 16:16:38

Operating Mode : DYNAMIC

Sweep Type : CURE

Geometry : DISK & PLATE
RADIUS : 25.00
GAP : 0.50

Notes :

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OF POOR QUALITY

NASA FINGERPRINT VISCOSITY PROFILE 91LD RESIN NASA LOT2-3

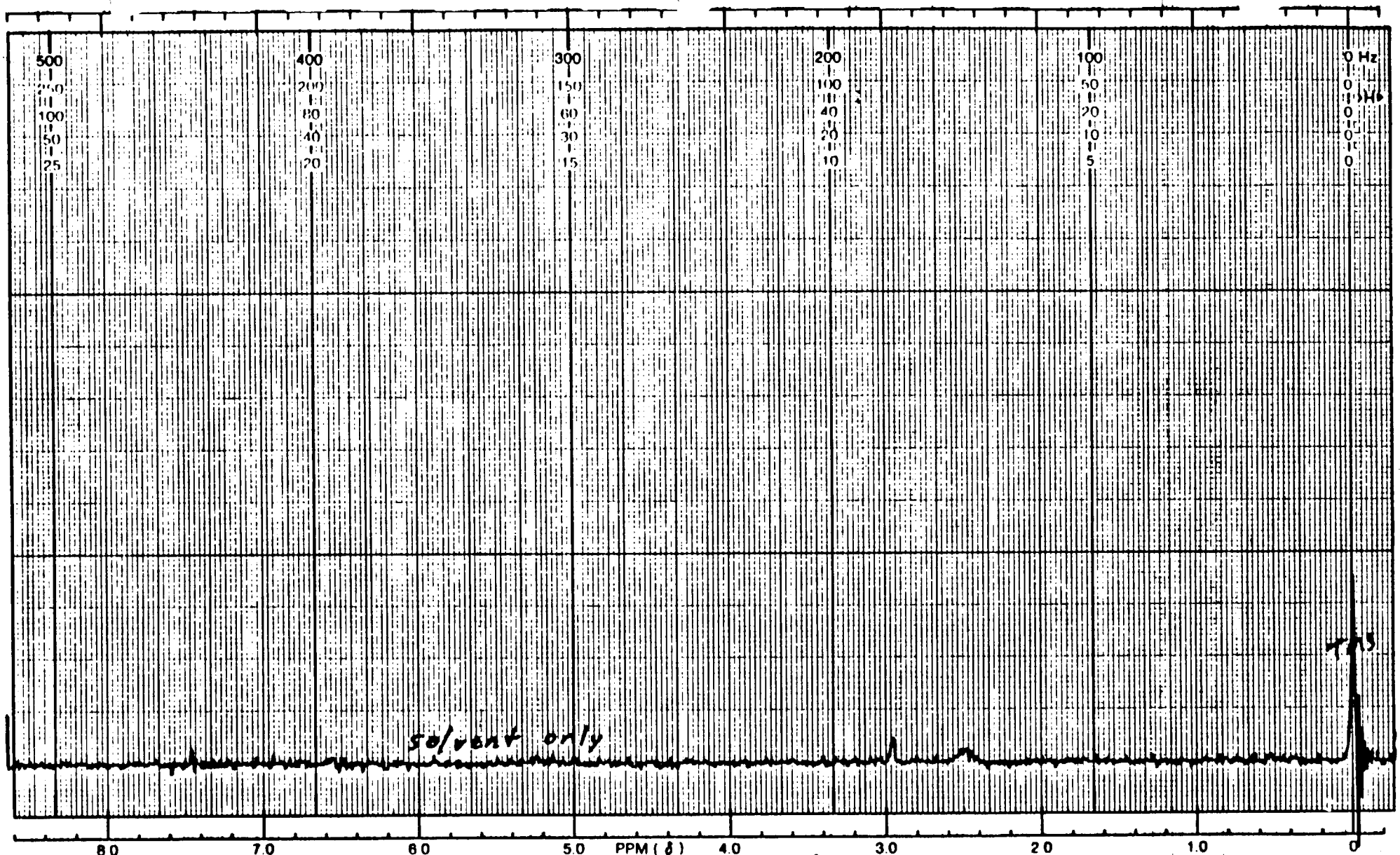
NO.	ETA* POISE	ETA' POISE	ETA" POISE	TORQUE GRAMS-CM	TIME MIN.	TEMP DEG. C
1	1.351e+002	1.256e+002	4.992e+001	1.696e+001	2.000e-001	3.200e+001
2	1.344e+002	1.266e+002	4.521e+001	1.686e+001	1.000e+000	3.200e+001
3	1.268e+002	1.196e+002	4.216e+001	1.591e+001	2.000e+000	3.300e+001
4	1.152e+002	1.081e+002	3.982e+001	1.446e+001	3.000e+000	3.400e+001
5	1.022e+002	9.490e+001	3.799e+001	1.282e+001	4.000e+000	3.600e+001
6	8.971e+001	8.175e+001	3.696e+001	1.125e+001	5.000e+000	3.800e+001
7	7.926e+001	7.087e+001	3.550e+001	9.945e+000	6.000e+000	4.000e+001
8	6.897e+001	6.003e+001	3.397e+001	8.650e+000	7.000e+000	4.100e+001
9	6.157e+001	5.200e+001	3.296e+001	7.728e+000	8.000e+000	4.300e+001
10	5.522e+001	4.550e+001	3.128e+001	6.926e+000	9.000e+000	4.500e+001
11	4.913e+001	3.904e+001	2.982e+001	6.164e+000	1.000e+001	4.700e+001
12	4.464e+001	3.422e+001	2.867e+001	5.602e+000	1.100e+001	4.900e+001
13	4.033e+001	2.964e+001	2.735e+001	5.057e+000	1.200e+001	5.100e+001
14	3.706e+001	2.634e+001	2.606e+001	4.652e+000	1.300e+001	5.300e+001
15	3.322e+001	2.355e+001	2.343e+001	4.165e+000	1.400e+001	5.500e+001
16	2.965e+001	2.132e+001	2.060e+001	3.718e+000	1.500e+001	5.700e+001
17	2.734e+001	1.993e+001	1.872e+001	3.427e+000	1.600e+001	5.900e+001
18	2.603e+001	1.949e+001	1.726e+001	3.268e+000	1.700e+001	6.100e+001
19	2.466e+001	1.901e+001	1.570e+001	3.094e+000	1.800e+001	6.300e+001
20	2.363e+001	1.883e+001	1.428e+001	2.965e+000	1.900e+001	6.400e+001
21	2.217e+001	1.829e+001	1.254e+001	2.780e+000	2.000e+001	6.600e+001
22	2.071e+001	1.778e+001	1.061e+001	2.598e+000	2.100e+001	6.800e+001
23	1.861e+001	1.656e+001	8.917e+000	2.359e+000	2.200e+001	7.000e+001
24	1.760e+001	1.597e+001	7.383e+000	2.208e+000	2.300e+001	7.200e+001
25	1.574e+001	1.449e+001	6.153e+000	1.976e+000	2.400e+001	7.400e+001
26	1.466e+001	1.367e+001	5.297e+000	1.840e+000	2.500e+001	7.600e+001
27	1.299e+001	1.226e+001	4.304e+000	1.631e+000	2.600e+001	7.800e+001
28	1.160e+001	1.108e+001	3.442e+000	1.456e+000	2.700e+001	8.000e+001
29	1.064e+001	1.011e+001	3.305e+000	1.335e+000	2.800e+001	8.200e+001
30	9.289e+000	8.890e+000	2.695e+000	1.165e+000	2.900e+001	8.400e+001
31	7.952e+000	7.710e+000	1.948e+000	9.980e-001	3.000e+001	8.600e+001
32	9.383e+000	8.947e+000	2.828e+000	1.179e+000	3.100e+001	8.800e+001
33	8.005e+000	7.707e+000	2.163e+000	1.004e+000	3.200e+001	9.000e+001
34	6.270e+000	6.029e+000	1.721e+000	7.872e-001	3.300e+001	9.200e+001

36	3.827e+000	3.777e+000	6.155e-001	4.806e-001	3.500e+001	9.500e+001
37	6.006e+000	5.839e+000	1.409e+000	7.535e-001	3.600e+001	9.700e+001
38	5.933e+000	5.725e+000	1.560e+000	7.447e-001	3.700e+001	9.900e+001
39	5.959e+000	5.798e+000	1.376e+000	7.473e-001	3.800e+001	1.010e+002
40	5.391e+000	5.287e+000	1.057e+000	6.766e-001	3.900e+001	1.030e+002
41	3.839e+000	3.688e+000	1.068e+000	4.817e-001	4.000e+001	1.050e+002
42	2.768e+000	2.534e+000	1.114e+000	3.474e-001	4.100e+001	1.070e+002
43	3.582e+000	3.517e+000	6.770e-001	4.496e-001	4.200e+001	1.090e+002
44	2.437e+000	2.379e+000	5.280e-001	3.056e-001	4.300e+001	1.110e+002
45	2.386e+000	2.258e+000	7.710e-001	2.994e-001	4.400e+001	1.130e+002
46	2.529e+000	2.486e+000	4.632e-001	3.171e-001	4.500e+001	1.150e+002
47	3.162e+000	3.068e+000	7.642e-001	3.967e-001	4.600e+001	1.160e+002
48	3.335e+000	3.251e+000	7.428e-001	4.178e-001	4.700e+001	1.180e+002
49	5.591e+000	5.426e+000	1.349e+000	7.010e-001	4.800e+001	1.200e+002
50	2.915e+000	2.873e+000	4.928e-001	3.657e-001	4.900e+001	1.220e+002

-- I --

VF A FINGERPRINT VISCOSITY PROFILE 91LD RESIN NASA LOT2-3

N.	ETA* POISE	ETA' POISE	ETA" POISE	TORQUE GRAMS-CM	TIME MIN.	TEMP DEG. C
51	4.183e+000	4.073e+000	9.518e-001	5.246e-001	5.000e+001	1.240e+002
2	5.029e+000	4.881e+000	1.211e+000	6.309e-001	5.100e+001	1.260e+002
3	6.973e+000	6.753e+000	1.739e+000	8.739e-001	5.200e+001	1.280e+002
54	1.866e+001	1.754e+001	6.376e+000	2.340e+000	5.300e+001	1.300e+002



SWEEP OFFSET (Hz): 0
SPECTRUM AMPLITUDE: 8.0
INTEGRAL AMPLITUDE: —
SPINNING RATE (RPS): 30

MANUAL
SWEEP TIME (SEC): 50 250 500 1000
SWEEP WIDTH (Hz): 25 50 100 250 500
FILTER: 1 2 3 4 5 6 7 8
RF POWER LEVEL: 0.30

AUTO ☐
(250)
(500)
(2)
(.05)

SAMPLE: Solvent
SOLVENT: Unisol-d + 0.62 TMS
DEC. LEVEL

REMARKS:

ORIGINAL PAGE IS
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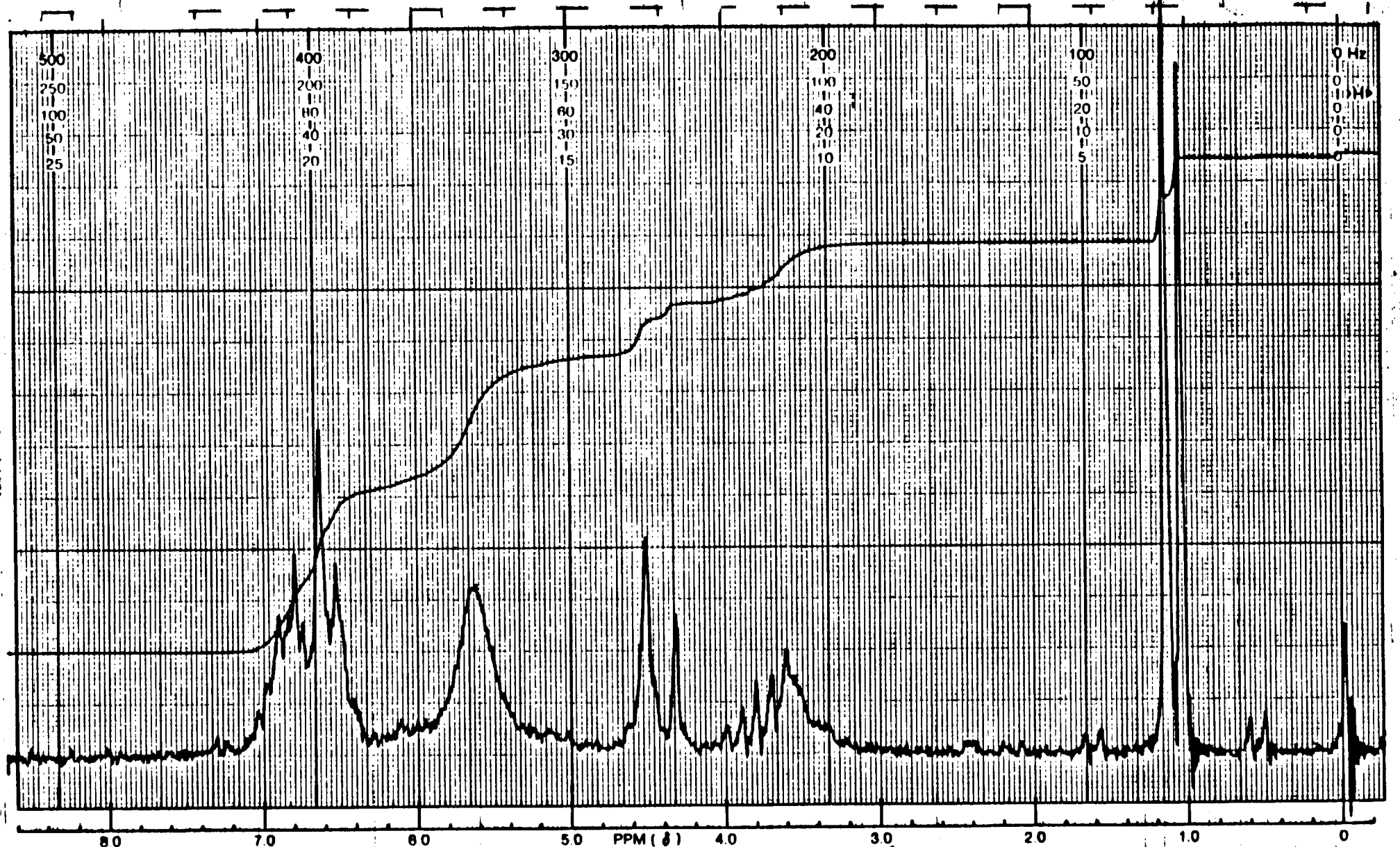
SOLVENT ONLY SCAN

NORELL, INC.
LANDISVILLE, N.J. 08326
T60 Phone: (609) 697-0020

DATE: 3-21-86 OPERATOR DGW SPECTRUM NO. 1A of 7
solvent scan



SWEEP OFFSET (Hz): 0
SPECTRUM AMPLITUDE: 8.0
INTEGRAL AMPLITUDE: 5.0
SPINNING RATE (RPS): 30

MANUAL
SWEEP TIME (SEC): 50 250 500 1000
SWEEP WIDTH (Hz): 25 50 100 250 500
FILTER: 1 2 3 4 5 6 7 8
RF POWER LEVEL: 0.25

AUTO ☐
(250)
(500)
(2)
(.05)

SAMPLE: 91LD Lt#2-1
SOLVENT: Unisol-d + 0.5% TMS
DEC. LEVEL

REMARKS: 0.130 gm sample
0.846 gm solvent

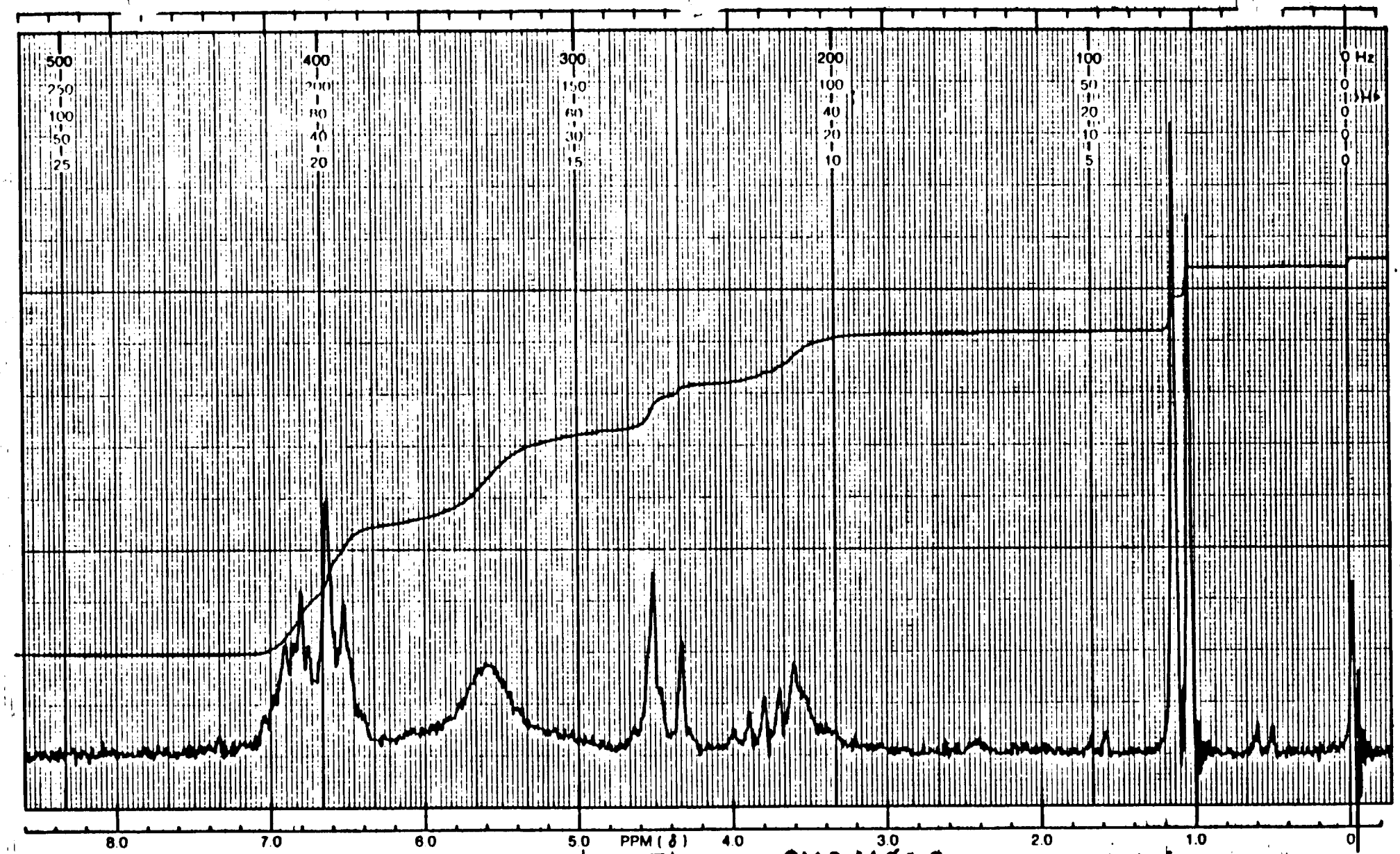
CHART 15A

NORELL, INC.
LANDISVILLE, N.J. 08326
T60 Phone: (609) 697-0020

DATE: 3-21-86

OPERATOR DGW

SPECTRUM NO. 4 of 9 91LD Lt#2-1



SWEEP OFFSET (Hz): 0
SPECTRUM AMPLITUDE: 8.0
INTEGRAL AMPLITUDE: 5.0
SPINNING RATE (RPS): 30

MANUAL / AUTO ☐

SWEEP TIME (SEC): 50 | 250 | 500 | 1000 — (250)
SWEEP WIDTH (Hz): 25 | 50 | 100 | 250 | 500 — (500)
FILTER: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 — (2)
RF POWER LEVEL: 0.25 — (.05)

SAMPLE: 91LD Lot #2-2
SOLVENT: Unisol-d + 0.5% TMS
DEC. LEVEL

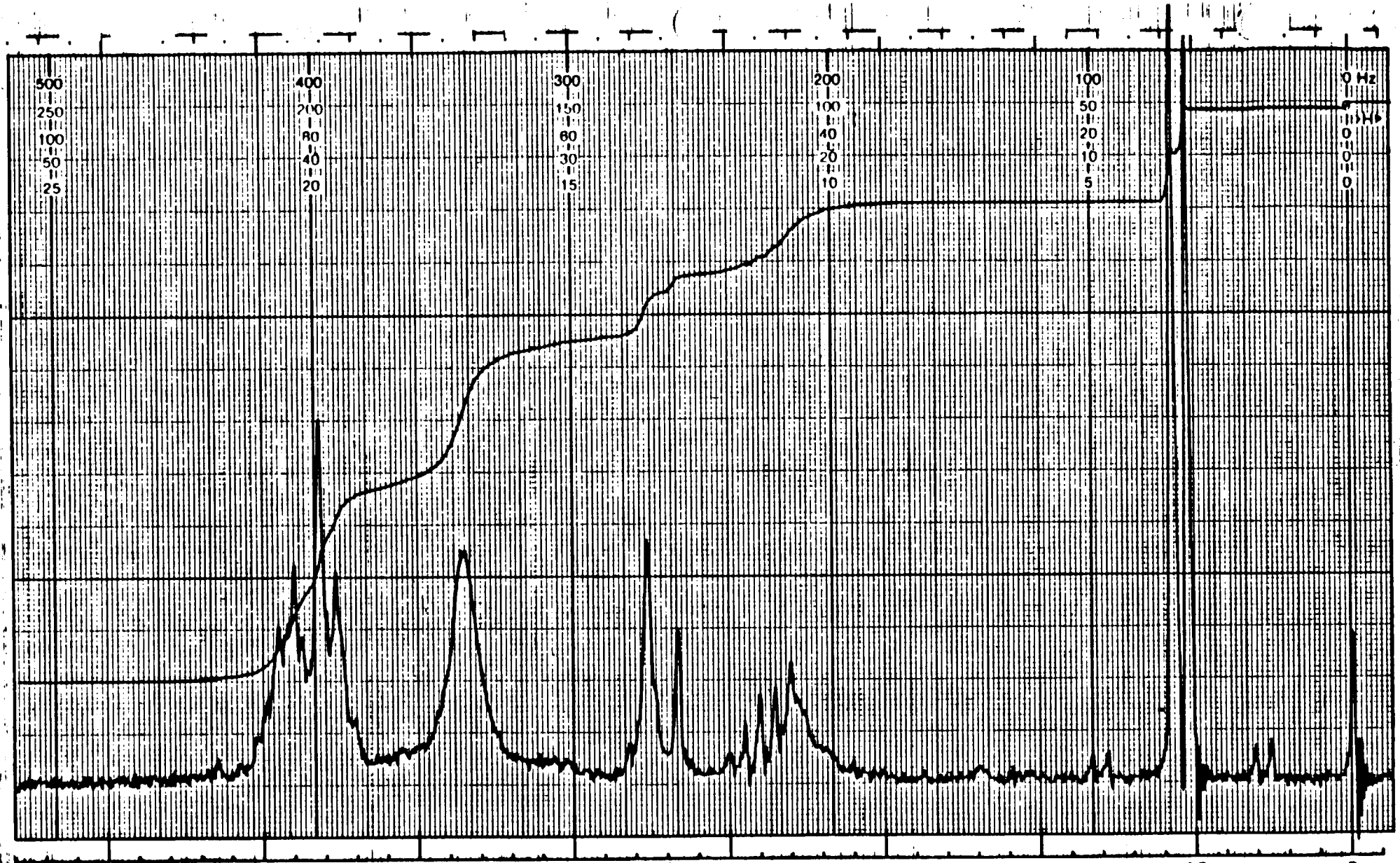
REMARKS: 0.114 gm sample
0.946 gm solvent

ORIGINAL PAGE IS
OF POOR QUALITY

CHART 15B

NORELL, INC.
LANDISVILLE, N.J. 08326
T60 Phone: (609) 697-0020

DATE: 3-21-86 OPERATOR DEW SPECTRUM NO. 5 of 9 91LD
Lot #2-2



SWEEP OFFSET (Hz): 0
SPECTRUM AMPLITUDE: 8.0
INTEGRAL AMPLITUDE: 5.0
SPINNING RATE (RPS): 20

MANUAL
SWEEP TIME (SEC): 30 250 500 1000
SWEEP WIDTH (Hz): 25 50 100 250 500
FILTER: 1 2 3 4 5 6 7 8
RF POWER LEVEL: 0.25

AUTO ☐
(250)
(500)
(2)
(.05)

SAMPLE: 9(2D Lot#2-3
SOLVENT: Uniref-d+0.5% TMS
DEC. LEVEL

REMARKS: 0.136 gm sample
0.775 gm solvent

ORIGINAL PAGE IS
OF POOR QUALITY

CHART 15C

NORELL, INC.
LANDISVILLE, N.J. 08326
T60 Phone: (609) 697-0020

DATE: 3-21-86

OPERATOR DGW

SPECTRUM NO. 6 of 9 9(2D
Lot# 2-3

TABLE OF CONTENTS

FABRIC TESTING

NAS8-36298

U.S. Polymeric O.E. 71108

SWB-8 Fabric for NASA Lot# 2

CHARTS

U.S. Polymeric

FABRIC TESTING

NAS8-36298

U.S. POLYMERIC O.E. 71108

SWB-8 Fabric for NASA Lot# 2

1a. Breaking Strength, lbs/in, WARP
ASTM D1682

	#2-1	#2-2	#2-3
PICK	61	42	92
CENTER	55	44	98
PLAIN	75	60	27
AVG.	63.7	48.7	72.3

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
PICK	16	27	63	48	25	12
CENTER	69	84	65	87	14	41
PLAIN	76	77	66	88	48	73
AVG.	53.7	62.7	64.7	74.3	29.0	42

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
PICK	24	59	71	38	44.5
CENTER	71	92	103	64	68.2
PLAIN	23	43	82	28	58.9
AVG.	39.3	64.7	85.3	43.3	57.2

1b. Breaking Strength, lbs/inch, FILL
ASTM D1682

	#2-1	#2-2	#2-3
PICK	72	59	77
CENTER	83	66	63
PLAIN	67	63	73
AVG.	74.0	63.3	71.0

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
PICK	92	28	71	102	25	53
CENTER	71	77	39	48	22	46
PLAIN	61	47	70	27	19	55
AVG.	74.7	50.7	60.0	59.0	22.0	51.3

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
PICK	73	83	30	55	63.1
CENTER	20	83	58	51	55.9
PLAIN	58	85	88	45	58.5
AVG.	50.3	83.7	58.7	50.3	59.2

2a. Carbon Assay, %
MDQAI 5560

	#2-1	#2-2	#2-3
PICK	99.2	99.6	99.8
CENTER	99.6	99.8	99.6
PLAIN	99.0	98.9	99.9
AVG.	99.27	99.43	99.77

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
PICK	99.1	99.2	99.9	99.7	99.7	99.7
CENTER	99.8	99.7	99.6	99.8	99.7	99.8
PLAIN	99.9	99.0	99.9	99.4	99.9	99.9
AVG.	99.60	99.30	99.80	99.63	99.77	99.80

HITCO MATERIALS DIVISION
700 E. DYER ROAD, SANTA ANA, CALIFORNIA 92707 • (714) 549-1101 • TWX (910) 595-1130 • FAX # (714) 549-2858-5-2437

SWB-8 Fabric for NASA Lot# 2

2a. Carbon Assay, % (CONTINUED)
MDQAI 5560

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
PICK	99.9	99.9	99.4	99.9	99.62
CENTER	99.6	99.5	99.8	99.9	99.71
PLAIN	99.2	99.4	99.6	99.9	99.53
AVG.	99.57	99.60	99.60	99.90	99.62

2b. Hydrogen Assay, %
MDQAI 5560

	#2-1	#2-2	#2-3
PICK	.03	.02	.01
CENTER	.03	.01	.01
PLAIN	.02	.02	.01
AVG.	.027	.017	.010

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
PICK	.02	.01	.02	<.01	<.01	<.01
CENTER	.01	<.01	.02	<.01	<.01	<.01
PLAIN	.01	<.01	.01	<.01	<.01	<.01
AVG.	.013	EST .004	.017	EST .001	EST .001	EST .001

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
PICK	<.01	.01	<.01	<.01	.010
CENTER	<.01	<.01	.01	<.01	.007
PLAIN	.01	<.01	.01	<.01	.007
AVG.	EST .004	EST .004	EST .007	EST .001	.008

2c. Nitrogen Assay, %
MDQAI 5560

	#2-1	#2-2	#2-3
PICK	.22	.19	.11
CENTER	.21	.23	.09
PLAIN	.09	.09	.16
AVG.	.17	.17	.12

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
PICK	.1	.1	.1	.1	.2	.3
CENTER	.1	.02	.1	.1	.2	.2
PLAIN	.1	.1	.1	.04	.1	.1
AVG.	.1	.073	.1	.08	.167	.2

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
PICK	.1	.1	.1	.1	.14
CENTER	.2	.1	.2	.1	.14
PLAIN	.2	.1	.1	.02	.10
AVG.	.167	.1	.133	.073	.127

3. Visual Inspection
QCi-102

See Charts 3A-3M

4. Specific Gravity, Units
PTM-84

	#2-1	#2-2	#2-3
PICK	1.7376	2.0163	2.0137
CENTER	1.7742	2.0569	2.0601
PLAIN	1.9094	2.0466	2.0501
AVG.	1.807	2.040	2.041

SWB-8 Fabric for NASA Lot# 2

4. Specific Gravity, Units (CONTINUED)
PTM-84

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
PICK	2.1453	2.1458	2.2223	2.0307	2.1896	1.7857
CENTER	2.1874	2.7238	2.1354	2.0625	2.1918	1.8273
PLAIN	2.1789	2.2718	2.1337	2.1014	2.1909	1.7342
AVG.	2.171	2.380	2.164	2.065	2.191	1.782

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
PICK	1.6823	1.7784	1.5362	1.6062	1.9146
CENTER	1.8032	1.7732	1.6435	1.7198	1.9969
PLAIN	1.7129	1.7895	1.7164	1.7572	1.9689
AVG.	1.733	1.780	1.632	1.694	1.960

5. pH, Units
CTM-24B

	#2-1	#2-2	#2-3
	6.6	4.2	6.1
	6.3	4.2	6.2
AVG.	6.45	4.2	6.15

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
	6.0	6.2	6.4	6.0	6.4	6.9
	6.3	6.2	6.4	6.0	6.4	7.0
AVG.	6.15	6.2	6.4	6.0	6.4	6.95

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
	6.2	6.6	6.0	6.8	6.18
	6.2	6.5	6.0	6.9	6.20
AVG.	6.2	6.55	6.0	6.85	6.19

6. TGA, °C at 50% Weight Loss
CTM-51 (AIR)

SET UP# 1		SET UP# 2	
#2-2	939	#2-1	867
#2-4	926	#2-3	881
#2-5	934	#2-6	834
#2-7	913	#2-8	825
#2-9	879	#2-10	833
#2-11	876	#2-12	782
#2-13	905		
AVG.	910	AVG.	837

See Chart 6A-6M

7a. Atomic Absorption, ppm
CTM-53B

	#2-1	#2-2	#2-3
Na	3	4	6
K	1	1	1
Ca	31	32	16
Mg	0	0	1
Li	0	0	0
AVG.	35	37	24

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
Na	3	5	6	4	9	11
K	2	2	1	1	1	1
Ca	25	16	13	15	77	101
Mg	0	1	1	0	1	1
Li	0	0	0	0	0	0
AVG.	30	24	21	20	88	114

SWB-8 Fabric for NASA Lot# 2

7a. Atomic Absorption, ppm (CONTINUED)
CTM-53B

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
Na	7	6	4	4	5.5
K	1	1	1	1	1.2
Ca	62	54	29	30	38.5
Mg	0	0	0	1	0.5
Li	0	0	0	0	0.0
AVG.	70	61	34	36	45.7

7b. Moisture Content, %
CTM-53B

#2-1	.020	#2-8	.000
#2-2	.025	#2-9	.010
#2-3	.020	#2-10	.015
#2-4	.015	#2-11	.010
#2-5	.005	#2-12	.005
#2-6	.015	#2-13	.005
#2-7	.005		
	Lot# 2	AVERAGE	.011

7c. Ash Content,
CTM-53B

#2-1	.020	#2-8	.080
#2-2	.035	#2-9	.059
#2-3	.020	#2-10	.070
#2-4	.020	#2-11	.055
#2-5	.010	#2-12	.005
#2-6	.035	#2-13	.029
#2-7	.030		
	Lot# 2	AVERAGE	.036

8a. Filament diameter, microns, WARP
S.E.M. procedure
(diameters are an average of 10 measurements)

	#2-1	#2-2	#2-3
AVERAGE	9.12	9.60	9.64
Minimum	8.25	8.00	8.95
Maximum	9.75	10.90	10.30
Std. Dev	0.52	0.94	0.43

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
AVERAGE	9.58	10.03	9.36	9.65	9.28	9.74
Minimum	7.95	8.75	8.00	8.05	8.00	8.35
Maximum	11.25	12.45	10.60	11.50	11.00	10.45
Std. Dev	1.15	1.21	0.89	0.97	0.90	0.56

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
AVERAGE	9.85	9.55	9.18	10.11	9.59
Minimum	7.75	8.55	8.10	8.25	7.75
Maximum	12.00	10.55	10.05	12.05	12.45
Std. Dev	1.28	0.66	0.64	1.25	0.92

8b. Filament diameter, microns, FILL
S.E.M. procedure
(diameters are an average of 10 measurements)

	#2-1
AVERAGE	10.00
Minimum	9.00
Maximum	13.50
Std. Dev	1.34

SWB-8 Fabric for NASA Lot# 2

9a. Thread Count, per inch, WARP
PTM-5A

	#2-1	#2-2	#2-3
	41	44	40
	41	43	40
	40	45	40
	41	44	41
	41	44	40
AVG.	40.8	44	40.2

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
	44	43	40	39	36	40
	44	43	40	38	36	40
	43	42	40	39	36	41
	43	43	40	39	36	41
	44	42	40	38	35	41
AVG.	43.6	42.6	40	38.6	35.8	40.6

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
	35	40	42	35	39.9
	35	39	42	34	39.6
	36	39	41	35	39.8
	35	39	41	34	39.8
	35	40	40	34	39.5
AVG.	35.2	39.4	41.2	34.4	39.7

9b. Thread Count, per inch, FILL
PTM-5A

	#2-1	#2-2	#2-3
	38	38	35
	38	38	36
	38	38	35
	38	38	36
	38	38	36
AVG.	38.0	38.0	35.6

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
	38	39	38	39	37	37
	38	38	38	39	39	37
	39	38	37	39	39	38
	39	38	37	39	38	37
	39	38	37	38	40	38
AVG.	38.6	38.2	37.4	38.8	38.6	37.4

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
	39	41	39	39	38.2
	38	41	39	39	38.3
	39	41	39	38	38.3
	38	42	39	39	38.3
	38	41	39	39	38.4
AVG.	38.4	41.2	39.0	38.8	38.3

10a. Areal Weight as received, gm/4x4
PTM-3A

	#2-1	#2-2	#2-3
LEFT	3.416	3.516	3.214
CENTER	3.234	3.510	3.196
RIGHT	3.327	3.722	3.375
AVG.	3.326	3.583	3.262

SWB-8 Fabric for NASA Lot# 2

10a. Areal Weight as received, gm/4x4
PTM-3A

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
LEFT	3.607	3.640	3.464	3.806	3.246	3.145
CENTER	3.533	3.569	3.366	3.566	2.970	2.933
RIGHT	3.636	3.762	3.377	3.710	3.079	3.284
AVG.	3.592	3.657	3.402	3.694	3.098	3.121

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
LEFT	3.275	3.562	3.587	3.056	3.426
CENTER	3.159	3.263	2.759	3.149	3.247
RIGHT	3.015	3.477	3.379	2.848	3.384
AVG.	3.150	3.434	3.242	3.018	3.352

10b. Volatiles as received, %
PTM-3A

	#2-1	#2-2	#2-3
	.50	.46	.59
	.43	.40	.47
	.30	.38	.47
AVG.	.41	.41	.51

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
	.58	.49	.52	.47	.62	.13
	.34	.45	.33	.34	.40	.48
	.36	.37	.30	.38	.39	.55
AVG.	.43	.44	.38	.40	.47	.38

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
	.24	.25	.33	.36	.43
	.44	.40	.47	.44	.41
	.60	.46	.53	.49	.43
AVG.	.43	.37	.45	.43	.42

10c. Weight change on Acetone wash, %
PTM-3A

	#2-1	#2-2	#2-3
LEFT	.06	.11	.13
CENTER	-.16	.03	-.16
RIGHT	-.18	-.05	-.15
AVG.	-.09	.03	-.06

	#2-4	#2-5	#2-6	#2-7	#2-8	#2-9
LEFT	.00	.03	-.03	.00	.00	-.51
CENTER	-.17	-.11	-.18	-.14	-.20	-.21
RIGHT	-.11	-.16	-.09	-.11	-.13	-.06
AVG.	-.09	-.08	-.10	-.08	-.11	-.26

	#2-10	#2-11	#2-12	#2-13	LOT2 AVG
LEFT	-.15	-.11	-.22	-.30	-.08
CENTER	-.13	-.18	-.25	-.26	-.16
RIGHT	.00	-.14	-.15	-.07	-.11
AVG.	-.09	-.15	-.21	-.21	-.12

U.S. Polymeric

Hamid M. Quraishi, Manager
Quality Assurance Department

USP NO. CHART 3A

DATE 4/15/86

FABRIC SNB FABRIC 33" Lot1483-3

MFG. STOCKPOLE FIBERS CO

ROLL NO. 16-1708

YARDS 31.0

POUNDS 16.9

ORDER NO. 71108

SPECIFICATION STD MFG CARD

Q.C. FILE # NASA# 2-1

FOOTAGE

START Sample

LEFT

BAG 3"

49 V

66 W

74 & 76 W

TREATER OPERATOR READ UP

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE Group B

CHART 3B

USP NO.

DATE 4/15/86

FABRIC SUB FABRIC 33"

MFG. STOCKTON FIBERS CO. Lot-1483-3

ROLL NO. # 16-1527A

YARDS 26.0

POUNDS 15.0

ORDER NO. 7608

SPECIFICATION STD MFG CATS

Q.C. FILE # NASA 2-2

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE Group B

GARCIA

FOOTAGE

START Sample

LEFT

23 S

26 V

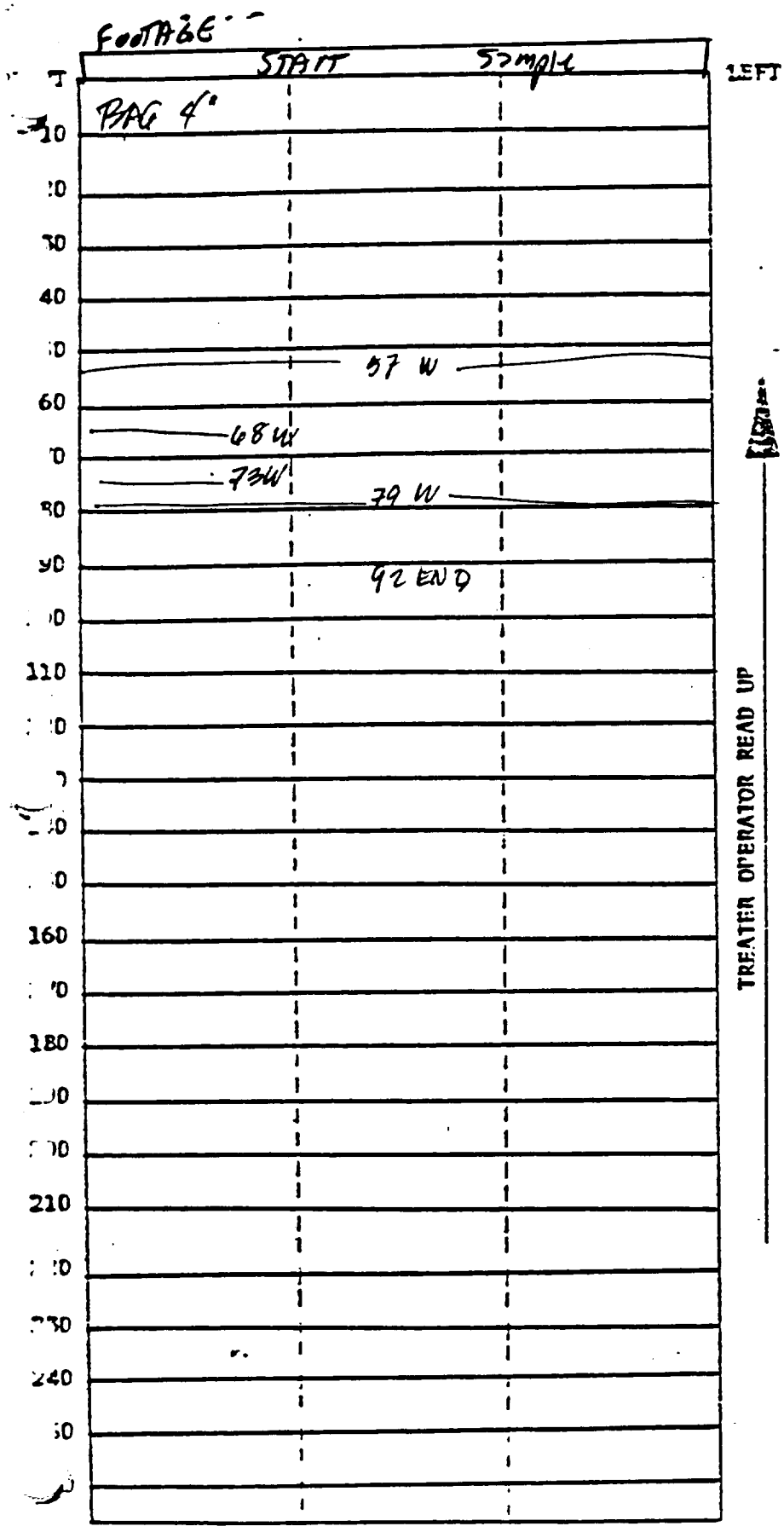
52 N

71 END

TREATER OPERATOR READ UP

30 40 60 90 110 160 210 240

USP NO CHART 3C



DATE 4/15/86

FABRIC SUB FABRIC 33"

MFG. STODDARD FIBERS LOT MFG 3-3

ROLL NO. P16-1709

YARDS 340

POUNDS 19.2

ORDER NO. 71108

SPECIFICATION STD MFG CAT 3.

Q.C. FILE # NASA #2-3

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE GROUP B

GARCIA

CHART 3D

USP NO. -

FOOTAGE

START Sample LEFT

1 BAG
15

END

TREATER OPERATOR READ UP

DATE 4/15/86

FABRIC SUB FABRIC 33" Lot 1483-3

MFG. STOCKPOLE FIBERS CO

ROLL NO. 16-1845A

YARDS 28.0

POUNDS 15.7

ORDER NO. 71108

SPECIFICATION STD MFG CONTR.

Q.C. FILE # NASA # 2-4

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE Group A

GARCIA

USP NO. CHART 3E

DATE 4/16/66

FABRIC SWB FABRIC 33

MFG. STOCKPOLE FIBERS CO Lot 1483-3

ROLL NO. 16-1731A

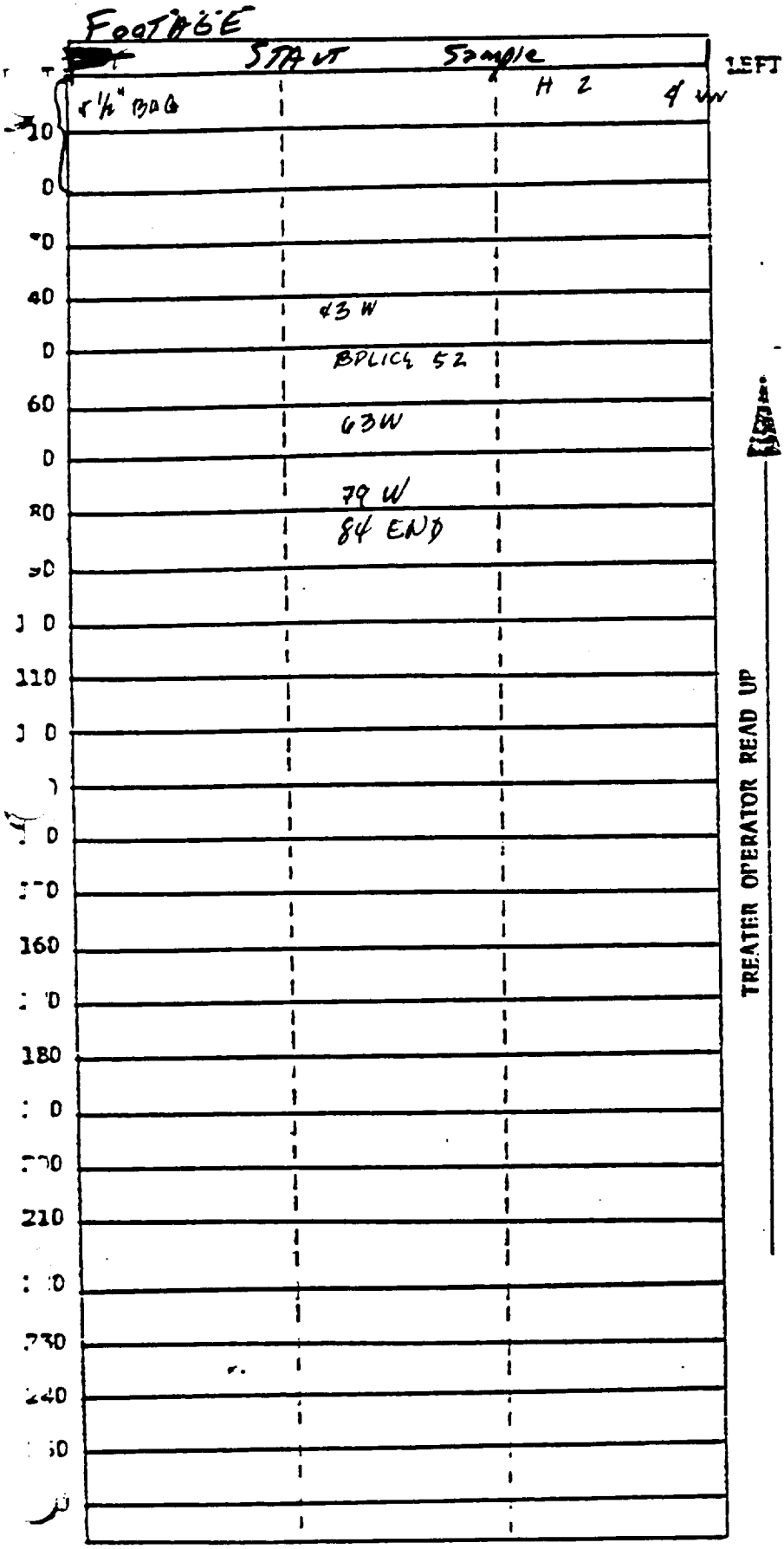
YARDS 31.0

POUNDS 17.3

ORDER NO. 71108

SPECIFICATION STD MFG CATS

Q.C. FILE # NASA 2-5



SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

FRAYED EDGE

REMARKS H - HOLE

GRADE Group C

GARCIA

CHART 3F

USP NO.

DATE 4/15/86

FABRIC SWB FABRIC 33"

MFG. STOKPOLE FIBERS CO LOT 1483-3

ROLL NO. 16-1524

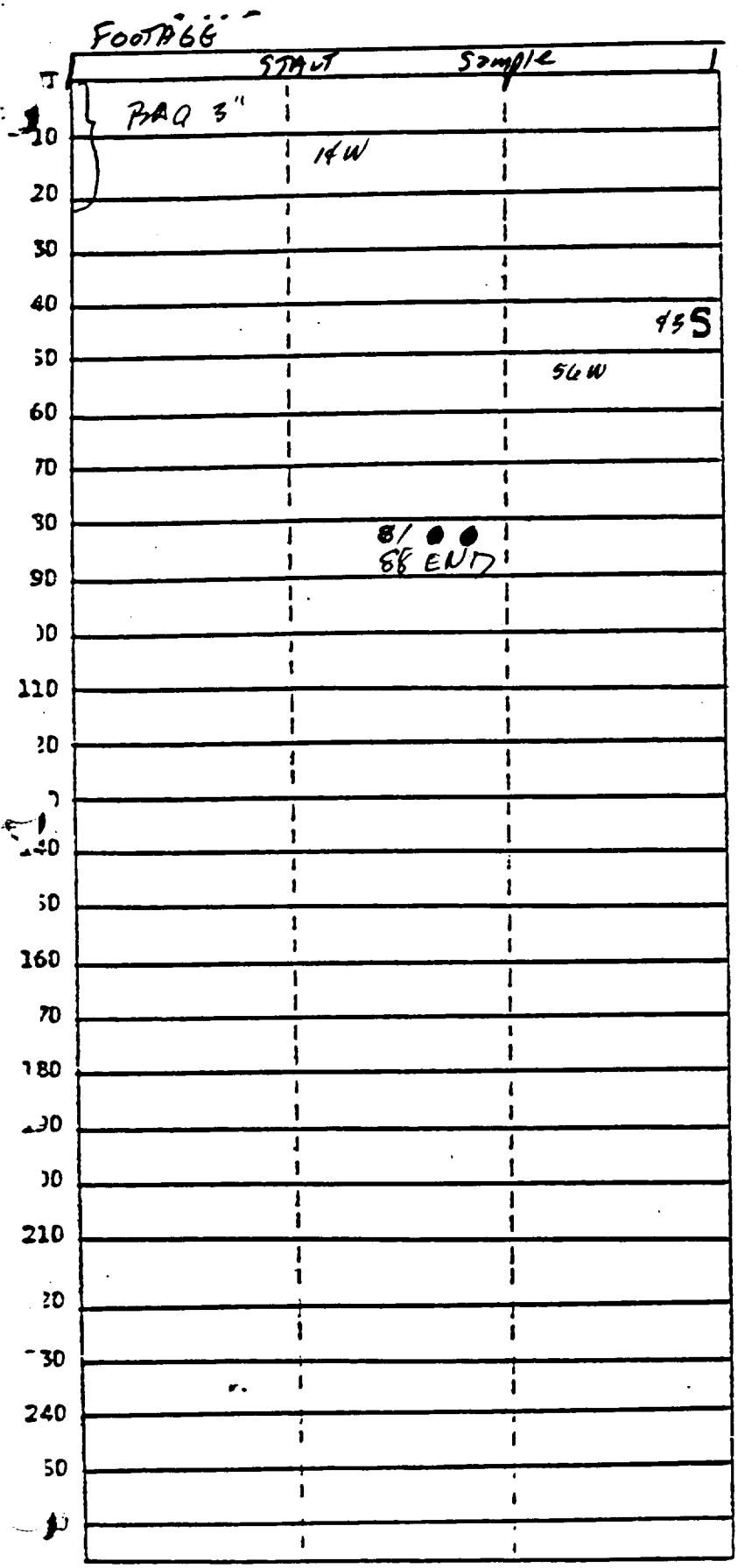
YARDS 30.0

POUNDS 17.6

ORDER NO. 71108

SPECIFICATION STD MFG CMT3

Q.C. FILE # NASA #2-6



SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE Group C

GARCIA

USP NO. CHART 3G

DATE 4/15/86

FABRIC SUB FABRIC 38"

MFG. STOCKPOLE FIBERS CO Lot 14F3-3

ROLL NO. 16-1717

YARDS 34.0

POUNDS 18.6

ORDER NO. 71108

SPECIFICATION STD MFG CAT 3

Q.C. FILE # NASA #2-7

FOOTAGE

	START	Sample	LEFT
0	BAG	10 W	
10	12	18 W	
20		25 W	
30		37 W	
40		48 W	
50			55 W
60			
70			
80			
90			
100			
110			
120			
130			
140			
150			
160			
170			
180			
190			
200			
210			
220			
230			
240			
250			

TREATER OPERATOR READ UP

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

TREAD ENDS HANGING OUT

GRADE Gray B

GARCIA

CHART 3H

USP NO. _____

DATE 28 Apr 1986

FABRIC SWB-8

MFG. STACKPOLE Fibers LOT 1413-1

ROLL NO. 16-1463

YARDS 31.0

POUNDS 16.0

ORDER NO. 71108

SPECIFICATION STD MFG CARDS

Q.C. FILE # NASA # 2-8

Footage

START Sample

LEFT

40
20 W ΔΔ
W
30 PULL THREAD
40 ⊘⊘
50 PULL THREAD
PULL THREAD
60 PULL THREAD
70
80
86 END OF ROLL
90
00
110
20
40
150
160
70
180
90
200
210
220
230
240
250

TREATER OPERATOR READ UP

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE Group C

J. Stutz

USP NO. CHART 31

DATE 26 APR. 86

FABRIC SWB-8

MFG. STACKPOLE FIBERS LOT 1413-1

ROLL NO. 16-1464

YARDS 340

POUNDS 185

ORDER NO. 7108

SPECIFICATION STD MFG CATS.

Q.C. FILE # NASA 2-9

Footage

START Sample

LEFT

W

3 INCH BAG ON SIDES

PULL THREADS

PULL THREAD

PULL THREAD

END OF ROLL

TREATER OPERATOR READ UP

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE Group B

CHART 3J

USP NO. -

DATE 4/15/86

FABRIC SWB FABRIC 33"

MFG. STOCKPOLE FIBERS CO. 1483-3

ROLL NO. 16-1744

YARDS 42.0

POUNDS 21.3

ORDER NO. 7108

SPECIFICATION STD MFG CONT.

Q.C. FILE # NASA 2-10

Footage

START Sample

LEFT

10
W/ ED
27 W
30 W
40
41 W
47 W
60
68 W
80
Sle WHOLE
90
100
110
115 END
120
130
140
150
160
170
180
190
200
210
220
230
240
250

TREATER OPERATOR READ UP

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE GRAPB

QA ROIA

USP NO. CHART 3K

DATE 4/15/86

FABRIC SMB FABRIC 33"

MFG. STOCKPOLE FIBERS CO. LOT 1483-3

ROLL NO. 16-1834

YARDS 320

POUNDS 19.7

ORDER NO. 71108

SPECIFICATION STD MFG CATS

Q.C. FILE # NASA 2-11

FOOTAGE

FT	START Sample	LEFT
	BAG 6'	
10	HOLE @ 15	
20		
30		
40		
50		
60		
70		
80	88 END	
90		
100		
110		
120		
130		
140		
150		
160		
170		
180		
190		
200		
210		
220		
230		
240		
250		
260		

TREATER OPERATOR READ UP

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE Group C

QA/QA

USP NO. CHART 3L

DATE 4/15/86

FABRIC SWB FABRIC 33' LOT 14F3-3

MFG. STOCKPOLE FIBERS CO.

ROLL NO. 16-1700

YARDS 32.0

POUNDS 18.6

ORDER NO. 71108

SPECIFICATION STD MFG CAT 3

Q.C. FILE # NASA 2-12

FOOTAGE

FT	START	Sample	LEFT
10	BAG	7W	
20		11W	
30		24W	
40			
50			
60			
70			
80		88W	
90		91 END	
100			
110			
120			
130			
140			
150			
160			
170			
180			
190			
200			
210			
220			
230			
240			
250			
260			

TREATER OPERATOR READ UP

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE Group B

GARCIA

USP NO. ___ CHART 3M1

FOOTAGE

START Sample — LEFT

W

2 inch EACH ON SIDES

W

SPLICE

END OF ROLL — 48 FT.

TREATER OPERATOR READ UP

DATE 28 APR. 86

FABRIC SWB-8

MFG. STARKPOLE LOT: 1413-1 FIBER

ROLL NO. 16-1491A

YARDS 180

POUNDS 9.3

ORDER NO. 7108 DAB

SPECIFICATION STD MFG CO'S.

Q.C. FILE # NASA 2-13

SYMBOLS

- TEAR
- SPOTS OR STAINS
- FOLDS
- EDGE CURL
- TIGHT WEAVE OR SELVAGE
- WEAVE DISTORTION
- VISIBLE PUCKERS
- ONE PUCKER CREASING
- TWO OR MORE CREASINGS

REMARKS

GRADE — GROUP B

GARCIA

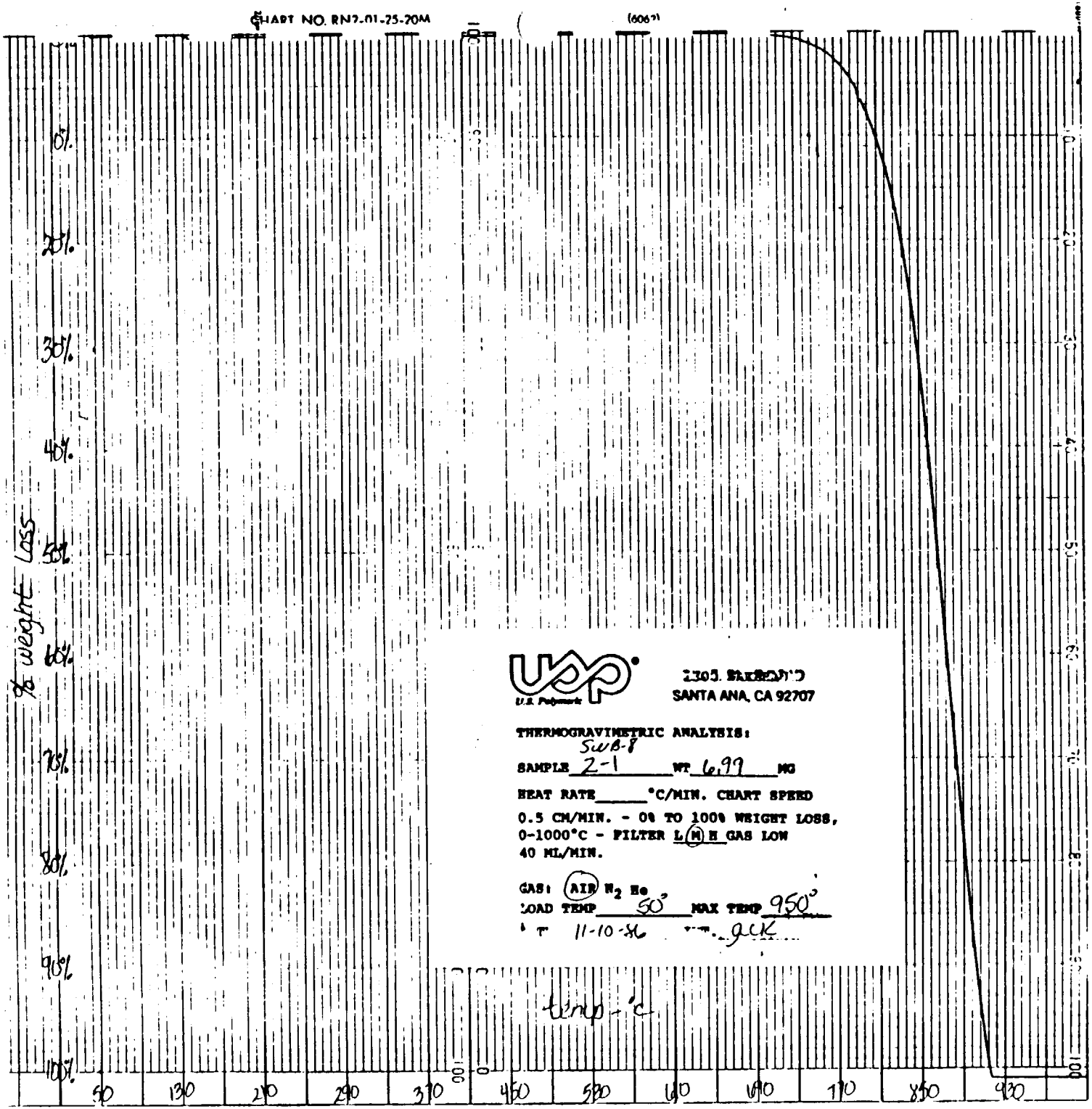


CHART NO. RN7-01-25-20M
(606?)
% Weight Loss
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
50
130
210
290
370
450
530
610
690
770
850
930
Temp - °C
USP
U.S. Pharmacopeia
2303 [illegible]
SANTA ANA, CA 92707
THERMOGRAVIMETRIC ANALYSIS:
SAMPLE Sub-B Z-1 WT 6.99 MG
HEAT RATE _____ °C/MIN. CHART SPEED
0.5 CM/MIN. - 0% TO 100% WEIGHT LOSS,
0-1000°C - FILTER L (M) H GAS LOW
40 ML/MIN.
GAS: (AIR) N2 He
LOAD TEMP 50° MAX TEMP 950°
11-10-86 gck

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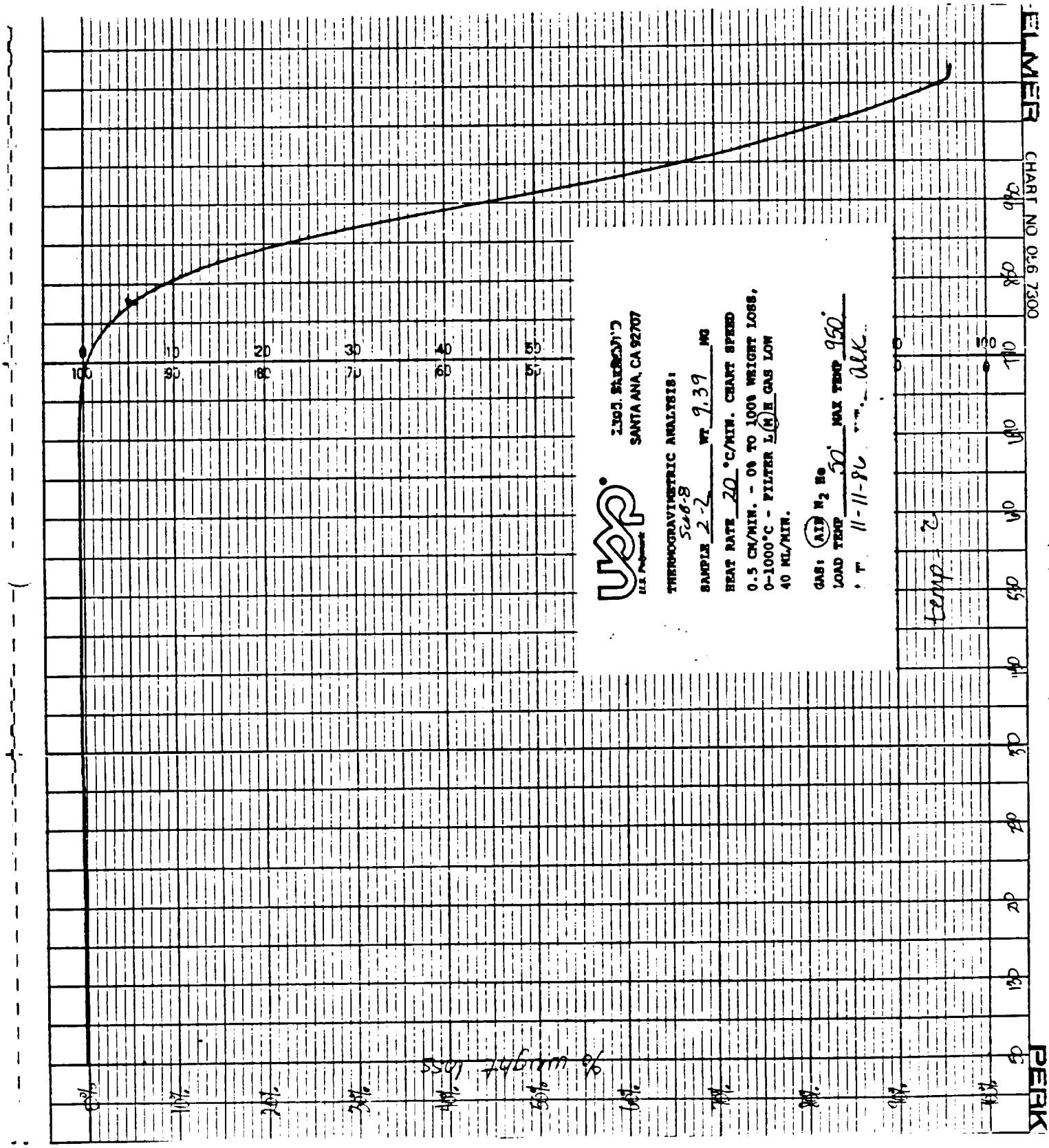
CHART 6B



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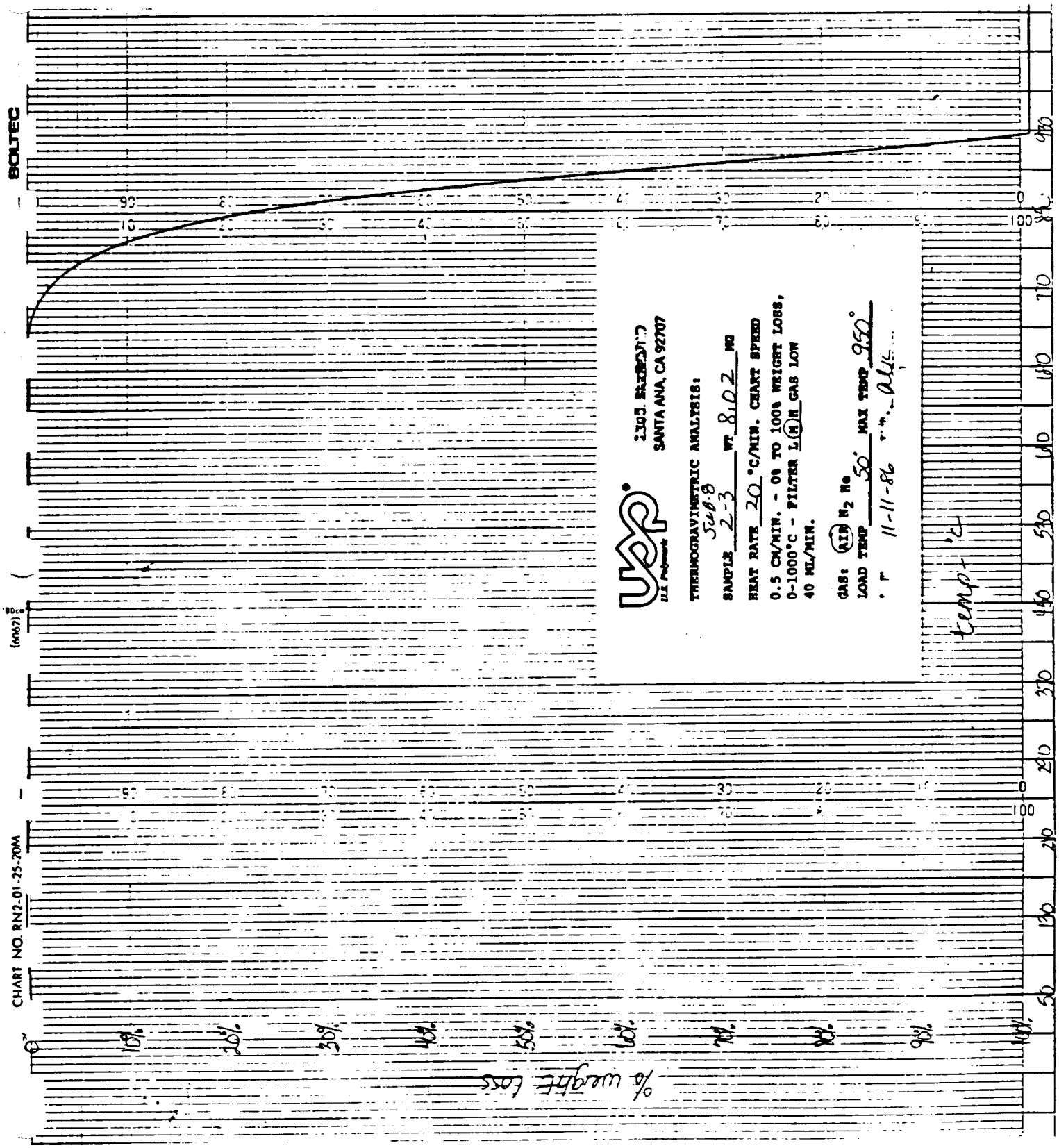

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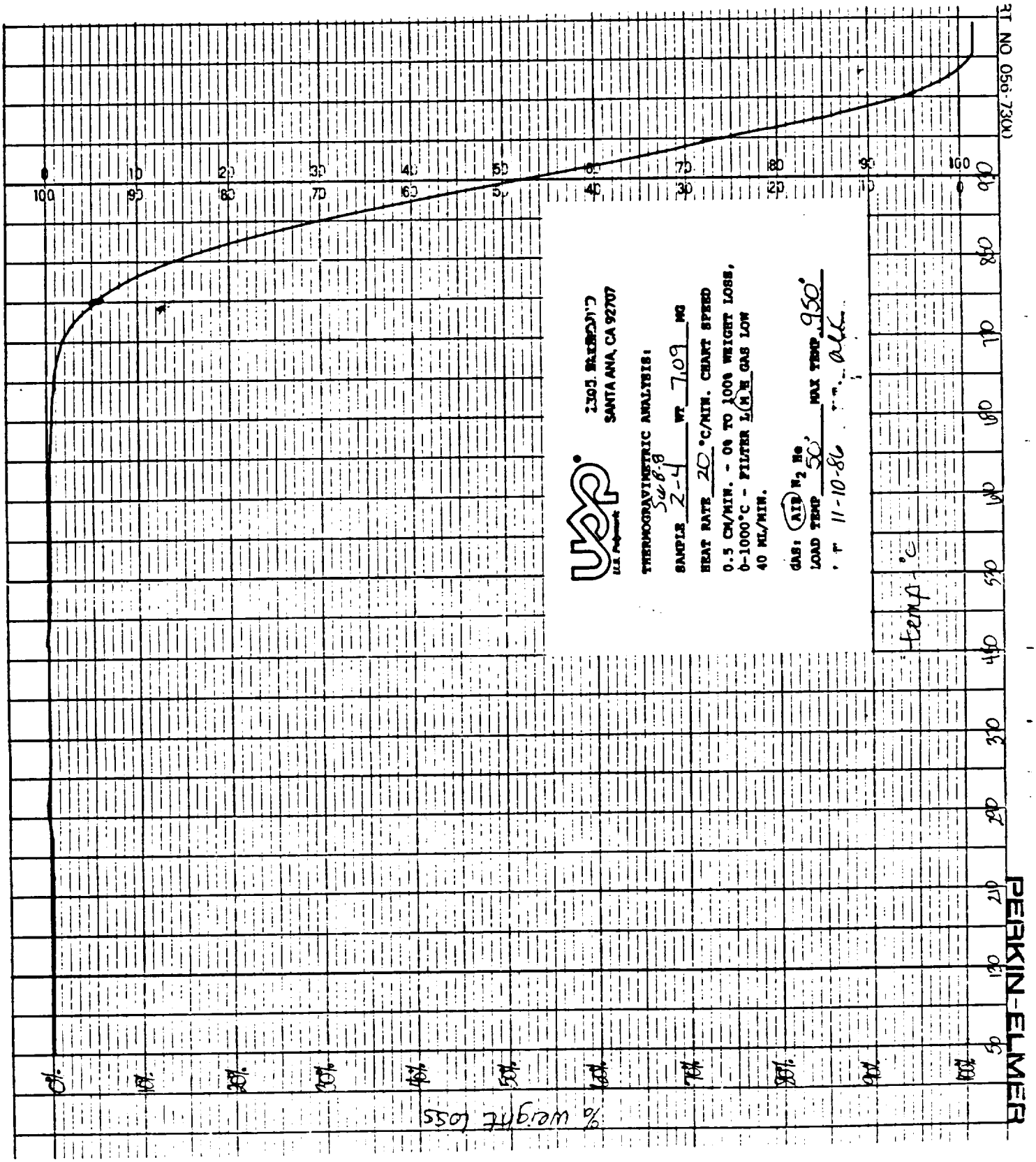

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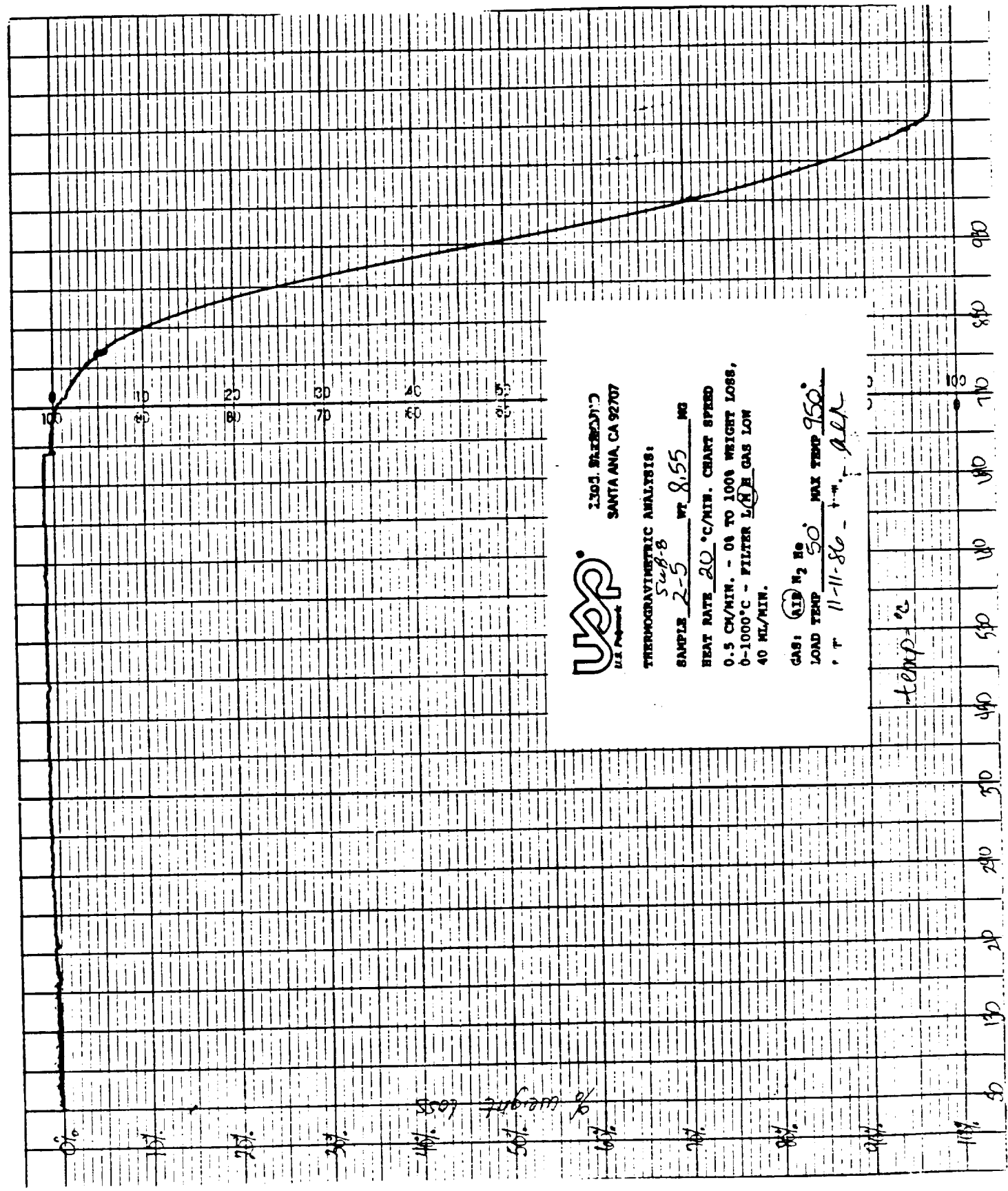

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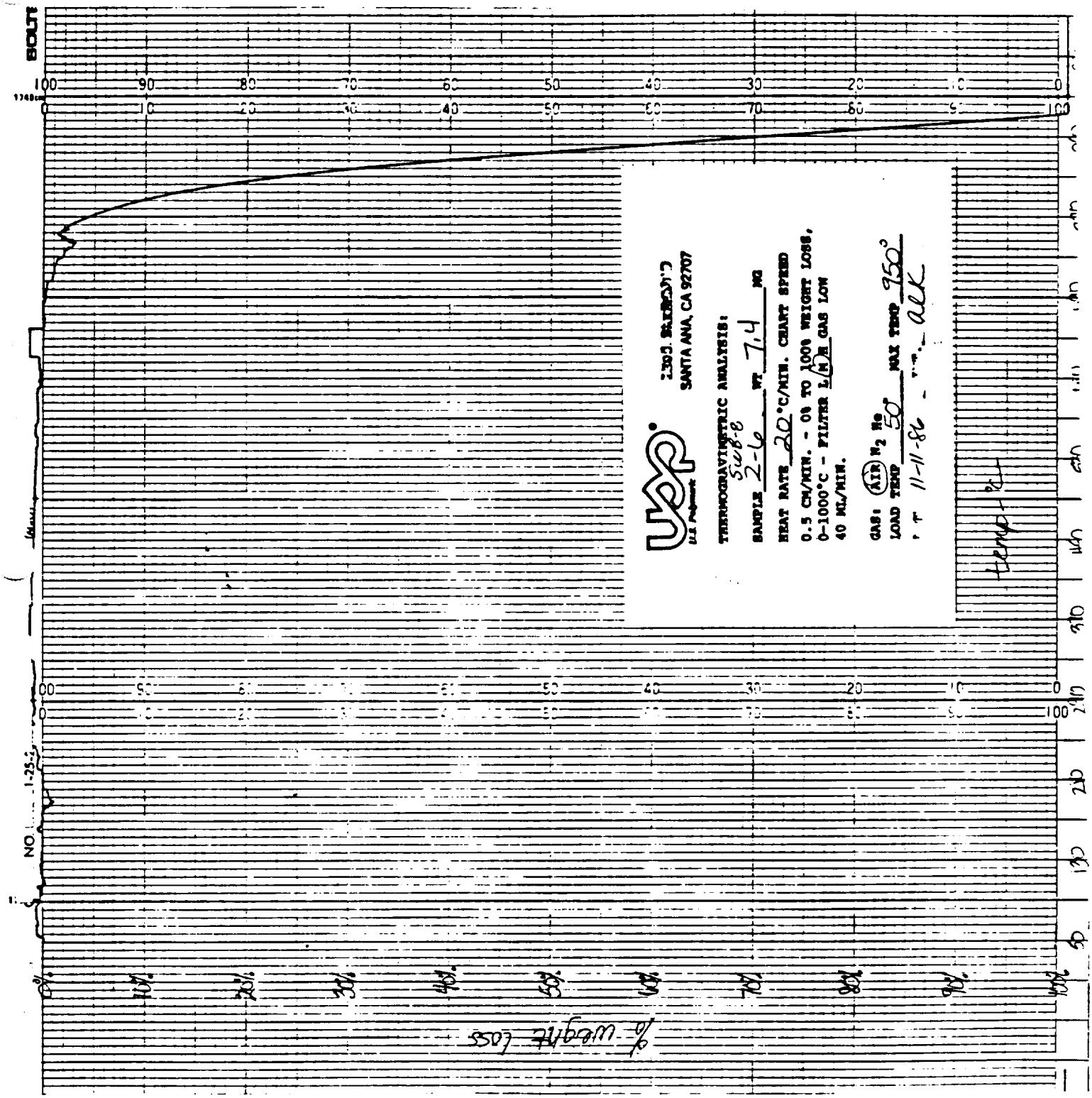

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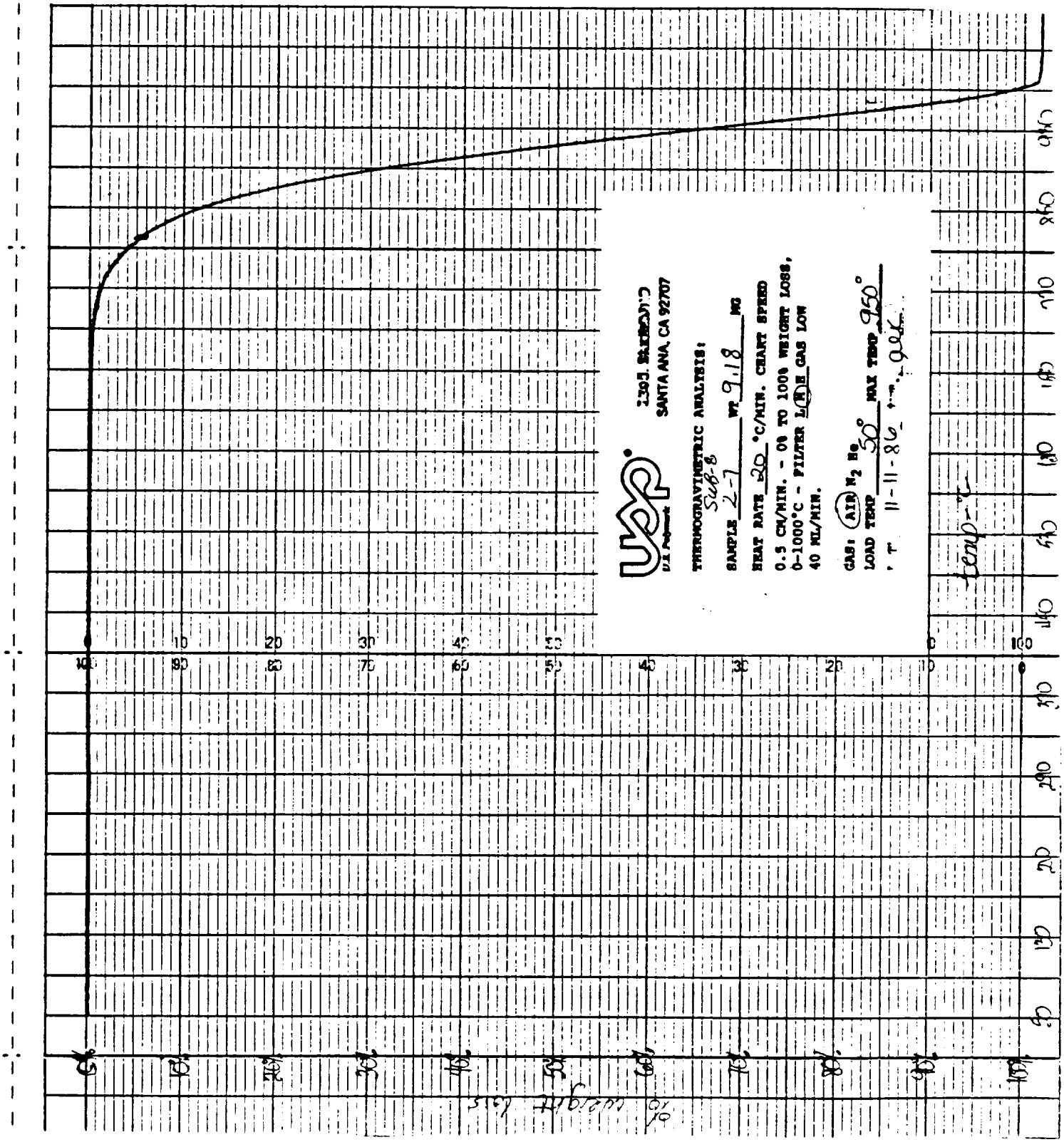

CHART 61

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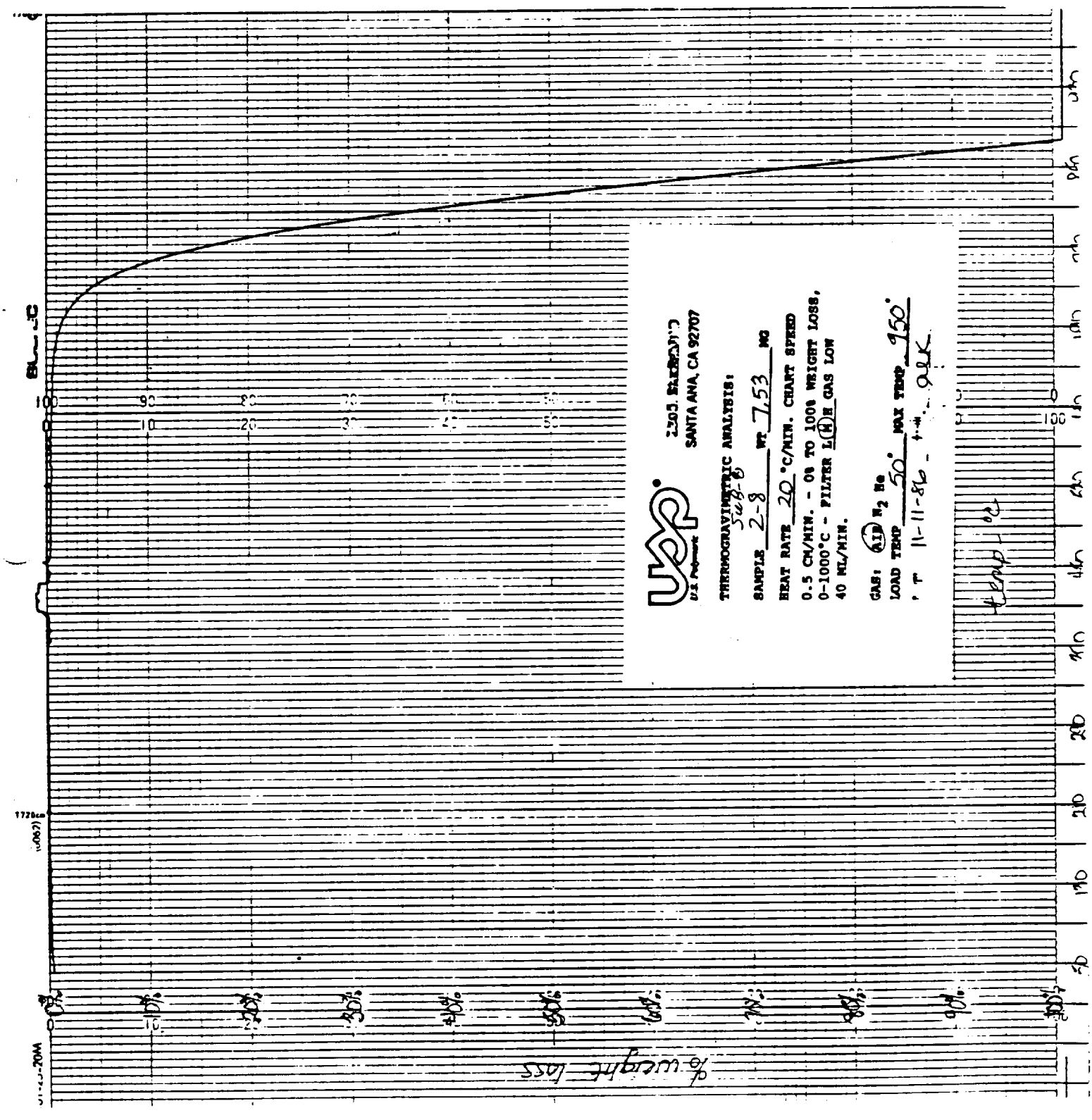

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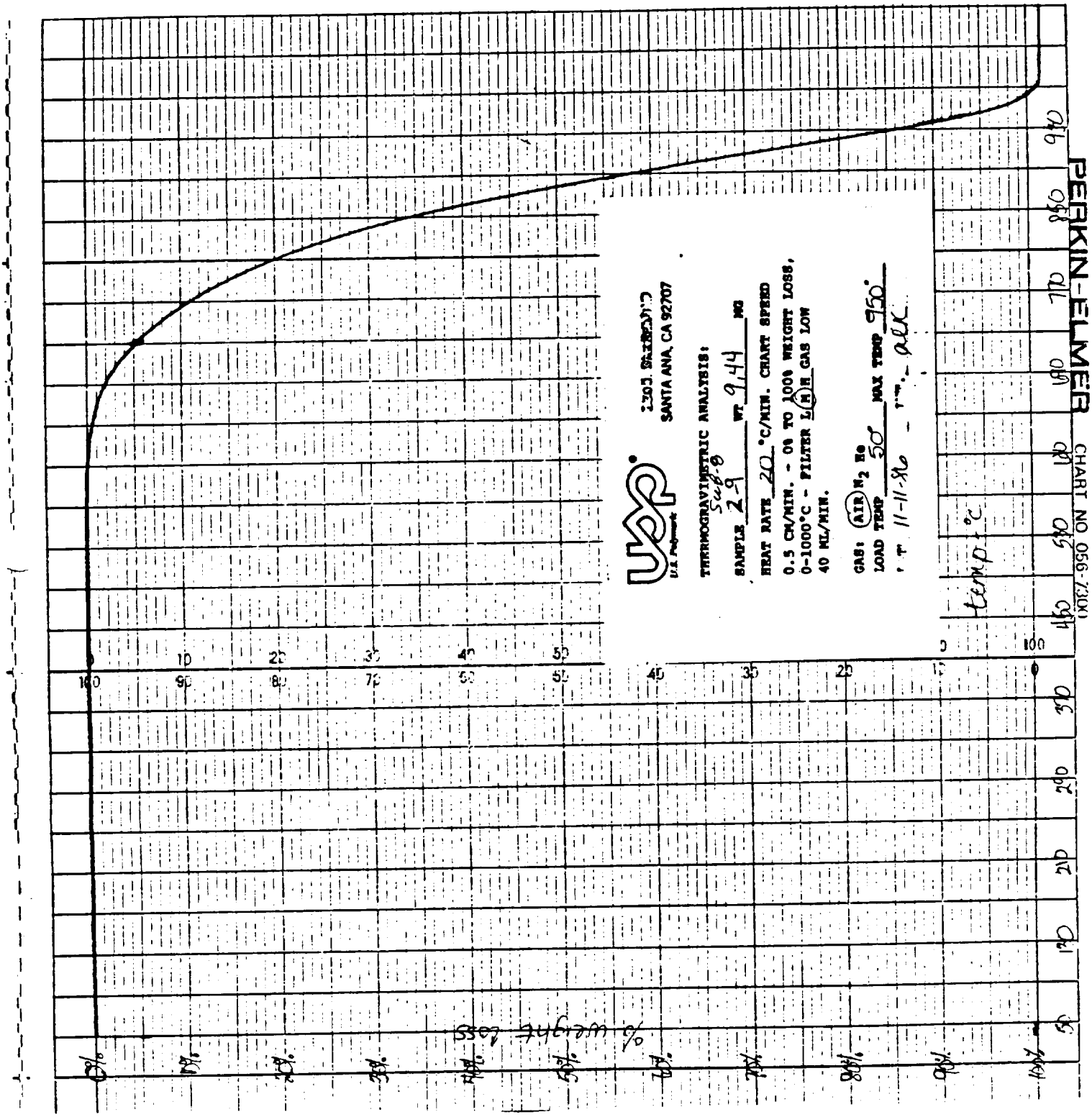

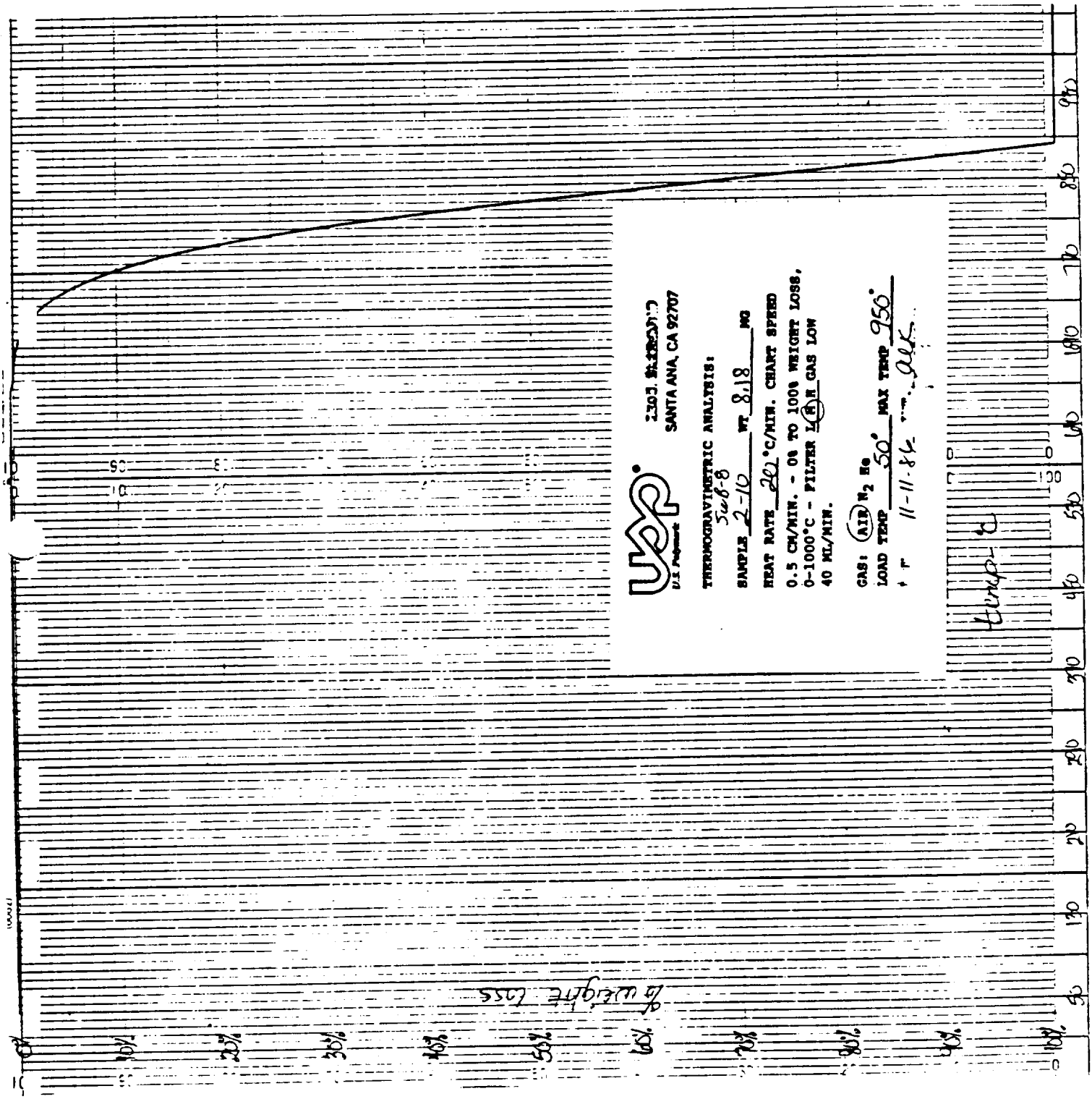

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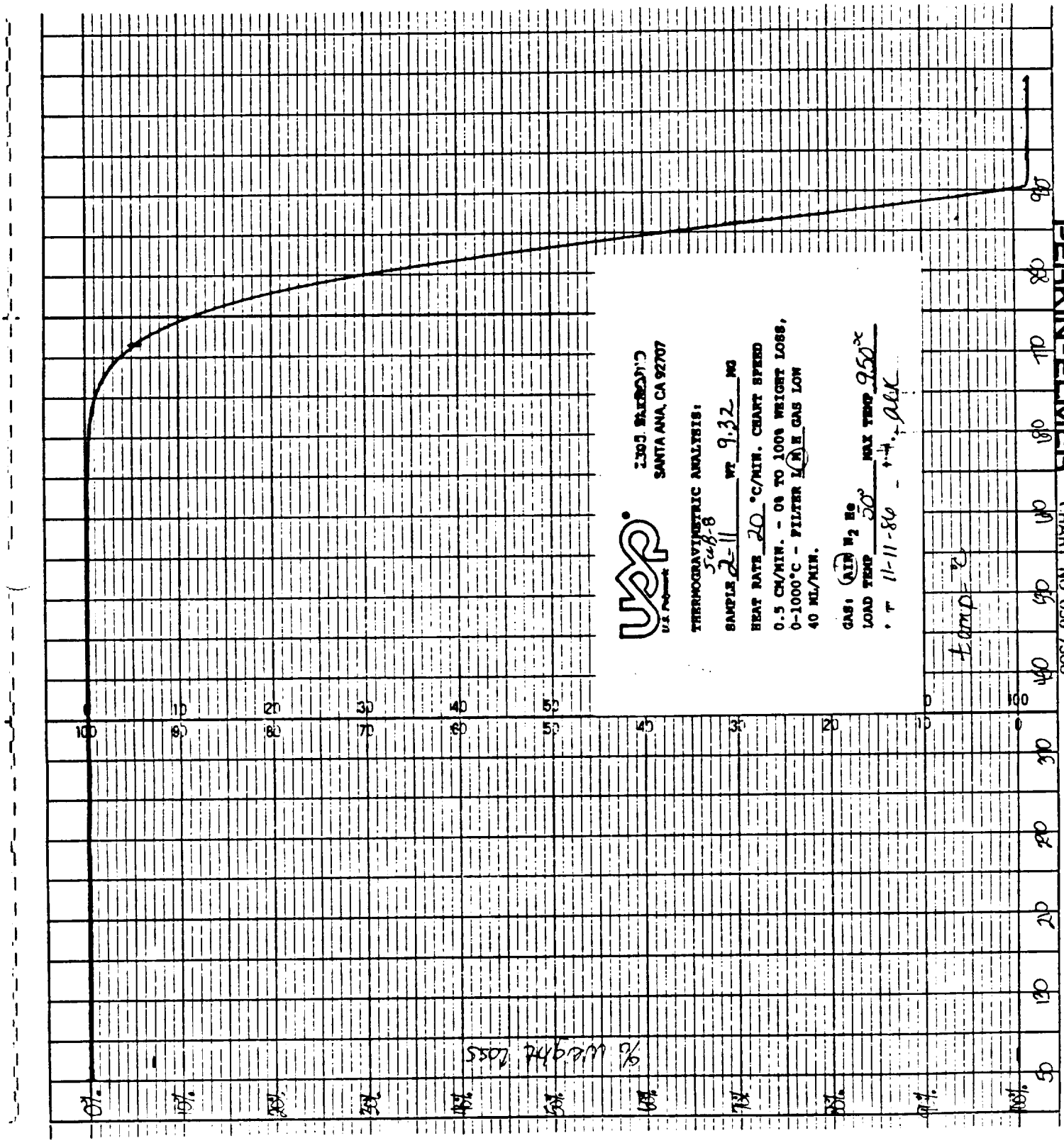

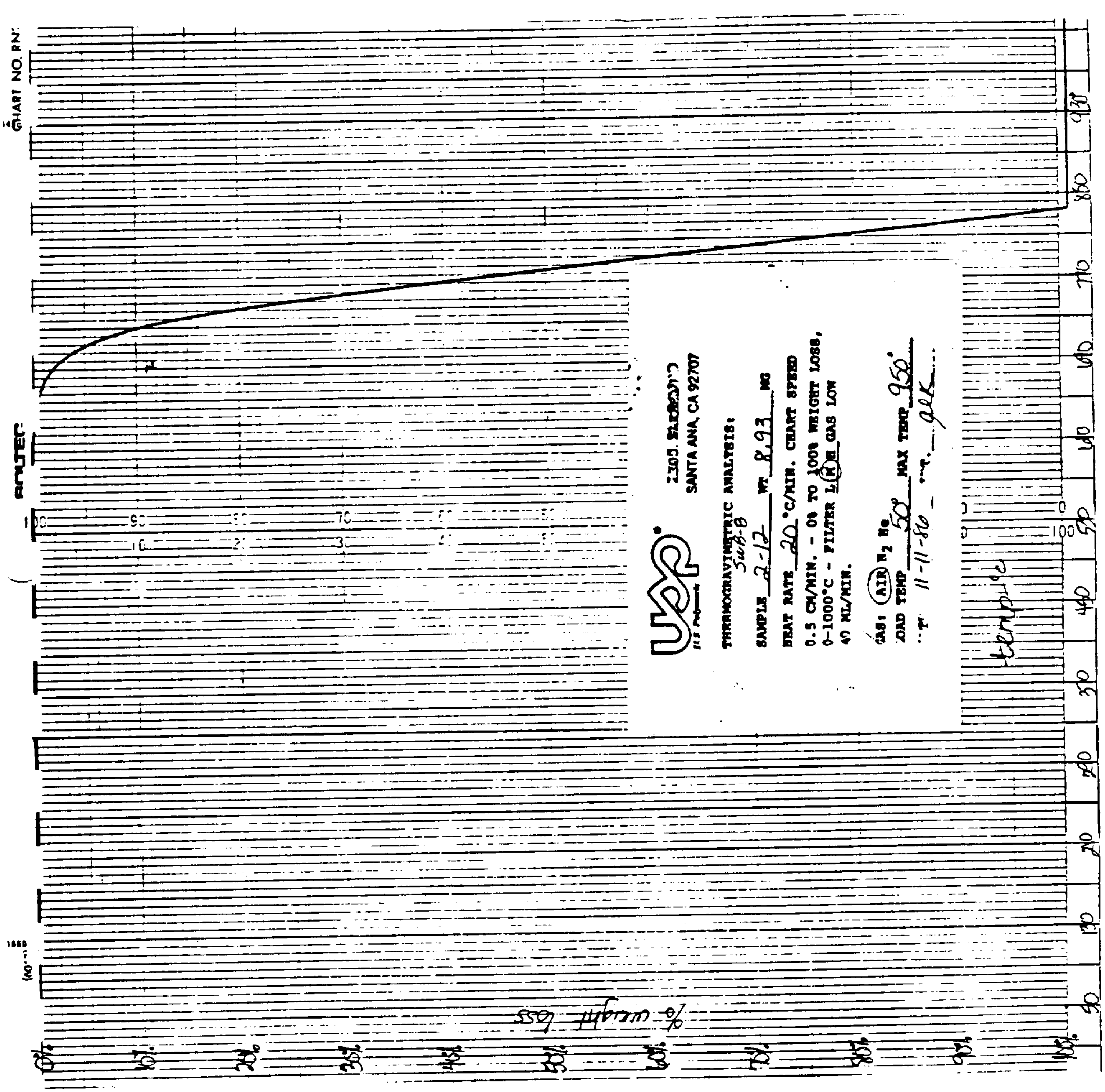

CHART 6M

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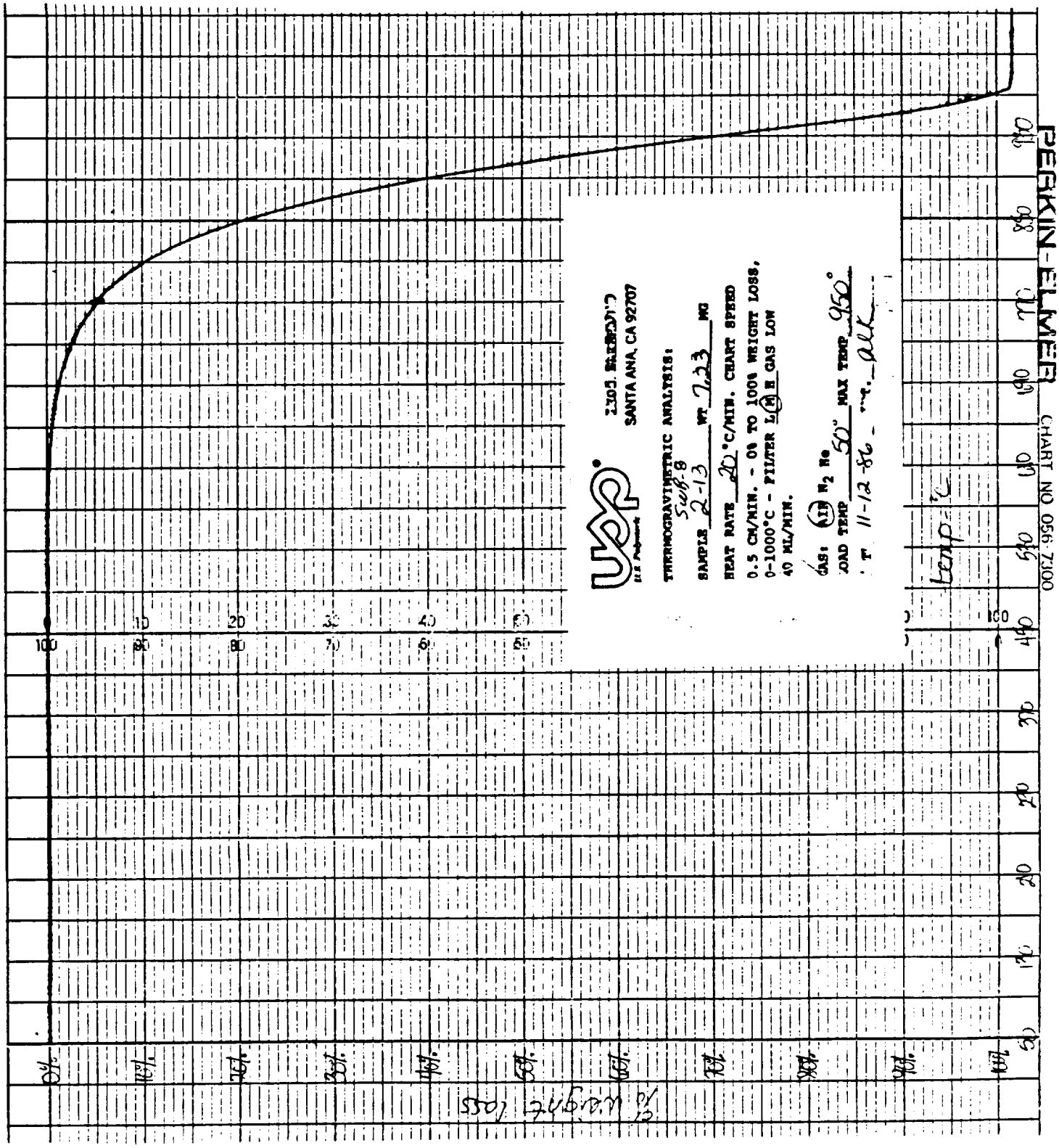


TABLE OF CONTENTS

PREPREG TESTING

NAS8-36298

U.S. Polymeric O.E. 71108

FM 5834 NASA LOT# 2 U.S.P. LOT# D09275

CHARTS

U.S. Polymeric

PREPREG TESTING

NAS8-36298

U.S. POLYMERIC O.E. 71108

FM 5834 NASA LOT# 2 U.S.P. LOT# D09275

1a. Resin Content, Soxhlet, %
CTM-6D

	ROLL#1 START	ROLL#2 START	ROLL#3 START	ROLL#4 START	ROLL#5 START	ROLL#6 START	ROLL#7 START
	37.5	36.0	35.1	36.3	37.9	38.0	37.2
	39.6	36.3	35.4	35.8	37.3	37.4	37.7
	37.1	35.2	35.2	35.6	39.3	38.2	37.8
AVG.	38.1	35.8	35.2	35.9	38.2	37.9	37.6
					NASA LOT# 2 AVERAGE		36.9

1b. Filler Content, Soxhlet, %
CTM-6D

	15.6	15.0	14.6	15.1	15.8	15.8	15.5
	16.5	15.1	14.7	14.9	15.5	15.6	15.7
	15.4	14.5	14.7	14.8	16.4	15.9	15.7
AVG.	15.8	14.9	14.7	14.9	15.9	15.8	15.6
					NASA LOT# 2 AVERAGE		15.4

1c. Cloth Content, Soxhlet, %
CTM-6D

	46.9	49.0	50.3	48.6	46.3	46.2	47.3
	43.9	48.6	49.9	49.3	47.2	47.0	46.6
	47.5	50.3	50.1	49.6	44.3	45.9	46.5
AVG.	46.1	49.3	50.1	49.2	45.9	46.4	46.8
					NASA LOT# 2 AVERAGE		47.7

2. Volatile Content, %
PTM-17B

	4.5	5.4	5.4	5.5	5.1	5.6	6.1
	4.3	5.7	5.5	5.8	5.4	5.5	5.5
	4.3	5.4	5.2	4.9	5.6	5.5	5.8
AVG.	4.4	5.5	5.4	5.4	5.4	5.5	5.8
					NASA LOT# 2 AVERAGE		5.3

3. Flow, %
PTM-19G

	11.0	18.8	13.5	18.4	19.1	17.2	19.0
	11.7	20.3	17.6	19.5	20.0	17.9	20.2
	12.9	19.8	17.0	20.4	18.0	18.9	19.8
AVG.	11.9	19.6	16.0	19.4	19.0	18.0	19.7
					NASA LOT# 2 AVERAGE		17.7

HITCO MATERIALS DIVISION
700 E. DYER ROAD, SANTA ANA, CALIFORNIA 92707 • (714) 549-1101 • TWX (910) 595-1130 • FAX # (714) 549-2858-5-2437

FM 5834 NASA LOT# 2 U.S.P. LOT# D09275

4. Resin Content, Dry Basis, %
PTM-16F, Type II

	ROLL#1 START	ROLL#2 START	ROLL#3 START	ROLL#4 START	ROLL#5 START	ROLL#6 START	ROLL#7 START
	38.3	38.7	41.5	37.7	42.4	38.0	43.3
	38.8	41.0	41.6	40.1	41.6	38.4	42.7
	38.9	36.6	39.4	34.5	41.3	39.4	41.8
AVG.	38.7	38.8	40.8	37.4	41.8	38.6	42.6
					NASA LOT# 2 AVERAGE		39.8

5. Tack, lbs
PTM-80

60	44	36	40	48	35	42
				NASA LOT#2	AVERAGE	44

6. Gel Time, Seconds
PTM-20E

87	68	70	62	73	65	63
				NASA LOT# 2	AVERAGE	70

7a. Atomic Absorption, ppm
CTM-53B

	ROLL#1 START	ROLL#2 START	ROLL#3 START	ROLL#4 START
Na	8	7	13	6
K	2	2	1	1
Ca	18	17	16	15
Mg	2	2	1	1
Li	0	0	0	0
TOTAL	30	28	31	23

	ROLL#5 START	ROLL#6 START	ROLL#7 START	LOT#2 AVG.
Na	6	10	5	8
K	2	1	1	1
Ca	16	35	58	25
Mg	1	1	2	1
Li	0	0	0	0
TOTAL	25	47	66	36

7b. Moisture Content, %
CTM-53B

ROLL#1 START	ROLL#2 START	ROLL#3 START	ROLL#4 START	ROLL#5 START	ROLL#6 START	ROLL#7 START
3.11	2.85	3.44	2.97	3.13	3.77	2.83
				NASA LOT# 2	AVERAGE	3.16

FM 5834 NASA LOT# 2 U.S.P. LOT# D09275

7c. Ash Content, %
CTM-53B

ROLL#1	ROLL#2	ROLL#3	ROLL#4	ROLL#5	ROLL#6	ROLL#7
START	START	START	START	START	START	START
.04	.04	.03	.04	.04	.02	.04

NASA LOT# 2 AVERAGE .03

8. TGA, % Weight Loss at 500°C
CTM-51 (Nitrogen)

7.1	4.9	7.6	6.4	6.9	7.9	6.5

NASA LOT# 2 AVERAGE 6.8

See Chart 8A-8G

9. DSC, °C
CTM-50A

	FIRST TEMPERATURE	SECOND TEMPERATURE
ROLL#1-S	182	240
ROLL#2-S	182	243
ROLL#3-S	182	241
ROLL#4-S	182	243
ROLL#5-S	181	241
ROLL#6-S	183	239
ROLL#7-S	180	243
NASA LOT# 2 AVERAGE	182	241

See Chart 9A-9G

10. Infrared (IRZB) Baseline
CTM-21C

ROLL#1	ROLL#2	ROLL#3	ROLL#4	ROLL#5	ROLL#6	ROLL#7
START	START	START	START	START	START	START
1.08	1.09	1.09	1.07	1.07	1.05	1.08

NASA LOT# 2 AVERAGE 1.08

See Chart 10A-10G

11. Environmental History

Date manufactured: 28 May 1986
Packaged in: Polyethylene bag supported in cardboard carton
Date shipped: 8 July 1986 in 40°F truck

12. Specific Gravity, Cured, Units
ASTM D 792

1.516	1.513	1.500	1.515	1.509	1.496	1.511
1.513	1.527	1.501	1.523	1.509	1.485	1.512
1.511	1.526	1.499	1.522	1.504	1.493	1.513
AVG. 1.513	1.522	1.500	1.520	1.507	1.491	1.512

NASA LOT# 2 AVERAGE 1.509

FM 5834 NASA LOT# 2 U.S.P. LOT# D09275

13a. Tensile Strength, ksi, WARP
FTMS 406-1011

ROLL#1 START	ROLL#2 START	ROLL#3 START	ROLL#4 START	ROLL#5 START	ROLL#6 START	ROLL#7 START
22.87	24.71	29.95	27.64	22.81	29.86	28.65
25.17	21.18	30.48	26.27	22.37	29.89	27.54
24.65	25.99	25.90	25.48	20.25	28.63	24.87
24.40	22.83	27.55	22.55	22.68	31.79	27.13
23.67	23.47	27.46	26.04	21.08	29.72	25.13
AVG. 24.15	23.64	28.27	25.60	21.84	29.98	26.70

NASA LOT# 2 AVERAGE 25.74

13b. Tensile Modulus, msi, WARP
FTMS 406-1011

4.59	4.88	4.57	5.34	3.95	5.79	5.61
5.66	5.38	5.18	6.17	4.20	5.48	5.26
4.74	4.84	4.99	5.45	4.43	--	5.40
4.93	5.06	4.92	5.36	4.36	6.15	5.80
5.02	4.80	5.34	4.91	4.16	6.02	5.38
AVG. 4.99	4.99	5.00	5.45	4.22	5.86	5.49

NASA LOT# 2 AVERAGE 5.14

13c. Tensile Elongation, %, WARP
FTMS 406-1011

.50	.62	.68	.60	.68	.55	.64
--	.53	.65	.53	.64	.60	.63
.60	.65	.58	.54	.53	--	.57
.54	.55	.64	.51	.64	.53	.60
.54	.58	.60	.59	.62	.57	.55
AVG. .55	.59	.63	.55	.62	.56	.60

NASA LOT# 2 AVERAGE .59

14a. Flexural Strength, ksi, WARP
FTMS 406-1031

33.89	37.80	47.66	37.41	38.21	43.37	39.23
36.63	38.59	43.56	37.08	33.17	42.09	41.73
41.72	36.87	45.82	40.61	37.20	44.55	41.86
38.59	32.49	45.90	39.15	32.90	44.63	42.03
40.45	31.68	44.35	34.60	37.91	43.66	41.59
AVG. 38.26	35.49	45.46	37.77	35.88	43.66	41.29

NASA LOT# 2 AVERAGE 39.69

FM 5834 NASA LOT# 2 U.S.P. LOT# D09275

14b. Flexural Modulus, msi, WARP
FTMS 406-1031

ROLL#1 START	ROLL#2 START	ROLL#3 START	ROLL#4 START	ROLL#5 START	ROLL#6 START	ROLL#7 START
4.32	4.28	6.06	4.46	4.32	4.94	4.76
4.16	4.80	5.58	4.44	3.70	4.82	4.66
4.08	4.72	5.68	4.50	4.06	5.22	4.32
4.38	3.82	6.04	4.40	3.96	5.28	4.88
4.38	4.32	4.88	4.42	4.24	5.02	4.68
AVG. 4.26	4.39	5.65	4.44	4.06	5.06	4.66

NASA LOT# 2 AVERAGE 4.65

15a. Compressive Strength, ksi, WARP
FTMS 406-1021

26.50	24.88	27.59	25.71	26.56	29.07	28.84
22.75	24.65	26.86	26.83	23.95	27.76	26.08
24.73	24.14	27.22	25.94	26.89	27.90	27.80
25.37	23.31	26.15	26.68	24.98	28.33	30.12
25.15	23.19	27.42	25.47	27.17	28.73	28.51
AVG. 24.90	24.03	27.05	26.12	25.91	28.36	28.27

NASA LOT# 2 AVERAGE 26.38

15b. Compressive Modulus, msi, WARP
FTMS 406-1021

5.12	4.96	5.07	5.25	4.86	5.23	4.83
4.44	4.59	4.56	5.26	4.54	4.50	4.52
5.04	4.22	5.02	4.97	5.02	4.62	4.69
5.09	4.50	4.67	5.32	4.79	4.75	4.92
5.16	4.46	4.81	4.89	4.69	4.91	4.88
AVG. 4.97	4.55	4.82	5.14	4.78	4.80	4.77

NASA LOT# 2 AVERAGE 4.83

16. Double Shear Strength, ksi
FTMS 406-1041A

3.55	2.98	3.21	3.66	3.33	3.08	3.62
3.42	3.33	3.60	3.62	3.39	3.48	3.21
3.26	3.09	3.85	3.48	3.35	3.31	3.43
3.42	3.21	3.35	3.49	3.37	3.57	3.94
3.36	3.62	3.54	3.93	3.52	3.15	3.52
AVG. 3.40	3.25	3.51	3.64	3.39	3.32	3.54

NASA LOT# 2 AVERAGE 3.44

17. Barcol Hardness, Units
ASTM D-2583
(Average of 10 determinations)

69.5	68.8	70.5	70.4	69.7	70.8	72.4

NASA LOT# 2 AVERAGE 70.3

FM 5834 NASA LOT# 2 U.S.P. LOT# D09275

18. Residual Volatiles, %
PTM-98

	ROLL#1 START	ROLL#2 START	ROLL#3 START	ROLL#4 START	ROLL#5 START	ROLL#6 START	ROLL#7 START
	2.32	2.34	2.62	2.35	2.49	2.39	2.49
	2.35	2.28	2.63	2.28	2.77	2.41	2.37
	2.36	2.37	2.60	2.34	2.73	2.46	2.45
AVG.	2.34	2.33	2.62	2.33	2.66	2.42	2.44
					NASA LOT# 2 AVERAGE		2.45

19. Resin Content, Pyrolysis, %
CTM-14B

	39.44	35.74	35.92	36.23	38.50	40.14	36.08
	37.60	35.74	34.23	37.24	37.34	38.56	34.60
	39.39	36.82	36.54	37.69	34.35	39.48	34.36
AVG.	38.81	36.10	35.56	37.05	36.73	39.40	35.01
					NASA LOT# 2 AVERAGE		36.95

20. Acetone Extraction, %
CTM-18A

	-.15	.81	.59	.69	1.98	.00	-.55
	1.19	-.46	.16	1.38	-.16	-.62	.38
	.72	.54	.40	.86	.16	3.66	-.22
AVG.	.58	.30	.38	.98	.66	1.01	-.13
					NASA LOT# 2 AVERAGE		.54

21a. CTE, in/in °F, with PLY
PTM-61B

	-.27	.75	-.26	.58	1.09	.10	-6.92
	1.07	.48	-.51	.61	.86	.77	.78
AVG.	.40	.62	-.39	.60	.98	.44	-3.07
					NASA LOT# 2 AVERAGE		-.06

21b CTE, in/in °F, Cross PLY
PTM-61B

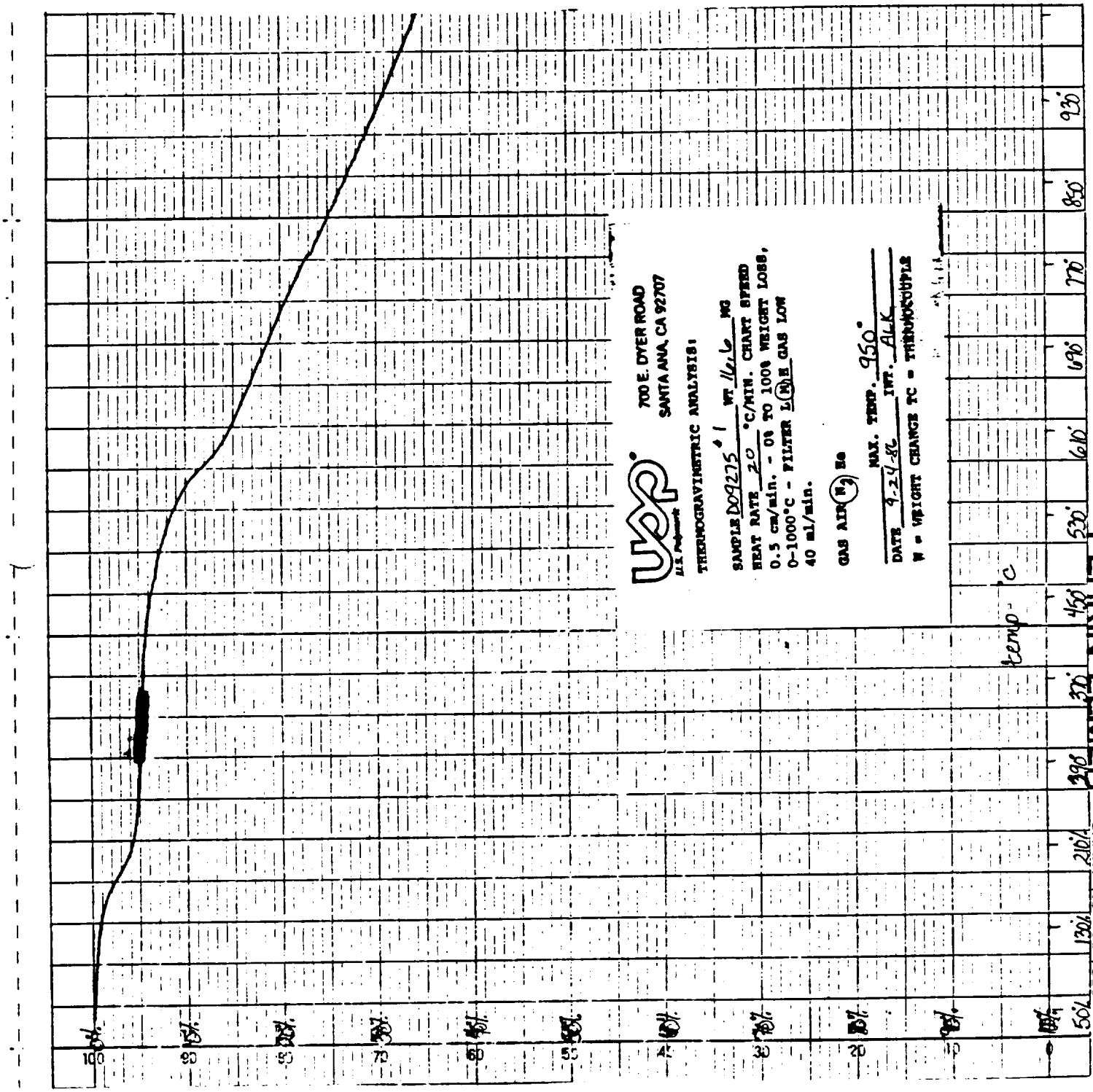
	13.44	11.31	11.20	13.79	13.12	15.62	14.38
	9.80	11.06	11.20	12.96	12.75	15.75	14.09
AVG.	11.62	11.19	11.20	13.38	12.94	15.69	14.24
					NASA LOT# 2 AVERAGE		12.89

See Chart 21A-21G

U.S. Polymeric

Hamid M. Quraishi, Manager
Quality Assurance Department

CHART 8A



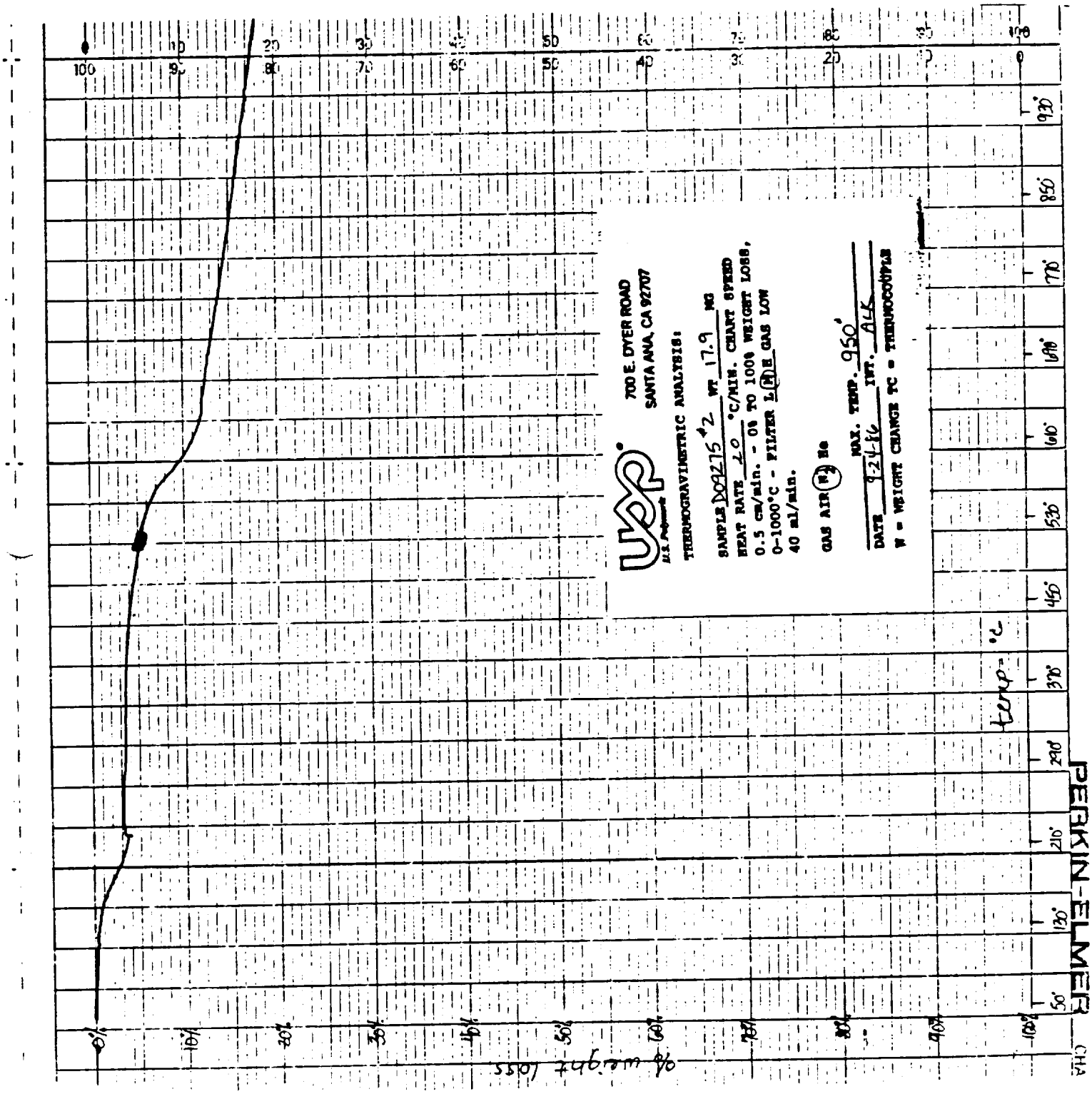


CHART 8C

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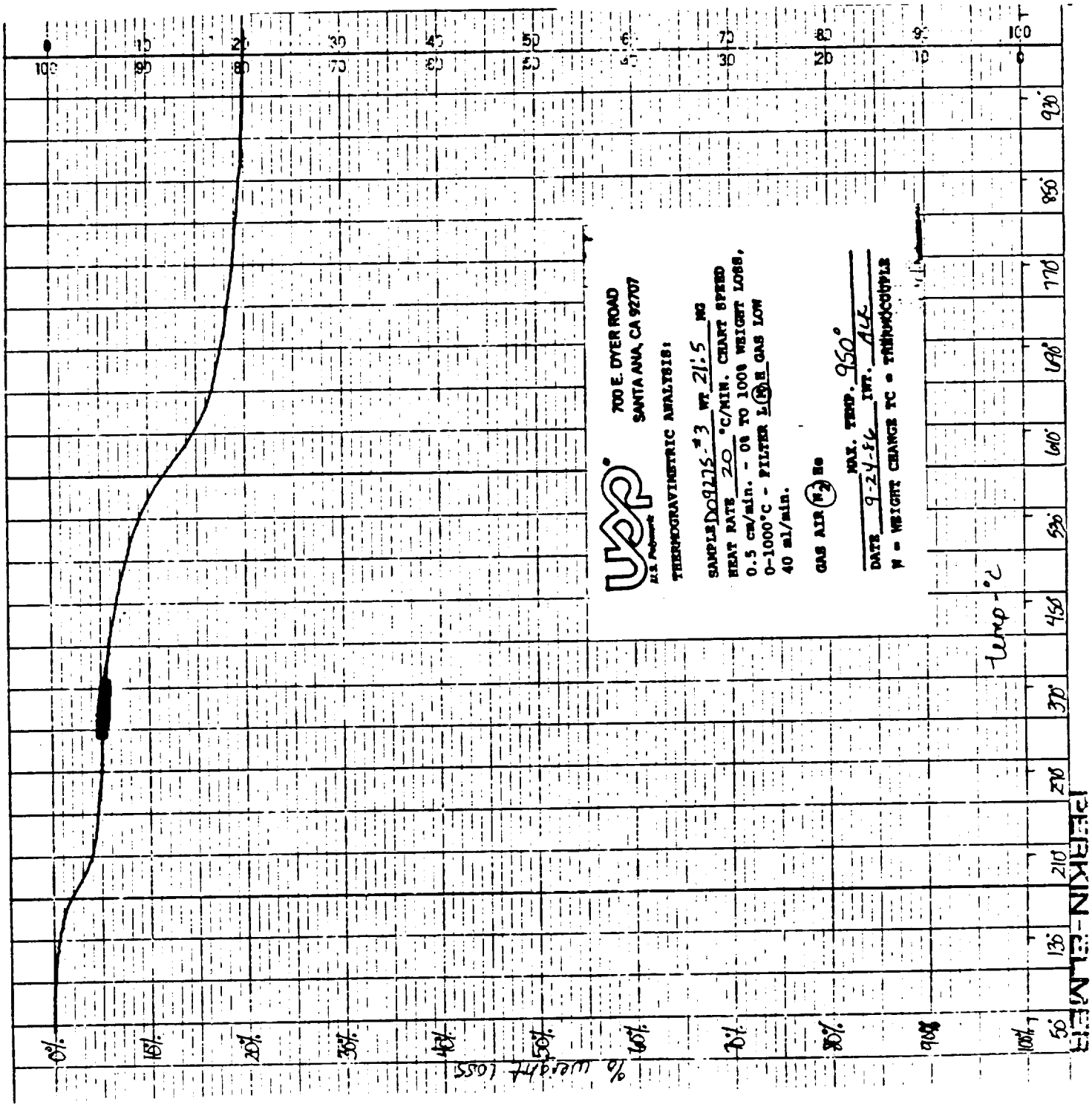

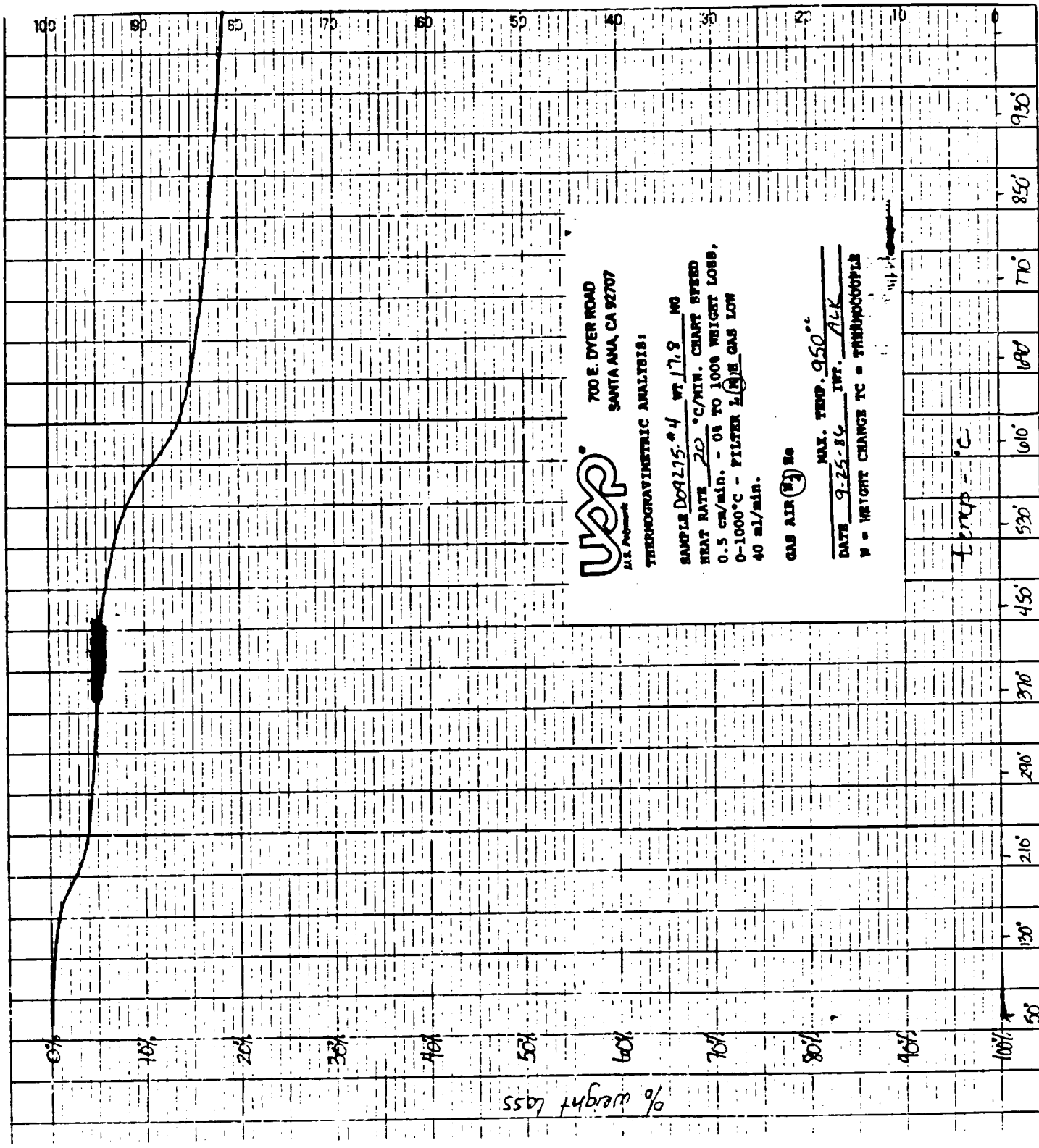

CHART 8E

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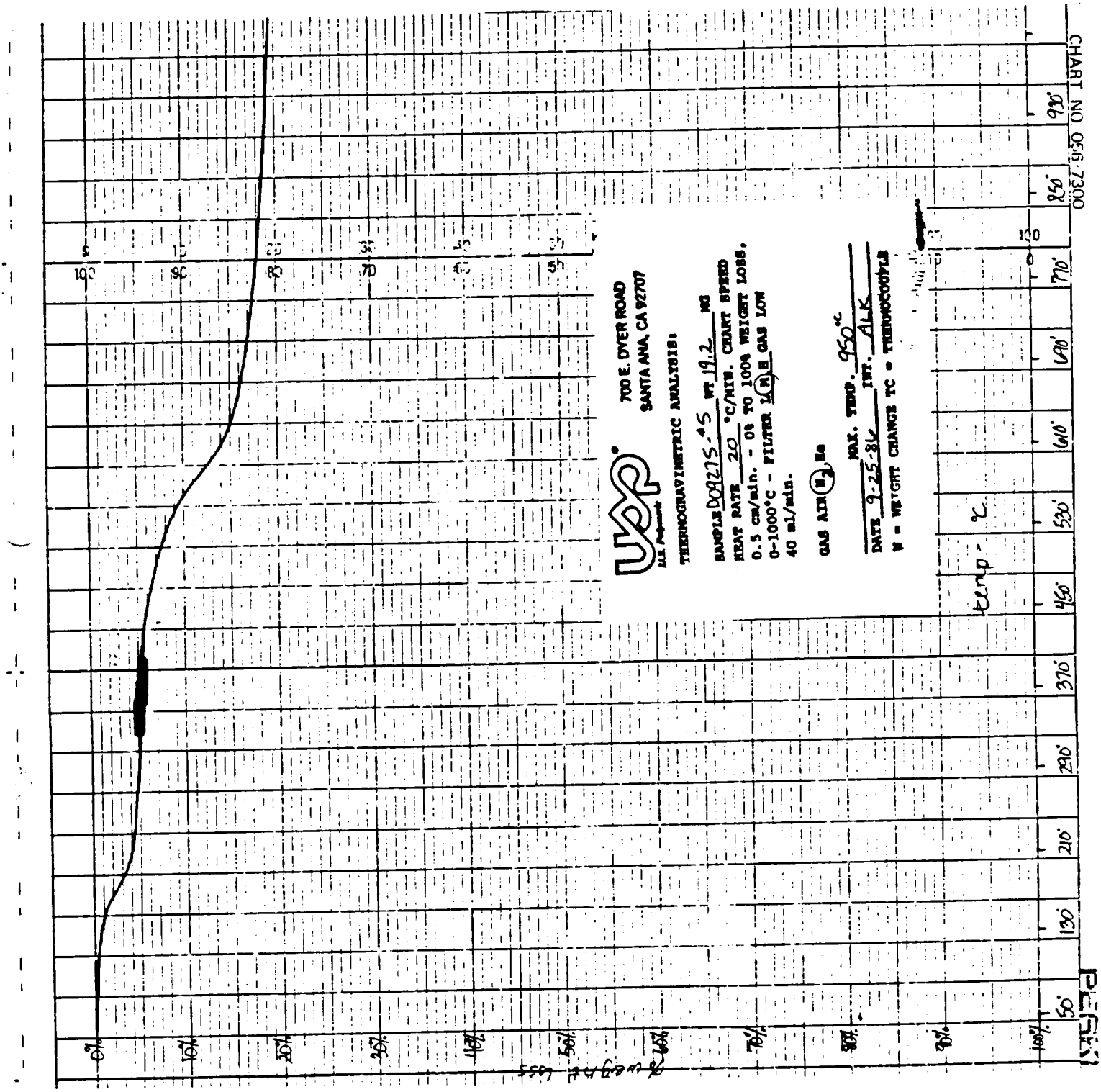

CHART 8F

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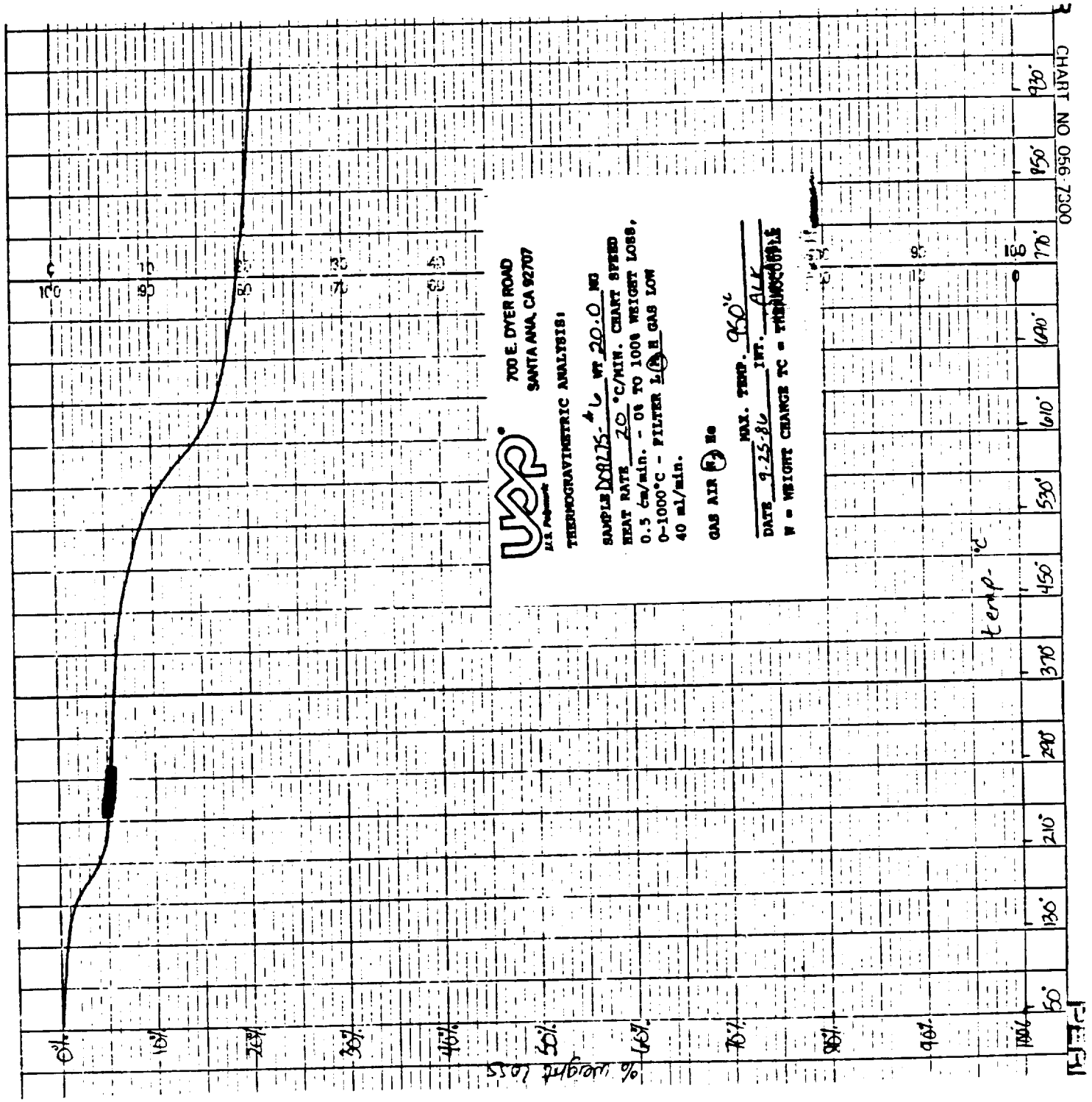

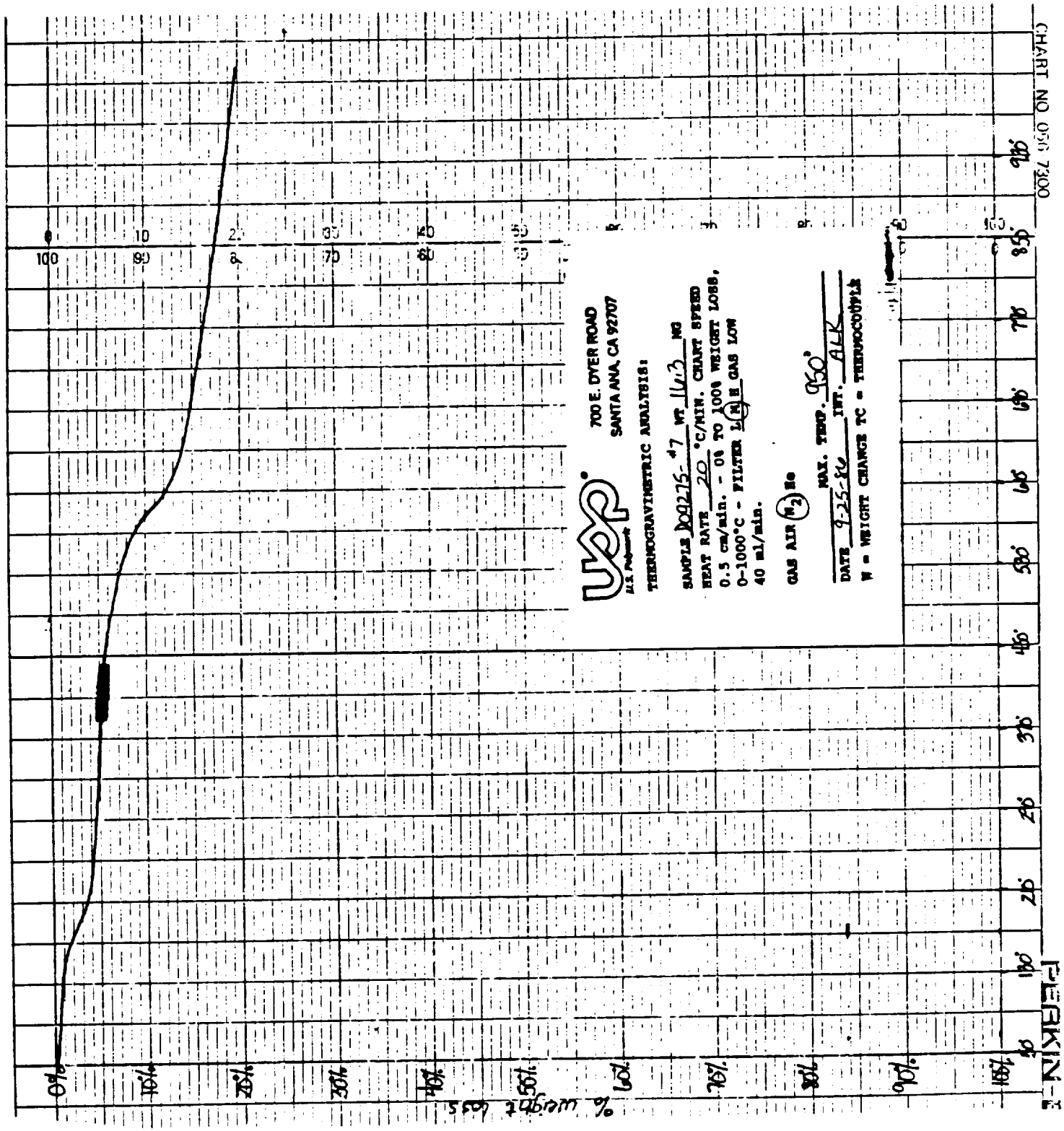

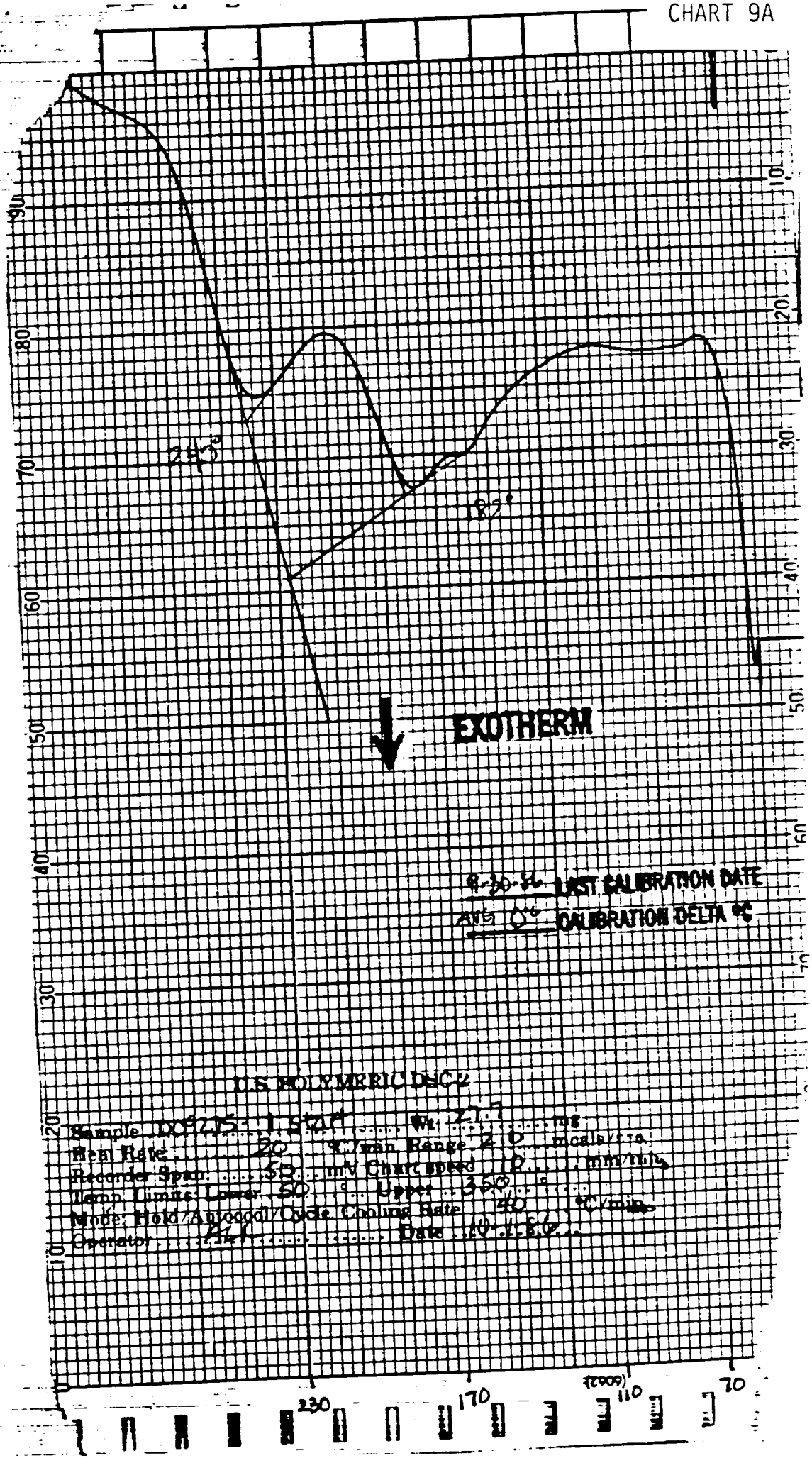

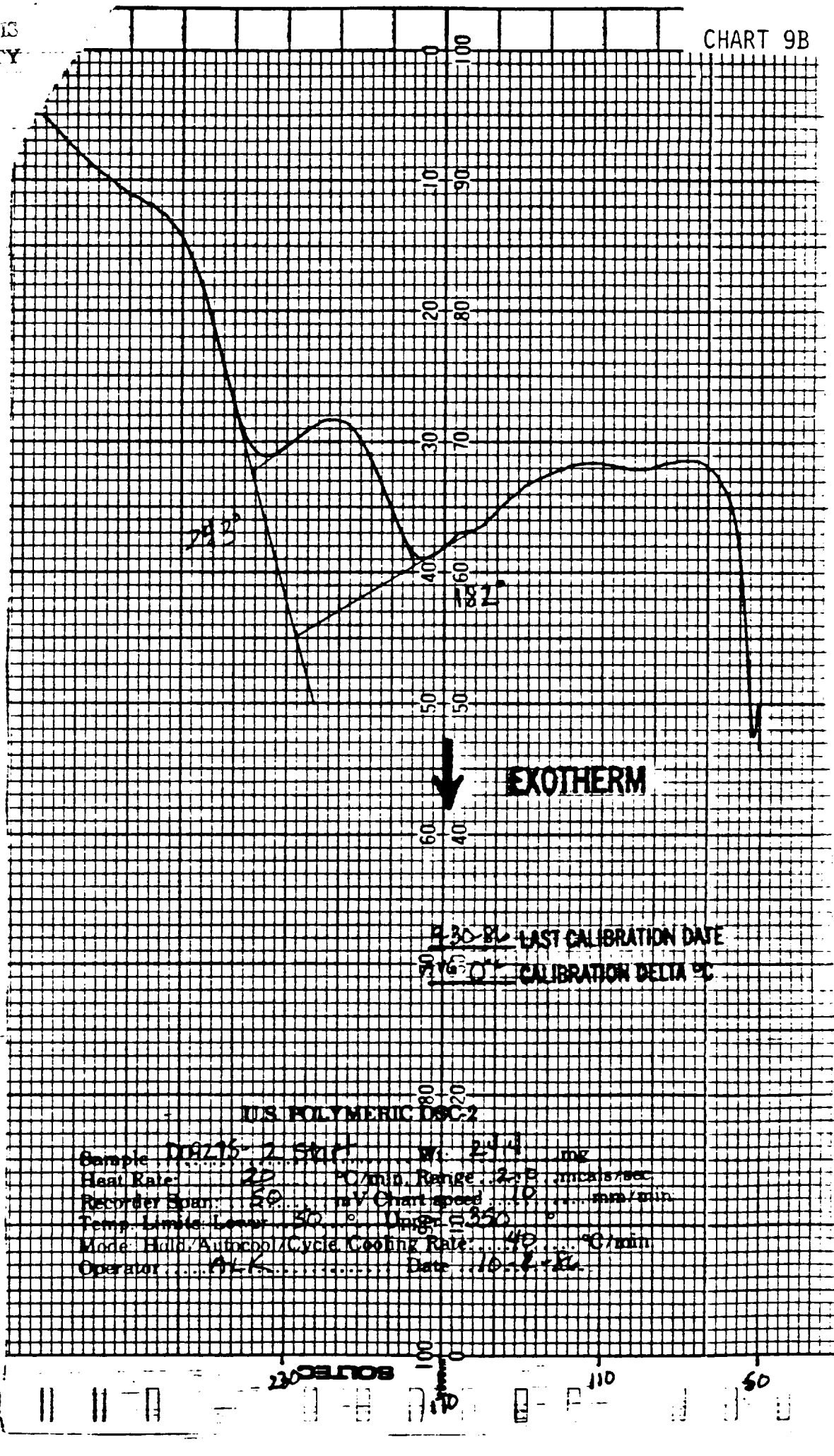

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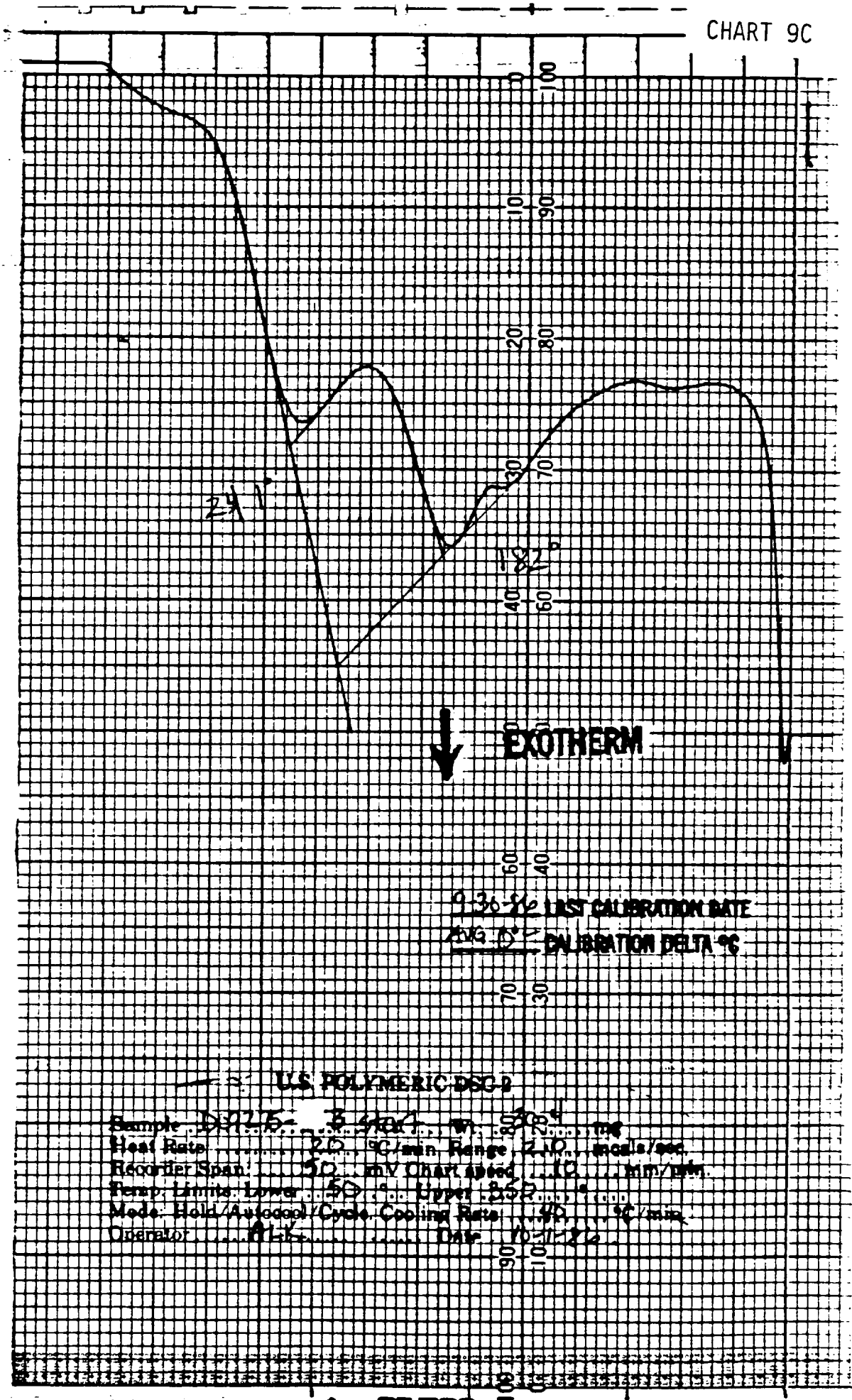

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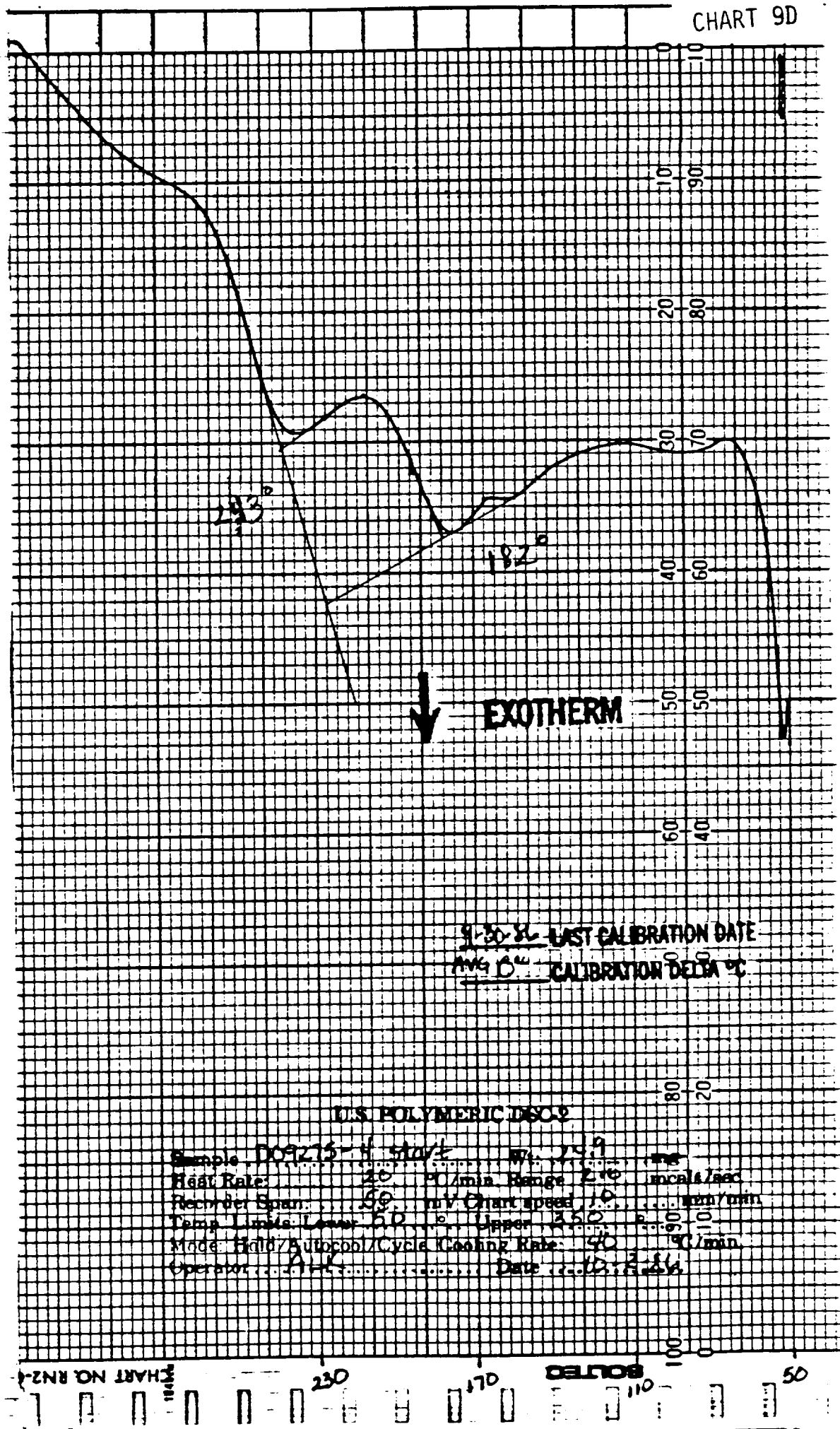

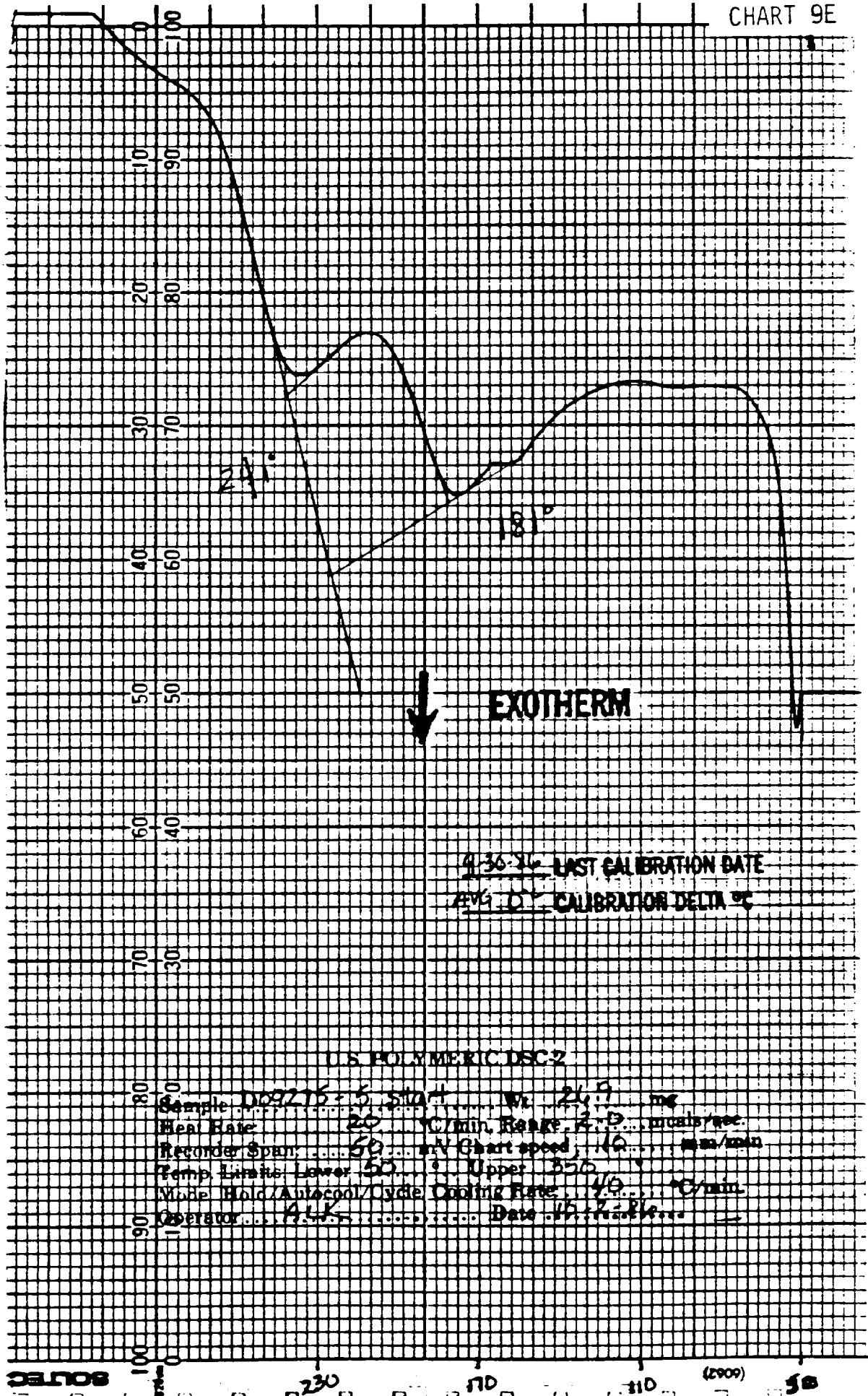

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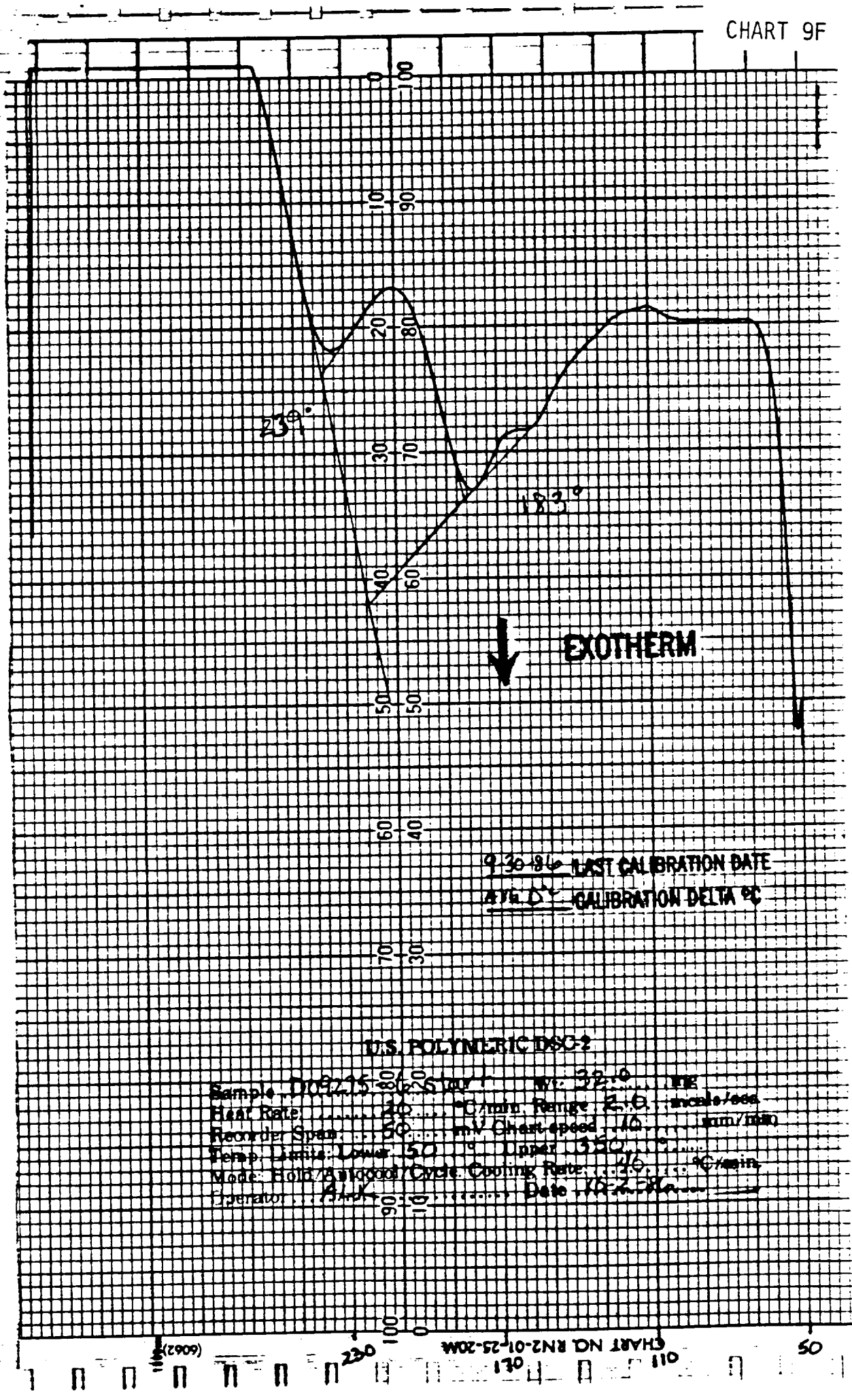
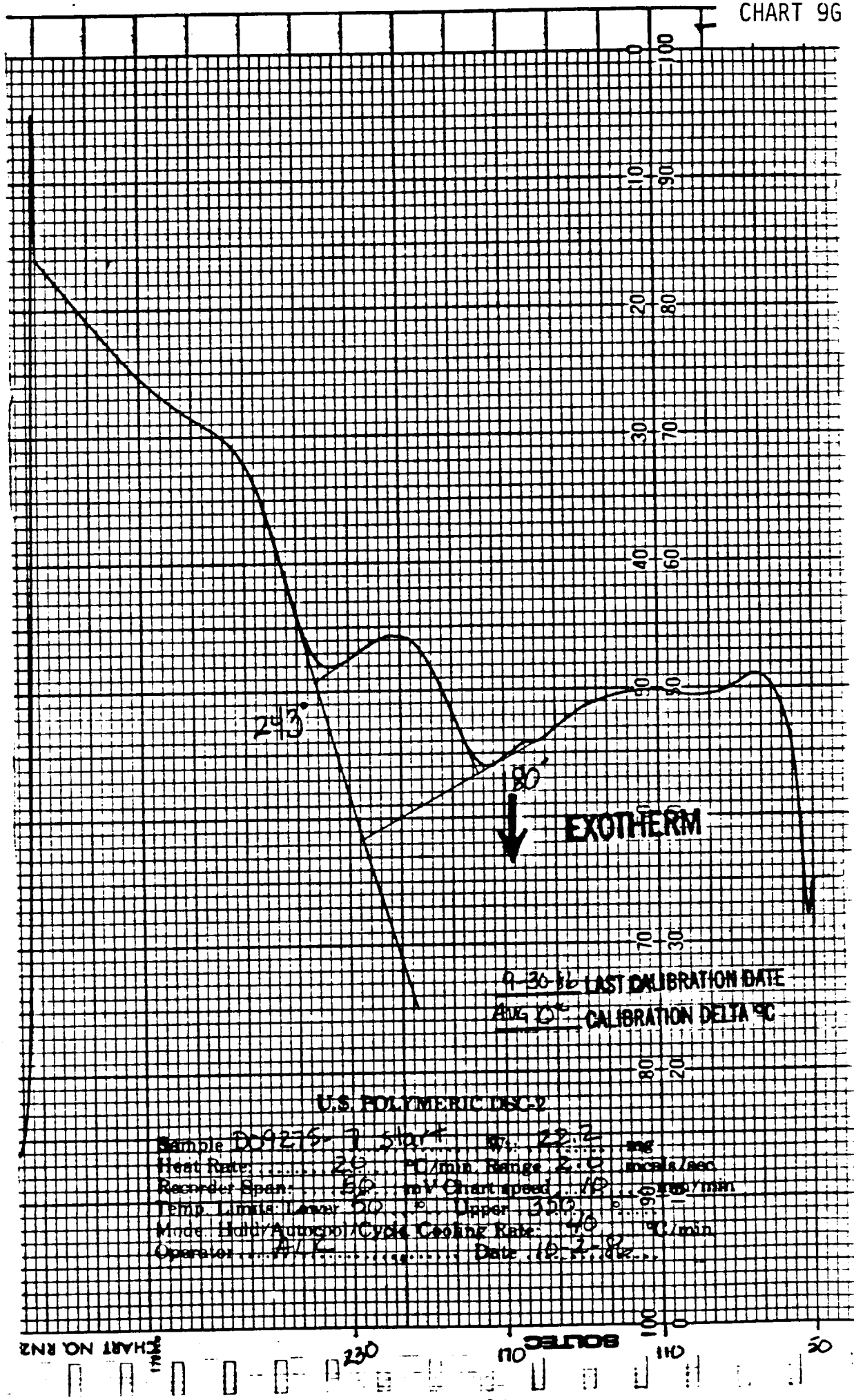


CHART 96



SPECTRUM NO. 15170
DATE 7-03-86
SAMPLE FM 5834
D09275 # ST.-1

SOURCE
STRUCTURE

PATH 0.2 mm HACL
SOLVENT ACETONE
CONCENTRATION 30-50%T
PHASE 3
COMMENTS PRE-PREG
MATERIAL

ANALYST V. MIRANDA

Beckman®
INFRARED
SPECTROPHOTOMETER

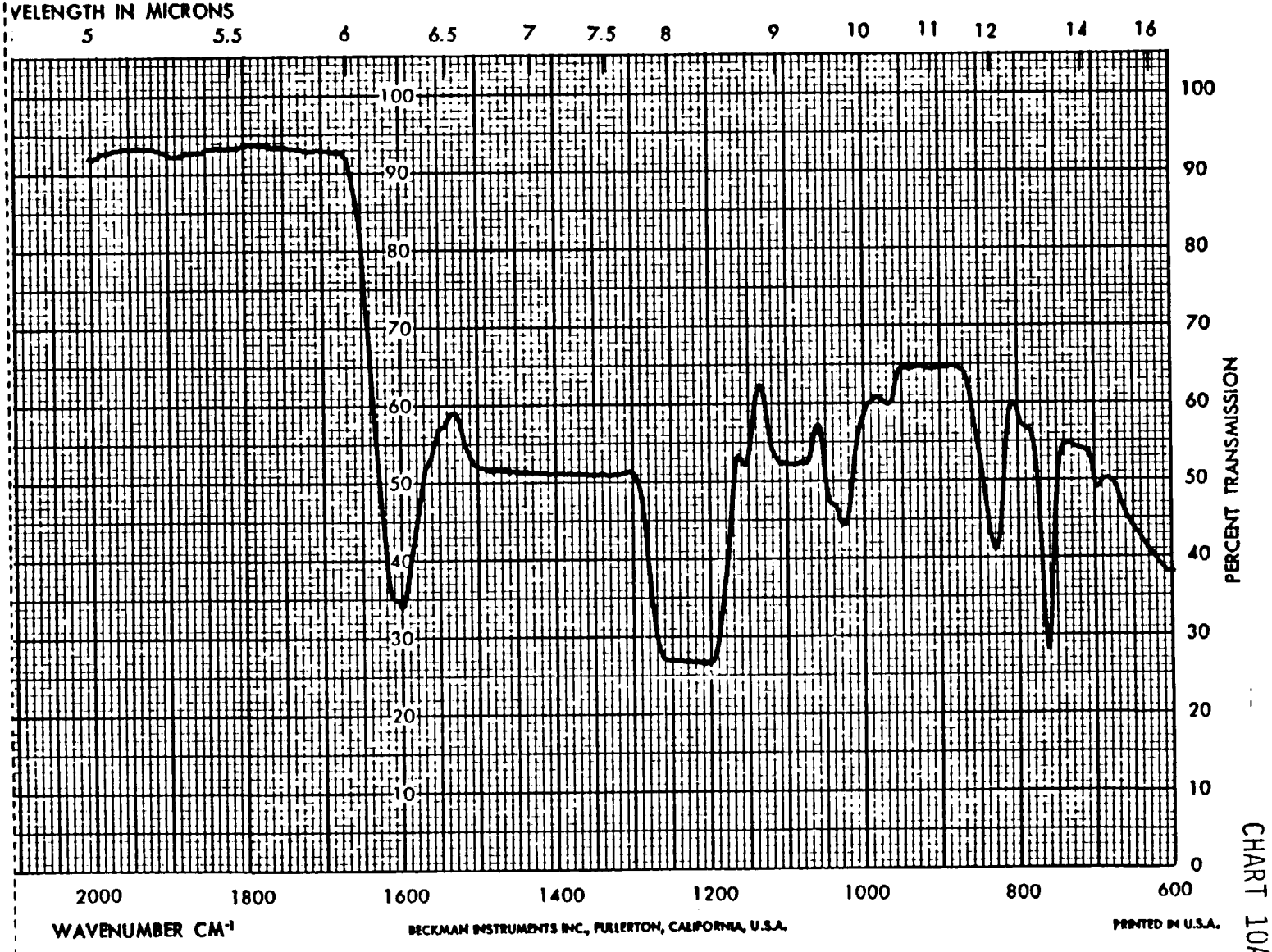


CHART 10A

SPECTRUM NO. 15171
DATE 7-03-86
SAMPLE FM 5834
D09275 # ST-2

SOURCE

STRUCTURE

PATH 0.2 mm NACL
SOLVENT ACETONE
CONCENTRATION 30-50 %T
PHASE 3
COMMENTS PRE-PREG
MATERIAL

ANALYST V. MIRANDA

Beckman®
INFRARED
SPECTROPHOTOMETER

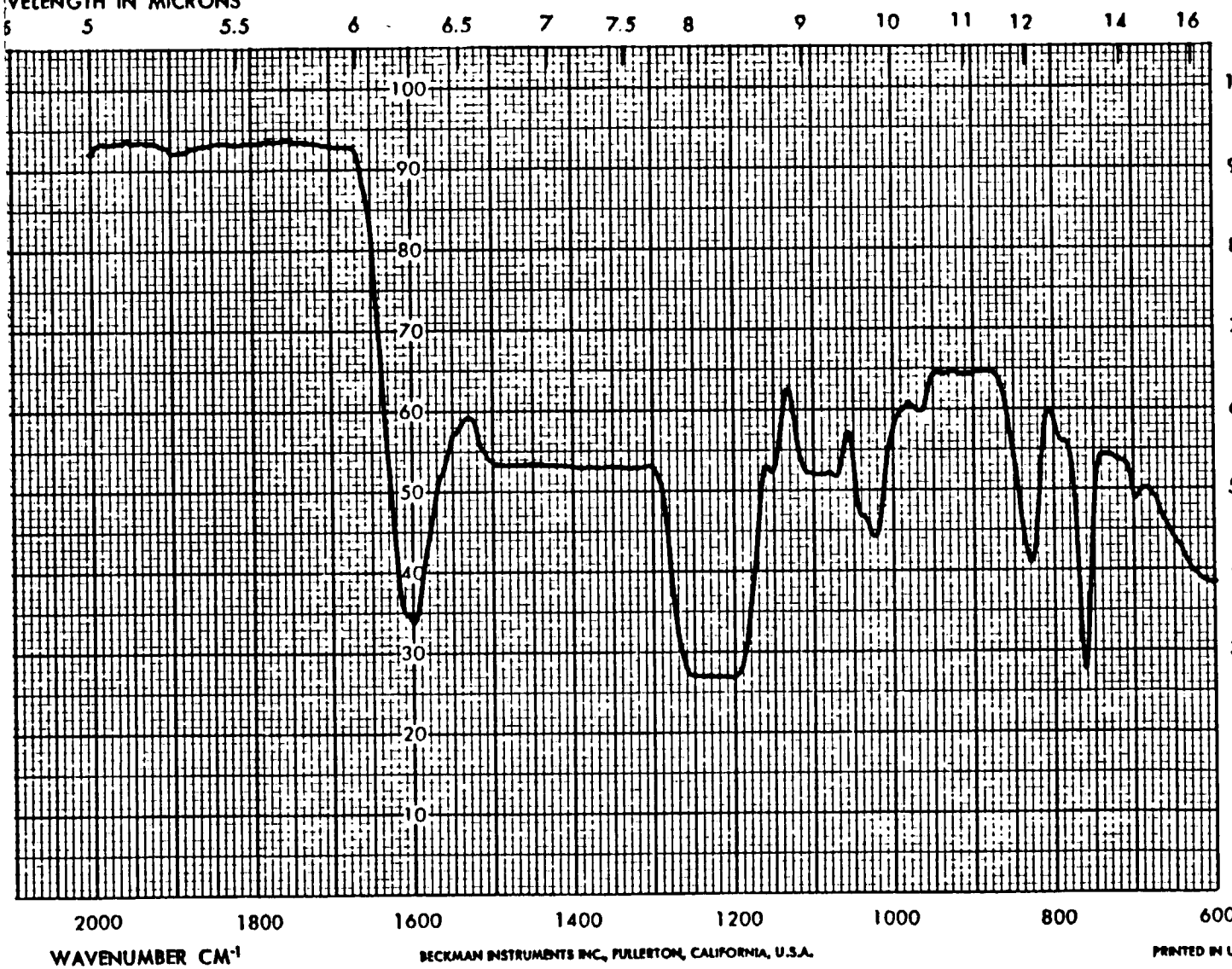


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CHART 10B

SPECTRUM NO. 15172
DATE 7-03-86
SAMPLE FM 5834
DD 9275 # ST. 3

SOURCE
STRUCTURE

PATH 0.2 mm NACL
SOLVENT ACETONE
CONCENTRATION 30-50%
PHASE 3
COMMENTS PRE-PREG
MATERIAL

ANALYST V. MIRANDA

Beckman®
INFRARED
SPECTROPHOTOMETER

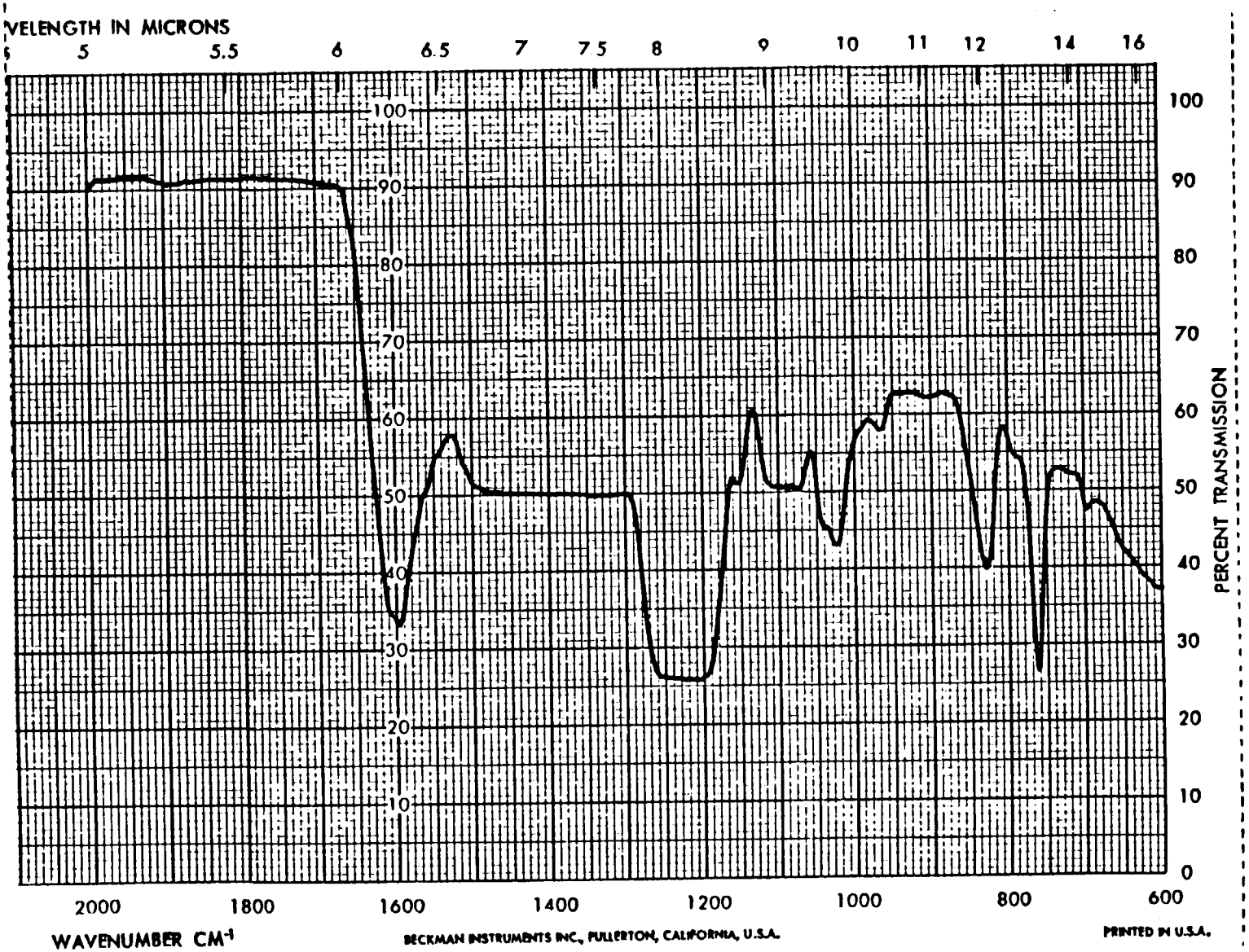

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CHART 10C

SPECTRUM NO. 15173

DATE 7-03-86

SAMPLE FM 5B32

D09275 #ST-4

SOURCE

STRUCTURE

PATH 0.2 mm NACL

SOLVENT ACETONE

CONCENTRATION 30-50%T

PHASE 3

COMMENTS PRE-PREG MATERIAL

ANALYST V. MIRANDA

Beckman®

INFRARED SPECTROPHOTOMETER

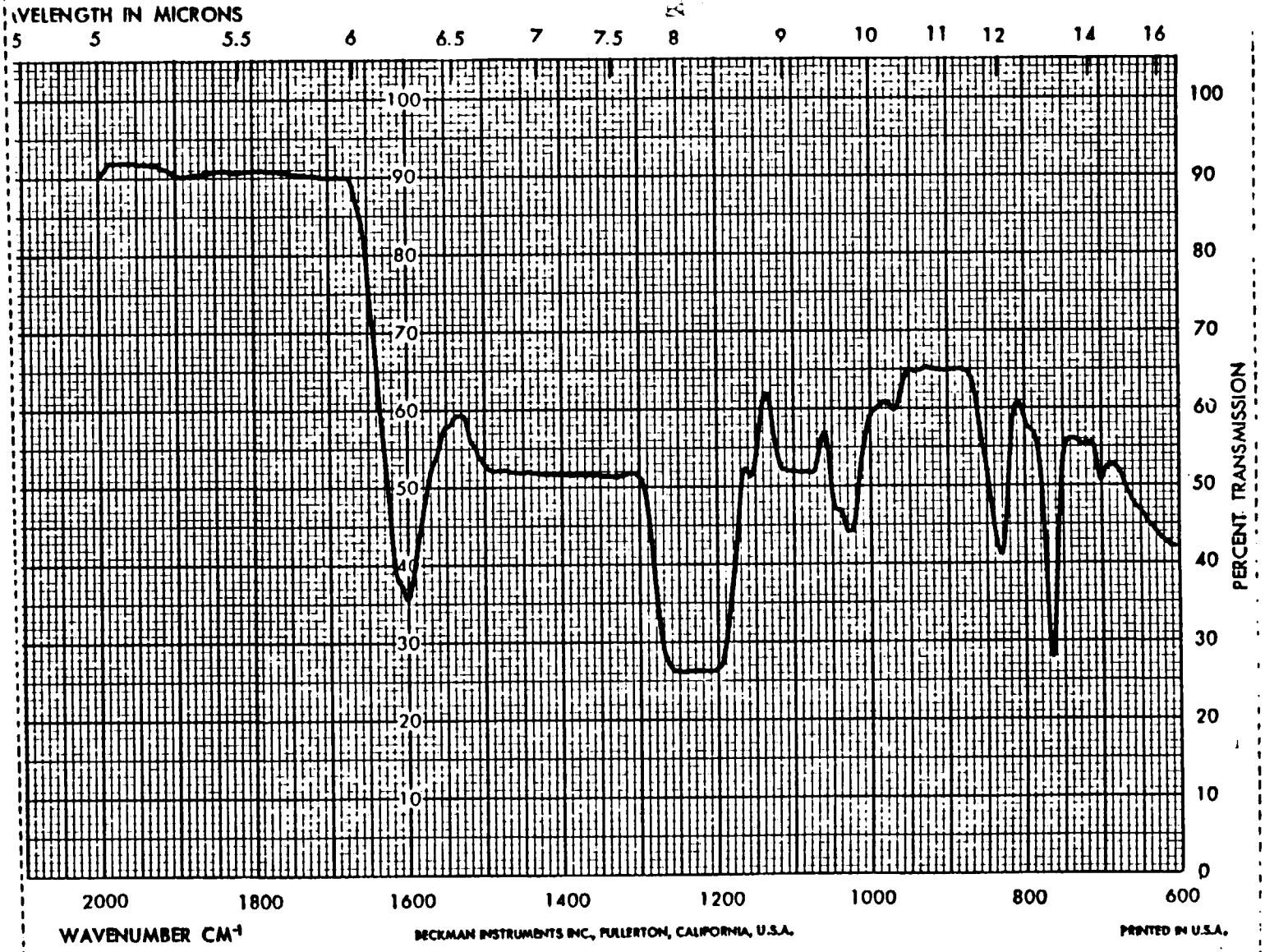

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CHART 10D

SPECTRUM NO. 15174

DATE 7-03-86

SAMPLE FM 5834

D09275 # 5T.-5

SOURCE

STRUCTURE

PATH 0.2 mm NACL

SOLVENT ACETONE

CONCENTRATION 30-50%T

PHASE 3

COMMENTS PRE-PREG MATERIAL

ANALYST V. MIRANDA

Beckman®

INFRARED SPECTROPHOTOMETER

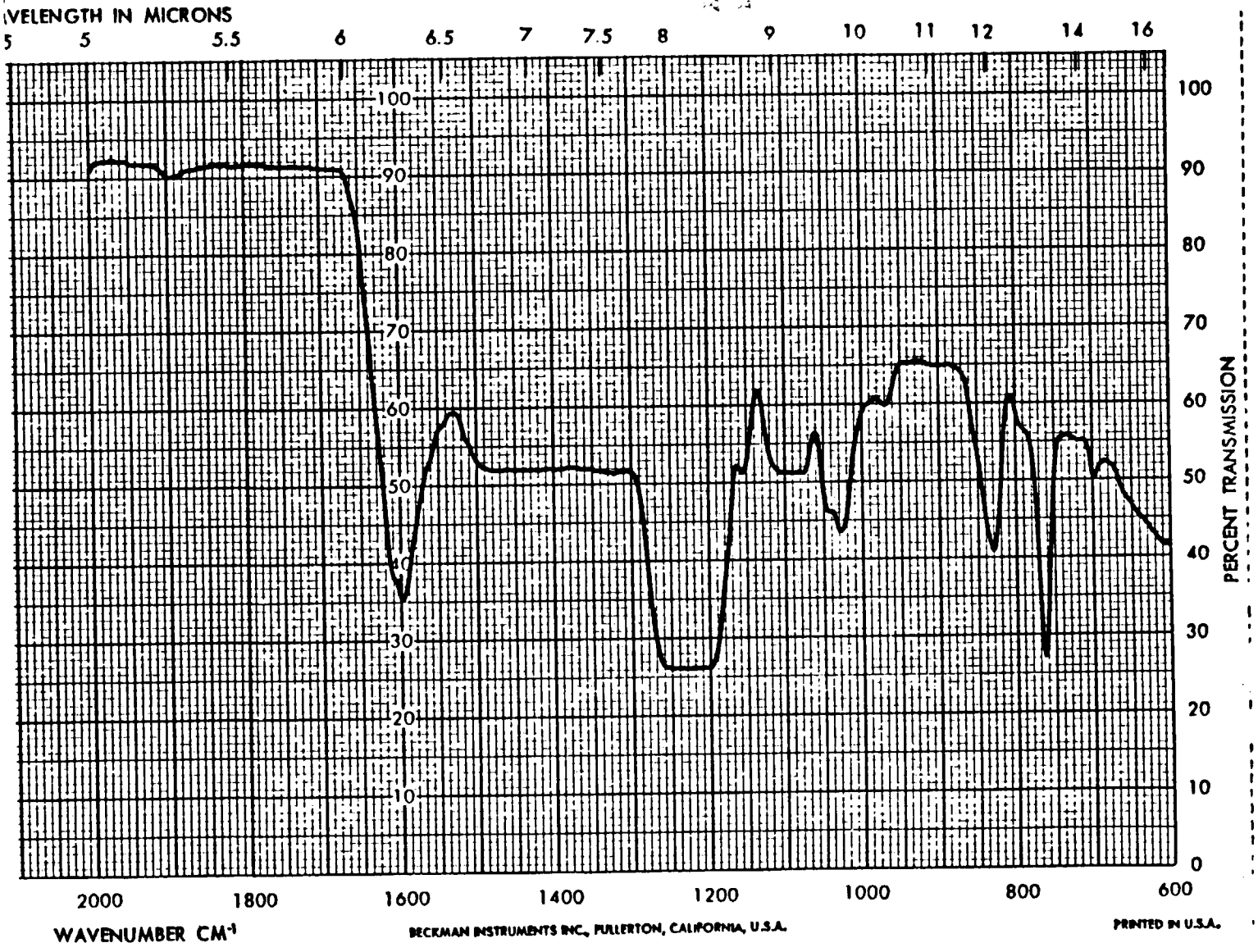

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CHART 10E

SPECTRUM NO. 15175
DATE 7-03-86
SAMPLE FM 5834
D09275 # ST.-6

SOURCE
STRUCTURE

PATH 0.2 mm NACL
SOLVENT ACETONE
CONCENTRATION 30-50%
PHASE 3
COMMENTS PRE-PREG
MATERIAL

ANALYST Y. MIRANDA

Beckman®
INFRARED
SPECTROPHOTOMETER

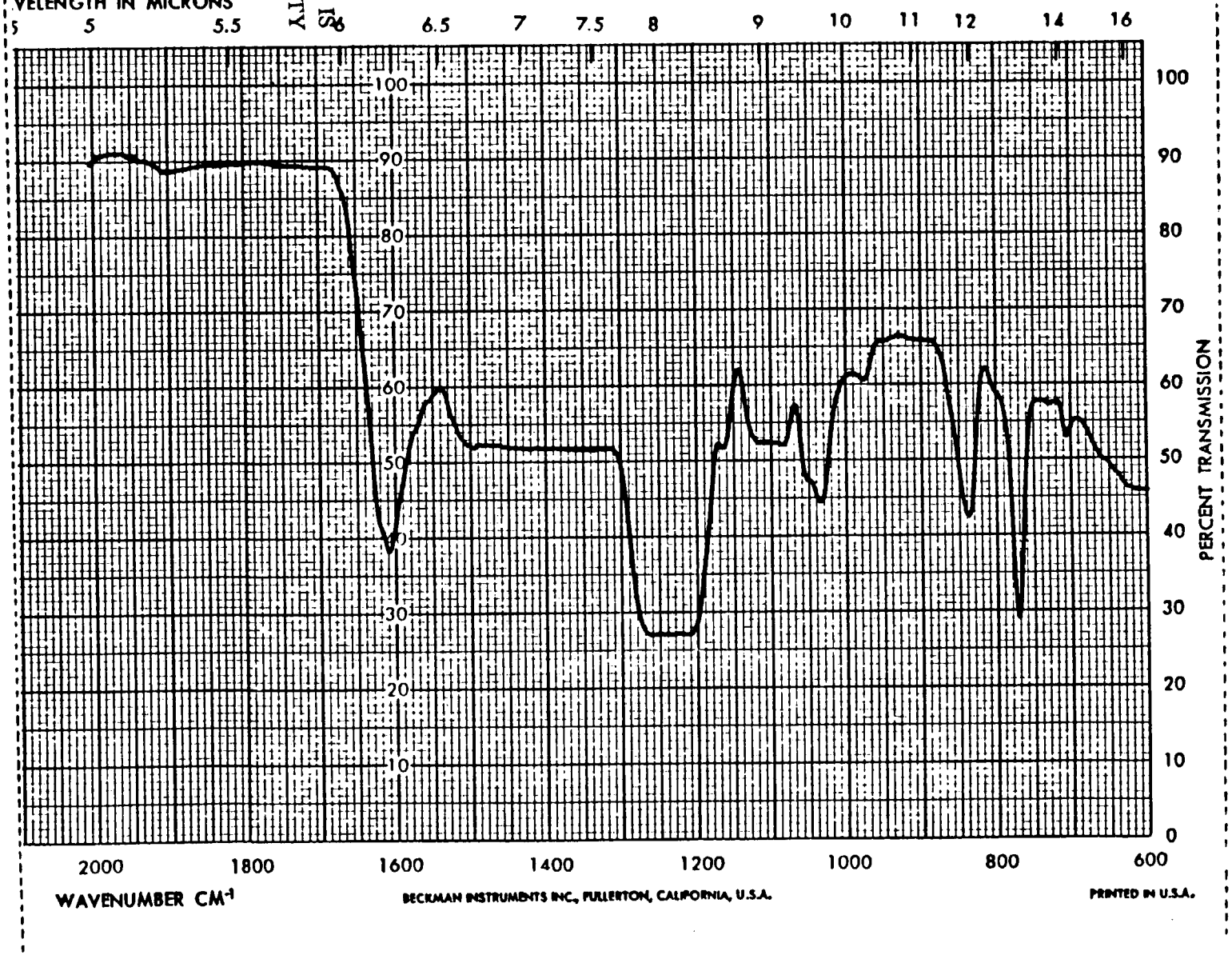

CHART 10F

SPECTRUM NO. 15176
DATE 7-03-86
SAMPLE FM 5834
DD9275 # 6T-7

SOURCE
STRUCTURE

PATH 0.2 mm NACL
SOLVENT ACETONE
CONCENTRATION 30-50%T
PHASE 3
COMMENTS PRE-PREG
MATERIAL

ANALYST V. MIRANDA

Beckman®
INFRARED
SPECTROPHOTOMETER

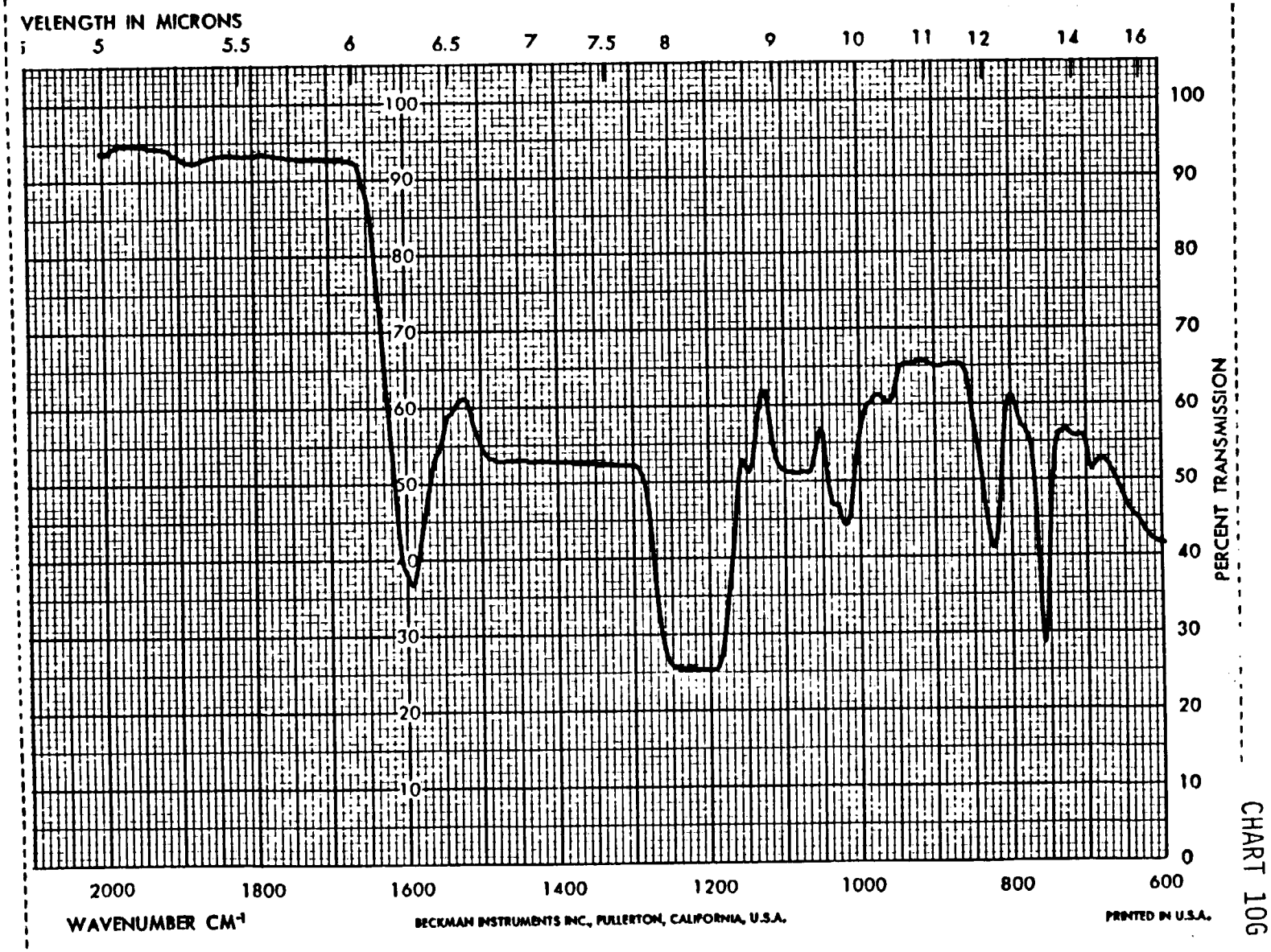

CHART 10G

Chart 21A1

PART NO. 990088

RUN NO ____ DATE 10/17/86

OPERATOR DH

SAMPLE

D0535 - 1 - smm - (1)

ATM Air @ NR

FLOW RATE 1:55:50

T-AXIS

SCALE, °C/in 50 20

PROG. RATE, °C/min 10

HEAT ✓ COOL ___ ISO ___

SHIFT, in 0

DTA-DSC

SCALE, °C/in ___

(mcal/sec)/in ___

WEIGHT, mg ___

REFERENCE ___

TGA

SCALE, mg/in ___

SUPPRESSION, mg ___

WEIGHT, mg ___

TIME CONST., sec ___

dY/dT (mg/min)/in ___

TMA (μm/in F)

SCALE, mils/in 0.1/0.1

MODE Expansion

SAMPLE SIZE 0.260

LOAD, g 10

dY/dT (10X) (mils/min)/in ___

MEASURED VARIABLE

DUPONT instruments

Chart 21A2

PART NO. 990088

RUN NO ___ DATE 10/17/96
OPERATOR TJ
SAMPLE
Dow X-1 Sheet (2)
ATM Air @ STP
FLOW RATE 3-Cond
apply

T-AXIS
SCALE, °C/in 50 20
PROG RATE, °C/min 10
HEAT ✓ COOL ___ ISO ___
SHIFT, in ___ 0 ___

DTA-DSC
SCALE, °C/in ___
(mcal/sec)/in ___
WEIGHT, mg ___
REFERENCE ___

TGA
SCALE, mg/in ___
SUPPRESSION, mg ___
WEIGHT, mg ___
TIME CONST, sec ___
dY/dT (mg/min)/in ___

TMA (μm/inf)
SCALE, mils/in 0.5/0.2
MODE Expansion
SAMPLE SIZE 0.240
LOAD, g 10
dY/dT (10X) (mils/min)/in ___

MEASURED VARIABLE ___

DUPONT instruments

Chart 21A3

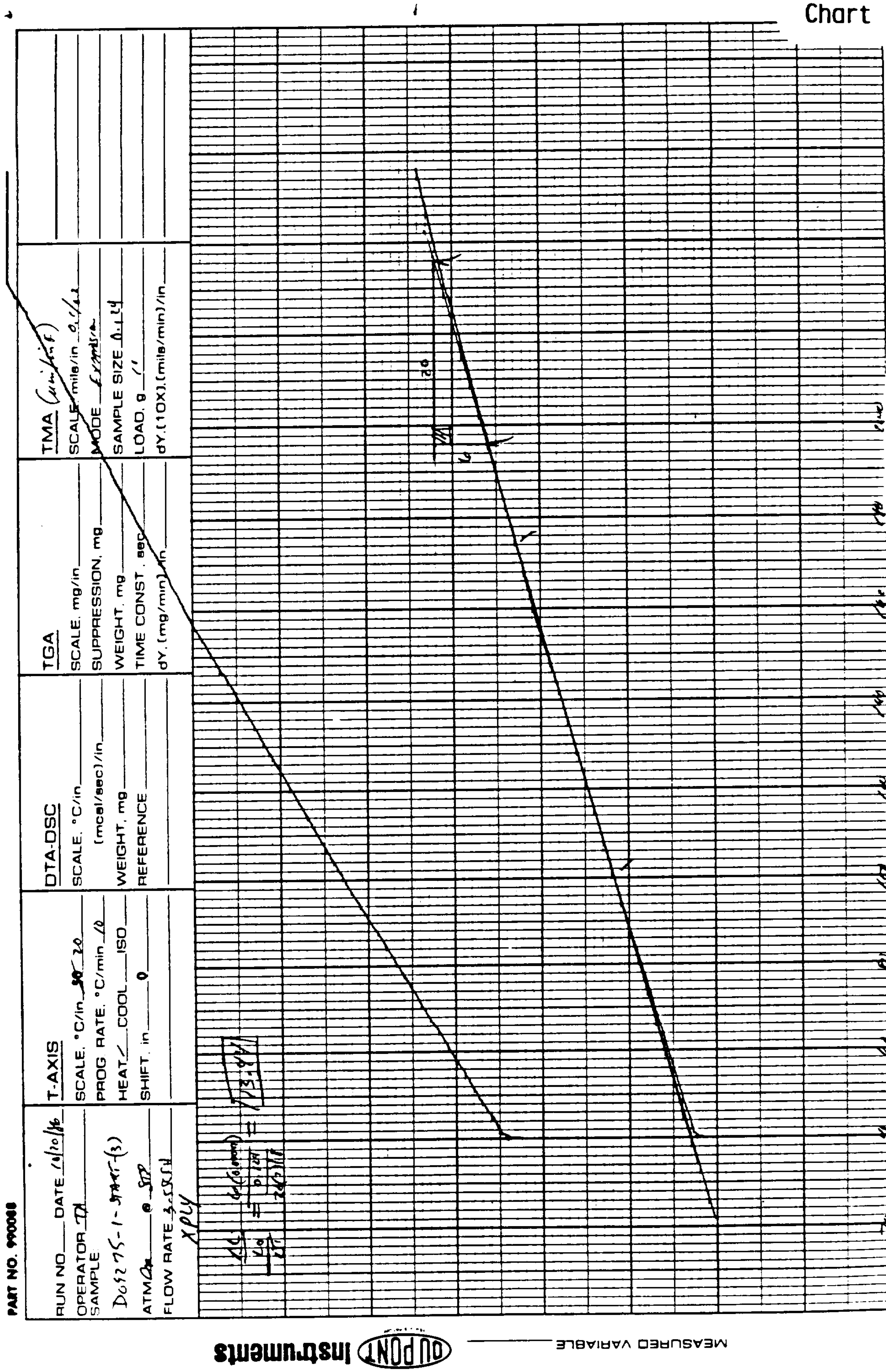

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Chart 21A4

PART NO. 990088

RUN NO ___ DATE 10/24/96
OPERATOR TA
SAMPLE
D9115 - 1-super- (d)
ATM RA @ 3PM
FLOW RATE 3-SCCM
XPLY

T-AXIS
SCALE, °C/in 50 20
PROG RATE, °C/min 10
HEAT ✓ COOL ___ ISO ___
SHIFT, in 0

DTA-DSC
SCALE, °C/in ___
(mcal/sec)/in ___
WEIGHT, mg ___
REFERENCE ___

TGA
SCALE, mg/in ___
SUPPRESSION, mg ___
WEIGHT, mg ___
TIME CONST., sec ___
dY/dT (mg/min)/in ___

TMA (μm/in)
SCALE, mils/in 0.1/0.2
MODE EXPANS/PEN
SAMPLE SIZE 0.124
LOAD, g 10
dY/dT (10X) (mils/min)/in ___

DuPont Instruments

MEASURED VARIABLE

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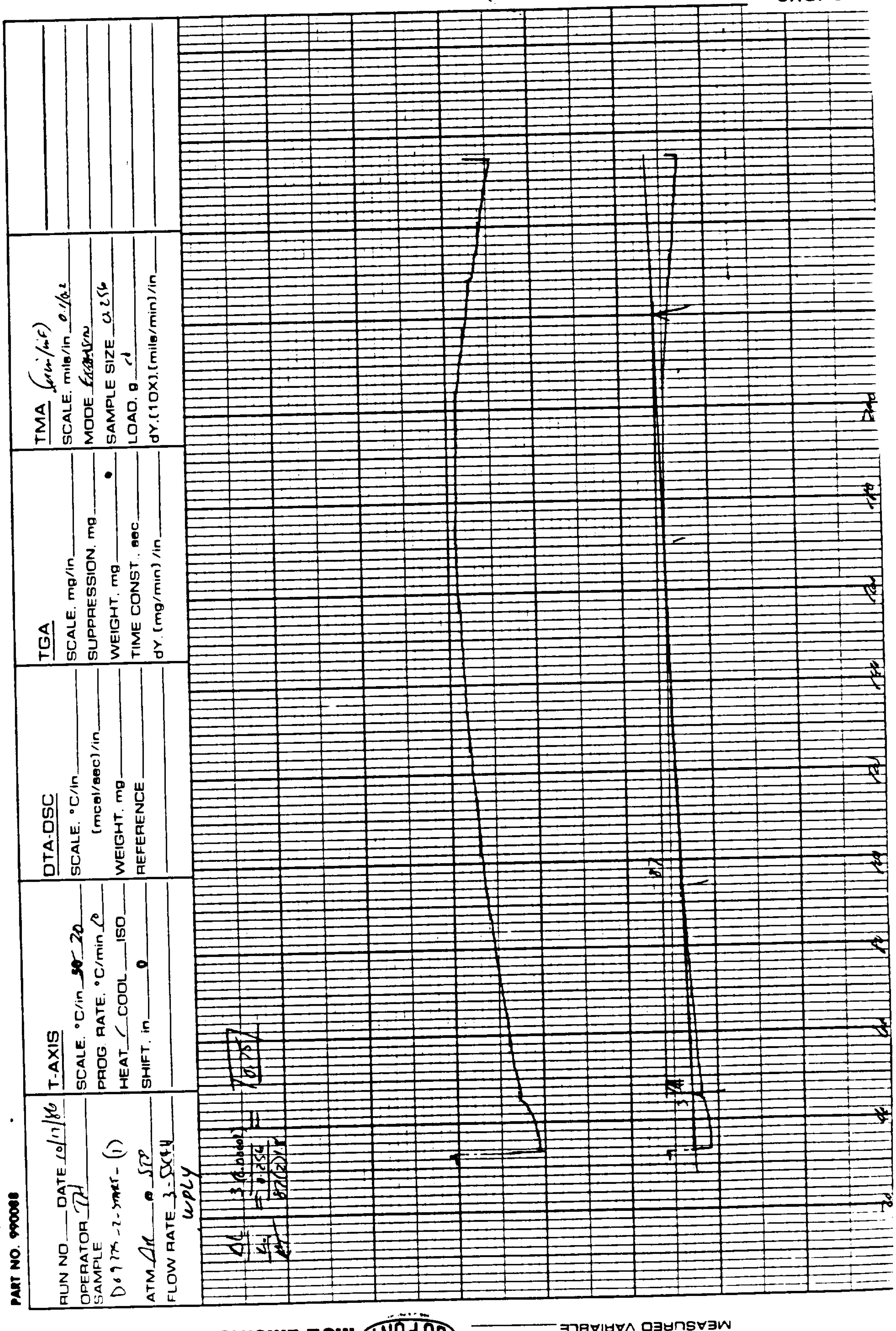
Chart 21B1



DU PONT Instruments

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Chart 21B2

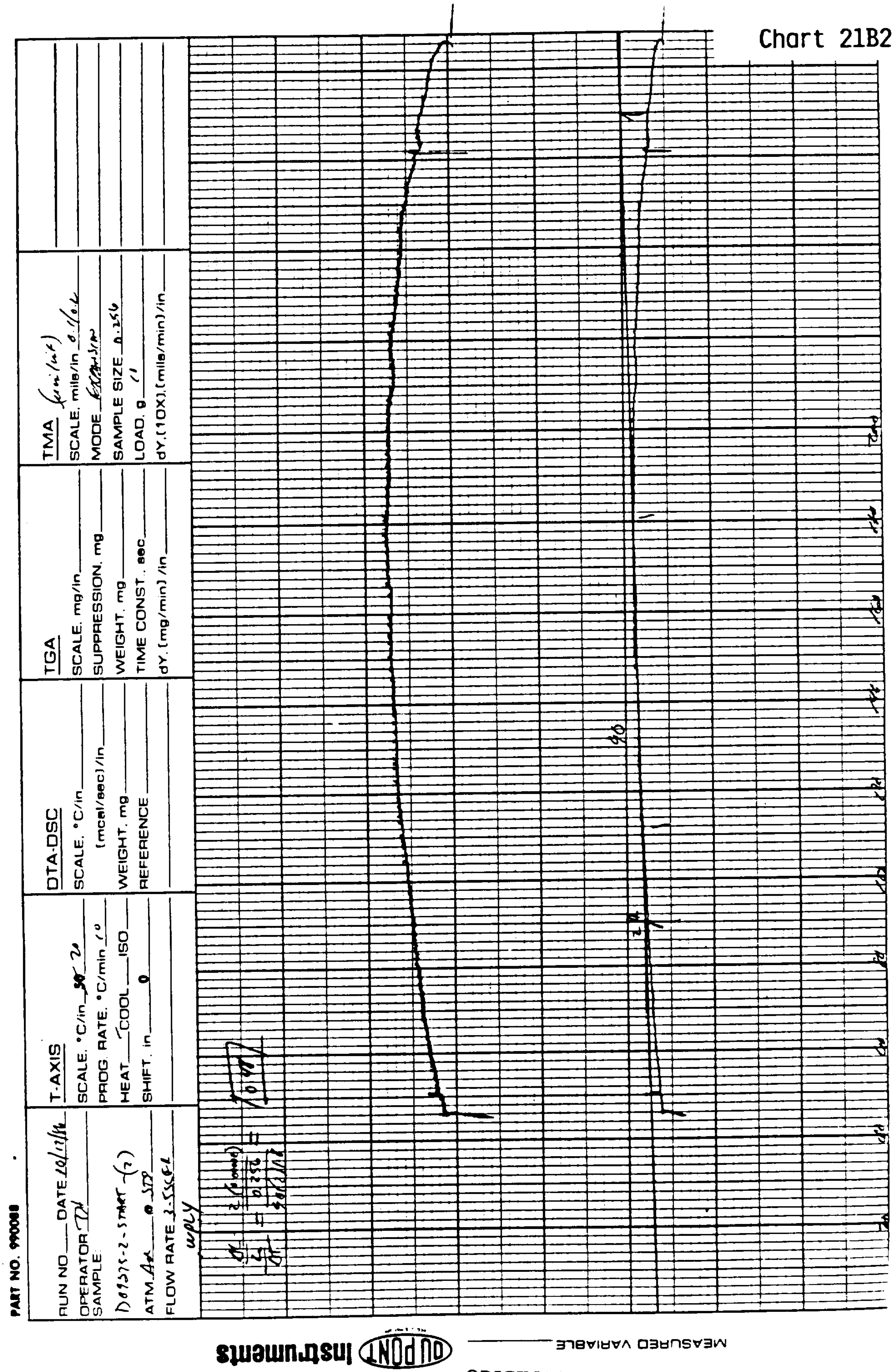

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Chart 21B3

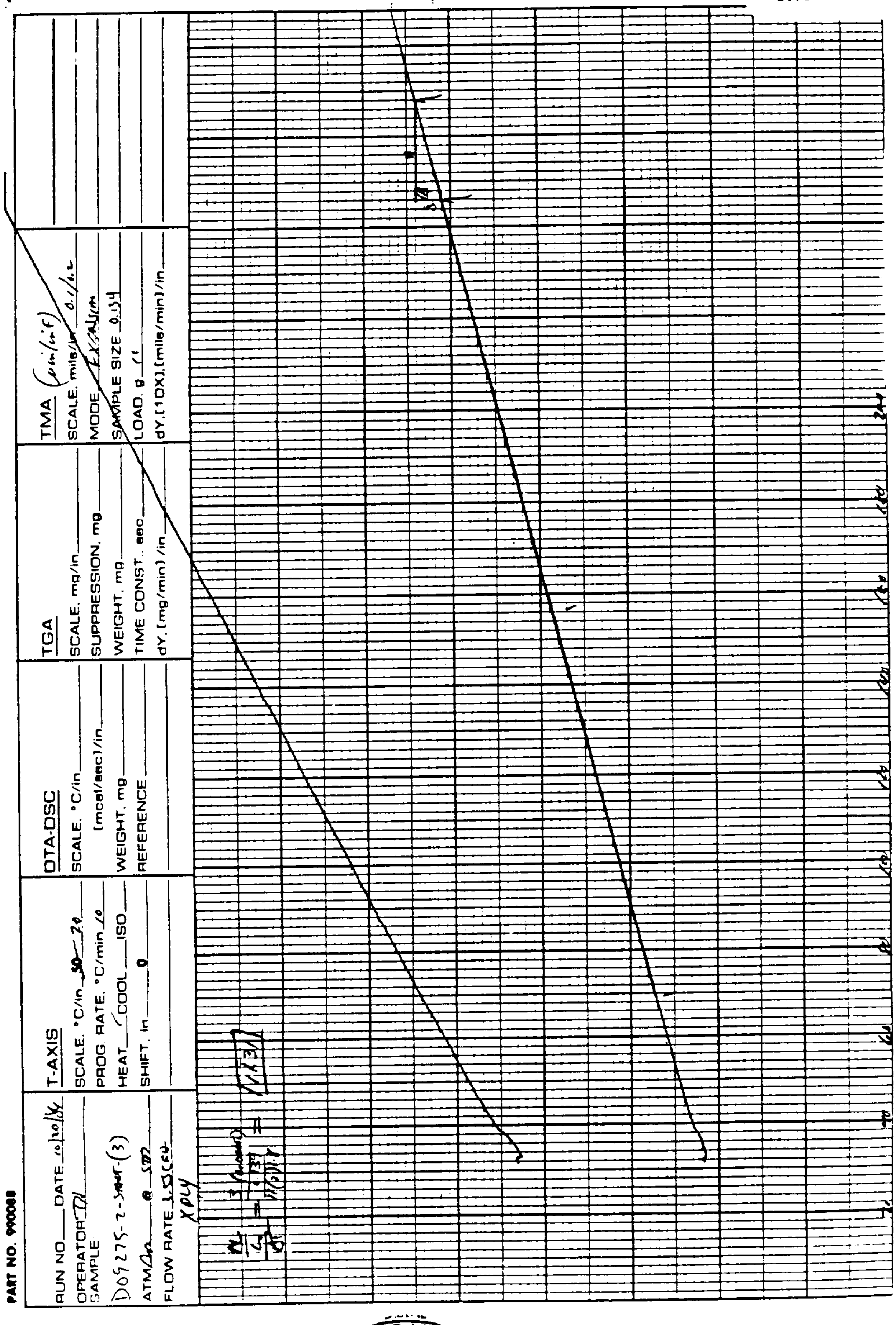


Chart 21B4

PART NO. 990088

RUN NO ___ DATE 10/20/94

OPERATOR PJ

SAMPLE Dolz75-2-Summer-(4)

ATM Air @ STP

FLOW RATE 1-Sized

T-AXIS
SCALE, °C/in 50 / 20
PROG RATE, °C/min 10
HEAT ✓ COOL ___ ISO ___
SHIFT, In 0

DTA-DSC
SCALE, °C/in ___
(mcal/sec)/in ___
WEIGHT, mg ___
REFERENCE ___

TGA
SCALE, mg/in ___
SUPPRESSION, mg ___
WEIGHT, mg ___
TIME CONST., sec ___
dY, (mg/min) /in ___

TMA (µm/mF)
SCALE, mils/in 0.1/0.2
MODE Extension
SAMPLE SIZE 0.134
LOAD g 10
dY, (10X), (mils/min)/in ___

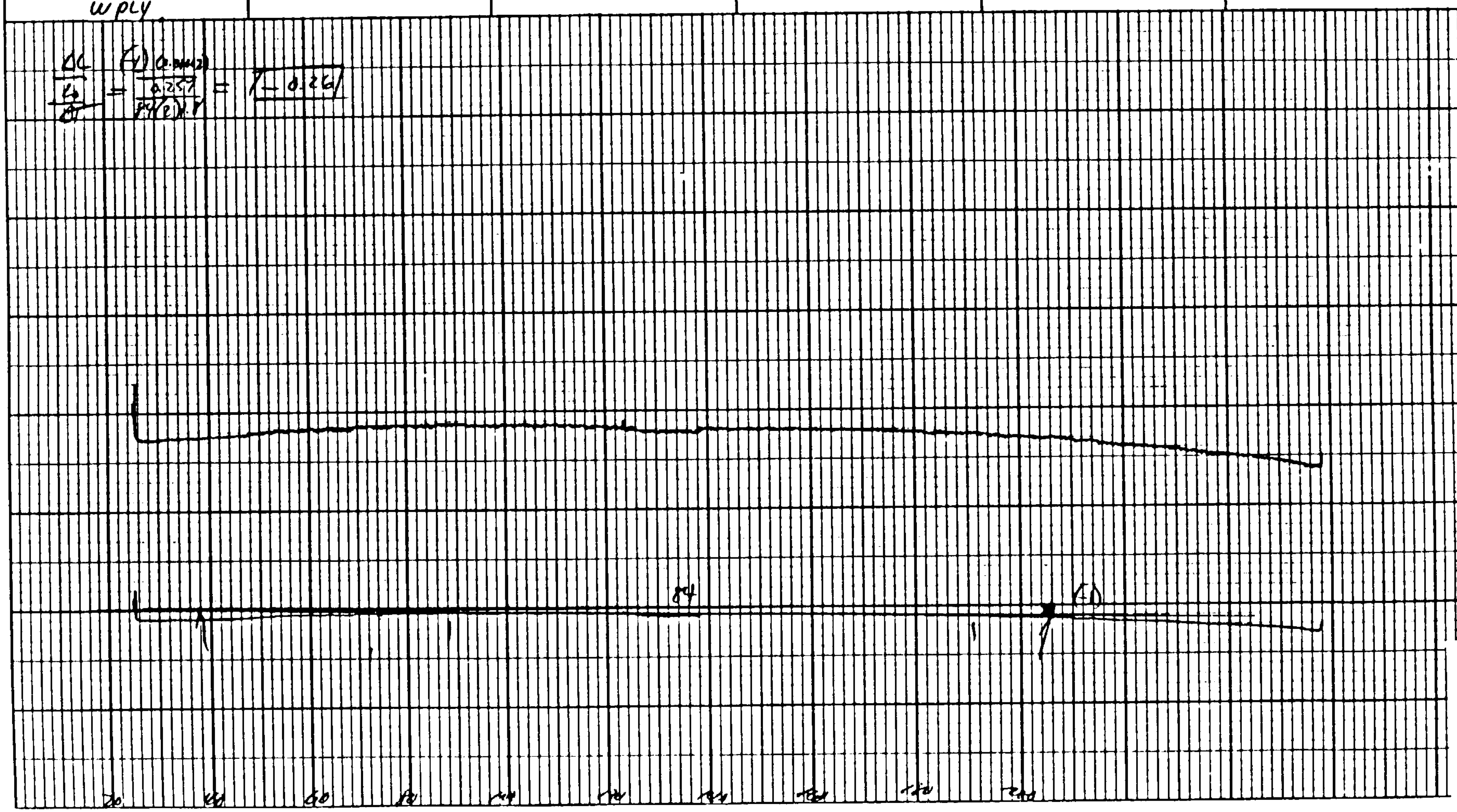
MEASURED VARIABLE

DUPONT instruments

Chart 21C1

PART NO. 990088

RUN NO ___ DATE 10/12/86	**T-AXIS**	**DTA-DSC**	**TGA**	**TMA** (axial)	
OPERATOR D	SCALE, °C/in 20	SCALE, °C/in ___	SCALE, mg/in ___	SCALE, mils/in 0.1/0.2	
SAMPLE D05375-3-START-(1)	PROG RATE, °C/min 10	(mcal/sec)/in ___	SUPPRESSION, mg ___	MODE Expansion	
ATM Air @ ___	HEAT ✓ COOL ___ ISO ___	WEIGHT, mg ___	WEIGHT, mg ___	SAMPLE SIZE 0.257	
FLOW RATE ___ w ply	SHIFT, in 0	REFERENCE ___	TIME CONST, sec ___	LOAD, g 10	
			dY, (mg/min)/in ___	dY,(10X),(mils/min)/in ___	



MEASURED VARIABLE ———

DUPONT Instruments

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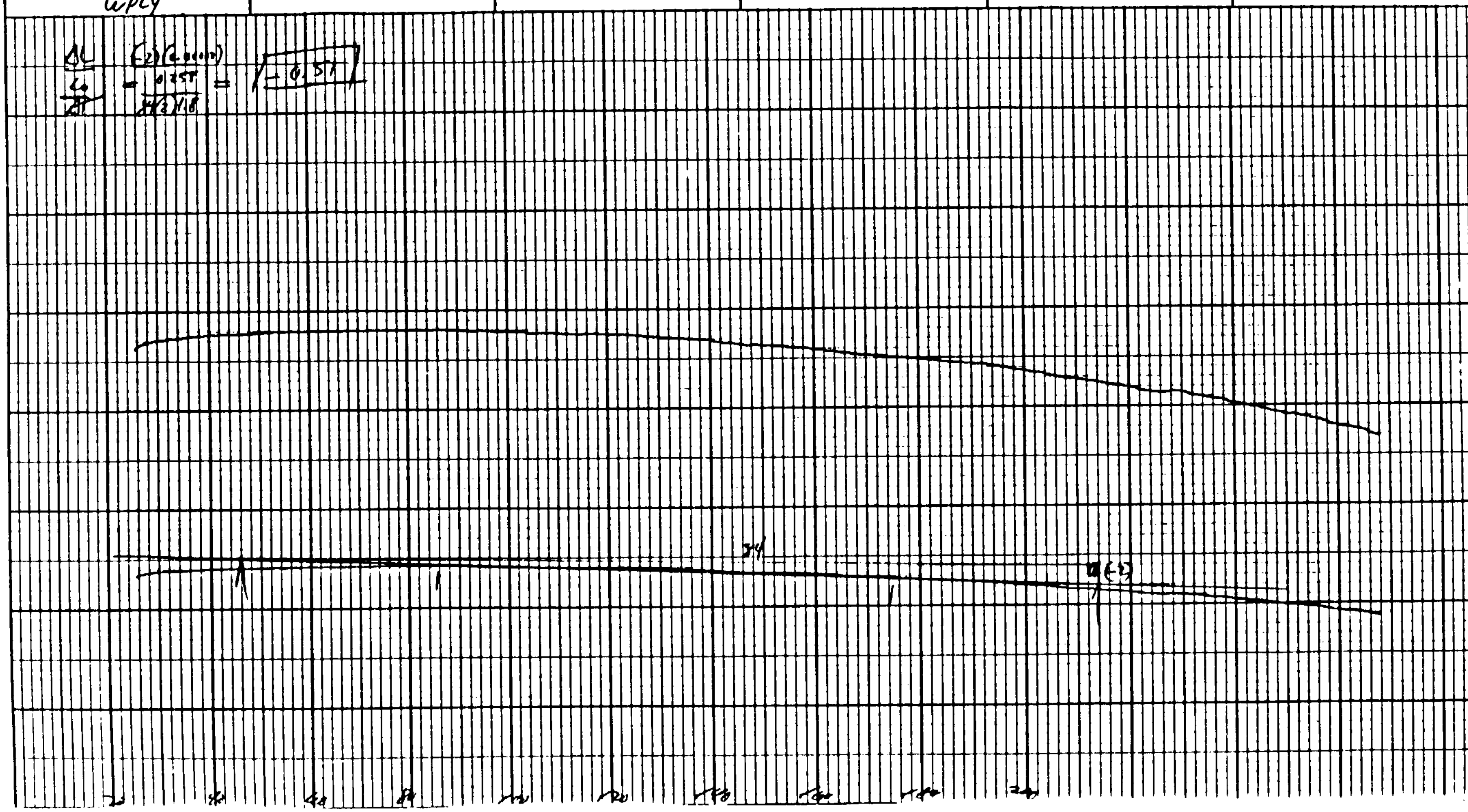
Chart 21C2

PART NO. 990088

	T-AXIS	DTA-DSC	TGA	TMA (Expansion)	
RUN NO. ___ DATE 10/17/86	SCALE, °C/in 50 20	SCALE, °C/in ___	SCALE, mg/in ___	SCALE, mils/in 01/0.2	
OPERATOR TH	PROG. RATE, °C/min 10	(mcal/sec)/in ___	SUPPRESSION, mg ___	MODE Expansion	
SAMPLE: D0 9375-3-start-(2)	HEAT ✓ COOL ___ ISO ___	WEIGHT, mg ___	WEIGHT, mg ___	SAMPLE SIZE 0.258	
ATM Ar @ STP	SHIFT, in. 0	REFERENCE ___	TIME CONST., sec ___	LOAD, g ___	
FLOW RATE 3-5 SCFH WPLY			dY, (mg/min)/in ___	dY, (10X), (mils/min)/in ___	



MEASURED VARIABLE ___

DUPONT Instruments

PART NO. 990068

RUN NO ___ DATE 10/10/86	T-AXIS	DTA-DSC	TGA	TMA (μm/in)	
OPERATOR TR	SCALE. °C/in 30 20	SCALE. °C/in ___	SCALE. mg/in ___	SCALE. mils/in 0.1/0.2	
SAMPLE:	PROG RATE. °C/min 10	(mcal/sec)/in ___	SUPPRESSION. mg ___	MODE EXPANSION	
D01275-3-STAGE-(3)	HEAT ___ COOL ___ ISO ___	WEIGHT. mg ___	WEIGHT. mg ___	SAMPLE SIZE 0.124	
ATM Air @ STP	SHIFT. in 0	REFERENCE ___	TIME CONST. sec ___	LOAD g 10	
FLOW RATE 2-5 CFM			dY. (mg/min) /in ___	dY. (10X). (mils/min)/in ___	
XPLY					

$\frac{dL}{L_0 \, dT} = \frac{8(0.124)}{32(3)(.8)} = 11.2$

32

DUPONT Instruments

MEASURED VARIABLE

Chart 21C3

Chart 21C4

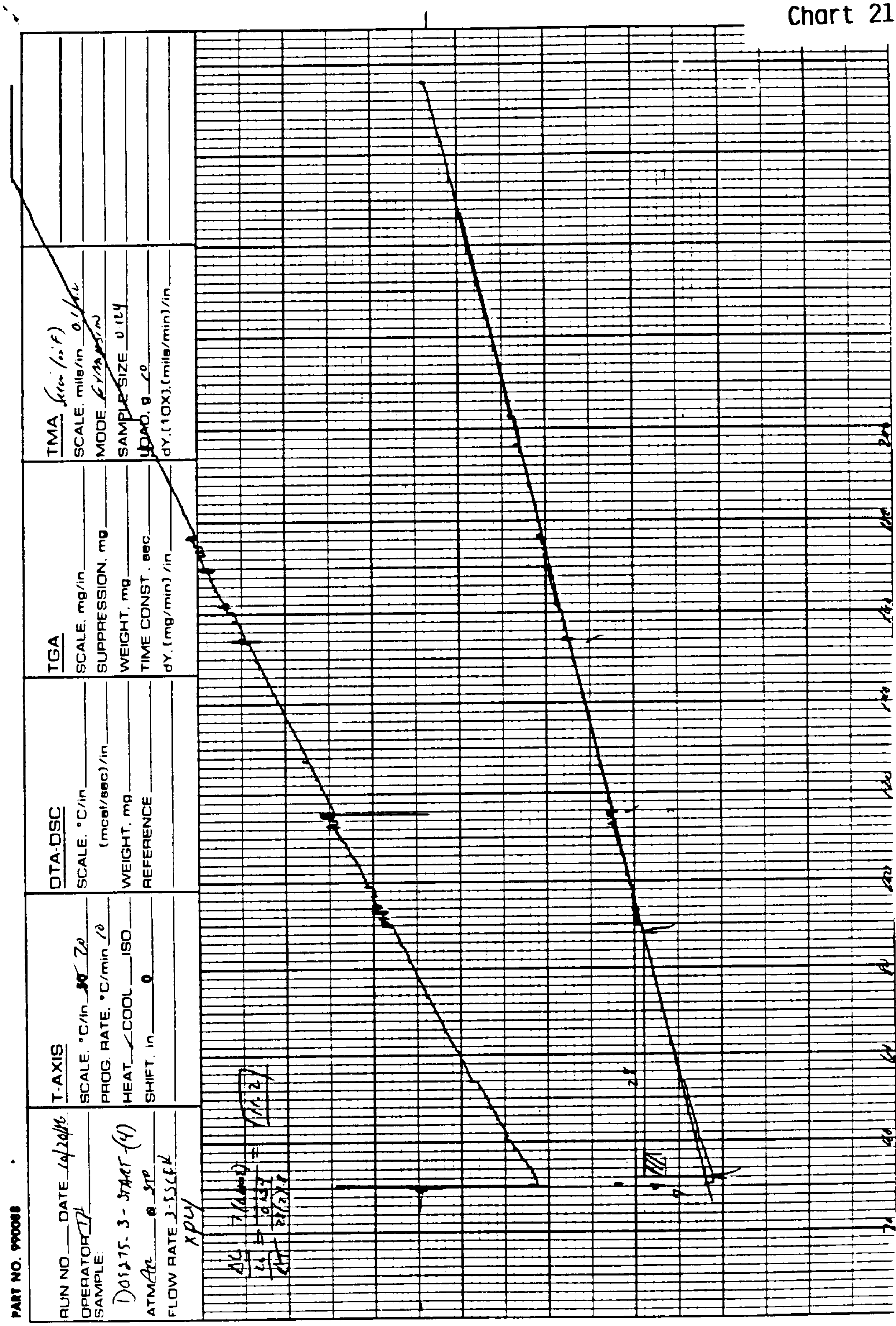


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Chart 21D1

PART NO. 990088

RUN NO ___ DATE 10/11/96

OPERATOR TT

SAMPLE

D4515-4-STD-(1)

ATM BM @ SRT

FLOW RATE 3.5SCCM

supply

T-AXIS

SCALE, °C/in 20

PROG RATE, °C/min 10

HEAT ✓ COOL ___ ISO ___

SHIFT, in 0

DTA-DSC

SCALE, °C/in ___

(mcal/sec)/in ___

WEIGHT, mg ___

REFERENCE ___

TGA

SCALE, mg/in ___

SUPPRESSION, mg ___

WEIGHT, mg ___

TIME CONST., sec ___

dY, (mg/min) /in ___

TMA (µin/in F)

SCALE, mils/in 0.1/0.2

MODE Expansion

SAMPLE SIZE 0.25g

LOAD, g 10

dY, (10X), (mils/min) /in ___

MEASURED VARIABLE

DuPont Instruments

ORIGINAL PAGE IS
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PART NO. 990088

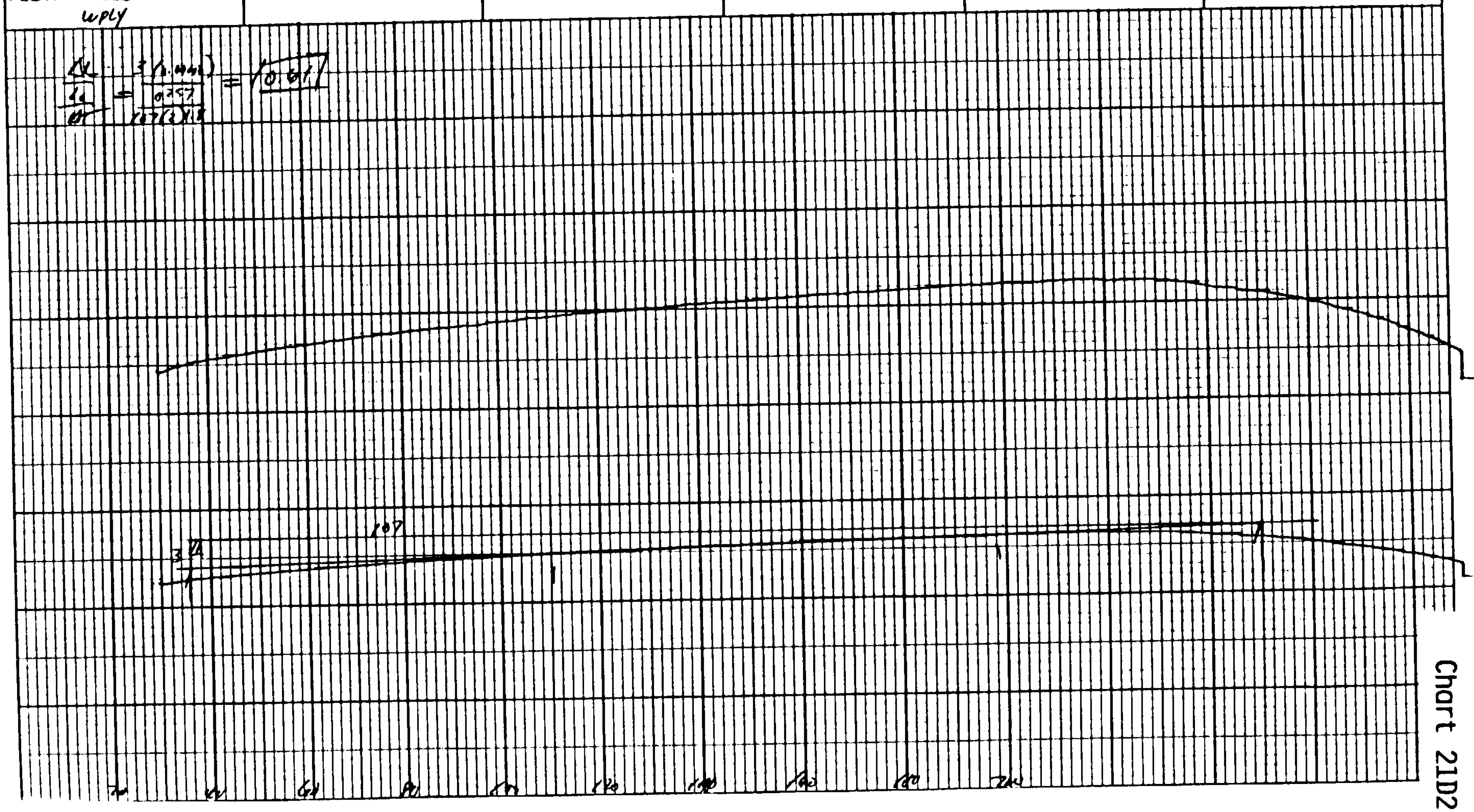
RUN NO.___ DATE 10/20/86
OPERATOR DJ
SAMPLE: DOS 5X-4-START-(2)
ATM Ar @ STP
FLOW RATE 3-5 SCFH
wply

T-AXIS
SCALE, °C/in 50 20
PROG. RATE, °C/min 10
HEAT ✓ COOL ___ ISO ___
SHIFT, in 0

DTA-DSC
SCALE, °C/in ___
(mcal/sec)/in ___
WEIGHT, mg ___
REFERENCE ___

TGA
SCALE, mg/in ___
SUPPRESSION, mg ___
WEIGHT, mg ___
TIME CONST., sec ___
dY, (mg/min)/in ___

TMA (μm/in F)
SCALE, mils/in 0.1/0.~
MODE Expansion
SAMPLE SIZE 0.257
LOAD, g 10
dY, (10X), (mils/min)/in ___



MEASURED VARIABLE

DUPONT Instruments

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Chart 21D2

Chart 21D3

PART NO. 990088

RUN NO ____ DATE 10/20/K
OPERATOR DJ
SAMPLE
D01215-4-STRIP-(3)
ATM Air @ STP
FLOW RATE 3.5SCFH
XDM

T-AXIS
SCALE, °C/in 50 20
PROG RATE, °C/min 10
HEAT ✓ COOL ___ ISO ___
SHIFT, in 0

DTA-DSC
SCALE, °C/in ___
(mcal/sec)/in ___
WEIGHT, mg ___
REFERENCE ___

TGA
SCALE, mg/in ___
SUPPRESSION, mg ___
WEIGHT, mg ___
TIME CONST., sec ___
dY/dT (mg/min)/in ___

TMA (Lauri Knife)
SCALE, mils/in 0.1/0.2
MODE Expansion
SAMPLE SIZE 0.124
LOAD, g 10
dY/dT (10X) (mils/min)/in ___

MEASURED VARIABLE

DUPONT instruments

PART NO. 990088

RUN NO ___ DATE 10/10/86	T-AXIS	DTA-DSC	TGA	TMA (cm/mF)	
OPERATOR DJ	SCALE, °C/in 80 20	SCALE, °C/in	SCALE, mg/in	SCALE, mils/in 0.1/0.2	
SAMPLE: D09875-4-Sheet-(4)	PROG. RATE, °C/min 10	(mcal/sec)/in	SUPPRESSION, mg	MODE Expansion	
ATM Air @ STP	HEAT ✓ COOL ___ ISO ___	WEIGHT, mg	WEIGHT, mg	SAMPLE SIZE 0.125	
FLOW RATE 3-5 (est)	SHIFT, in 0	REFERENCE	TIME CONST, sec	LOAD, g 10	
XPDV			dY, (mg/min)/in	dY, (10X), (mils/min)/in	

$\frac{\Delta L}{L_0} = \frac{7\,(0.1\text{mm})}{3\%\,(0.125)} = 112.9\%$

DUPONT Instruments

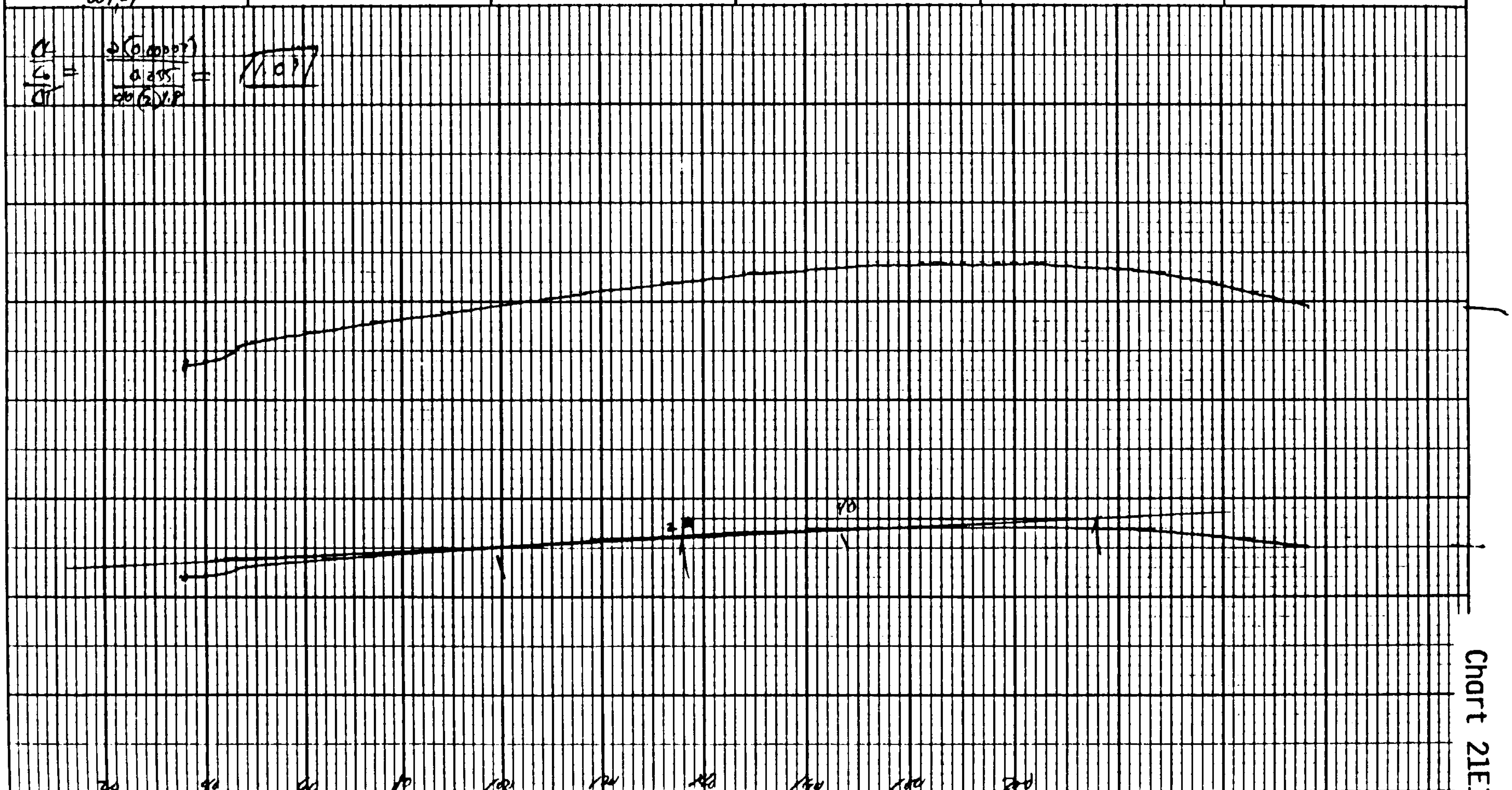
MEASURED VARIABLE

Chart 21D4

Chart 21E1

PART NO. 990088

RUN NO.____ DATE 10/20/84	**T-AXIS**	**DTA-DSC**	**TGA**	**TMA** (un/cap)	
OPERATOR DJ	SCALE, °C/in 20	SCALE, °C/in	SCALE, mg/in	SCALE, mils/in 0.1/0.2	
SAMPLE D05375-5-start-(1)	PROG. RATE, °C/min 10	(mcal/sec)/in	SUPPRESSION, mg	MODE Expansion	
ATM Air @ STP	HEAT ✓ COOL ___ ISO ___	WEIGHT, mg	WEIGHT, mg	SAMPLE SIZE 0.255	
FLOW RATE 3-Dcell w/A/1	SHIFT, in 0	REFERENCE	TIME CONST., sec	LOAD, g 10	
			dY, (mg/min)/in	dY,(10X),(mils/min)/in	



MEASURED VARIABLE

DUPONT Instruments

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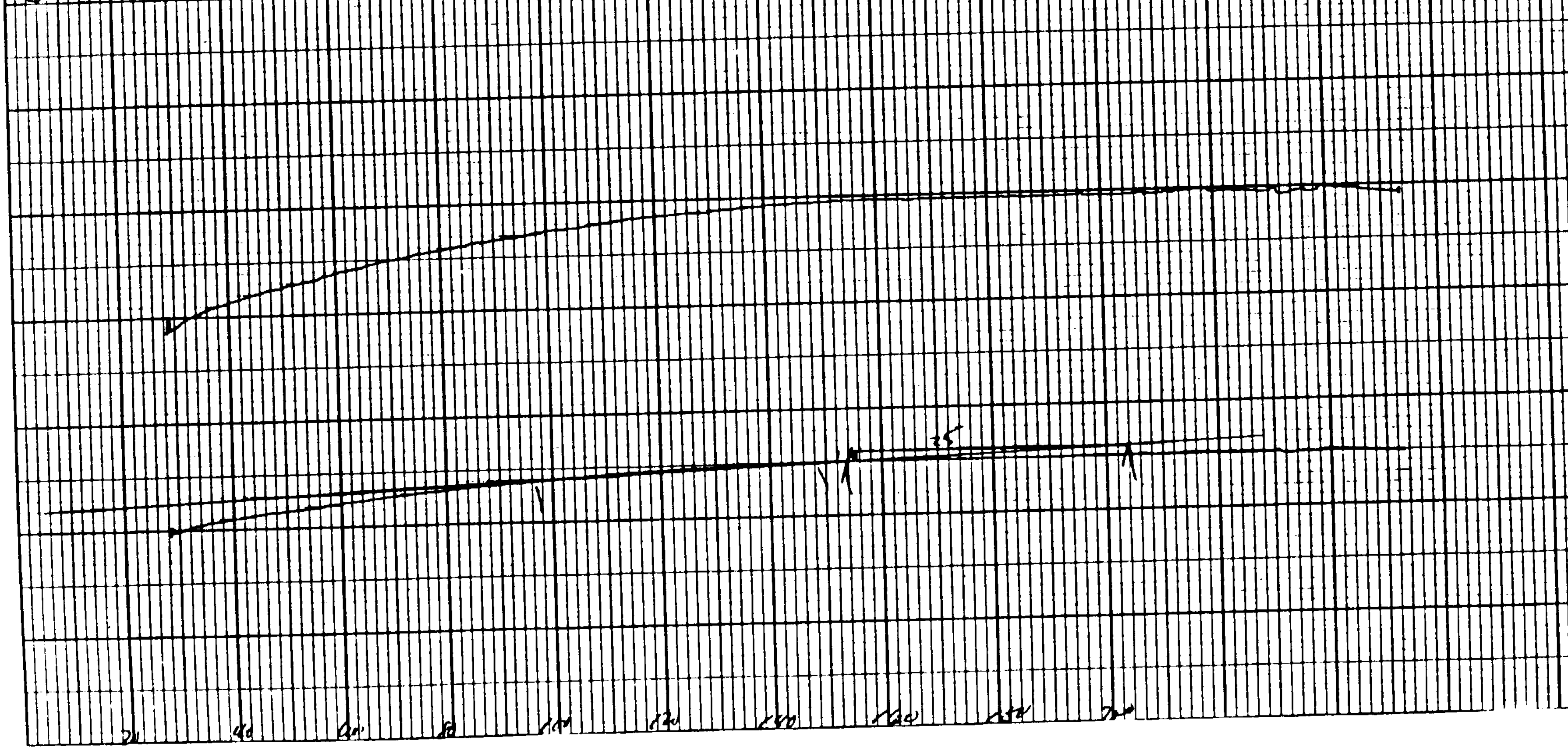
Chart 21E2

PART NO. 990088

RUN NO ___ DATE 10/20/86	**T-AXIS**	**DTA-DSC**	**TGA**	**TMA** (mm/in F)	
OPERATOR DJ	SCALE, °C/in ~~80~~ 20	SCALE, °C/in ___	SCALE, mg/in ___	SCALE, mils/in 0.1/0.2	
SAMPLE D09275 - 5 - Start - (2)	PROG RATE, °C/min 10	(mcal/sec)/in ___	SUPPRESSION, mg ___	MODE Expansion	
ATM Ar @ STP	HEAT ✓ COOL ___ ISO ___	WEIGHT, mg ___	WEIGHT, mg ___	SAMPLE SIZE 0.257	
FLOW RATE 3-5 SCFH	SHIFT, in 0	REFERENCE ___	TIME CONST., sec ___	LOAD, g 10	
WPLY			dY, (mg/min)/in ___	dY,(10X),(mils/min)/in ___	

$\frac{\Delta L}{L} \Big/ \Delta T = \frac{(0.001)}{\frac{0.257}{25(2)\cdot 8}} = $ 0.86 (boxed)



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MEASURED VARIABLE

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Chart 21E3

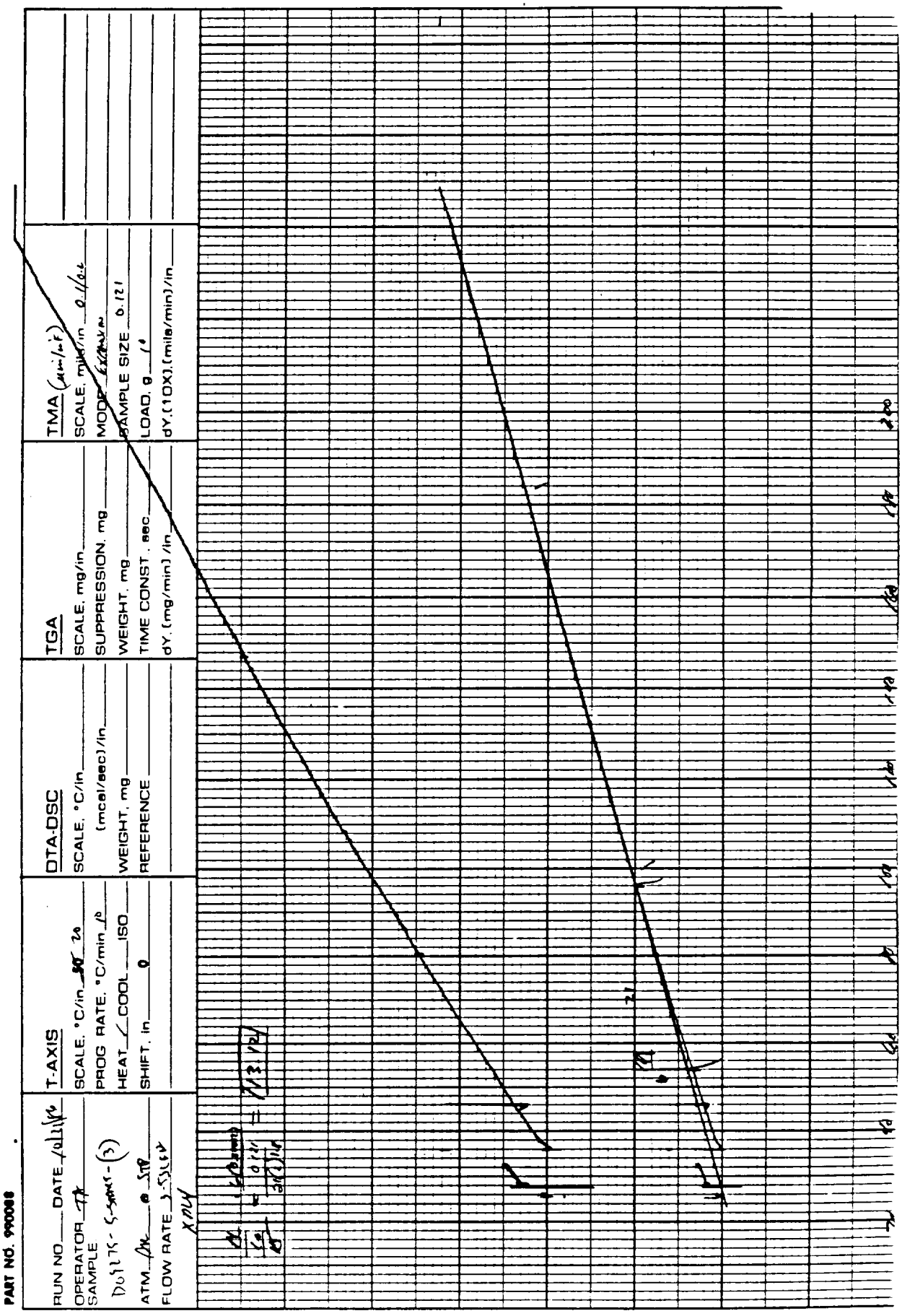

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Chart 21E4

PART NO. 990088

RUN NO. ___ DATE 11/21/86	T-AXIS	DTA-DSC	TGA	TMA (uni/alt)	
OPERATOR	SCALE, °C/in 20	SCALE, °C/in	SCALE, mg/in	SCALE, mils/in	
SAMPLE: D09275-5-ster-(4)	PROG. RATE, °C/min 10	(mcal/sec)/in	SUPPRESSION, mg	MODE Expansion	
ATM Air @ STP	HEAT ✓ COOL ___ ISO ___	WEIGHT, mg	WEIGHT, mg	SAMPLE SIZE 0.122	
FLOW RATE	SHIFT, in 0	REFERENCE	TIME CONST., sec	LOAD, g 10	
			dY, (mg/min)/in	dY, (10X), (mils/min)/in	

XPLY

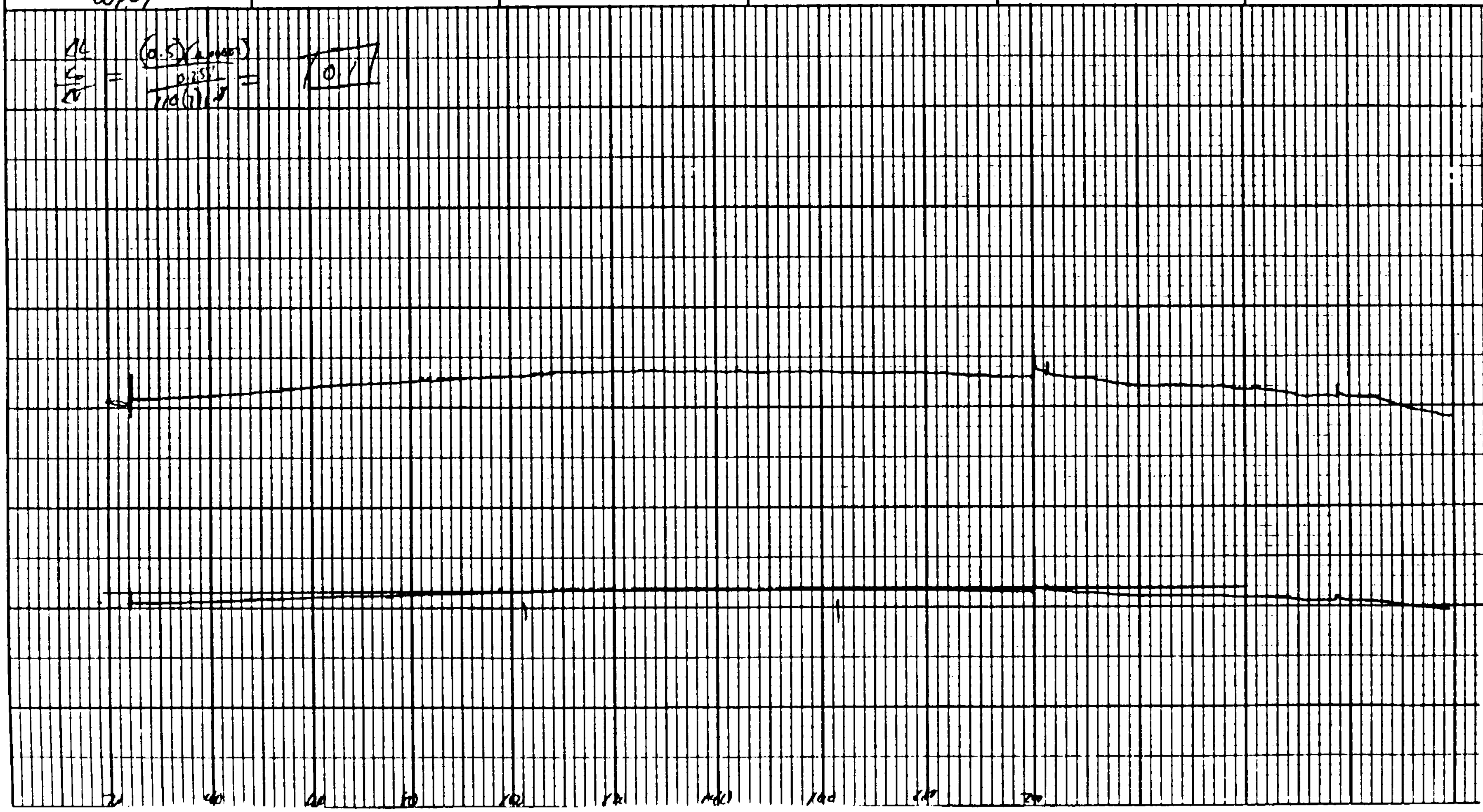
MEASURED VARIABLE

DUPONT Instruments

Chart 21F1

PART NO. 990088

RUN NO.___ DATE 6/29/84	**T-AXIS**	**DTA-DSC**	**TGA**	**TMA** (mm/mF)	
OPERATOR TH	SCALE, °C/in 50 20	SCALE, °C/in___	SCALE, mg/in___	SCALE, mils/in 0.1/02	
SAMPLE D09275-6-start-(1)	PROG. RATE, °C/min 10	(mcal/sec)/in___	SUPPRESSION, mg___	MODE Expansion	
	HEAT ✓ COOL___ ISO___	WEIGHT, mg___	WEIGHT, mg___	SAMPLE SIZE 0.257	
ATM Air @ STP	SHIFT, in 0	REFERENCE___	TIME CONST., sec___	LOAD, g 10	
FLOW RATE 3-5 SCFH WPLY			dY, (mg/min)/in___	dY,(10X),(mils/min)/in___	



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MEASURED VARIABLE

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PART NO. 990088

RUN NO. ____ DATE ____	T-AXIS	DTA-DSC	TGA	TMA (µin/in°F)	
OPERATOR ____	SCALE, °C/in 50 20	SCALE, °C/in ____	SCALE, mg/in ____	SCALE, mils/in ____	
SAMPLE: D05375-6-XX-(2)	PROG. RATE, °C/min ____	(mcal/sec)/in ____	SUPPRESSION, mg ____	MODE Expansion	
ATM ____ @ STP	HEAT ____ COOL ____ ISO ____	WEIGHT, mg ____	WEIGHT, mg ____	SAMPLE SIZE 0.257	
FLOW RATE ____	SHIFT, in 0	REFERENCE ____	TIME CONST., sec ____	LOAD, g ____	
			dY, (mg/min)/in ____	dY, (10X), (mils/min)/in ____	

MEASURED VARIABLE

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Chart 21F2

Chart 21F3

PART NO. 990088

RUN NO. ___ DATE 10/11/88
OPERATOR Ad
SAMPLE
D69375- 6-Inner-(3)
ATM Air @ STP
FLOW RATE 1-SIZE#
Xpul

T-AXIS
SCALE, °C/in 50 20
PROG RATE, °C/min 10
HEAT ✓ COOL ___ ISO ___
SHIFT, in 0

DTA-DSC
SCALE, °C/in ___
(mcal/sec)/in ___
WEIGHT, mg ___
REFERENCE ___

TGA
SCALE, mg/in ___
SUPPRESSION, mg ___
WEIGHT, mg ___
TIME CONST., sec ___
dY/dT (mg/min)/in ___

TMA (Air/Air)
SCALE, mils/in 0.1/0.2
MODE Expansion
SAMPLE SIZE 0.62
LOAD, g 10
dY/dT (10X) (mils/min)/in ___

MEASURED VARIABLE

DUPONT instruments

Chart 21F4

PART NO. 990088

RUN NO ___ DATE 4/11/96
OPERATOR TK
SAMPLE
D012775-6-Smear (4)
ATM Air @ STP
FLOW RATE 3.5 SCFH
XPLY

T-AXIS
SCALE, °C/in 20 20
PROG RATE, °C/min 10
HEAT ✓ COOL ___ ISO ___
SHIFT, in 0

DTA-DSC
SCALE, °C/in ___
(mcal/sec)/in ___
WEIGHT, mg ___
REFERENCE ___

TGA
SCALE, mg/in ___
SUPPRESSION, mg ___
WEIGHT, mg ___
TIME CONST., sec ___
dY/dT (mg/min)/in ___

TMA (μm/in)
SCALE, mils/in 0.1/0.1
MODE Expansion
SAMPLE SIZE 6.17
LOAD, g 10
dY/dT (10X) (mils/min)/in ___

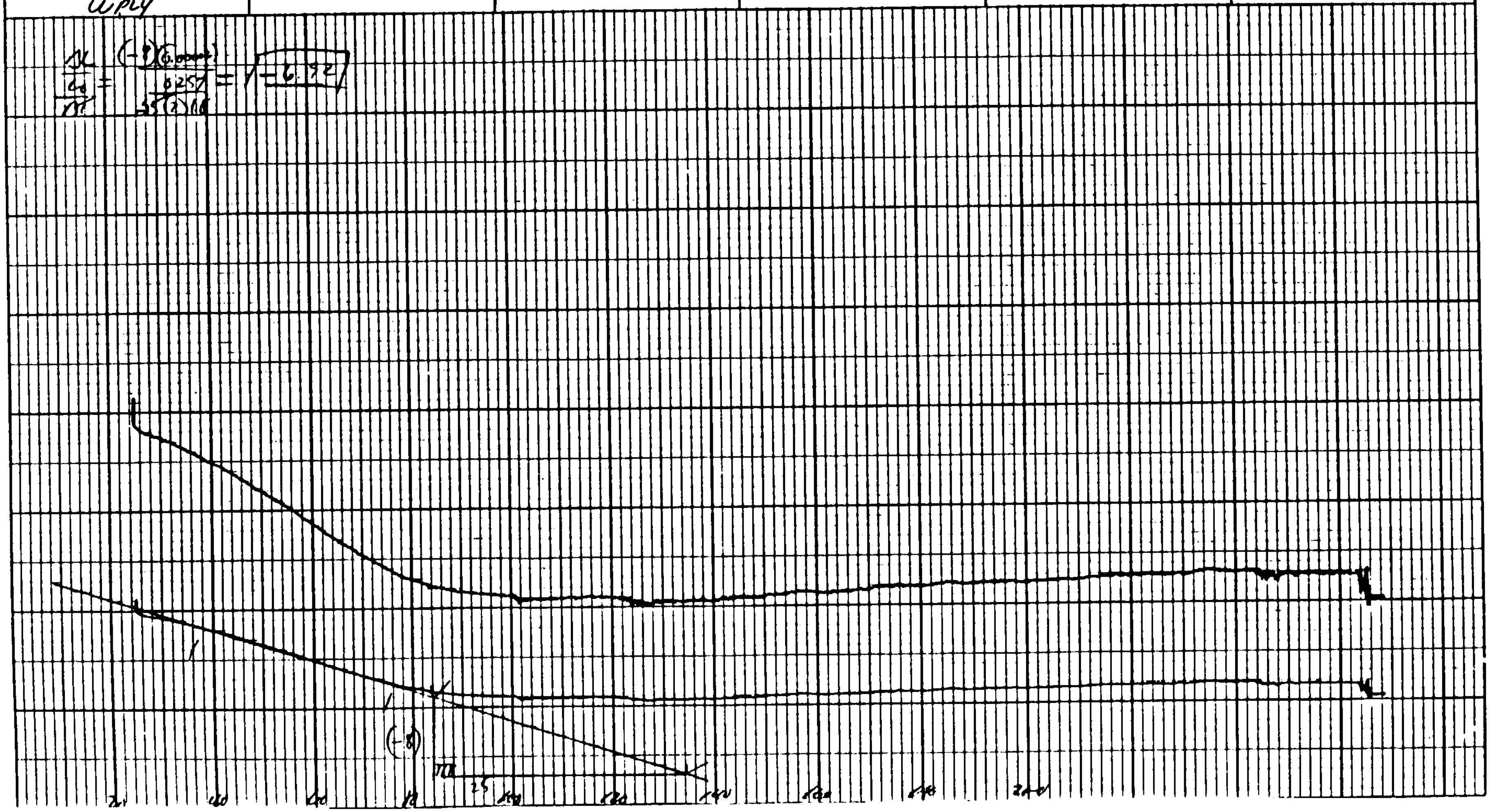
MEASURED VARIABLE

DUPONT Instruments

Chart 21G1

PART NO. 990088

RUN NO. ___ DATE 10/21/??	T-AXIS	DTA-DSC	TGA	TMA (?)	
OPERATOR TL	SCALE, °C/in 50 20	SCALE, °C/in ___	SCALE, mg/in ___	SCALE, mils/in 0.1/0.2	
SAMPLE D09235-7-START-(1)	PROG. RATE, °C/min 10	(mcal/sec)/in ___	SUPPRESSION, mg ___	MODE Expansion	
ATM Air @ 50	HEAT ✓ COOL ___ ISO ___	WEIGHT, mg ___	WEIGHT, mg ___	SAMPLE SIZE .0257	
FLOW RATE 25x64	SHIFT, in 0	REFERENCE ___	TIME CONST., sec ___	LOAD, g 10	
WPLY			dY, (mg/min)/in ___	dY, (10X), (mils/min)/in ___	



MEASURED VARIABLE

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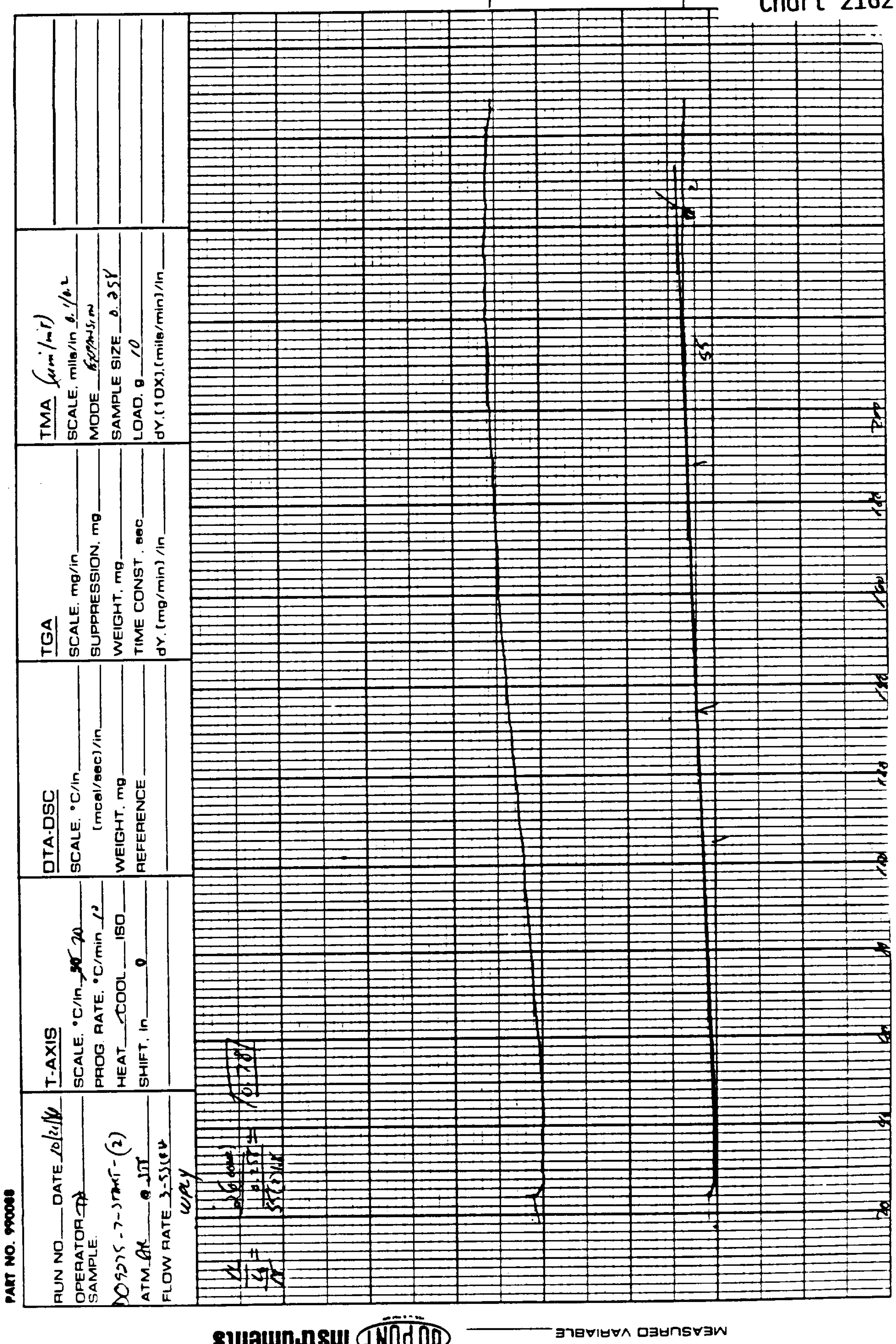
Chart 21G2



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PART NO. 990088

RUN NO. ___ DATE 11/21/86	T-AXIS	DTA-DSC	TGA	TMA (μm/min)	
OPERATOR DL	SCALE, °C/In 50 20	SCALE, °C/in	SCALE, mg/in	SCALE, mils/in 0.1/0.2	
SAMPLE:	PROG. RATE, °C/min 10	(mcal/sec)/in	SUPPRESSION, mg	MODE EXPANSION	
D05275-7-SPACER-(3)	HEAT ✓ COOL ___ ISO ___	WEIGHT, mg	WEIGHT, mg	SAMPLE SIZE 0.138	
ATM DN @ SC	SHIFT, in 0	REFERENCE	TIME CONST., sec	LOAD, g 10	
FLOW RATE 3-5 SCFH			dY, (mg/min) /in	dY, (10X), (mils/min) /in	

XPLY

$\frac{\Delta L}{L_0} = \frac{5\text{(Expand)}}{0.138} \quad \boxed{114.38}$

MEASURED VARIABLE

DUPONT Instruments

Cha