Contra Costa, 5/94

BID 109 AP-42 75

NOx
CO
NMOC - DE
CE Data for Some toxics
(A)

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

NORMANDEAU ASSOCIATES

EMISSIONS TESTING OF A LANDFILL GAS FLARE at CONTRA COSTA LANDFILL Antioch, California

March 22, 1994
and
April 22, 1994

Reference: Normandeau Associates, Inc. (NAI) Project No. 14207.01

Prepared by:

Richard Parker
Normandeau Associates, Inc.
2030 Wright Avenue
Richmond, CA 94804
(510) 235-9131

May 17, 1994

75

O.W.T. INC.

Organic Waste Technologies
Western Region

Fax Transmittal

To : RAY
Fax :
Date :

Company :
Phone No. :
Time :

From : R. MASUKAWA
Subject :

Total No. of Pages :
Project No. :

Comments :

RAY: INFORMATION YOU REQUESTED REGARDING SOURCE TEST UP DATE FROM EBA

WILL FOLLOW UP ON CALDERON LIMITS FOR BENZENE, VINYL CHLORIDE AND METHYLENE CHLORIDE

R. MAS.

San Ramon Office
2819 Crow Canyon Rd. Ste. 103
San Ramon, Ca. 94583
(510) 743-2983 Fax 743-9376

Danville Office
1037 Yorkshire Pl.
Danville, Ca. 94506
(510) 736-5229 Fax 736-5229

NORMANDEAU ASSOCIATES

TABLE I: CRITERIA POLLUTANT EMISSION RATES AND DESTRUCTION EFFICIENCY

CLIENT: EBA Wastechnologies
SOURCE ID: CONTRA COSTA LANDFILL FLARE
TEST DATE: March 22, 1994

PARAMETERS	RUN NUMBER R-1	R-2	R-3	AVERAGES
TIME OF DAY	1054–1124	1200–1230	1306–1336	
DURATION OF RUN, min	30	30	30	
FLARE STACK DATA				
FLARE TEMPERATURE, °F	1651	1652	1658	1654
EXHAUST FLOW RATE, DSCFM	7087	7199	7038	7108
OXYGEN, dry %	11.2	11.4	11.1	11.2
CARBON DIOXIDE, dry %	8.5	8.5	8.7	8.5
WATER, %	5.6	7.0	---	6.3
CARBON MONOXIDE				
Concentration, ppmv	23.2	3.9	0.5	9.2
Emission rate, lb/hr	0.71	0.12	0.02	0.28
Emission rate, lb/day	17.1	2.9	0.4	6.8
OXIDES OF NITROGEN (Emission rate as NO2)				
Concentration, ppmv	14.1	13.8	14.8	14.2
Emission rate, lb/hr	0.71	0.71	0.74	0.72
Emission rate, lb/day	17.1	17.0	17.8	17.3
NON–METHANE ORGANIC CARBON (Emission rate as C1)				
Total hydrocarbons, ppmv	1.3	< 1	< 1	< 1
Methane, ppmv	2.1	< 1	< 1	< 1
NMOC Concentration, ppmv	< 1	< 1	< 1	< 1
Emission rate, lb/hr	< 0.01	< 0.01	< 0.01	< 0.01
Emission rate, lb/day	< 0.3	< 0.3	< 0.3	< 0.3
FLARE INLET DUCT DATA				
INLET FLOW RATE, dscfm	1015	1050	1033	1033
INLET TEMPERATURE, °F	104	105	101	103
OXYGEN, dry %	5.3	5.4	5.2	5.3
NITROGEN, dry %	36	37	36	36
CARBON DIOXIDE, dry %	27	26	27	27
METHANE, dry %	32	32	32	32
WATER VAPOR, %	3.6	3.1	---	3.4
NON–METHANE HYDROCARBONS				
Concentration, ppmv	1770	1830	1920	1840
Mass emission rate, lb/hr	3.34	3.57	3.69	3.53
DESTRUCTION EFFICIENCY, %	> 99.7	> 99.7	> 99.7	> 99.7

MID PROPANE

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Normandeau Associates
Scott Brown
2030 Wright Ave
Richmond, CA 94804

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 839431
Project # 28725.002

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1, Section Number 3.0.4

Cylinder Number BAL-3284 **Certification Date** 12/07/93 **Exp. Date** 12/07/96
Cylinder Pressure 1900psig

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Propane	99.53ppm = 298.59 ppm C1	±1 % NIST Traceable
Balance Gas: Nitrogen		

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
SRM 1668b	Oct 94	CLM-7196	95.5ppm Propane

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Hewlett/Packard HP5710a 170340793	12/07/93	GC FID

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Propane

First Triad Analysis

Date: 12/07/93 Response Units: mv
Z1= 0.046 R1= 57.773 T1= 60.585
R2= 58.143 Z2= 0.258 T2= 60.306
Z3= 0.000 T3= 60.206 R3= 57.619
Avg. Conc. of Cust Cyl. 99.53ppm

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Second Triad Analysis

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Calibration Curve, Linear

Concentration=

Concentration=

Concentration=

SPECIAL NOTES: IF THIS PRODUCT IS USED FOR ACID RAIN COMPLIANCE, THE ACID RAIN EXPIRATION DATE NOTED ABOVE APPLIES PER 40 CFT PART 72 APPENDIX H. OTHERWISE THE GENERAL EXPIRATION DATE APPLIES.

ANALYST

NORMANDEAU ASSOCIATES

(ZERO AIR)

Scott Specialty Gases, Inc.

Shipped From: 5121 BRANDIN COURT
FREMONT CA 94538
Phone: 510-659-0162 Fax: 510-659-9156

CERTIFICATE OF ANALYSIS

NORMANDEAU ASSOCIATES
2030 WRIGHT AVE
RICHMOND CA 94804

PROJECT #: 09-11265
PO#: 838054
ITEM #: 0901022 A
DATE: 7/24/92

CYLINDER #: 1A8025
FILL PRESSURE: 2015 PSIG

PURE MATERIAL: AIR CAS# 25635-88-5

GRADE: "HYDROCARBONFREE"

IMPURITY	MAXIMUM CONCENTRATIONS	ACTUAL CONCENTRATIONS
O2 CONTENT	=20 TO 21%	=20 TO 21%
CO	0.5 PPM	L/T 0.5 PPM
CO2	1 PPM	L/T 1 PPM
H2O	5 PPM	L/T 5 PPM
THC(CH4)	0.1 PPM	L/T 0.1 PPM

QC NO.: 9207-167

QC BATCH : 9207-167

CV

Scott Specialty Gases, Inc.
5121 BRANDIN COURT, FREMONT, CA 94538 (510) 659-0162 FAX: (510) 659-9156

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Normandeau Associates
2030 Wright Ave
Richmond, CA 94804-5120

Assay Laboratory
Scott Speciality Gases, Inc.
Fremont, CA 94538

Purchase Order 839298
Scott Project # 0916720

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1, Section Number 3.0.4

Cylinder Number ALM-013431
Cylinder Pressure 2000 psi
Certification Date 10-18-93
Previous Certification Dates NONE
Expiration Date 10-18-96

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
CARBON DIOXIDE	2.50 %	±1 % NIST Directly Traceable
CARBON MONOXIDE	451.1 ppm	±1 % NIST Directly Traceable
NITROGEN	Balance	

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
CRM # 2624	05-05-94	ALM-024691	2.889 % CO2/N2
CRM # 1680	01-18-96	ALM-031341	479.8 PPM CO/N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
HORIBA/AIA-23/8506580506	10-13-93	NDIR
HORIBA/AIA-23AS/850658016	09-22-93	NDIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

CARBON DIOXIDE

First Triad Analysis: 10-17-93 Response Units: %

Z1= 0.001	R2= 2.879	Z3= -0.001
R1= 2.878	Z2= -0.001	T3= 2.500
T1= 2.502	T2= 2.499	R3= 2.880

Mean Assay = 2.500 %

Second Triad Analysis:

Calibration Curve: Concentration=A+Bx+Cx^2+Dx^3+Cx^4
r= 0.9999990
Constants: A= -6.382604E-03
B= 5.424621 C= 4.220289
D= -0.429575 E= 0.8349025

CARBON MONOXIDE

First Triad Analysis: 10-10-93 Response Units: PPM

Z1= 0.6	R2= 480.4	Z3= 0.2
R1= 480.3	Z2=0.5	T3= 451.2
T1= 451.4	T2= 450.9	R3= 480.0

Mean Assay = 451.2 ppm

Second Triad Analysis: 10-17-93 Response Units: PPM

Z1= 0.2	R2= 481.3	Z3= 0.3
R1=481.2	Z2= 0.3	T3= 451.1
T1= 451.3	T2= 450.8	R3= 481.2

Mean Assay = 451.1 ppm

Calibration Curve: Concentration=A+Bx+Cx^2+Dx^3+Cx^4
r= 0.9999978
Constants: A= 0.1986406
B= 354.0686 C= 102.6648
D= 21.73912 E= 0

Special Notes

Analyst MIKE HUYNH

Scott Specialty Gases, Inc.

5121 BRANDIN COURT, FREMONT, CA 94538 (510) 659-0162 FAX (510) 659-9156

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer :
NORMANDEAU ASSOCIATES
2030 WRIGHT AVE
RICHMOND, CA 94804

Assay Laboratory
Scott Specialty Gases
5121 Brandin Ct.
Fremont, CA 94538

Purchase Order 839588
Scott Project # 0918796

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September 1993.

Cylinder Number ALM-025997 **Certification Date** 03-02-94 **Expiration Date** 03-02-97
Cylinder Pressure 2000 psig **Previous Certification Dates** NONE

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
CARBON DIOXIDE	10.43%	1% NIST traceable
CARBON MONOXIDE	849.6 ppm	1% NIST traceable
OXYGEN	8.54 %	1% NIST traceable
NITROGEN	Balance	

Do not use when cylinder pressure is below 150 psig.

*Analytical uncertainty is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
GRM# 1675	05-21-95	ALM-001816	14.02 % CO2/N2
NTRM# 1681	07-14-95	ALM-019972	978 PPM CO/N2
GRM # 2659	05-15-95	ALM-017709	20.63 % O2/N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
HORIBA/AIA-23/8506580506	01-18-94	NDIR
HORIBA/AIA-23AS/850658016	01-18-94	NDIR
HORIBA/MPA-21A/8506581307	02-18-94	PARAMAGNETISM

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

CO2

First Triad Analysis — 02-28-94, Response Units: %

Z1 = 0.00	R2 = 14.05	Z3 = 0.00
R1 = 14.05	Z2 = 0.00	T3 = 10.45
T1 = 10.46	T2 = 10.46	R3 = 14.06
Conc = 10.43	Conc = 10.43	Conc = 10.42

Mean Assay = 10.43 %

Second Triad Analysis: N/A

Calibration Curve:
Conc=A+Bx+Cx^2+Dx^3
A = -7.631615E-03
B = 7.561312
C = 10.39198
D = -5.239282
E = 6.864614 r=0.9999994

CO

First Triad Analysis — 02-21-94, Response Units: PPM

Z1 = 0.1	R2 = 979.7	Z3 = 0.3
R1 = 979.3	Z2 = 0.4	T3 = 850.8
T1 = 850.3	T2 = 850.8	R3 = 979.6
Conc = 849.1	Conc = 849.3	Conc = 849.4

Mean Assay = 849.2 ppm

Second Triad Analysis — 02-28-94, Response Units: PPM

Z1 = 0.1	R2 = 978.0	Z3 = -0.0
R1 = 978.0	Z2 = -0.1	T3 = 849.1
T1 = 849.7	T2 = 849.5	R3 = 977.5
Conc = 849.6	Conc = 849.5	Conc = 849.5

Mean Assay = 849.6 ppm

Calibration Curve:
Conc=A+Bx+Cx^2+Dx^3
A = -0.7164326 E = 651.6921
B = 649.9772
C = 739.525 r = 0.9999995
D = -554.5323

O2

First Triad Analysis — 02-28-94, Response Units: %

Z1 = -0.021	R2 = 20.653	-Z3 = -0.021
R1 = 20.650	Z2 = -0.013	T3 = 8.553
T1 = 8.535	T2 = 8.545	R3 = 20.683
Conc = 8.538	Conc = 8.542	Conc = 8.543

Mean Assay = 8.541 %

Second Triad Analysis: N/A

Calibration Curve:
Conc=A+Bx+Cx^2+Dx^3 +Ex^4
A = -5.290301E-02
B = 25.46361
C = -0.5447496
r=0.9999964

Special Notes

Analyst MIKE HUYNH

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA FORM

Gauge type Mag (var) Serial or ID number R911113R7195

Scale 0 - 50"

	Gauge-oil manometer Δp	Differential pressure gauge Δp	Pressure difference %
(+)	5	5.0	0
	10	10.0	
(-)	5	5.0	0
	10	10.0	

Calibration: _____ initial X _____ posttest

Date calibrated 4/7/93 by S.A. Brown

Lo NOx (20 ppm)

NORMANDEAU ASSOCIATES

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer:
NORMANDEAU ASSOCIATES
2030 WRIGHT AVE
RICHMOND, CA 94804

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 838726
Scott Project # 24421.001

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1, Section Number 3.0.4

Cylinder Number AAL 12642 **Certification Date** 3/22/93 **Expiration Date** 9/22/94
Cylinder Pressure 1800 psig **Previous Certification Dates**

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
NITRIC OXIDE	17.98 ppm	± 1 % NIST Traceable
Balance Gas: Nitrogen		
NOX	20.64 ppm	

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
SRM2629a	9/93	FF28519	19.3 ppm Nitrous Oxide

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
TECO / 10AR / 14853-150	1/20/93	Chemi-Luminescent

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components Nitrous Oxide

First Triad Analysis

Date: 3/15/93 Response Units: mv

Z1=	0.00	R1=	77.24	T1=	72.05
R2=	77.26	Z2=	0.00	T2=	71.98
Z3=	0.00	T3=	72.03	R3=	77.27

Avg. Conc. of Cust Cyl. 17.99 ppm

Second Triad Analysis

Date: 3/22/93 Response Units: mv

Z1=	0.00	R1=	77.20	T1=	72.00
R2=	77.22	Z2=	0.04	T2=	71.80
Z3=	0.00	T3=	71.83	R3=	77.32

Avg. Conc. of Cust Cyl. 17.96 ppm

Calibration Curve

Concentration= Ax^2+Bx+C
A =-0.0002963
B =1.02959
C =-0.2946

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Concentration=

Date: Response Units:
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units:
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Concentration=

Special Notes

Analyst: Joseph De La Torre

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA FORM

Gauge type Mag Serial or ID number R807073MV10

Scale M4 0-3.0"

	Gauge-oil manometer Δp	Differential pressure gauge Δp	Pressure difference %
+	.60	.60	0
	1.20	1.17	2.5%
	1.80	1.76	2.2%
	2.40	2.4	0%
−	.60	.59	1.67%
	1.20	1.18	1.67%
	1.80	1.79	0.56%
	2.40	2.4	0

Calibration: _____ initial _____ posttest

Date calibrated 1/12/94 by S.A Brown

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA FORM

Gauge type Mag Serial or ID number R0021JC24

Scale M4 0-5.0"

	Gauge-oil manometer Δp	Differential pressure gauge Δp	Pressure difference %
+	1.0	1.0	0
	2.0	1.95	2.5%
	3.0	2.9	3.3%
	4.0	3.9	2.5%
−	1.0	1.0	0
	2.0	2.0	0
	3.0	2.95	1.67%
	4.0	3.9	2.5%

Calibration: initial X posttest

Date calibrated 1/24/94 by S.A. Brown

DATE: 1/10/94 - 1/11/94

OPERATOR: S. Brown

METER Yd: 1.0122

Meter ΔH@: 1.6507

METER: M2 8008-58

BAROMETRIC PRESSURE (Pb): 30.24 (1.
30.35 (2.)

Q	ΔH	ΔP	Yds	Standard Meter Gas Volume (ft³) Initial	Final	(Vds) Net	Meter Gas Volume (ft³) Initial	Final	(Vd) Net	Standard Meter Temperature In	Out	Tds Avg	Meter Temperature In	Out	Td Avg	Time (Min.) θ	Yd	ΔH@
0.5916	1.0	1.3	1.0	0	10.0	10.0	407.774	418.095	10.321	X	53.30	53.3	70.67	60	65.34	17.567	.9923	1.62
0.5879	1.0	1.3	1.0	10.0	20.0	10.0	418.095	428.429	10.334	X	53.6	53.6	75.33	60.33	67.83	17.667	.9982	1.63
0.5916	1.0	1.3	1.0	20.0	30.02	10.02	428.429	438.76	10.331	X	53.84	53.84	78	61	69.5	17.583	1.0003	1.616
0.8359	2.0	2.5	1.0	0	19.996	19.996	462.512	482.609	20.097	X	45.86	45.86	70.67	48.33	59.50	25.317	1.0230	1.618
0.8345	2.0	2.5	1.0	20.0	40.002	20.002	482.609	502.812	20.203	X	46.19	46.19	74.33	50.67	62.5	25.35	1.0232	1.64
0.8352	2.0	2.5	1.0	40.0	60.002	20.002	502.812	523.084	20.272	X	46.46	46.46	75.33	52.33	63.83	25.317	1.0218	1.63
1.0012	3.0	3.5	1.0	0	30.0	30.0	524.304	554.79	30.486	X	47.66	47.66	80.75	55.0	67.875	31.60	1.0245	1.697
0.9991	3.0	3.5	1.0	30.0	60.022	30.022	554.79	585.527	30.737	X	48.80	48.80	84.0	58.33	71.167	31.617	1.0209	1.693
0.9971	3.0	3.5	1.0	60.0	90.005	30.005	585.527	616.351	31.124	X	50.12	50.12	85.67	60.67	73.168	31.583	1.0088	1.689

Q - Flow Rate (cfm)
ΔH - Orifice Pressure Differential (in. H O)
ΔP - Inlet Pressure Differential Standard Meter (in. H O)
Yds - Standard Meter Correction Factor (Unitless)
Yd - Meter Correction Factor (Unitless)
ΔH@ - Orifice Pressure Differential that gives 0.75 cfm of air at 70°F and 29.92" Hg (in. H O)

$$Yd = (Yds)\underbrace{\left(\frac{Vds}{Vd}\right)}_{STD\ 1}\underbrace{\left(\frac{Td + 460}{Tds + 460}\right)}_{STD\ 2}\underbrace{\left(\frac{Pb + \Delta P/13.6}{Pb + \Delta H/13.}\right.}_{STD\ 3}$$

$$\Delta H@ = \underbrace{\frac{0.0317\ \Delta H}{Pb\ (Td + 460)}}_{STD\ 4}\left[\underbrace{\frac{(Tds + 460)\ \theta}{Vds \cdot Yds}}_{STD\ 5}\right]^2$$

$$Q = \underbrace{\frac{17.64 \cdot Vds \cdot Pb}{(Tds + 460)\ \theta}}_{STD\ 7\ \ STD\ 8}$$

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA FORM

Gauge type Mag Serial or ID number R30506AG25

Scale M4 0 - .50

	Gauge-oil manometer Δp	Differential pressure gauge Δp	Pressure difference %
	.10	.10	0
	.20	.198	1%
+	.30	.297	1%
	.40	.40	0%
	.10	.101	1%
	.20	.20	0%
−	.30	.301	.033%
	.40	.402	.5%

Calibration: _____ initial X posttest

Date calibrated 1/12/94 by J.A Brown

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

180 Blue Ravine Road
Suite B
Folsom, CA 95630
(916)985-1000
(916)985-1020 FAX

CHAIN OF CUSTODY RECORD

PROJECT # 14207.01 PO # COLLECTED BY (Signature) [signature]

REMARKS Note: Inlet samples contain 30-40% methane.
Heat bags to 120°F or more to evaporate H_2O prior to Run in GC

FIELD SAMPLE I.D.#	SAMPLING MEDIA (Tenax, Canister etc.)	DATE/TIME		ANALYSIS	VAC./PRESSURE	LAB I.D. #
INLET #1	Tedlar Bag	4/22/94	9:15	Calderon Attachment		
INLET #2	↓	↓	9:55	1		
INLET #3	↓	↓	10:30	Compounds		
				by GC/MS fullscan		
STACK #1	Tedlar Bag	4/22/94	9:10	↓		
STACK #2	↓	↓	9:55			
STACK #3	↓	↓	10:30	↓		

RELINQUISHED BY: DATE/TIME	RECEIVED BY: DATE/TIME	RELINQUISHED BY: DATE/TIME	RECEIVED BY: DATE/TIME
[signature] 4/22/94	[signature] 4/22/94 15:45		

Custody Seal Intact? Y N None

LAB USE ONLY

SHIPPER NAME	AIR BILL #	OPENED BY: DATE/TIME	TEMP (°C)	CONDITION

REMARKS

APPENDIX D

CALIBRATION DATA AND GAS CERTIFICATIONS

AIR TOXICS LTD.

SAMPLE NAME: Stack #3
ID#: 9404164-06A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5042311	Date of Collection:	4/22/94
Dil. Factor:	4.0	Date of Analysis:	4/23/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	0.80	Not Detected
Methylene Chloride	0.80	410 B
Chloroform	0.80	Not Detected
1,1,1-Trichloroethane	0.80	Not Detected
Carbon Tetrachloride	0.80	Not Detected
Benzene	0.80	1.6
1,2-Dichloroethane	0.80	Not Detected
Trichloroethene	0.80	Not Detected
Tetrachloroethene	0.80	Not Detected
Ethylene Dibromide	0.80	Not Detected

B = Compound present in laboratory blank, background subtraction not performed.

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
Octafluorotoluene	92	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	106	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank
ID#: 9404164-07A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5042304	Date of Collection:	NA
Dil. Factor:	1.0	Date of Analysis:	4/23/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	0.20	Not Detected
Methylene Chloride	0.20	0.38
Chloroform	0.20	Not Detected
1,1,1-Trichloroethane	0.20	Not Detected
Carbon Tetrachloride	0.20	Not Detected
Benzene	0.20	Not Detected
1,2-Dichloroethane	0.20	Not Detected
Trichloroethene	0.20	Not Detected
Tetrachloroethene	0.20	Not Detected
Ethylene Dibromide	0.20	Not Detected

Container Type: NA

Surrogates	% Recovery	Method Limits
Octafluorotoluene	108	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: Stack #1
ID#: 9404164-04A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5042309	Date of Collection:	4/22/94
Dil. Factor:	2.0	Date of Analysis:	4/23/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	0.40	Not Detected
Methylene Chloride	0.40	260 B
Chloroform	0.40	Not Detected
1,1,1-Trichloroethane	0.40	Not Detected
Carbon Tetrachloride	0.40	Not Detected
Benzene	0.40	8.0
1,2-Dichloroethane	0.40	Not Detected
Trichloroethene	0.40	Not Detected
Tetrachloroethene	0.40	Not Detected
Ethylene Dibromide	0.40	Not Detected

B = Compound present in laboratory blank, background subtraction not performed.

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
Octafluorotoluene	96	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	104	70-130

9404164 Normandeau

AIR TOXICS LTD.

SAMPLE NAME: Stack #2
ID#: 9404164-05A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5042310	Date of Collection:	4/22/94
Dil. Factor:	3.6	Date of Analysis:	4/23/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	0.72	Not Detected
Methylene Chloride	0.72	500 B
Chloroform	0.72	Not Detected
1,1,1-Trichloroethane	0.72	Not Detected
Carbon Tetrachloride	0.72	Not Detected
Benzene	0.72	2.7
1,2-Dichloroethane	0.72	Not Detected
Trichloroethene	0.72	Not Detected
Tetrachloroethene	0.72	Not Detected
Ethylene Dibromide	0.72	Not Detected

B = Compound present in laboratory blank, background subtraction not performed.

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
Octafluorotoluene	101	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	109	70-130

9404164 Normandeau

AIR TOXICS LTD.

SAMPLE NAME: Inlet #2

ID#: 9404164-02A

Tedlar Bag Method: California Calderon

Full Scan GC/MS

File Name:	5042307	Date of Collection:	4/22/94
Dil. Factor:	25	Date of Analysis:	4/23/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	5.0	2000
Methylene Chloride	5.0	830 B
Chloroform	5.0	Not Detected
1,1,1-Trichloroethane	5.0	65
Carbon Tetrachloride	5.0	Not Detected
Benzene	5.0	730
1,2-Dichloroethane	5.0	Not Detected
Trichloroethene	5.0	750
Tetrachloroethene	5.0	540
Ethylene Dibromide	5.0	Not Detected

B = Compound present in laboratory blank, background subtraction not performed.

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
Octafluorotoluene	100	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: Inlet #3
ID#: 9404164-03A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5042308	Date of Collection:	4/22/94
Dil. Factor:	25	Date of Analysis:	4/23/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	5.0	2100
Methylene Chloride	5.0	750 B
Chloroform	5.0	Not Detected
1,1,1-Trichloroethane	5.0	67
Carbon Tetrachloride	5.0	Not Detected
Benzene	5.0	790
1,2-Dichloroethane	5.0	Not Detected
Trichloroethene	5.0	800
Tetrachloroethene	5.0	560
Ethylene Dibromide	5.0	Not Detected

B = Compound present in laboratory blank, background subtraction not performed.

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
Octafluorotoluene	100	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	101	70-130

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 9404164

Work Order Summary

CLIENT: Mr. Rick Parker
Normandeau Associates, Inc.
2030 Wright Avenue
Richmond, CA 94804

BILL TO: Same

PHONE: 510-235-9131
FAX: 510-235-0438
DATE RECEIVED: 4/22/94
DATE COMPLETED: 5/4/94

INVOICE # 3535
P.O. # 839840
PROJECT # 14207.01
AMOUNT$: $1,350.00

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	PRICE
01A	Inlet #1	Calderon VOC	Tedlar Bag	$225.00
02A	Inlet #2	Calderon VOC	Tedlar Bag	$225.00
03A	Inlet #3	Calderon VOC	Tedlar Bag	$225.00
04A	Stack #1	Calderon VOC	Tedlar Bag	$225.00
05A	Stack #2	Calderon VOC	Tedlar Bag	$225.00
06A	Stack #3	Calderon VOC	Tedlar Bag	$225.00
07A	Lab Blank	Calderon VOC	NA	NC

LAB NARRATIVE:
B = Compound present in laboratory blank, background subtraction not performed

CERTIFIED BY: Linda J. Freeman
Laboratory Director

DATE: 5/4/94

180 BLUE RAVINE ROAD, SUITE B • FOLSOM, CA 95630
(916) 985-1000 • FAX (916) 985-1020

9404164 Normandeau

AIR TOXICS LTD.

SAMPLE NAME: Inlet #1
ID#: 9404164-01A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5042306	Date of Collection:	4/22/94
Dil. Factor:	25	Date of Analysis:	4/23/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	5.0	2100
Methylene Chloride	5.0	1100 B
Chloroform	5.0	Not Detected
1,1,1-Trichloroethane	5.0	65
Carbon Tetrachloride	5.0	Not Detected
Benzene	5.0	730
1,2-Dichloroethane	5.0	Not Detected
Trichloroethene	5.0	740
Tetrachloroethene	5.0	500
Ethylene Dibromide	5.0	Not Detected

B = Compound present in laboratory blank, background subtraction not performed.

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
Octafluorotoluene	105	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	102	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank
ID#: 9403181B-03A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5032503	Date of Collection:	NA
Dil. Factor:	1.0	Date of Analysis:	3/25/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	0.20	Not Detected
Methylene Chloride	0.20	Not Detected
Chloroform	0.20	Not Detected
1,1,1-Trichloroethane	0.20	Not Detected
Carbon Tetrachloride	0.20	Not Detected
Benzene	0.20	Not Detected
1,2-Dichloroethane	0.20	Not Detected
Trichloroethene	0.20	Not Detected
Tetrachloroethene	0.20	Not Detected
Ethylene Dibromide	0.20	Not Detected

Container Type: NA

Surrogates	% Recovery	Method Limits
Octafluorotoluene	109	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	102	70-130

94031814

180 Blue Ravine Road
Suite B
Folsom, CA 95630
(916)985-1000
(916)985-1020 FAX

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT # 14207.00 PO # will call COLLECTED BY (Signature) [signature]

REMARKS Note: All INLET samples contain approx. 50% methane and are FLAMMABLE.

	FIELD SAMPLE I.D.#	SAMPLING MEDIA (Tenax, Canister etc.)	DATE/TIME	ANALYSIS	VAC./PRESSURE	LAB I.D. #
01A	INLET R-1	Tedlar Bag	3/22/94 2PM	ASTM # 3416		
02A	INLET R-2	↓	↓	for Oxygen, Carbon Dioxide,		
03A	INLET R-3			Nitrogen, Methane, CO,		
				Non-methane hydrocarbons		
	INLET R-4	Tedlar bag	3/22/94 2PM	Calderon Attachment 1		
	STACK R-5	↓	↓	Compounds		
				GC/MS full scan		

RELINQUISHED BY: DATE/TIME	RECEIVED BY: DATE/TIME	RELINQUISHED BY: DATE/TIME	RECEIVED BY: DATE/TIME
[signature] 3/21/94		Michelle S. Payne 3/22/94 4pm	Theresa Schmidt ATL 3/23/94 9:15

LAB USE ONLY

SHIPPER NAME	AIR BILL #	COUNTED BY: DATE/TIME	TEMP (°C)	CONDITION

REMARKS

AIR TOXICS LTD.

SAMPLE NAME: INLET R-4
ID#: 9403181B-01A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5032507	Date of Collection:	3/22/94
Dil. Factor:	17	Date of Analysis:	3/25/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	3.4	2000
Methylene Chloride	3.4	1100
Chloroform	3.4	5.7
1,1,1-Trichloroethane	3.4	81
Carbon Tetrachloride	3.4	Not Detected
Benzene	3.4	840
1,2-Dichloroethane	3.4	Not Detected
Trichloroethene	3.4	660
Tetrachloroethene	3.4	590
Ethylene Dibromide	3.4	Not Detected

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
Octafluorotoluene	99	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: STACK R-5
ID#: 9403181B-02A
Tedlar Bag Method: California Calderon
Full Scan GC/MS

File Name:	5032505	Date of Collection:	3/22/94
Dil. Factor:	5.7	Date of Analysis:	3/25/94

Compound	Det. Limit (ppbv)	Amount (ppbv)
Vinyl Chloride	1.1	Not Detected
Methylene Chloride	1.1	850
Chloroform	1.1	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected
Carbon Tetrachloride	1.1	Not Detected
Benzene	1.1	2.4
1,2-Dichloroethane	1.1	Not Detected
Trichloroethene	1.1	Not Detected
Tetrachloroethene	1.1	Not Detected
Ethylene Dibromide	1.1	Not Detected

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
Octafluorotoluene	102	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	105	70-130

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

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Suite B
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(916)985-1020 FAX

94031814

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT # 14207.00 PO # will call COLLECTED BY (Signature) [signature]

REMARKS Note: All INLET samples contain approx. 50% methane and are FLAMMABLE.

FIELD SAMPLE I.D.#	SAMPLING MEDIA (Tenax, Canister etc.)	DATE/TIME	ANALYSIS	VAC./PRESSURE	LAB I.D. #
INLET R-1	Tedlar Bag	3/22/94 2PM	ASTM # 3416	[redacted]	
INLET R-2	↓	↓	for Oxygen, Carbon Dioxide,		
INLET R-3			Nitrogen, Methane, CO,		
			Non-methane hydrocarbons		
INLET R-4	Tedlar bag	3/22/94 2pm	Calderon Attachment I		
STACK R-5	↓	↓	Compounds		
			GC/MS full scan		

RELINQUISHED BY: DATE/TIME	RECEIVED BY: DATE/TIME	RELINQUISHED BY: DATE/TIME	RECEIVED BY: DATE/TIME
[signature] 3/22/94		Michelle S. Payne 3/22/94 4pm	Theresa Schmidt AT 3/23/94 9:15

[redacted]

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1
To Theresa Schmidt | From M. Payne
Co. | Co.
Dept. | Phone #
Fax # 916 985-1020 | Fax #

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 9403181B

Work Order Summary

CLIENT: Ms. Michelle Pappe
Normandeau Associates, Inc.
2030 Wright Avenue
Richmond, CA 94804

BILL TO: Same

PHONE: 510-235-9131
FAX: 510-235-0438
DATE RECEIVED: 3/23/94
DATE COMPLETED: 4/5/94

INVOICE # 3326
P.O. # 839650
PROJECT # 14207.00
AMOUNT$: $450.00

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	PRICE
01A	INLET R-4	Calderon VOC	Tedlar Bag	$225.00
02A	STACK R-5	Calderon VOC	Tedlar Bag	$225.00
03A	Lab Blank	Calderon VOC	NA	NC

CERTIFIED BY: Isabella C. Crume
for Laboratory Director

DATE: 4-11-94

180 BLUE RAVINE ROAD, SUITE B • FOLSOM, CA 95630
(916) 985-1000 • FAX (916) 985-1020

AIR TOXICS LTD.

SAMPLE NAME: INLET R-3
ID#: 9403181A-03A

Atmospheric Gases by Modified ASTM D-3416
GC/TCD/FID

File Name: 3032309 **Date of Collection:** 3/22/94
Dil. Factor: 1.0 **Date of Analysis:** 3/23/94

Compound	Det. Limit (%)	Amount (%)
Oxygen	0.001	5.2
Nitrogen	0.001	36
Carbon Monoxide	0.001	Not Detected
Methane	0.001	32
Carbon Dioxide	0.001	27
Total Non-Methane Hydrocarbons*	0.010	0.064
	Total (%)	100

*Referenced to Propane

Container Type: Tedlar Bag

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank
ID#: 9403181A-04A

Atmospheric Gases by Modified ASTM D-3416
GC/TCD/FID

File Name:	3032302	Date of Collection:	NA
Dil. Factor:	1.0	Date of Analysis:	3/23/94

Compound	Det. Limit (%)	Amount (%)
Oxygen	0.001	Not Detected
Nitrogen	0.001	100
Carbon Monoxide	0.001	Not Detected
Methane	0.001	Not Detected
Carbon Dioxide	0.001	Not Detected
Total Non-Methane Hydrocarbons*	0.010	Not Detected
	Total (%)	100

*Referenced to Propane

Container Type: NA

AIR TOXICS LTD.

SAMPLE NAME: INLET R-1
ID#: 9403181A-01A

Atmospheric Gases by Modified ASTM D-3416
GC/TCD/FID

File Name: 3032307 **Date of Collection:** 3/22/94
Dil. Factor: 1.0 **Date of Analysis:** 3/23/94

Compound	Det. Limit (%)	Amount (%)
Oxygen	0.001	5.3
Nitrogen	0.001	36
Carbon Monoxide	0.001	Not Detected
Methane	0.001	32
Carbon Dioxide	0.001	27
Total Non-Methane Hydrocarbons*	0.010	0.059
	Total (%)	100

*Referenced to Propane

Container Type: Tedlar Bag

AIR TOXICS LTD.

SAMPLE NAME: INLET R-2
ID#: 9403181A-02A

Atmospheric Gases by Modified ASTM D-3416
GC/TCD/FID

File Name:	3032308	Date of Collection:	3/22/94
Dil. Factor:	1.0	Date of Analysis:	3/23/94

Compound	Det. Limit (%)	Amount (%)
Oxygen	0.001	5.4
Nitrogen	0.001	37
Carbon Monoxide	0.001	Not Detected
Methane	0.001	32
Carbon Dioxide	0.001	26
Total Non-Methane Hydrocarbons*	0.010	0.061
	Total (%)	100

*Referenced to Propane

Container Type: Tedlar Bag

APPENDIX C

LABORATORY DATA

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 9403181A

Work Order Summary

CLIENT: Ms. Michelle Pappe
Normandeau Associates, Inc.
2030 Wright Avenue
Richmond, CA 94804

BILL TO: Same

PHONE: 510-235-9131
FAX: 510-235-0438
DATE RECEIVED: 3/23/94
DATE COMPLETED: 4/5/93

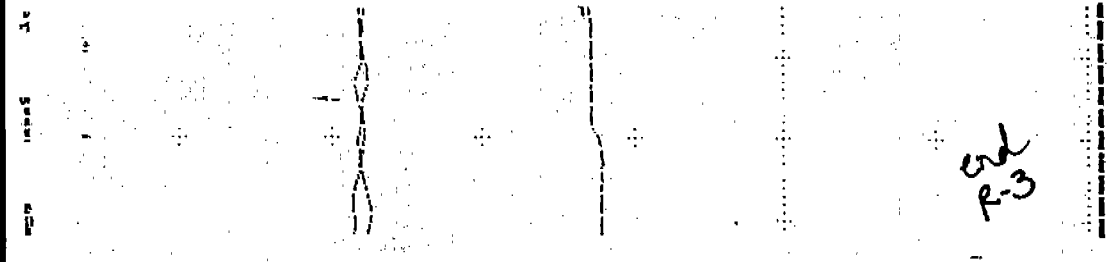
INVOICE # 3326
P.O. # 839650
PROJECT # 14207.00
AMOUNT$: $375.00

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	PRICE
01A	INLET R-1	ASTM D-3416	Tedlar Bag	$125.00
02A	INLET R-2	ASTM D-3416	Tedlar Bag	$125.00
03A	INLET R-3	ASTM D-3416	Tedlar Bag	$125.00
04A	Lab Blank	ASTM D-3416	NA	NC

CERTIFIED BY: Linda L. Freeman
Laboratory Director

DATE: 4/5/94

180 BLUE RAVINE ROAD, SUITE B • FOLSOM, CA 95630
(916) 985-1000 • FAX (916) 985-1020



end R-3

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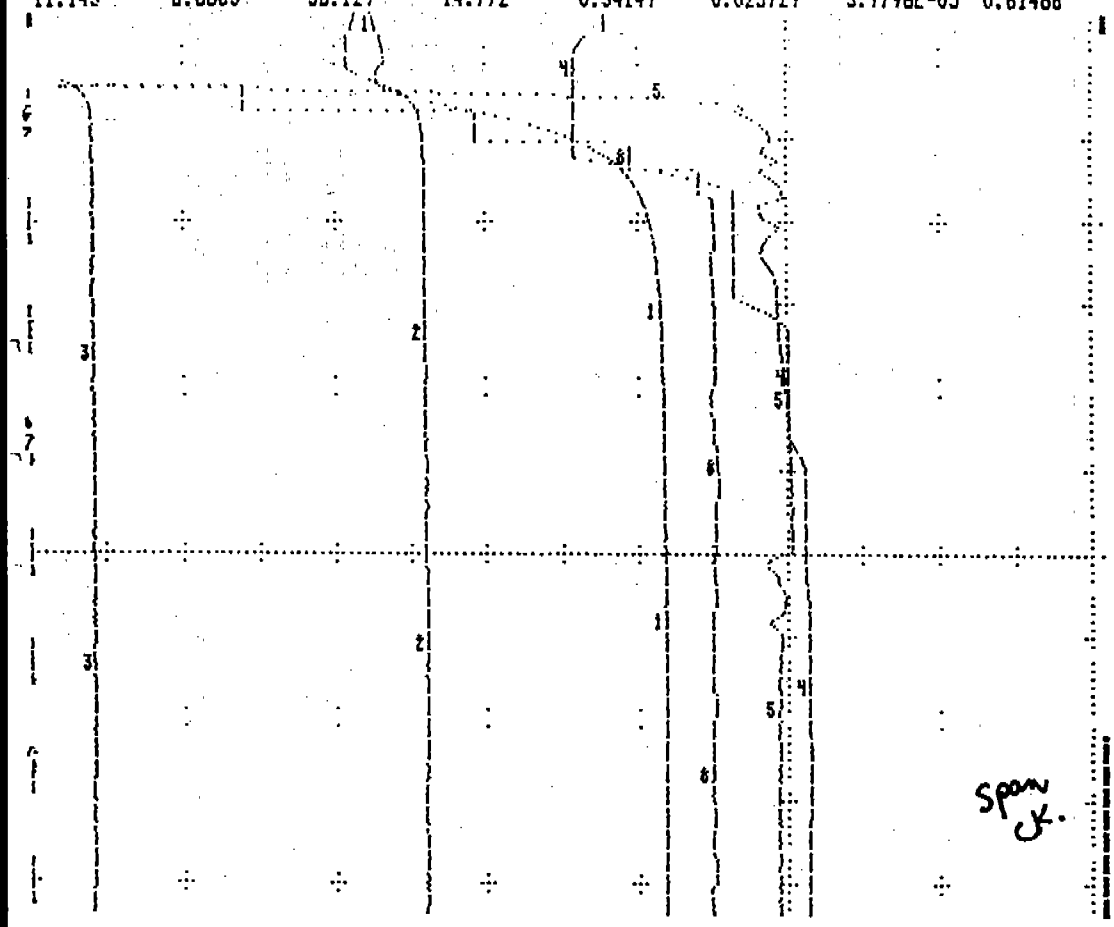
	-1.5150	.12890	0.0091	[illegible]
13:36:26	10.890	0.0700	54.200	[illegible]
	-1.6240	0.0304	0.0055	[illegible]
13:36:56	11.290	0.6250	60.600	[illegible]

MARY TIME : 13:37:09 DATE : 3/22/94

1	2	3	4	5	6	7	8
11.143	8.6883	56.129	14.772	-0.34149	-0.025729	-3.9796E-05	0.61488



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	-1.5210	.17500	0.0022	.27170
13:37:26	11.650	0.3390	60.410	[illegible]
	-2.1570	0.0757	0.0010	.10100
13:37:56	17.850	10.350	055.00	[illegible]
	294.10	0.0025	0.0009	[illegible]
13:38:26	20.410	10.400	057.20	[illegible]
	294.00	.16210	0.0036	[illegible]
13:38:56	20.760	10.410	060.00	[illegible]
	296.60	0.0302	0.0063	[illegible]
13:39:26	20.850	10.410	040.30	[illegible]
	299.70	0.0793	0.0037	[illegible]
13:39:56	20.890	10.420	050.40	[illegible]
	301.30	-.11270	-0.1010	[illegible]
13:40:26	20.900	10.410	053.70	[illegible]
	299.60	0.0066	0.0021	[illegible]
13:40:56	20.910	10.430	057.30	[illegible]
	297.80	-0.0401	0.0057	[illegible]
13:41:26	20.930	10.430	050.40	[illegible]
	296.70	.13040	0.0102	[illegible]
13:41:56	20.940	10.420	046.00	[illegible]
	296.50	0.0425	0.0154	[illegible]
13:42:26	20.940	10.420	053.60	[illegible]
	296.80	0.0300	0.0030	[illegible]

MARY TIME : 13:42:42 DATE : 3/22/94

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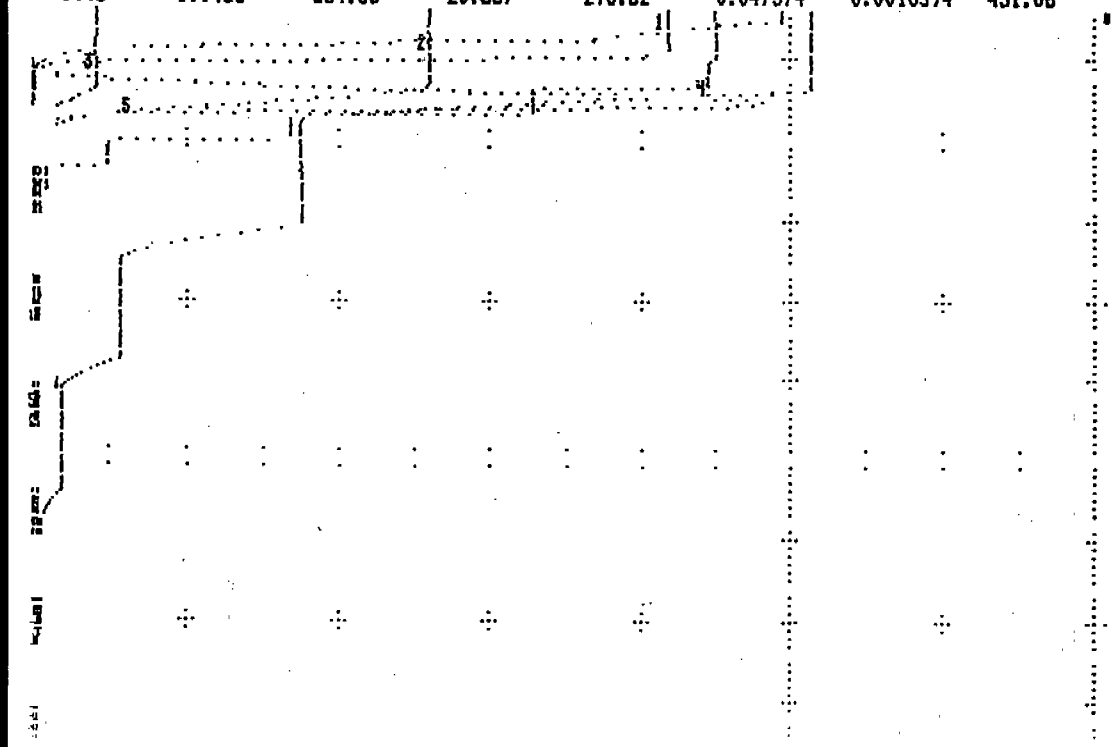

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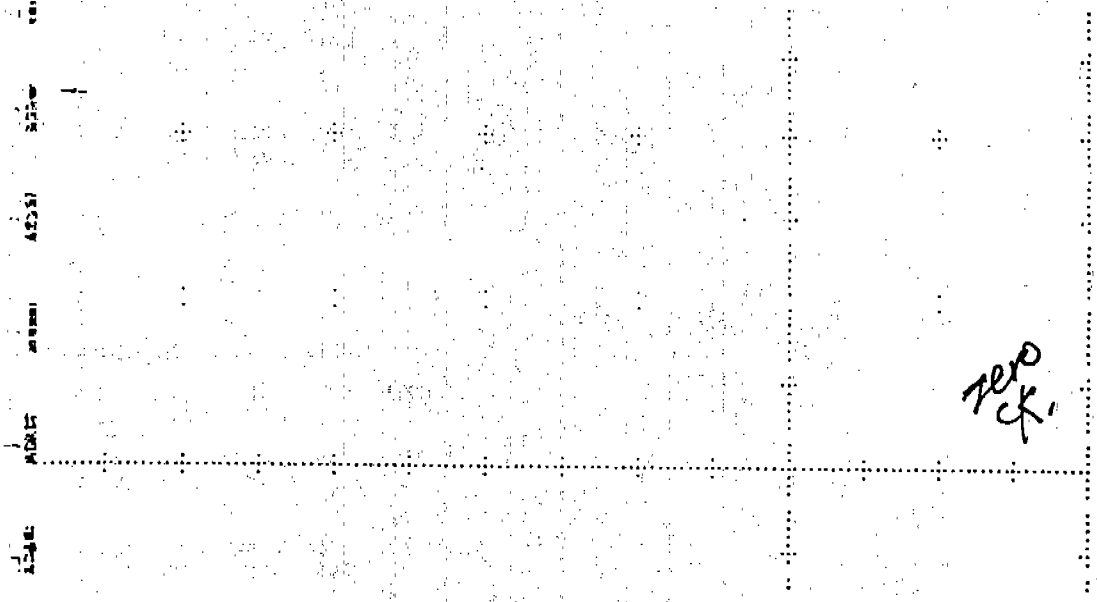
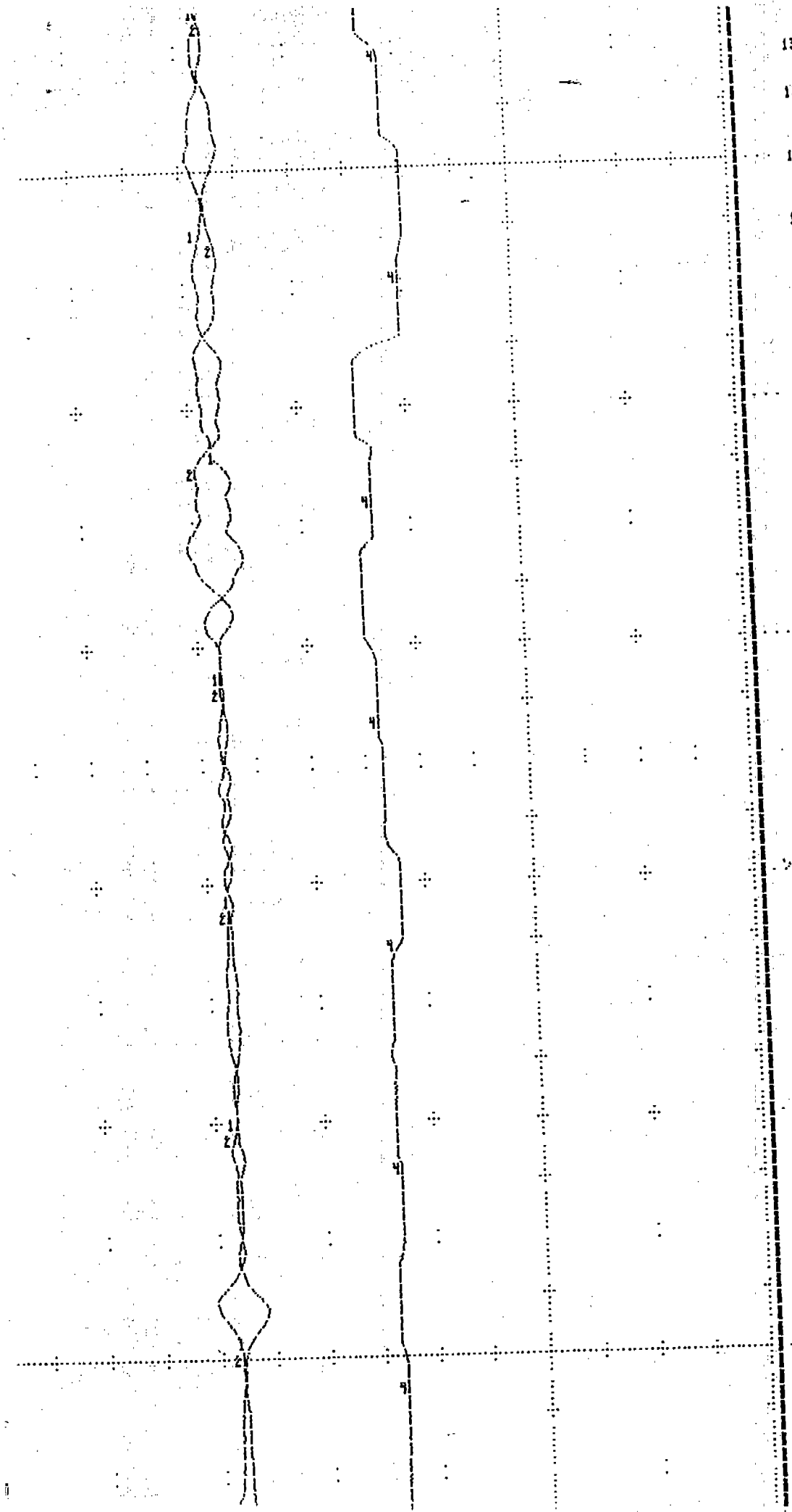
13:43:26	0.0465	.34000	20.960	7.0170
	2.7290	0.0677	0.0142	[illegible]
13:43:56	0.0391	.16150	25.520	7.0240
	.30570	.11020	0.0003	1.5600
13:44:26	0.0234	.16360	15.710	2.3260
	-.27690	0.0500	0.0040	.13630
13:44:56	0.0275	.15340	14.640	1.1700
	-.76360	.25310	0.0107	.10270
13:45:26	0.0340	.15260	35.410	.76050
	-.76350	0.0372	0.0120	.13010
13:45:56	0.0040	.14170	9.1200	.24600
	-.05000	.10100	0.0051	.13040
13:46:26	0.0095	.13040	27.500	.24660
	.73550	0.0732	0.0043	.15000
13:46:56	0.0056	.13110	20.320	6.0705
	[illegible]	[illegible]	[illegible]	[illegible]



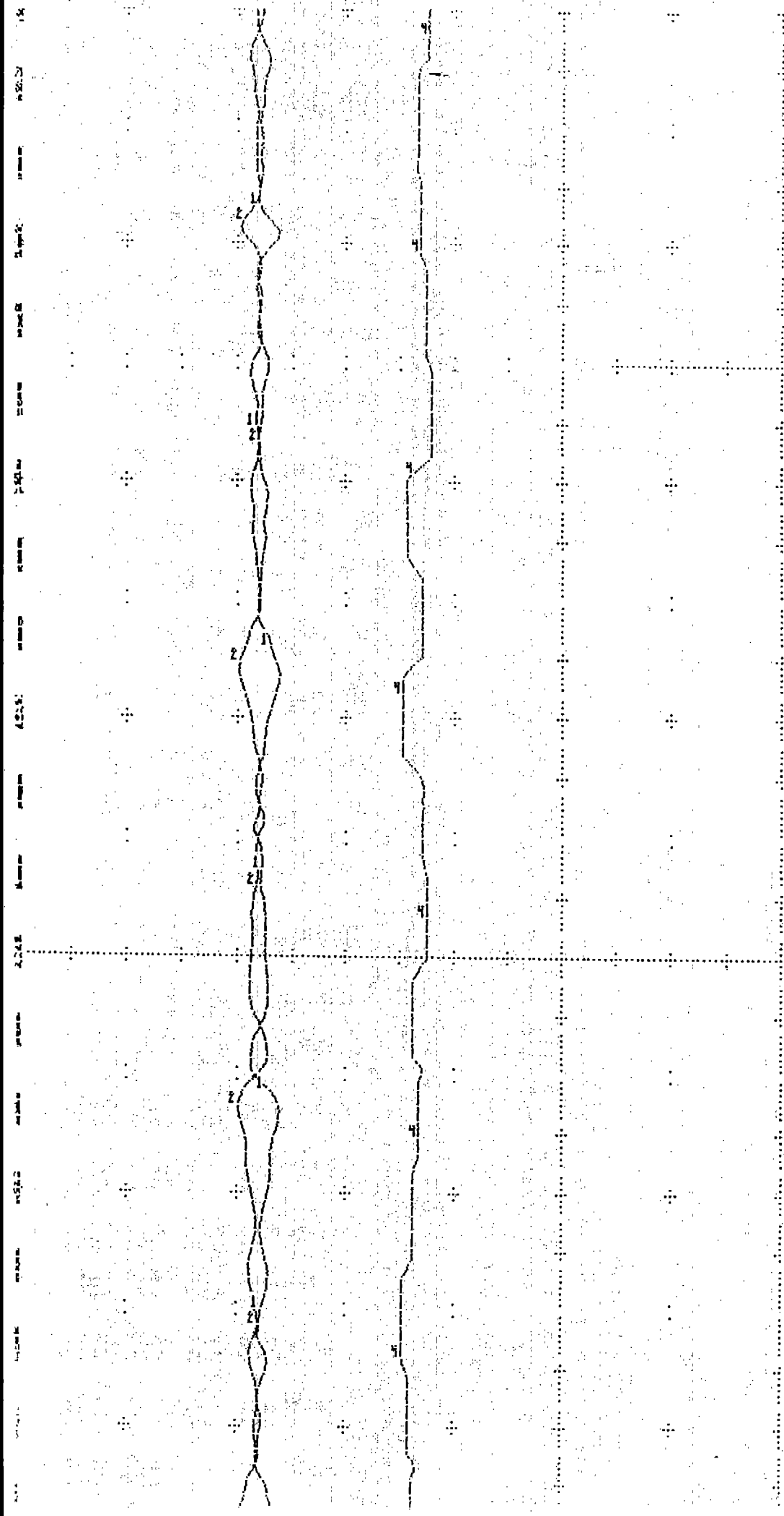
	[illegible]	[illegible]	[illegible]	[illegible]
13:47:56	0.0178	[illegible]	[illegible]	[illegible]
	-.96100	[illegible]	[illegible]	[illegible]
13:48:26	0.0179	[illegible]	[illegible]	[illegible]
	-1.0100	[illegible]	[illegible]	[illegible]
13:48:56	-0.0029	[illegible]	[illegible]	[illegible]
	-1.2340	[illegible]	[illegible]	[illegible]
13:49:26	0.0127	[illegible]	[illegible]	[illegible]
	-1.0680	[illegible]	[illegible]	[illegible]
13:49:56	0.0037	[illegible]	[illegible]	[illegible]
	-1.0270	-0.0496	0.0127	[illegible]
13:50:26	0.0225	[illegible]	[illegible]	[illegible]
	-.73270	0.0707	[illegible]	[illegible]
13:50:56	-0.0001	[illegible]	[illegible]	[illegible]
	-.81870	[illegible]	[illegible]	[illegible]

SUMMARY TIME : 13:51:14 DATE : 3/22/94

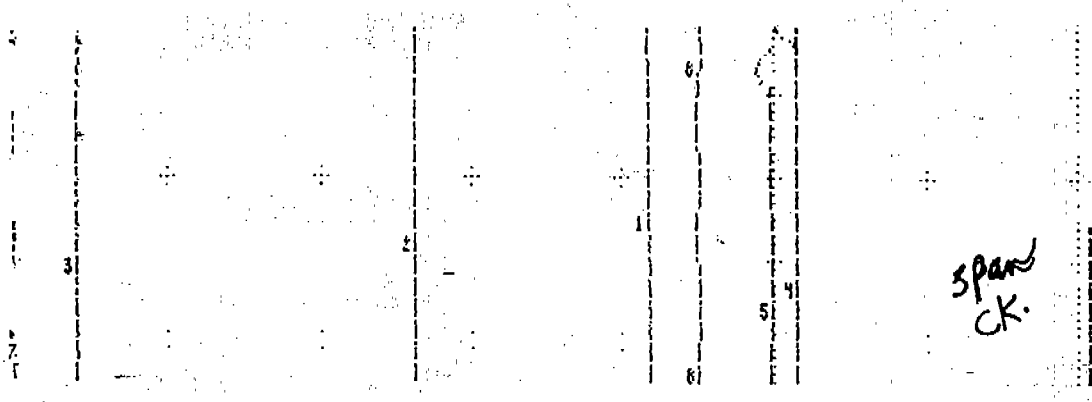
1	2	3	4	5	6	7	8
".0093258	0.1255	25.437	-0.028078	-0.87215	-0.038026	-0.003024	0.13054



13:09:26	10.760	8.9880	57.03[illegible]	[illegible]
	.66530	0.0506	[illegible]	[illegible]
13:09:56	10.560	9.2520	50.170	[illegible]
	.70110	[illegible]	[illegible]	[illegible]
13:10:26	10.530	9.1700	65.330	[illegible]
	.72700	0.0737	0.0050	[illegible]
13:10:56	10.860	8.9980	59.970	[illegible]
	.73160	-.37080	0.0030	[illegible]
13:11:26	10.640	9.1010	55.710	[illegible]
	0.0539	-0.0045	0.0063	[illegible]
13:11:56	11.340	0.3650	50.450	[illegible]
	.23100	.32220	0.0027	[illegible]
13:12:26	11.420	0.5330	53.200	[illegible]
	.58080	0.0322	0.0004	[illegible]
13:12:56	11.530	6.1970	56.920	[illegible]
	.38970	.10450	0.0047	[illegible]
13:13:26	11.570	6.1560	50.560	[illegible]
	.44960	0.0383	0.0100	[illegible]
13:13:56	11.610	0.6370	41.460	[illegible]
	.73660	.33700	0.0107	[illegible]
13:14:26	10.960	8.7950	45.150	[illegible]
	.94750	.45110	0.0020	[illegible]
13:14:56	11.070	0.0350	61.470	[illegible]
	.70180	-.42710	0.0213	[illegible]
13:15:26	10.960	0.0670	51.690	[illegible]
	.78010	.10540	0.0040	[illegible]
13:15:56	10.810	0.0230	59.910	[illegible]
	.43390	-.20030	0.0125	[illegible]
13:16:26	10.840	0.0050	60.170	[illegible]
	-0.0454	0.0134	0.0091	[illegible]
13:16:56	11.090	8.7210	46.700	[illegible]
	.12130	.19100	0.0014	[illegible]
13:17:26	11.170	6.6330	59.030	[illegible]
	-.17660	.11770	0.0074	[illegible]
13:17:56	11.110	0.7700	47.710	[illegible]
	.20100	.20620	0.0175	[illegible]
13:18:26	11.000	0.7670	54.050	[illegible]
	-.16190	.14000	0.0013	[illegible]
13:18:56	11.060	0.7200	66.220	[illegible]
	-.35190	.11000	0.0041	[illegible]
13:19:26	10.990	0.0320	53.660	[illegible]
	-.37600	0.0990	0.0004	[illegible]
13:19:56	11.000	7.9330	50.230	[illegible]
	-.45310	-0.0172	0.0127	[illegible]
13:20:26	11.050	8.7640	60.900	[illegible]
	-.70090	0.0556	0.0013	[illegible]
13:20:56	11.130	0.6020	52.270	[illegible]
	-.25190	.26430	0.0051	[illegible]
13:21:26	11.100	0.6360	56.140	[illegible]
	-.20320	.15930	0.0107	[illegible]



13:22:26	10.840	0.9190	53.020	15.020
	-.57210	-.10990	0.0025	.10710
13:22:56	11.420	0.5290	55.940	14.710
	-.75170	.03670	0.0072	.10370
13:23:26	11.071	0.7010	57.600	14.650
	-1.0330	0.0670	0.0030	.13900
13:23:56	11.050	0.7090	56.990	14.740
	-.60570	-0.0854	0.0054	.14110
13:24:26	11.690	8.5000	60.500	14.740
	-.56400	0.0200	0.0016	.10190
13:24:56	11.090	0.7090	56.990	14.940
	-.94150	0.0105	0.0100	.20630
13:25:26	10.700	9.1300	53.720	15.070
	-.96220	0.0102	0.0070	.23060
13:25:56	10.000	0.0790	55.630	15.150
	-1.0070	0.0723	0.0016	.19750
13:26:26	11.230	0.5390	50.900	14.270
	-.59690	.14150	0.0070	.16430
13:26:56	11.200	0.6100	50.200	14.270
	-.81350	0.0469	0.0076	0.0229
13:27:26	10.990	0.0440	73.350	14.040
	-.58260	-0.0805	0.0041	.23360
13:27:56	11.670	0.1510	50.630	14.740
	-.80850	0.0614	0.0100	.10940
13:28:26	11.400	0.5190	65.750	14.100
	-1.1450	0.0350	0.0069	.17040
13:28:56	10.900	8.9070	62.030	14.000
	-1.6930	.22760	0.0074	.34220
13:29:26	10.900	0.7620	61.000	14.050
	-1.4720	-0.1640	0.0006	1.2700
13:29:56	11.170	0.6240	64.360	15.000
	-1.3890	0.0311	0.0002	1.3740
13:30:26	11.290	0.5350	62.090	14.990
	-1.4630	0.0130	0.0009	.13140
13:30:56	11.090	0.6740	50.960	14.590
	-1.2370	0.0904	0.0037	1.3760
13:31:26	10.770	0.7520	63.000	14.010
	-1.2380	0.0100	0.0049	1.2690
13:31:56	11.710	0.2040	52.530	14.690
	-1.4740	0.0325	0.0000	2.2940
13:32:26	11.390	8.5400	56.160	14.500
	-1.3700	-0.0159	0.0019	1.2000
13:32:56	11.230	8.5630	55.000	14.500
	-1.1410	-.12610	-0.1014	0.0911
13:33:26	11.120	0.7130	56.230	14.110
	-1.2420	0.0092	0.0004	.12240
13:33:56	11.350	0.5020	51.190	14.240
	-1.5400	0.0495	0.0039	.16730
13:34:26	10.860	0.9000	70.610	14.370
	-1.6660	0.0099	0.0041	.14000
13:34:56	11.360	0.4490	63.020	14.500
	-1.3330	[illegible]	[illegible]	[illegible]

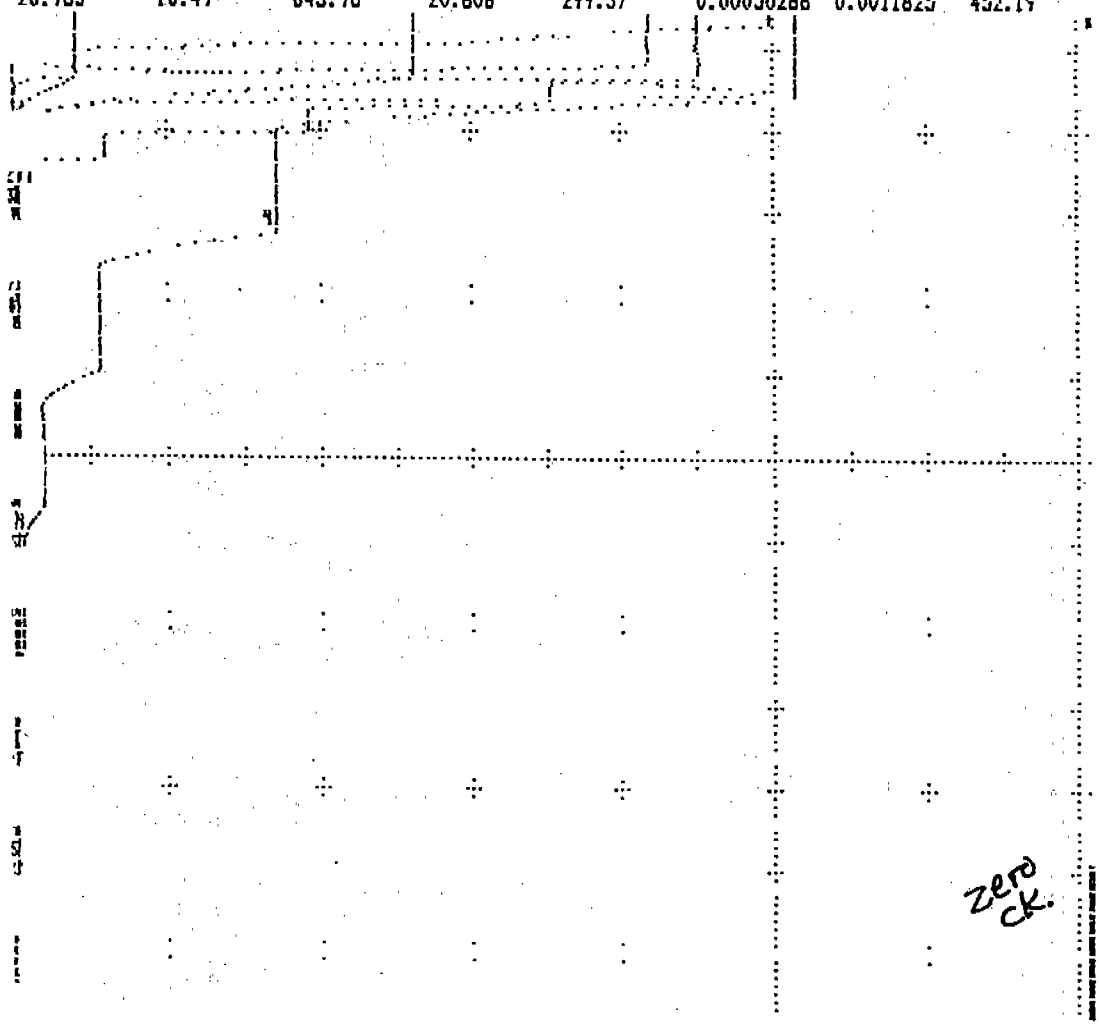


span ck.

12:45:26	20.000	10.400	[illegible]	20.610
	296.80	0.0017	0.0000	[illegible]
12:45:56	20.920	10.400	[illegible]	20.610
	298.80	0.0025	-0.0007	[illegible]
12:46:26	20.940	10.500	[illegible]	20.610
	299.00	-0.0050	0.0017	[illegible]
12:46:56	20.960	10.400	[illegible]	20.600
	299.30	-0.0121	0.0016	[illegible]
12:47:26	20.960	10.400	[illegible]	20.600
	299.20	-0.1119	0.0140	[illegible]

SUMMARY TIME : 12:47:46 DATE : 3/22/94

1	2	3	4	5	6	7	8
20.965	10.49	845.98	20.606	299.37	0.00050288	0.0011825	452.19

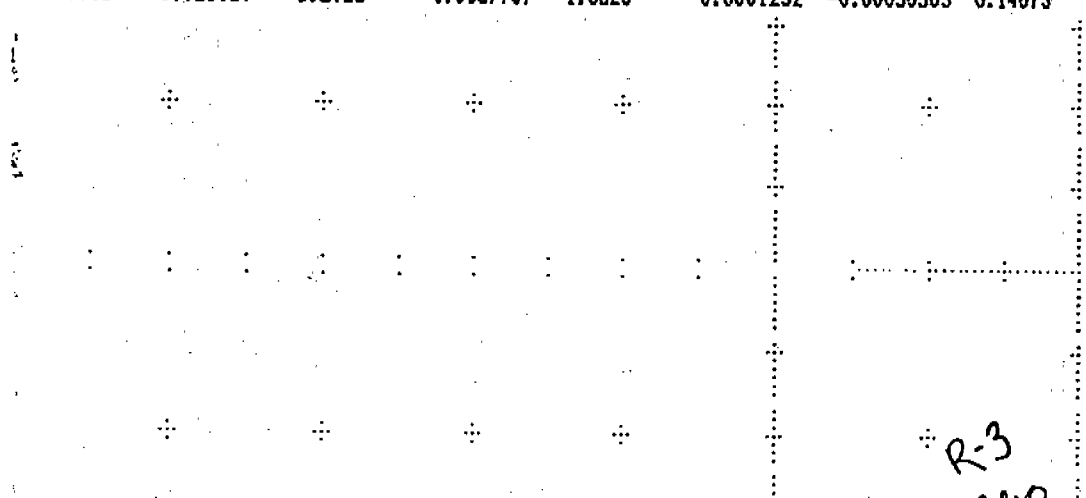


zero ck.

12:47:56	20.970	10.400	[illegible]	20.610
	35.000	0.0020	0.0027	[illegible]
12:48:26	0.0106	[illegible]	[illegible]	[illegible]
	4.7100	-0.0135	0.0155	[illegible]
12:48:56	-0.0025	.17370	10.240	[illegible]
	2.9440	0.0251	0.0167	[illegible]
12:49:26	-0.0019	.15500	11.320	[illegible]
	1.0900	0.0004	0.0036	[illegible]
12:49:56	-0.0145	.17160	5.0760	[illegible]
	1.6670	0.0345	0.0074	[illegible]
12:50:26	-0.0186	.12960	14.520	[illegible]
	1.0030	0.0014	0.0231	[illegible]
12:50:56	-0.0142	.11100	3.0100	[illegible]
	1.6300	0.0116	0.0034	[illegible]
12:51:26	-0.0152	0.0046	5.2010	[illegible]
	1.6720	0.0114	0.0103	[illegible]
12:51:56	-0.0287	0.0592	3.2660	[illegible]
	1.3400	0.0017	0.0124	[illegible]
12:52:26	-0.0175	0.0417	[illegible]	[illegible]
	1.5570	0.0026	0.0070	[illegible]
12:52:56	-0.0313	0.0334	6.0010	[illegible]
	1.3030	0.0430	0.0240	[illegible]
12:53:26	-0.0326	0.0279	11.590	[illegible]
	1.2900	0.0157	0.0035	[illegible]

SUMMARY TIME : 12:53:53 DATE : 3/22/94

1	2	3	4	5	6	7	8
026706	0.028989	3.2985	0.0037707	1.3523	-0.0001232	-0.00050503	0.14073



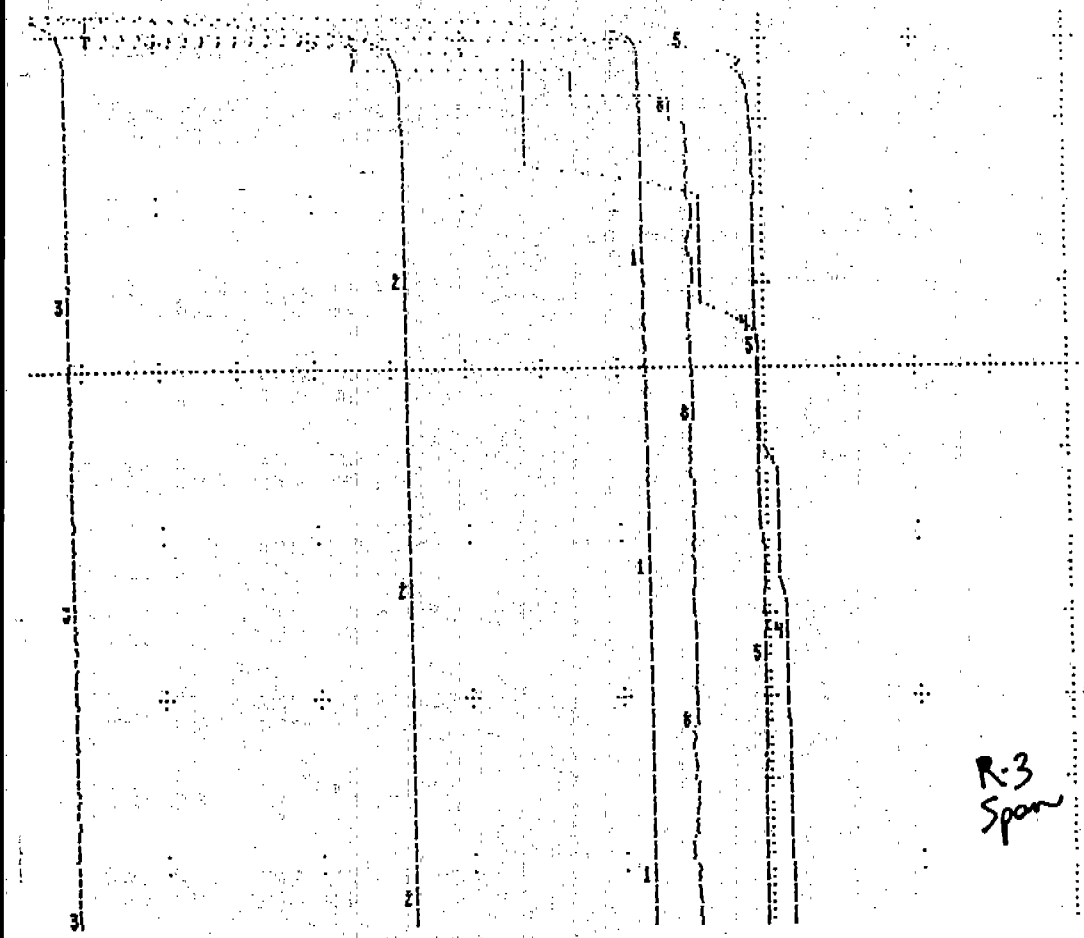
R-3

12:53:59	-0.0235	0.0237	5.7910	0.0006
	-1.2310	0.0012	0.0107	[illegible]
12:54:26	-0.0280	0.0260	4.2350	0.0170
	-1.6300	0.0112	0.0160	0.0615
12:54:56	-0.0407	0.0202	3.5500	0.0201
	-.22030	0.0107	0.0173	[illegible]
12:55:26	-0.0357	0.0361	1.7200	0.0240
	-0.0603	0.0275	0.0136	0.0500
12:55:56	-0.0293	0.0452	7.2090	0.0251
	-0.0907	0.0325	0.0127	0.0607
12:56:26	-0.0223	0.0536	7.0090	0.0265
	-.25430	0.0248	0.0091	0.0023

12:57:26	-0.0276	0.0740	13.630	0.0273			
	.12410	0.0103	0.0191	.20790			

MMARY TIME : 12:57:56 DATE : 3/22/94

1	2	3	4	5	6	7	8
.029752	0.066139	7.5149	-0.027609	-0.090755	0.00029163	-0.0026357	0.12475

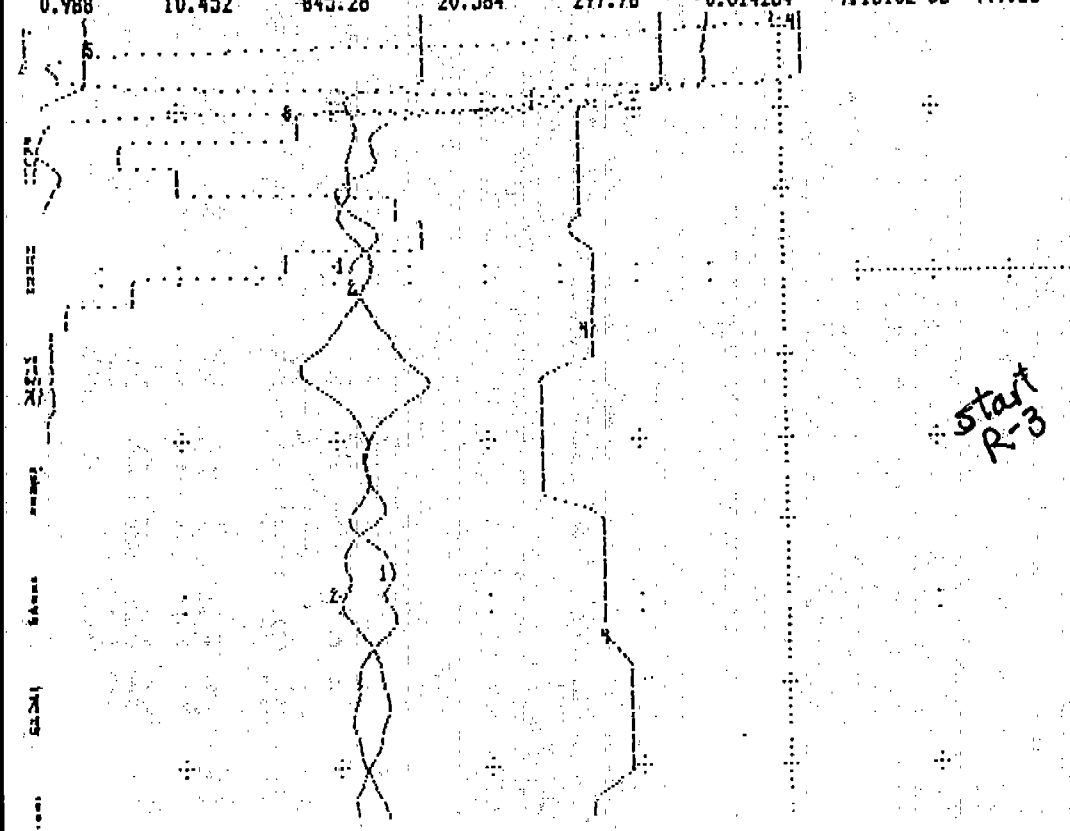


12:57:56	-0.0368	0.0790	9.1420	0.0200
	.27680	-0.0093	0.0005	.36550
12:58:26	20.600	9.0020	703.10	6.9110
	233.50	0.0016	0.0022	56.970
12:58:56	20.910	10.420	037.90	13.600
	296.00	0.0210	0.0052	430.70
12:59:26	20.940	10.420	036.40	10.330
	296.70	0.0020	0.0031	442.70
12:59:56	20.960	10.450	037.00	10.320
	296.40	0.0039	0.0017	452.00
13:00:26	20.940	10.430	046.30	17.040
	297.30	0.0006	0.0077	450.70
13:00:56	20.960	10.440	051.60	20.010
	296.90	-0.0035	-0.1257	440.70
13:01:26	20.970	10.440	047.00	20.330
	297.80	0.0074	0.0039	450.70
13:01:56	20.970	10.440	040.40	20.500
	298.70	0.0020	0.0007	447.00
13:02:26	20.970	10.450	040.20	20.470
	298.40	0.0004	0.0055	450.00
13:02:56	20.990	10.450	041.70	20.550
	298.10	-0.0242	0.0107	440.70
13:03:26	20.900	10.450	030.10	20.550
	297.60	0.0329	0.0126	446.70

R-3 Span

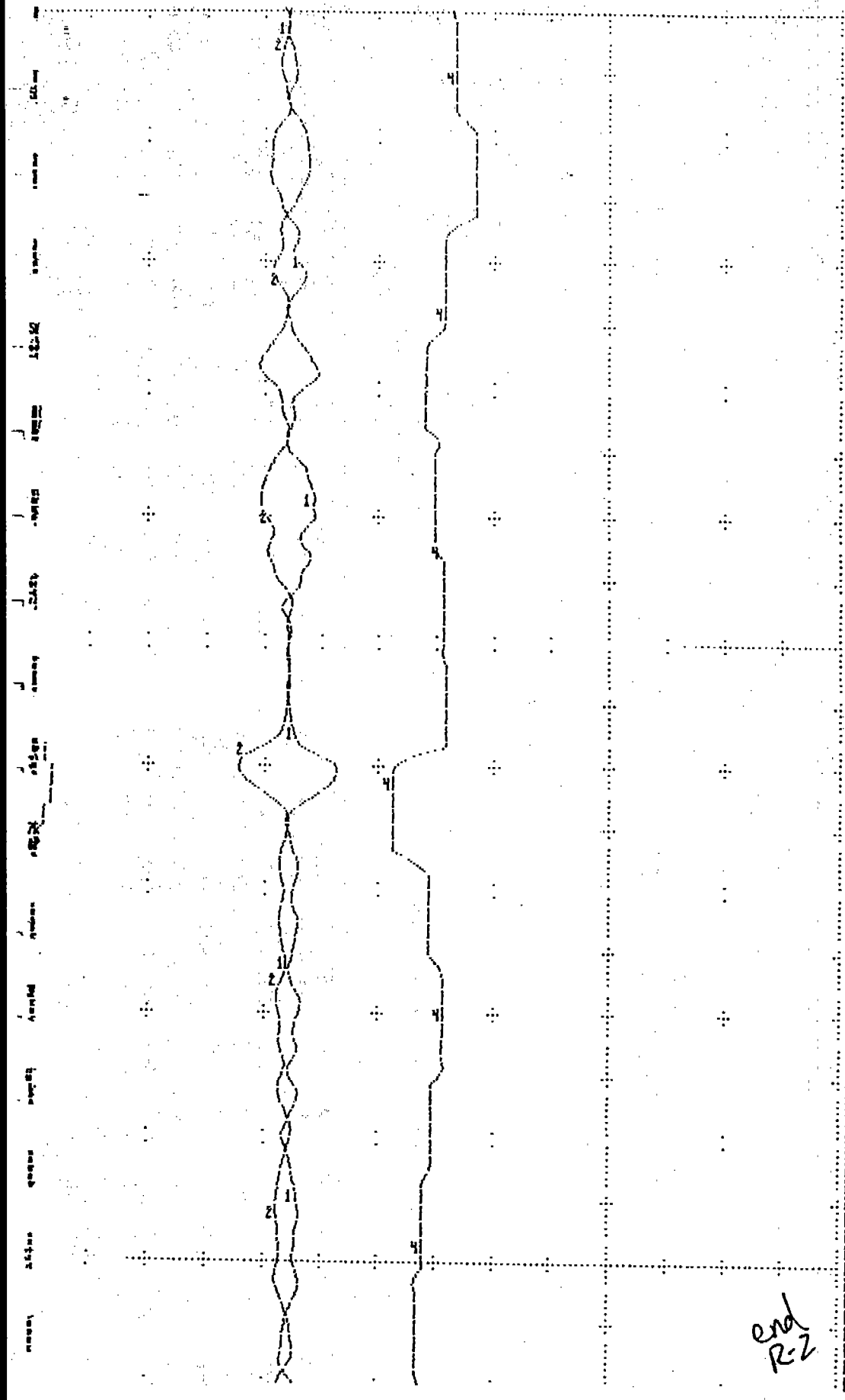
SUMMARY TIME : 13:03:54 DATE : 3/22/94

1	2	3	4	5	6	7	8
0.988	10.452	845.28	20.564	297.78	-0.014284	9.1610E-05	449.58



13:04:00	20.970	10.450	054.60	20.500
	261.20	0.0756	0.0056	450.70
13:04:26	14.390	0.4660	175.40	14.550
	125.00	.13070	0.0034	333.90
13:04:56	10.130	0.4490	377.40	14.530
	3.4700	.10960	0.0032	100.90
13:05:26	10.560	0.9010	72.930	14.050
	2.2200	0.0927	0.0016	169.90
13:05:56	12.220	7.3300	60.540	14.040
	3.0960	-0.1252	0.0036	14.920
13:06:26	11.100	0.0220	52.650	13.470
	2.1400	0.0240	0.0026	12.150
13:06:56	10.410	1.0440	44.510	15.050
	1.5900	.27060	0.0124	1.2160
13:07:26	11.630	1.1110	41.300	15.030
	1.6470	.10270	0.0021	1.2410
13:07:56	10.640	1.1710	45.190	15.710
	1.1160	0.0466	0.0106	1.2740
13:08:26	10.820	8.7590	39.470	15.701
	1.1710	0.0556	0.0063	1.2500

start R-3

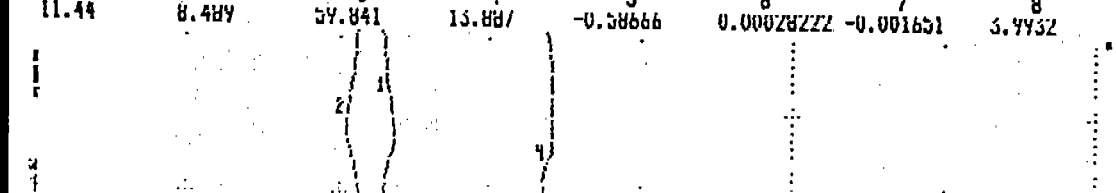


12:20:26	10.950	0.0590	55.200	14.500
	1.1390	0.0099	0.0097	2.2090
12:20:56	11.410	0.0110	59.520	14.690
	1.1350	0.0269	0.0436	1.1310
12:21:26	10.400	0.0470	67.100	15.300
	.40430	0.0100	0.0141	.99890
12:21:56	10.700	0.1050	51.130	15.300
	-.16890	-0.202	0.0022	1.3920
12:22:26	11.370	0.3000	55.190	14.310
	-.32830	-0.0012	0.0041	1.2950
12:22:56	11.130	0.6700	52.360	14.290
	-0.0656	0.0307	0.0045	6.2130
12:23:26	11.730	0.7390	51.030	13.650
	.41690	0.0045	0.0090	6.3000
12:23:56	11.110	0.5400	46.160	13.990
	.25160	0.0050	0.0147	7.2200
12:24:26	12.220	0.0390	43.000	13.970
	.37740	0.0163	0.0052	7.1600
12:24:56	11.550	0.7640	50.050	14.200
	.14420	0.0209	0.0351	2.2610
12:25:26	11.050	0.0240	45.400	14.200
	-.13290	-0.0045	-0.0112	2.4720
12:25:56	11.070	0.7950	53.460	14.360
	-0.0210	0.0193	0.0027	1.5200
12:26:26	13.120	7.1200	65.920	12.620
	1.8430	-0.0045	-0.0110	11.010
12:26:56	10.960	0.7990	53.760	12.520
	.13840	0.0157	0.0045	10.230
12:27:26	11.250	0.6720	30.620	13.760
	0.0915	-0.0132	0.0041	2.6650
12:27:56	11.260	0.6720	45.360	13.750
	.27220	0.0119	0.0000	2.1790
12:28:26	11.530	0.5200	47.750	14.250
	.23050	0.0030	0.0043	1.1010
12:28:56	11.100	0.6430	39.300	14.150
	-.13000	0.0167	0.0360	1.3890
12:29:26	10.810	0.9410	39.300	13.900
	-.36620	0.0137	0.0065	1.4130
12:29:56	11.470	0.4720	46.460	13.590
	-.22760	0.0067	0.0131	.97850
12:30:26	11.320	0.5300	32.430	13.500
	-.25030	0.0094	0.0007	1.2630
12:30:56	10.990	0.0210	55.960	13.370
	-.23340	0.0146	0.0314	1.2320

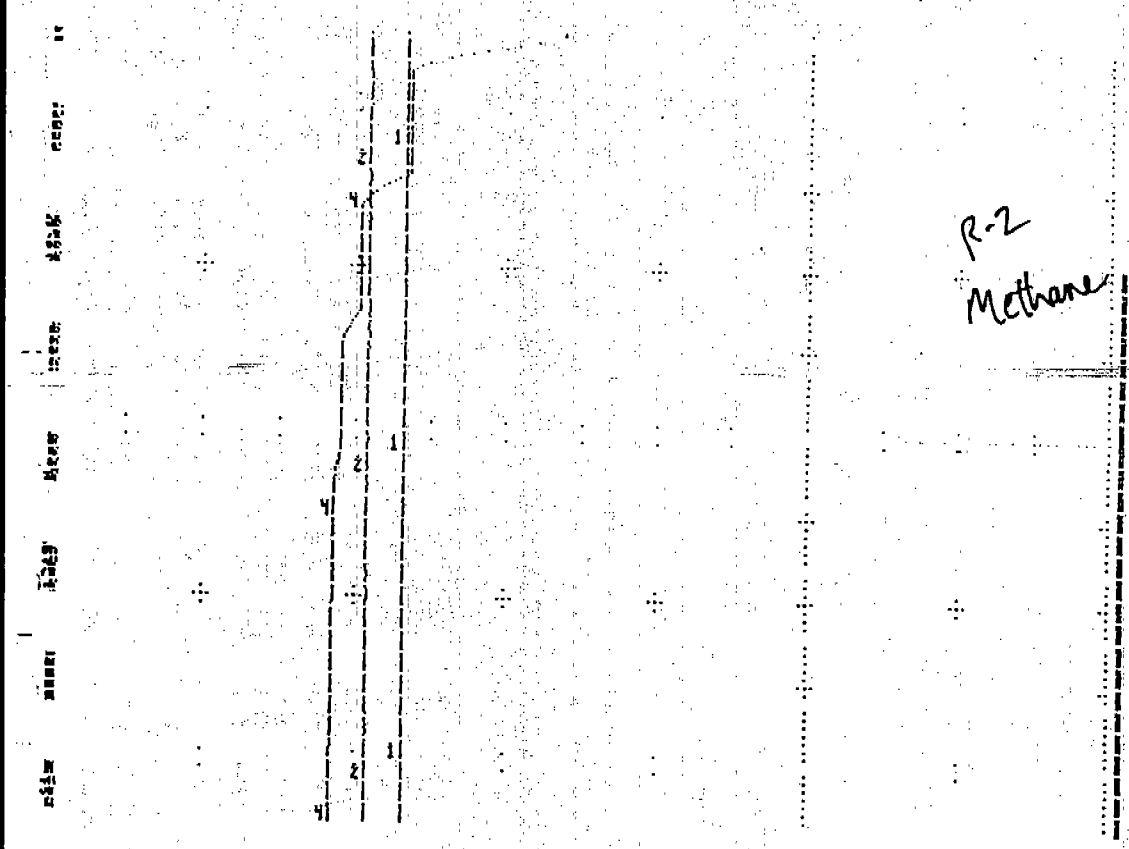
end R-2

SUMMARY TIME : 12:31:29 DATE : 3/22/94

1	2	3	4	5	6	7	8
11.44	8.489	59.841	13.887	-0.58666	0.00028222	-0.001651	3.9932



12:31:26	11.370	0.4940	50.750	13.520
	-.16190	-0.0154	0.0004	2.0000
12:31:56	11.790	0.2300	44.450	13.600
	-.46100	0.0046	0.0007	1.1670

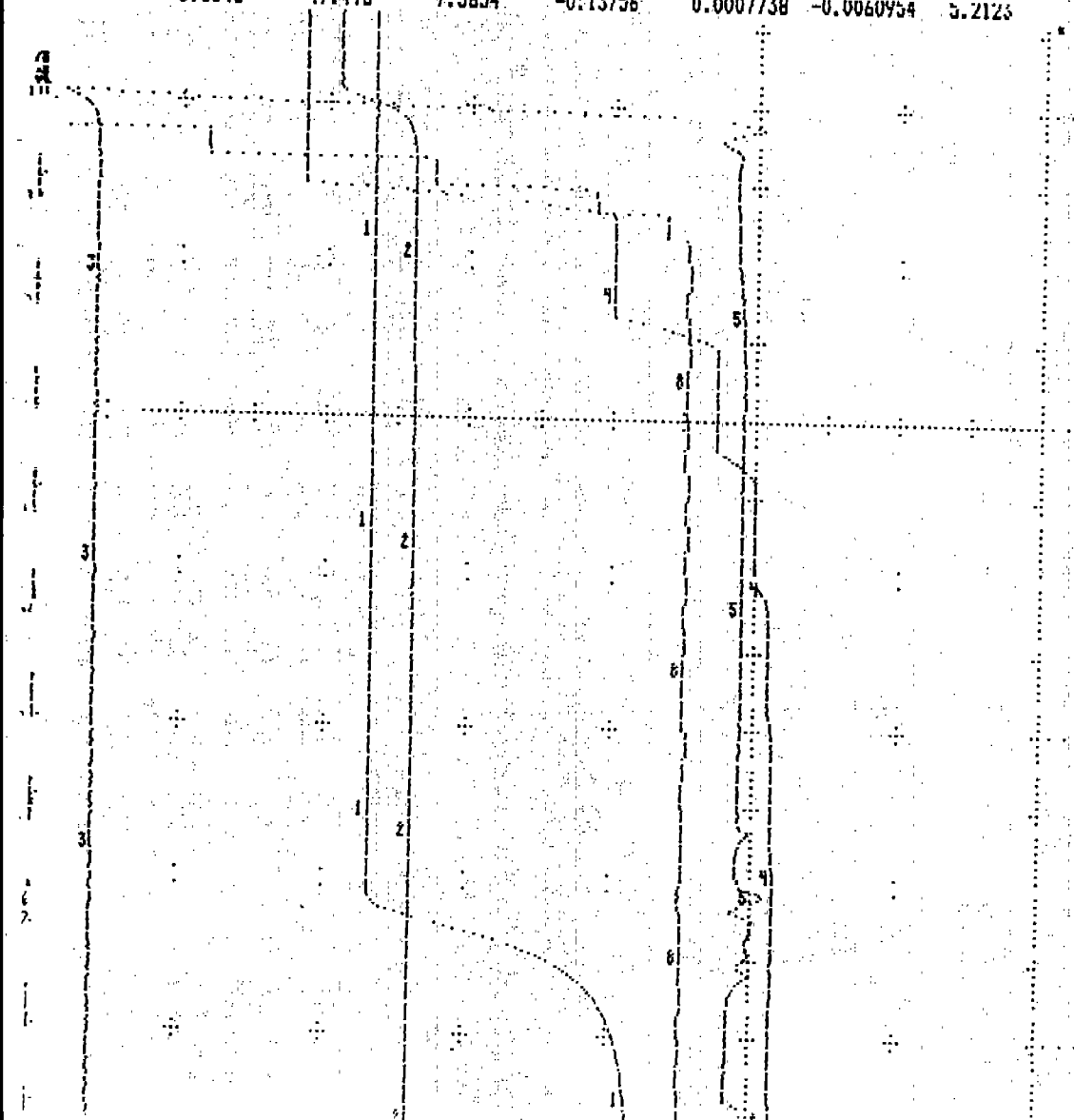


R-2
Methane

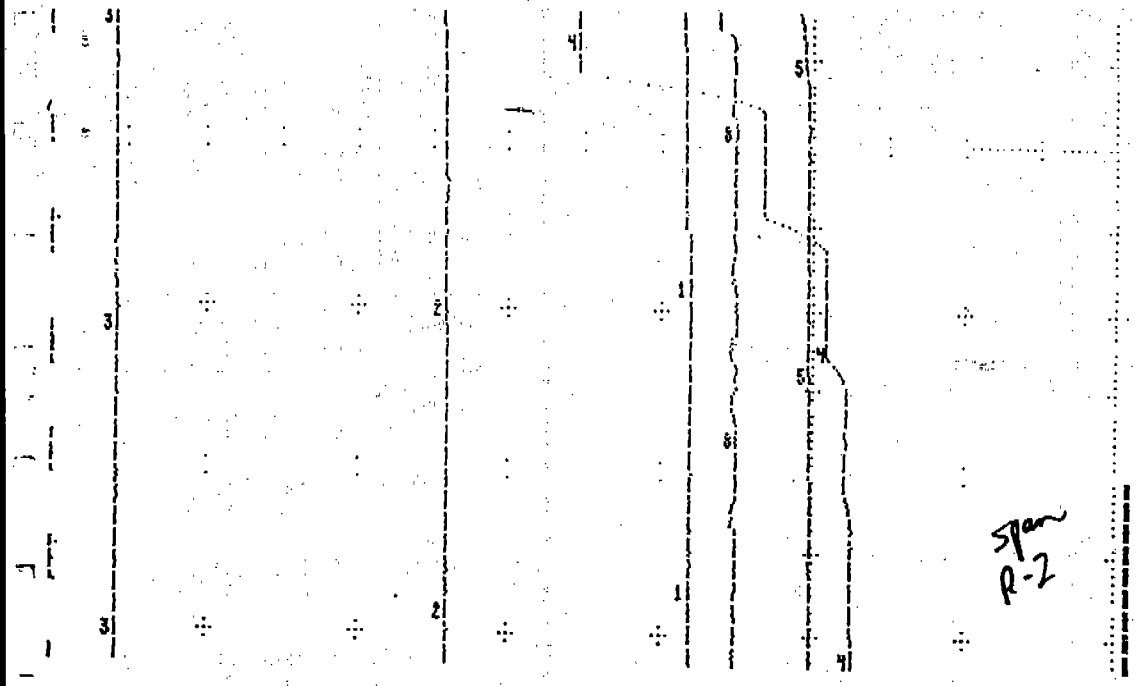
12:32:26	11.620	0.3320	55.020	7.3000
	-.33670	0.0117	0.0062	2.2000
12:32:56	11.620	0.3320	55.020	7.3000
	-.81590	0.0000	0.0001	2.2000
12:34:26	11.620	0.3320	55.070	7.3000
	-.31680	0.0104	0.0005	2.2000
12:34:56	11.630	0.3320	55.070	7.3000
	0.0240	-0.0044	0.0053	2.2000
12:35:26	11.630	0.3310	55.020	7.3000
	-.32640	-0.0059	-0.0022	2.2000
12:35:56	11.610	0.3310	55.000	7.3000
	-0.0044	0.0000	0.0114	2.2000
12:36:26	11.620	0.3320	55.170	7.3000
	-.16640	0.0107	0.0126	2.2000
12:36:56	11.630	0.3250	55.150	7.3000
	-.16540	-0.0113	-0.126	2.2000
12:37:26	11.630	0.3250	55.010	7.3010
	-0.0283	0.0027	0.0105	2.2000

SUMMARY TIME : 12:37:53 DATE : 3/22/94

1	2	3	4	5	6	7	8
11.629	0.3348	47.495	7.5654	-0.13756	0.0007738	-0.0060954	5.2123



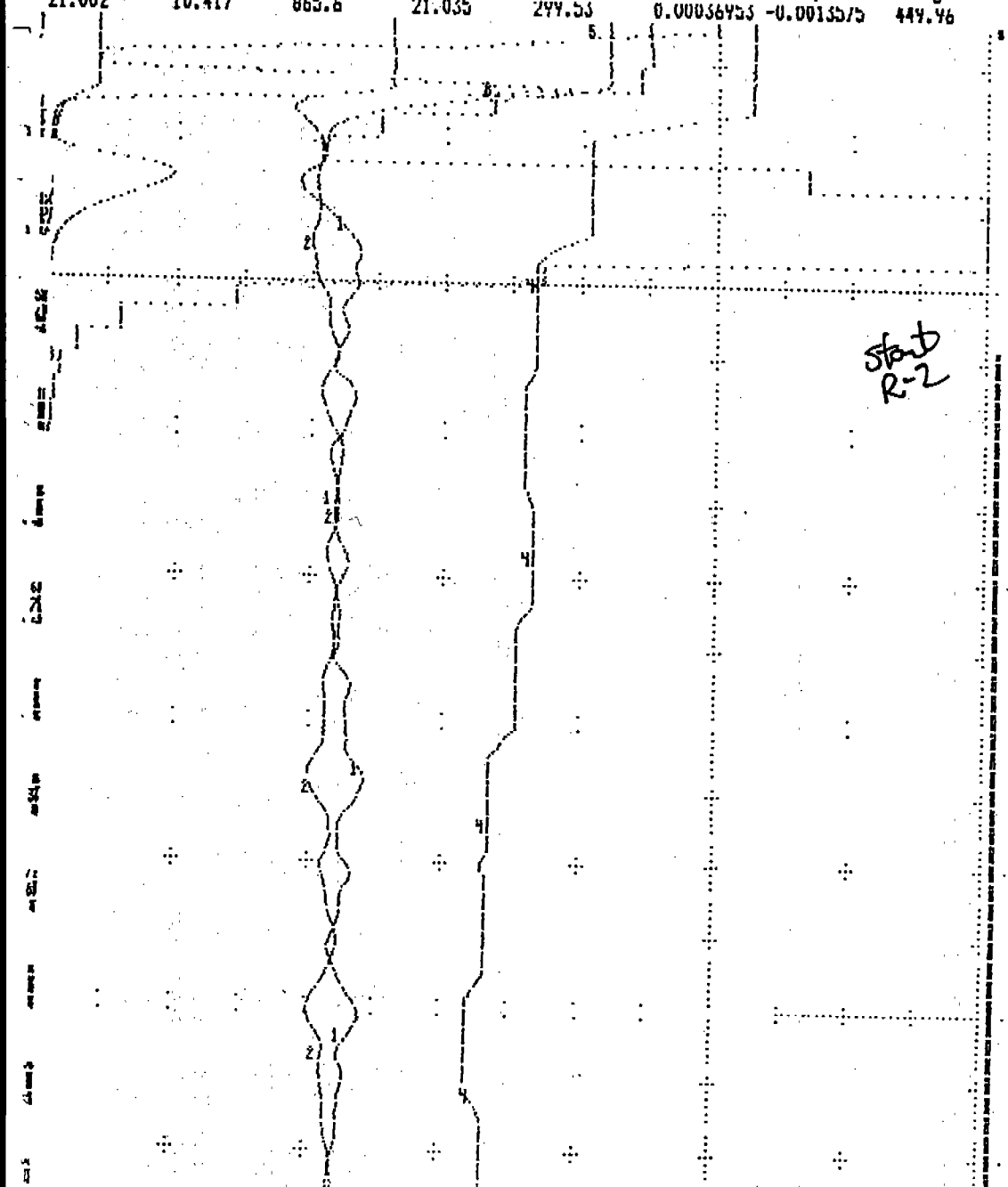
12:37:59	11.640	0.3330	55.210	7.3070
	-.36000	-0.0134	0.0117	2.2100
12:38:26	11.640	0.3050	613.70	7.3020
	146.50	0.0062	0.0071	2.0000
12:38:56	11.620	10.760	656.10	7.3000
	271.50	0.0063	0.0020	275.20
12:39:26	11.630	10.750	650.50	16.000
	272.00	0.0061	0.0001	292.70
12:39:56	11.640	10.760	650.50	16.100
	275.30	0.0017	0.0000	292.00
12:40:26	11.640	10.700	652.10	16.010
	295.50	0.0050	0.0003	292.70
12:40:56	11.620	10.700	653.30	16.010
	295.10	0.0230	0.1035	291.70
12:41:26	11.630	10.770	657.50	16.010
	295.10	0.0000	0.0023	292.00
12:41:56	11.640	10.770	658.10	16.100
	295.10	-0.1023	0.0037	292.50
12:42:26	11.630	10.770	650.50	16.000
	271.50	0.0016	0.0021	291.70
12:42:56	11.620	10.770	657.00	16.000
	271.70	0.0027	0.0019	292.00
12:43:26	11.620	10.750	658.70	16.000
	293.50	0.0017	0.0017	292.70
12:43:56	17.750	10.700	656.50	16.000
	297.50	0.0071	0.0003	292.50
12:44:26	20.270	10.700	651.20	16.000
	291.20	0.0193	0.0156	291.70



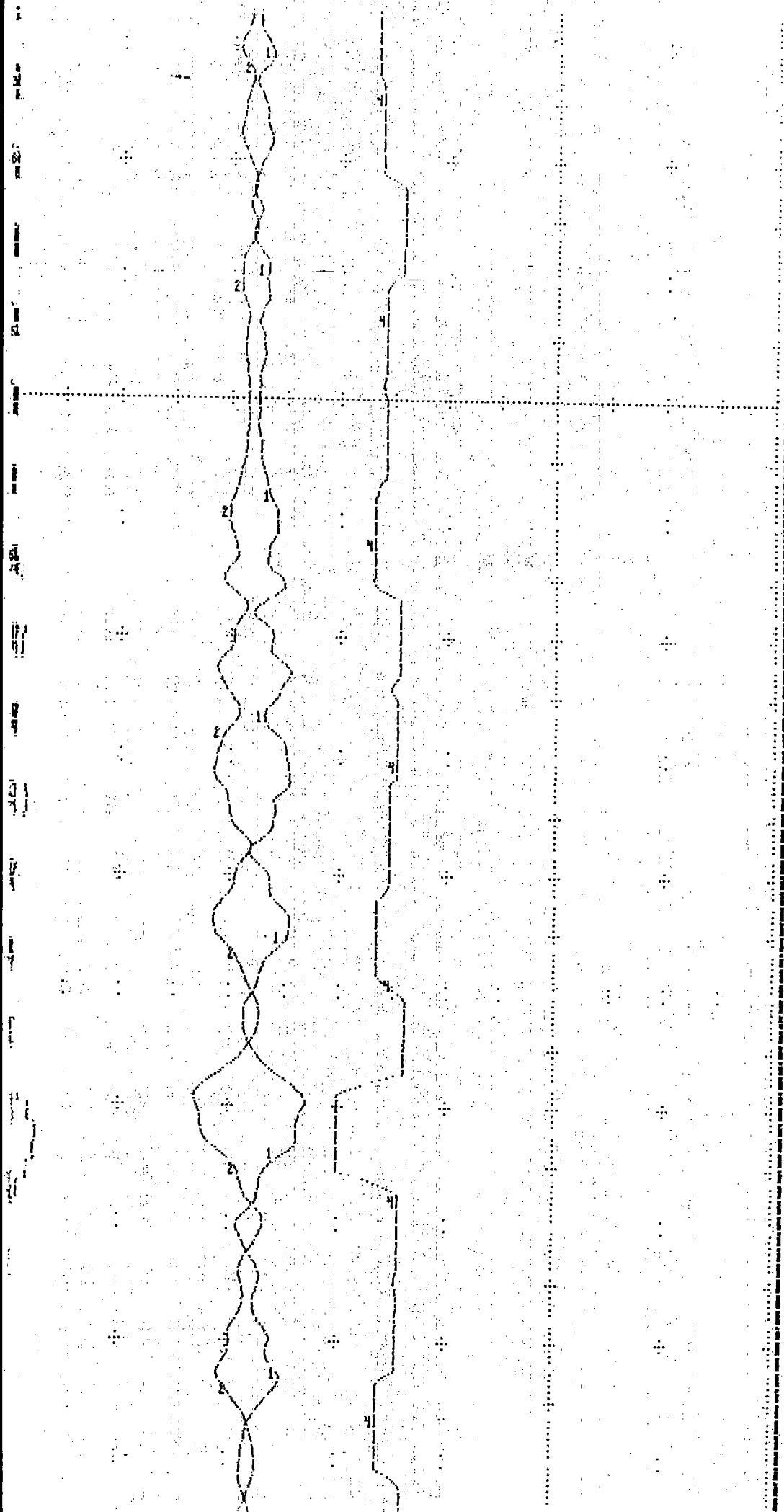
11:54:56	20.800	10.300	661.70	[illegible]
	297.30	0.0230	0.0005	[illegible]
11:55:26	20.820	10.360	661.70	[illegible]
	298.70	0.0040	0.0005	[illegible]
11:55:56	20.870	10.370	661.80	[illegible]
	298.50	-0.0132	0.0060	[illegible]
11:56:26	20.900	10.370	662.10	[illegible]
	298.00	0.0072	0.0042	[illegible]
11:56:56	20.950	10.400	664.60	[illegible]
	298.00	0.0170	0.0015	[illegible]
11:57:26	20.970	10.410	663.50	[illegible]
	299.20	0.0067	0.0060	[illegible]
11:57:56	21.010	10.400	661.30	[illegible]
	299.30	0.1017	0.0137	[illegible]
11:58:26	21.000	10.410	660.70	[illegible]
	299.50	-0.0033	0.1012	[illegible]

MARKY TIME : 11:58:42 DATE : 3/22/94

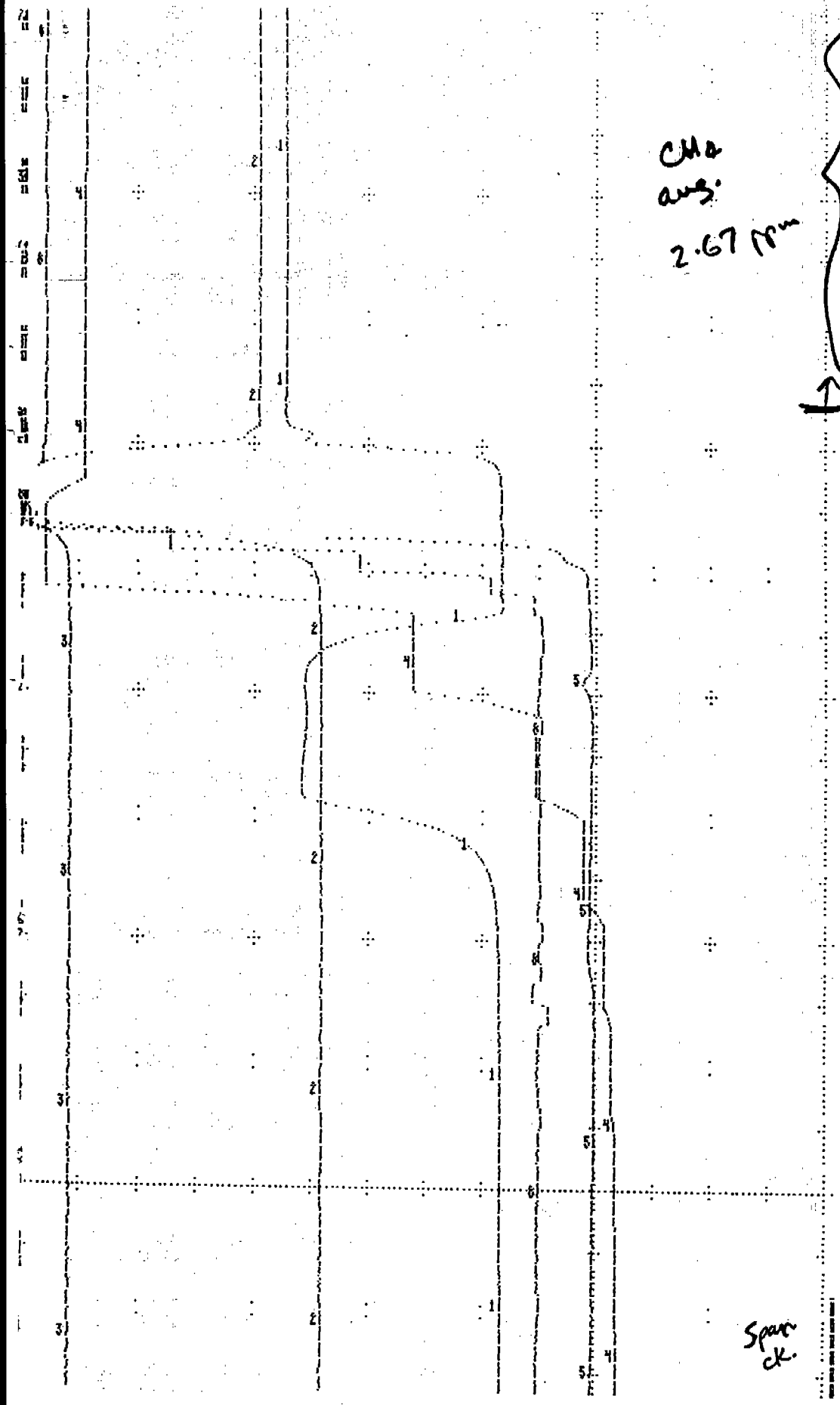
1	2	3	4	5	6	7	8
21.002	10.417	865.6	21.035	299.53	0.00036953	-0.0013575	449.46



11:58:56	21.000	10.720	661.30	[illegible]
	24.450	0.0112	0.0071	[illegible]
11:59:26	10.570	6.1170	220.30	[illegible]
	5.1900	0.0014	0.0030	[illegible]
11:59:56	10.500	6.2390	070.00	[illegible]
	4.2050	0.0170	0.0010	[illegible]
12:00:26	11.700	0.2760	117.10	[illegible]
	2.1060	0.0000	0.0070	[illegible]
12:00:56	10.700	0.0000	69.200	[illegible]
	1.1220	0.0021	0.0020	[illegible]
12:01:26	11.270	6.7140	65.480	[illegible]
	1.2000	0.0067	0.0003	[illegible]
12:01:56	10.950	0.0710	57.010	[illegible]
	.55650	0.0050	0.0127	[illegible]
12:02:26	11.270	6.6030	67.700	[illegible]
	.17950	0.1171	0.0107	[illegible]
12:02:56	10.770	0.0770	70.000	[illegible]
	-.24530	-0.0113	-0.0212	[illegible]
12:03:26	11.390	6.4800	67.750	[illegible]
	-0.0275	0.0170	0.0177	[illegible]
12:03:56	11.760	0.1620	62.750	[illegible]
	-.30520	0.0070	0.0107	[illegible]
12:04:26	11.300	0.7200	70.330	[illegible]
	-.33320	0.0030	0.0020	[illegible]
12:04:56	11.000	0.0000	63.730	[illegible]
	-.47330	-0.0264	-0.123	[illegible]
12:05:26	11.670	0.0030	71.030	[illegible]
	-.86350	-0.0133	0.0060	[illegible]
12:05:56	11.470	0.5150	69.720	[illegible]
	-.59270	0.0132	0.0107	[illegible]
12:06:26	11.120	0.7730	65.300	[illegible]



12:07:26	11.650	0.2660	64.070	13.340
	-1.2780	0.0044	0.0020	2.2490
12:07:56	11.400	0.4570	55.300	13.470
	-1.4630	-0.0097	0.0125	2.3600
12:08:26	11.350	0.6140	72.000	13.490
	-1.1790	-0.0060	-0.0075	3.1300
12:08:56	11.130	0.0160	59.540	13.300
	-1.5400	0.0053	0.0040	3.2240
12:09:26	11.560	0.3690	63.500	13.030
	-1.3070	0.0100	0.0109	2.3670
12:09:56	11.430	0.5030	66.400	13.660
	-1.2410	0.0091	0.0043	2.3100
12:10:26	11.220	0.6270	64.650	13.700
	-1.5720	0.0024	0.0191	2.3370
12:10:56	11.370	0.5000	52.090	13.700
	-1.7800	-0.0143	0.0247	2.4060
12:11:26	12.110	7.9490	65.250	13.290
	-1.6620	-0.0105	-0.0074	3.1790
12:11:56	12.300	7.7500	73.560	13.270
	-.71440	0.0245	0.0011	4.0030
12:12:26	11.930	8.1560	70.670	13.240
	-1.0000	0.0005	0.0100	12.000
12:12:56	12.190	8.0510	76.200	13.040
	-1.2360	0.0043	0.0420	7.0920
12:13:26	12.540	7.5190	71.450	13.140
	-.93710	0.0229	0.0033	4.0120
12:13:56	12.020	8.0460	66.030	13.000
	-.83670	0.0143	0.0066	12.260
12:14:26	11.790	8.2350	65.730	13.070
	-1.2070	0.0047	0.0103	5.2790
12:14:56	12.670	7.5290	53.920	13.430
	-1.4640	0.0403	0.0012	2.7520
12:15:26	11.140	8.0400	53.840	13.140
	-1.4260	0.0137	-0.0110	2.1700
12:15:56	11.080	8.1520	64.190	13.460
	-1.3560	0.0105	0.0152	1.4390
12:16:26	13.400	6.0650	73.420	11.990
	-.34830	-0.0022	0.0195	9.3110
12:16:56	11.900	8.2220	71.170	11.900
	-.83920	-0.0458	0.0051	22.640
12:17:26	10.460	9.3100	59.700	13.290
	-1.6320	0.0033	0.0040	4.2400
12:17:56	11.480	8.5490	57.740	13.190
	-1.4570	-0.0039	0.0017	1.4340
12:18:26	11.970	8.1510	73.390	13.250
	-1.3790	0.0114	0.0252	2.3500
12:18:56	11.770	8.3300	64.210	13.560
	-1.3000	0.0114	0.0133	7.0250
12:19:26	10.740	9.1110	55.540	13.560
	1.1540	0.0153	0.0070	3.0660



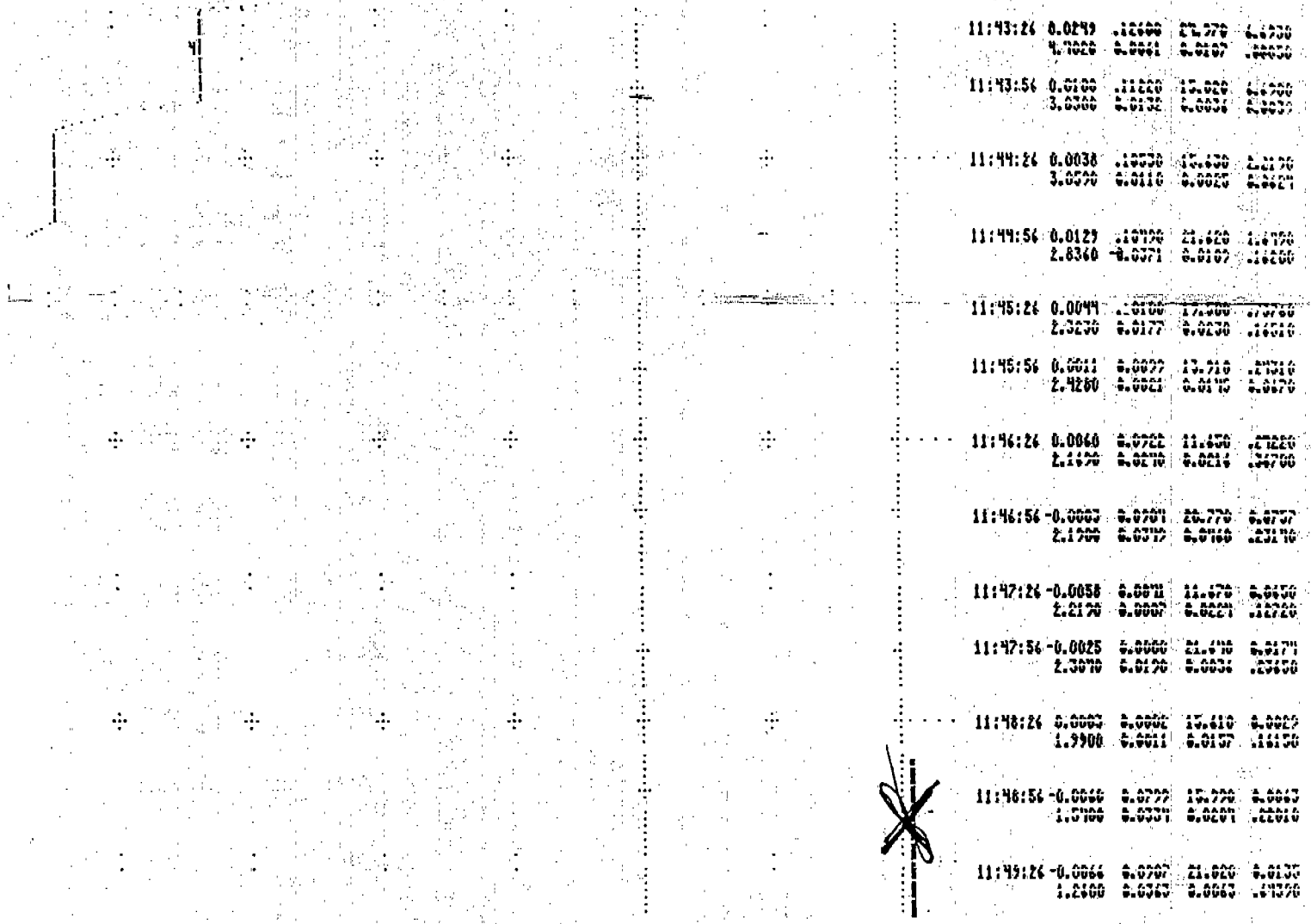
CH4 avg. 2.67 ppm

Span ck.

11:30:56	11.430	6.2130	71.[illegible]	[illegible]
	2.9600	0.0147	0.0005	[illegible]
11:31:26	11.430	0.2320	76.[illegible]	[illegible]
	2.9200	-0.0109	0.0048	22.130
11:31:56	11.430	0.2290	83.[illegible]	[illegible]
	2.5770	-0.0147	0.0000	[illegible]
11:32:26	11.440	0.2260	69.090	[illegible]
	3.0660	0.0050	0.0055	22.110
11:32:56	11.440	0.2200	80.090	[illegible]
	2.6280	0.0007	0.0026	[illegible]
11:33:26	11.440	0.2170	76.710	[illegible]
	2.2920	0.0021	0.0050	[illegible]
11:33:56	11.450	0.2170	69.220	[illegible]
	2.2490	0.0004	0.0057	22.210
11:34:26	14.250	6.1300	71.930	[illegible]
	3.1360	0.0017	0.0070	22.170
11:34:56	20.880	.13740	14.620	[illegible]
	.64490	0.0250	0.0077	[illegible]
11:35:26	20.900	10.110	043.70	[illegible]
	294.80	0.0040	0.0063	[illegible]
11:35:56	15.360	10.350	057.30	[illegible]
	297.40	0.000	0.0136	[illegible]
11:36:26	12.230	10.350	042.00	[illegible]
	296.20	-0.000[illegible]	0.0134	[illegible]
11:36:56	12.170	10.370	054.30	[illegible]
	298.10	0.0022	0.0065	[illegible]
11:37:26	16.090	10.300	055.20	[illegible]
	297.70	0.0120	0.0127	[illegible]
11:37:56	20.390	10.370	040.70	[illegible]
	297.20	-0.0061	0.0040	[illegible]
11:38:26	20.720	10.390	054.30	[illegible]
	296.60	0.0040	0.0057	[illegible]
11:38:56	20.700	10.300	053.00	[illegible]
	299.90	0.0191	0.0003	[illegible]
11:39:26	20.010	10.300	045.40	[illegible]
	299.60	0.126	-0.01[illegible]	[illegible]
11:39:56	20.010	10.390	055.60	[illegible]
	299.60	0.0061	0.0056	[illegible]
11:40:26	20.030	10.370	051.90	[illegible]
	299.10	0.0090	0.0040	[illegible]
11:40:56	20.040	10.300	044.40	[illegible]
	299.20	0.0223	0.0077	[illegible]
11:41:26	20.060	10.390	055.00	[illegible]
	299.30	-0.0011	0.0050	[illegible]
11:41:56	20.670	10.370	052.70	[illegible]
	298.60	-0.0050	0.0033	[illegible]
11:42:26	20.000	10.390	040.40	[illegible]
	18.030	-0.007	0.0005	[illegible]

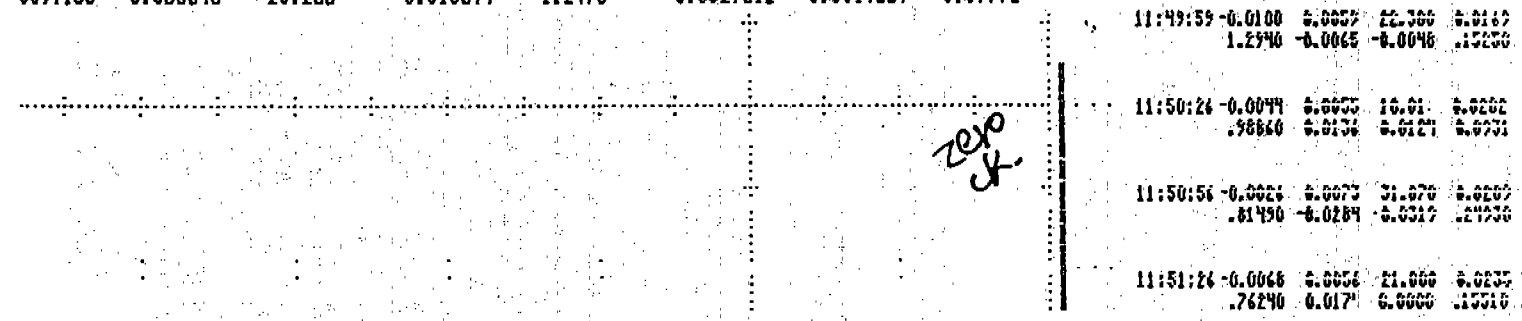
SUMMARY TIME : 11:42:12 DATE : 3/22/94

1	2	3	4	5	6	7	8
[illegible].871	10.387	852.23	20.769	299.02	0.0006472	-0.0018451	450.48



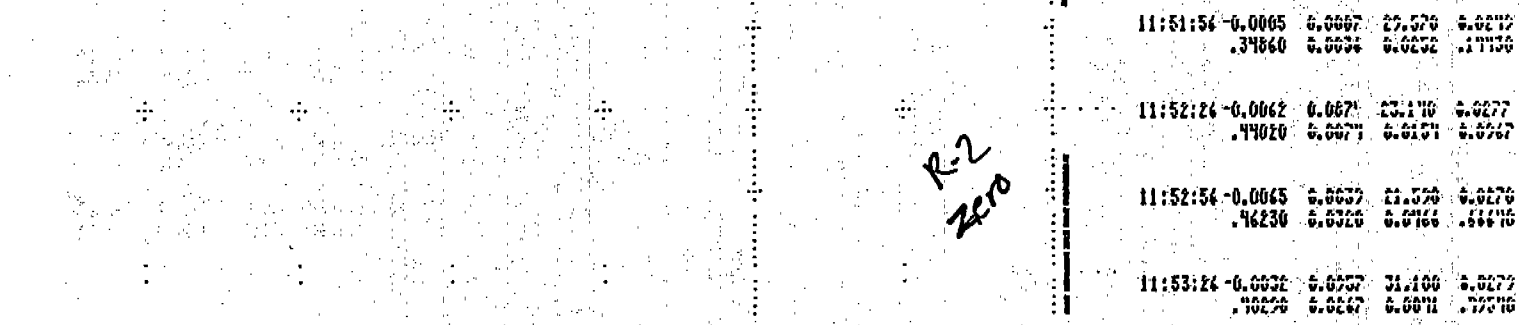
MARKY TIME : 11:49:33 DATE : 3/22/94

1	2	3	4	5	6	7	8
0099133	0.086548	20.255	-0.010599	1.2473	0.0027512	-0.0019859	0.07772



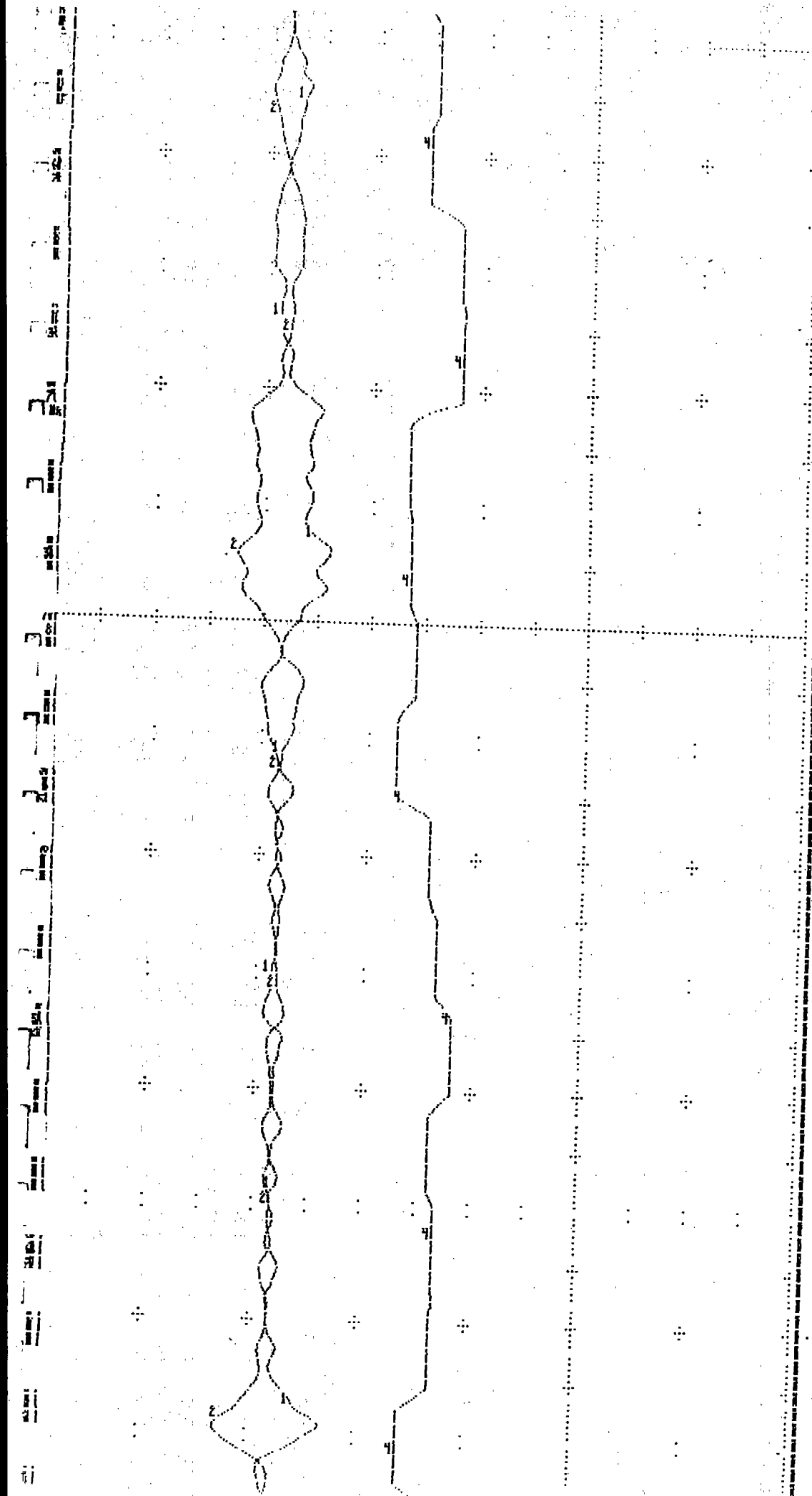
MARKY TIME : 11:51:48 DATE : 3/22/94

1	2	3	4	5	6	7	8
0088165	0.087828	23.621	-0.021828	0.74899	0.0007911	-0.0051623	0.11621

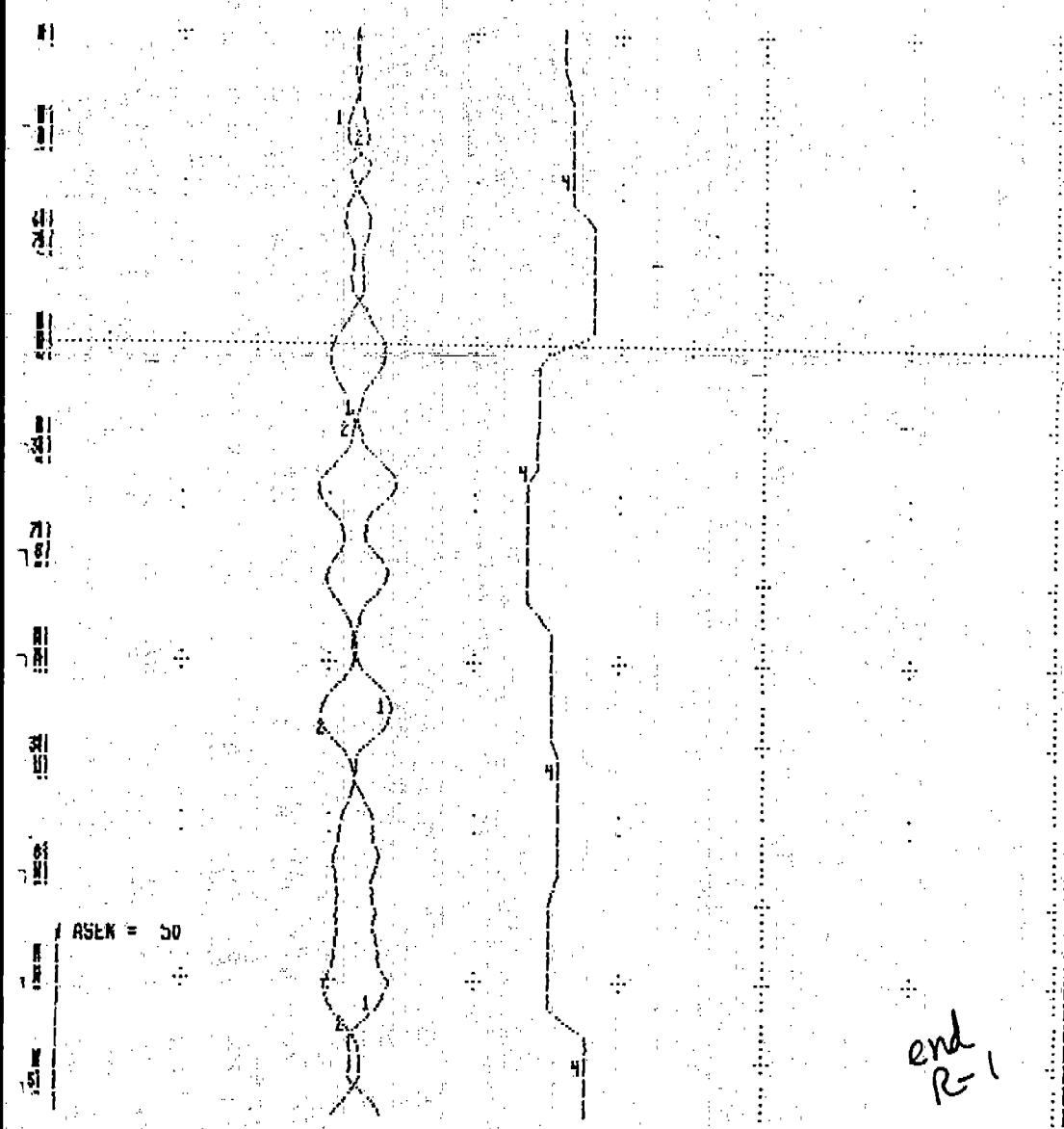


MARKY TIME : 11:53:46 DATE : 3/22/94

1	2	3	4	5	6	7	8
.0090323	0.088753	25.304	-0.02859	0.61166	-0.0064993	-0.0080611	0.12826



11:05:26	10.920	0.6700	00.150	17.150
	1.6070	0.0103	0.0067	20.160
11:05:56	11.610	0.0430	02.000	17.150
	1.0840	0.0070	0.0063	20.260
11:06:26	10.960	0.5510	71.640	13.000
	1.3550	0.0020	0.0020	27.010
11:06:56	10.240	0.0000	92.010	17.140
	1.2300	0.0140	0.0221	27.260
11:07:26	10.300	0.1720	00.060	15.130
	.50220	0.0040	0.0165	20.130
11:07:56	10.600	0.0220	01.560	15.210
	.31290	-0.0050	0.0017	20.230
11:08:26	11.700	0.3300	70.650	15.210
	.77840	0.0061	0.0036	20.160
11:08:56	12.070	7.6970	74.500	13.340
	.96910	0.0464	0.0051	26.360
11:09:26	12.140	7.6960	77.640	13.350
	1.2200	0.0044	0.0003	21.030
11:09:56	12.670	7.1500	75.200	13.700
	1.4300	0.0104	0.0000	10.190
11:10:26	11.610	0.0710	67.300	13.670
	1.6170	0.0034	0.0177	15.970
11:10:56	11.060	0.0570	77.000	13.670
	1.8250	0.0104	0.0116	15.900
11:11:26	11.360	0.3210	60.060	13.060
	1.8090	0.0040	0.0130	10.200
11:11:56	11.750	0.3070	74.000	13.100
	1.5540	0.0072	0.0020	20.150
11:12:26	11.010	0.6610	73.770	17.320
	1.7870	0.0051	0.0079	20.020
11:12:56	10.760	0.7740	76.030	17.610
	1.5620	0.0019	0.0061	21.000
11:13:26	10.760	0.7710	76.110	17.650
	1.3650	-0.0036	0.0152	22.260
11:13:56	11.160	0.6500	07.010	15.270
	1.2210	0.0007	0.0030	22.740
11:14:26	10.920	0.6640	69.060	15.260
	1.0640	-0.0067	0.0120	21.040
11:14:56	10.920	0.6060	75.960	17.470
	1.1060	0.0053	0.0110	22.060
11:15:26	10.840	0.7190	77.050	17.740
	1.0510	-0.0042	0.0000	21.110
11:15:56	11.290	0.4000	70.400	17.740
	.98150	-0.0263	0.0054	21.120
11:16:26	10.870	0.7200	76.070	17.690
	1.0030	0.0170	0.0090	21.110
11:16:56	11.260	0.4490	76.030	17.690
	1.3420	0.0051	0.0124	21.000
11:17:26	12.740	7.0350	61.740	13.590
	1.1340	0.0000	0.0035	22.020

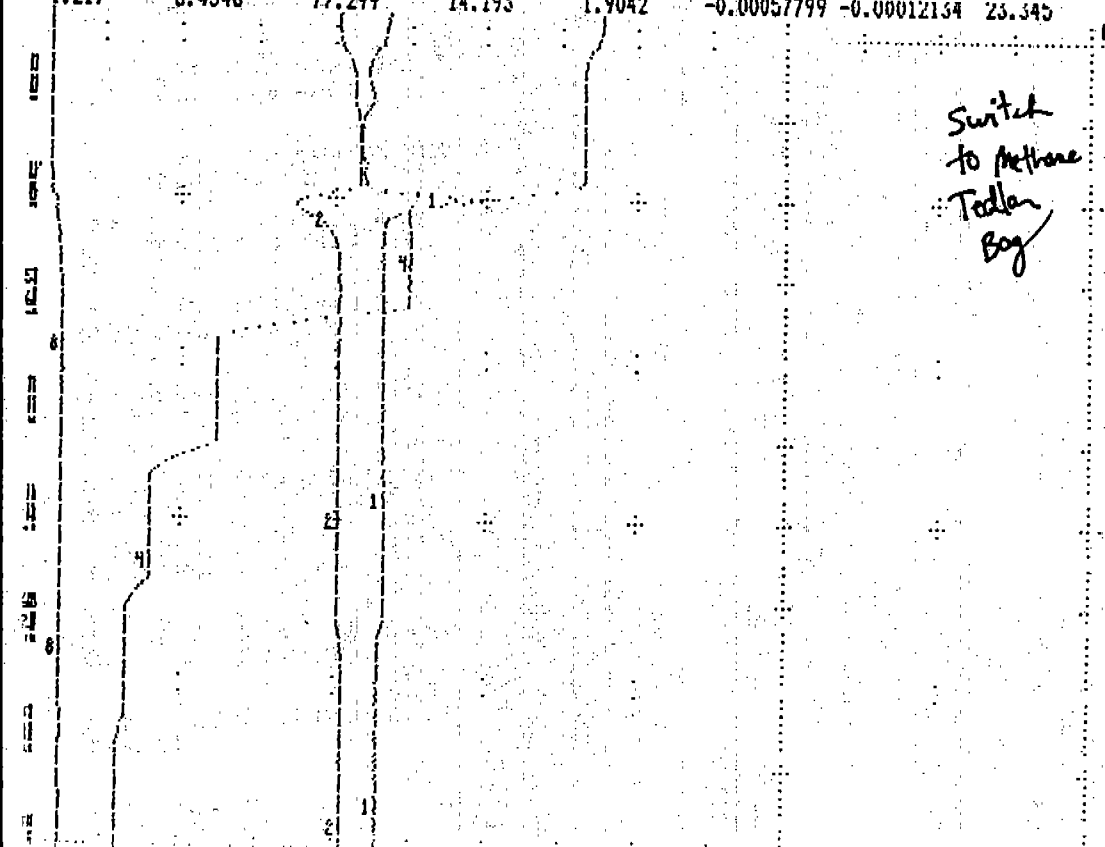


end R-1

11:18:26	10.940	0.7100	65.100	[illegible]
	1.3160	-0.0059	0.0103	17.230
11:18:56	10.690	0.0510	74.470	[illegible]
	1.7540	0.0274	-0.0126	[illegible]
11:19:26	10.020	0.6950	79.040	[illegible]
	1.4730	-0.0158	0.0127	[illegible]
11:19:56	10.710	0.0610	75.630	15.200
	1.5620	0.0000	0.0016	19.100
11:20:26	11.850	0.0640	76.610	[illegible]
	1.1320	-0.0090	0.0032	19.070
11:20:56	10.940	8.6980	69.320	13.740
	1.1590	-0.0066	0.0131	18.360
11:21:26	11.890	7.8350	69.210	13.400
	1.4930	0.0101	0.0121	17.200
11:21:56	11.920	7.7440	66.640	13.470
	1.6750	0.0014	0.0124	16.010
11:22:26	11.000	0.6000	69.040	14.140
	2.0680	-0.0179	0.0011	16.130
11:22:56	11.390	0.1990	65.270	14.100
	2.1100	0.0321	0.0176	15.040
11:23:26	11.500	0.3360	61.630	14.320
	1.9200	0.0174	0.0102	15.040
11:23:56	11.510	0.2460	67.710	14.070
	1.8940	0.0000	0.0112	14.940
11:24:26	12.020	7.9310	76.450	14.060
	1.8820	0.0065	0.0070	14.930
11:24:56	10.770	0.0500	80.720	15.100
	1.8640	0.0104	0.0050	14.160

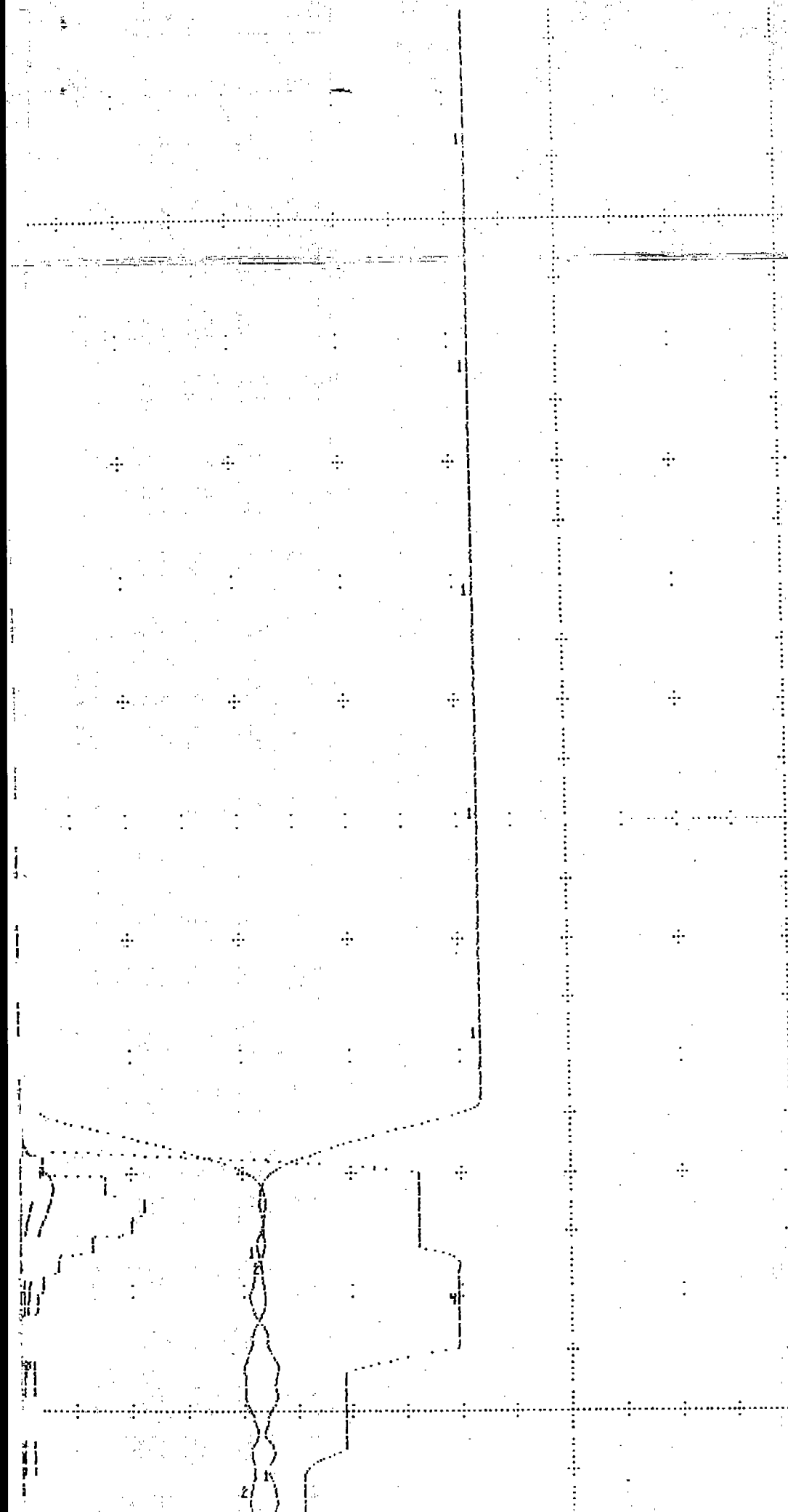
SUMMARY TIME : 11:25:23 DATE : 3/22/94

1	2	3	4	5	6	7	8
1.217	8.4348	77.299	14.193	1.9042	-0.00057799	-0.00012134	23.345

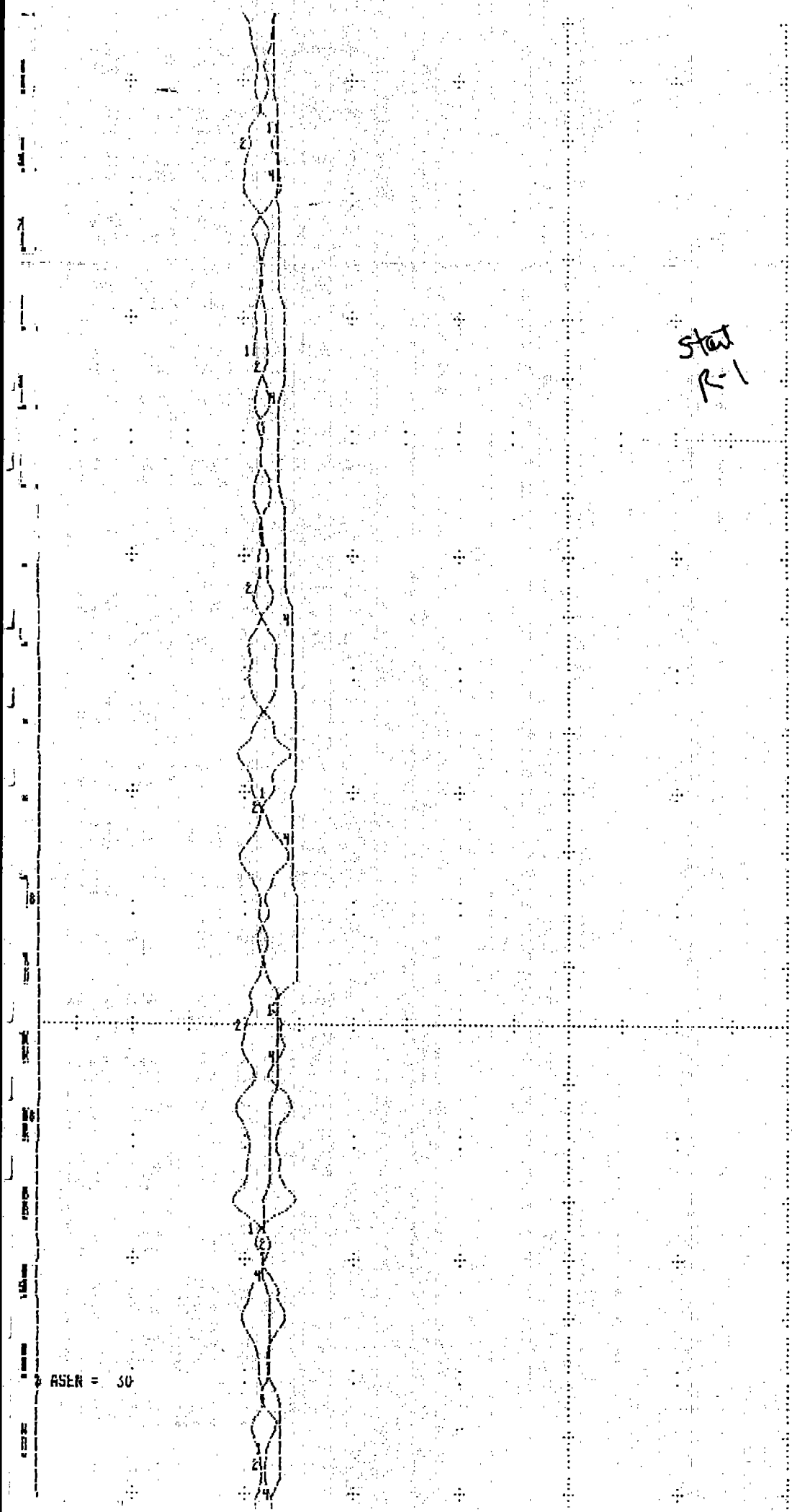


Switch to Methane Tedlar Bag

11:25:29	11.620	0.1440	64.110	15.010
	2.2850	-0.0047	0.0016	14.130
11:25:56	10.930	0.6260	71.750	14.600
	1.3530	-0.0048	-0.0047	14.210
11:26:26	14.920	7.2560	71.230	11.090
	2.0940	0.0102	0.0069	15.030
11:26:56	11.540	0.1210	70.130	9.9570
	1.0550	0.0071	0.0192	21.000
11:27:26	11.560	8.1260	82.650	4.9630
	2.0010	-0.0072	0.0127	22.140
11:27:56	11.590	0.1040	84.950	4.9640
	2.1650	0.0037	0.0041	22.190
11:28:26	11.600	0.0970	76.030	3.2050
	2.6500	0.0095	-0.0032	22.210
11:28:56	11.610	0.1000	77.960	2.7530
	3.5220	0.0053	0.0070	22.100
11:29:26	11.420	0.2250	74.170	2.6000
	3.0560	-0.0161	0.0081	22.170
11:29:56	11.430	0.2230	75.500	2.3060
	3.0020	-0.0123	0.0035	22.100

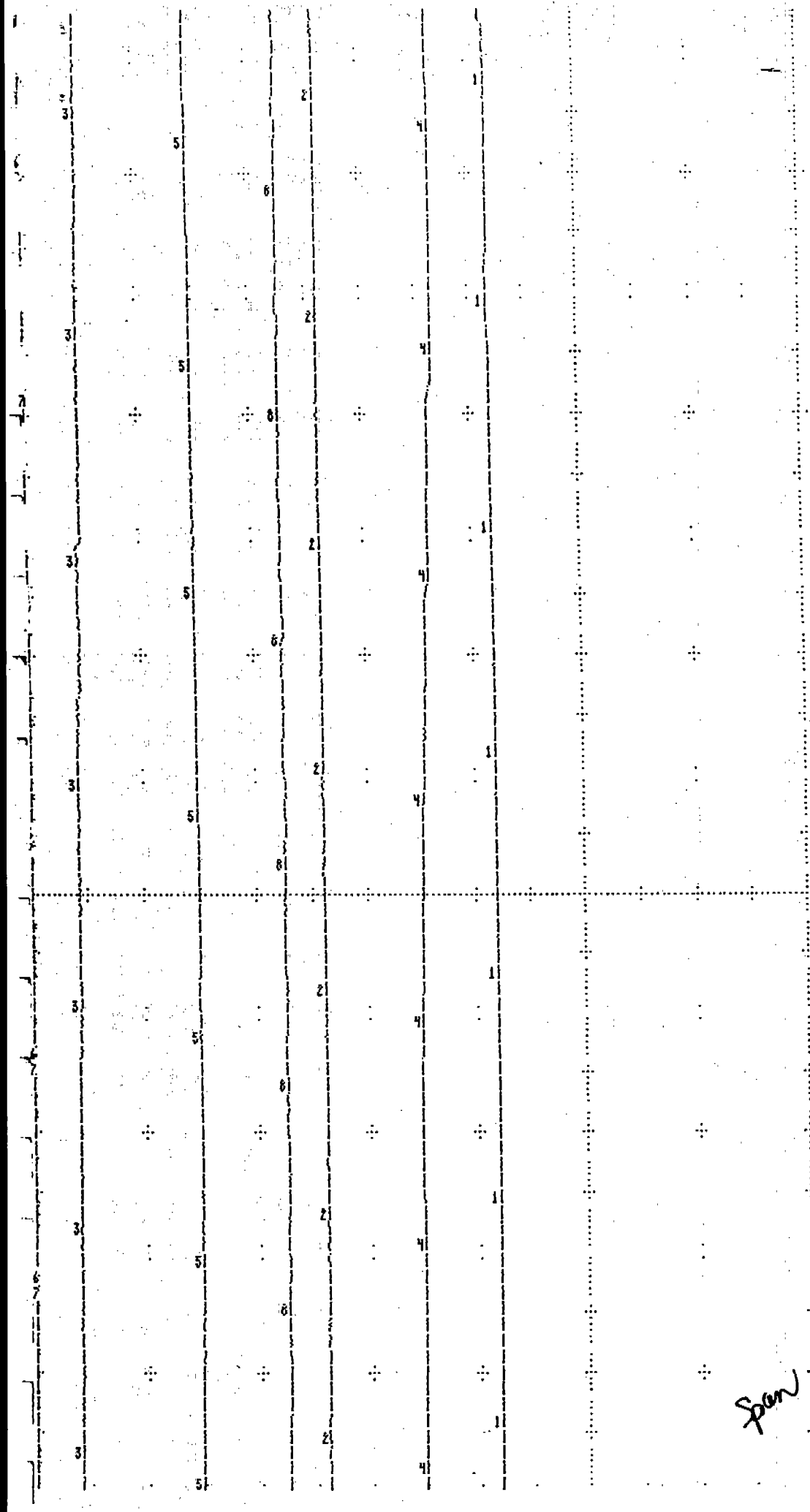


10:38:56	20.960	0.0055	15.040	.10020
	16.270	0.0236	0.0446	.11030
10:39:26	20.960	0.0037	5.4120	.10450
	7.0490	0.0015	0.0147	0.0730
10:39:56	20.960	0.0060	14.260	.10360
	5.1240	0.0152	0.0033	0.0002
10:40:26	20.950	0.0000	2.0300	0.0999
	4.0640	0.0034	0.0006	0.0990
10:40:56	20.960	0.0060	2.6200	0.0955
	4.9400	0.0231	0.0222	0.0563
10:41:26	20.950	0.0091	6.7440	0.0924
	5.2530	0.0020	0.0007	.17300
10:41:56	20.960	-0.1077	9.0010	0.0920
	5.1100	0.0047	0.0007	.17660
10:42:26	20.960	-0.0072	13.300	0.0914
	4.4660	0.0109	0.0231	.16060
10:42:56	20.960	0.0050	7.0360	0.0003
	4.6020	0.0021	0.0147	0.0256
10:43:26	20.960	0.0067	16.690	0.0003
	4.7950	0.0143	0.0186	.10010
10:43:56	20.950	0.0064	1.3650	0.0056
	4.7170	0.0091	0.0030	.17550
10:44:26	20.950	0.0042	10.310	0.0063
	4.8160	0.0178	-0.0007	0.0167
10:44:56	20.960	-0.0063	7.2510	0.0054
	5.0670	0.0344	-0.0186	0.0606
10:45:26	20.950	0.0057	2.6430	0.0050
	4.9100	0.0112	0.0066	.10050
10:45:56	20.960	0.0074	15.740	0.0045
	5.1300	0.0090	0.0111	0.0003
10:46:26	20.960	0.0070	0.5000	0.0022
	5.2680	0.0079	0.0041	.21900
10:46:56	20.970	0.0060	4.3120	0.0035
	5.0940	0.0323	0.0050	0.0051
10:47:26	20.950	0.0069	13.110	0.0010
	4.7410	0.0015	0.0197	0.0109
10:47:56	19.940	.77950	26.010	0.0016
	4.9070	0.0065	0.0104	.14790
10:48:26	11.290	8.1810	347.80	21.720
	48.250	0.0263	0.0000	41.940
10:48:56	10.830	0.7350	105.50	21.730
	34.530	0.0051	0.0021	201.00
10:49:26	10.350	0.7710	75.450	23.010
	16.470	0.0032	0.0063	40.990
10:49:56	11.180	0.2390	70.910	23.090
	9.6720	0.0115	0.0065	25.100
10:50:26	11.190	0.2630	76.600	17.640
	7.4080	0.0035	0.0013	24.040
10:50:56	11.060	0.3020	70.960	15.420
	6.1150	0.0059	0.0045	24.140



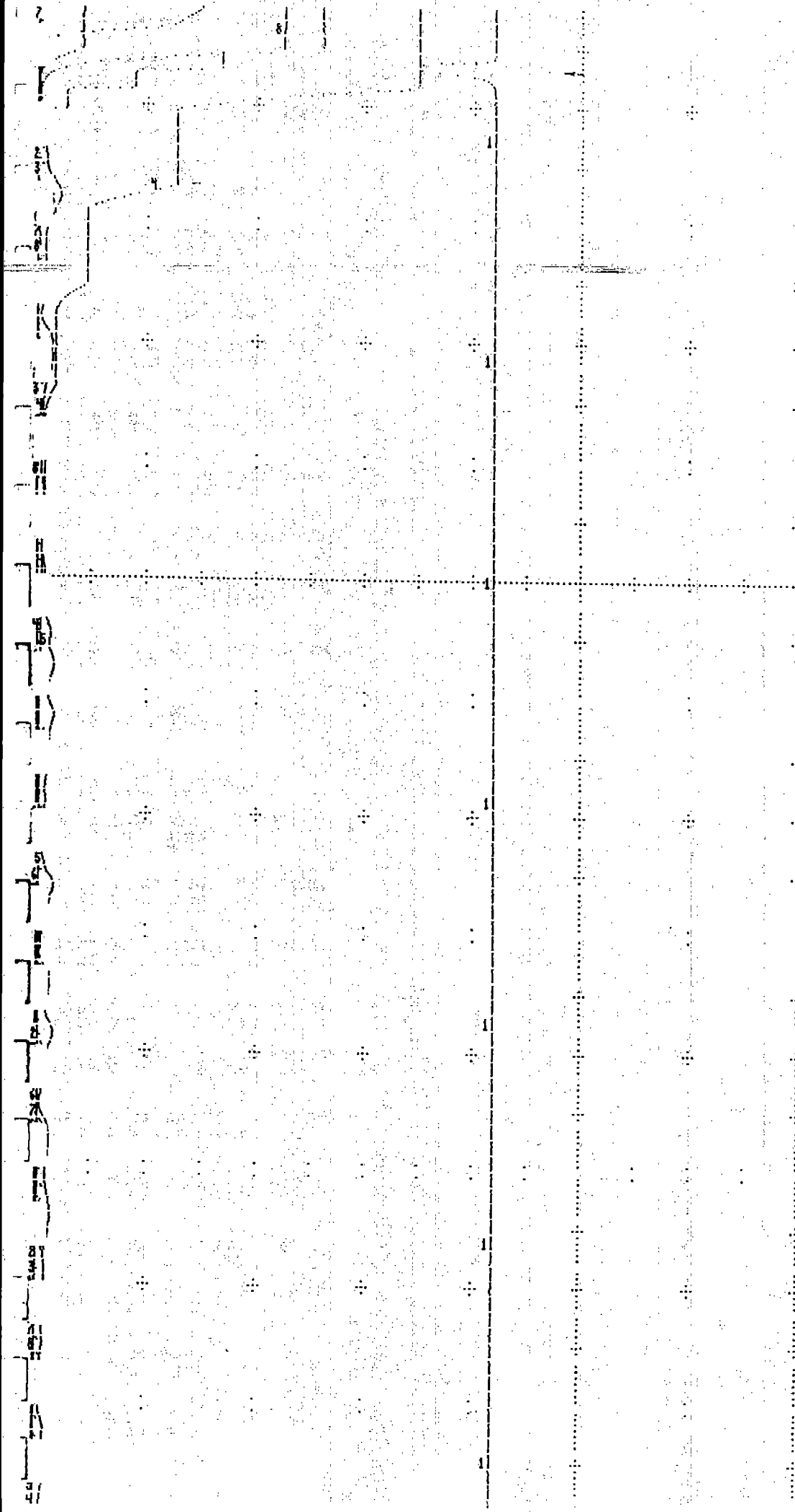
Start
R-1

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5.1100	0.0126	0.0130	22.700
10:52:26	11.120	[illegible]	70.310	13.670
	4.3450	-0.0008	0.0027	23.020
10:52:56	11.340	0.2540	69.320	13.000
	4.3030	-0.0061	0.0067	25.190
10:53:26	11.390	0.1950	67.050	13.010
	3.9730	-0.0016	0.0066	25.270
10:53:56	10.760	8.7170	79.440	13.910
	3.7030	0.0004	0.0011	27.110
10:54:26	10.570	0.0150	77.000	14.250
	3.7130	-0.0034	0.0169	29.130
10:54:56	10.920	0.6550	60.360	14.250
	3.6900	0.0109	0.0100	30.130
10:55:26	10.810	8.7100	76.140	13.930
	3.6430	-0.0108	-0.0104	20.170
10:55:56	11.250	0.3040	04.300	14.000
	3.6430	0.0146	0.0009	29.230
10:56:26	11.080	0.5400	70.000	14.270
	3.4850	0.0092	0.0023	29.160
10:56:56	10.830	8.6140	77.750	14.670
	3.4540	0.0276	0.0100	29.100
10:57:26	10.230	9.1760	85.040	14.670
	3.1370	0.0016	0.0150	30.050
10:57:56	11.370	0.2940	03.920	14.020
	2.7620	0.0099	0.0066	30.200
10:58:26	11.320	0.3150	09.070	14.620
	2.9710	0.0052	0.0090	30.220
10:58:56	11.940	7.9370	03.090	14.660
	2.9350	-0.0196	-0.0042	30.340
10:59:26	11.050	0.5490	70.570	14.090
	2.9610	0.0130	0.0102	20.170
10:59:56	10.910	0.6390	09.550	14.090
	2.5390	0.0033	0.0042	29.160
11:00:26	11.700	8.0500	69.020	13.020
	2.2760	-0.0023	0.0094	30.270
11:00:56	11.310	8.3130	02.470	13.030
	2.1740	-0.0088	0.0072	30.130
11:01:26	11.450	8.1920	91.090	13.300
	2.8990	-0.0053	0.0005	20.190
11:01:56	12.330	7.6030	05.440	13.020
	2.9970	-0.0090	0.0119	27.130
11:02:26	10.840	0.7600	79.910	13.020
	2.6620	0.0099	0.0097	20.110
11:02:56	11.050	7.9440	00.230	13.390
	2.4720	-0.0223	0.0033	20.190
11:03:26	11.050	0.5400	02.710	13.300
	2.5400	0.0044	0.0022	20.040
11:03:56	11.250	0.3440	74.060	13.920
	2.1000	0.0020	0.0109	26.330
11:04:26	11.140	0.4060	07.430	13.500
	[illegible]	[illegible]	[illegible]	[illegible]



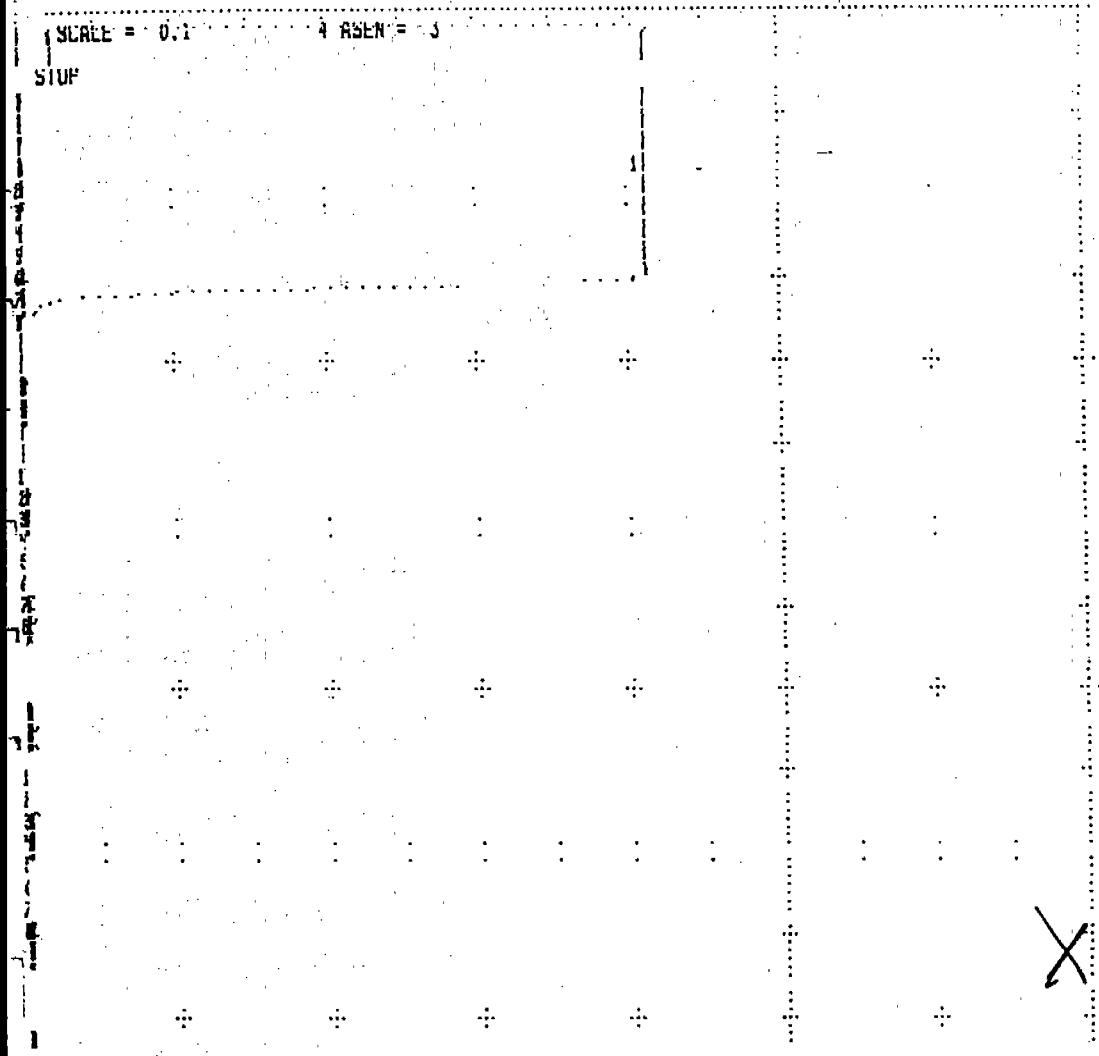
	292.70	0.0117	0.0021	702.70
10:13:26	20.900	10.730	700.70	21.070
	292.20	0.0030	0.0002	702.10
10:13:56	20.910	10.720	770.00	21.010
	294.30	0.0171	0.0070	702.10
10:14:26	20.910	10.700	777.10	21.010
	294.60	0.0036	0.0119	702.00
10:14:56	20.920	10.730	771.70	21.050
	295.00	-0.0219	0.0036	702.70
10:15:26	20.860	10.720	763.10	21.070
	296.30	-0.0050	0.0000	702.10
10:15:56	20.960	10.790	765.60	21.070
	296.60	-0.0109	0.0077	702.00
10:16:26	20.960	10.720	760.30	21.000
	296.30	-0.0035	0.0002	702.00
10:16:56	20.960	10.730	757.70	21.070
	297.90	0.0169	0.0020	701.00
10:17:26	20.970	10.790	776.50	21.000
	297.70	0.0125	0.0001	703.00
10:17:56	20.950	10.730	770.00	21.110
	297.50	0.0069	-0.0017	703.00
10:18:26	20.960	10.730	710.20	21.330
	297.90	0.0177	0.0121	700.00
10:18:56	20.970	10.730	770.10	21.250
	297.70	0.0001	0.0011	700.10
10:19:26	20.970	10.720	765.70	21.250
	297.60	0.0019	0.0001	701.10
10:19:56	20.960	10.730	763.70	21.100
	296.30	0.0110	0.0100	701.00
10:20:26	20.960	10.730	766.30	21.070
	296.20	0.0000	0.0071	702.00
10:20:56	20.960	10.730	765.10	21.070
	296.10	0.0145	0.0000	700.70
10:21:26	20.970	10.710	775.10	20.710
	296.00	0.0061	0.0073	703.00
10:21:56	20.970	10.730	770.10	20.730
	296.40	-0.0015	0.0012	700.70
10:22:26	20.970	10.730	771.70	20.000
	296.00	0.0056	0.0130	700.10
10:22:56	20.970	10.730	771.70	20.000
	297.70	0.0116	0.0103	702.70
10:23:26	20.970	10.720	770.20	20.770
	297.80	0.0041	-0.0167	703.00
10:23:56	20.960	10.730	770.70	20.700
	297.90	0.0061	0.0123	700.10
10:24:26	20.970	10.730	767.10	20.700
	297.70	0.0114	0.0001	702.70
10:24:56	20.960	10.720	770.70	20.700
	297.70	-0.0027	0.0012	700.10

Span



	297.40	[illegible]	[illegible]	[illegible]
10:25:56	20.980	[illegible]	[illegible]	[illegible]
	5.5660	[illegible]	[illegible]	[illegible]
10:26:26	20.960	[illegible]	7.1910	[illegible]
	7.7940	-0.0106	[illegible]	[illegible]
10:26:56	20.970	[illegible]	[illegible]	[illegible]
	18.230	[illegible]	[illegible]	.17190
10:27:26	20.960	[illegible]	[illegible]	[illegible]
	22.600	[illegible]	[illegible]	[illegible]
10:27:56	20.970	[illegible]	[illegible]	[illegible]
	12.350	[illegible]	[illegible]	[illegible]
10:28:26	20.970	[illegible]	[illegible]	[illegible]
	27.820	[illegible]	[illegible]	.27060
10:28:56	20.960	[illegible]	[illegible]	[illegible]
	12.380	[illegible]	[illegible]	[illegible]
10:29:26	20.960	[illegible]	[illegible]	[illegible]
	5.3650	[illegible]	[illegible]	[illegible]
10:29:56	20.970	[illegible]	[illegible]	[illegible]
	10.110	[illegible]	[illegible]	[illegible]
10:30:26	20.970	[illegible]	[illegible]	[illegible]
	15.440	-0.0210	[illegible]	[illegible]
10:30:56	20.960	[illegible]	[illegible]	[illegible]
	25.870	[illegible]	[illegible]	[illegible]
10:31:26	20.960	[illegible]	[illegible]	[illegible]
	20.530	[illegible]	[illegible]	[illegible]
10:31:56	20.970	[illegible]	[illegible]	[illegible]
	18.610	[illegible]	[illegible]	[illegible]
10:32:26	20.960	[illegible]	[illegible]	[illegible]
	15.150	[illegible]	[illegible]	[illegible]
10:32:56	20.970	[illegible]	[illegible]	[illegible]
	19.190	[illegible]	[illegible]	[illegible]
10:33:26	20.970	[illegible]	[illegible]	[illegible]
	12.650	[illegible]	[illegible]	[illegible]
10:33:56	20.960	[illegible]	[illegible]	[illegible]
	25.080	[illegible]	[illegible]	[illegible]
10:34:26	20.970	[illegible]	[illegible]	[illegible]
	23.910	[illegible]	[illegible]	[illegible]
10:34:56	20.970	[illegible]	[illegible]	[illegible]
	5.5670	[illegible]	[illegible]	[illegible]
10:35:26	20.950	[illegible]	[illegible]	[illegible]
	20.520	[illegible]	[illegible]	[illegible]
10:35:56	20.960	[illegible]	[illegible]	[illegible]
	27.460	[illegible]	[illegible]	[illegible]
10:36:26	20.960	-0.0078	17.130	[illegible]
	19.790	-0.0072	0.0177	[illegible]
10:36:56	20.960	[illegible]	[illegible]	[illegible]
	17.460	-0.0357	0.0277	[illegible]
10:37:26	20.960	[illegible]	[illegible]	[illegible]
	12.650	[illegible]	[illegible]	[illegible]
10:37:56	20.960	[illegible]	[illegible]	[illegible]
	24.790	[illegible]	[illegible]	[illegible]

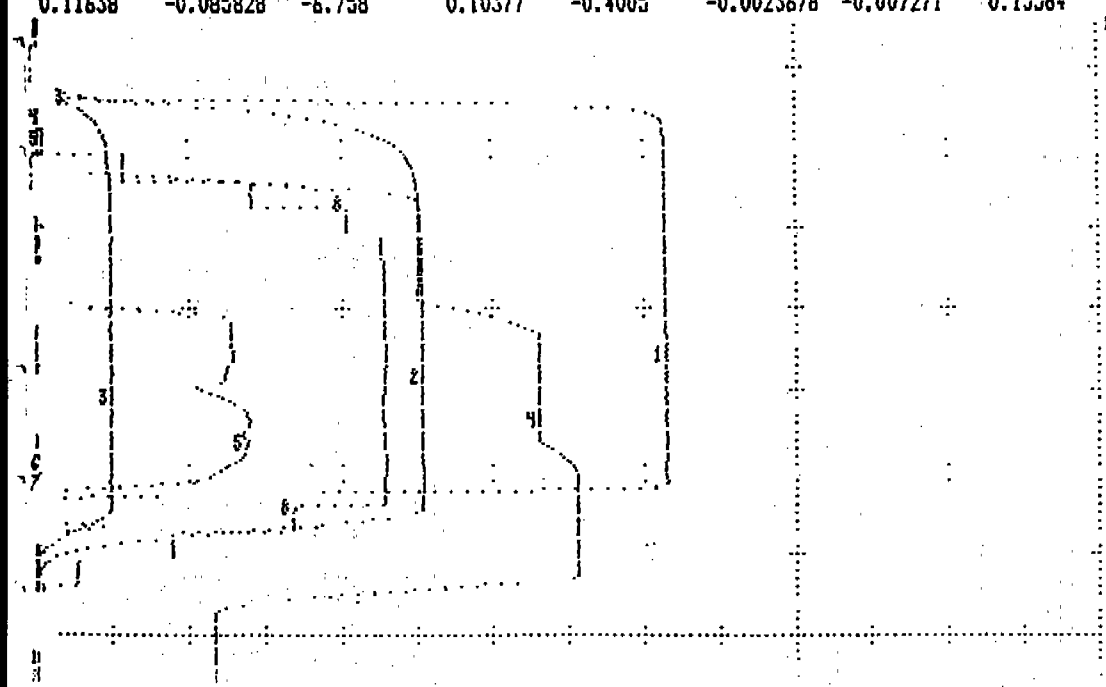
CHART : EBR DATE : 3/22/94 TIME : 9:13:34



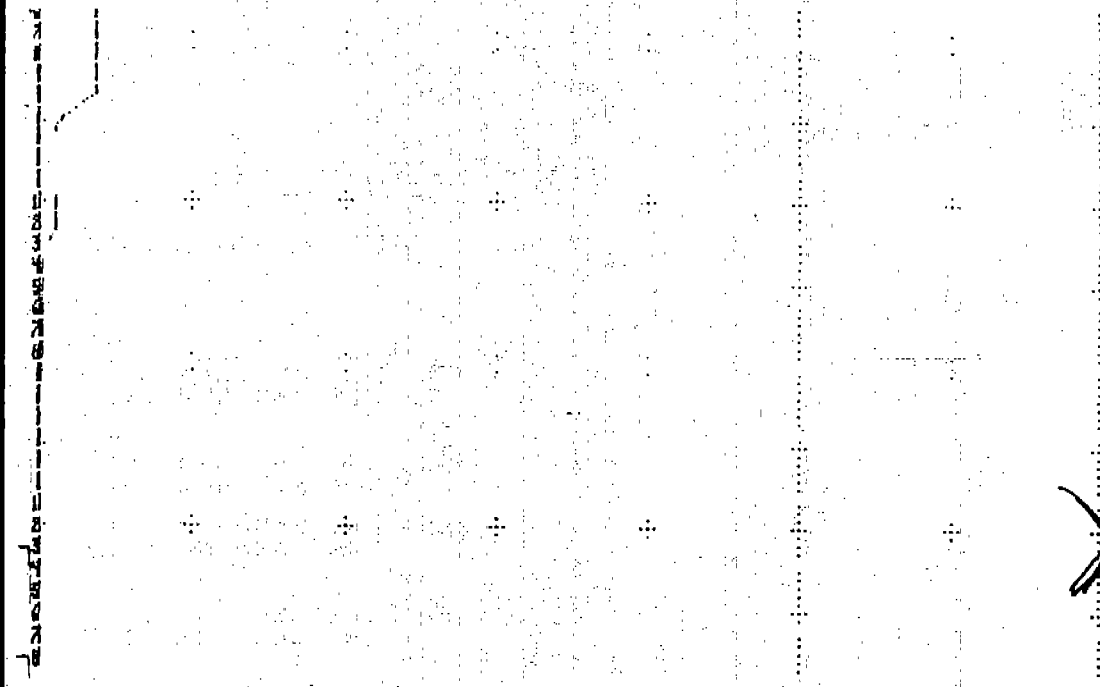
EVENT 1234	TIME H M S	1 O2 5 THC-	2 CO2 6 CO2	3 CO 7 LCO2	4 NOX 8 LCO
	09:50:56	20.610	-.10120	-2.9440	.14300
		2.6720	0.0011	-0.0049	.23100
	09:51:26	20.400	-.10450	-17.050	.14250
		2.9000	-0.0157	0.0181	.33650
	09:51:56	20.250	-0.0984	-7.5930	.12500
		2.8890	0.0097	-0.0061	0.0463
	09:52:26	.19090	-0.0946	-5.2690	.12550
		2.9410	-0.0152	0.0182	.30470
	09:52:56	.12310	-.10400	-19.100	.11510
		-.29610	-0.0432	-0.0386	.63560
	09:53:26	.12190	-0.0914	-13.110	.10910
		-.56600	-0.0115	-0.0209	.18640
	09:53:56	.11680	-0.0903	-11.760	.10600
		-.51910	-0.0005	-0.0172	.14570
	09:54:26	.10900	-0.0909	-18.820	.10580
		0.0509	-0.0319	-0.0184	.73710
	09:54:56	.12250	-0.0881	-2.5180	.10270
		-.40360	0.0177	-0.0066	.25650
	09:55:26	.11970	-0.0876	-13.720	.10460
		-.54200	-0.0032	-0.0149	.10070
	09:55:56	.12050	-0.0879	-8.1450	.10430
		-.23250	0.0071	-0.0233	-0.0266
	09:56:26	.11520	-0.0858	-3.4300	.10380
		-.25540	-0.0127	0.0090	-.28150

CHART TIME : 9:56:43 DATE : 3/22/94

1	2	3	4	5	6	7	8
0.11638	-0.085828	-6.758	0.10377	-0.4005	-0.0025678	-0.007271	0.15584



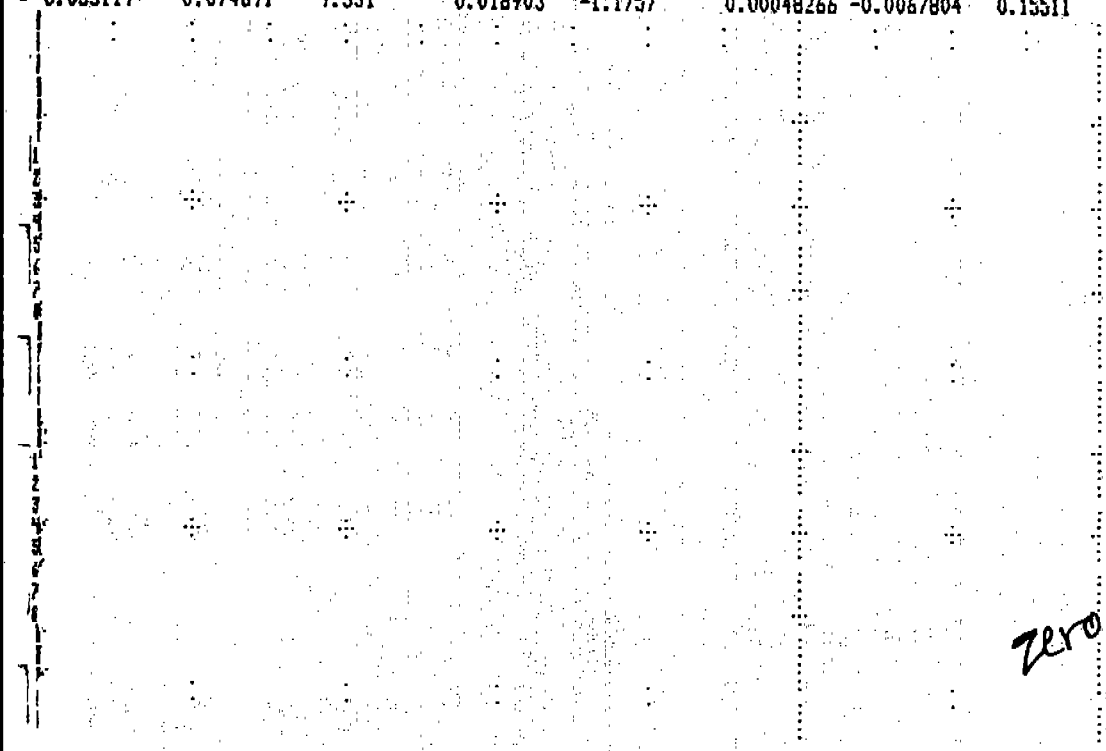
EVENT 1234	TIME H M S	1 O2 5 THC-	2 CO2 6 CO2	3 CO 7 LCO2	4 NOX 8 LCO
	09:56:56	0.0652	-0.0797	-4.5690	.10300
		.15760	0.0292	0.0126	.17250
	09:57:26	20.690	9.5210	545.80	0.0992
		-0.0469	0.0181	-0.0009	10.140
	09:57:56	20.720	10.110	591.60	15.070
		.45510	-0.0066	0.0018	407.10
	09:58:26	20.740	10.140	594.00	16.490
		136.20	0.0025	-0.0065	456.90
	09:58:56	20.730	10.160	589.60	15.900
		217.90	-0.0210	0.0240	457.20
	09:59:26	20.710	10.170	590.90	21.430
		238.40	0.0022	0.0035	455.10
	09:59:56	.10490	.78660	59.310	21.430
		-.34640	-0.0100	-0.0003	176.70
	10:00:26	0.0886	-0.0329	-3.5310	7.0630
		-2.7980	-0.0114	0.0065	1.4660



10:01:26	0.0814	-0.0589	-3.6680	1.3240
	-3.1540	-0.0011	-0.0084	.17160
10:01:56	0.0783	-0.0596	-16.560	[illegible]
	-2.5940	0.0161	-0.0087	.13760
10:02:26	0.0660	-0.0679	-6.9350	[illegible]
	.17670	-0.0106	0.0068	[illegible]
10:02:56	0.0699	-0.0744	-10.920	.23490
	.35740	0.0023	-0.0219	[illegible]
10:03:26	0.0768	-0.0683	12.710	[illegible]
	-.37320	0.0204	0.0015	[illegible]
10:03:56	0.0596	-0.0723	11.270	[illegible]
	-.59960	0.0107	0.0001	[illegible]
10:04:26	0.0662	-0.0732	11.030	[illegible]
	-1.1230	-0.0131	0.0179	.15530
10:04:56	0.0570	-0.0767	-10.01[illegible]	[illegible]
	-1.7240	-0.0522	-0.0213	[illegible]

S MARY TIME : 10:05:24 DATE : 3/22/94

1	2	3	4	5	6	7	8
0.063114	-0.074891	-4.331	0.016903	-1.1757	0.00048266	-0.0067804	0.13511

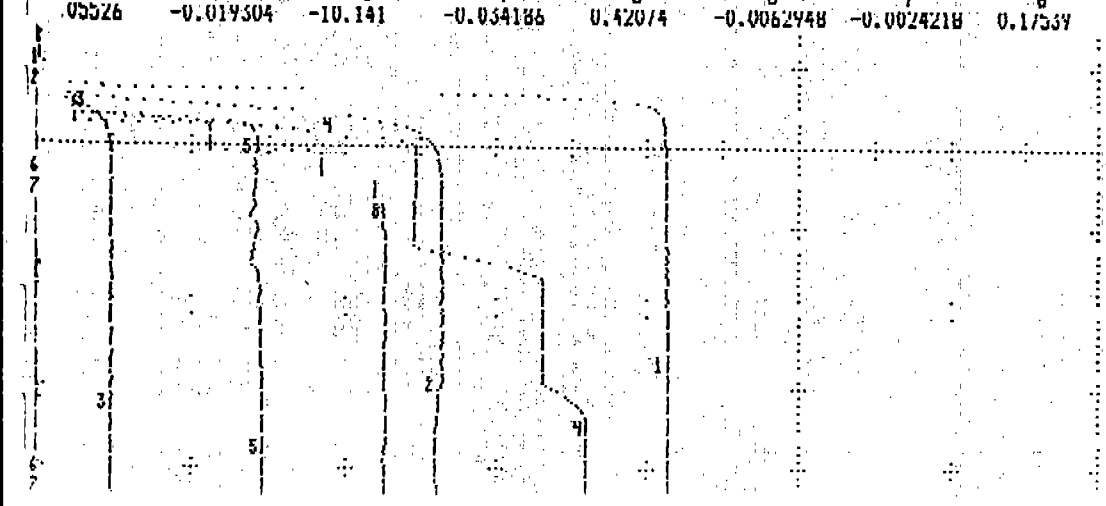


10:05:30	0.0541	-0.0771	17.260	[illegible]
	-.70830	-0.0093	0.0025	[illegible]
10:05:56	0.0527	-0.0781	0.7010	[illegible]
	-.15630	-0.0042	0.0066	.21230
10:06:26	0.0540	[illegible]	1.1500	[illegible]
	-0.0967	0.0015	0.0167	.17760
10:06:56	0.0527	-0.0200	17.120	[illegible]
	.32120	0.0191	0.0000	.17710
10:07:26	0.0531	0.0170	10.120	[illegible]
	.44460	0.0203	0.0120	.13170
10:07:56	0.0625	0.0162	9.4120	[illegible]
	.36450	0.0123	0.0130	[illegible]
10:08:26	0.0590	0.0130	11.270	[illegible]
	.44410	0.0015	0.0022	[illegible]
10:08:56	0.0514	0.0202	3.1700	[illegible]
	.31670	-0.0032	0.0325	.40700
10:09:26	0.0561	-0.0201	-11.590	[illegible]
	.63770	-0.0072	0.0233	.22130

zero

SUMMARY TIME : 10:09:48 DATE : 3/22/94

1	2	3	4	5	6	7	8
.05526	-0.019304	-10.141	-0.034186	0.42074	-0.0062948	-0.0024218	0.17537



10:09:56	0.0096	-0.0200	-21.170	[illegible]
	.34900	-0.0097	0.0141	[illegible]
10:10:26	20.640	10.300	701.60	17.010
	285.50	0.0067	0.0016	225.70
10:10:56	20.660	10.580	771.30	17.000
	285.70	-0.0100	0.0031	751.50
10:11:26	20.690	10.590	999.30	17.900
	289.10	0.0044	-0.0041	751.30
10:11:56	20.700	10.550	770.30	20.220
	291.60	0.0132	0.0027	[illegible]
10:12:26	20.710	10.720	705.10	21.500

CHART : EBA DATE : 3/22/94 TIME : 8:44:57

EVENT 1234	TIME H M S	1 O2 5 THC	2 CO2 6 SO2	3 CO 7 LOCO2	4 NOX 8 LOCO
	08:46:19	20.600 -5.2050	-.11050 0.0979	-66.650 -0.0038	-0.0234 .32750
	08:46:49	20.590 -5.1960	-.11540 0.0244	-90.380 0.0014	-0.0274 .21610

SCALE = 0.1

4 ASEN = 5

TOP

D I A N A C H A R T

INTELLIGENT RECORDER - DATALOGGER - ANALYZER

DIANACHART INC

ROCKAWAY NJ

DATE : 3/22/94 TIME : 9:11:07

ENTER THE NUMBER OF THE FUNCTION YOU WANT THEN PRESS ENTR

0 SETUP NEW PROGRAM
1 RUN 1
2 ALTER A PROGRAM
3 SET TIME AND DATE
4 DISPLAY INPUT MILLIVOLTS
5 READ PROGRAM FROM TAPE
6 STORE PROGRAM TO TAPE
7 READ PROGRAM 1 FROM RS232
8 WRITE PROGRAM TO RS232

FUNCTION 1 RUN PROGRAM 1

IF THIS IS OK JUST PRESS ENTR
IF YOU WANT TO CHANGE , PRESS 0 THEN PRESS ENTR

ENTER THE NAME OF THIS CHART , 10 CHARACTERS MAX THEN PRESS ENTR
FOR NO NAME JUST PRESS ENTR

EBA
SET PRINTER TO TOP OF PAGE THEN PRESS ENTR

3 ARY OF SETUP PARAMETERS 1 CHART : EBA

DATE : 3/22/94 TIME : 9:12:38 CHART SPEED : 2 CM/MIN

CONSTANTS

1 0	2 0	3 0	4 0	5 0	6 0
7 0	8 0	9 0	10 0	11 0	12 0

OPTIONS AVAILABLE ARE
1 PRINT TIME OF DAY
3 PRINT EVENT MARKERS
7 CALCULATION PACKAGE

CHAN	TITLE	UNITS	SCALE FACTOR		ZERO		ANALOG SENSITIVITY			ANALOG ZERO
1	O2	PCT	0.04	VOLTS/ PCT	0	PCT	2.5	PCT	/CM 0	PCT
2	CO2	PCT	0.05	VOLTS/ PCT	0	PCT	2	PCT	/CM 0	PCT
3	CO	PPM	0.0001	VOLTS/ PPM	0	PPM	1000	PPM	/CM 0	PPM
	NOX	PPM	0.01	VOLTS/ PPM	0	PPM	100	PPM	/CM 0	PPM
5	THC	PPM	0.01	VOLTS/ PPM	0	PPM	100	PPM	/CM 0	PPM
6	SO2	PPM	0.01	VOLTS/ PPM	0	PPM	10	PPM	/CM 0	PPM
	LOCO2	PCT	0.0333	VOLTS/ PCT	0	PCT	0.333	PCT	/CM 0	PCT
	LOCO	PPM	0.01	VOLTS/ PPM	0	PPM	100	PPM	/CM 0	PPM

* INDICATES AUTOMATIC RANGE CHANGE IN FOLLOWING DIGITAL CHANNEL

TO START CHART JUST PRESS RUN
TO STOP CHART JUST PRESS STOP
TO END CHART PRESS SET THEN END
TO CHANGE PARAMETERS ENTER A NUMBER THEN PRESS ENTR SEE MANUAL

1 CHART SPEED	4 PEN DROP	7 ANALOG ZERO
2 SET CHANNEL	5 ZERO	8 ANALOG SENSITIVITY
3 PEN LIFT	6 CHANNEL SCALE	9 SET CONSTANT

PRESS RUN TO START MEASUREMENT OR PRESS END TO RETURN TO START

NORMANDEAU ASSOCIATES

GAS ANALYZER ZERO/SPAN CORRECTION CALCULATIONS

CLIENT: EBA Wastechnologies
SOURCE ID: Contra Costa Landfill Flare, Antioch

TEST DATE: 22-Mar-94

Ch	ANALYTE	Calibration Gas Conc (CG) / Analyzer Full Scale	ANALYZER RESPONSE ZERO READING: start / end	ANALYZER RESPONSE ZERO READING: average / % drift	ANALYZER RESPONSE SPAN READING: start / end	ANALYZER RESPONSE SPAN READING: average / % drift	SAMPLING SYSTEM RESPONSE (C)	CORRECTED STACK GAS Concentration (Csg)
	RUN # T-1			TIME:	1054-1124			
1	O2, %	20.9	0.0553	0.0232	20.969	20.920	11.217	11.20 %
	Full scale	25	-0.0088	-0.26%	20.871	-0.39%		
2	CO2, %	10.43	-0.0193	0.0343	10.431	10.409	8.435	8.45 %
	Full scale	20	0.0878	0.54%	10.387	-0.22%		
4	NOx, ppm	20.64	-0.0342	-0.0280	20.95	20.86	14.193	14.1 ppm
	Full scale	100	-0.0218	0.01%	20.77	-0.18%		
5	THC, ppm	298.6	0.4207	0.5849	297.63	298.33	1.90	1.3 ppm
	Full scale	1000	0.7490	0.03%	299.02	0.14%	2.67	2.1 ppm
	CH4, ppm							
8	CO, ppm	451	0.1754	0.1458	451.14	450.81	23.35	23.2 ppm
	Full scale	1000	0.1162	-0.01%	450.48	-0.07%		
	RUN # T-2			TIME:	1200-1230			
1	O2, %	20.9	-0.0090	-0.0179	21.002	20.984	11.440	11.40 %
	Full scale	25	-0.0267	-0.07%	20.965	-0.15%		
2	CO2, %	10.43	0.0888	0.0589	10.417	10.454	8.489	8.46 %
	Full scale	20	0.0290	-0.30%	10.490	0.36%		
4	NOx, ppm	20.64	-0.0284	-0.0123	21.04	20.82	13.887	13.8 ppm
	Full scale	100	0.0038	0.03%	20.61	-0.43%		
5	THC, ppm	298.6	0.6117	0.9820	299.53	299.45	-0.59	-1.6 ppm
	Full scale	1000	1.3523	0.07%	299.37	-0.02%	-0.14	-1.1 ppm
	CH4, ppm							
8	CO, ppm	451	0.1283	0.1345	449.96	451.08	3.99	3.9 ppm
	Full scale	1000	0.1407	0.00%	452.19	0.22%		
	RUN # T-3			TIME:	1306-1336			
1	O2, %	20.9	-0.0298	-0.0102	20.988	20.965	11.143	11.11 %
	Full scale	25	0.0093	0.16%	20.942	-0.18%		
2	CO2, %	10.43	0.0661	0.0958	10.452	10.440	8.688	8.66 %
	Full scale	20	0.1255	0.30%	10.428	-0.12%		
4	NOx, ppm	20.64	-0.0276	-0.0278	20.56	20.58	14.772	14.8 ppm
	Full scale	100	-0.0281	-0.00%	20.59	0.02%		
5	THC, ppm	298.6	-0.0908	-0.4815	297.78	297.30	-0.34	0.14 ppm
	Full scale	1000	-0.8722	-0.08%	296.82	-0.10%		
8	CO, ppm	451	0.1248	0.1276	449.58	450.33	0.61	0.5 ppm
	Full scale	1000	0.1305	0.00%	451.08	0.15%		

Corrected gas conc, Csg = (C-Zero Avg)x(CG)/(Span Avg-Zero Avg)
% drift = 100 x (start - end)/(full scale)

RP 04/05/94

GAS ANALYZER DATA COVER SHEET

CLIENT: EBA Waste Technologies

Operator: S.A. Brown

PROJECT #: 14209.00

SOURCE DESCRIPTION: Flare

TEST DATE: 3/22/94

ANALYTE	ANALYZER MFG / MODEL	ANALYZER RANGE	TEST METHOD AGENCY	TEST METHOD #	SPAN GAS CONCENTRATION
OXYGEN	SERVOMEX 580	0 – 25			20.95 %
CARBON DIOXIDE	INFRARED 702	0 – 20			10.43 %
CARBON MONOXIDE	THERMO 48	0 – 1000			451 ppmv
NITROGEN OXIDES	THERMO 14A	0 – 100			20.64 ppmv
HYDROCARBONS	RATFISCH RS–55	0 – 1000			298.59 ppmv
SULFUR DIOXIDE	THERMO 40	0 –			N/A ppmv

LEAK CHECK DATA	TIME OF DAY	LEAKAGE FLOW RATE (scfh)	VACUUM ("Hg)
Pre–Test Leak Check	8:30	0	-13.0
Post–Test Leak Check			

RECORDED PROCESS DATA

CLIENT: EBA Wastetechnologies

Recorded By: S.A. Brown

SOURCE DESCRIPTION: flare

TEST DATE: 3/22/94

RUN #	R-1	R-2	R-3	
TIME OF DAY	10:54-11:24	12:00-12:30	13:06-13:36	

PROCESS PARAMETER	UNITS				
Flare Temp	°F	1651	1652	1658	

APPENDIX B

STRIP CHART DATA AND ZERO/SPAN CALCULATIONS

NORMANDEAU ASSOCIATES, Richmond, CA

WATER VAPOR AND VELOCITY DATA SHEET

DATE: 3/22/94
PLANT: CC Landfill
DUCT IDENTIFICATION: Plant Stack
DUCT I.D. (inches):
Port flange offset: + "

DILUENT GASES:

dry % O2
dry % CO2
dry %
% H20

BAROMETRIC PRESSURE: 29.89 "Hg

SAMPLING PERSONNEL:

PITOT TUBE Cp
GAS METER Yd 1.0122
MAG BOX #

VELOCITY TRAVERSE DATA

PITOT TRAVERSE #
TIME:
STATIC PRESSURE:

#	" From port flange	PITOT dP	TEMP °F
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12	Stack failed leg		
1	10:54	11:14	
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
Averages			

PITOT TRAVERSE #
TIME:
STATIC PRESSURE:

#	" From port flange	PITOT dP	TEMP °F
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

PITOT TRAVERSE #
TIME:
STATIC PRESSURE:

#	" From port flange	PITOT dP	TEMP °F
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

WATER VAPOR DATA

Stack R-1

TIME	METER TEMP in/out	METER VOLUME cu ft	PUMP VACUUM "Hg	ORIFICE dH "H2O
11:35	74/70	129.637	-7	2.0
11:40 5	78/76			
11:45 10	79/77	134.0		
50 15	77/76	138.1		
55 20	74/73	142.2		
12:00 25	72/70	146.3		
12:05 30	71/69	150.898		
avg/net				

Initial impinger volume 200 ml
Final impinger volume 223 ml
Silica gel weight 3.6 g
POST LEAK CHECK Ø CFM @ 15 "Hg

R-2

TIME	METER TEMP in/out	METER VOLUME cu ft	PUMP VACUUM "Hg	ORIFICE dH "H2O
12:10	66/63	150.635	-7	2.0
15 5	65/62	154.7		
20 10	68/61	158.9		
25 15	73/63	163.4		
30 20	74/64	168.1		
35 25	74/64	172.0		
40 30	75/65	175.932		
avg/net				

Initial impinger volume 200 ml
Final impinger volume 237 ml
Silica gel weight 4.3 g
POST LEAK CHECK CFM @ "Hg

NORMANDEAU ASSOCIATES, Richmond, CA

WATER VAPOR AND VELOCITY DATA SHEET

DATE: 3/22/94
PLANT: CC Landfill
DUCT IDENTIFICATION: flare inlet
DUCT I.D. (inches):
Port flange offset: +

DILUENT GASES:
dry % O2
dry % CO2
dry %
% H20

BAROMETRIC PRESSURE: " Hg

SAMPLING PERSONNEL:

PITOT TUBE Cp 0.99
GAS METER Yd 1.0122
MAG BOX # M4

VELOCITY TRAVERSE DATA

PITOT TRAVERSE # R-1
TIME: 11:15
STATIC PRESSURE: +4.5"

#	" From port flange	PITOT dP	TEMP °F
1	1.0	.58	104
2	2.0	.63	
3	6.0	.67	
4	7.0	.67	
5			
6			
7			
8			
9			
10			
11			
12			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
Averages			

Incin 1652°F

PITOT TRAVERSE # R-2
TIME: 11:45
STATIC PRESSURE: 4.5

#	" From port flange	PITOT dP	TEMP °F
1	1.0	.65	105
2	2.0	.68	
3	6.0	.67	
4	7.0	.70	
5			
6			
7			
8			
9			
10			
11			
12			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

1651°F

PITOT TRAVERSE # R-3
TIME: 12:15
STATIC PRESSURE: 4.5

#	" From port flange	PITOT dP	TEMP °F
1	1.0	.63	101
2	2.0	.65	
3	6.0	.67	
4	7.0	.67	
5			
6			
7			
8			
9			
10			
11			
12			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

1651

WATER VAPOR DATA

R-1

TIME	METER TEMP in/out	METER VOLUME cu ft	PUMP VACUUM " Hg	ORIFICE dH " H2O
0931	64/62	78.698	-7	2.0
36 5	71/69			
41 10	73/70	87.2		
46 15	77/72	91.0		
51 20	80/74	95.9		
56 25	80/73	99.4		
1001 30	79/73	103.562		
avg/net				

Initial impinger volume 200 ml
Final impinger volume 214 ml
Silica gel weight 5.6 g
POST LEAK CHECK Ø CFM @ 15 "Hg

R-2

TIME	METER TEMP in/out	METER VOLUME cu ft	PUMP VACUUM " Hg	ORIFICE dH " H2O
10:08	75/71	103.651	-7	2.0
:13 5	77/73	107.9		
:18 10	78/73	113.0		
:23 15	80/73			
:28 20	80/73	120.9		
:33 25	82/74	125.2		
:38 30	82/74	129.624		
avg/net				

Initial impinger volume ml
Final impinger volume 212 ml
Silica gel weight 5.8 g
POST LEAK CHECK Ø CFM @ 15 "Hg

WATER VAPOR AND FLOW CALCULATIONS

Test Date: 22-Mar-94

EBA WASTECHNOLOGIES

CONTRA COSTA LANDFILL FLARE

FLARE STACK RUN # R-1

Gas meter calibration, Yd = 1.0122
Pitot tube factor =

Stack diameter = "
Barometric pressure = 29.89 " Hg
Stack static pressure = " H2O
Avg. Oxygen conc. = 11.2 %
Avg. Carbon Dioxide conc. = 8.5 %
Avg. Methane conc. = 0.0 %
Avg. Nitrogen conc. = 80.4 %

Condensate volume = 23 ml
Silica gel weight = 3.6 g

VELOCITY TRAVERSE DATA

TRAVERSE POINT #	PITOT PRESSURE DROP ("H2O)	STACK TEMP (°F)	STACK VELOCITY (ft/sec)
1			
2			
3			
4			
AVG	ERR	ERR	ERR

MOISTURE SAMPLE DATA

TIME of DAY	METER TEMP IN (°F)	METER TEMP OUT (°F)	METER VOLUME (ft³)	PUMP VACCUM ("H2O)	ORIFICE PRESSURE ("H2O)
11:35	74	70	129.637	-7.0	2.0
11:40	78	76		-7.0	2.0
11:45	79	77		-7.0	2.0
11:50	77	76		-7.0	2.0
11:55	74	73		-7.0	2.0
12:00	72	70		-7.0	2.0
12:05	71	69	150.598	-7.0	2.0
AVG/NET		74	20.961	-7.0	2.0

CALCULATED VALUES

Stack area =
Water vapor percent = 5.6 %
Standard sample volume = 21.06 DSCF
Dry gas MWd = 29.92 g/gmol
Stack gas MWs = 29.25 g/gmol
Stack pressure, Ps = 29.89 " H2O
Actual flow rate = ft³/min

Dry Std Flow Rate = DSCFM

RP 04-Apr-94

WATER VAPOR AND FLOW CALCULATIONS

Test Date: 22-Mar-94

EBA WASTECHNOLOGIES

CONTRA COSTA LANDFILL FLARE

FLARE STACK RUN # R-2

Gas meter calibration, Yd = 1.0122
Pitot tube factor =

Stack diameter = "
Barometric pressure = 29.89 " Hg
Stack static pressure = " H2O
Avg. Oxygen conc. = 11.4 %
Avg. Carbon Dioxide conc. = 8.5 %
Avg. Methane conc. = 0.0 %
Avg. Nitrogen conc. = 80.1 %

Condensate volume = 37 ml
Silica gel weight = 4.3 g

VELOCITY TRAVERSE DATA

TRAVERSE POINT #	PITOT PRESSURE DROP ("H2O)	STACK TEMP (°F)	STACK VELOCITY (ft/sec)
1			
2			
3			
4			
AVG	ERR	ERR	ERR

MOISTURE SAMPLE DATA

TIME of DAY	METER TEMP IN (°F)	METER TEMP OUT (°F)	METER VOLUME (ft³)	PUMP VACCUM ("H2O)	ORIFICE PRESSURE ("H2O)
12:10	66	63	150.635	-7.0	2.0
12:15	65	62		-7.0	2.0
12:20	68	61		-7.0	2.0
12:25	73	63		-7.0	2.0
12:30	74	64		-7.0	2.0
12:35	74	64		-7.0	2.0
12:40	75	65	175.932	-7.0	2.0
AVG/NET		66.9	25.297	-7.0	2.0

CALCULATED VALUES

Stack area =
Water vapor percent = 7.0 %
Standard sample volume = 25.76 DSCF
Dry gas MWd = 29.93 g/gmol
Stack gas MWs = 29.09 g/gmol
Stack pressure, Ps = 29.89 " H2O
Actual flow rate = ft³/min

Dry Std Flow Rate = DSCFM

RP 04-Apr-94

NORMANDEAU ASSOCIATES

WATER VAPOR AND FLOW CALCULATIONS

Test Date: 22-Mar-94

EBA WASTECHNOLOGIES

CONTRA COSTA LANDFILL FLARE

INLET DUCT RUN # R-2

Gas meter calibration, Yd =	1.0122
Pitot tube factor =	0.99
Stack diameter =	7.875 "
Barometric pressure =	29.89 " Hg
Stack static pressure =	4.5 " H2O
Avg. Oxygen conc. =	5.4 %
Avg. Carbon Dioxide conc. =	26.0 %
Avg. Methane conc. =	32.0 %
Avg. Nitrogen conc. =	37.0 %
Condensate volume =	12 ml
Silica gel weight =	5.8 g

VELOCITY TRAVERSE DATA

TRAVERSE POINT #	PITOT PRESSURE DROP ("H2O)	STACK TEMP (°F)	STACK VELOCITY (ft/sec)
1	0.65	105	55.5
2	0.68	105	56.8
3	0.67	105	56.3
4	0.70	105	57.6
AVG	0.68	105	56.6

MOISTURE SAMPLE DATA

TIME of DAY	METER TEMP IN (°F)	METER TEMP OUT (°F)	METER VOLUME (ft³)	PUMP VACCUM ("H2O)	ORIFICE PRESSURE ("H2O)
10:08	75	71	103.651	-7.0	2.0
10:13	77	73		-7.0	2.0
10:18	78	73		-7.0	2.0
10:23	80	73		-7.0	2.0
10:28	80	73		-7.0	2.0
10:33	82	74		-7.0	2.0
10:38	82	74	129.624	-7.0	2.0
AVG/NET		76.1	25.973	-7.0	2.0

CALCULATED VALUES

Stack area =	0.34 ft2
Water vapor percent =	3.1 %
Standard sample volume =	26.00 DSCF
Dry gas MWd =	28.59 g/gmol
Stack gas MWs =	28.26 g/gmol
Stack pressure, Ps =	30.22 " H2O
Actual flow rate =	1,148 ft³/min
Dry Std Flow Rate =	1,050 DSCFM

RP 04-Apr-94

NORMANDEAU ASSOCIATES

WATER VAPOR AND FLOW CALCULATIONS

Test Date: 22-Mar-94

EBA WASTECHNOLOGIES

CONTRA COSTA LANDFILL FLARE

INLET DUCT RUN # R-3

Gas meter calibration, Yd =	1.0122
Pitot tube factor =	0.99
Stack diameter =	7.875 "
Barometric pressure =	29.89 " Hg
Stack static pressure =	4.5 " H2O
Avg. Oxygen conc. =	5.2 %
Avg. Carbon Dioxide conc. =	27.0 %
Avg. Methane conc. =	32.0 %
Avg. Nitrogen conc. =	36.0 %
Condensate volume =	ml
Silica gel weight =	g

MOISTURE SAMPLE DATA

TIME of DAY	METER TEMP IN (°F)	METER TEMP OUT (°F)	METER VOLUME (ft³)	PUMP VACCUM ("H2O)	ORIFICE PRESSURE ("H2O)
AVG/NET	ERR	0.000	ERR	ERR	

VELOCITY TRAVERSE DATA

TRAVERSE POINT #	PITOT PRESSURE DROP ("H2O)	STACK TEMP (°F)	STACK VELOCITY (ft/sec)
1	0.63	101	54.3
2	0.65	101	55.2
3	0.67	101	56.0
4	0.67	101	56.0
AVG	0.66	101	55.4

CALCULATED VALUES

Stack area =	0.34 ft2
Water vapor percent =	3.3 %
Standard sample volume =	ERR DSCF
Dry gas MWd =	28.74 g/gmol
Stack gas MWs =	28.38 g/gmol
Stack pressure, Ps =	30.22 " H2O
Actual flow rate =	1,124 ft³/min
Dry Std Flow Rate =	1,033 DSCFM

RP 04-Apr-94

SOURCE SAMPLING CALCULATIONS

ABBREVIATIONS:

A_n = Nozzle area, ft^2
A_s = Stack area, ft^2
C_p = Pitot tube correction factor
DH = Orifice pressure drop, "H_2O
DH@ = Orifice coefficient
D_n = Nozzle diameter, in
DP = Pitot tube pressure drop, "H_2O
dt = Sample duration, min
P_b = Barometric pressure, "Hg
P_m = Meter absolute pressure = P_b + (DH/13.6), "Hg
PM = Mass particulate matter collected, g
P_s = Stack static pressure, "H_2O gauge
P_s = Stack absolute pressure = P_b + (P_s/13.6), "Hg
T_m = Meter temperature, °R
T_s = Stack temperature, °R
V_{lc} = Condensed water volume, ml
V_m = Uncorrected Meter Volume, ft^3
Y_d = Gas Meter Calibration Factor
W_{sg} = Mass of water collected on silica gel, g

EQUATIONS:

V_o = Standard sample volume = V_m x Y_d x (P_m/29.92) x (528/T_m), DSCF
V_w = Water vapor volume = V_{lc} x 0.04707 + 0.04715 x W_{sg}, SCF
B_{ws} = % Water vapor = 100 x V_w / (V_w + V_o)

M_d = Dry gas molecular wt = 0.44 (%CO_2) + 0.32 (%O_2) + 0.2815 (100-%O_2-%CO_2)
M_s = Stack gas molecular wt = M_s x (1 - B_{ws}/100) + 18 x (B_{ws}/100)

v_s = Stack velocity = 85.49 x C_p x SQRT{(DP x T_s)/(P_s x M_s)}, ft/sec
Q_a = Actual stack flow rate = 60 x v_s x A_s, ACFM
Q_s = Dry Standard flow rate = Q_a x (1-B_{ws}/100) x (528/T_s) x (P_s/29.92), DSCFM

$$\%I = \text{Isokinetic variation} = \frac{100 \times T_s \times [0.002669(V_{lc}+W_{sg}) + V_m \times Y_d \times P_m / T_m]}{60 \times dt \times v_s \times P_s \times A_n}$$

PM_c = Particulate concentration = PM x (7000/453.6) / V_o, grains/DSCF
PM_e = Particulate emission rate = (PM_c/7000) x Q_s x 60, lb/hr

Isokinetic rate equation:

$$DH = DP \times [846.72 \times (D_n)^4 \times DH@ \times (C_p)^2 \times (1-B_{ws})^2 \times (M_d/M_s) \times (T_m/T_s) \times (P_s/P_m)]$$

NORMANDEAU ASSOCIATES

WATER VAPOR AND FLOW CALCULATIONS

Test Date: 22-Mar-94

EBA WASTECHNOLOGIES

CONTRA COSTA LANDFILL FLARE

INLET DUCT RUN # R-1

Gas meter calibration, Yd =	1.0122
Pitot tube factor =	0.99
Stack diameter =	7.875 "
Barometric pressure =	29.89 " Hg
Stack static pressure =	4.5 " H2O
Oxygen conc. =	5.3 %
Carbon Dioxide conc. =	27.0 %
Methane conc. =	32.0 %
Nitrogen conc. =	36.0 %
Condensate volume =	14 ml
Silica gel weight =	5.6 g

VELOCITY TRAVERSE DATA

TRAVERSE POINT #	PITOT PRESSURE DROP ("H2O)	STACK TEMP (°F)	STACK VELOCITY (ft/sec)
1	0.58	104	52.3
2	0.63	104	54.5
3	0.67	104	56.2
4	0.67	104	56.2
AVG	0.64	104	54.8

MOISTURE SAMPLE DATA

TIME of DAY	METER TEMP IN (°F)	METER TEMP OUT (°F)	METER VOLUME (ft³)	PUMP VACCUM ("H2O)	ORIFICE PRESSURE ("H2O)
09:31	64	62	78.698	-7.0	2.0
09:36	71	69		-7.0	2.0
09:41	73	70		-7.0	2.0
09:46	77	72		-7.0	2.0
09:51	80	74		-7.0	2.0
09:56	80	73		-7.0	2.0
10:01	79	73	103.562	-7.0	2.0
AVG/NET		72.6	24.864	-7.0	2.0

CALCULATED VALUES

Stack area =	0.34 ft2
Water vapor percent =	3.6 %
Standard sample volume =	25.05 DSCF
Dry gas MWd =	28.75 g/gmol
Stack gas MWs =	28.36 g/gmol
Stack pressure, Ps =	30.22 " H2O
Actual flow rate =	1,112 ft³/min
Dry Std Flow Rate =	1,015 DSCFM

RP 04-Apr-94

TABLE II: EMISSION RATES AND DESTRUCTION OF CALDERON ATTACHMENT 1 COMPOUNDS

CLIENT: EBA Wastechnologies
SOURCE: CONTRA COSTA LANDFILL FLARE, Antioch, CA
TEST DATES: March 22 & April 22, 1994

PARAMETERS			FLARE INLET DATA						FLARE STACK DATA						DESTRUCTION EFFICIENCY
Process flow rate, dscfm								1,033						7,108	
CALDERON ATTACHMENT 1	Lab Blank	Molecular	INDIVIDUAL SAMPLES				AVERAGES		INDIVIDUAL SAMPLES				AVERAGES		
ORGANIC COMPOUNDS	ppbv	Weight	ppbv	ppbv	ppbv	ppbv	ppbv	lb/hr	ppbv	ppbv	ppbv	ppbv	ppbv	lb/hr	
TEST DATE			3/22	4/22	4/22	4/22			3/22	4/22	4/22	4/22			
RUN #				R-1	R-2	R-3				R-1	R-2	R-3			
Vinyl chloride	nd	62.5	2000	2100	2000	2100	2050	0.0200	< 1.1	< 0.4	< 0.7	< 0.8	<0.75	< 0.00005	> 99.7%
Methylene chloride	0.38	84.9	1100	1100	830	750	945	0.0150	850	260	500	410	505	0.04724	-216%
Chloroform	nd	119.4	5.7	nd	nd	nd			nd	nd	nd	nd			nd
1,1,1-Trichloroethane	nd	133.4	81	65	65	67	70	0.0017	< 1.1	< 0.4	< 0.7	< 0.8	<0.75	< 0.00011	> 93.6%
Carbon tetrachloride	nd	153.8	nd	nd	nd	nd			nd	nd	nd	nd			nd
Benzene	nd	78.1	840	730	730	790	773	0.0105	2.4	6.0	2.7	1.6	3.7	0.00021	98.0%
1,2-Dichloroethane	nd	99.0	nd	nd	nd	nd			nd	nd	nd	nd			nd
Trichloroethene	nd	131.4	660	740	750	800	738	0.0139	< 1.1	< 0.4	< 0.7	< 0.8	<0.75	< 0.00011	> 99.2%
Tetrachloroethene	nd	165.8	590	500	540	560	548	0.0157	< 1.1	< 0.4	< 0.7	< 0.8	<0.75	< 0.00014	> 99.1%
Ethylene dibromide	nd	187.9	nd	nd	nd	nd			nd	nd	nd	nd			nd
Total chlorinated hydrocarbons	0.38	118.8	4437	4505	4185	4277	4350	0.0827	850	260	500	410	505	0.04724	42.9%
Detection limit, ppbv	0.20		3.4	5.0	5.0	5.0			1.1	0.40	0.72	0.80			

lb/hr = (ppbv/1000) x MW x DSCFM x 1.55 E-7

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APPENDIX A

FIELD DATA SHEETS, FLOW RATE AND MOISTURE CALCULATIONS

TABLE I: CRITERIA POLLUTANT EMISSION RATES AND DESTRUCTION EFFICIENCY

CLIENT: EBA Wastechnologies
SOURCE ID: CONTRA COSTA LANDFILL FLARE
TEST DATE: March 22, 1994

PARAMETERS	RUN NUMBER R-1	R-2	R-3	AVERAGES
TIME OF DAY	1054-1124	1200-1230	1306-1336	
DURATION OF RUN, min	30	30	30	
FLARE STACK DATA				
FLARE TEMPERATURE, °F	1651	1652	1658	1654
EXHAUST FLOW RATE, DSCFM	7087	7199	7038	7108
OXYGEN, dry %	11.2	11.4	11.1	11.2
CARBON DIOXIDE, dry %	8.5	8.5	8.7	8.5
WATER, %	5.6	7.0	--	6.3
CARBON MONOXIDE				
Concentration, ppmv	23.2	3.9	0.5	9.2
Emission rate, lb/hr	0.71	0.12	0.02	0.28
Emission rate, lb/day	17.1	2.9	0.4	6.8
OXIDES OF NITROGEN (Emission rate as NO2)				
Concentration, ppmv	14.1	13.8	14.8	14.2
Emission rate, lb/hr	0.71	0.71	0.74	0.72
Emission rate, lb/day	17.1	17.0	17.8	17.3
NON-METHANE ORGANIC CARBON (Emission rate as C1)				
Total hydrocarbons, ppmv	1.3	< 1	< 1	< 1
Methane, ppmv	2.1	< 1	< 1	< 1
NMOC Concentration, ppmv	< 1	< 1	< 1	< 1
Emission rate, lb/hr	< 0.01	< 0.01	< 0.01	< 0.01
Emission rate, lb/day	< 0.3	< 0.3	< 0.3	< 0.3
FLARE INLET DUCT DATA				
INLET FLOW RATE, dscfm	1015	1050	1033	1033
INLET TEMPERATURE, °F	104	105	101	103
OXYGEN, dry %	5.3	5.4	5.2	5.3
NITROGEN, dry %	36	37	36	36
CARBON DIOXIDE, dry %	27	26	27	27
METHANE, dry %	32	32	32	32
WATER VAPOR, %	3.6	3.1	--	3.4
NON-METHANE HYDROCARBONS				
Concentration, ppmv	1770	1830	1920	1840
Mass emission rate, lb/hr	3.34	3.57	3.69	3.53
DESTRUCTION EFFICIENCY, %	> 99.7	> 99.7	> 99.7	> 99.7

lb/hr = ppm x MW x dscfm x 1.551 E-7

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TABLE II

EMISSION RATES OF CALDERON ATTACHMENT 1 COMPOUNDS

SAMPLING PROCEDURES:

The following standard EPA and Bay Area AQMD source test methods were followed.

Agency	Ref. No.	Title
EPA	TO-14	Sampling Protocol for Attachment 1 Compounds
BAAQMD	ST-5	Carbon Dioxide, Continuous Monitoring
BAAQMD	ST-6	Carbon Monoxide, Continuous Monitoring
BAAQMD	ST-7	Non-Methane Hydrocarbons, Continuous Monitoring
BAAQMD	ST-13A	Oxides of Nitrogen, Continuous Monitoring
BAAQMD	ST-14	Oxygen, Continuous Monitoring
BAAQMD	ST-17	Stack Velocity & Volumetric Flow Rate
BAAQMD	ST-18	Stack Traverse, Point Determination
BAAQMD	ST-23	Water Vapor Sampling

Because of the high concentrations of methane and carbon dioxide at the flare inlet, tedlar bag samples were collected and analyzed for atmospheric gases and non-methane organic carbon (ASTM D-3416) to obtain the inlet data for determining flow rates and destruction efficiency. Tedlar bag samples were also collected at the flare inlet and outlet, and were analyzed for the Calderon Attachment 1 compounds in accordance with EPA Method TO-14.

The concentrations of CO_2, CO, O_2, NO_x, and total non-methane hydrocarbons were measured in the flare stack outlet using the following continuous gas analyzers:

Servomex Model 580 Paramagnetic Oxygen Analyzer
Infrared Industries Model 702 NDIR CO_2 Analyzer
TECO Model 14A Chemiluminescent $NO/NO_2/NO_x$ Analyzer
Ratfisch RS55CA Flame Ionization Hydrocarbon Analyzer
TECO Model 48 GFC/NDIR CO Analyzer

The field data sheets, calculations, analyzer data, lab data and calibrations are presented in the appendices.

TABLE I

CRITERIA POLLUTANT EMISSION RATES AND NMOC DESTRUCTION EFFICIENCY

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TABLE II Emissions Rates and Destruction of Calderon Attachment 1 Compounds

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APPENDIX A Field Data Sheets and Flow Rate and Moisture Calculations

APPENDIX B Strip Chart Data and Zero/Span Calculations

APPENDIX C Laboratory Data

APPENDIX D Calibration Data and Gas Certifications

INTRODUCTION:

EBA Wastechnologies contracted with Normandeau Associates to measure the emissions of oxides of nitrogen, carbon monoxide, total non-methane organic carbon, and the Calderon Attachment 1 toxic compounds from the gas flare at the Contra Costa Landfill in Antioch, California. It was also the objective to measure the destruction efficiency of the flare.

The tests were performed on March 22, 1994 by Richard Parker and Scott Brown of Normandeau Associates, Inc. (NAI). Calderon compound data were collected again on April 22, 1994 to verify the March 22, 1994 results.

SUMMARY OF RESULTS:

The emission rates of the criteria pollutants: oxides of nitrogen, carbon monoxide and total non-methane organic carbons (NMOC) from the gas flare are summarized in Table I. Also Table I presents data for the composition of gases entering the flare, and the flare destruction efficiency.

Table II presents the data for the Calderon Attachment 1 compounds both at the inlet and outlet of the flare. With the exception of methylene chloride, all Calderon compounds that were present appeared to be destroyed effectively by the flare.

DESCRIPTION OF SOURCE:

The source is an enclosed flare that burns landfill gas extracted from the Contra Costa Landfill. Landfill gas is collected and pumped through an 8-inch diameter PVC pipe into the flare stack. Since the previous test in September, 1993 a new flare burner was installed.

The velocity inside the flare stack was too small to measure directly. Instead the flow rate entering the flare was measured, and the gas compositions entering and exiting the flare were used to calculate the flare volumetric flow rate by carbon balance.