



HEALTH AND SAFETY EXECUTIVE

HEAVY GAS DISPERSION TRIALS THORNEY ISLAND 1982-3

DATA FOR TRIAL 045

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

HEALTH AND SAFETY EXECUTIVE

HEAVY GAS DISPERSION TRIALS
THORNEY ISLAND 1984

Data for Trial 045

Research and Laboratory Services Division
Broad Lane, Sheffield S3 7HQ

THORNEY ISLAND TRIALS SPILL 045 9 JUNE 1984

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at (approx 5 secs after fan start):	19:58:41 hrs
Freon 12/Nitrogen mixture: relative density	2.0
Spill rate:	260 m ³ /min
Spill duration:	7 min 35 secs
Number of smoke canisters discharged:	5
Mean Wind Speed at 10 m height:	
During main data collection period:	2.3 m/s
From 5 minute cyclic data just before the release:	2.4 m/s
Mean Wind Heading ('A' station) - (relative to the centre line of the array)	-34.5°
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)	102.4%
Insolation	65.0 W/m ²
Ambient Air Temperature (at 10 m height)	13.1°C
Treated Runway Surface Temperature	14.6°C
Grass Surface Temperature	12.8°C
Observed Cloud Cover	1/8

STABILITY CONDITION

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

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

HISTORY

This spill was conducted towards the late evening of a day during which insolation was generally strong to moderate. About three or four hours before gas was released, for example, insolation was about 56 W/m^2 ; the wind speed was then about 4 to 5 m/s and the heading was about 20 degrees to the left of the array centre line. Conditions at this time were judged to be on the unstable side of neutral. As the evening progressed and the sun set, insolation steadily dropped, as expected; the wind speed was also observed to decrease steadily but the heading remained at about 20 to 30 degrees to the left of the array centre line. Thus, by the time gas was released, insolation was very slight, the wind speed was relatively low and the heading was 30 degrees left of the centre line. Atmospheric conditions were then judged to be stable.

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 10 m, 14 m and 20 m the limits of Richardson number for the various stability categories were recalculated to correspond to a geometric mean height of 14 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 = $\sqrt{10 \times 20}$
 T is the temperature at 14 m above the ground
and $\bar{U}$ is the mean wind speed at 20 m.

Here again the limits of $R_{i\infty}$ were recalculated to correspond to a geometric mean height of 14 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 whole 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 pots.

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 speed as indicated by cup anemometer in metres/second.
WHDG:	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 4508 to 4208 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 3107 to 3407 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 2.1 m/s.

Turbulence intensity (U) = 15.9 (component in the wind direction)

Turbulence intensity (V) = 19.1 (crosswind component)

Turbulence intensity (W) = 7.6 (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 045

1 The standard gas sensors at the following positions were functioning correctly but did not detect gas:

X Coordinates (m)	Y Coordinates (m)	Height (m)
450	250	4.4
414	214	1.4
400	400	6.4

2 The fast-response gas sensor at 2 m height on the mast at (450, 275) was functioning correctly but did not detect gas.

3 The standard gas sensors listed below were malfunctioning.

X Coordinates (m)	Y Coordinates (m)	Height (m)
400	220	1.4
371	269	0.4
450	275	2.4
362	292	1.4 and 4.4
438	292	1.4
450	400	2.4
400	450	0.4 and 6.4

4 Plots obtained from standard gas sensors sited inside the gas container are included at pages GB1 and GB5. It should be noted that these sensors are intended to assist NMI Ltd 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 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 the 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.

5 The fast-response instrument stations at 1 m height at the mobile mast positions could not be mounted on the masts themselves. They were consequently sited 5 m up-range of the masts at points with a Y-coordinate of 270m. X-coordinates are as for the masts.

NOTES ON RAPID RESPONSE PLATINUM RESISTANCE THERMOMETERS FOR TRIAL 045

The rapid response platinum resistance thermometers at position (450,275), were malfunctioning. The plots at pages E40 and E45, should consequently be ignored.

B ROEBUCK
Special Instruments and Techniques Section
Safety Engineering Laboratory
8 January 1985

INSTRUMENT STATIONS AND DISTRIBUTIONS (EFFECTIVE FOR TRIAL 045)

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	6.0	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	10.0	Thermometer		E19
		1	3	14.0	Thermometer		E20
		1	2	17.3	Cup Anemometer		E21
		1	4	20.0	Cup Anemometer		E22
		1	5	20.0	Thermometer		E23
4.2, 0.5	V	1	7	10.0	Wind Vane		E24
4.0, 1.5	V	5	7	10.0	Wind Vane		E25
4.0, 2.0	S	6	0	0.4	Thermometer		E26
		6	1	0.4	Gas Sensor		GB1
		6	4	4.5	Gas Sensor		GB2
		6	6	9.0	Gas Sensor		GB3
		6	2	12.0	Thermometer		E27
		6	3	12.0	Gas Sensor		GB4
		6	7	13.5	Gas Sensor		GB5
		9	4	0.4	Gas Sensor		G01
4.5, 2.1	P	9	5	0.4	Gas Sensor		G02
4.14, 2.14	F	5	3	0.4	Gas Sensor		G03
		5	5	1.4	Gas Sensor		
4.86, 2.14	F	5	4	2.4	Gas Sensor		
		9	0	0.4	Gas Sensor		G04
		9	1	1.4	Gas Sensor		G05
		9	2	2.4	Gas Sensor		G06
4.0, 2.2	F	26	5	0.4	Gas Sensor		G07
		26	7	1.4	Gas Sensor		
		26	6	2.4	Gas Sensor		G08
4.5, 2.2	P	9	6	0.4	Gas Sensor		G09
5.0, 2.2	F	19	4	0.4	Gas Sensor		
		19	5	1.4	Gas Sensor		
		19	6	2.4	Gas Sensor		
4.28, 2.28	F	28	0	0.4	Gas Sensor		G10
		28	2	1.4	Gas Sensor		G11
		28	1	2.4	Gas Sensor		G12
		28	3	0.4	Gas Sensor		G13
4.5, 2.28	F	28	4	1.4	Gas Sensor		G14
		28	5	2.4	Gas Sensor		G15
		34	4	0.4	Gas Sensor		G16
		34	5	1.4	Gas Sensor		G17
4.72, 2.28	F	34	7	2.4	Gas Sensor		G18
		34	1	0.4	Gas Sensor		G19
4.5, 2.3	P	5	1	0.4	Gas Sensor		G20
4.0, 2.4	F	16	3	0.4	Gas Sensor		G21
		16	5	1.4	Gas Sensor		G22
		16	4	2.4	Gas Sensor		G23
4.5, 2.4	P	28	6	0.4	Gas Sensor		
5.0, 2.4	F	19	0	0.4	Gas Sensor		
		19	1	1.4	Gas Sensor		
		19	2	2.4	Gas Sensor		
4.28, 2.48	P	34	6	0.4	Gas Sensor		G24
4.72, 2.48	P	28	7	0.4	Gas Sensor		G25
4.5, 2.5	F	34	0	0.4	Gas Sensor		G26
		34	3	1.4	Gas Sensor		G27
		34	1	2.4	Gas Sensor		G28
		34	2	4.4	Gas Sensor		

LOCATION COORDINATES	TYPE OF MAST	DATA TERMINAL NUMBER	CHANNEL NUMBER	HEIGHT ABOVE GROUND m	TYPE OF SENSOR	REMARKS	PAGE NUMBER
3.71, 2.69	F	30	0	0.4	Gas Sensor		
		30	3	1.4	Gas Sensor		G29
		30	1	2.4	Gas Sensor		G30
		30	2	4.4	Gas Sensor		G31
4.29, 2.69	F	26	0	0.4	Gas Sensor		G32
		26	3	1.4	Gas Sensor		G33
		26	1	2.4	Gas Sensor		G34
		26	2	4.4	Gas Sensor		G35
4.0, 2.75	M2	3	0	0.4	Gas Sensor		G36
		3	5	1.0	High Speed Gas Sensor	See Notes	G37
		2	0	1.0	Sonic Anemometer - XY	See Notes	E28
		2	1	1.0	Sonic Anemometer - XY	See Notes	E29
		2	2	1.0	Sonic Anemometer - Z	See Notes	E30
		2	3	1.0	Sonic Anemometer - Temp	See Notes	E31
		3	6	1.0	Smoke Sensor	See Notes	
		3	3	1.4	Gas Sensor		G38
		3	1	2.4	Gas Sensor		G39
		3	2	4.4	Gas Sensor		G40
		3	4	10.4	Gas Sensor		
		2	4	14.5	Sonic Anemometer - XY		E32
		2	5	14.5	Sonic Anemometer - XY		E33
		2	6	14.5	Sonic Anemometer - Z		E34
		2	7	14.5	Sonic Anemometer - Temp		E35
4.50, 2.75	M3	12	0	0.4	Gas Sensor		G41
		33	4	1.0	High Speed Gas Sensor	See Notes	G42
		33	6	1.0	Smoke Sensor	See Notes	G43
		11	0	1.0	Sonic Anemometer - XY	See Notes	E36
		11	1	1.0	Sonic Anemometer - XY	See Notes	E37
		11	2	1.0	Sonic Anemometer - Z	See Notes	E38
		11	3	1.0	Sonic Anemometer - Temp	See Notes	E39
		12	4	1.0	Thermometer	See Notes	E40
		12	3	1.4	Gas Sensor		G44
		33	7	2.0	High Speed Gas Sensor		
		33	0	2.0	Sonic Anemometer - XY		E41
		33	1	2.0	Sonic Anemometer - XY		E42
		33	2	2.0	Sonic Anemometer - Z		E43
		33	3	2.0	Sonic Anemometer - Temp		E44
		33	5	2.0	Smoke Sensor		
		12	6	2.0	Thermometer		E45
		12	1	2.4	Gas Sensor		
		12	2	4.4	Gas Sensor		G45
		12	5	10.4	Gas Sensor		
5.00, 2.75	M3	11	4	14.5	Sonic Anemometer - XY		E46
		11	5	14.5	Sonic Anemometer - XY		E47
		11	6	14.5	Sonic Anemometer - Z		E48
		11	7	14.5	Sonic Anemometer - Temp		E49
		24	0	0.4	Gas sensor		
		25	1	1.0	High Speed Gas Sensor	See Notes	
		25	4	1.0	Sonic Anemometer - XY	See Notes	E50
		25	5	1.0	Sonic Anemometer - XY	See Notes	E51
		25	6	1.0	Sonic Anemometer - Z	See Notes	E52
		25	7	1.0	Sonic Anemometer - Temp	See Notes	E53
		25	3	1.0	Smoke Sensor	See Notes	
		24	3	1.4	Gas Sensor		
		25	2	2.0	High Speed Gas Sensor		
		24	1	2.4	Gas Sensor		
		24	2	4.4	Gas Sensor		
		24	4	14.5	Sonic Anemometer - XY		E54
		24	5	14.5	Sonic Anemometer - XY		E55
		24	6	14.5	Sonic Anemometer - Z		E56
		24	7	14.5	Sonic Anemometer - Temp		E57

LOCATION COORDINATES	TYPE OF MAST	DATA TERMINAL NUMBER	CHANNEL NUMBER	HEIGHT ABOVE GROUND m	TYPE OF SENSOR	REMARKS	PAGE NUMBER
3.62, 2.92	F	23	0	0.4	Gas Sensor		G46
		23	3	1.4	Gas Sensor		
		23	1	2.4	Gas Sensor		G47
4.38, 2.92	F	23	2	4.4	Gas Sensor		
		21	3	0.4	Gas Sensor		G48
		21	6	1.4	Gas Sensor		
4.0, 3.0	F	21	4	2.4	Gas Sensor		G49
		21	5	4.4	Gas Sensor		G50
		23	5	0.4	Gas Sensor		G51
5.0, 3.0	F	21	0	1.4	Gas Sensor		G52
		23	6	2.4	Gas Sensor		G53
		23	7	4.4	Gas Sensor		
6.0, 3.0	F	10	0	0.4	Gas Sensor		
		10	3	1.4	Gas Sensor		
		10	1	2.4	Gas Sensor		
3.0, 3.5	F	10	2	4.4	Gas Sensor		
		10	4	0.4	Gas Sensor		
		10	7	1.4	Gas Sensor		
4.0, 3.5	F	10	5	2.4	Gas Sensor		
		10	6	4.4	Gas Sensor		
		15	4	0.4	Gas Sensor		G54
4.5, 3.5	F	15	7	1.4	Gas Sensor	Not connected	
		15	5	2.4	Gas Sensor		G55
		15	6	4.4	Gas Sensor		G56
5.0, 3.5	F	15	0	0.4	Gas Sensor		G57
		15	3	1.4	Gas Sensor		G58
		15	1	2.4	Gas Sensor		G59
4.0, 4.0	F	15	2	4.4	Gas Sensor		G60
		31	4	0.4	Gas Sensor		G61
		31	5	1.4	Gas Sensor		G62
4.5, 4.0	F	31	6	2.4	Gas Sensor		G63
		31	7	4.4	Gas Sensor		G64
		17	4	0.4	Gas Sensor		
3.0, 4.0	F	17	7	1.4	Gas Sensor		
		17	5	2.4	Gas Sensor		
		17	6	4.4	Gas Sensor		
4.0, 4.0	F	7	0	0.4	Gas Sensor		G65
		7	1	2.4	Gas Sensor		G66
		7	2	4.4	Gas Sensor		G67
4.5, 4.0	F	7	3	6.4	Gas Sensor		G68
		7	4	0.4	Gas Sensor		G69
		7	5	2.4	Gas Sensor		G70
5.0, 4.0	F	7	6	4.4	Gas Sensor		G71
		7	7	6.4	Gas Sensor		
		31	0	0.4	Gas Sensor		G72
6.0, 4.0	F	31	1	2.4	Gas Sensor		
		31	2	4.4	Gas Sensor		G73
		31	3	6.4	Gas Sensor		
2.0, 5.0	F	17	0	0.4	Gas Sensor		
		17	1	2.4	Gas Sensor		
		17	2	4.4	Gas Sensor		
3.0, 5.0	F	17	3	6.4	Gas Sensor		
		18	4	0.4	Gas Sensor		
		18	5	2.4	Gas Sensor		
4.0, 5.0	F	18	6	4.4	Gas Sensor		
		18	7	6.4	Gas Sensor		
		13	4	0.4	Gas Sensor		G74
5.0, 5.0	F	13	5	2.4	Gas Sensor		G75
		13	6	4.4	Gas Sensor		G76
		13	7	6.4	Gas Sensor		G77
6.0, 5.0	F	8	0	0.4	Gas Sensor		G78
		8	1	2.4	Gas Sensor		G79
		8	2	4.4	Gas Sensor		G80
7.0, 5.0	F	8	3	6.4	Gas Sensor		G81

LOCATION COORDINATES	TYPE OF MAST	DATA TERMINAL NUMBER	CHANNEL NUMBER	HEIGHT ABOVE GROUND m	TYPE OF SENSOR	REMARKS	PAGE NUMBER
4.0, 5.0	F	8	4	0.4	Gas Sensor		
		8	5	2.4	Gas Sensor		G82
		8	6	4.4	Gas Sensor		G83
		8	7	6.4	Gas Sensor		
5.0, 5.0	F	18	0	0.4	Gas Sensor		
		18	1	2.4	Gas Sensor		
		18	2	4.4	Gas Sensor		
		18	3	6.4	Gas Sensor		
6.0, 5.0	F	20	4	0.4	Gas Sensor		
		20	5	2.4	Gas Sensor		
		20	6	4.4	Gas Sensor		
		20	7	6.4	Gas Sensor		
7.0, 5.0	F	20	2	0.4	Solarimeter		E58
		20	0	0.4	Gas Sensor		
		20	1	2.4	Gas Sensor	Not connected	
2.0, 6.0	F	22	6	0.4	Gas Sensor		G84
		22	7	2.4	Gas Sensor	Not connected	
3.0, 6.0	F	22	4	0.4	Gas Sensor	Not connected	
		22	5	2.4	Gas Sensor		
4.0, 6.0	F	14	6	0.4	Gas Sensor		
		14	7	2.4	Gas Sensor		
5.0, 6.0	F	14	4	0.4	Gas Sensor		
		14	5	2.4	Gas Sensor		
6.0, 6.0	F	27	6	0.4	Gas Sensor		
		27	7	2.4	Gas Sensor		
7.0, 6.0	F	27	4	0.4	Gas Sensor	Not connected	
		27	5	2.4	Gas Sensor	Not connected	
2.2, 6.7	F	22	0	0.4	Gas Sensor	Not connected	
		22	1	2.4	Gas Sensor		G85
3.0, 7.0	F	22	2	0.4	Gas Sensor		G86
		22	3	2.4	Gas Sensor	Not connected	
4.0, 7.0	F	14	0	0.4	Gas Sensor		
		14	1	2.4	Gas Sensor		
5.0, 7.0	F	14	2	0.4	Gas Sensor		
		14	3	2.4	Gas Sensor		
6.0, 7.0	F	27	0	0.4	Gas Sensor	Not connected	
		27	1	2.4	Gas Sensor		
7.0, 7.0	F	27	2	0.4	Gas Sensor	Not connected	
		27	3	2.4	Gas Sensor	Not connected	
4.0, 9.5	D	29	4	10.0	Wind Speed		E59
		29	5	10.0	Relative Humidity		E60
		29	6	10.0	Thermometer		E61
		29	7	10.0	Wind Vane		E62

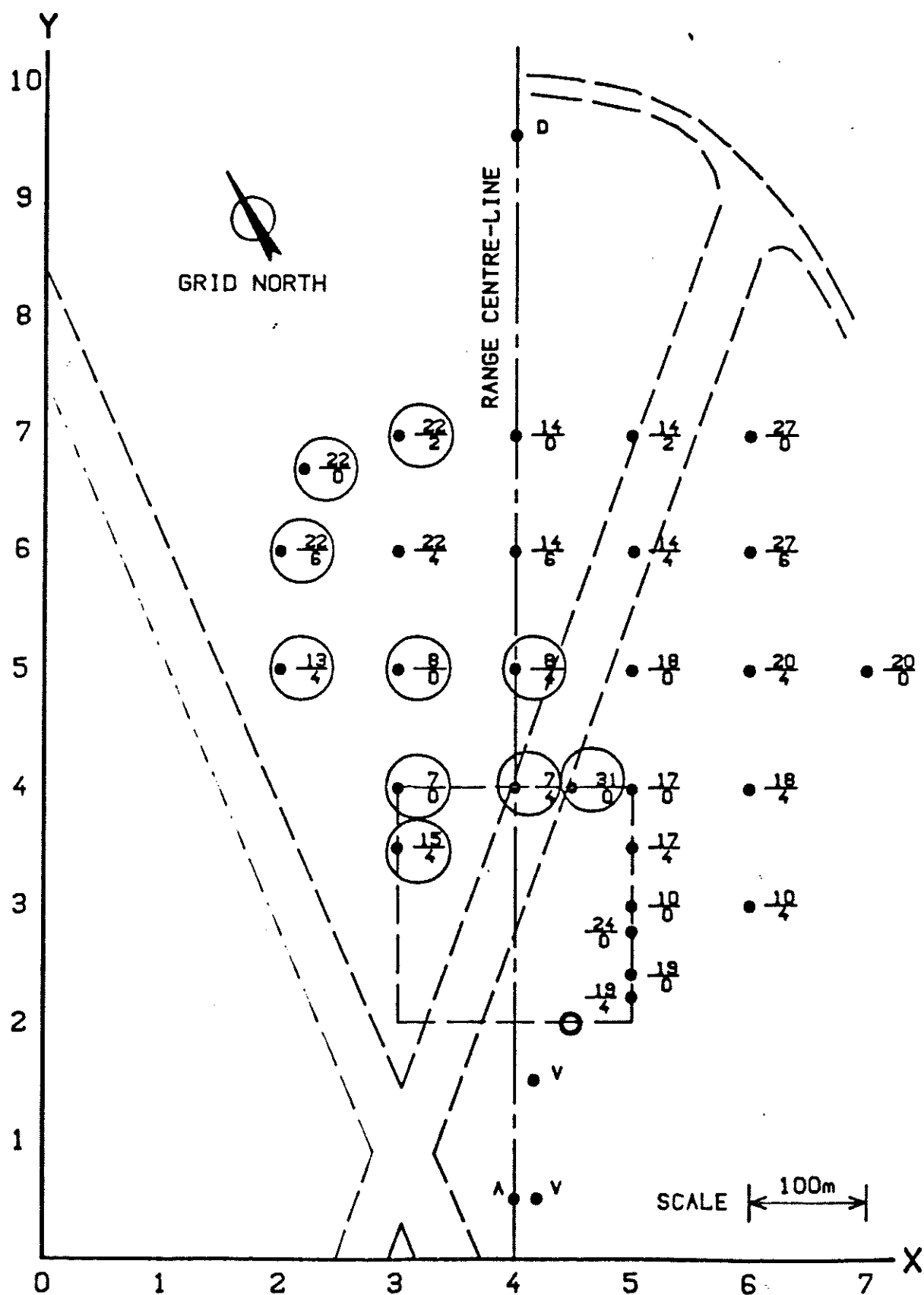
TRIAL No. - 045

DATE - 9/6/84

86 SENSORS SAW GAS

WIND SPEED (U_{10}) 2.3 m/sec

PASQUILL CATEGORY E/F



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

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

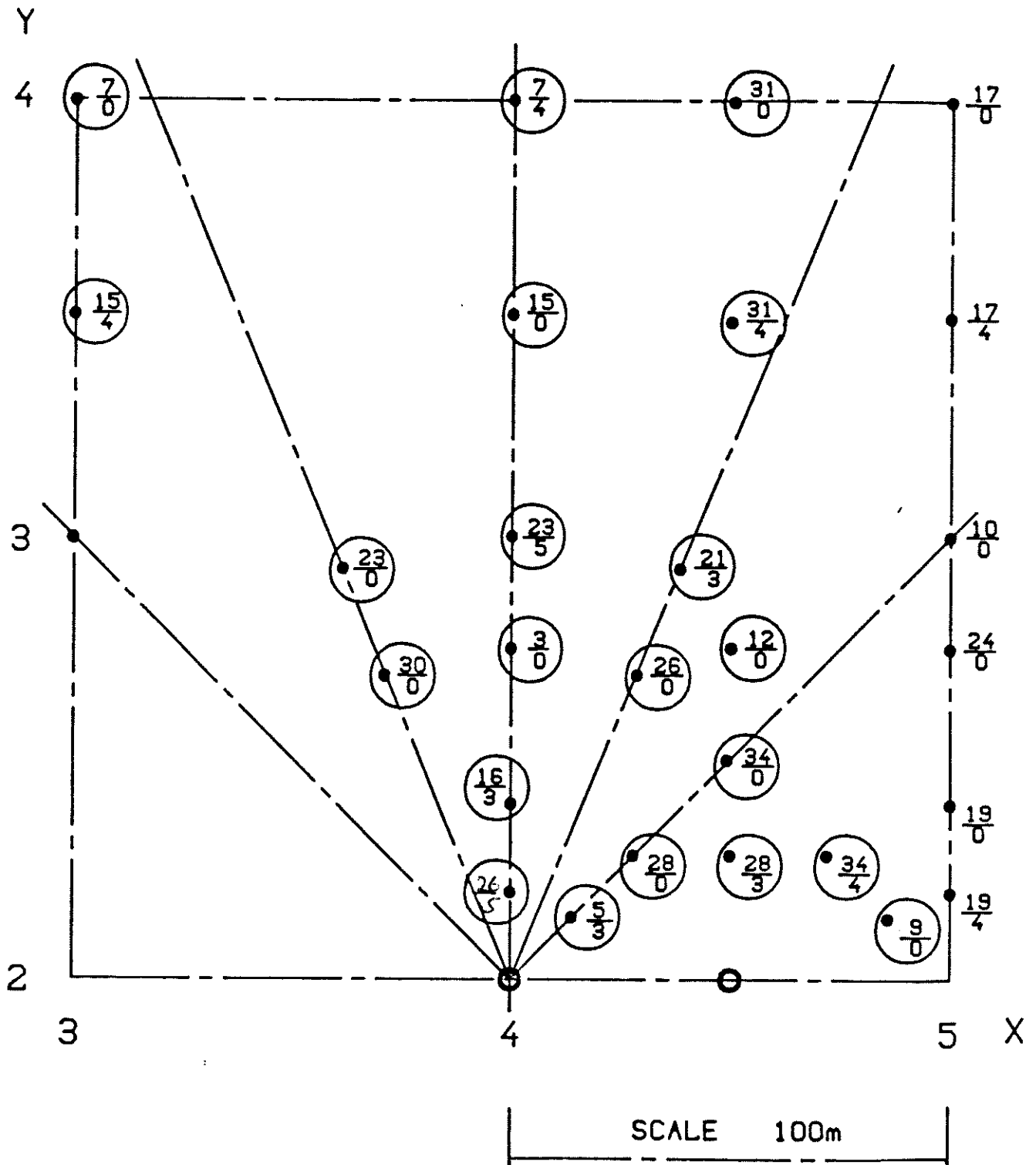
TRIAL No. - 045

DATE - 9/6/84

86 SENSORS SAW GAS

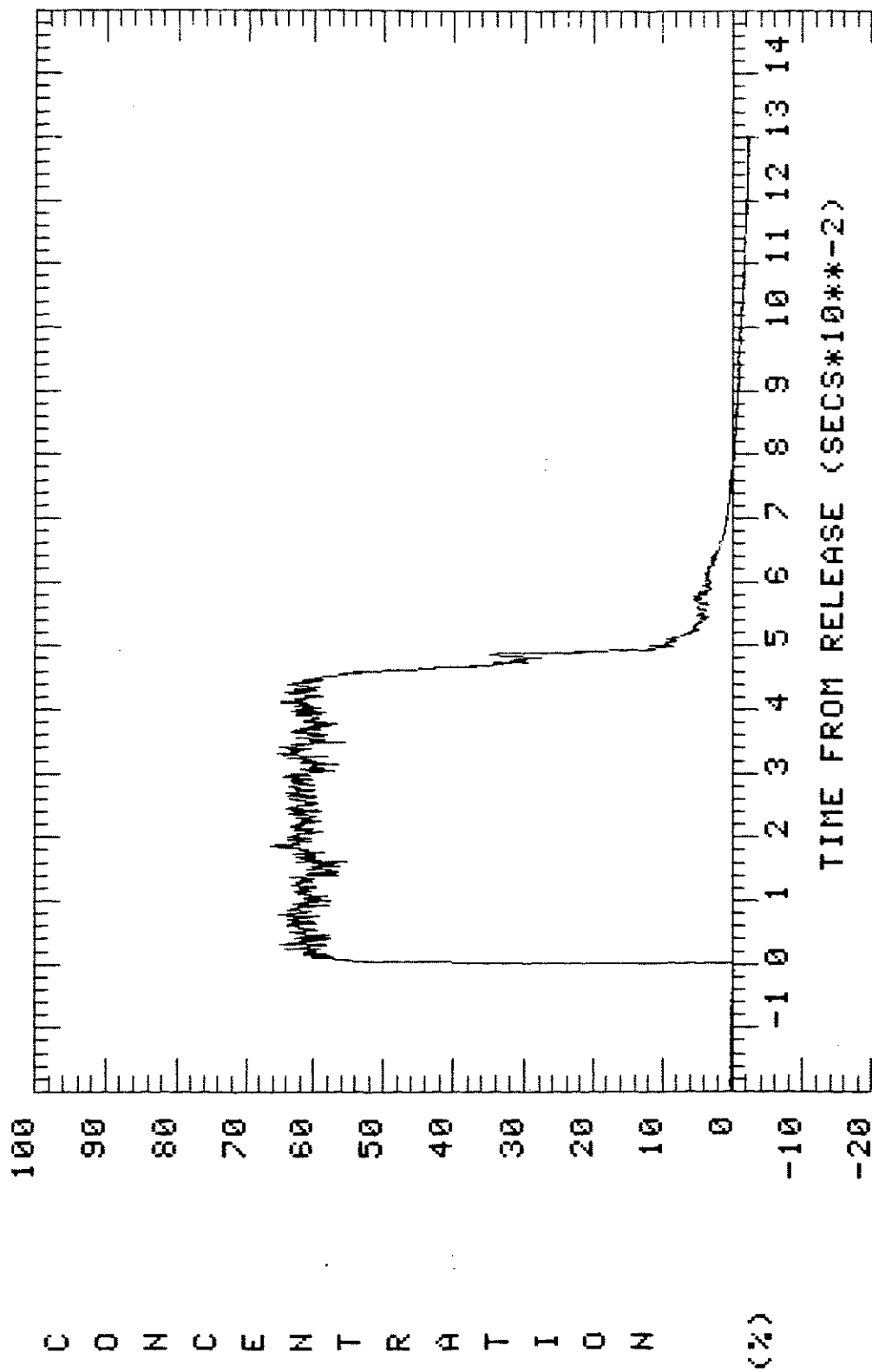
WIND SPEED (U_{10}) 2.3 m/sec

PASQUILL CATEGORY E/F



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

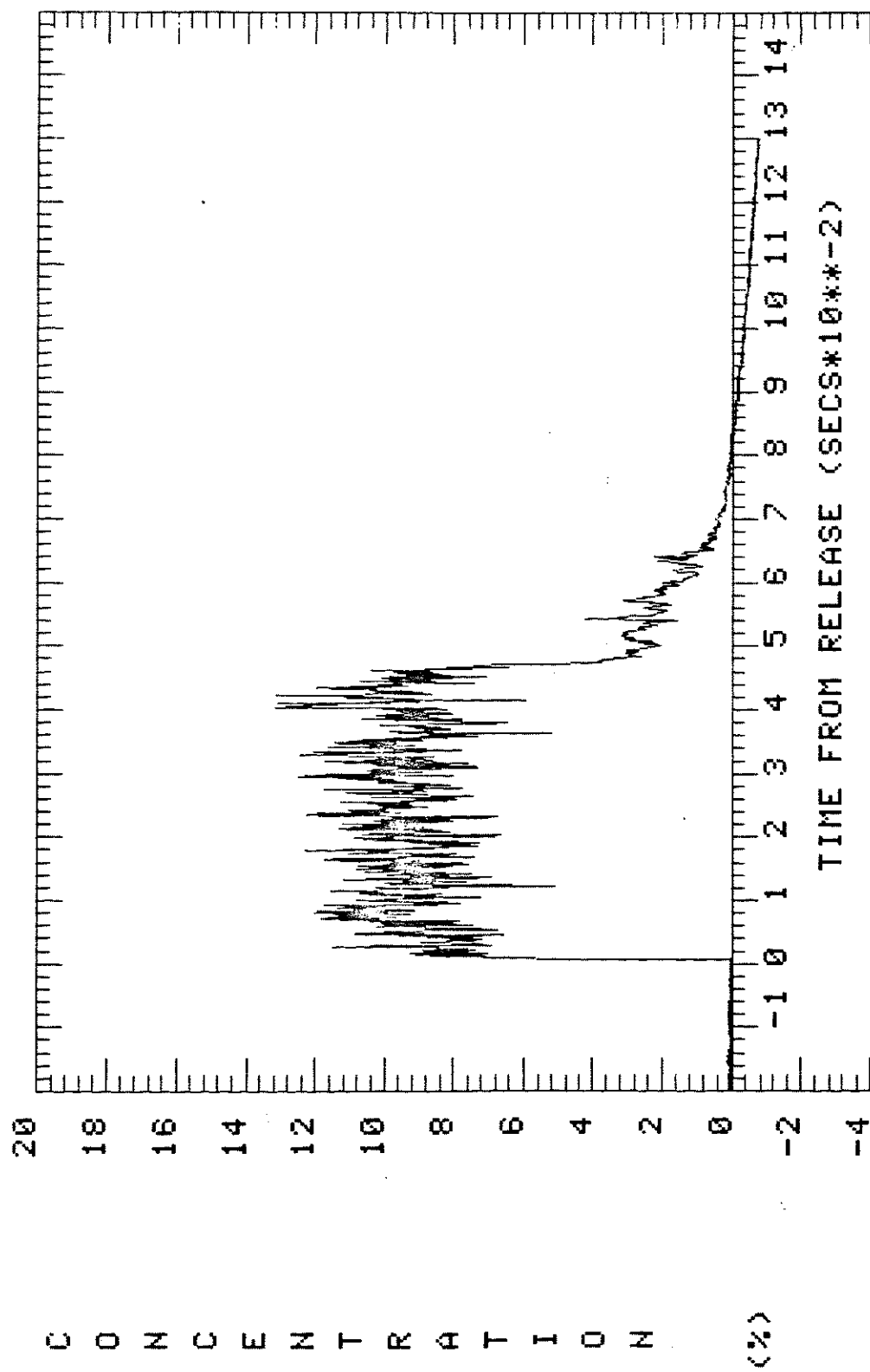
○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 202 M Z: 0.4 M

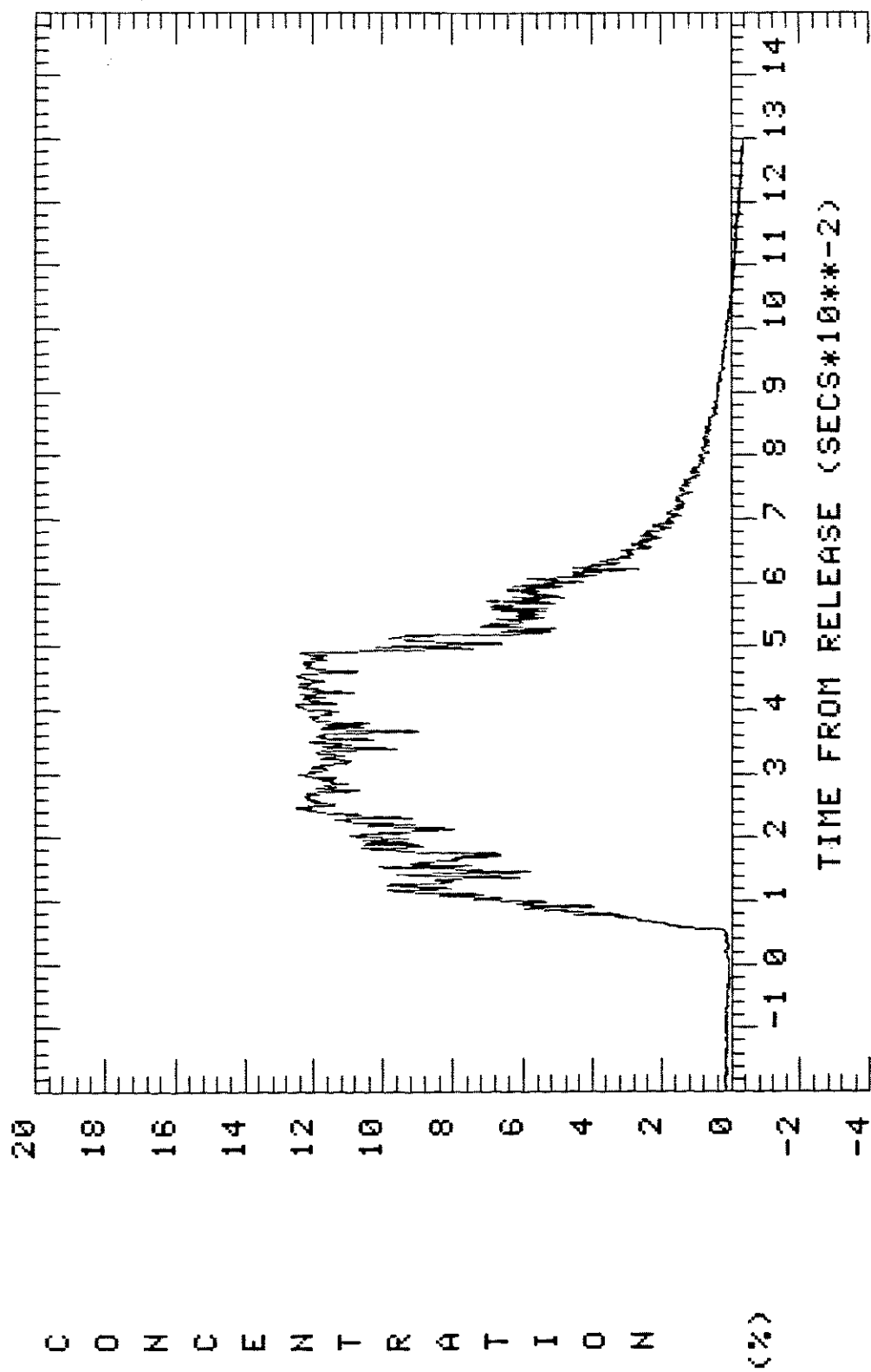
G01



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 210 M Z: 0.4 M

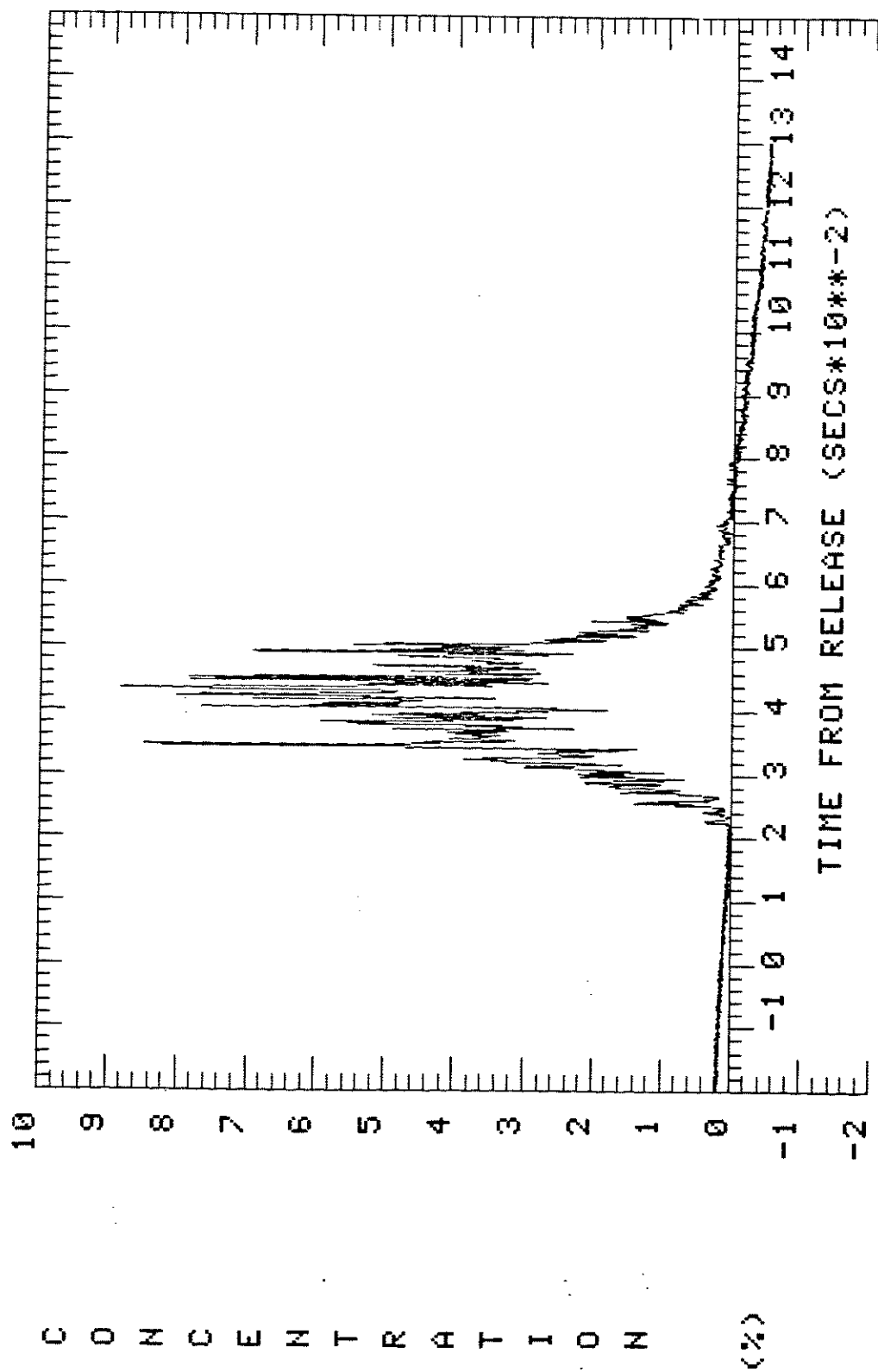
G02



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 414 M Y: 214 M Z: 0.4 M

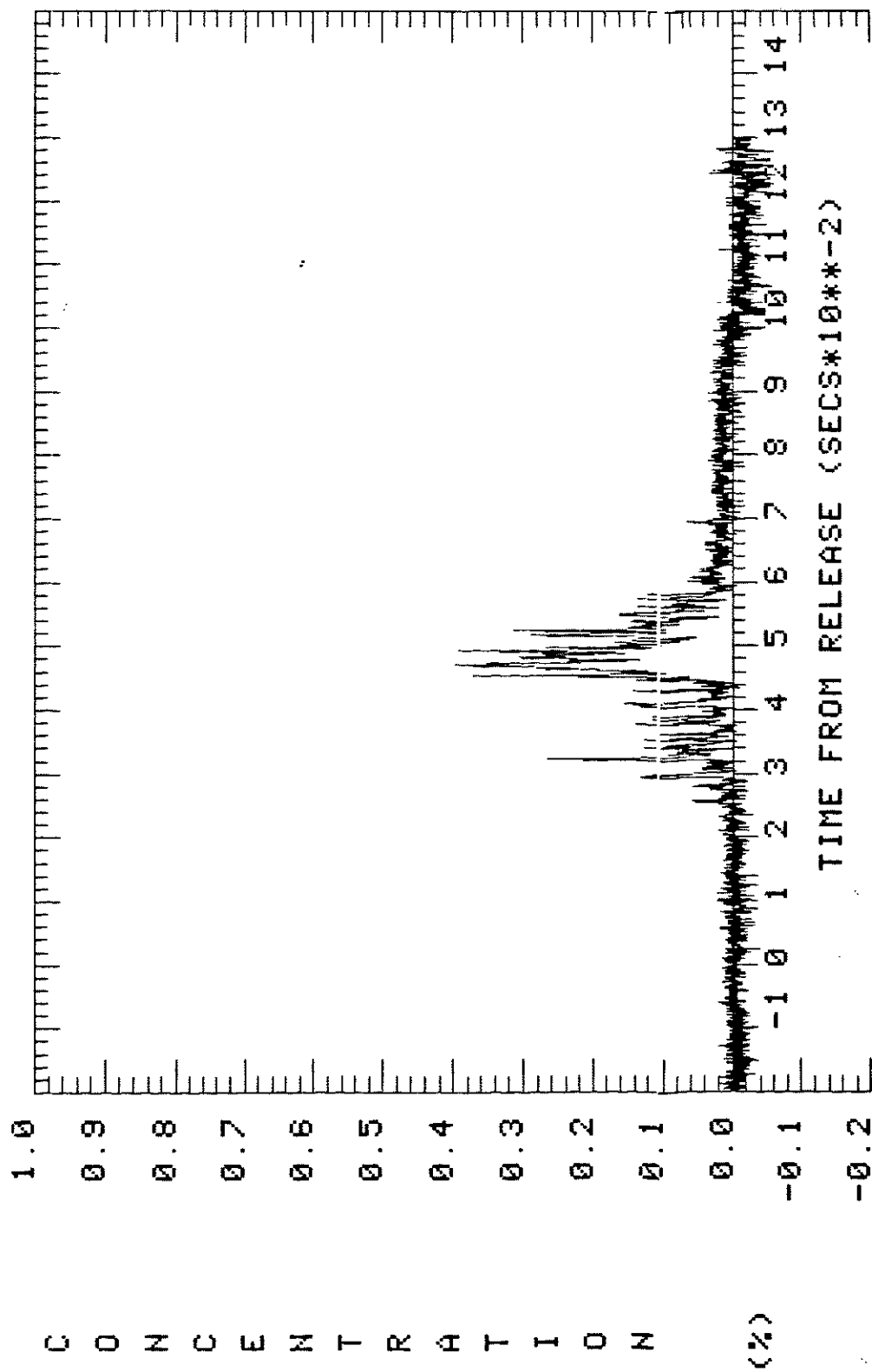
G03



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 486 M Y: 214 M Z: 0.4 M

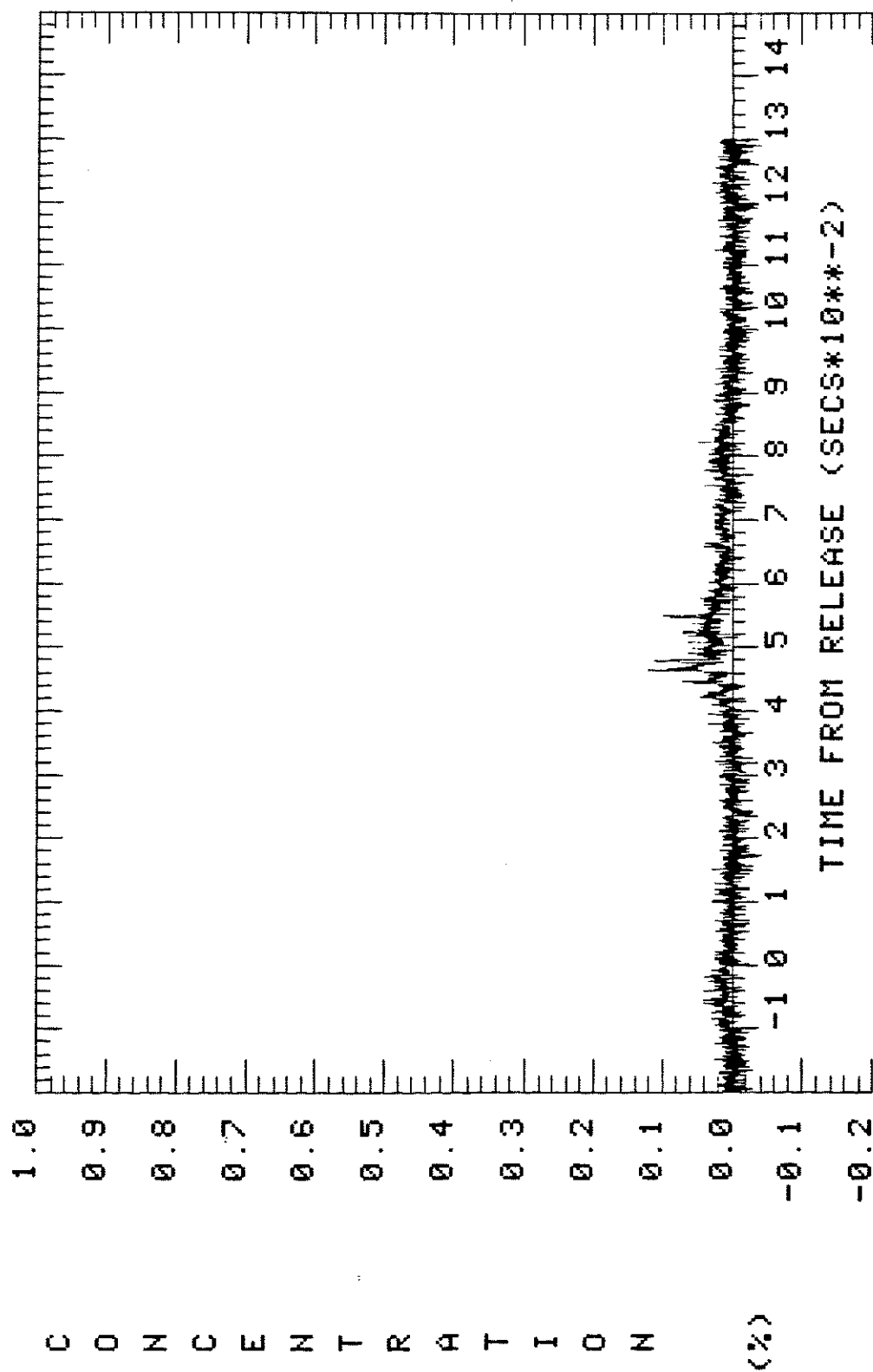
G04



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 436 M Y: 214 M Z: 1.4 M

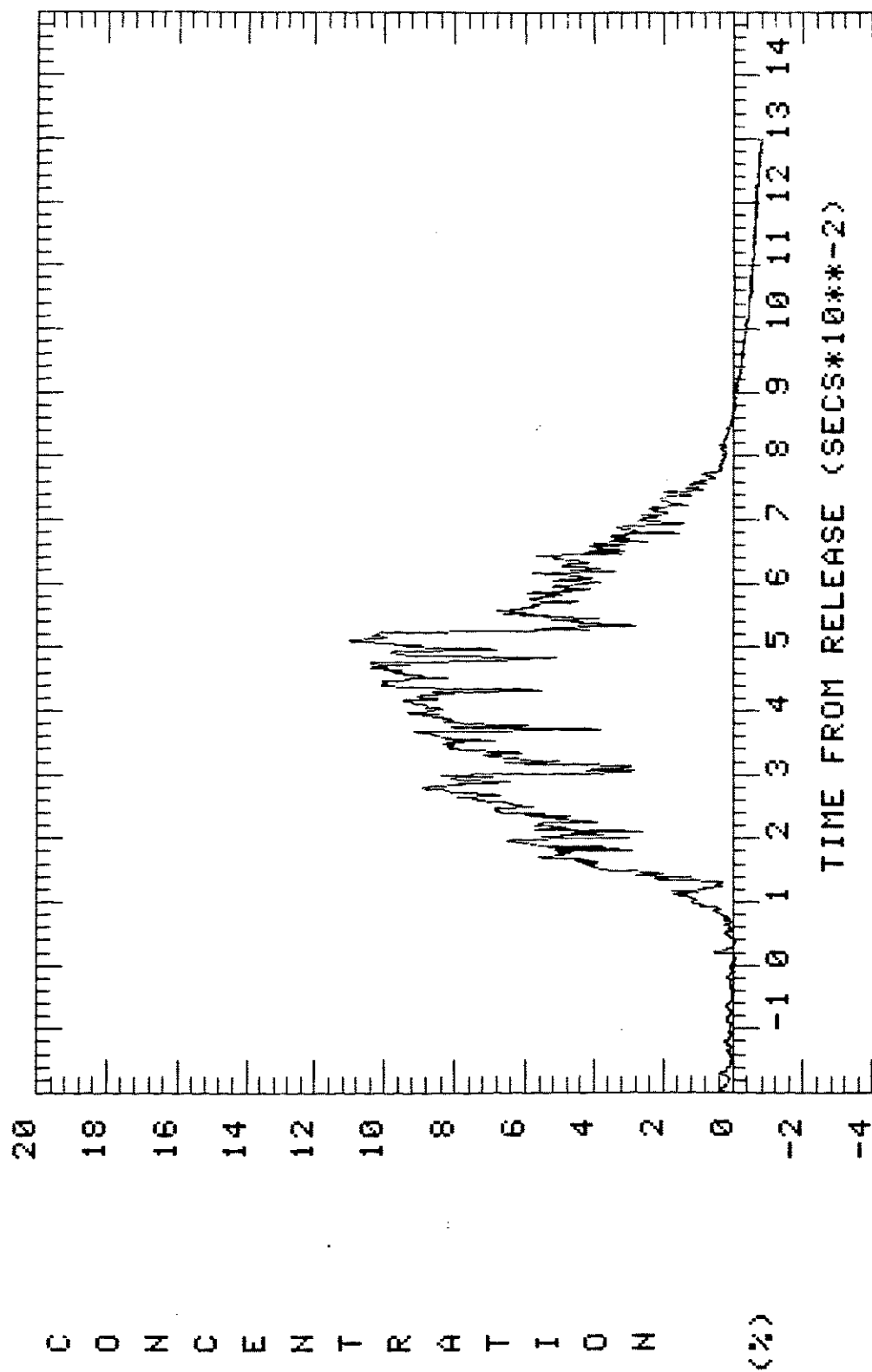
G05



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 486 M Y: 214 M Z: 2.4 M

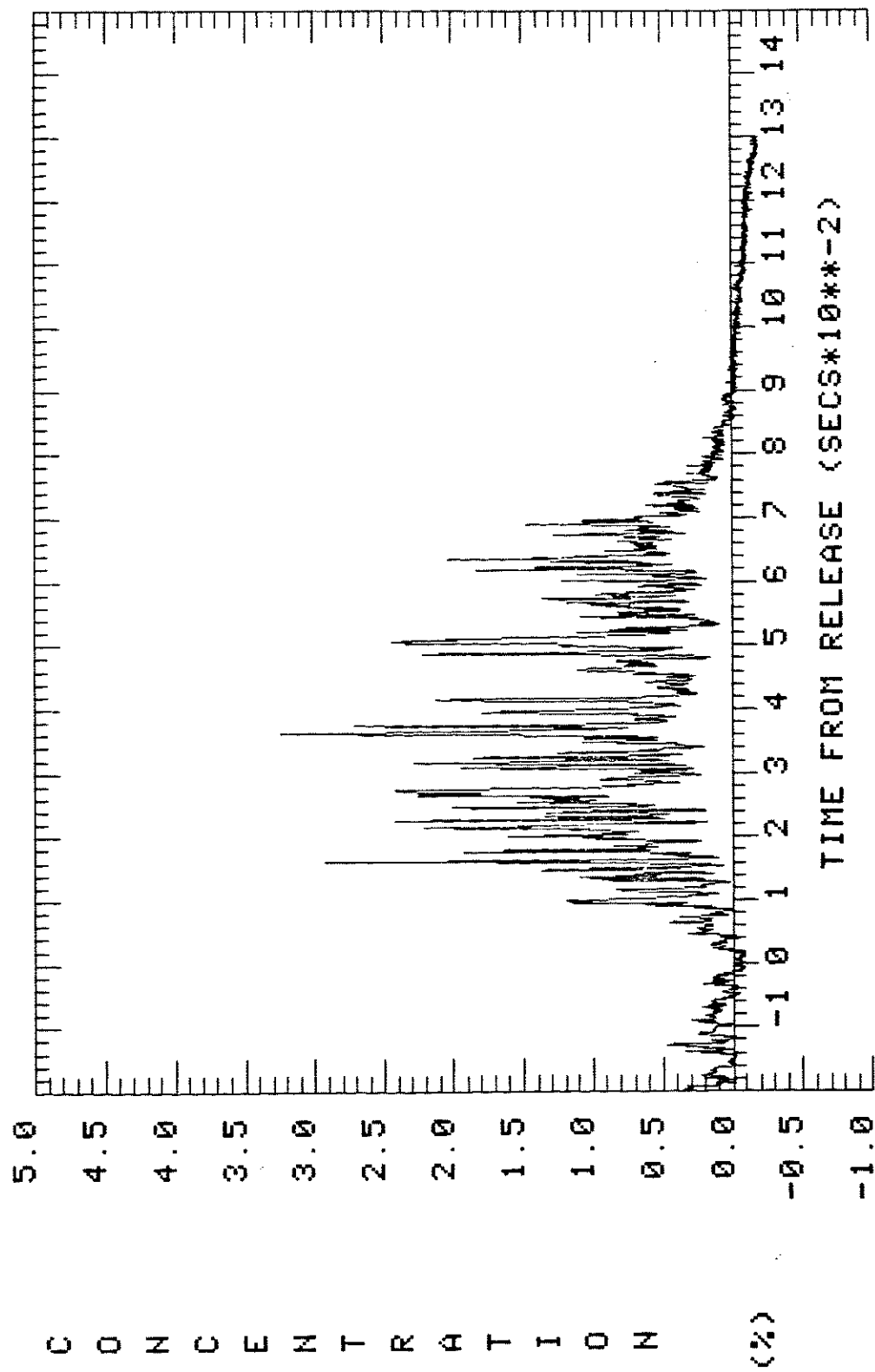
G06



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 220 M Z: 0.4 M

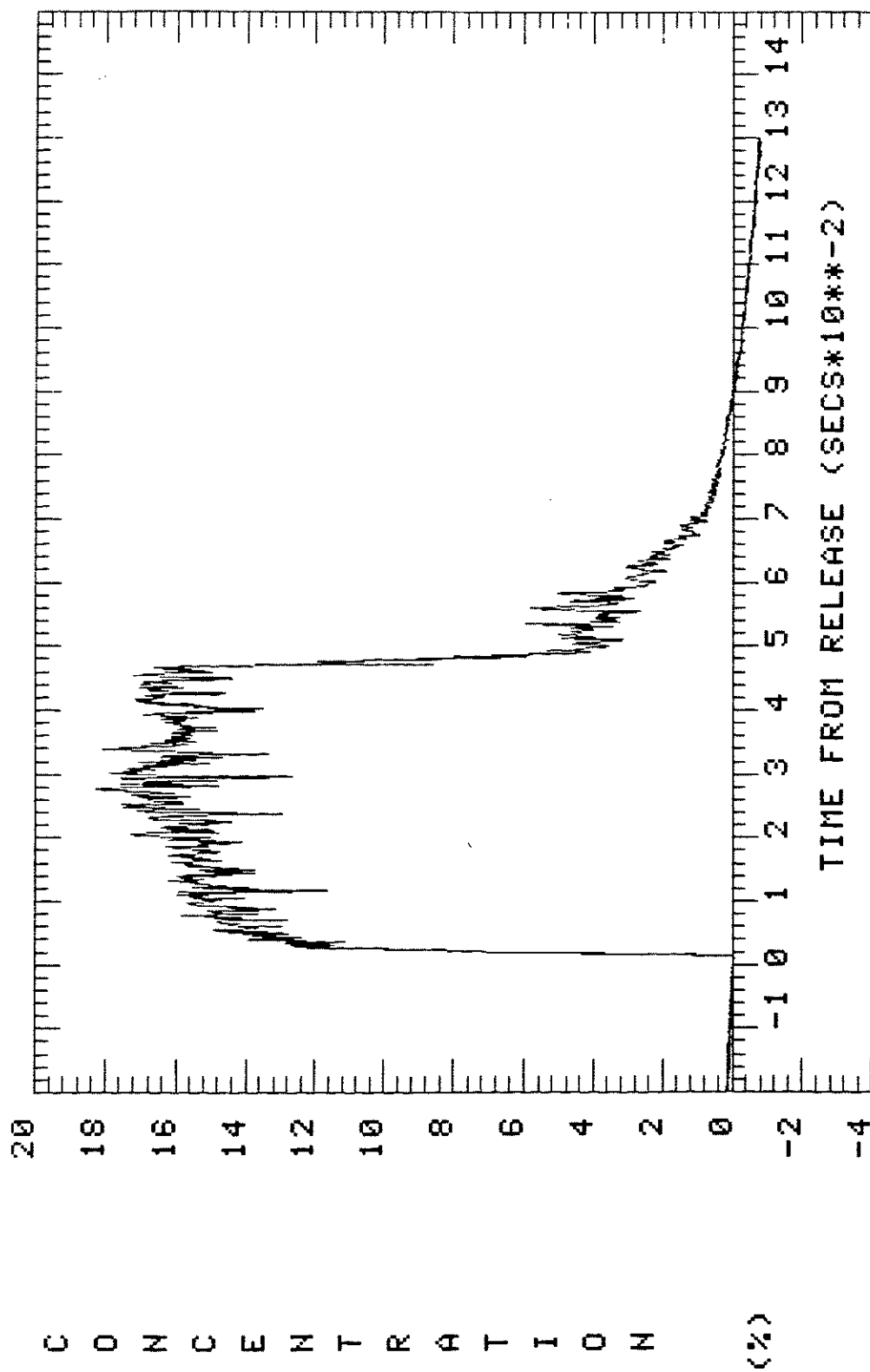
G07



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 220 M Z: 2.4 M

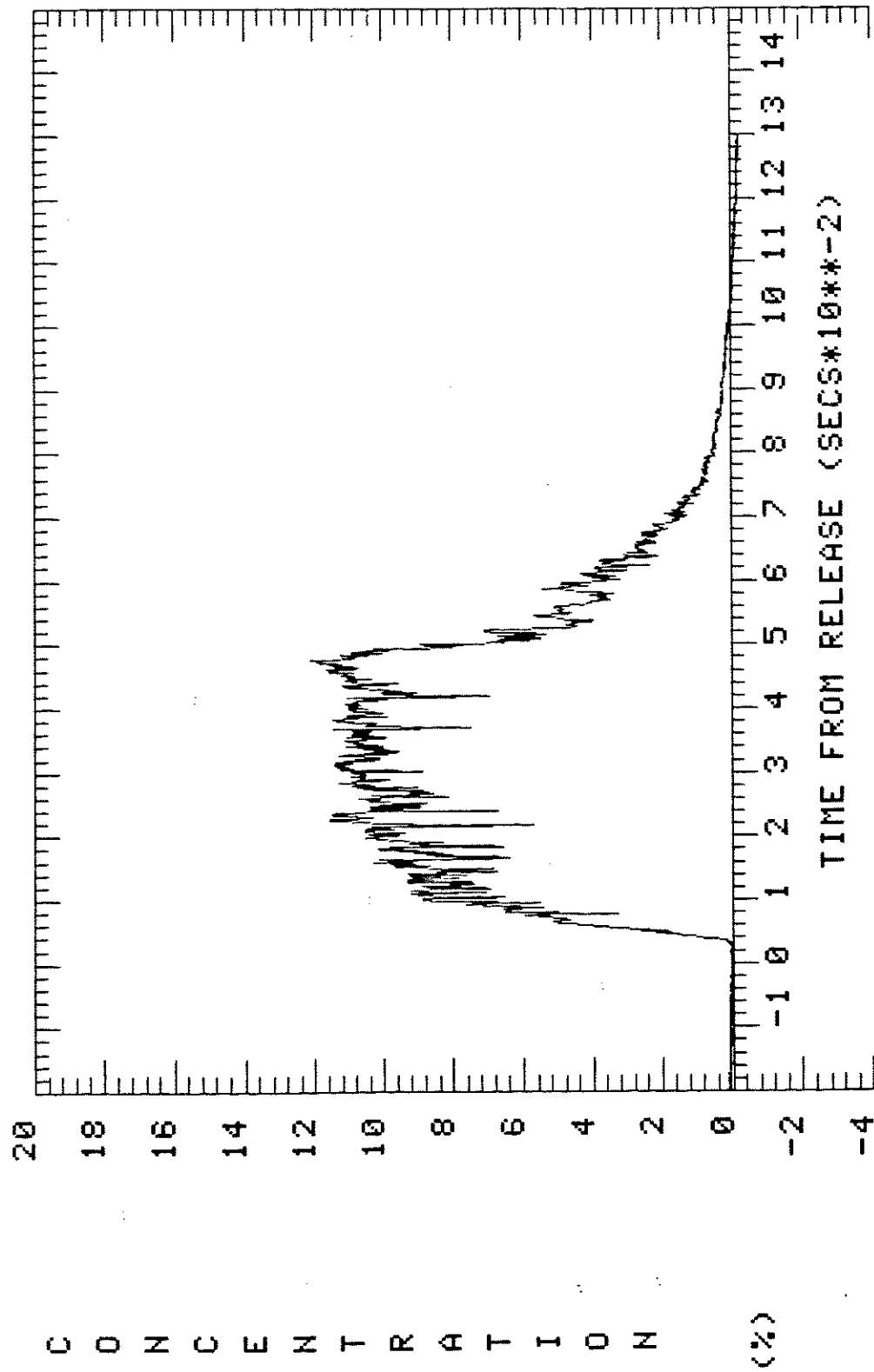
G08



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 220 M Z: 0.4 M

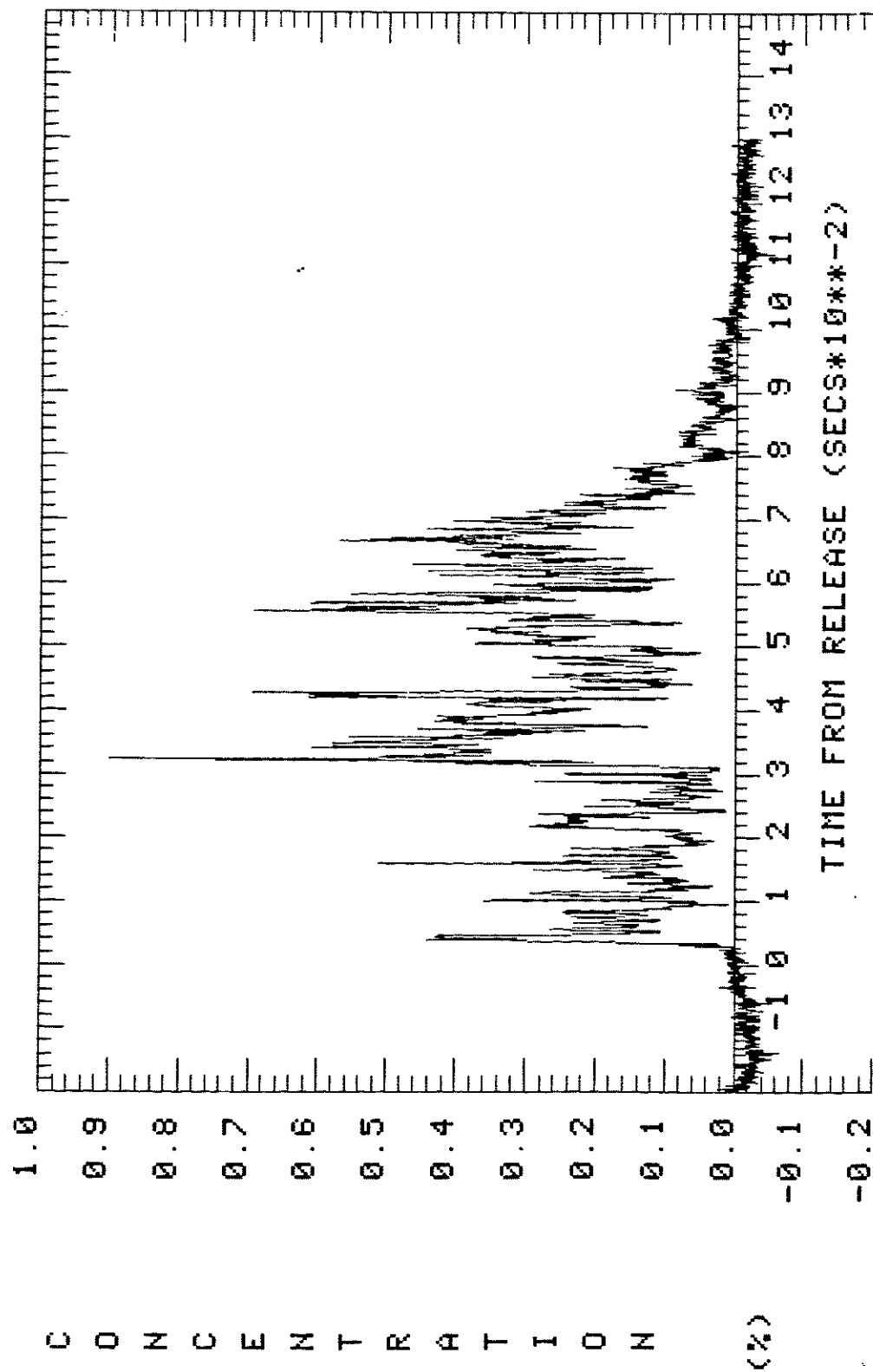
G09



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 428 M Y: 228 M Z: 0.4 M

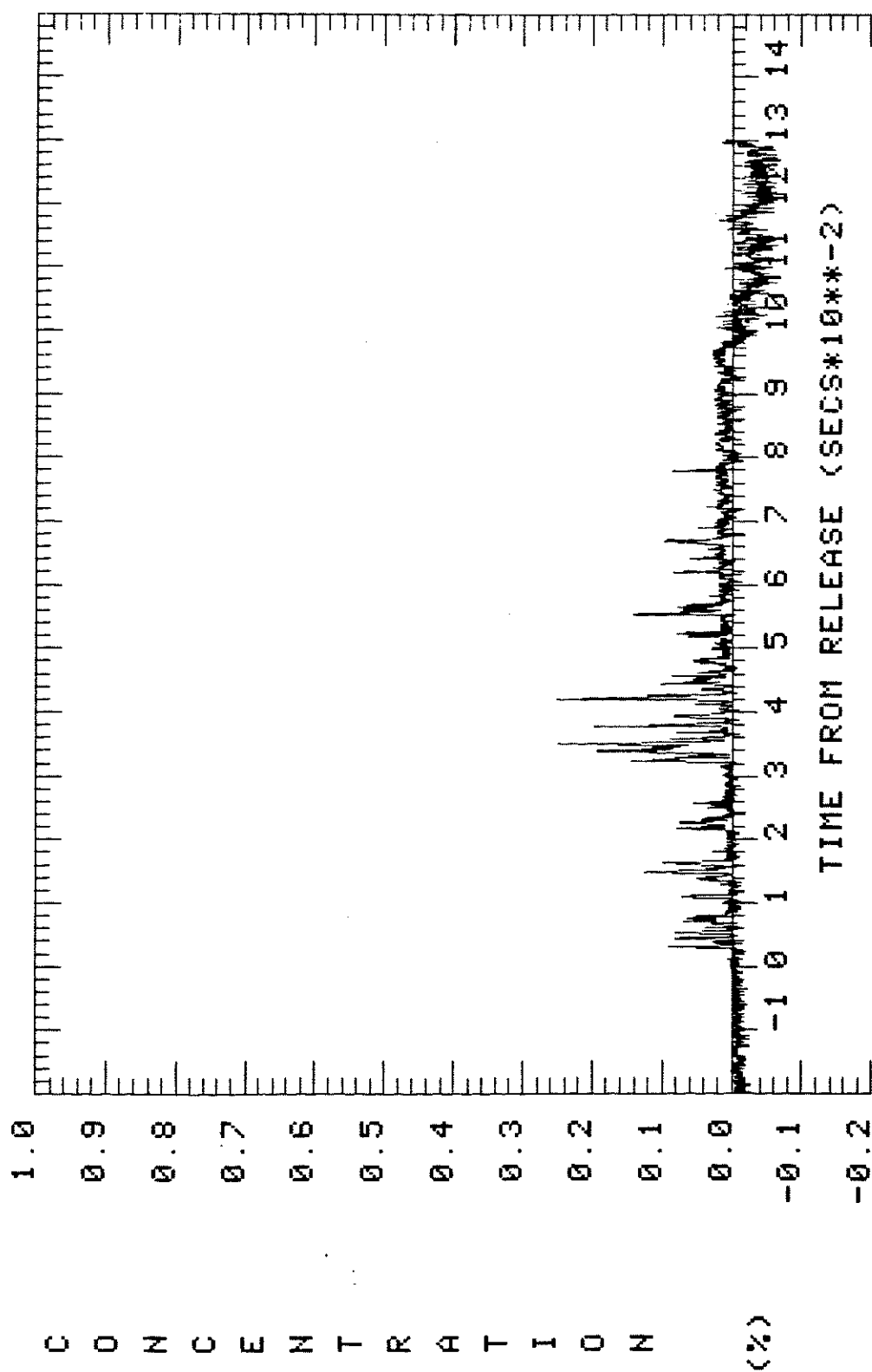
G10



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 428 M Y: 228 M Z: 1.4 M

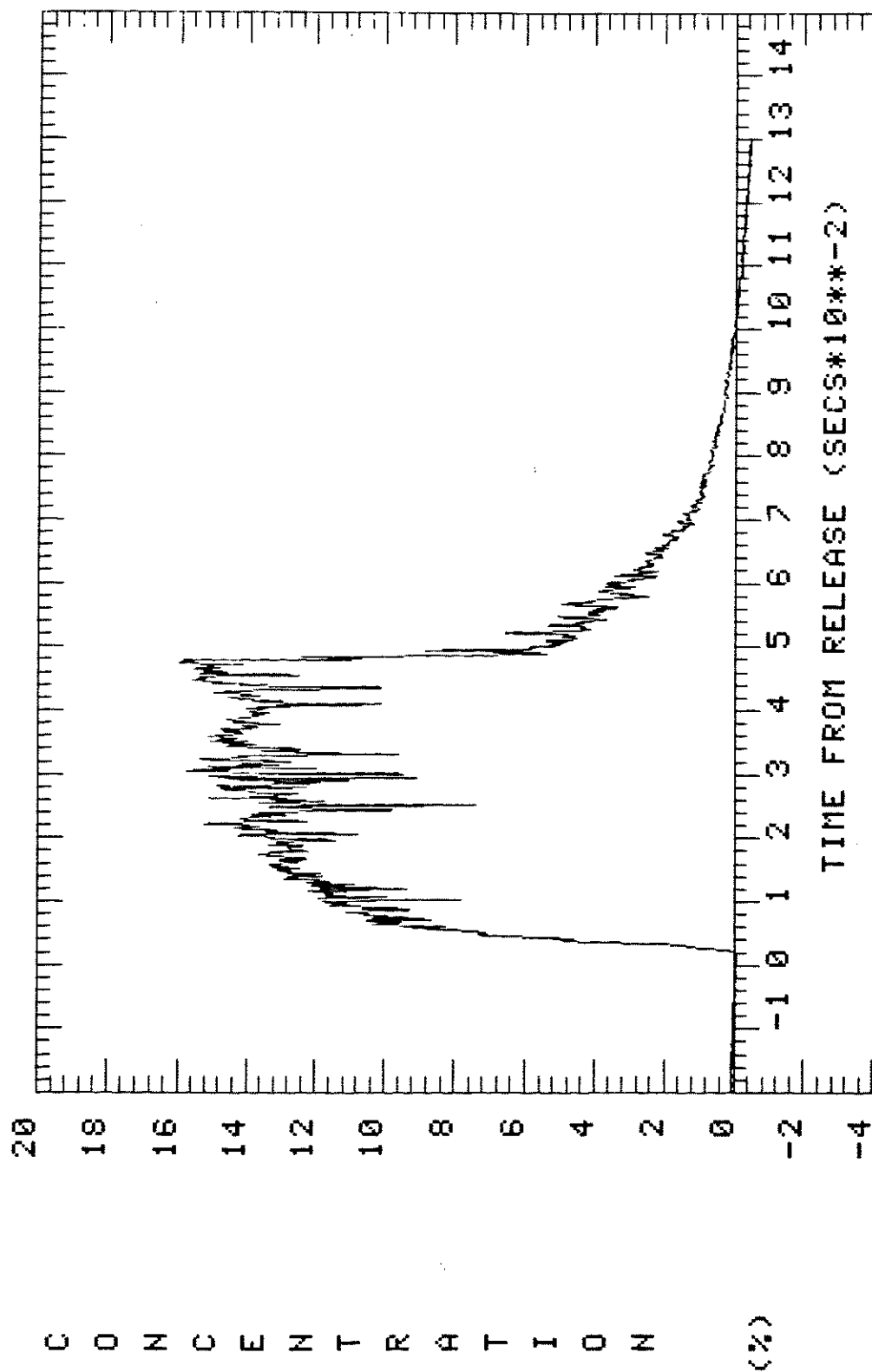
G11



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

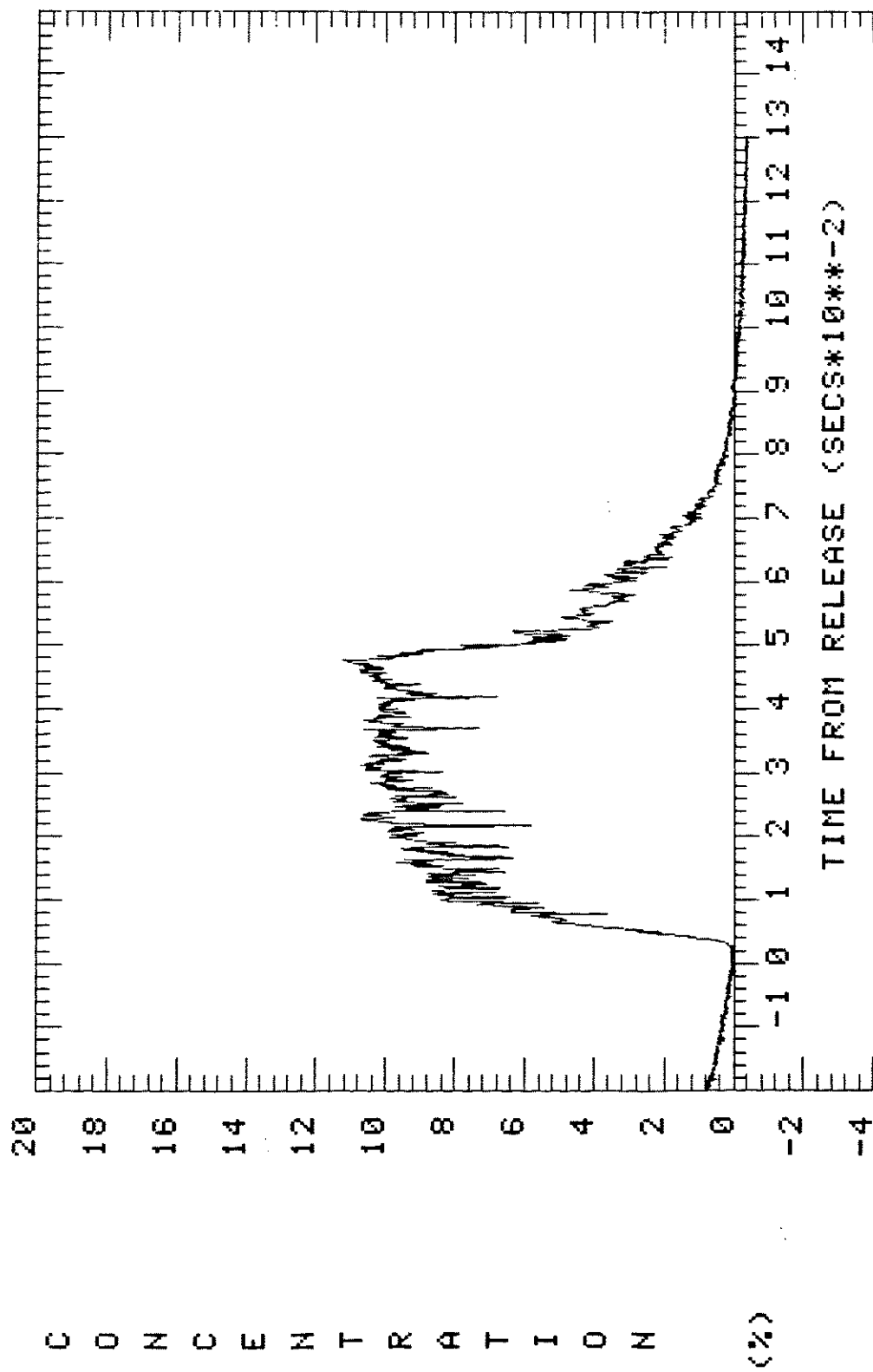
X: 428 M Y: 228 M Z: 2.4 M

G12



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

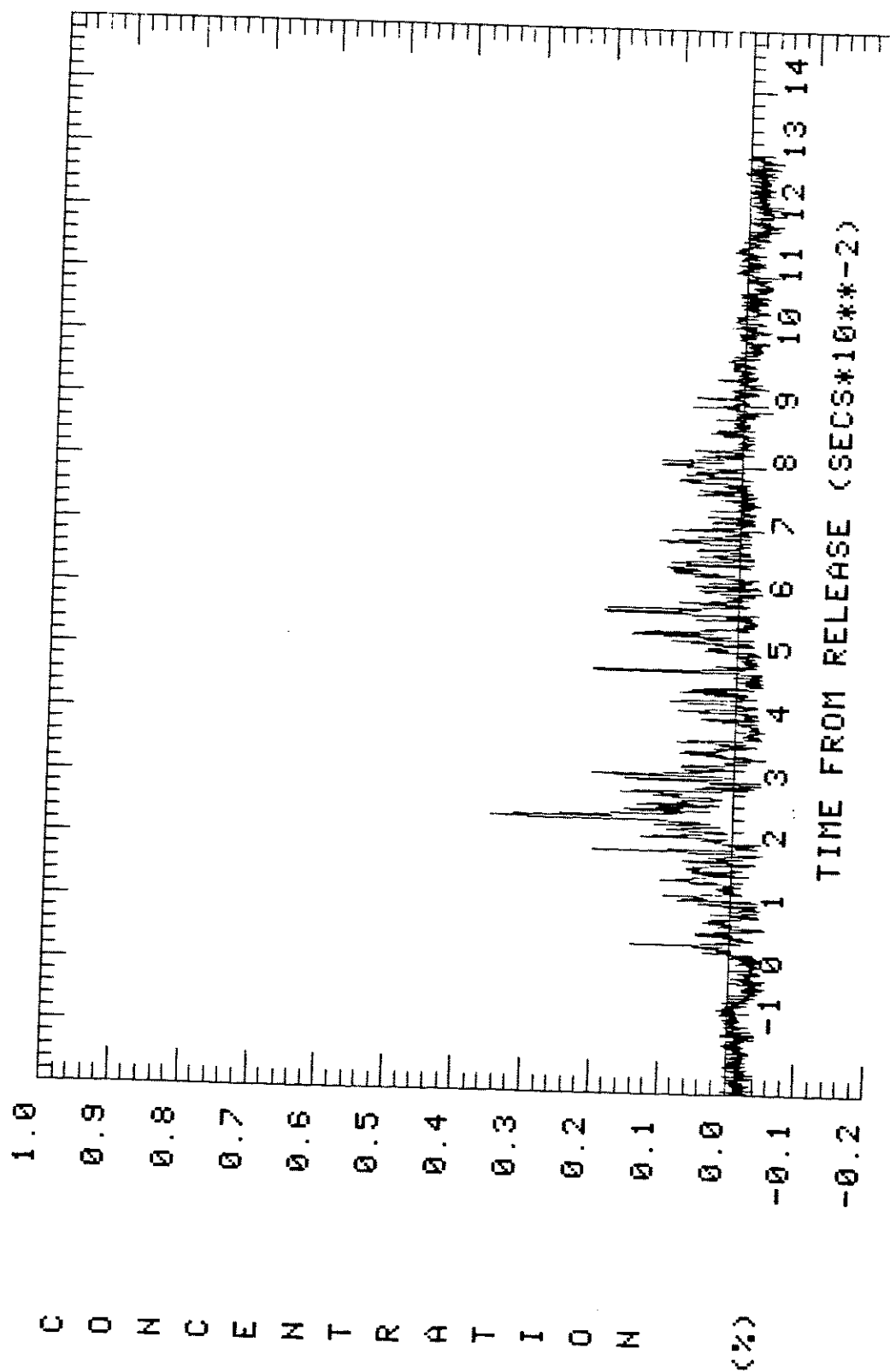
X: 450 M Y: 228 M Z: 0.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

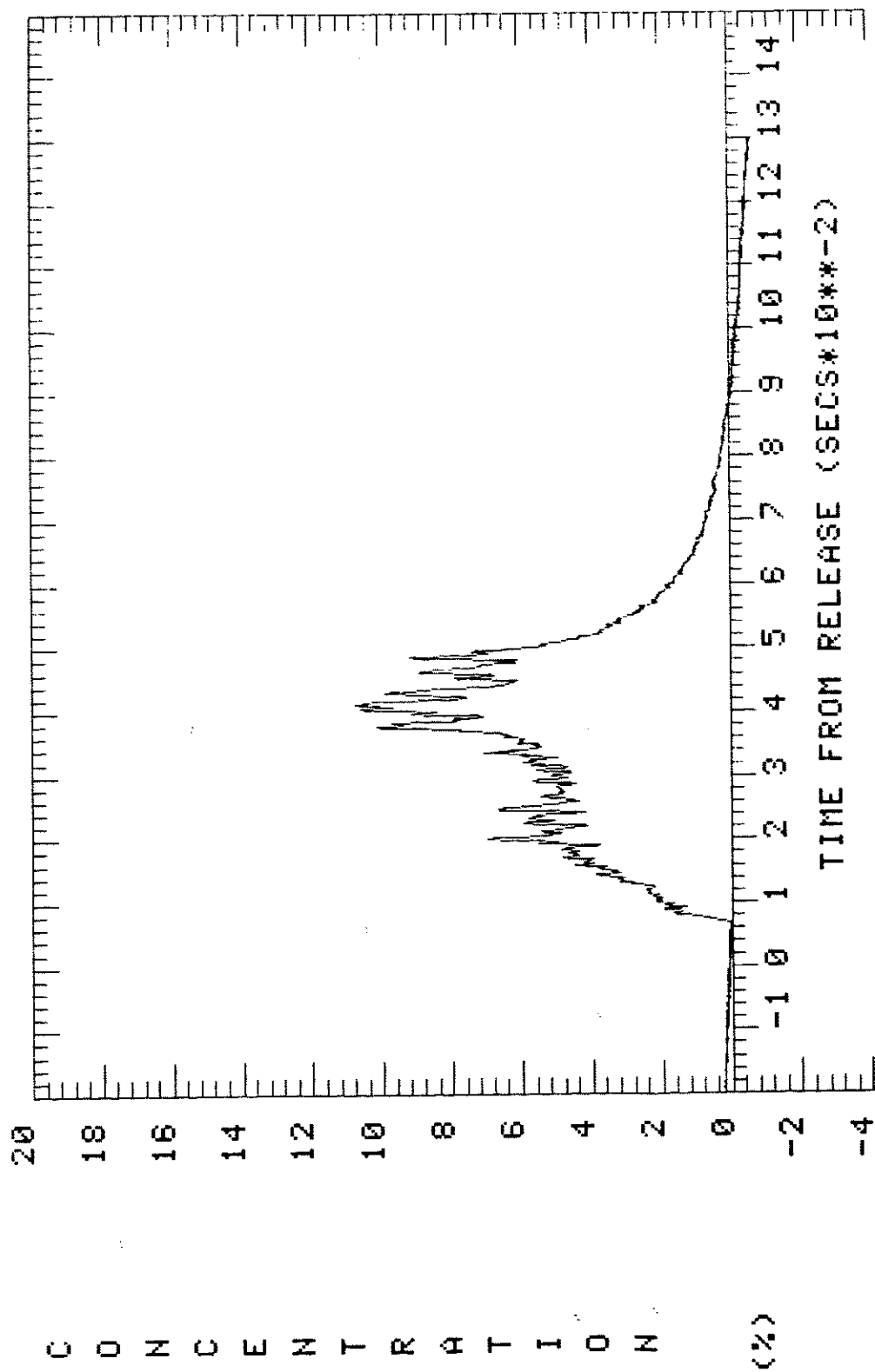
X: 450 M Y: 228 M Z: 1.4 M

G14



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

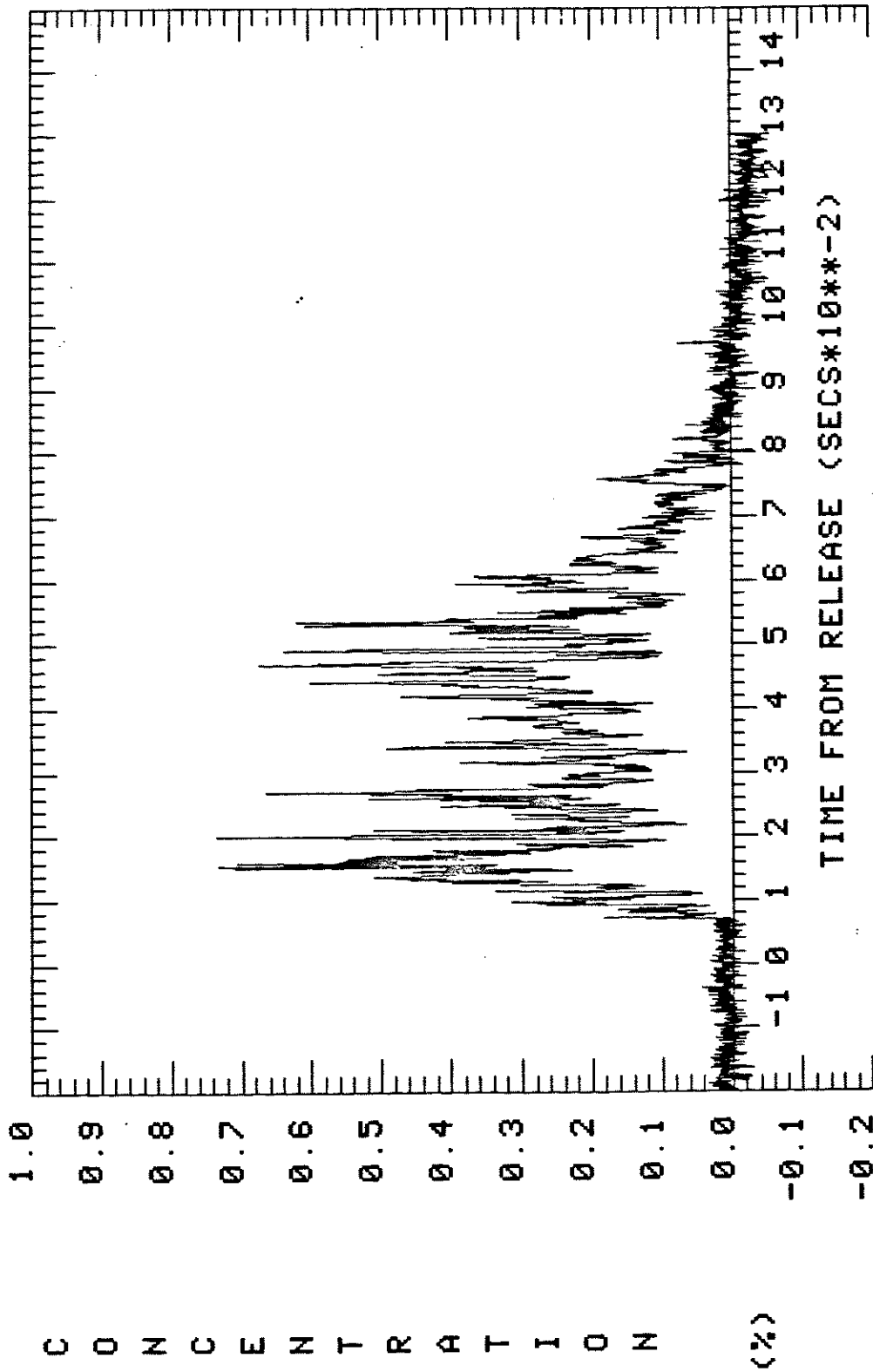
X: 450 M Y: 228 M Z: 2.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

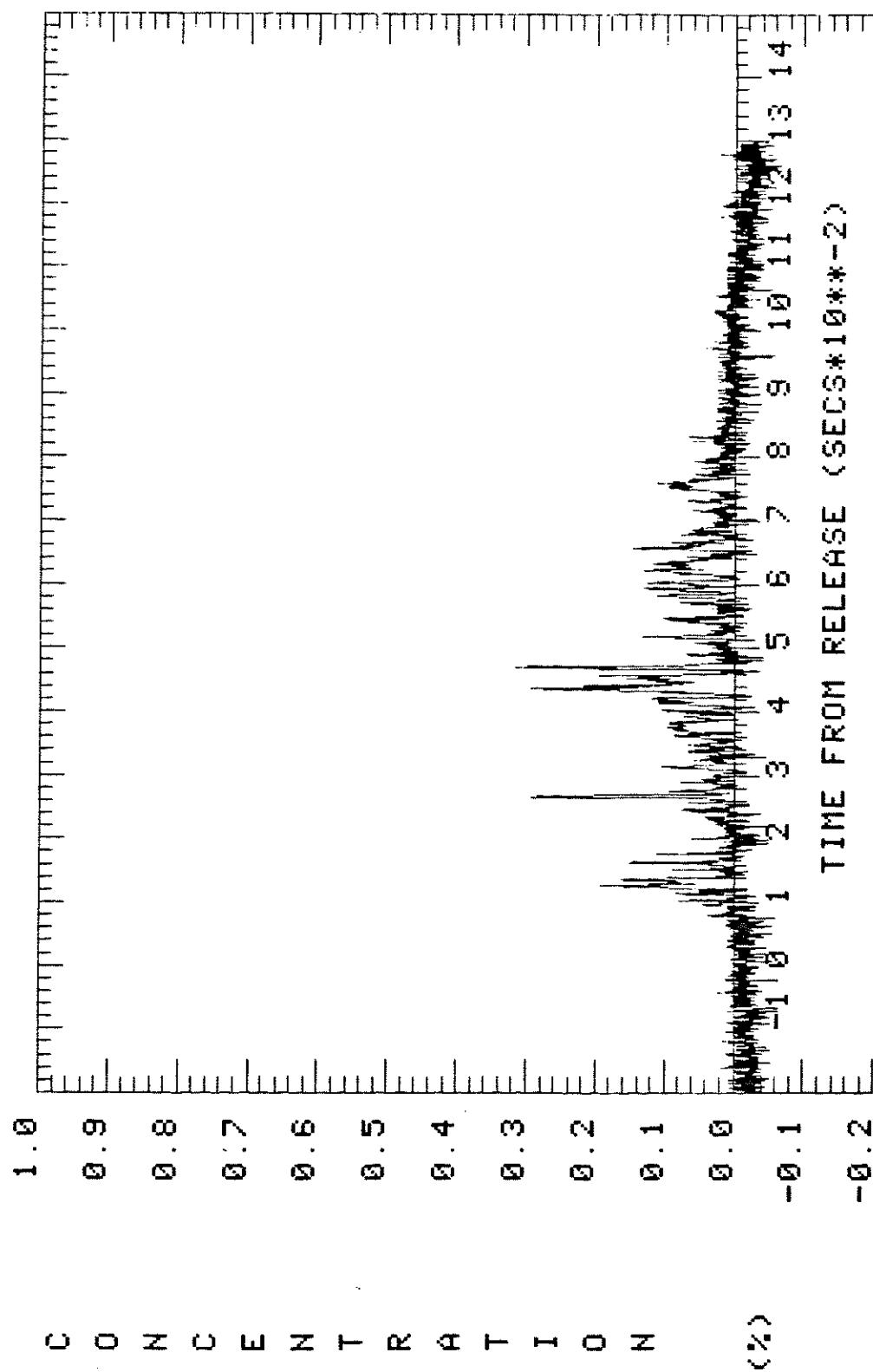
X: 472 M Y: 228 M Z: 0.4 M

G16



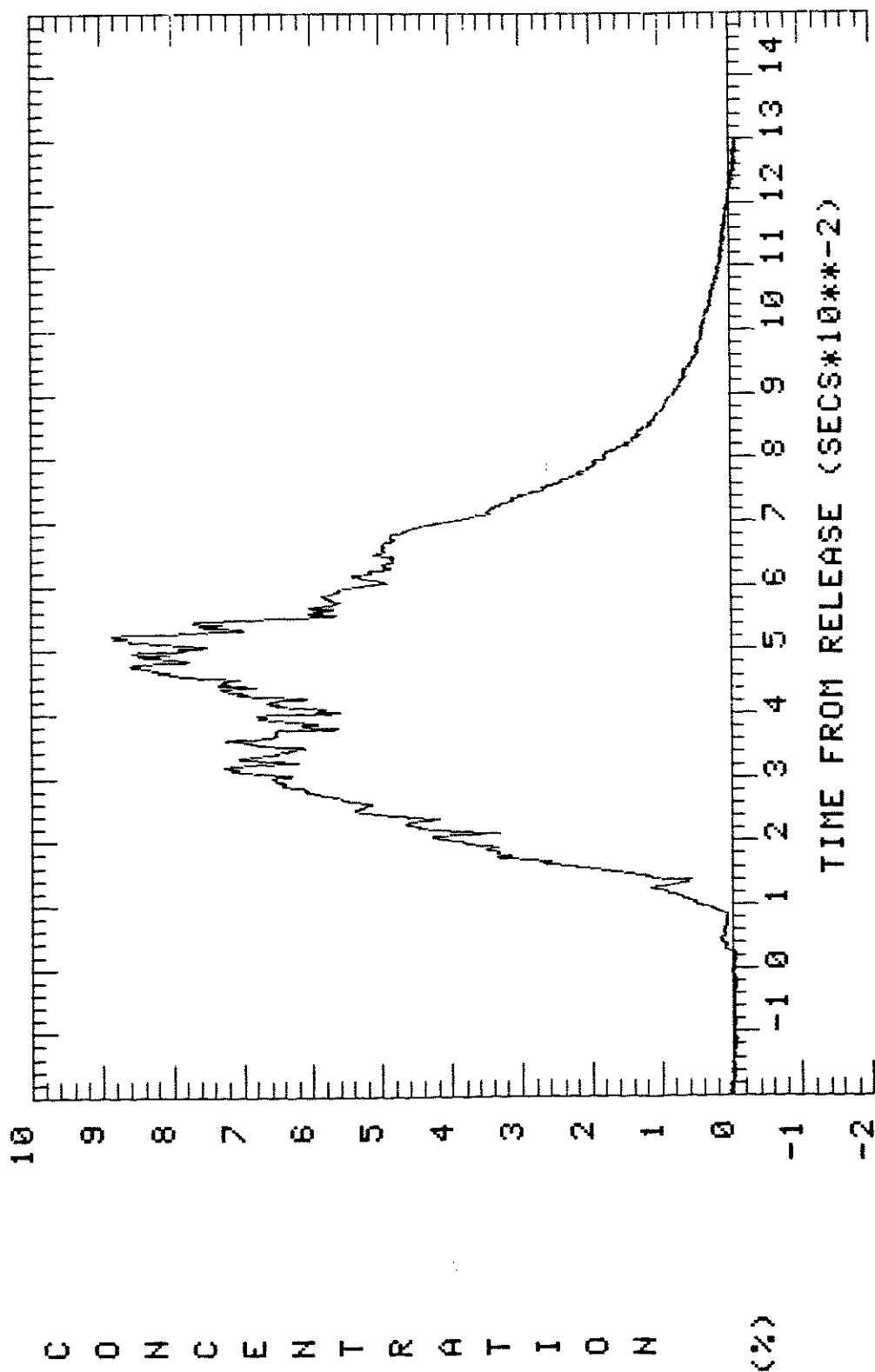
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 472 M Y: 228 M Z: 1.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

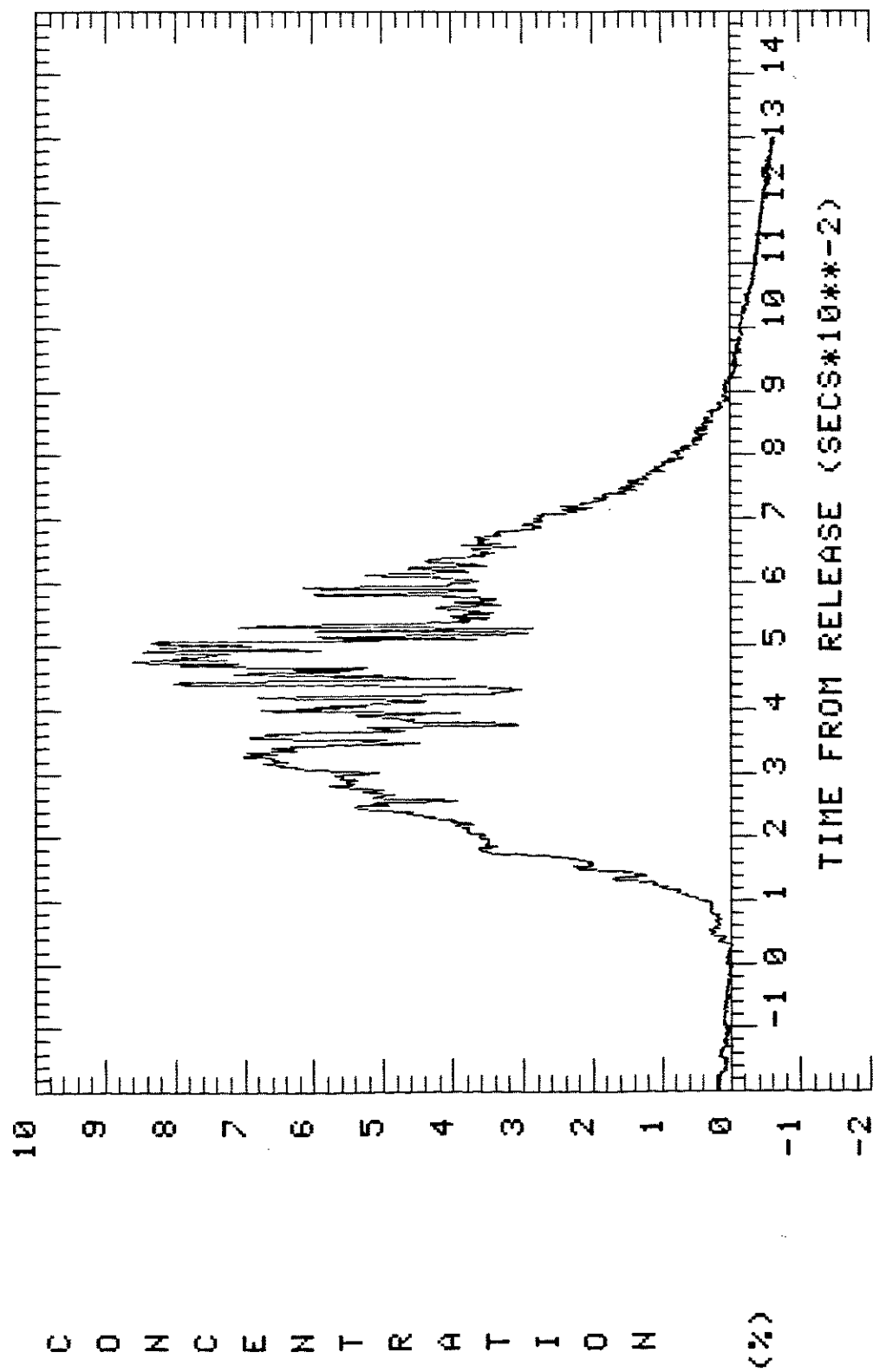
X: 472 M Y: 228 M Z: 2.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 230 M Z: 0.4 M

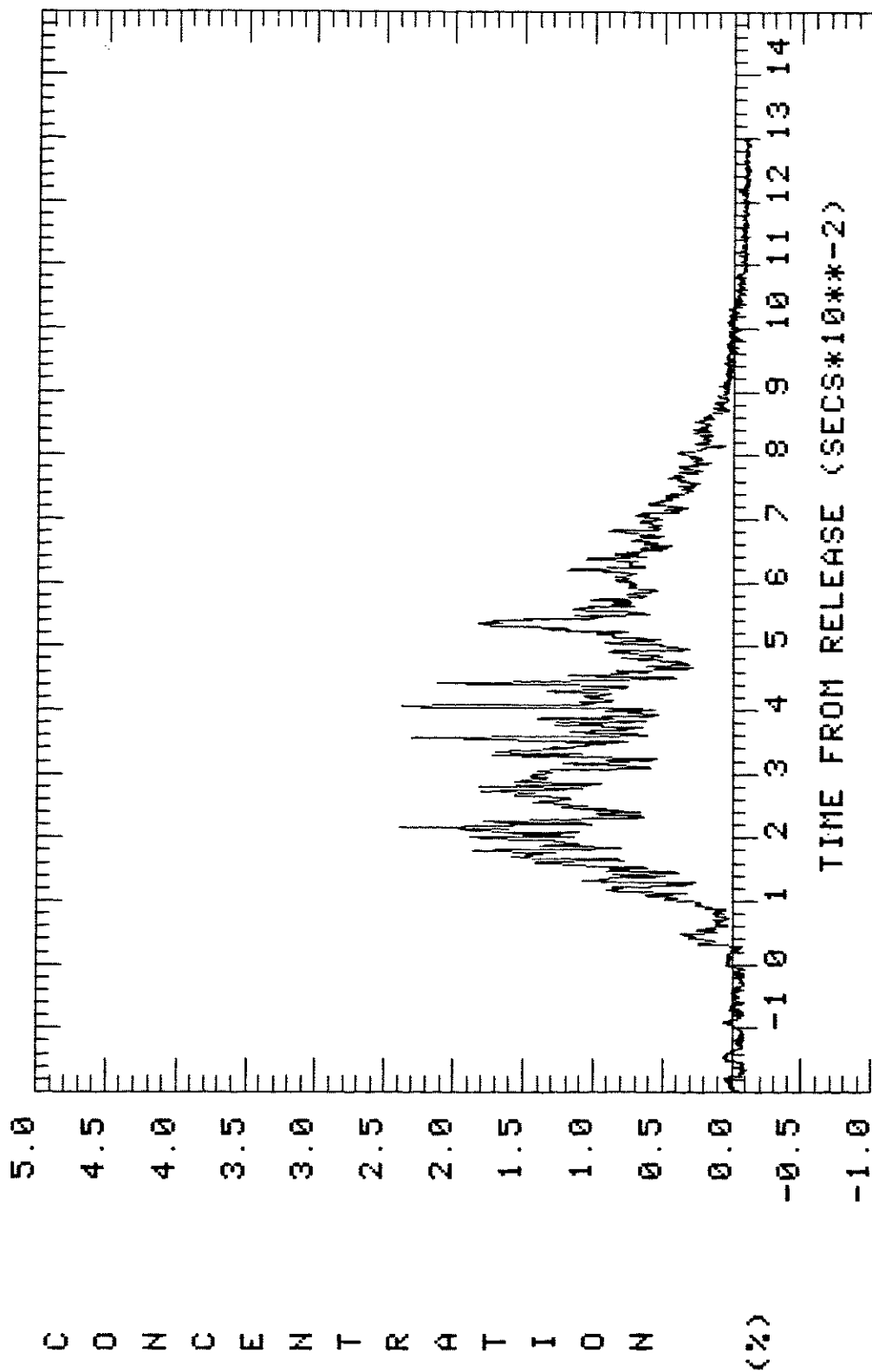
G19



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 240 M Z: 0.4 M

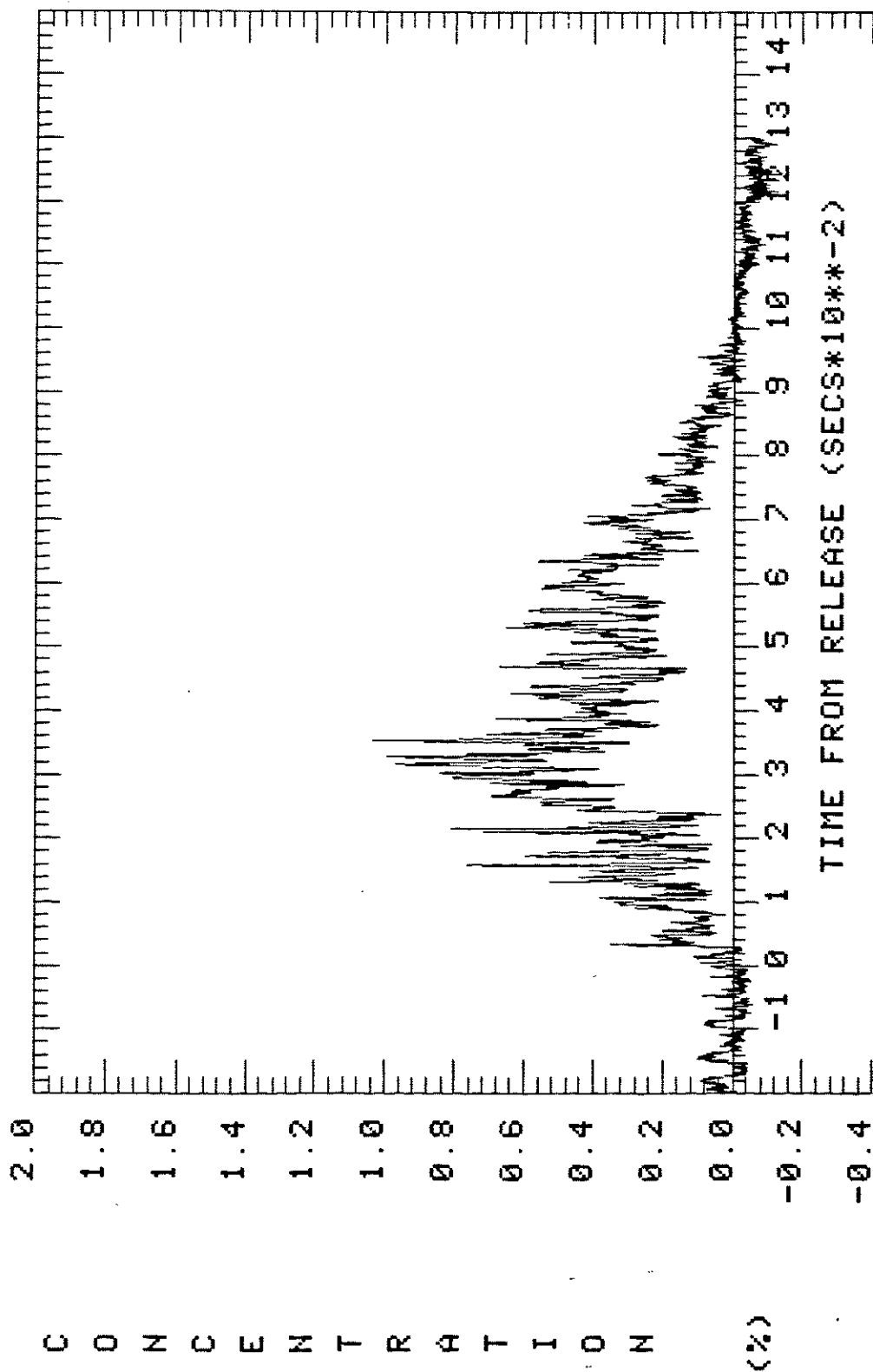
G20



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 240 M Z: 1.4 M

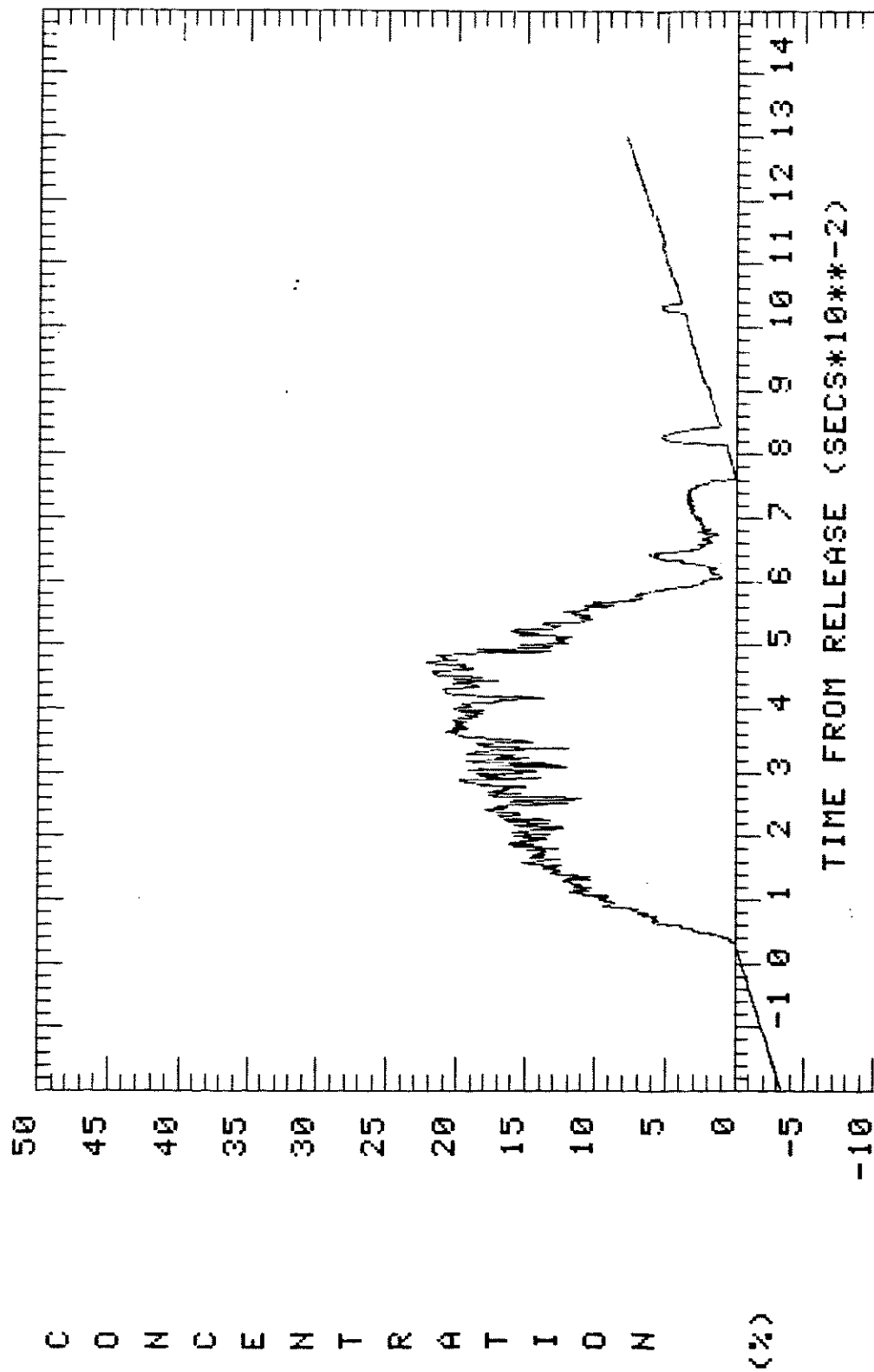
G21



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 240 M Z: 2.4 M

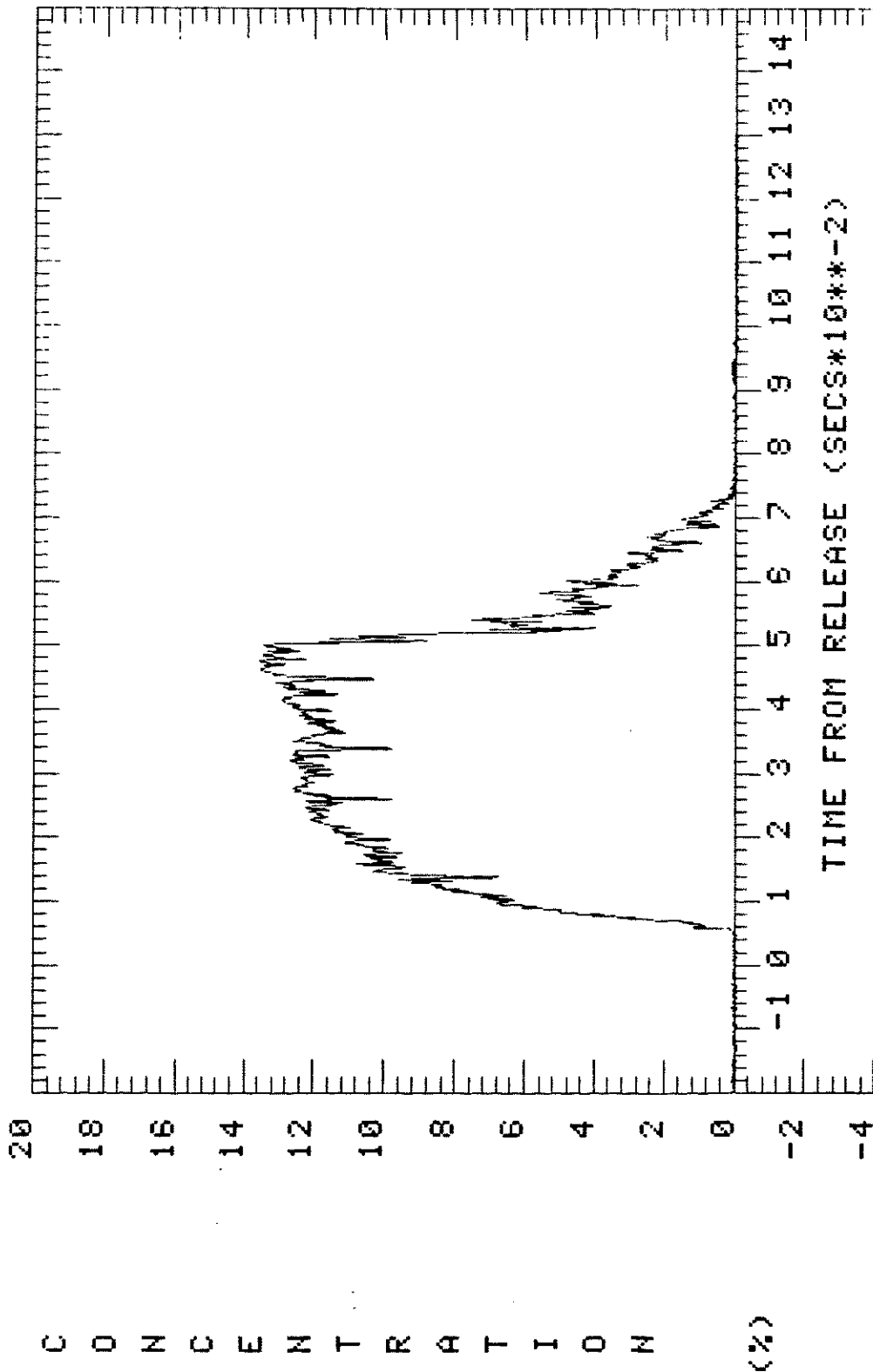
G22



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

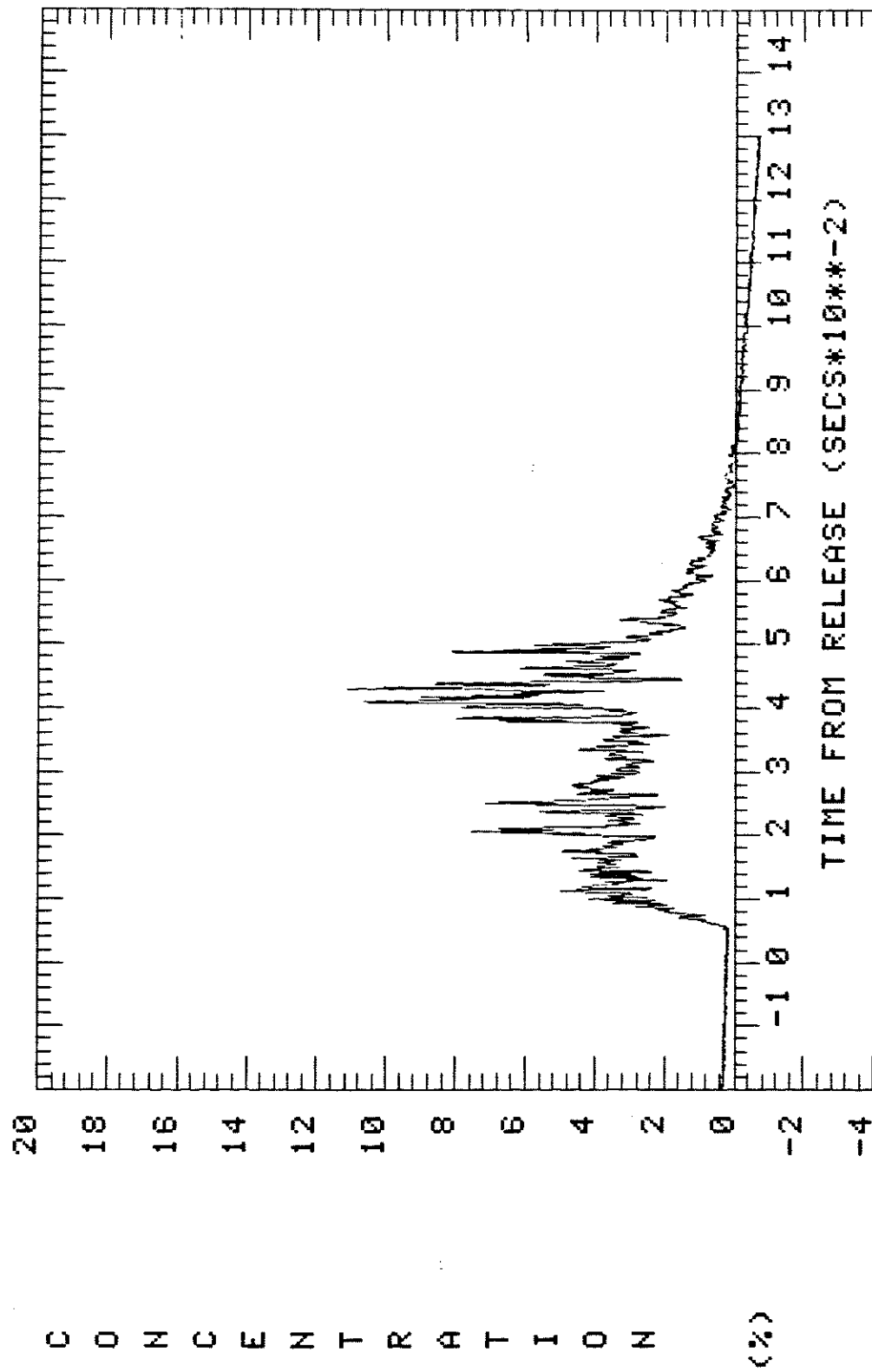
X: 450 M Y: 240 M Z: 0.4 M

G23



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

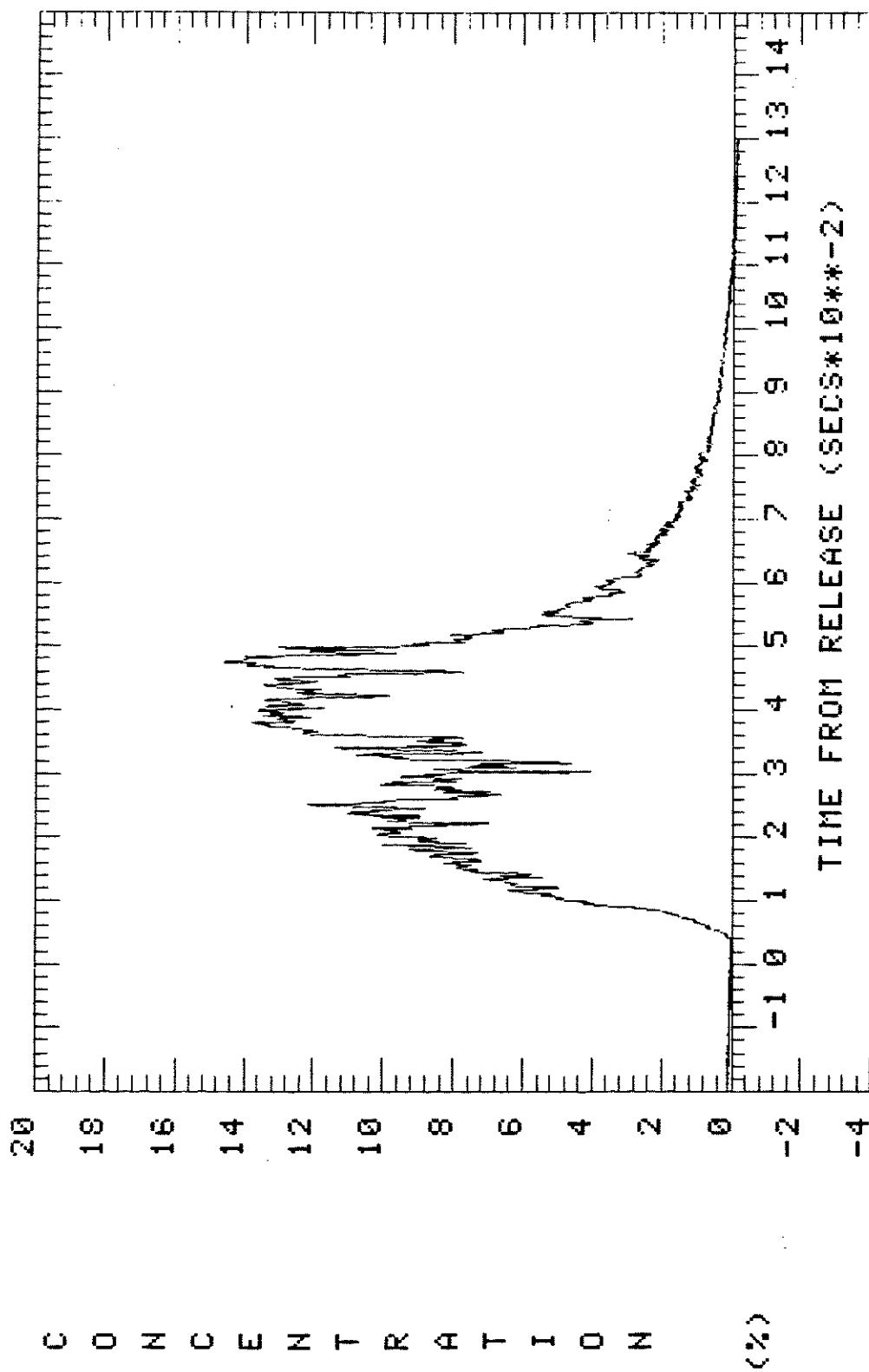
X: 428 M Y: 248 M Z: 0.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

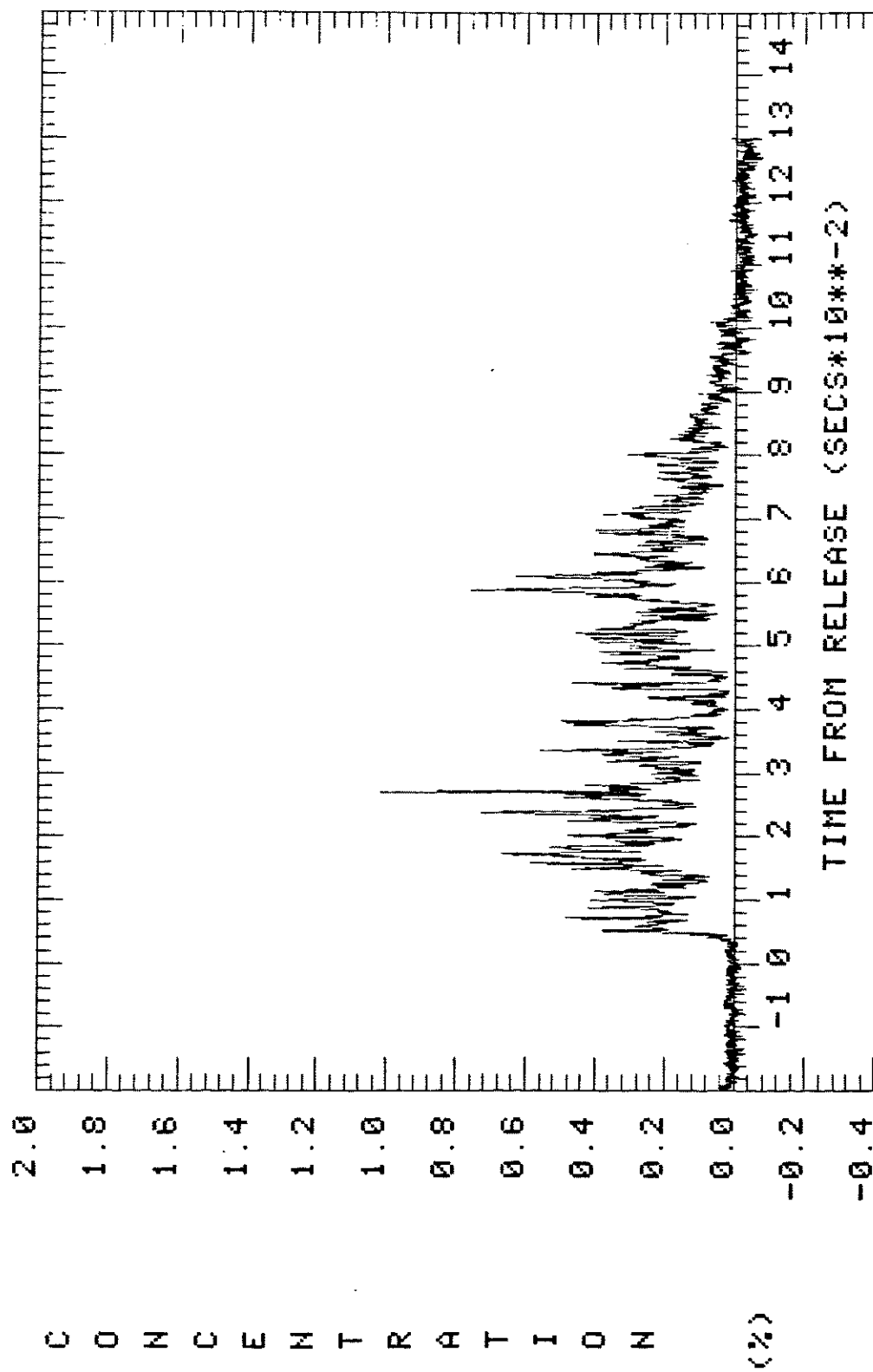
X: 472 M Y: 248 M Z: 0.4 M

G25



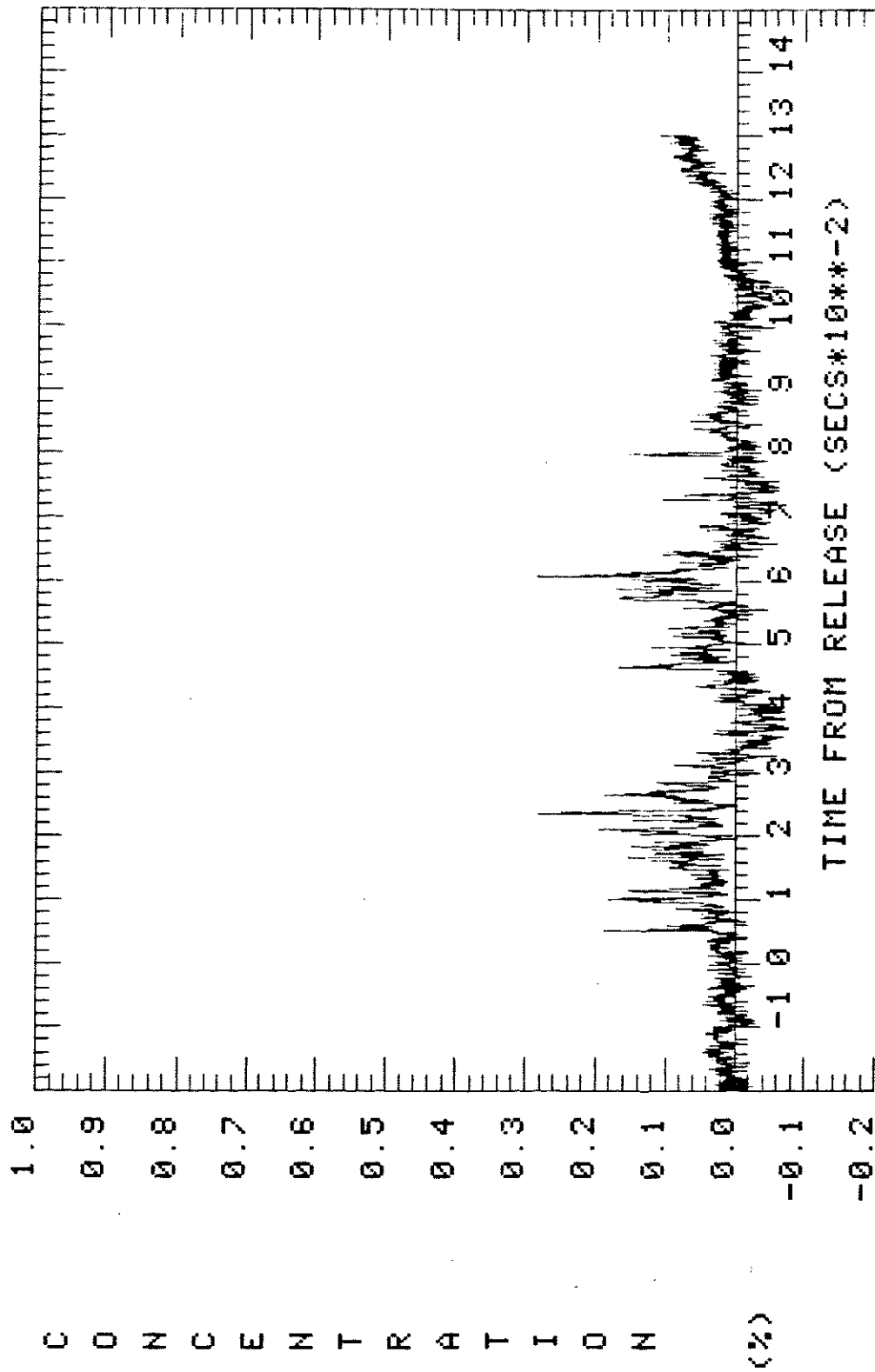
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



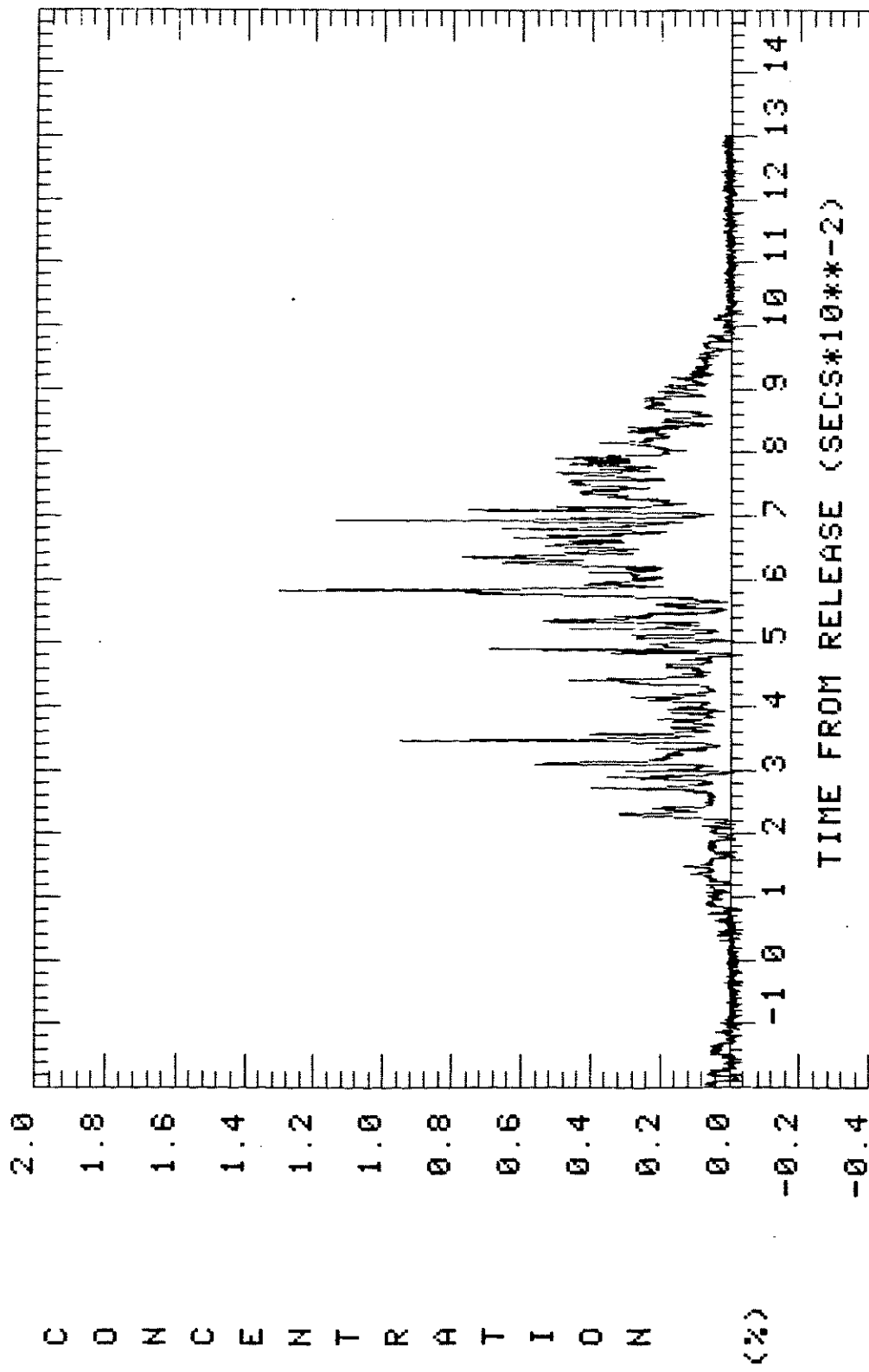
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 250 M Z: 1.4 M



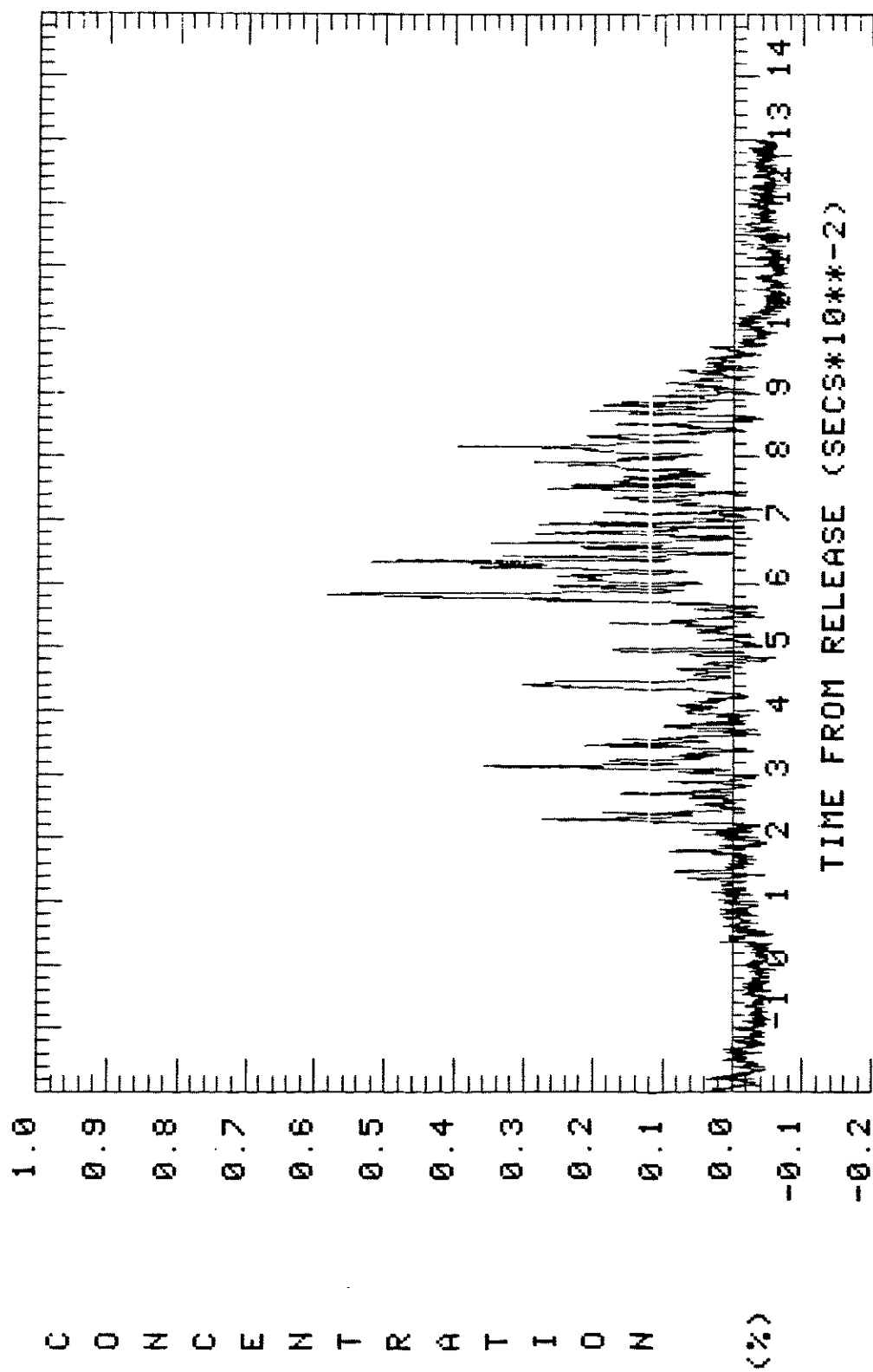
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

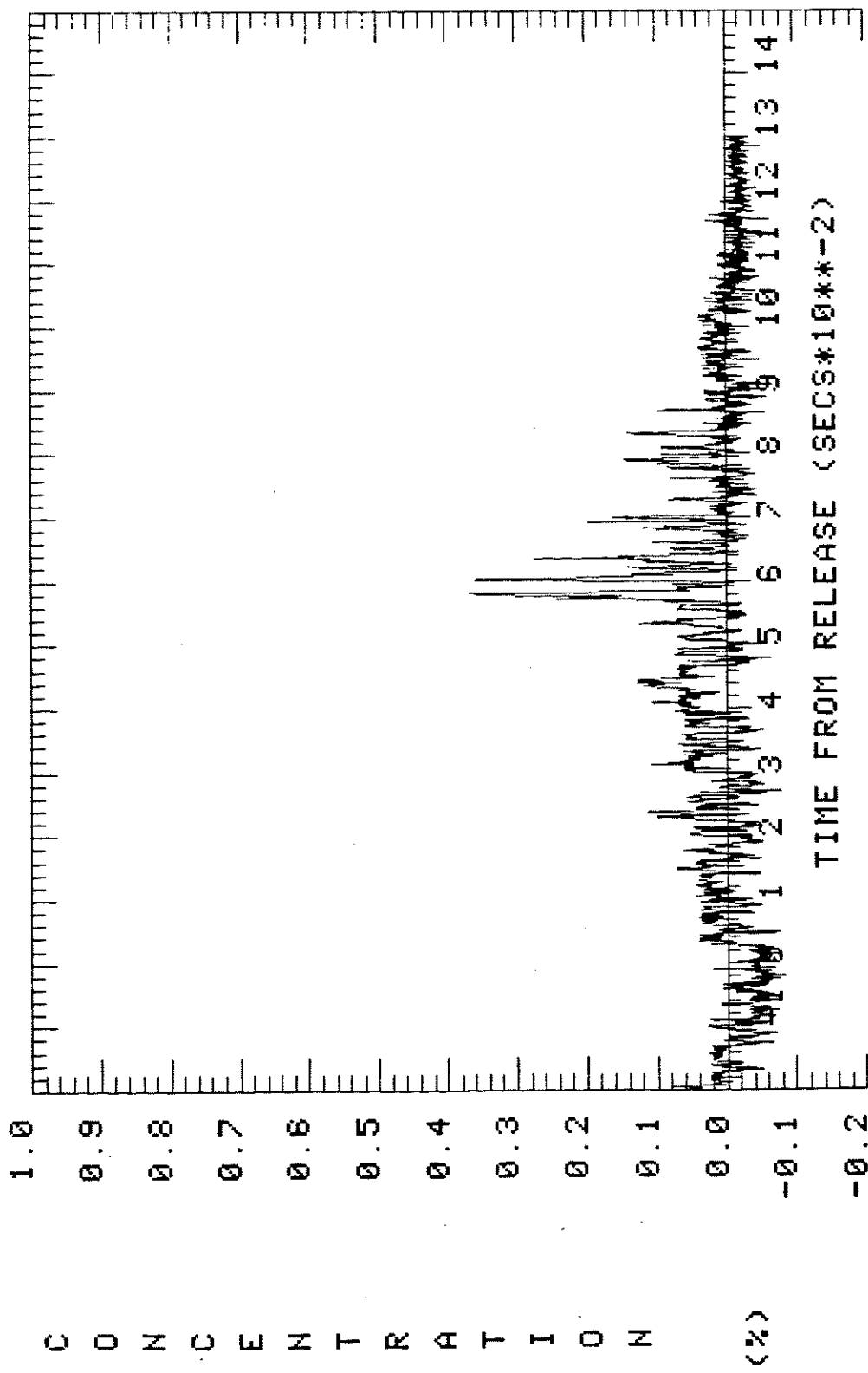
X: 371 M Y: 269 M Z: 1.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

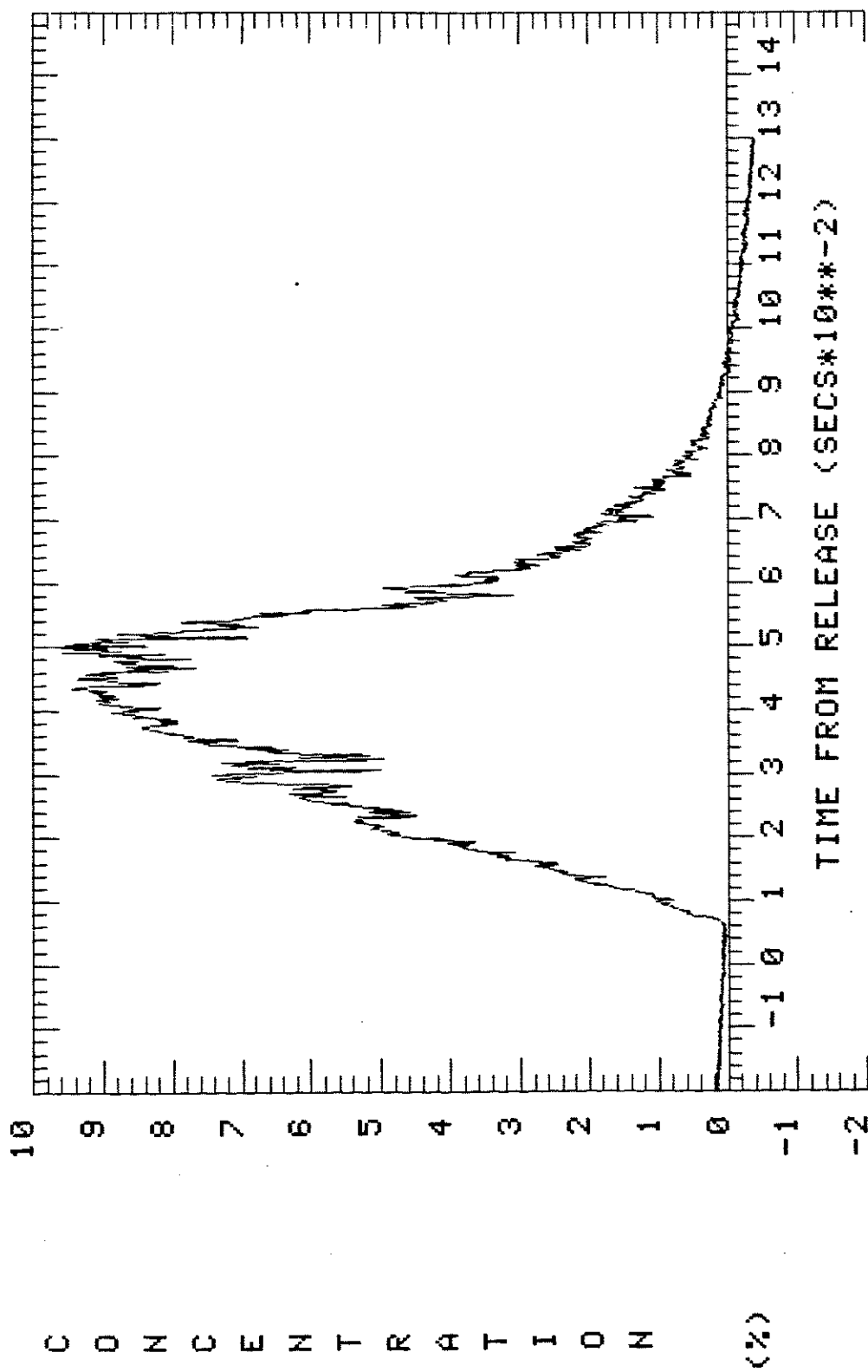
X: 371 M Y: 269 M Z: 2.4 M

G30



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

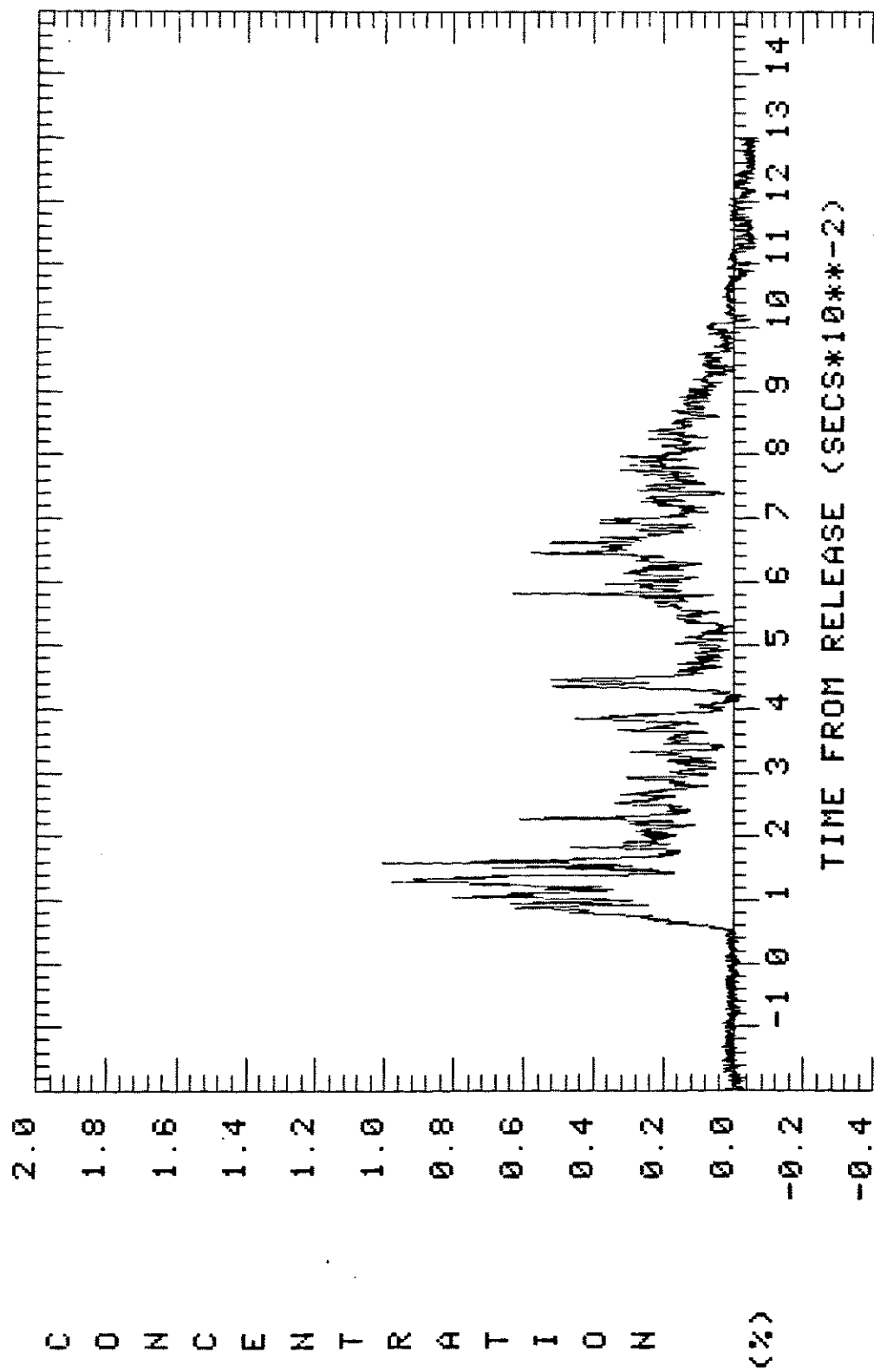
X: 371 M Y: 269 M Z: 4.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 429 M Y: 269 M Z: 0.4 M

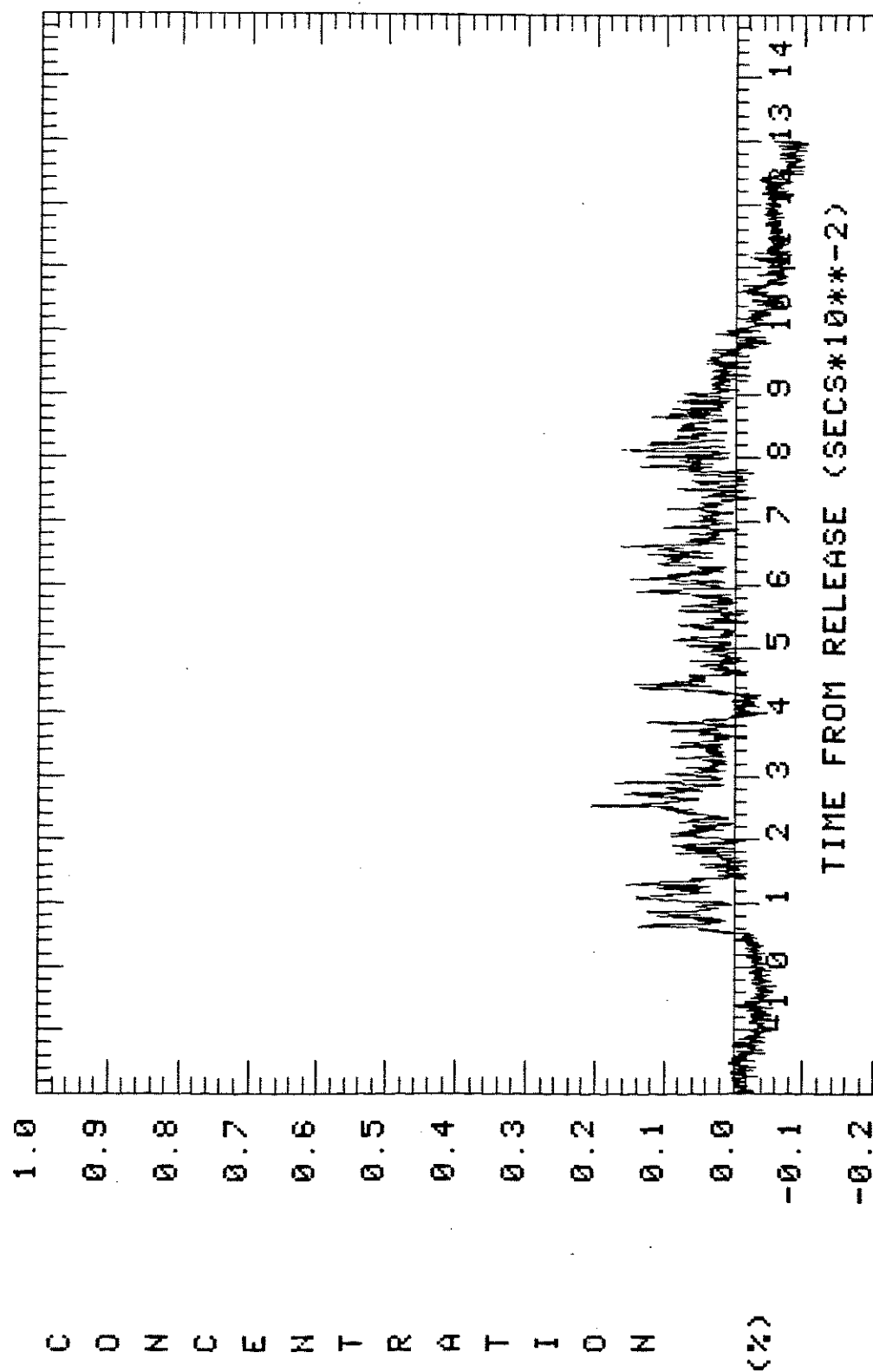
G32



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

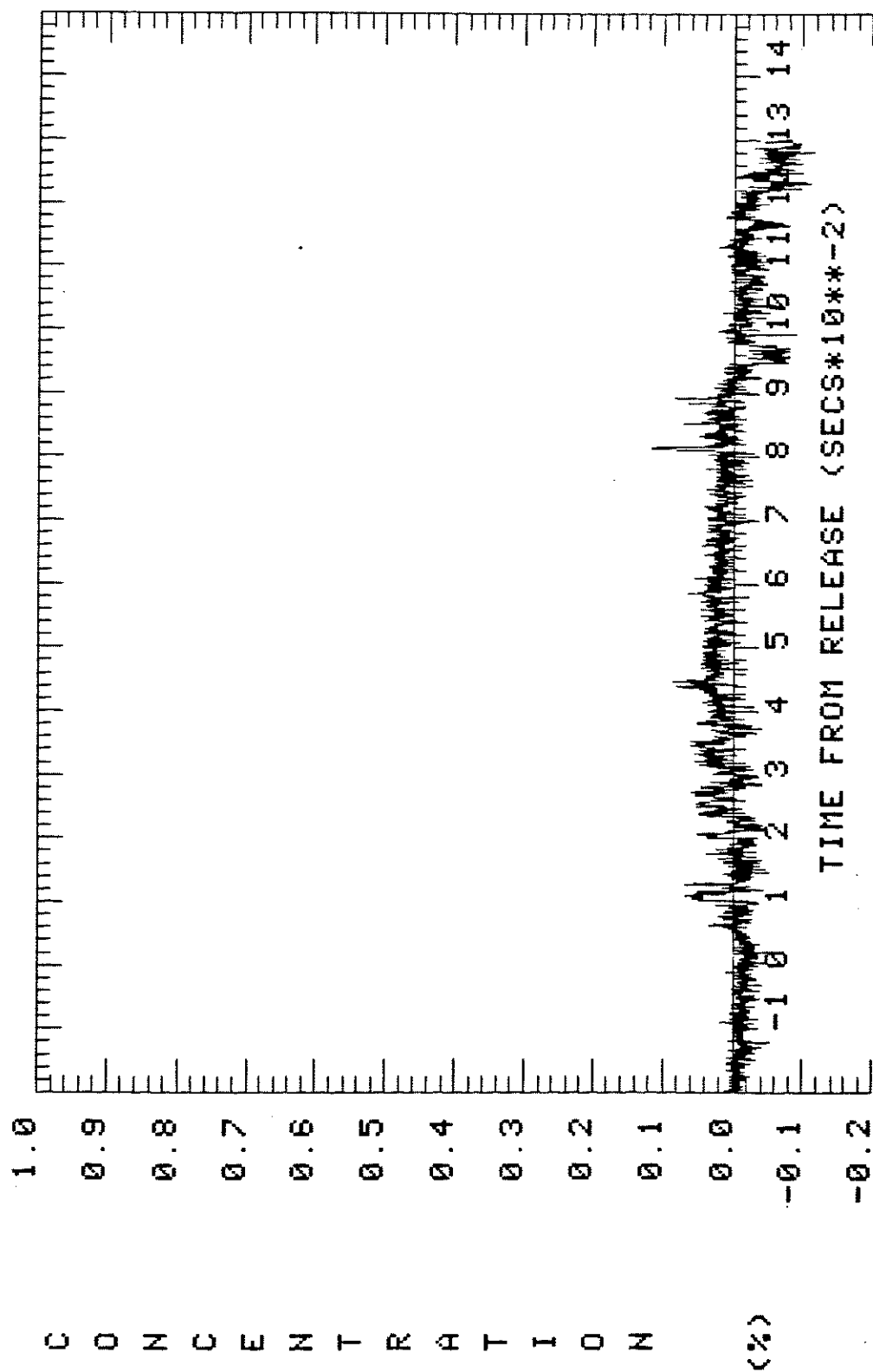
X: 429 M Y: 269 M Z: 1.4 M

G33



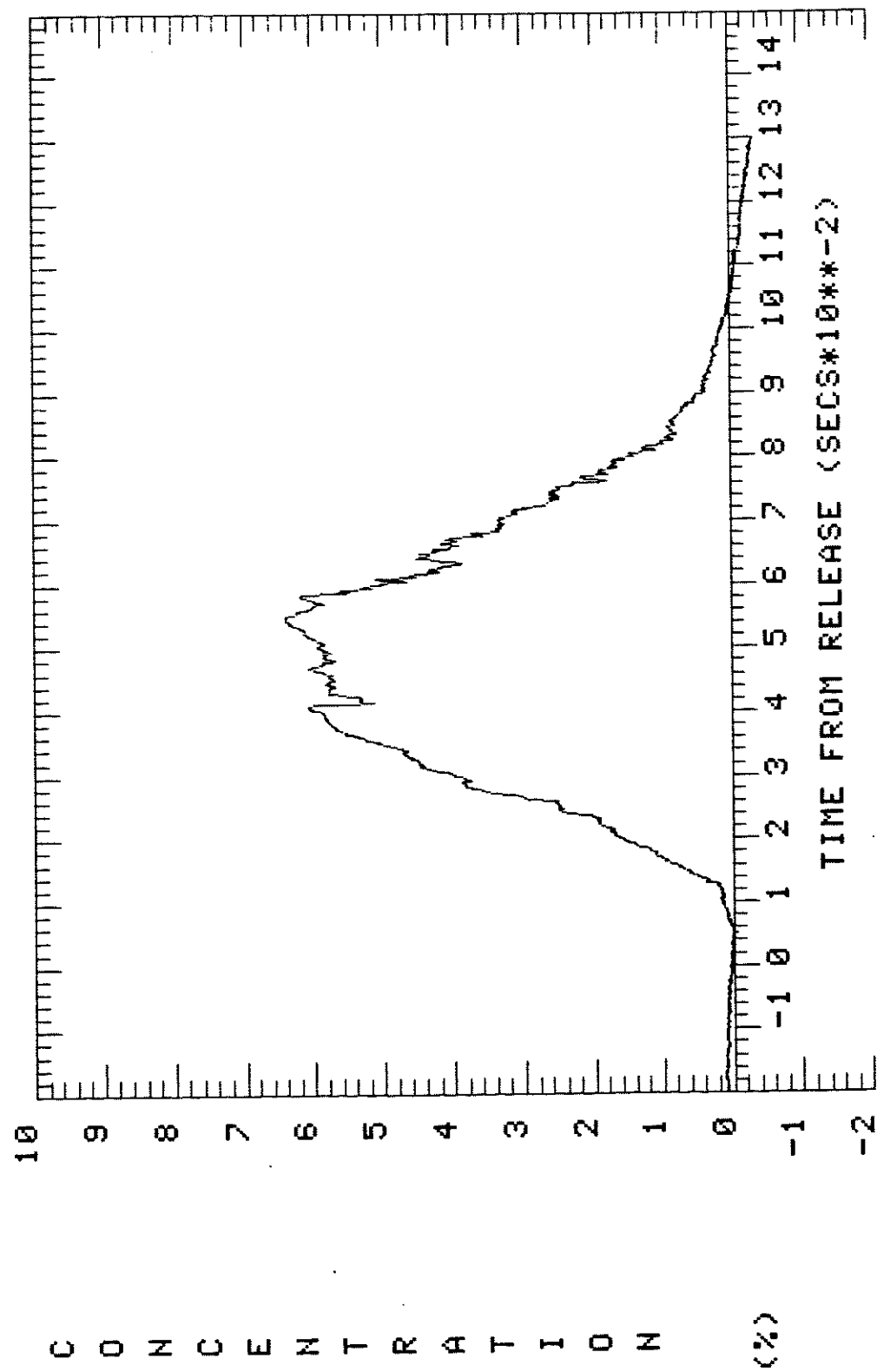
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 429 M Y: 269 M Z: 2.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

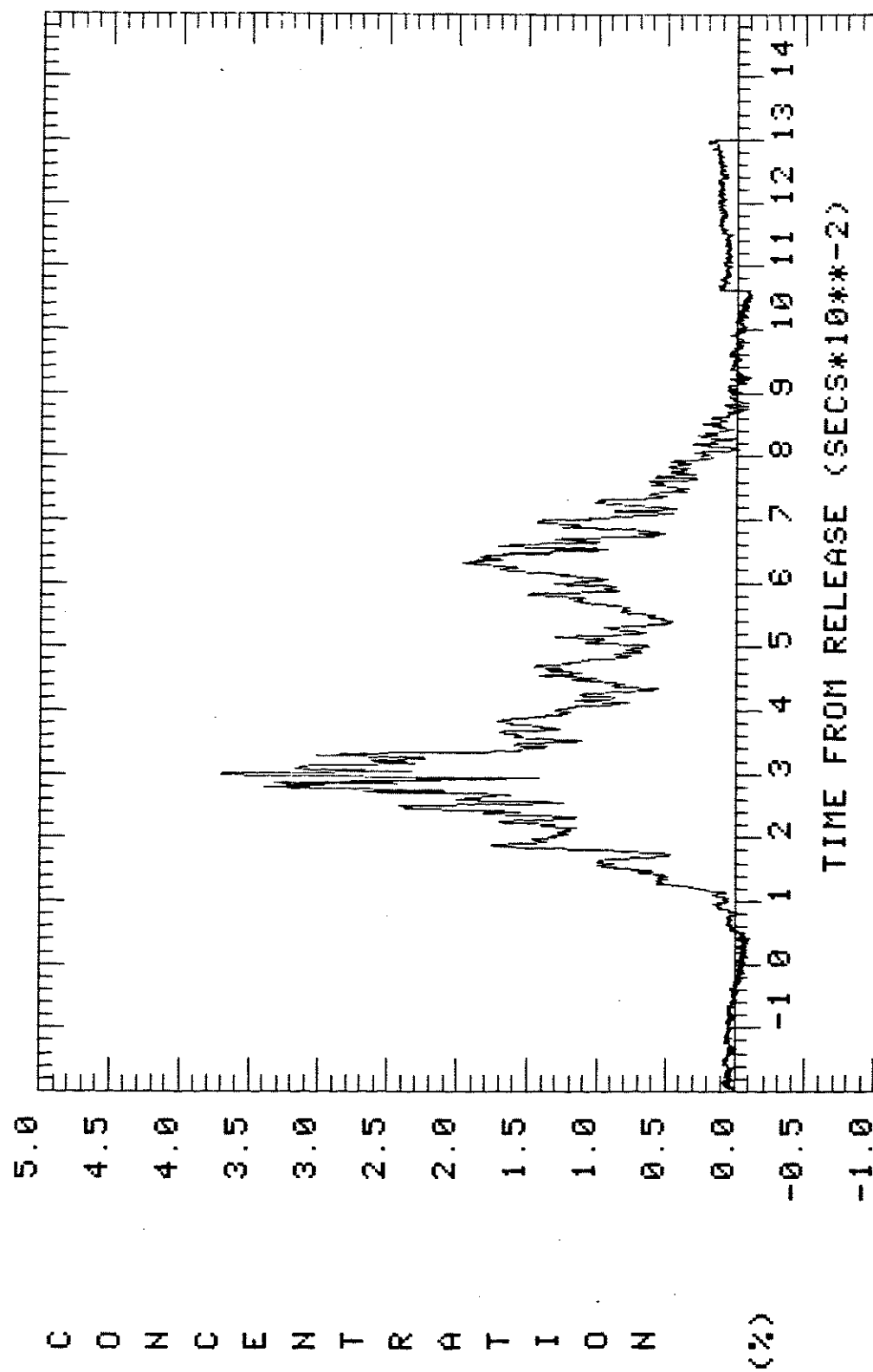
X: 429 M Y: 269 M Z: 4.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 275 M Z: 0.4 M

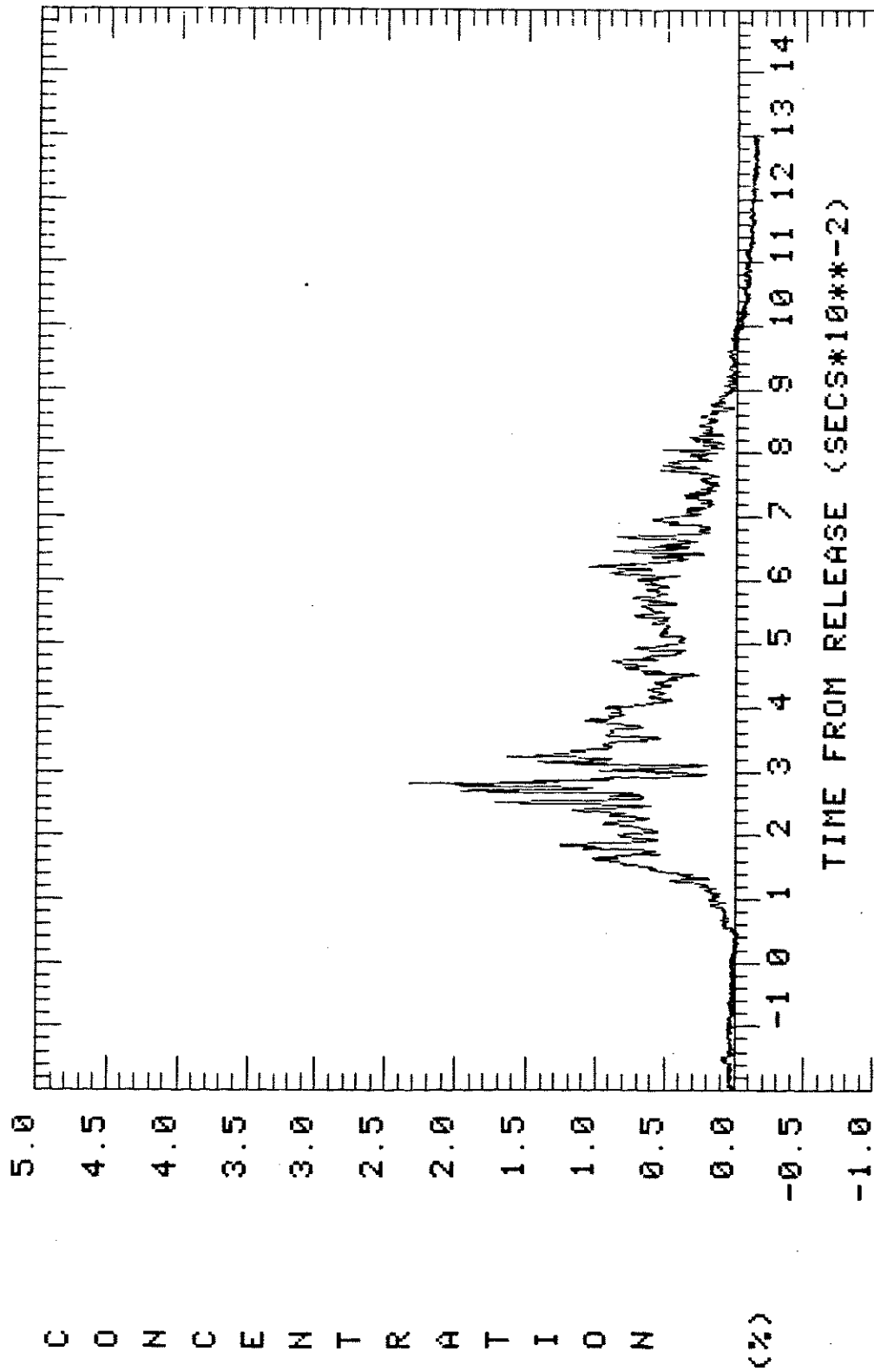
G36



TRIAL: 045 TYPE: HGAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 270 M Z: 1.0 M

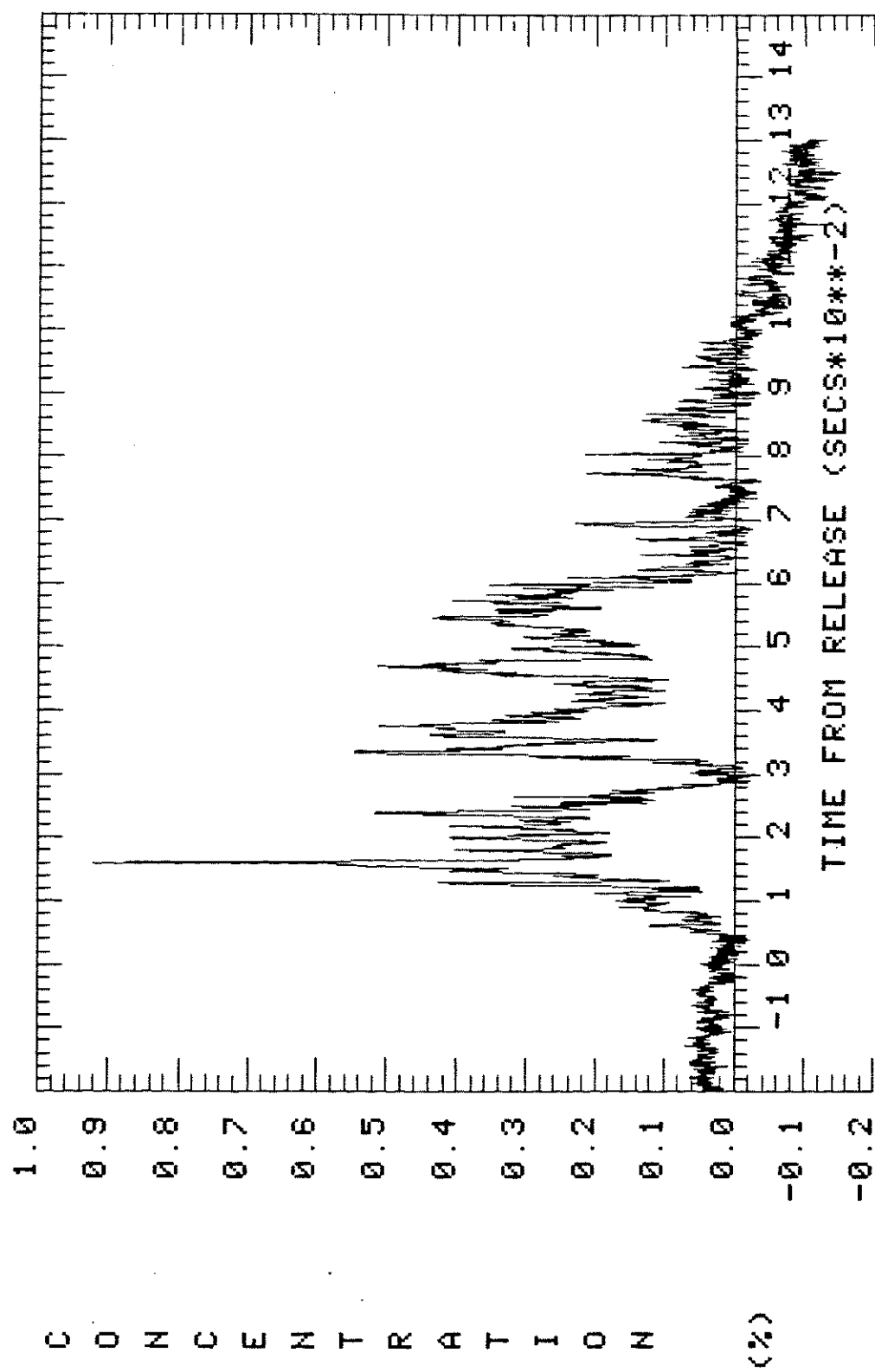
G37



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 275 M Z: 1.4 M

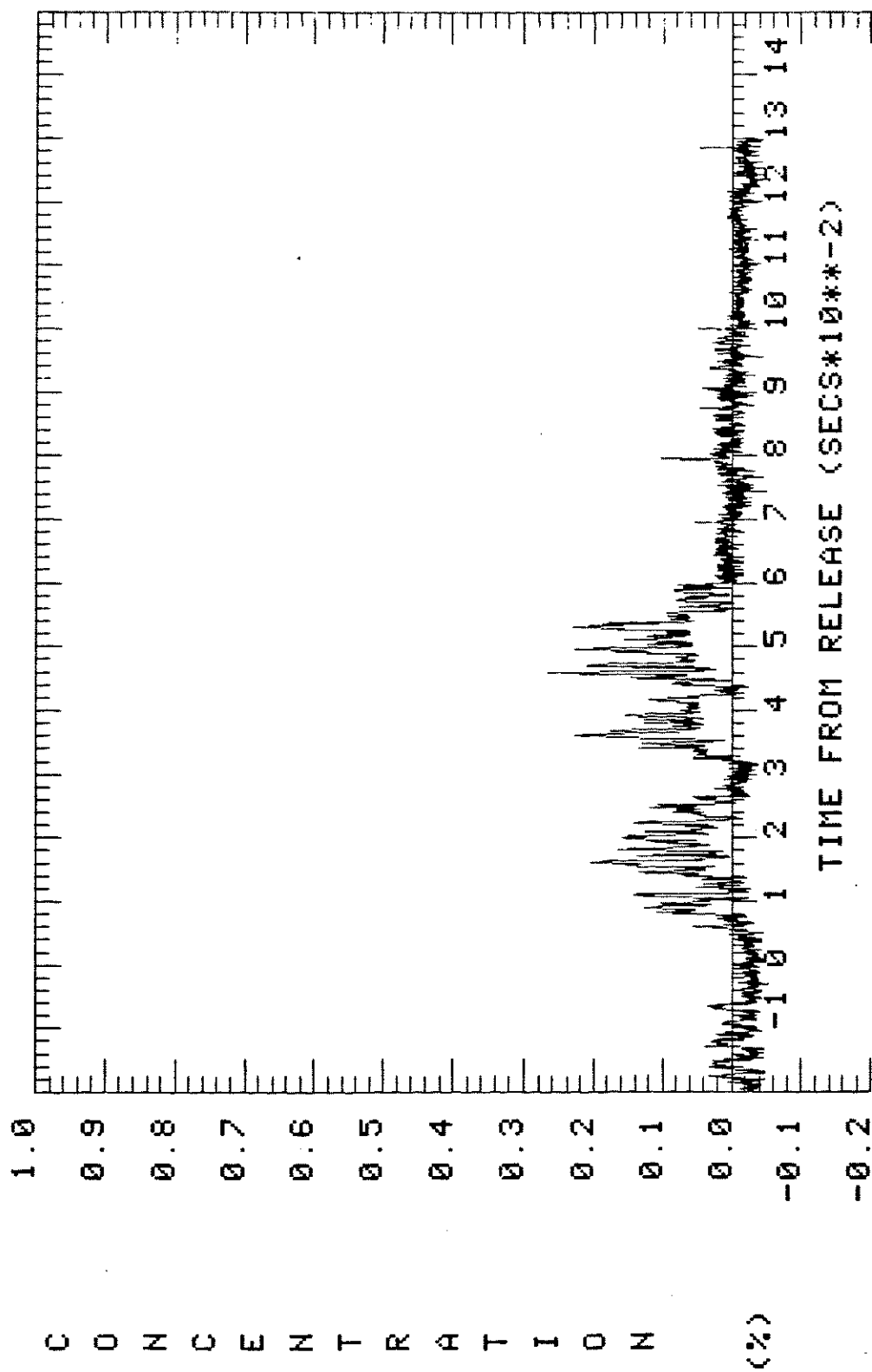
G38



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 275 M Z: 2.4 M

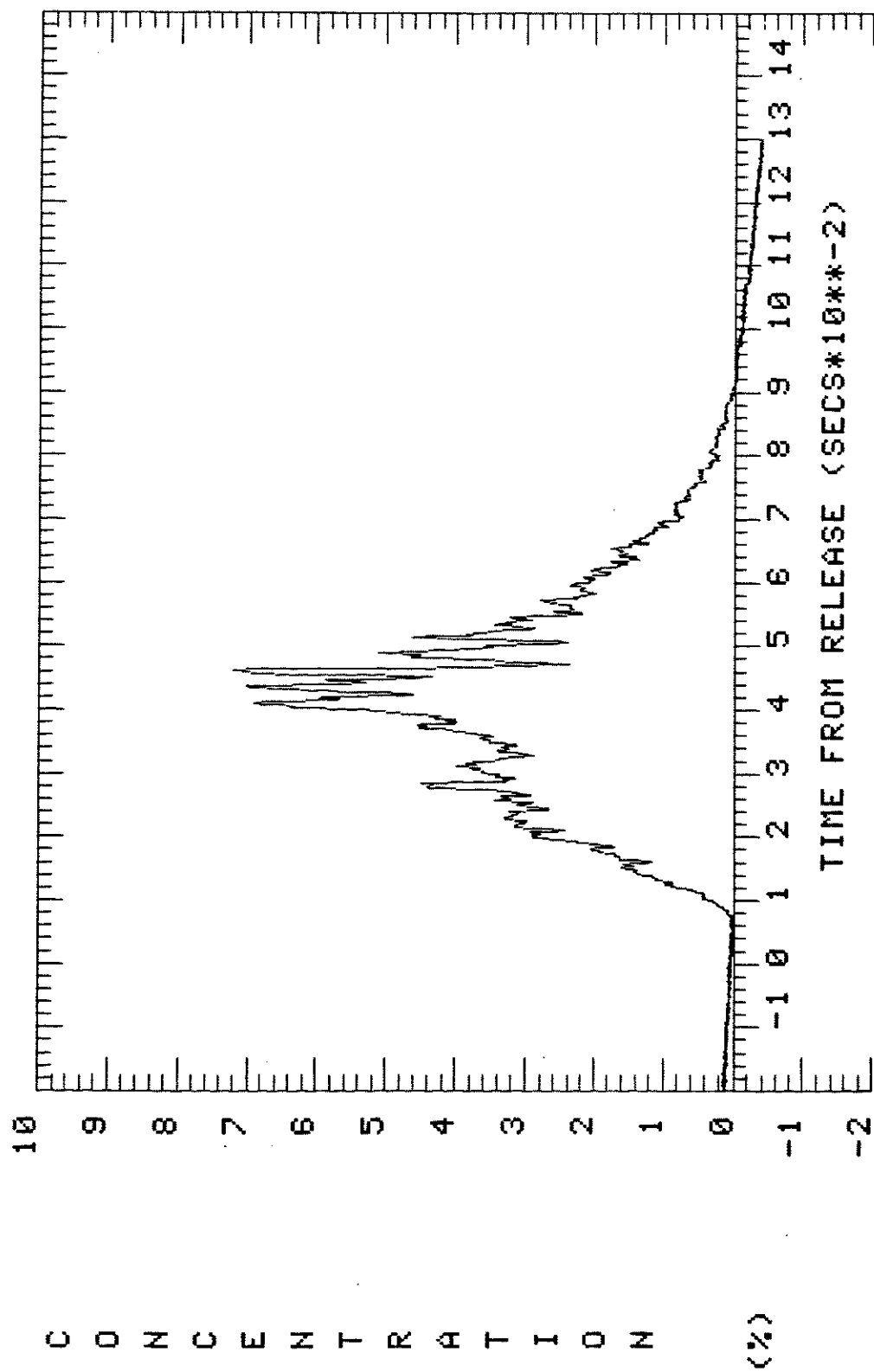
G39



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 275 M Z: 4.4 M

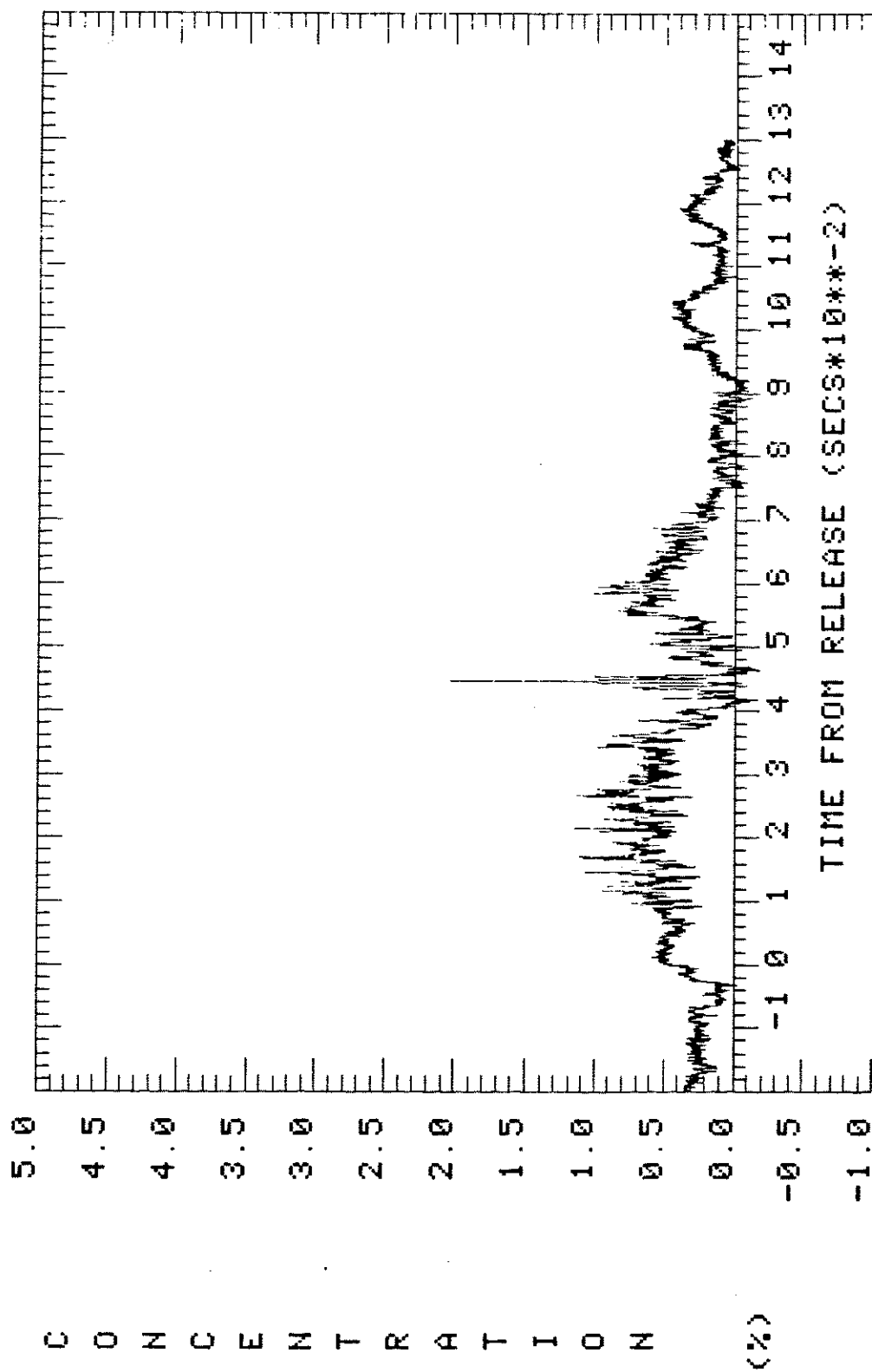
G40



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 275 M Z: 0.4 M

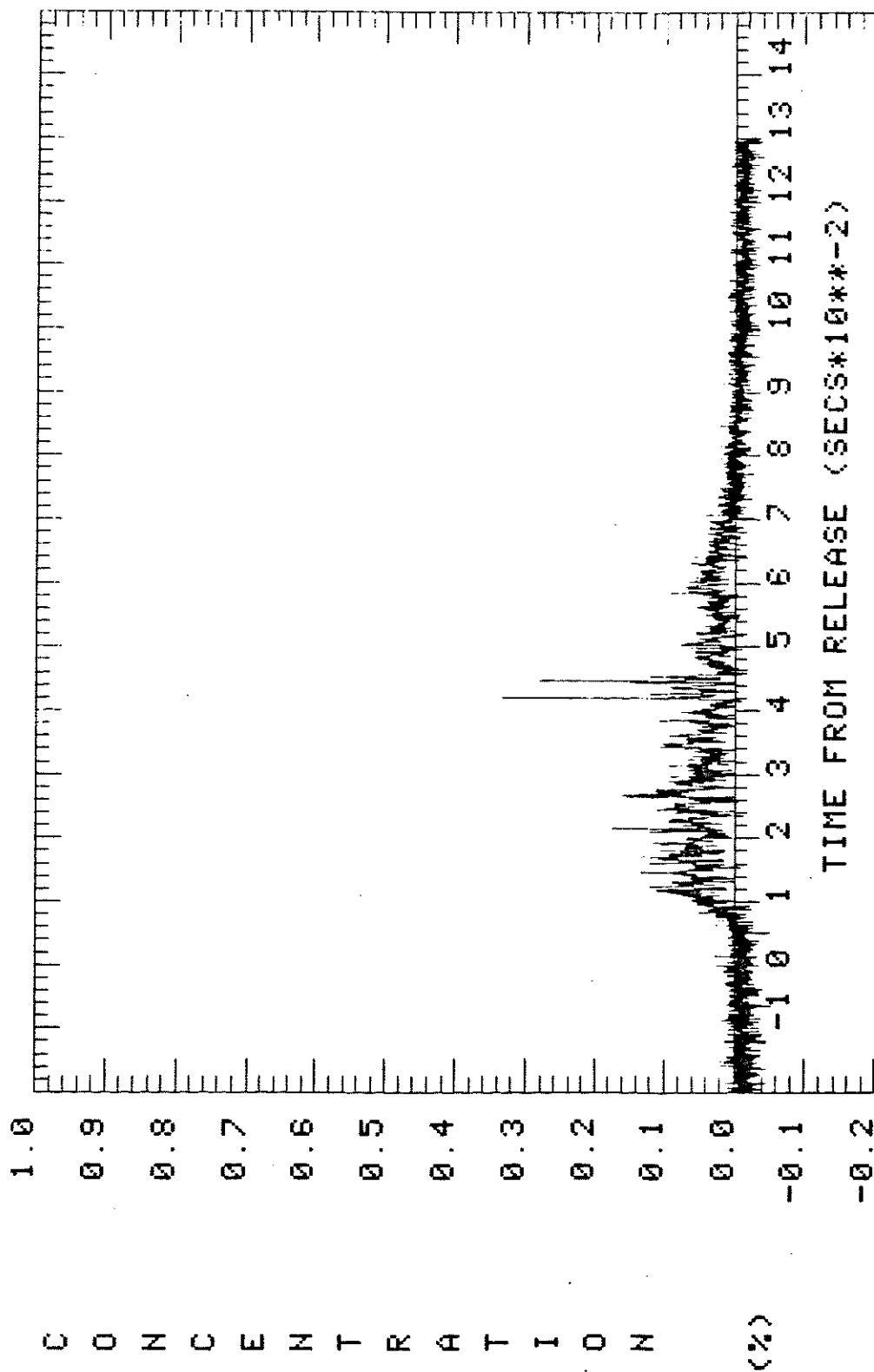
G41



TRIAL: 045 TYPE: HGAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 275 M Z: 1.0 M

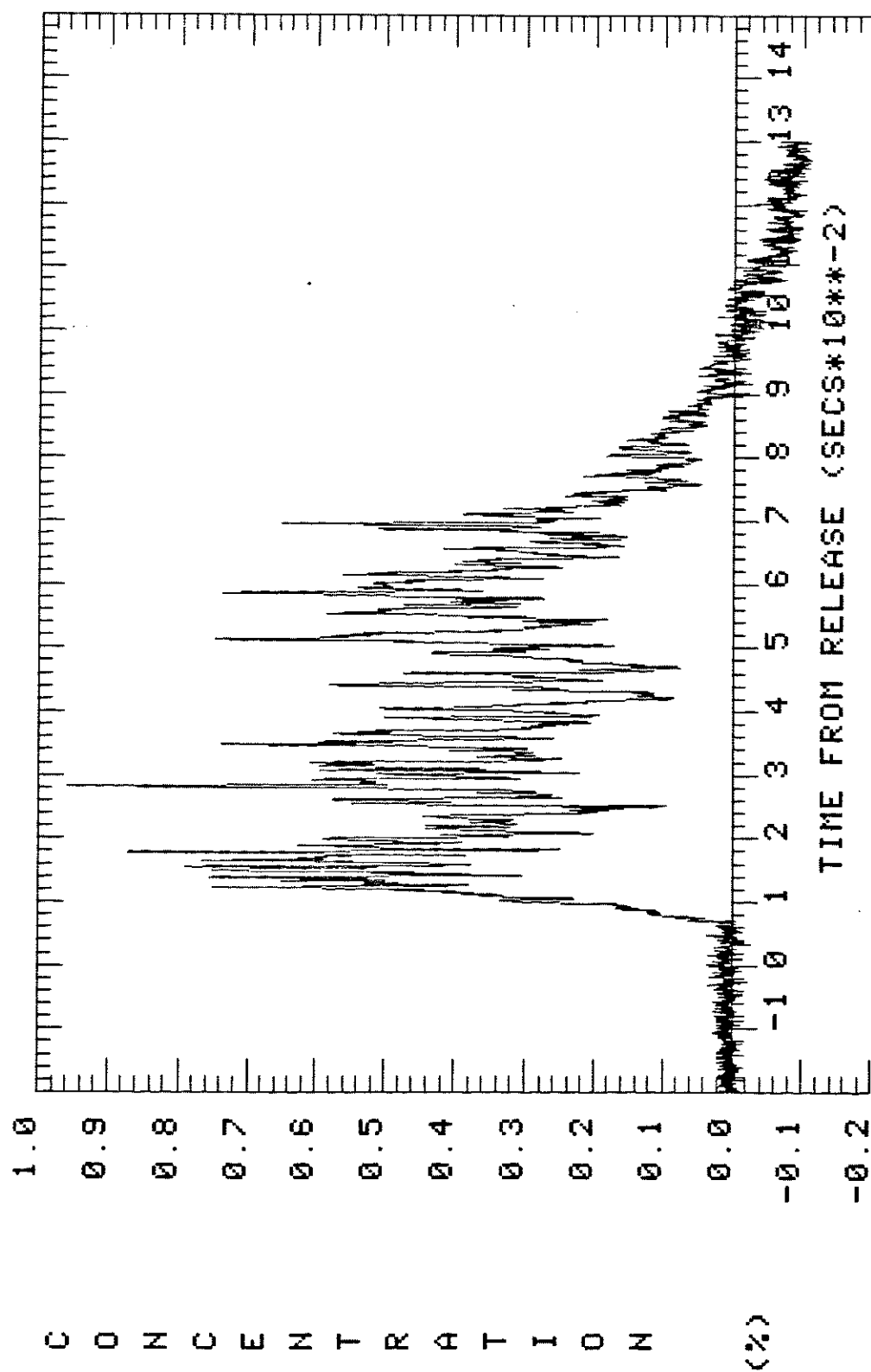
G42



TRIAL: 045 TYPE: SMOK AVERAGING TIME: 0.6 SECS

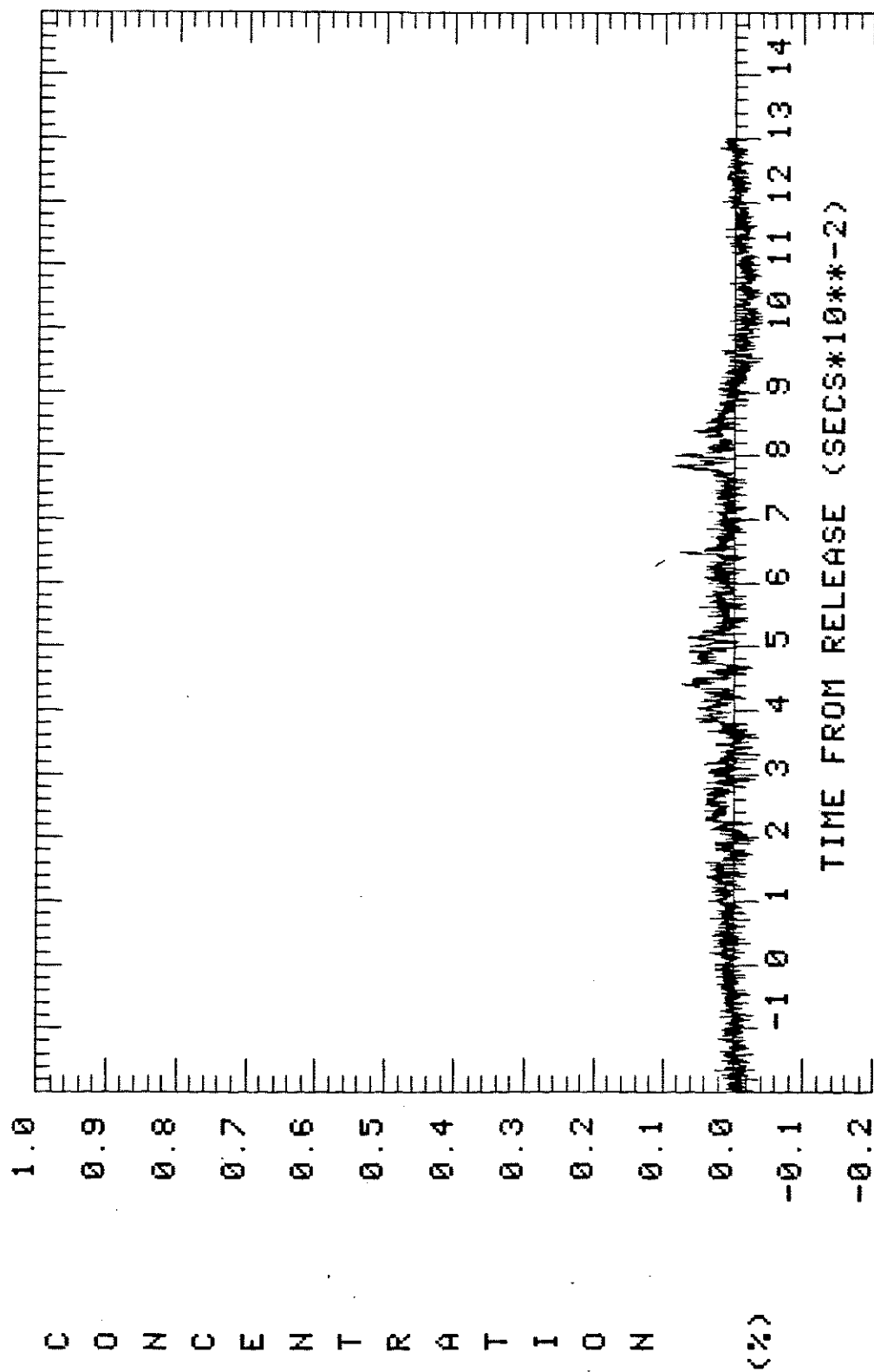
X: 450 M Y: 270 M Z: 1.0 M

G43



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

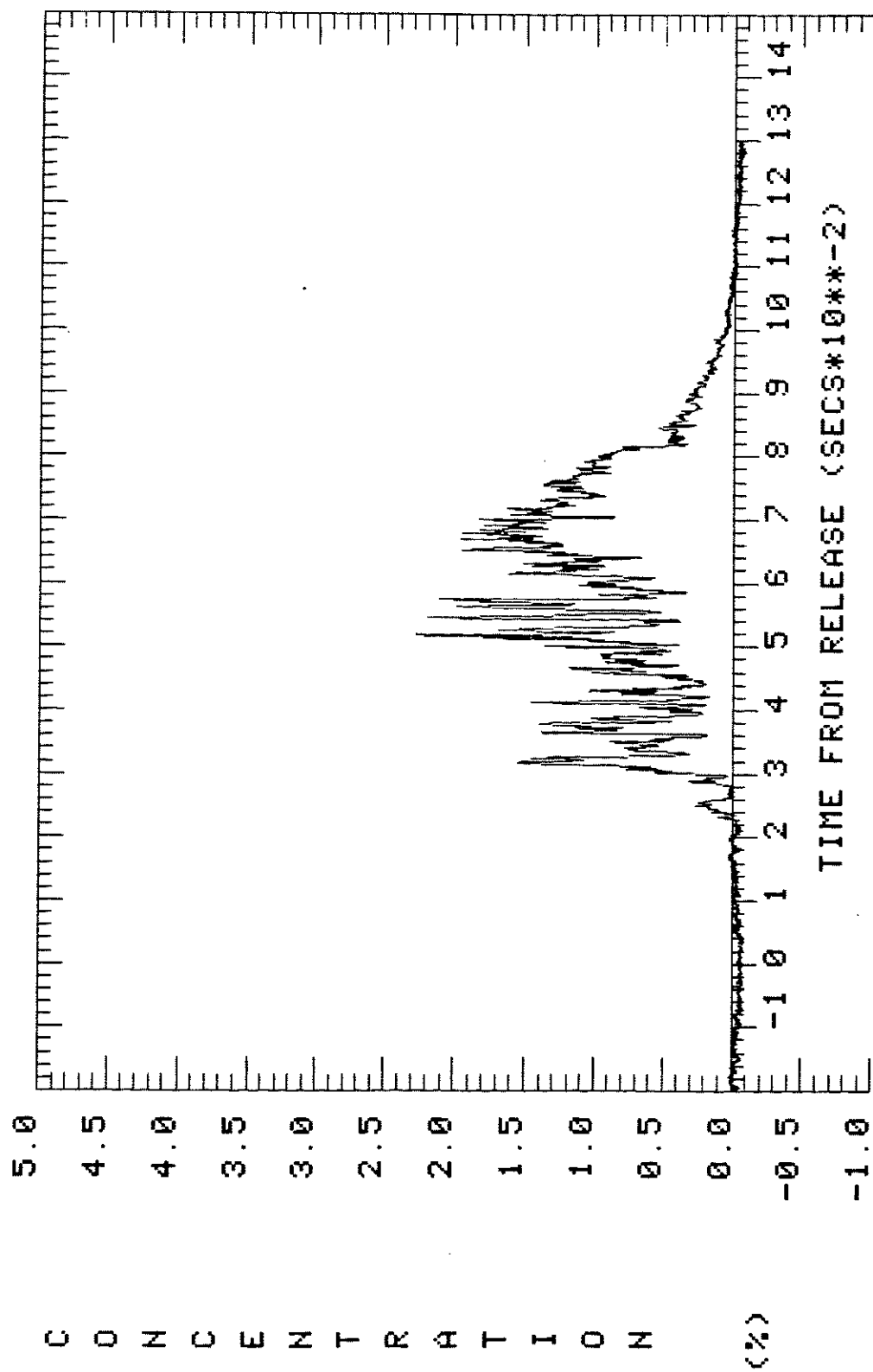
X: 450 M Y: 275 M Z: 1.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 275 M Z: 4.4 M

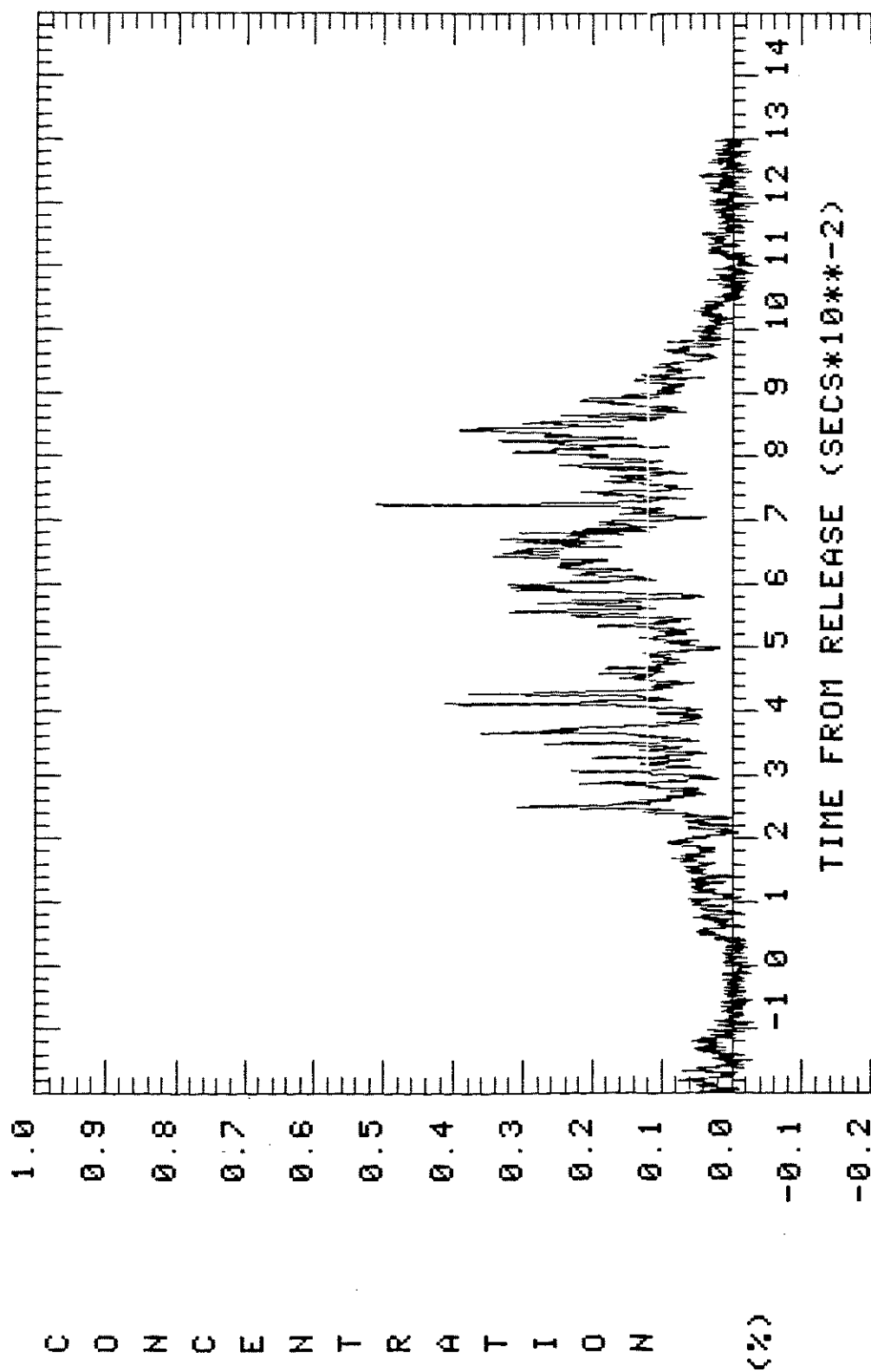
G45



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 362 M Y: 292 M Z: 0.4 M

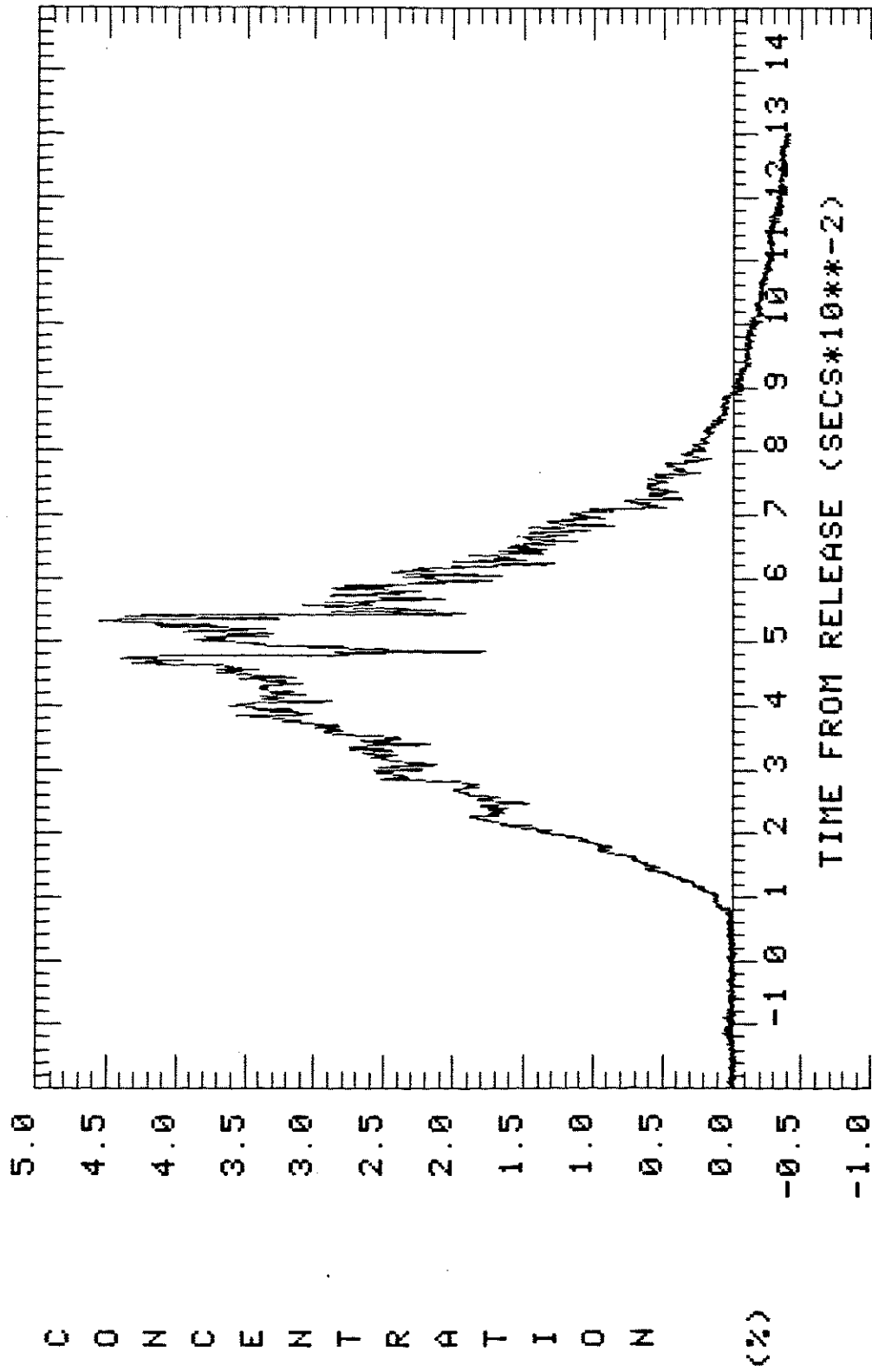
G46



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

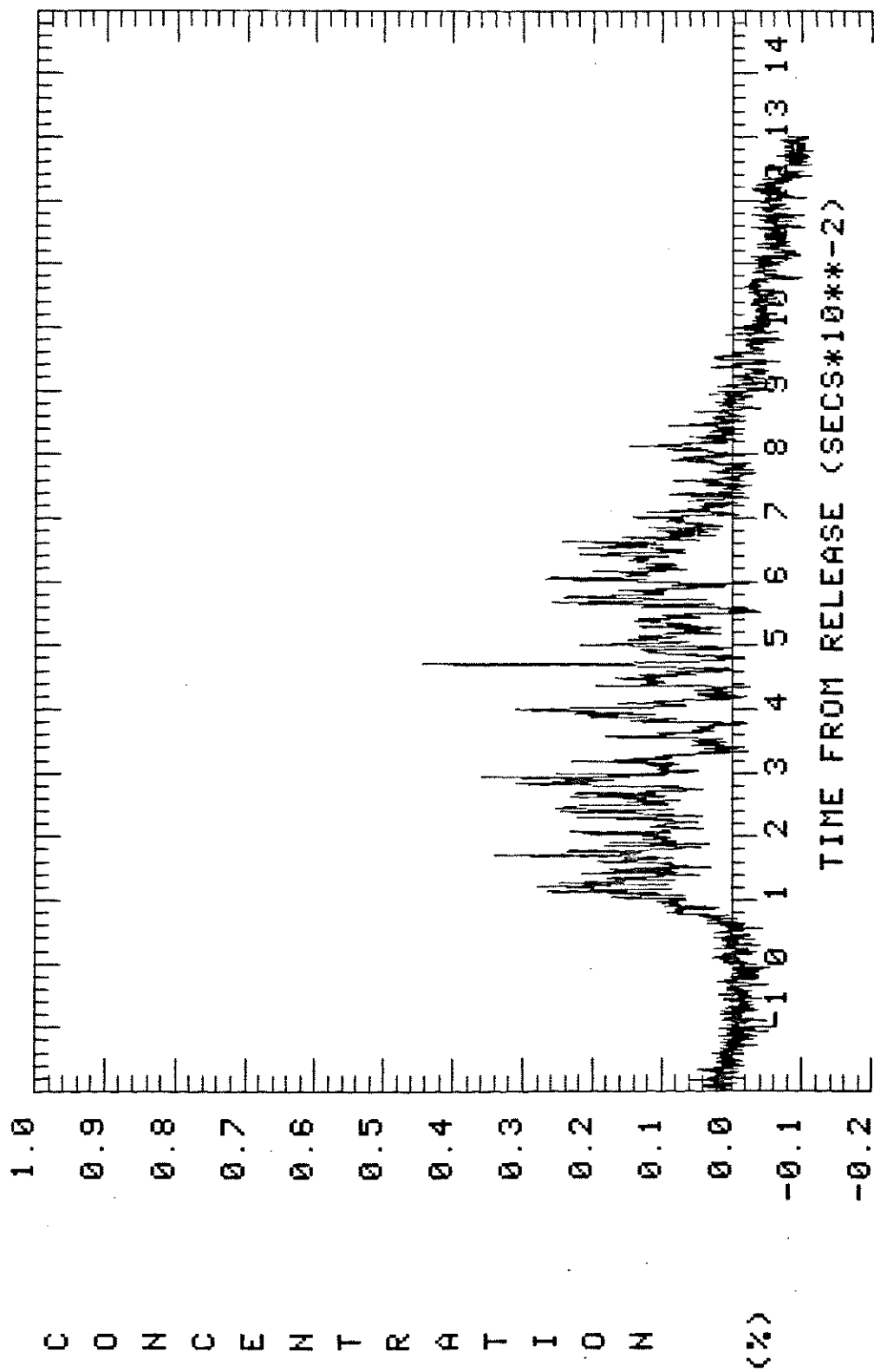
X: 362 M Y: 292 M Z: 2.4 M

G47



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

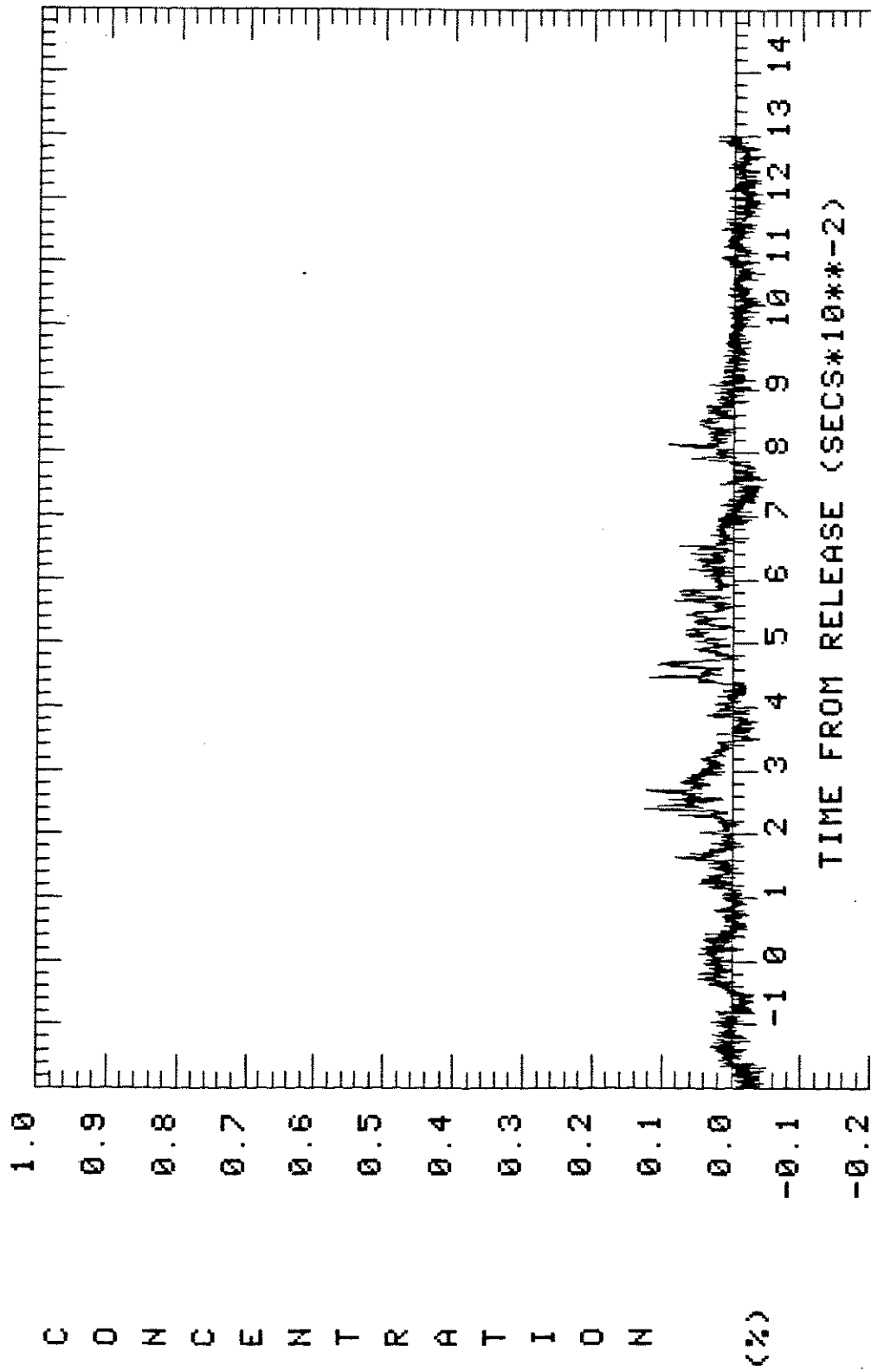
X: 438 M Y: 292 M Z: 0.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 438 M Y: 292 M Z: 2.4 M

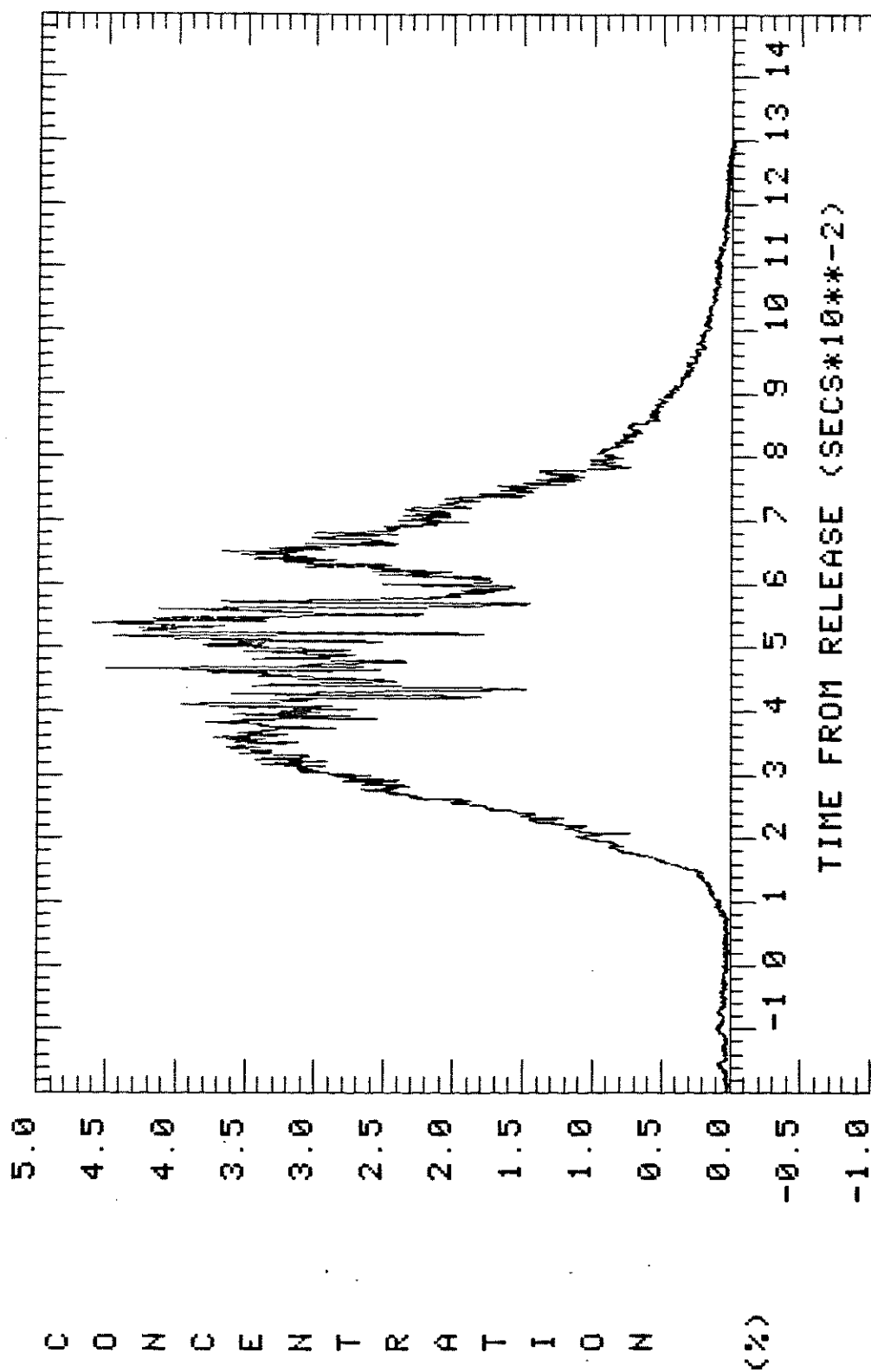
G49



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 438 M Y: 292 M Z: 4.4 M

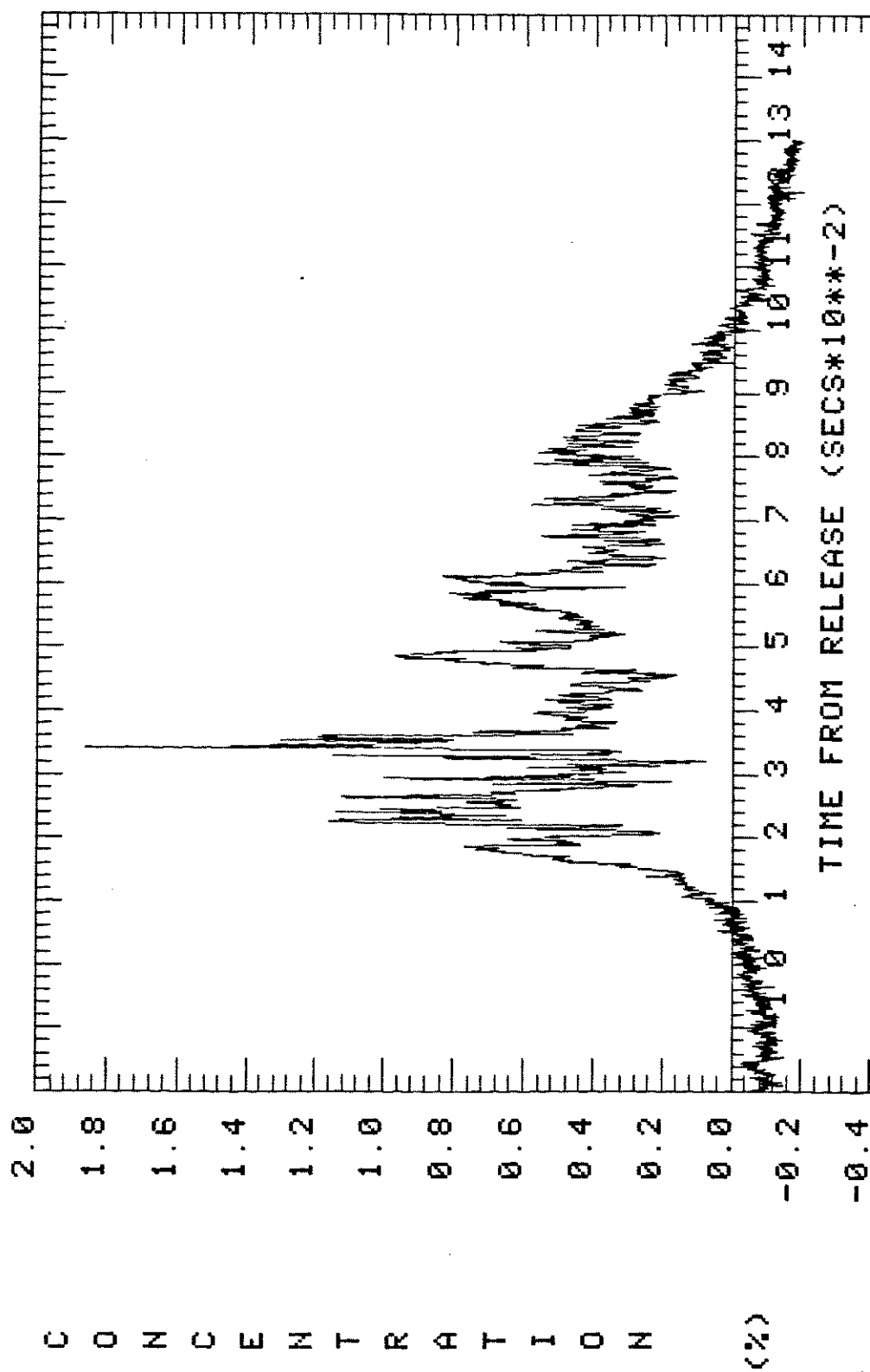
G50



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

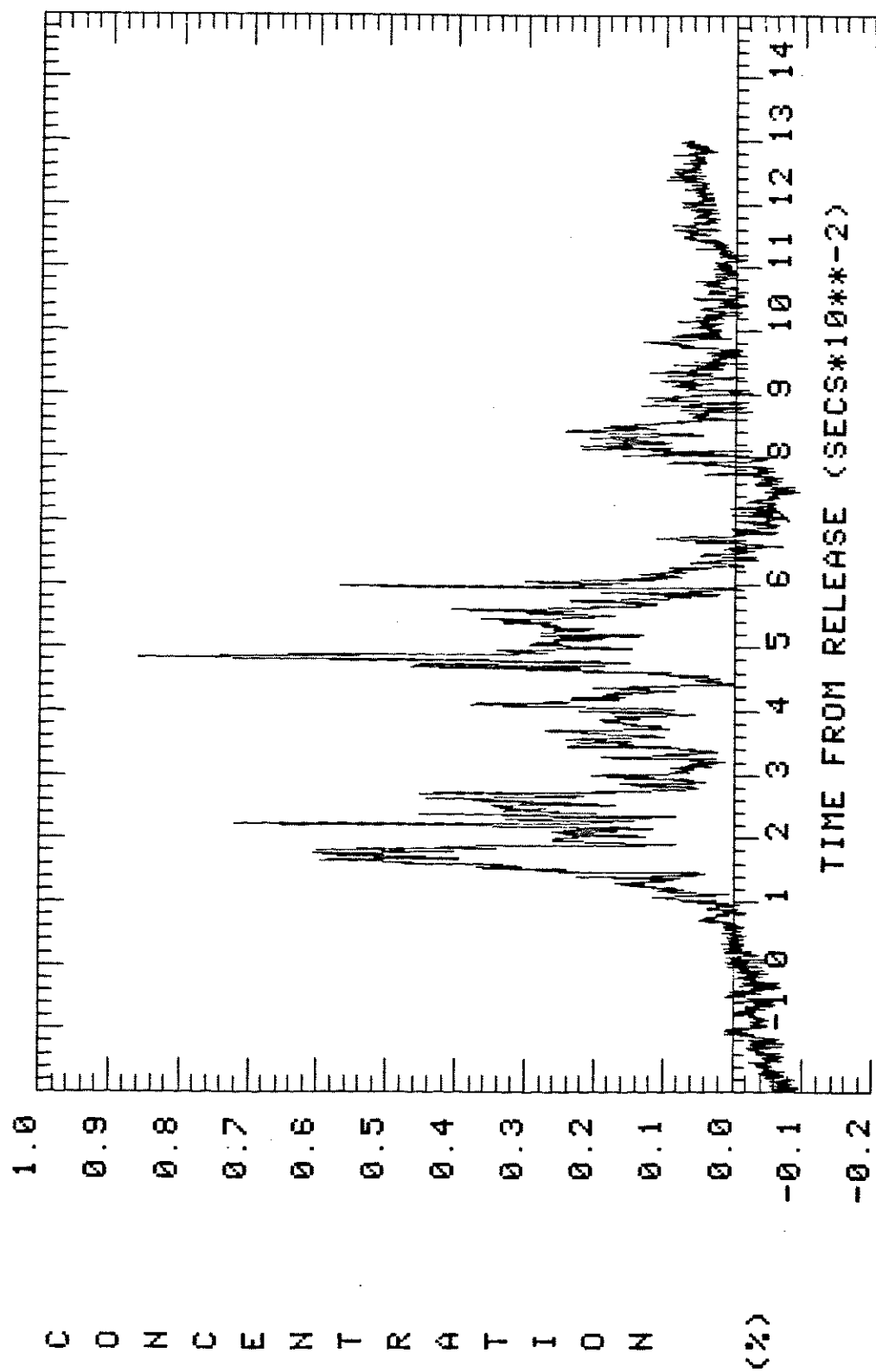
G51



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

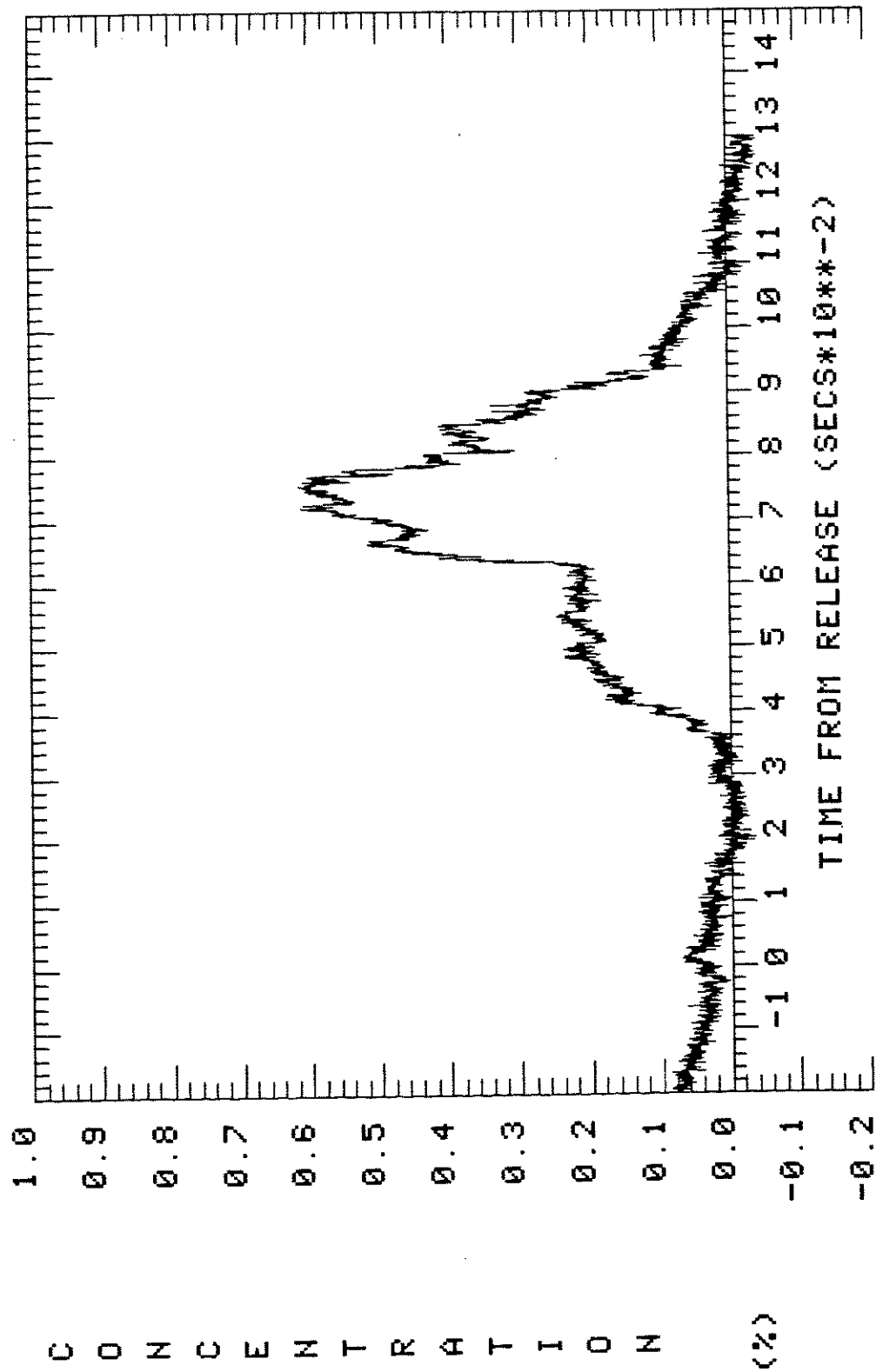
X: 400 M Y: 300 M Z: 1.4 M

G52



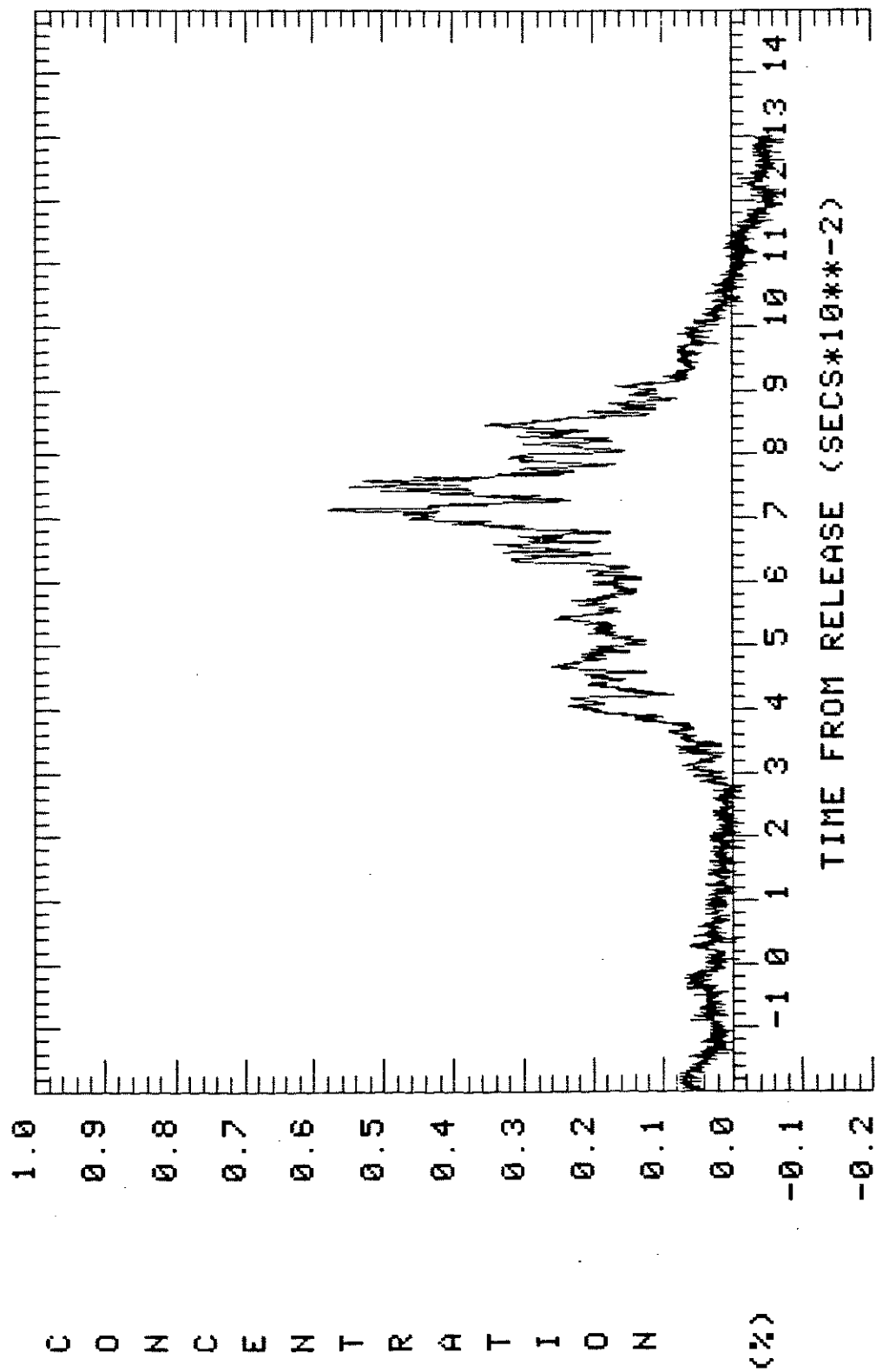
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

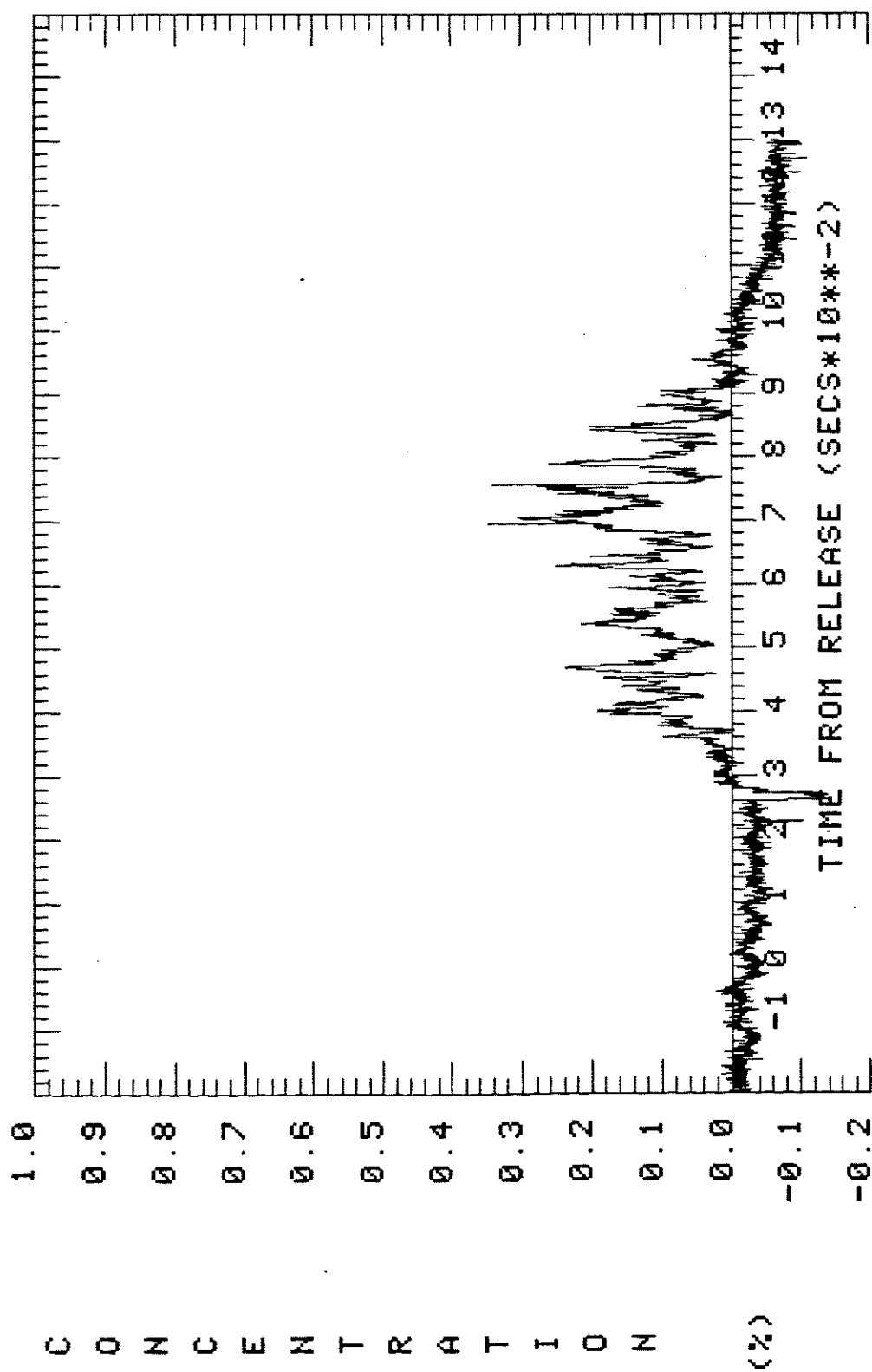
X: 300 M Y: 350 M Z: 0.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 300 M Y: 350 M Z: 2.4 M

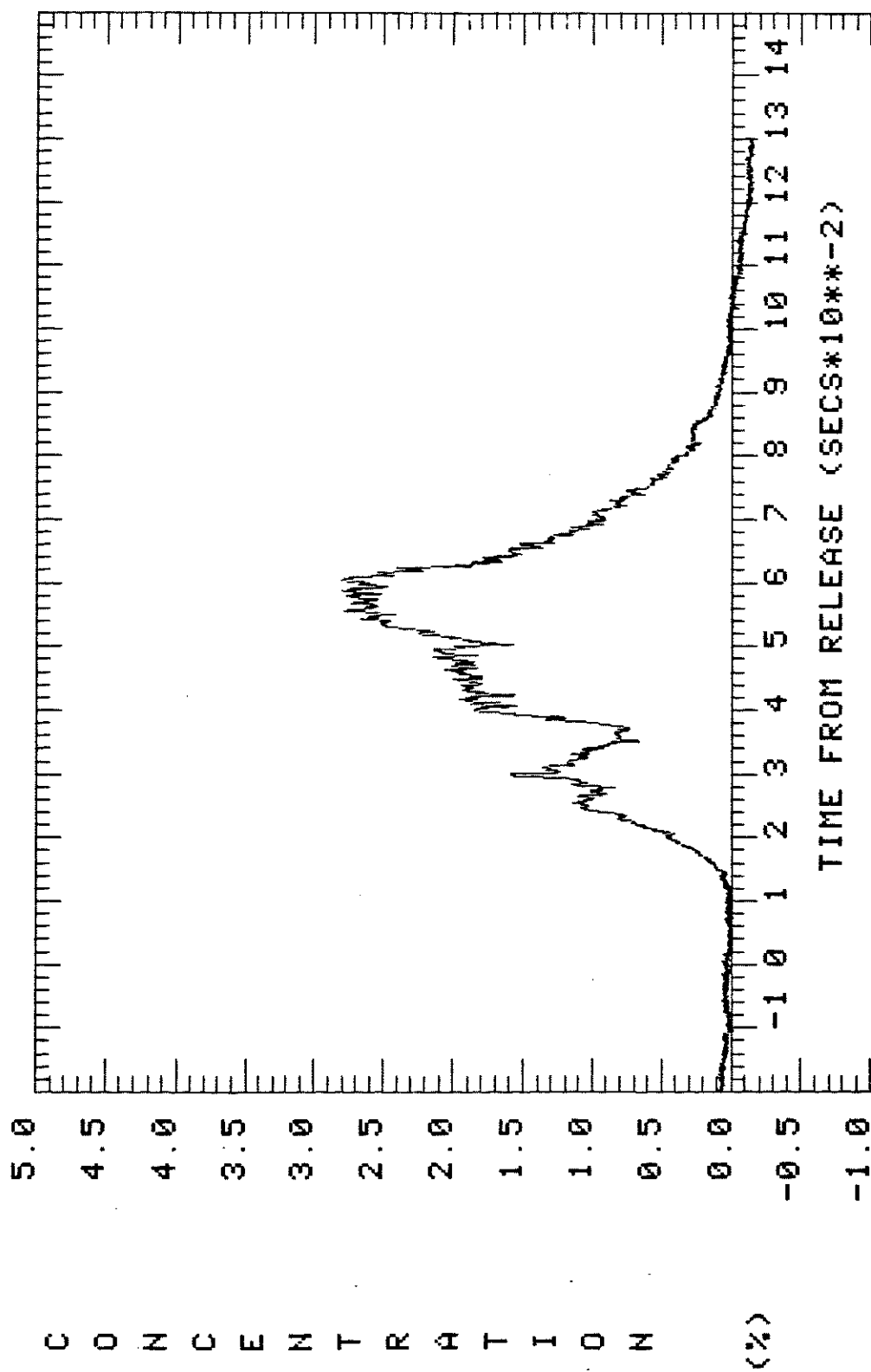
G55



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 300 M Y: 350 M Z: 4.4 M

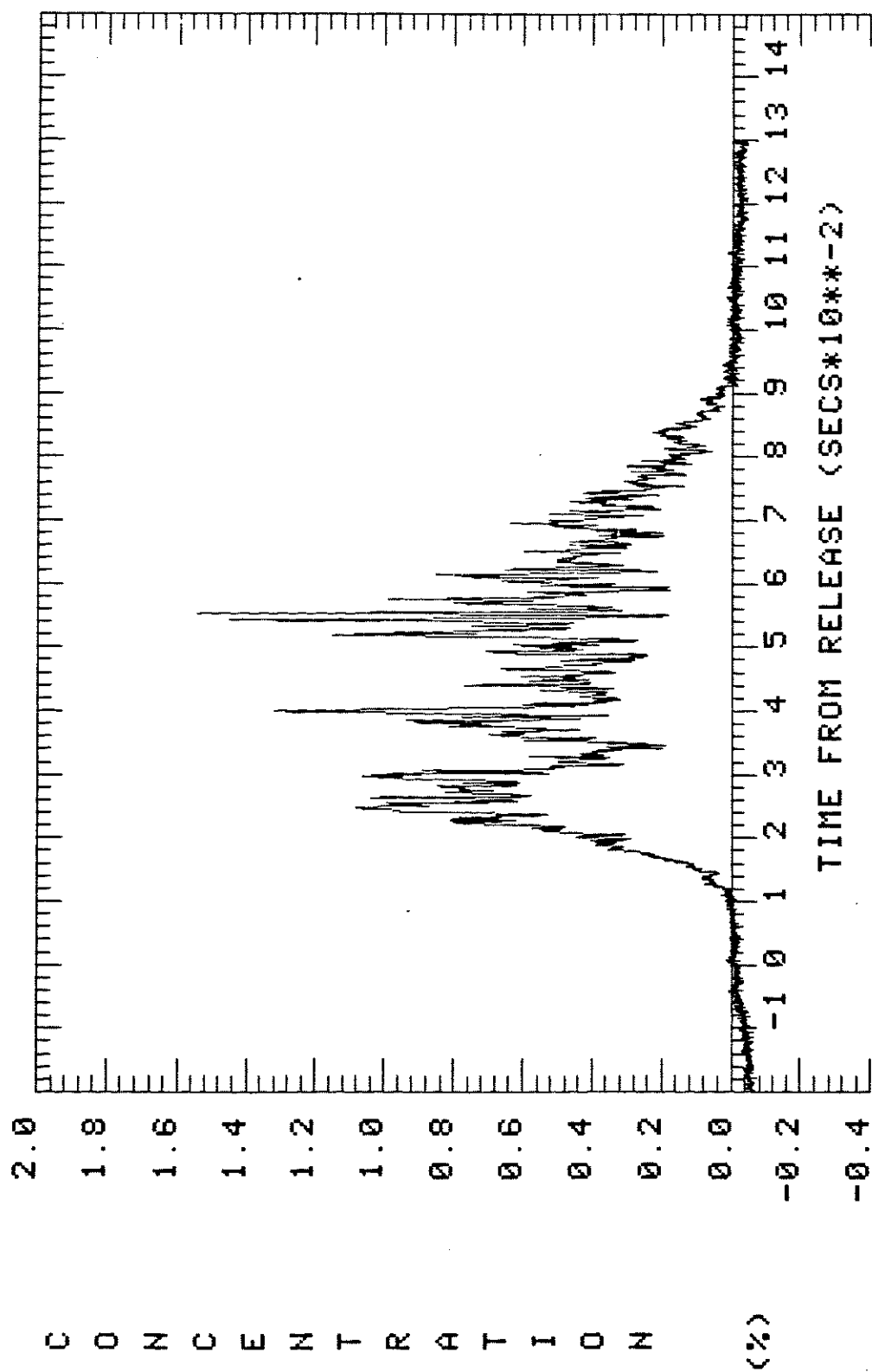
G56



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

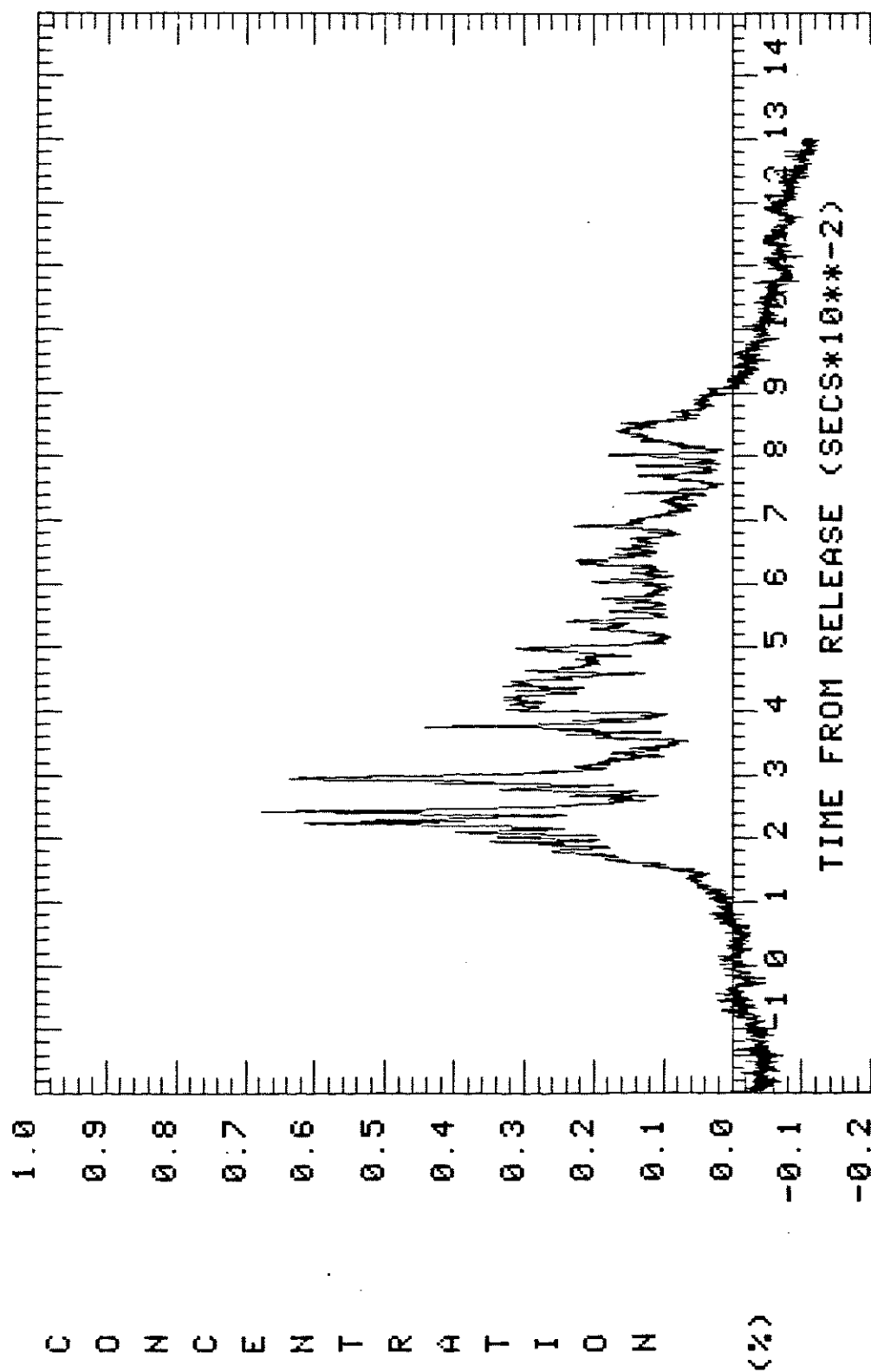
X: 400 M Y: 350 M Z: 0.4 M

G57



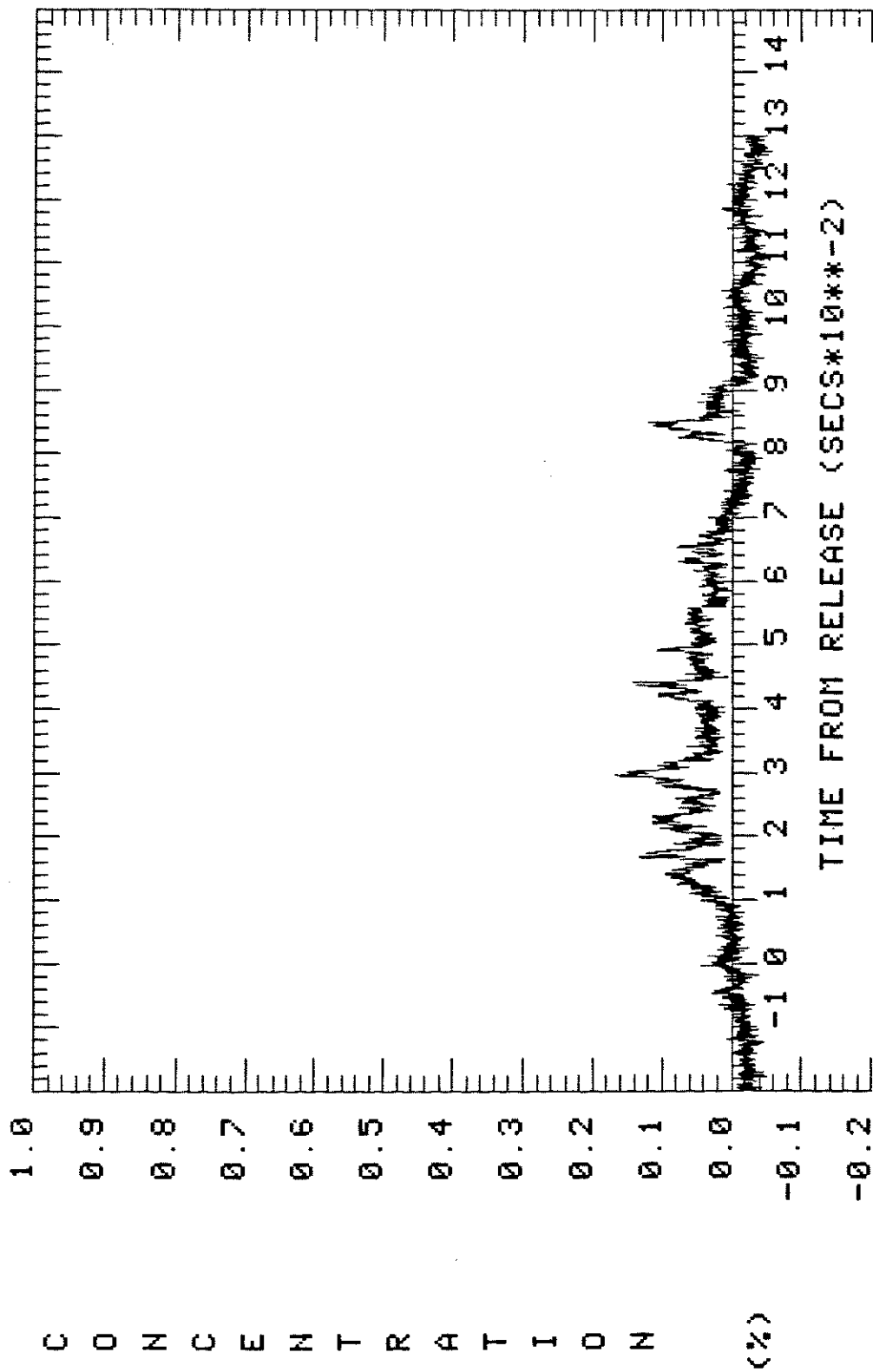
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 350 M Z: 1.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

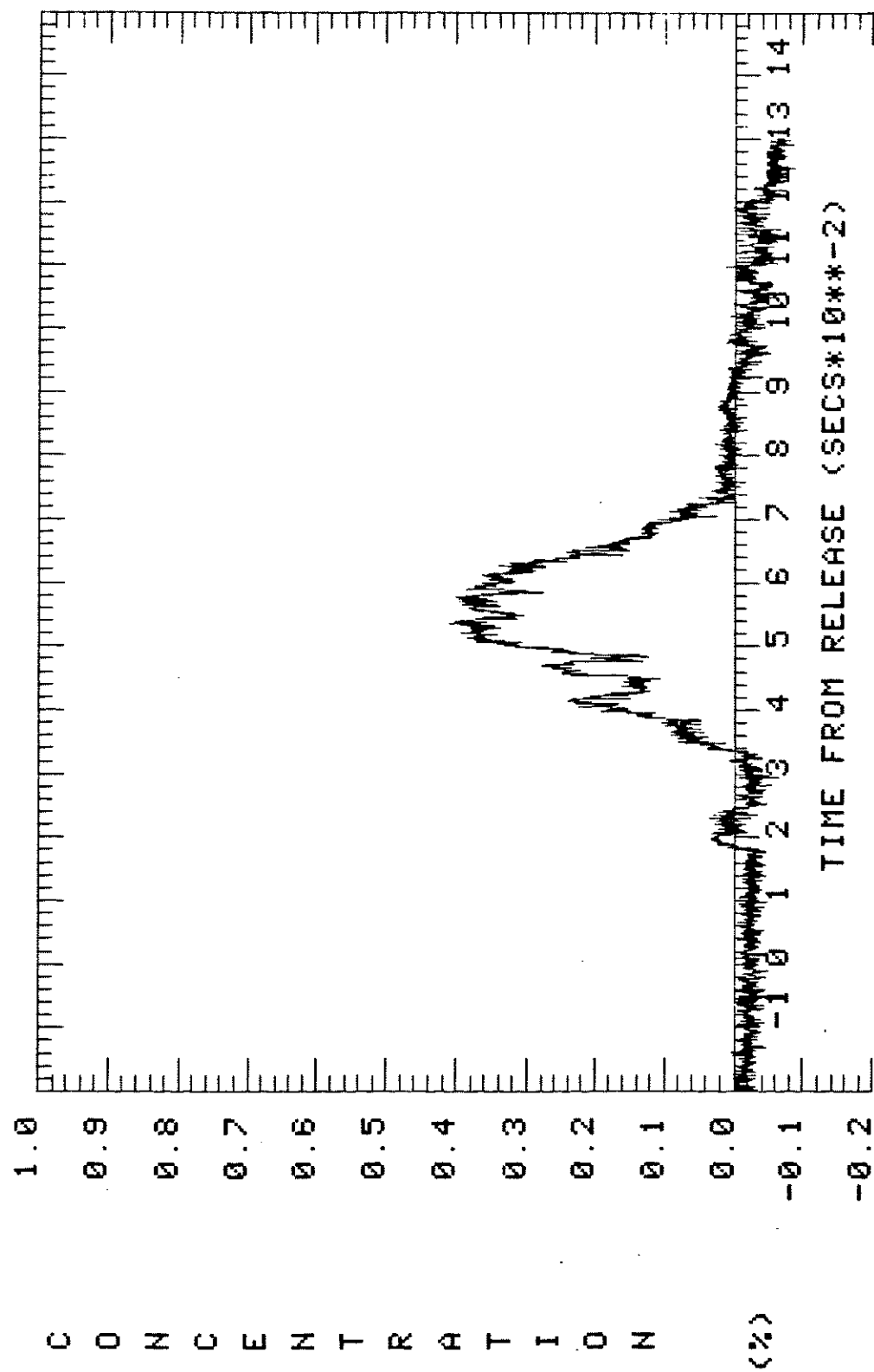
X: 400 M Y: 350 M Z: 2.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 350 M Z: 4.4 M

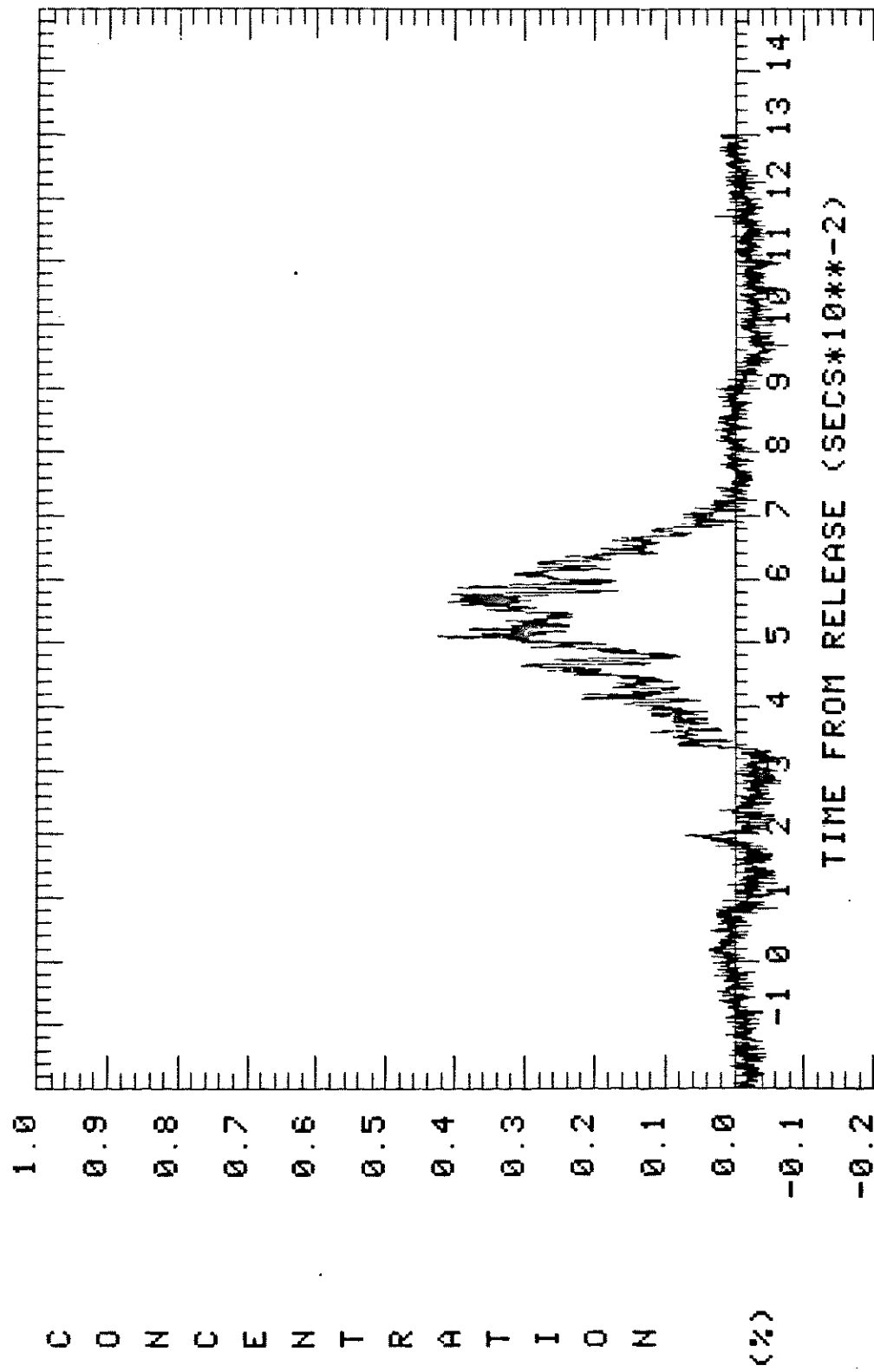
G60



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 350 M Z: 0.4 M

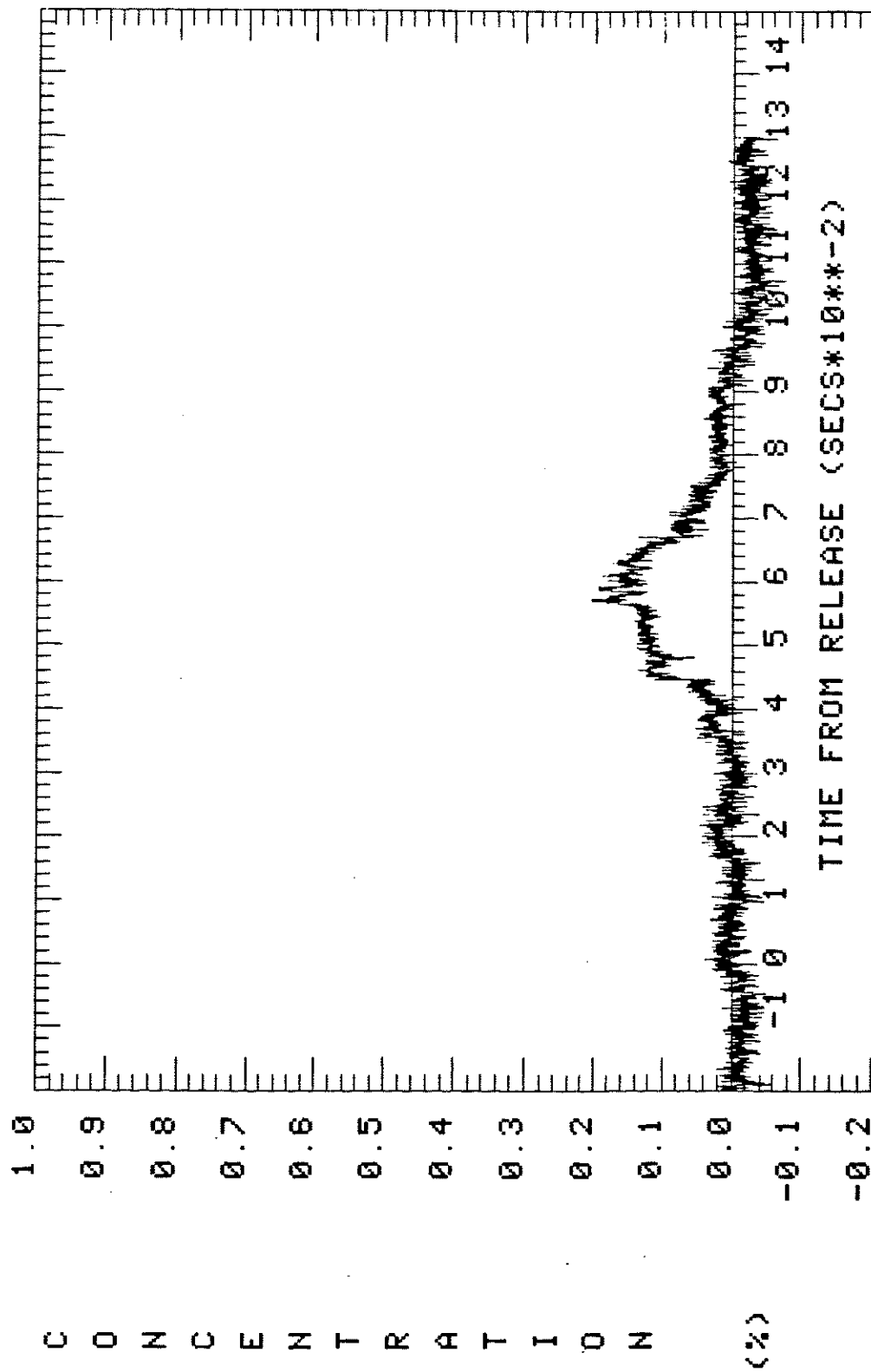
G61



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 350 M Z: 1.4 M

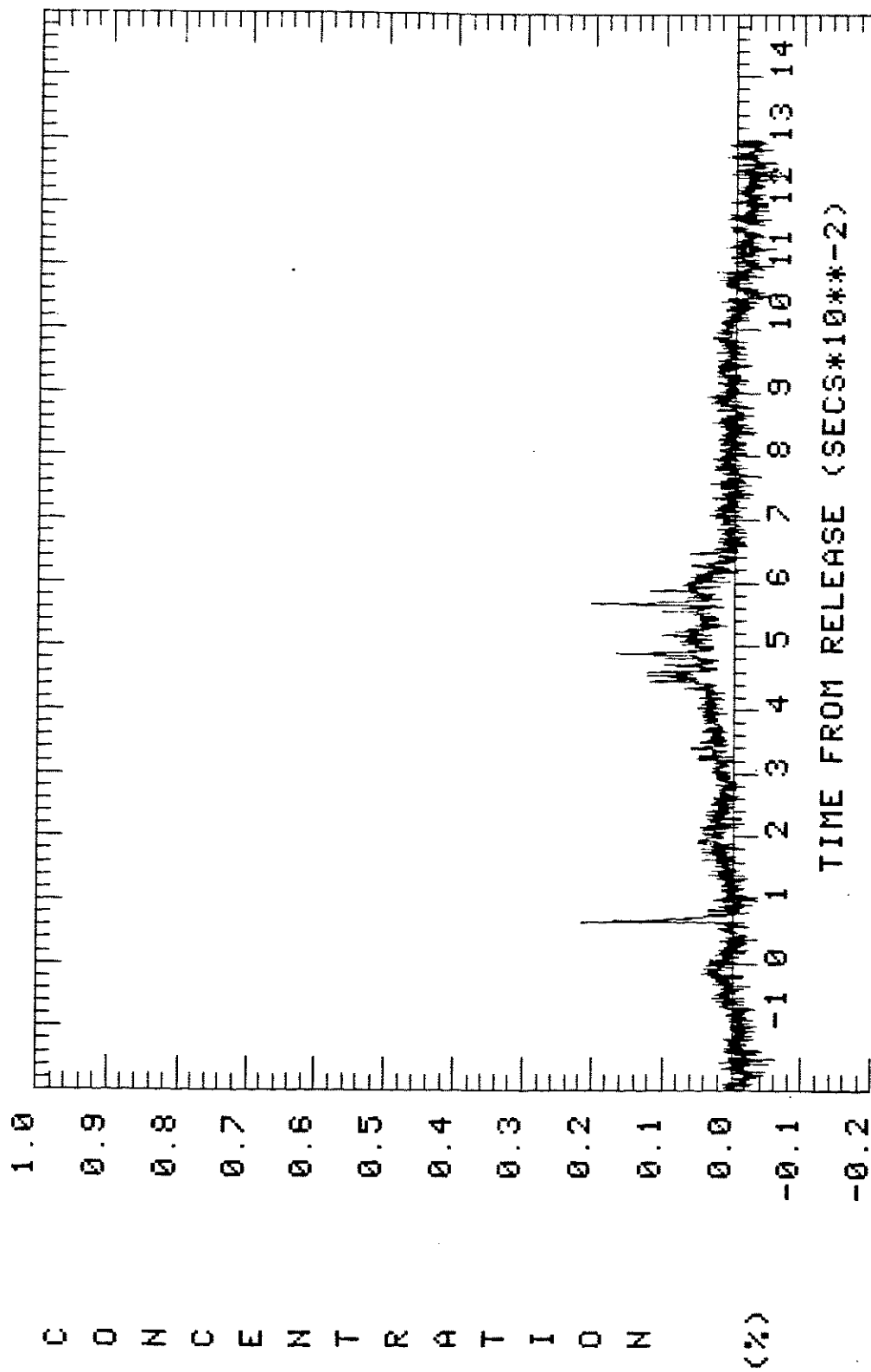
G62



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 350 M Z: 2.4 M

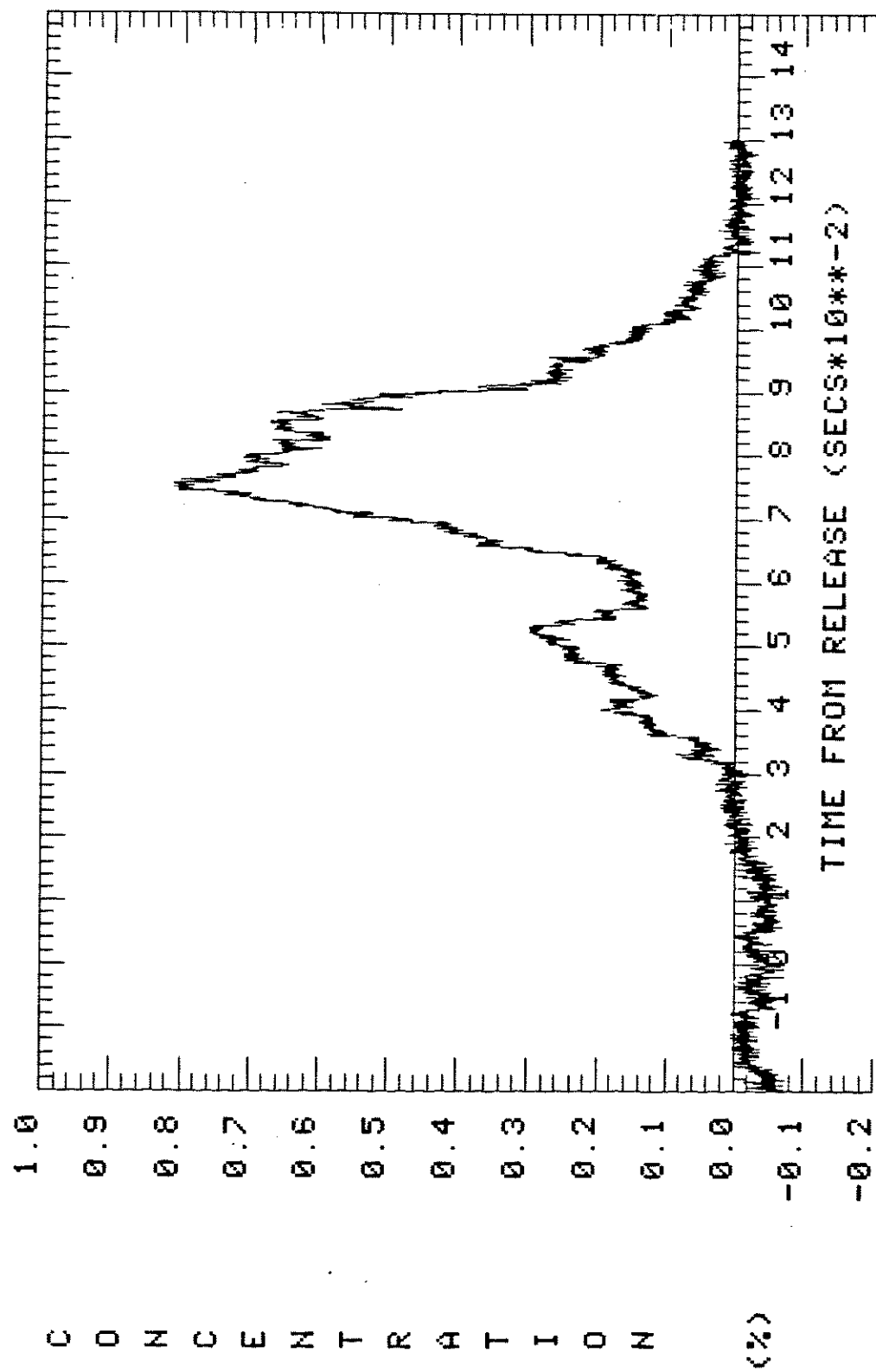
G63



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 350 M Z: 4.4 M

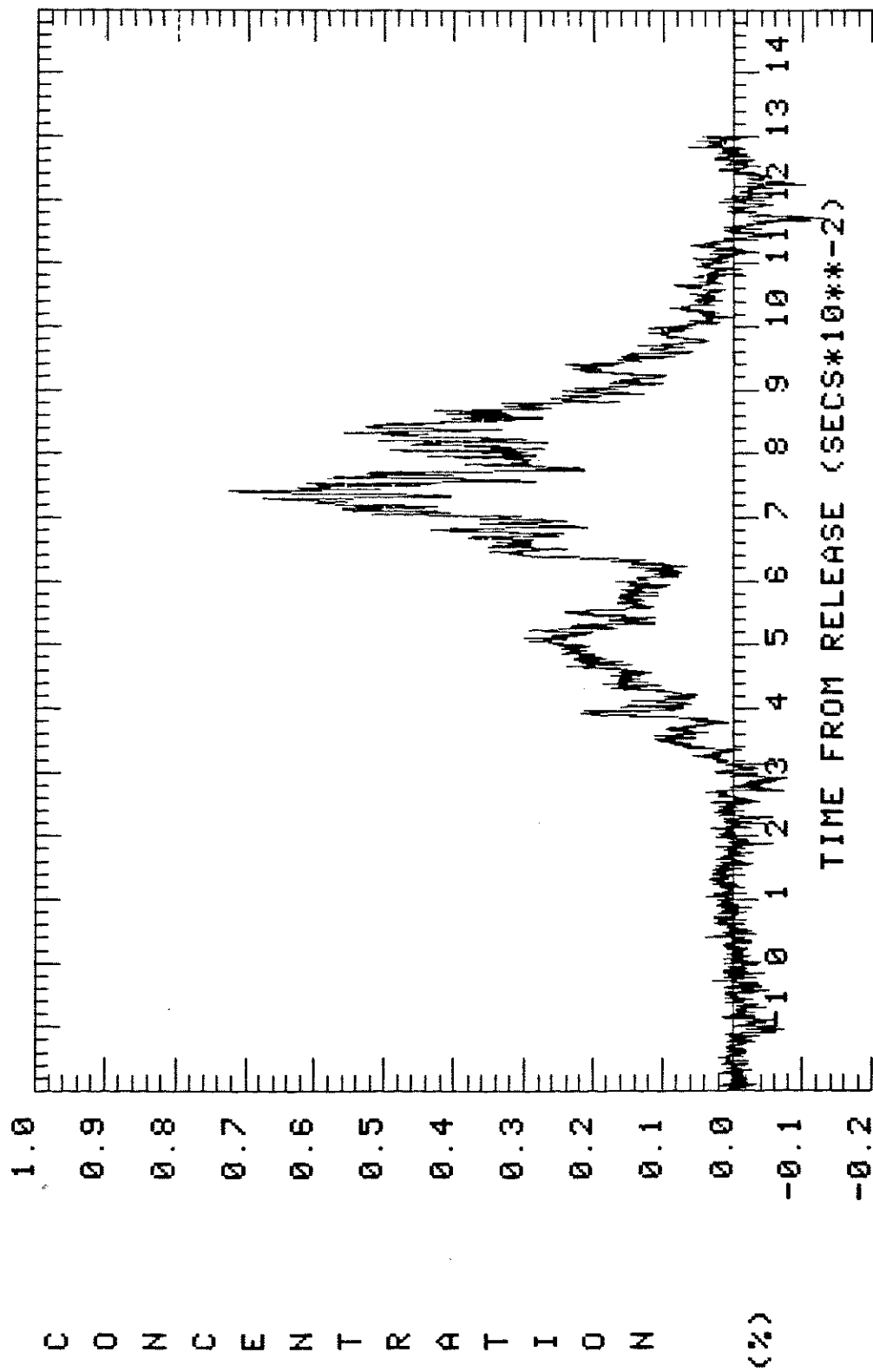
G64



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

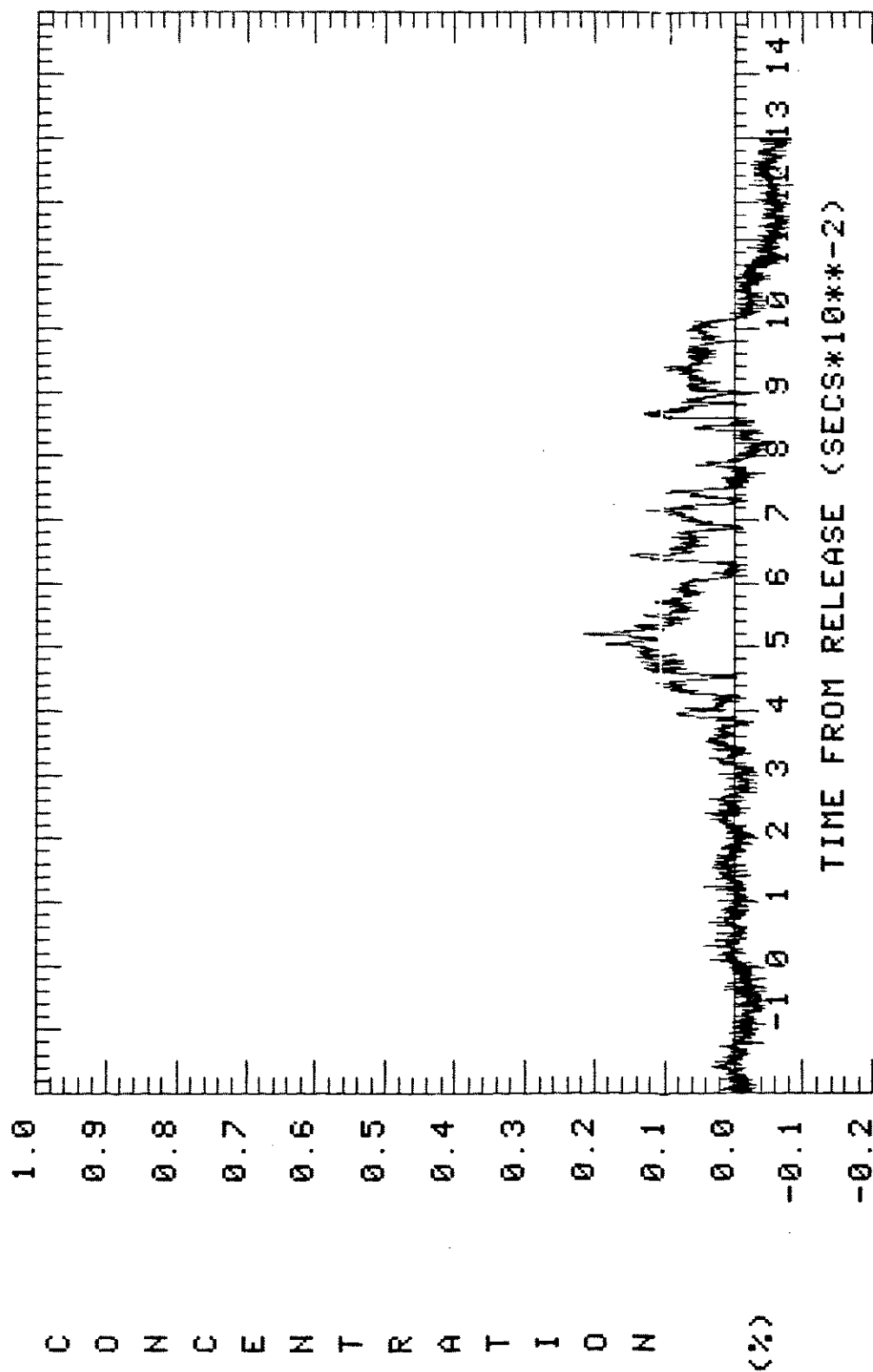
G65



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

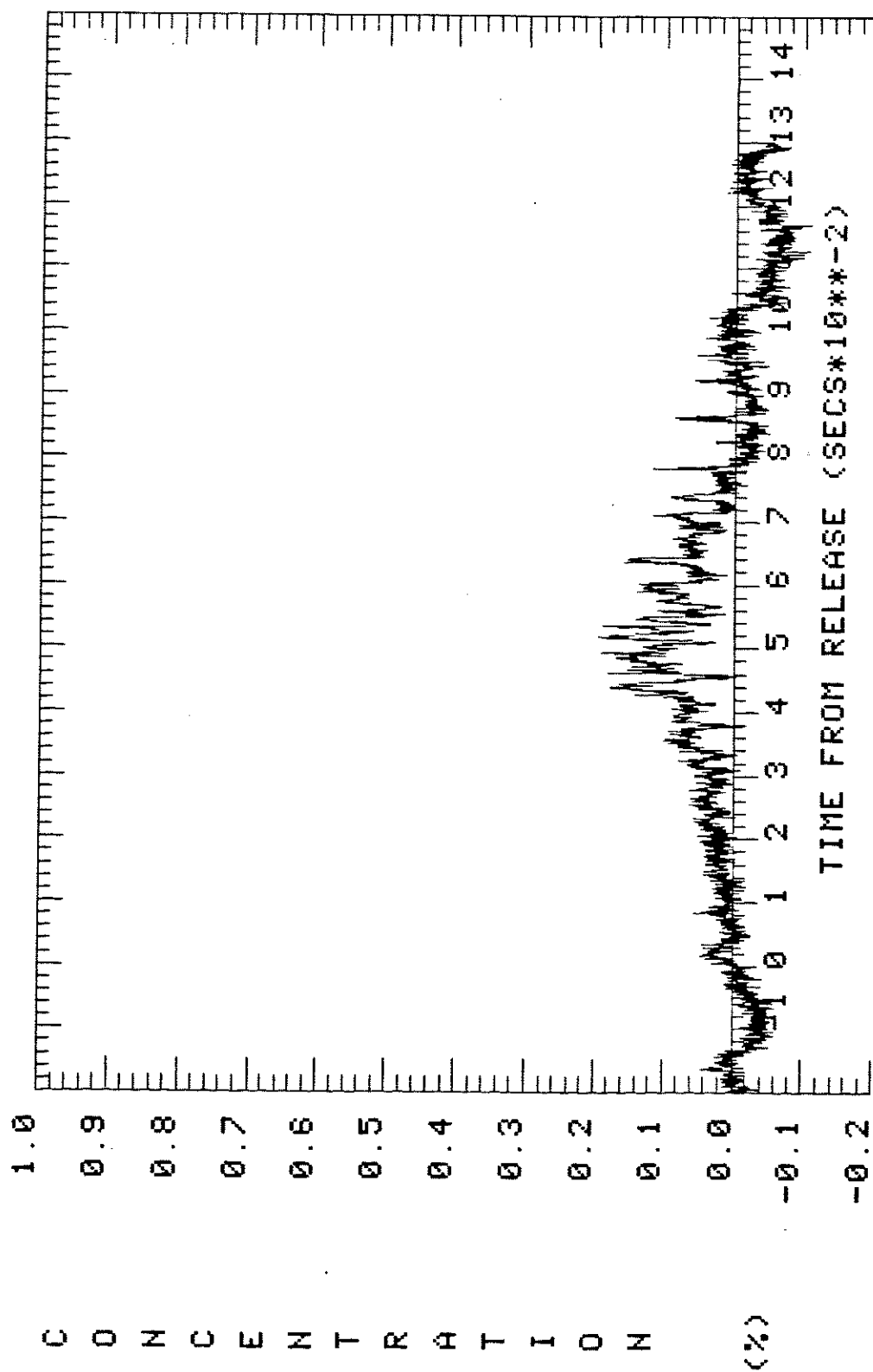
G66



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

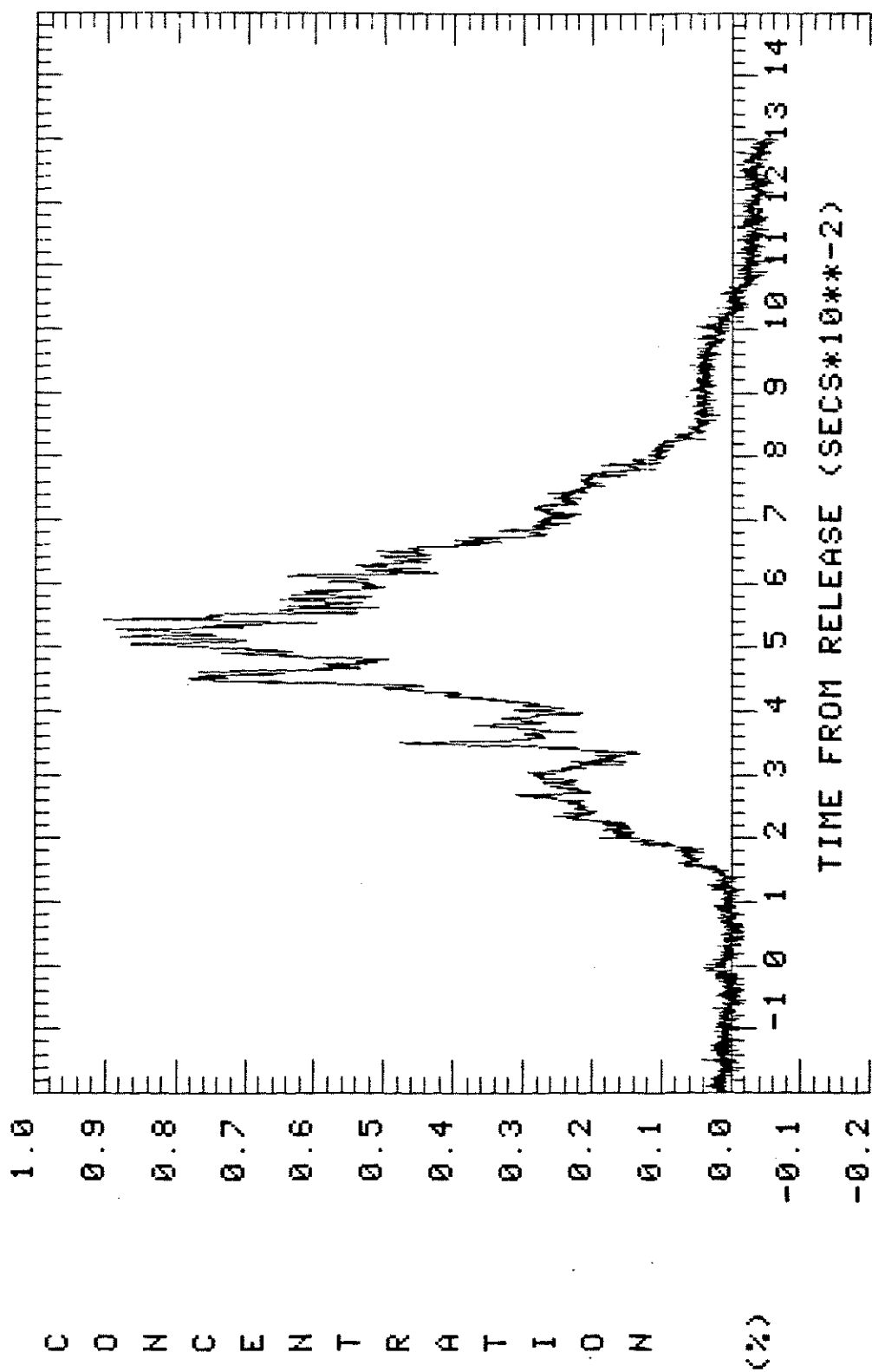
G67



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 300 M Y: 400 M Z: 6.4 M

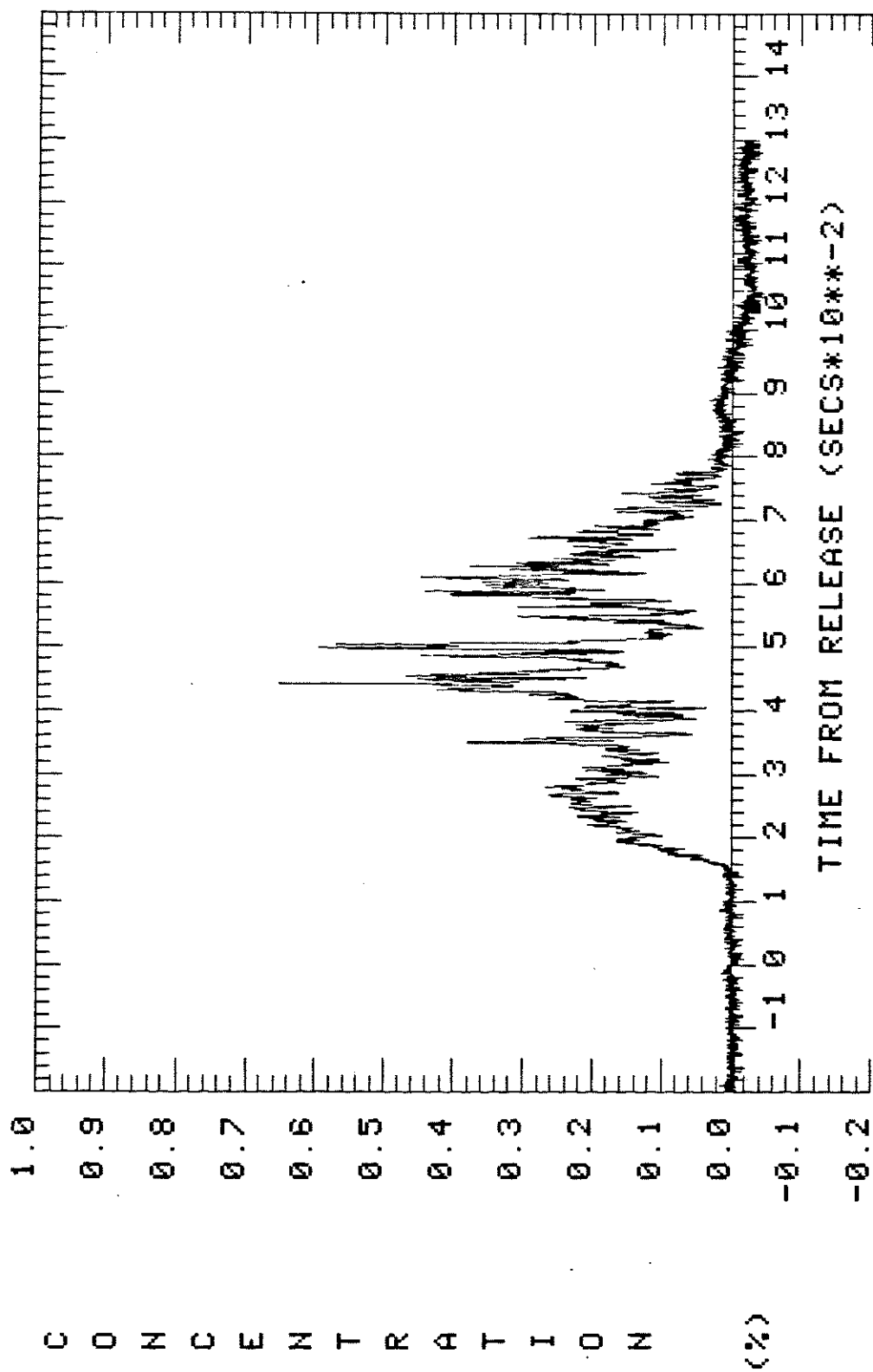
G68



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

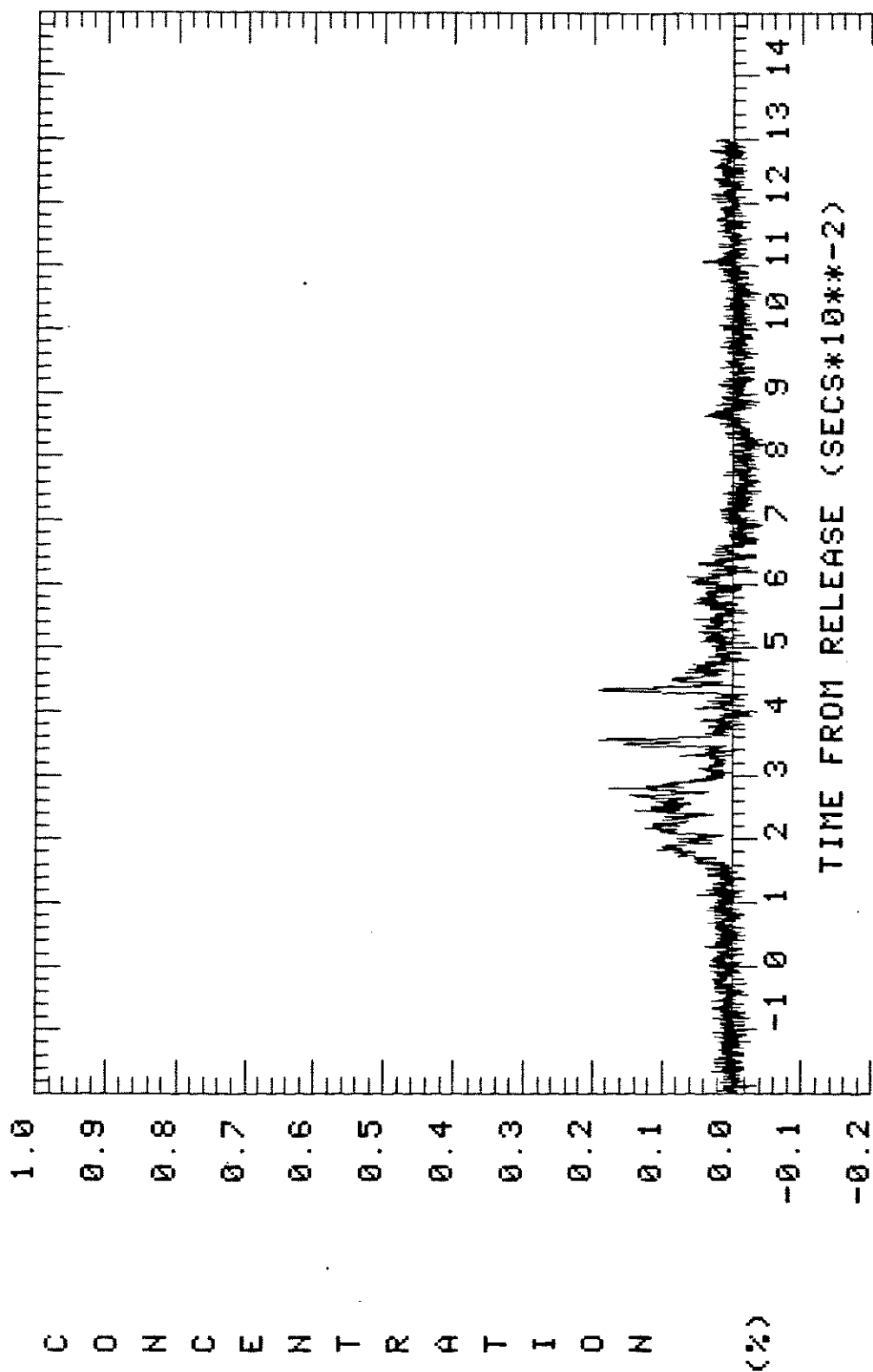
G69



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

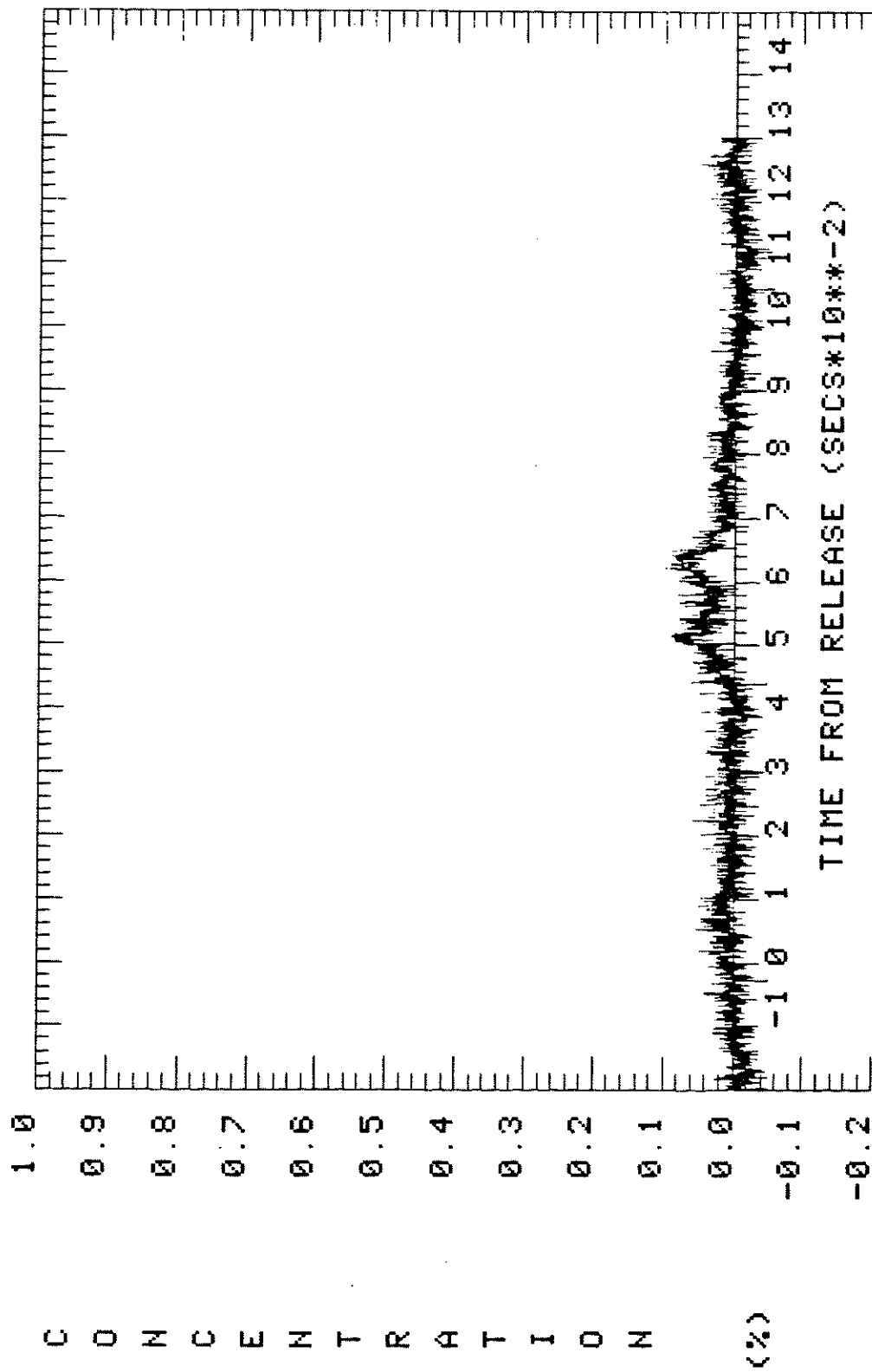
G70



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

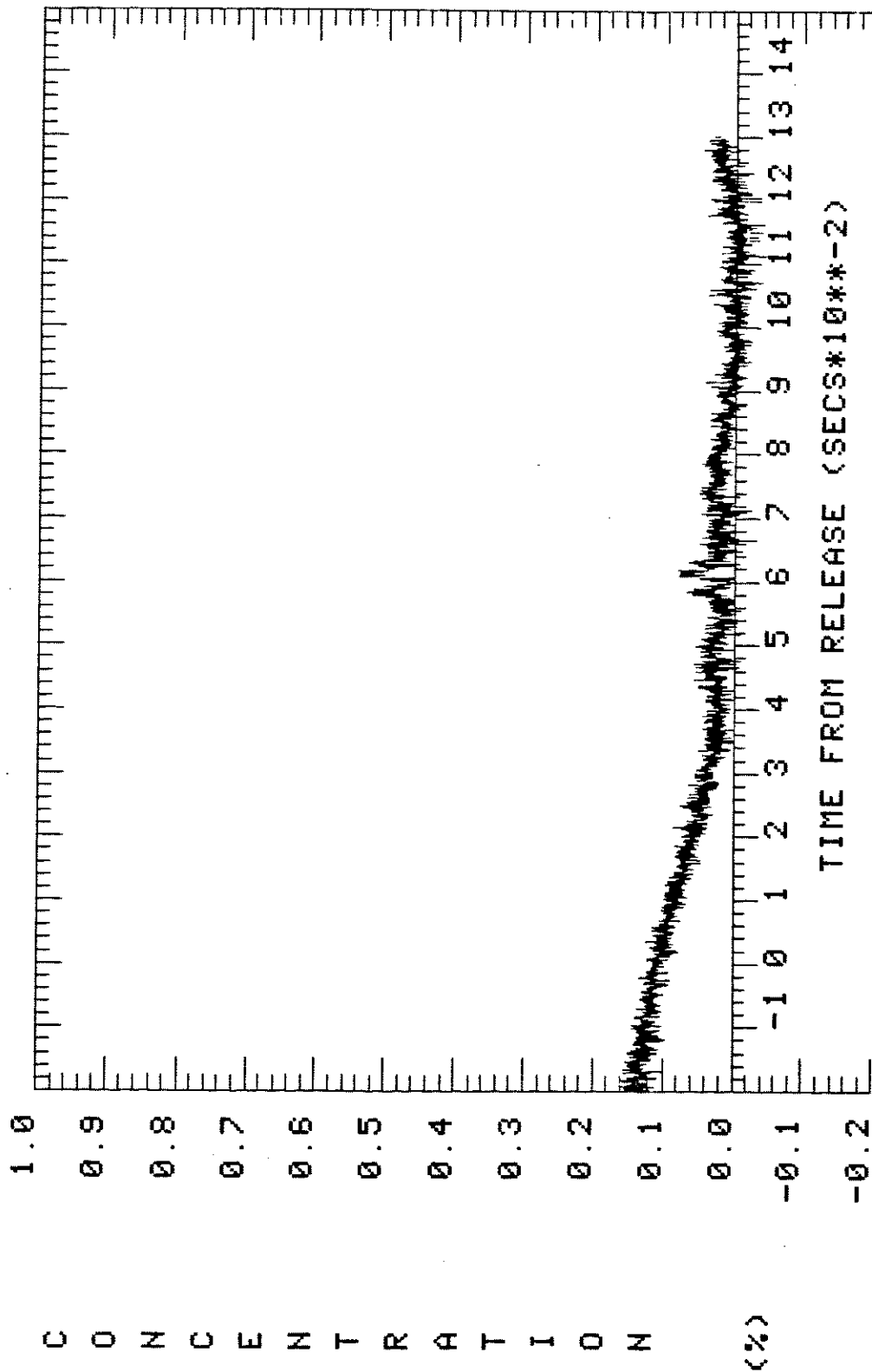
G71



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 400 M Z: 0.4 M

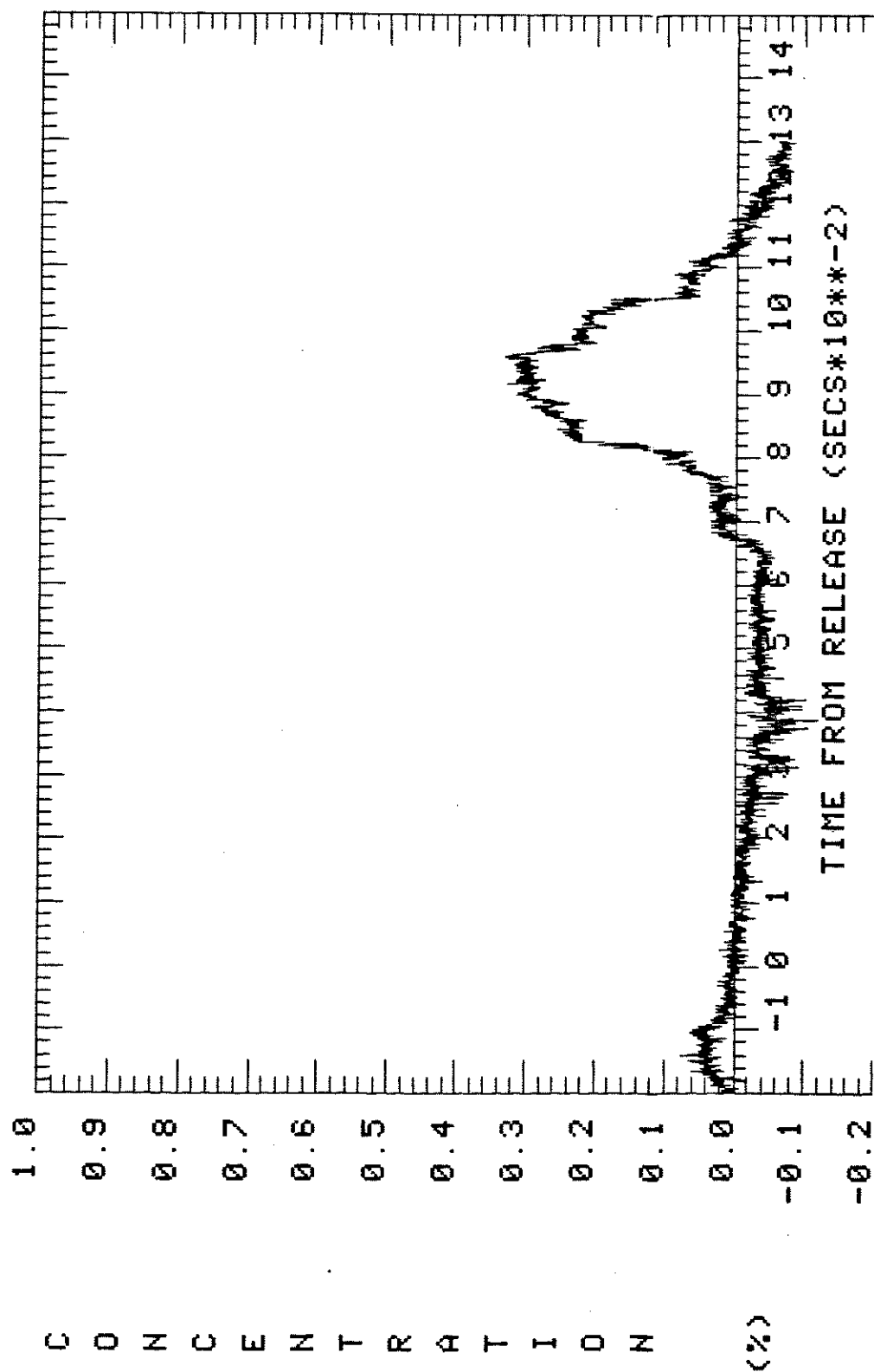
G72



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

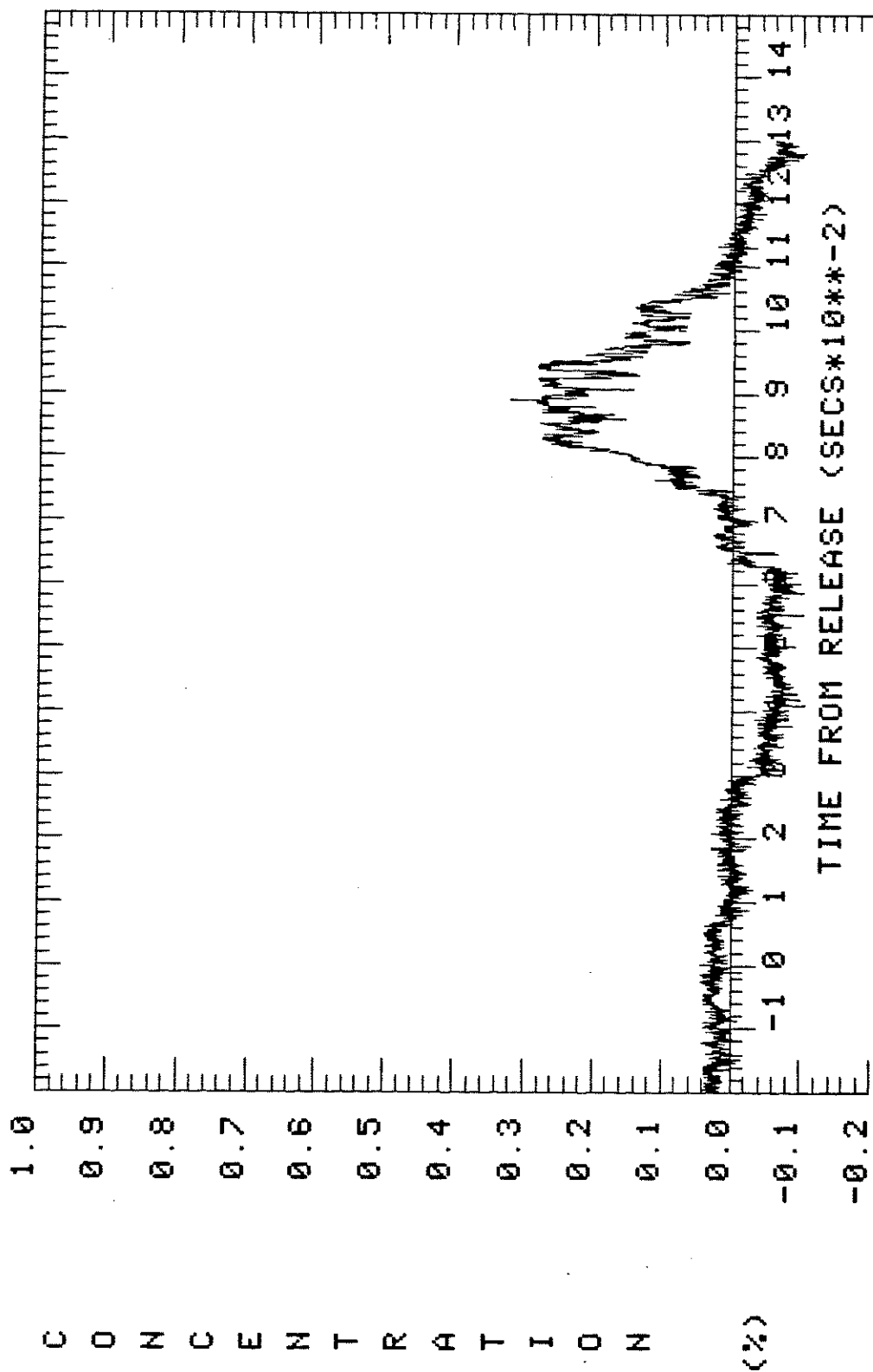
X: 450 M Y: 400 M Z: 4.4 M

G73



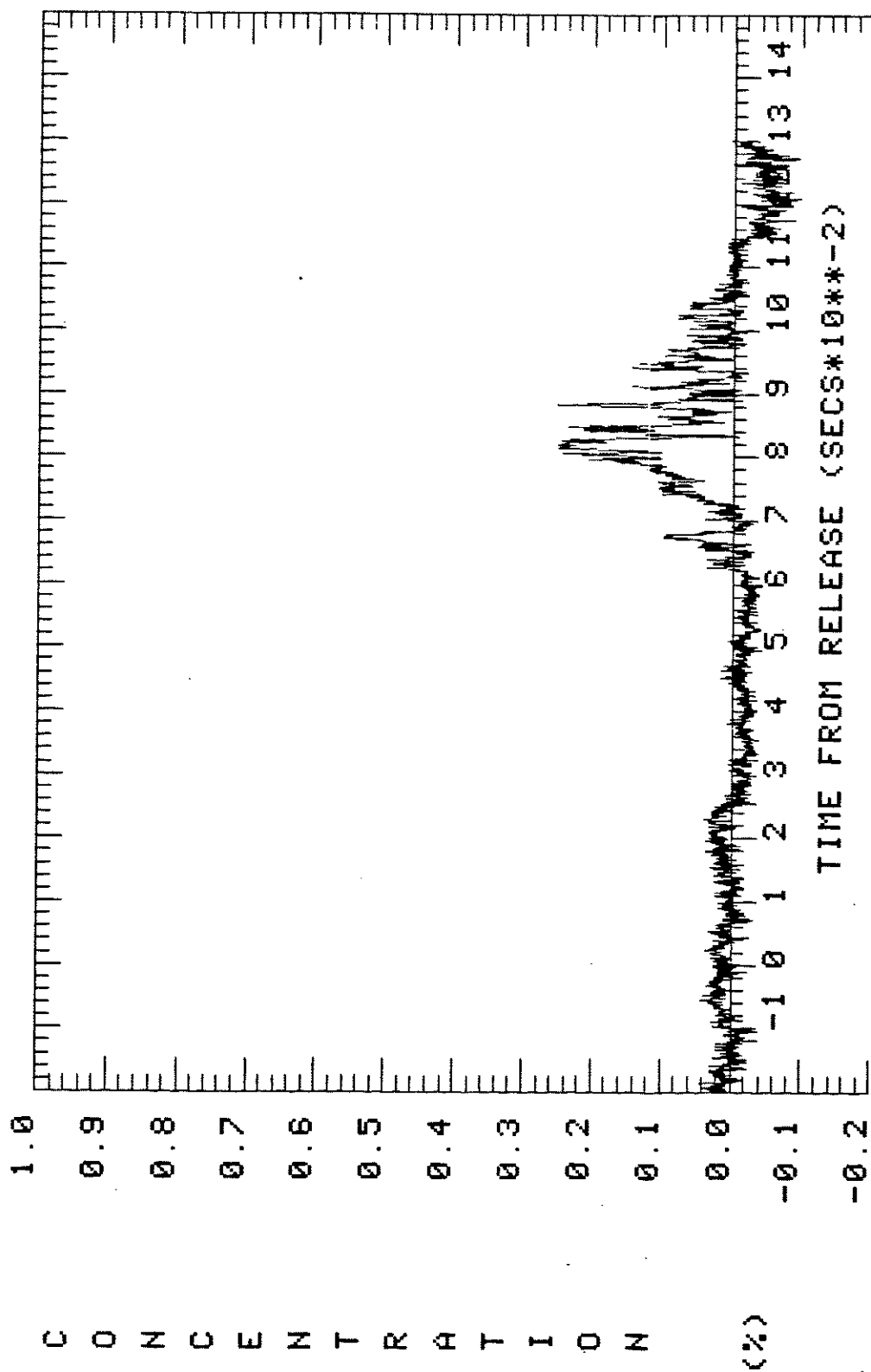
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 200 M Y: 500 M Z: 0.4 M



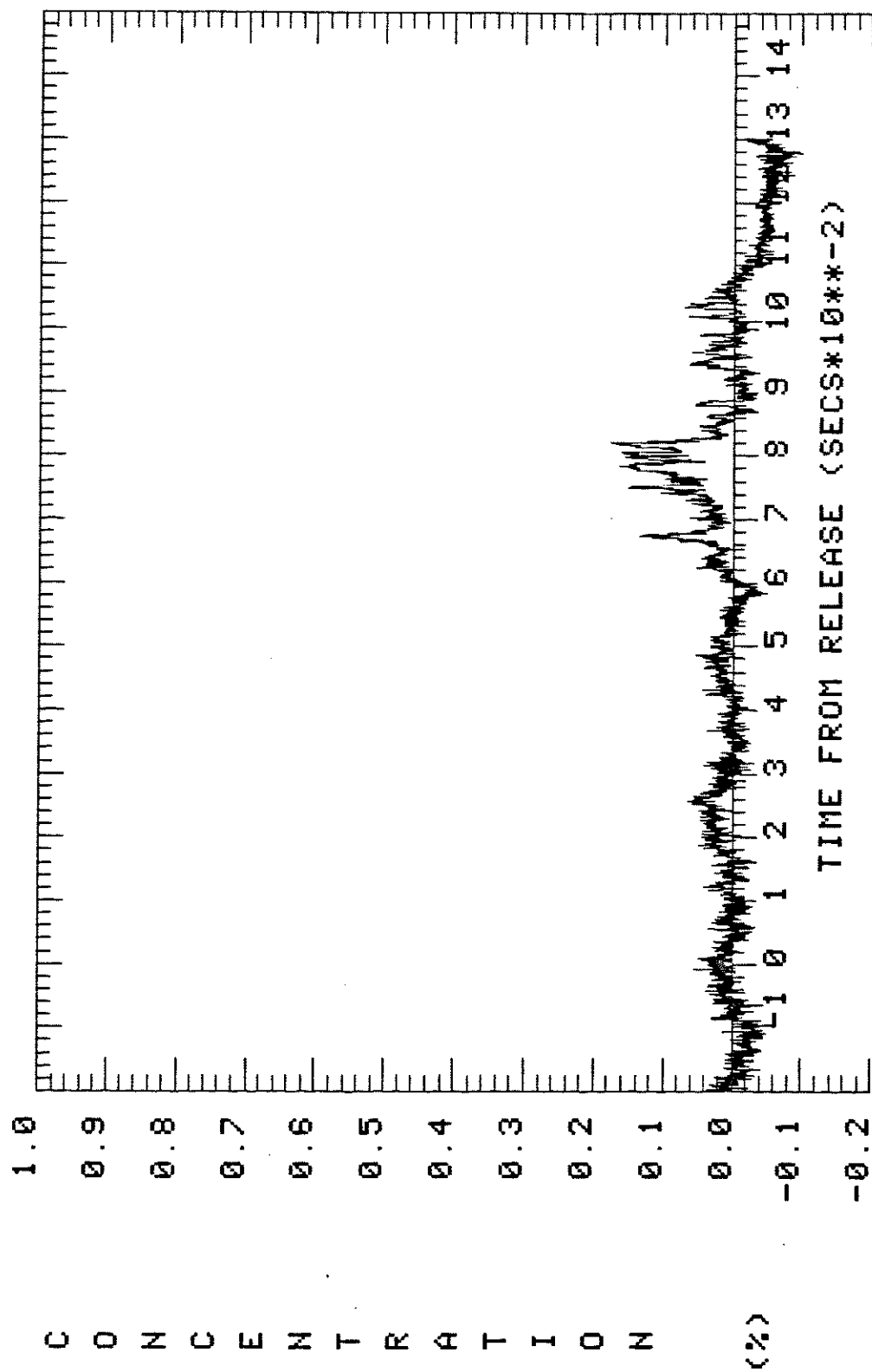
TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 200 M Y: 500 M Z: 2.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

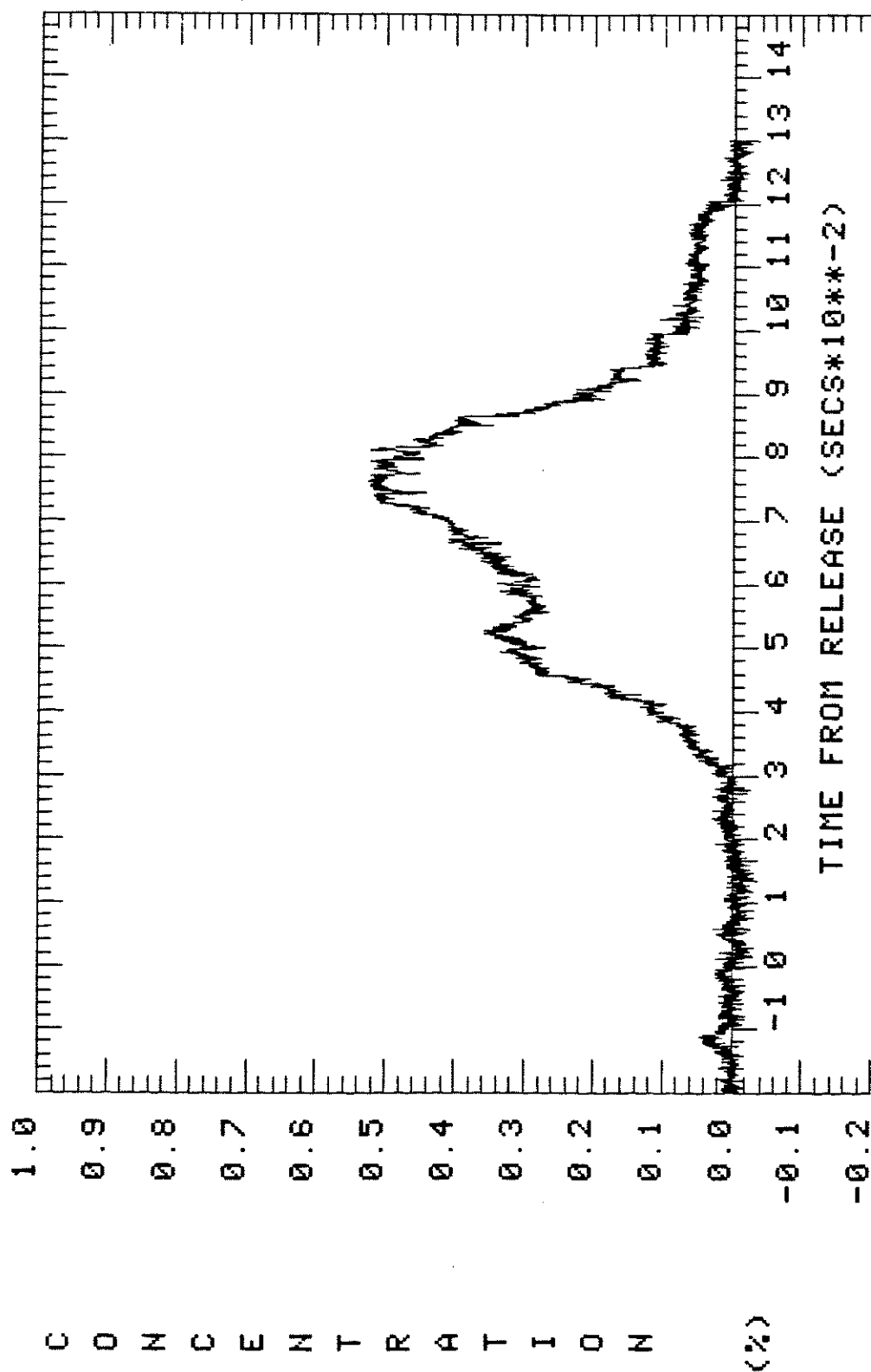
X: 200 M Y: 500 M Z: 4.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 200 M Y: 500 M Z: 6.4 M

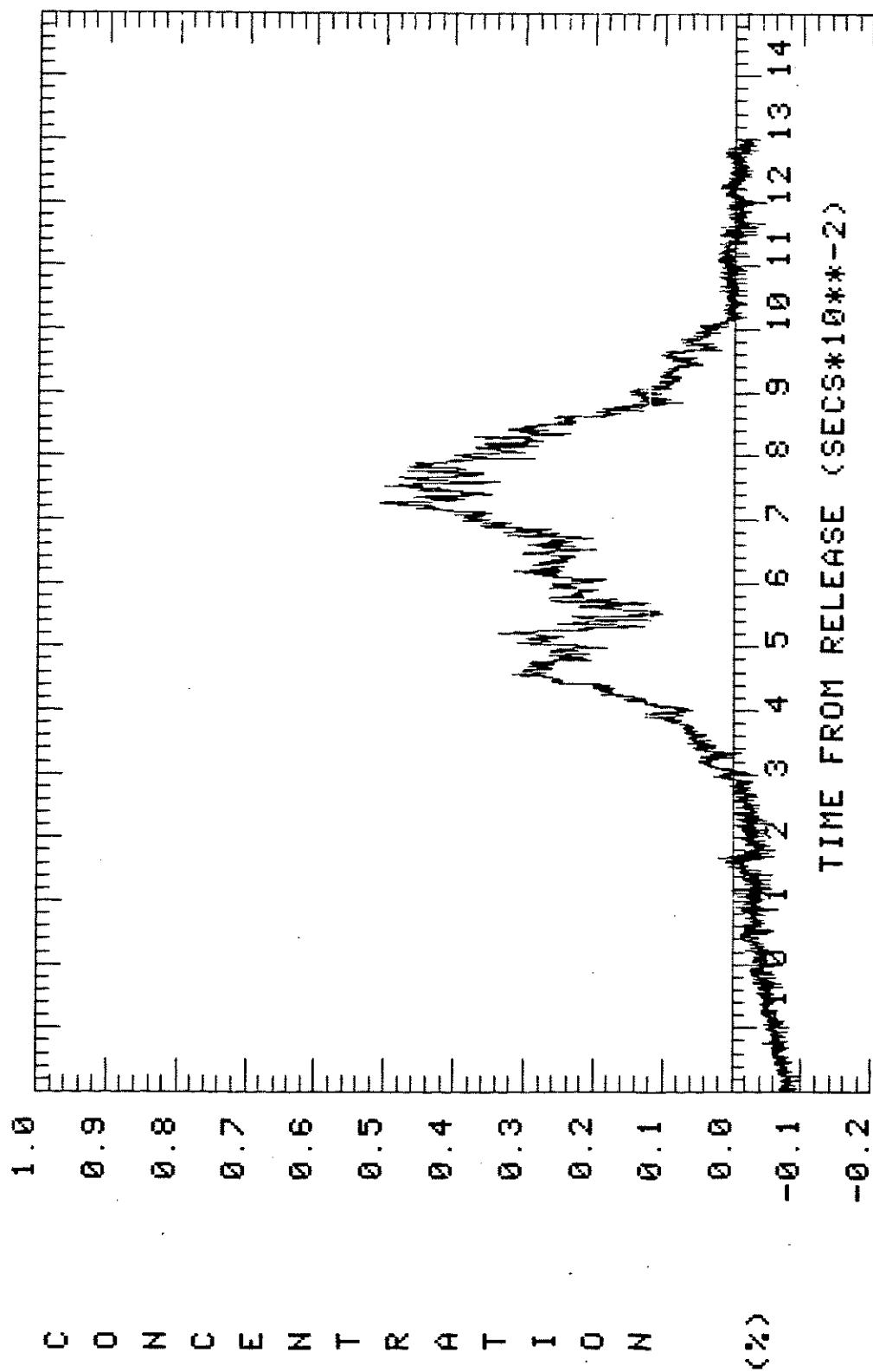
G77



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

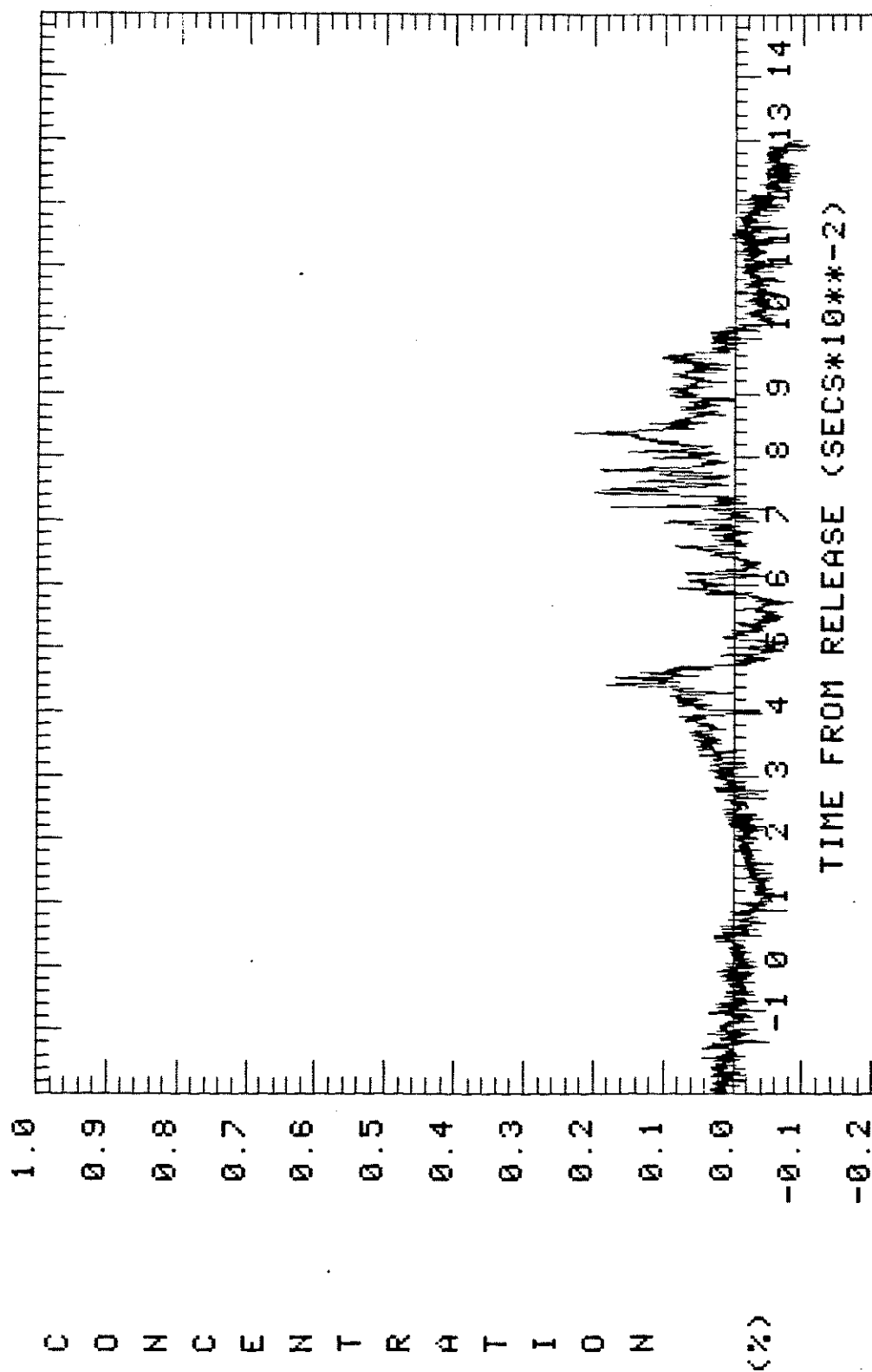
G78



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 300 M Y: 500 M Z: 2.4 M

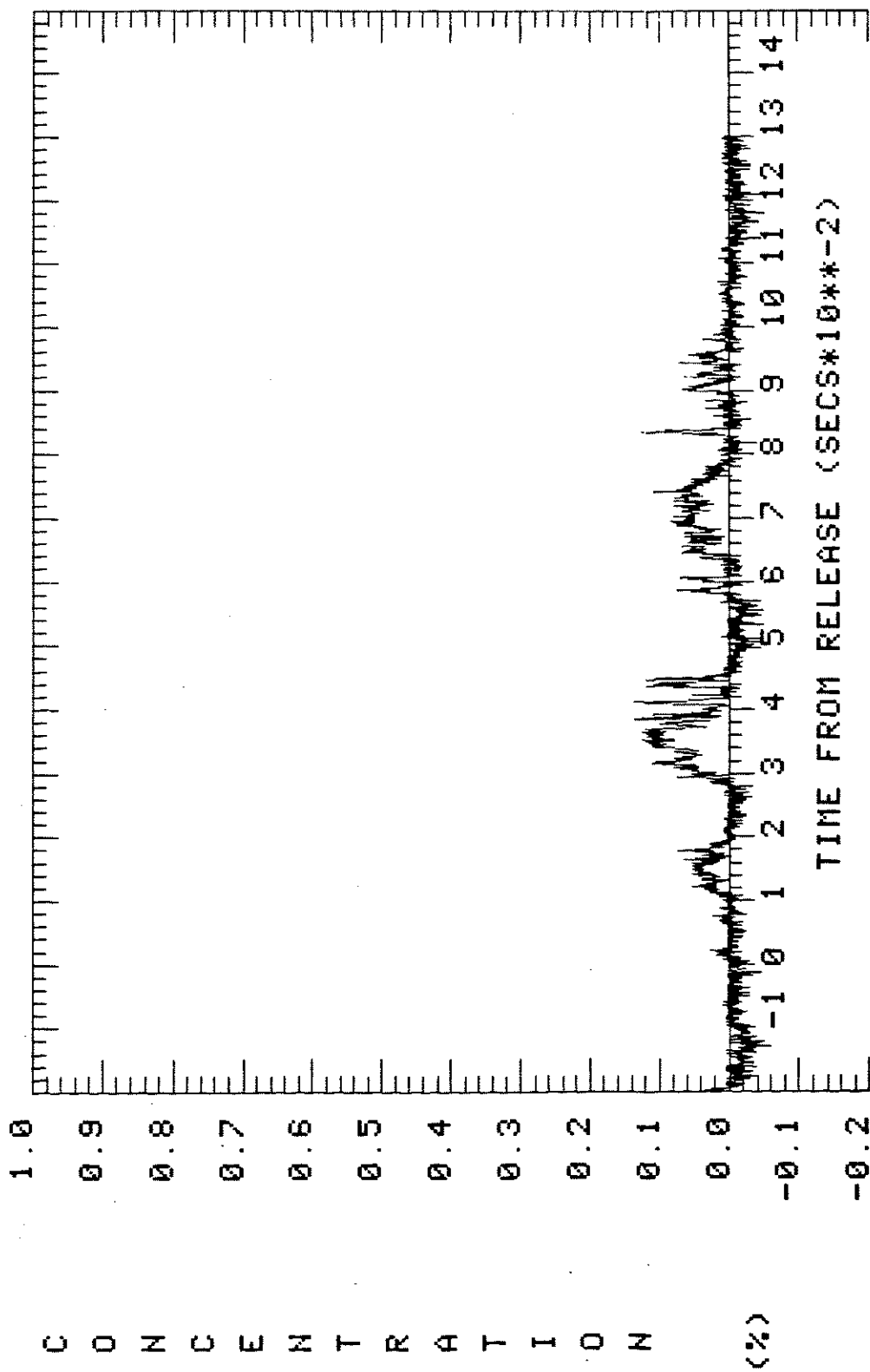
G79



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

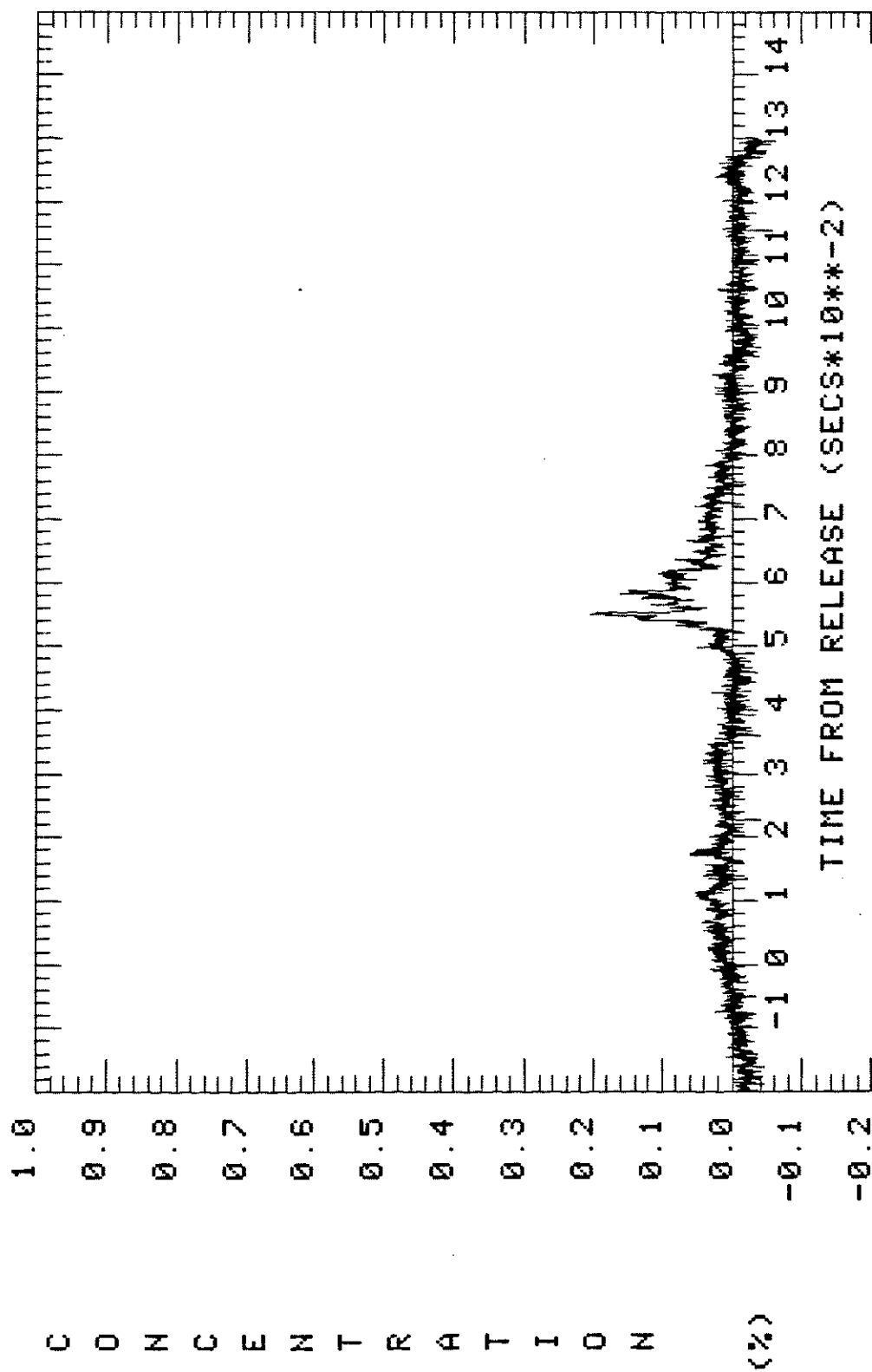
G80



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

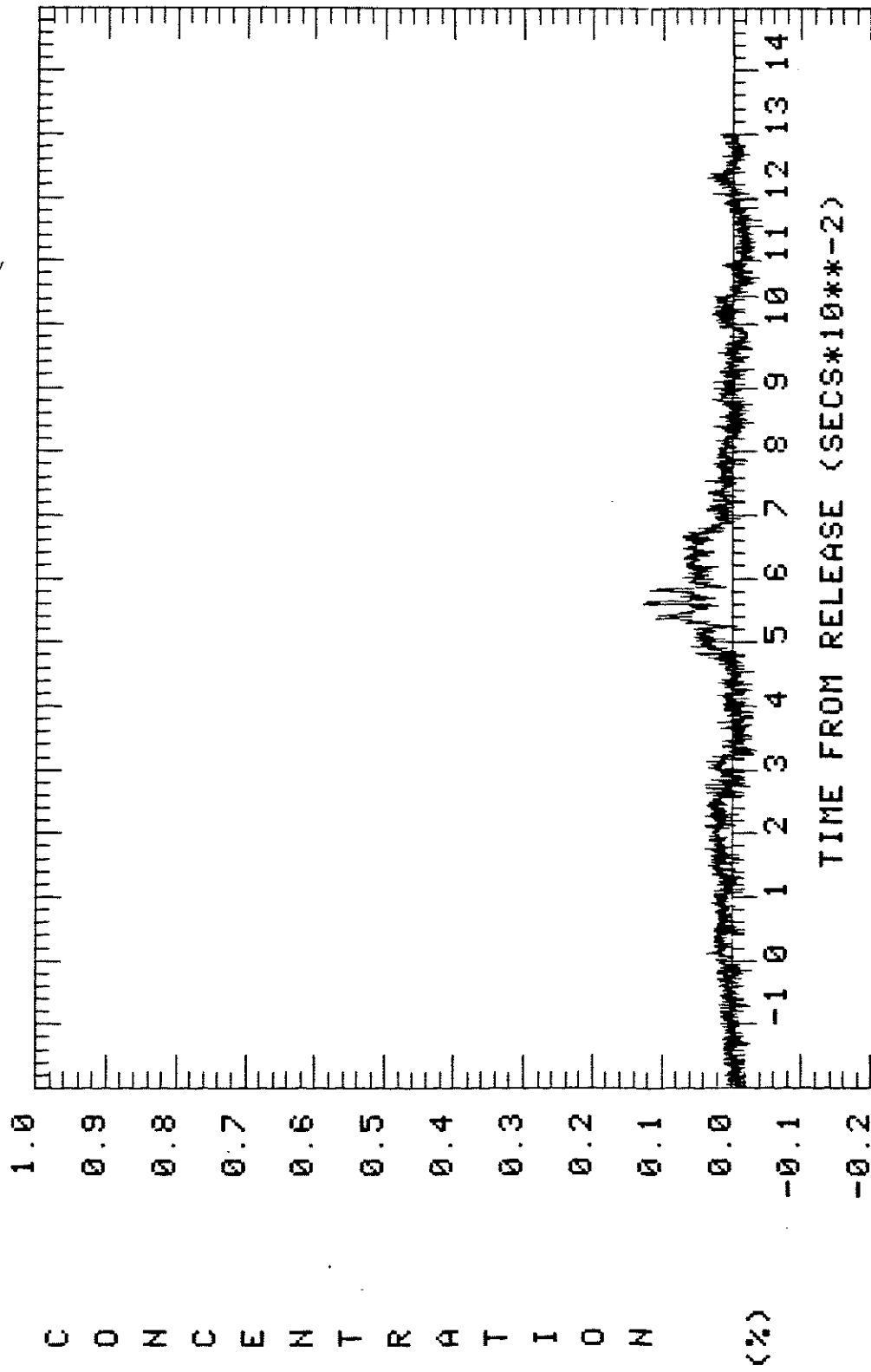
X: 300 M Y: 500 M Z: 6.4 M

G81



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

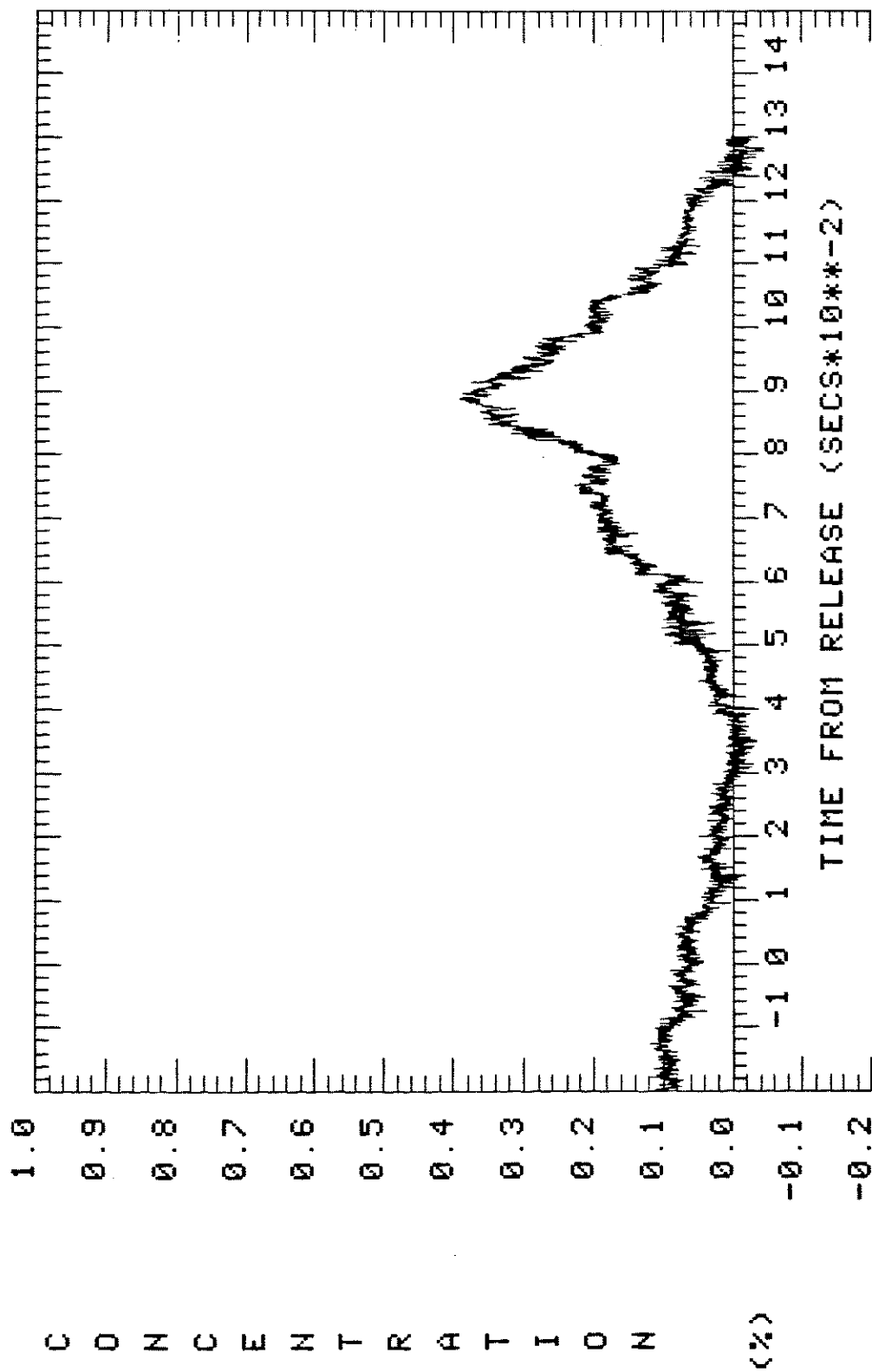
X: 400 M Y: 500 M Z: 2.4 M



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 400 M Y: 500 M Z: 4.4 M

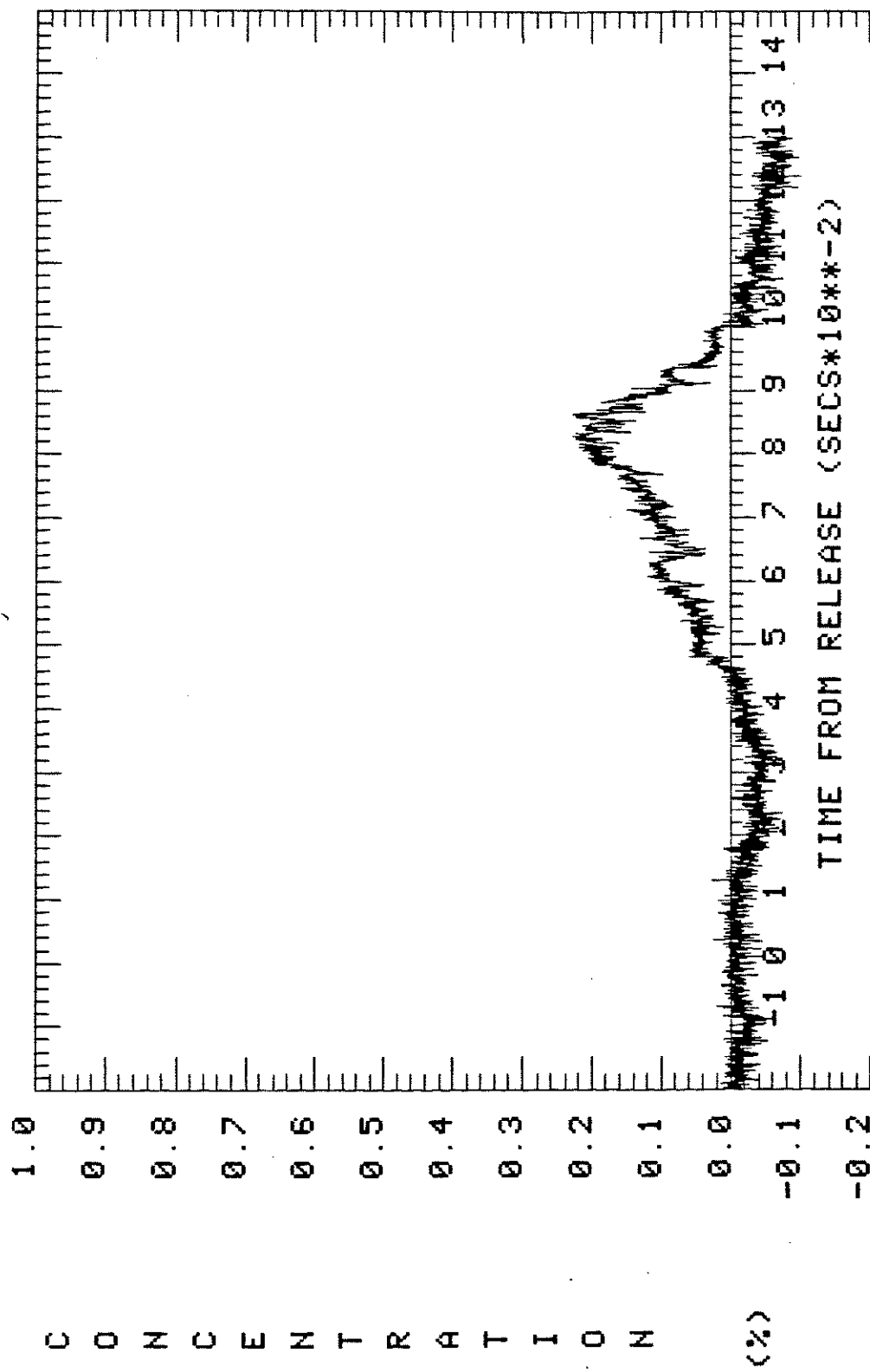
G83



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 200 M Y: 600 M Z: 0.4 M

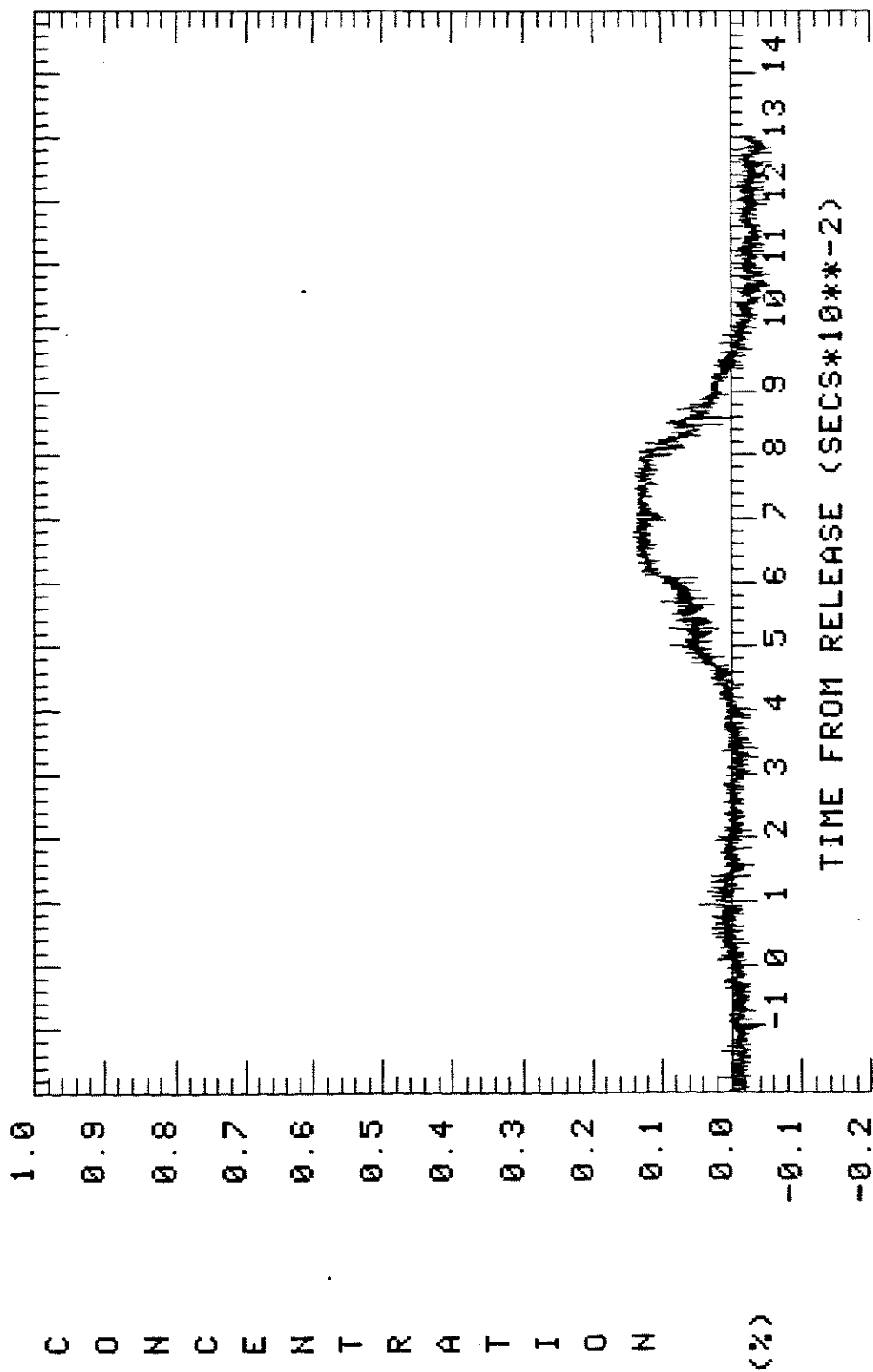
G84



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 220 M Y: 670 M Z: 2.4 M

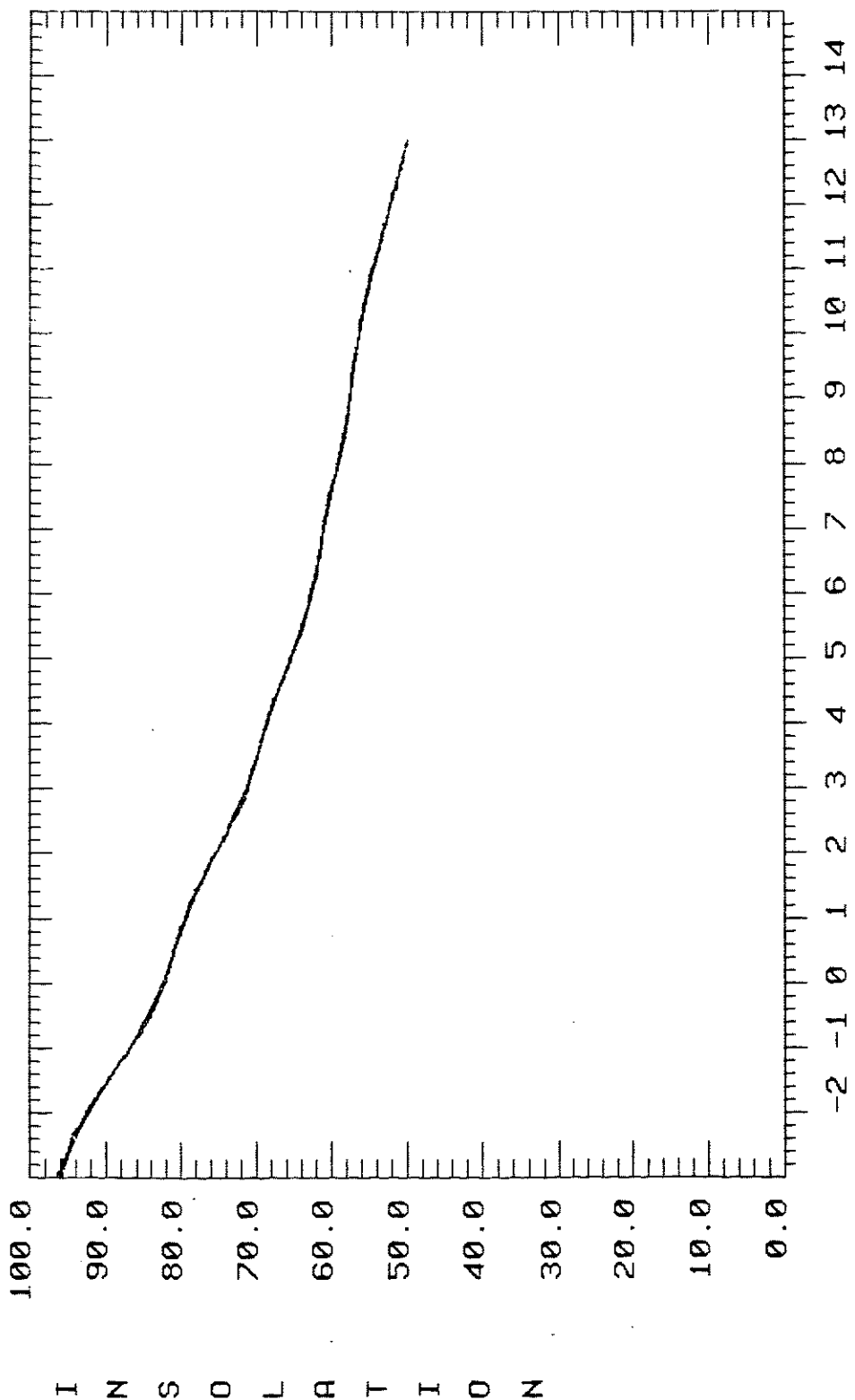
G85



TRIAL: 045 TYPE: GAS AVERAGING TIME: 0.6 SECS

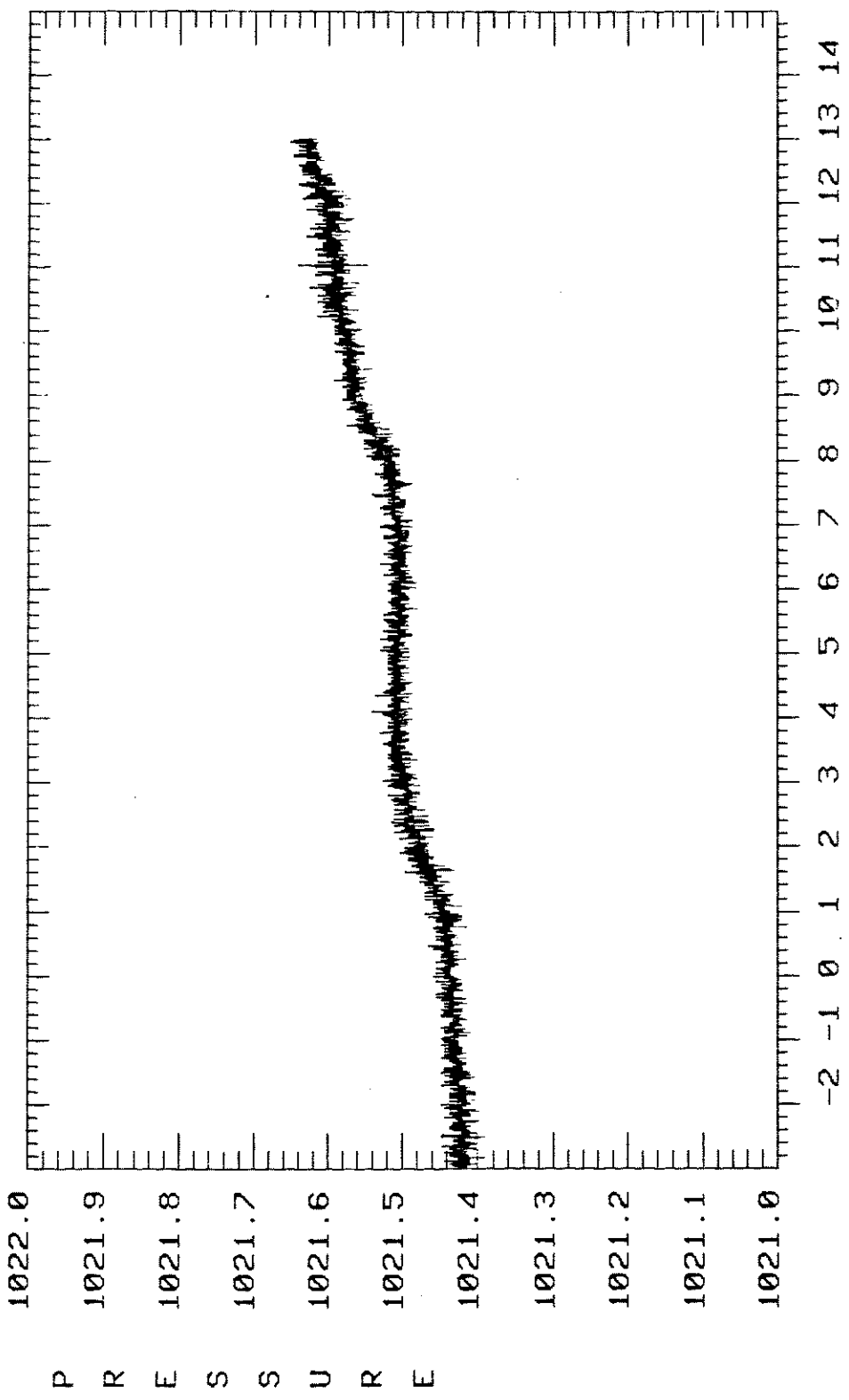
X: 300 M Y: 700 M Z: 0.4 M

G86



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

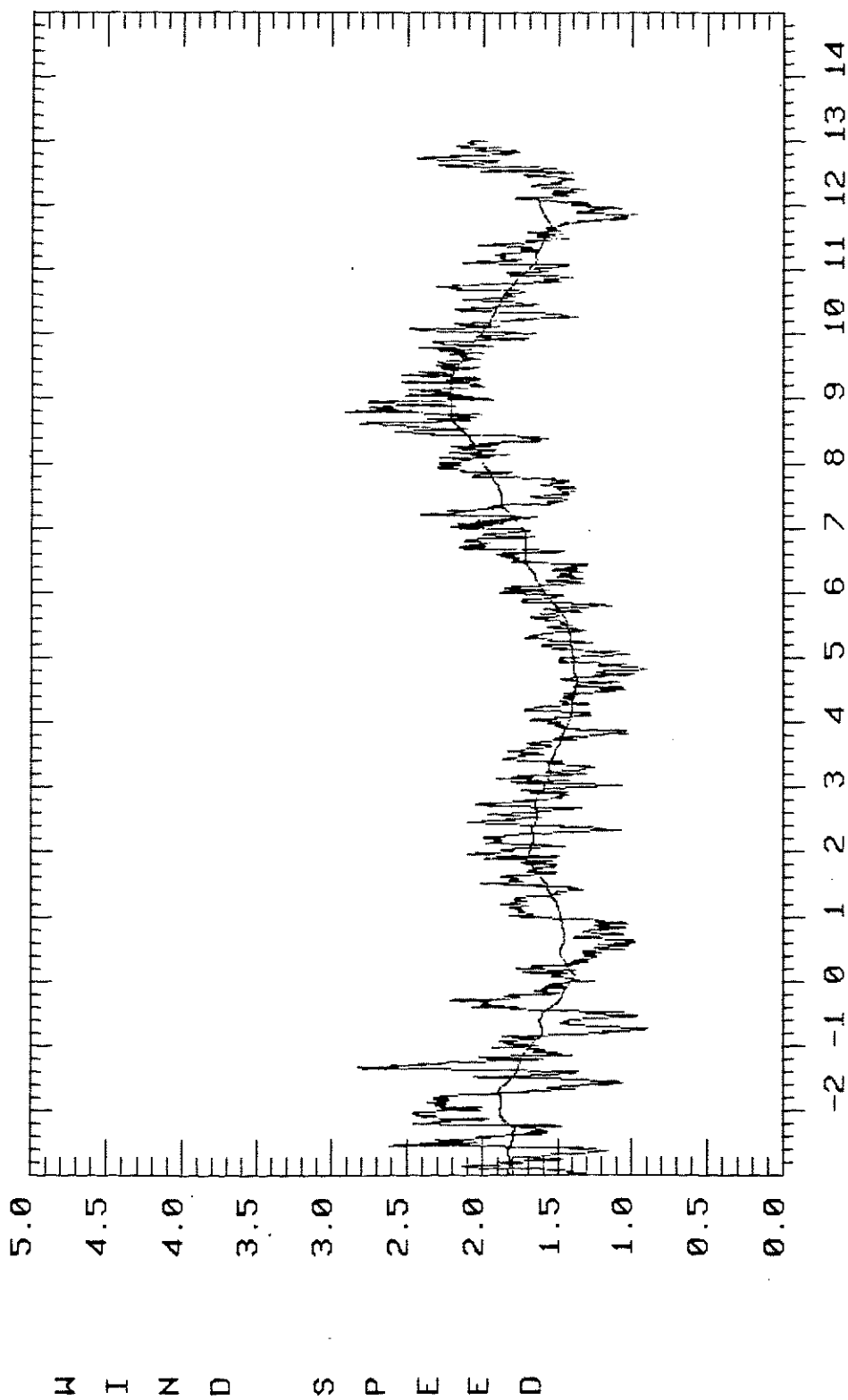
TRIAL: 045 TYPE: SOLA UNITS: W/M**2
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 0.4 M
 MEAN OF RUN UP: 248.79 MEAN OF RUN DOWN: 26.51



TRIAL: 045 TYPE: BROM UNITS: MBAR

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 0.4 M

MEAN OF RUN UP: 1021 MEAN OF RUN DOWN: 1022

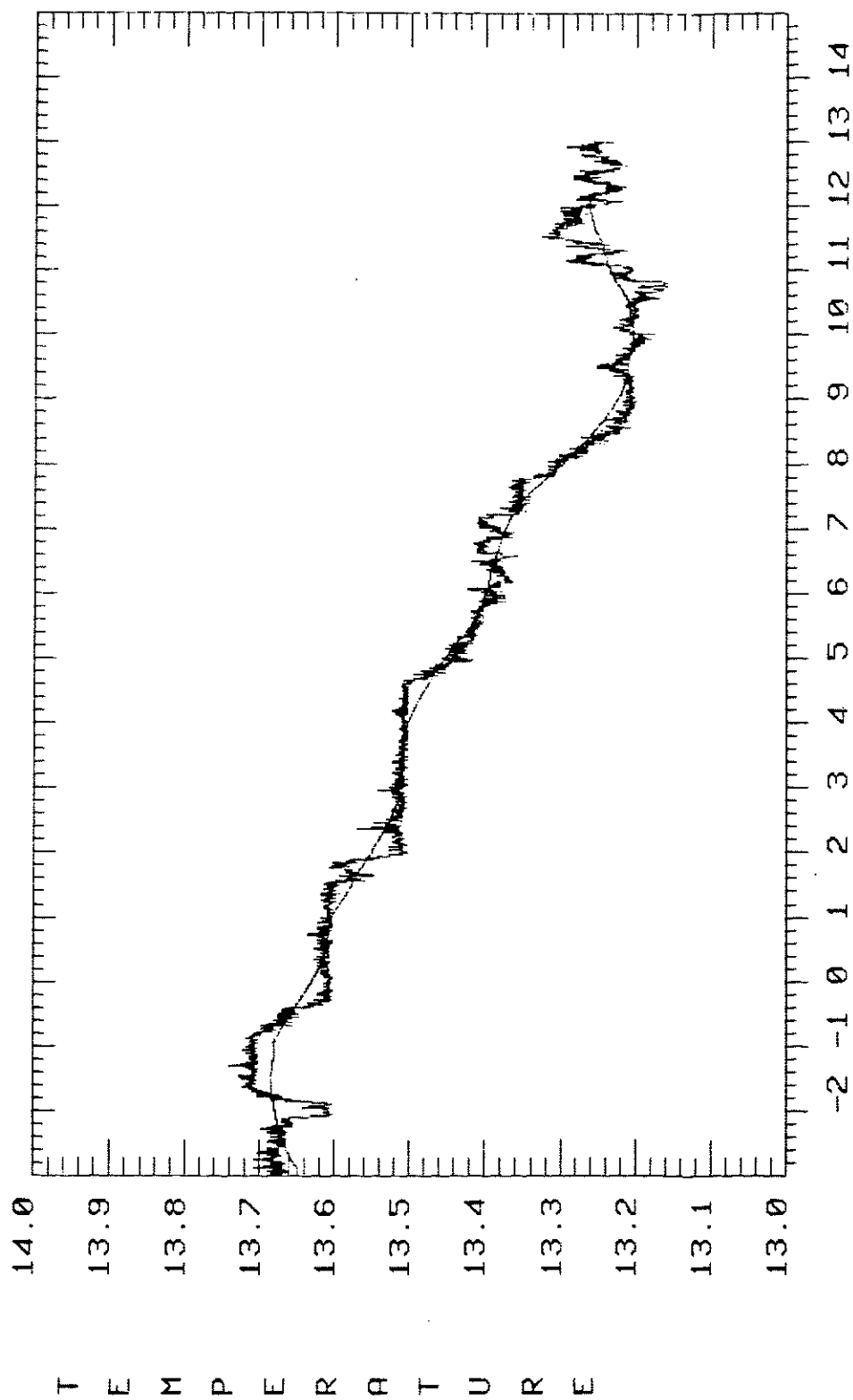


TRIAL: 045 TYPE: WSPD UNITS: M/S

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

MEAN OF RUN UP: 2.96 MEAN OF RUN DOWN: 0.53

E03

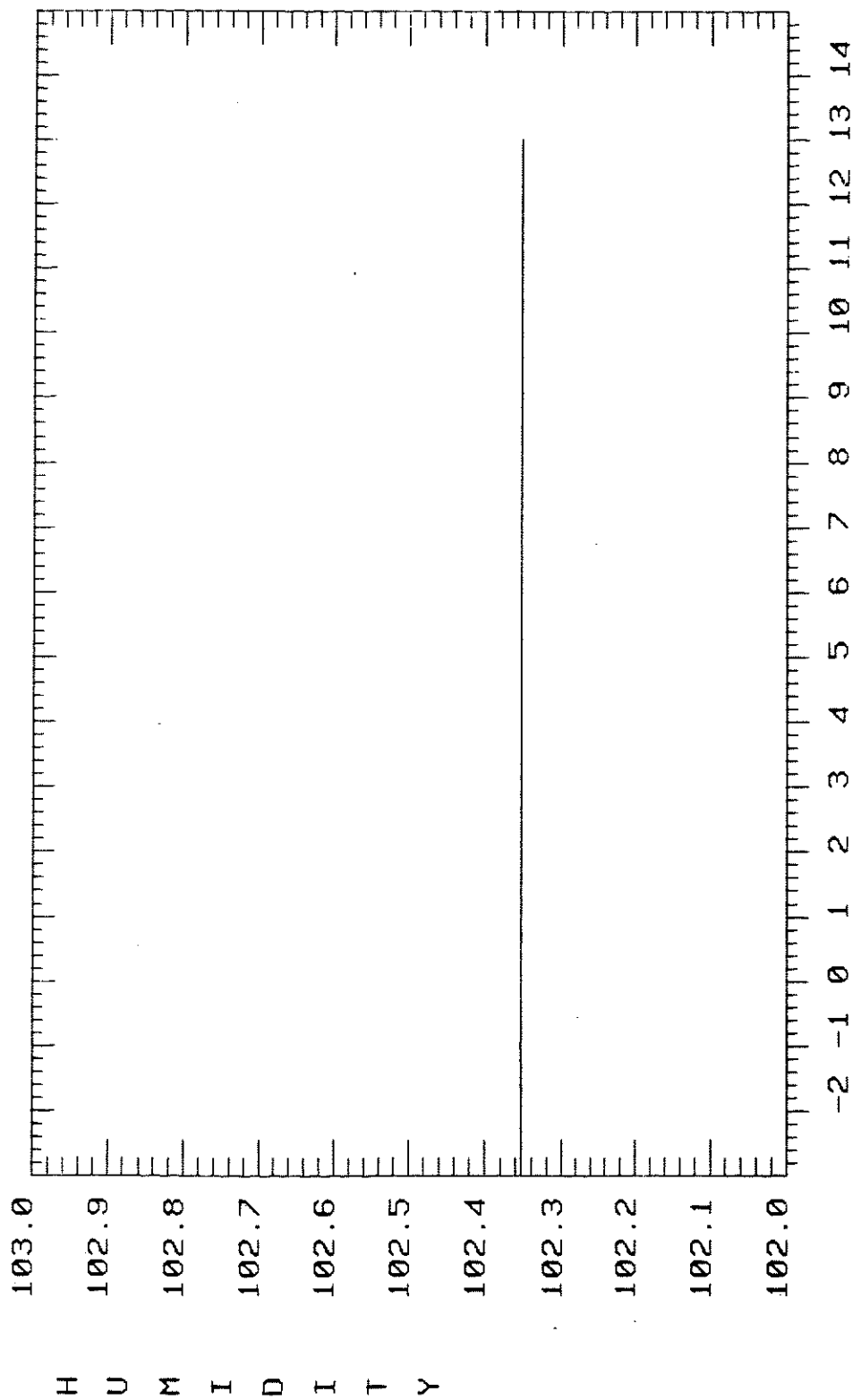


TRIAL: 045 TYPE: AIRT UNITS: DEGREES C

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

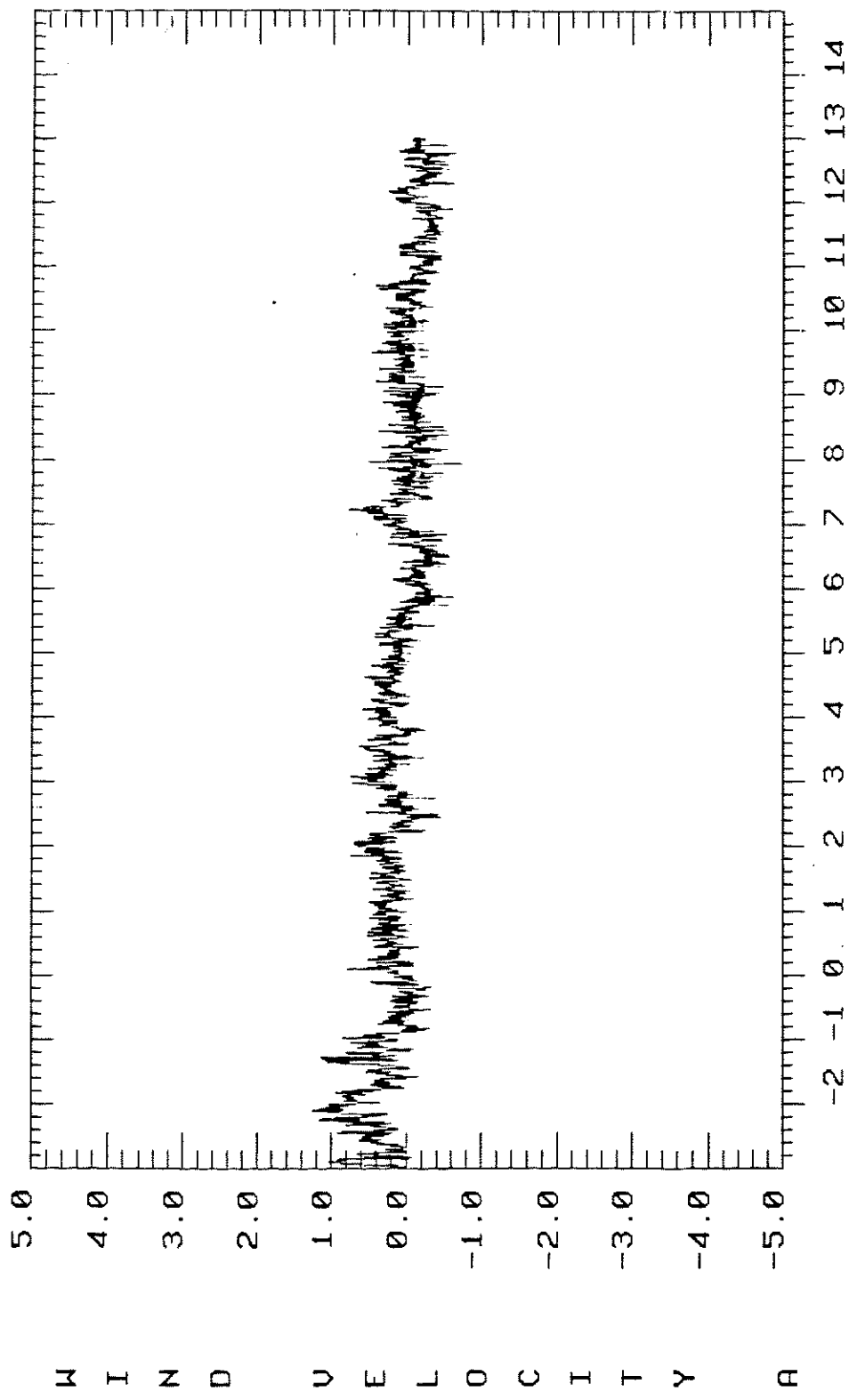
MEAN OF RUN UP: 12.97 MEAN OF RUN DOWN: 12.82

E04



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

TRIAL: 045 TYPE: RHUM UNITS: PER CENT
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 2.0 M
 MEAN OF RUN UP: 102.35 MEAN OF RUN DOWN: 102.35

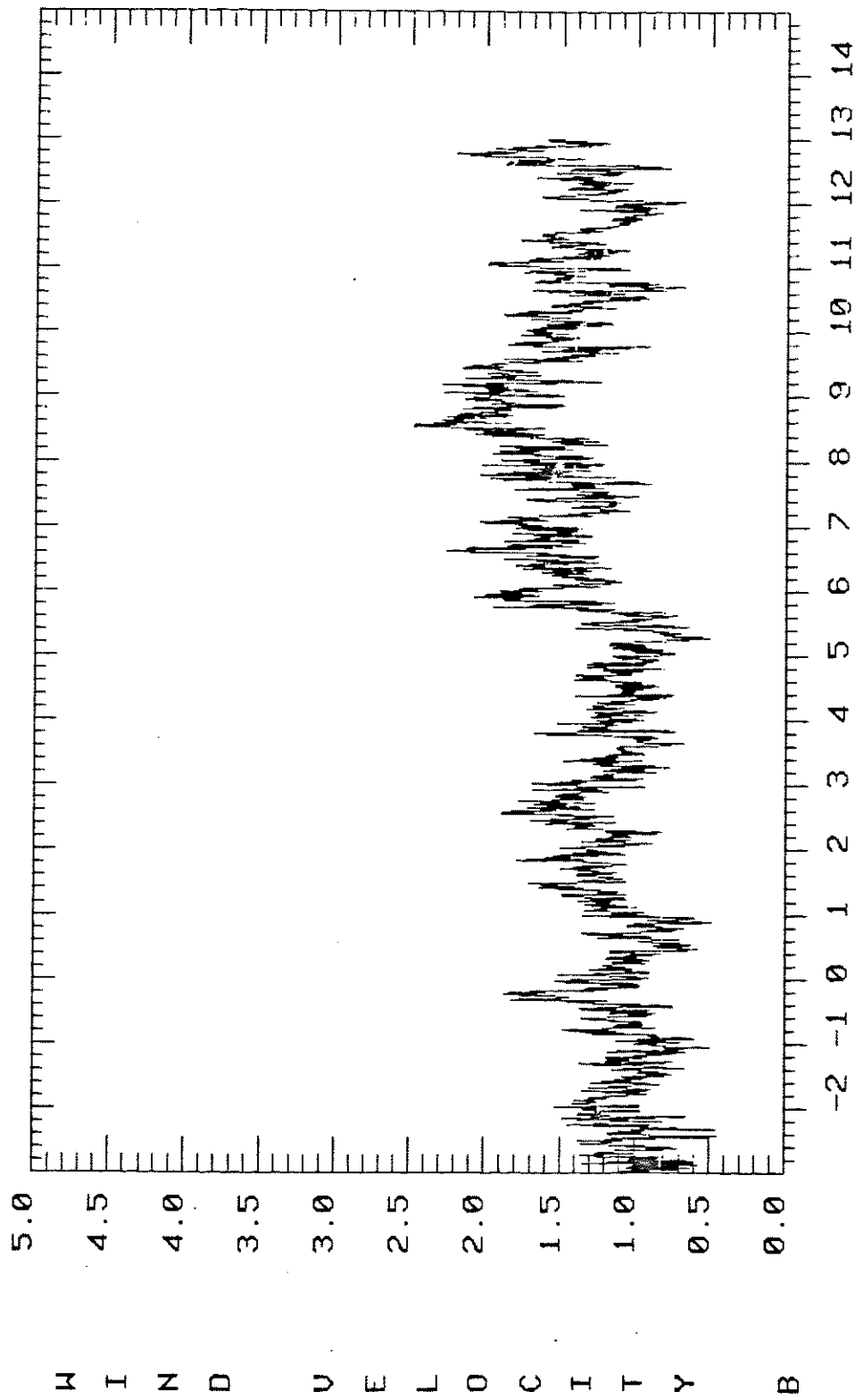


TRIAL: 045 TYPE: UANA UNITS: M/S

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

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

E06

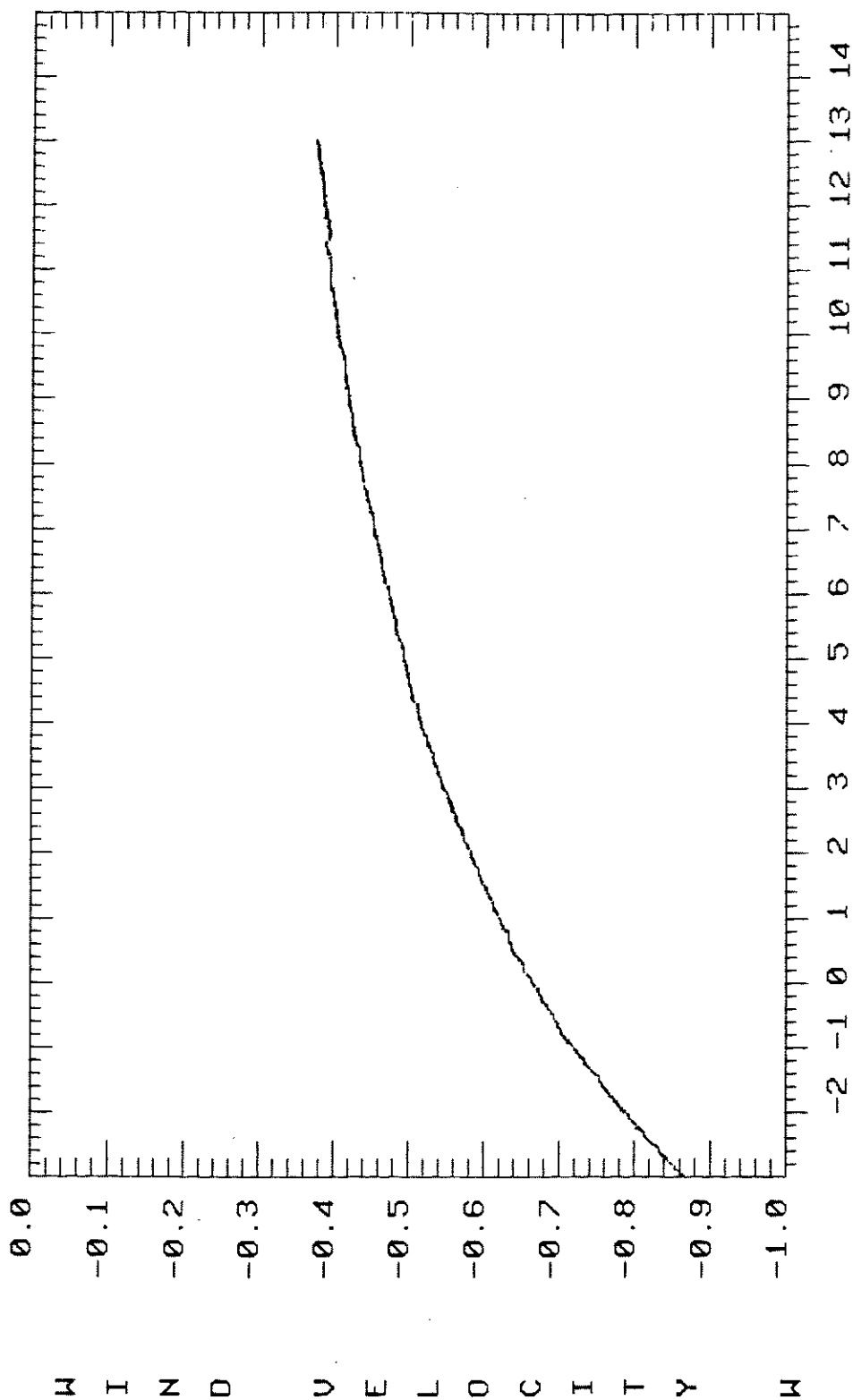


TRIAL: 045 TYPE: UANB UNITS: M/S

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

MEAN OF RUN UP: 2.15 MEAN OF RUN DOWN: 0.44

E07

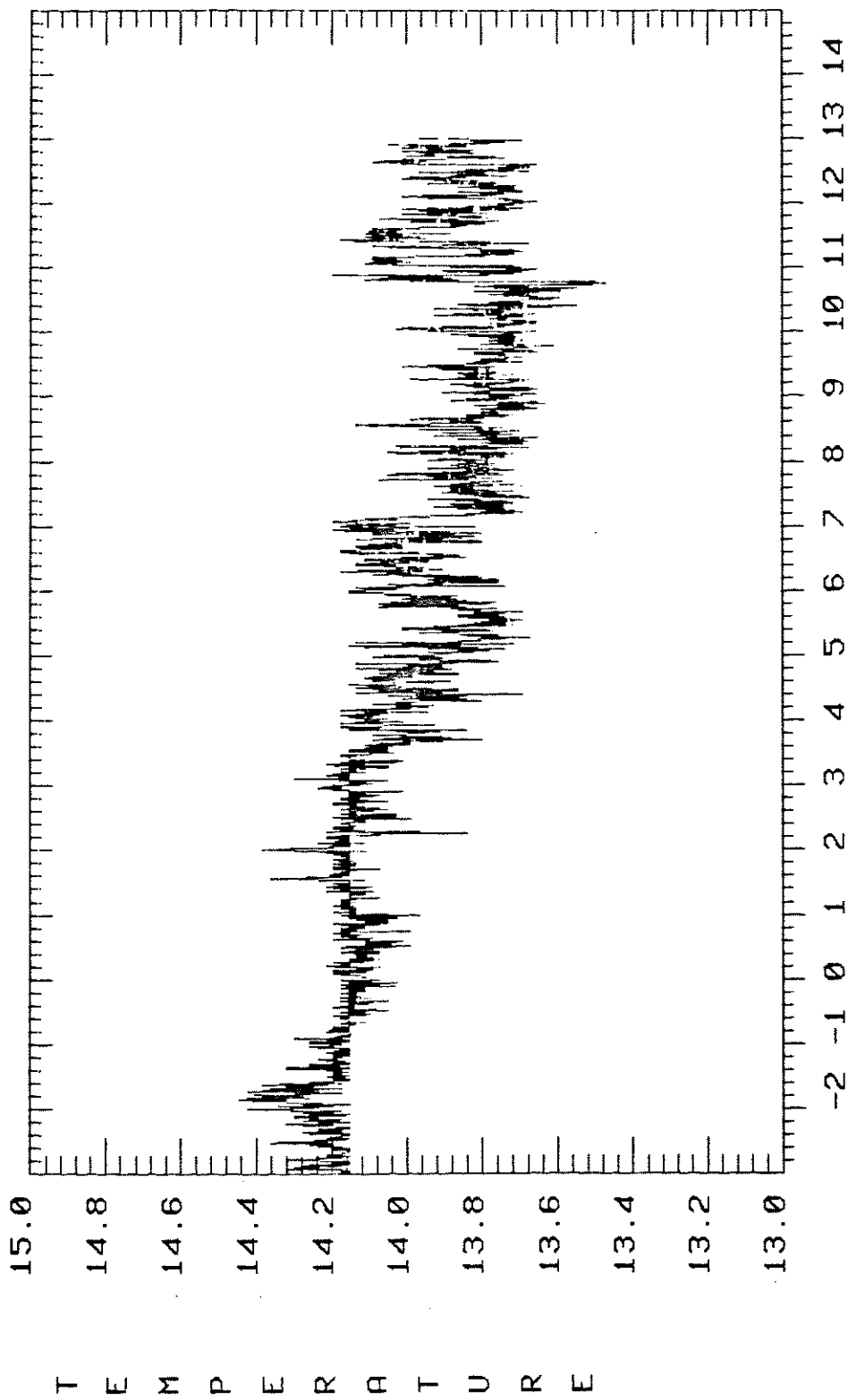


TRIAL: 045 TYPE: UANW UNITS: M/S

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

MEAN OF RUN UP: -0.76 MEAN OF RUN DOWN: -0.79

E08



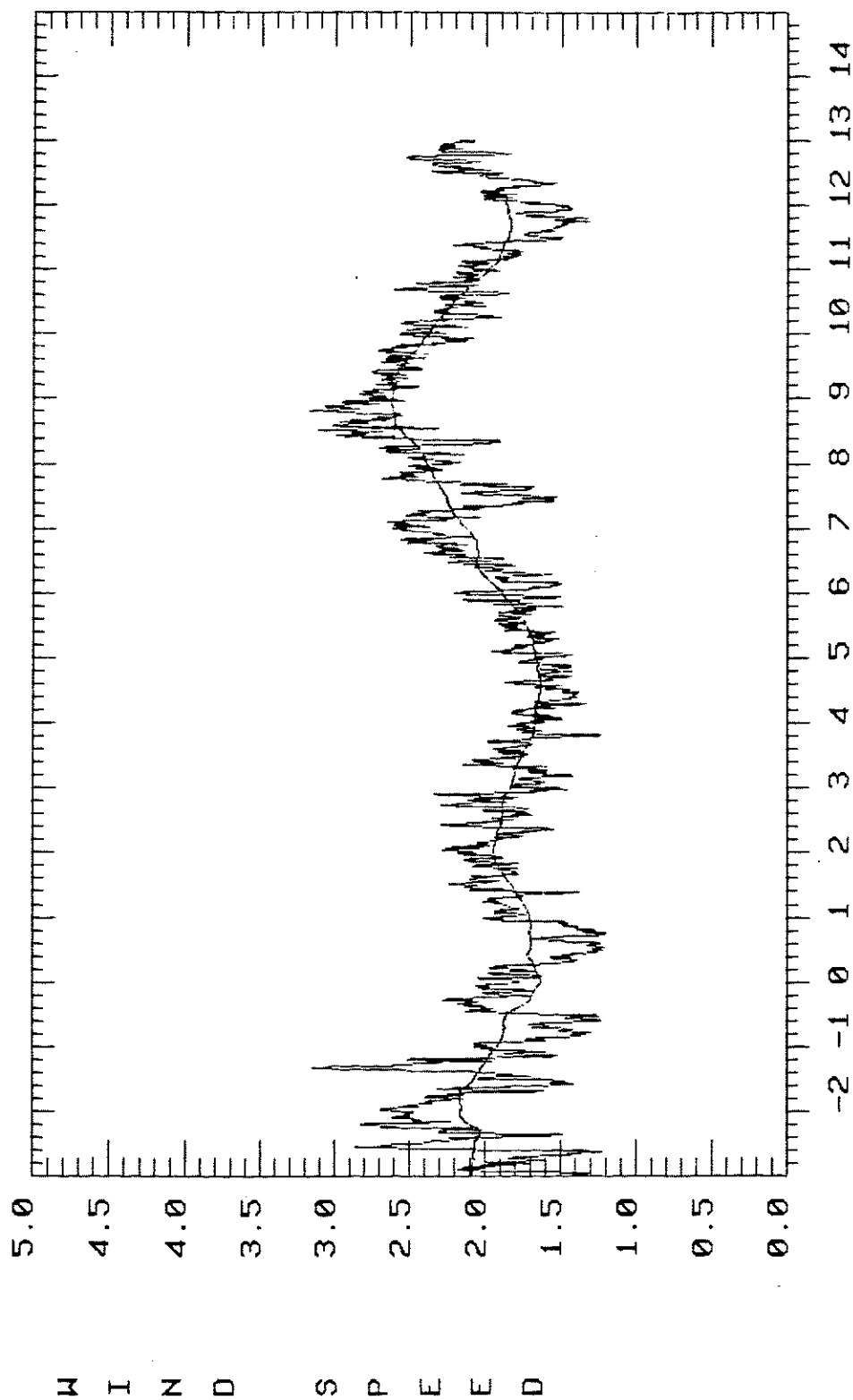
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANT UNITS: DEGREES C

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

MEAN OF RUN UP: 13.59 MEAN OF RUN DOWN: 13.49

E09

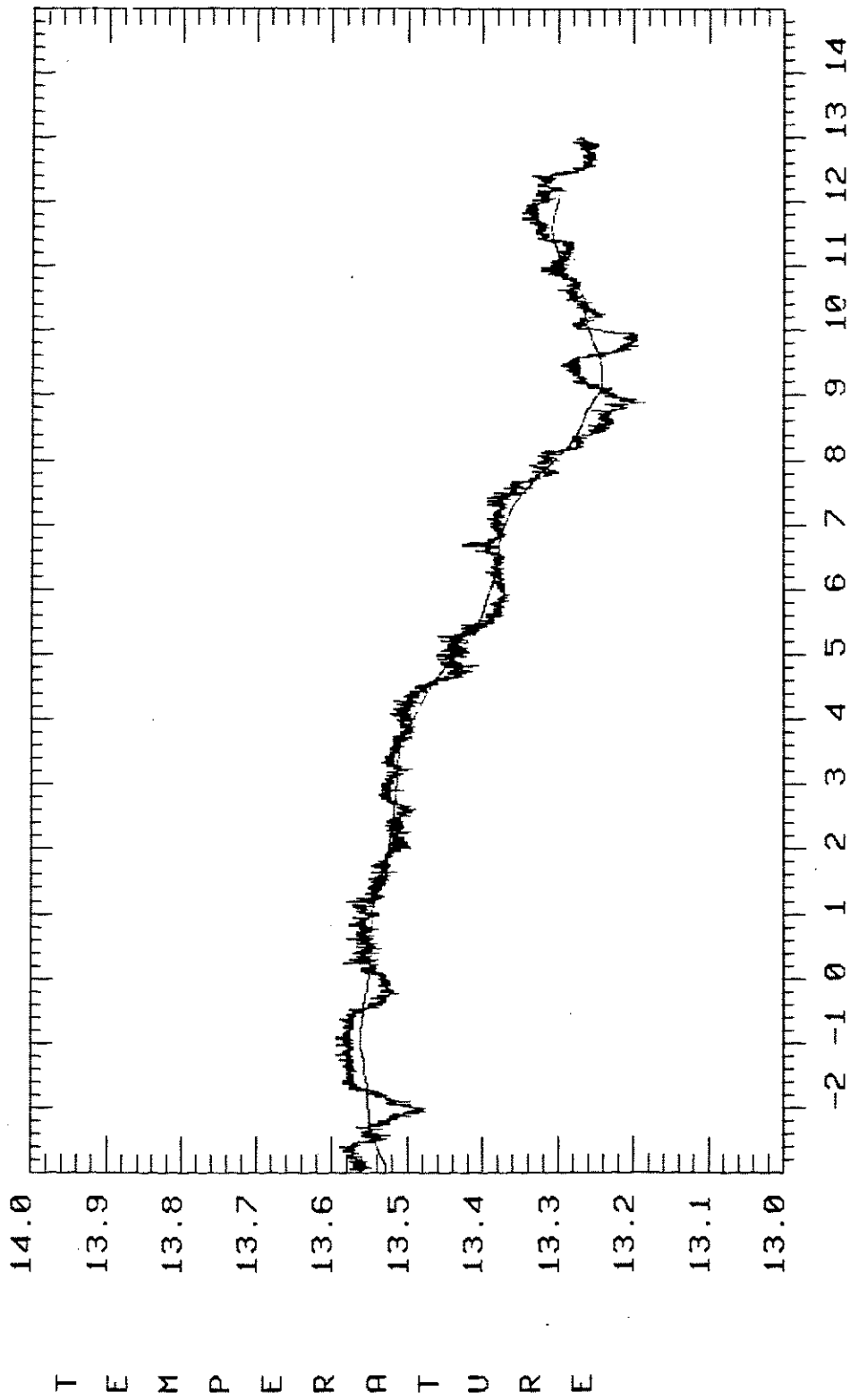


TRIAL: 045 TYPE: WSPD UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 4.5 M

MEAN OF RUN UP: 3.26 MEAN OF RUN DOWN: 0.79

E10

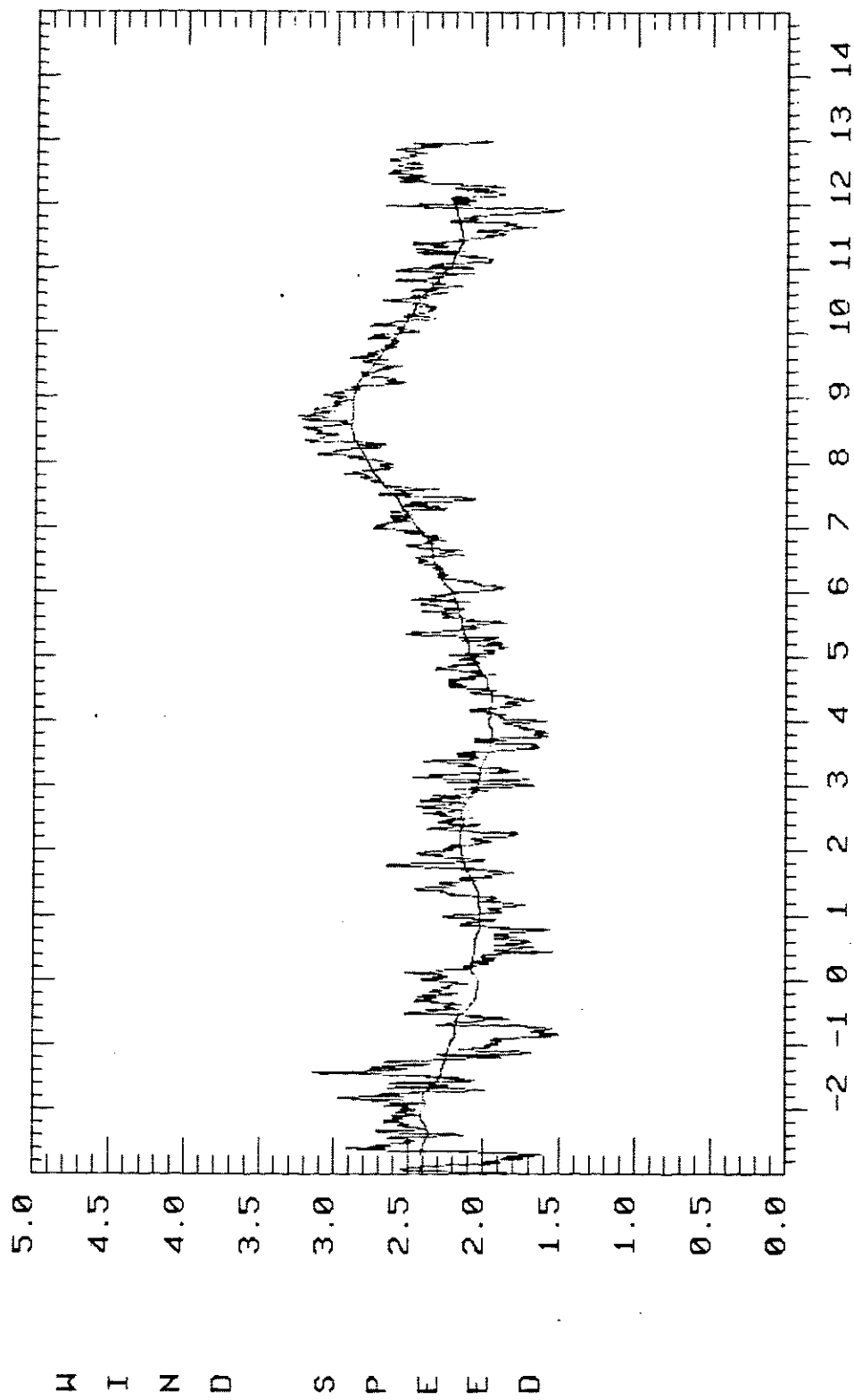


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 6.0 M

MEAN OF RUN UP: 12.57 MEAN OF RUN DOWN: 12.94

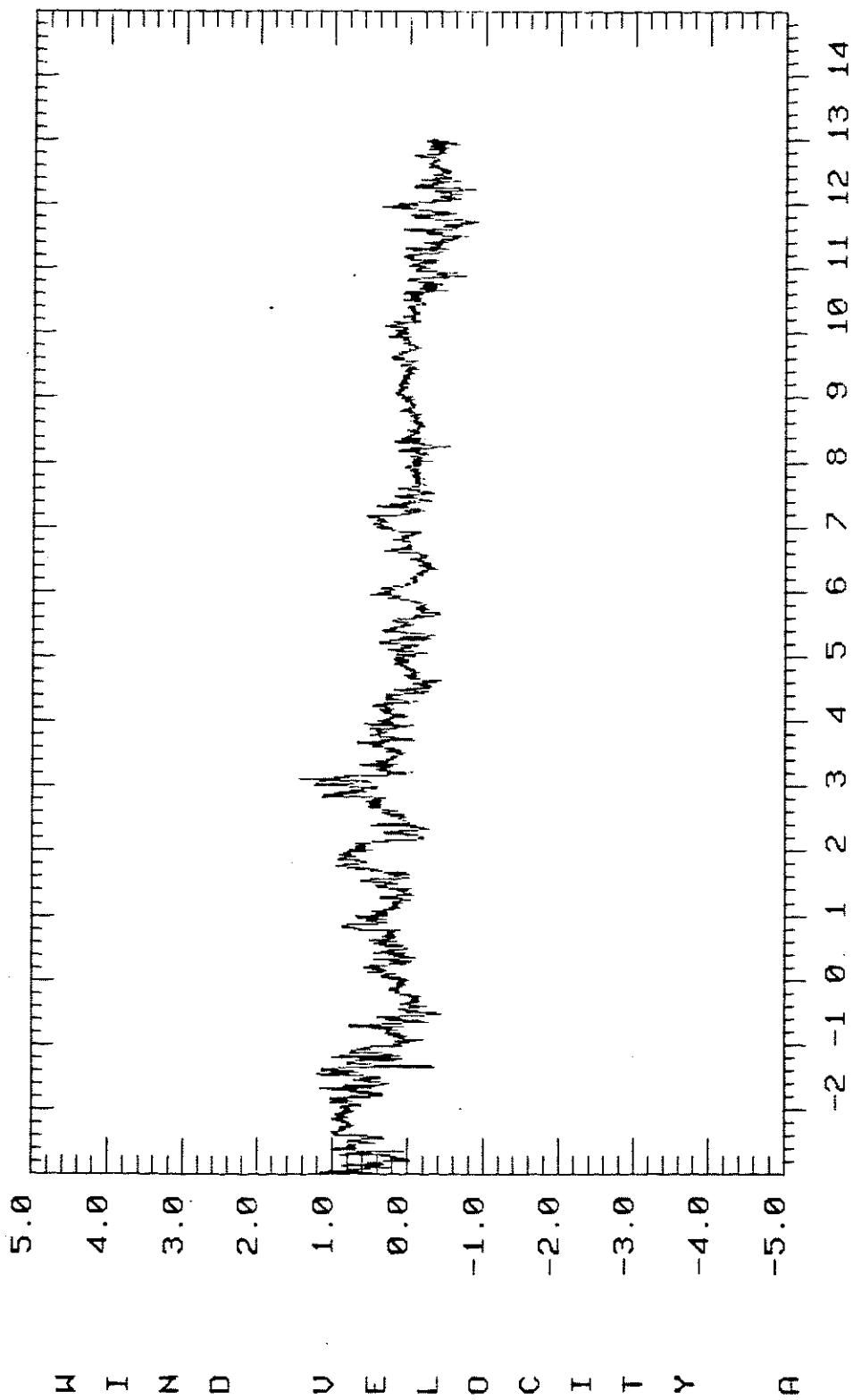


TRIAL: 045 TYPE: WSPD UNITS: M/S

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

MEAN OF RUN UP: 3.50 MEAN OF RUN DOWN: 1.09

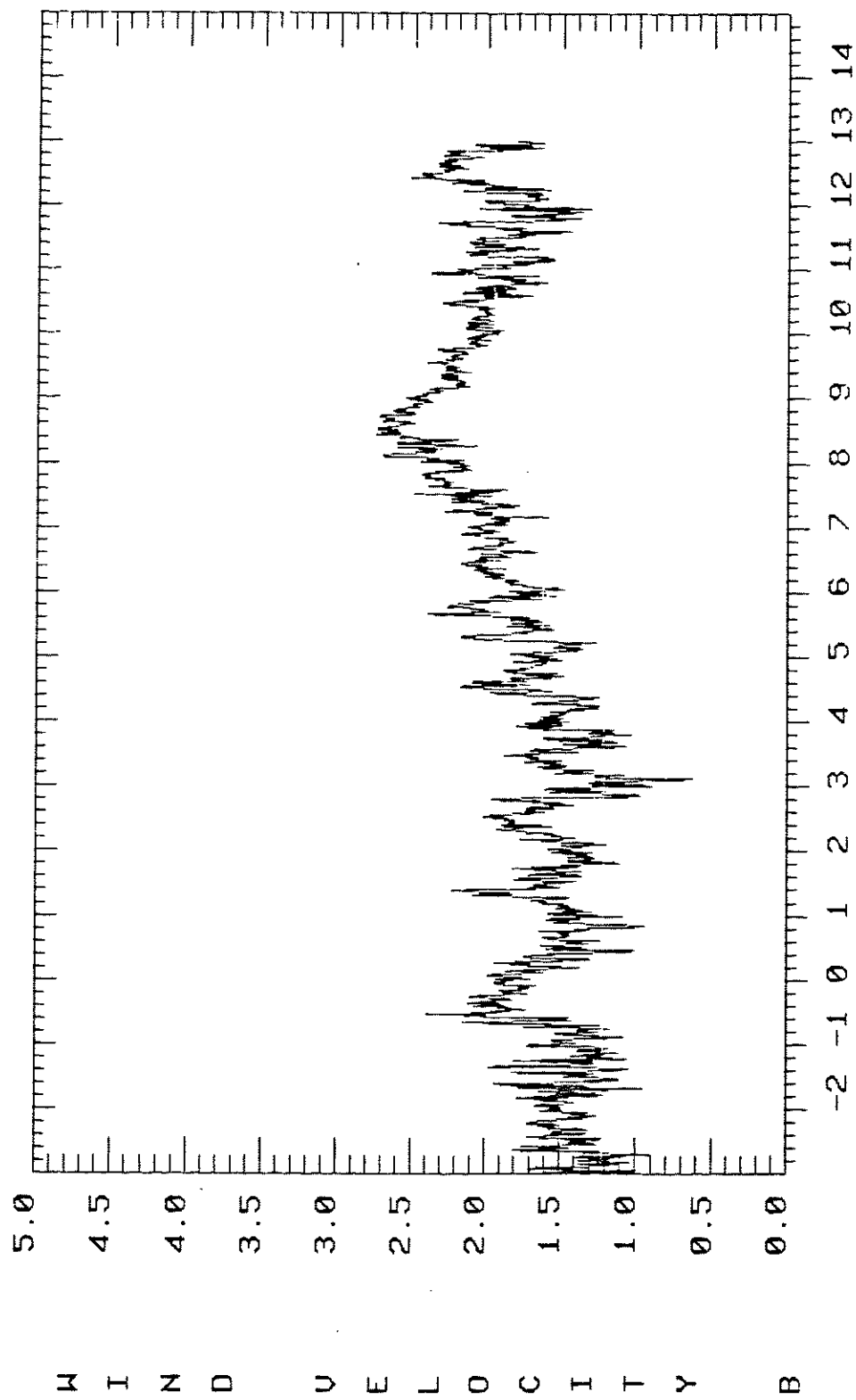
E12



TRIAL: 045 TYPE: UANA UNITS: M/S

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

MEAN OF RUN UP: 0.22 MEAN OF RUN DOWN: 0.03

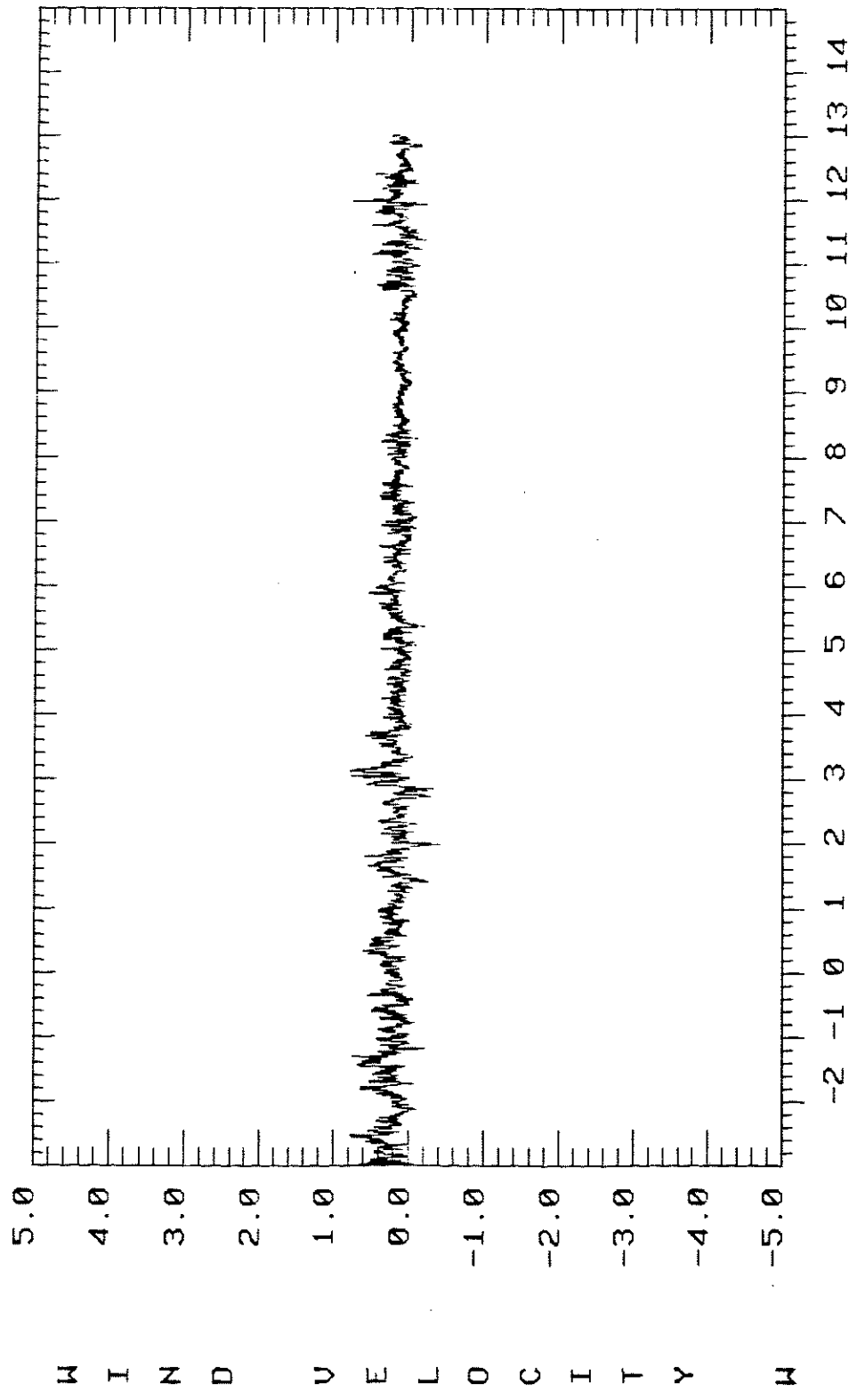


TRIAL: 045 TYPE: UANB UNITS: M/S

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

MEAN OF RUN UP: 2.67 MEAN OF RUN DOWN: 0.84

E14

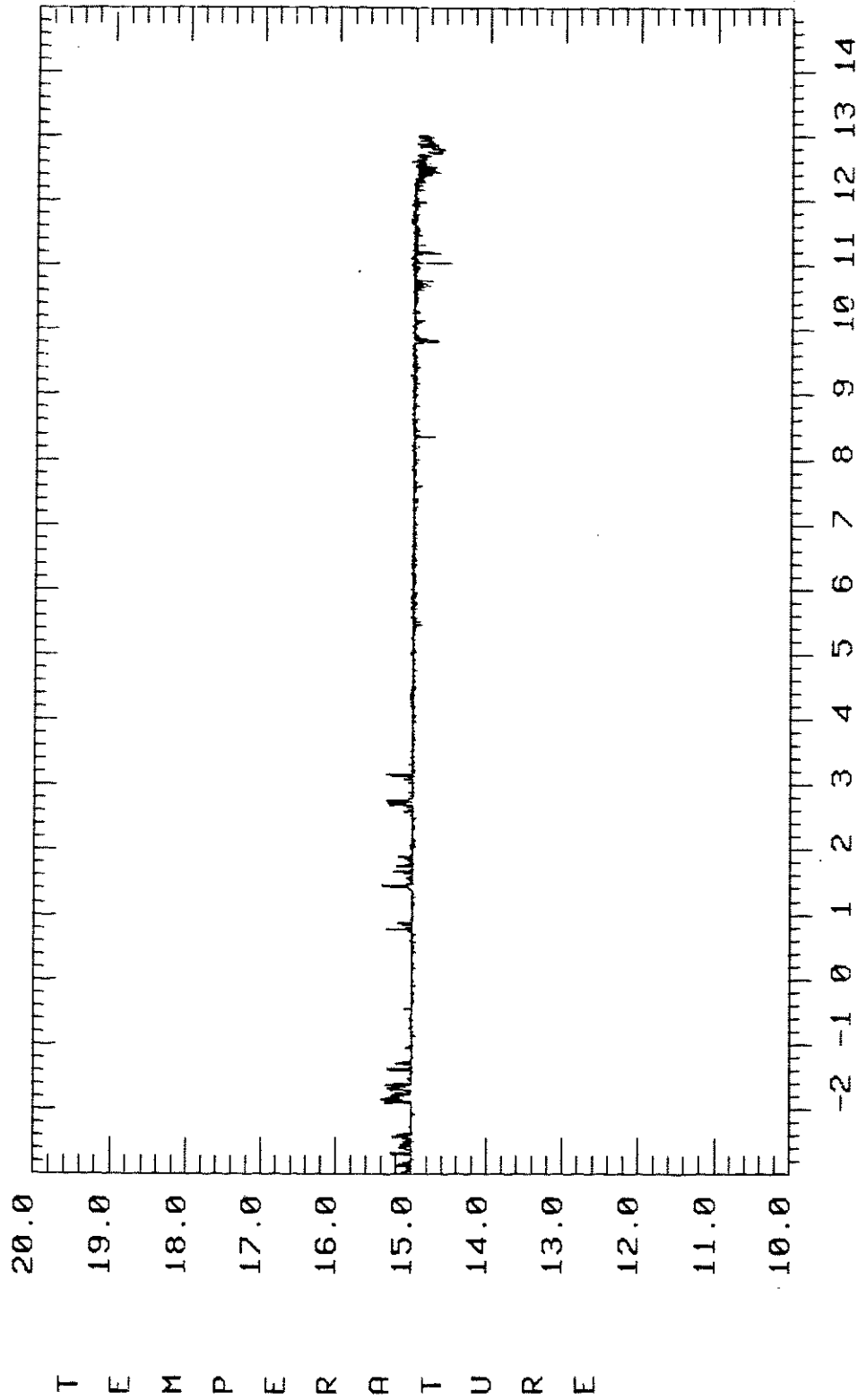


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANW UNITS: M/S

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

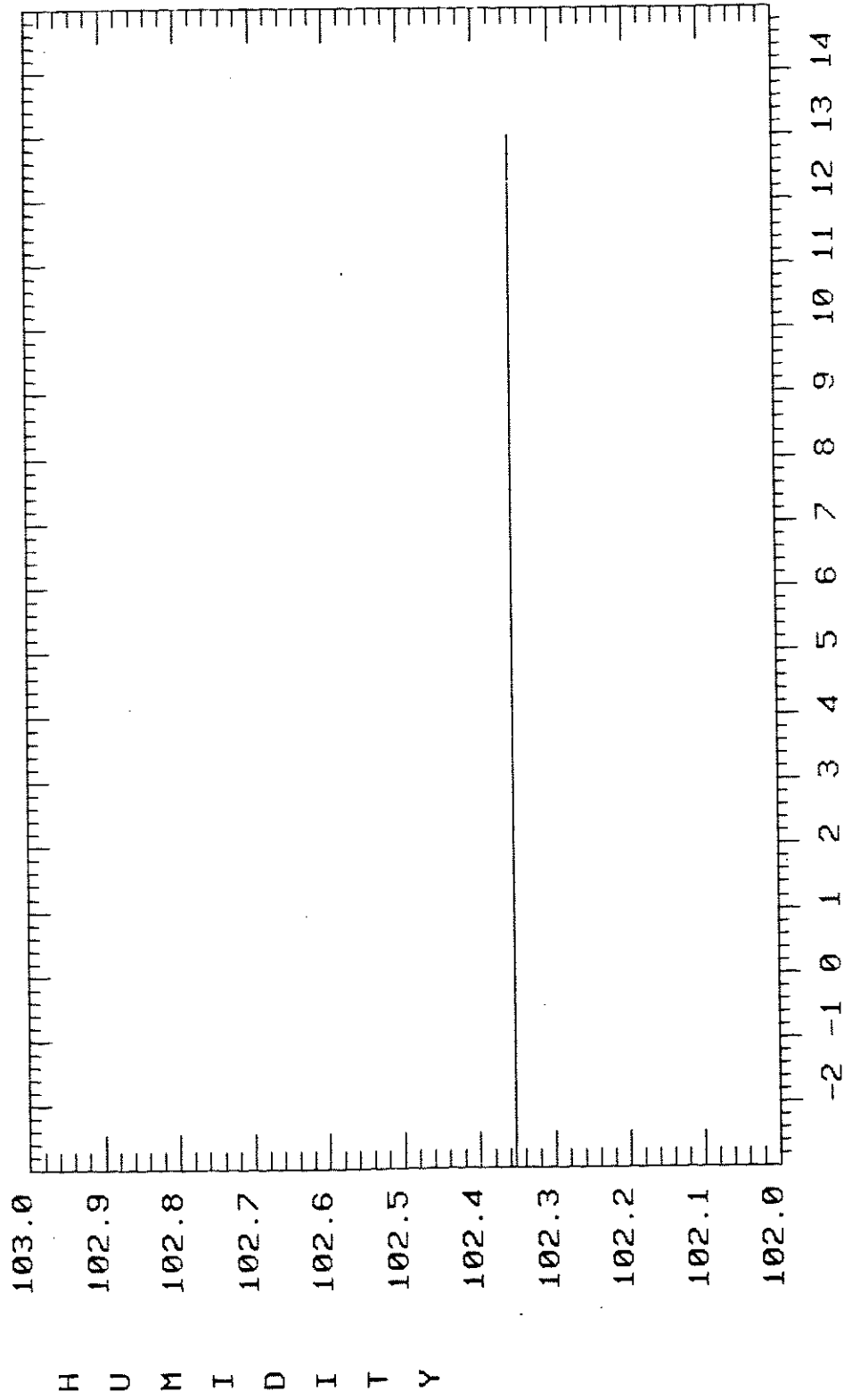
MEAN OF RUN UP: 0.20 MEAN OF RUN DOWN: 0.08



TRIAL: 045 TYPE: UANT UNITS: DEGREES C

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

MEAN OF RUN UP: 13.99 MEAN OF RUN DOWN: 14.53

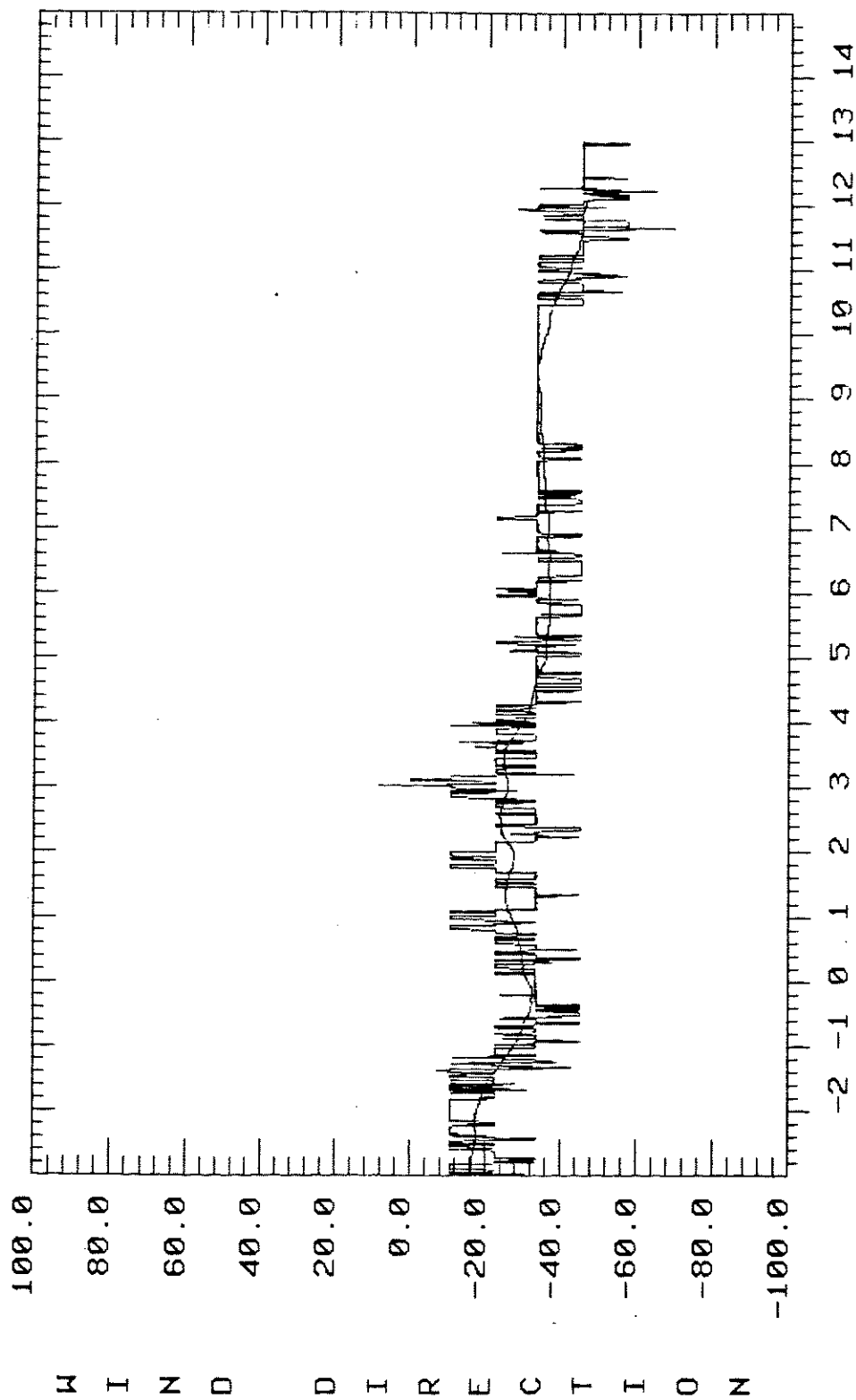


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: RHUM UNITS: PER CENT

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

MEAN OF RUN UP: 102.06 MEAN OF RUN DOWN: 102.35

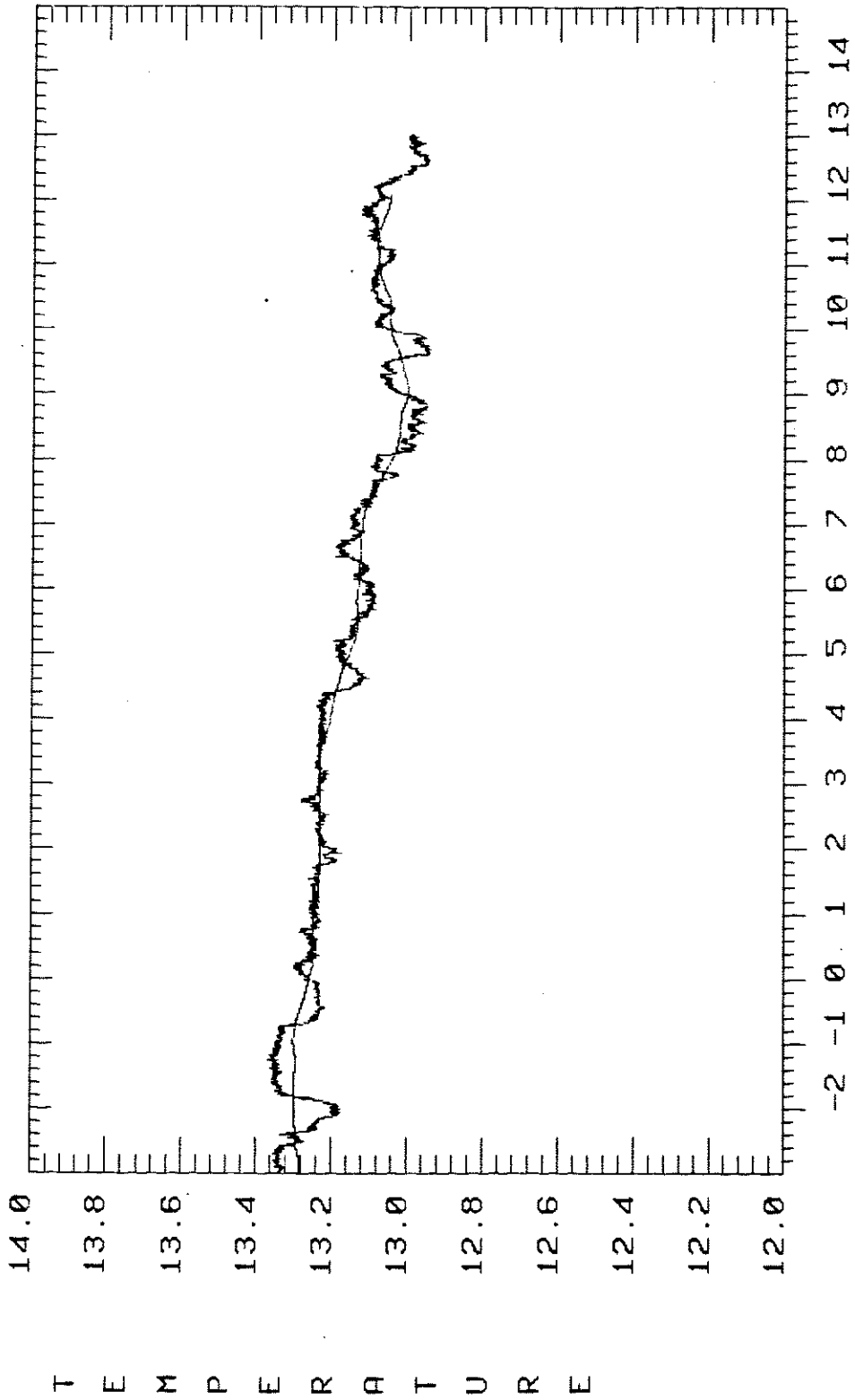


TRIAL: 045 TYPE: WHDG UNITS: DEGREES

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

MEAN OF RUN UP: -32.73 MEAN OF RUN DOWN: -32.18

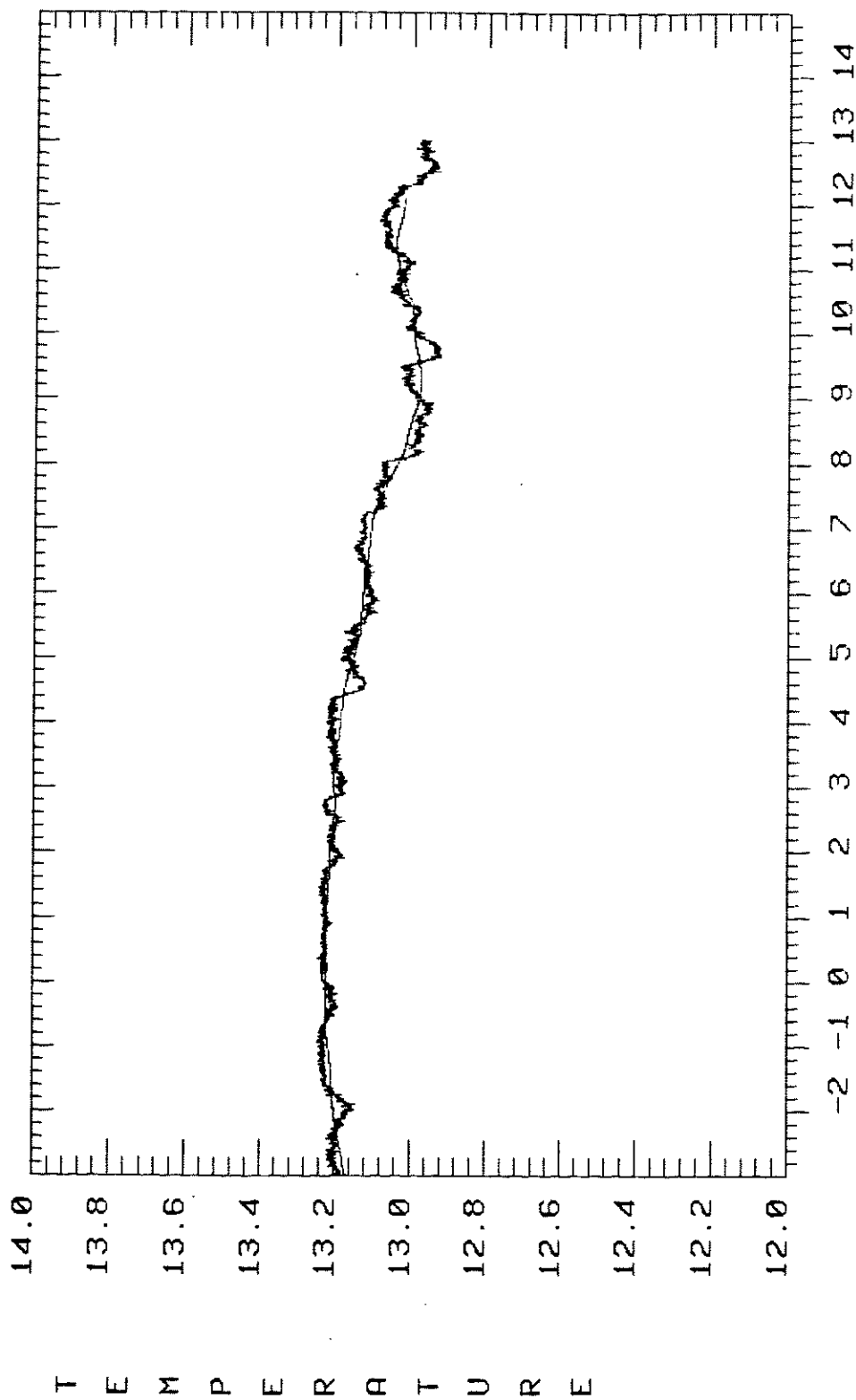
E18



TRIAL: 045 TYPE: AIRT UNITS: DEGREES C

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

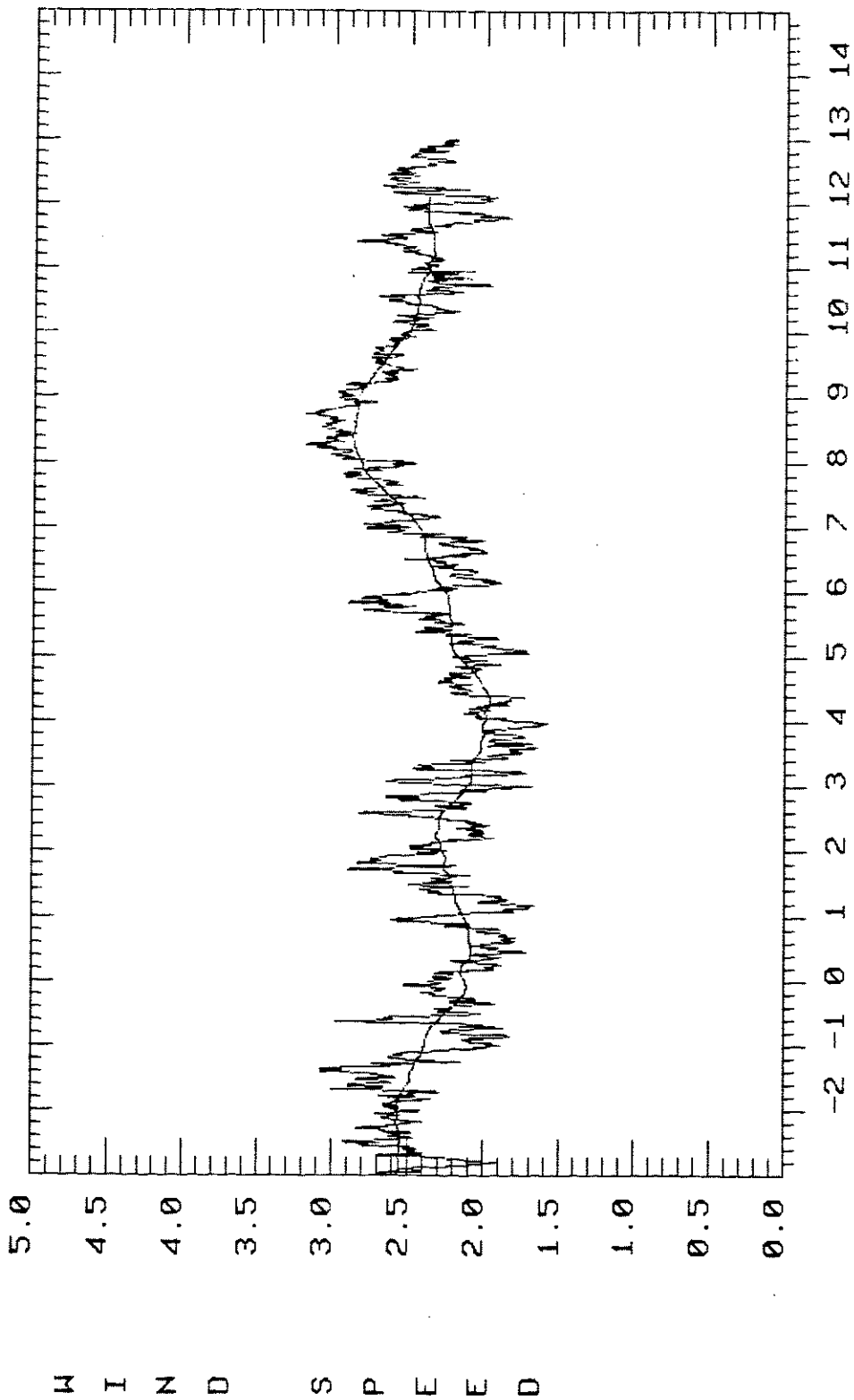
MEAN OF RUN UP: 12.16 MEAN OF RUN DOWN: 12.72



TRIAL: 045 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 14.0 M

MEAN OF RUN UP: 12.07 MEAN OF RUN DOWN: 12.77

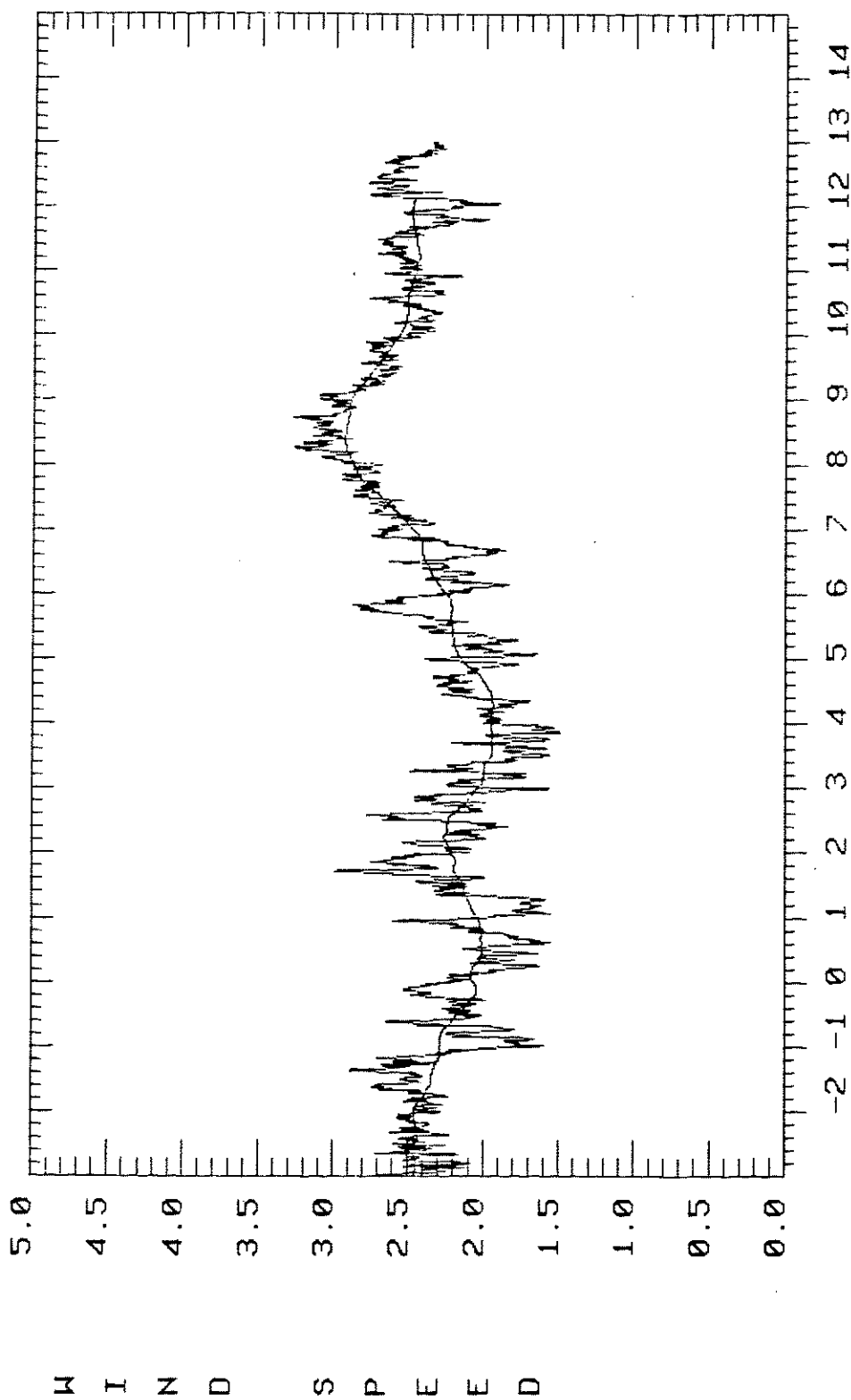


TRIAL: 045 TYPE: WSPD UNITS: M/S

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

MEAN OF RUN UP: 3.55 MEAN OF RUN DOWN: 1.39

E21

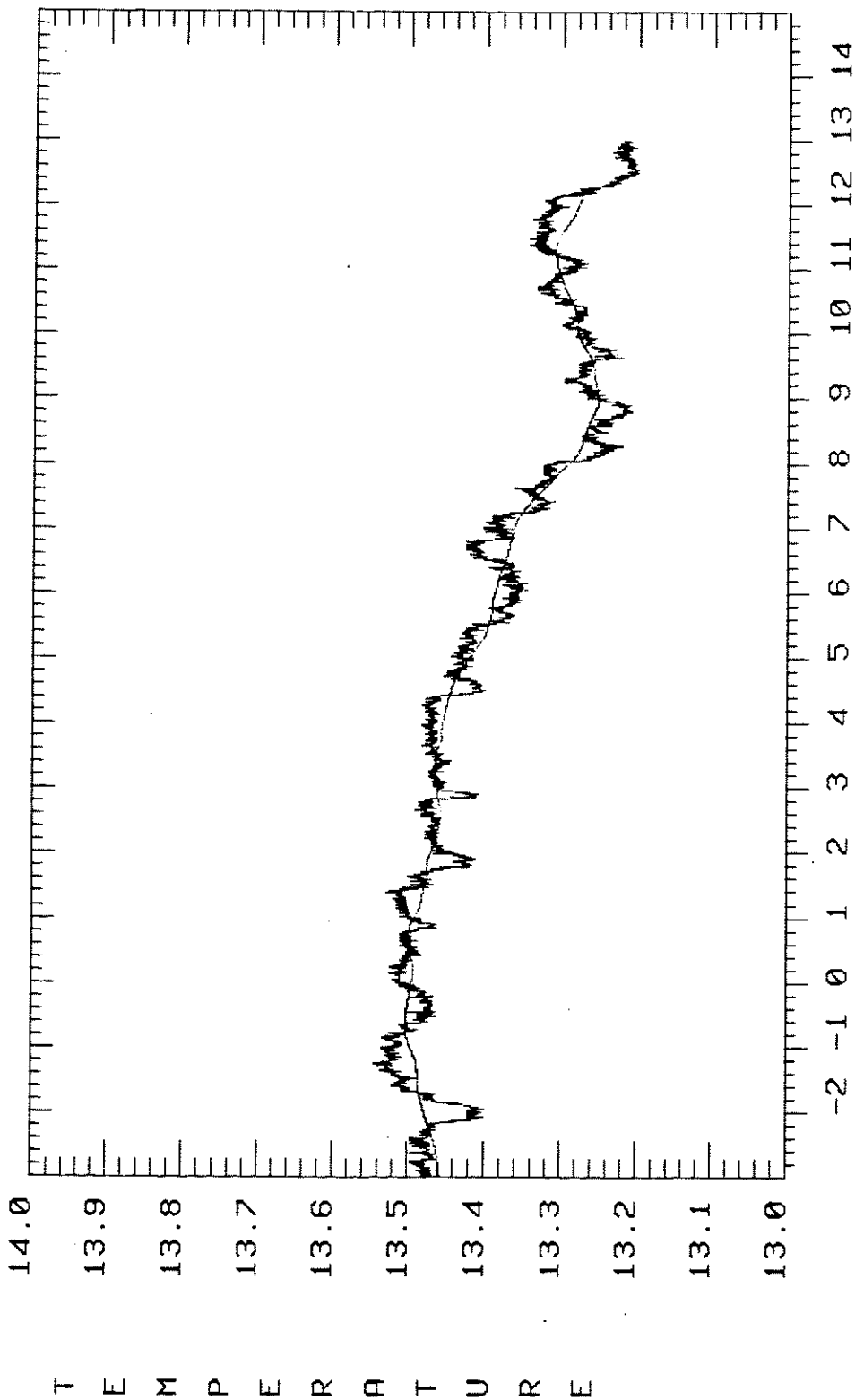


TRIAL: 045 TYPE: WSPD UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 20.0 M

MEAN OF RUN UP: 3.53 MEAN OF RUN DOWN: 1.47

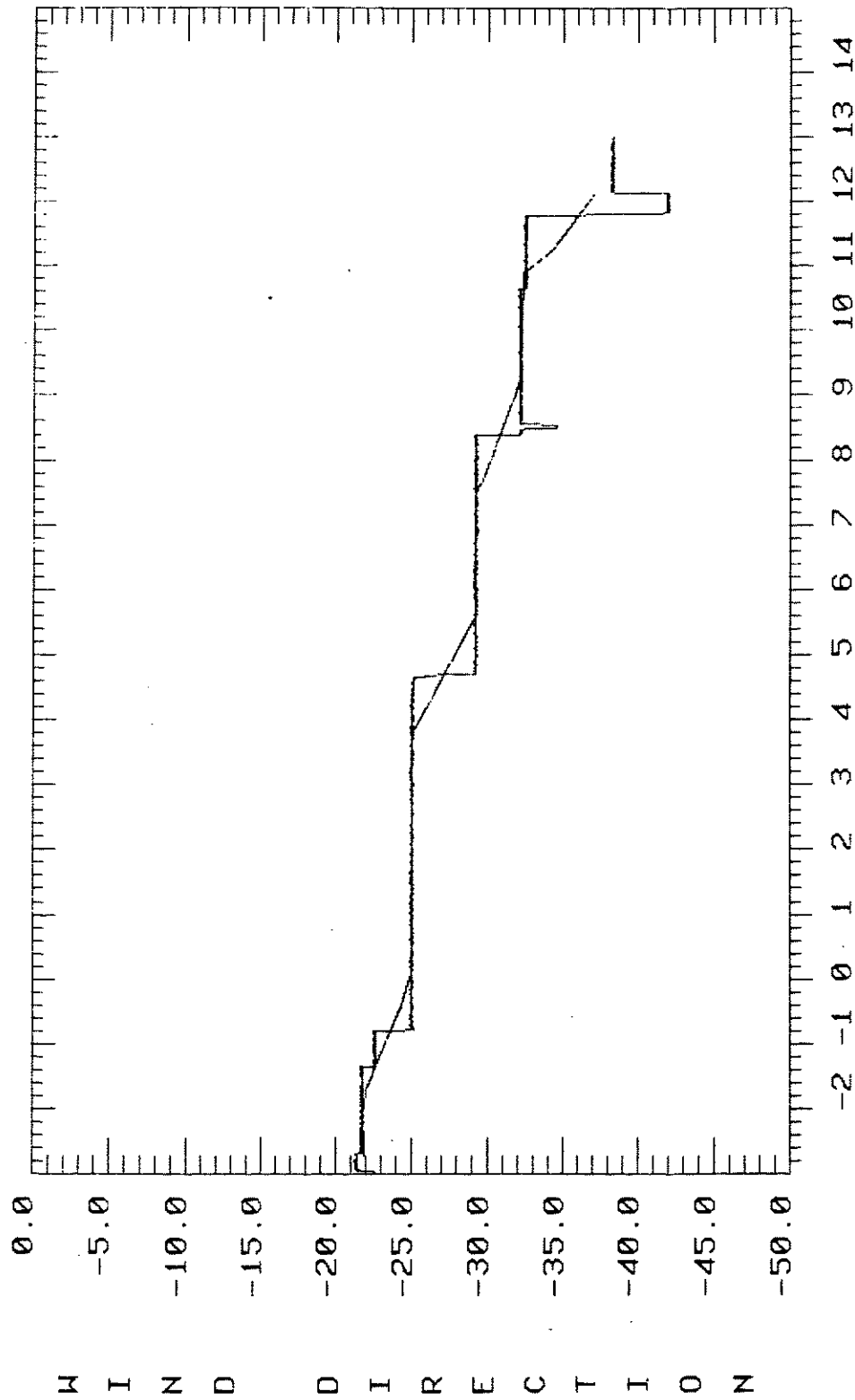
E22



TRIAL: 045 TYPE: AIRT UNITS: DEGREES C

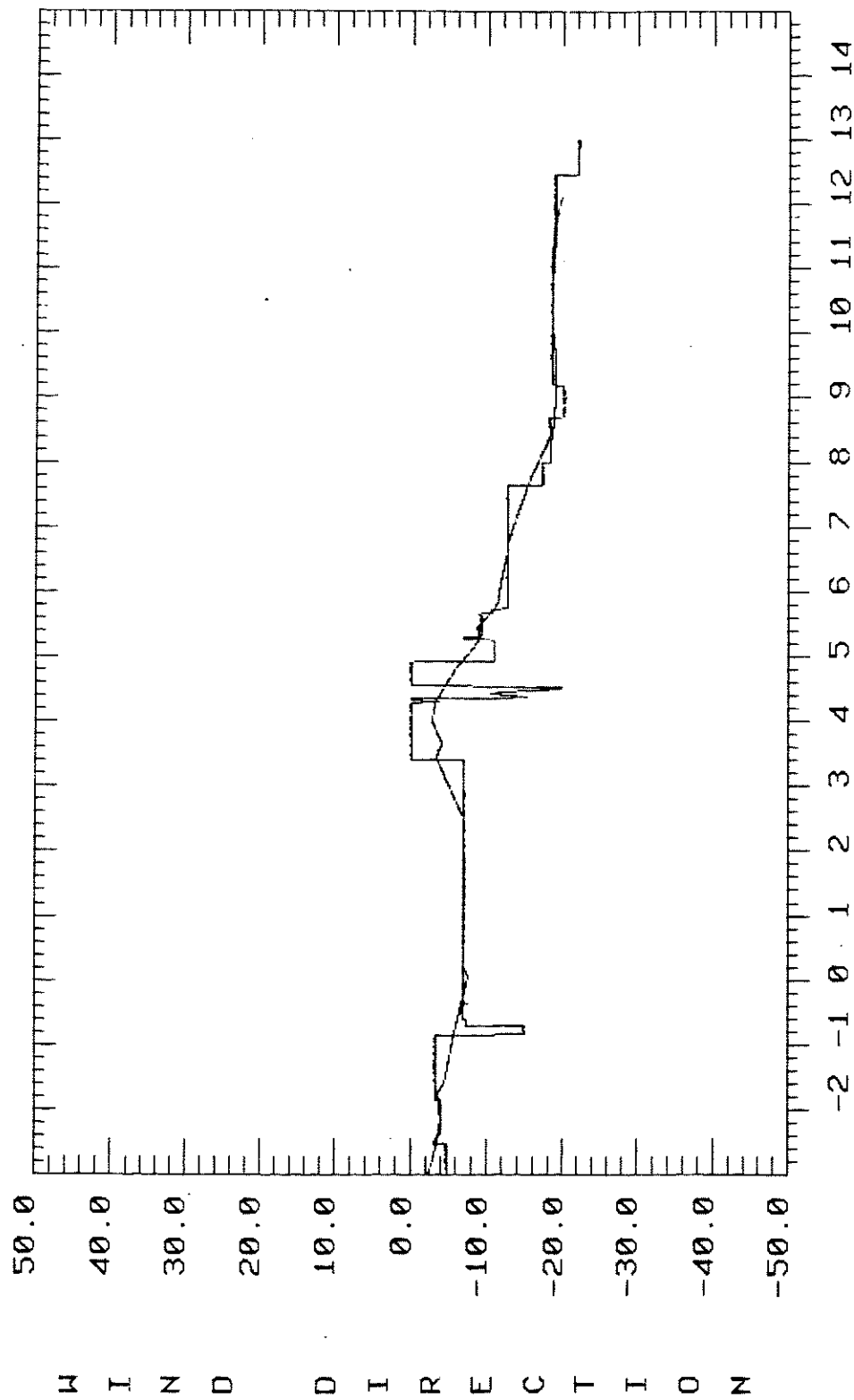
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 20.0 M

MEAN OF RUN UP: 12.29 MEAN OF RUN DOWN: 13.10



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

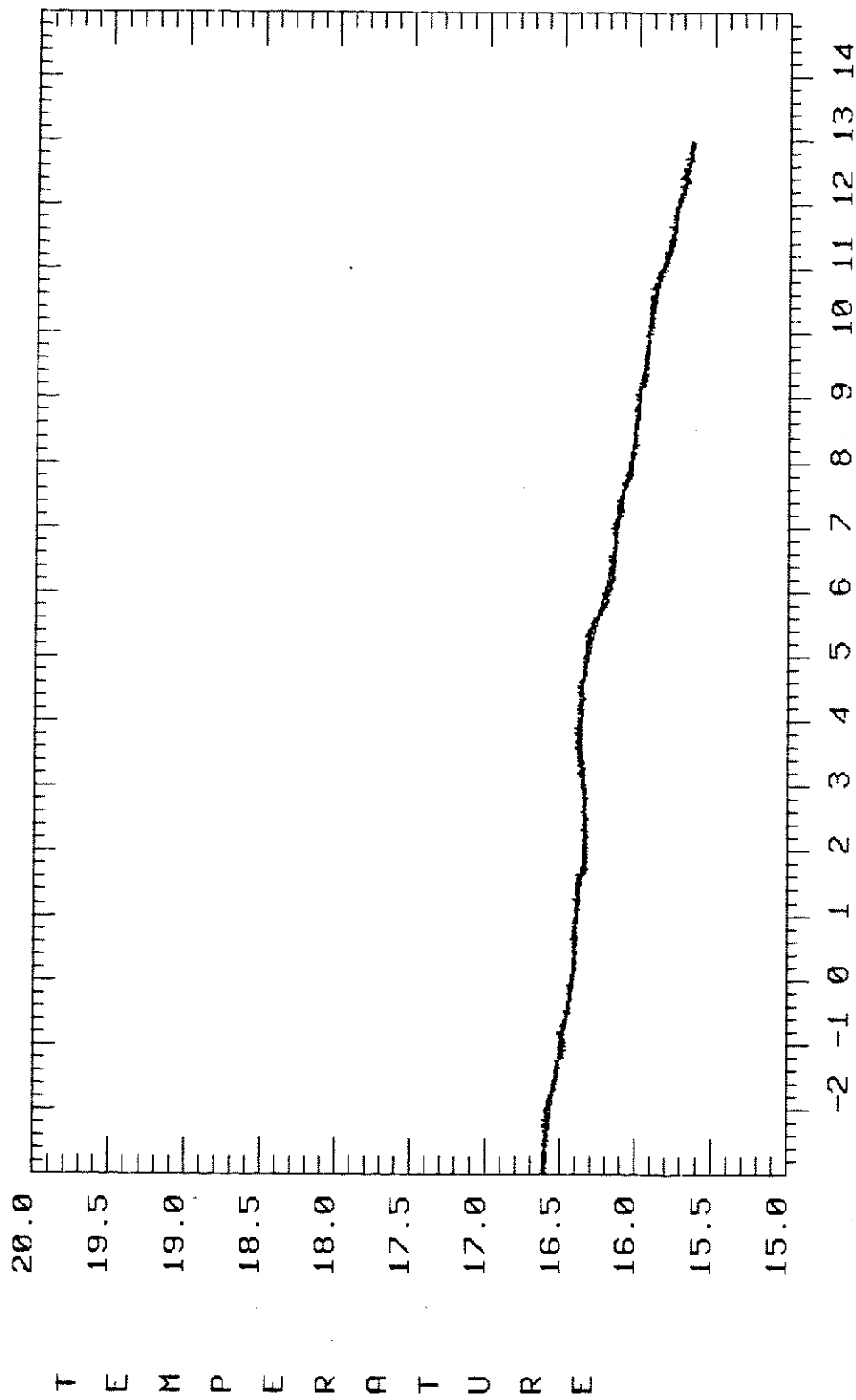
TRIAL: 045 TYPE: WHDG UNITS: DEGREES
 AVERAGING TIME: 0.6 SEC X: 425 M Y: 50 M Z: 10.0 M
 MEAN OF RUN UP: -26.76 MEAN OF RUN DOWN: -47.45



TRIAL: 045 TYPE: WHDG UNITS: DEGREES

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

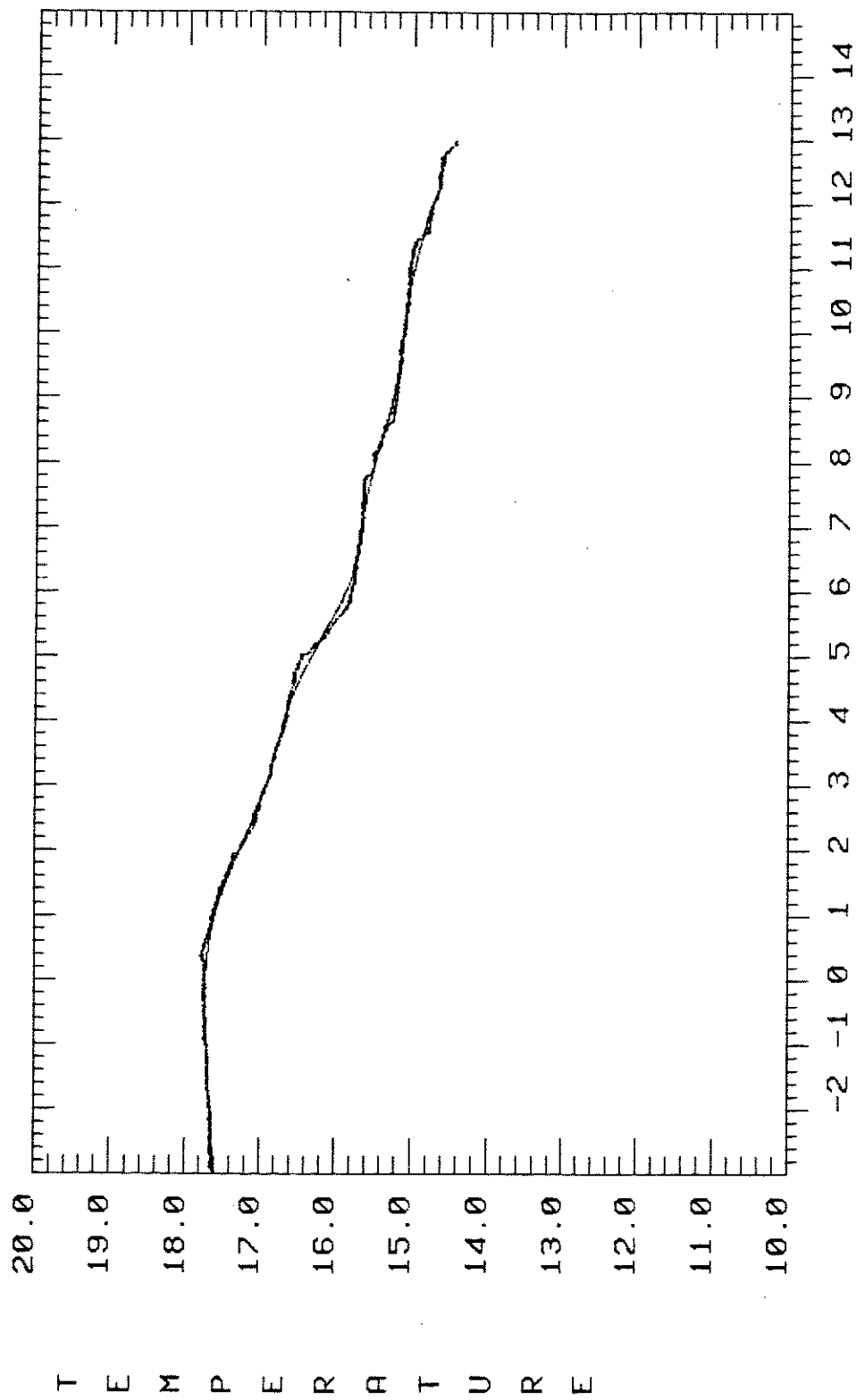
MEAN OF RUN UP: -12.10 MEAN OF RUN DOWN: -22.22



TRIAL: 045 TYPE: AIRT UNITS: DEGREES C

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

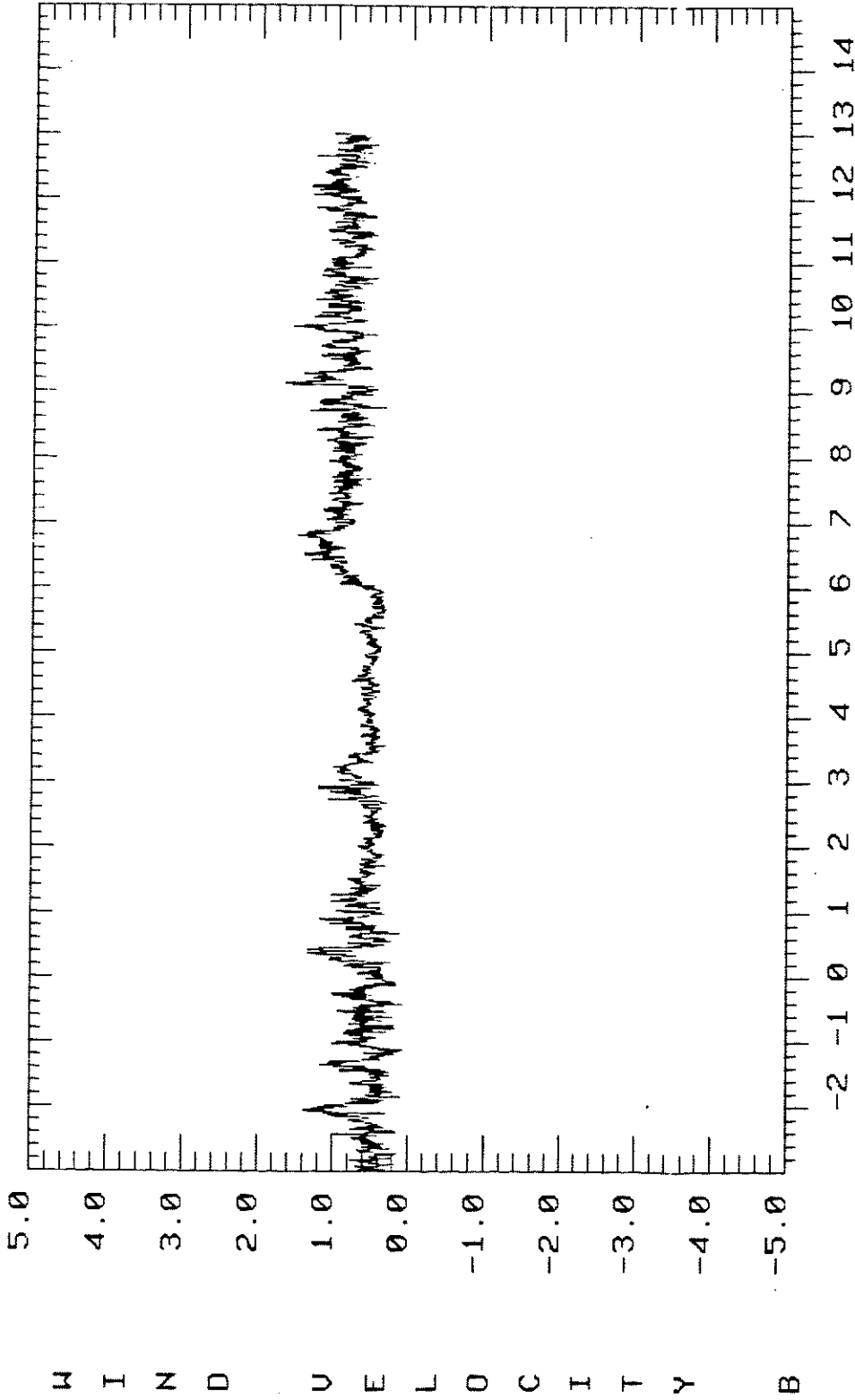
MEAN OF RUN UP: 17.40 MEAN OF RUN DOWN: 14.08



TRIAL: 045 TYPE: AIRT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 200 M Z: 12.0 M

MEAN OF RUN UP: 18.92 MEAN OF RUN DOWN: 12.03

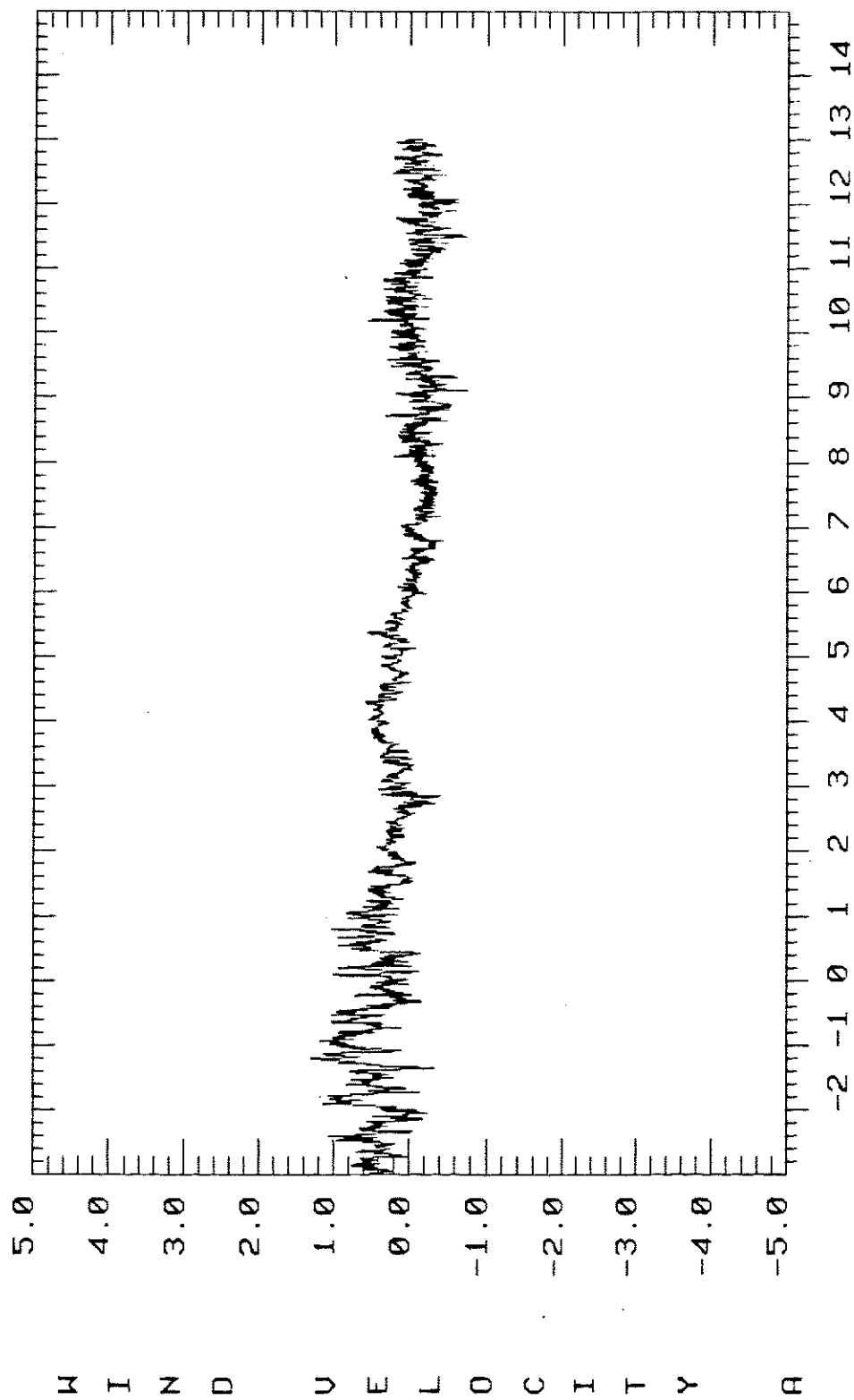


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 270 M Z: 1.0 M

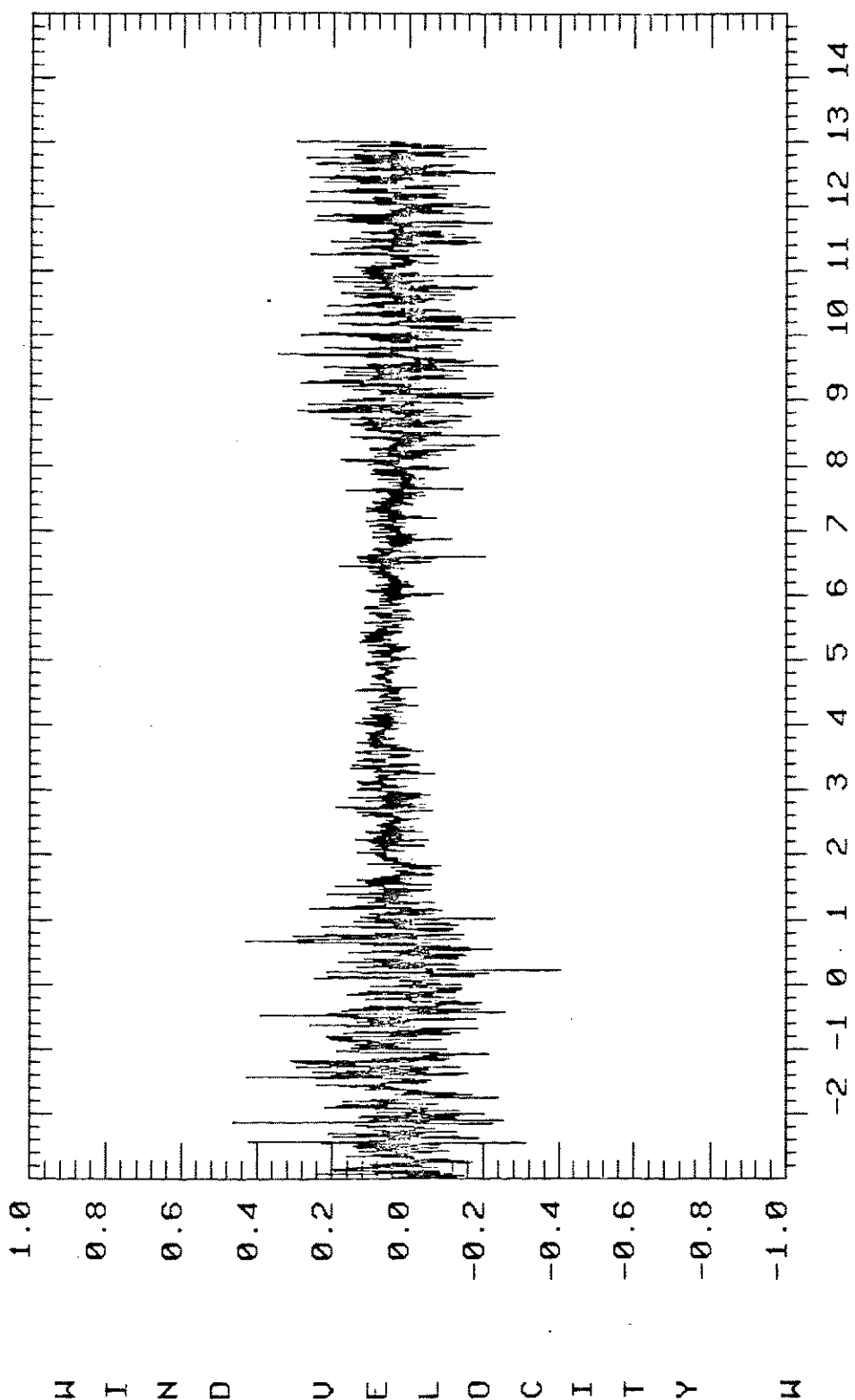
MEAN OF RUN UP: 1.34 MEAN OF RUN DOWN: 0.38



TRIAL: 045 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 270 M Z: 1.0 M

MEAN OF RUN UP: 0.50 MEAN OF RUN DOWN: 0.15

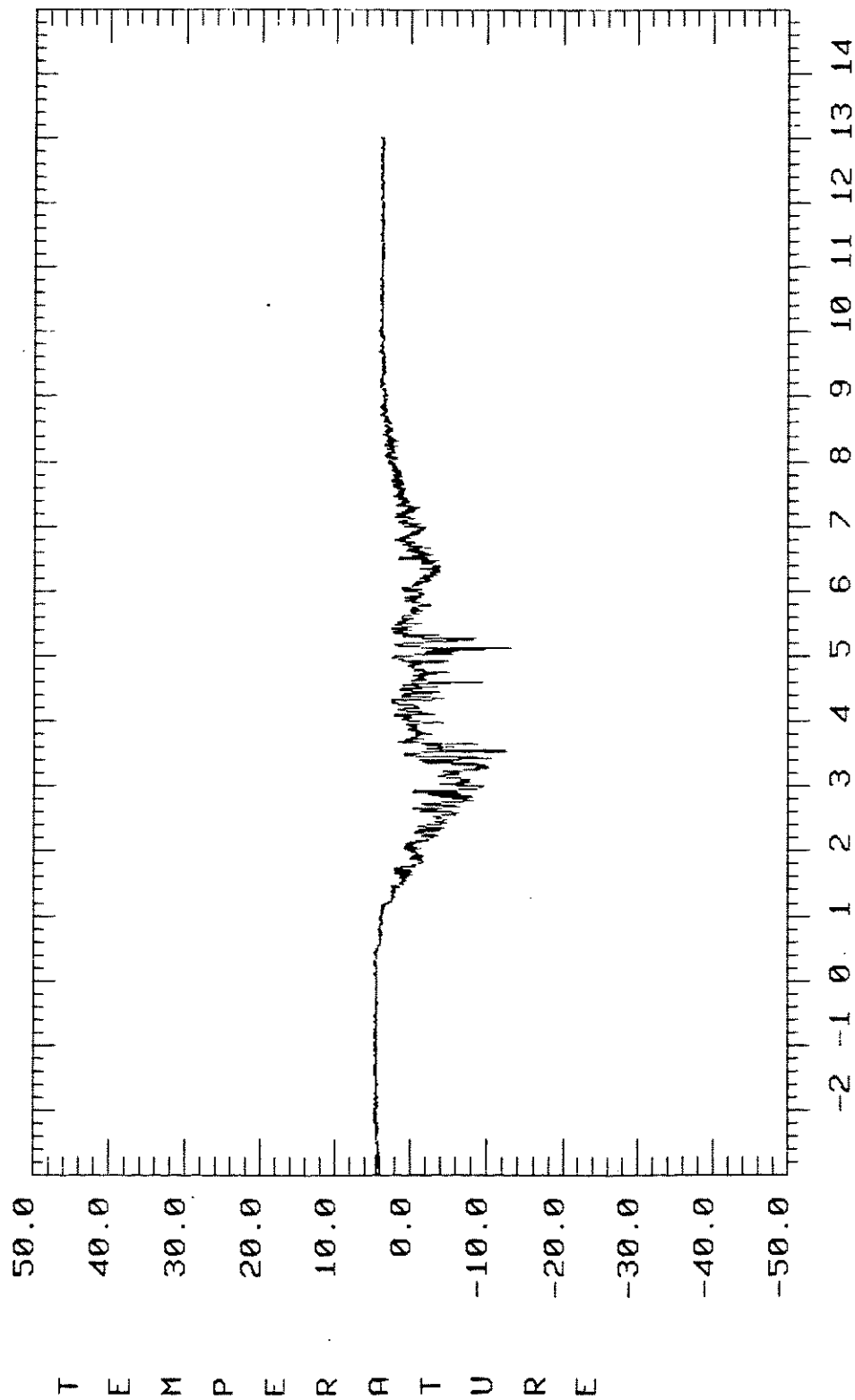


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANW UNITS: M/S

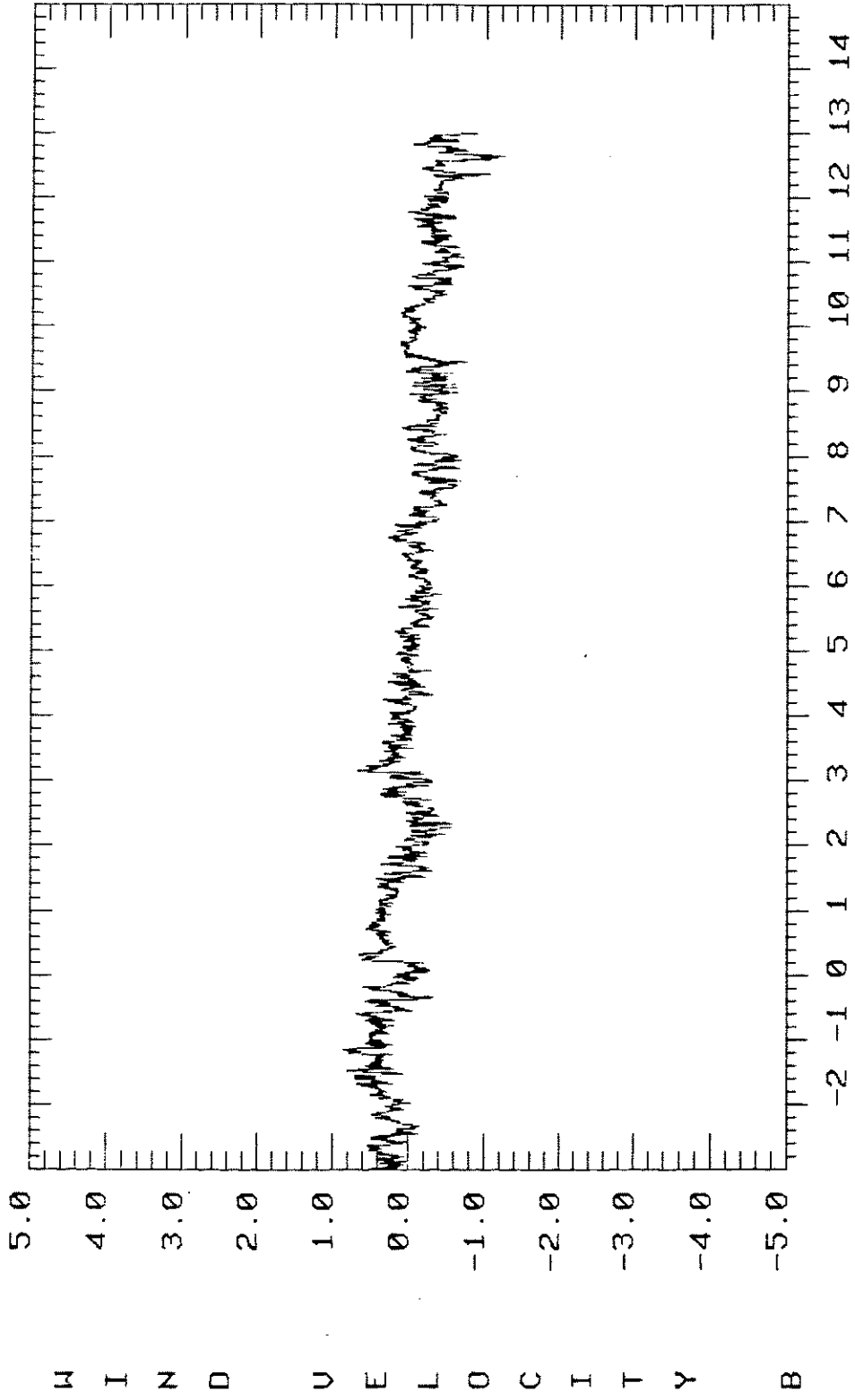
AVERAGING TIME: 0.6 SEC X: 400 M Y: 270 M Z: 1.0 M

MEAN OF RUN UP: 0.00 MEAN OF RUN DOWN: 0.03



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

TRIAL: 045 TYPE: UANT UNITS: DEGREES C
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 270 M Z: 1.0 M
 MEAN OF RUN UP: 4.42 MEAN OF RUN DOWN: 3.08

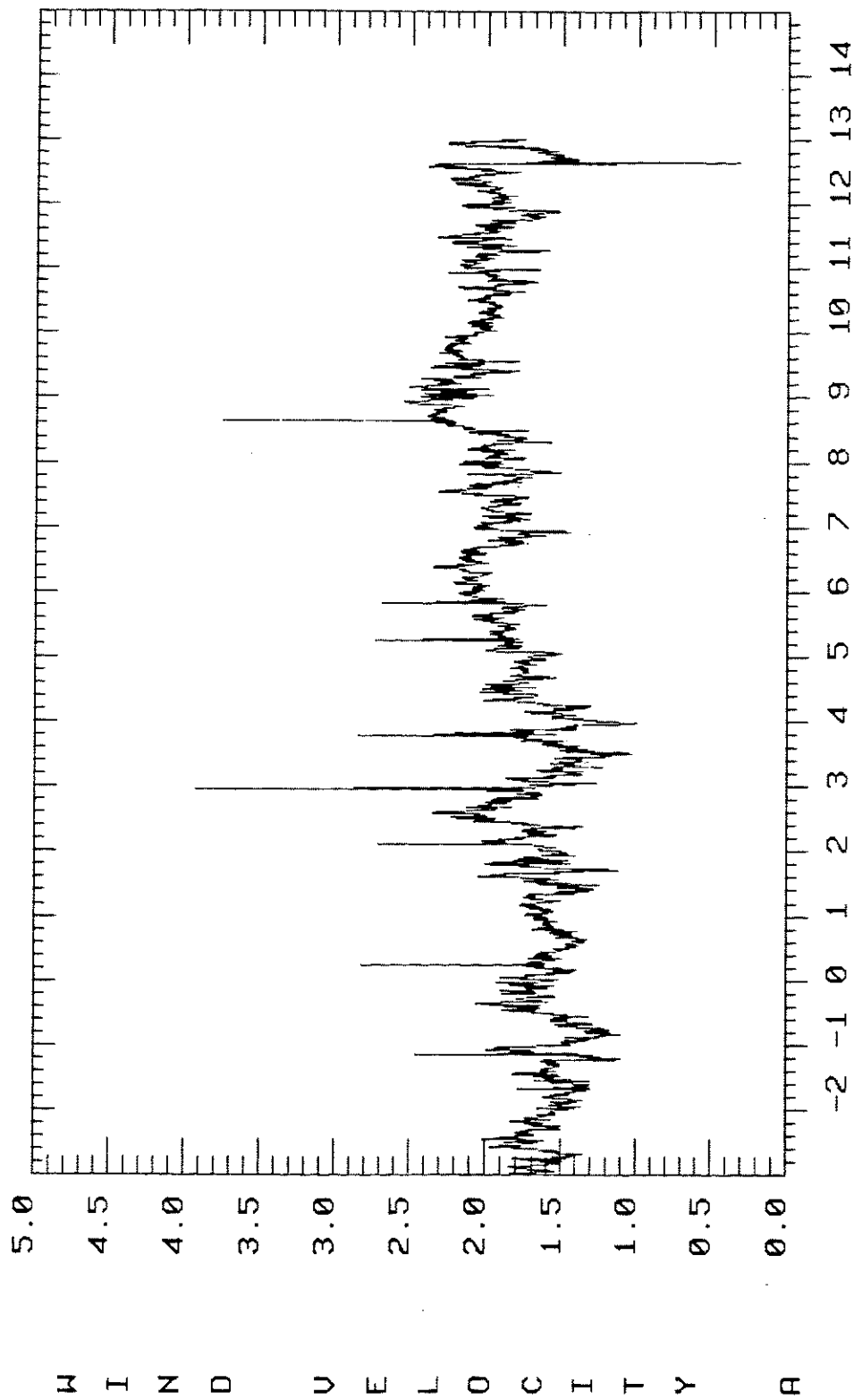


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 275 M Z: 15.0 M

MEAN OF RUN UP: 0.12 MEAN OF RUN DOWN: -0.20

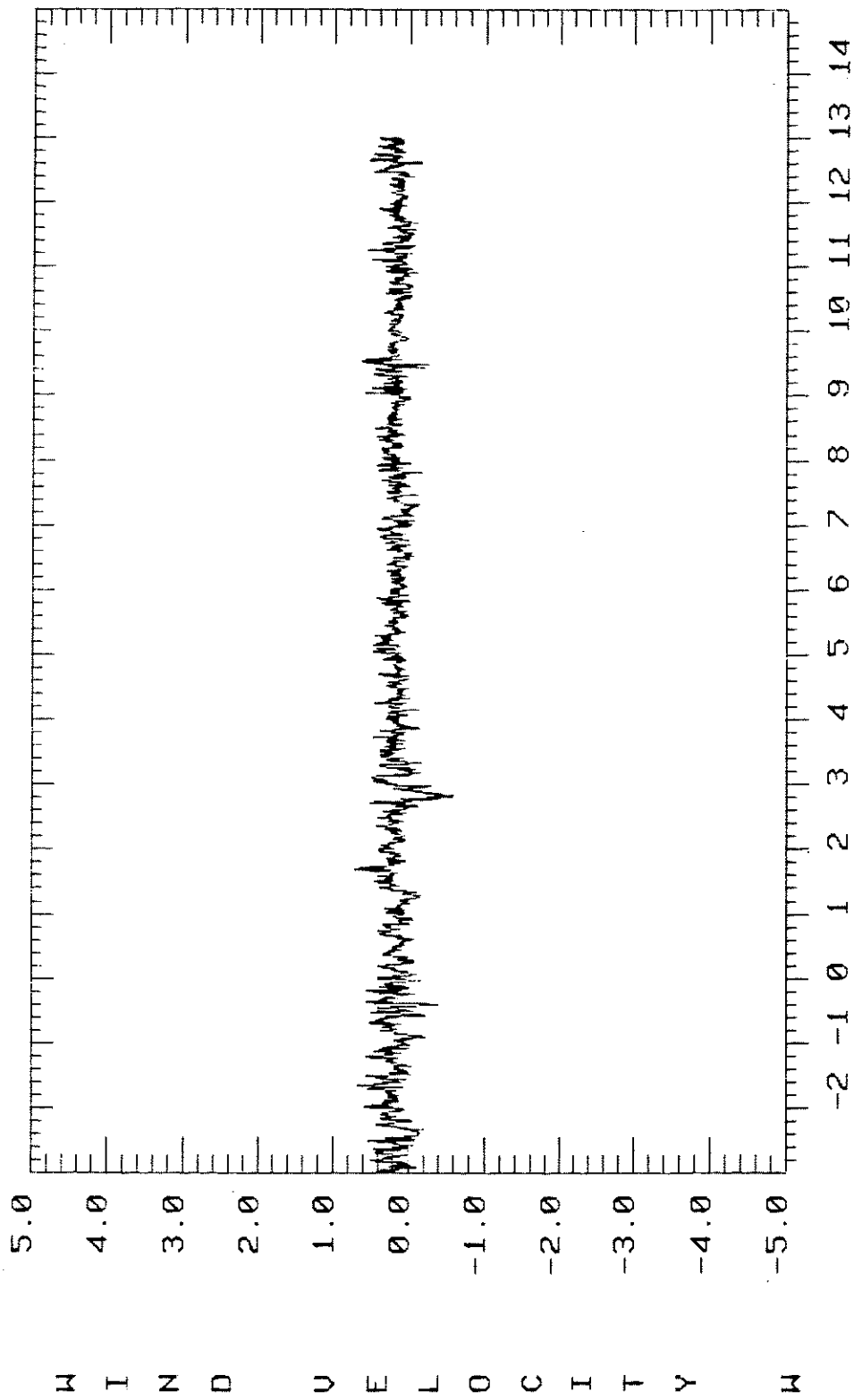


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 275 M Z: 15.0 M

MEAN OF RUN UP: 2.48 MEAN OF RUN DOWN: 1.21

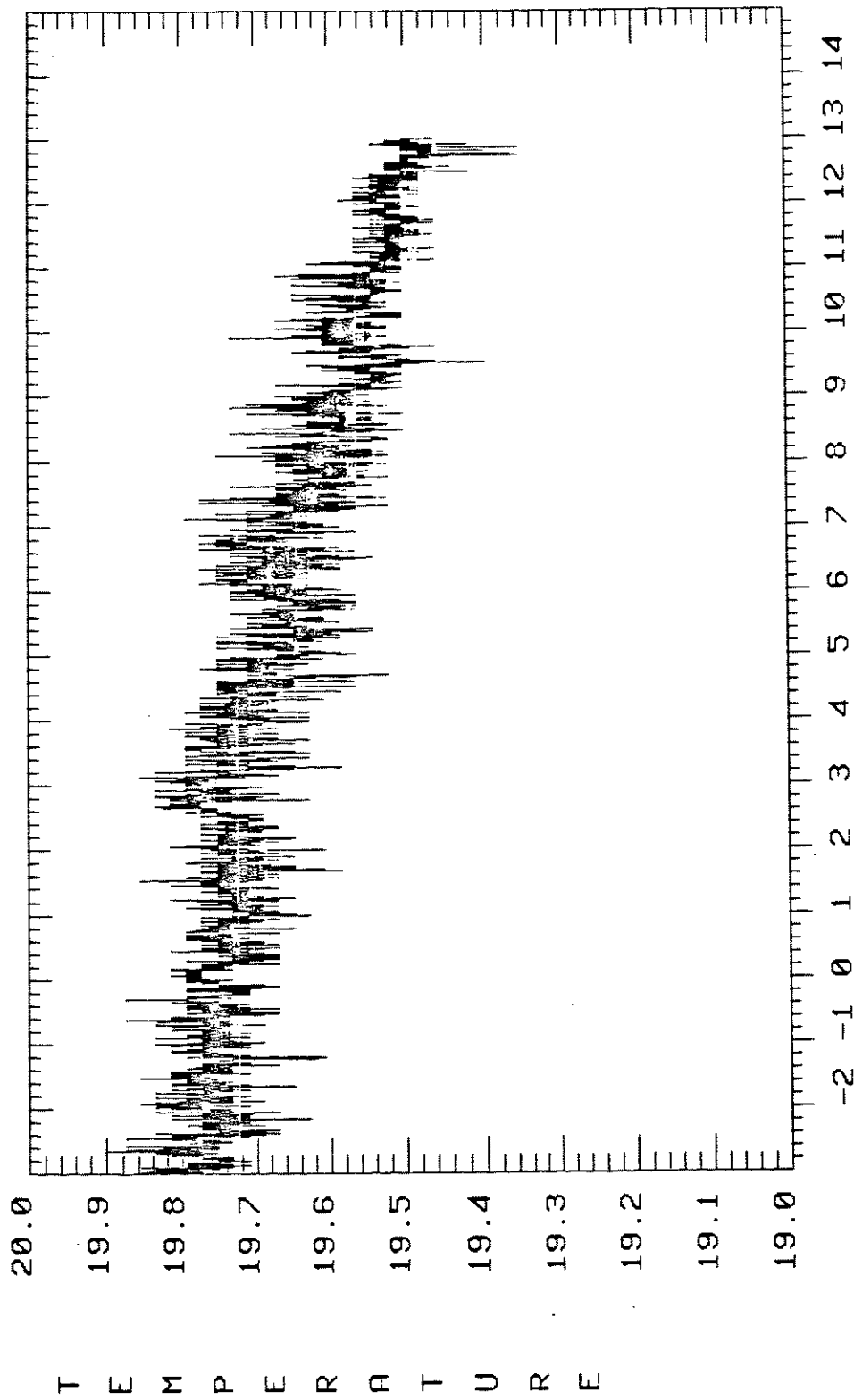


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANW UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 400 M Y: 275 M Z: 15.0 M

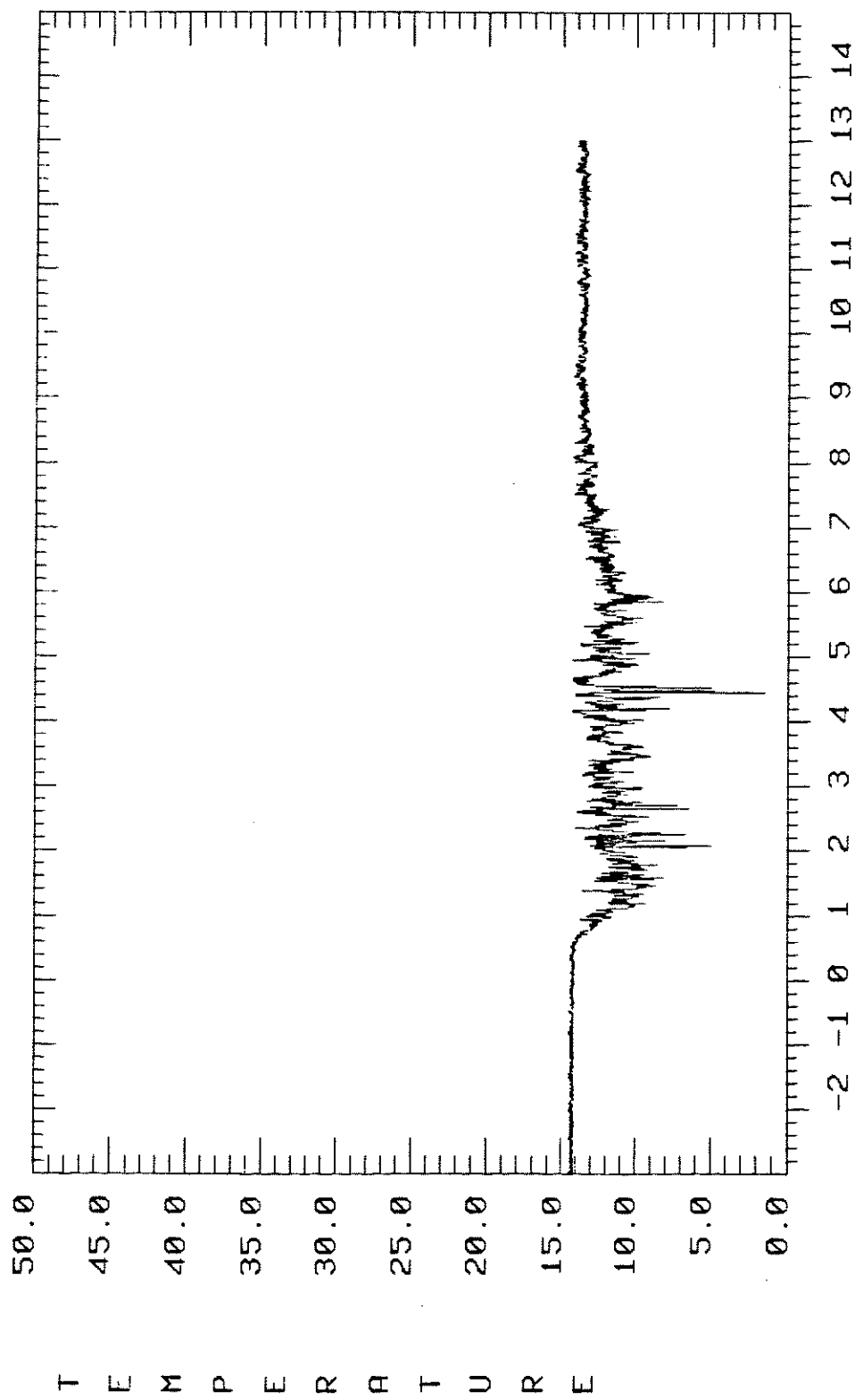
MEAN OF RUN UP: 0.31 MEAN OF RUN DOWN: 0.10



TRIAL: 045 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 275 M Z: 15.0 M

MEAN OF RUN UP: 18.86 MEAN OF RUN DOWN: 19.30

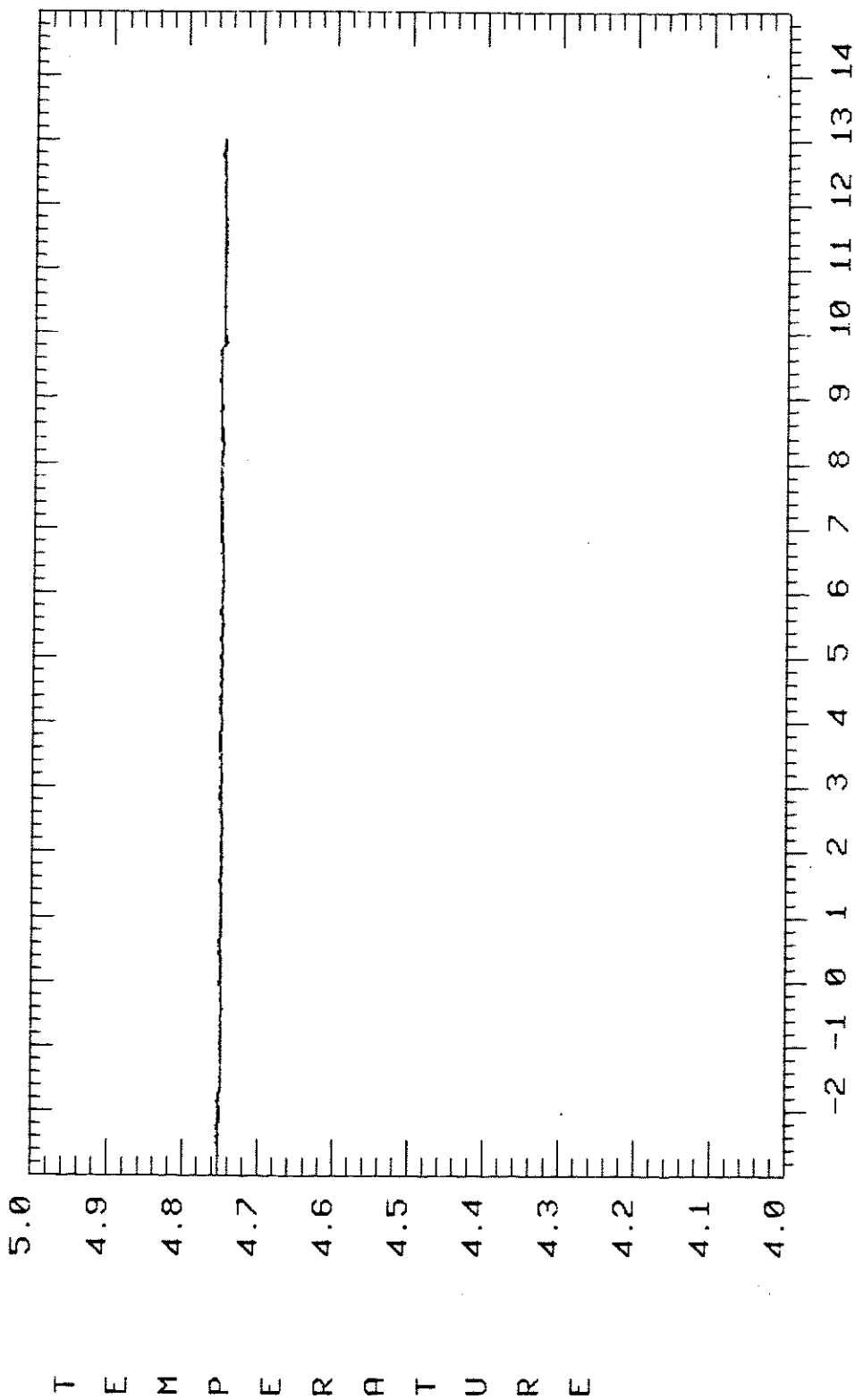


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 450 M Y: 270 M Z: 1.0 M

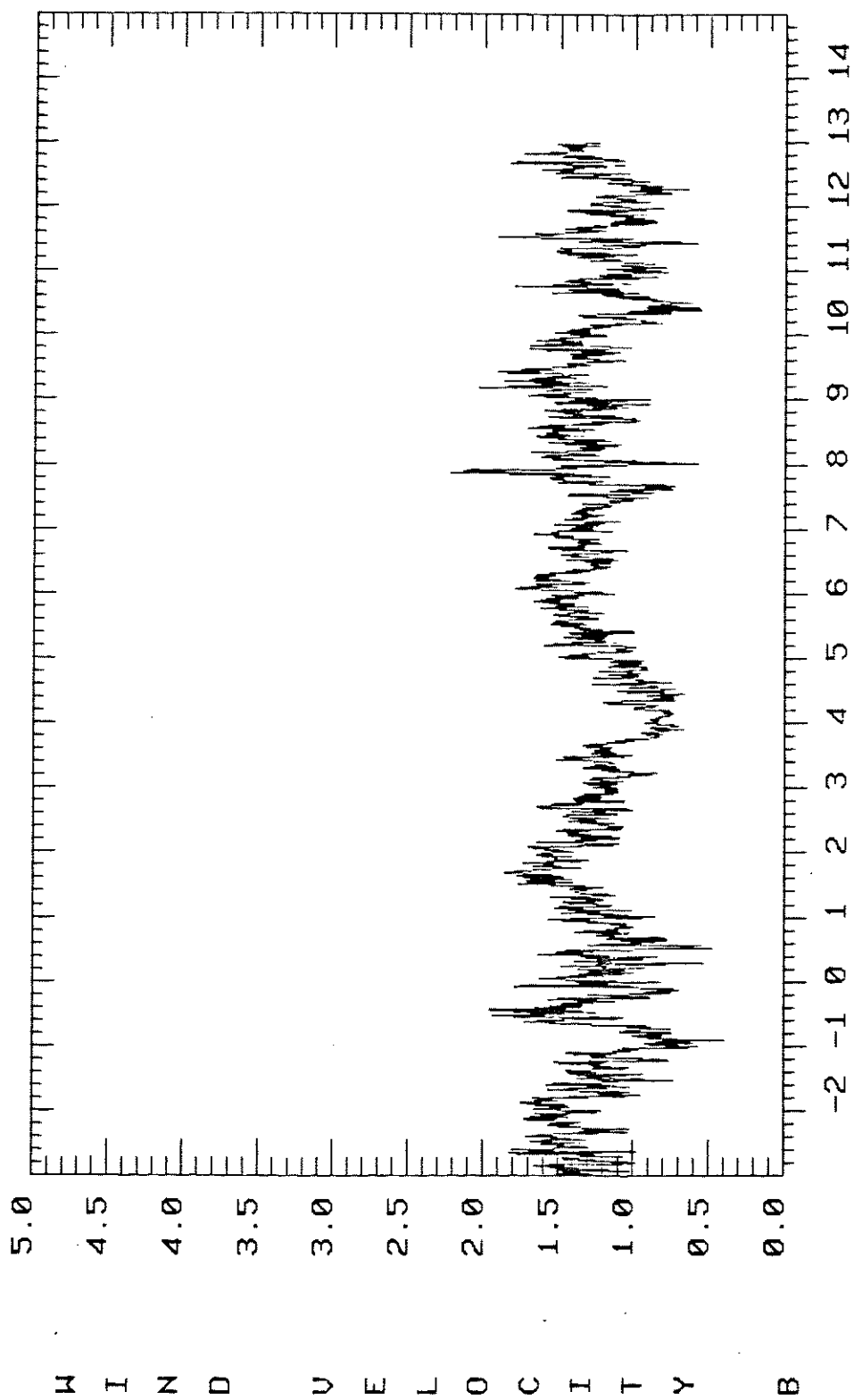
MEAN OF RUN UP: 14.02 MEAN OF RUN DOWN: 13.09



TRIAL: 045 TYPE: TEMP UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 450 M Y: 270 M Z: 1.0 M

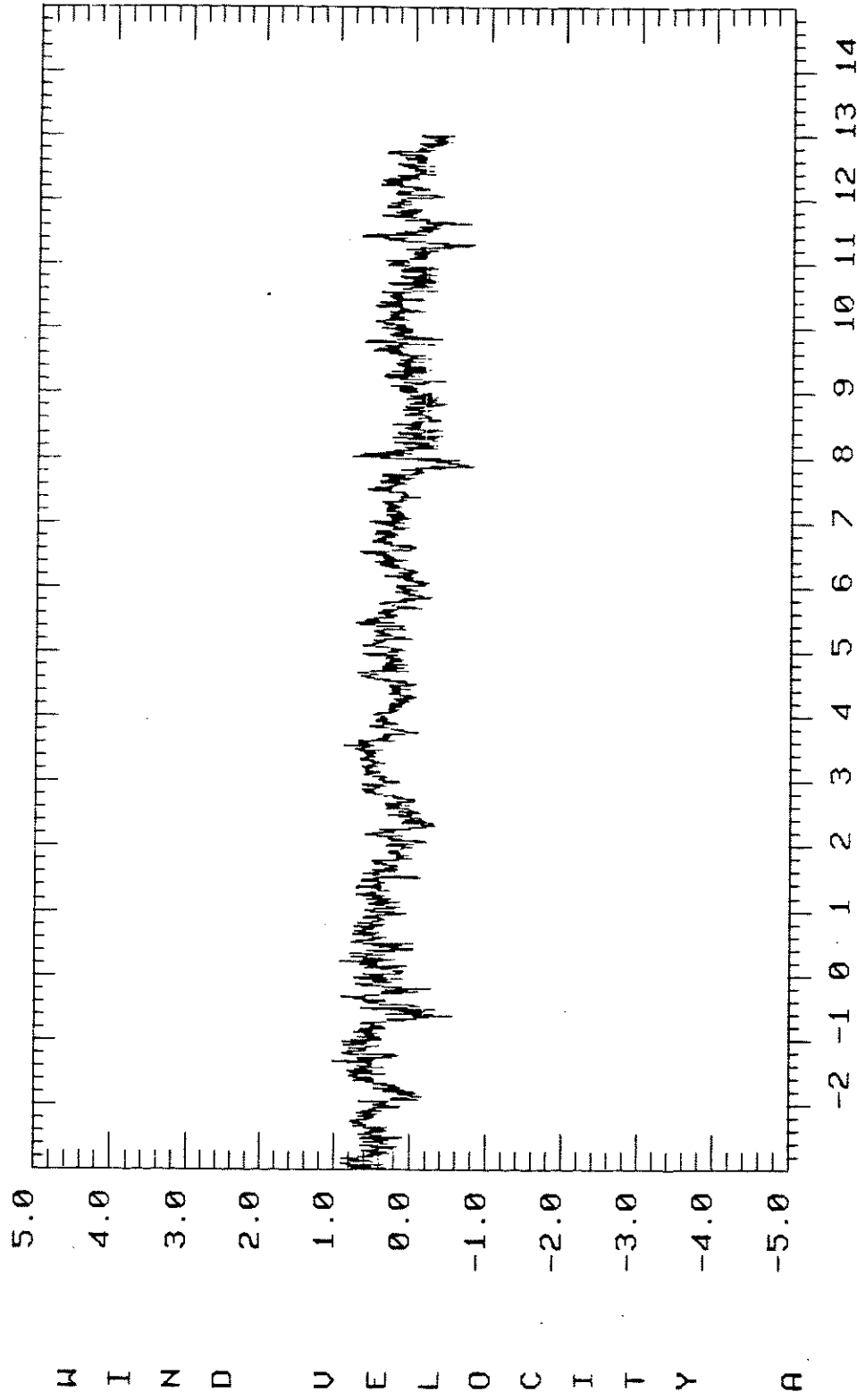
MEAN OF RUN UP: 4.73 MEAN OF RUN DOWN: 4.75



TRIAL: 045 TYPE: UANB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.0 M

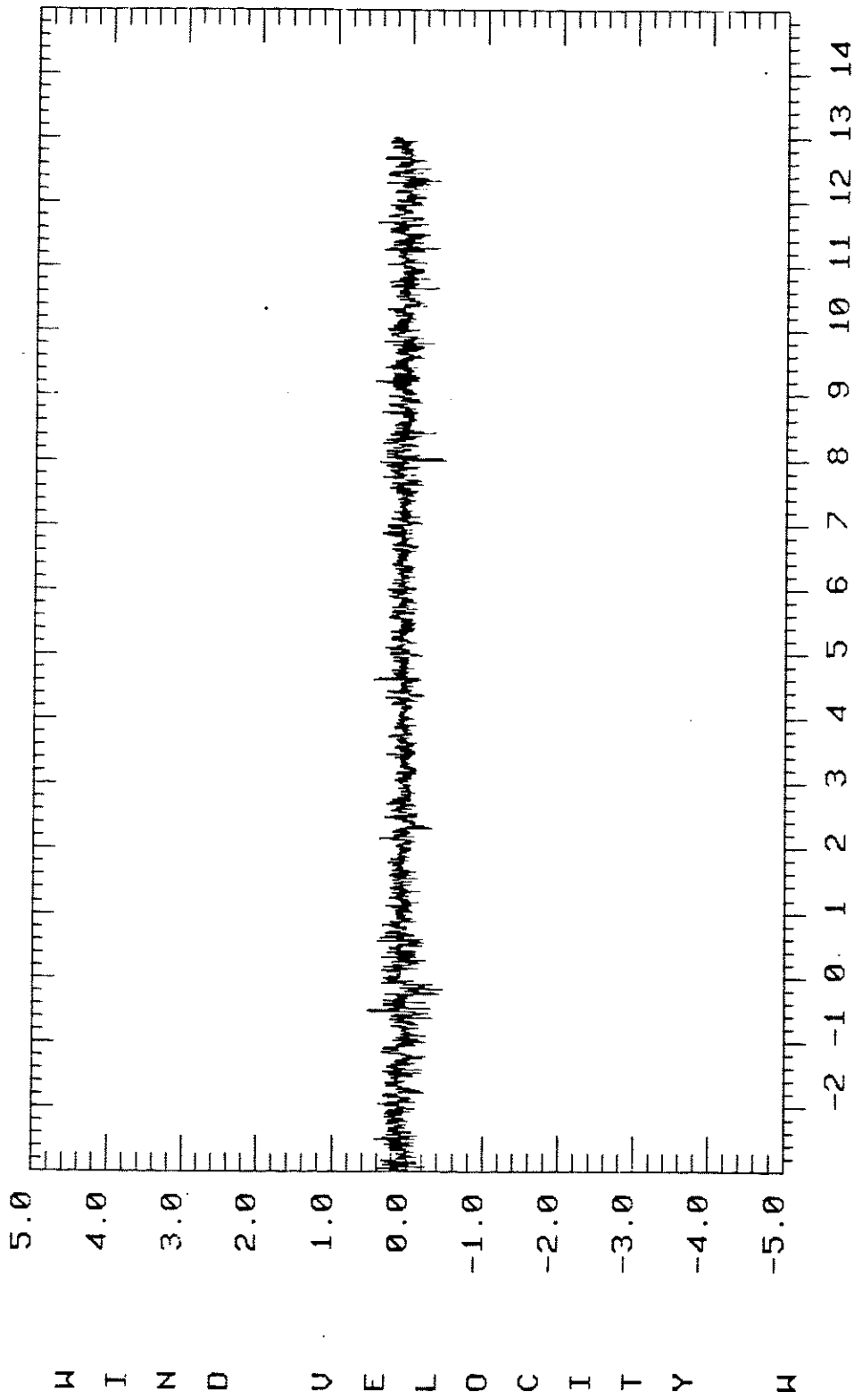
MEAN OF RUN UP: 1.83 MEAN OF RUN DOWN: 0.62



TRIAL: 045 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.0 M

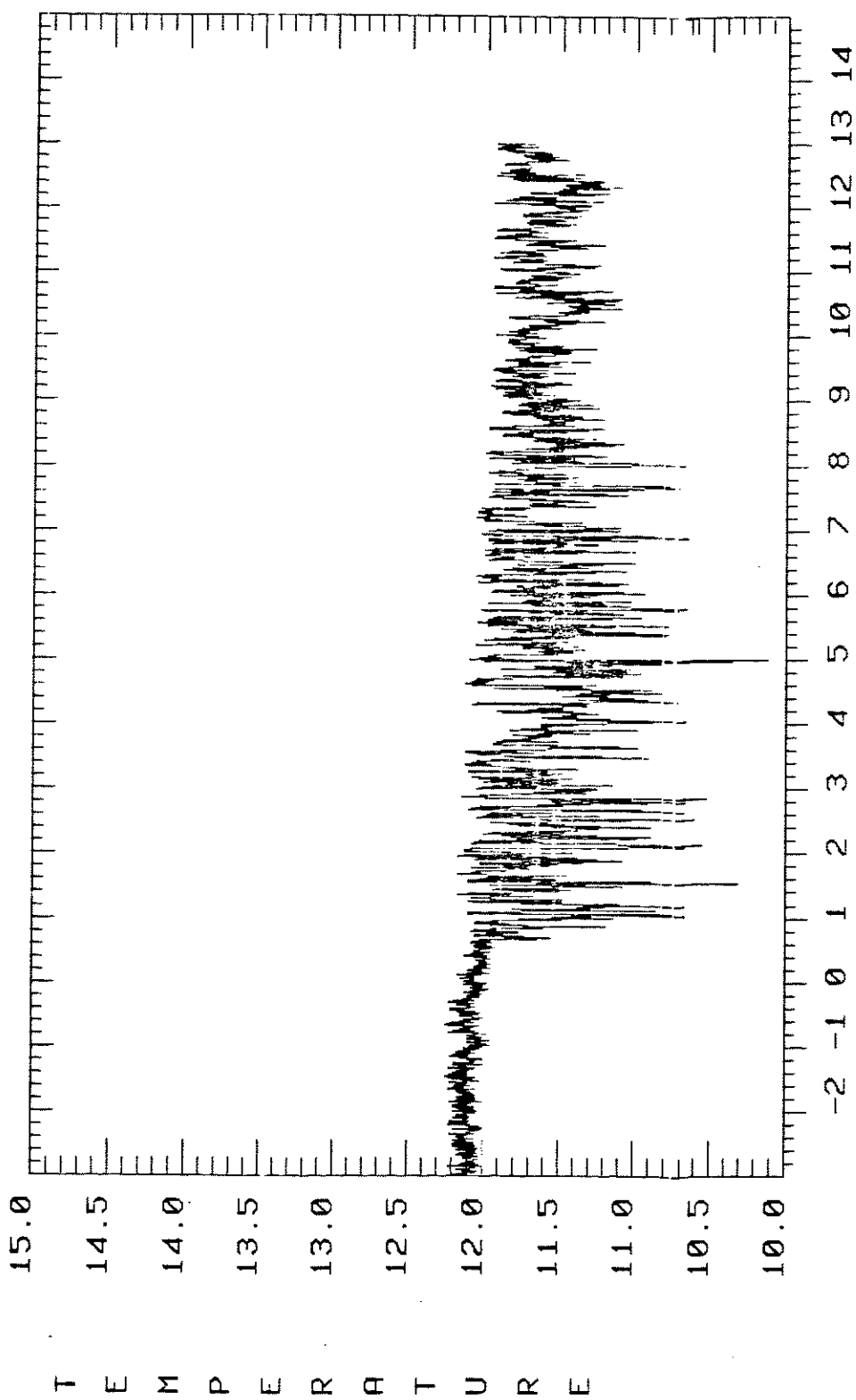
MEAN OF RUN UP: 0.51 MEAN OF RUN DOWN: 0.27



TRIAL: 045 TYPE: UANW UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.0 M

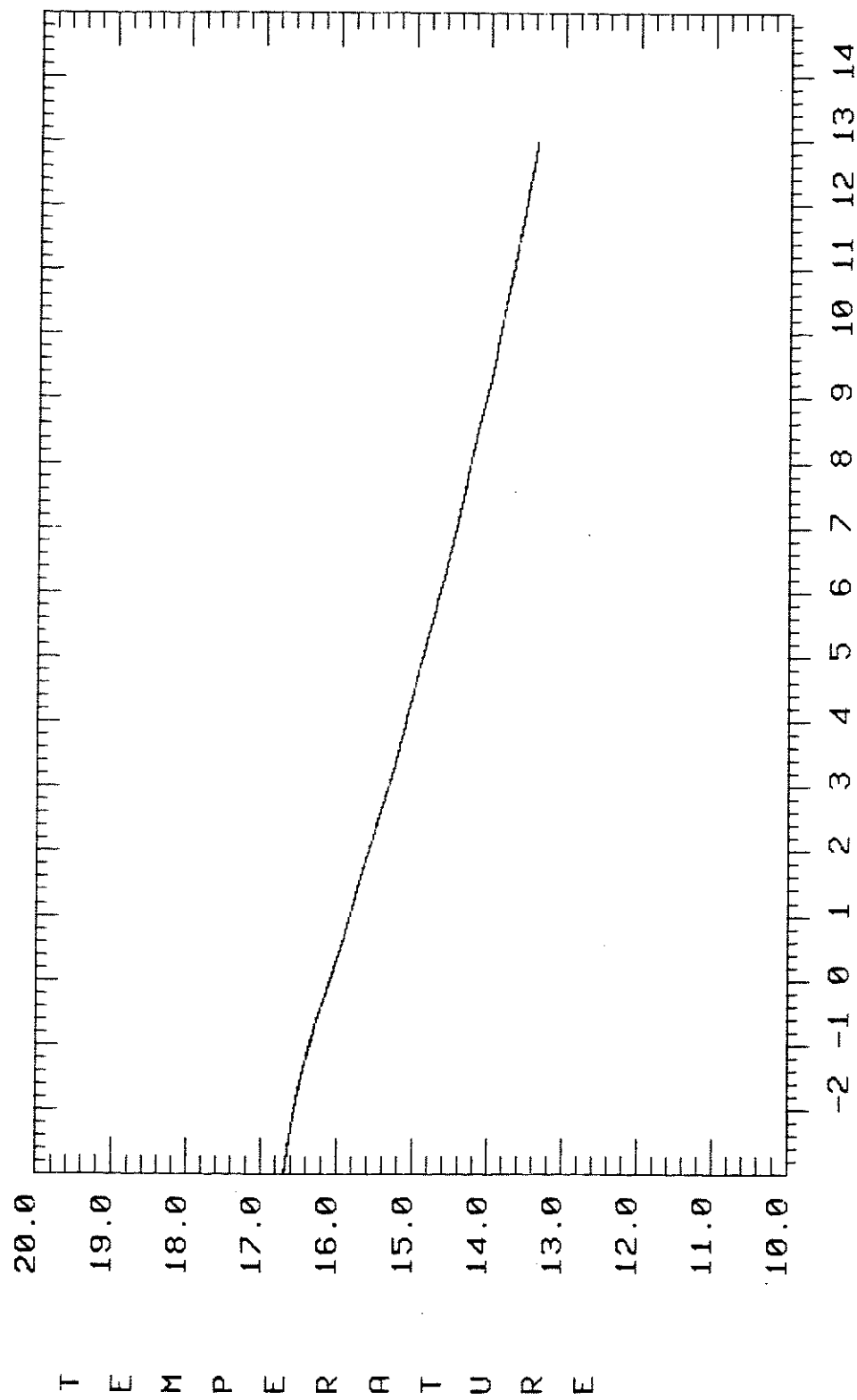
MEAN OF RUN UP: 0.04 MEAN OF RUN DOWN: 0.05



TRIAL: 045 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.0 M

MEAN OF RUN UP: 11.50 MEAN OF RUN DOWN: 11.36

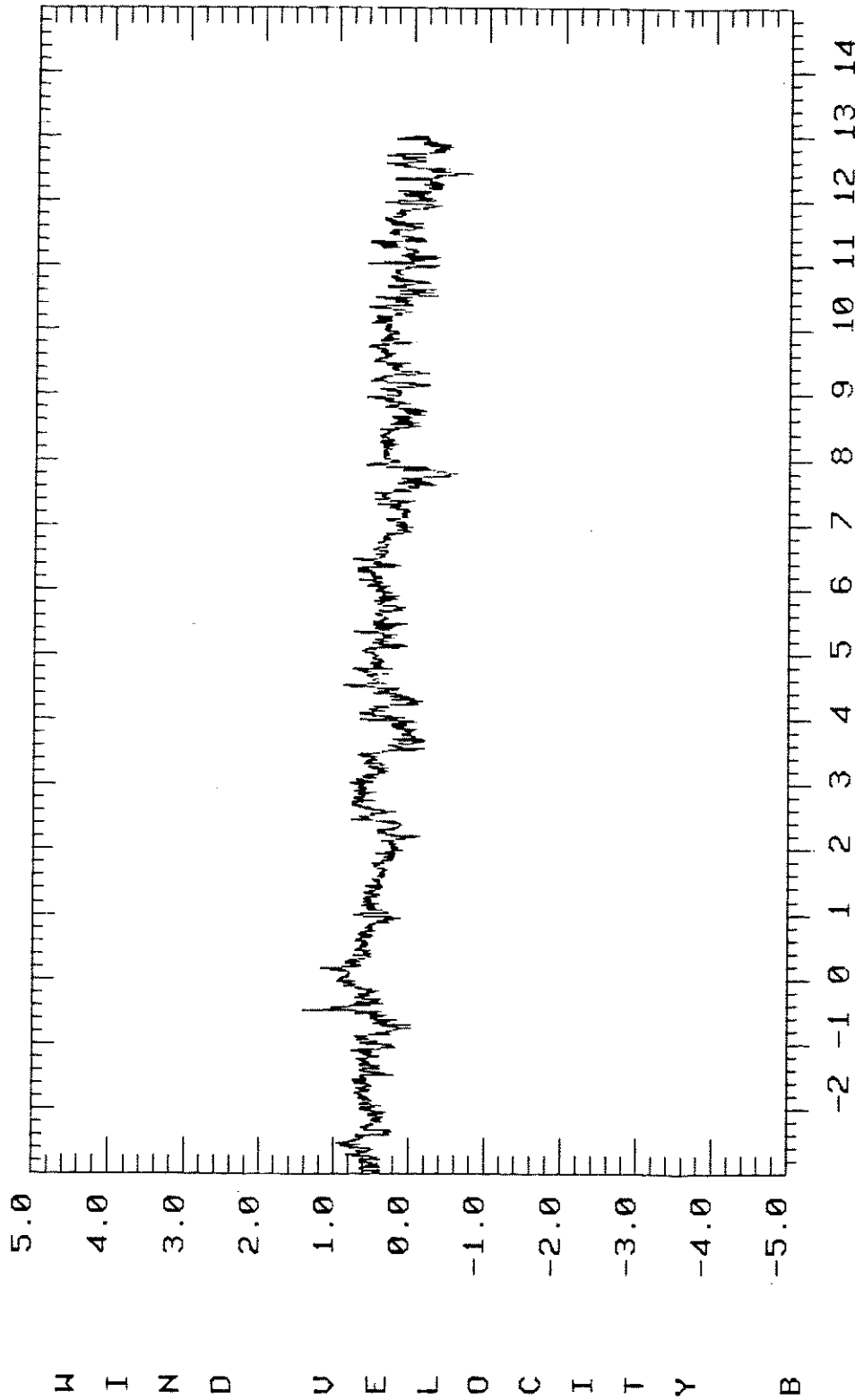


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: TEMP UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.0 M

MEAN OF RUN UP: 22.08 MEAN OF RUN DOWN: 11.42

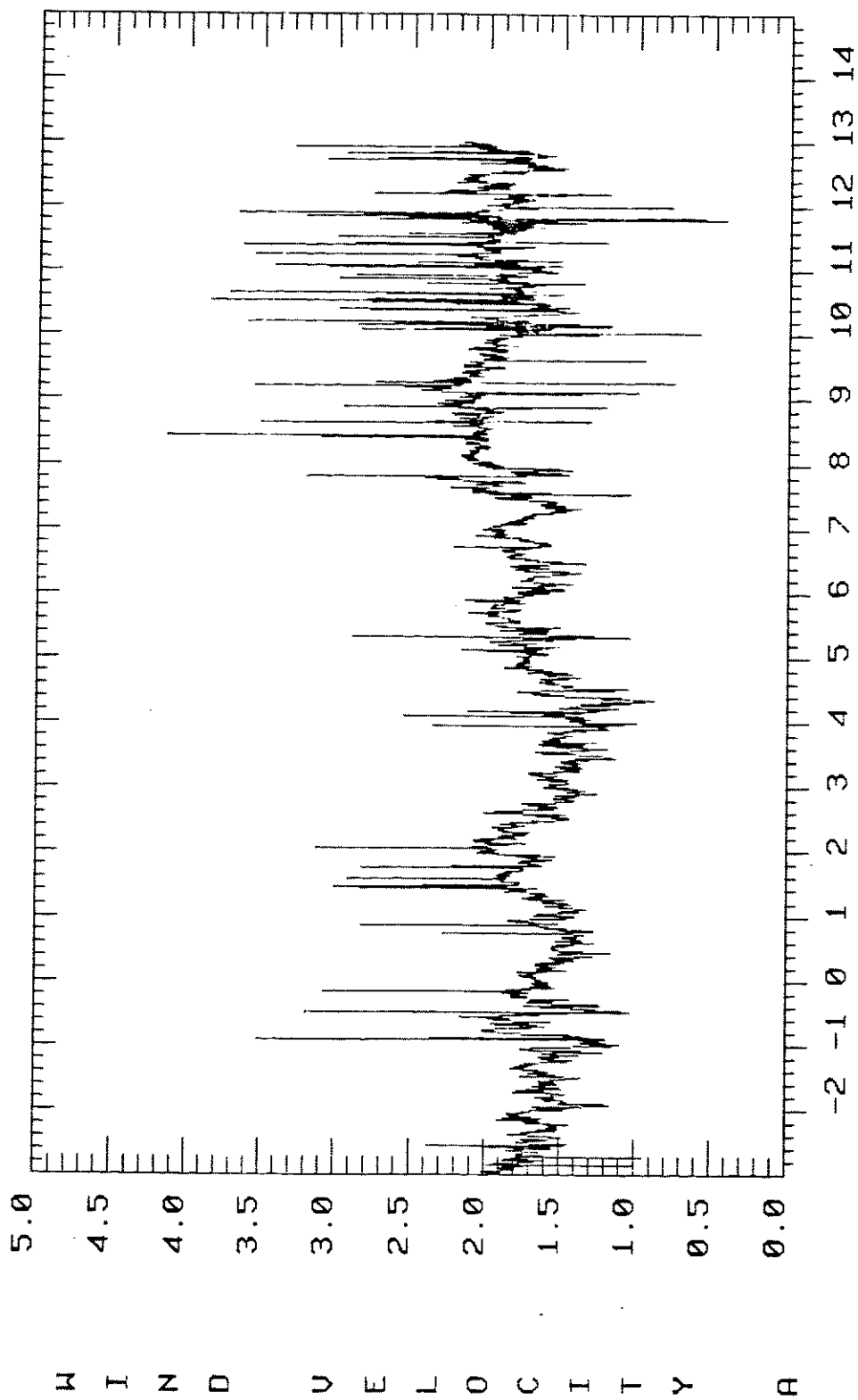


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 15.0 M

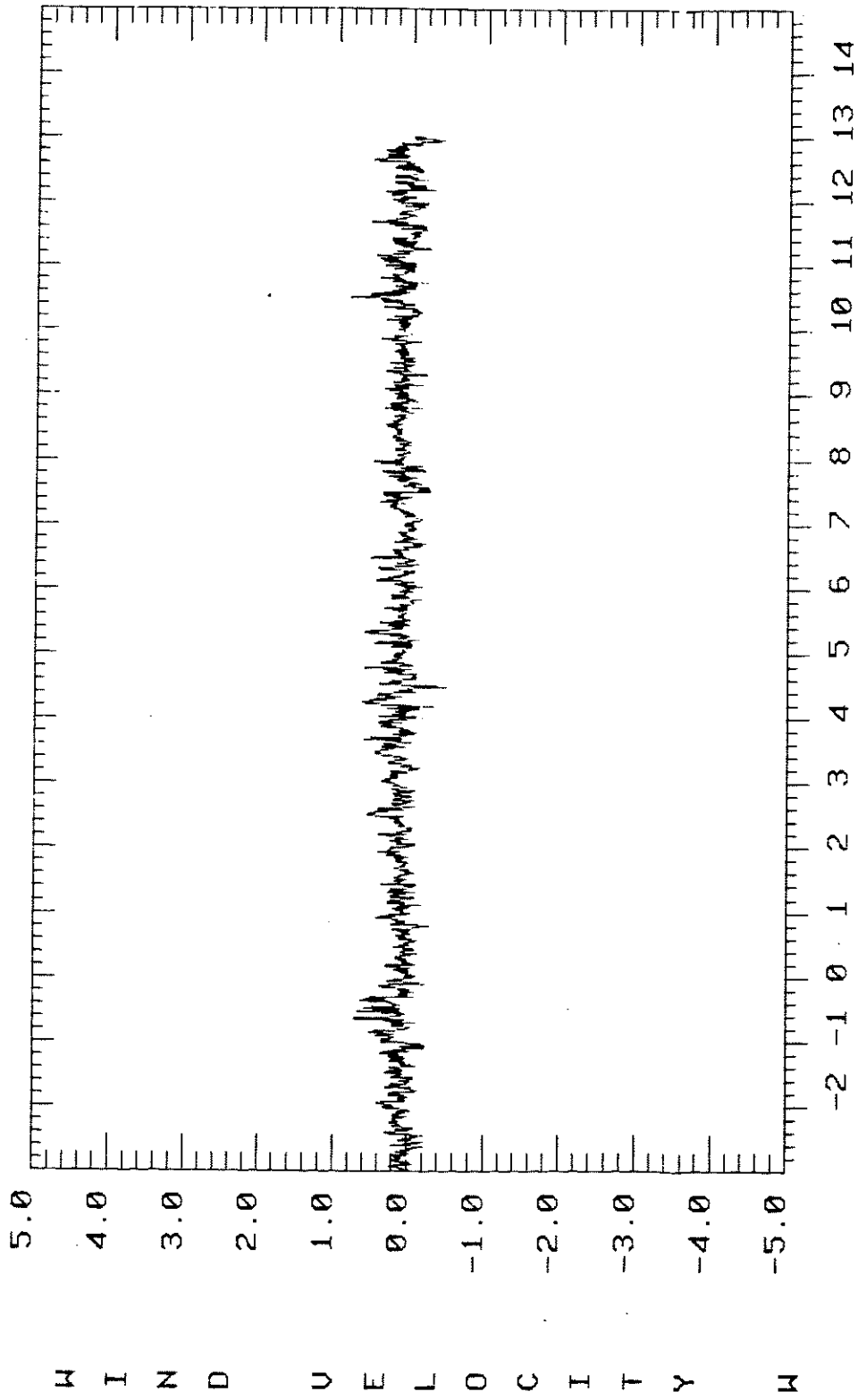
MEAN OF RUN UP: 0.55 MEAN OF RUN DOWN: -0.01



TRIAL: 045 TYPE: UANB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 15.0 M

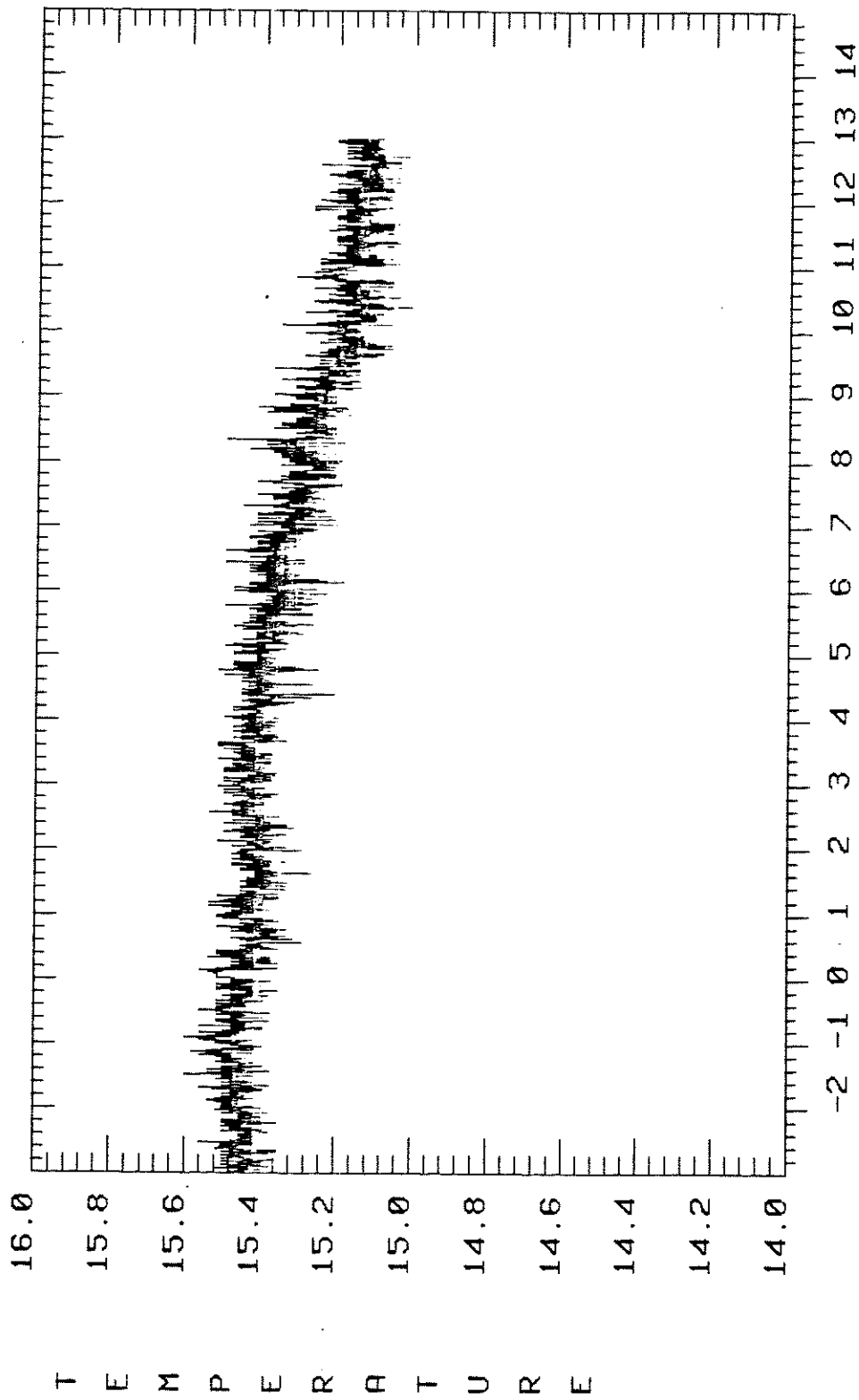
MEAN OF RUN UP: 2.48 MEAN OF RUN DOWN: 1.18



TRIAL: 045 TYPE: UANW UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 15.0 M

MEAN OF RUN UP: -0.02 MEAN OF RUN DOWN: 0.05

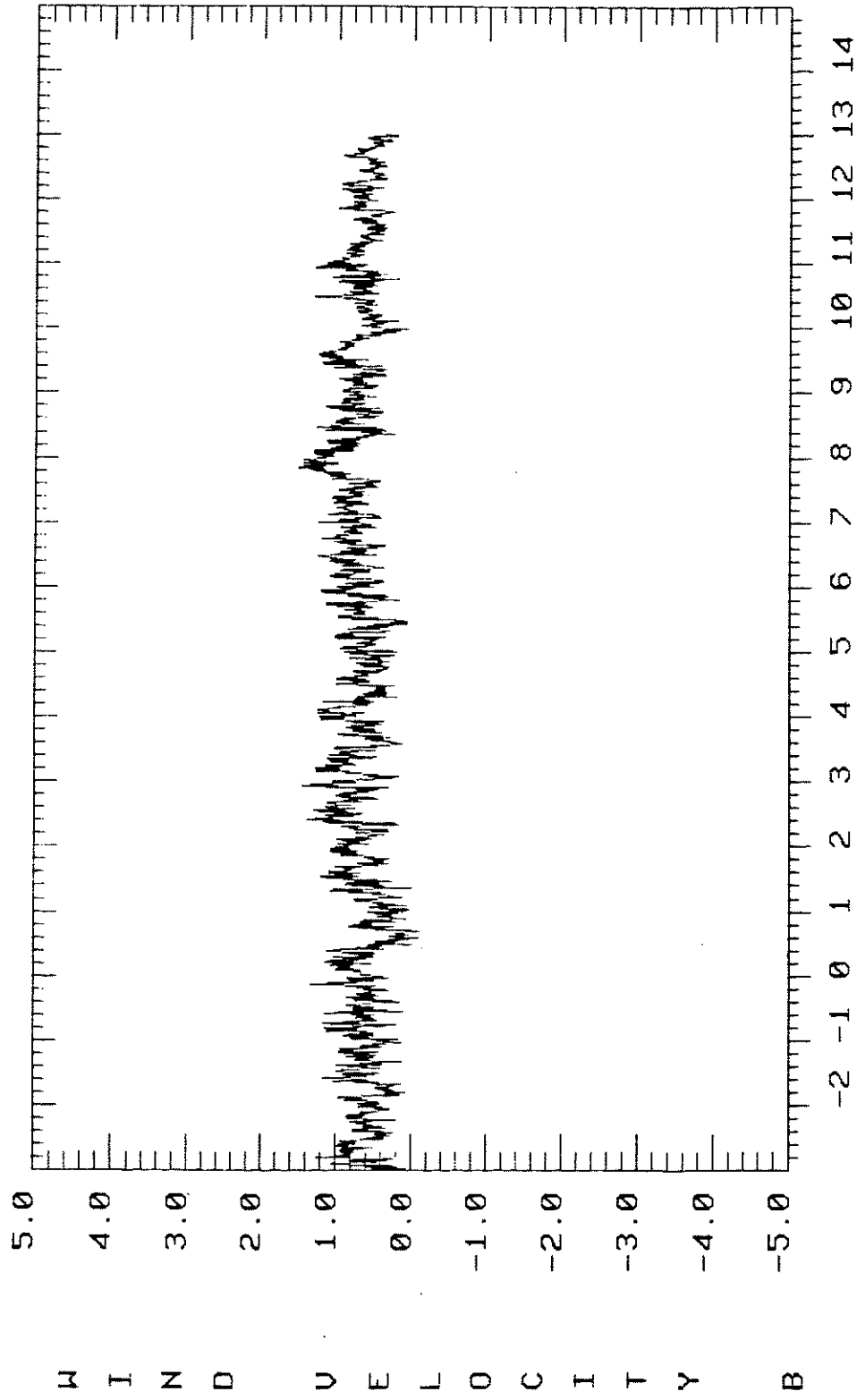


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 15.0 M

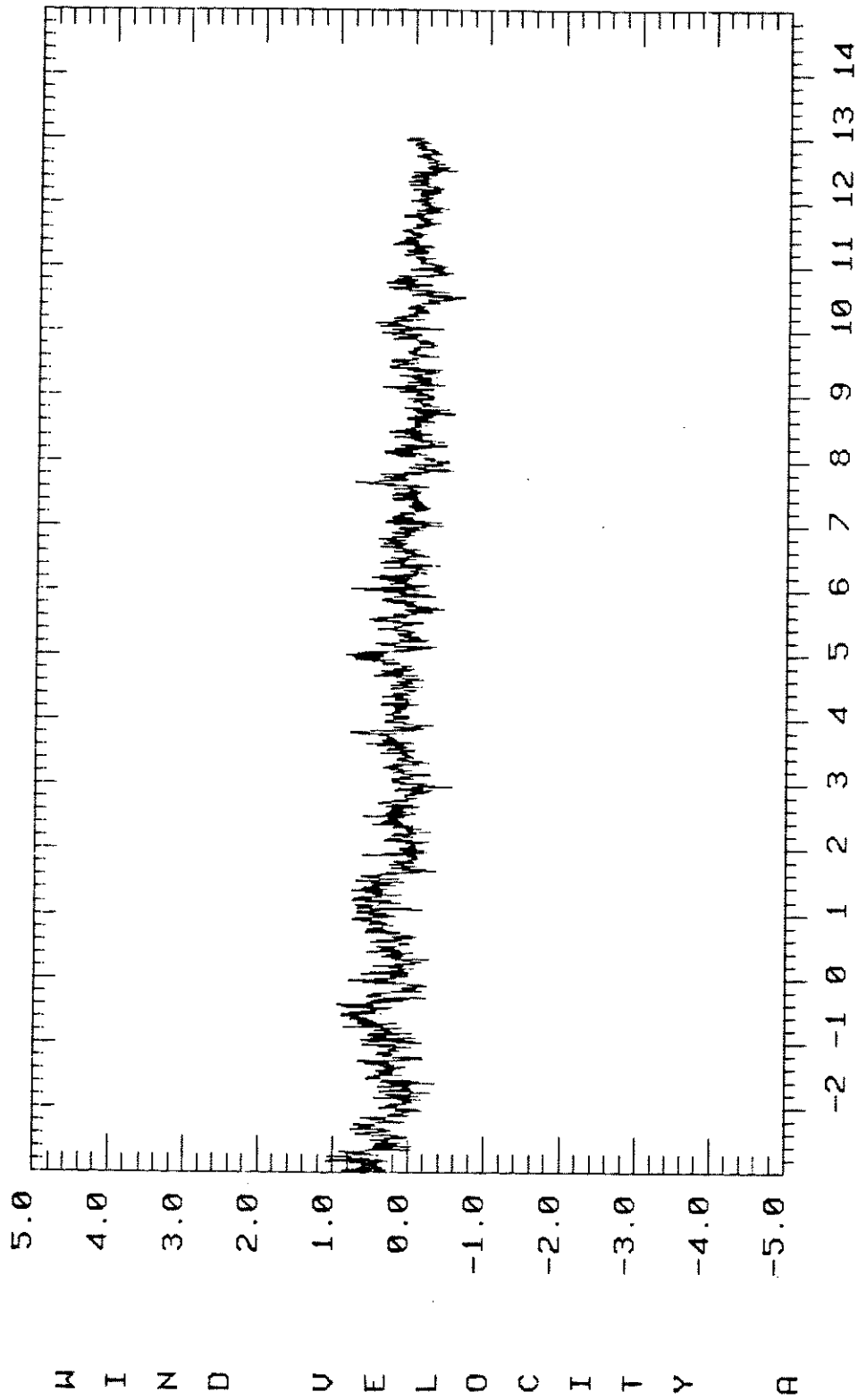
MEAN OF RUN UP: 14.27 MEAN OF RUN DOWN: 14.94



TRIAL: 045 TYPE: UANB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 500 M Y: 270 M Z: 1.0 M

MEAN OF RUN UP: 1.10 MEAN OF RUN DOWN: 0.22

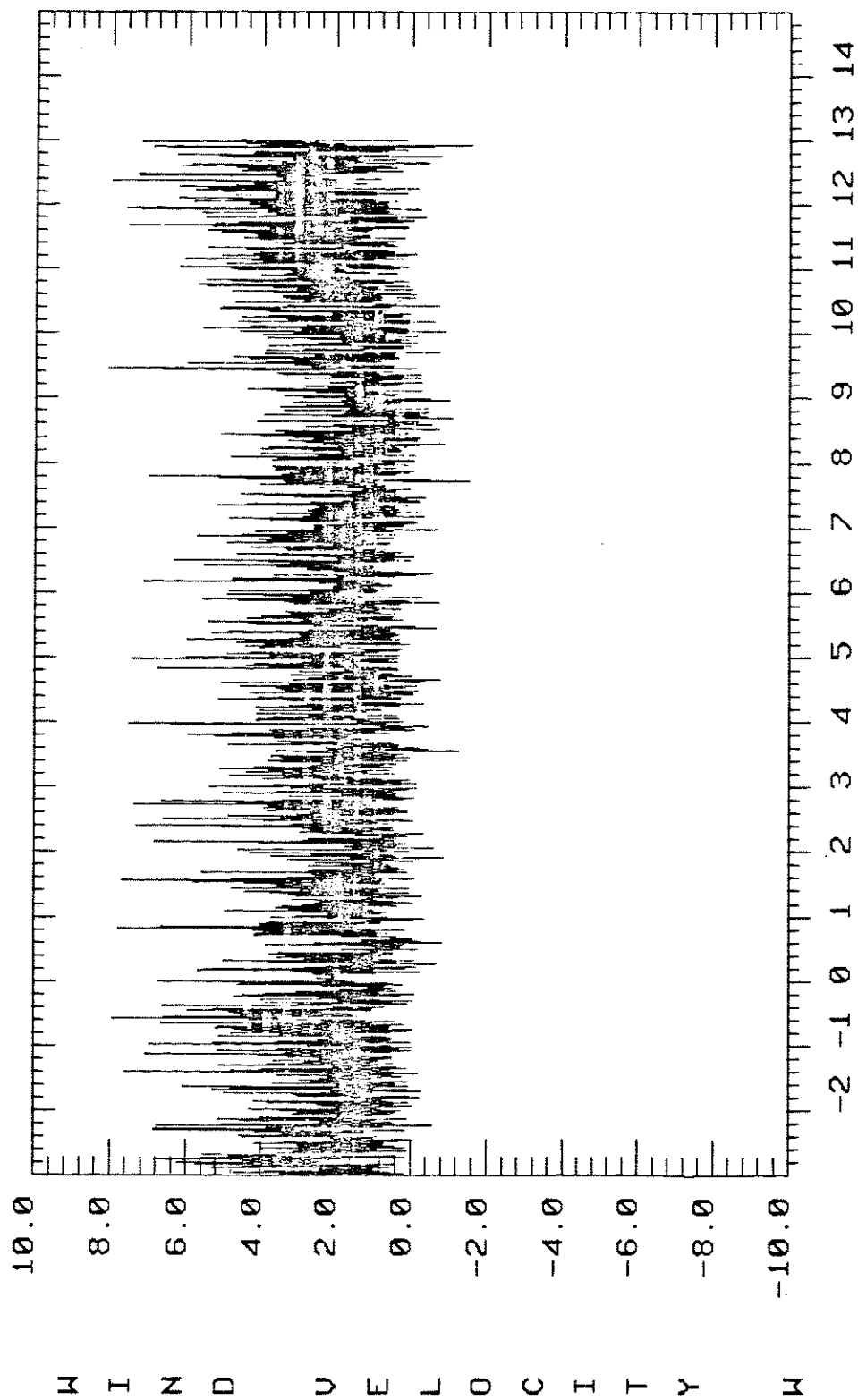


TRIAL: 045 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 500 M Y: 270 M Z: 1.0 M

MEAN OF RUN UP: 0.63 MEAN OF RUN DOWN: 0.02

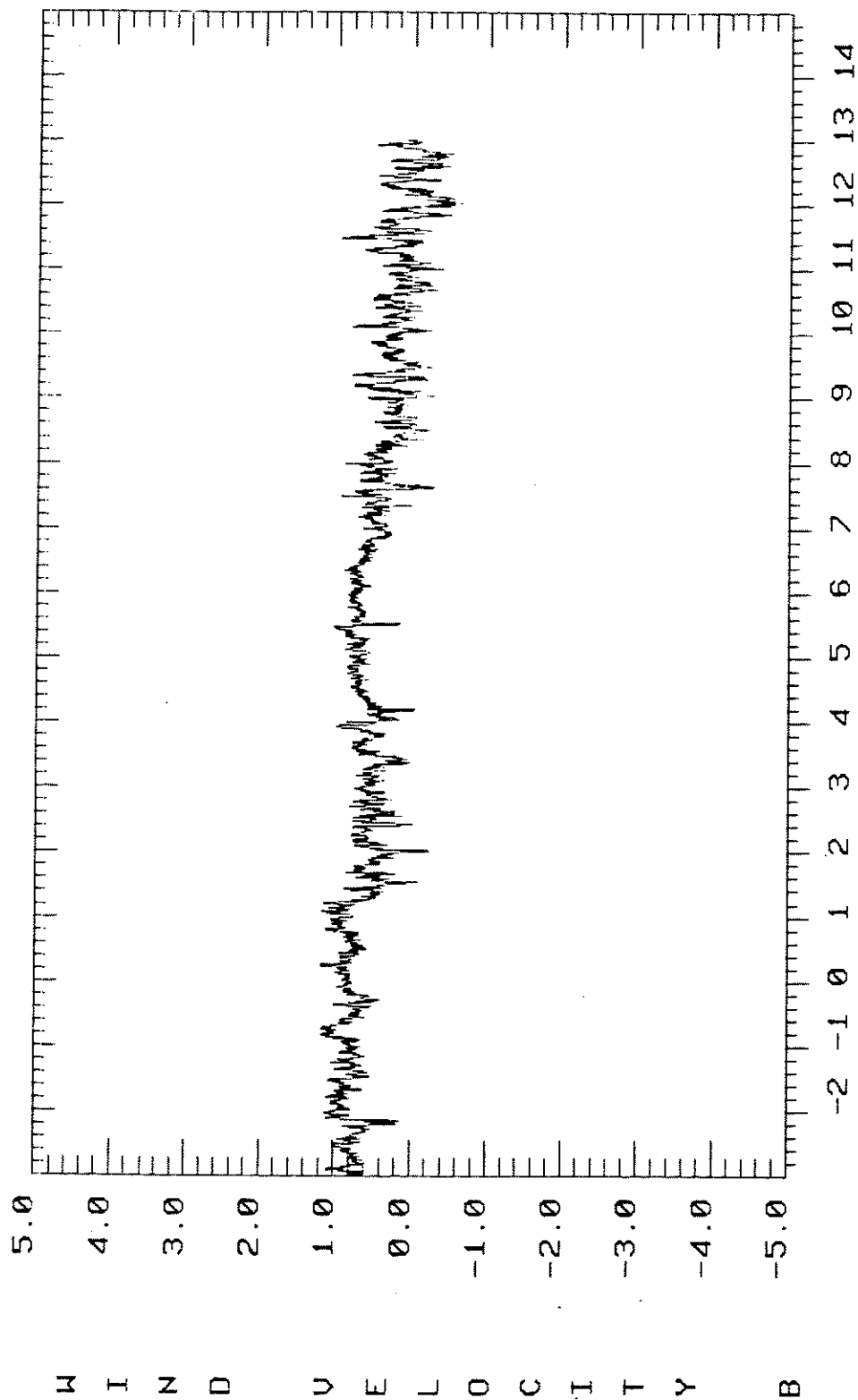
E51



TRIAL: 045 TYPE: UANW UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 500 M Y: 270 M Z: 1.0 M

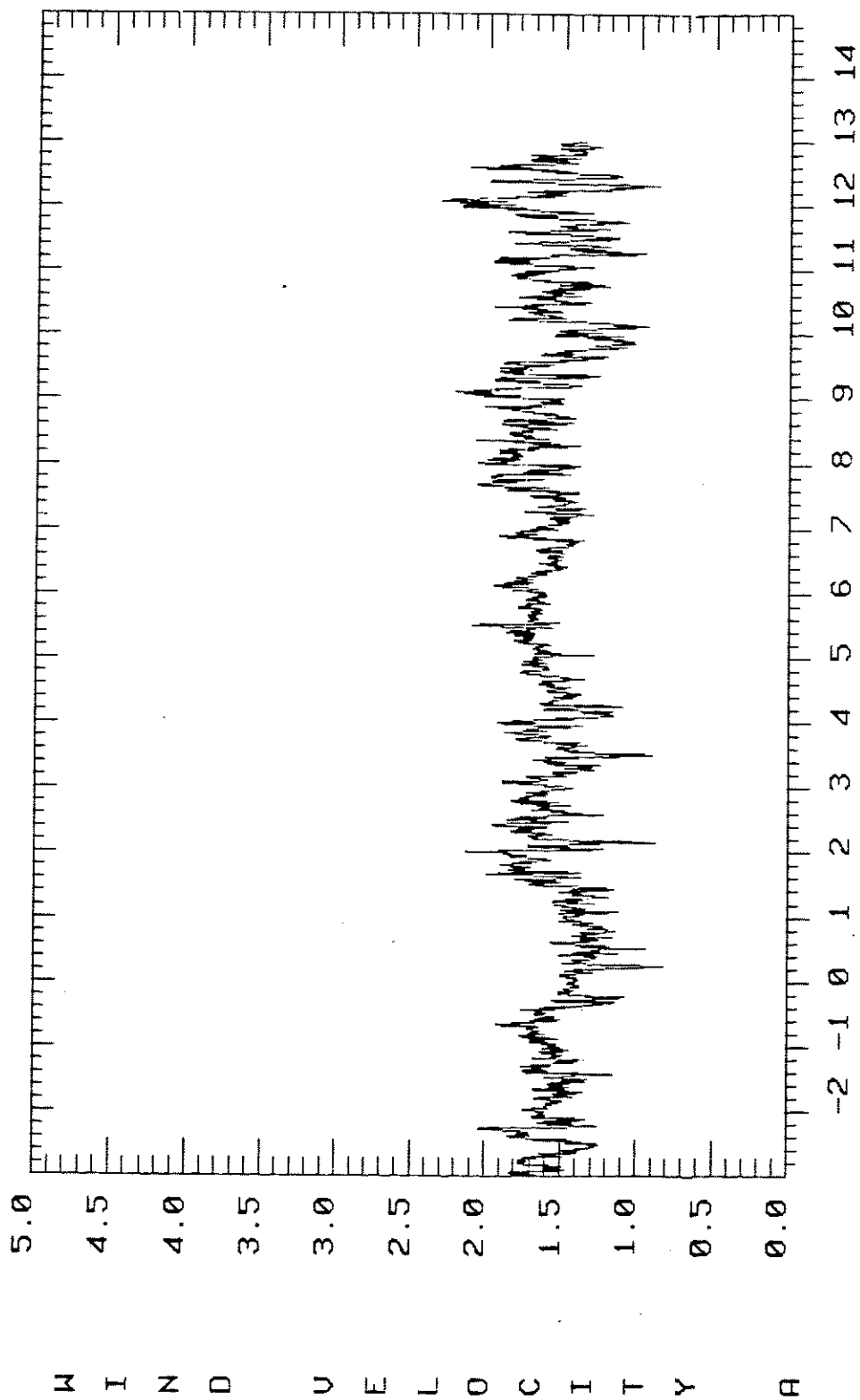
MEAN OF RUN UP: 2.90 MEAN OF RUN DOWN: 0.18



TRIAL: 045 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 500 M Y: 275 M Z: 15.0 M

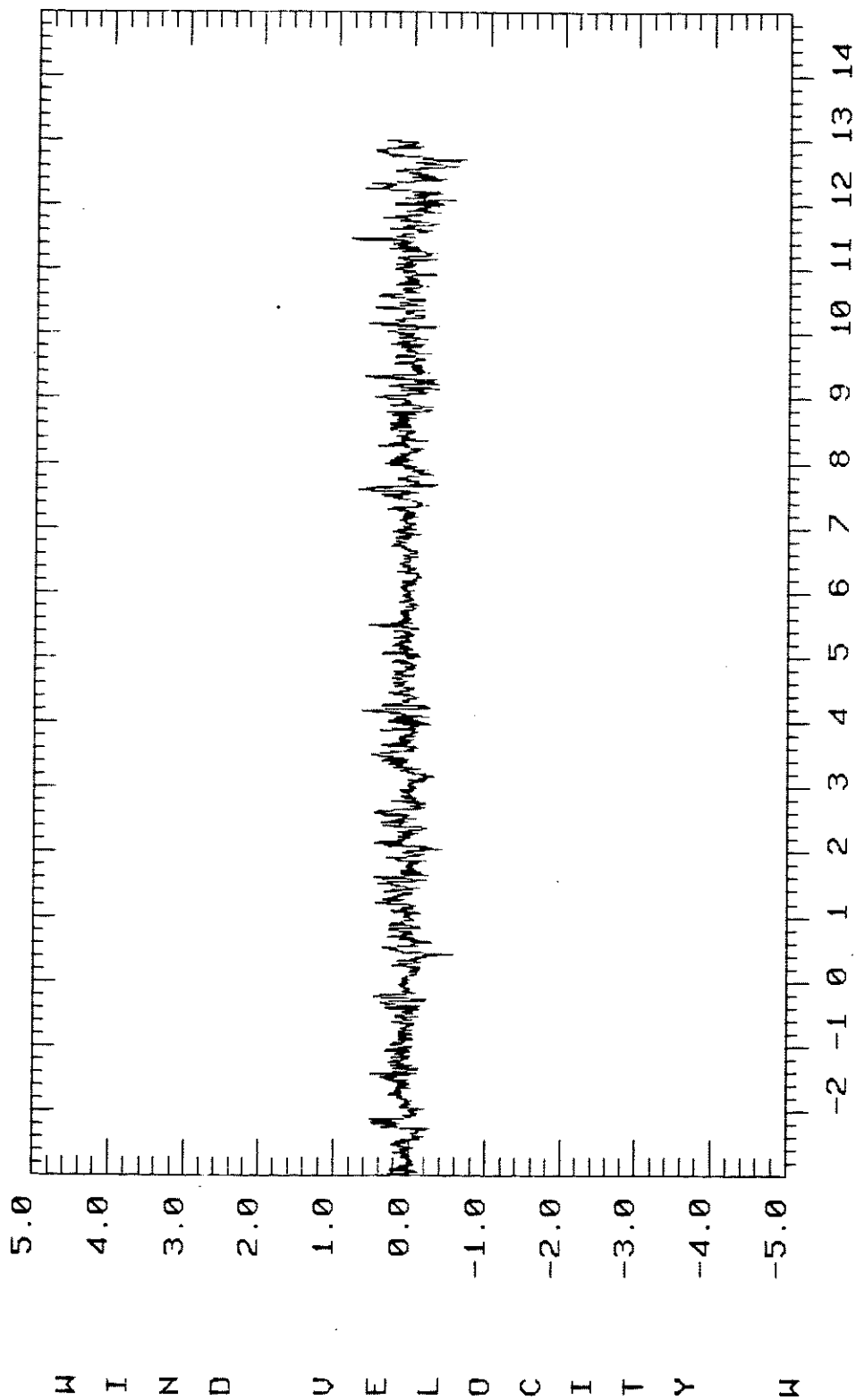
MEAN OF RUN UP: 1.01 MEAN OF RUN DOWN: 0.12



TRIAL: 045 TYPE: UANB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 500 M Y: 275 M Z: 15.0 M

MEAN OF RUN UP: 2.20 MEAN OF RUN DOWN: 1.24

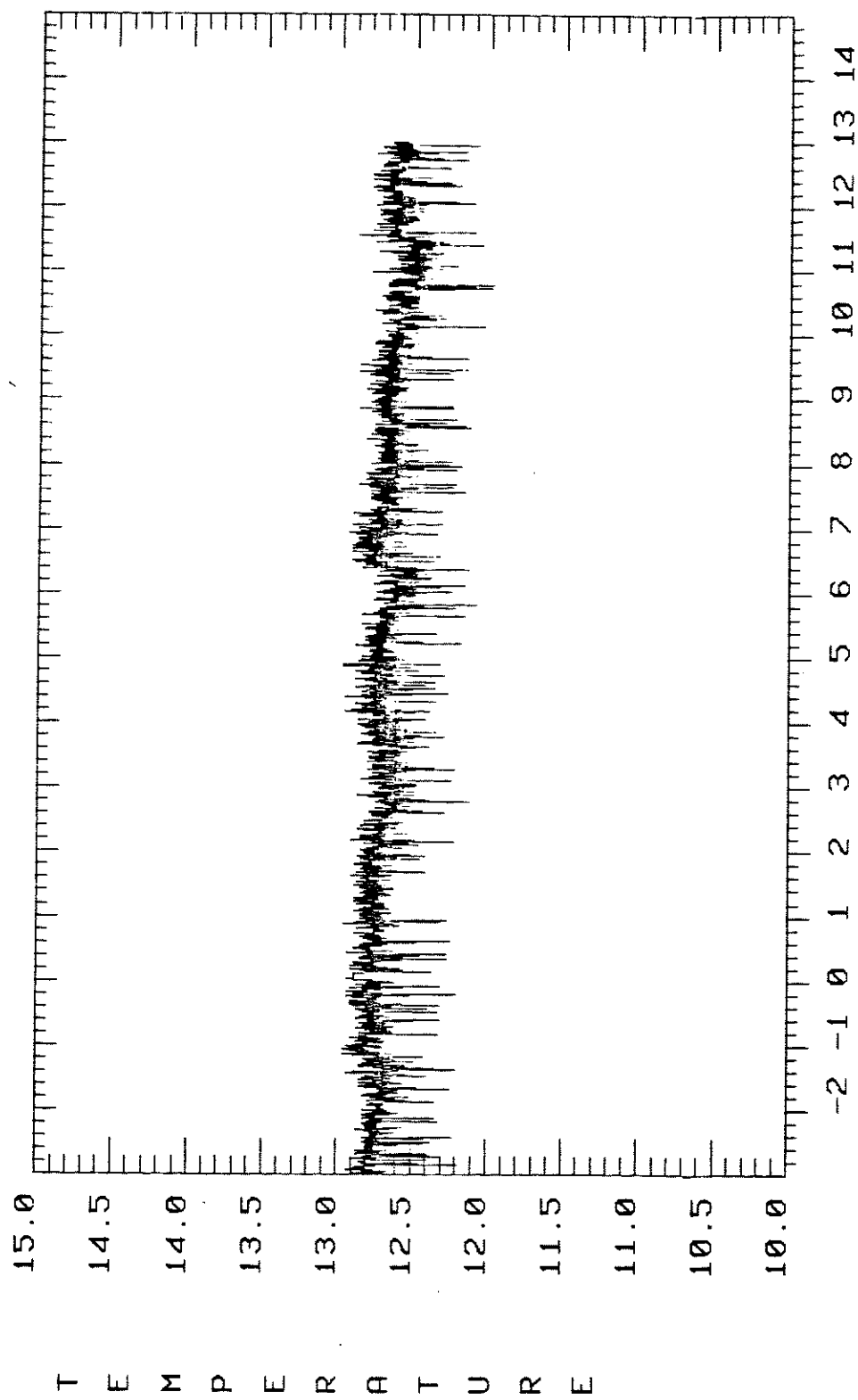


TRIAL: 045 TYPE: UANW UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 500 M Y: 275 M Z: 15.0 M

MEAN OF RUN UP: 0.04 MEAN OF RUN DOWN: 0.03

E5.6



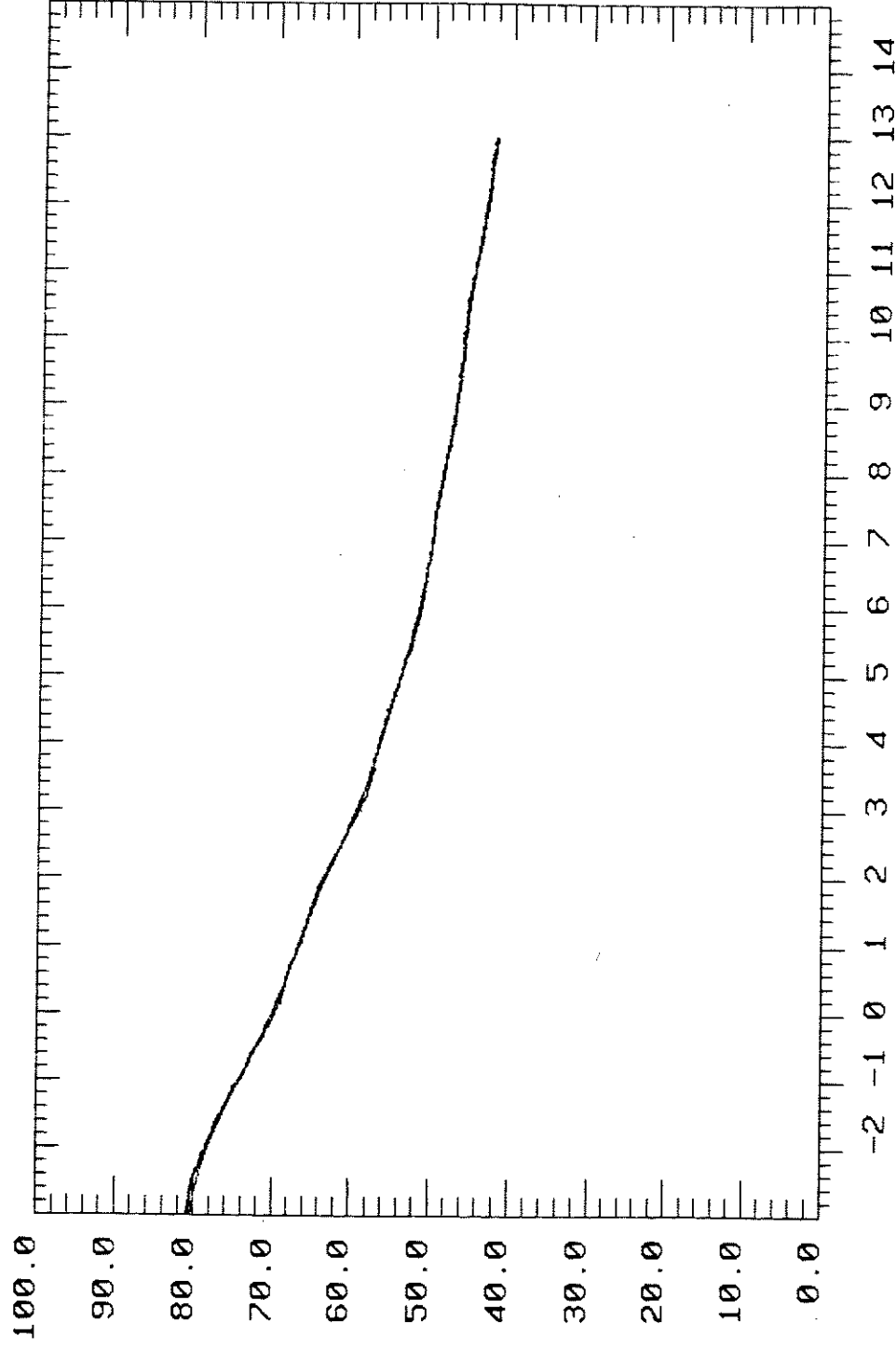
TRIAL: 045 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 500 M Y: 275 M Z: 15.0 M

MEAN OF RUN UP: 11.53 MEAN OF RUN DOWN: 12.56

E517

I N S O L A T I O N

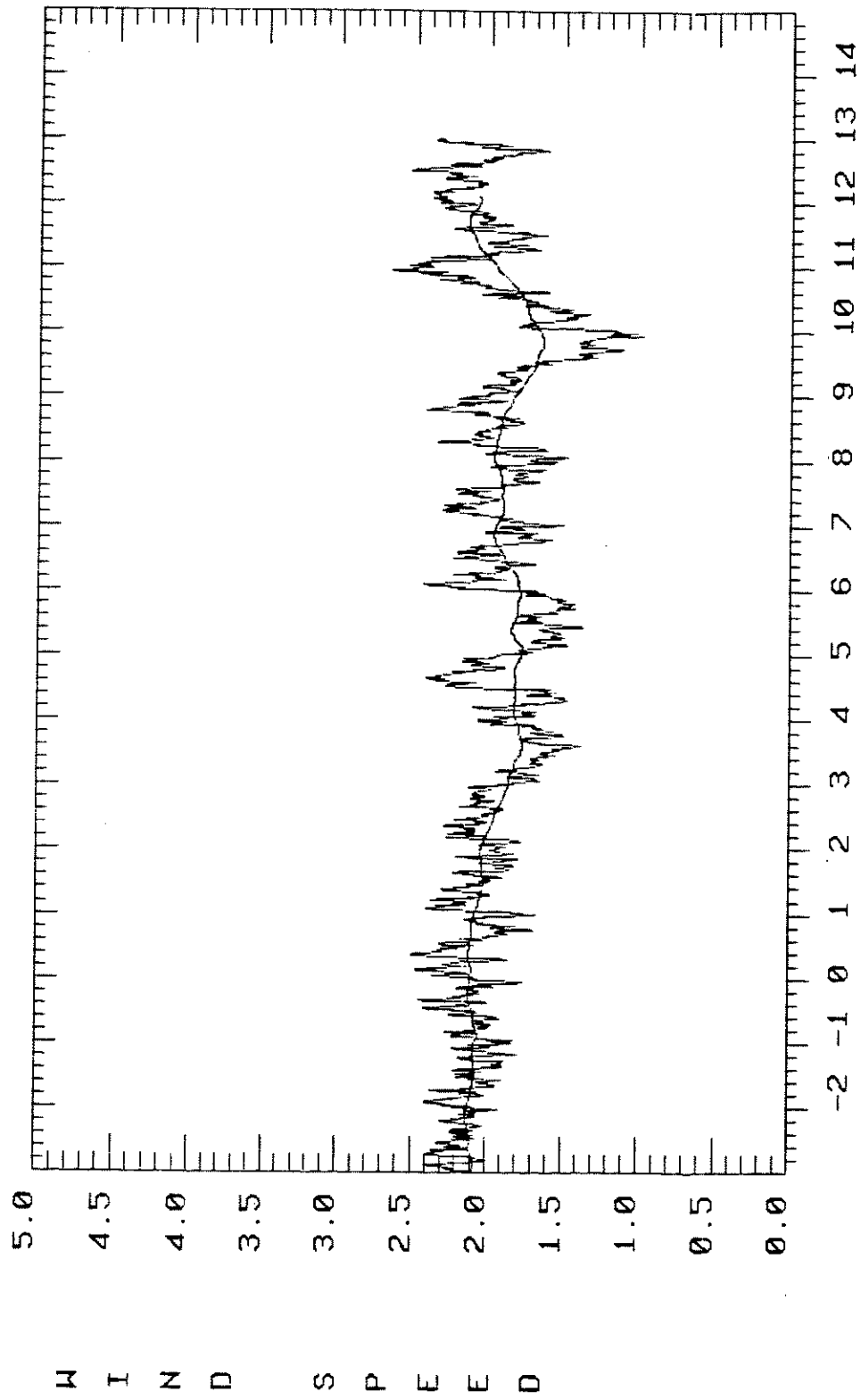


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: SOLA UNITS: W/M**2

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

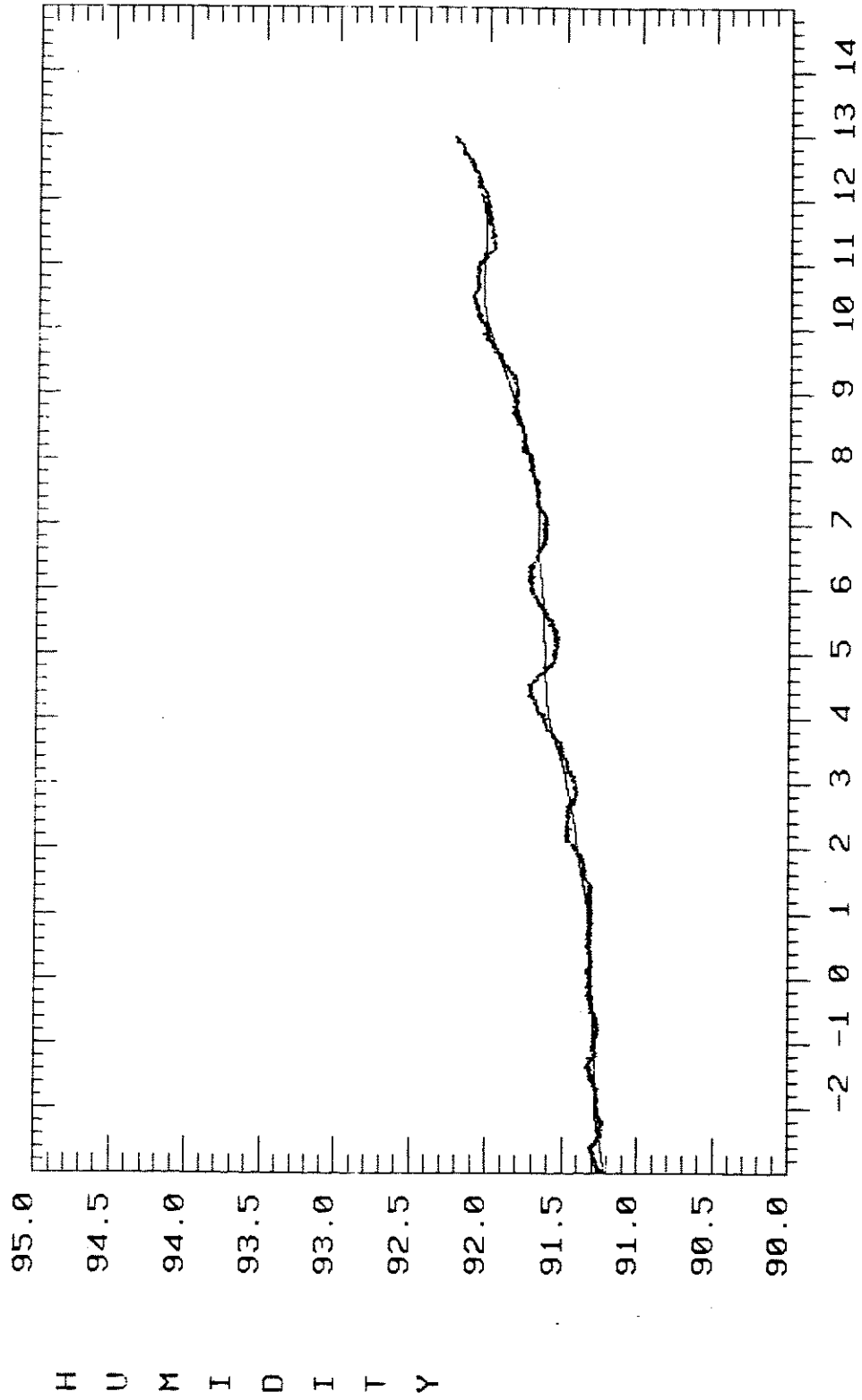
MEAN OF RUN UP: 225.01 MEAN OF RUN DOWN: 18.77



TRIAL: 045 TYPE: WSPD UNITS: M/S

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

MEAN OF RUN UP: 2.99 MEAN OF RUN DOWN: 0.83

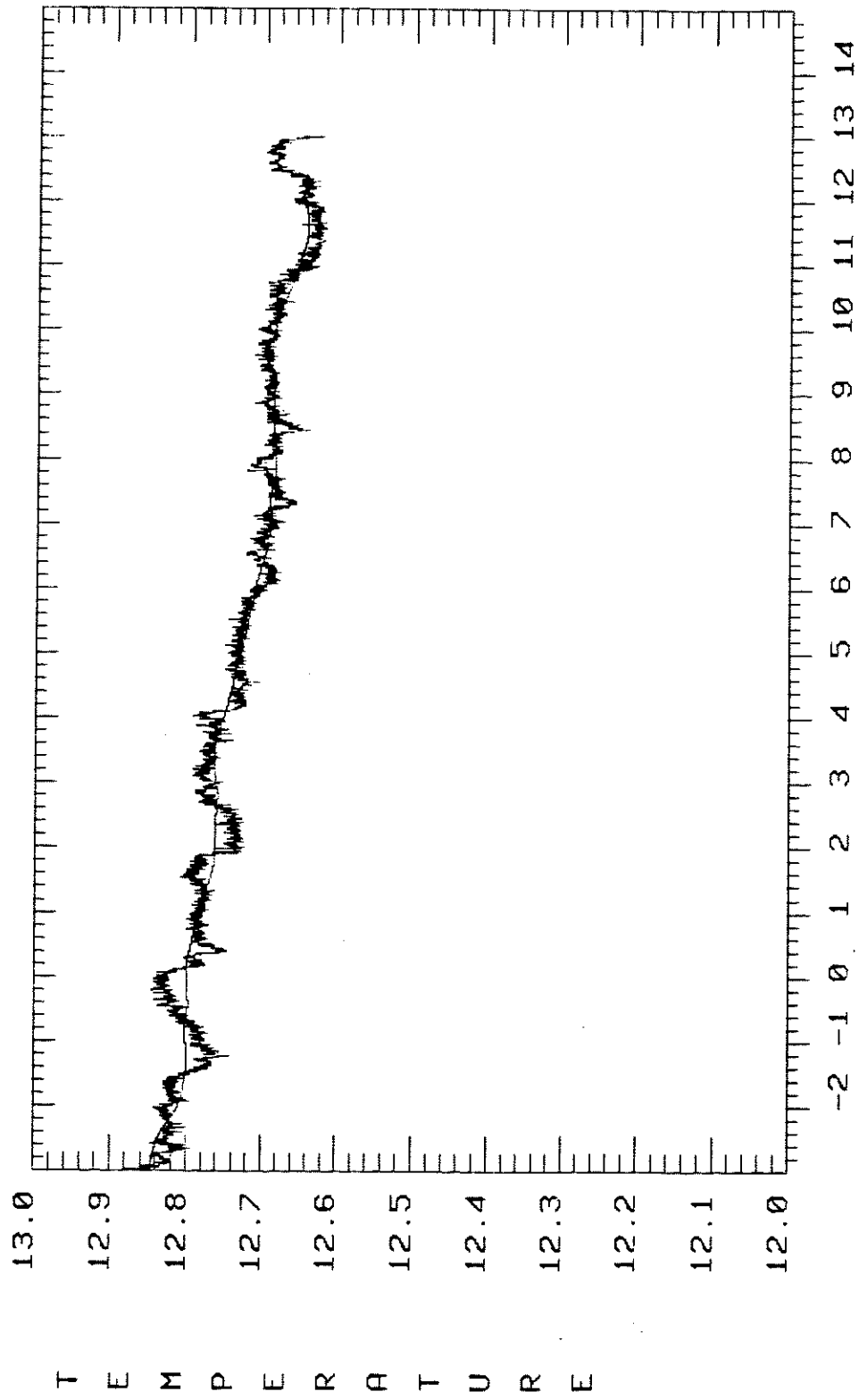


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 045 TYPE: RHUM UNITS: PER CENT

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

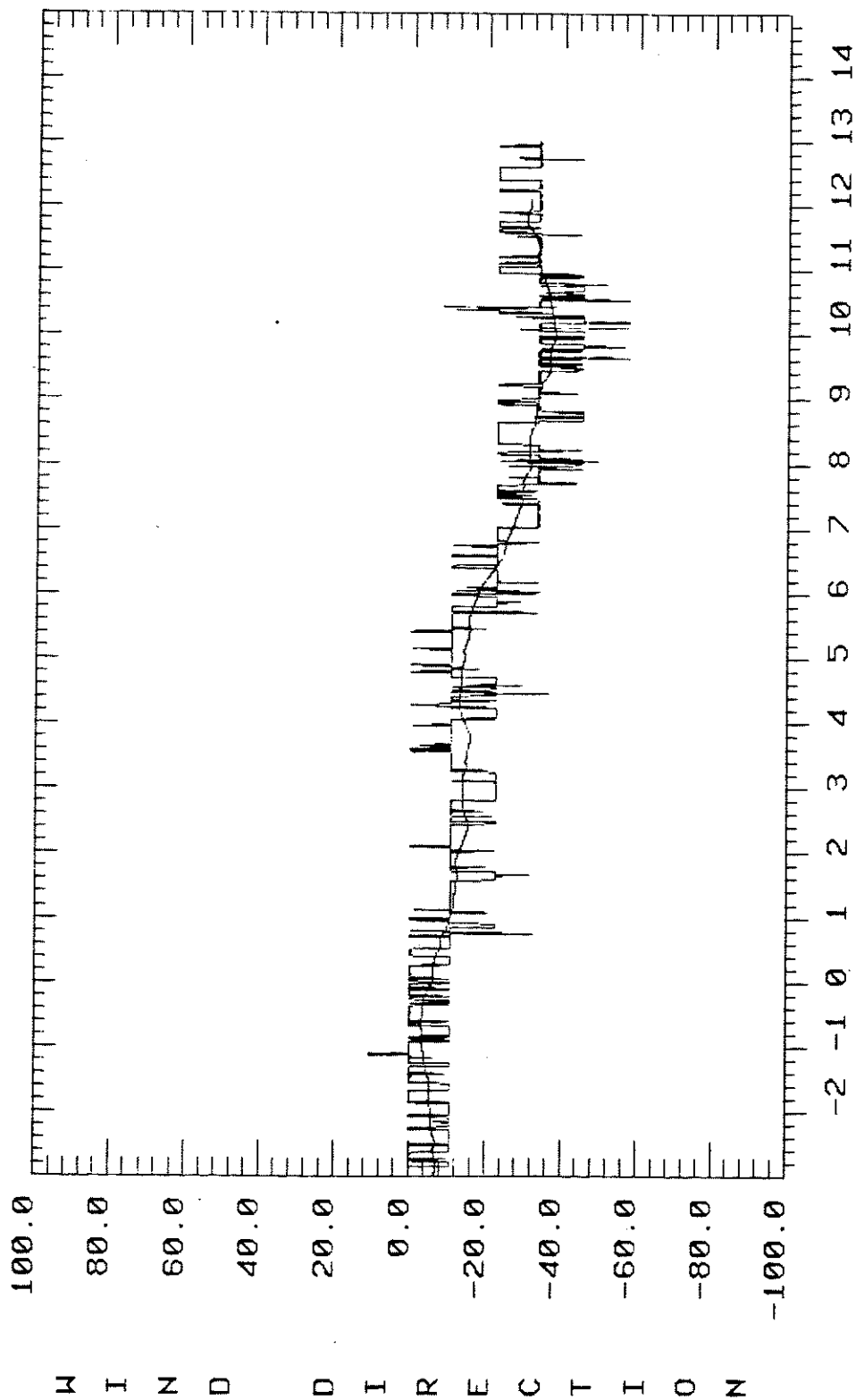
MEAN OF RUN UP: 94.55 MEAN OF RUN DOWN: 91.52



TRIAL: 045 TYPE: AIRT UNITS: DEGREES C

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

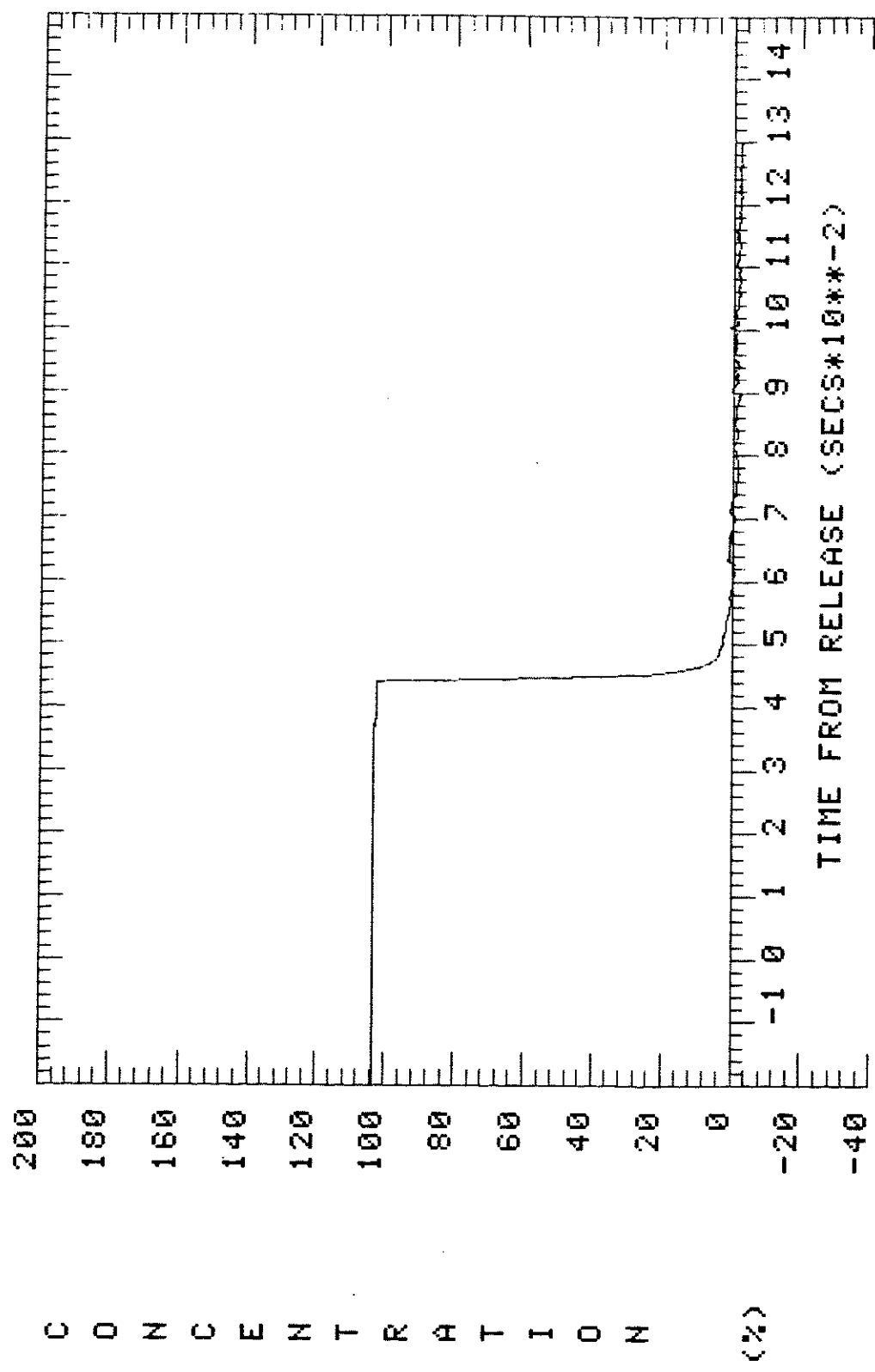
MEAN OF RUN UP: 11.94 MEAN OF RUN DOWN: 12.36



TRIAL: 045 TYPE: WHDG UNITS: DEGREES

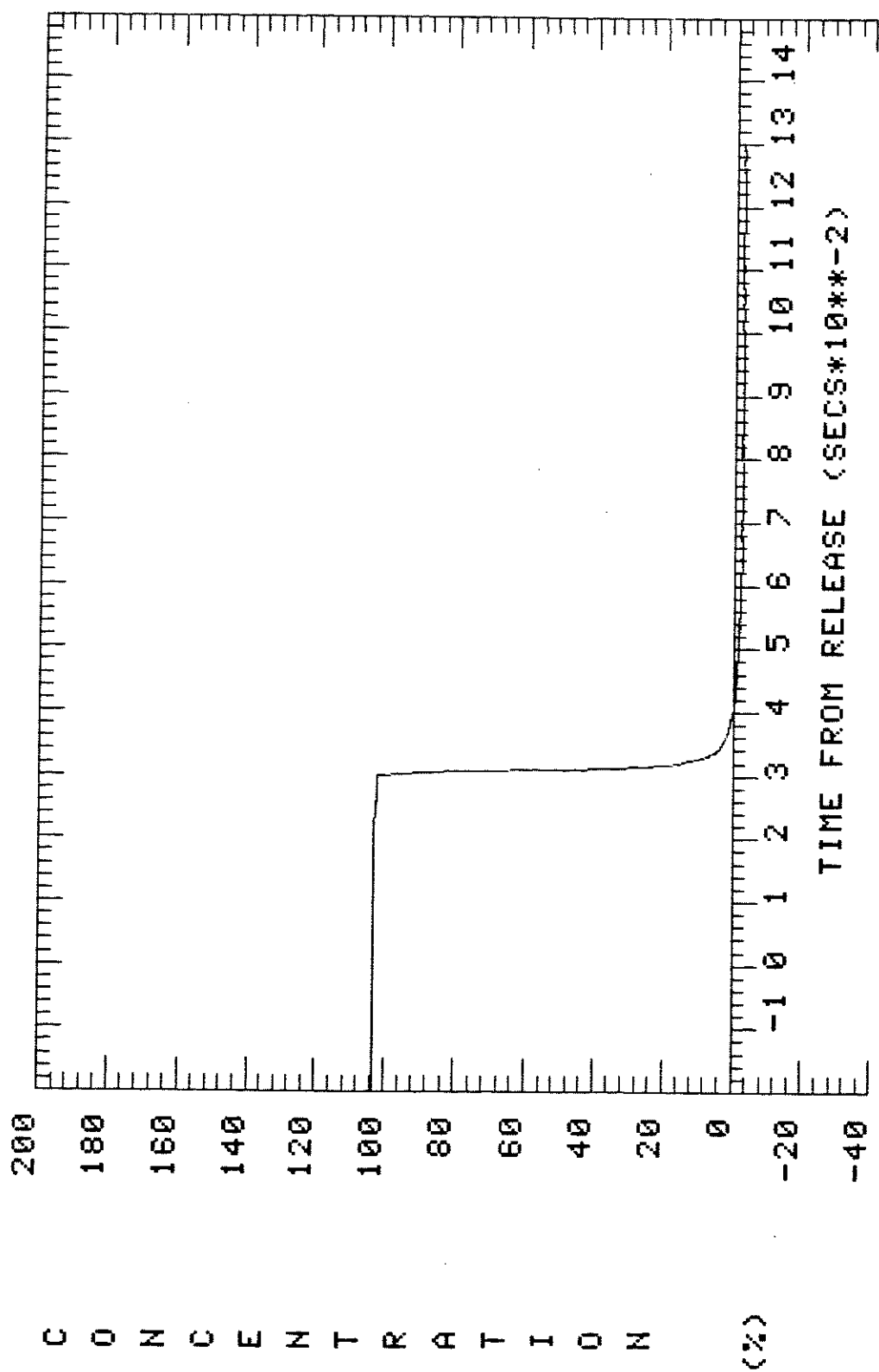
AVERAGING TIME: 0.6 SEC X: 400 M Y: 950 M Z: 10.0 M

MEAN OF RUN UP: -14.54 MEAN OF RUN DOWN: -13.42



TRIAL: 045 TYPE: GASB AVERAGING TIME: 0.6 SECS

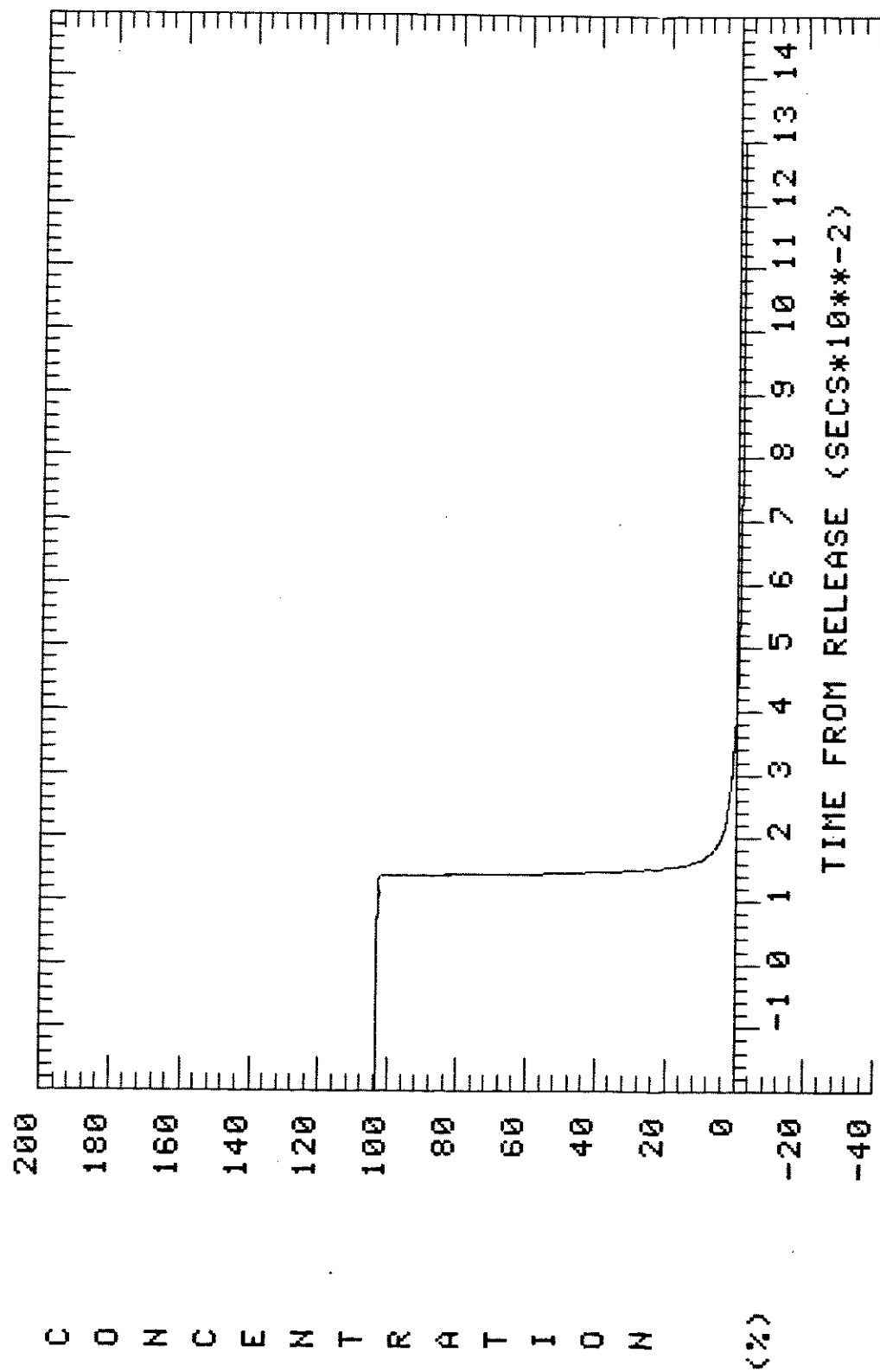
X: 400 M Y: 200 M Z: 0.4 M



TRIAL: 045 TYPE: GASB AVERAGING TIME: 0.6 SECS

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

GB2



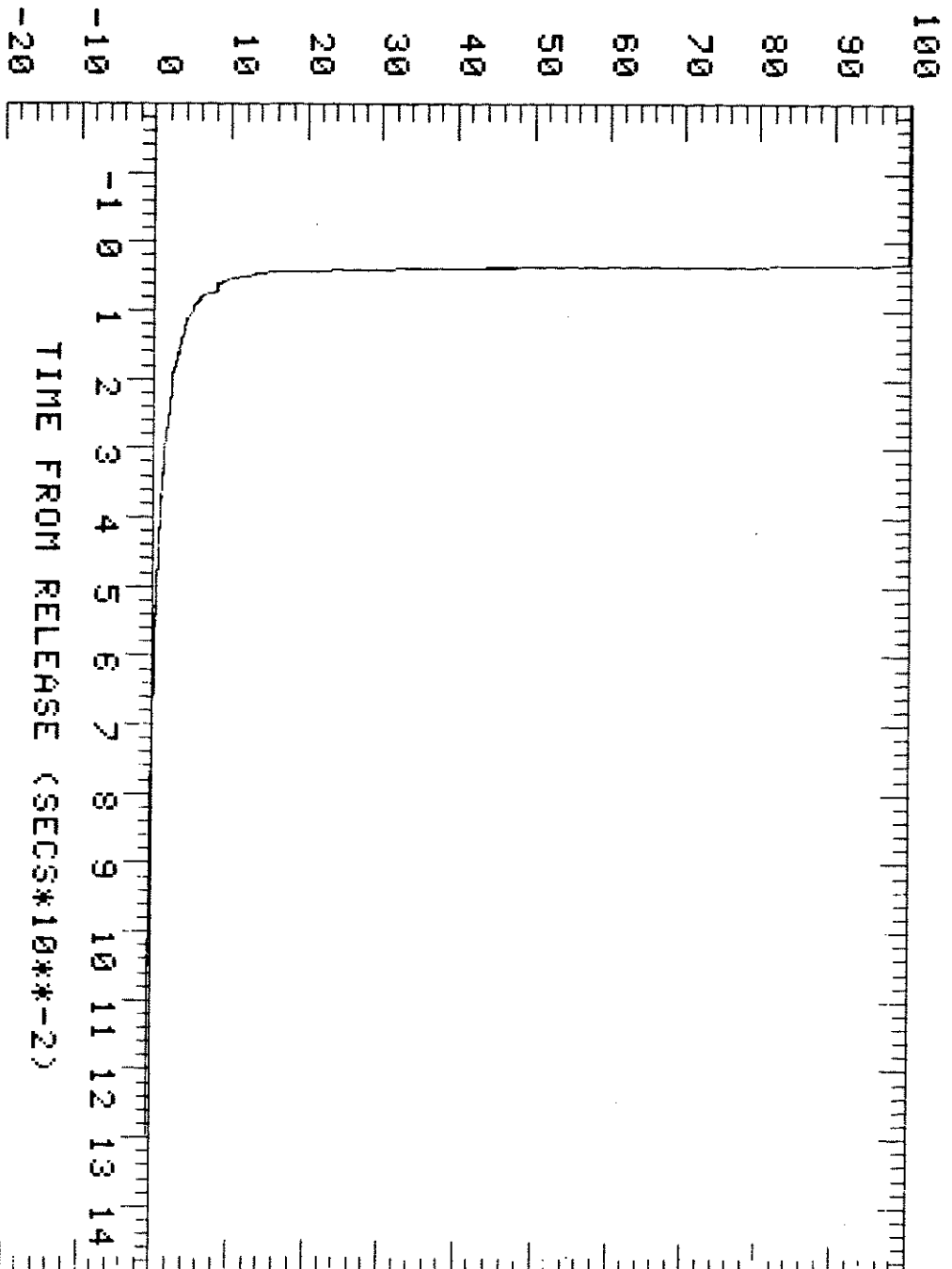
TRIAL: 045 TYPE: GASB AVERAGING TIME: 0.6 SECS

X: 400 M Y: 200 M Z: 9.0 M

GB3

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

(%)

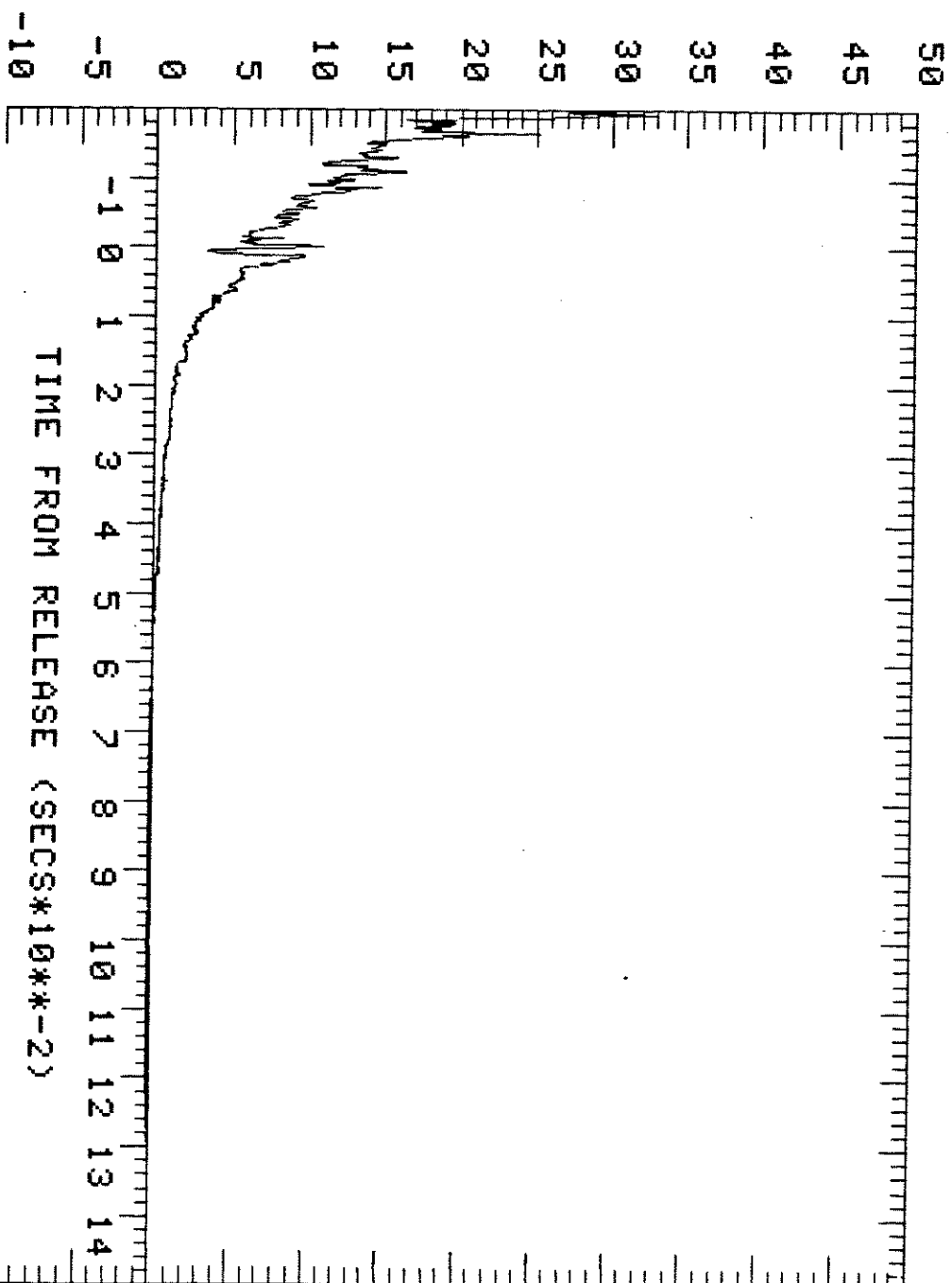


TRIAL: 045 TYPE: GASB AVERAGING TIME: 0.8 SECS

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

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

(%)



TRIAL: 045 TYPE: GASB AVERAGING TIME: 0.6 SECS

X: 400 M Y: 200 M Z: 13.5 M

