



HEALTH AND SAFETY EXECUTIVE

HEAVY GAS DISPERSION TRIALS THORNEY ISLAND 1982-3

DATA FOR TRIAL 019/1

Research and Laboratory Services Division
Red Hill, Sheffield S3 7HQ Tel: 0742 78141

8 Trials 24 to 29

The correct heights for the gas sensors on the mast at (372,228) are 0.4, 2.4 and 4.4 metres, not 0.4, 1.4 and 2.4 as shown. In trials 26 and 27, where the mast was in the cloud, gas was detected at a height 2.4 m as shown on page G05. The height shown on page G05 is therefore correct.

9 Trial 23

Pages E05 and E17 have been inverted. Although the page numbers are incorrect, the positional information on the plots is correct.

10 Trials 26 to 28

The key to the instrument list shows

BE = Building east side i.e. to right of axis

BW = Building west side i.e. to left of axis

This should be

BE = Building east side i.e. to left of axis

BW = Building west side i.e. to right of axis

I shall be pleased to answer any queries arising from the above changes.

B ROEBUCK
HGDT Project Manager
Health and Safety Executive
Safety Engineering Laboratory
Broad Lane, Sheffield S3 7HQ

Tel 0742 78141

HEALTH AND SAFETY EXECUTIVE

HEAVY GAS DISPERSION TRIALS
THORNEY ISLAND 1982-3

Data for Trial 019/I

Research and Laboratory Services Division
Red Hill, Sheffield S3 7HQ



Health & Safety Executive

Red Hill
Broad Lane
Sheffield S3 7HQ
Telephone 0742 78141
ext _____
Telex 668113

Telex No 54556

Your reference

Our reference

Date

COMMERCIAL IN CONFIDENCE

This report is issued to sponsors of the trials on a commercial in confidence basis and must not be released before 1 January 1984

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at:	20:41:00 hrs
Freon 12/Nitrogen mixture: relative density	2.12
Number of smoke canisters discharged:	2
Mean Wind Speed at 10 m height:	
During main data collection period:	6.4 m/s
From 5 minute cyclic data just before the release:	7.0 m/s
Mean Wind Heading ('A' station) - (relative to the centre line of the array)	30.2°
NB Positive angles are to the right (clockwise) of the centre line when looking downwind of the gas bag.	
Relative Humidity (at 10 m height)	94.8%
Insolation	18 W/m ²
Ambient Air Temperature (at 9 m height)	13.3°C
Treated Runway Surface Temperature	13.6°C
Grass Surface Temperature	13.0°C
Observed Cloud Cover	3/8

STABILITY CONDITION

D/E	(From Observations)
E	(From DT/DZ)
D	(From Solarimeter)
D	(From Heat Flux)
F	(From Richardson No)
D	(From Bulk Richardson No)
D	(From Standard Deviation of Wind Heading)

Stability condition inferred from data during the release and just before the release: D/E

HISTORY

This spill was carried out about four and a half hours after spill 018. During the time between the two spills, the mean wind speed at first varied between 7 and 8 m/s and the heading slowly swung further round to the right of the array centre-line. Insolation steadily decreased as the sun set, so that by the time gas was released (quite late in the evening at 20:40 hrs) insolation was very low. During the hour or so before gas was released, the wind speed dropped a little such that, at the time of the spill, it was 6.4 m/s; the wind heading was then about 30° to the right of the array centre-line. These conditions then led to an atmospheric stability which was judged to be about Pasquill category 'D/E'.

THORNEY ISLAND HEAVY GAS DISPERSION TRIALS

Notes on information presented in the Summary Sheets

1 ATMOSPHERIC STABILITY

The atmospheric stability during the period of the experiment was obtained from the following methods:

i) Visual Observation

This is based on the amount of cloud cover, or the judged level of incoming solar radiation and the value of the wind speed (see attached table provided by the Meteorological Office).

ii) Temperature Difference (DT/DZ)

This method is one of the two suggested by the US Nuclear Regulatory Commission and in the present exercise was calculated as:

$$\frac{DT}{DZ} = \frac{T_{30} - T_9}{21} * 100.00$$

The NRC tables, see e.g. Sedefian and Bennett^[1] or McQuaid^[2] were then consulted to determine the appropriate stability.

iii) Solarimeter

The measured insolation, from the solarimeter, was used together with the wind speed to determine the stability based on the information presented in Pasquill^[3] (Figure 6.13).

iv) Heat Flux

Heat flux (H) was calculated from the insolation (R) by the formula $H = 0.4(R-100)$ based on the suggestion by Smith^[4]. Pasquill's^[3] Figure 6.13 was then consulted to determine the stability. This method therefore agrees generally with the previous method.

v) Richardson Number

The Richardson number is calculated according to Sedefian and Bennett^[1] as:

$$R_i = \frac{g(D\theta/DZ)}{T(DU/DZ)^2}$$

where θ is the potential temperature and T is the actual temperature; in this case, the temperature at 16 m above the ground. $D\theta/DZ$ was calculated as:

$$\frac{T_{30} - T_9}{21} + 0.00986$$

$$\frac{DU}{DZ} \text{ was calculated as } \frac{U_{30} - U_{10}}{20}$$

Sedefian and Bennett calculate the limits of Richardson number for the various stability categories, however the limits they presented were valid for measurements at heights whose geometric mean was 22 m. Since the measurement stations were at 30 m, 9 m and 16 m the limits of Richardson number for the various stability categories were recalculated to correspond to a geometric mean height of 16 m.

vi) Bulk Richardson Number

The bulk Richardson number was also calculated according to Sedefian and Bennett^[1] as:

$$R_{i\infty} = \frac{g(D\theta/DZ)\bar{Z}^2}{T \bar{U}^2}$$

where $\bar{Z}$ is the geometric mean height = $\sqrt{9 \times 30}$
 T is the temperature at 16 m above the ground
and $\bar{U}$ is the mean wind speed at 30 m.

Here again the limits of $R_{i\infty}$ were recalculated to correspond to a geometric mean height of 16 m.

vii) Standard Deviation of Wind Heading

The standard deviation of wind heading was calculated from the Porton wind vane, which has a resolution bandwidth of 11°. The resulting accuracy is predicted to be around ±2° or so, assuming a Gaussian distribution of wind direction. These estimates were compared with the simple assumption that the standard deviation is approximately 1/6 (maximum-minimum angle).

The NRC limits for σ_θ are then used to determine the appropriate stability category.

2 WIND SPEED

Two values of wind speed are presented. The first is the mean value at the 10 m height for the first 10 minutes of the data collection period, which generally began about one minute before the gas bag was dropped.

The second wind speed is also a mean value obtained at the 10 m height, but corresponds to data taken over a five minute period just before main data collection began; data during this period is termed the 'cyclic' data.

REFERENCES

- 1 Sedefian L and Bennett E (1980) "A comparison of Turbulence classification schemes". Atmospheric Environment, Vol 14, No 7, pp741-750.
- 2 McQuaid J (1981) "Climatological records from the Thorney Island mast". Commercial in Confidence HGDT Report 1981/6.
- 3 Pasquill F (1974) "Atmospheric Diffusion" 2nd Ed. Published by Ellis Horwood Ltd, Chichester.
- 4 Smith F B (1979) "The relation between Pasquill stability P and Kazanski-Monin stability (in neutral and unstable conditions). Atmospheric Environment, Vol 13 pp879-881.

MODIFIED PASQUILL STABILITY CATEGORIES

Wind Speed (kt)	DAYTIME (excluding 1 hour after sunrise and 1 hour before sunset)				Within 1 hour before sunset or after	NIGHT-TIME		
	Incoming Solar Radiation ($W\ m^{-2}$)					Cloud Amount (oktas)		
	Strong (>600)	Mod (300-600)	Slt (<300)	Overcast		0-3	4-7	8
<3	A	A-B	B	C	D	F or G see note 2 below	F	D
4-5	A-B	B	C	C	D	F	E	D
6-9	B	B-C	C	C	D	E	D	D
10-12	C	C-D	D	D	D	D	D	D
>12	C	D	D	D	D	D	D	D

Notes

- 1 Night was originally defined to include periods of one hour before sunset and after sunrise. These two hours are always categorised here as D.
- 2 Pasquill said that in light winds on clear nights the vertical spread may be less than for category F but excluded such cases because the surface plume is unlikely to have any definable travel. However, they are important from the point of view of the build up of pollution and category G (night-time, 0 or 1 okta of cloud, wind speed 0 or 1 kt) has been added.
- 3 1 kt = 0.52 m/s.

KEY TO GRAPHS

1 AVERAGING TIME

Length of the time window over which mean values have been calculated for the purpose of the plots. Since the full record contains 20 samples per second, an averaging time of 0.6 seconds gives the arithmetic mean of 12 samples of the original signal. Note that it is not a running average but a 'box' window which is moved through the data in increments of the averaging time.

2 X:Y:Z

The location in metres of the sensor on the trials site. The (X,Y) axes are defined by the grid of fixed masts, the release point is at X = 400 metres, Y = 200 metres. The Z axis defines the height of the sensor on the mast at location (X, Y) - see mast array. Note that the Z axis is defined by measurement from the mast base and is not absolute in the sense that it takes no account of any slope of the trials site.

3 TYPE

Defines the type of sensor which generated the data shown in the plots.

GAS:	Standard oxygen deficiency sensor Frequency response 1 Hz (at - 3 dB point)
HGAS:	High speed oxygen deficiency sensor Frequency response 10 Hz (at - 3 dB point)
SMOK:	High speed light scattering smoke sensor Frequency response 10 Hz (at - 3 dB point)
WSPD:	Wind heading as indicated by wind vanes in degrees relative to the site axis. Positive values are to the right of the site axis (looking 'downwind' from the source) and negative values to the left.
AIRT:	Air temperature in degrees centigrade
SOLA:	Solar radiation as measured by solarimeter in watts/square metre.
BROM:	Barometric pressure measured in millibars.
TEMP:	Rapid response platinum resistance thermometer. Frequency response 10 Hz approximately.
UANA:	Velocity component A of tri-axial anemometers in the horizontal (X Y) plane.
UANB:	Velocity component B of tri-axial anemometer in the horizontal (X Y) plane.
UANW:	Velocity component W of tri-axial anemometer in the vertical (Z) direction.

UANT: Temperature, as measured by tri-axial anemometer with this facility.

RUN UP MEAN: The mean value of the appropriate sensor output averaged over the run up period i.e. in the period 7870 to 7570 seconds before the gas container release.

RUN DOWN MEAN: The mean value of the appropriate sensor output averaged over the run down period i.e. in the period 1139 to 1439 seconds after the gas container release.

4 GAS SENSORS

The readings of the GAS and HGAS sensors are in terms of the % concentration of the released gas mixture with an associated error band of either 10% of reading or as determined by calibration checks with a standard gas mixture. An estimate of the accuracy of each sensor for each test will be sent out separately. Note that the SMOK sensors have no absolute calibration in terms of gas concentration but have been included because of the potential high frequency information their outputs contain. An approximate calibration may be obtained by comparing their output to that of the nearest oxygen deficiency sensor.

5 SONIC ANEMOMETERS

Prints of the sonic anemometer outputs are included for completeness but it will be appreciated that analysis of records can only be performed using the data tapes. The three wind velocity components A, B and W can be transposed into components corresponding with the X, Y and Z coordinates of the mast array as follows:

$$X = \frac{1}{\sqrt{3}} (A - B)$$

$$Y = A + B$$

$$Z = W$$

RMS turbulence values measured at 10 m height on 'A' mast are given below. The values are non-dimensionalised i.e. original values have been divided by U_{10} , the mean wind speed at 10 m height during the main data collection period which was 6.281 m/s.

Turbulence intensity (U) = 13.5 (component in the wind direction)

Turbulence intensity (V) = 9.0 (crosswind component)

Turbulence intensity (W) = 7.0 (vertical component)

6 RUNNING MEANS

In order to assist analysis, a three minute running mean has been superimposed on all environmental records except the sonic anemometers. The points plotted represent the mean of 300 values (0.6 second averages) and are plotted at 0.6 second intervals.

NOTES ON VALIDATION OF GAS SENSOR DATA FOR TRIAL 019

- 1 Standard gas sensors at 4.4 metres on the mast at (600, 600) and at 6.4 metres on the mast at (600, 700) were malfunctioning.
- 2 Smoke sensors at 2.0 and 5.0 metres on the mast at (475, 275) were functioning correctly but did not detect gas.
- 3 Plots obtained from standard gas sensors sited inside the gas container are included at pages GB1 to GB5. It should be noted that these sensors are intended to assist NMI Limited in determining the release conditions and do not form part of the dispersion field. Any interpretation of the output from these sensors should take account of the following:
 - a) No validation of the gas bag sensor data has been carried out and no corrections have been made to take account of offset or drift before and after the release;
 - b) The sensors are mounted within the central gantry of the gas container which has horizontal platforms at various heights;
 - c) Sensors in the lower and central part of the gas container are always in 100% gas immediately before release;
 - d) The performance of the sensors is adversely affected by exposure to high concentrations (in the region of 30%) of Freon 12. Specifically, the presence of high concentrations of Freon 12 reduces the sensitivity of the electrochemical cells in the sensors to oxygen.

The cells recover in about four minutes and the effect is manifested by a zero undershoot and slow recovery after the gas has been released.

NOTES ON RAPID RESPONSE PLATINUM RESISTANCE THERMOMETERS FOR TRIAL 019

The rapid response platinum resistance thermometers at positions (475, 275, 5) and (325, 275, 5) were not functioning correctly. The platinum resistance thermometers at positions (400, 250, 2) and (475, 275, 2) were not connected. The plots at pages E32, E46, E55 and E60 should consequently be ignored.

M J Leck
Special Instruments and Techniques Section
Safety Engineering Laboratory
25 January 1984

21

INSTRUMENT STATIONS AND DISTRIBUTIONS (EFFECTIVE FOR TRIAL 019)

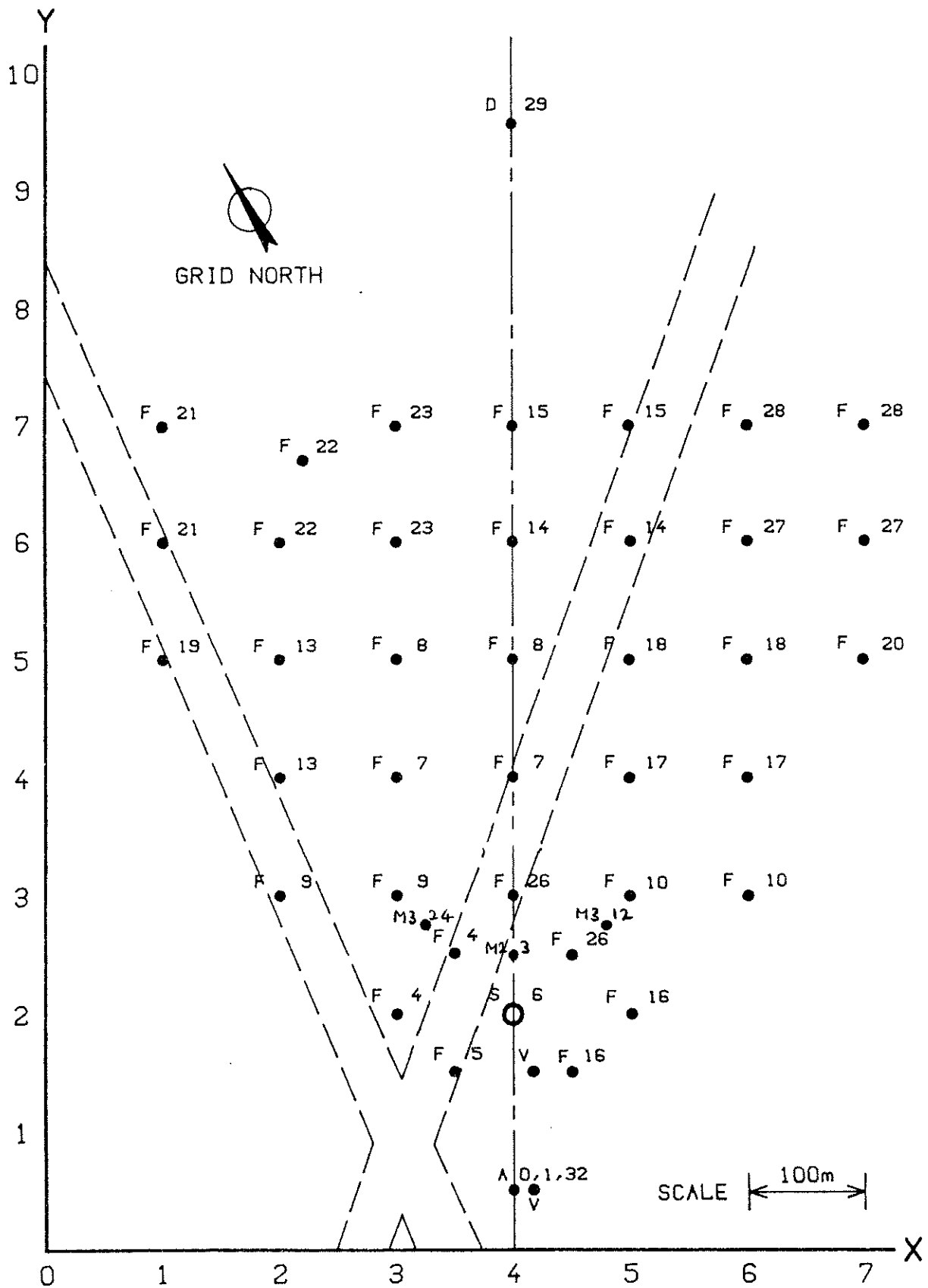
Note: The Location Coordinates are the X, Y coordinates in metres at 1/100 scale. The source is at (4.0, 2.0).
The table scans the layout by successive rows (i.e. at constant Y) of masts.

LOCATION COORDINATES	TYPE OF MAST	DATA TERMINAL NUMBER	CHANNEL NUMBER	HEIGHT ABOVE GROUND m	TYPE OF SENSOR	REMARKS	PAGE NUMBER
4.0, 0.5	A	32	5	0.4	Solarimeter		E01
		32	6	0.4	Barometric Pressure		E02
		0	0	2.0	Cup Anemometer		E03
		0	1	2.0	Thermometer		E04
		32	4	2.0	Relative Humidity		E05
		0	4	2.0	Sonic Anemometer - XY		E06
		0	5	2.0	Sonic Anemometer - XY		E07
		0	6	2.0	Sonic Anemometer - Z		E08
		0	7	2.0	Sonic Anemometer - Temp		E09
		0	2	4.5	Cup Anemometer		E10
		0	3	9.0	Thermometer		E11
		1	0	10.0	Cup Anemometer		E12
		32	0	10.0	Sonic Anemometer - XY		E13
		32	1	10.0	Sonic Anemometer - XY		E14
		32	2	10.0	Sonic Anemometer - Z		E15
		32	3	10.0	Sonic Anemometer - Temp		E16
		32	7	10.0	Relative Humidity		E17
		1	6	10.0	Wind Vane		E18
		1	1	16.0	Thermometer		E19
		1	2	17.3	Cup Anemometer		E20
		1	3	22.0	Thermometer		E21
		1	4	30.0	Cup Anemometer		E22
		1	5	30.0	Thermometer		E23
4.2, 0.5	V	1	7	10.0	Wind Vane		E24
3.5, 1.5	F	5	0	0.4	Gas Sensor		
		5	1	1.0	Gas Sensor		
		5	2	1.6	Gas Sensor		
		5	3	2.4	Gas Sensor		
4.0, 1.5	V	5	7	10.0	Wind Vane		E25
4.5, 1.5	F	16	0	0.4	Gas Sensor		
		16	1	1.0	Gas Sensor		
		16	2	1.6	Gas Sensor		
		16	3	2.4	Gas Sensor		
3.0, 2.0	F	4	0	0.4	Gas Sensor		
		4	1	1.0	Gas Sensor		
		4	2	1.6	Gas Sensor		
		4	3	2.4	Gas Sensor		
4.0, 2.0	S	6	0	0.4	Thermometer		E26
		6	1	0.4	Gas Sensor		
		6	2	12.0	Thermometer		E27
		6	3	12.0	Gas Sensor		
		6	4	4.5	Gas Sensor		
		6	6	9.0	Gas Sensor		
		6	7	13.5	Gas Sensor		
		16	4	0.4	Gas Sensor		
5.0, 2.0	F	16	5	1.0	Gas Sensor		
		16	6	1.6	Gas Sensor		
		16	7	2.4	Gas Sensor		
		16	7	2.4	Gas Sensor		
3.5, 2.5	F	4	4	0.4	Gas Sensor		
		4	5	2.4	Gas Sensor		
		4	6	4.4	Gas Sensor		
		4	7	6.4	Gas Sensor		
4.0, 2.5	M2	3	0	0.4	Gas Sensor		G01
		3	5	2.0	High Speed Gas Sensor		G02
		3	6	2.0	Smoke Sensor		G03
		3	7	2.0	Smoke Sensor		G04
		2	0	2.0	Sonic Anemometer - XY		E28
		2	1	2.0	Sonic Anemometer - XY		E29
		2	2	2.0	Sonic Anemometer - Z		E30
		2	3	2.0	Sonic Anemometer - Temp		E31
		3	4	2.0	Thermometer	Not connected	E32
		3	1	2.4	Gas Sensor		G05
		3	2	4.4	Gas Sensor		G06
		3	3	6.4	Gas Sensor		G07
		2	4	15.0	Sonic Anemometer - XY		E33
		2	5	15.0	Sonic Anemometer - XY		E34
		2	6	15.0	Sonic Anemometer - Z		E35
		2	7	15.0	Sonic Anemometer - Temp		E36
4.5, 2.5	F	26	0	0.4	Gas Sensor		G08
		26	1	2.4	Gas Sensor		G09
		26	2	4.4	Gas Sensor		G10
		26	3	6.4	Gas Sensor		G11

LOCATION COORDINATES	TYPE OF MAST	DATA TERMINAL NUMBER	CHANNEL NUMBER	HEIGHT ABOVE GROUND m	TYPE OF SENSOR	REMARKS	PAGE NUMBER
3.25, 2.75	M3	24	0	0.4	Gas Sensor		
		31	0	2.0	High Speed Gas Sensor		
		31	4	2.0	Smoke Sensor		
		25	0	2.0	Sonic Anemometer - XY		E37
		25	1	2.0	Sonic Anemometer - XY		E38
		25	2	2.0	Sonic Anemometer - Z		E39
		25	3	2.0	Sonic Anemometer - Temp		E40
		31	2	2.0	Thermometer		E41
		24	1	2.4	Gas Sensor		
		31	6	4.0	Smoke Sensor		
		24	2	4.4	Gas Sensor		
		31	1	5.0	High Speed Gas Sensor		
		31	5	5.0	Smoke Sensor		
		25	4	5.0	Sonic Anemometer - XY		E42
		25	5	5.0	Sonic Anemometer - XY		E43
		25	6	5.0	Sonic Anemometer - Z		E44
		25	7	5.0	Sonic Anemometer - Temp		E45
		31	3	5.0	Thermometer		E46
		24	3	6.4	Gas Sensor		
		24	4	14.5	Sonic Anemometer - XY		E47
		24	5	14.5	Sonic Anemometer - XY		E48
		24	6	14.5	Sonic Anemometer - Z		E49
		24	7	14.5	Sonic Anemometer - Temp		E50
4.75, 2.75	M3	12	0	0.4	Gas Sensor		G12
		33	7	2.0	High Speed Gas Sensor		G13
		33	5	2.0	Smoke Sensor		
		33	0	2.0	Sonic Anemometer - XY		E51
		33	1	2.0	Sonic Anemometer - XY		E52
		33	2	2.0	Sonic Anemometer - Z		E53
		33	3	2.0	Sonic Anemometer - Temp		E54
		12	4	2.0	Thermometer	Not connected	E55
		12	1	2.4	Gas Sensor		G14
		12	2	4.4	Gas Sensor		G15
		33	4	5.0	High Speed Gas Sensor		G16
		33	6	5.0	Smoke Sensor		
		11	0	5.0	Sonic Anemometer - XY		E56
		11	1	5.0	Sonic Anemometer - XY		E57
		11	2	5.0	Sonic Anemometer - Z		E58
		11	3	5.0	Sonic Anemometer - Temp		E59
		11	7	5.0	Thermometer		E60
		12	3	6.4	Gas Sensor		G17
		11	4	14.5	Sonic Anemometer - XY		E61
		11	5	14.5	Sonic Anemometer - XY	Wanted	E62
		11	6	14.5	Sonic Anemometer - Z		E63
2.0, 3.0	F	9	0	0.4	Gas Sensor		
		9	1	2.4	Gas Sensor		
		9	2	4.4	Gas Sensor		
		9	3	6.4	Gas Sensor		
3.0, 3.0	F	9	4	0.4	Gas Sensor		
		9	5	2.4	Gas Sensor		
		9	6	4.4	Gas Sensor		
		9	7	6.4	Gas Sensor		
4.0, 3.0	F	26	4	0.4	Gas Sensor		G18
		26	5	2.4	Gas Sensor		G19
		26	6	4.4	Gas Sensor		G20
		26	7	6.4	Gas Sensor		G21
5.0, 3.0	F	10	0	0.4	Gas Sensor		G22
		10	1	2.4	Gas Sensor		G23
		10	2	4.4	Gas Sensor		G24
		10	3	6.4	Gas Sensor		G25
6.0, 3.0	F	10	4	0.4	Gas Sensor		
		10	5	2.4	Gas Sensor		
		10	6	4.4	Gas Sensor		
		10	7	6.4	Gas Sensor		
2.0, 4.0	F	13	0	0.4	Gas Sensor	Not connected	
		13	1	2.4	Gas Sensor	Not connected	
		13	2	4.4	Gas Sensor	Not connected	
		13	3	6.4	Gas Sensor	Not connected	
3.0, 4.0	F	7	0	0.4	Gas Sensor		
		7	1	2.4	Gas Sensor		
		7	2	4.4	Gas Sensor		
		7	3	6.4	Gas Sensor		
4.0, 4.0	F	7	4	0.4	Gas Sensor		
		7	5	2.4	Gas Sensor		
		7	6	4.4	Gas Sensor		
		7	7	6.4	Gas Sensor		
5.0, 4.0	F	17	0	0.4	Gas Sensor		G26
		17	1	2.4	Gas Sensor		G27
		17	2	4.4	Gas Sensor		G28
		17	3	6.4	Gas Sensor		G28
6.0, 4.0	F	17	4	0.4	Gas Sensor		G30
		17	5	2.4	Gas Sensor		G31
		17	6	4.4	Gas Sensor		G32
		17	7	6.4	Gas Sensor		G33

LOCATION COORDINATES	TYPE OF MAST	DATA TERMINAL NUMBER	CHANNEL NUMBER	HEIGHT ABOVE GROUND m	TYPE OF SENSOR	REMARKS	PAGE NUMBER
1.0, 5.0	F	19	0	0.4	Gas Sensor		
		19	1	2.4	Gas Sensor		
		19	2	4.4	Gas Sensor		
		19	3	6.4	Gas Sensor		
2.0, 5.0	F	13	4	0.4	Gas Sensor	Not connected	
		13	5	2.4	Gas Sensor	Not connected	
		13	6	4.4	Gas Sensor	Not connected	
		13	7	6.4	Gas Sensor	Not connected	
3.0, 5.0	F	8	0	0.4	Gas Sensor		
		8	1	2.4	Gas Sensor		
		8	2	4.4	Gas Sensor		
		8	3	6.4	Gas Sensor		
4.0, 5.0	F	8	4	0.4	Gas Sensor		
		8	5	2.4	Gas Sensor		
		8	6	4.4	Gas Sensor		
		8	7	6.4	Gas Sensor		
5.0, 5.0	F	18	0	0.4	Gas Sensor		G34
		18	1	2.4	Gas Sensor		G35
		18	2	4.4	Gas Sensor		G36
		18	3	6.4	Gas Sensor		G37
6.0, 5.0	F	18	4	0.4	Gas Sensor		G38
		18	5	2.4	Gas Sensor		G39
		18	6	4.4	Gas Sensor		G40
		18	7	6.4	Gas Sensor		G41
7.0, 5.0	F	20	4	0.4	Solarimeter		G42
		20	0	0.4	Gas Sensor		G42
		20	1	2.4	Gas Sensor		G43
		20	2	4.4	Gas Sensor		G44
1.0, 6.0	F	20	3	6.4	Gas Sensor		G45
		21	0	0.4	Gas Sensor		
		21	1	2.4	Gas Sensor		
		21	2	4.4	Gas Sensor		
2.0, 6.0	F	21	3	6.4	Gas Sensor		
		22	0	0.4	Gas Sensor		
		22	1	2.4	Gas Sensor		
		22	2	4.4	Gas Sensor		
3.0, 6.0	F	22	3	6.4	Gas Sensor		
		23	0	0.4	Gas Sensor		
		23	1	2.4	Gas Sensor		
		23	2	4.4	Gas Sensor		
4.0, 6.0	F	23	3	6.4	Gas Sensor	Not connected	
		14	0	0.4	Gas Sensor		
		14	1	2.4	Gas Sensor		
		14	2	4.4	Gas Sensor		
5.0, 6.0	F	14	3	6.4	Gas Sensor		
		14	4	0.4	Gas Sensor		
		14	5	2.4	Gas Sensor		
		14	6	4.4	Gas Sensor		
6.0, 6.0	F	14	7	6.4	Gas Sensor		
		27	0	0.4	Gas Sensor		G46
		27	1	2.4	Gas Sensor		G47
		27	2	4.4	Gas Sensor		
7.0, 6.0	F	27	3	6.4	Gas Sensor		G48
		27	4	0.4	Gas Sensor		G49
		27	5	2.4	Gas Sensor		G50
		27	6	4.4	Gas Sensor		G51
1.0, 7.0	F	27	7	6.4	Gas Sensor		G52
		21	4	0.4	Gas Sensor		
		21	5	2.4	Gas Sensor		
		21	6	4.4	Gas Sensor		
2.2, 6.7	F	21	7	6.4	Gas Sensor		
		22	4	0.4	Gas Sensor		
		22	5	2.4	Gas Sensor		
		22	6	4.4	Gas Sensor		
3.0, 7.0	F	22	7	6.4	Gas Sensor		
		23	4	0.4	Gas Sensor		
		23	5	2.4	Gas Sensor		
		23	6	4.4	Gas Sensor		
4.0, 7.0	F	23	7	6.4	Gas Sensor		
		15	0	0.4	Gas Sensor		
		15	1	2.4	Gas Sensor		
		15	2	4.4	Gas Sensor		
		15	3	6.4	Gas Sensor		

LOCATION COORDINATES	TYPE OF MAST	DATA TERMINAL NUMBER	CHANNEL NUMBER	HEIGHT ABOVE GROUND m	TYPE OF SENSOR	REMARKS	PAGE NUMBER
5.0, 7.0	F	15	4	0.4	Gas Sensor		
		15	5	2.4	Gas Sensor		
		15	6	4.4	Gas Sensor		
		15	7	6.4	Gas Sensor		
6.0, 7.0	F	28	0	0.4	Gas Sensor		G53
		28	1	2.4	Gas Sensor		G54
		28	2	4.4	Gas Sensor		G55
		28	3	6.4	Gas Sensor		
7.0, 7.0	F	28	4	0.4	Gas Sensor		G56
		28	5	2.4	Gas Sensor		G57
		28	6	4.4	Gas Sensor		G58
		28	7	6.4	Gas Sensor		G59
4.0, 9.5	D	29	0	0.4	Gas Sensor		
		29	1	2.4	Gas Sensor		
		29	2	4.4	Gas Sensor		
		29	3	6.4	Gas Sensor		
		29	4	10.0	Wind Speed		E65
		29	5	10.0	Relative Humidity		E66
		29	6	10.0	Thermometer		E67
		29	7	10.0	Wind Vane		E68
4.0, 2.1		30	0	0.4	Gas Sensor		G60
4.0, 2.2		30	1	0.4	Gas Sensor		G61
4.0, 2.3		30	2	0.4	Gas Sensor		G62
4.0, 2.4		30	3	0.4	Gas Sensor		G63
4.0, 2.6		30	4	0.4	Gas Sensor		G64
4.0, 2.7		30	5	0.4	Gas Sensor		G65
4.0, 2.8		30	6	0.4	Gas Sensor		G66
4.0, 2.9		30	7	0.4	Gas Sensor		G67



LAYOUT OF MASTS
 ALPHABETIC CODE = MAST TYPE
 NUMERIC CODE = DATA TERMINAL NUMBER

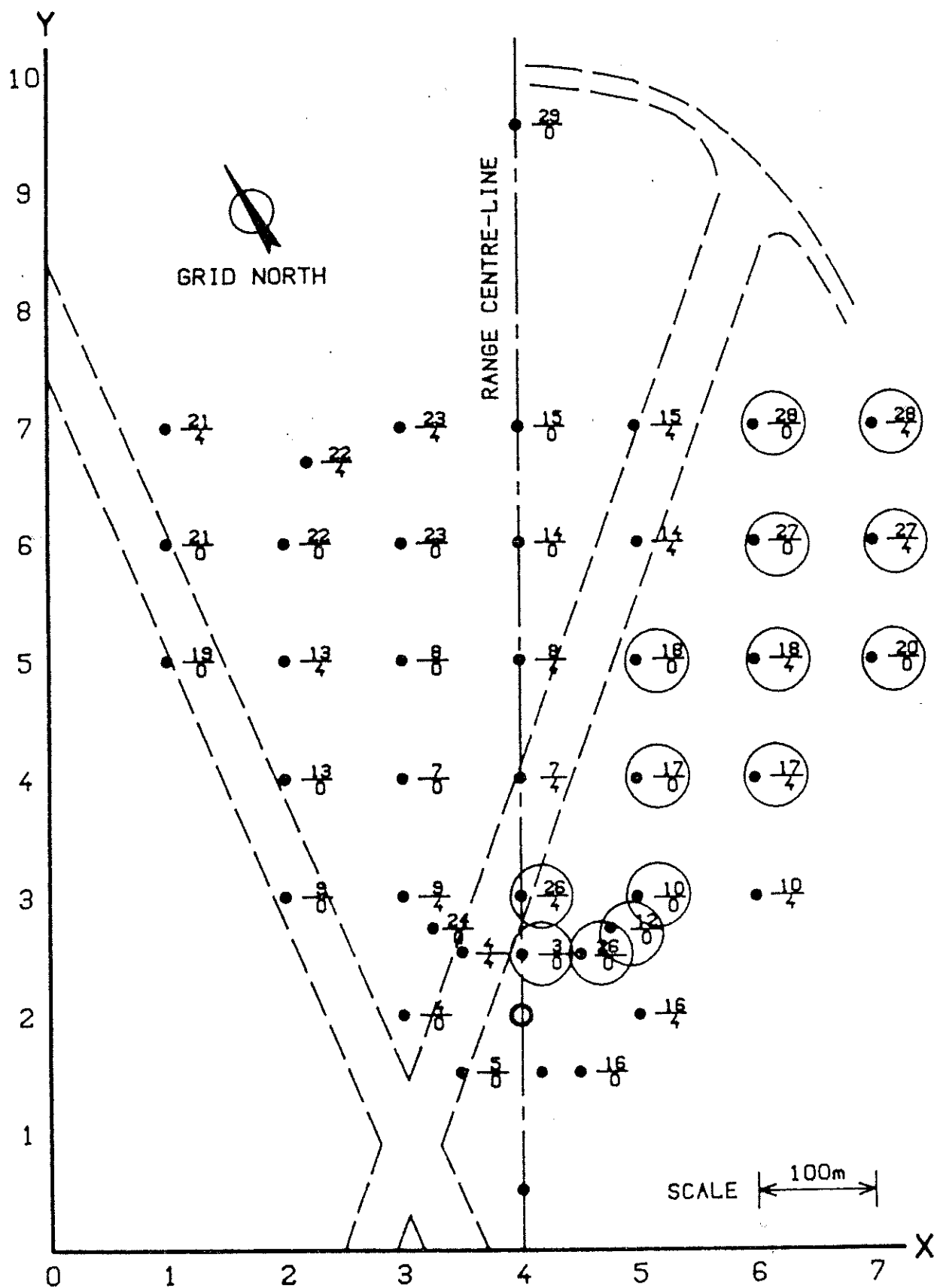
TRIAL No. - 019

DATE - 10/6/83

67 SENSORS SAW GAS

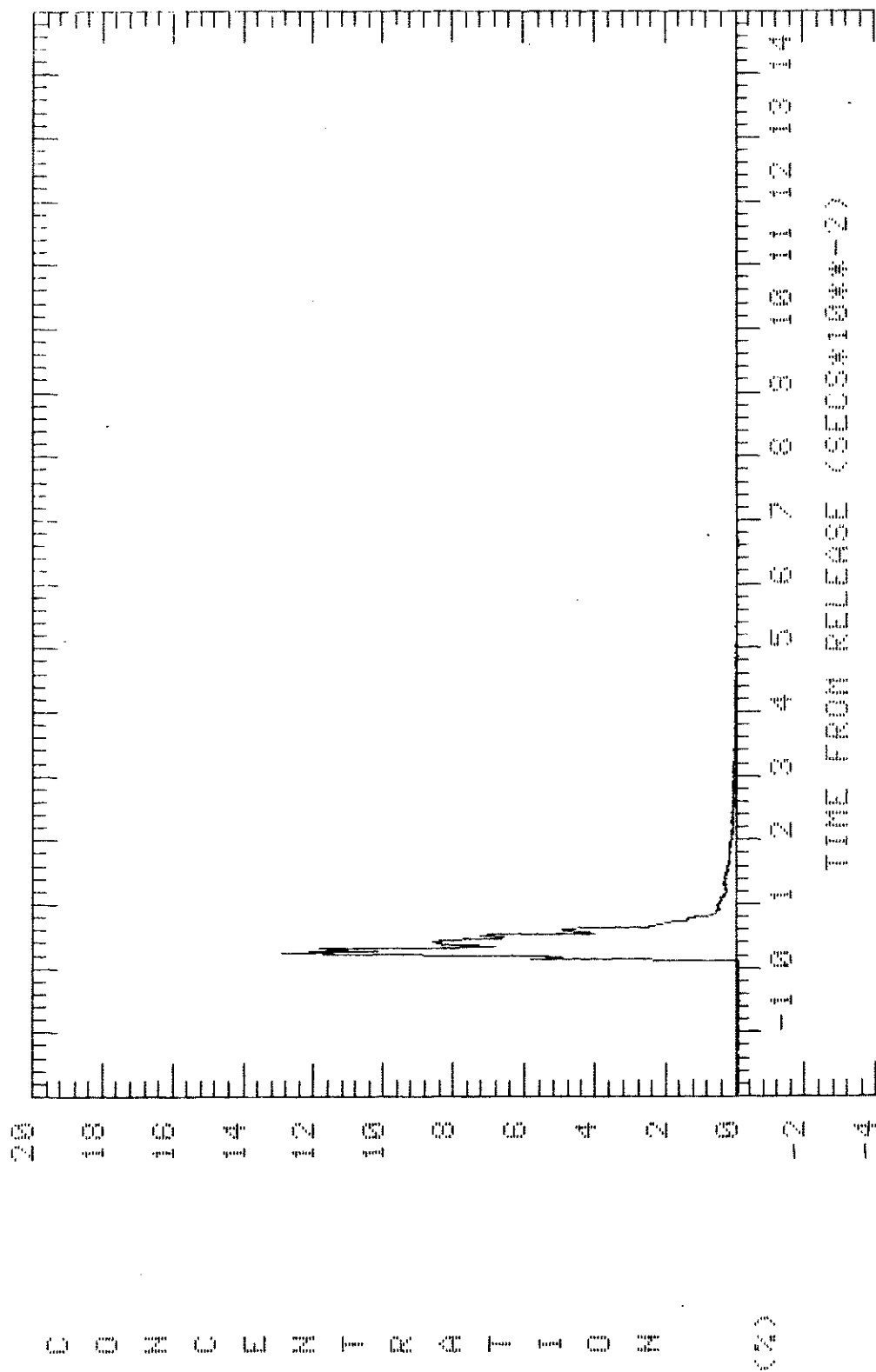
WIND SPEED (U_{10}) 6 m/sec

PASQUILL CATEGORY D/E



$\frac{21}{4}$ = DATA TERMINAL CHANNEL NUMBER OF GAS SENSORS AT 0.4m HEIGHT

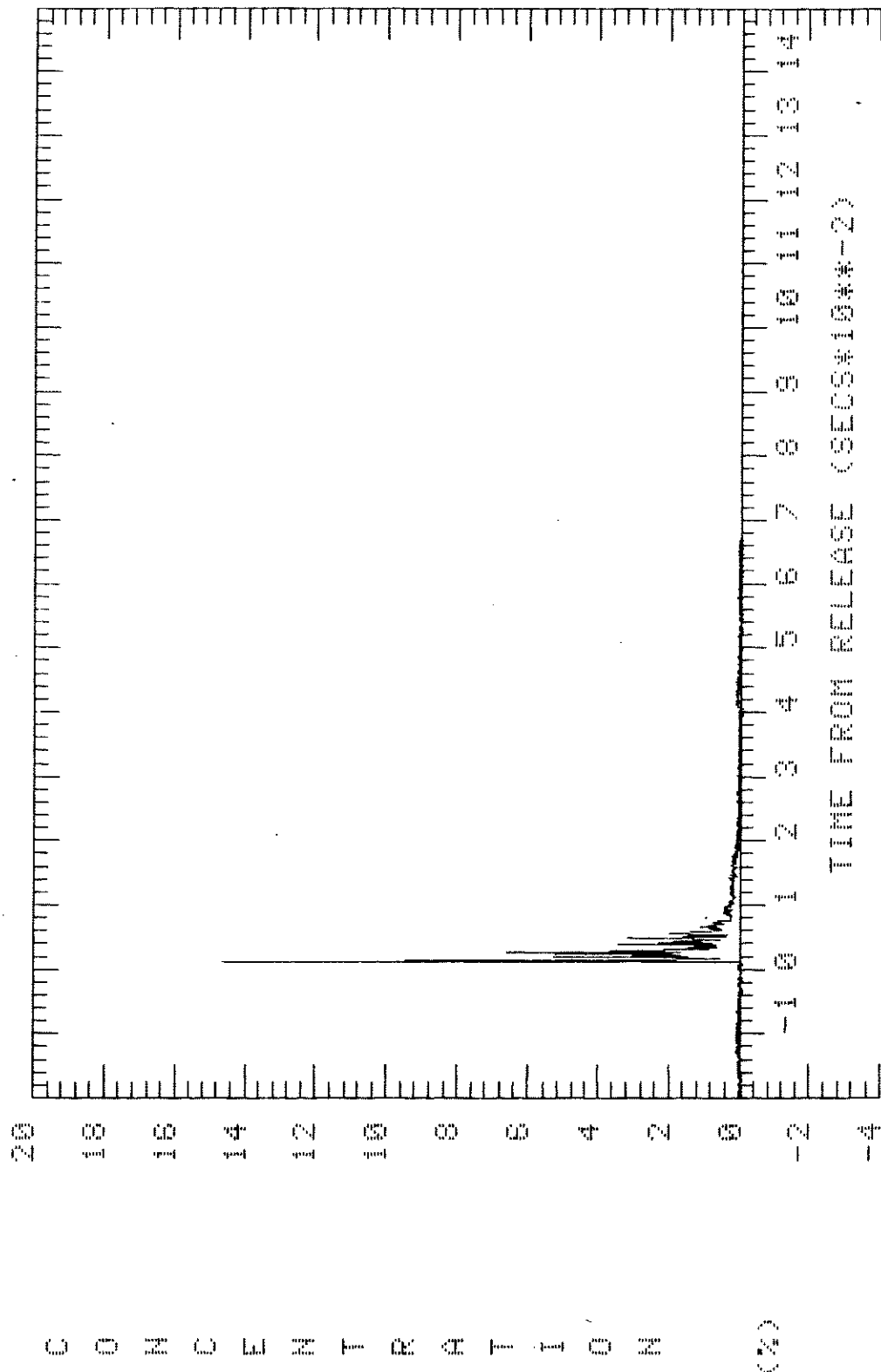
○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 250 M Z: 0.4 M

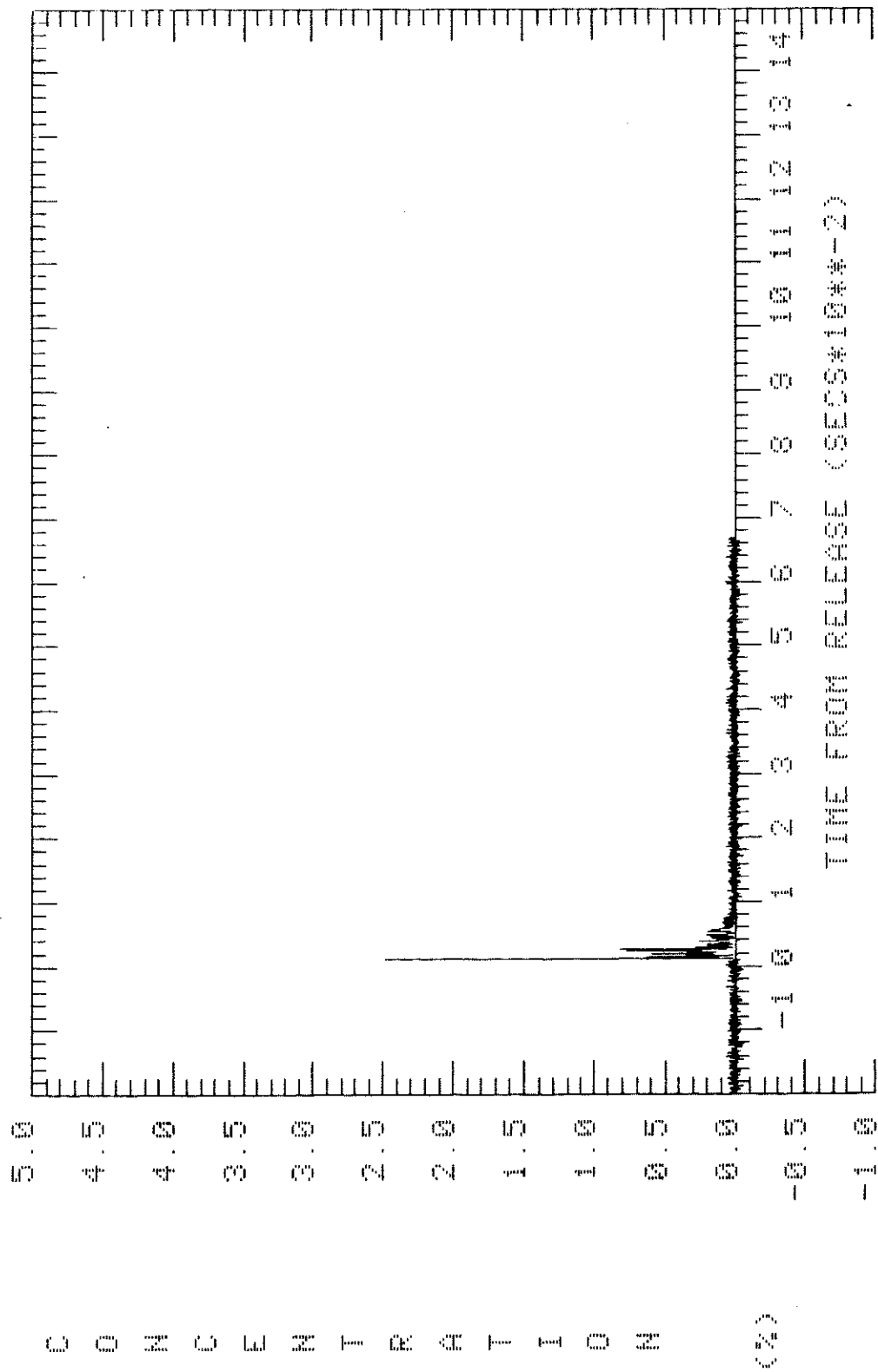
G01



TRIAL: 019 TYPE: HGAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 250 M Z: 2.0 M

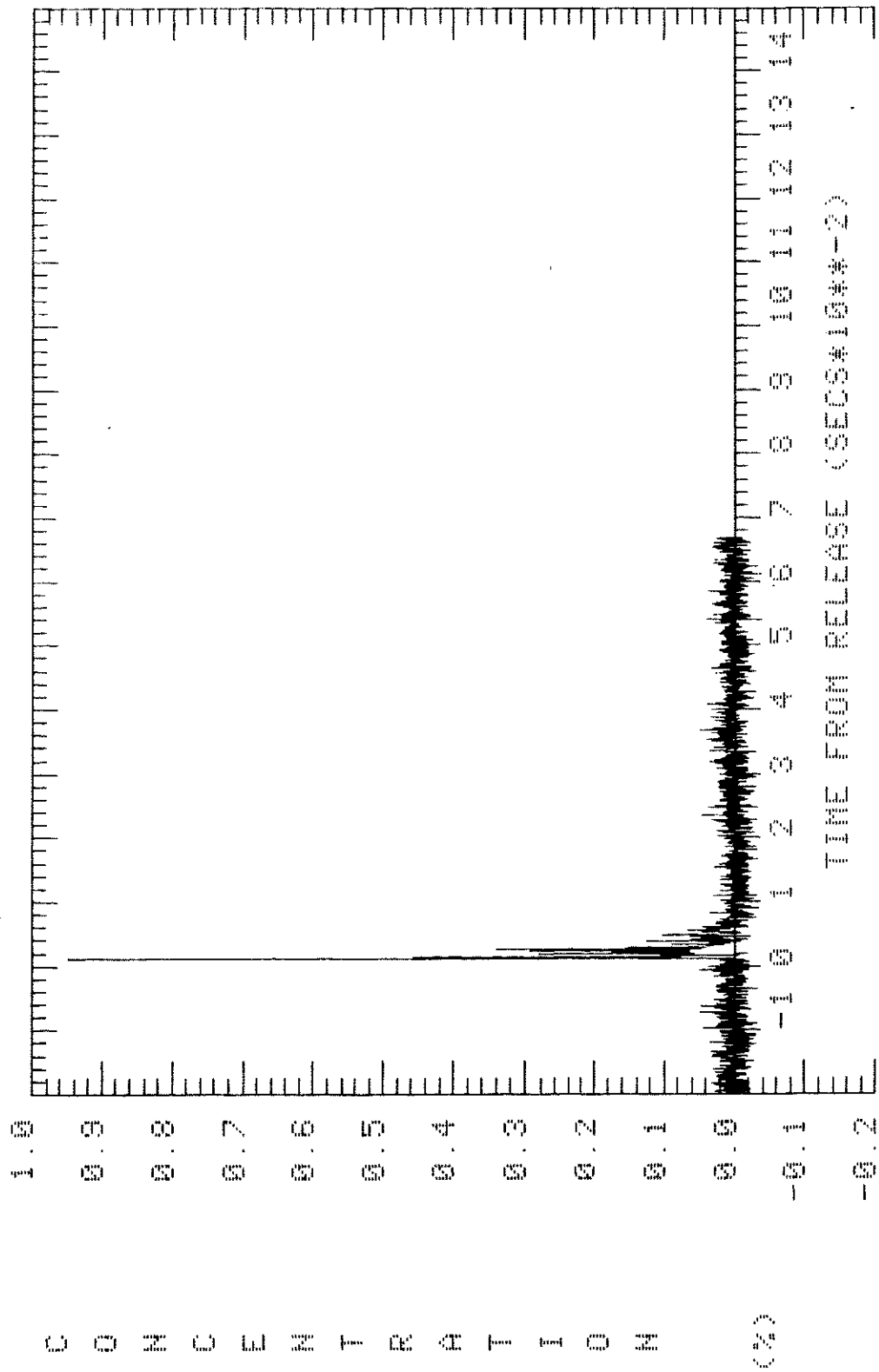
G02



TRIAL: 019 TYPE: SHOK AVERAGING TIME: 0.6 SECS

X: 400 H Y: 250 H Z: 0.0 H

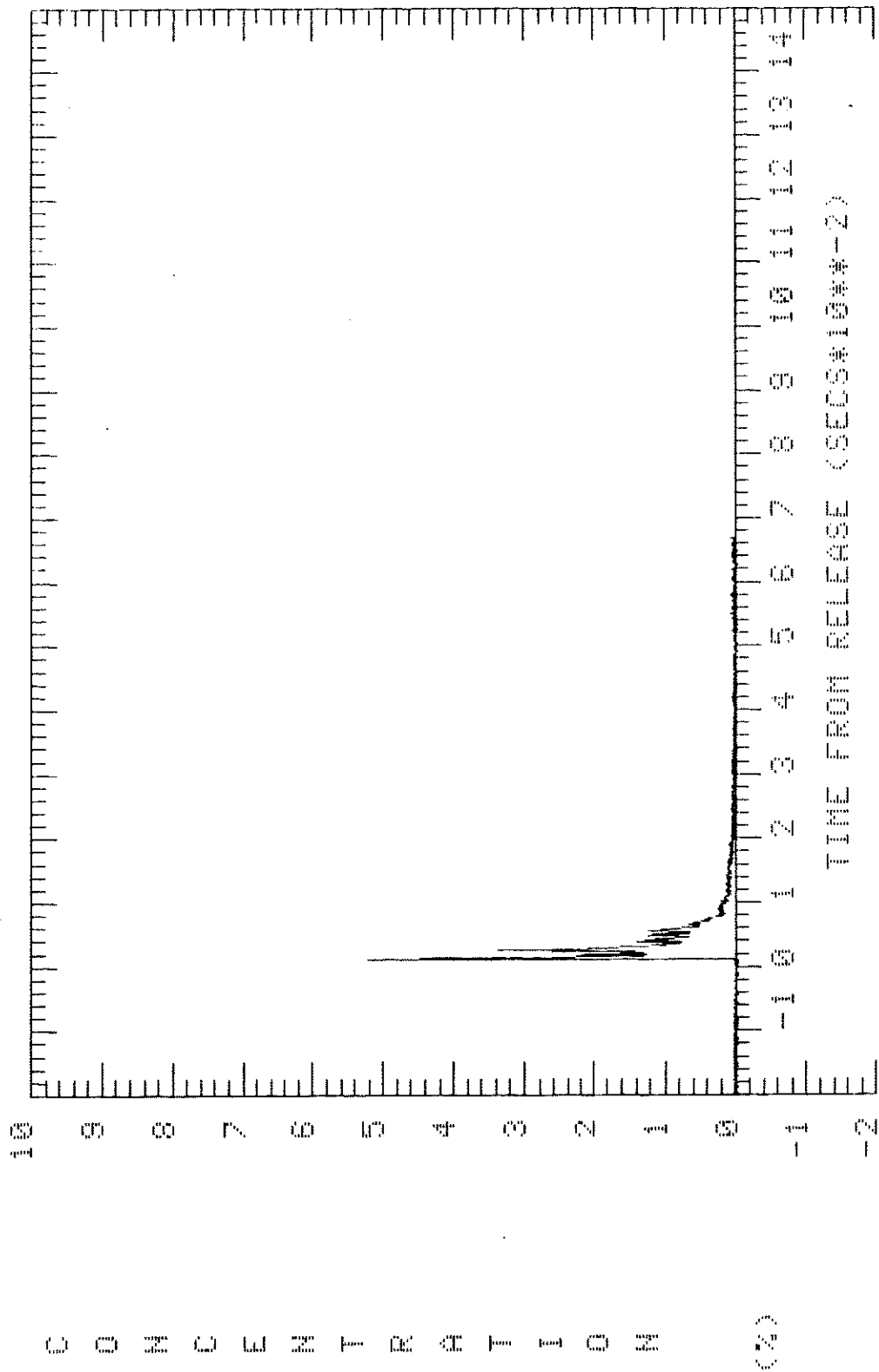
G03



TRIAL: 019 TYPE: SHOK AVERAGING TIME: 0.6 SECS

X: 400 N Y: 250 N Z: 0.0 N

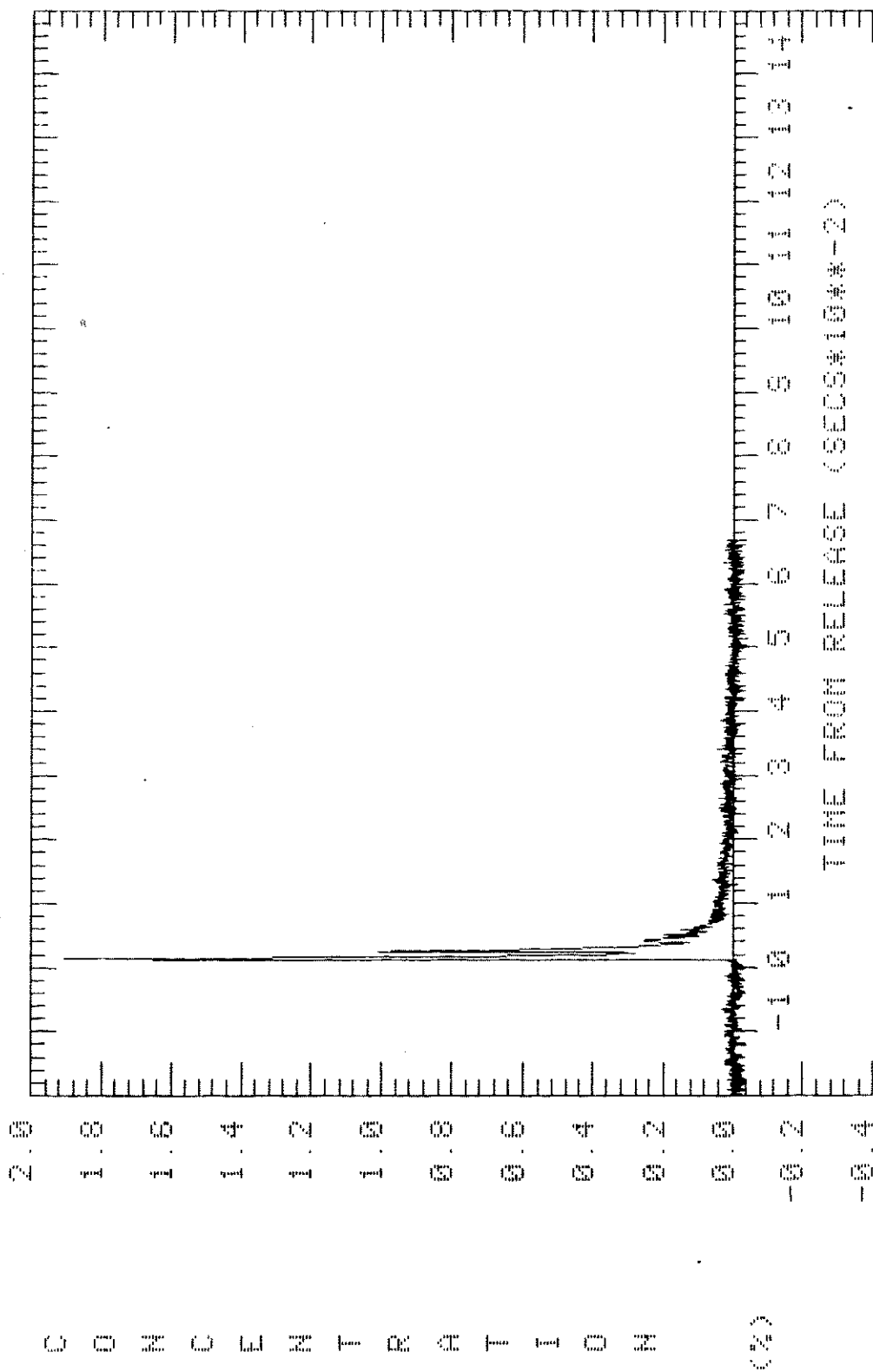
G04



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 250 M Z: 2.4 M

G05



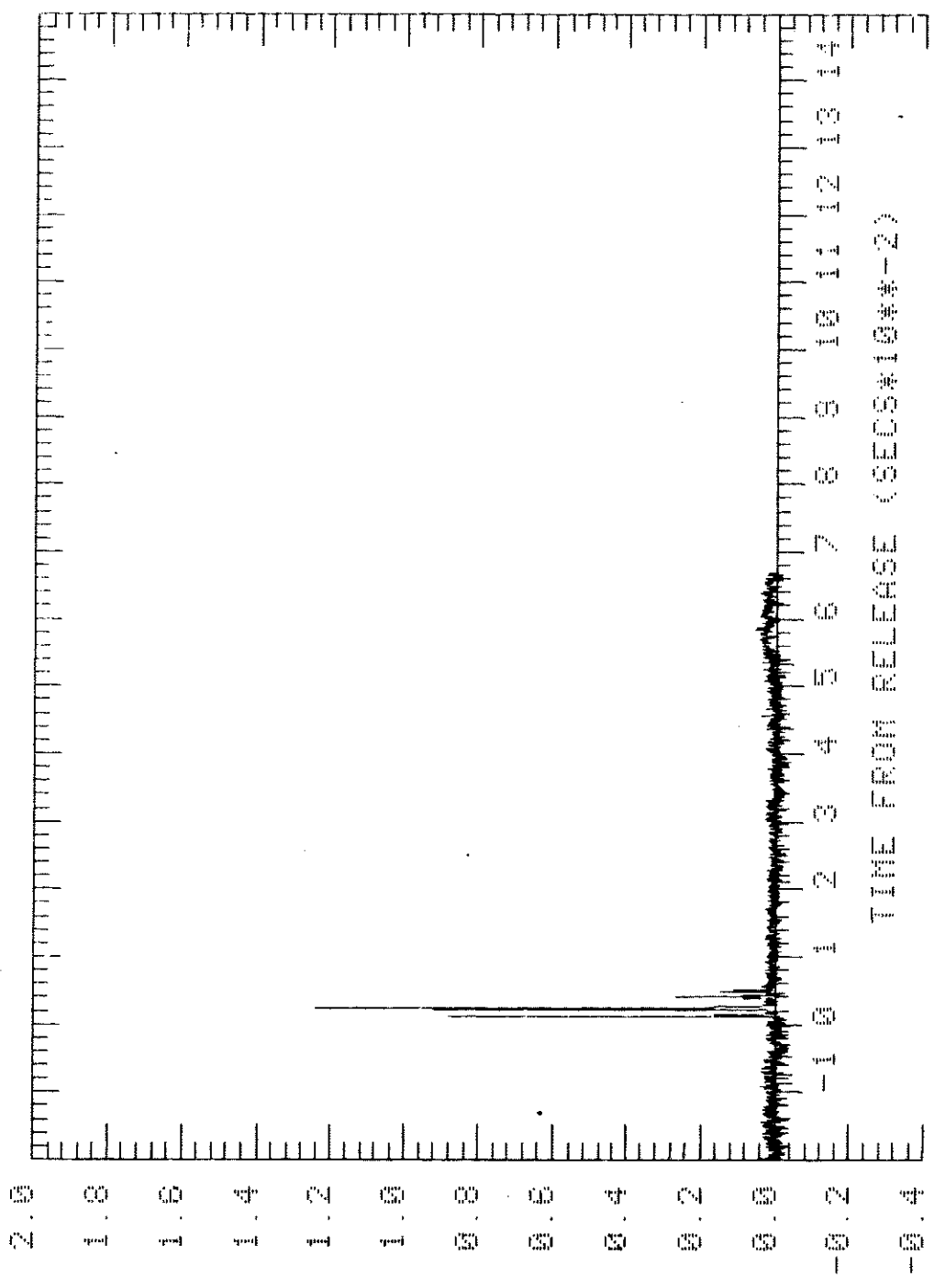
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 250 M Z: 4.4 M

G06

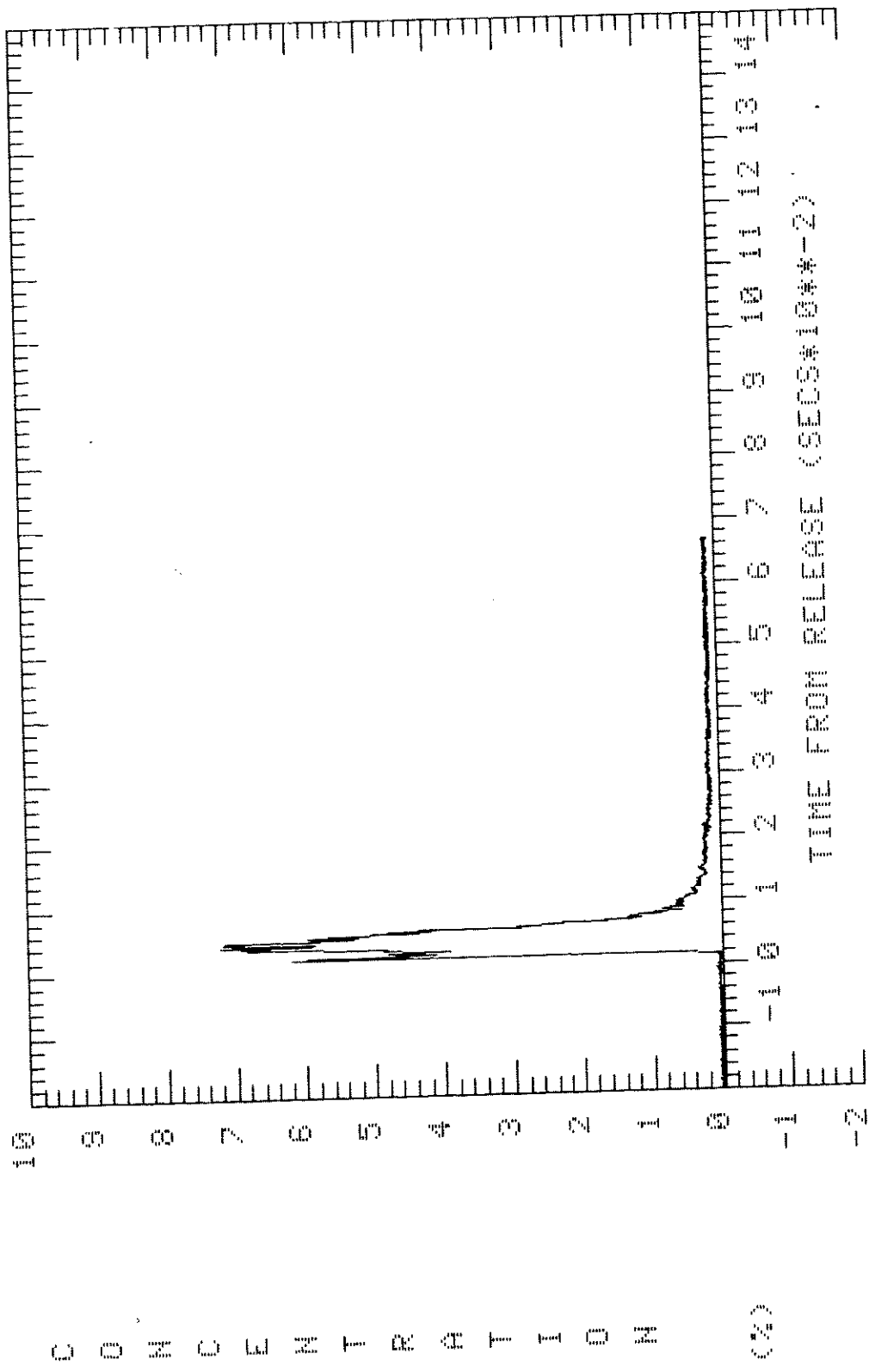
COEFFICIENT

(%)



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 H Y: 250 H Z: 6.4 H

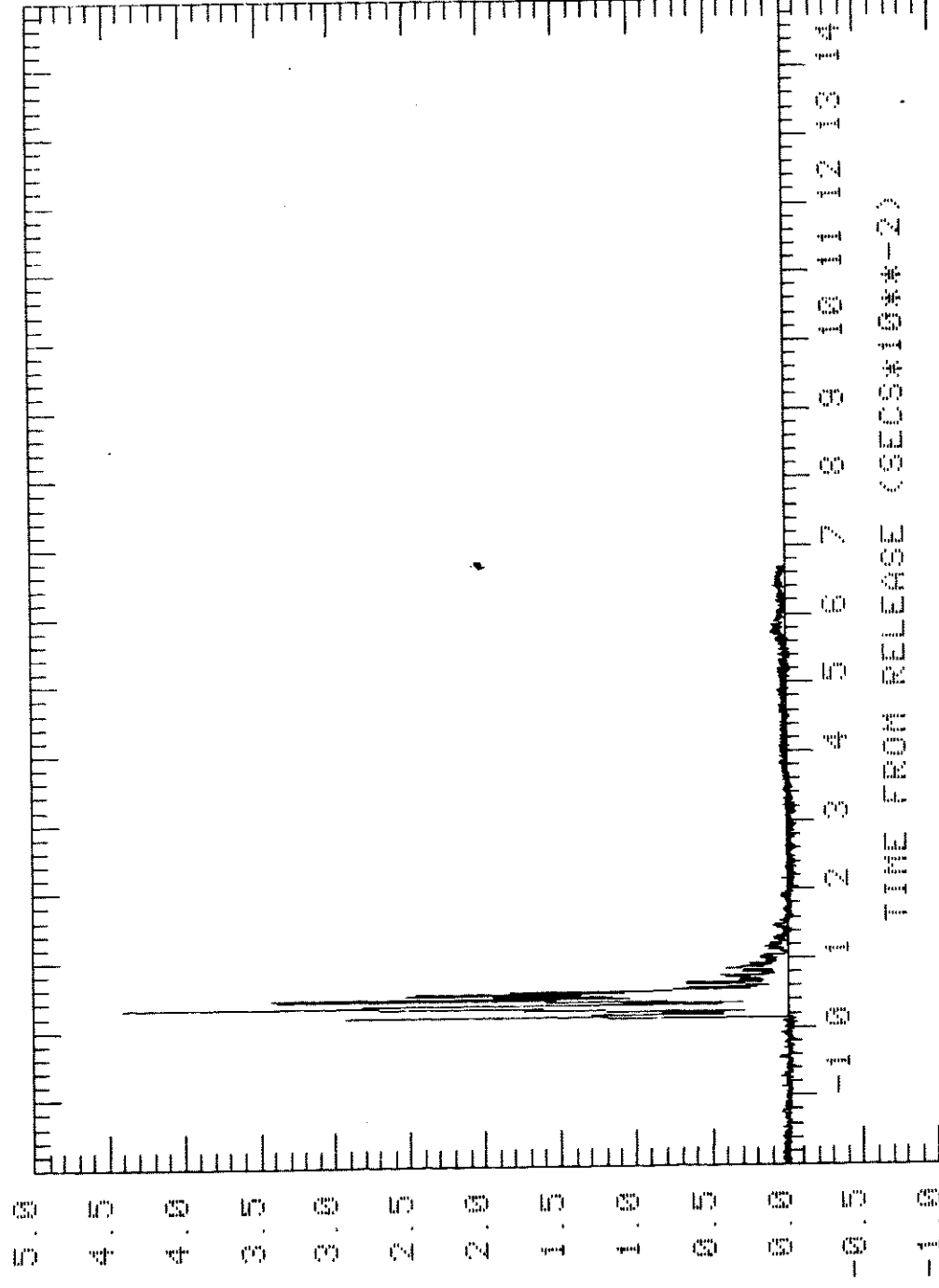


TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 250 M Z: 0.4 M

COZOLZETRAFOR

(%)



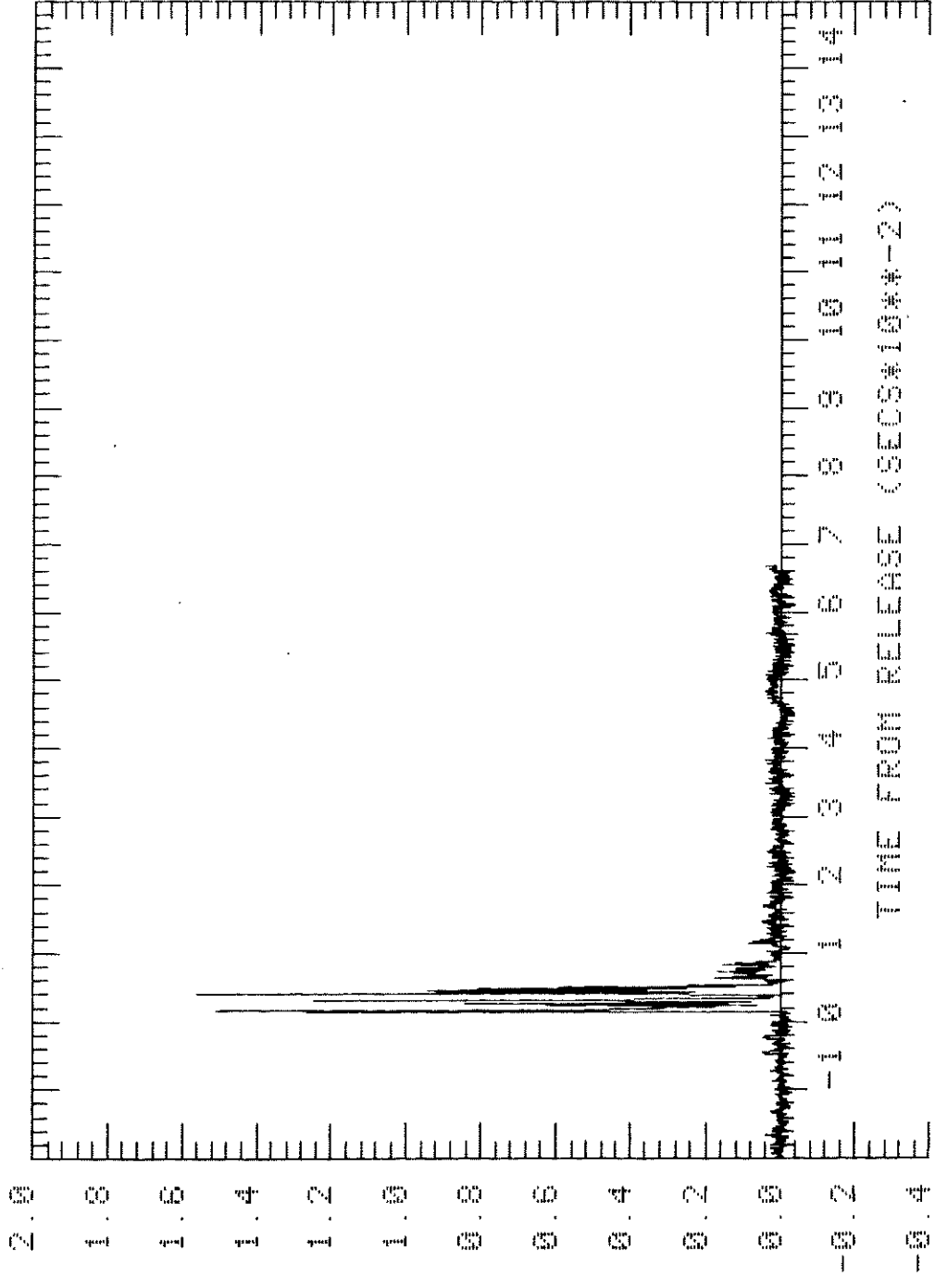
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 250 M Z: 2.4 M

G09

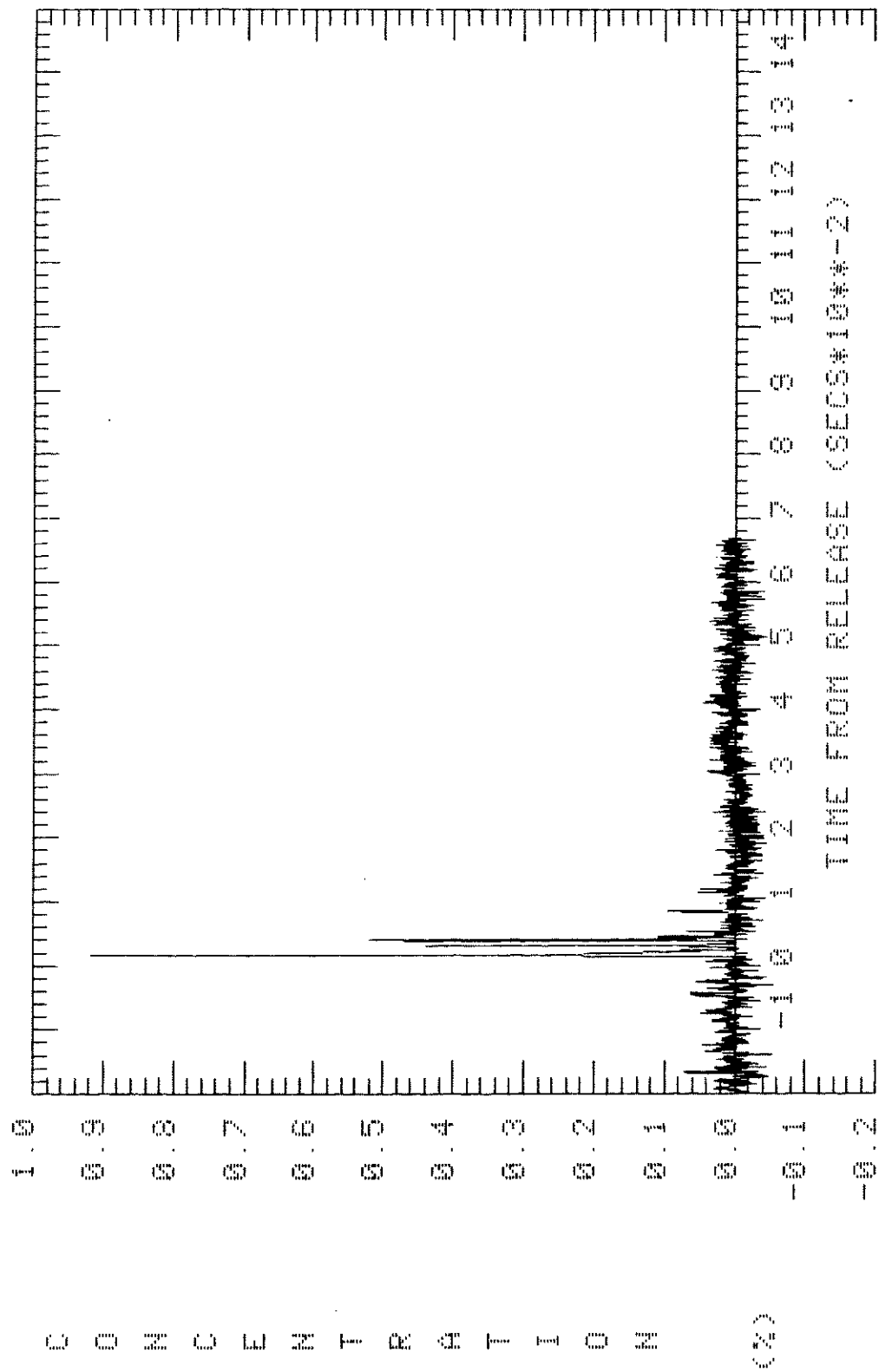
C O N C E N T R A T I O N

(%)



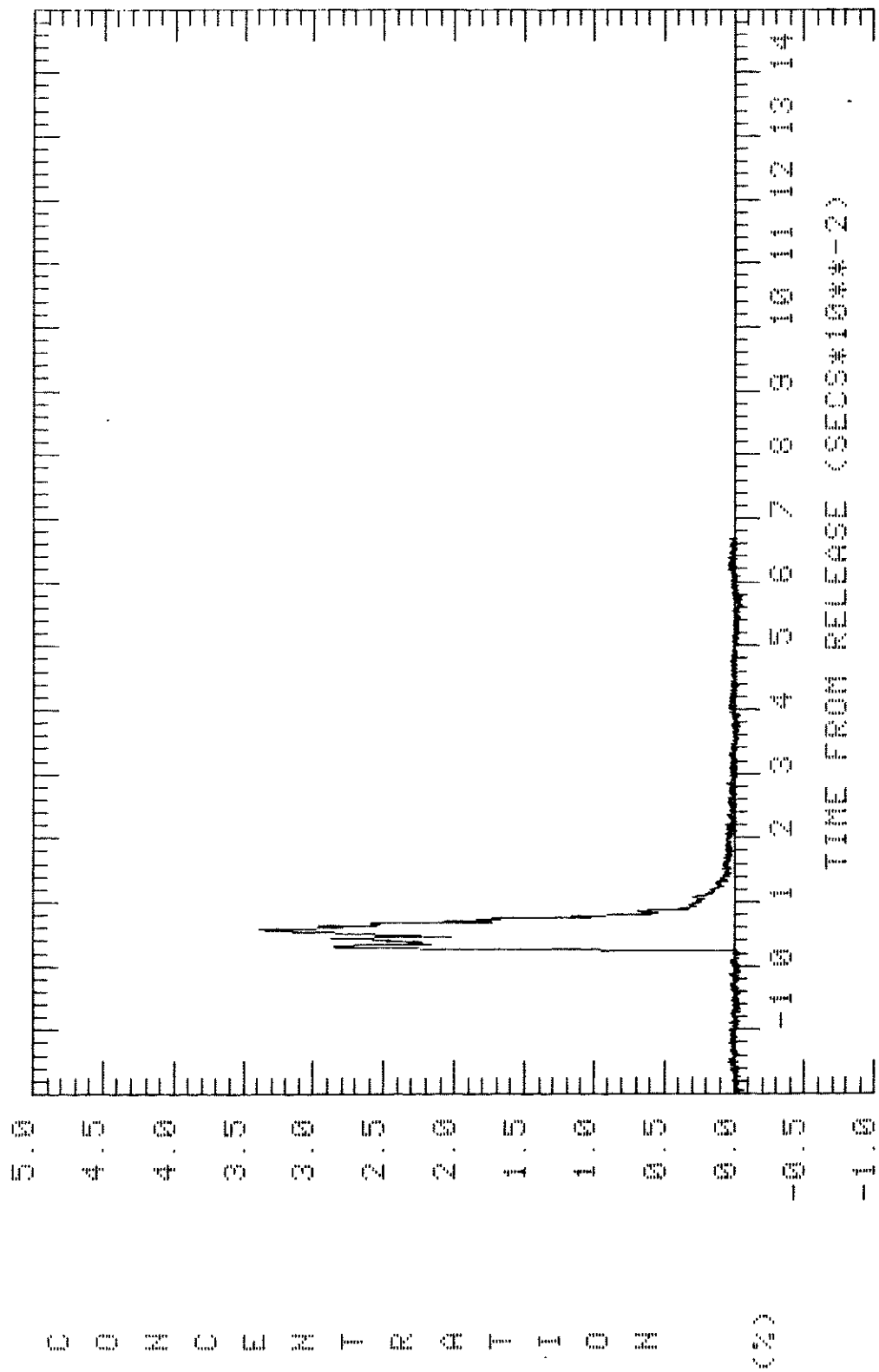
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 250 M Z: 4.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

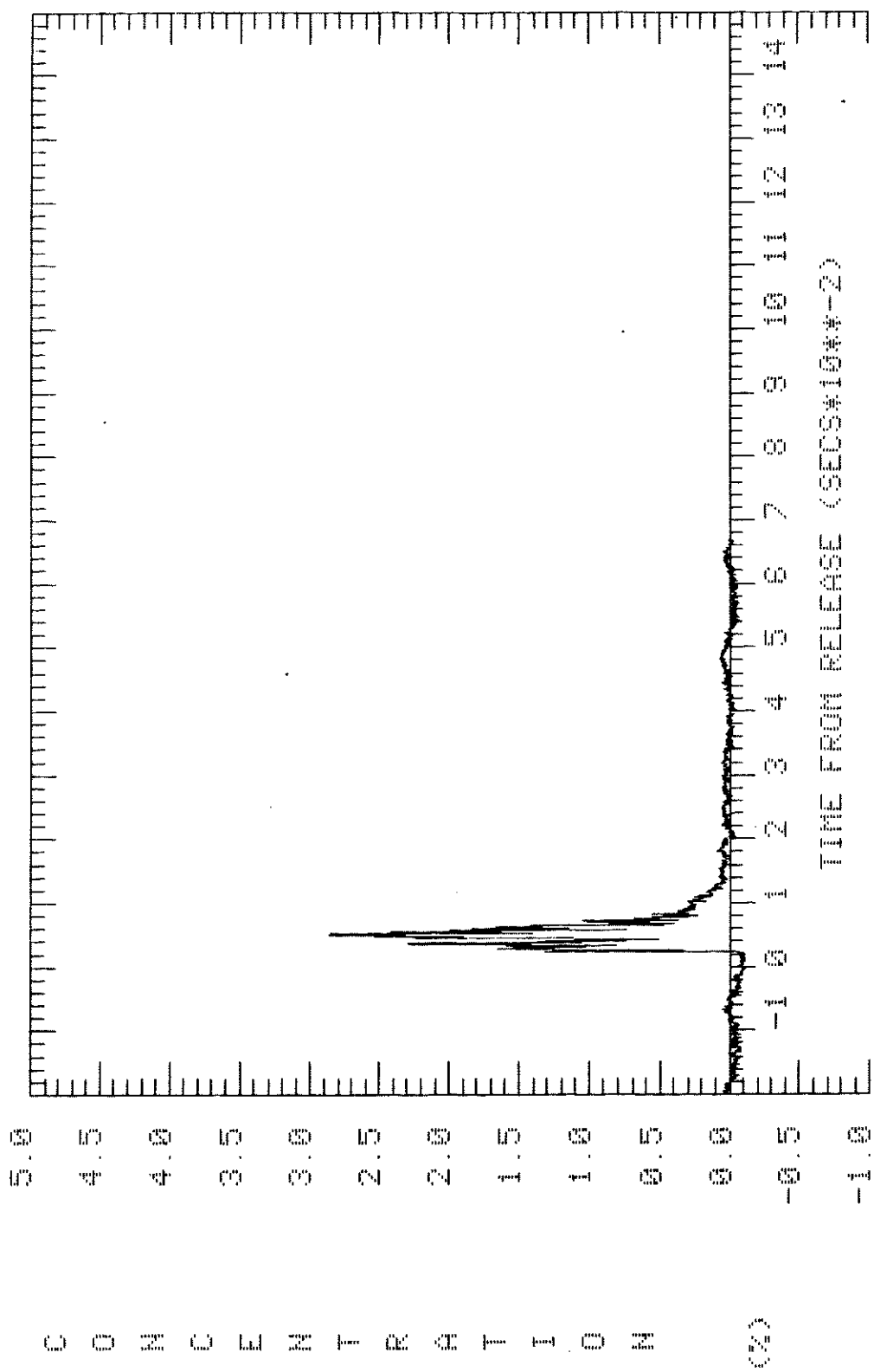
X: 450 M Y: 250 M Z: 6.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

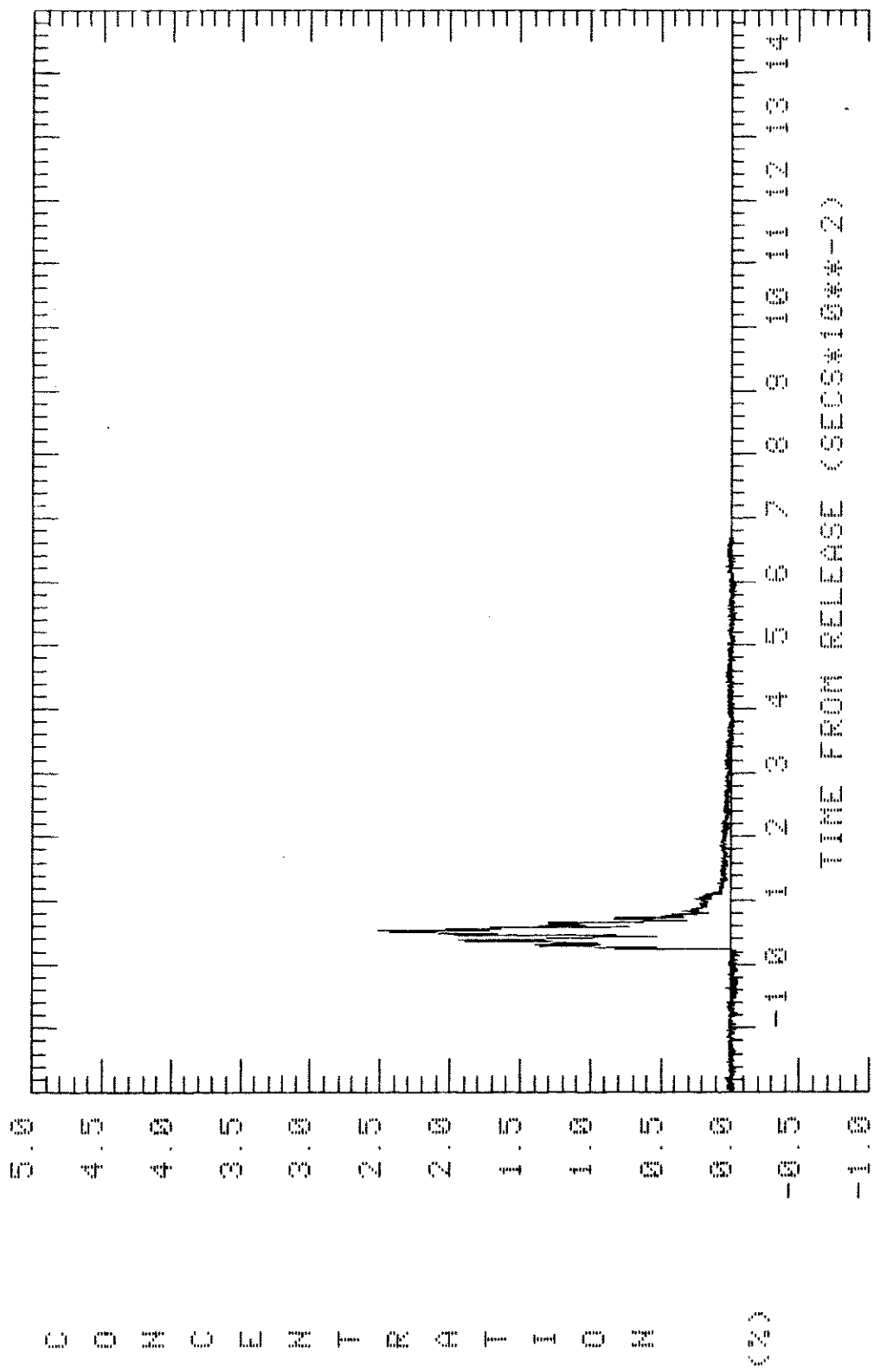
X: 475 M Y: 275 M Z: 0.4 M

G12



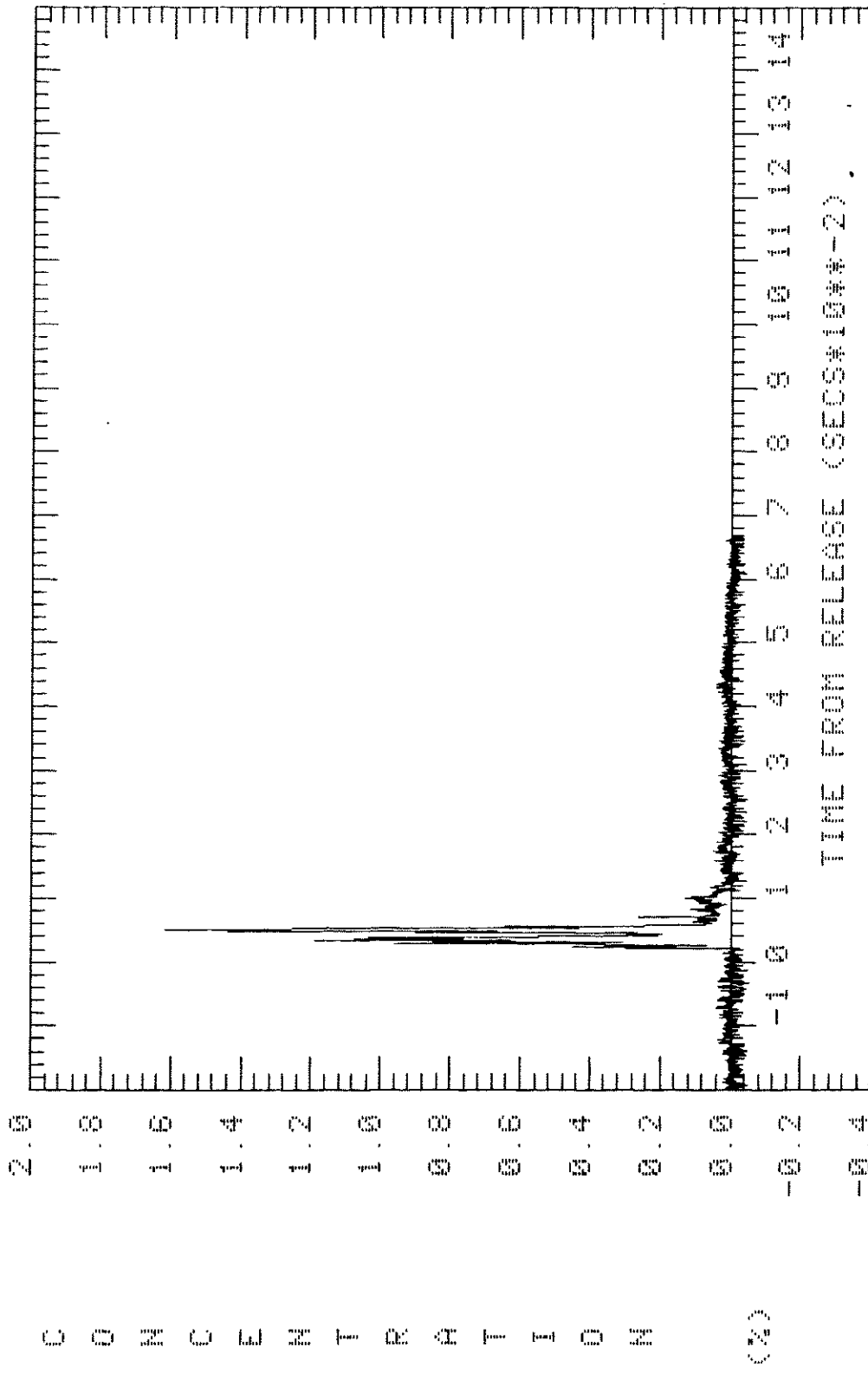
TRIAL: 019 TYPE: HGAS AVERAGING TIME: 0.6 SECS

X: 475 M Y: 275 M Z: 2.0 M



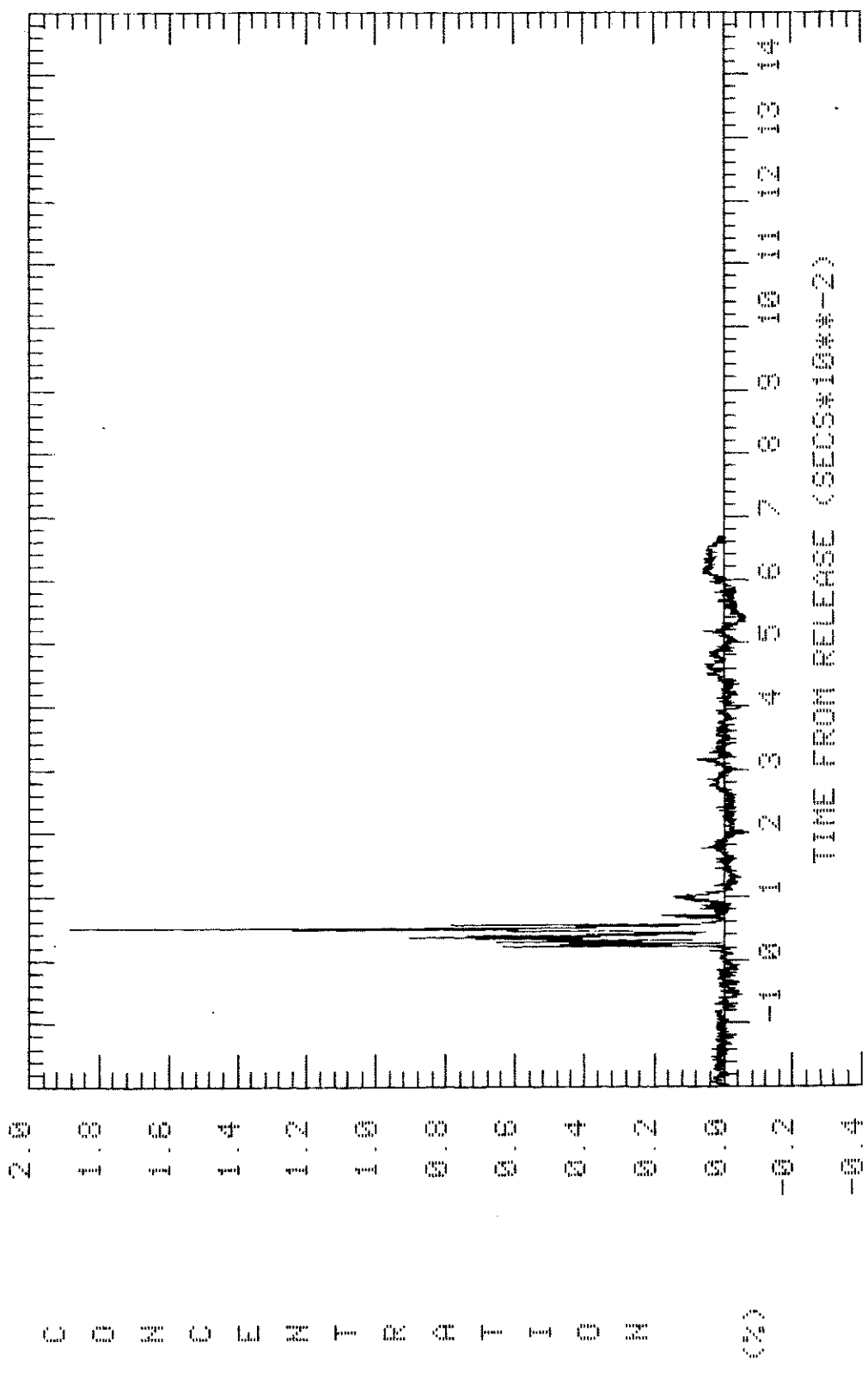
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 475 M Y: 275 M Z: 2.4 M



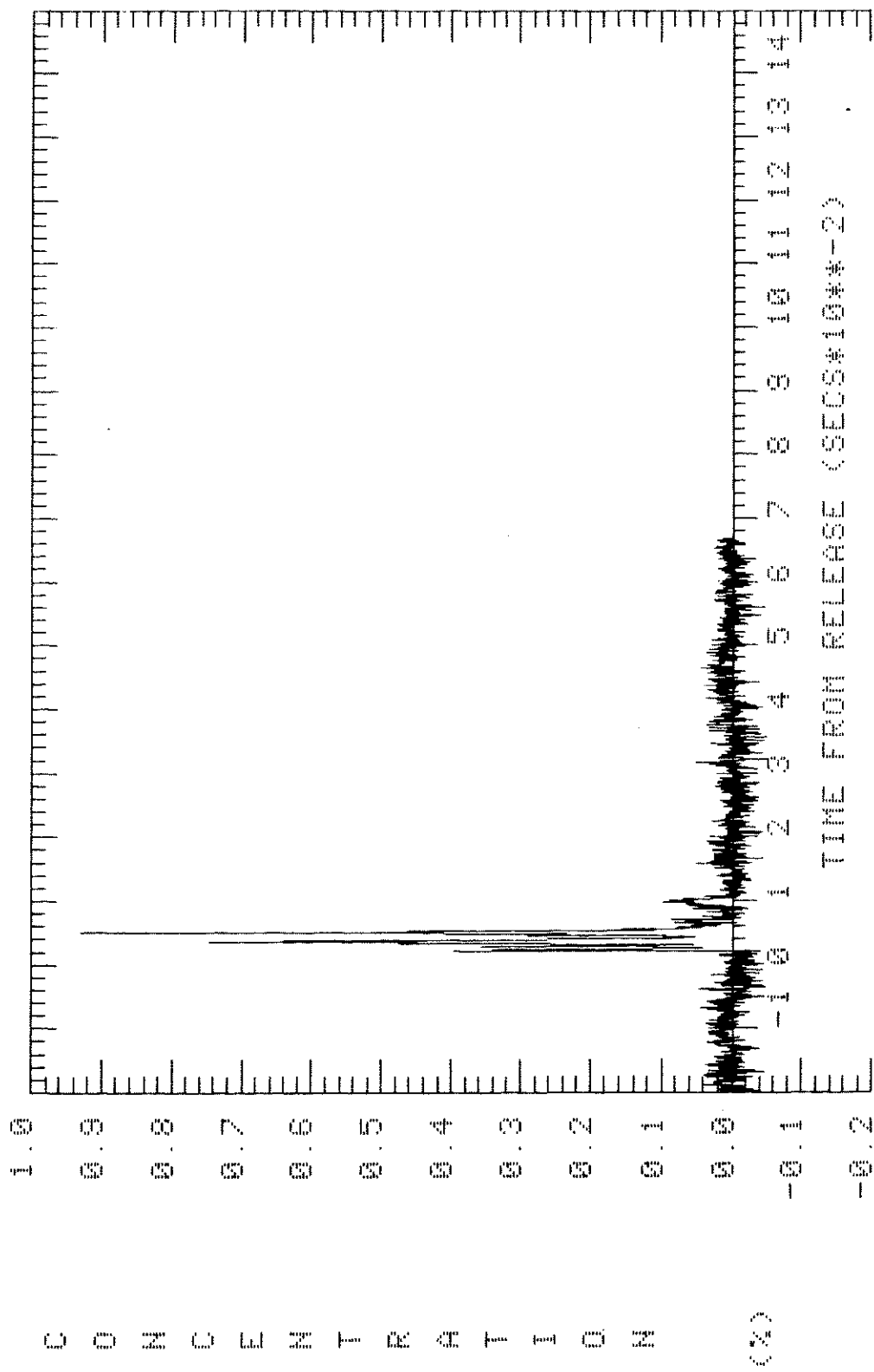
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 475 M Y: 275 M Z: 4.4 M



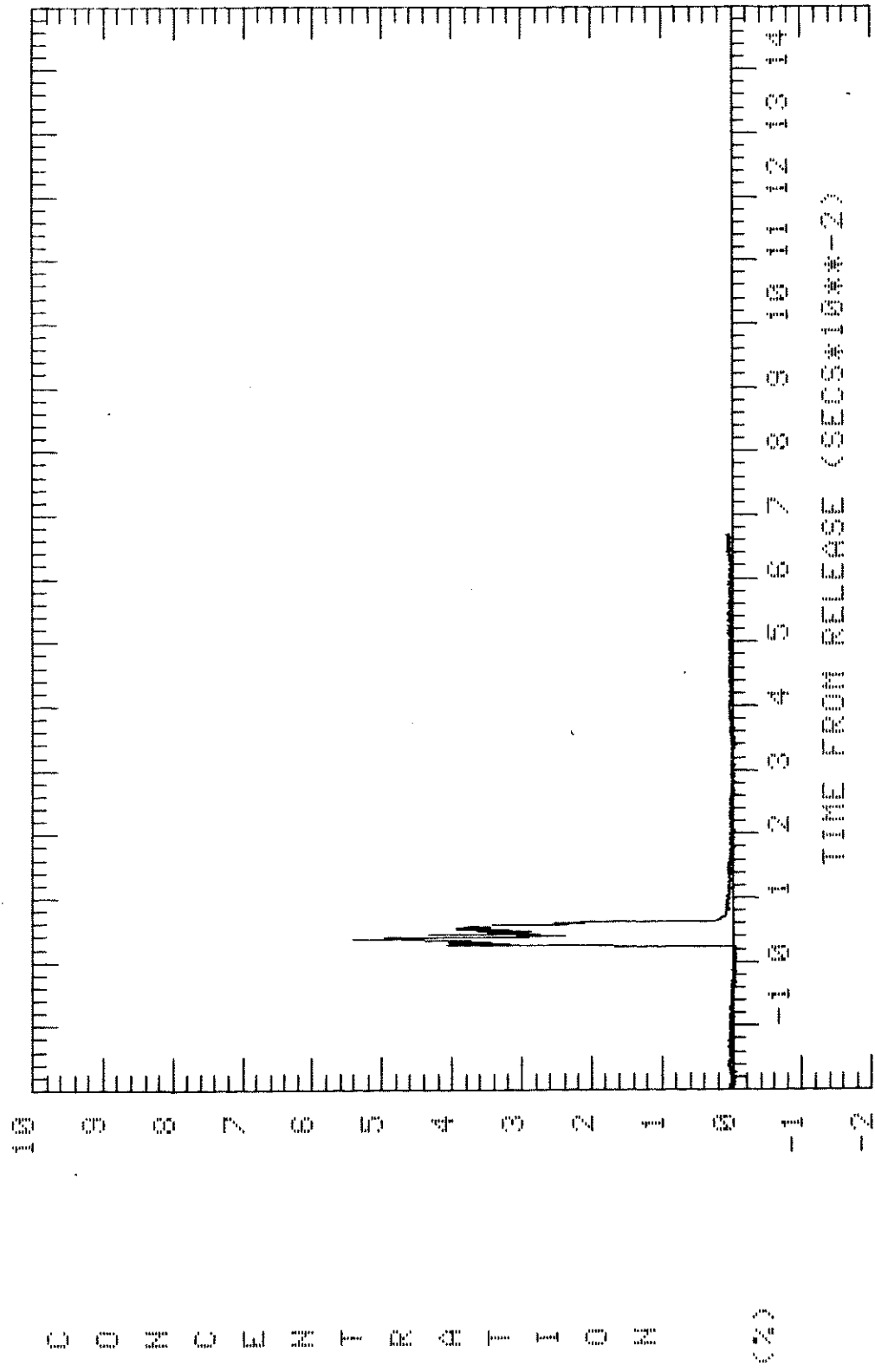
TRIAL: 019 TYPE: HGAS AVERAGING TIME: 0.6 SECS

X: 475 N Y: 275 N Z: 5.0 N



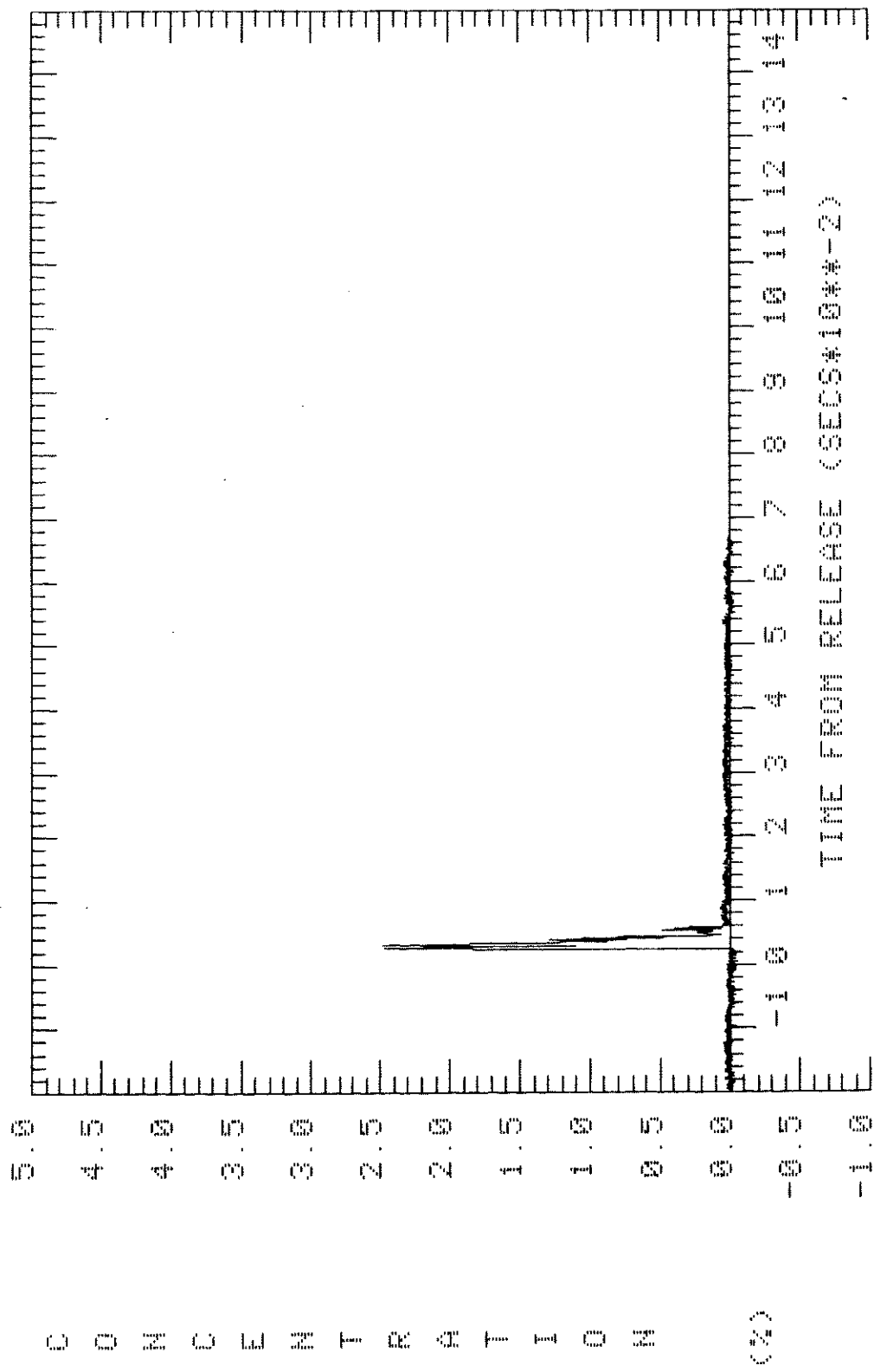
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 475 M Y: 275 M Z: 6.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

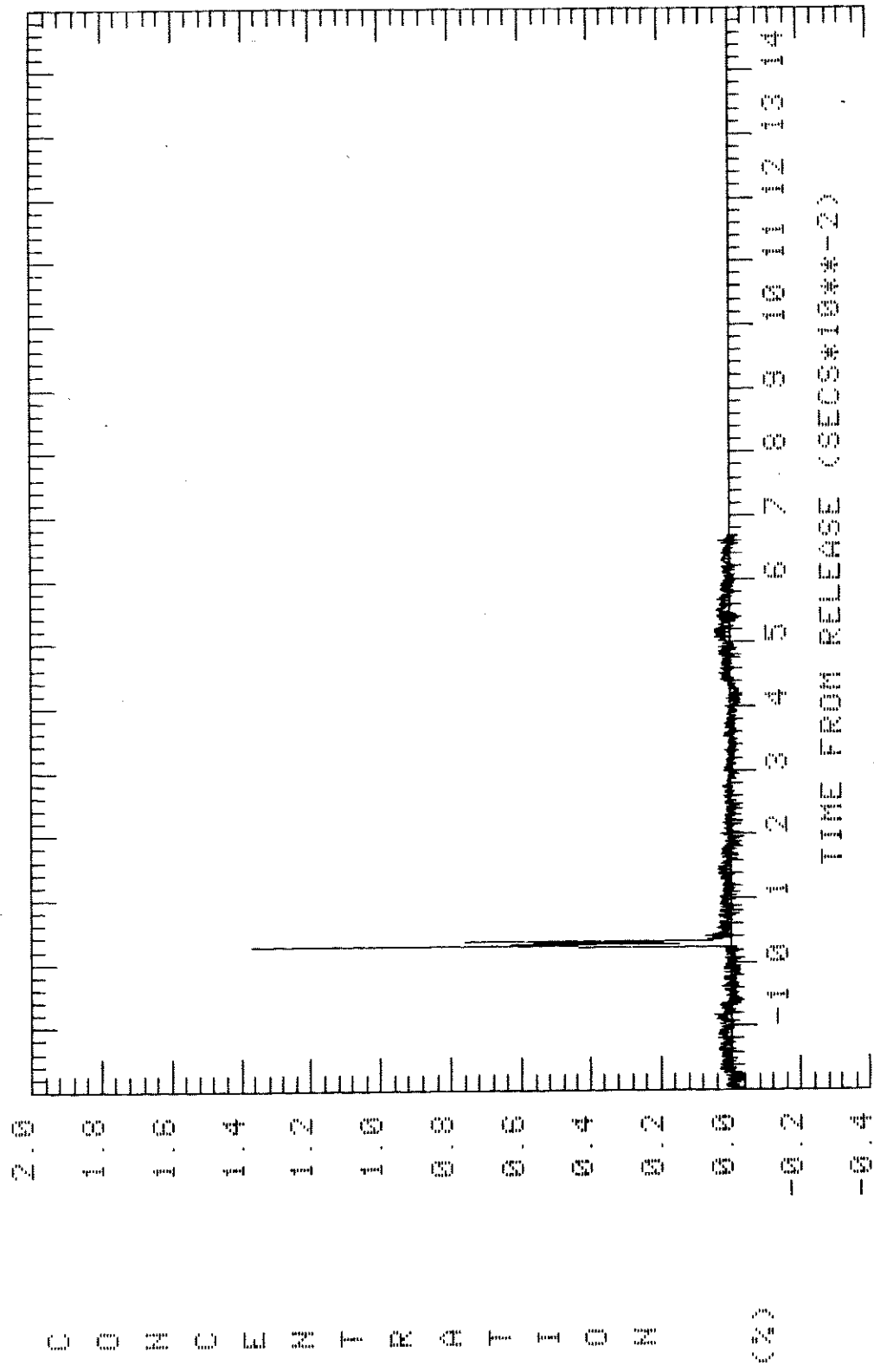
X: 400 H Y: 300 H Z: 0.4 H



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 300 M Z: 2.4 M

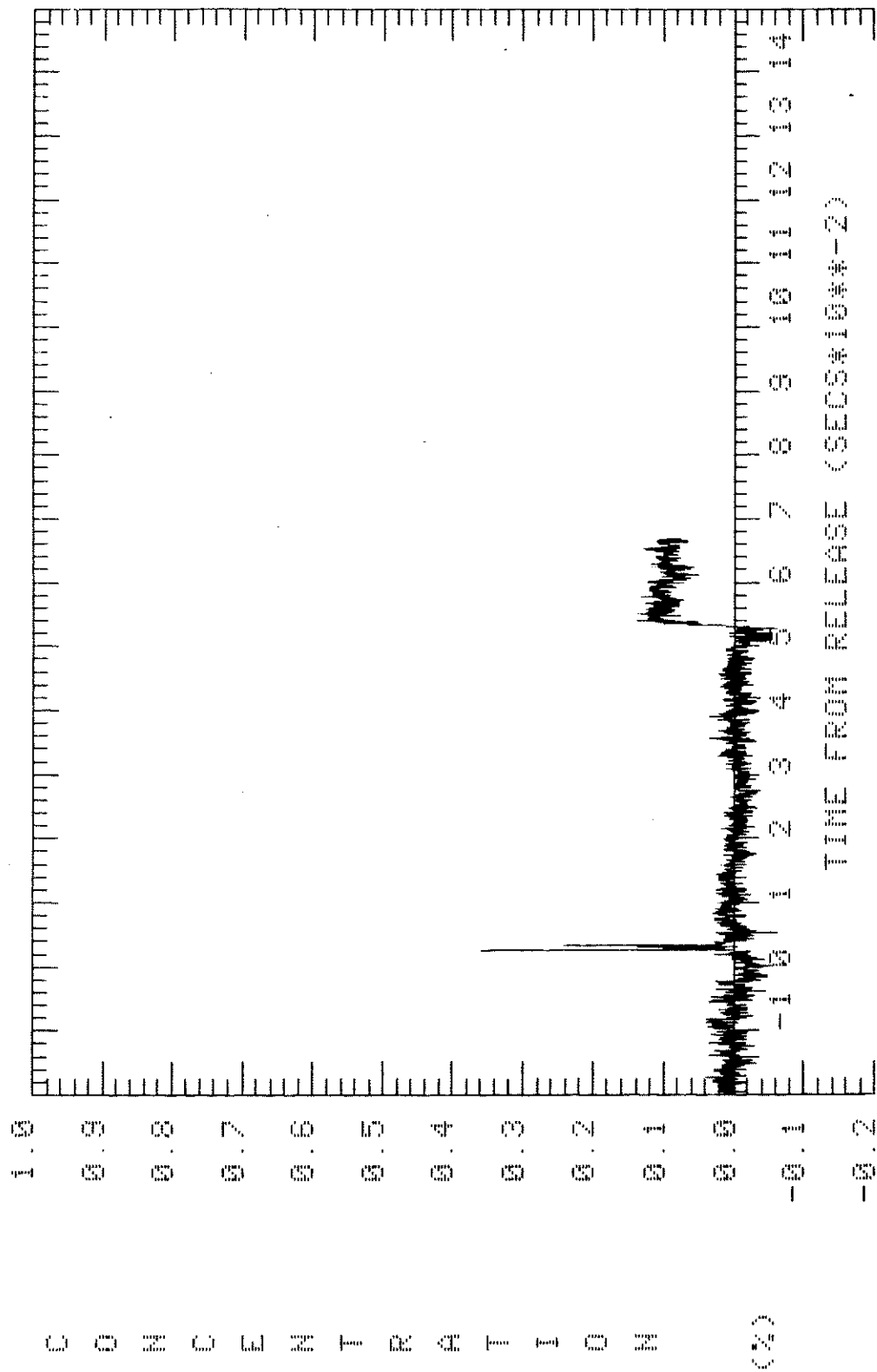
G19



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 300 M Z: 4.4 M

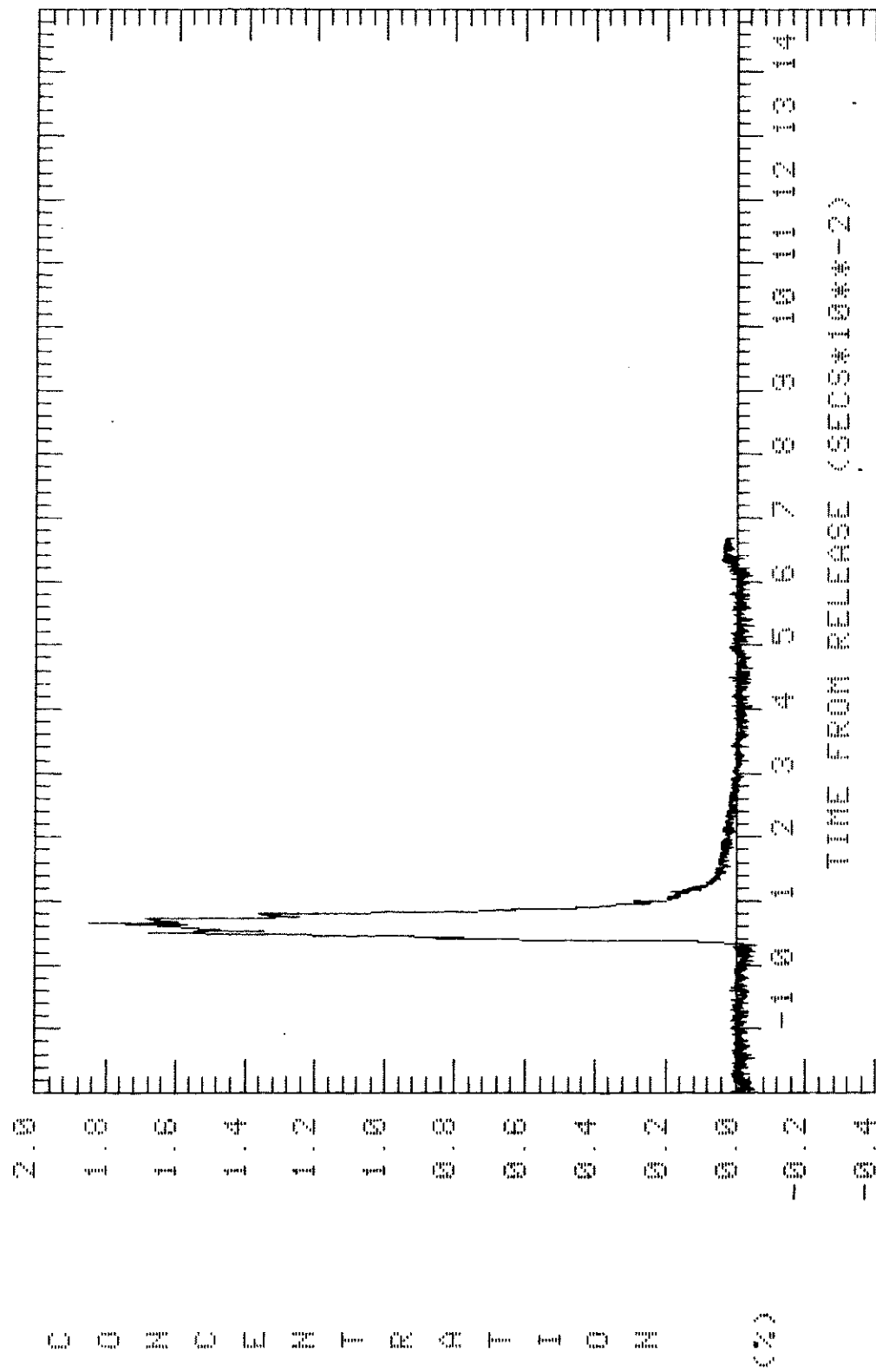
G20



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 300 M Z: 0.4 M

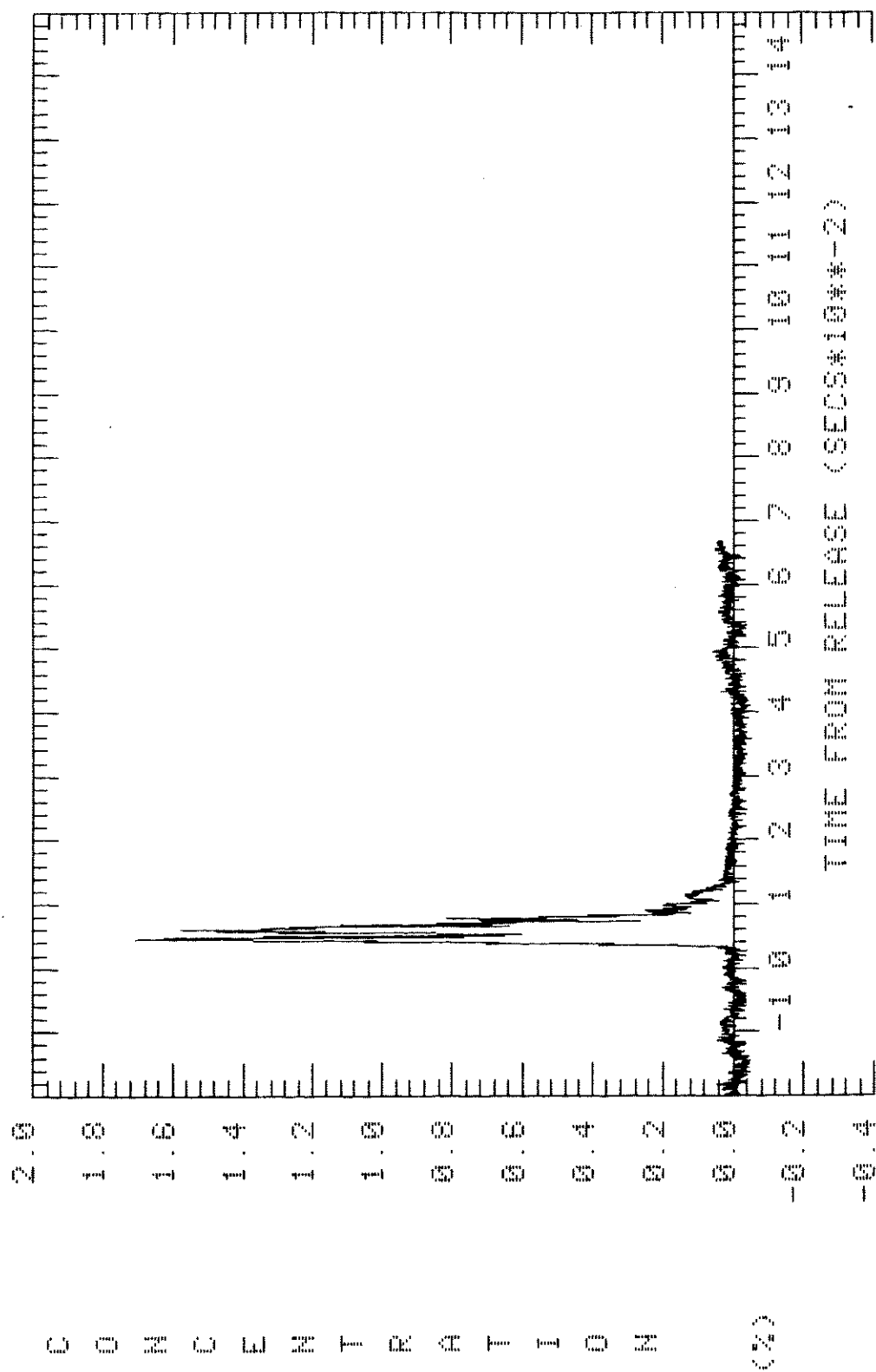
G21



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 500 M Y: 300 M Z: 0.4 M

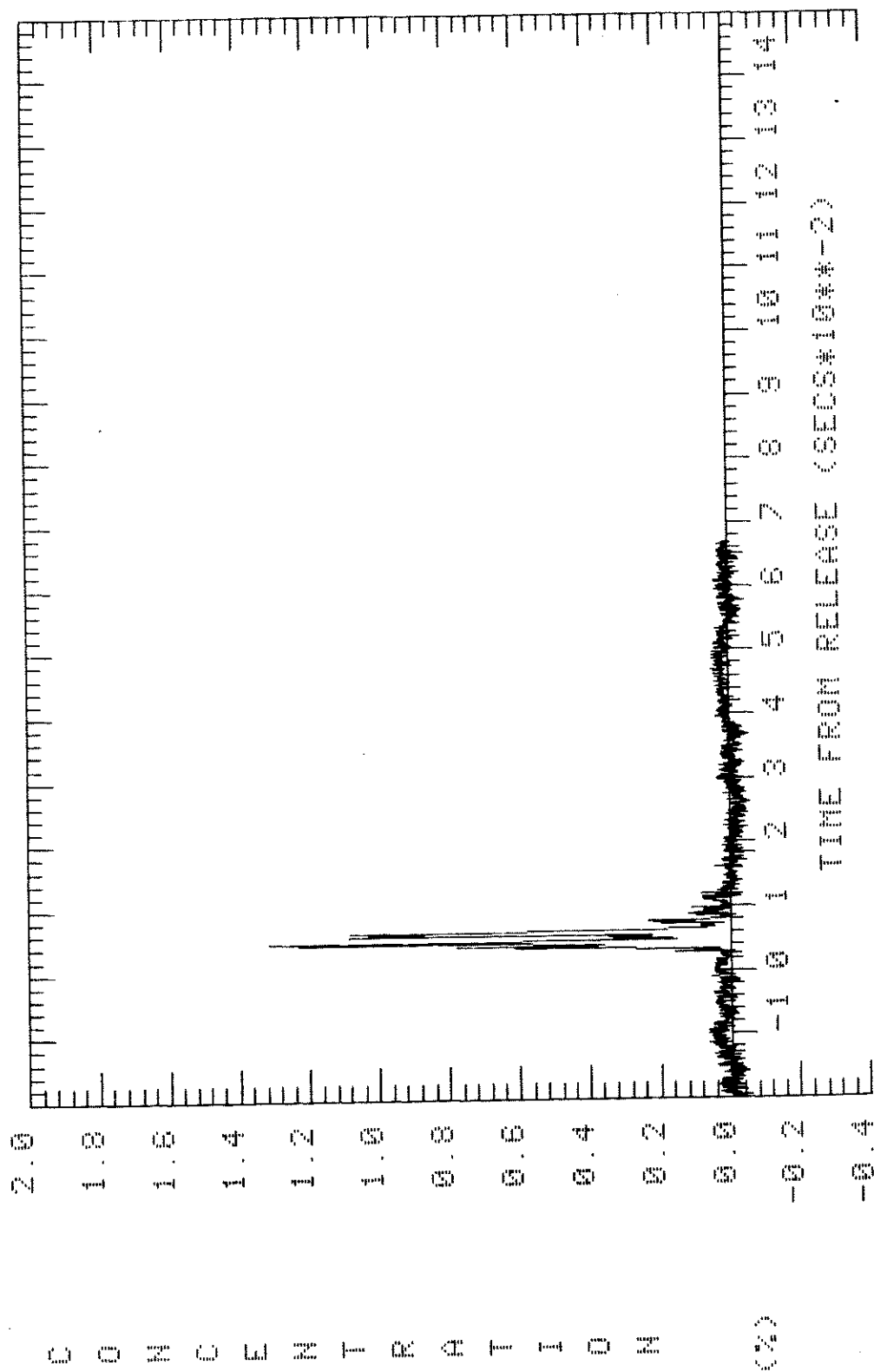
G22



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.8 SECS

X: 500 M Y: 300 M Z: 2.6 M

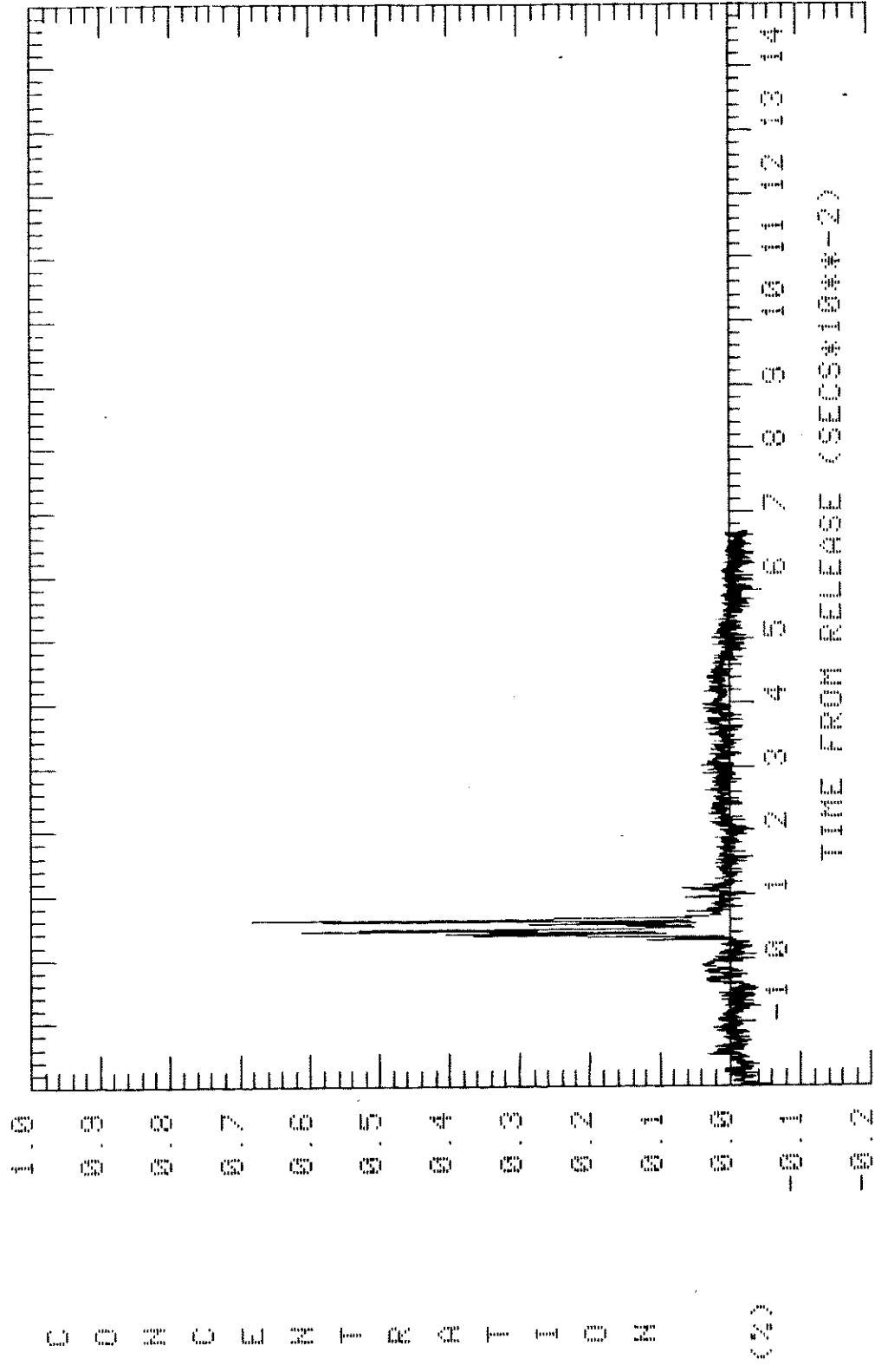
G23



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

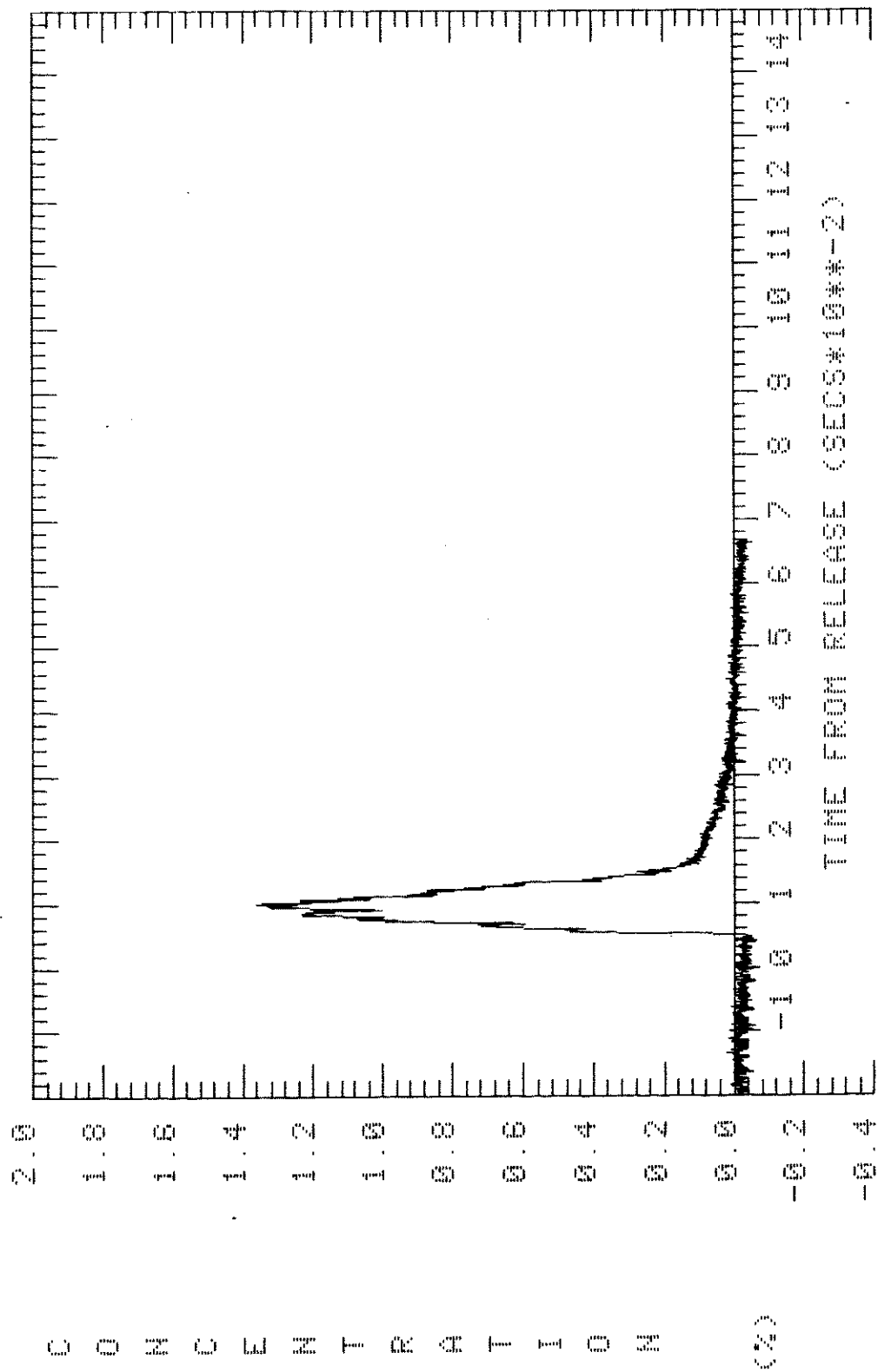
X: 500 M Y: 300 M Z: 4.4 M

G24



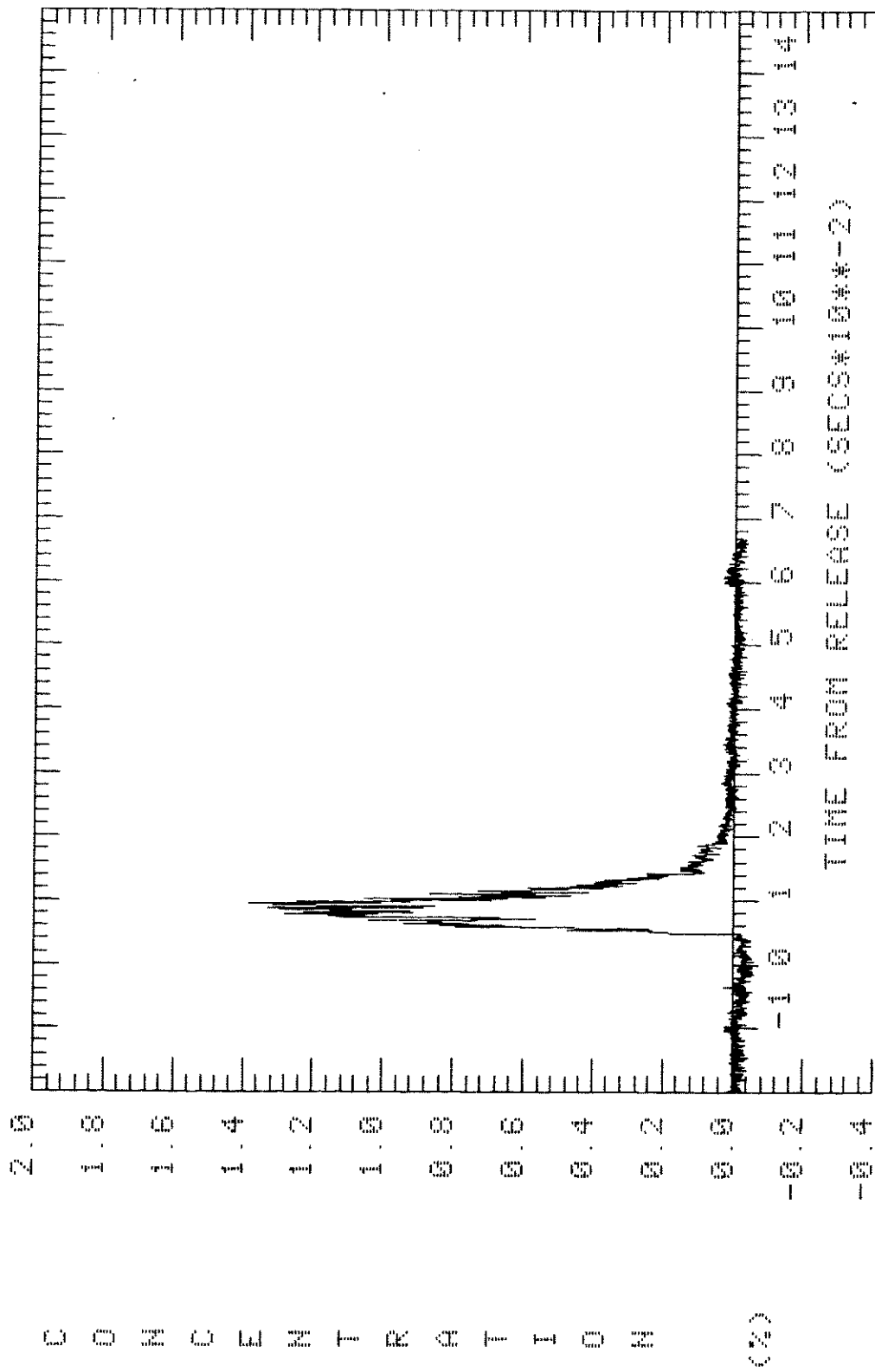
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 500 M Y: 300 M Z: 9.4 M



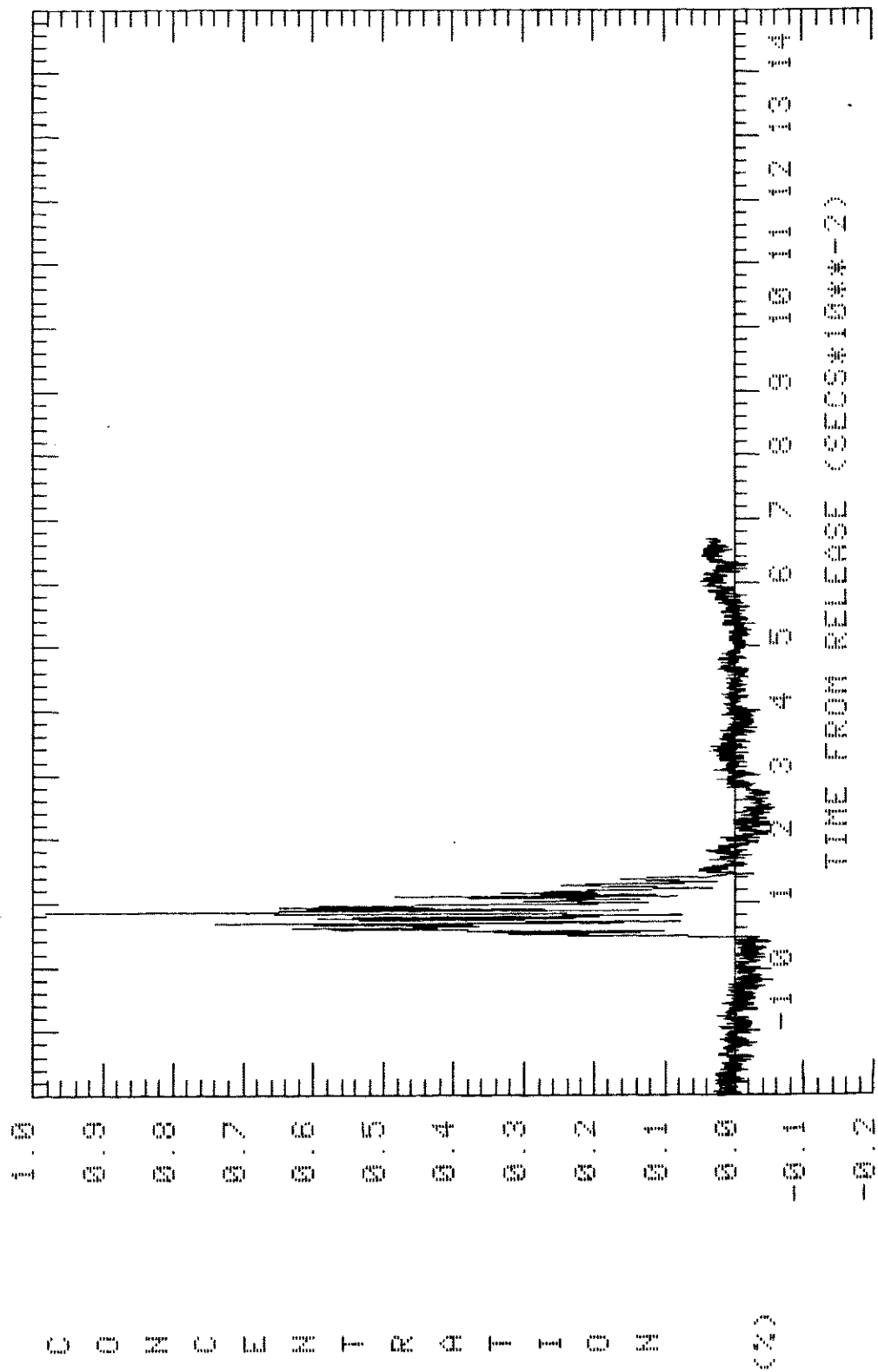
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 500 M Y: 400 M Z: 0.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

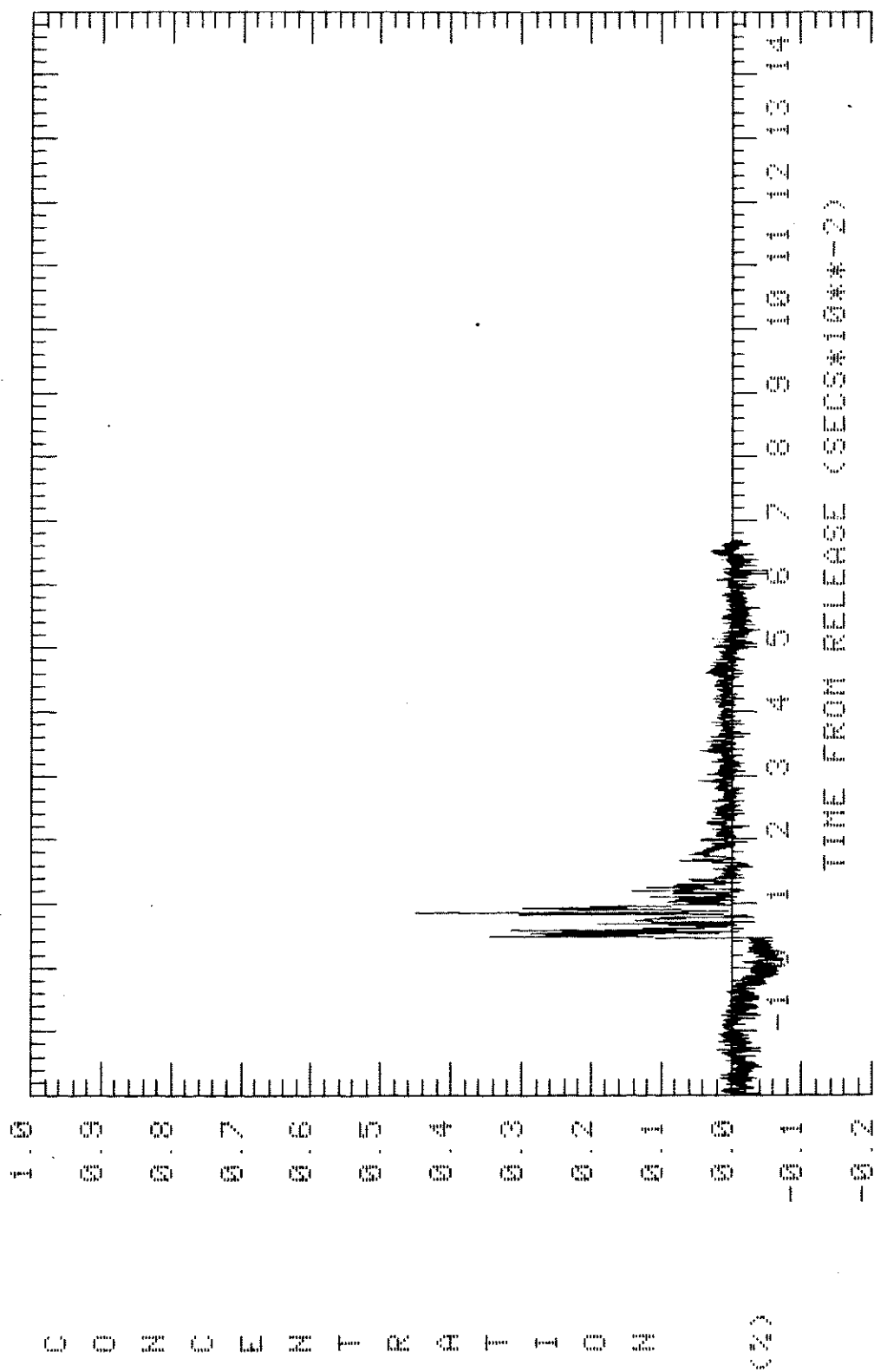
X: 590 M Y: 400 M Z: 2.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 500 H Y: 400 H Z: 4.4 H

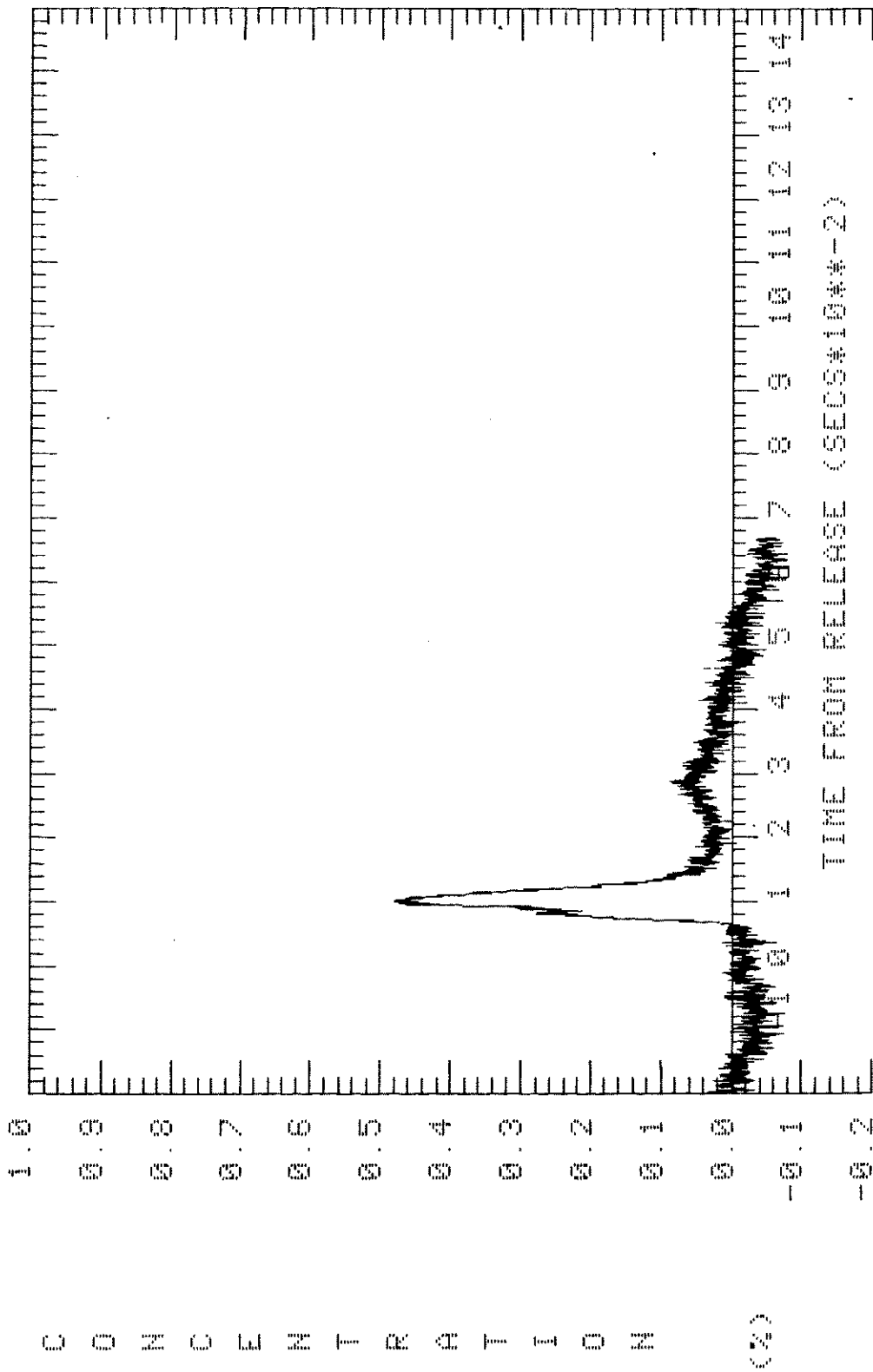
G28



TRIAL: 919 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 500 M Y: 400 M Z: 8.4 M

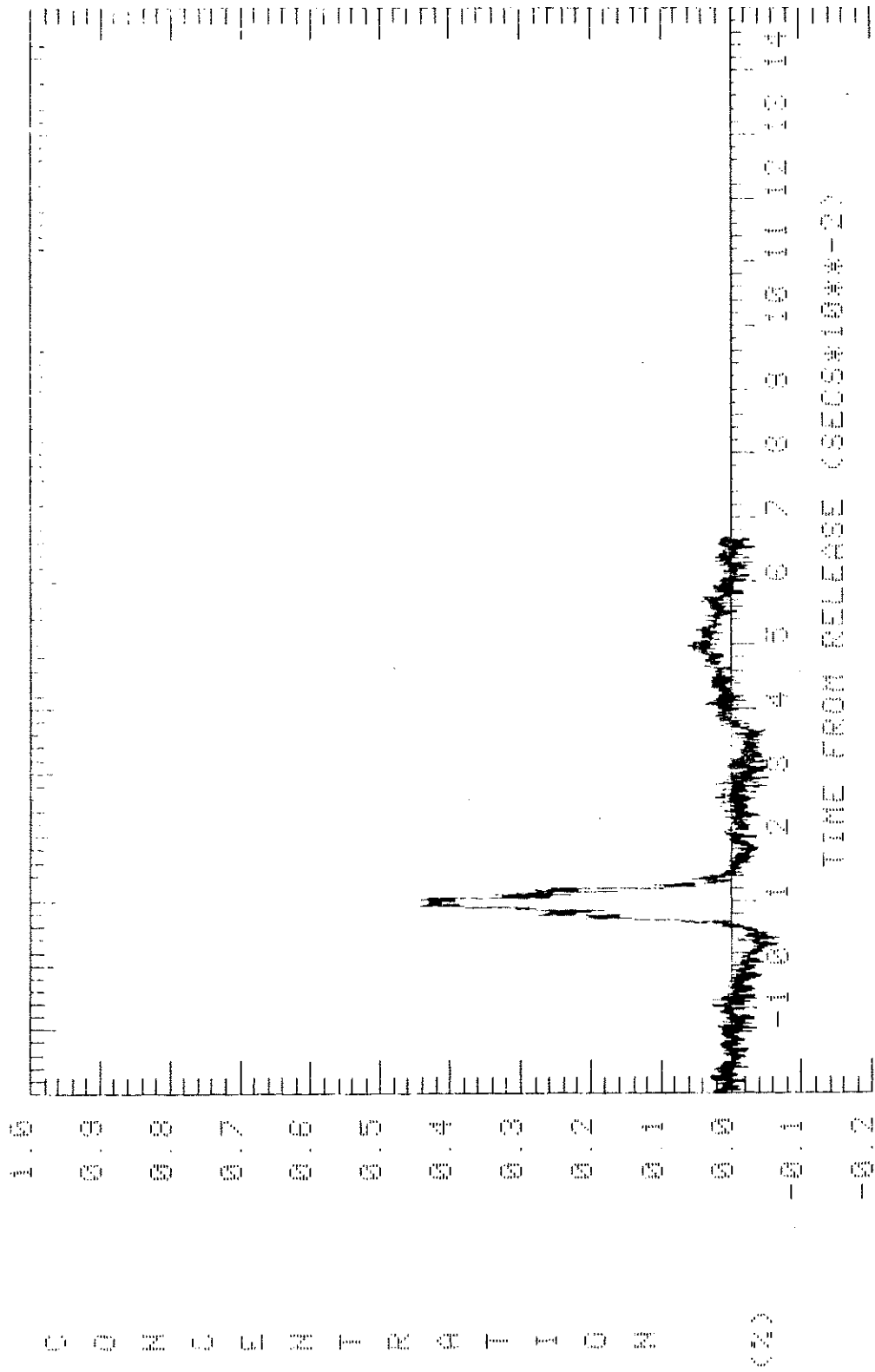
G29



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

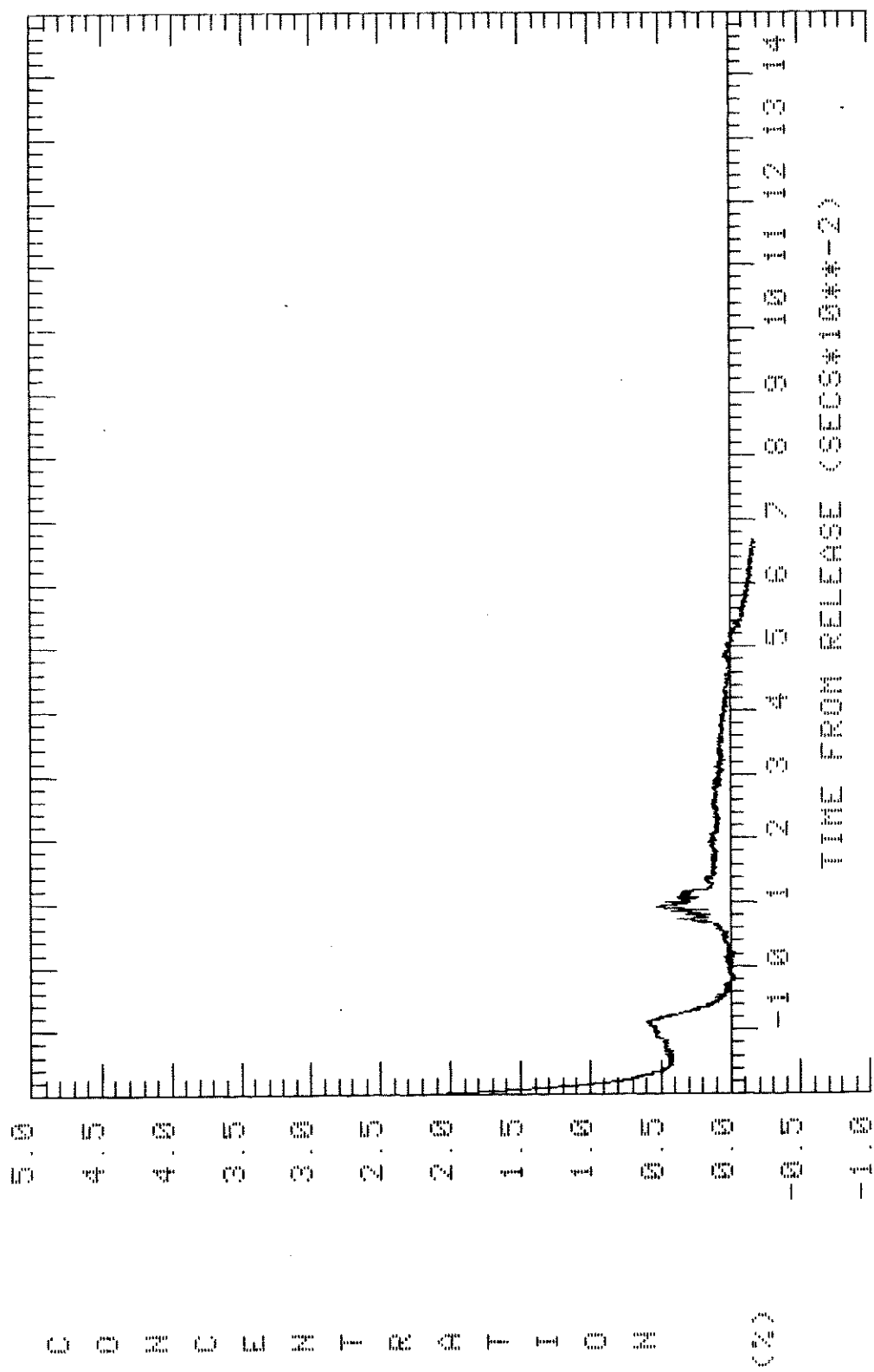
X: 600 M Y: 400 M Z: 0.4 M

G30



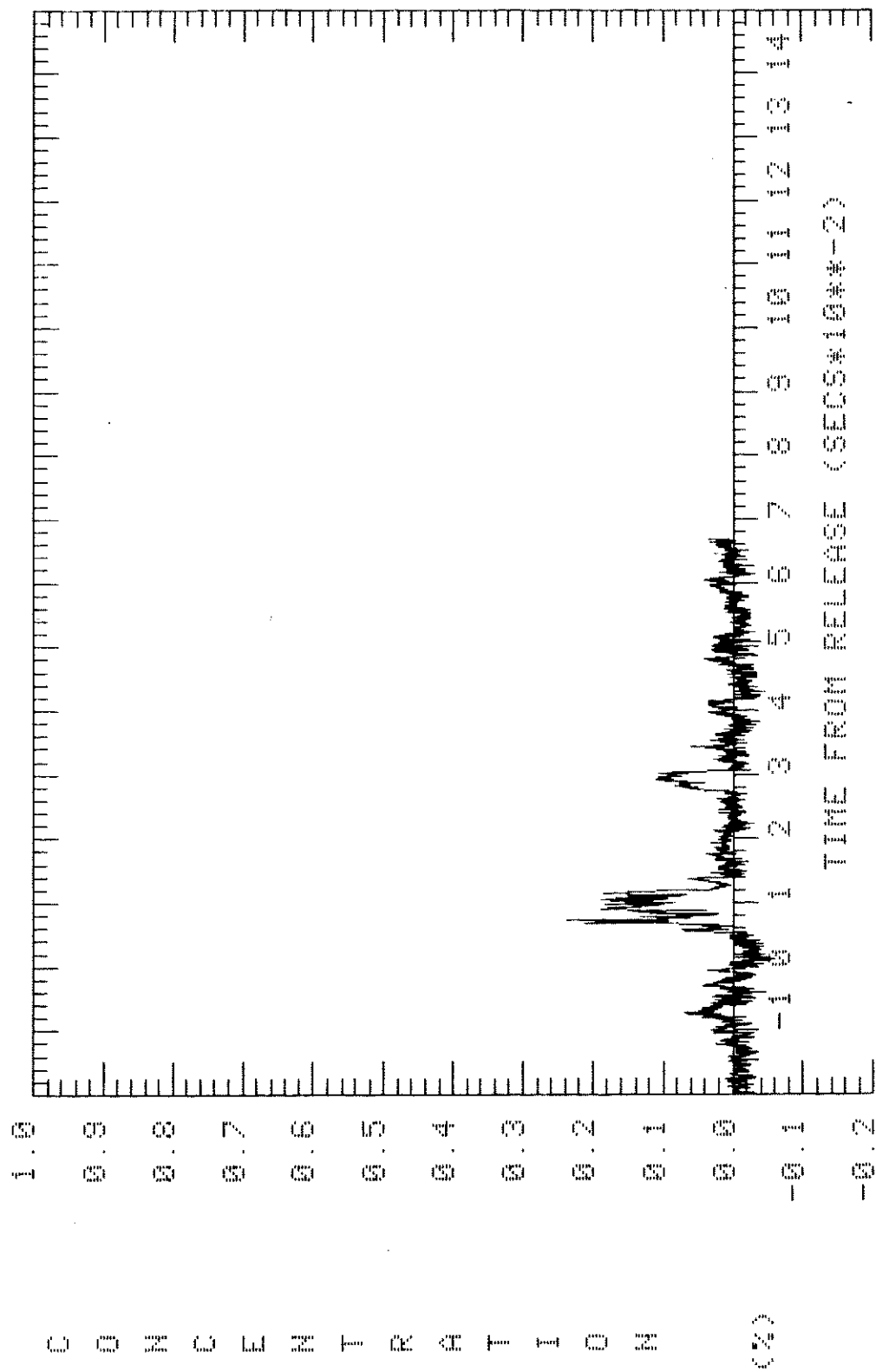
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.5 SECS

X: 600 M Y: 400 M Z: 2.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

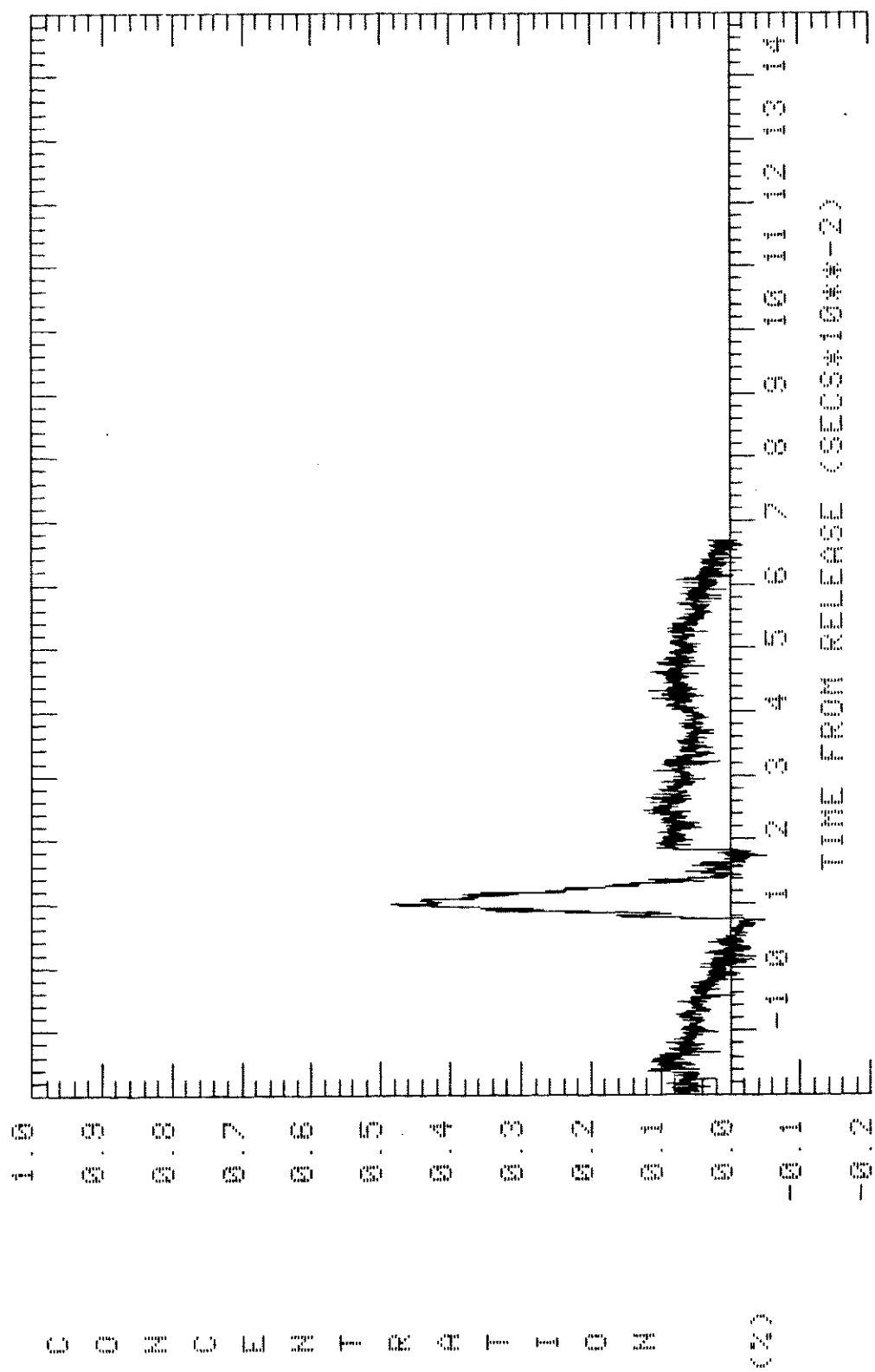
X: 600 M Y: 400 M Z: 4.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 600 N Y: 400 N Z: 6.4 M

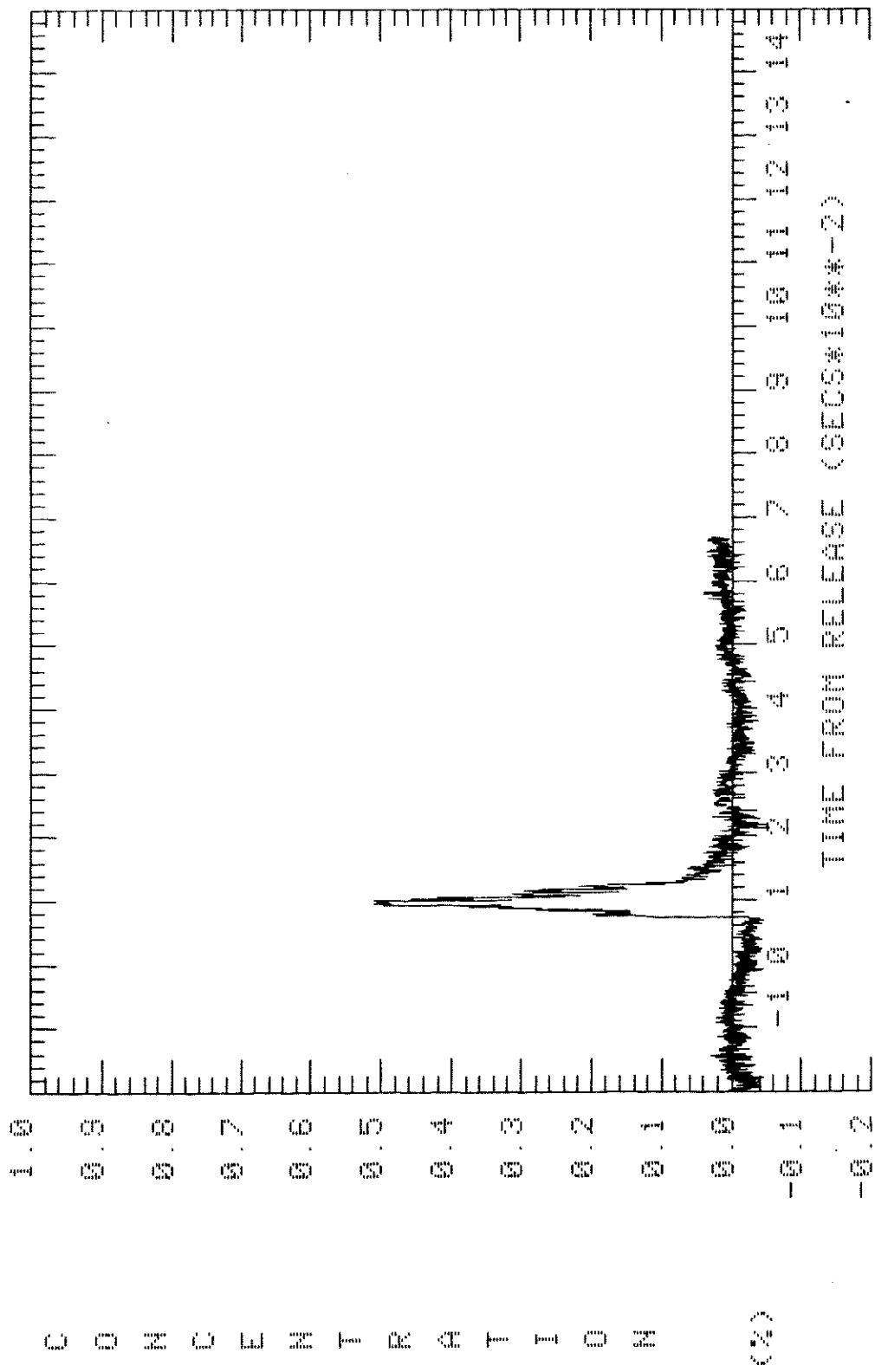
G33



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

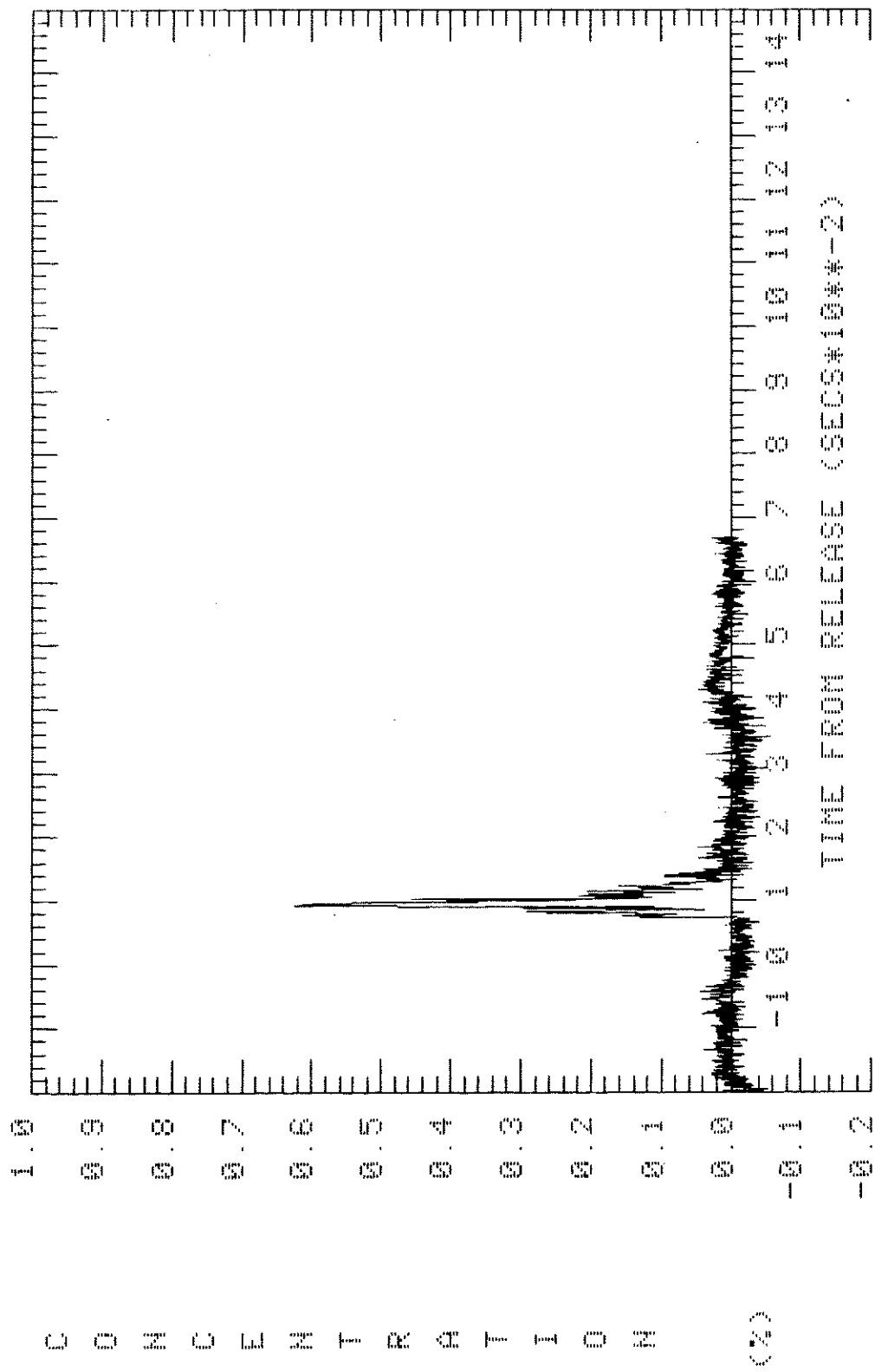
X: 500 H Y: 500 H Z: 0.4 H

G34



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

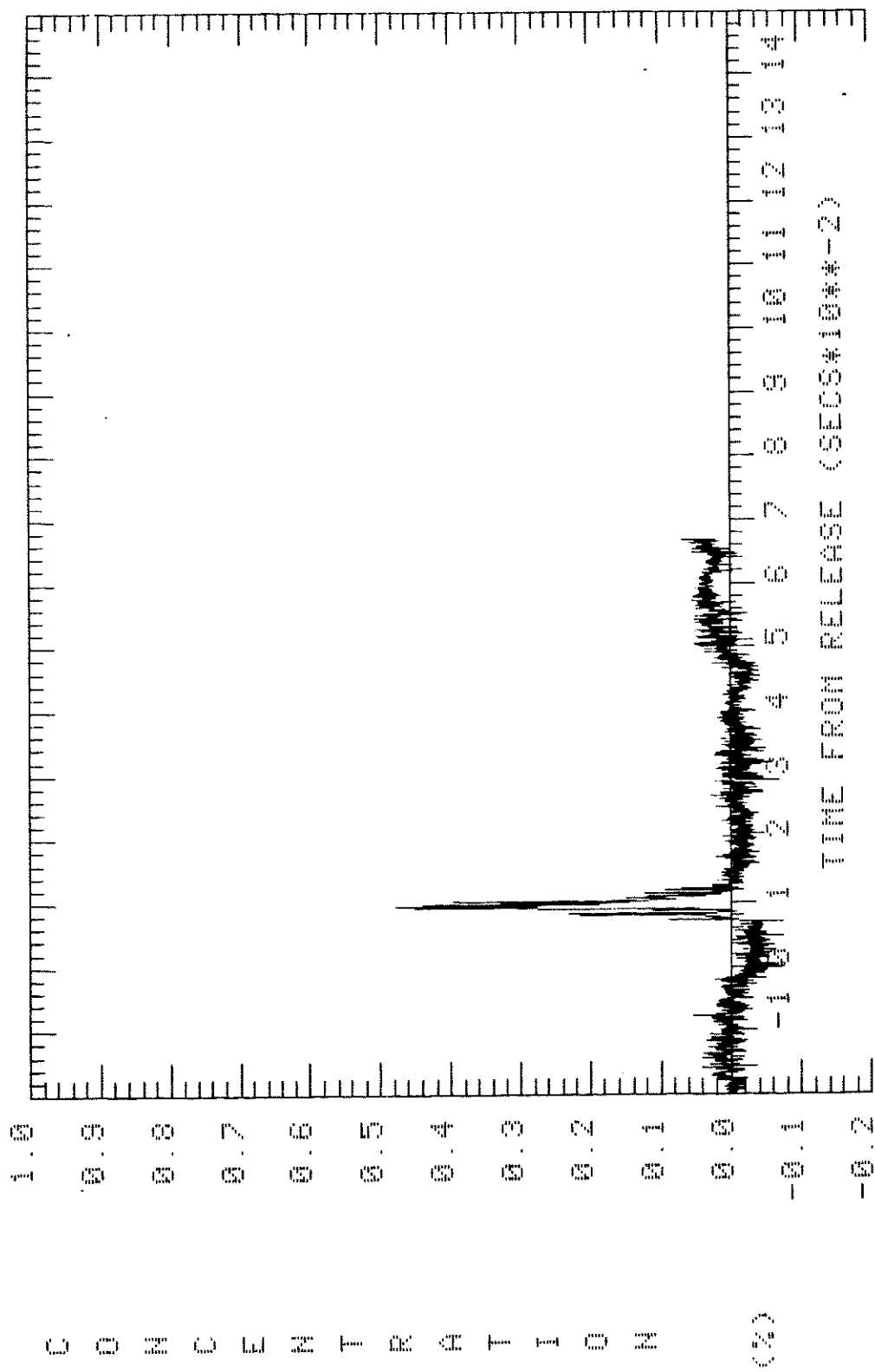
X: 500 M Y: 500 M Z: 2.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

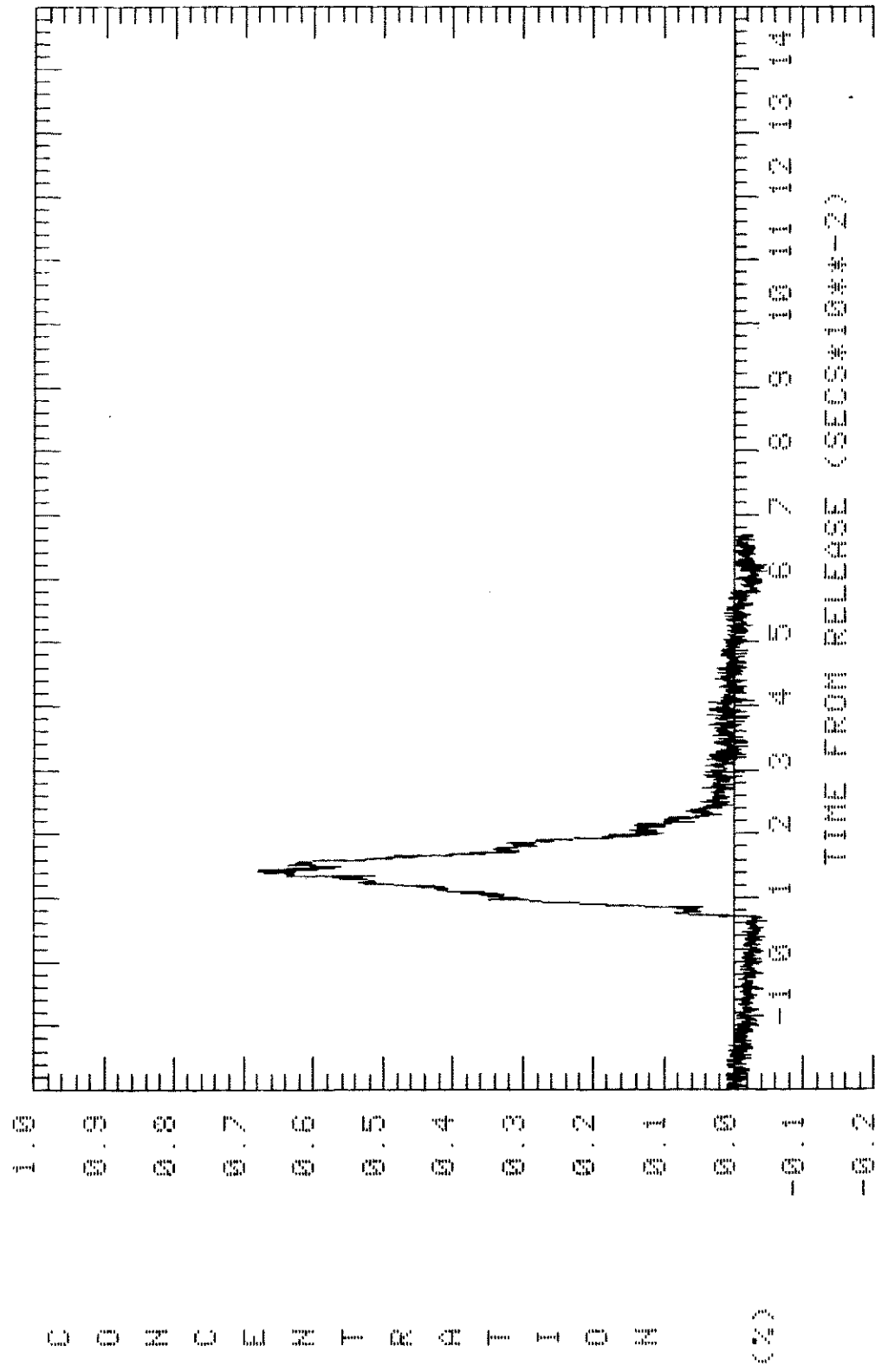
X: 500 M Y: 500 M Z: 4.4 M

G36



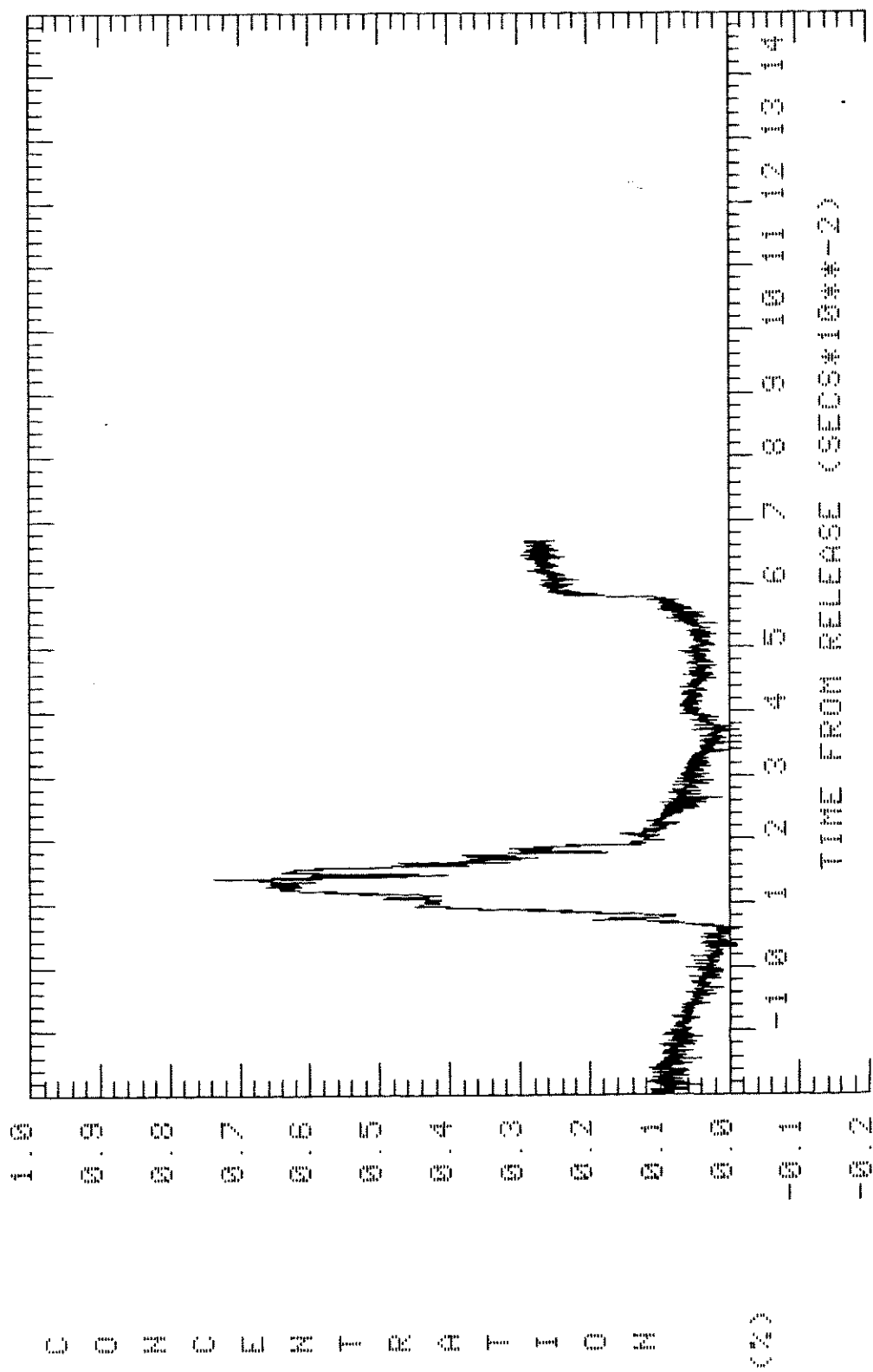
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 500 M Y: 500 M Z: 6.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

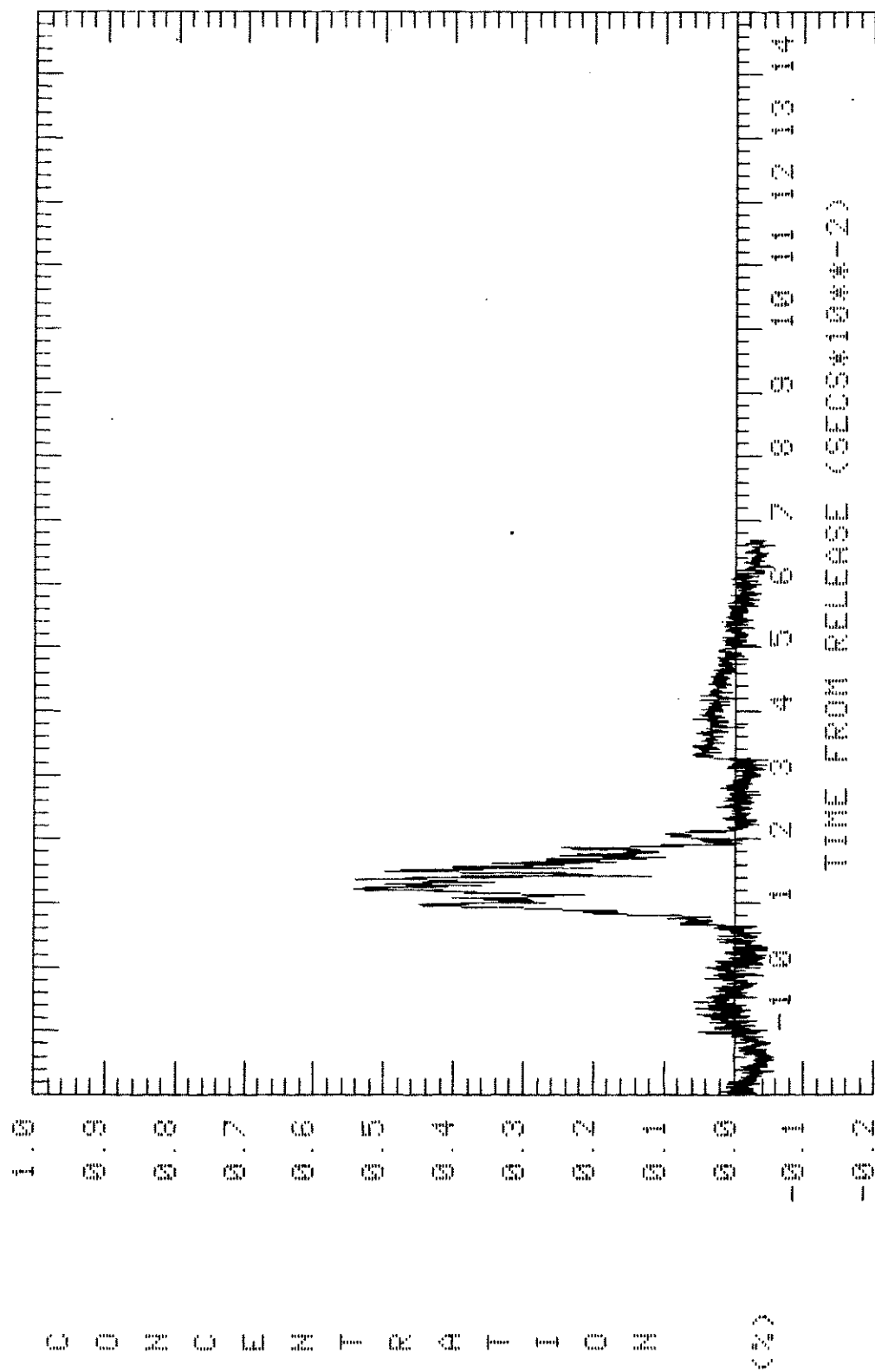
X: 600 M Y: 500 M Z: 0.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 500 M Y: 500 M Z: 2.4 M

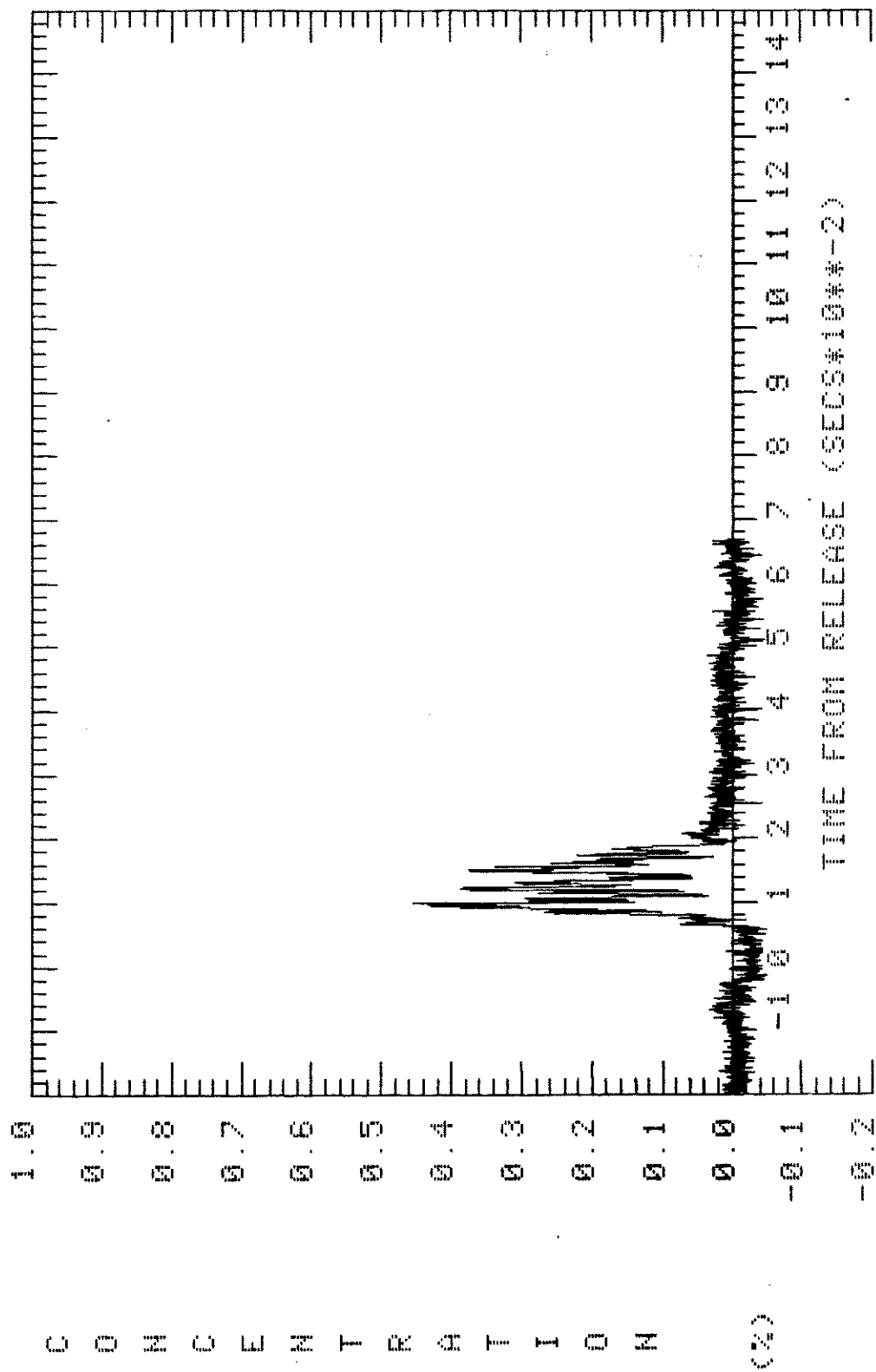
G39



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 600 H Y: 500 H Z: 4.4 H

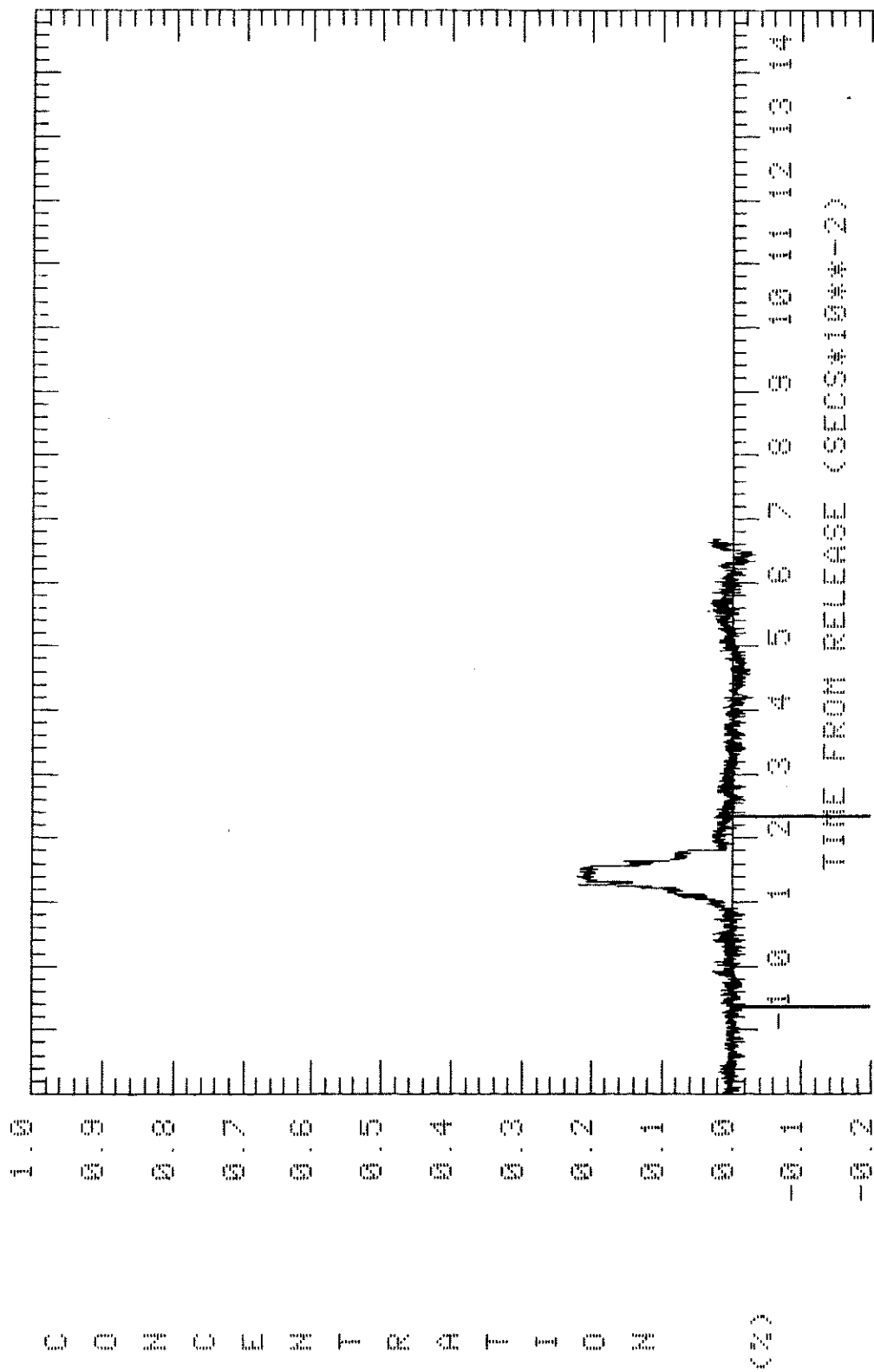
G40



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 600 M Y: 500 M Z: 6.4 M

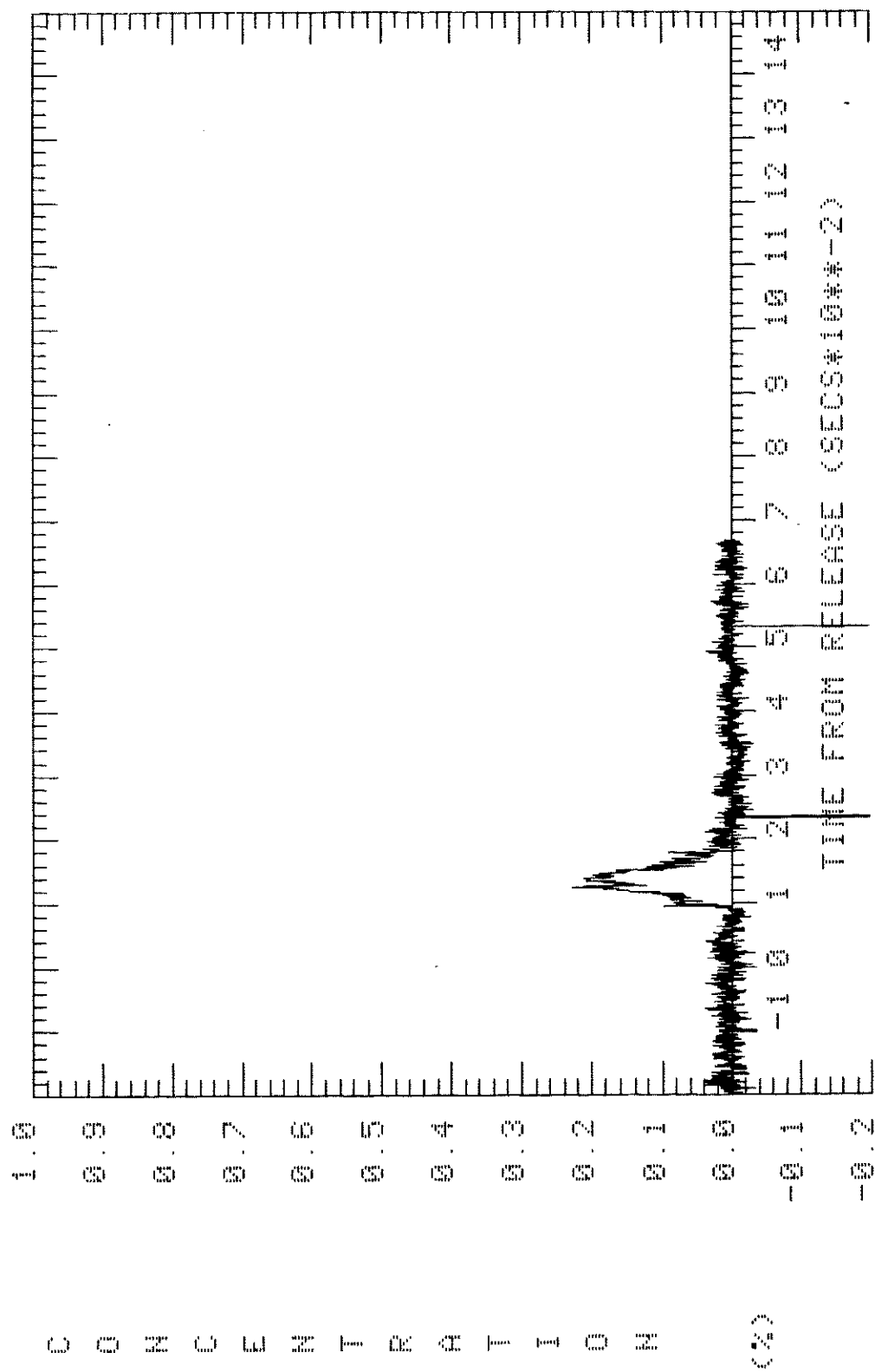
G41



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

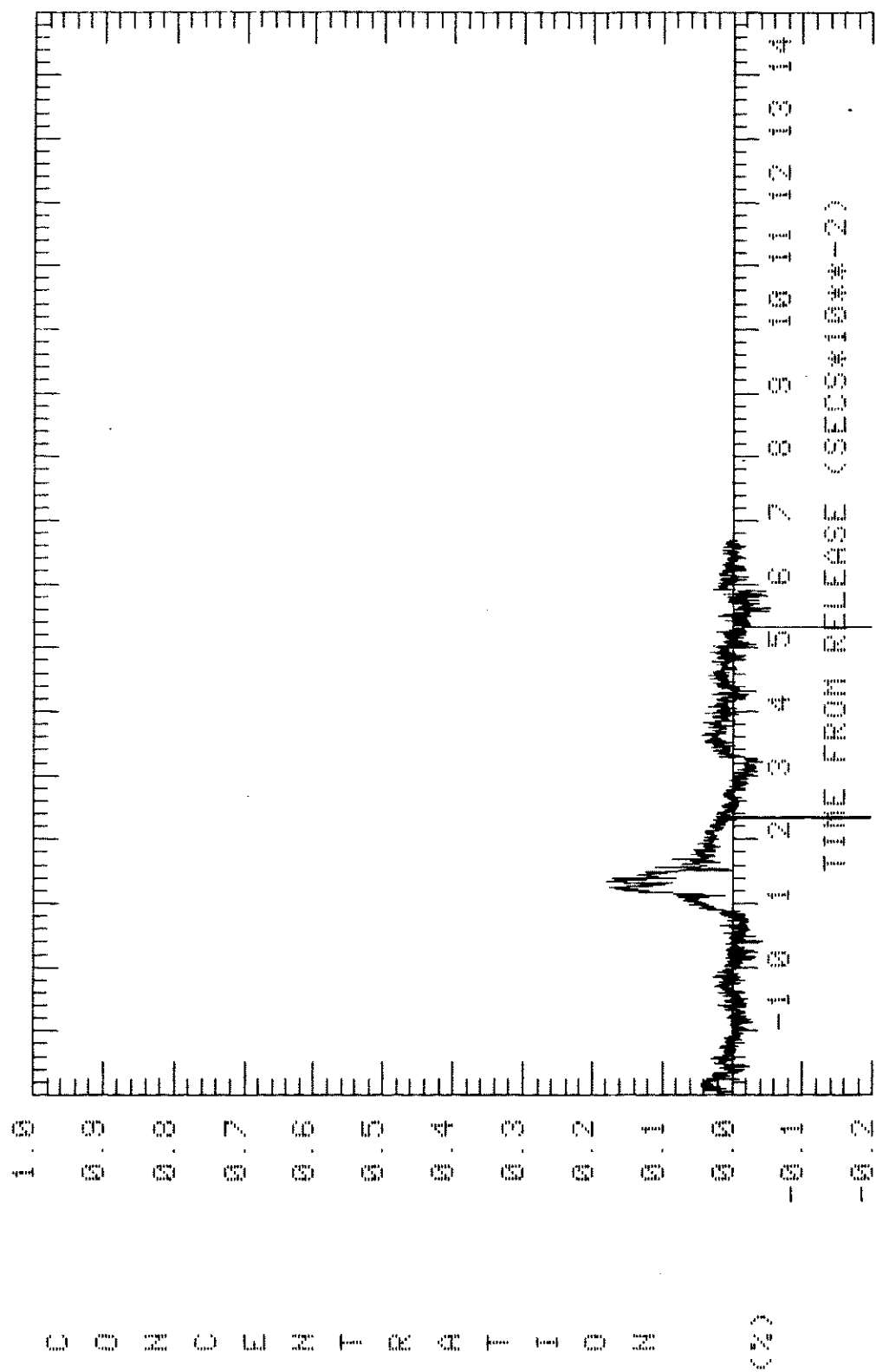
X: 700 H Y: 500 H Z: 0.4 H

G42



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

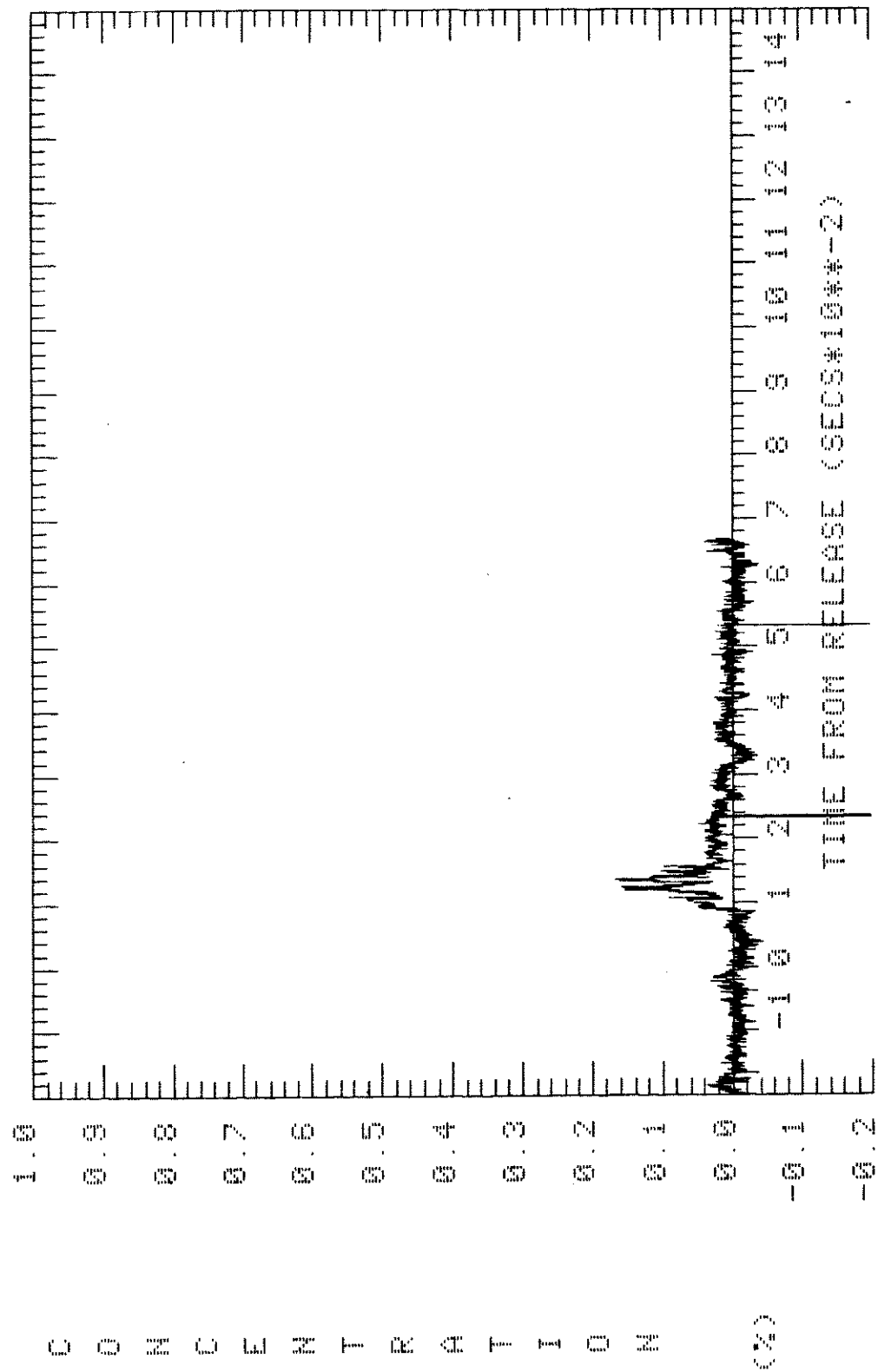
X: 700 N Y: 500 N Z: 2.4 N



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 700 M Y: 500 M Z: 4.4 M

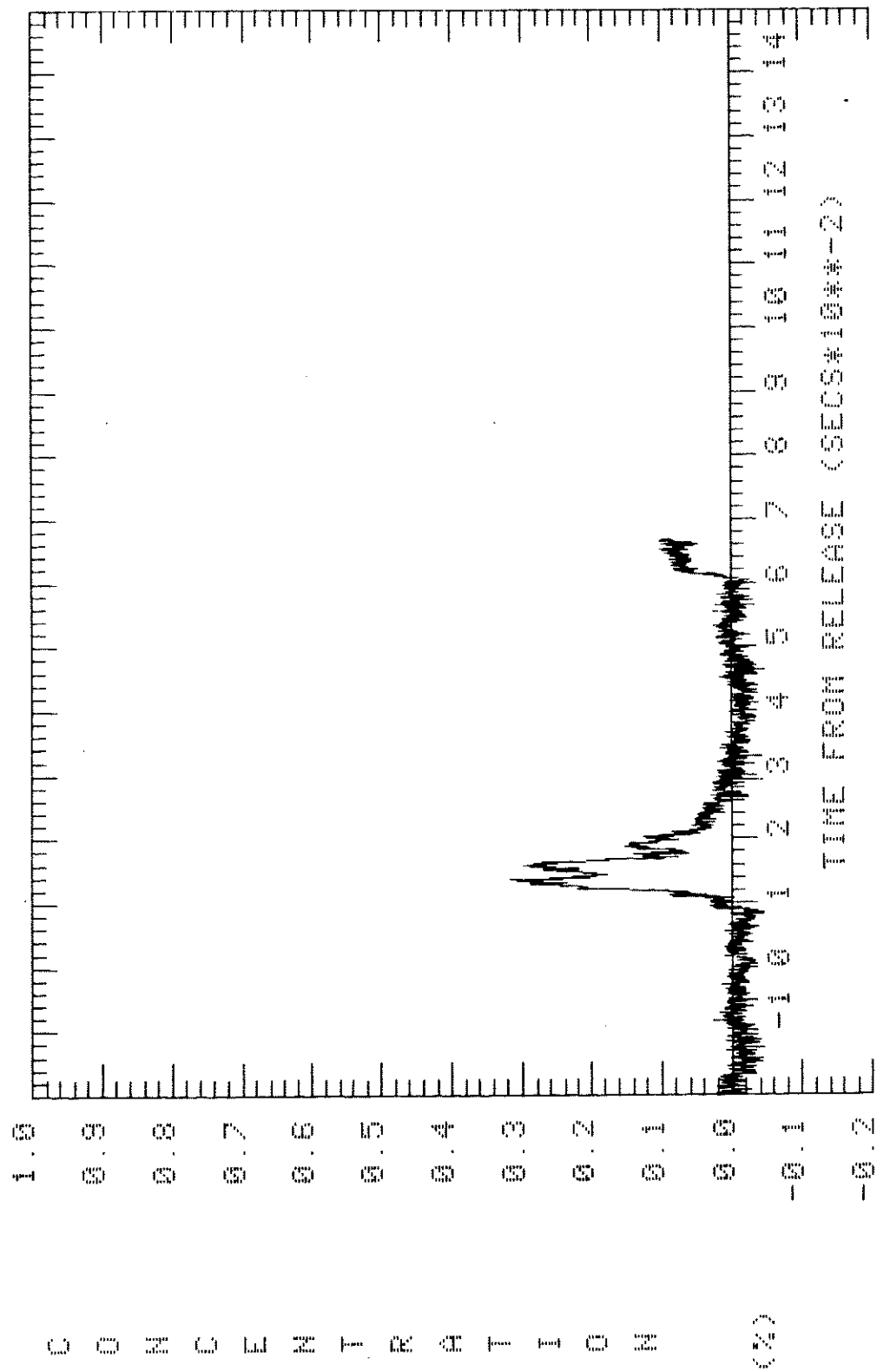
G44



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 700 N Y: 500 N Z: 6.4 N

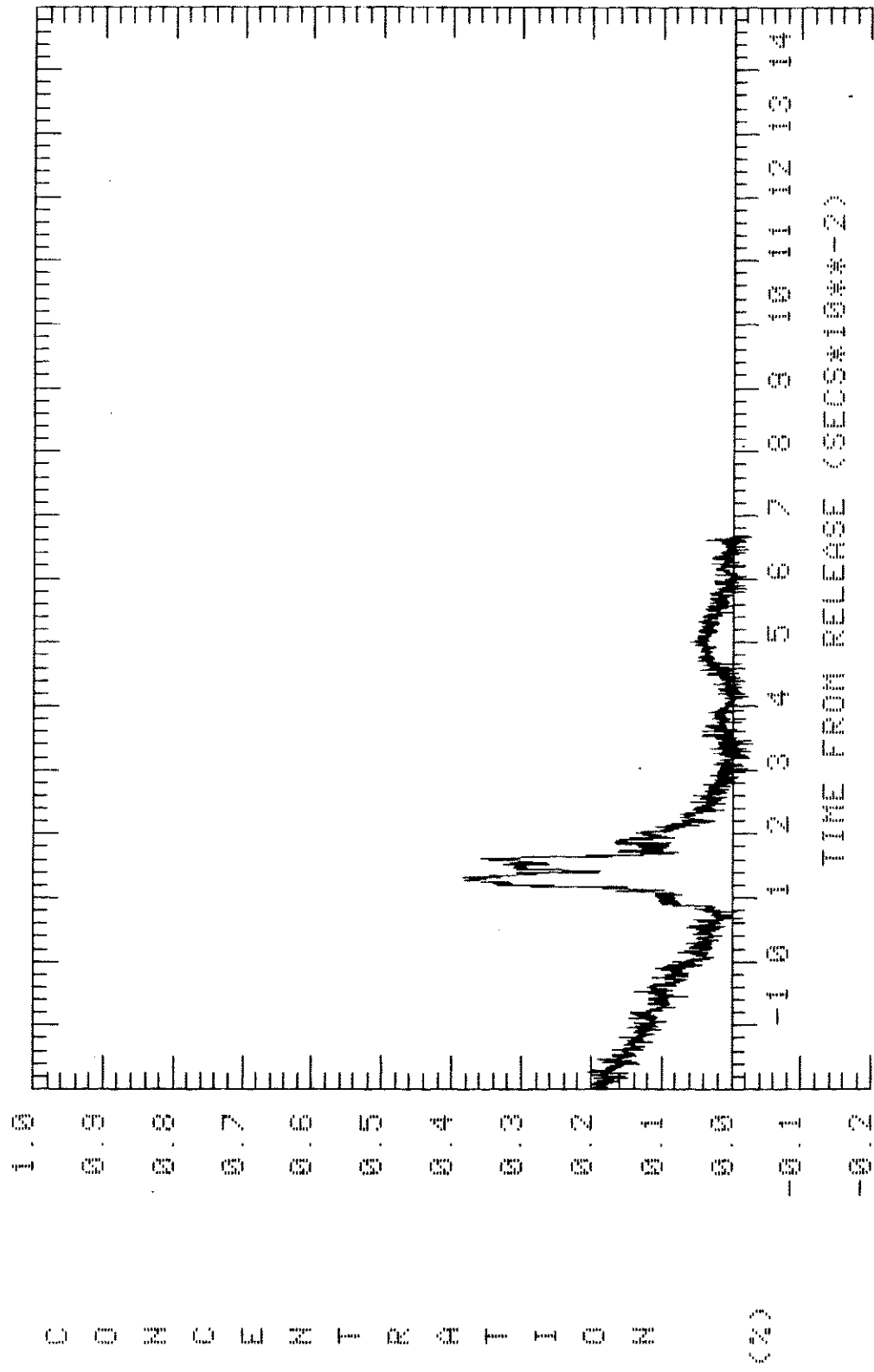
G45



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

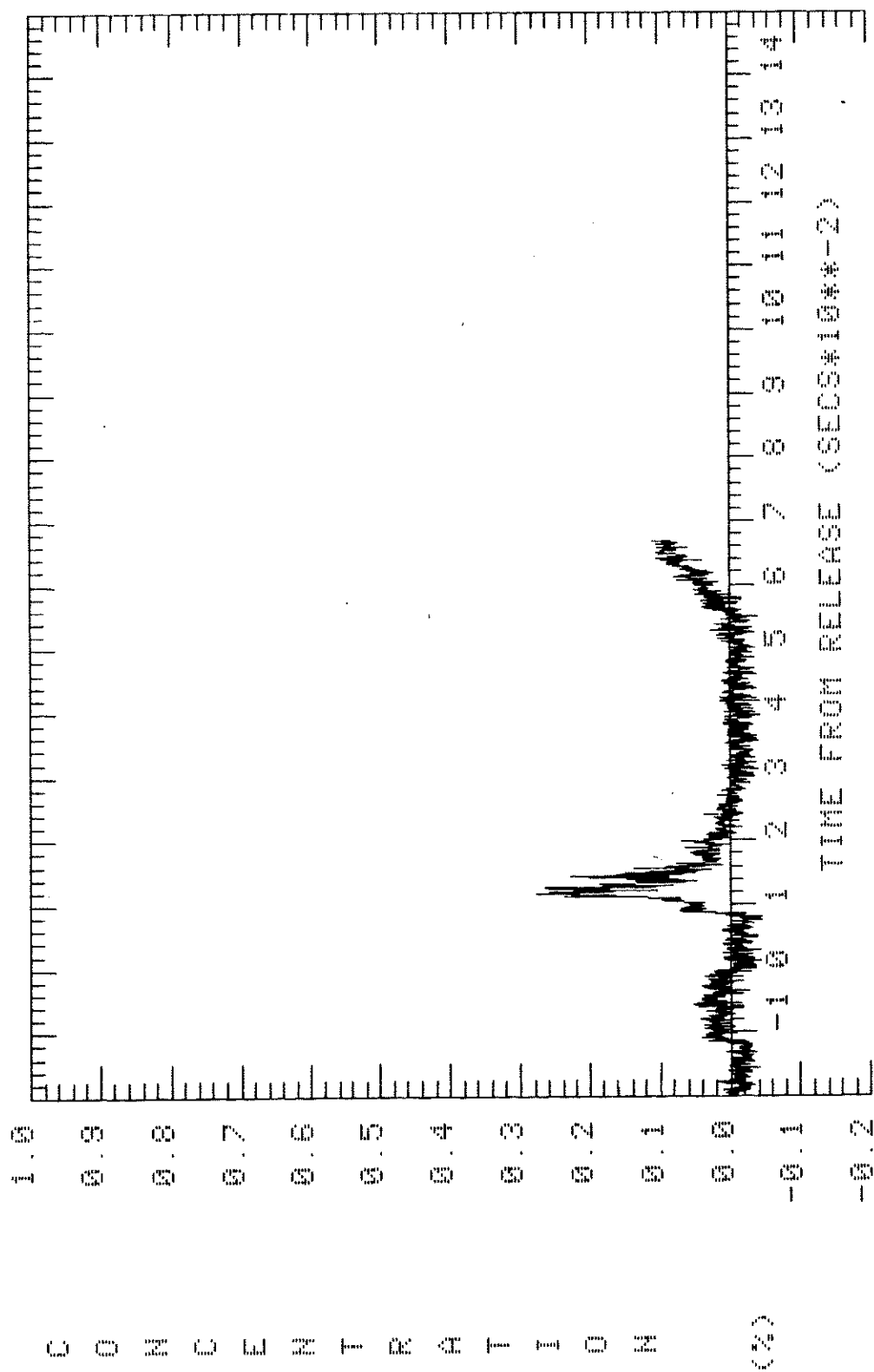
X: 600 H Y: 600 H Z: 0.4 H

G46



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

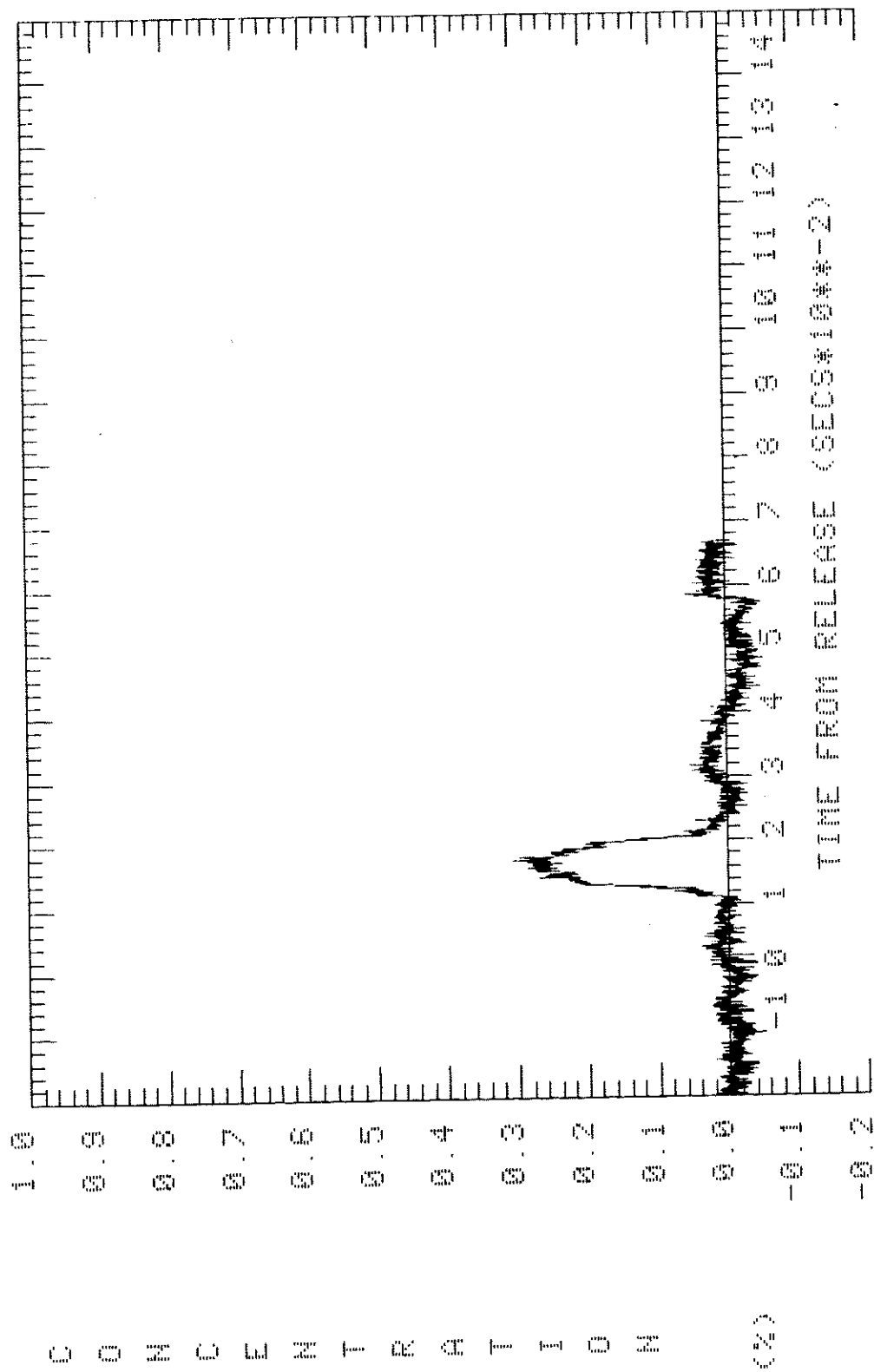
X: 600 M Y: 600 M Z: 2.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 600 M Y: 600 M Z: 6.4 M

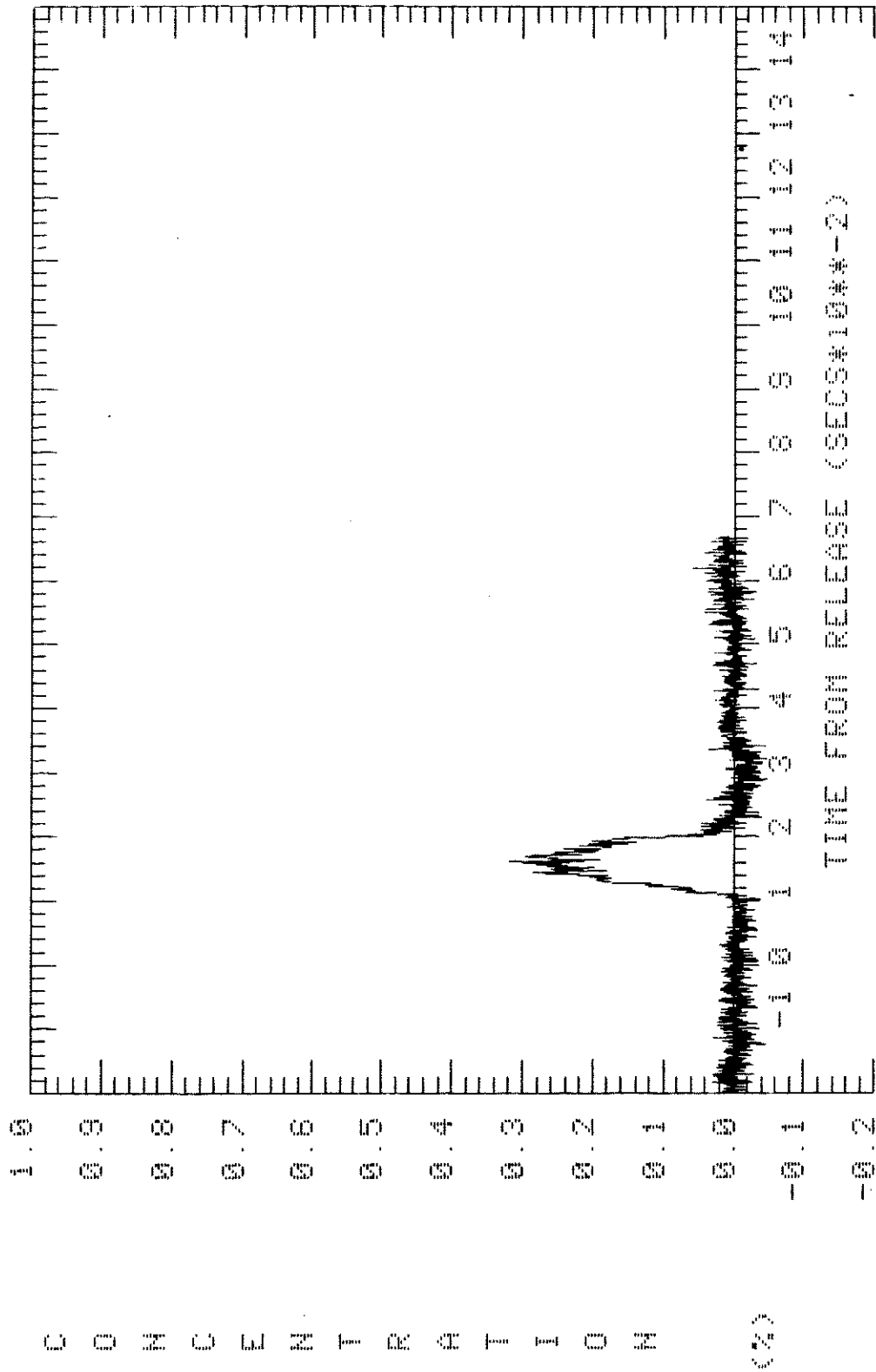
G48



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 700 M Y: 600 M Z: 0.4 M

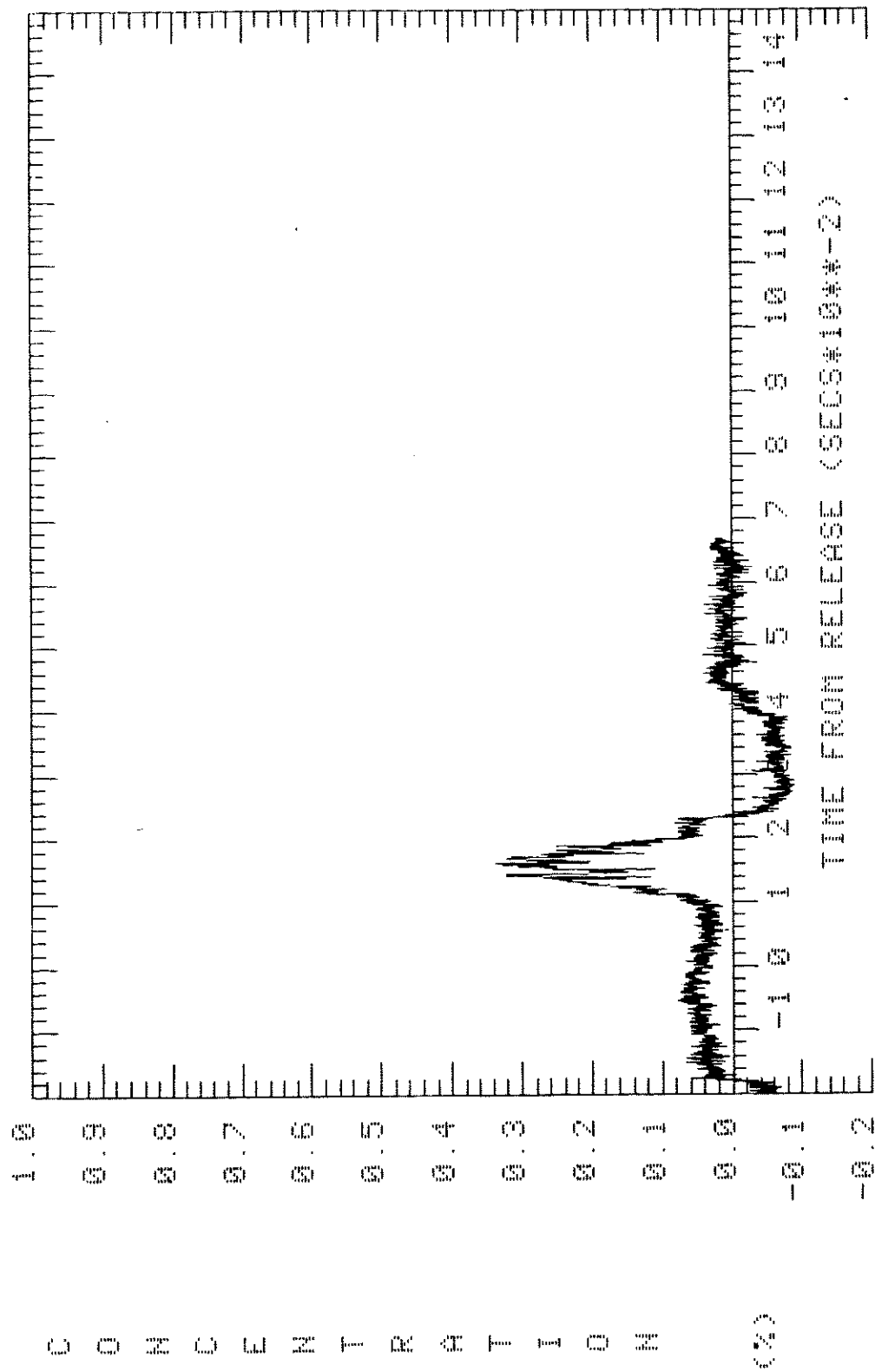
G49



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 700 H Y: 600 H Z: 2.4 H

G50



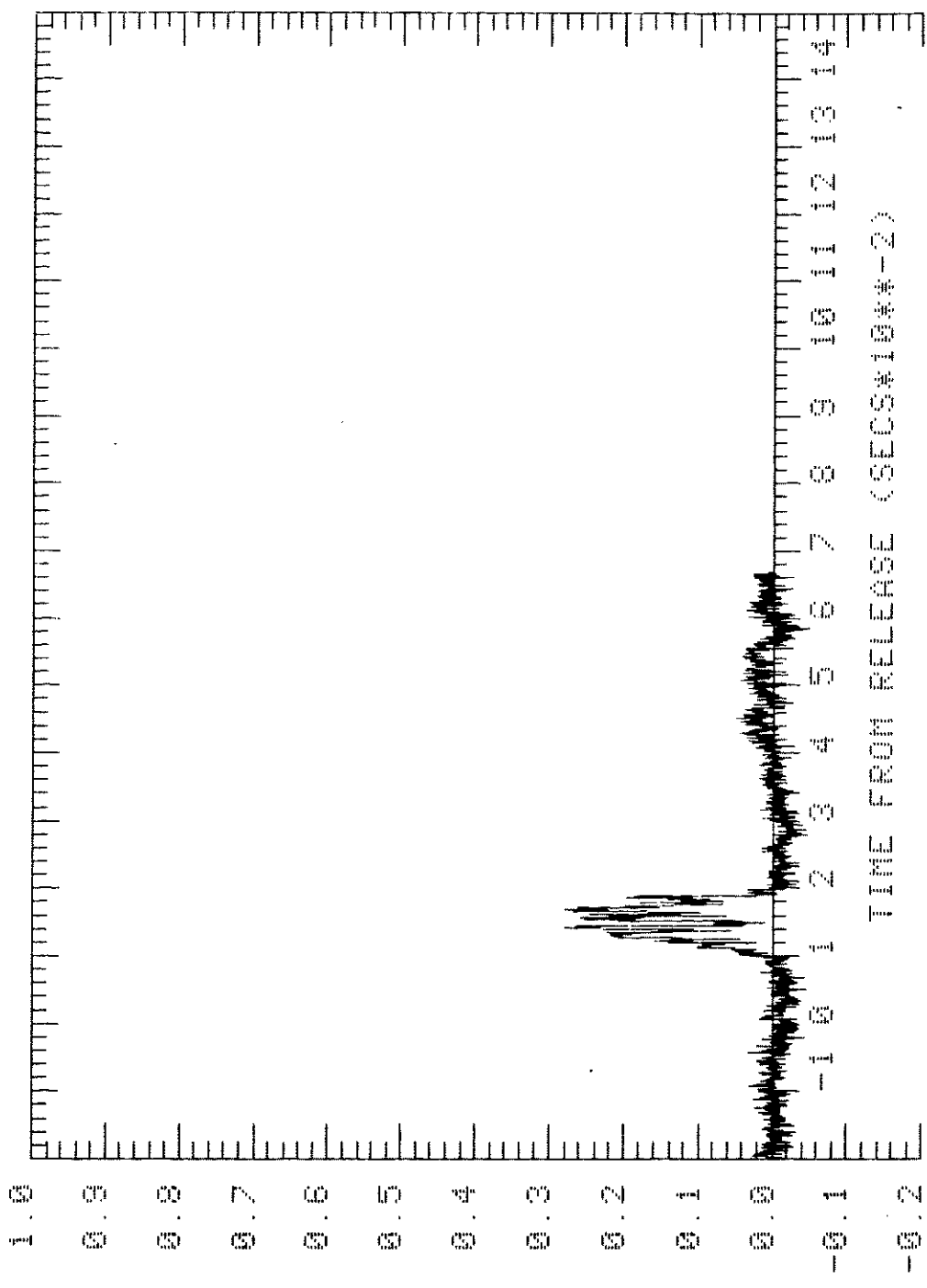
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 700 M Y: 600 M Z: 4.4 M

G51

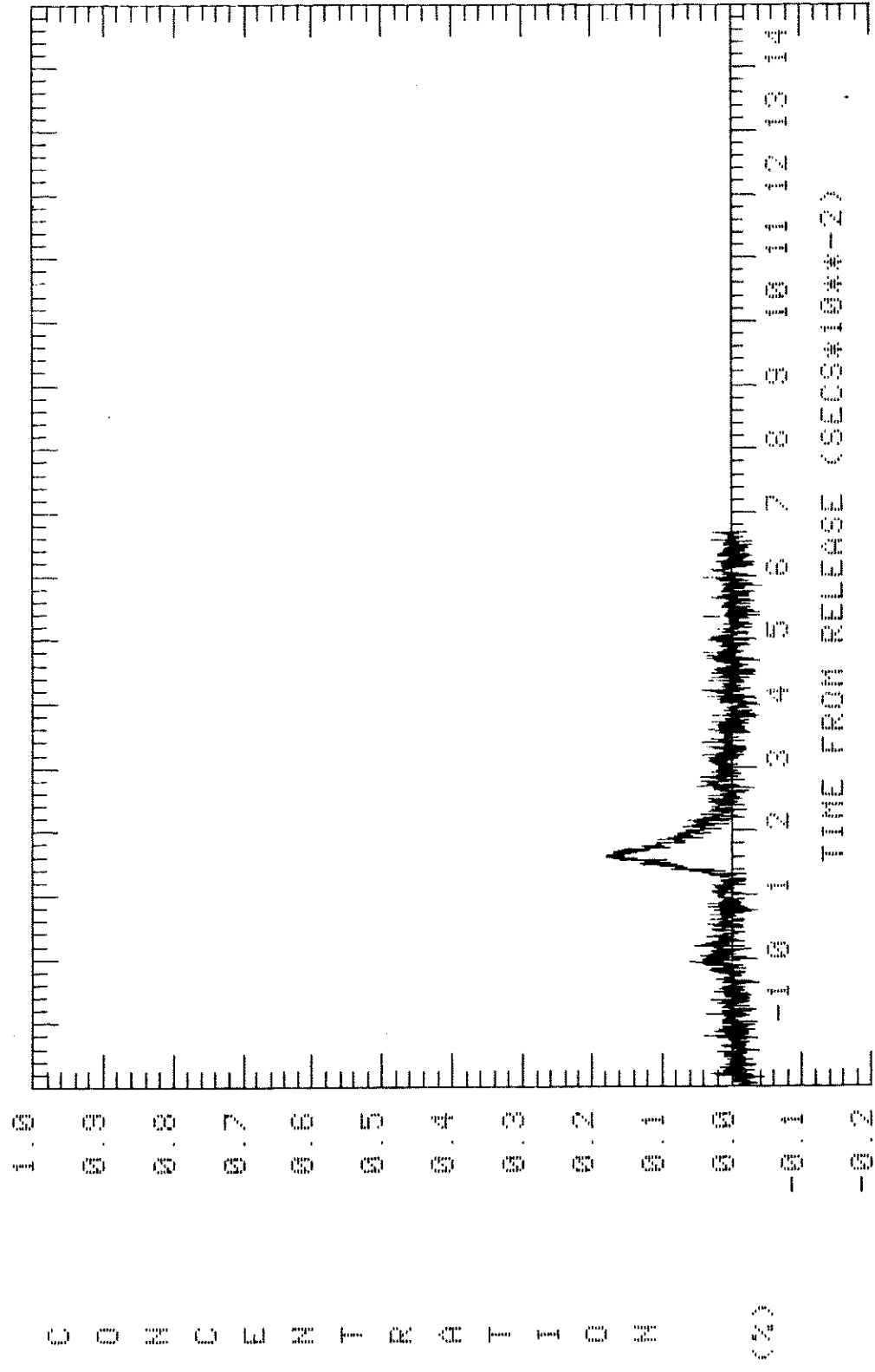
COEFFICIENT

(2)



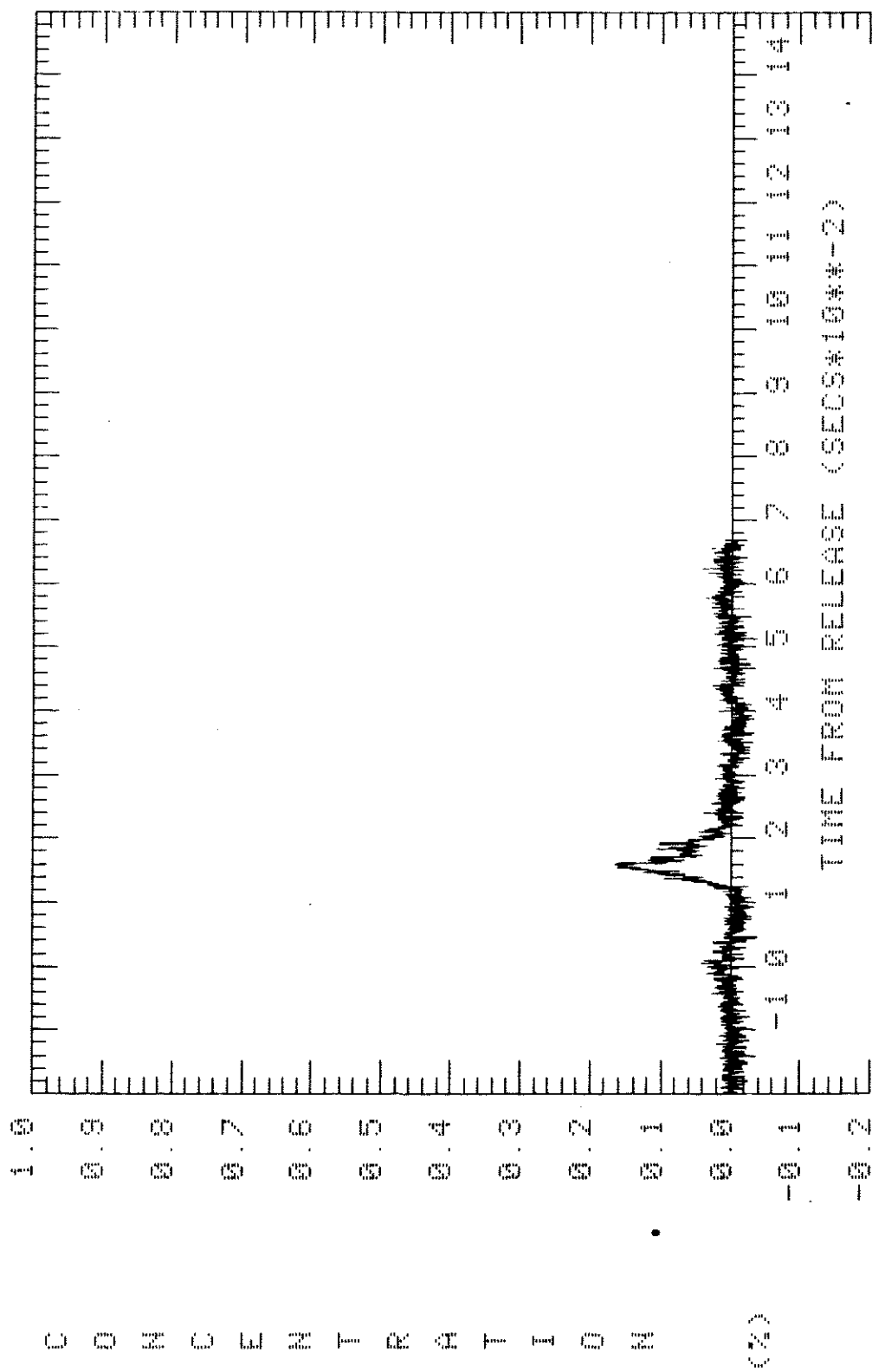
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 790 H Y: 600 H Z: 6.4 H



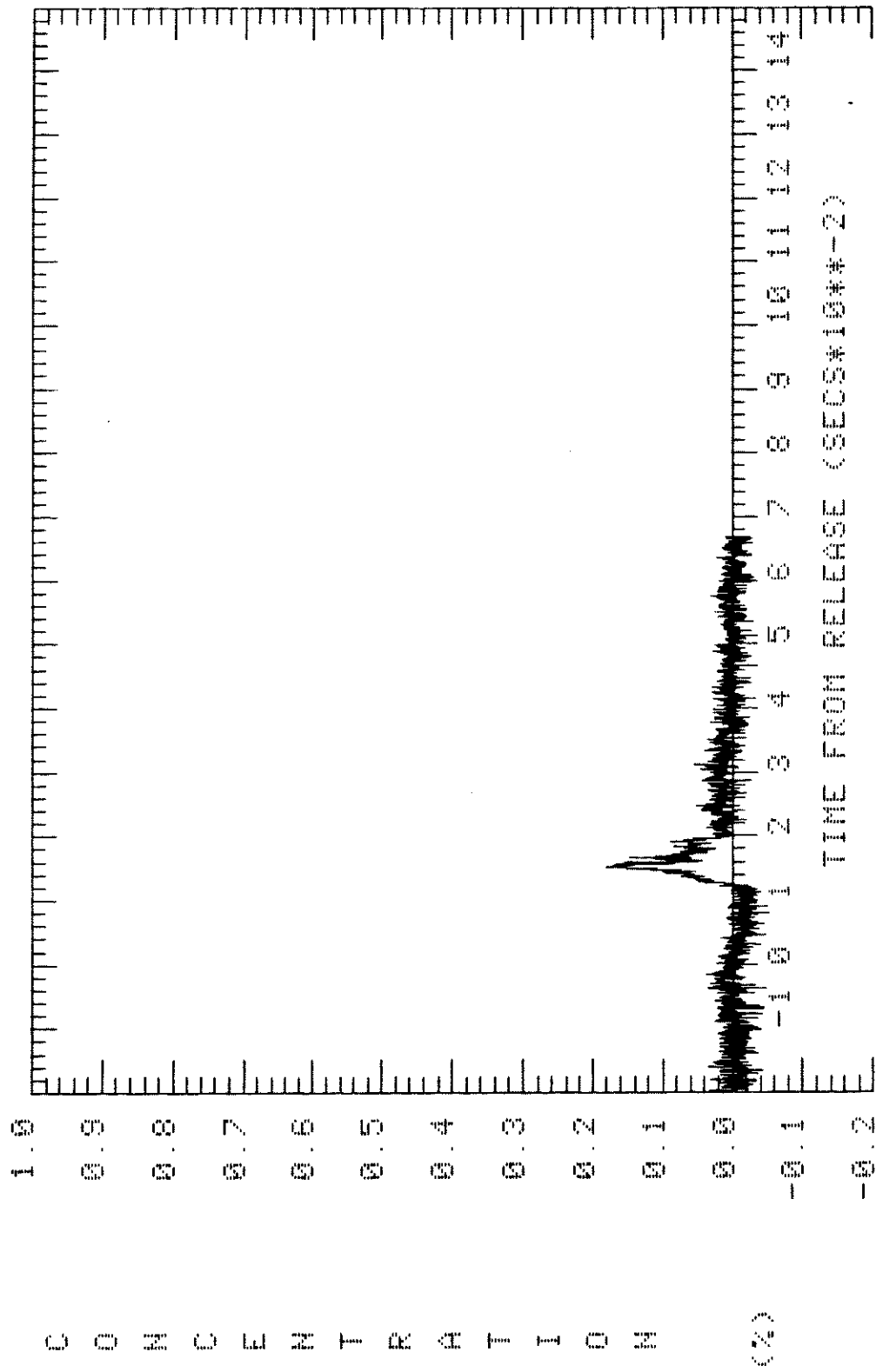
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 600 M Y: 700 M Z: 0.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

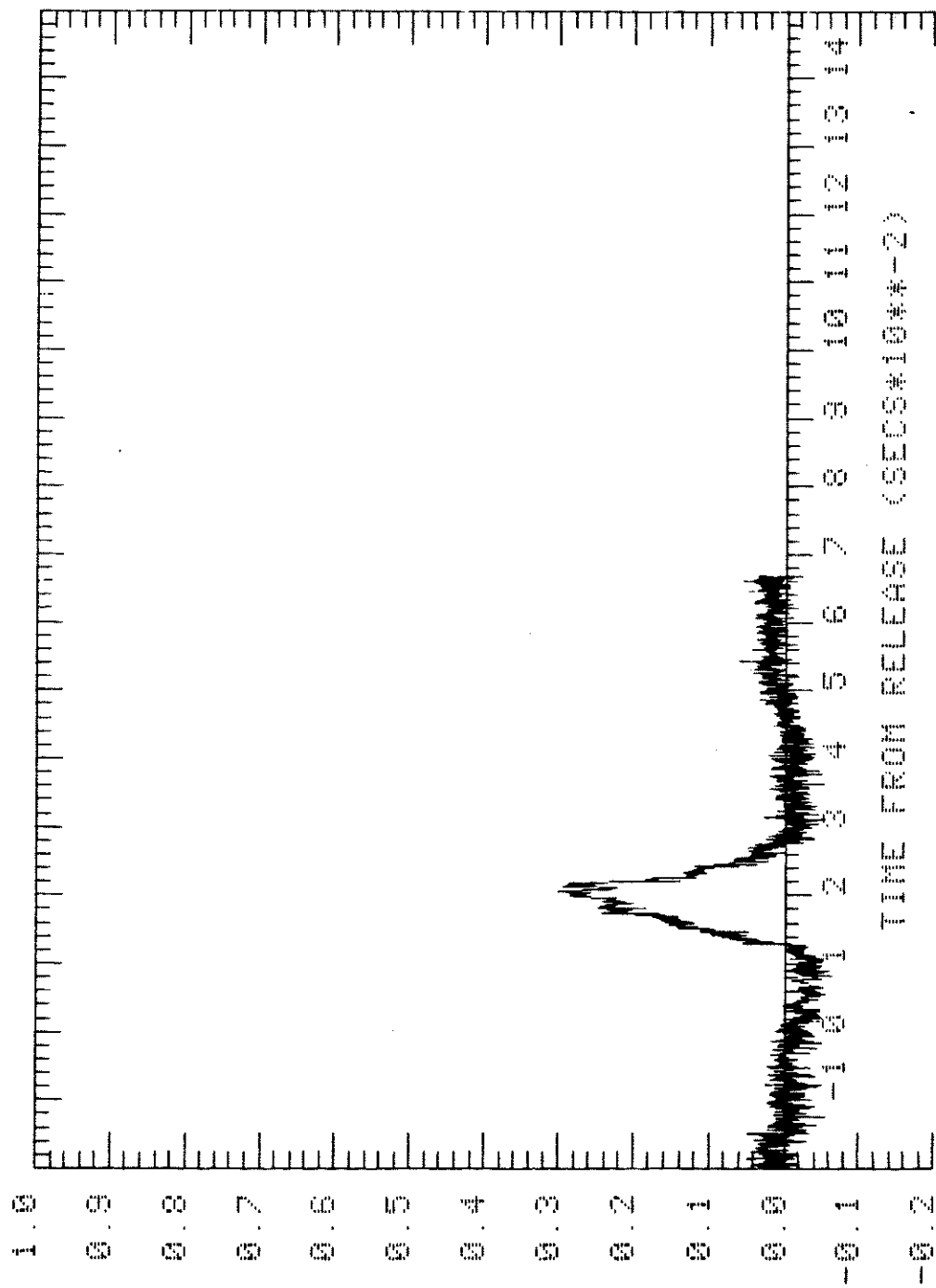
X: 600 M Y: 700 M Z: 2.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 600 M Y: 700 M Z: 4.4 M

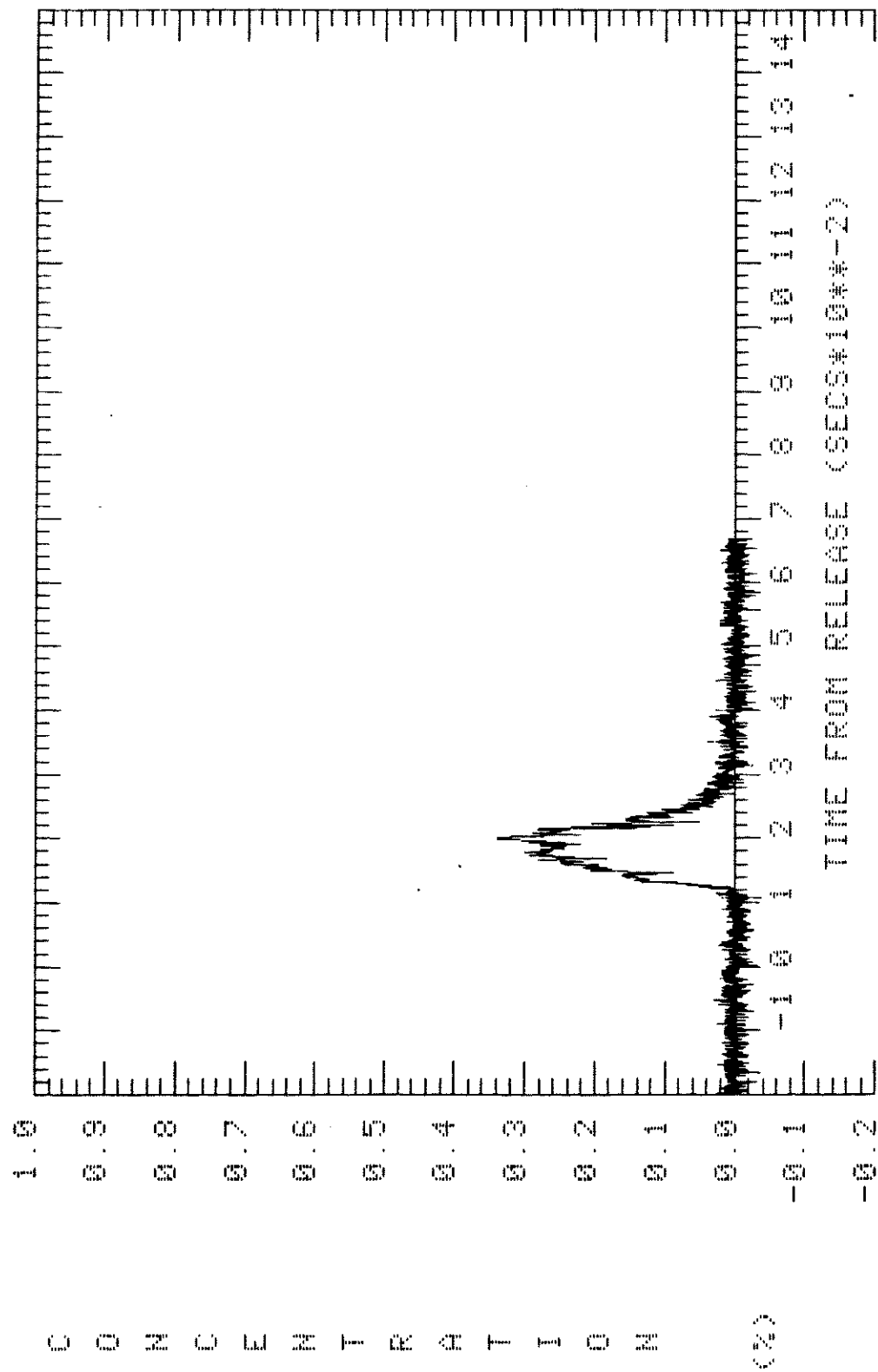
G55



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 700 M Y: 700 M Z: 0.4 M

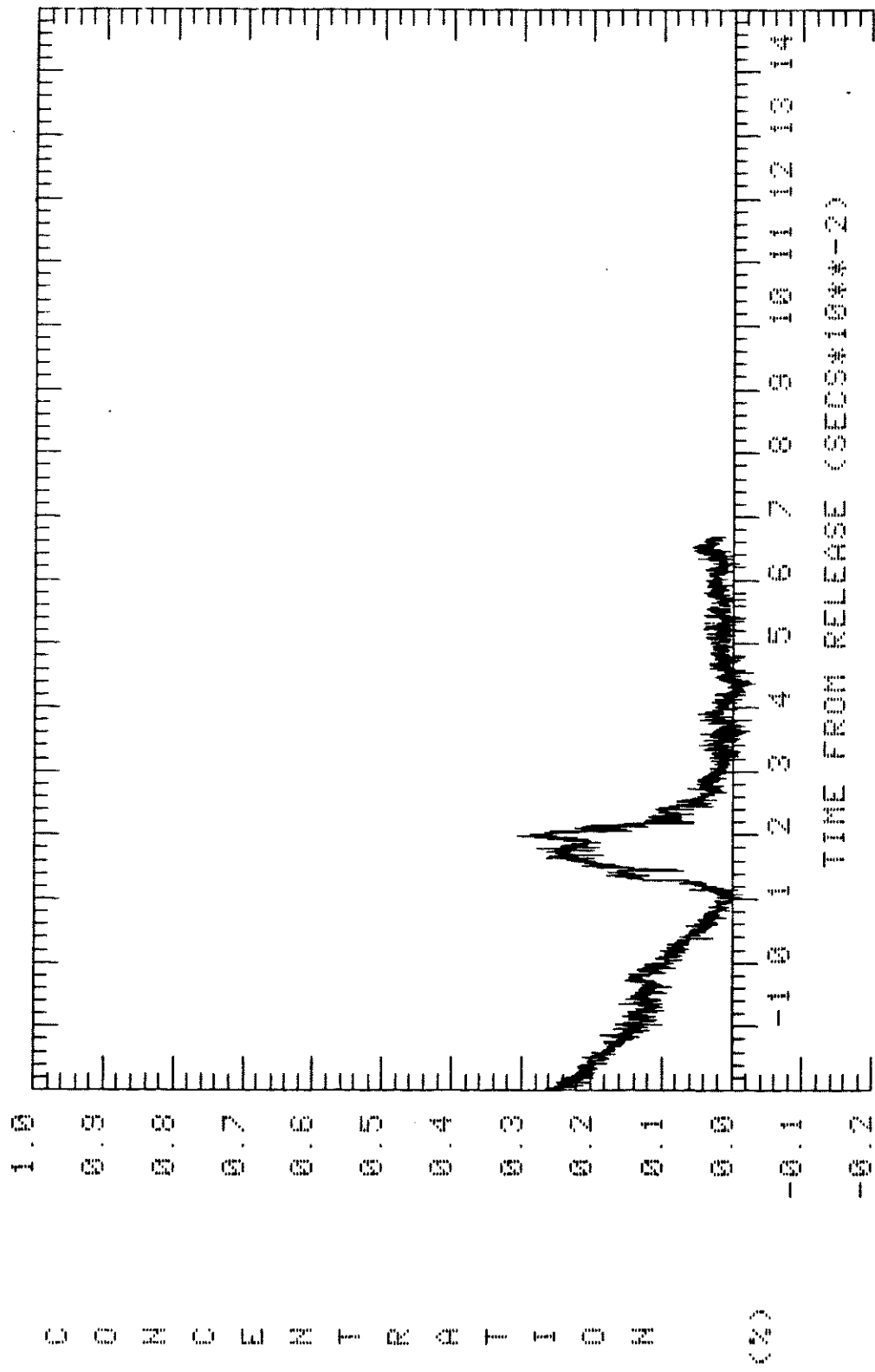
G56



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

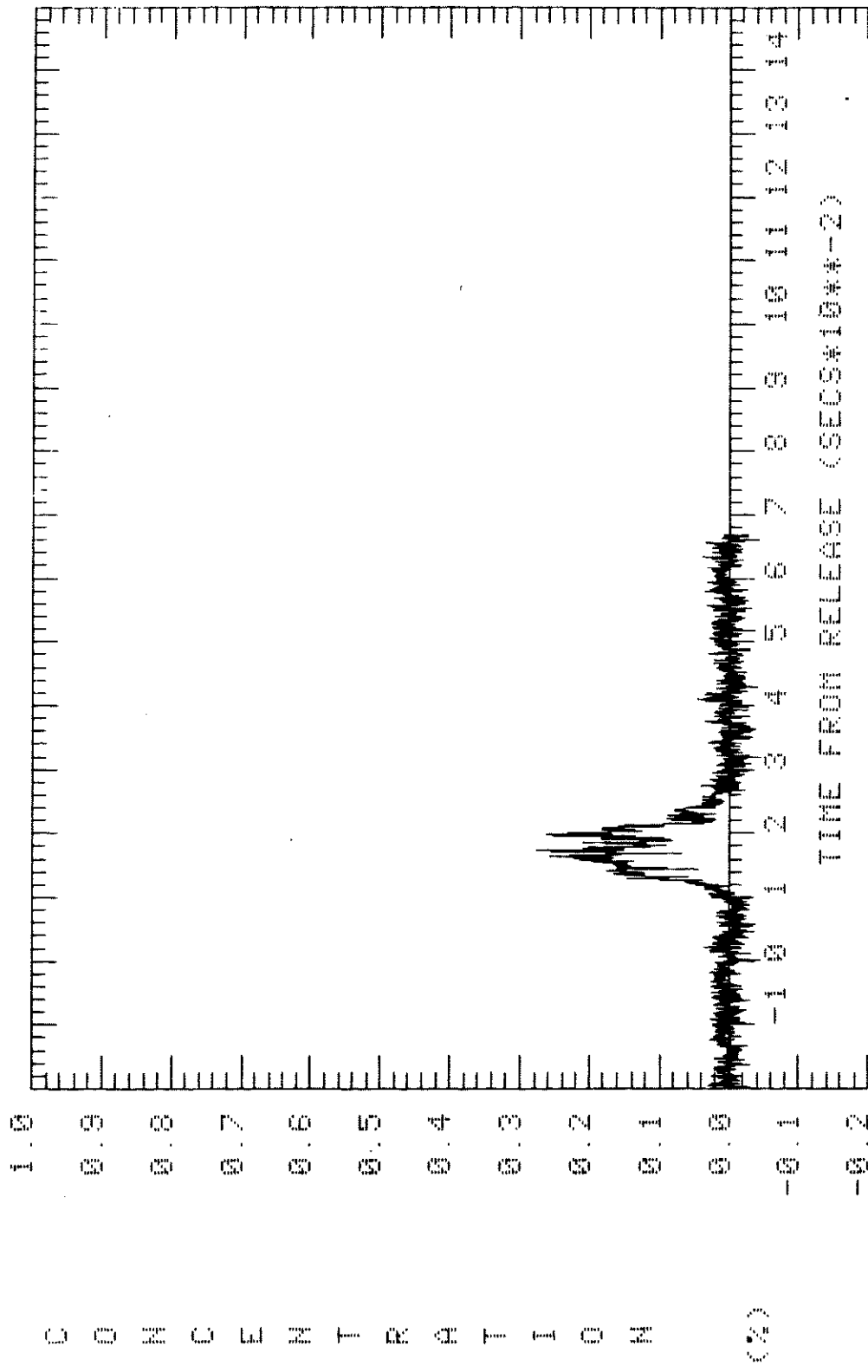
X: 700 M Y: 700 M Z: 2.4 M

G57



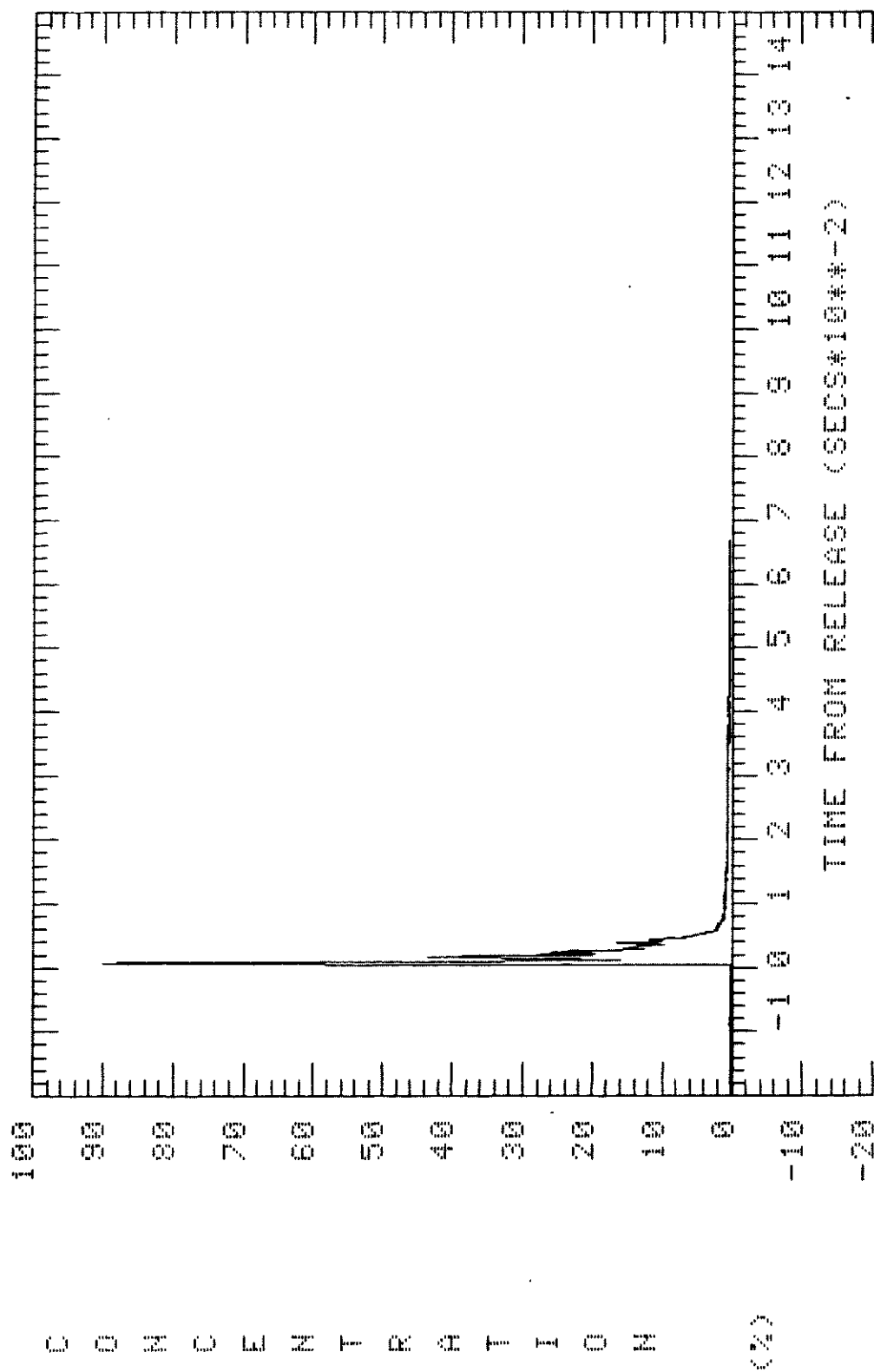
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 700 M Y: 700 M Z: 4.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

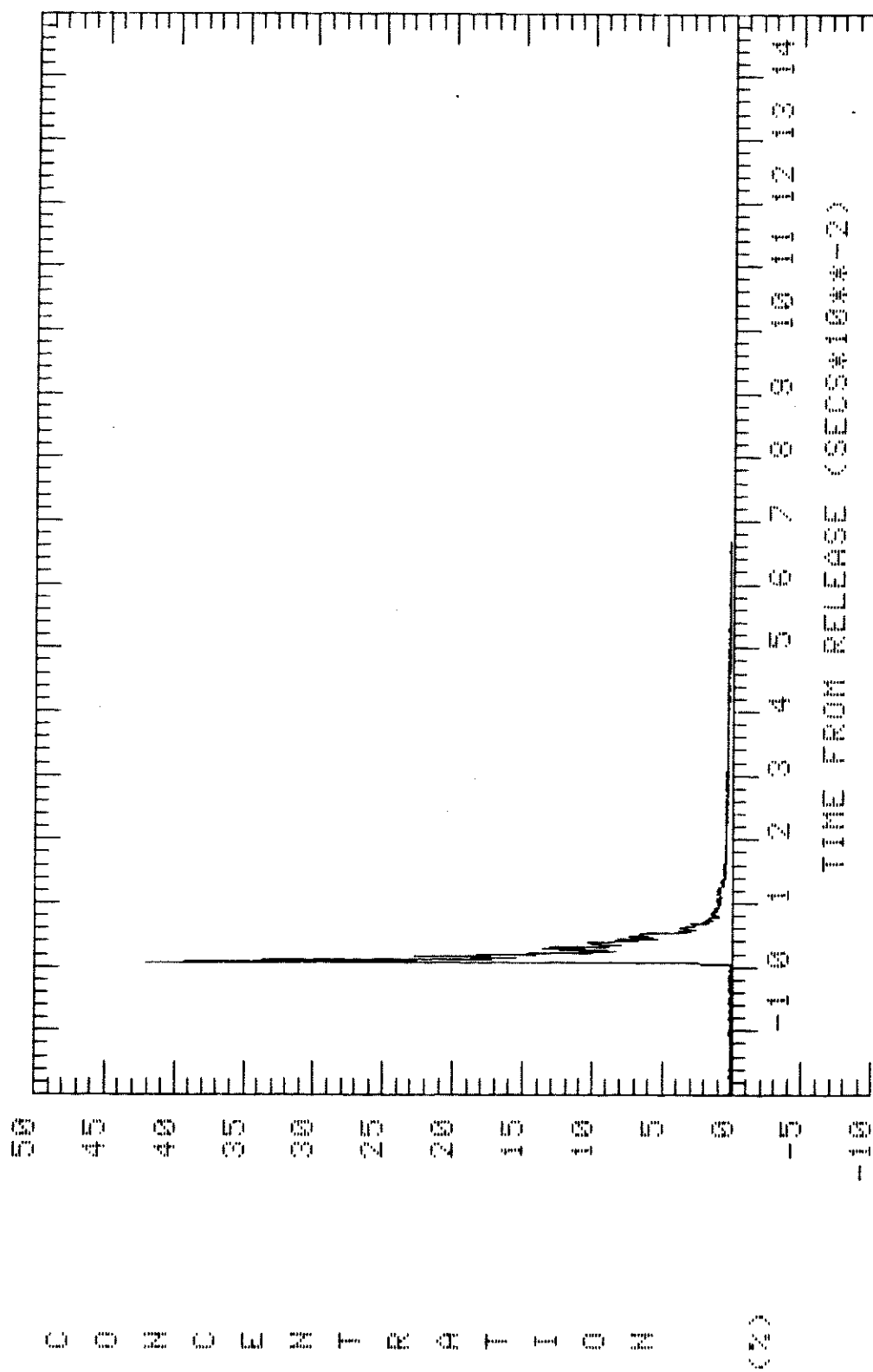
X: 700 H Y: 700 H Z: 6.4 H



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 210 M Z: 0.4 M

G60

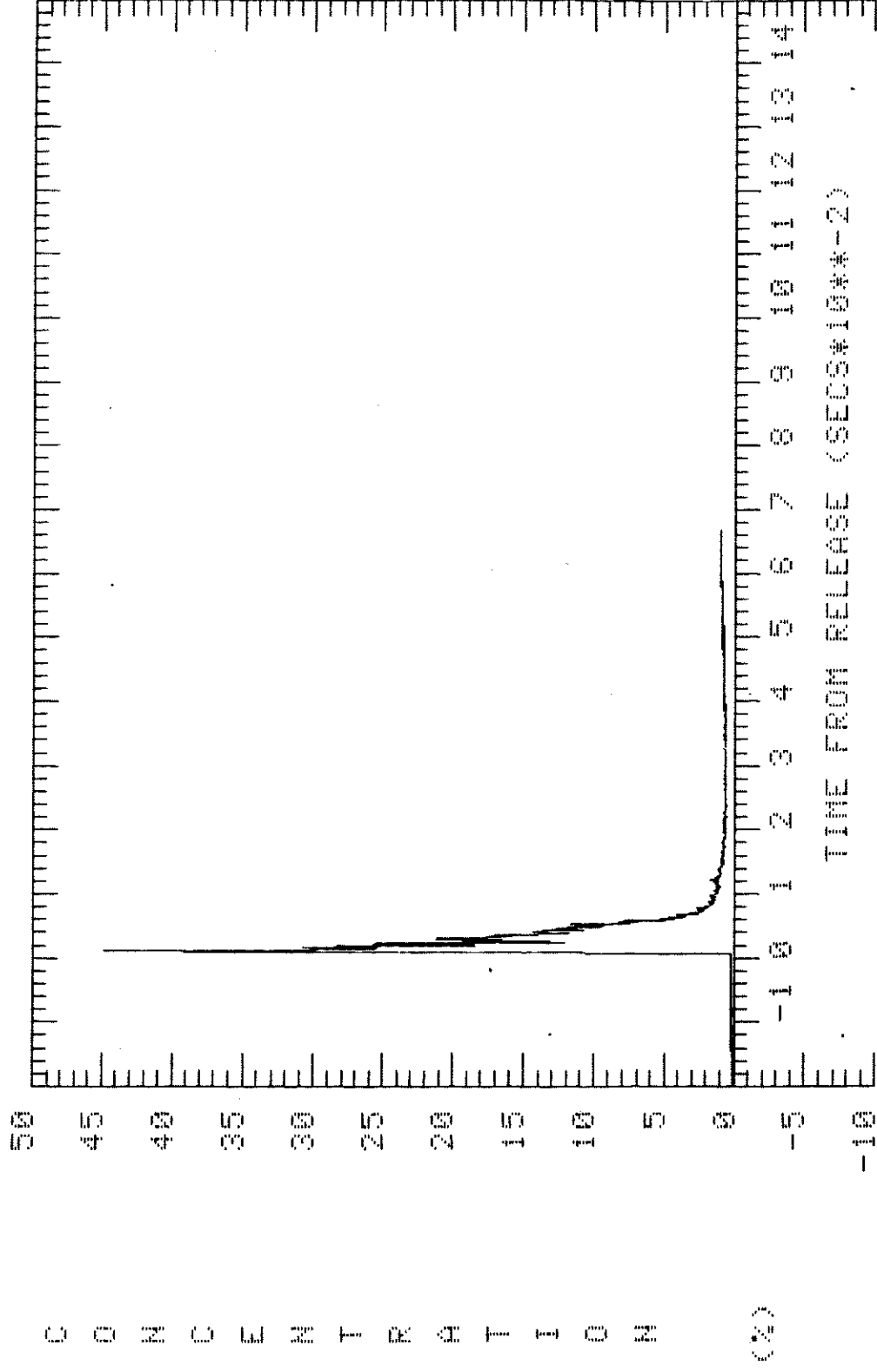


TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 499 M Y: 228 M Z: 9.4 M

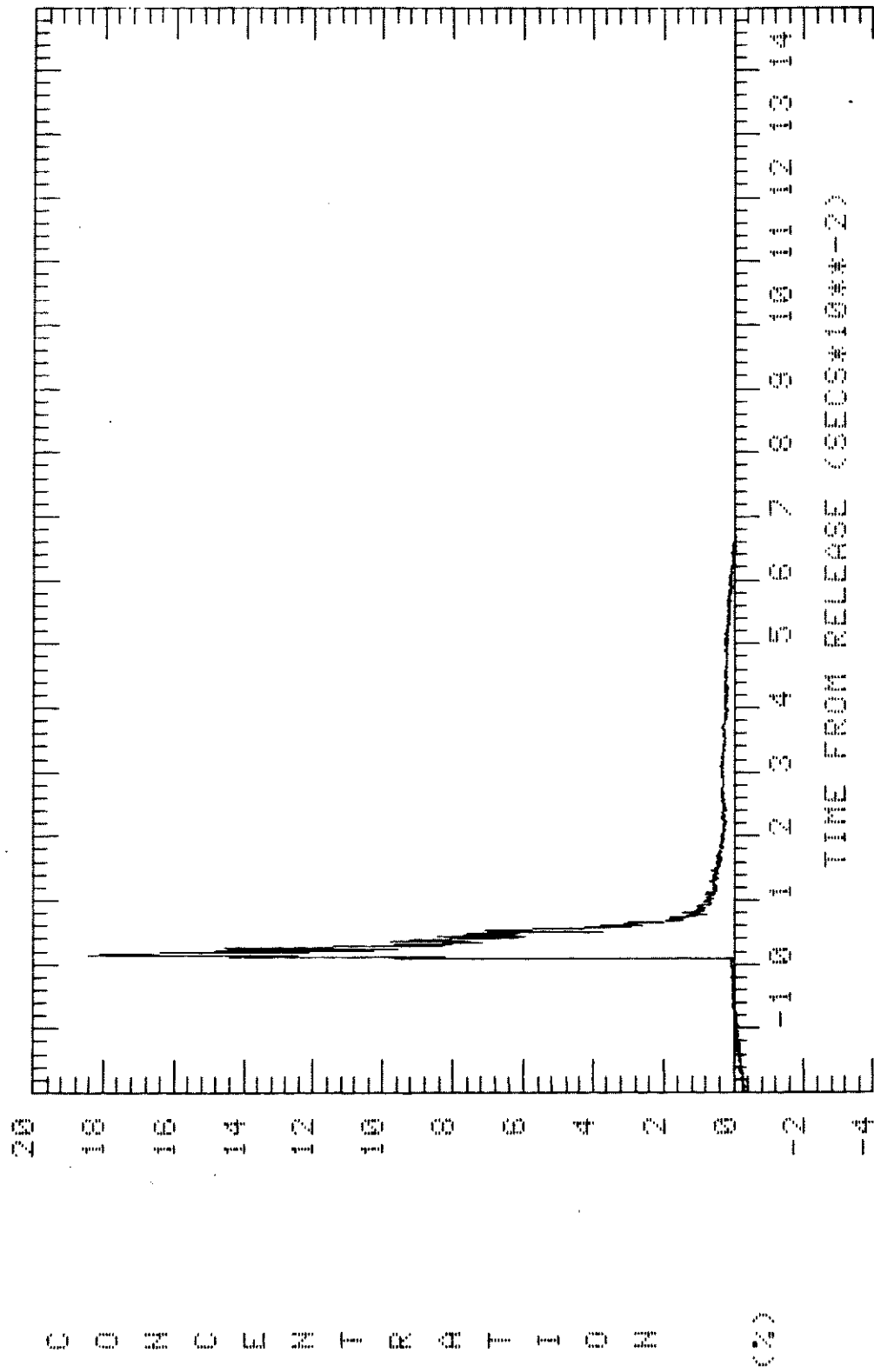
G61

C O N F I D E N T I A L



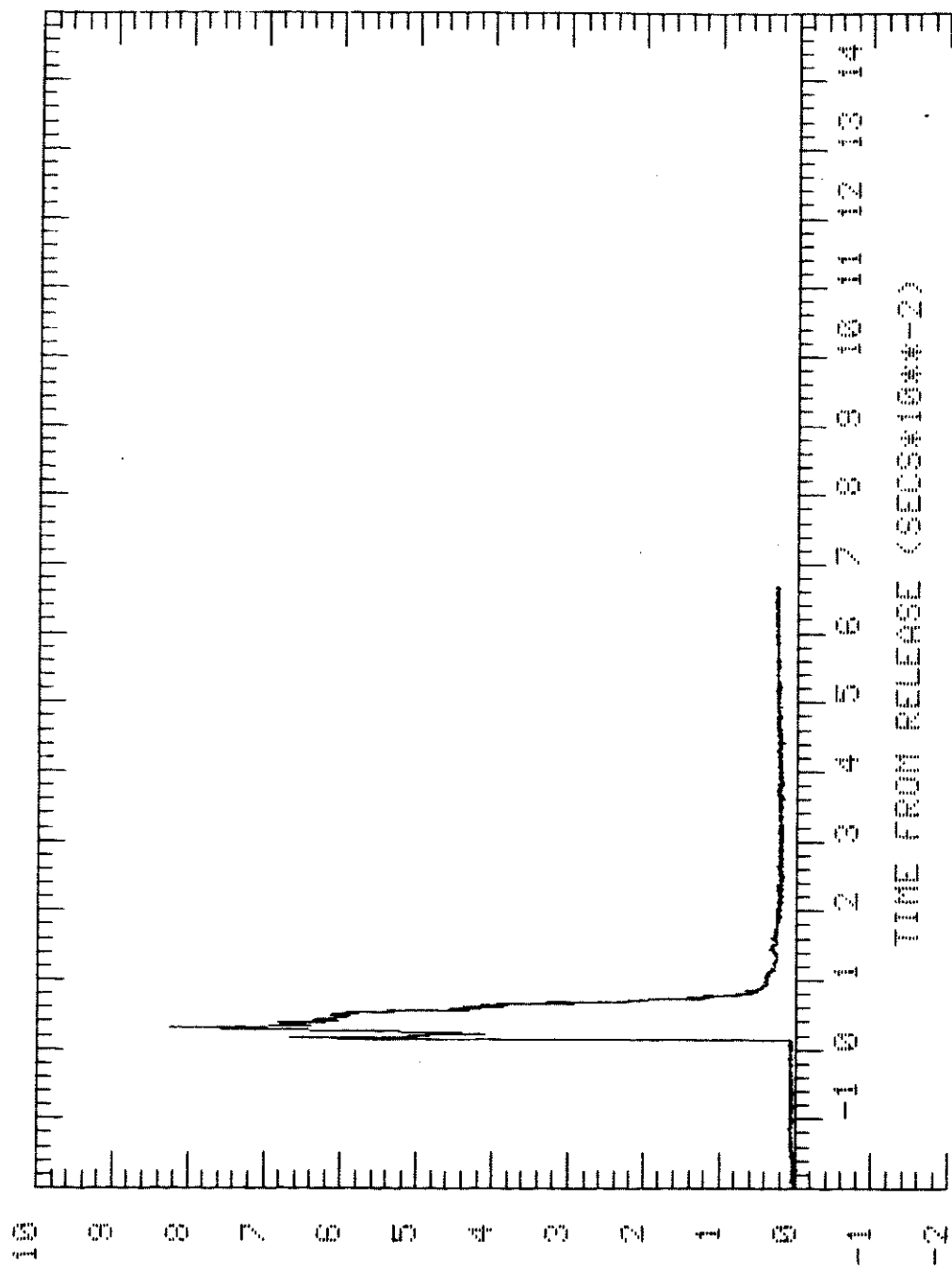
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 230 M Z: 0.4 M



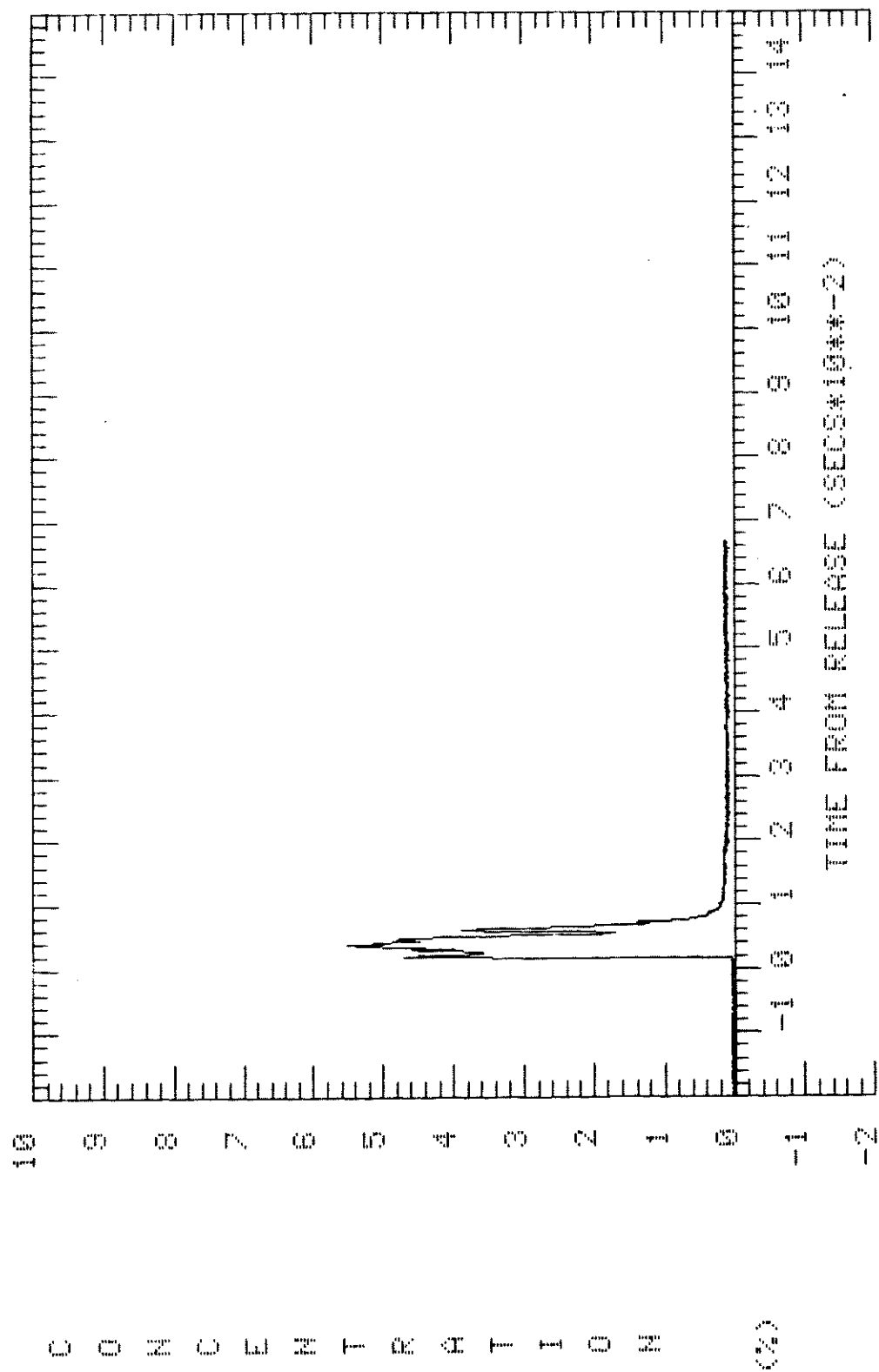
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 H Y: 240 H Z: 0.4 H



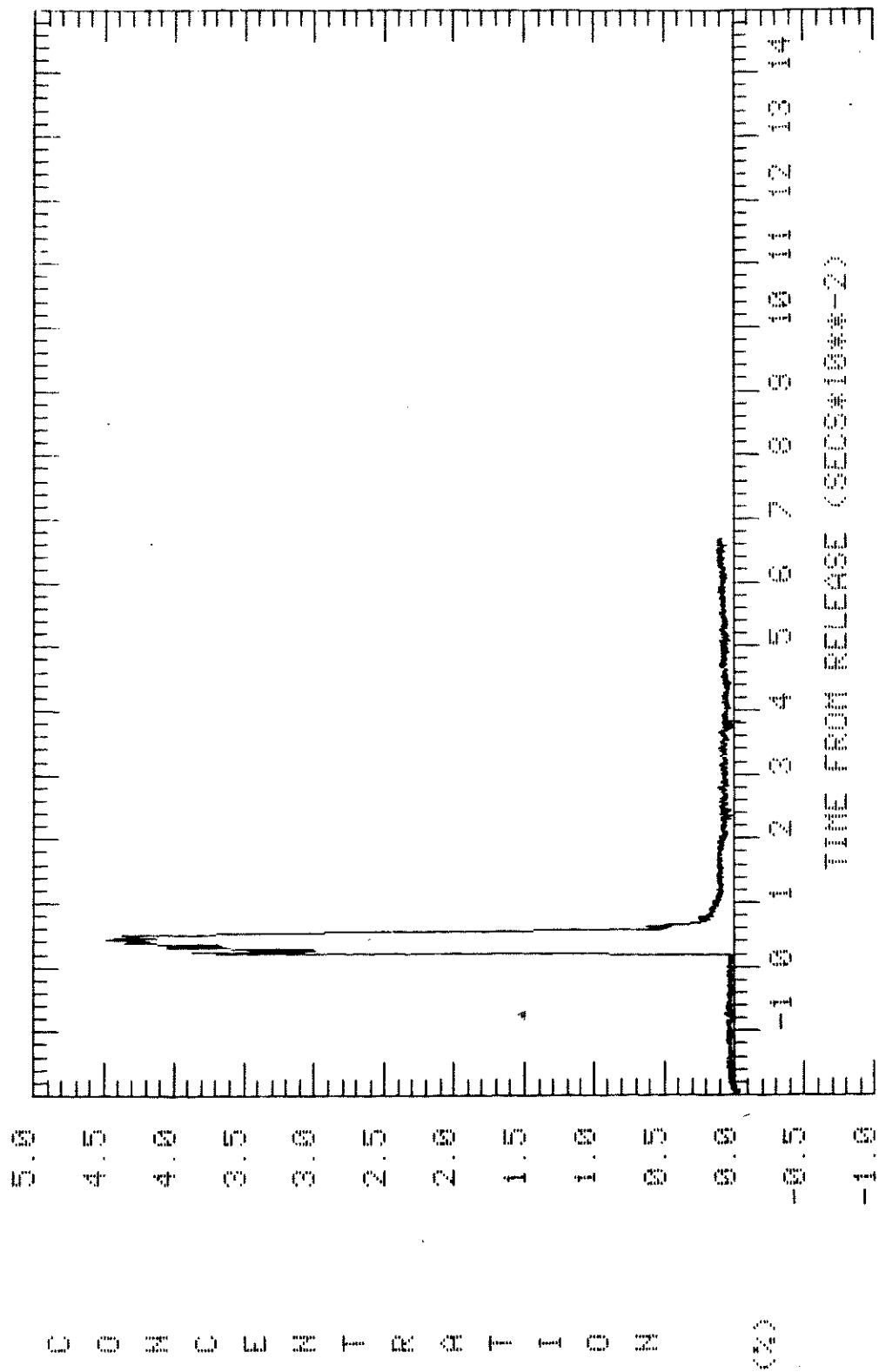
TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 280 M Z: 0.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

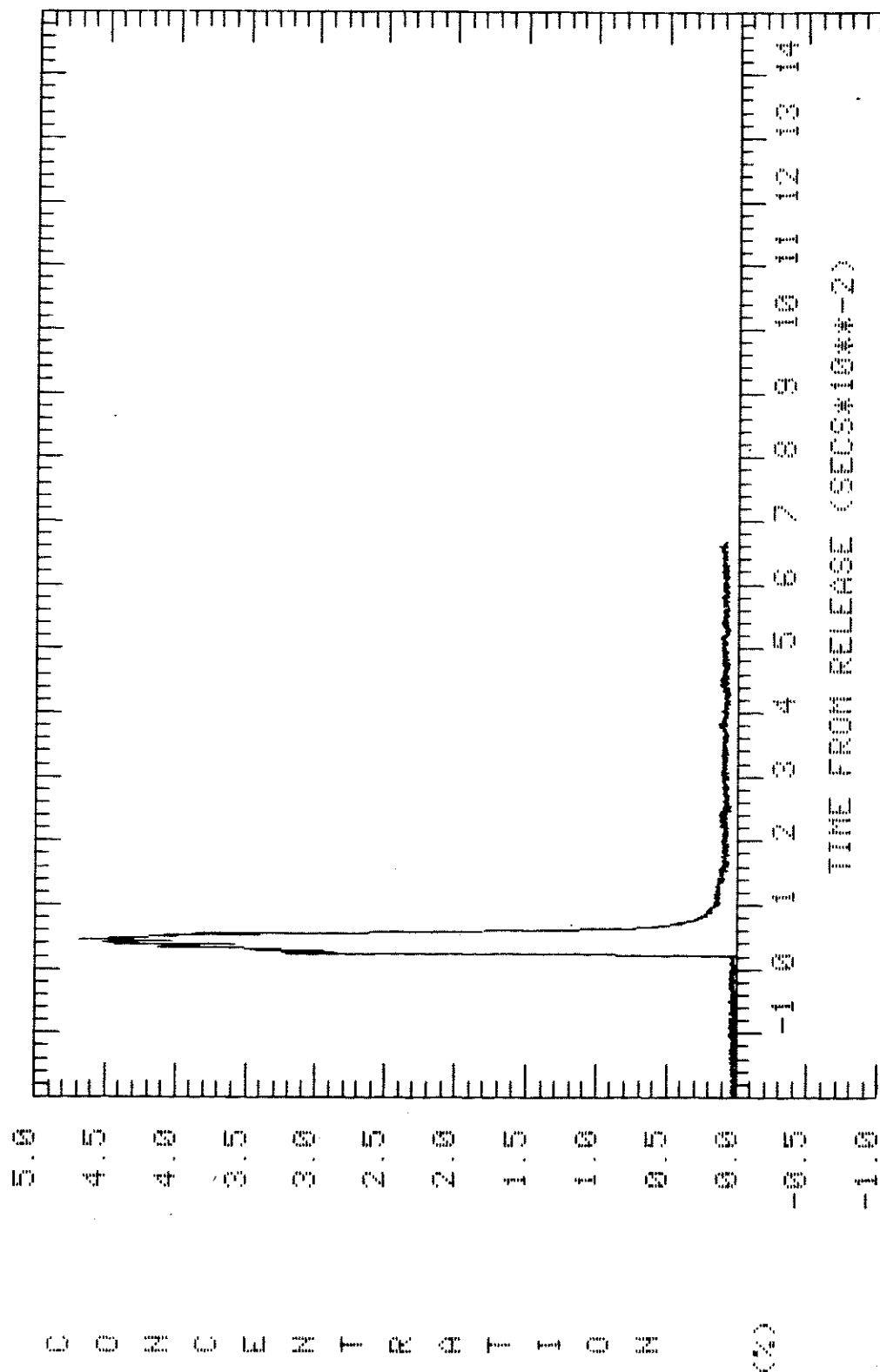
X: 400 M Y: 270 M Z: 0.4 M



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 N Y: 200 N Z: 0.4 N

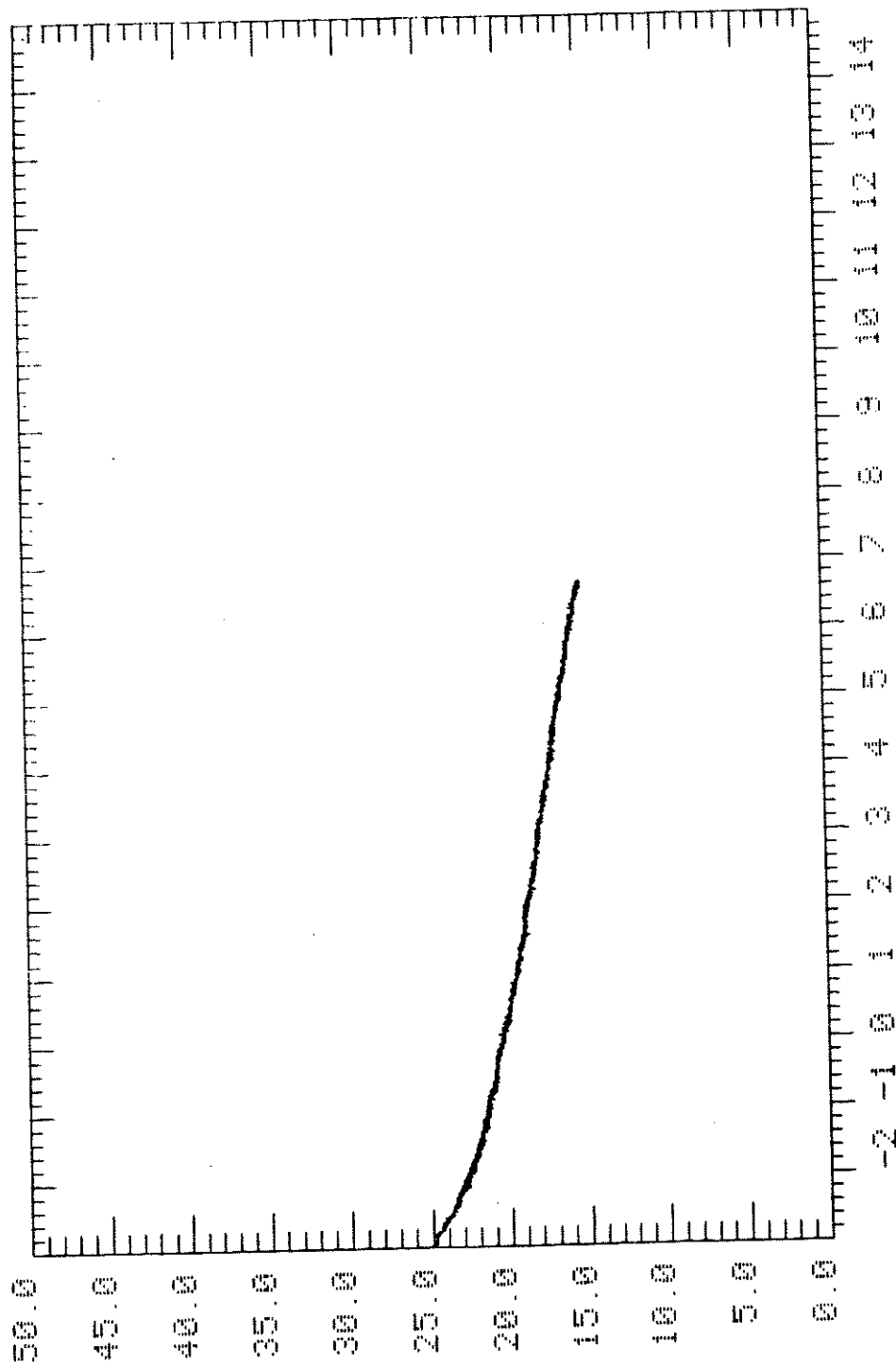
G66



TRIAL: 019 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 499 M Y: 290 M Z: 0.4 M

I N S O L I T I O N

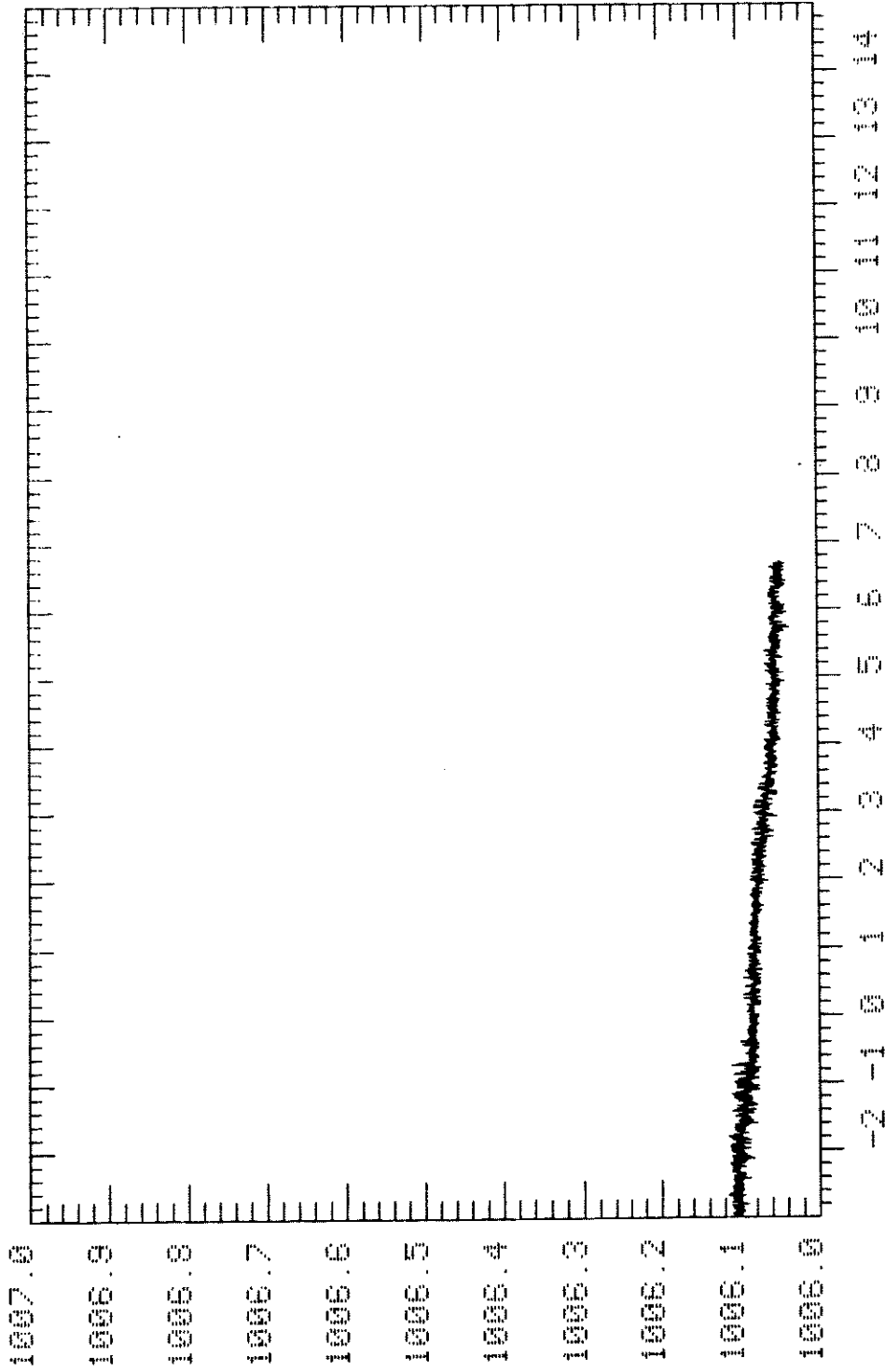


TRIAL: 019 TYPE: SOLA UNITS: W/M**2

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 3.4 M

MEAN OF RUN UP: 00.90 MEAN OF RUN DOWN: 10.93

A R E S S U R E

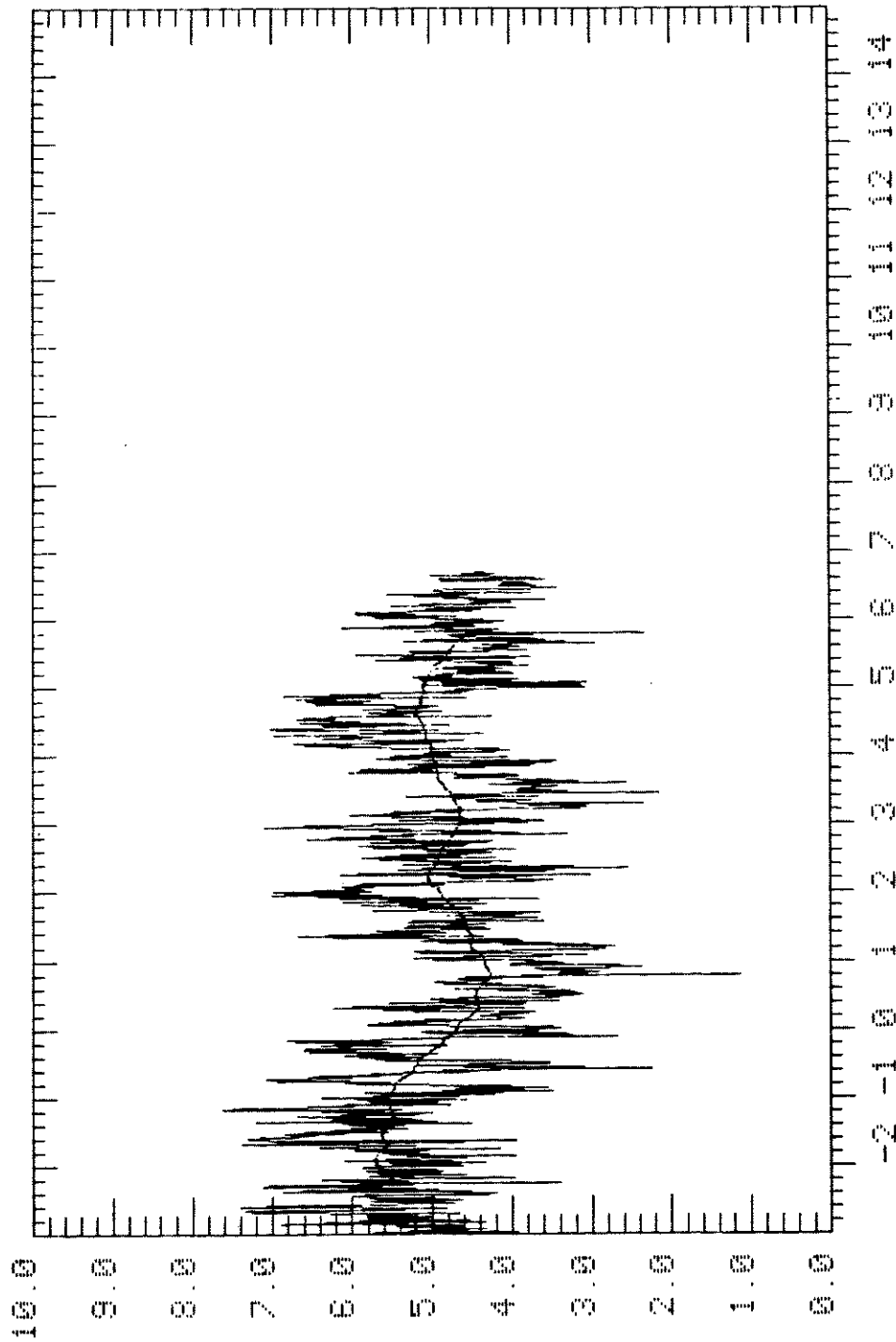


TRIAL: 019 TYPE: BRON UNITS: MBAR

AVERAGING TIME: 0.8 SEC X: 400 N Y: 50 N Z: 0.4 M

MEAN OF RUN UP: 1006 MEAN OF RUN DOWN: 1006

W I N D S P E E D

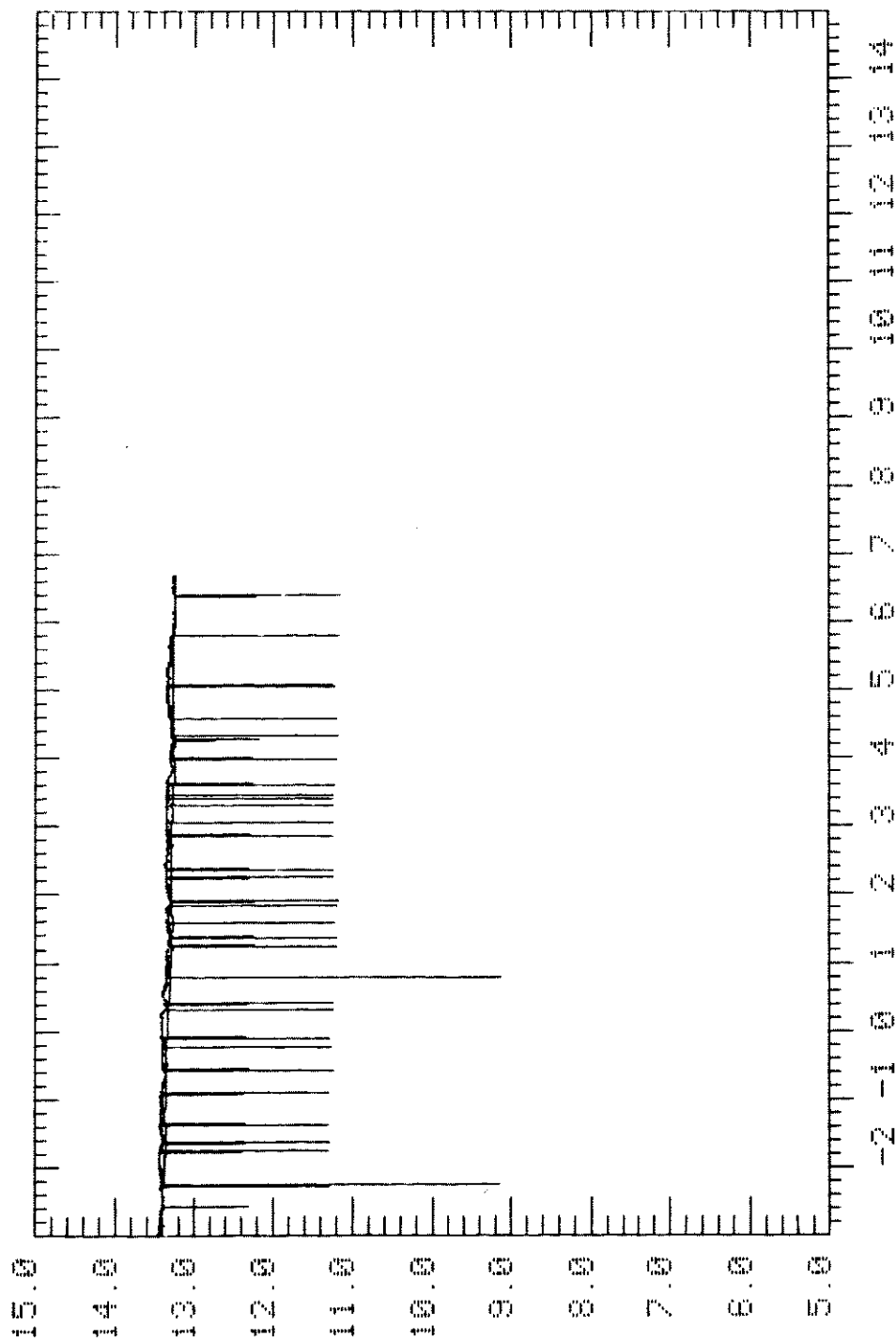


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: WSPD UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 2.0 M

MEAN OF RUN UP: 5.86 MEAN OF RUN DOWN: 4.07

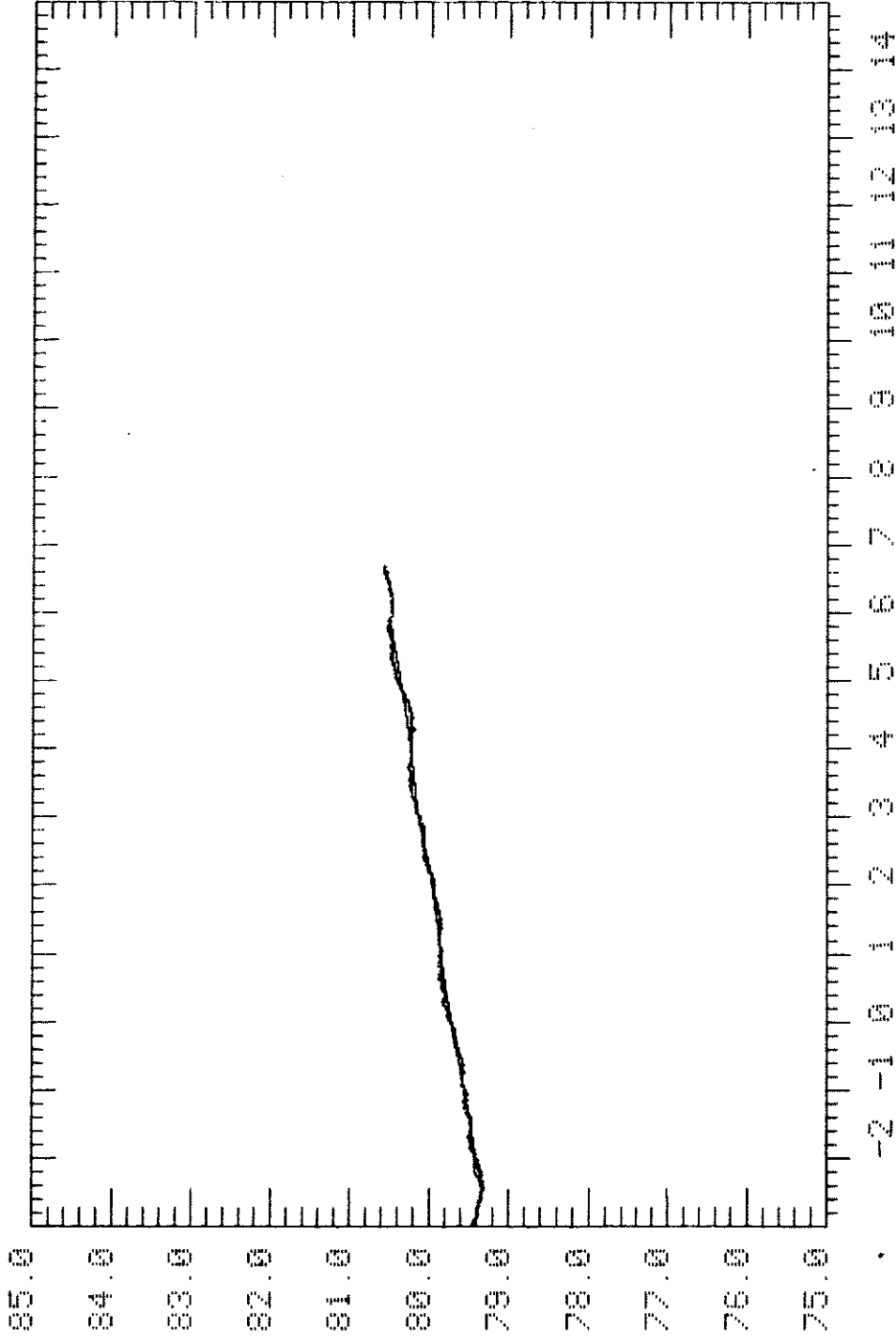


TRIAL: 019 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 490 M Y: 50 M Z: 2.0 M

MEAN OF RUN UP: 15.09 MEAN OF RUN DOWN: 13.99

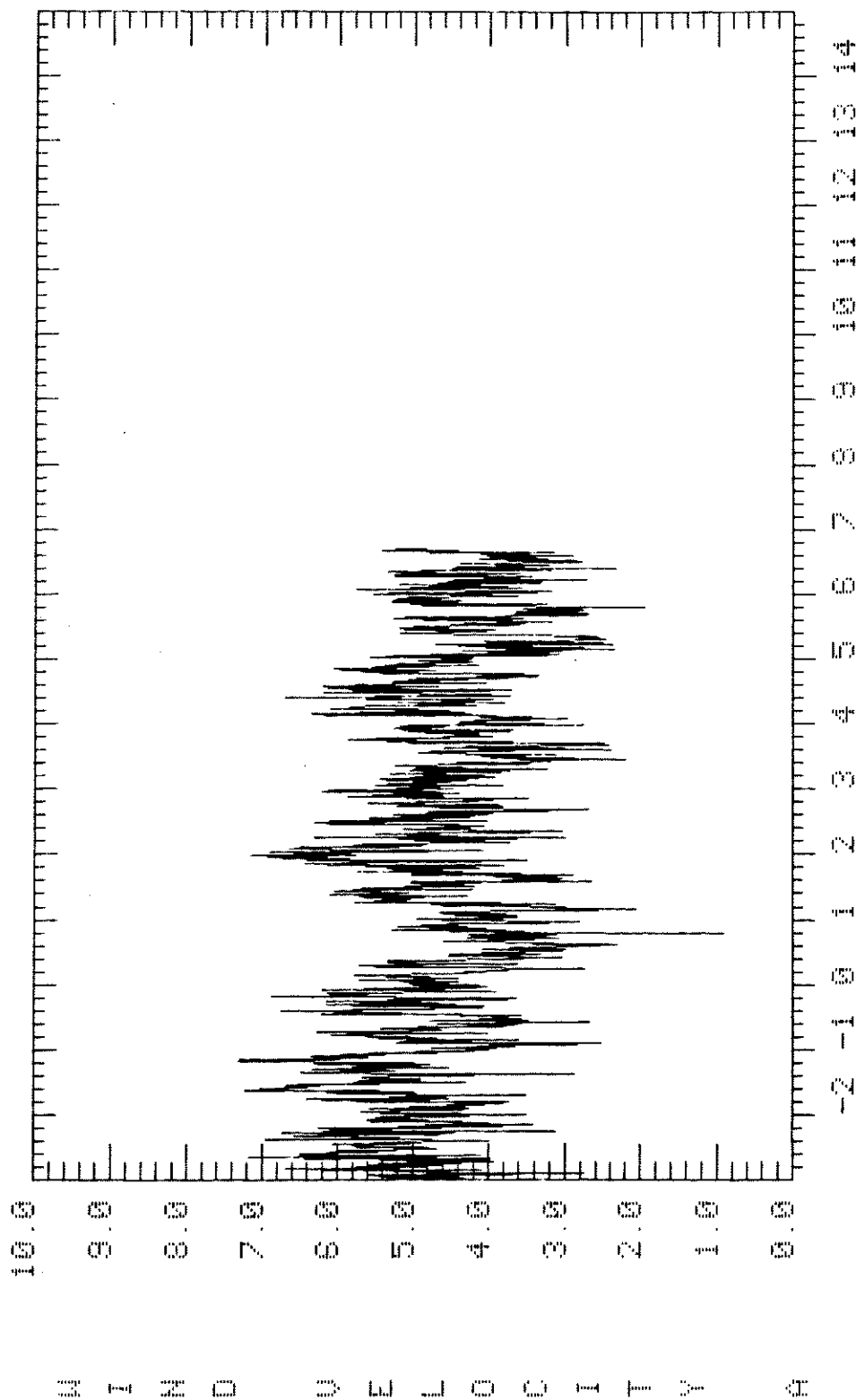
H D N I D I T Y



TRIAL: 019 TYPE: RUNH UNITS: PER CENT

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 2.0 M

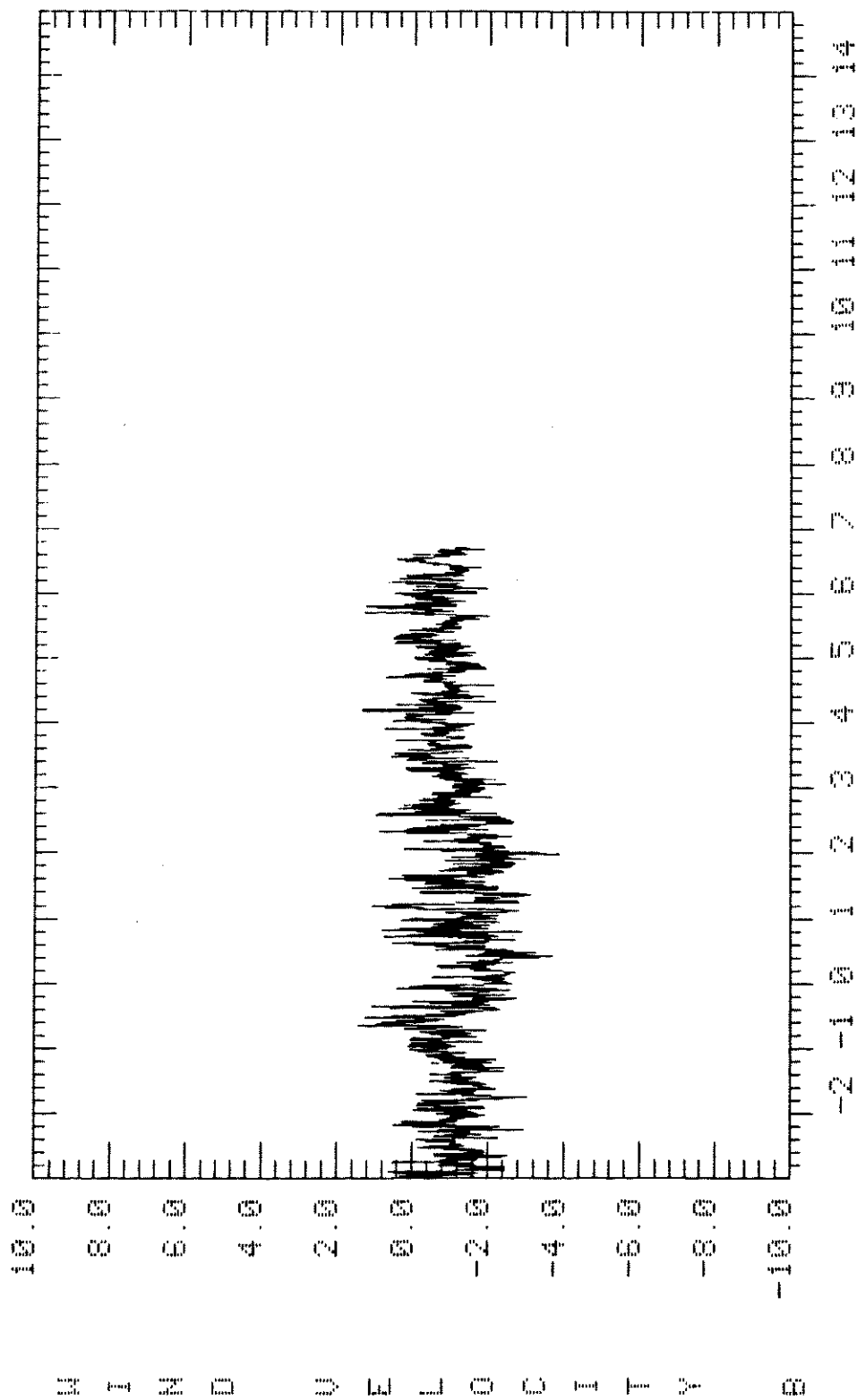
MEAN OF RUN UP: 73.48 MEAN OF RUN DOWN: 81.34



TRIAL: 019 TYPE: WIND UNITS: M/S

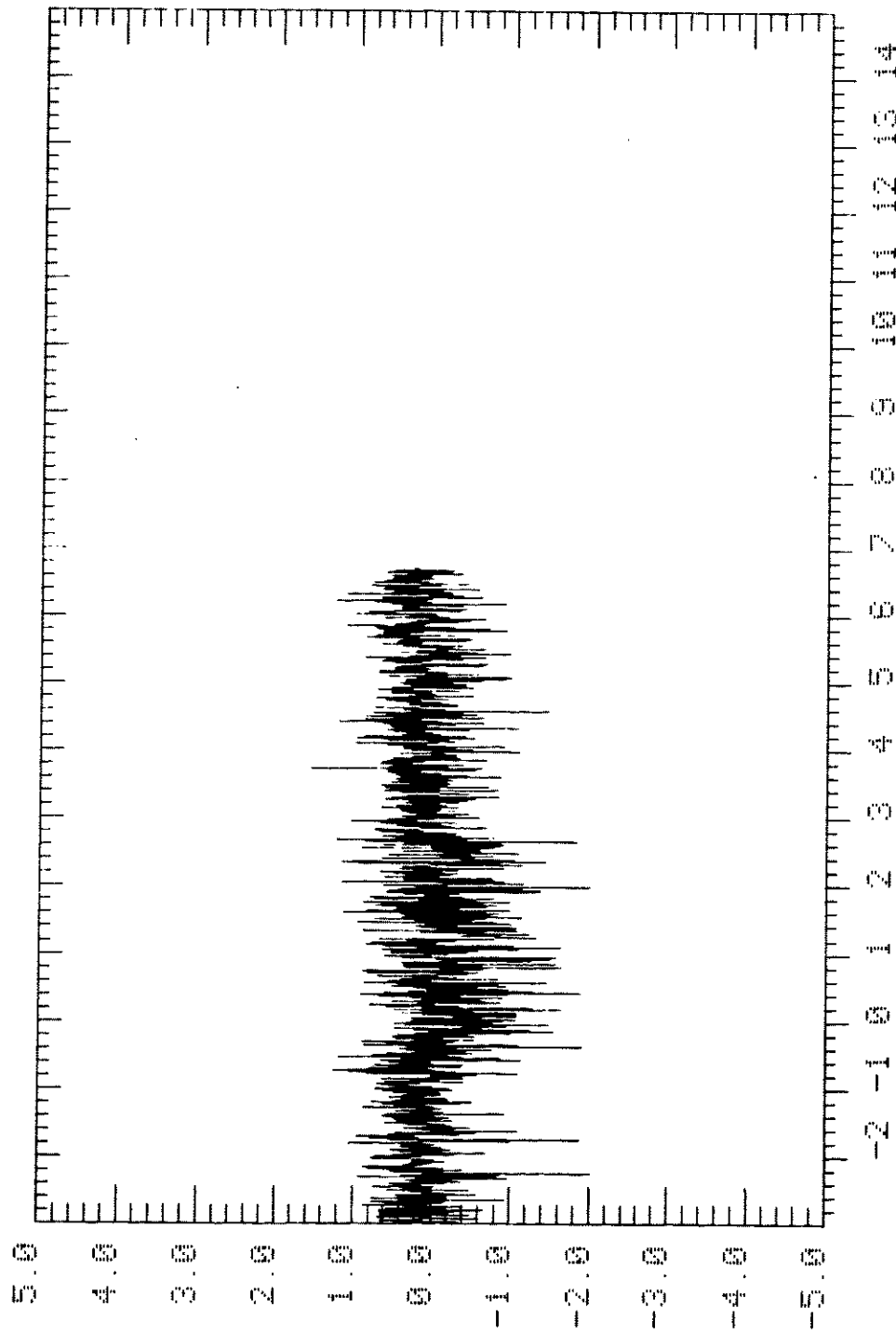
AVERAGING TIME: 0.6 SEC X: 490 M Y: 50 M Z: 2.0 M

MEAN OF RUN UP: 5.23 MEAN OF RUN DOWN: 3.72



TRIAL: 019 TYPE: UMB UNITS: M/S
 AVERAGING TIME: 0.6 SEC X: 499 N Y: 50 N Z: 2.0 N
 MEAN OF RUN UP: -36.14 MEAN OF RUN DOWN: -3.45

WIND VELOCITY

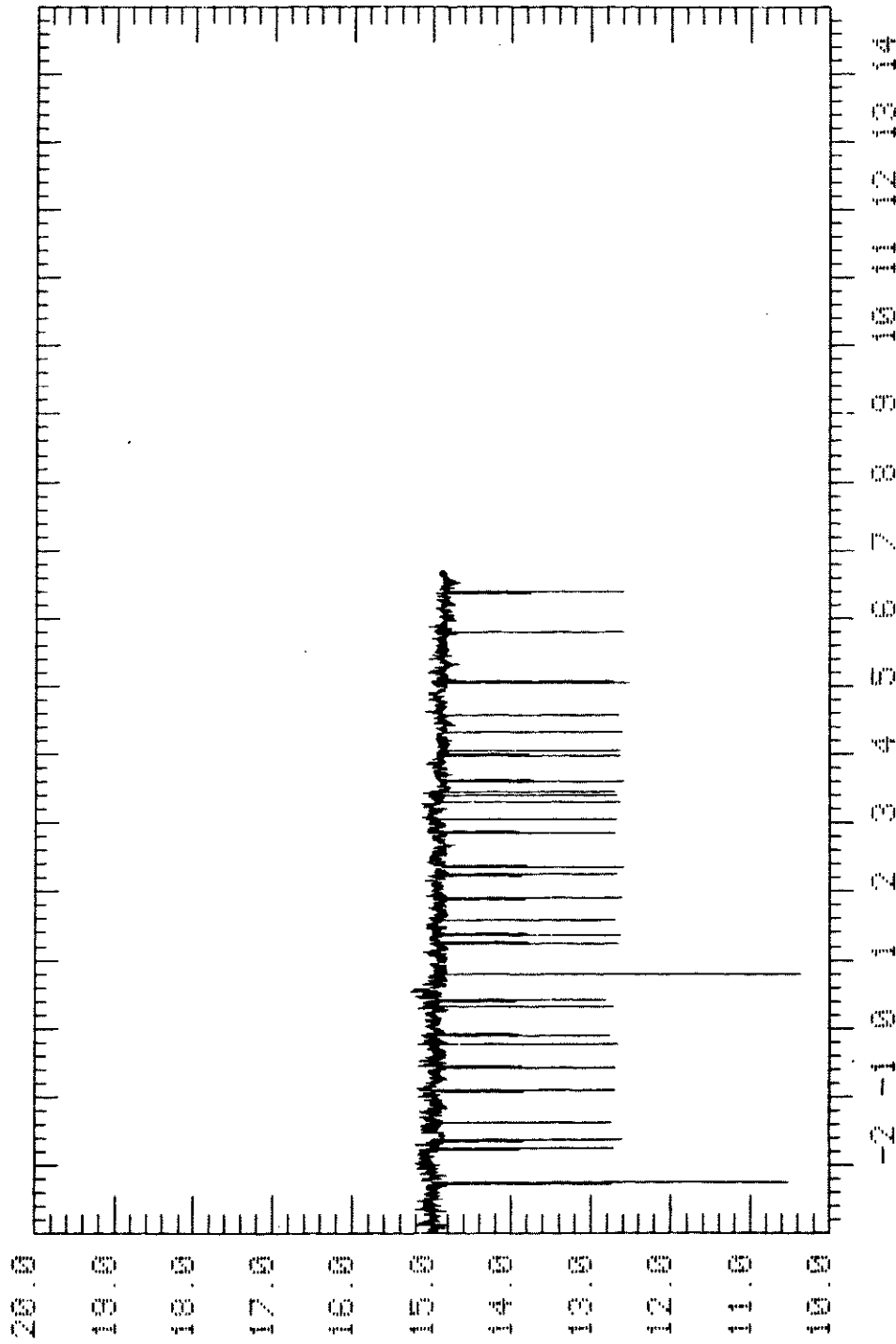


TRIAL: 019 TYPE: WIND UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 2.6 M

MEAN OF RUN UP: -3.45 MEAN OF RUN DOWN: 0.07

T E M P E R A T U R E

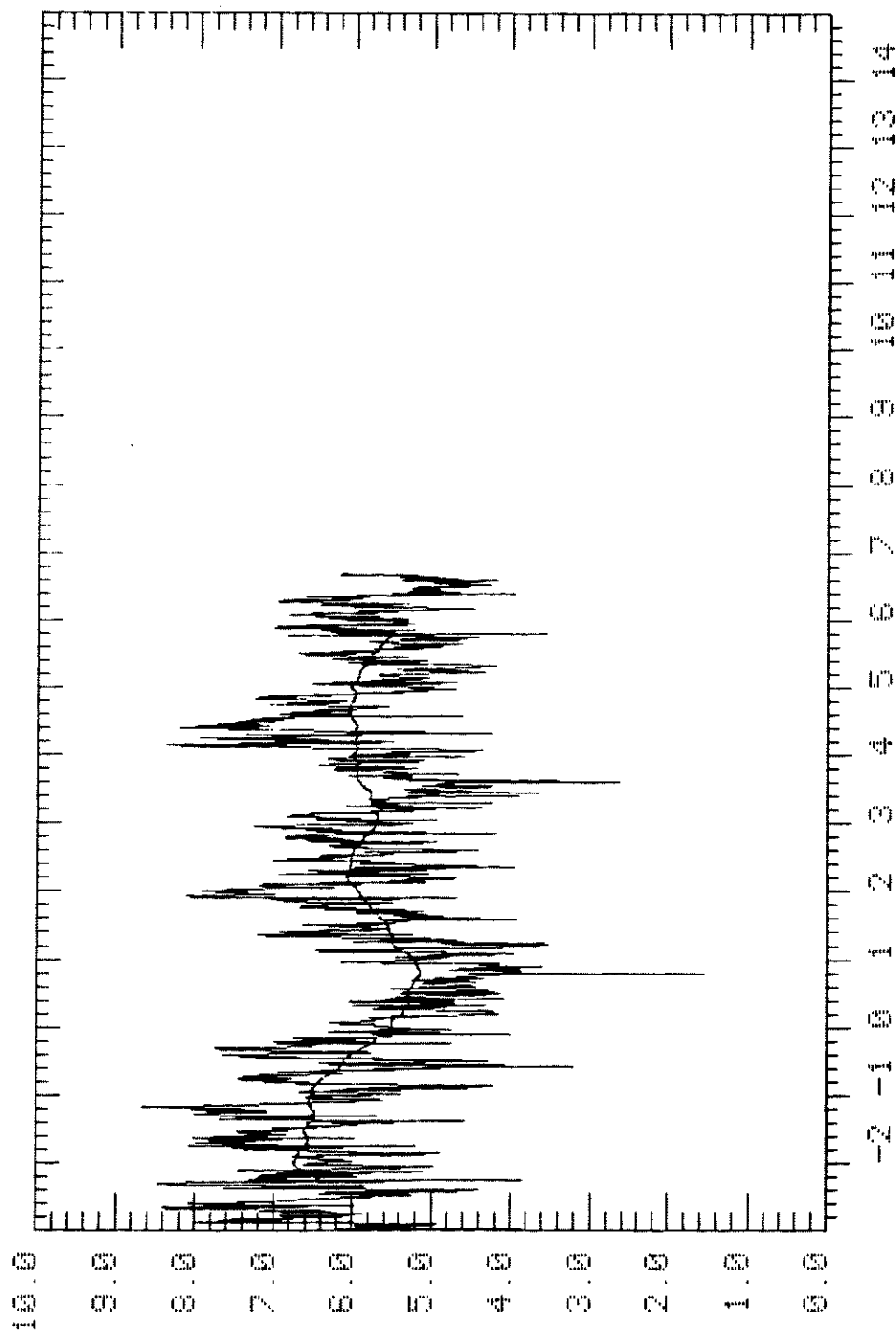


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 N Z: 2.0 M

MEAN OF RUN UP: 17.15 MEAN OF RUN DOWN: 14.73

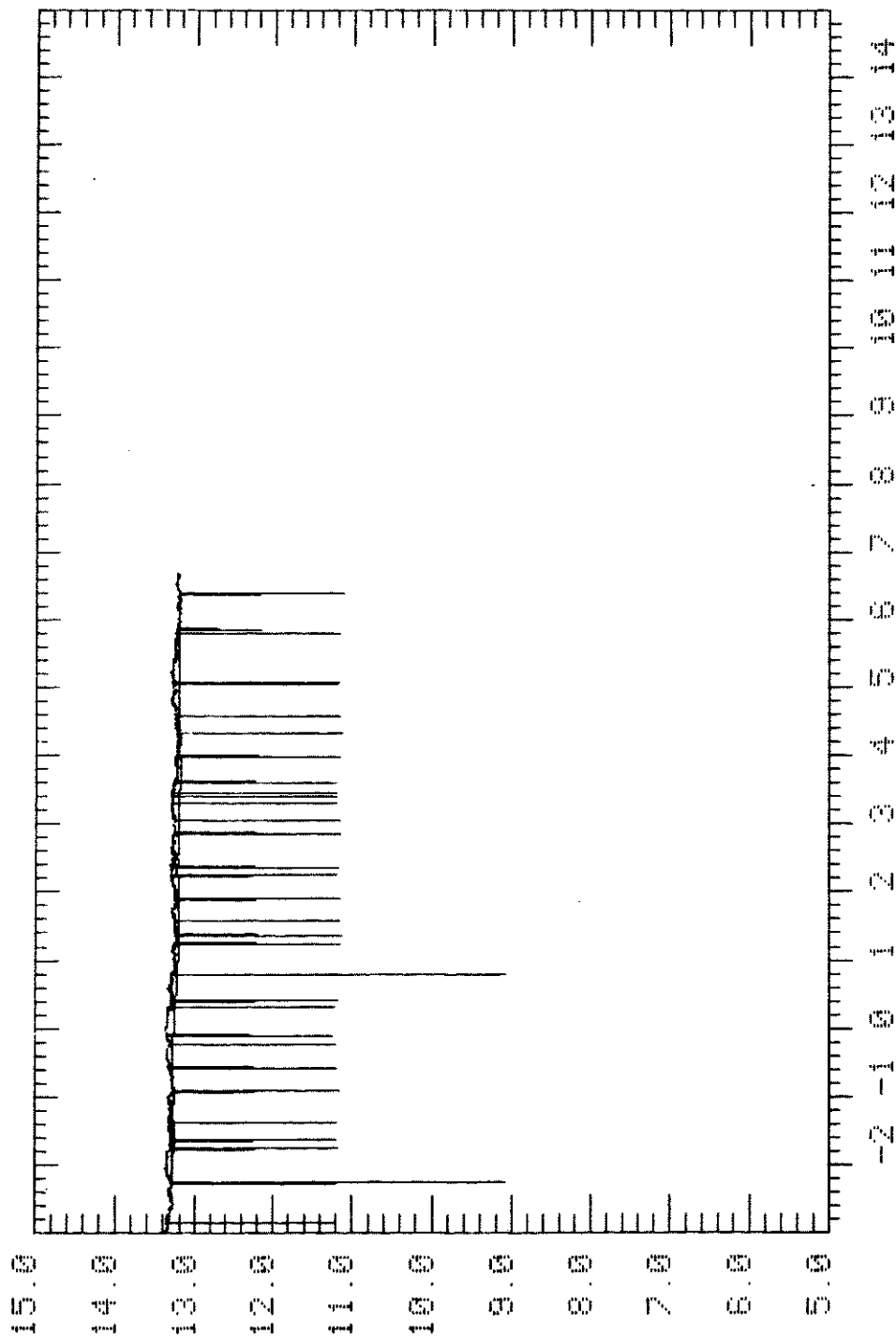


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: WSPD UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 499 N Y: 50 N Z: 4.5 M

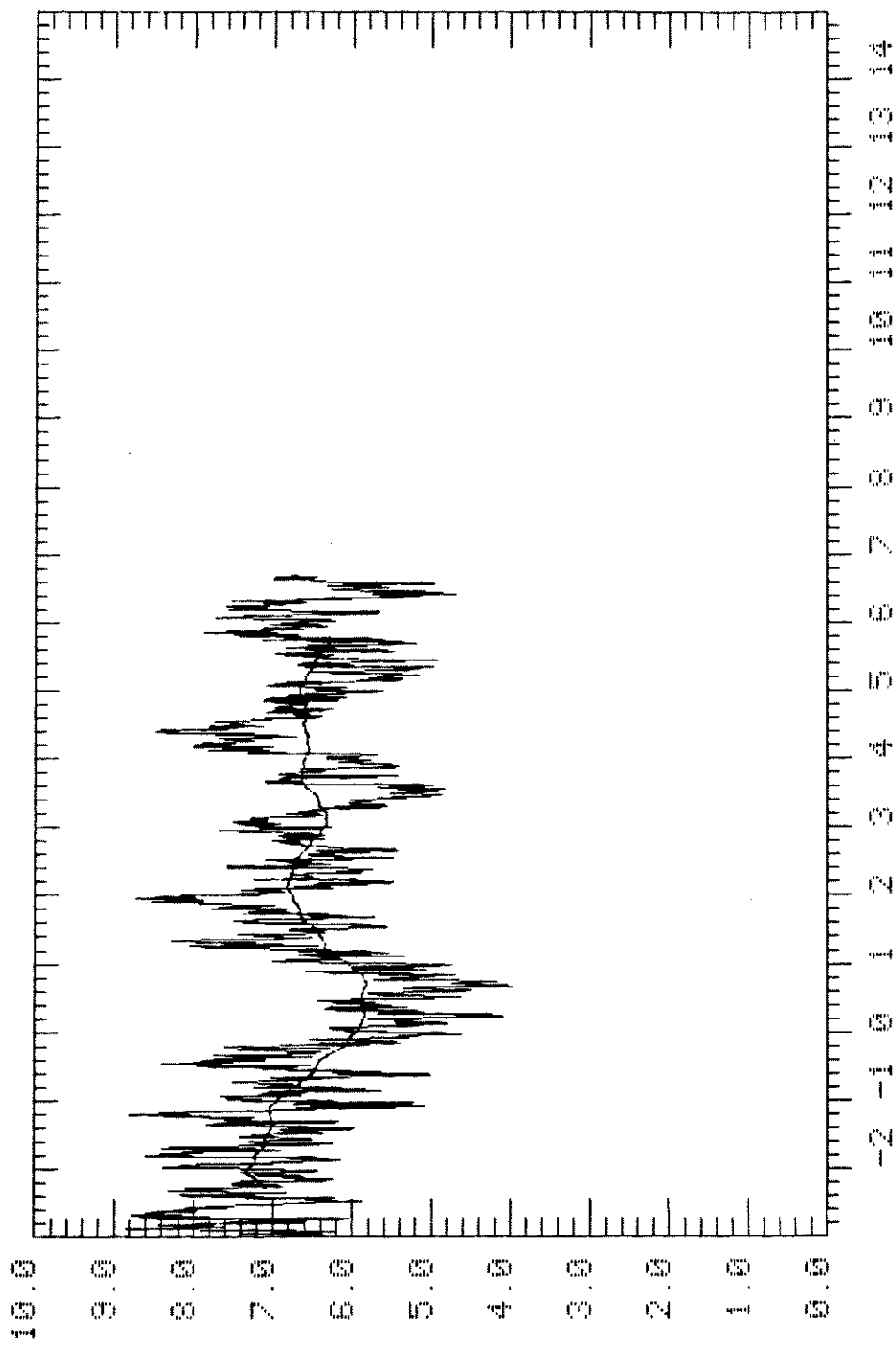
MEAN OF RUN UP: 6.93 MEAN OF RUN DOWN: 4.85



TRIAL: 919 TYPE: AIRT UNITS: DEGREES C

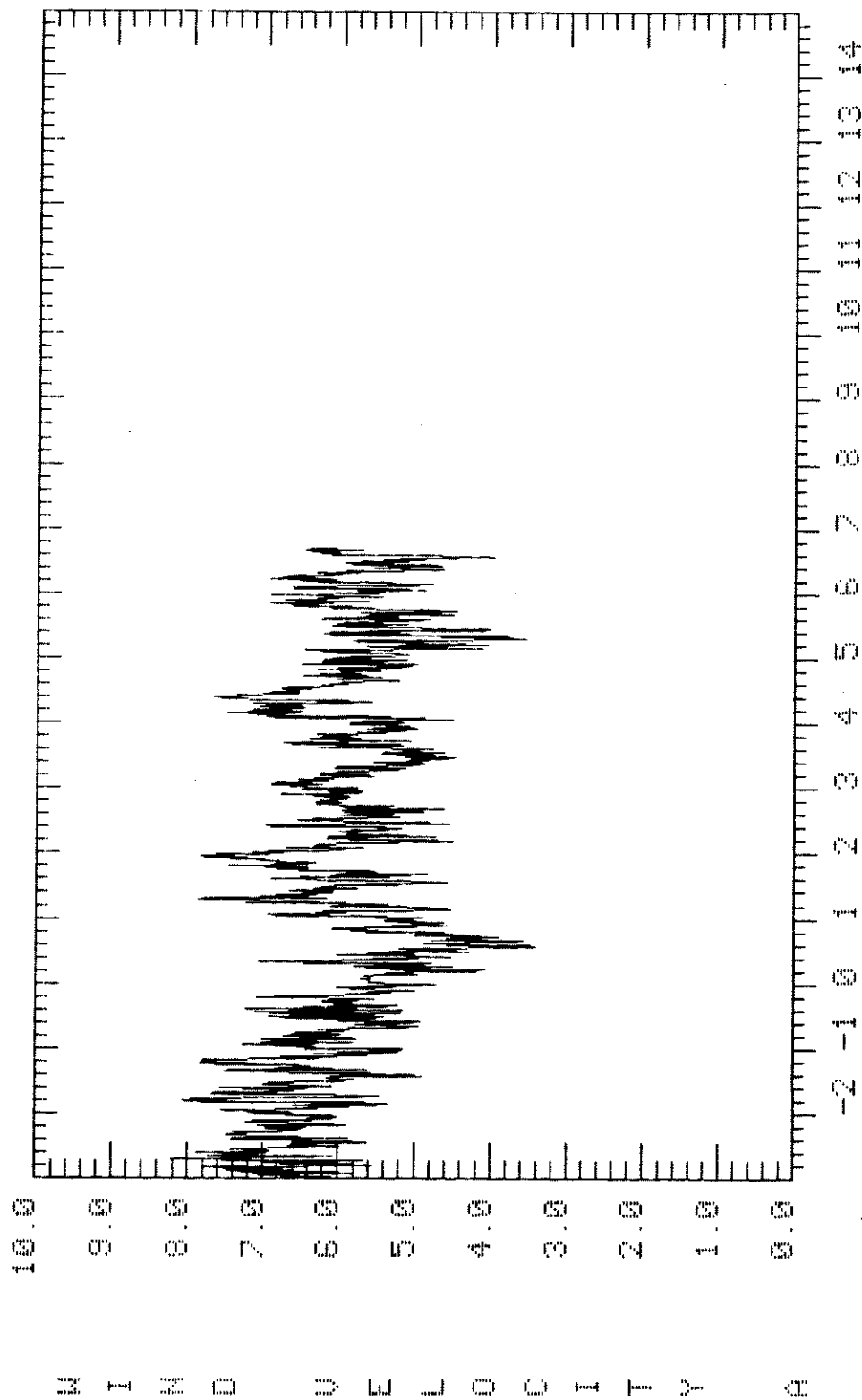
AVERAGING TIME: 0.6 SEC X: 499 M Y: 50 M Z: 9.0 M

MEAN OF RUN UP: 14.88 MEAN OF RUN DOWN: 13.11



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: WSPD UNITS: N/S
 AVERAGING TIME: 0.6 SEC X: 499 N Y: 59 N Z: 10.0 N
 MEAN OF RUN UP: 7.51 MEAN OF RUN DOWN: 5.49



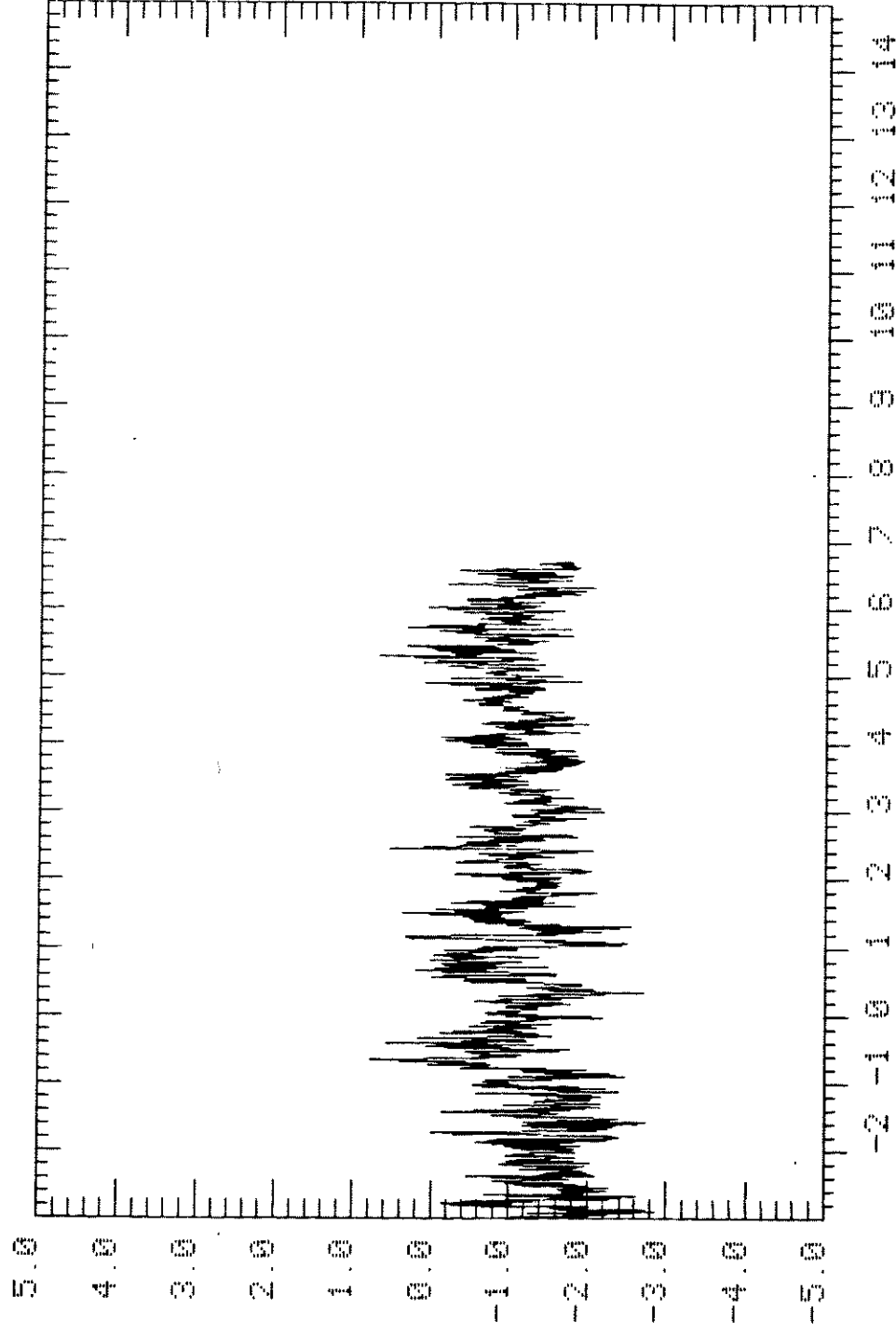
TRIAL: 013 TYPE: UAHN UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M

MEAN OF RUN UP: 6.93 MEAN OF RUN DOWN: 4.67

E13

W I N D V E L O C I T Y

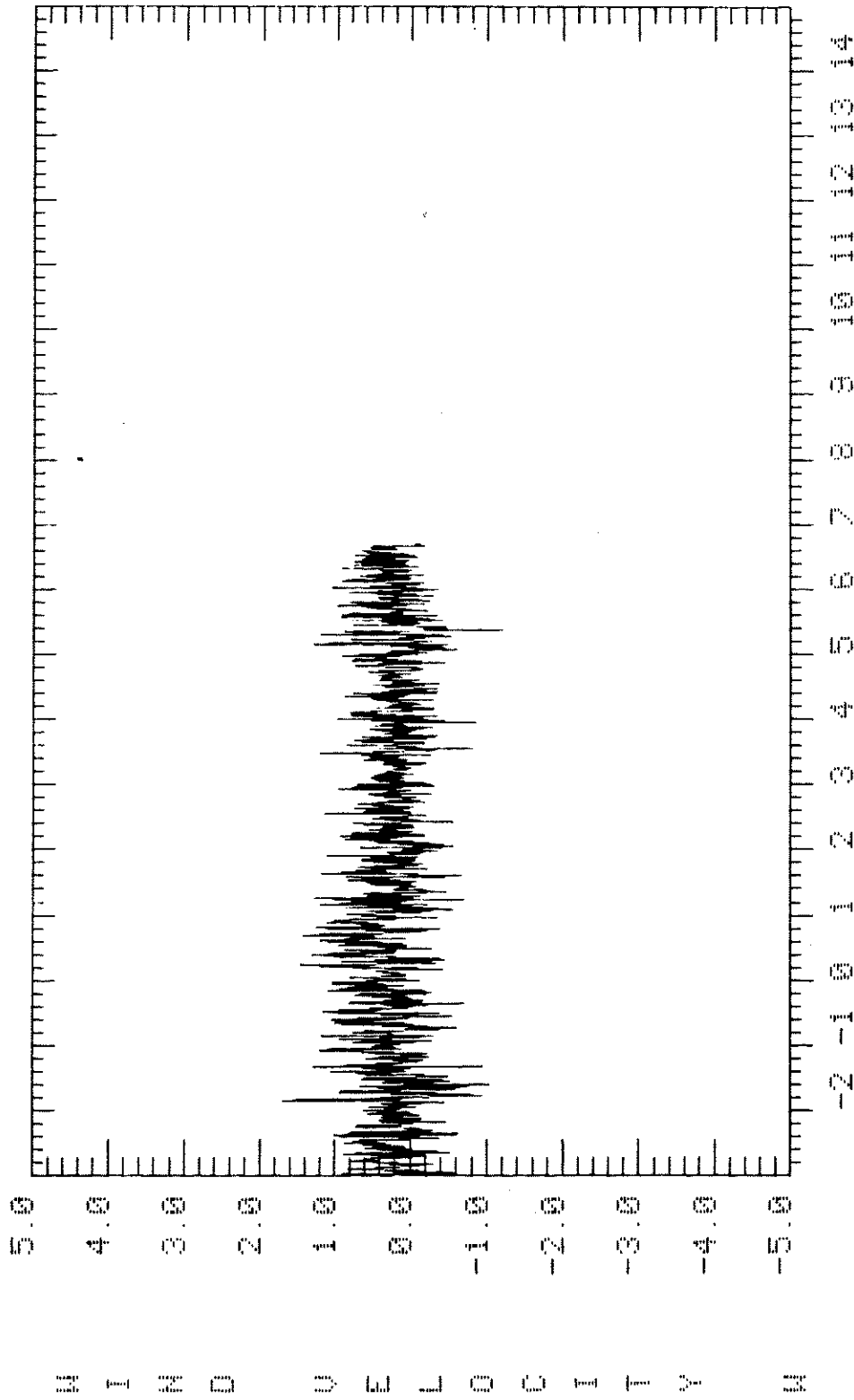


TRIAL: 019 TYPE: UAHB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M

MEAN OF RUN UP: -1.62 MEAN OF RUN DOWN: -3.65

E14



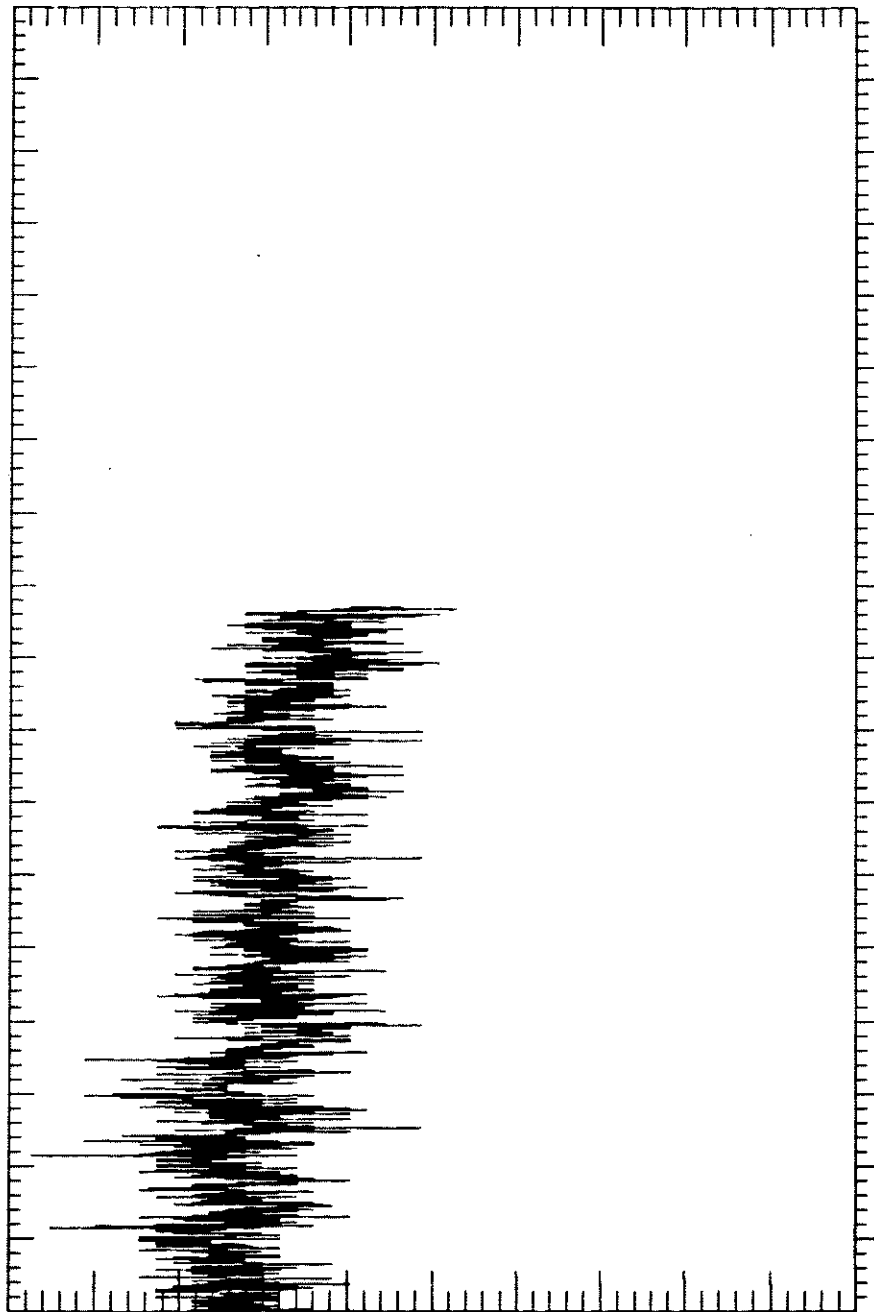
TRIAL: 019 TYPE: UAHN UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M

MEAN OF RUN UP: 0.35 MEAN OF RUN DOWN: 0.21

T E M P E R A T U R E

14.0
13.9
13.8
13.7
13.6
13.5
13.4
13.3
13.2
13.1
13.0



-2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

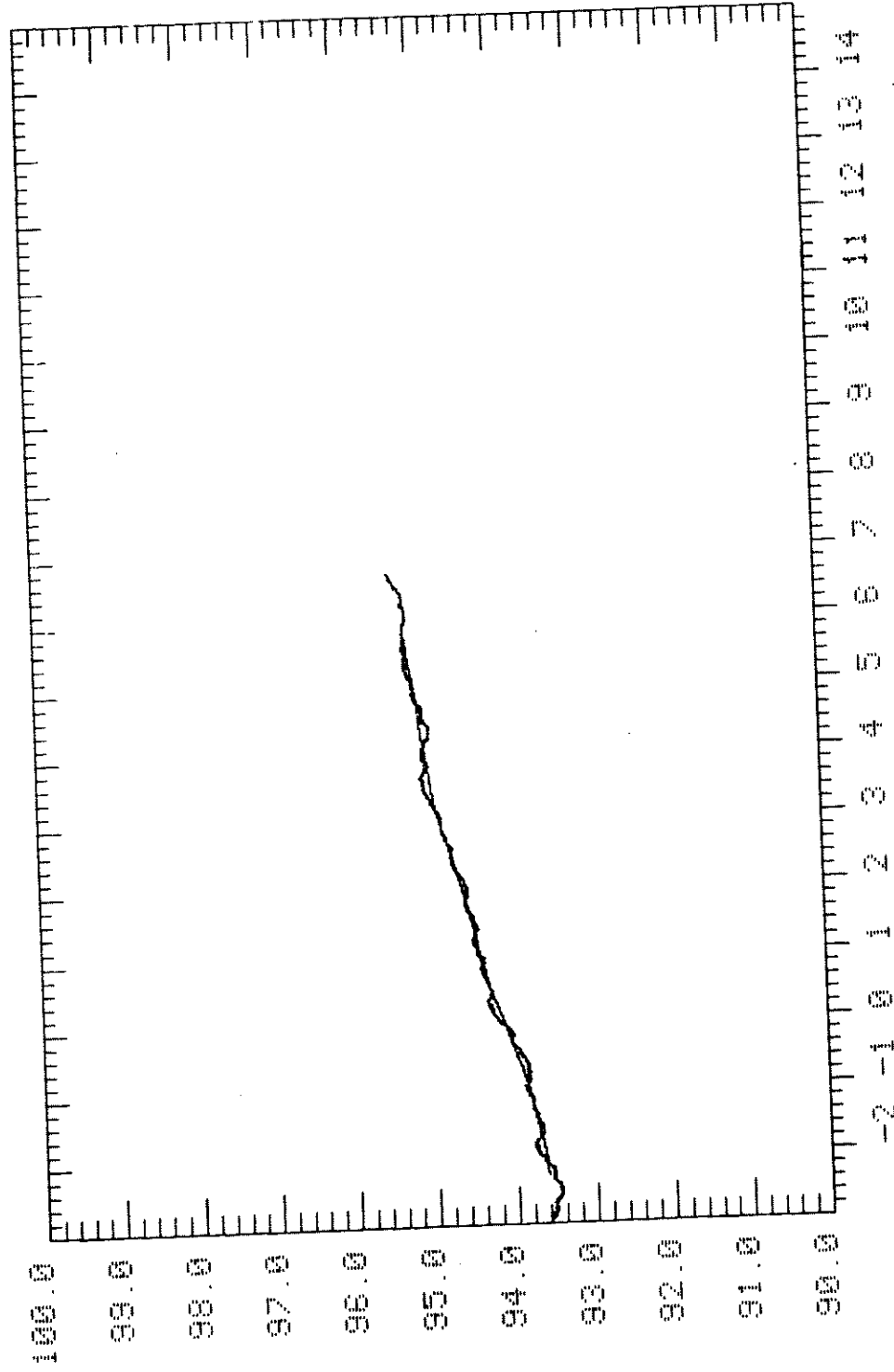
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M

MEAN OF RUN UP: 15.58 MEAN OF RUN DOWN: 13.57

H U M I D I T Y



TIME FROM RELEASE (SECS*10**-2)

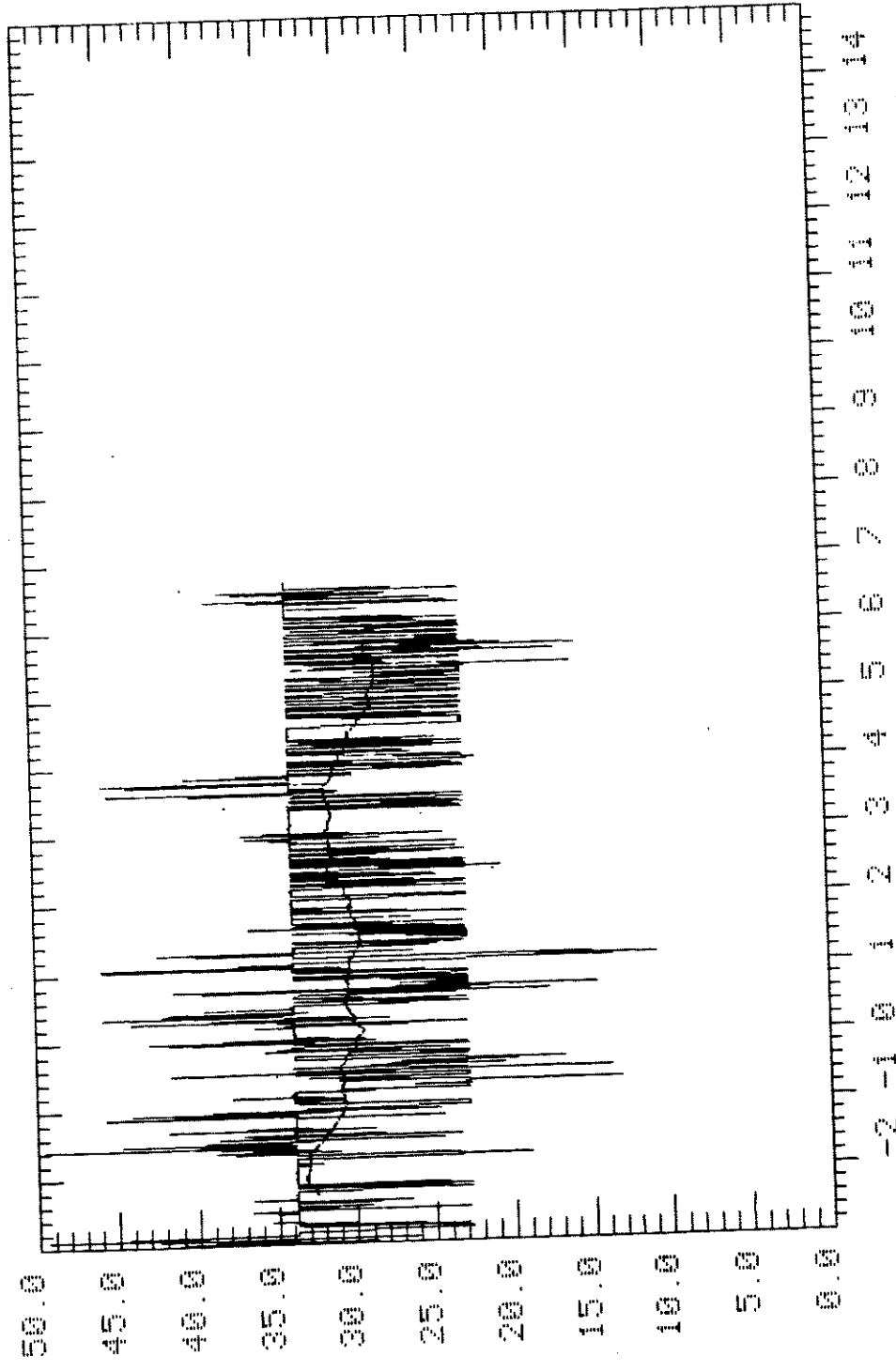
TRIAL: 019 TYPE: RHUM UNITS: PER CENT

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M

MEAN OF RUN UP: 76.43 MEAN OF RUN DOWN: 97.20

E17

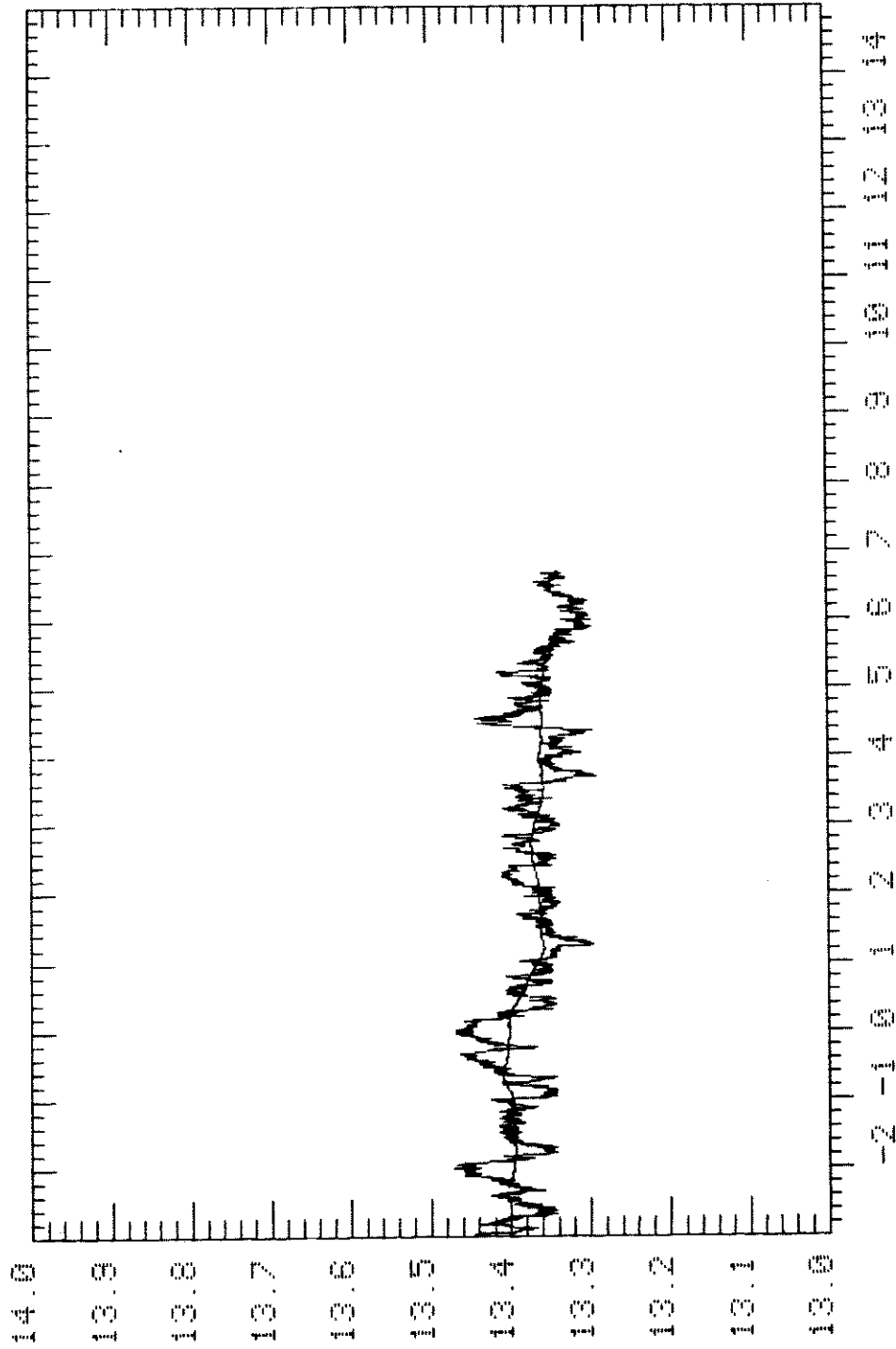
WIND DIRECTION



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: WINDS UNITS: DEGREES
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M
 MEAN OF RUN UP: 32.97 MEAN OF RUN DOWN: 27.08
 E18

T E M P E R A T U R E



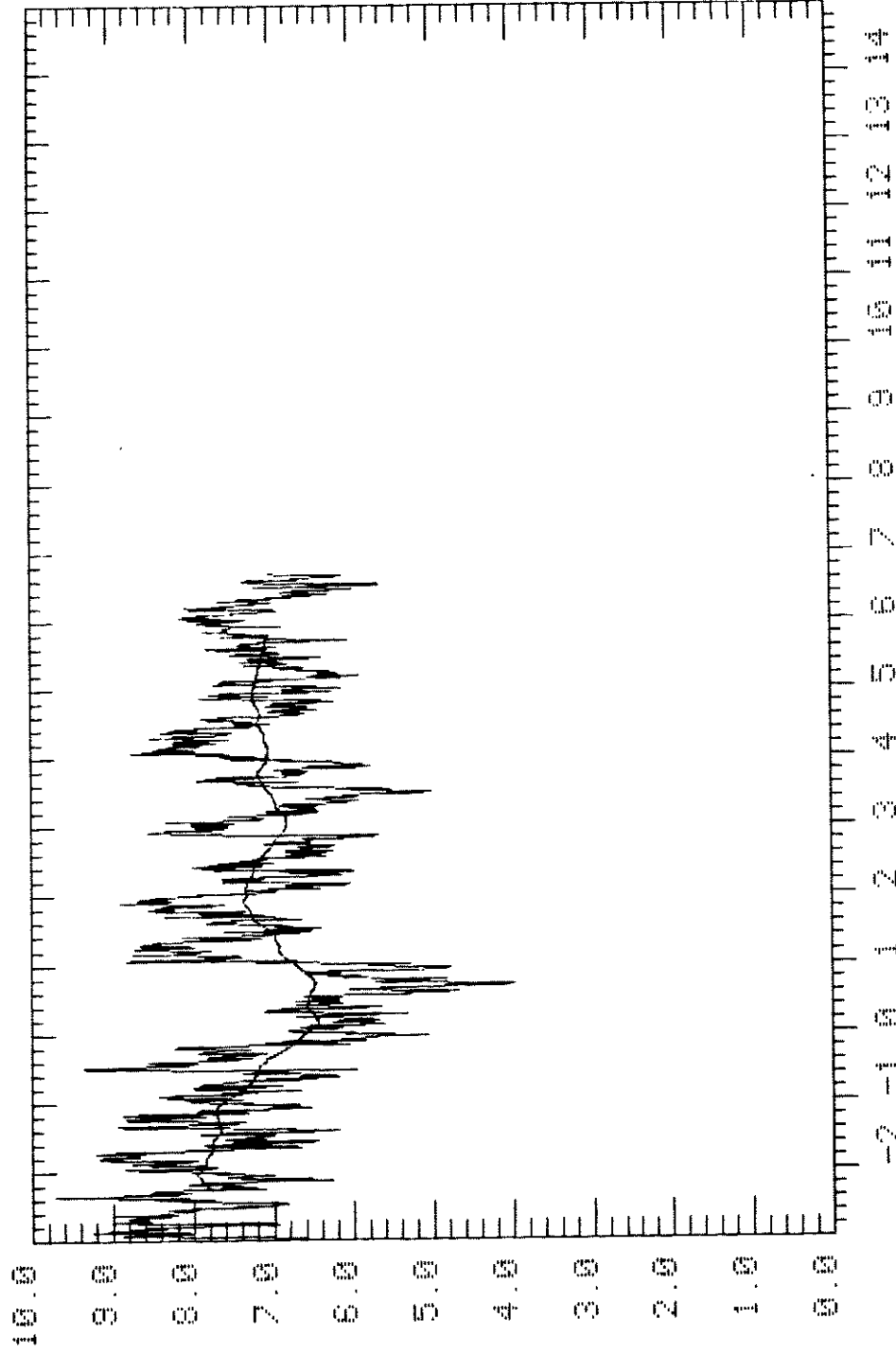
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 16.0 M

MEAN OF RUN UP: 14.98 MEAN OF RUN DOWN: 13.24

W I N D S P E E D



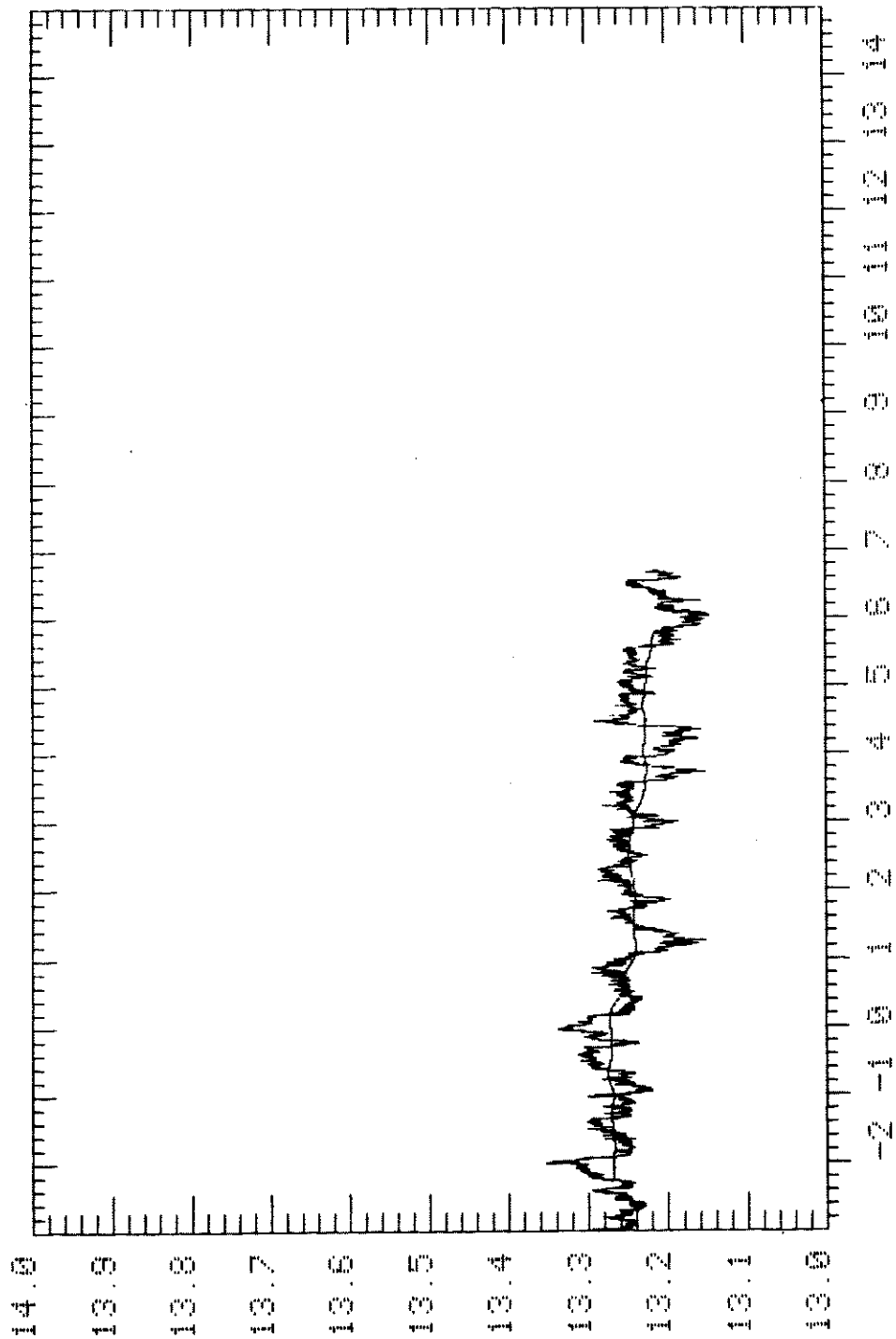
TRIAL: 019 TYPE: WSPD UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 17.3 M

MEAN OF RUN UP: 8.06 MEAN OF RUN DOWN: 5.89

E22

T E M P E R A T U R E

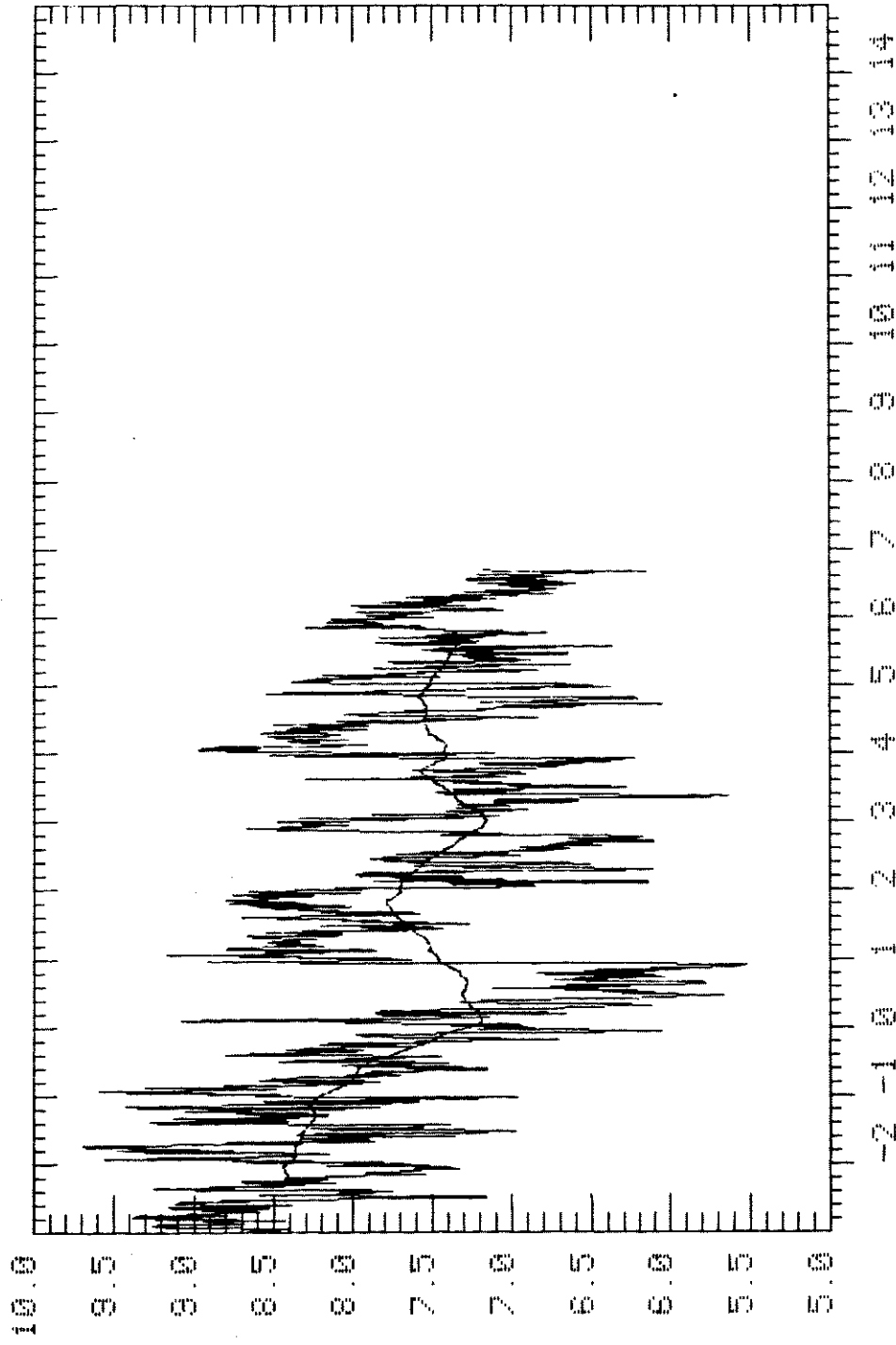


TRIAL: 919 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 499 M Y: 59 M Z: 22.9 M

MEAN OF RUN UP: 14.67 MEAN OF RUN DOWN: 13.11

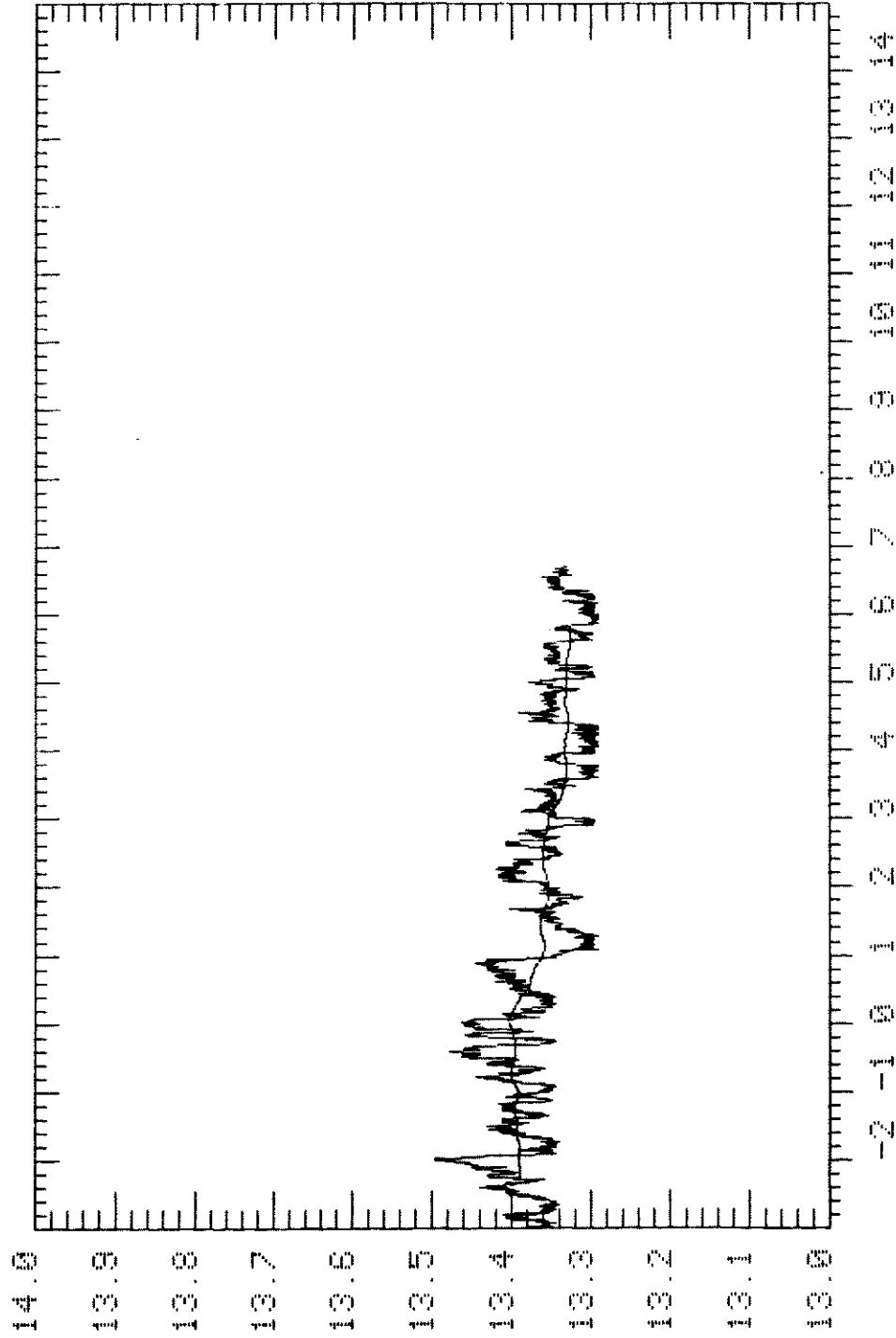
W I N D S P E E D



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: WSPD UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 59 M Z: 30.9 M
MEAN OF RUN UP: 8.81 MEAN OF RUN DOWN: 8.45

T E M P E R A T U R E



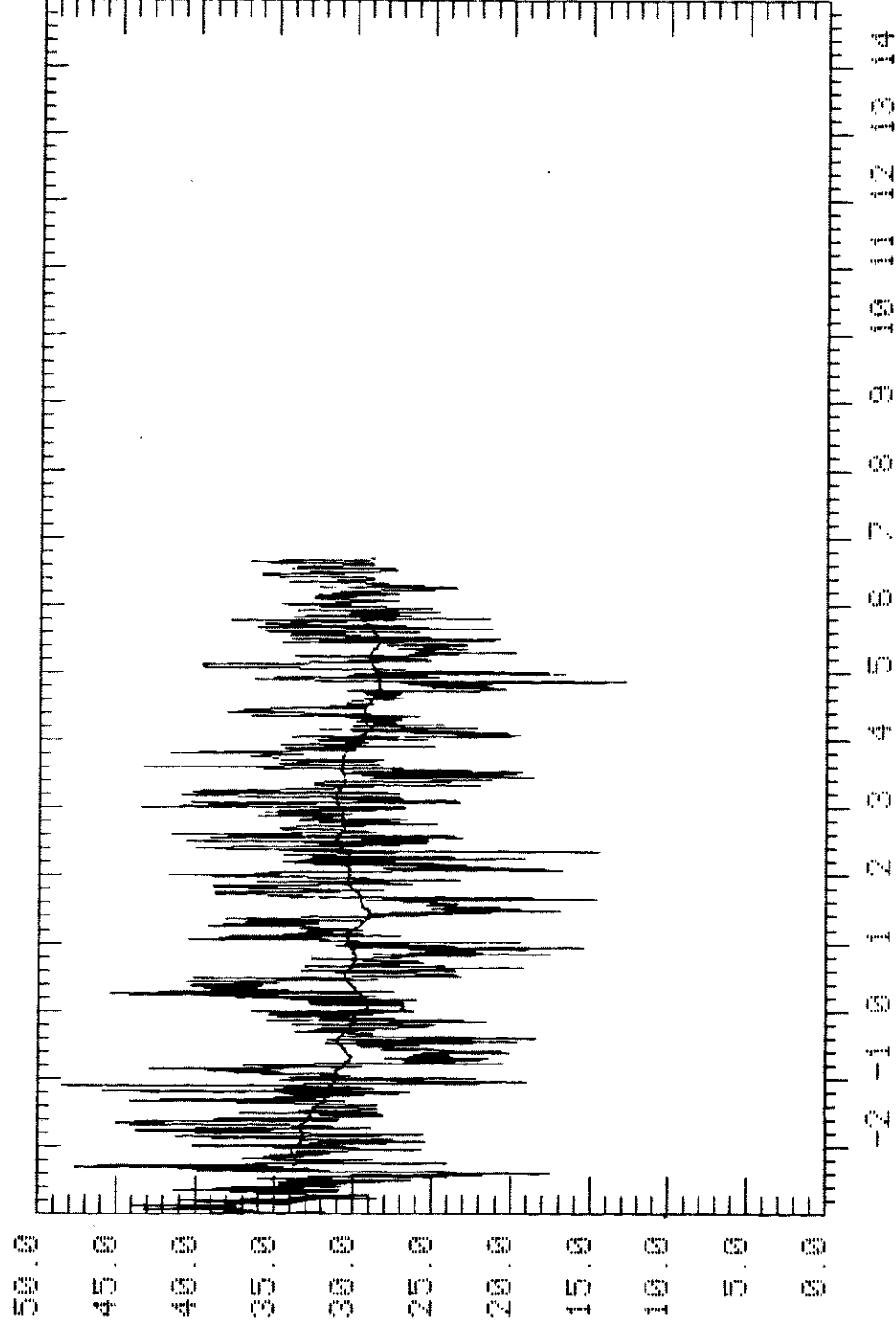
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 30.0 M

MEAN OF RUN UP: 14.04 MEAN OF RUN DOWN: 13.22

H I H D D I R E C T I O N



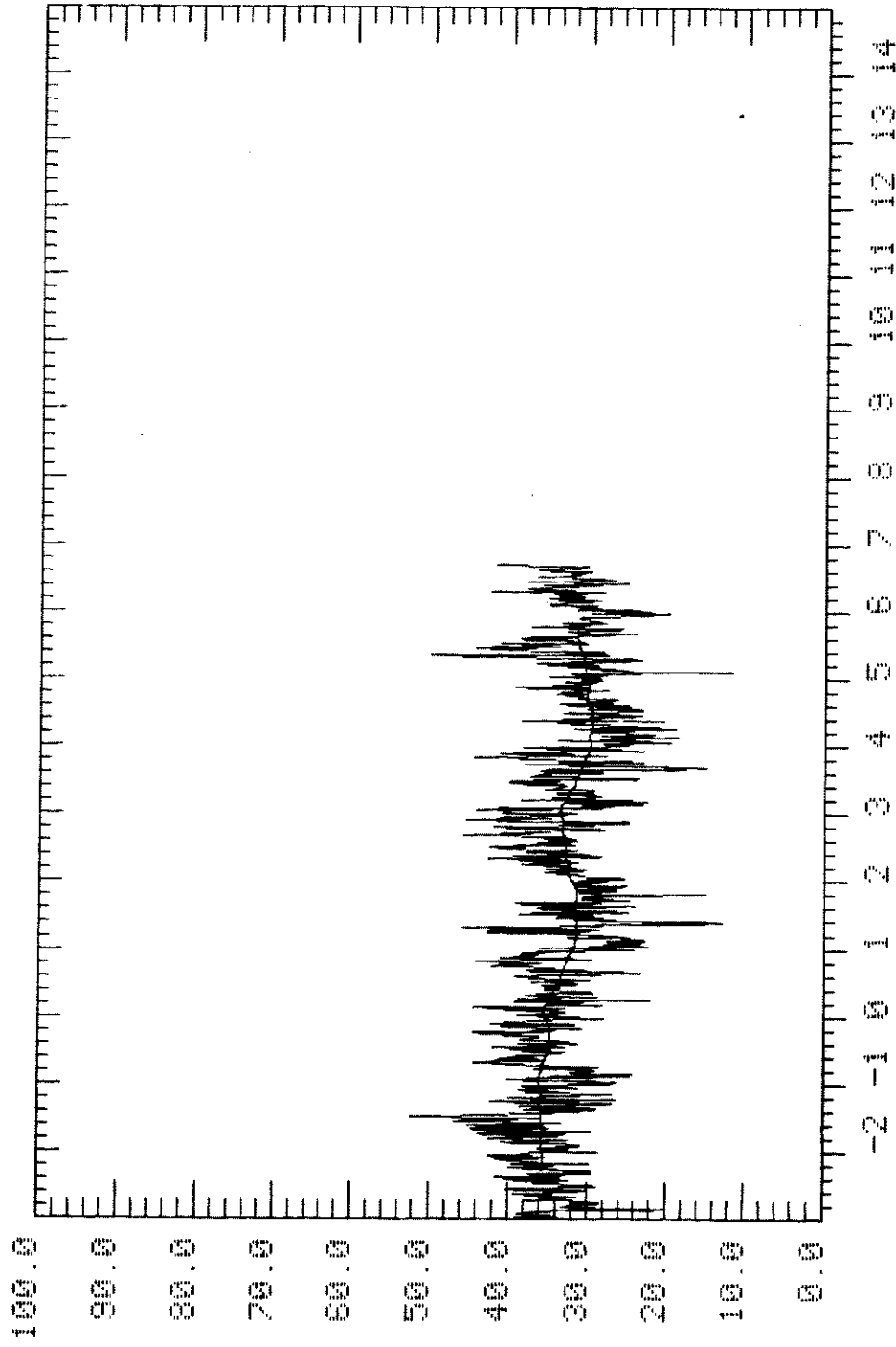
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 919 TYPE: WHDG UNITS: DEGREES

AVERAGING TIME: 0.6 SEC X: 425 M Y: 50 M Z: 10.0 M

MEAN OF RUN UP: 34.00 MEAN OF RUN DOWN: 28.10

W I N D D I R E C T I O N



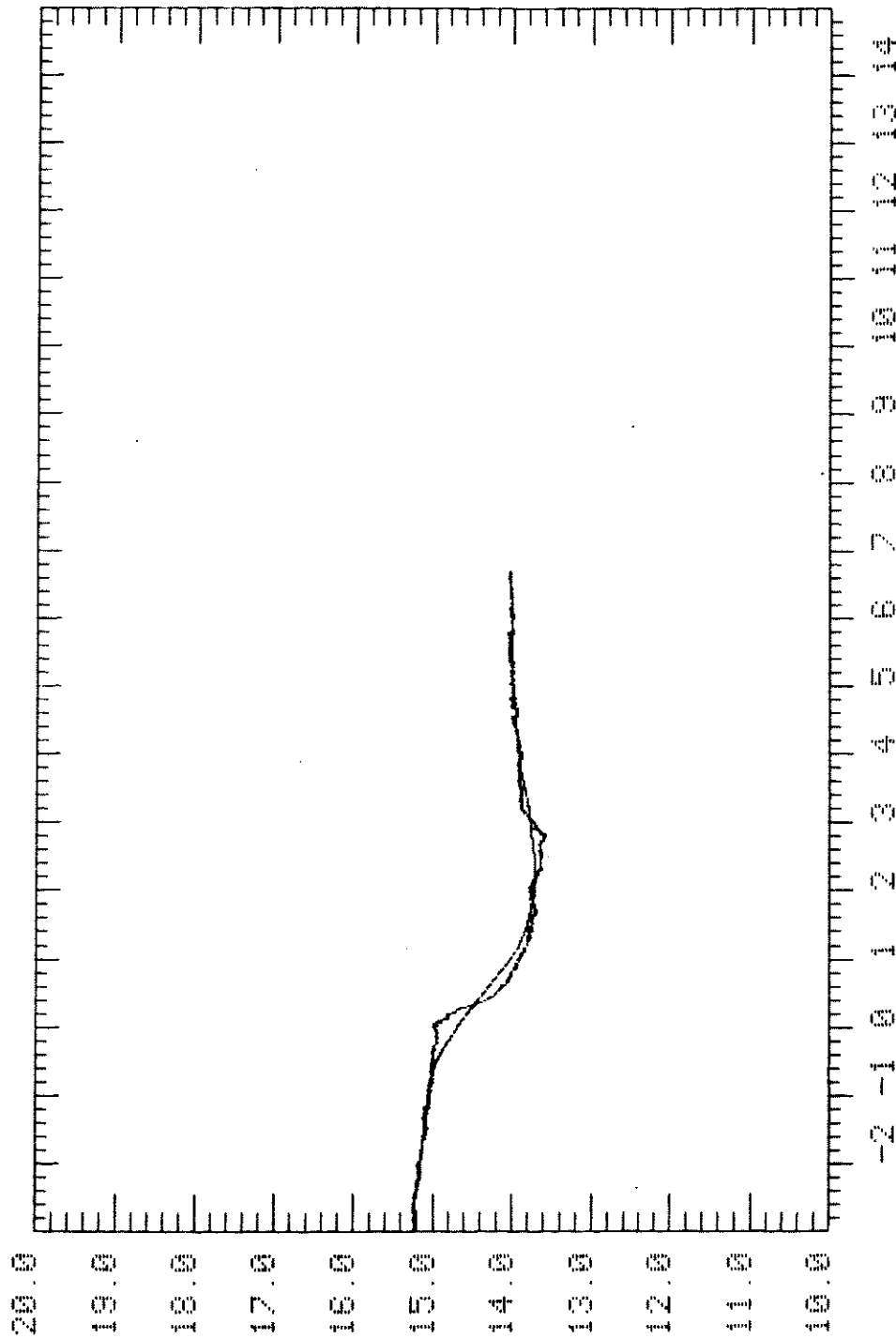
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: WHDG UNITS: DEGREES

AVERAGING TIME: 0.6 SEC X: 400 W Y: 150 M Z: 10.0 H

MEAN OF RUN UP: 37.11 MEAN OF RUN DOWN: 29.73

T E M P E R A T U R E



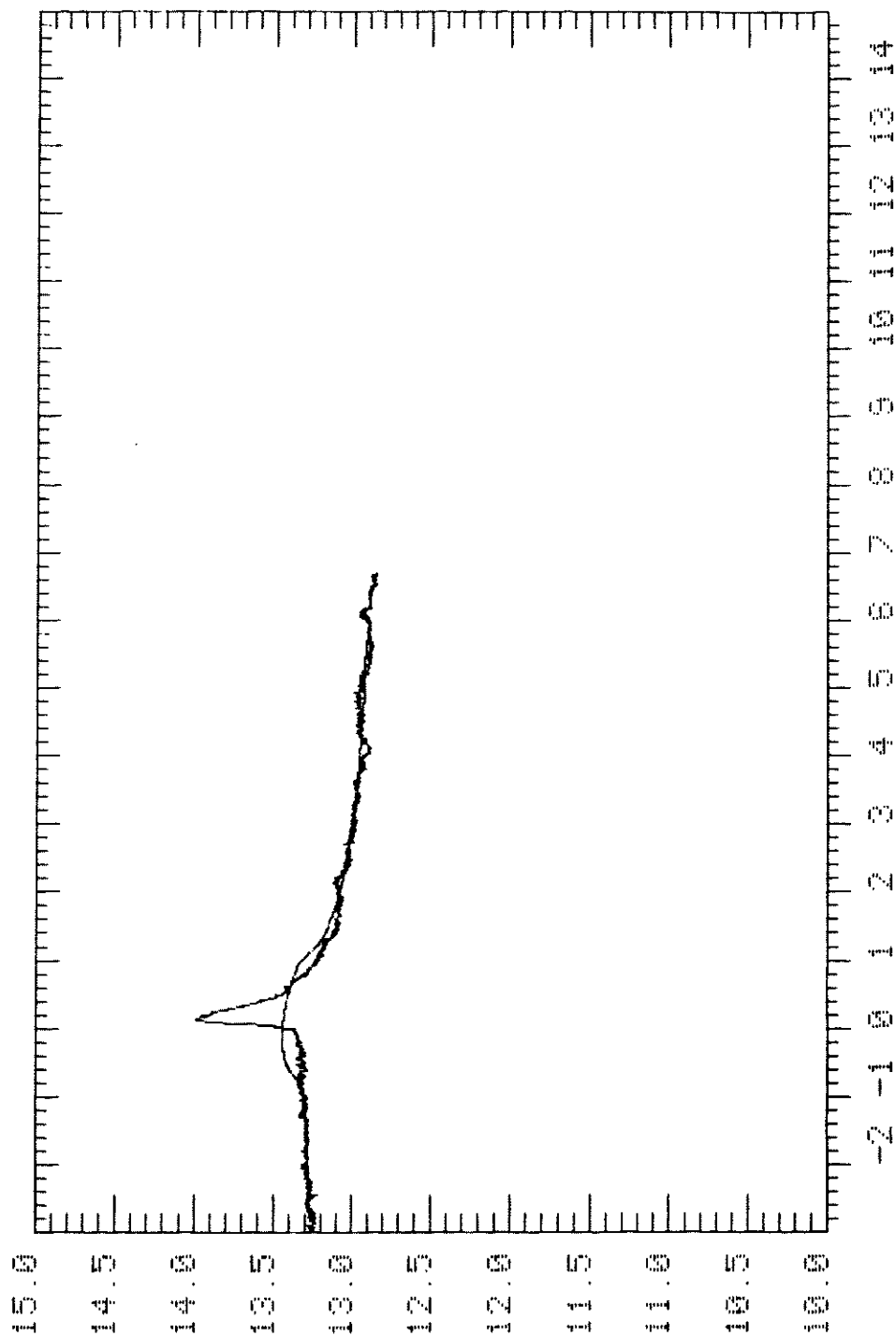
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 013 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 200 M Z: 0.4 M

MEAN OF RUN UP: 13.84 MEAN OF RUN DOWN: 13.81

T E M P E R A T U R E

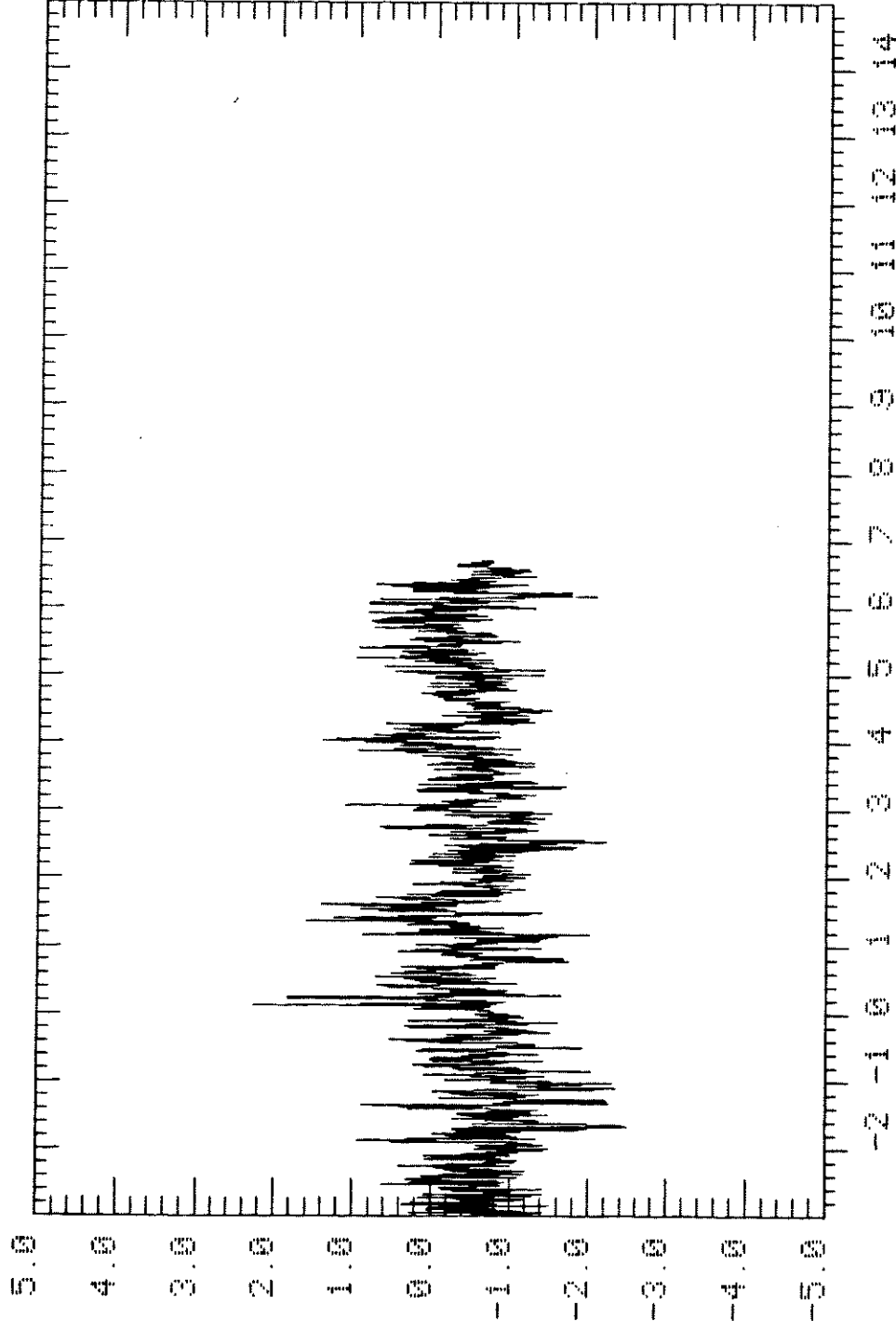


TRIAL: 019 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 9.6 SEC X: 489 N Y: 290 N Z: 12.9 M

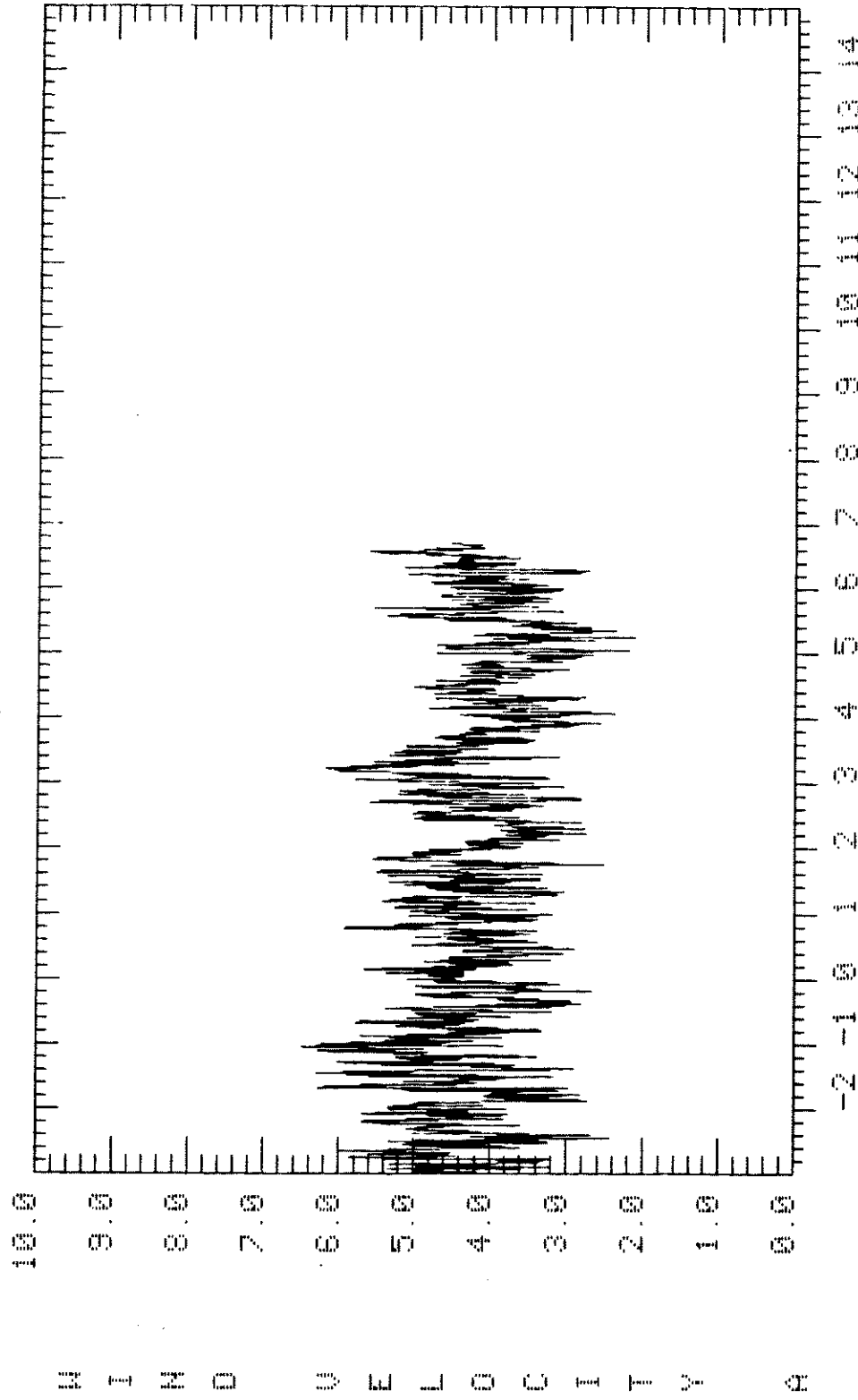
MEAN OF RUN UP: 14.62 MEAN OF RUN DOWN: 12.77

W I N D V E L O C I T Y D



TIME FROM RELEASE (SECS*10**-2)

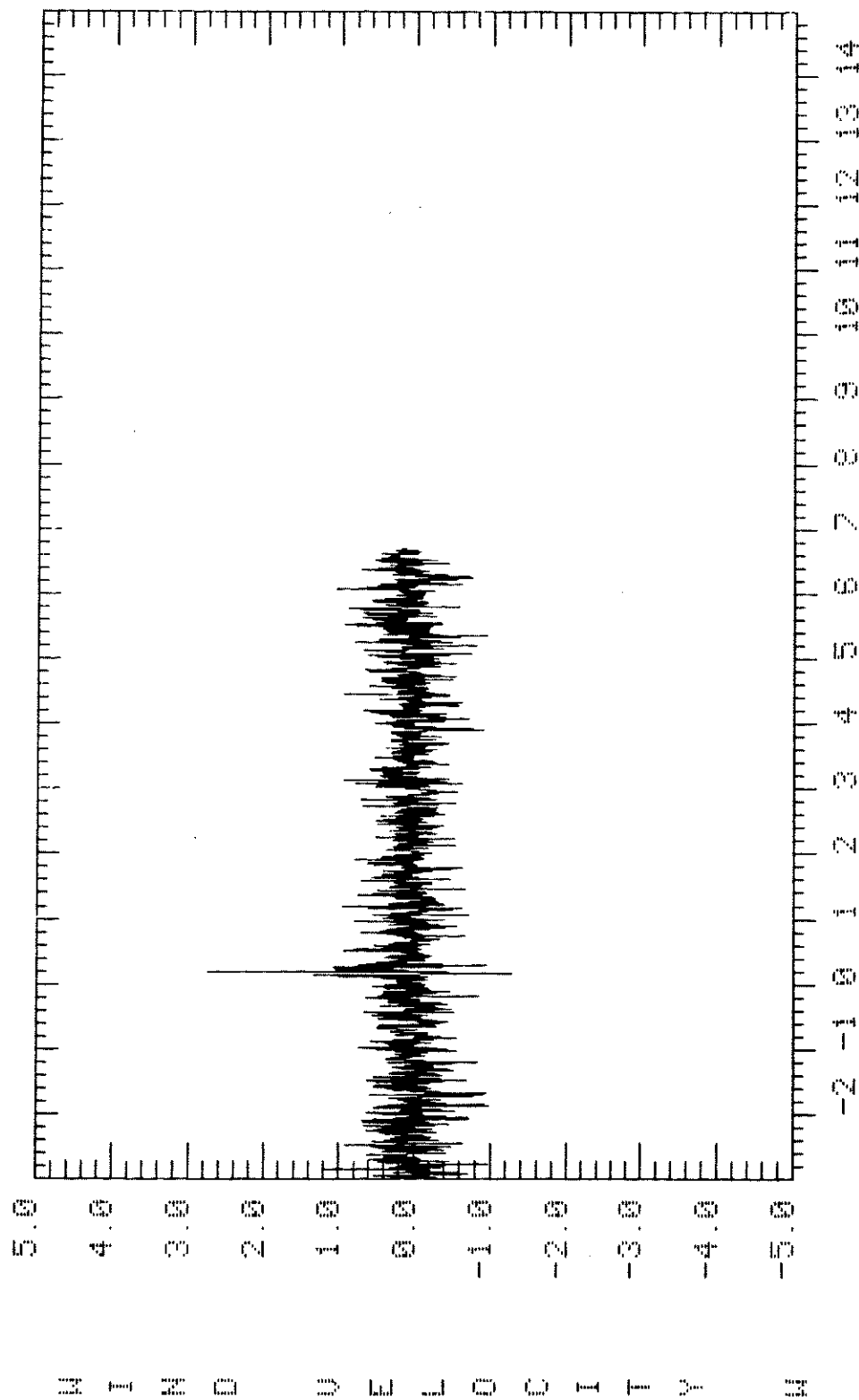
TRIAL: 019 TYPE: UANB UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 250 M Z: 2.0 M
MEAN OF RUN UP: -1.04 MEAN OF RUN DOWN: -0.15



TRIAL: 019 TYPE: UAHN UNITS: M/S

AVERAGING TIME: 0.8 SEC X: 400 M Y: 250 M Z: 2.0 M

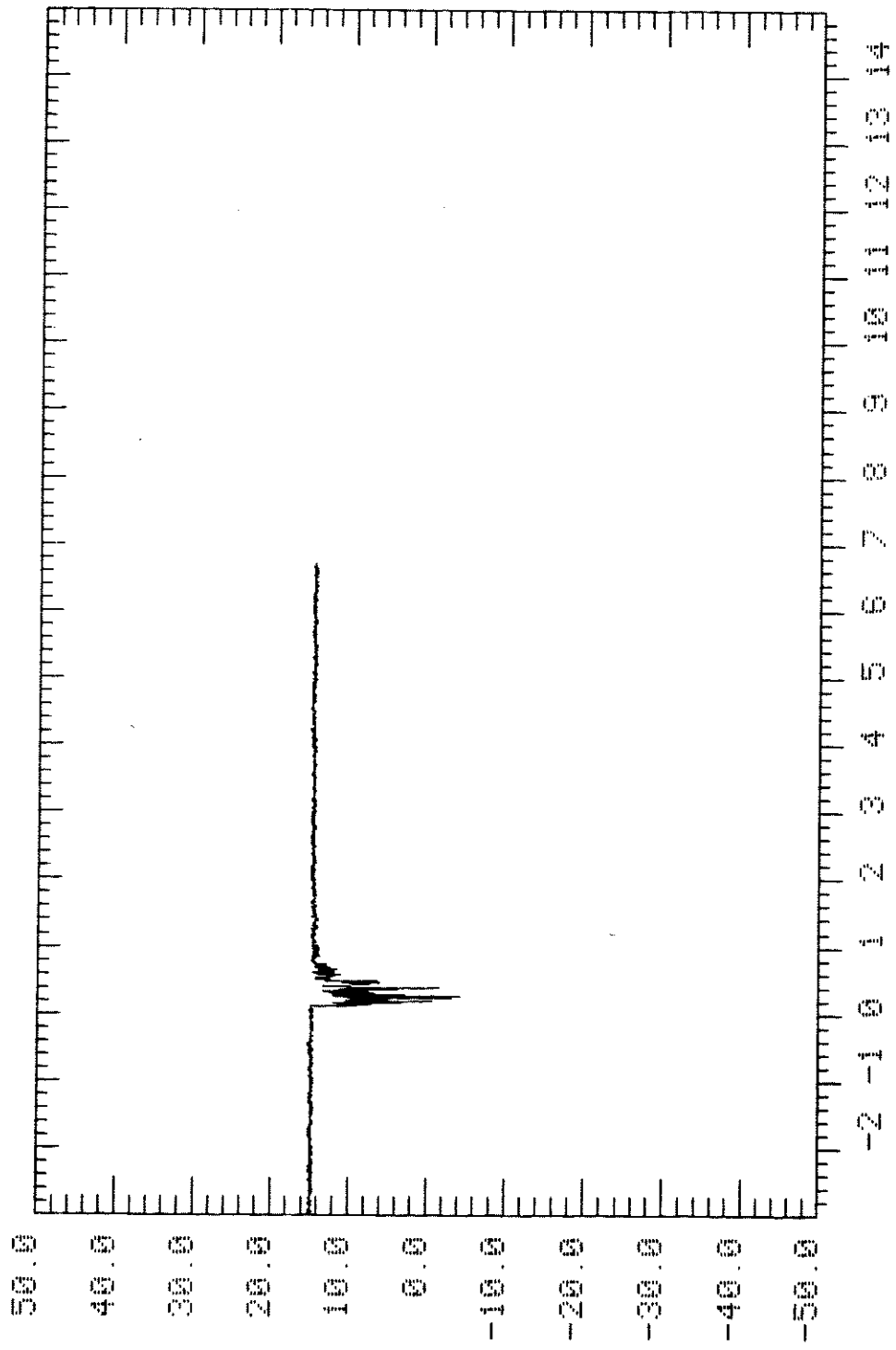
MEAN OF RUN UP: 6.95 MEAN OF RUN DOWN: 3.54



TRIAL: 019 TYPE: WIND UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 250 M Z: 2.0 M

MEAN OF RUN UP: 0.07 MEAN OF RUN DOWN: 0.05

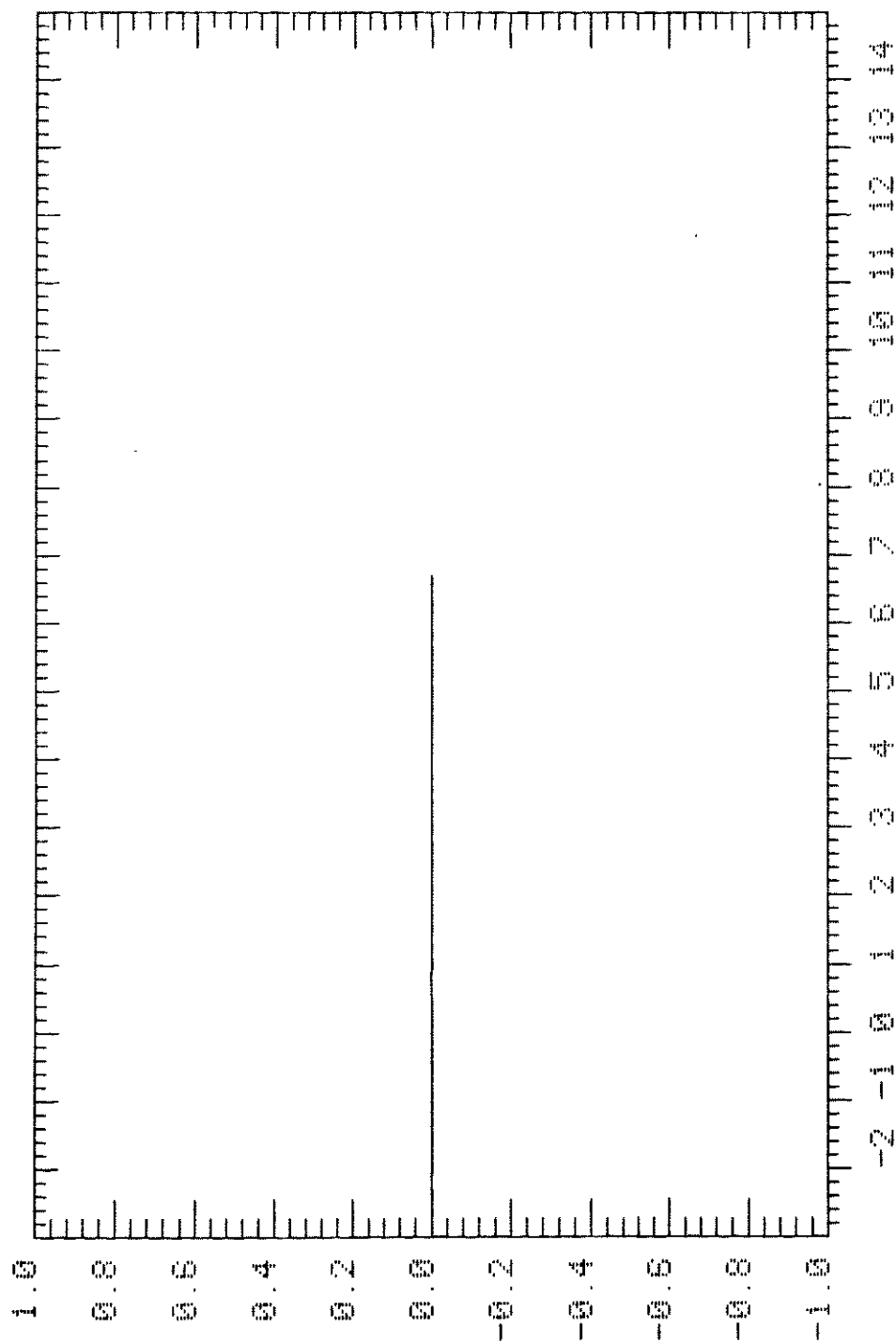


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 250 M Z: 2.0 M

MEAN OF RUN UP: 16.35 MEAN OF RUN DOWN: 14.50



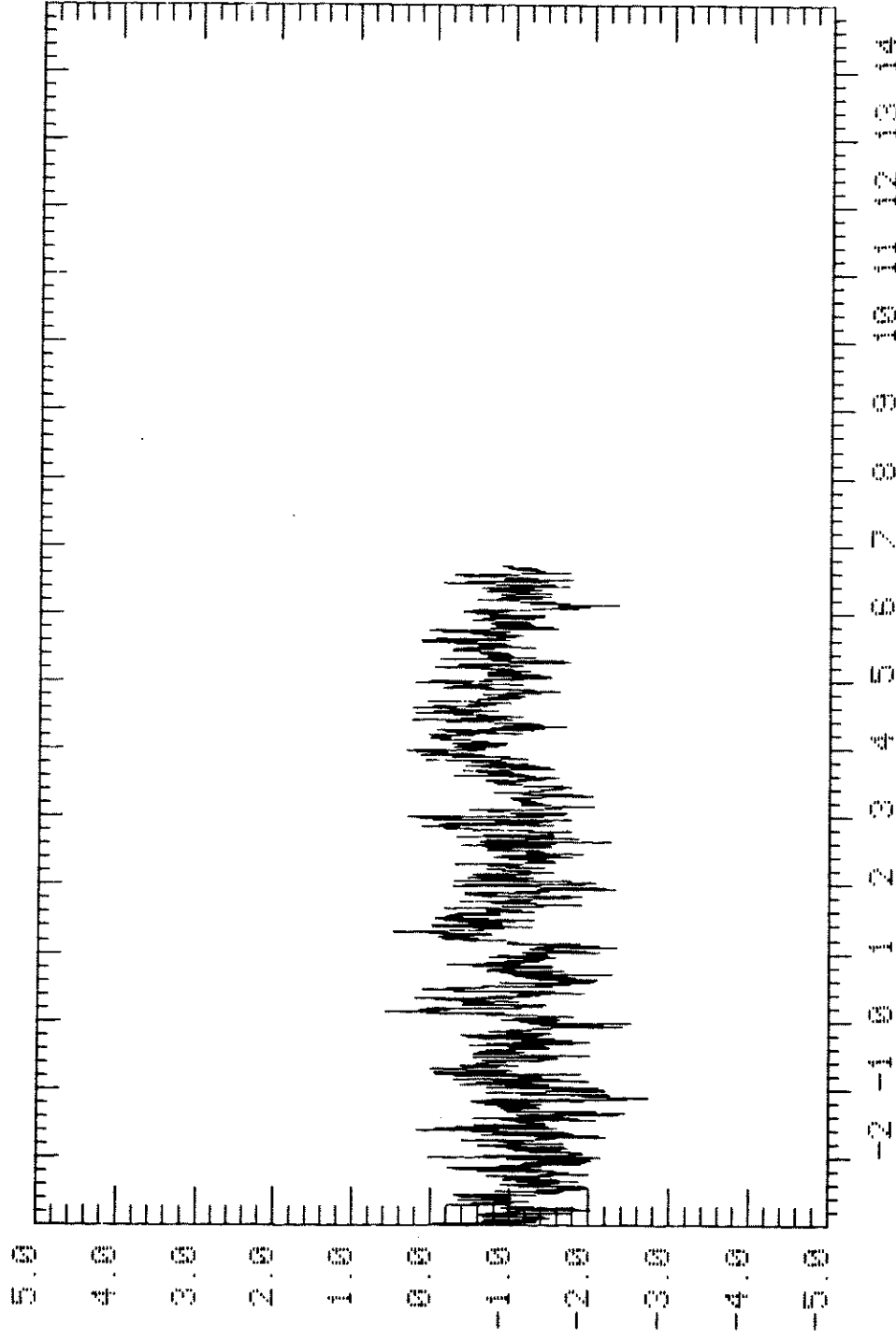
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: SP UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 N Y: 250 N Z: 0.0 M

MEAN OF RUN UP: 0.00 MEAN OF RUN DOWN: 0.00

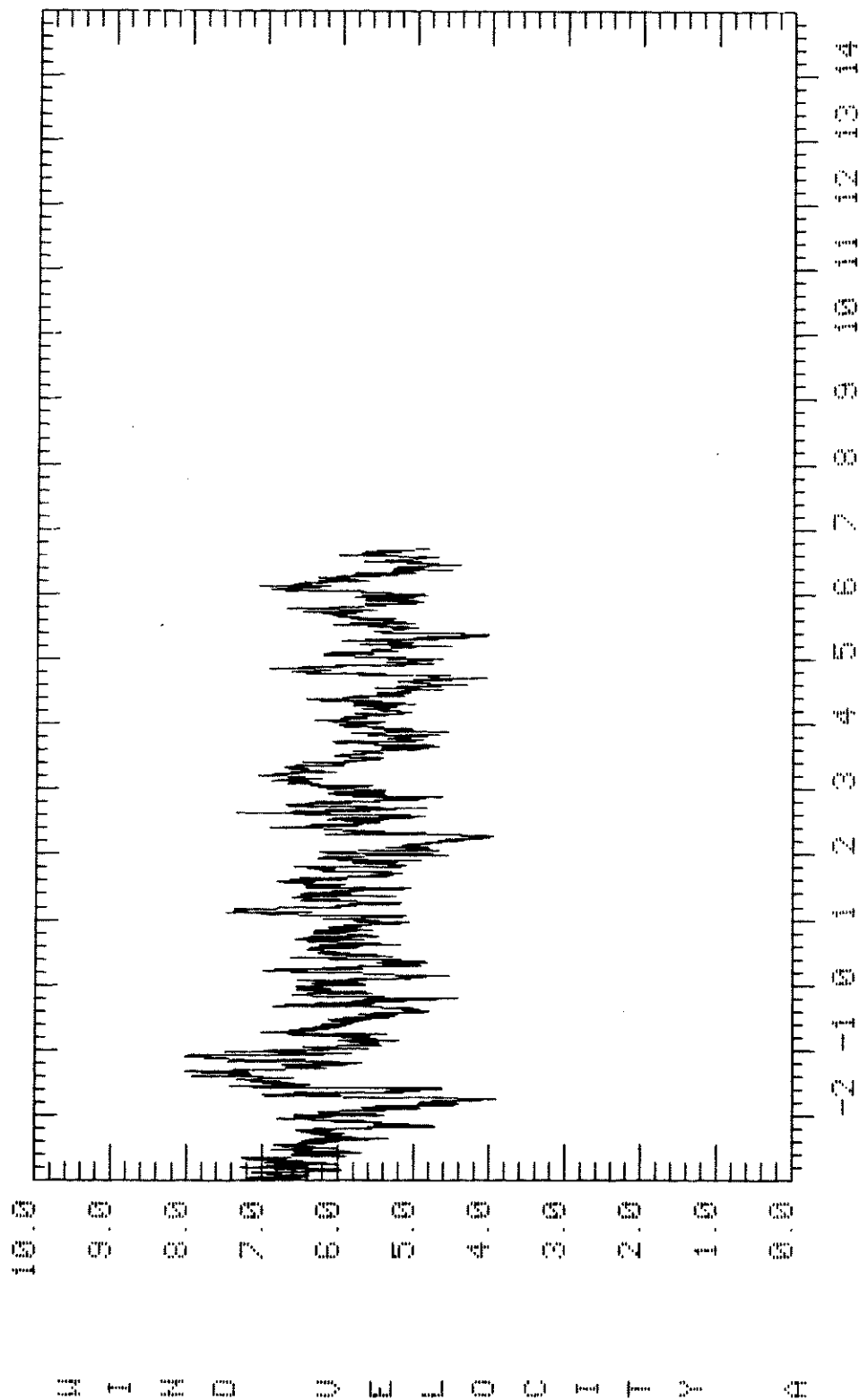
W I N D V E L O C I T Y B



TRIAL: 019 TYPE: UAB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 250 M Z: 15.0 M

MEAN OF RUN UP: -1.60 MEAN OF RUN DOWN: -0.49

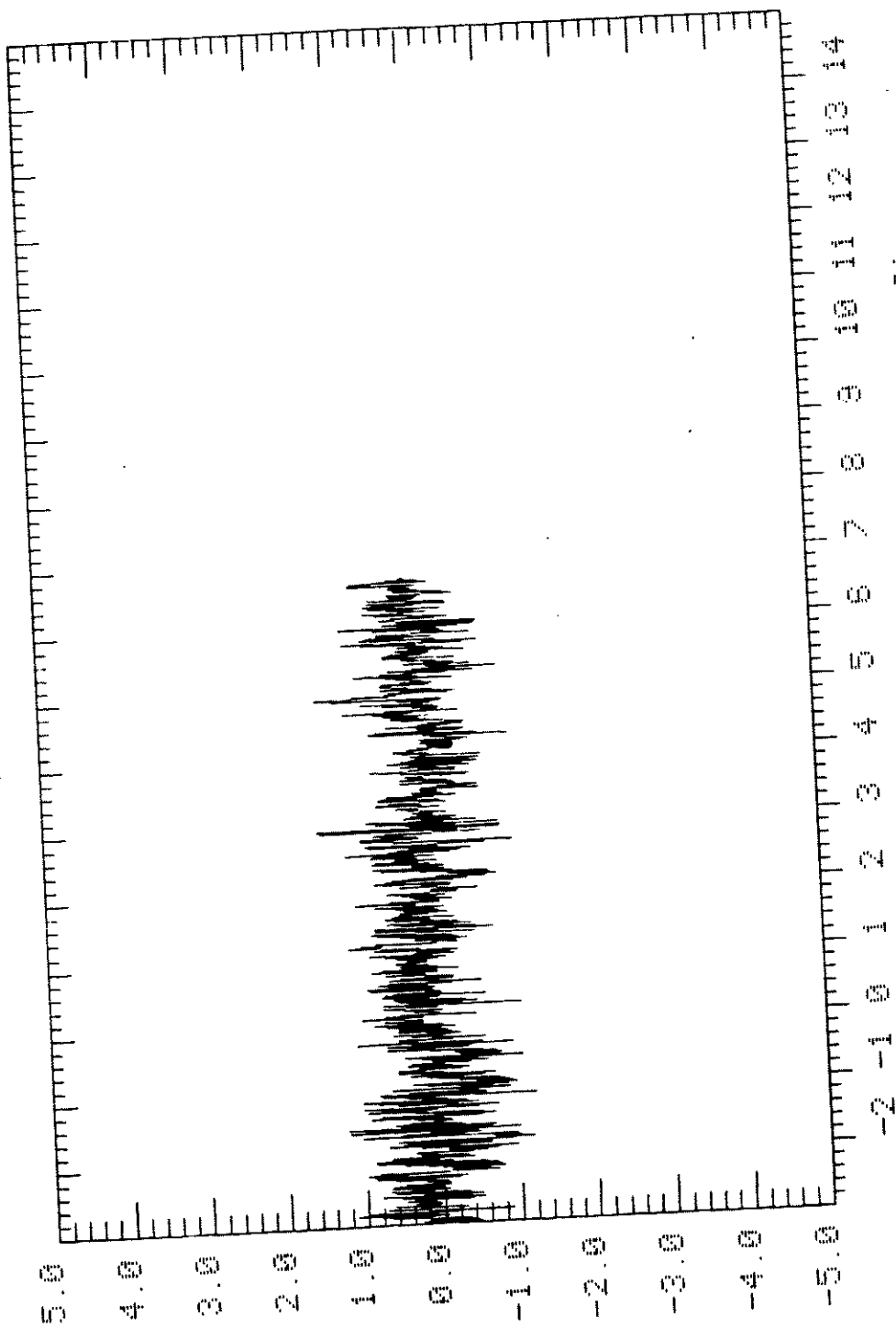


TRIAL: 019 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 490 M Y: 250 M Z: 15.9 M

MEAN OF RUN UP: 7.72 MEAN OF RUN DOWN: 5.01

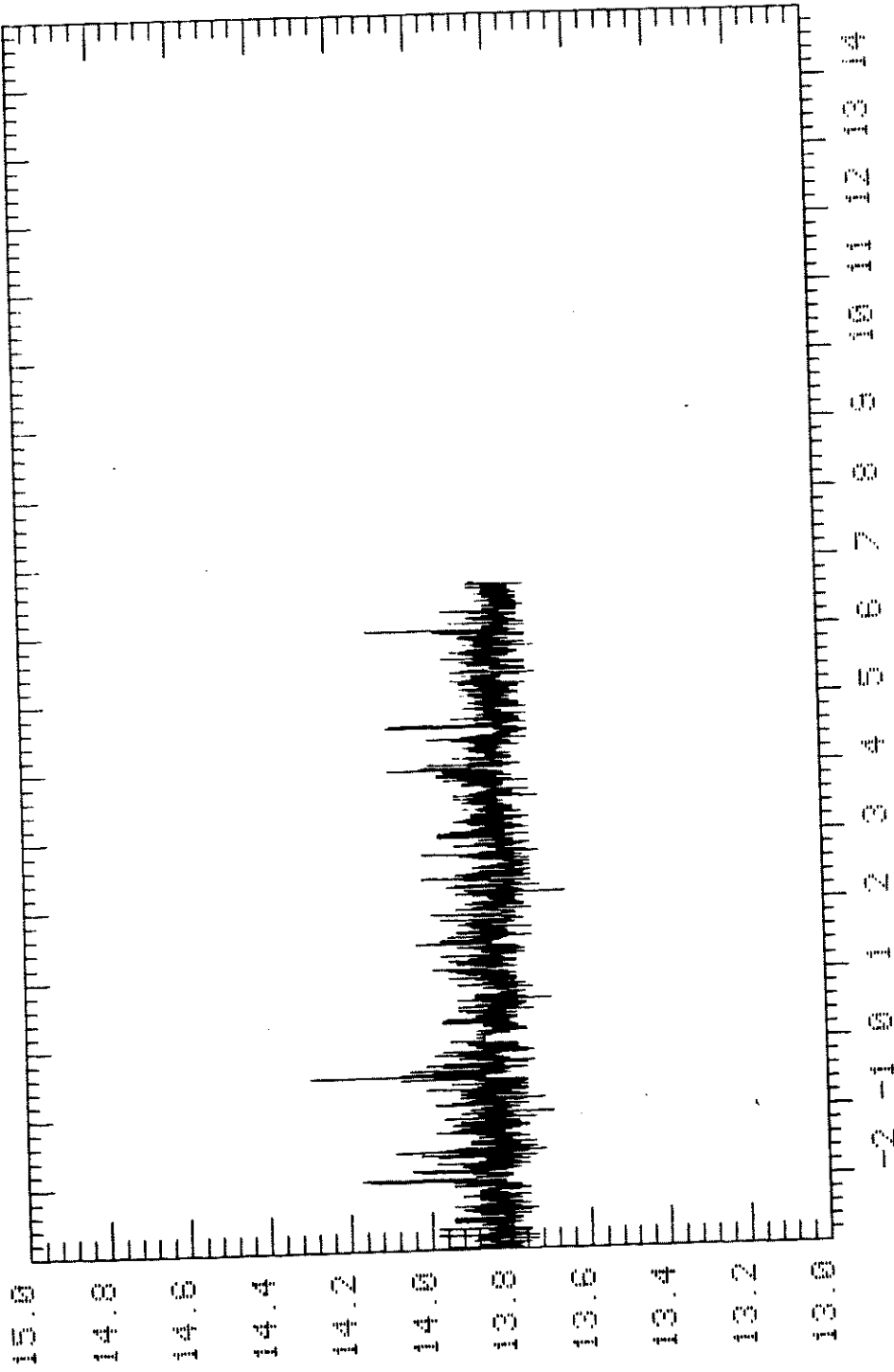
W I N D V E L O C I T Y W



TRIAL: 019 TYPE: WIND UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 250 M Z: 15.0 M
MEAN OF RUN UP: 0.21 MEAN OF RUN DOWN: 0.06

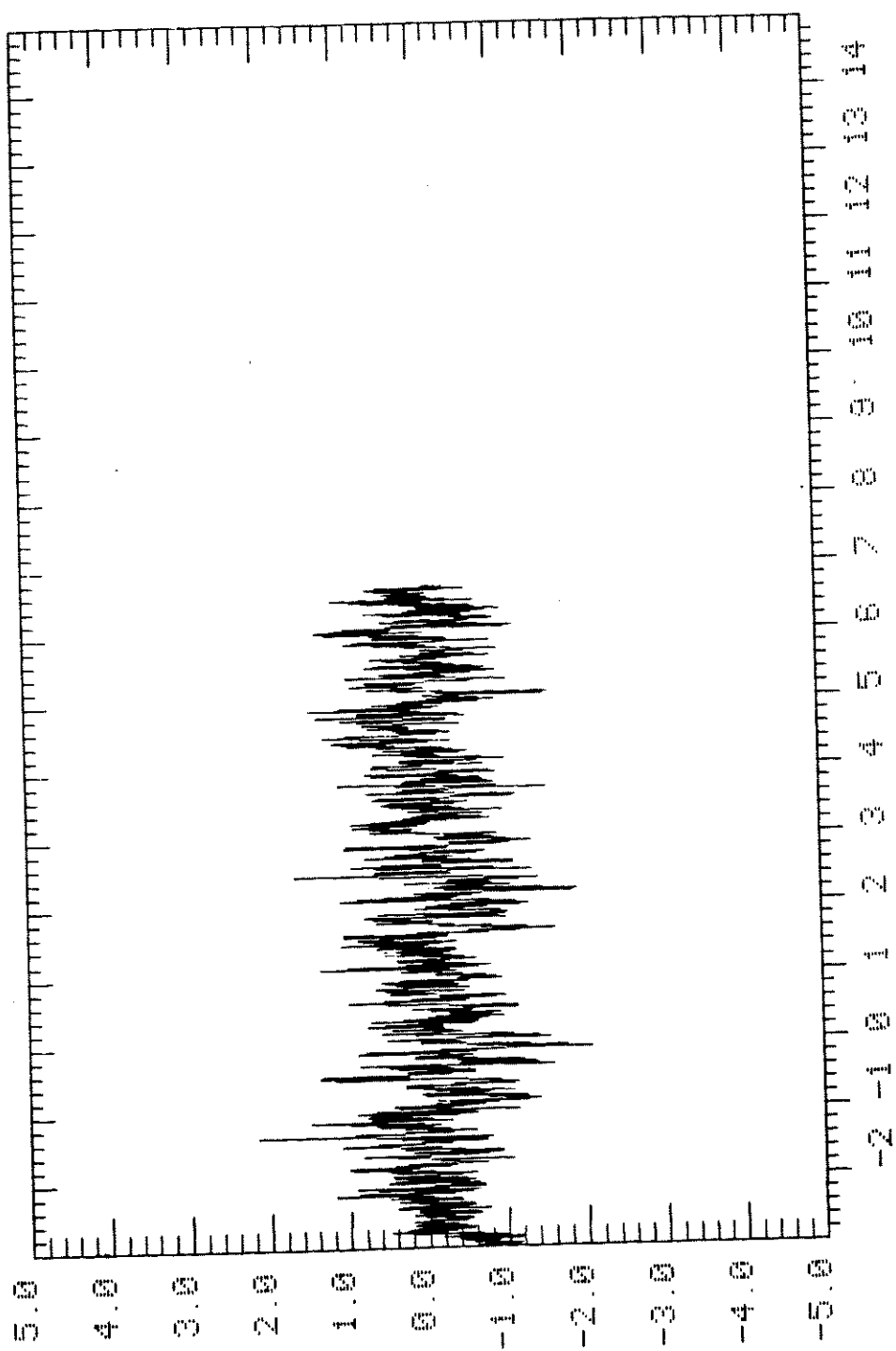
E35

T E M P E R A T U R E



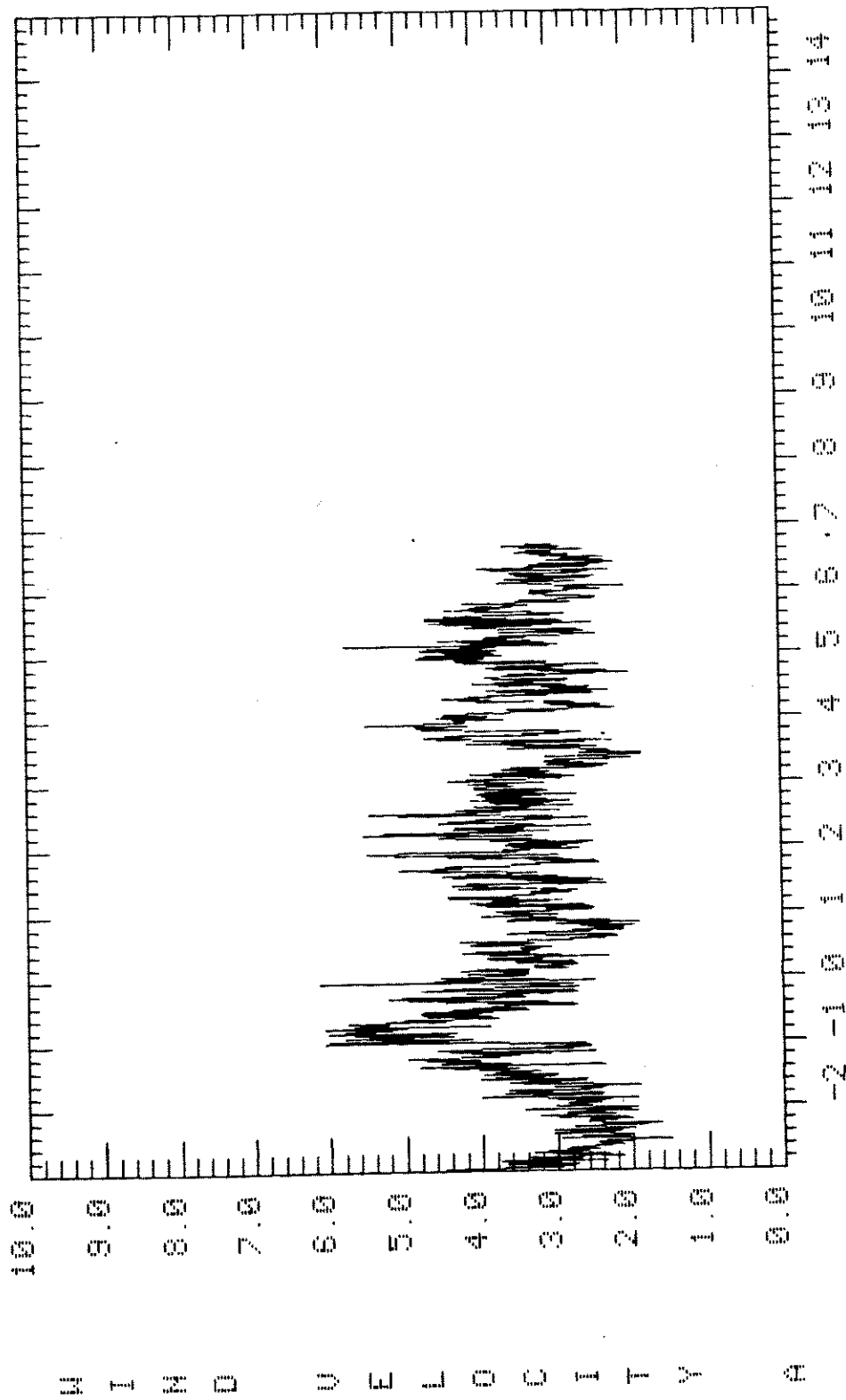
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UAH T UNITS: DEGREES C
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 250 M Z: 15.9 M
 MEAN OF RUN UP: 15.27 MEAN OF RUN DOWN: 13.82



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UAHB UNITS: M/S
 AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 2.0 M
 MEAN OF RUN UP: -0.39 MEAN OF RUN DOWN: 0.12

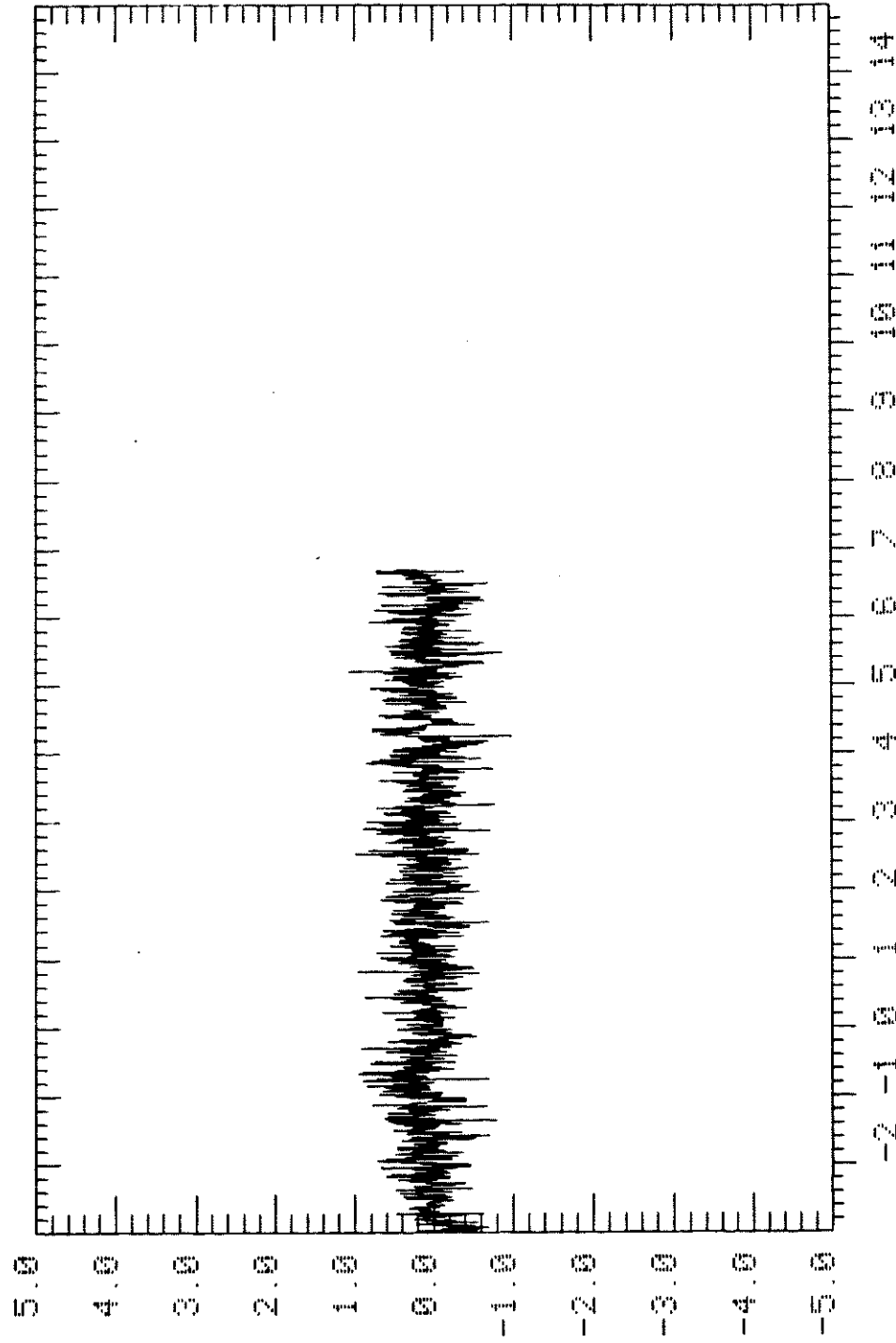


TRIAL: 019 TYPE: UAHN UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 2.0 M

MEAN OF RUN UP: 4.41 MEAN OF RUN DOWN: 3.01

W I N D U F L O C I T Y W



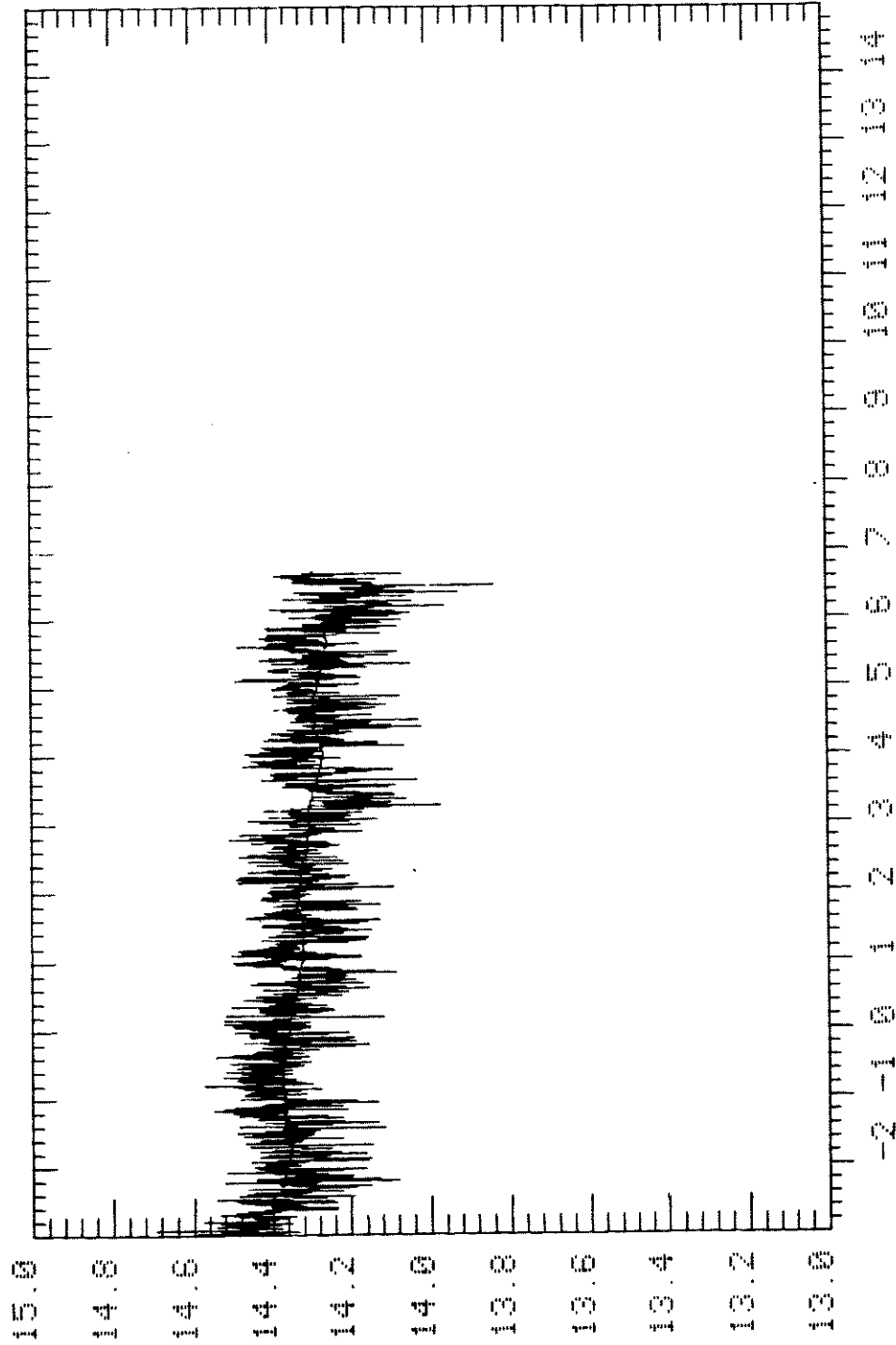
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UAWW UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 2.0 M

MEAN OF RUN UP: 0.00 MEAN OF RUN DOWN: 0.07

T E M P E R A T U R E



TIME FROM RELEASE (SECS*10**-2)

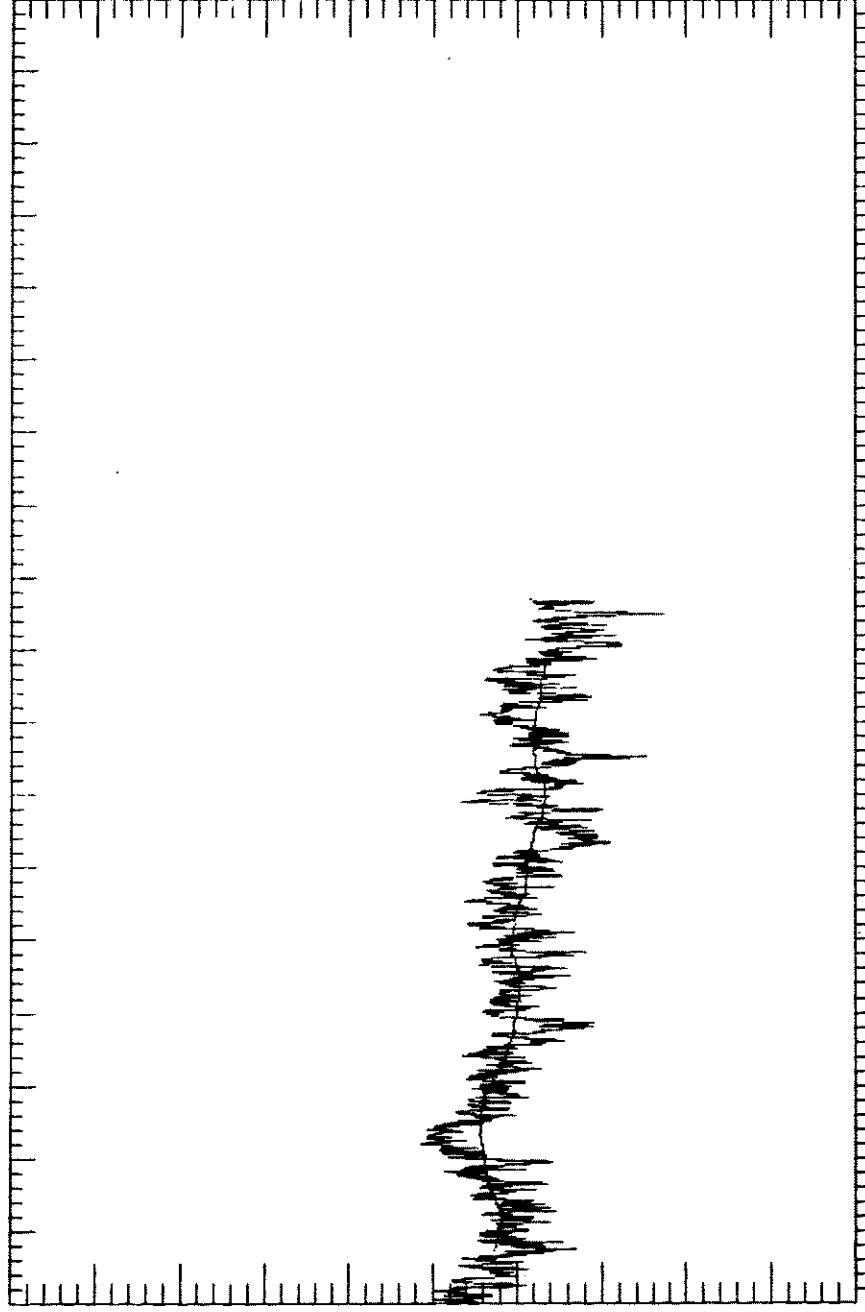
TRIAL: 019 TYPE: UNIT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 325 N Y: 275 N Z: 2.0 N

MEAN OF RUN UP: 16.48 MEAN OF RUN DOWN: 14.18

15.0
14.8
14.6
14.4
14.2
14.0
13.8
13.6
13.4
13.2
13.0

T E M P E R A T U R E



-2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

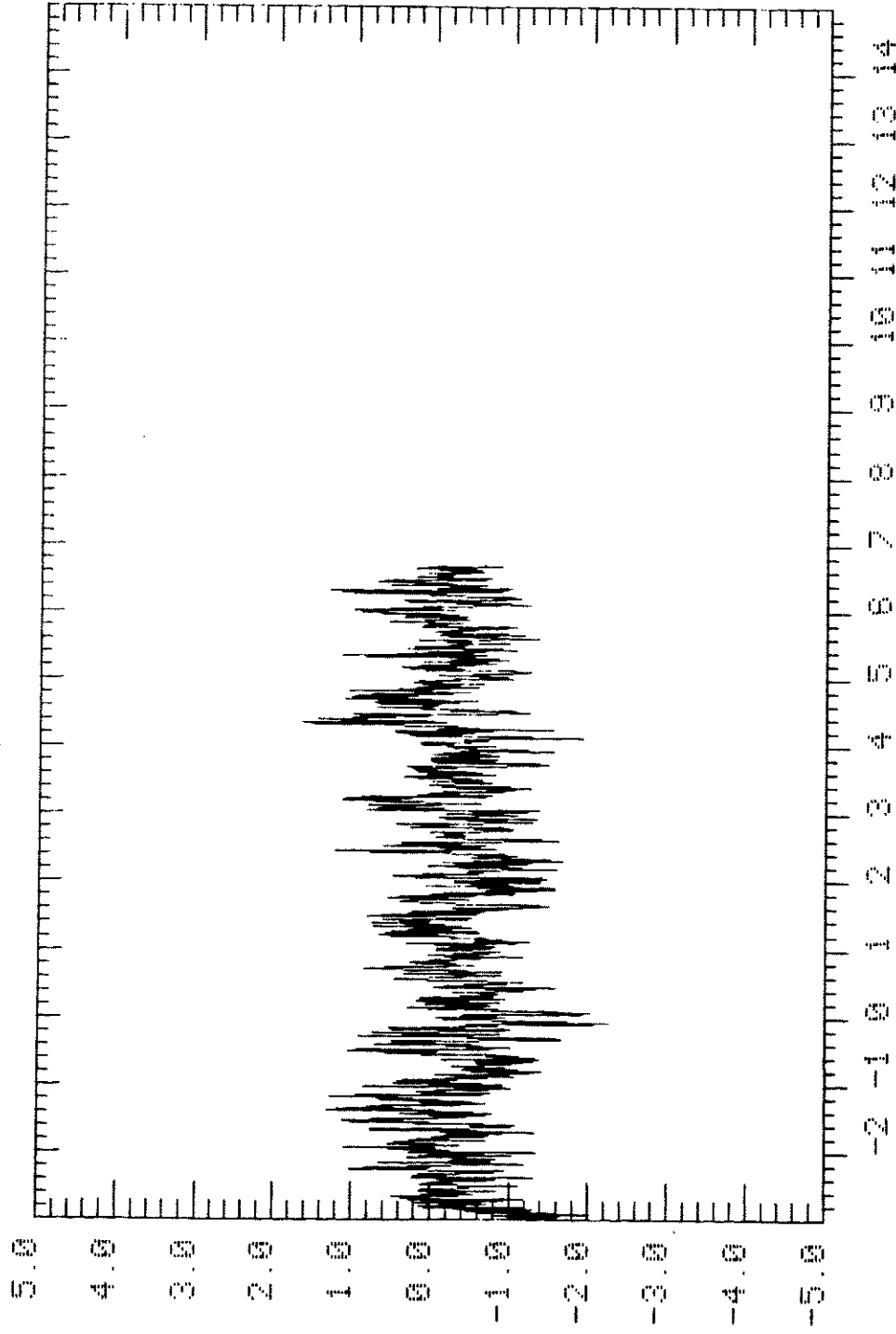
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: TEMP UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 2.0 M

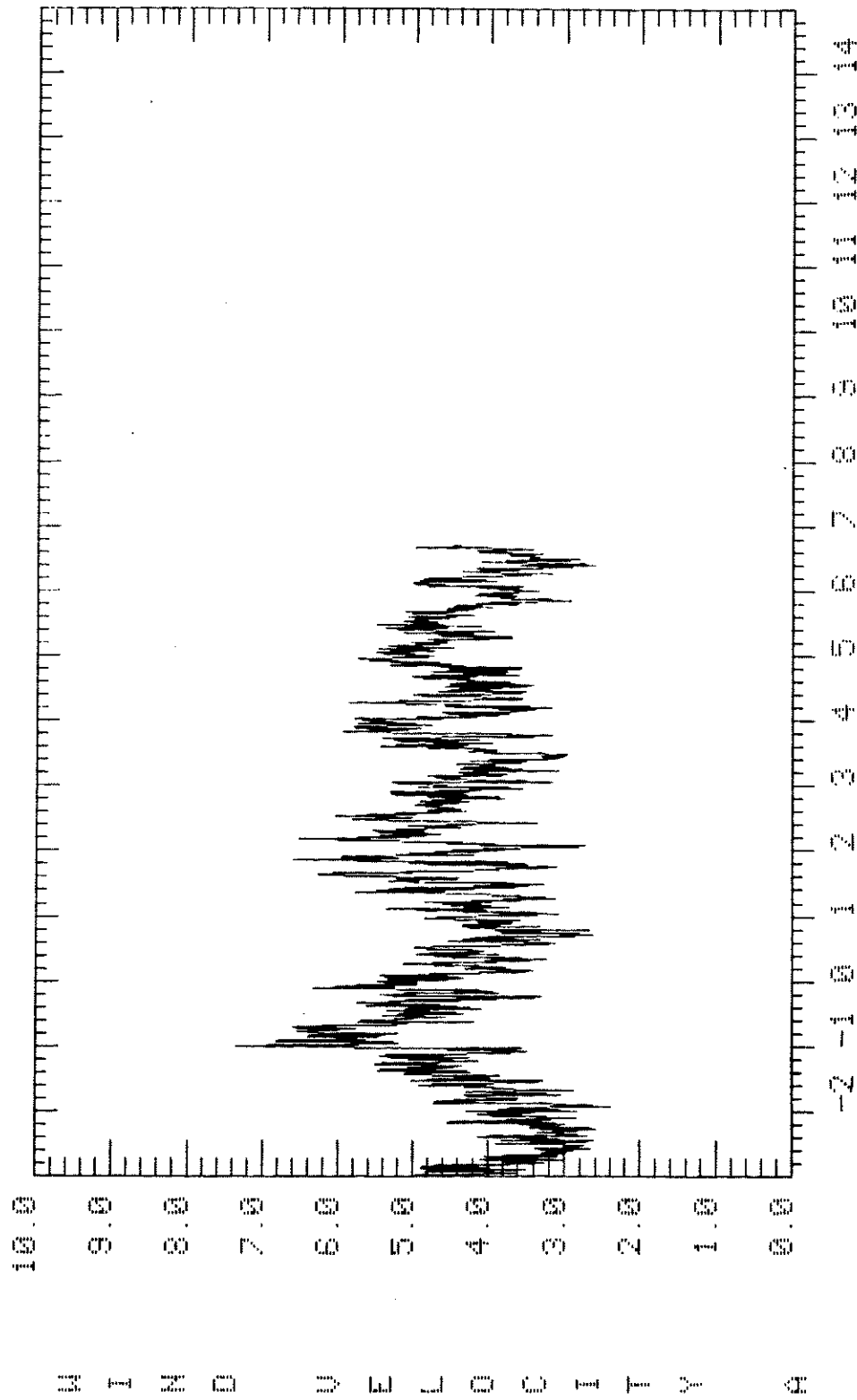
MEAN OF RUN UP: 15.88 MEAN OF RUN DOWN: 13.59

W I N D U F L O C I T Y B



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UMB UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 5.0 M
MEAN OF RUN UP: -0.47 MEAN OF RUN DOWN: 0.01

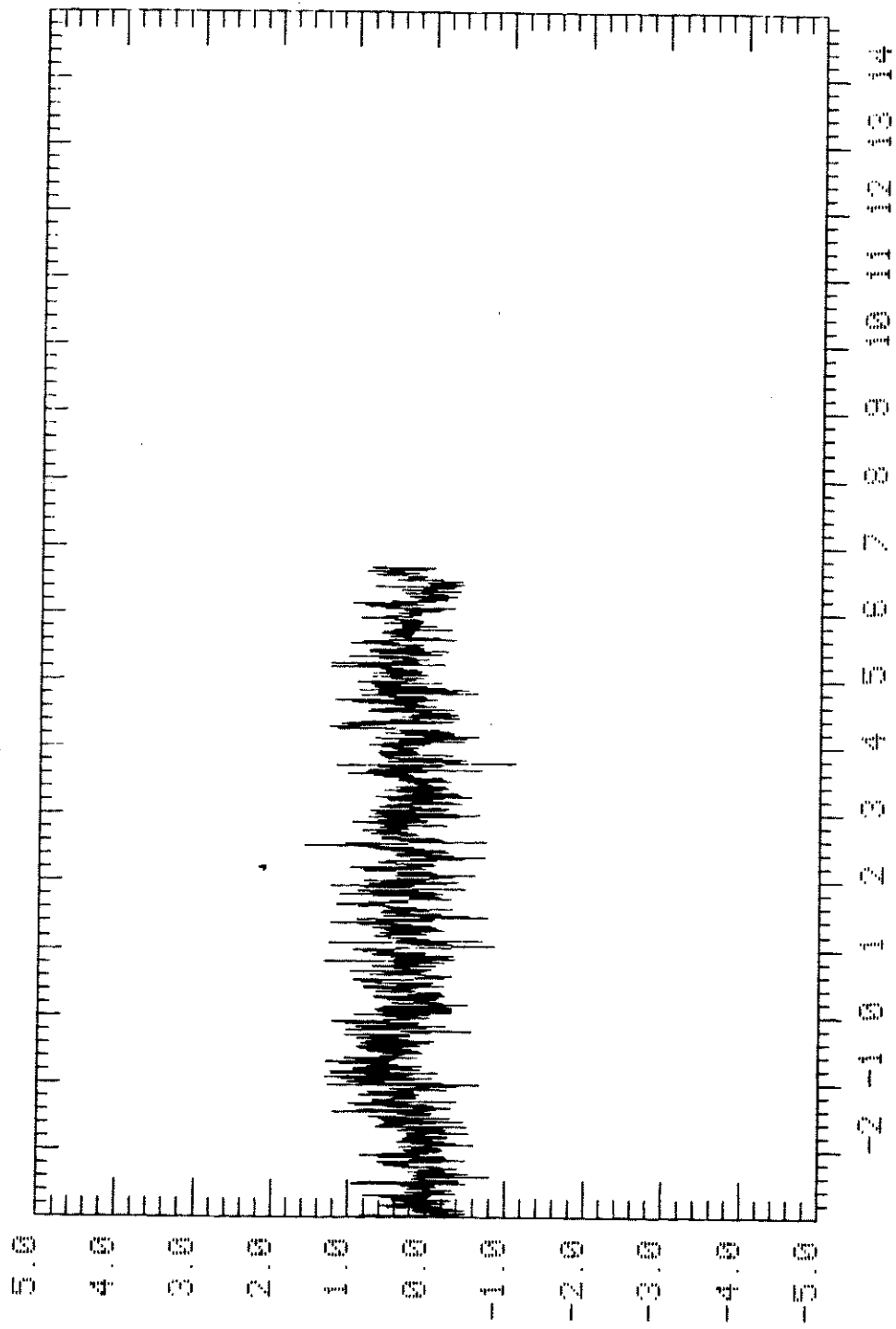


TRIAL: 013 TYPE: UAH UNIT3: M/S

AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 5.0 M

MEAN OF RUN UP: 5.41 MEAN OF RUN DOWN: 3.93

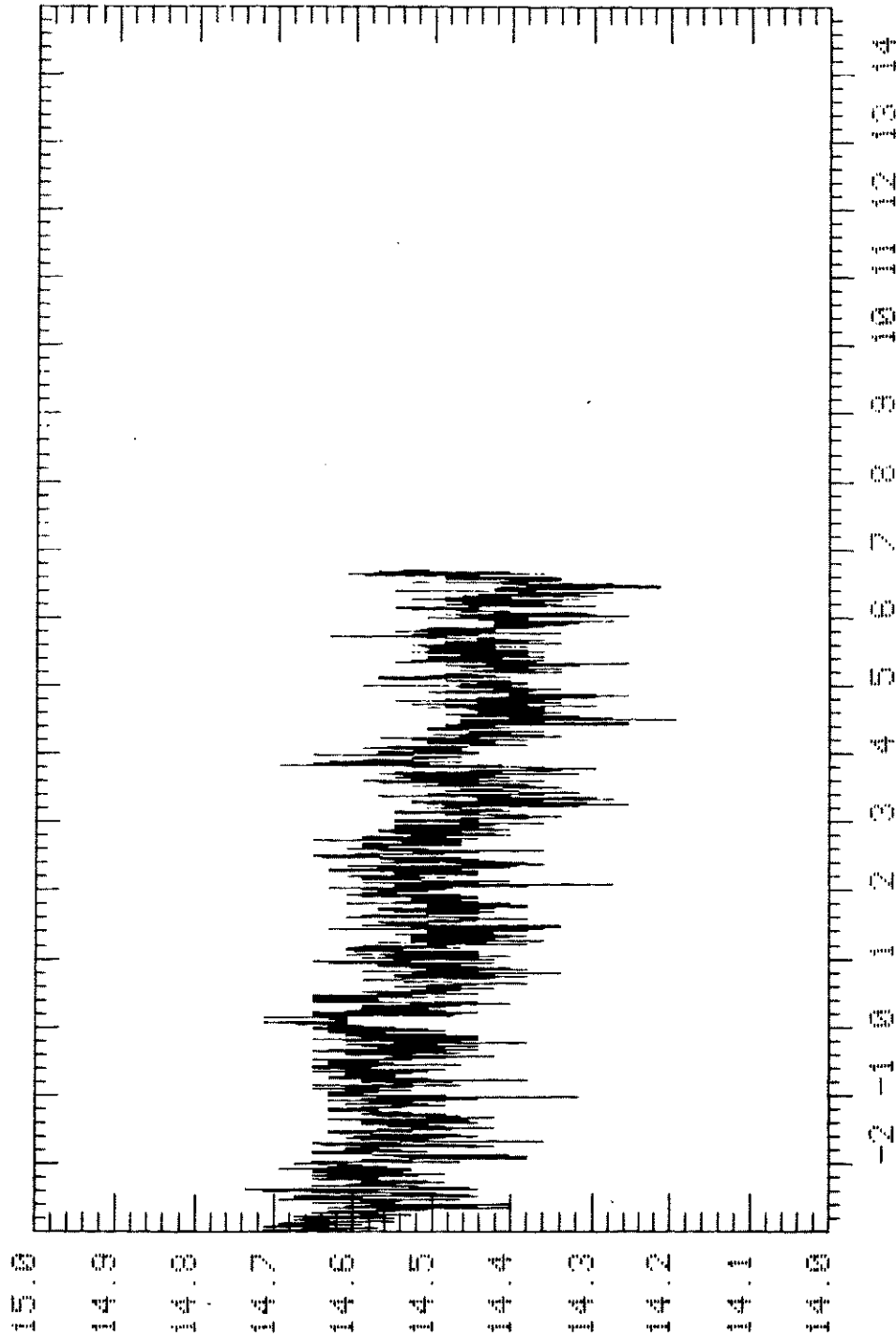
W I N D V E L O C I T Y



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: WIND UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 5.0 M
MEAN OF RUN UP: 0.23 MEAN OF RUN DOWN: 0.27

T E M P E R A T U R E



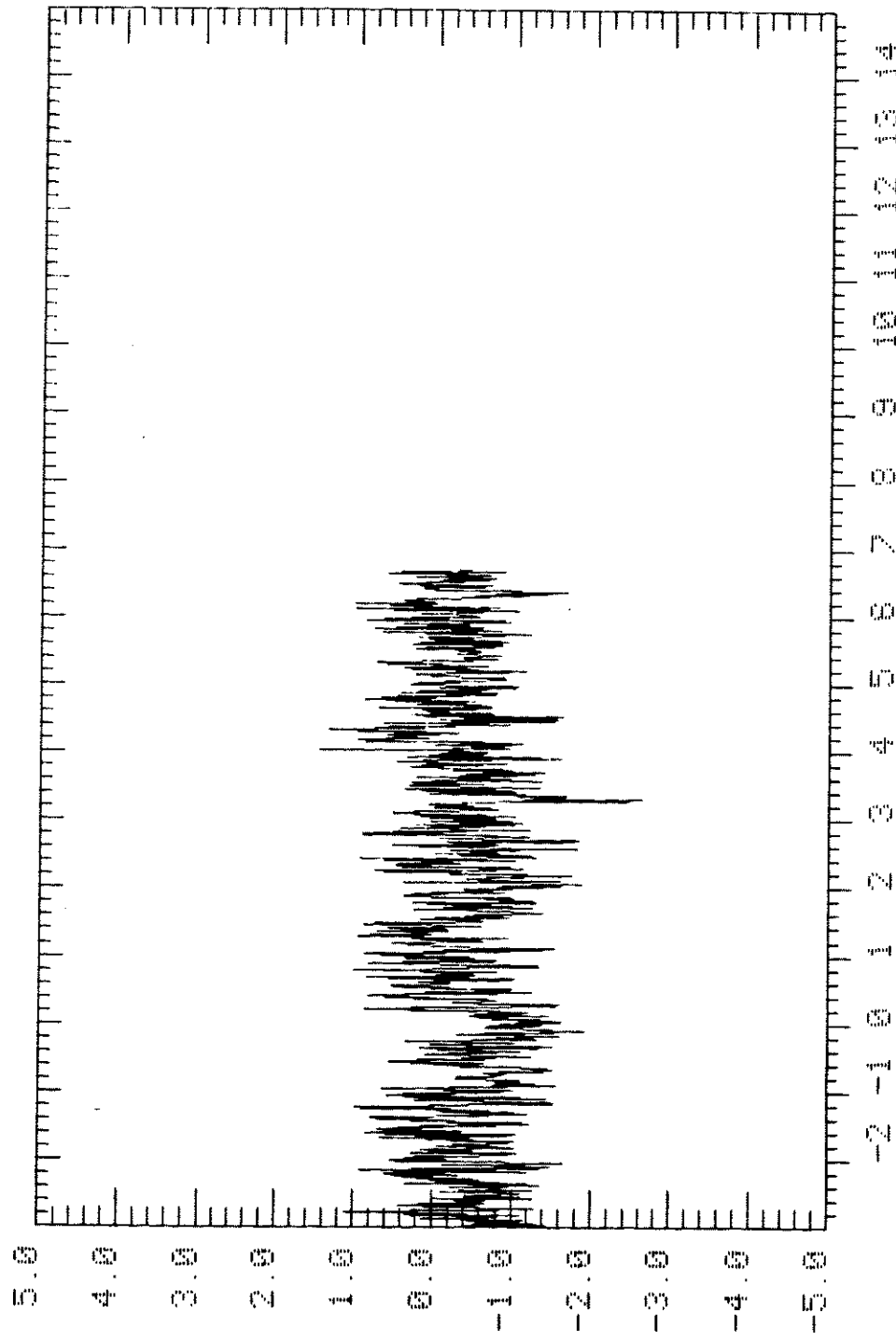
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 325 N Y: 275 N Z: 5.0 N

MEAN OF RUN UP: 18.39 MEAN OF RUN DOWN: 14.32

W I N D U F L O O I T Y

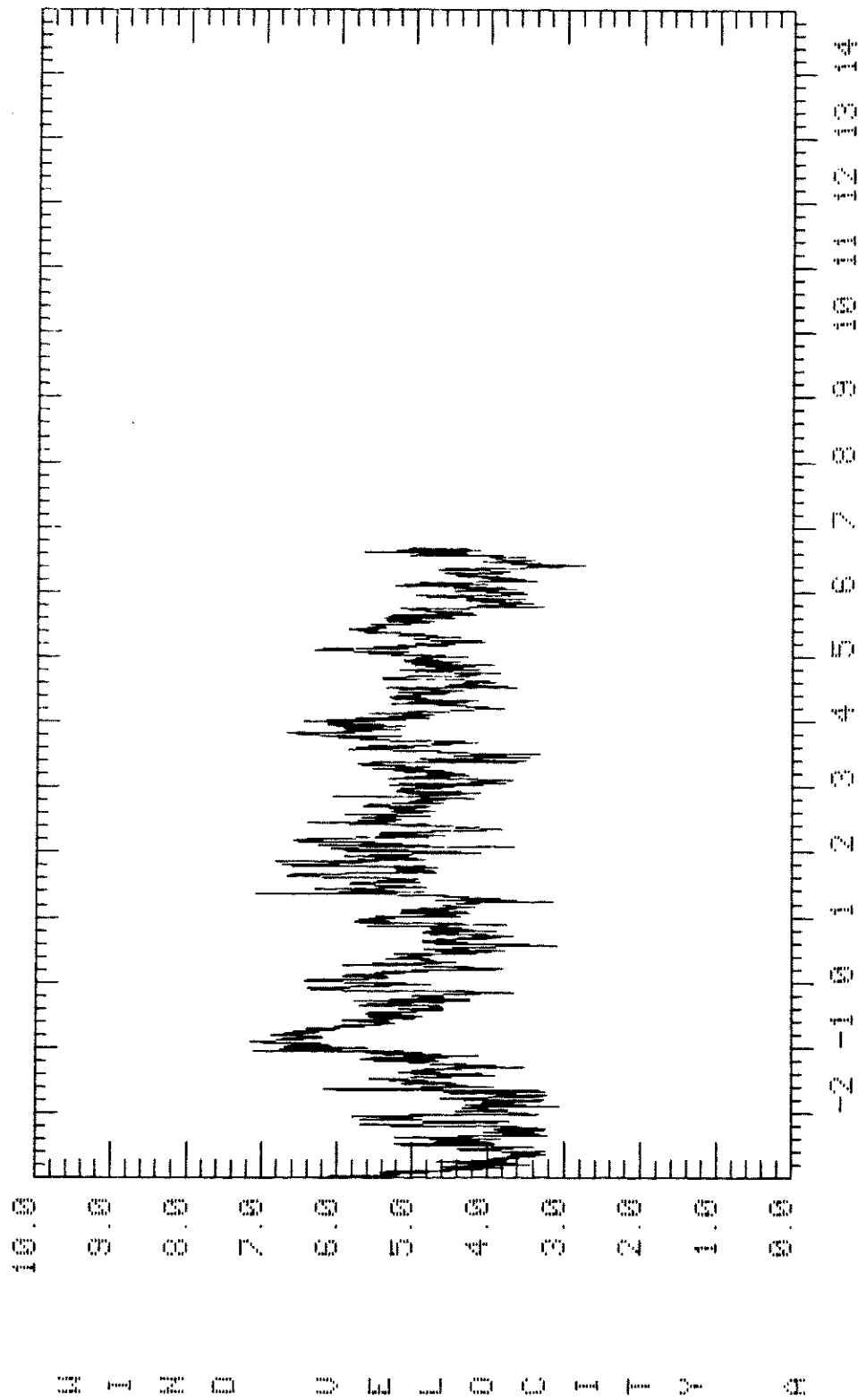


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: U4NB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 14.5 M

MEAN OF RUN UP: -0.78 MEAN OF RUN DOWN: -0.02

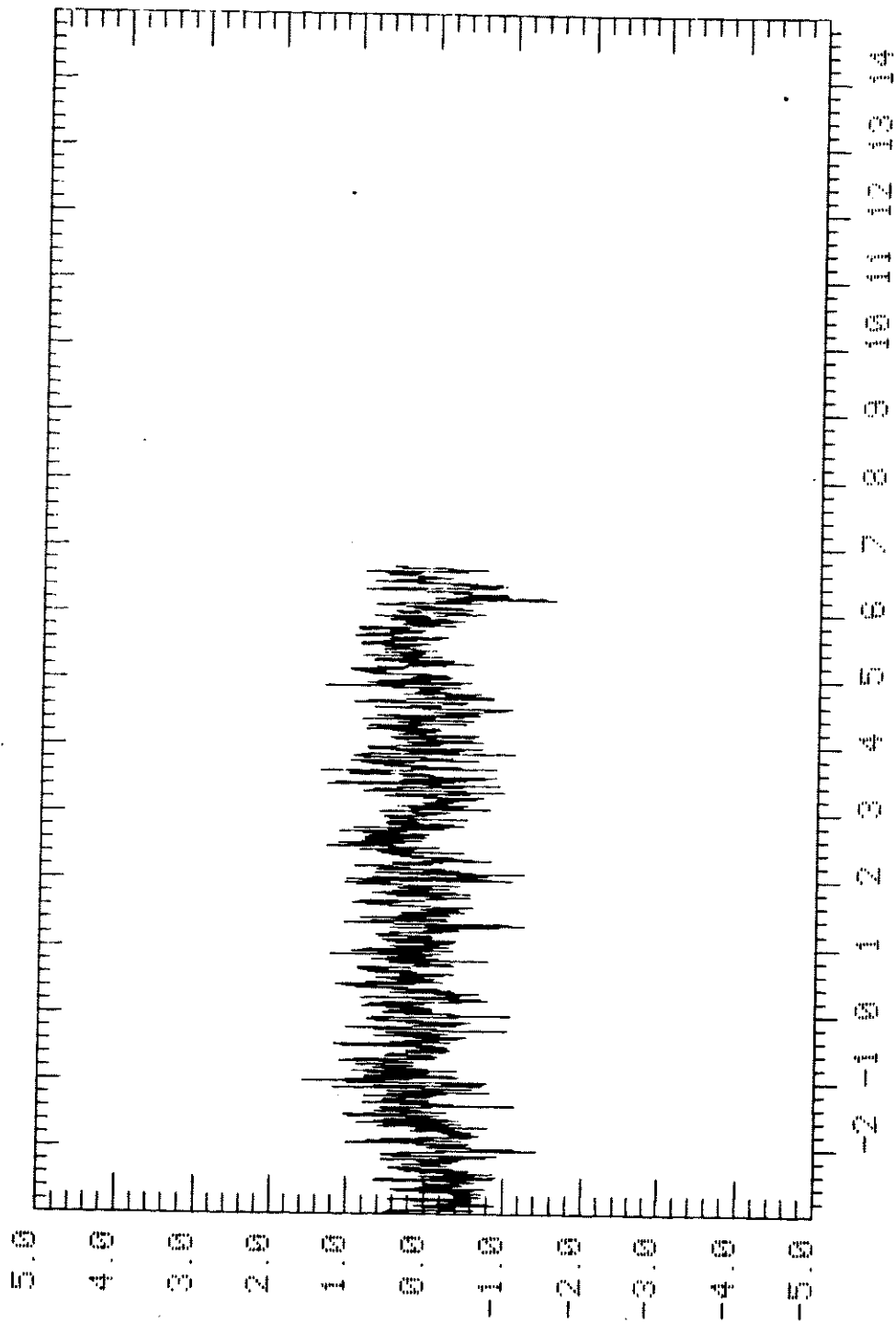


TRIAL: 919 TYPE: WIND UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 14.5 M

MEAN OF RUN UP: 6.07 MEAN OF RUN DOWN: 4.25

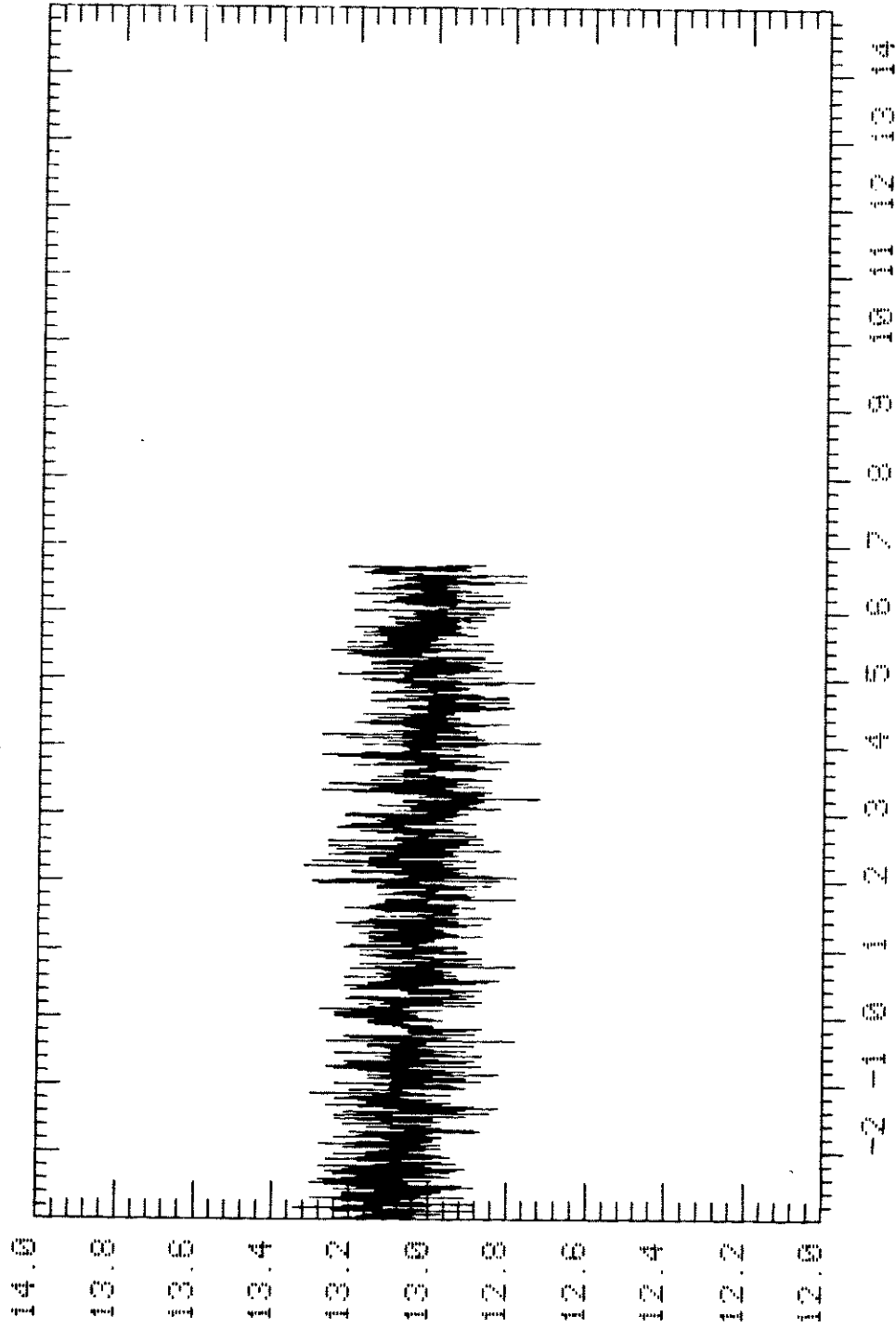
U I N D U F L O C I T Y



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UAHN UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 14.5 M
MEAN OF RUN UP: -0.02 MEAN OF RUN DOWN: 0.12

T E M P E R A T U R E

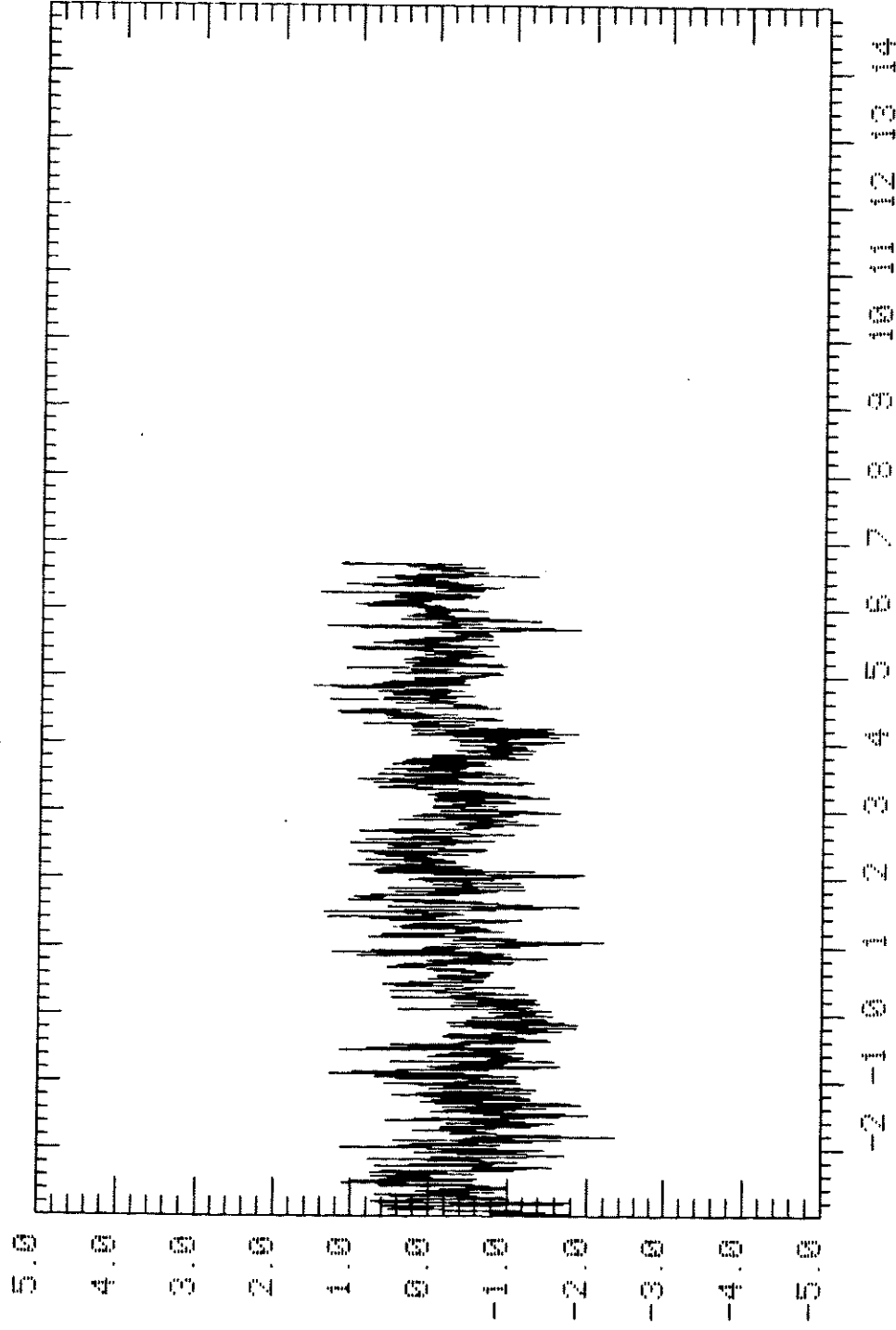


TRIAL: 019 TYPE: UHT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 325 M Y: 275 M Z: 14.5 M

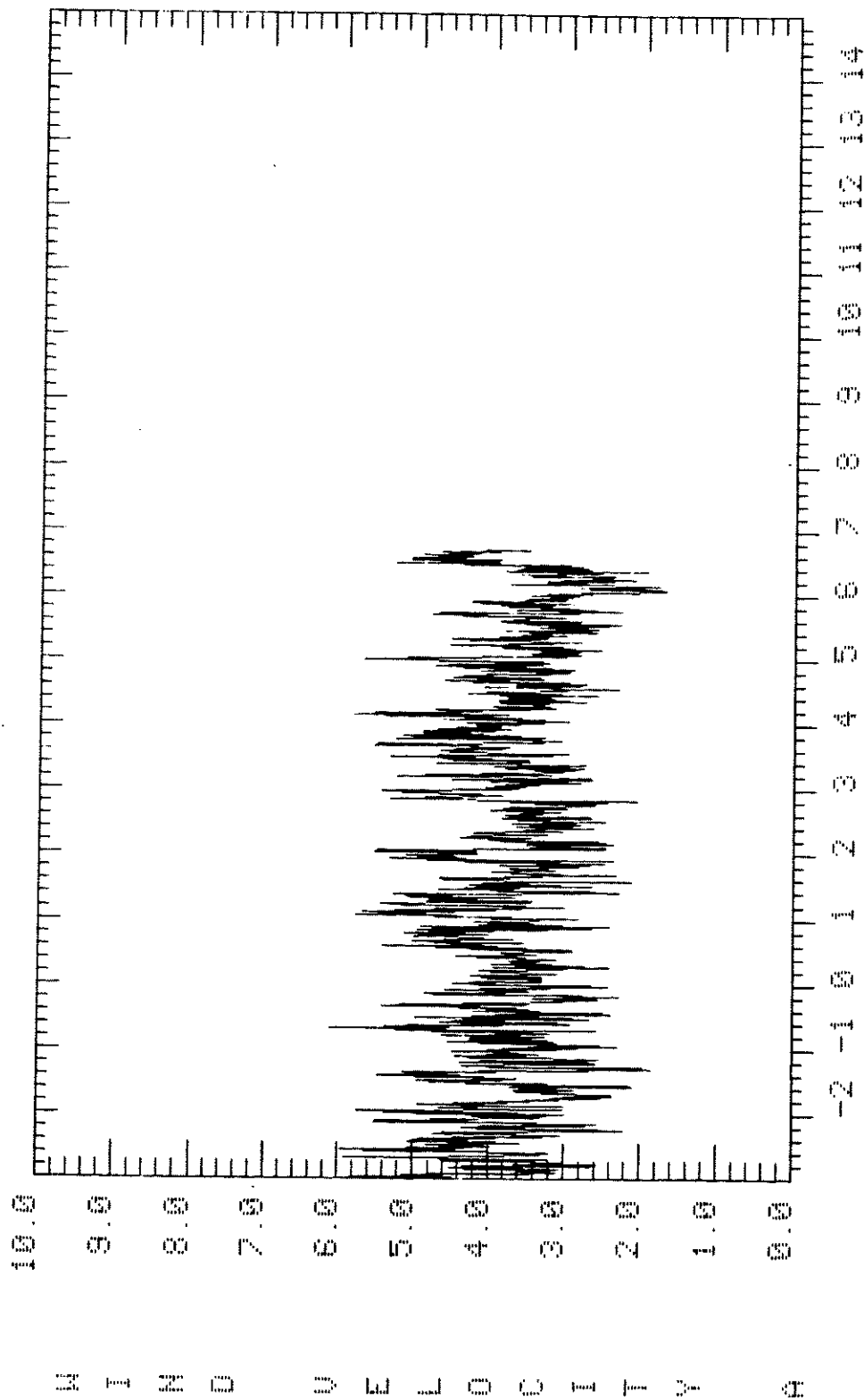
MEAN OF RUN UP: 14.60 MEAN OF RUN DOWN: 12.93

W I N D S P E E D U N I T Y



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UMB UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 2.0 M
MEAN OF RUN UP: -1.06 MEAN OF RUN DOWN: -0.93

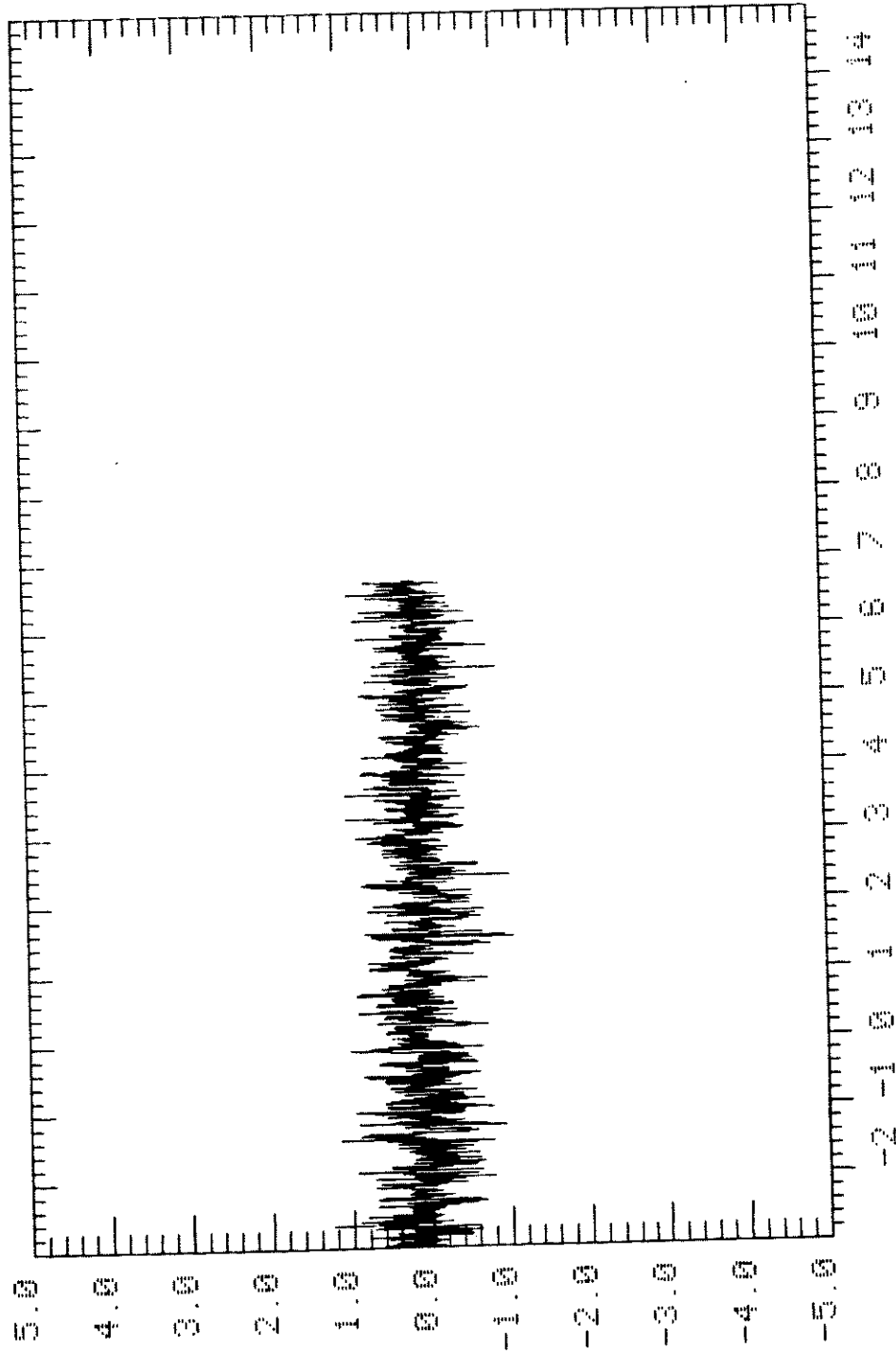


TRIAL: 019 TYPE: UAMA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 2.0 M

MEAN OF RUN UP: 5.88 MEAN OF RUN DOWN: 3.97

W I N D U E L O C I T Y W



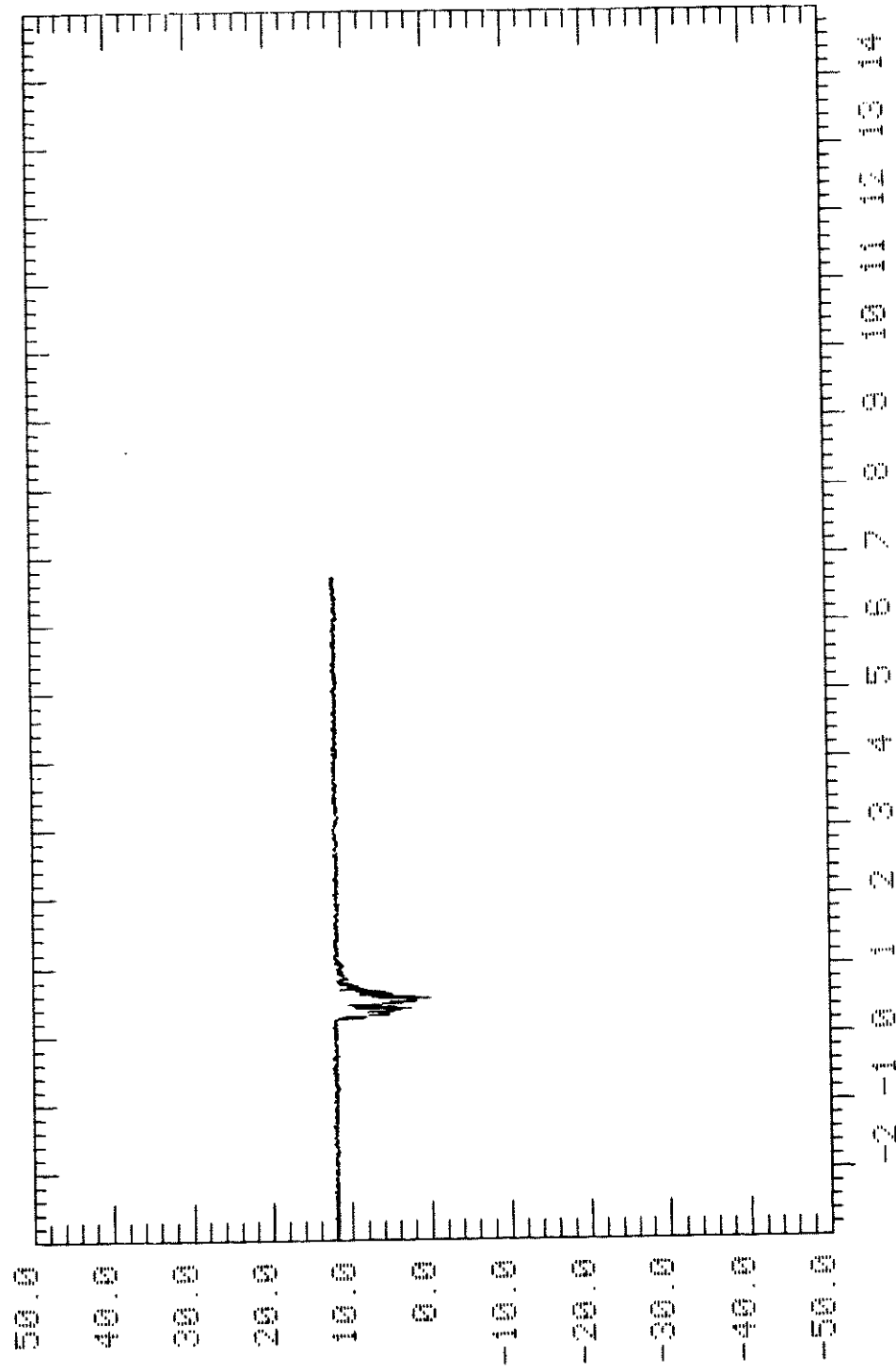
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UAHN UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 2.0 M

MEAN OF RUN UP: 0.21 MEAN OF RUN DOWN: 0.11

T E M P E R A T U R E



TIME FROM RELEASE (SECS*10**-2)

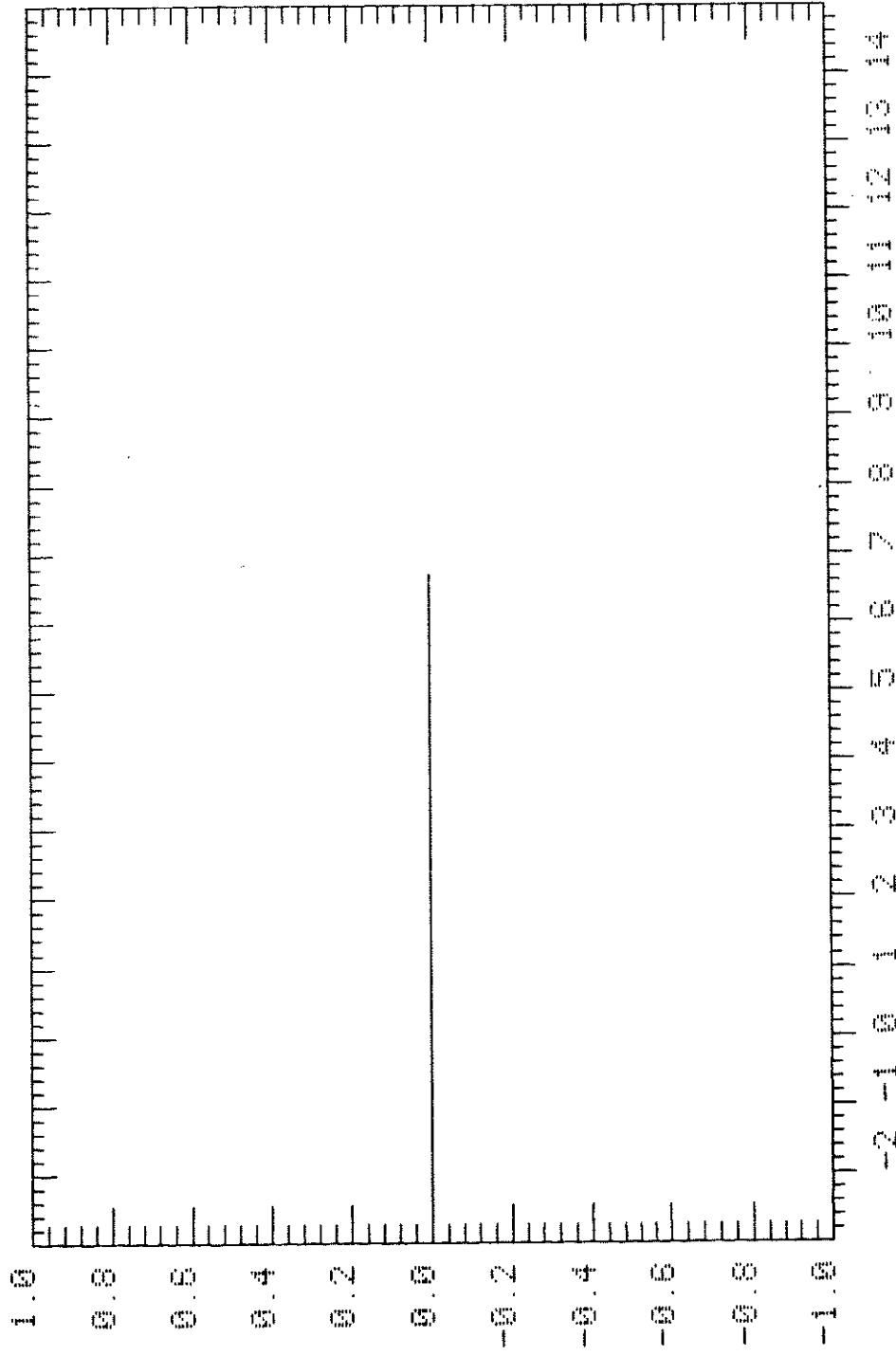
TRIAL: 019 TYPE: UNIT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 2.0 M

MEAN OF RUN UP: 13.58 MEAN OF RUN DOWN: 11.51

E54

T E M P E R A T U R E



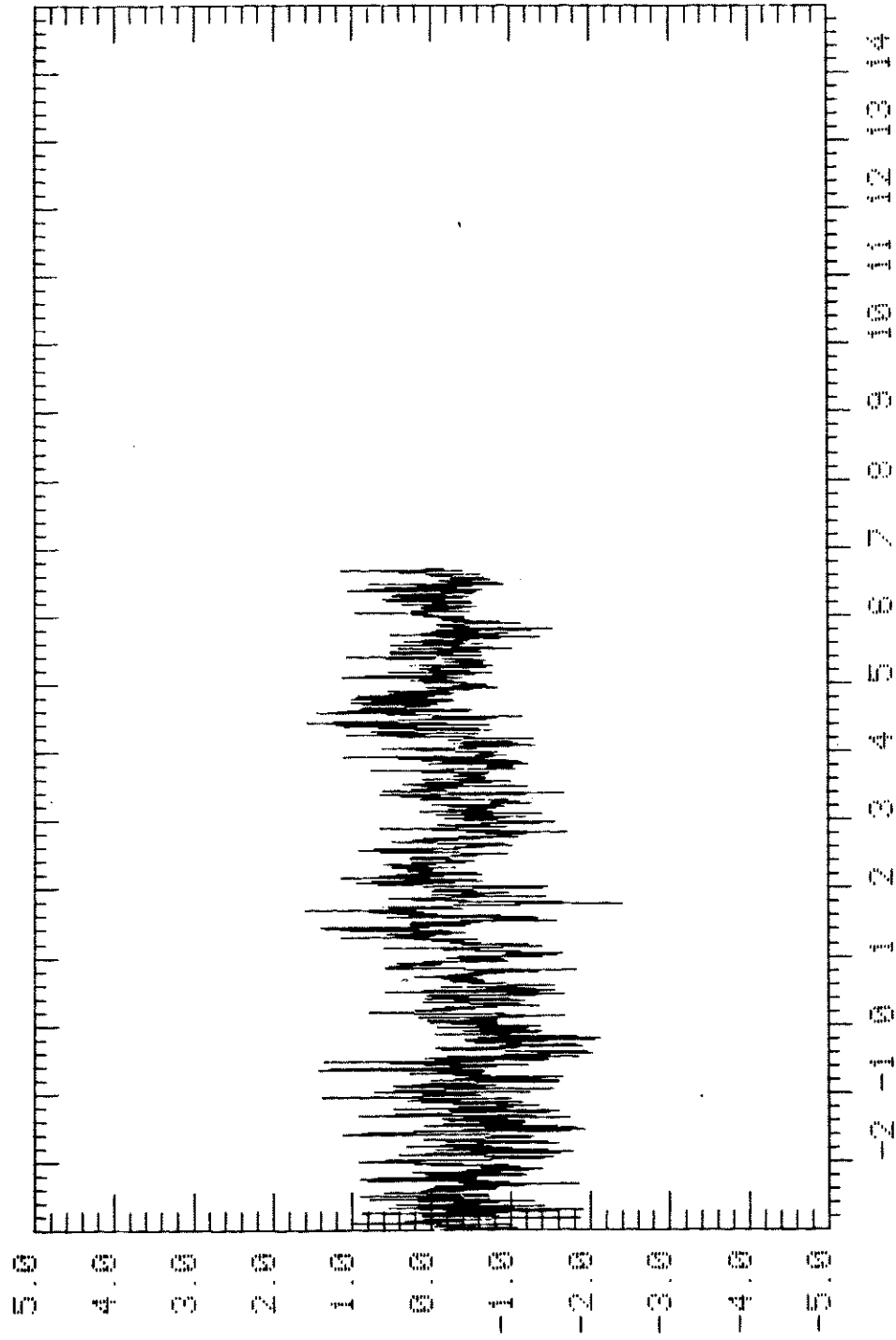
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: SP UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 0.8 M

MEAN OF RUN UP: 0.00 MEAN OF RUN DOWN: 0.00

U I N O V E L O C I T Y B

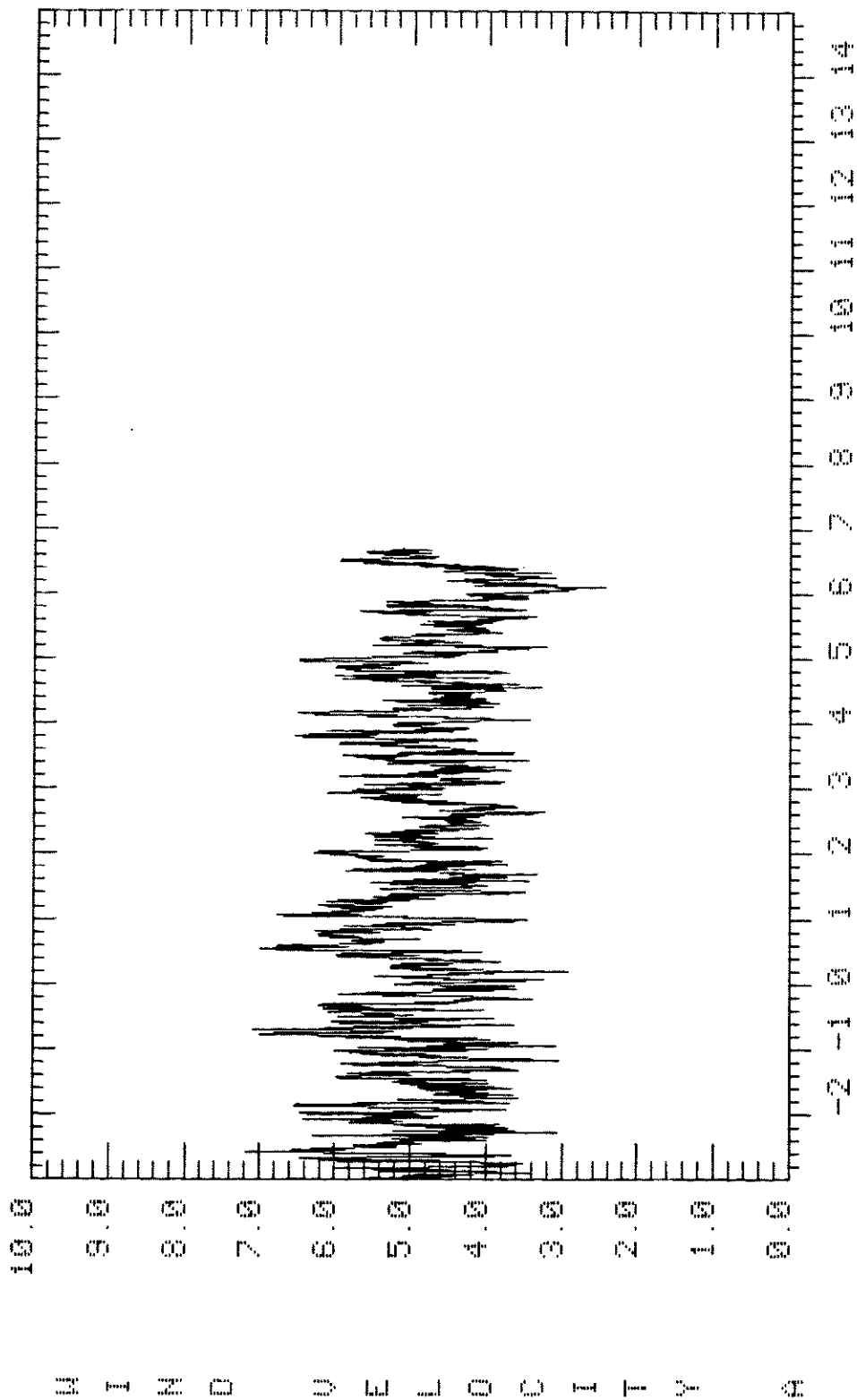


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UAHB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 5.0 M

MEAN OF RUN UP: -1.18 MEAN OF RUN DOWN: -0.85

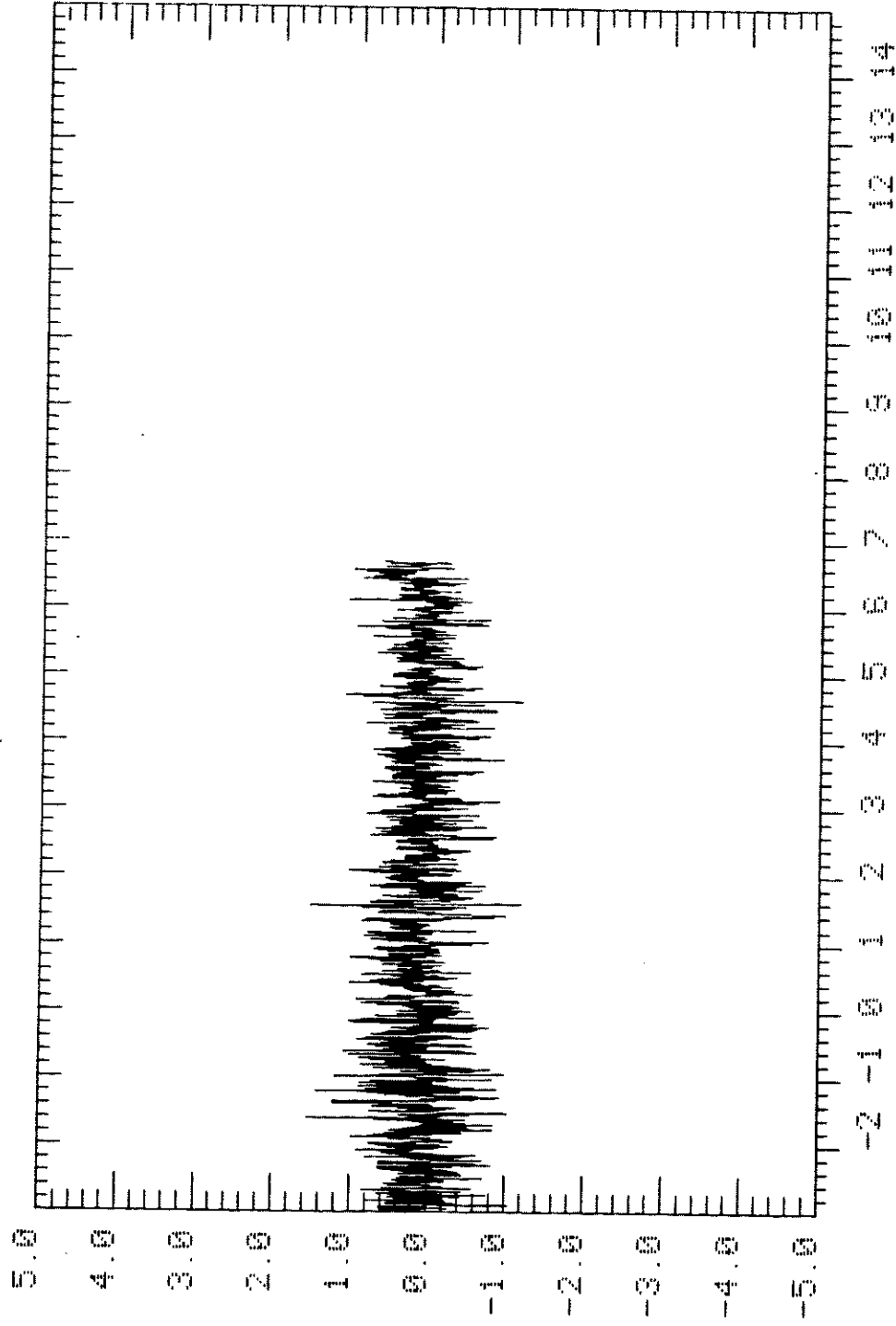


TRIAL: 019 TYPE: WIND UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 5.0 M

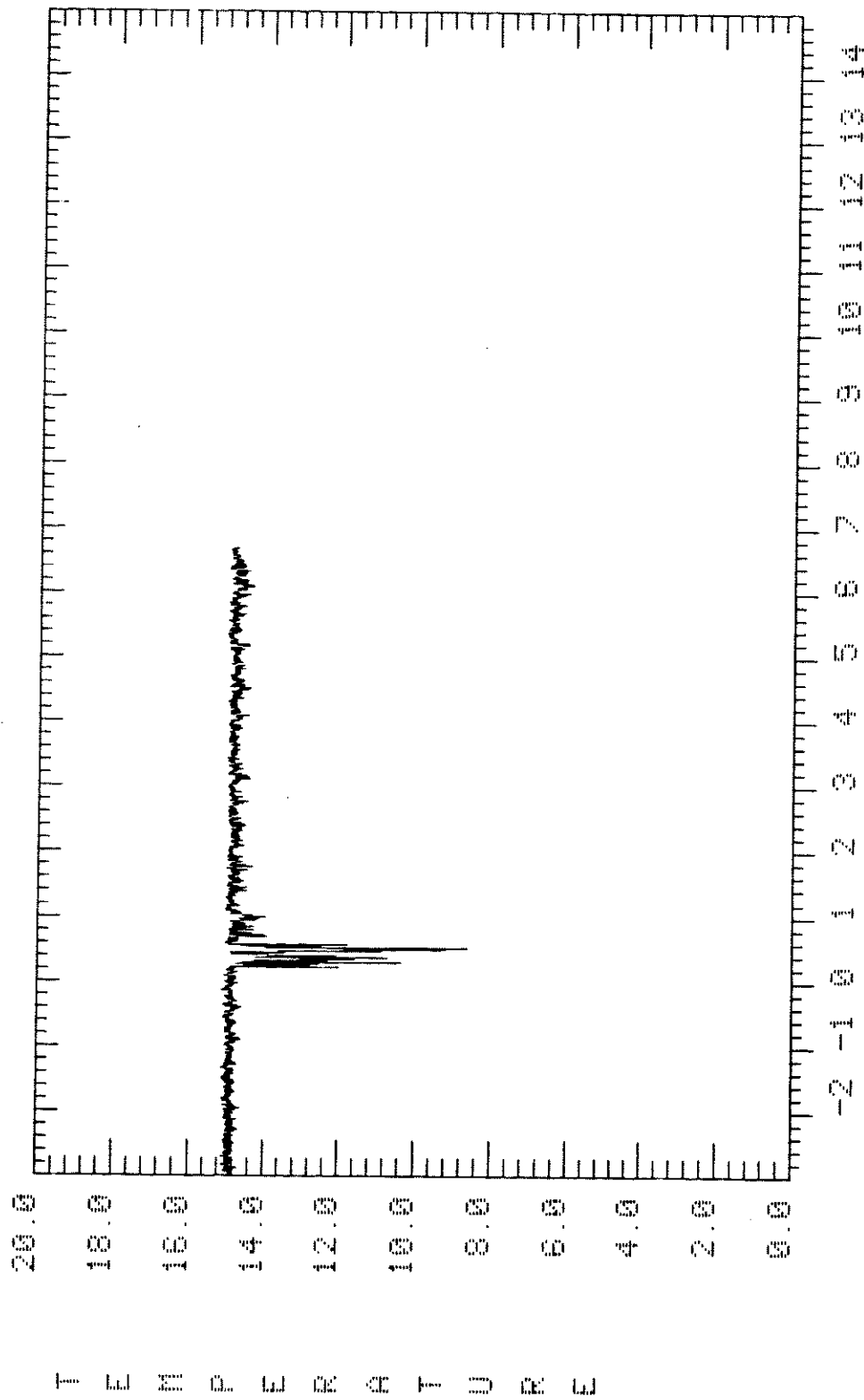
MEAN OF RUN UP: 7.12 MEAN OF RUN DOWN: 4.35

W I N D U F L O C I T Y W



TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UAW UNITS: N/S
AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 5.0 M
MEAN OF RUN UP: 0.28 MEAN OF RUN DOWN: 0.12



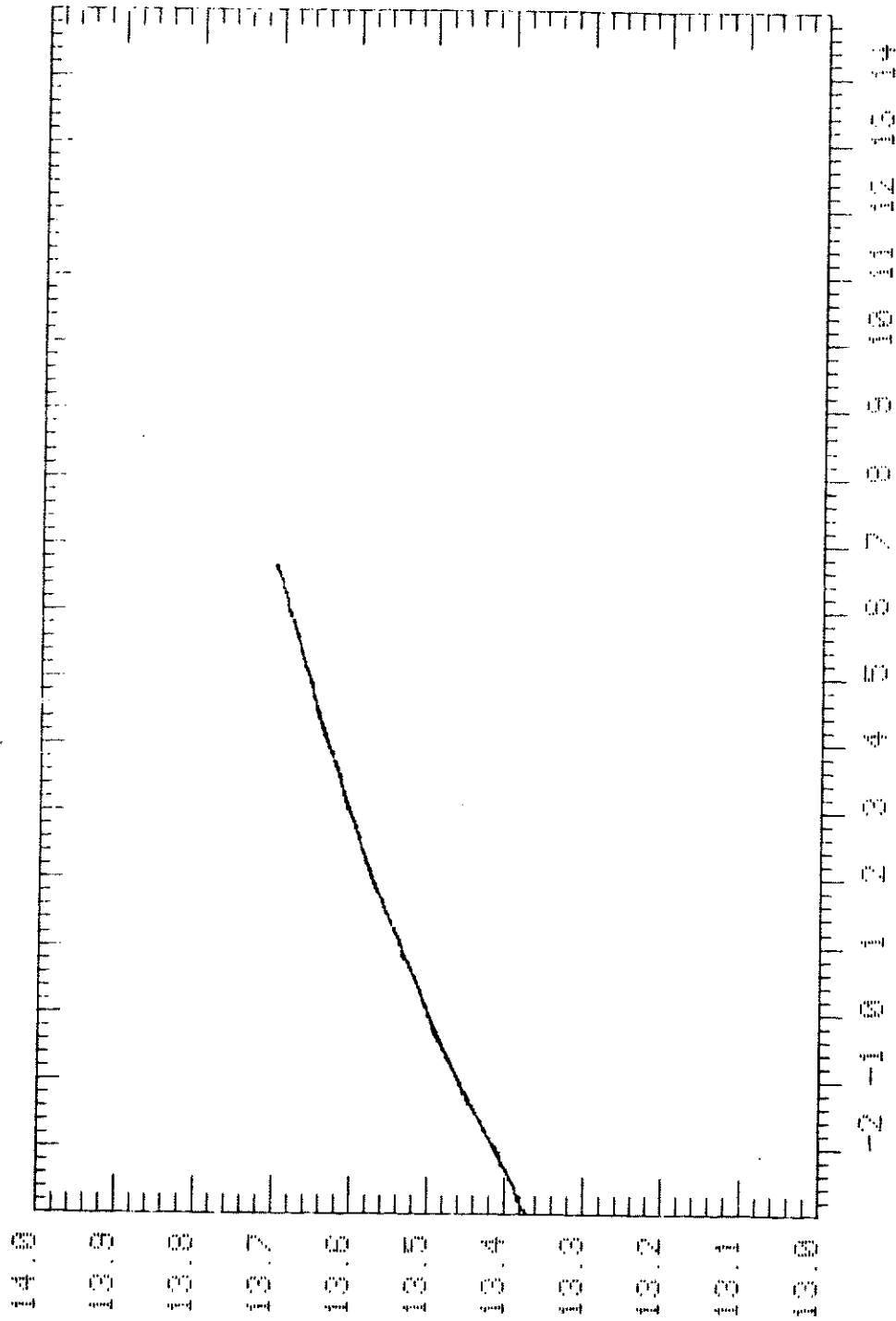
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 5.0 M

MEAN OF RUN UP: 16.43 MEAN OF RUN DOWN: 14.72

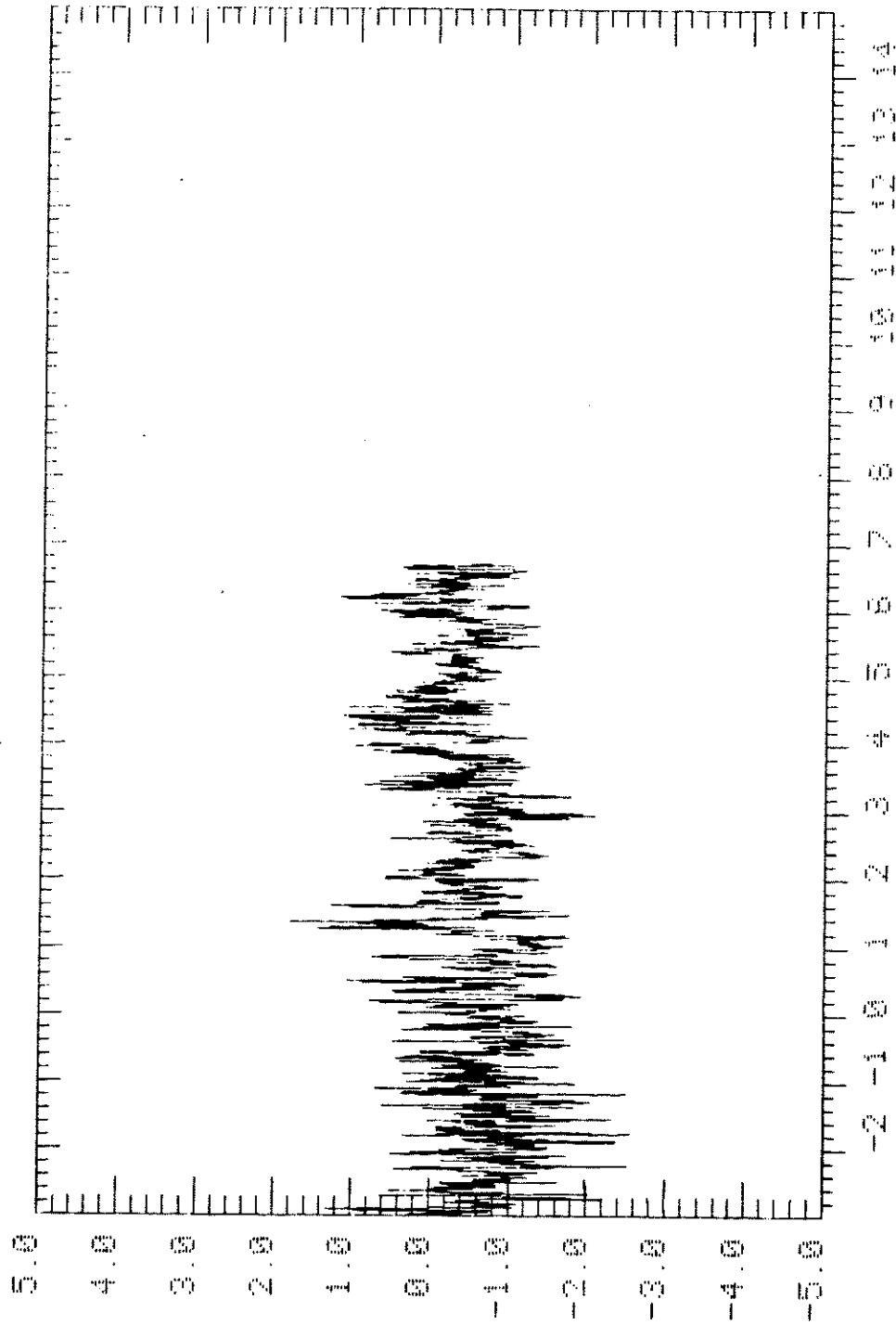
T E M P E R A T U R E



TIME FROM RELEASE (SECS*10**-2)

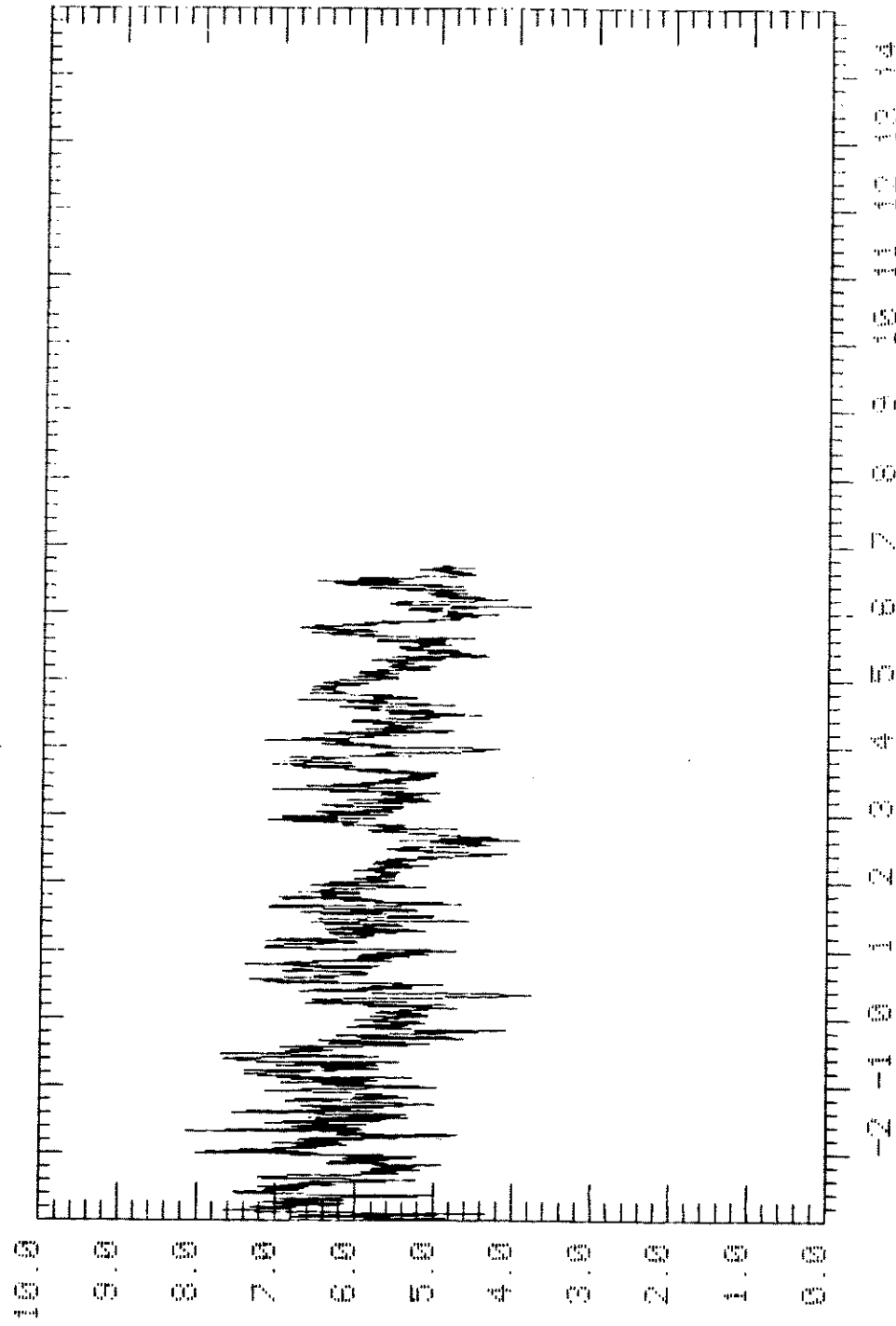
TRIAL: 019 TYPE: TEMP UNITS: DEGREES C
AVERAGING TIME: 0.6 SEC X: 475 H Y: 275 H Z: 5.0 M
MEAN OF RUN UP: 13.72 MEAN OF RUN DOWN: 13.96

U I N C V E L O C I T Y D



TRIAL: 019 TYPE: UHMB UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 14.5 M
MEAN OF RUN UP: -1.41 MEAN OF RUN DOWN: -0.15

U N I T Y



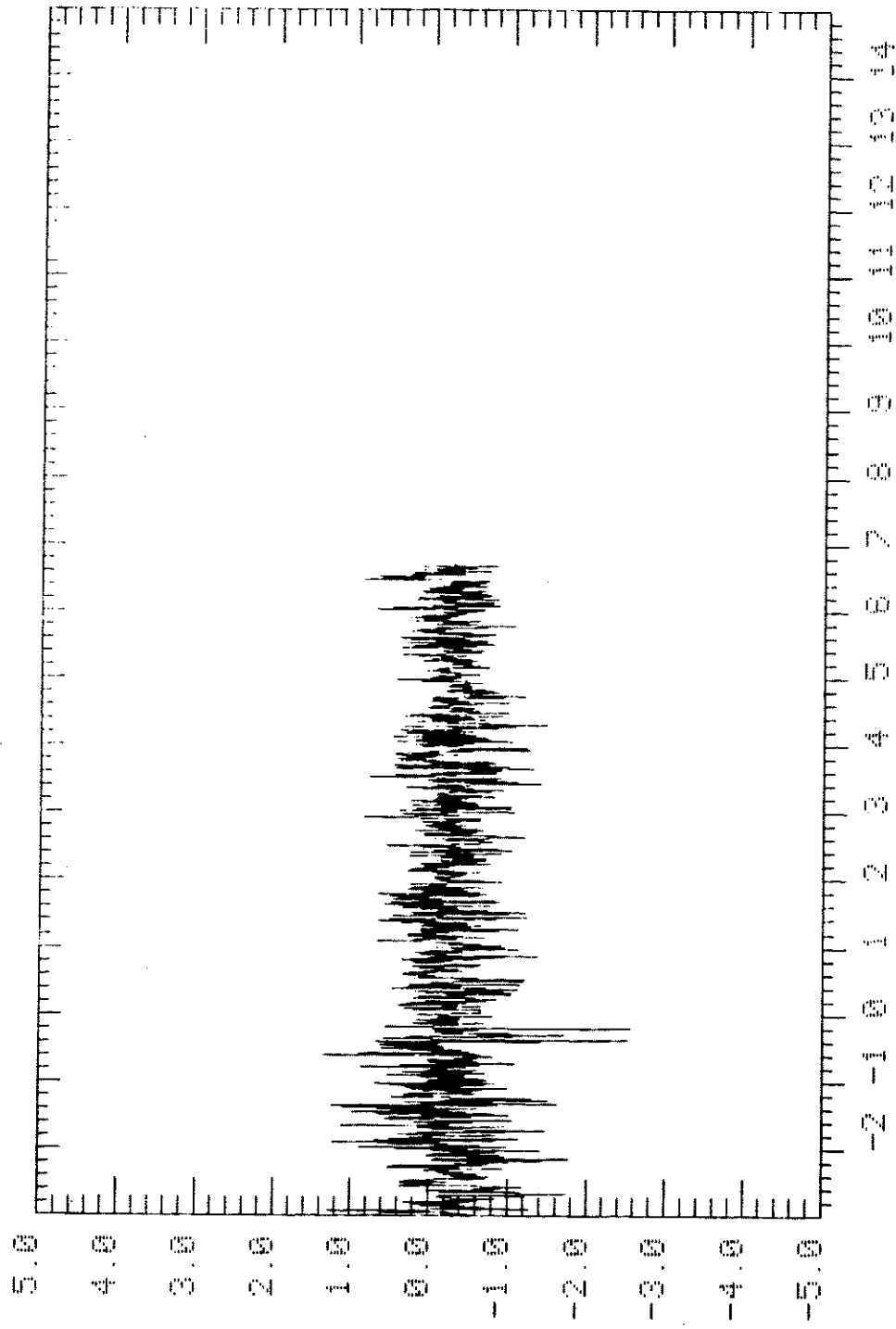
TIME FROM RELEASE (SECS*10**2)

TRIAL: 019 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 14.5 M

MEAN OF RUN UP: 8.11 MEAN OF RUN DOWN: 5.14

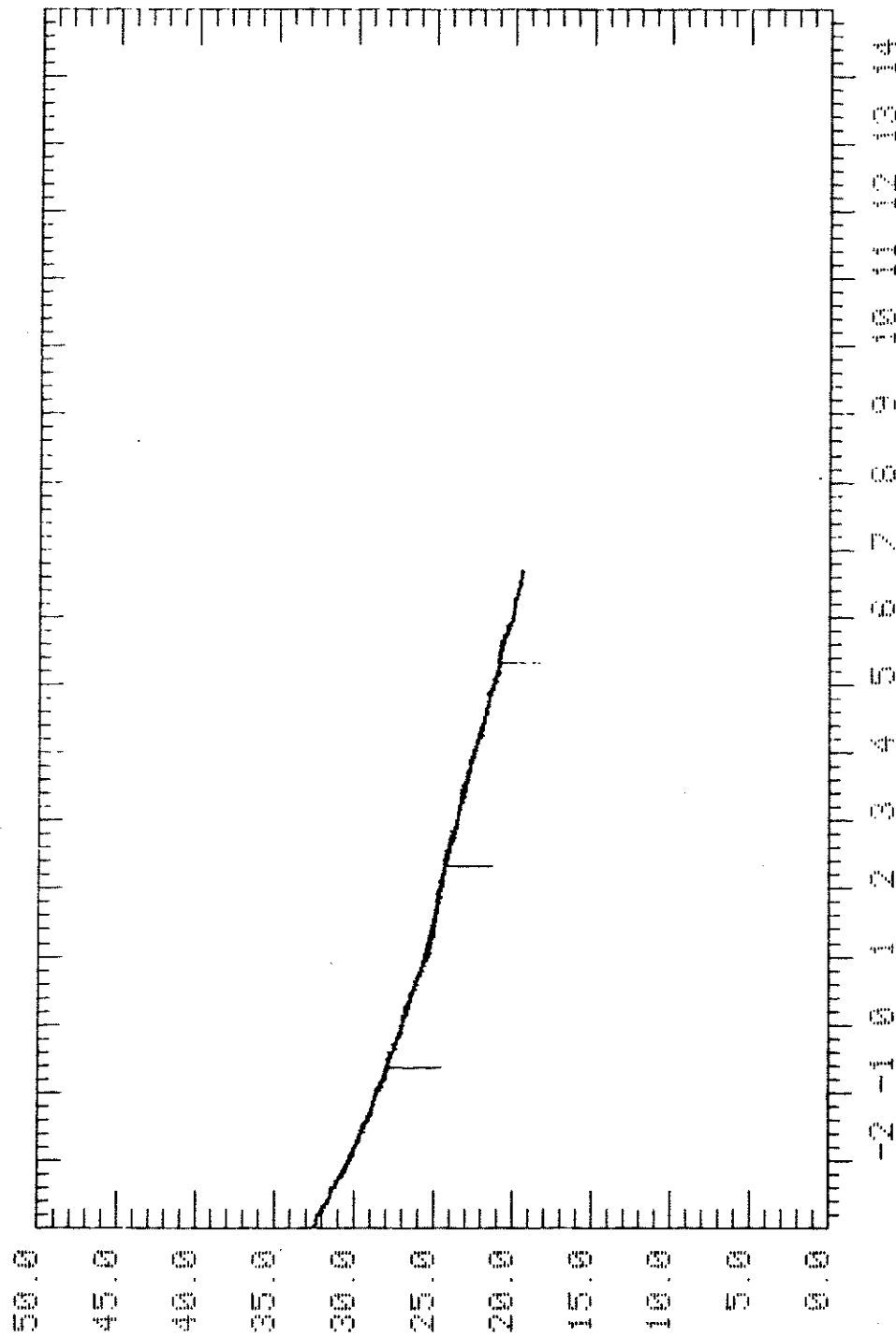
H I R D U F L O C I T Y W



TIME FROM RELEASE (SECS*10**2)

TRIAL: 019 TYPE: UAHN UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 475 M Y: 275 M Z: 14.5 M
MEAN OF RUN UP: -0.19 MEAN OF RUN DOWN: -0.27

I N S O L A T I O N

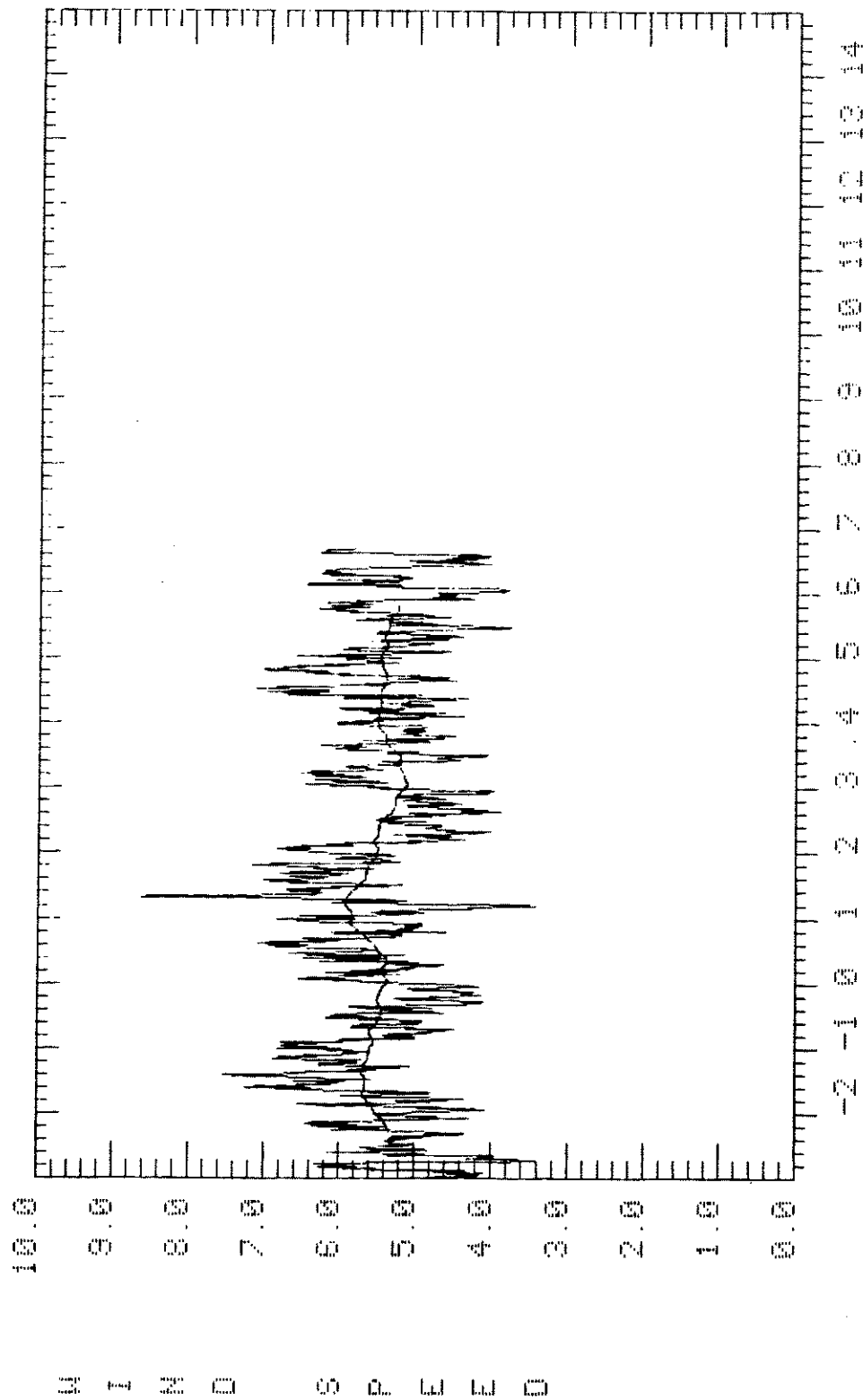


TIME FROM RELEASE (SECS*10**2)

TRIAL: 019 TYPE: SOLA UNITS: W/M**2

AVERAGING TIME: 0.6 SEC X: 700 M Y: 500 M Z: 0.4 M

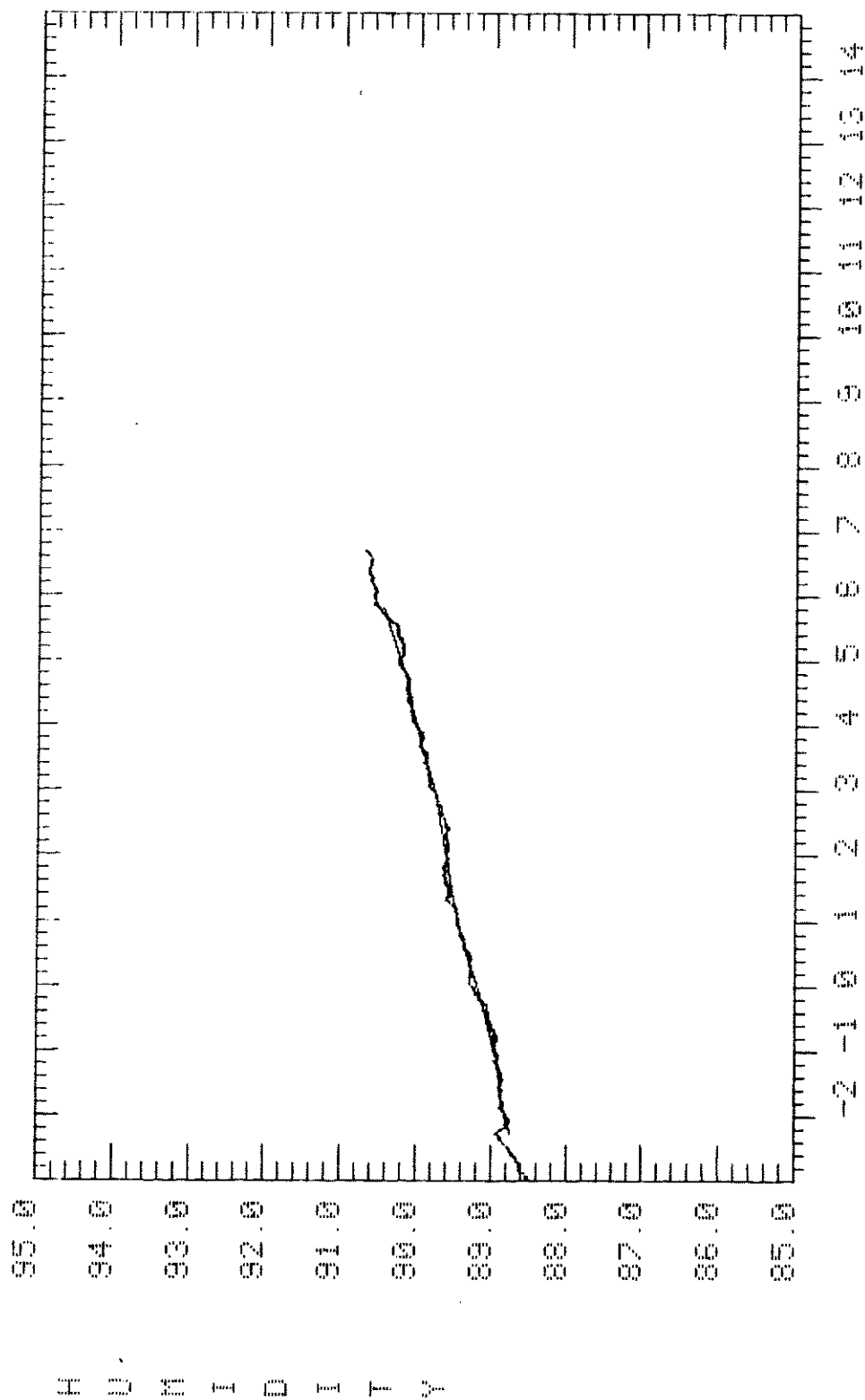
MEAN OF RUN UP: 221.64 MEAN OF RUN DOWN: 13.32



TRIAL: 019 TYPE: USPD UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 950 M Z: 10.0 M

MEAN OF RUN UP: 7.20 MEAN OF RUN DOWN: 5.02



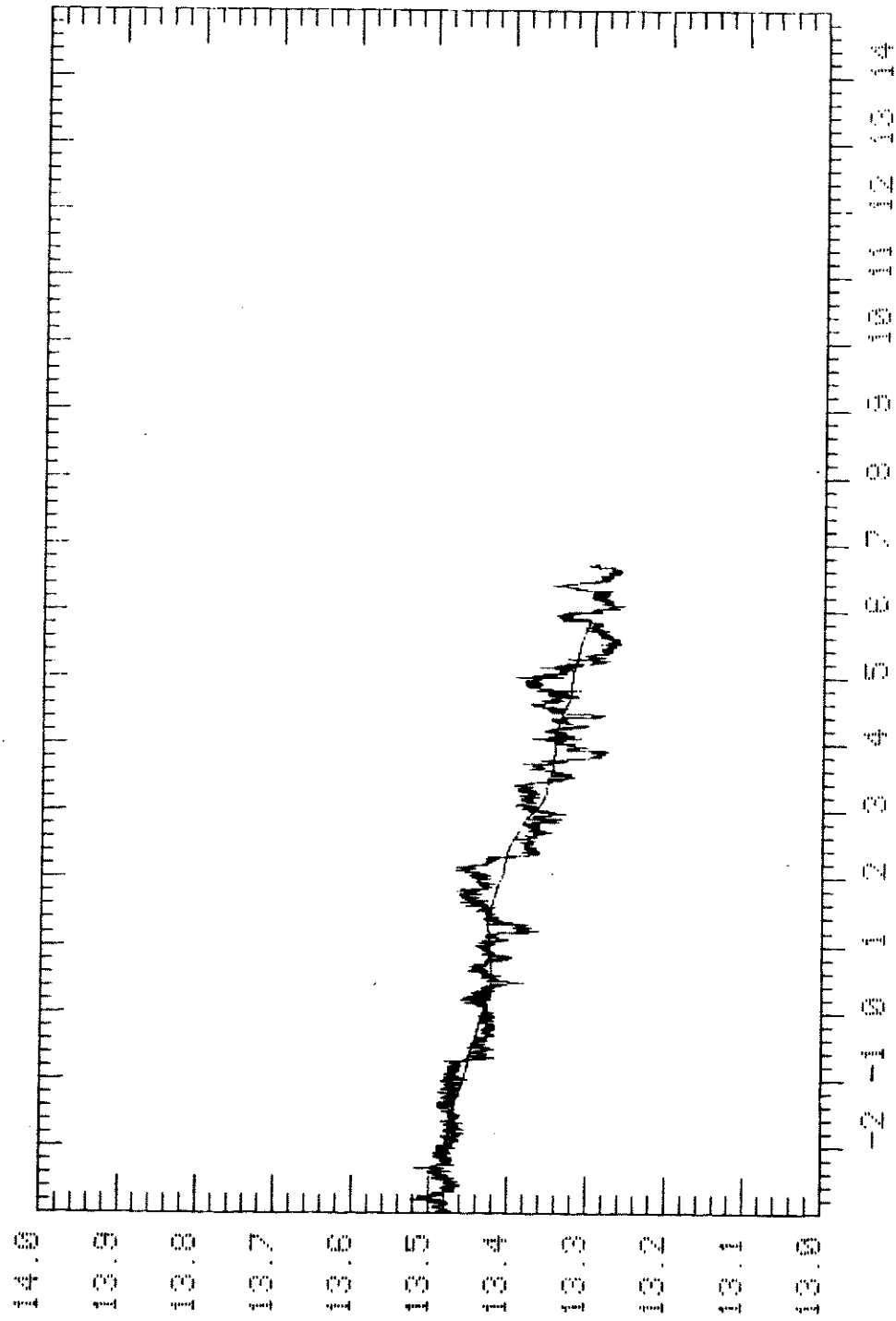
TIME FROM RELEASE (SECS*10**2)

TRIAL: 019 TYPE: RHUM UNITS: PER CENT

AVERAGING TIME: 0.6 SEC X: 400 M Y: 950 M Z: 10.0 M

MEAN OF RUN UP: 74.35 MEAN OF RUN DOWN: 91.15

T E M P E R A T U R E

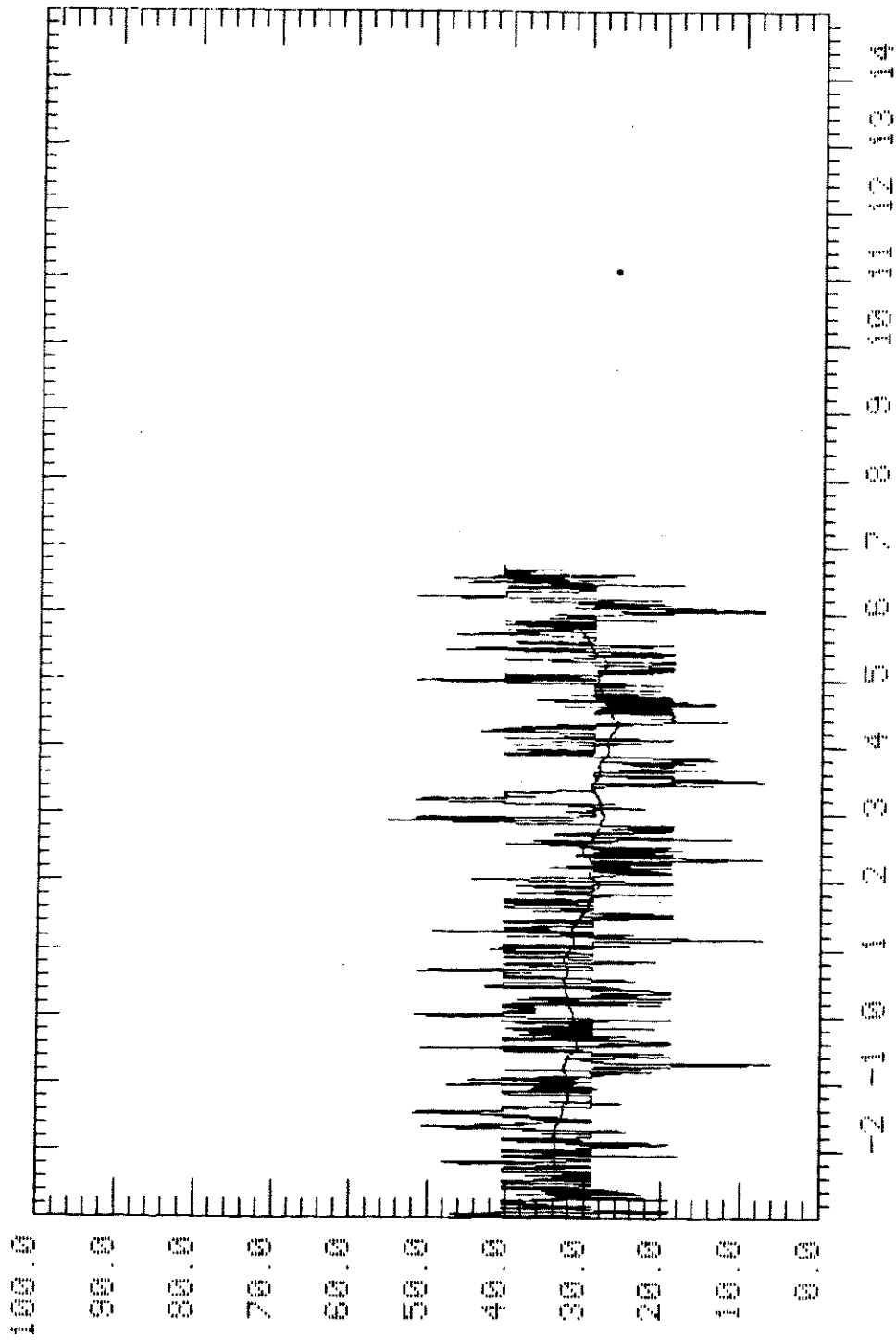


TRIAL: 019 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 N Y: 950 N Z: 19.0 N

MEAN OF RUN UP: 15.22 MEAN OF RUN DOWN: 13.21

W I N D D I R E C T I O N



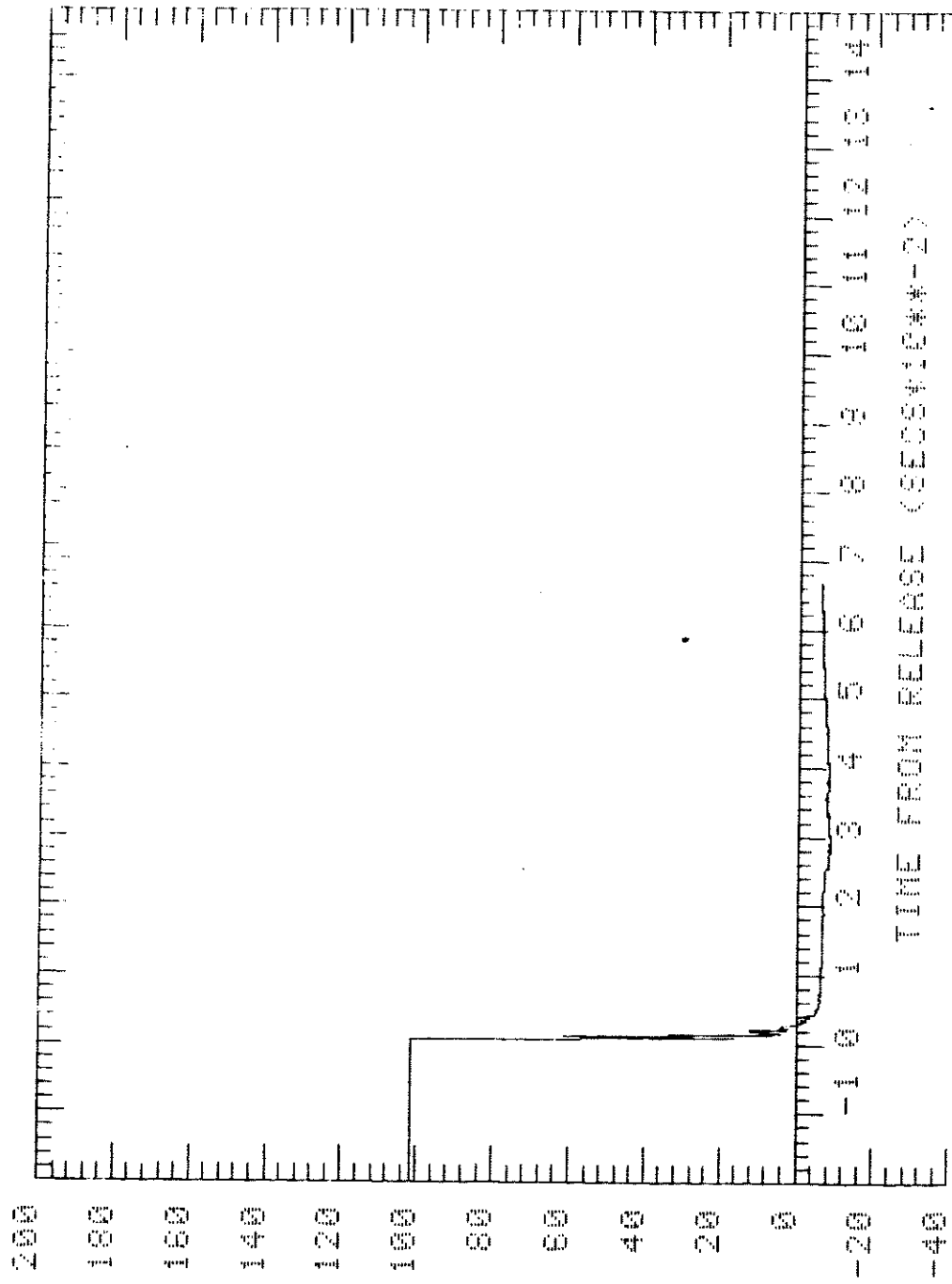
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 019 TYPE: WHOG UNITS: DEGREES

AVERAGING TIME: 9.6 SEC X: 400 M Y: 350 M Z: 10.6 M

MEAN OF RUN UP: 39.71 MEAN OF RUN DOWN: 29.17

C O N F I D E N T I A L



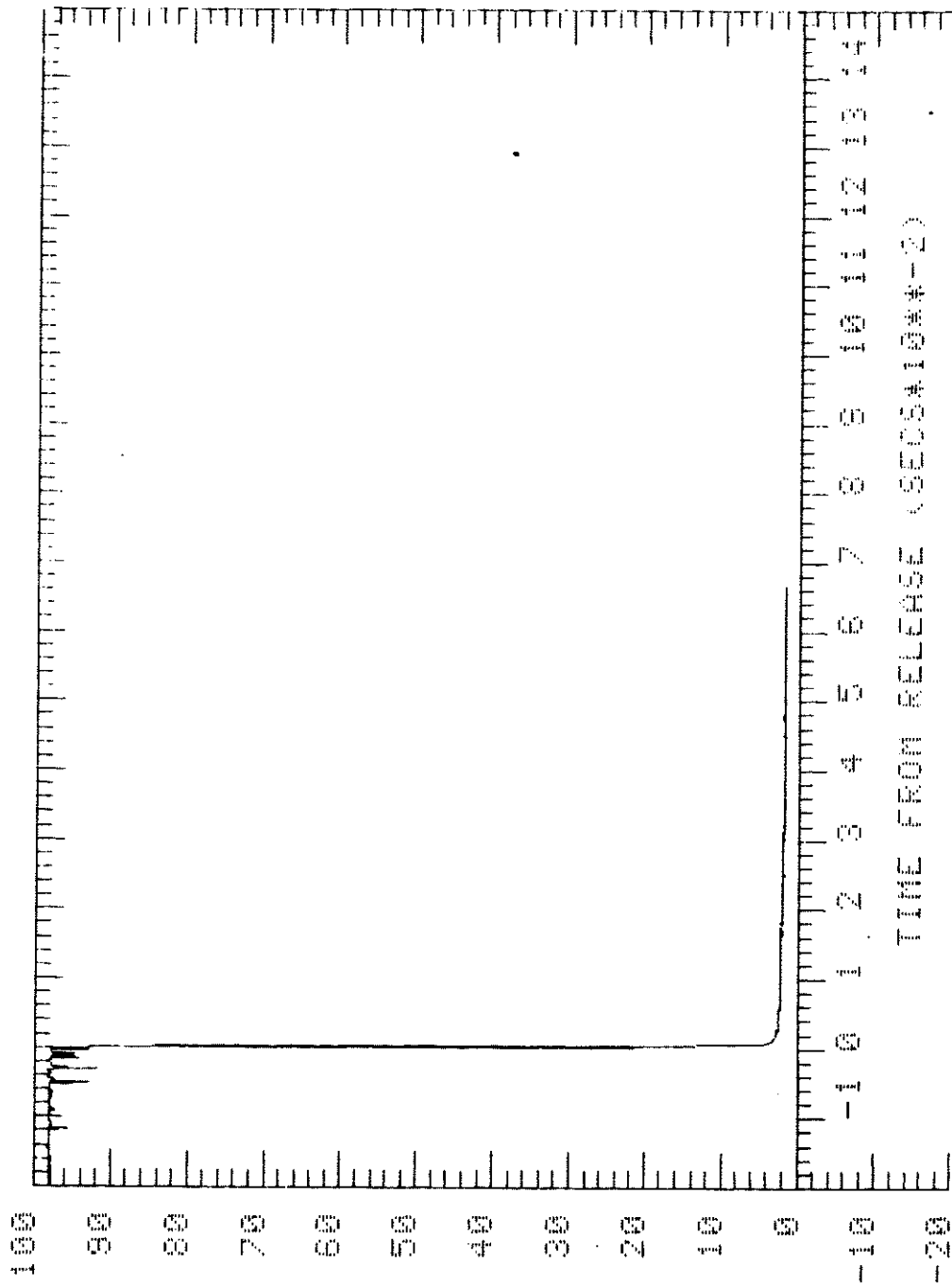
TRIAL: 019 TYPE: GASE AVERAGING TIME: 0.8 SECS

X: 400 M Y: 295 M Z: 0.4 M

GB1

CONCENTRATION

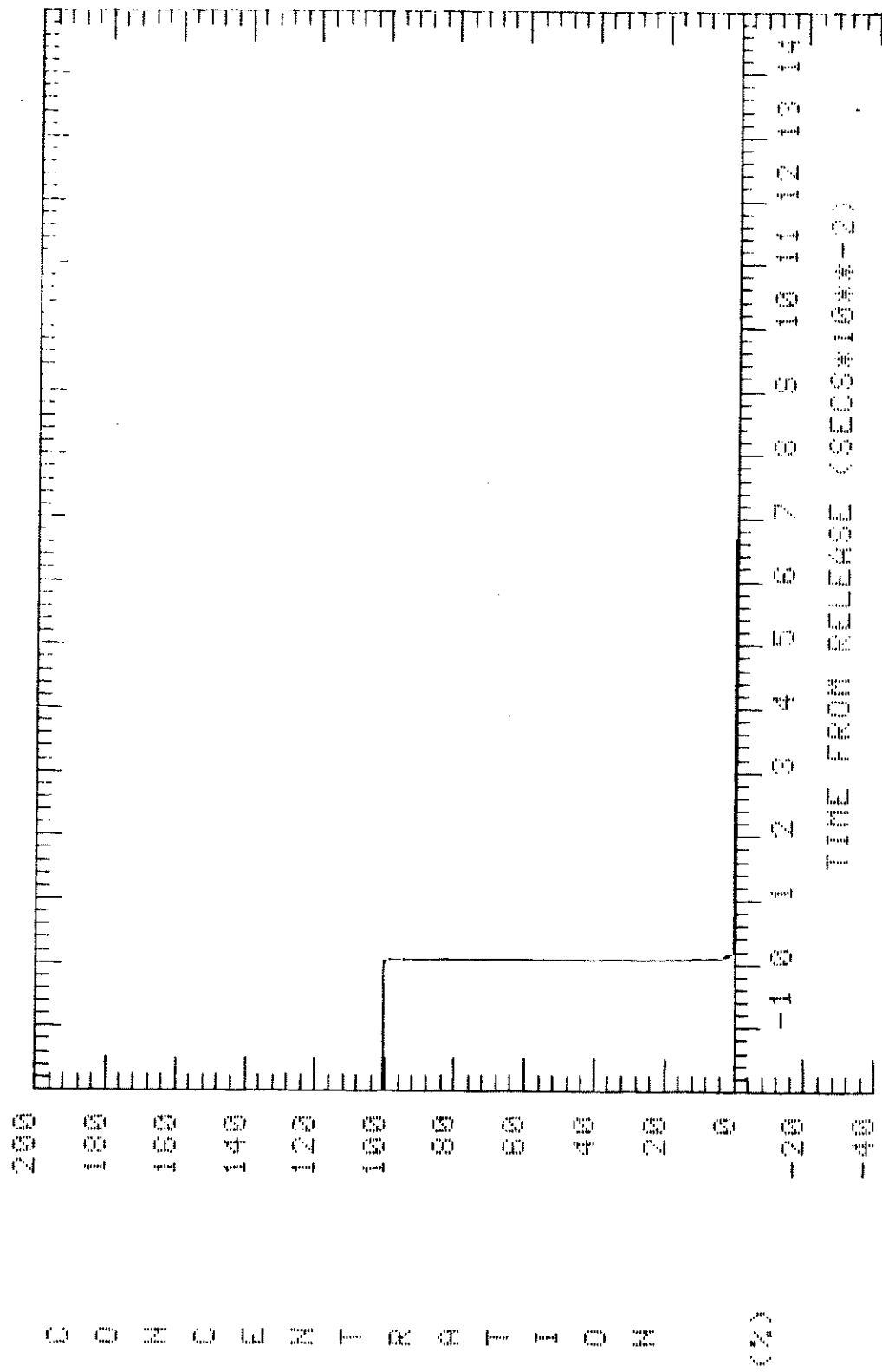
(%)



TRIAL: 019 TYPE: GASB AVERAGING TIME: 0.6 SECS

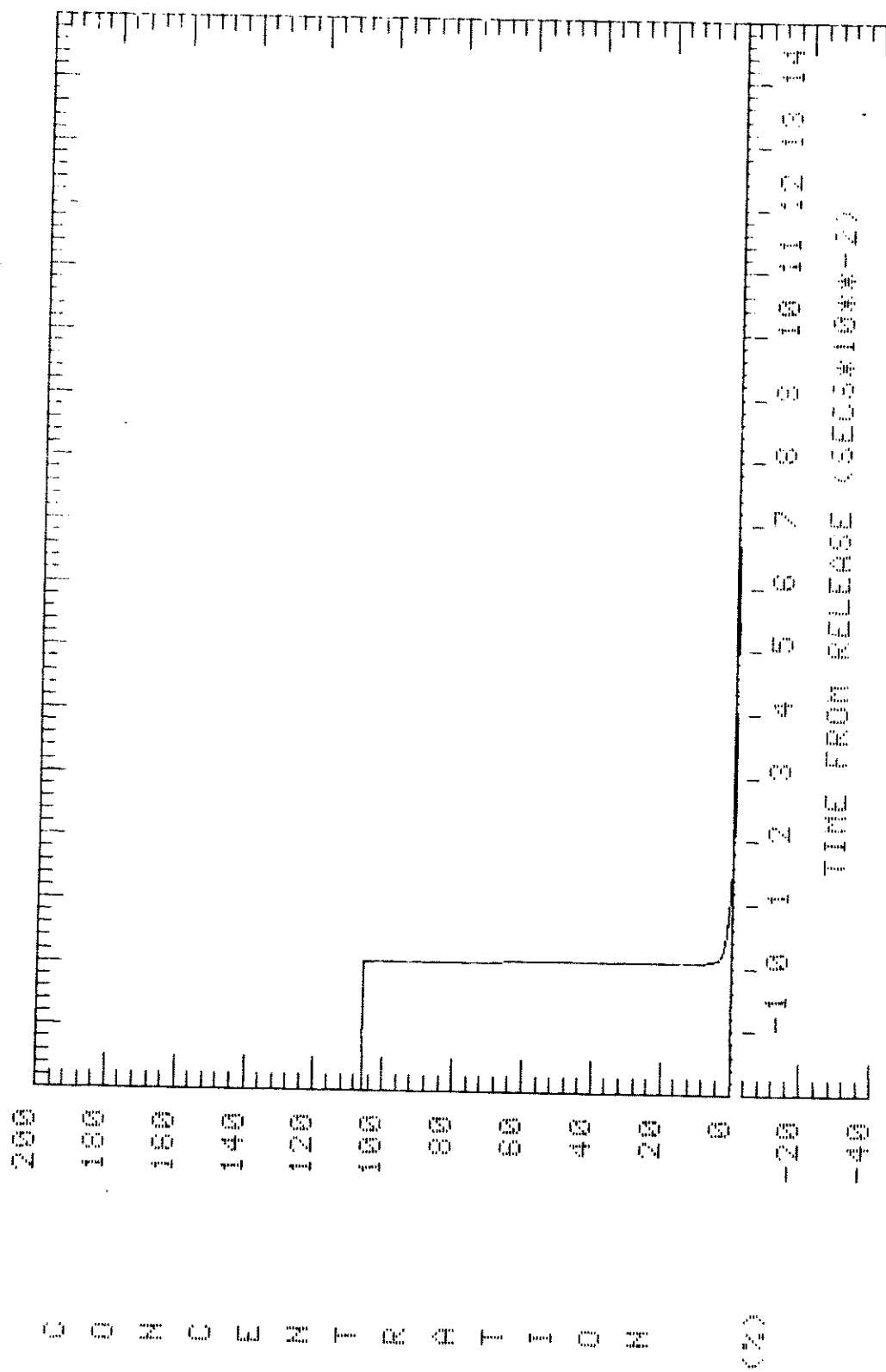
X: 400 M Y: 200 M Z: 12.0 M

GB2



TRIAL: 019 TYPE: GASE AVERAGING TIME: 0.5 SECS

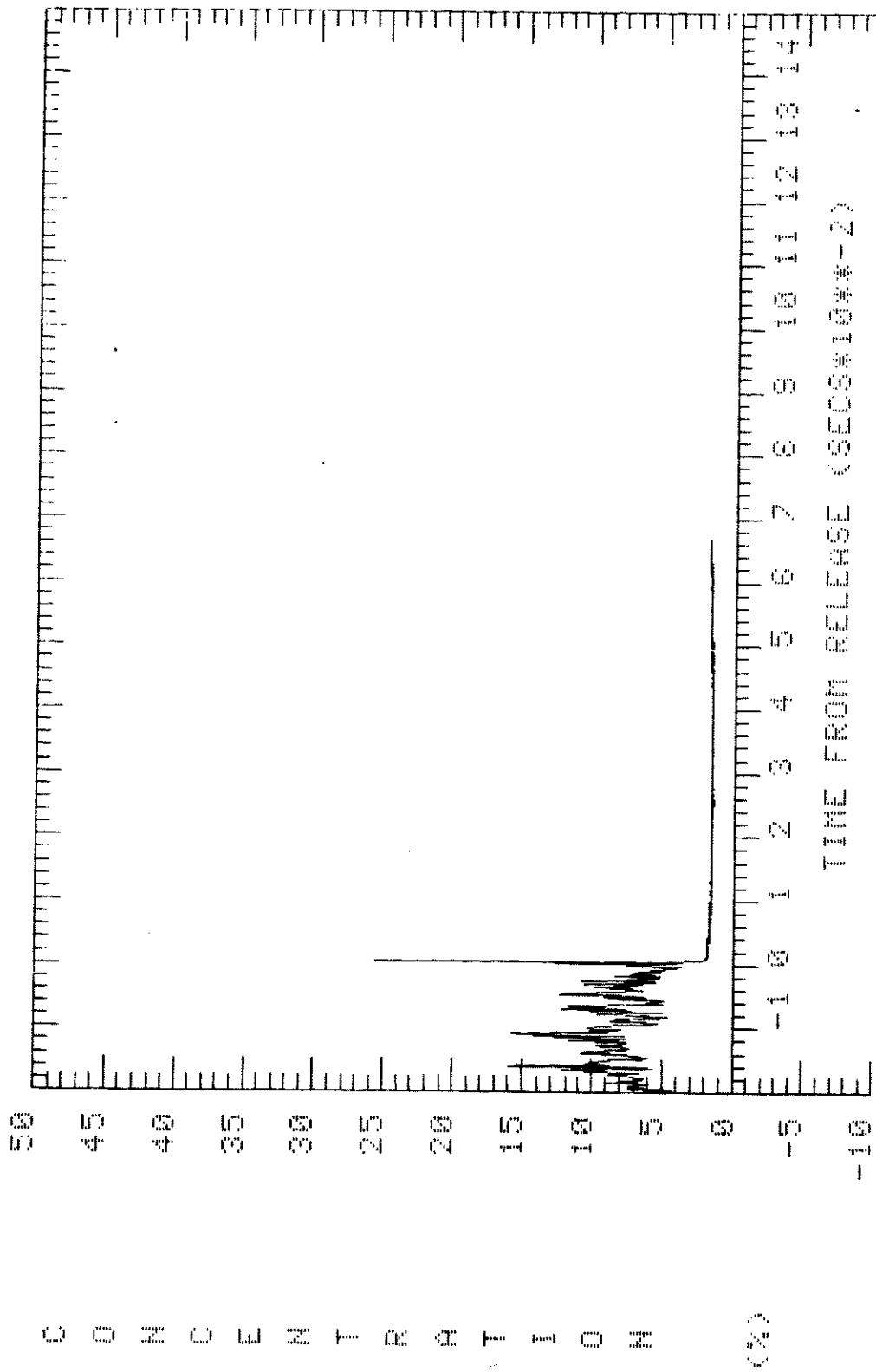
X: 400 M Y: 200 M Z: 4.5 M



TRIAL: 019 TYPE: GASS AVERAGING TIME: 0.5 SECS

X: 400 M Y: 200 M Z: 5.0 M

GB4



TRIAL: 019 TYPE: GASB AVERAGING TIME: 0.6 SECS

X: 400 M Y: 200 M Z: 15.5 M

