



HEALTH AND SAFETY EXECUTIVE

HEAVY GAS DISPERSION TRIALS THORNEY ISLAND 1982-3

DATA FOR TRIAL 051

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THORNEY ISLAND TRIALS SPILL 051 26 JUNE 1984

SUMMARY INFORMATION AT THE TIME OF THE SPILL

Gas released at (approx 5 secs after fan start):	20:48 hrs
Enclosure arrangement	Transverse
Freon 12/Nitrogen mixture: relative density	1.38
Mean spill rate:	270 m ³ /min
Spill duration:	6 min 40 secs
Mean Wind Speed at 10 m height:	
During the first 5 minutes of the main data collection period:	1.6 m/s
From 5 minute cyclic data just before the release:	1.7 m/s
Mean Wind Heading ('A' station) - (relative to the centre line of the array)	36.0°
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)	74.2%
Insolation	19.7 W/m ²
Ambient Air Temperature (at 9 m height)	19.9°C
Treated Runway Surface Temperature	16.9°C
Grass Surface Temperature	17.2°C
Observed Cloud Cover	5/8
Observational Pasquill Stability Category	C

DESCRIPTION

A strong sea breeze was blowing whilst preparations were made for this final continuous spill which was to be a near neutrally buoyant release. As the air temperature dropped the wind decreased and by 1750 hours was south south westerly, 4-5 m/sec. The gas plant was started at 1756 hours and by 1910 hours the container was full.

Following the usual release of the lid securing lines so as to break the container rim seal and prevent any possibility of a vacuum forming at the top of the gas column during pump out, gas was seen to be advected out of the top of the container.

The gas discharge into the bund which began at 1916 hours was at first invisible due to poor smoke marking and stratification but soon afterwards observed to have formed a lively pool within the fenced enclosure which spread well upwind of the spill hole. Gas was being quickly drawn over the downwind wall of the bund to disperse across the measurement field together with that which continued to escape from the container top after the pump out had started. The gas cloud spread over a large area of the trials' site with its centre about 50 m to the right of the range centre line and moved rapidly down the range despite the wind having decreased to 3 m/sec.

Subsequent analysis suggested that some 10% of the gas supplied had been advected out of the container on releasing the lid lines and prior to the pumping operation with an additional 45% following during pump out, leaving less than half of the original contents of container to have been discharged from the spill hole.

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:

$$R_1 = \frac{g(D\theta/DZ)}{T(DU/DZ)^2}$$

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 are recalculated to correspond to a geometric mean height of 14 m.

v) Bulk Richardson Number

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

$$R_{1\infty} = \frac{g(D\theta/DZ)\bar{Z}^2}{T\bar{U}^2}$$

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 $R_{1\infty}$ are recalculated to correspond to a geometric mean height of 14 m.

vi) Standard Deviation of Wind Heading

The standard deviation of wind heading is calculated from the Porton wind vane, which has a resolution bandwidth of 11° . The resulting accuracy is predicted to be around $\pm 2^\circ$ 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 five minutes of the main data collection period, which generally began about one minute before the start of gas release.

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	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 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 6200 to 5900 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 1200 to 1500 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:

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

$$Y = A + B$$

$$Z = W$$

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 051

1 The standard gas sensor at position (450, 250) at 4.4 m height was functioning correctly but did not detect gas.

2 The standard gas sensors listed below were malfunctioning:

X Coordinates (m)	Y Coordinates (m)	Height (m)
450	228	0.4, 1.4, 2.4
428	248	0.4
400	275	1.0
400	300	2.4
400	350	2.4
450	350	2.4
400	500	0.4, 4.4, 6.4

3 The standard gas sensors listed below had a very high noise level. No signal due to the detection of gas could be identified.

X Coordinates (m)	Y Coordinates (m)	Height (m)
414	214	2.4
450	240	0.4
450	275	0.4

4 A large number of gas sensors showed signs of a rapid positive drift during the last five minutes of the data collection period. This effect occurred simultaneously across the sensor field and should not be attributed to the presence of gas. The most likely cause is a rapid increase in relative humidity.

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

6 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.

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19 June 1985

INSTRUMENT STATIONS AND DISTRIBUTIONS (EFFECTIVE FOR TRIAL 051)

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
		6	0	0.4	Gas Sensor		G01
4.19, 2.02	PL	9	1	1.4	Gas Sensor		G02
		9	2	2.4	Gas Sensor		G03
		9	5	0.4	Gas Sensor		G04
		26	7	1.4	Gas Sensor		G05
4.0, 2.2	F	26	6	2.4	Gas Sensor		G06
		26	5	0.4	Gas Sensor		G07
		26	4	0.4	Gas Sensor		G08
4.19, 2.2	P	9	6	0.4	Gas Sensor		G09
4.5, 2.2	P	9	1	0.4	Gas Sensor		G10
4.0, 2.3	F	5	3	0.4	Gas Sensor		G11
		5	5	1.4	Gas Sensor		G12
		5	4	2.4	Gas Sensor		G13
4.14, 2.14	F	16	3	0.4	Gas Sensor		G14
		16	5	1.4	Gas Sensor		G15
		16	4	2.4	Gas Sensor		G16
		16	4	0.4	Gas Sensor		G17
4.0, 2.4	F	28	5	0.4	Gas Sensor		G18
		28	0	0.4	Gas Sensor		G19
		28	2	1.4	Gas Sensor		G20
3.52, 2.28	P	28	1	2.4	Gas Sensor		G21
4.28, 2.28	F	28	3	0.4	Gas Sensor		G22
		28	4	1.4	Gas Sensor		G23
		28	5	2.4	Gas Sensor		G24
4.5, 2.28	P	34	4	0.4	Gas Sensor		G25
		34	5	1.4	Gas Sensor		G26
		34	7	2.4	Gas Sensor		G27
4.72, 2.28	PL	9	4	0.4	Gas Sensor		G28
		34	6	0.4	Gas Sensor		G29
		34	7	0.4	Gas Sensor		G30
4.19, 2.4	P	28	4	0.4	Gas Sensor		G31
4.5, 2.4	P	28	6	0.4	Gas Sensor		G32
4.28, 2.48	P	34	6	0.4	Gas Sensor		G33
4.72, 2.48	P	28	7	0.4	Gas Sensor		G34
3.88, 2.5	PL	19	0	0.4	Gas Sensor		G35
		19	1	1.4	Gas Sensor		G36
		19	2	2.4	Gas Sensor		G37
4.19, 2.5	PL	19	4	0.4	Gas Sensor		G38
		19	5	1.4	Gas Sensor		G39
		19	6	2.4	Gas Sensor		G40
4.5, 2.5	F	34	0	0.4	Gas Sensor		G41
		34	3	1.4	Gas Sensor		G42
		34	1	2.4	Gas Sensor		G43
		34	2	4.4	Gas Sensor		G44

LOCATION COORDINATES	TYPE OF MAST	DATA TERMINAL NUMBER	CHANNEL NUMBER	HEIGHT ABOVE GROUND m	TYPE OF SENSOR	REMARKS	PAGE NUMBER
4.0, 2.55	P	3	7	0.4	Gas Sensor	Not Connected	
3.71, 2.69	F	30	0	0.4	Gas Sensor		
		30	3	1.4	Gas Sensor		
		30	1	2.4	Gas Sensor		
		30	2	4.4	Gas Sensor		
4.0, 2.75	M2	3	0	0.4	Gas Sensor		G27
		3	5	1.0	High Speed Gas Sensor		
		2	0	1.0	Sonic Anemometer - XY		E28
		2	1	1.0	Sonic Anemometer - XY		E29
		2	2	1.0	Sonic Anemometer - Z		E30
		2	3	1.0	Sonic Anemometer - Temp		E31
		3	6	1.0	Smoke Sensor		
		3	3	1.4	Gas Sensor		G28
		3	1	2.4	Gas Sensor		G29
		3	2	4.4	Gas Sensor		G30
		3	4	10.4	Gas Sensor		G31
		2	4	15.0	Sonic Anemometer - XY		E32
		2	5	15.0	Sonic Anemometer - XY		E33
		2	6	15.0	Sonic Anemometer - Z		E34
		2	7	15.0	Sonic Anemometer - Temp		E35
4.29, 2.69		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
4.50, 2.75	M3	12	0	0.4	Gas Sensor		
		11	0	1.0	Sonic Anemometer - XY		E36
		11	1	1.0	Sonic Anemometer - XY		E37
		11	2	1.0	Sonic Anemometer - Z		E38
		11	3	1.0	Sonic Anemometer - Temp		E39
		12	4	1.0	Thermometer		E40
		33	4	1.0	High Speed Gas Sensor		G36
		33	6	1.0	Smoke Sensor		
		33	7	2.0	High Speed Gas Sensor		G37
		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
		12	6	2.0	Thermometer		E45
		12	3	1.4	Gas Sensor		G38
		12	1	2.4	Gas Sensor		G39
		12	2	4.4	Gas Sensor		G40
		12	5	10.4	Gas Sensor		G41
		11	4	15.0	Sonic Anemometer - XY		E46
		11	5	15.0	Sonic Anemometer - XY		E47
		11	6	15.0	Sonic Anemometer - Z		E48
		11	7	15.0	Sonic Anemometer - Temp		E49
5.00, 2.75	M3	24	0	0.4	Gas Sensor		
		25	4	1.0	Sonic Anemometer - XY		E50
		25	5	1.0	Sonic Anemometer - XY		E51
		25	6	1.0	Sonic Anemometer - Z		E52
		25	7	1.0	Sonic Anemometer - Temp		E53
		25	1	1.0	High Speed Gas Sensor		
		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	15.0	Sonic Anemometer - XY		E54
		24	5	15.0	Sonic Anemometer - XY		E55
		24	6	15.0	Sonic Anemometer - Z		E56
		24	7	15.0	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		23	0	0.4	Gas Sensor		
		23	3	1.4	Gas Sensor		
		23	1	2.4	Gas Sensor		
		23	2	4.4	Gas Sensor		
4.0, 3.0		23	5	0.4	Gas Sensor		G42
		21	0	1.4	Gas Sensor		G43
		23	6	2.4	Gas Sensor		
		23	7	4.4	Gas Sensor		G44
4.38, 2.92		21	3	0.4	Gas Sensor		G45
		21	6	1.4	Gas Sensor		G46
		21	4	2.4	Gas Sensor		G47
		21	5	4.4	Gas Sensor		G48
5.0, 3.0	F	10	0	0.4	Gas Sensor		
		10	3	1.4	Gas Sensor		
		10	1	2.4	Gas Sensor		
		10	2	4.4	Gas Sensor		
6.0, 3.0	F	10	4	0.4	Gas Sensor		
		10	7	1.4	Gas Sensor		
		10	5	2.4	Gas Sensor		
		10	6	4.4	Gas Sensor		
3.0, 3.5	F	15	4	0.4	Gas Sensor		
		15	7	1.4	Gas Sensor		
		15	5	2.4	Gas Sensor		
		15	6	4.4	Gas Sensor		
4.0, 3.5	F	15	0	0.4	Gas Sensor		G49
		15	3	1.4	Gas Sensor		G50
		15	1	2.4	Gas Sensor		
		15	2	4.4	Gas Sensor		G51
4.5, 3.5	PL	31	4	0.4	Gas Sensor		G52
		31	5	1.4	Gas Sensor		G53
		31	6	2.4	Gas Sensor		
		31	7	4.4	Gas Sensor		G54
5.0, 3.5	F	17	4	0.4	Gas Sensor		
		17	7	1.4	Gas Sensor		
		17	5	2.4	Gas Sensor		
		17	6	4.4	Gas Sensor		
3.0, 4.0		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		G55
		7	5	2.4	Gas Sensor		G56
		7	6	4.4	Gas Sensor		G57
		7	7	6.4	Gas Sensor		G58
4.5, 4.0	PL	31	0	0.4	Gas Sensor		G59
		31	1	2.4	Gas Sensor		G60
		31	2	4.4	Gas Sensor		G61
		31	3	6.4	Gas Sensor		G62
5.0, 4.0	F	17	0	0.4	Gas Sensor		
		17	1	2.4	Gas Sensor		
		17	2	4.4	Gas Sensor		
		17	3	6.4	Gas Sensor		
6.0, 4.0	F	18	4	0.4	Gas Sensor		
		18	5	2.4	Gas Sensor		
		18	6	4.4	Gas Sensor		
		18	7	6.4	Gas Sensor		
2.0, 5.0	F	13	4	0.4	Gas Sensor		
		13	5	2.4	Gas Sensor		
		13	6	4.4	Gas Sensor		
		13	7	6.4	Gas Sensor		
3.0, 5.0	F	8	0	0.4	Gas Sensor	Not connected	
		8	1	2.4	Gas Sensor		
		8	2	4.4	Gas Sensor		
		8	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
4.0, 5.0	F	8	4	0.4	Gas Sensor		G63
		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		
		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	Not connected	
7.0, 5.0	F	20	2	0.4	Solarimeter		E58
		20	0	0.4	Gas Sensor		
		20	1	2.4	Gas Sensor		
		22	6	0.4	Gas Sensor		
2.0, 6.0	F	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		G64
		14	7	2.4	Gas Sensor		G65
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	Not connected	
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		
3.0, 7.0	F	22	2	0.4	Gas Sensor		
		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	1	0.4	Gas Sensor		
		27	0	2.4	Gas Sensor	Not connected	
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

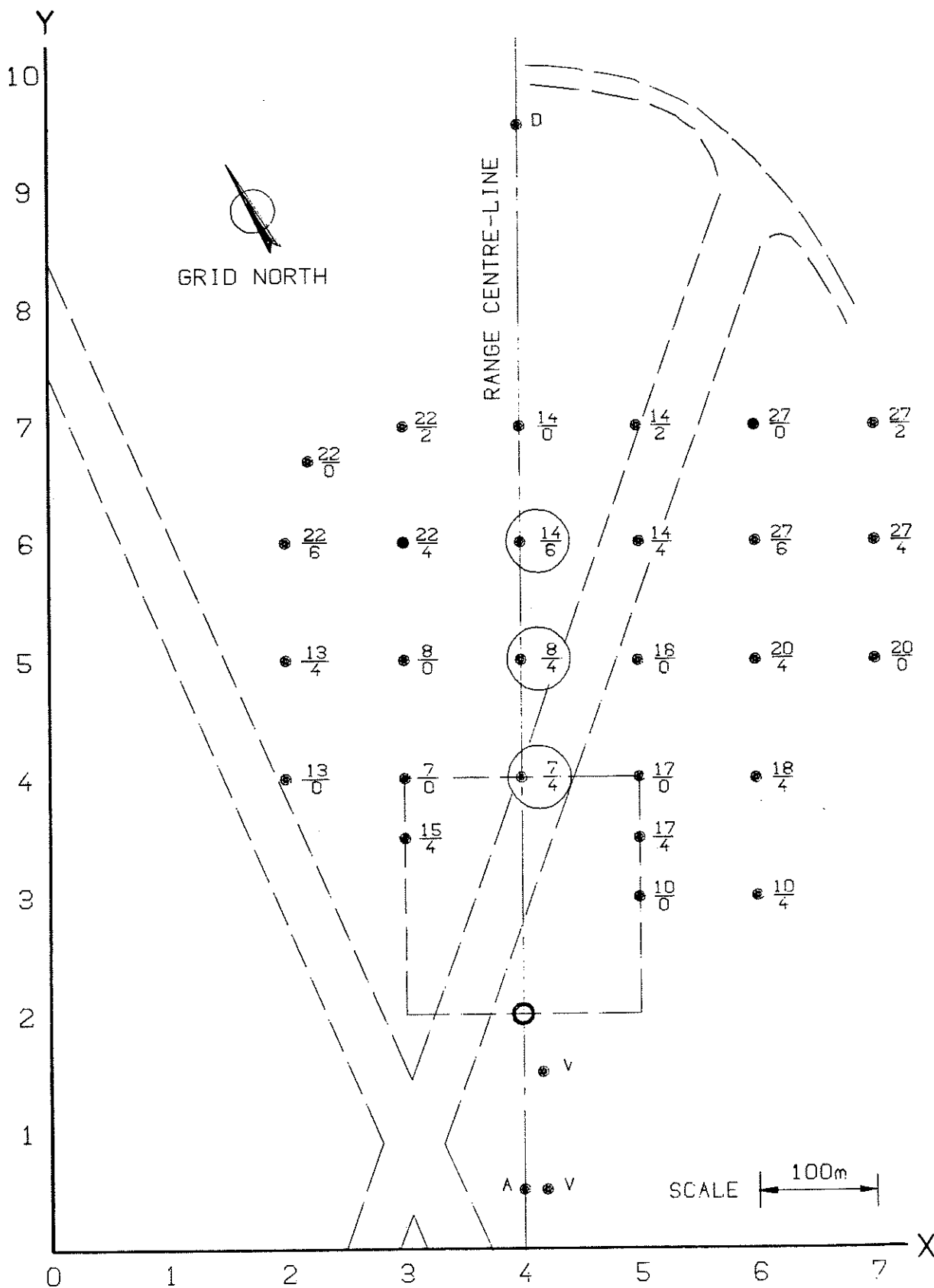
TRIAL No. - 051

DATE - 30/6/84

65 SENSORS SAW GAS

WIND SPEED (U_{10}) 4.3 m/sec

PASQUILL CATEGORY C



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

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

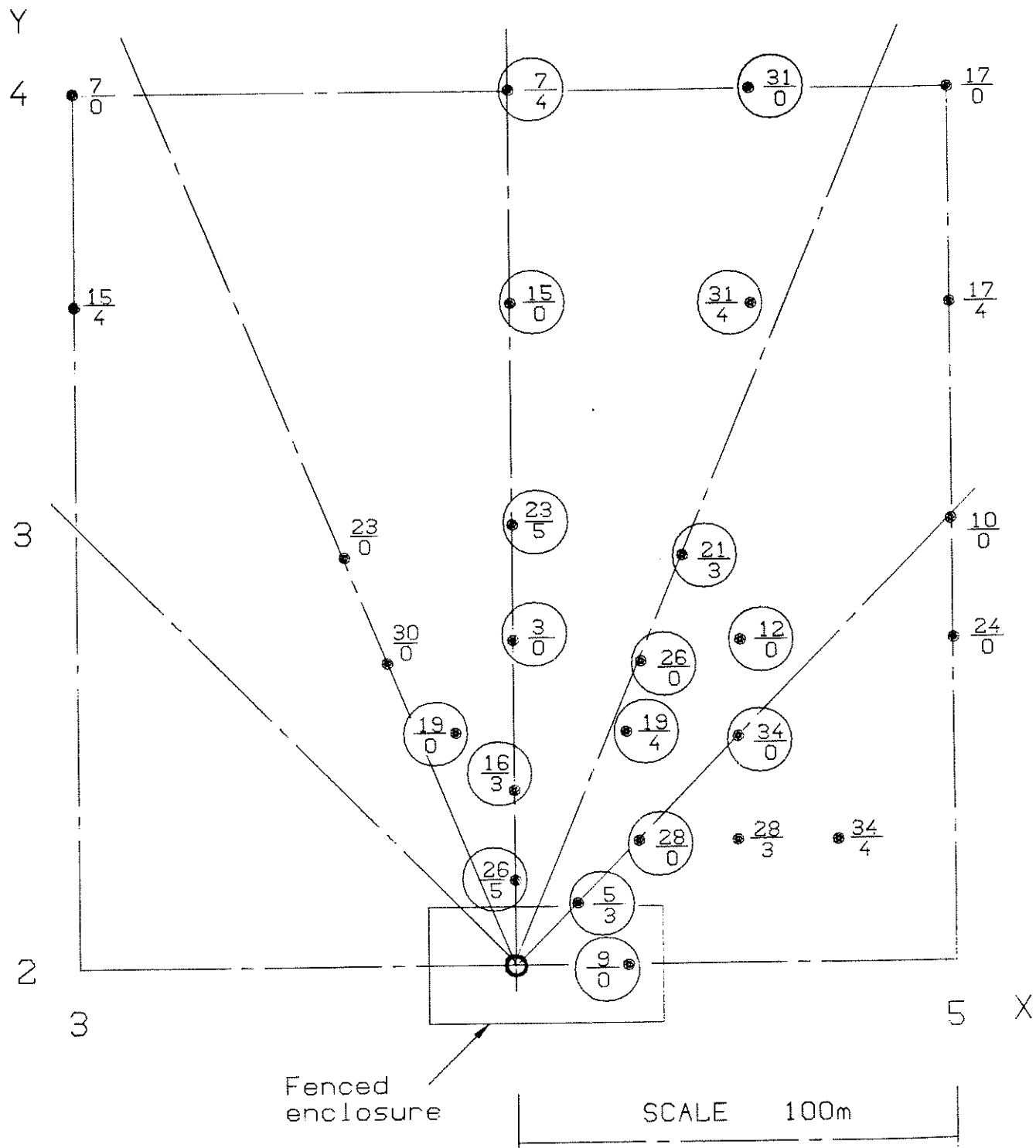
TRIAL No. - 051

DATE - 30/6/84

65 SENSORS SAW GAS

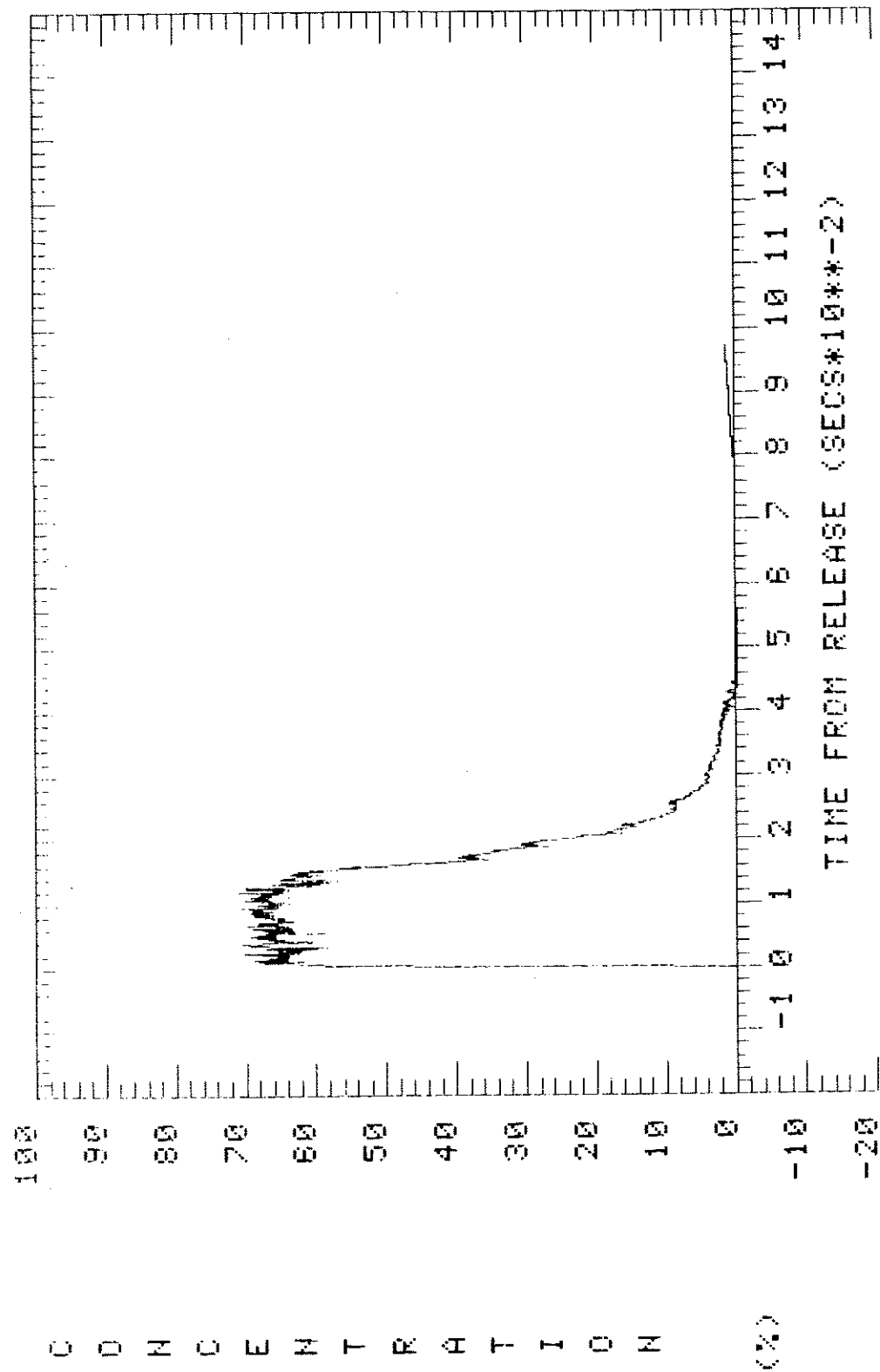
WIND SPEED (U_{10}) 4.3 m/sec

PASQUILL CATEGORY C



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

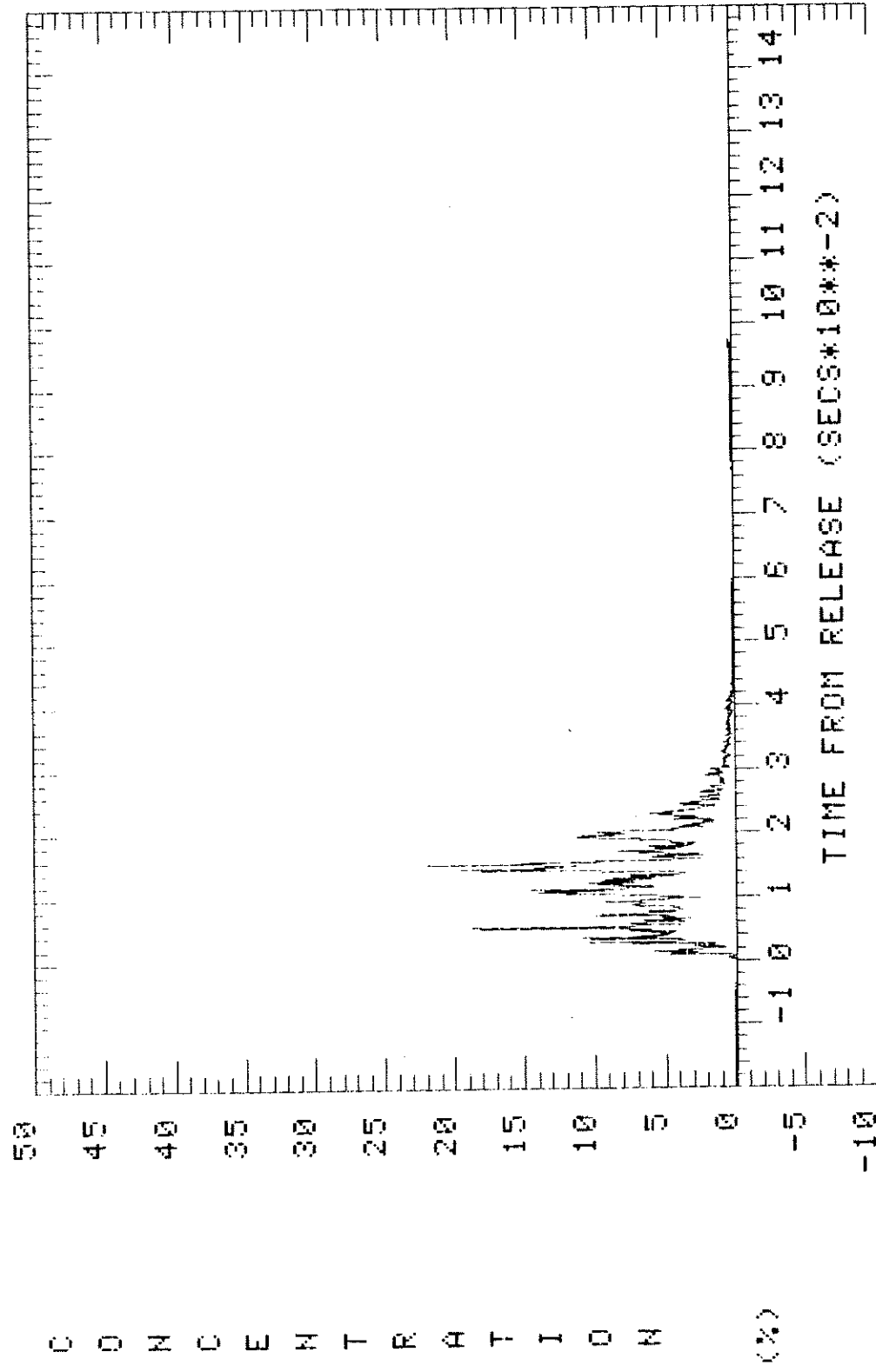
○ = SENSORS AT 0.4m HEIGHT VERIFIED TO HAVE SEEN GAS



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 419 M Y: 202 M Z: 0.4 M

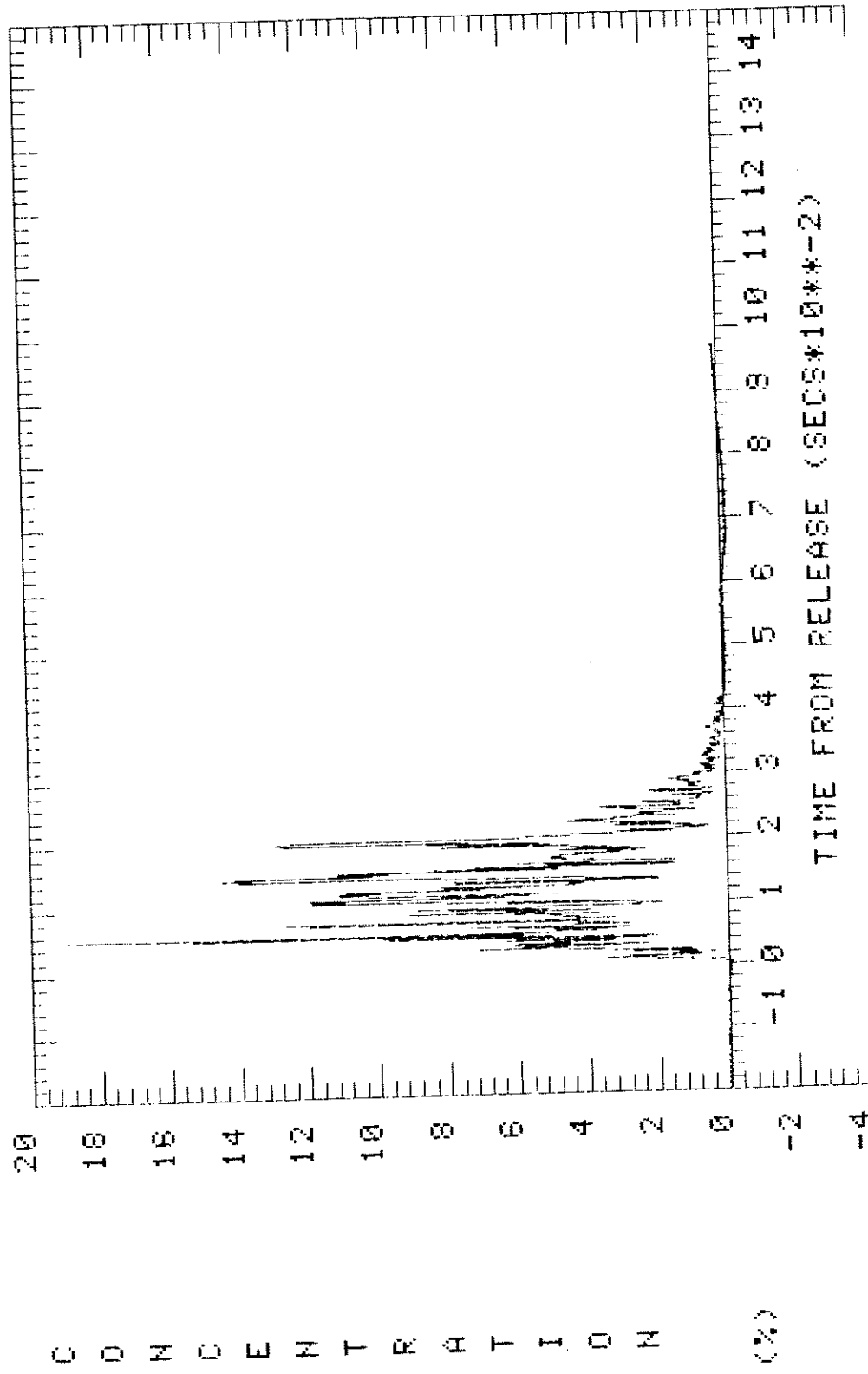
G01



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

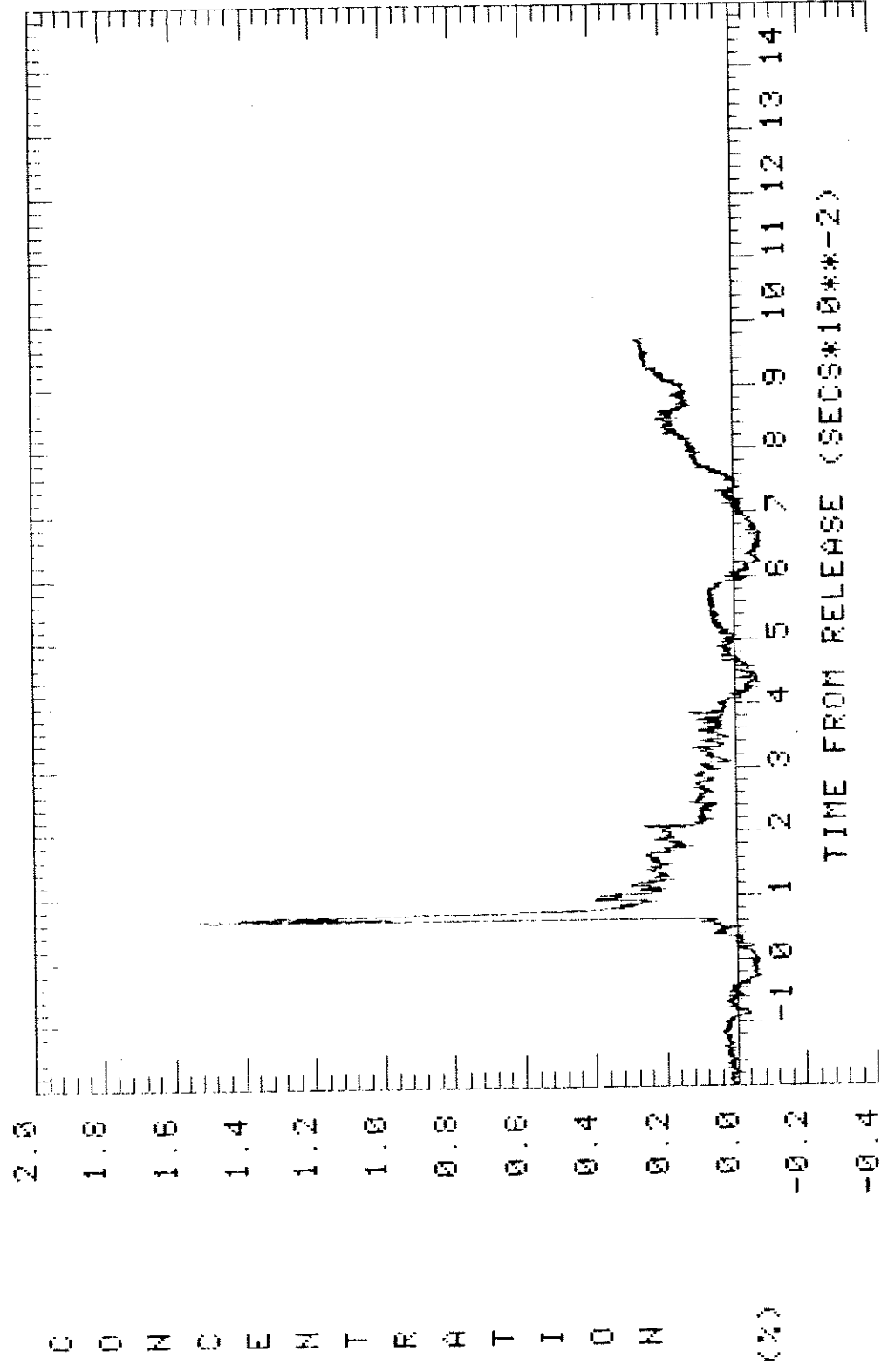
X: 418 M Y: 202 M Z: 1.4 M

G02



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

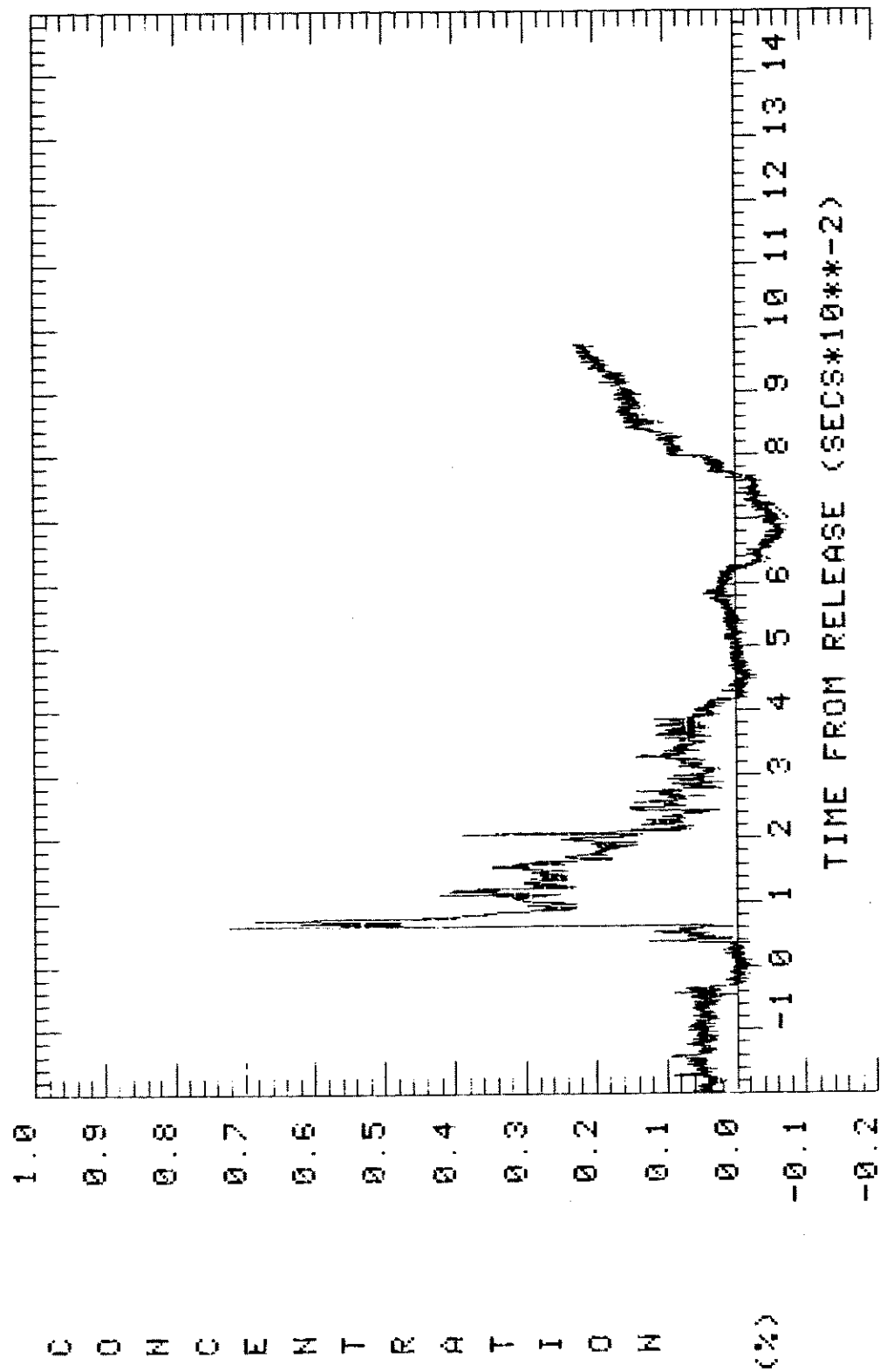
W: 419 M Y: 202 M Z: 2.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

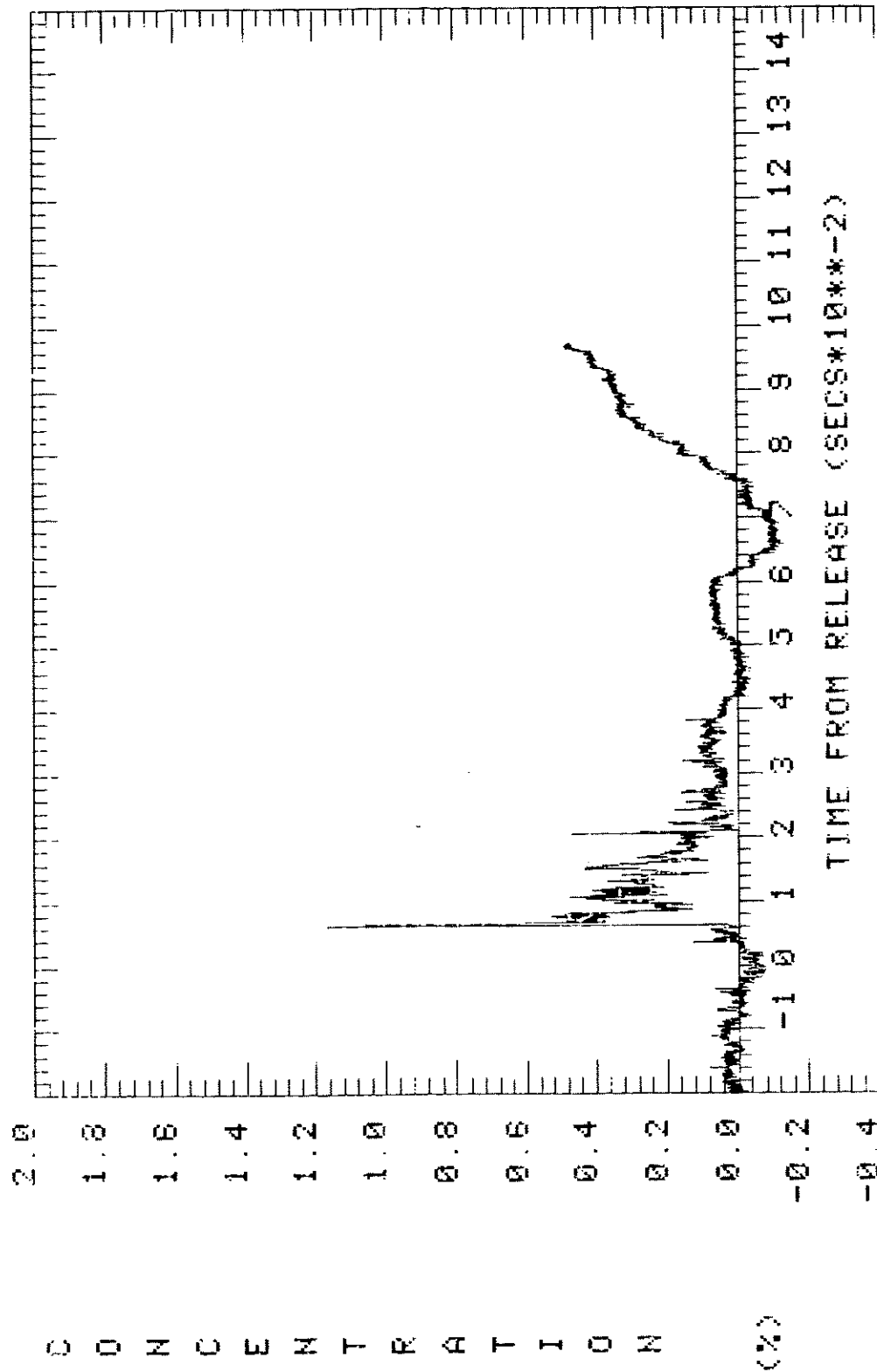
X: 400 M Y: 220 M Z: 0.4 M

G04



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

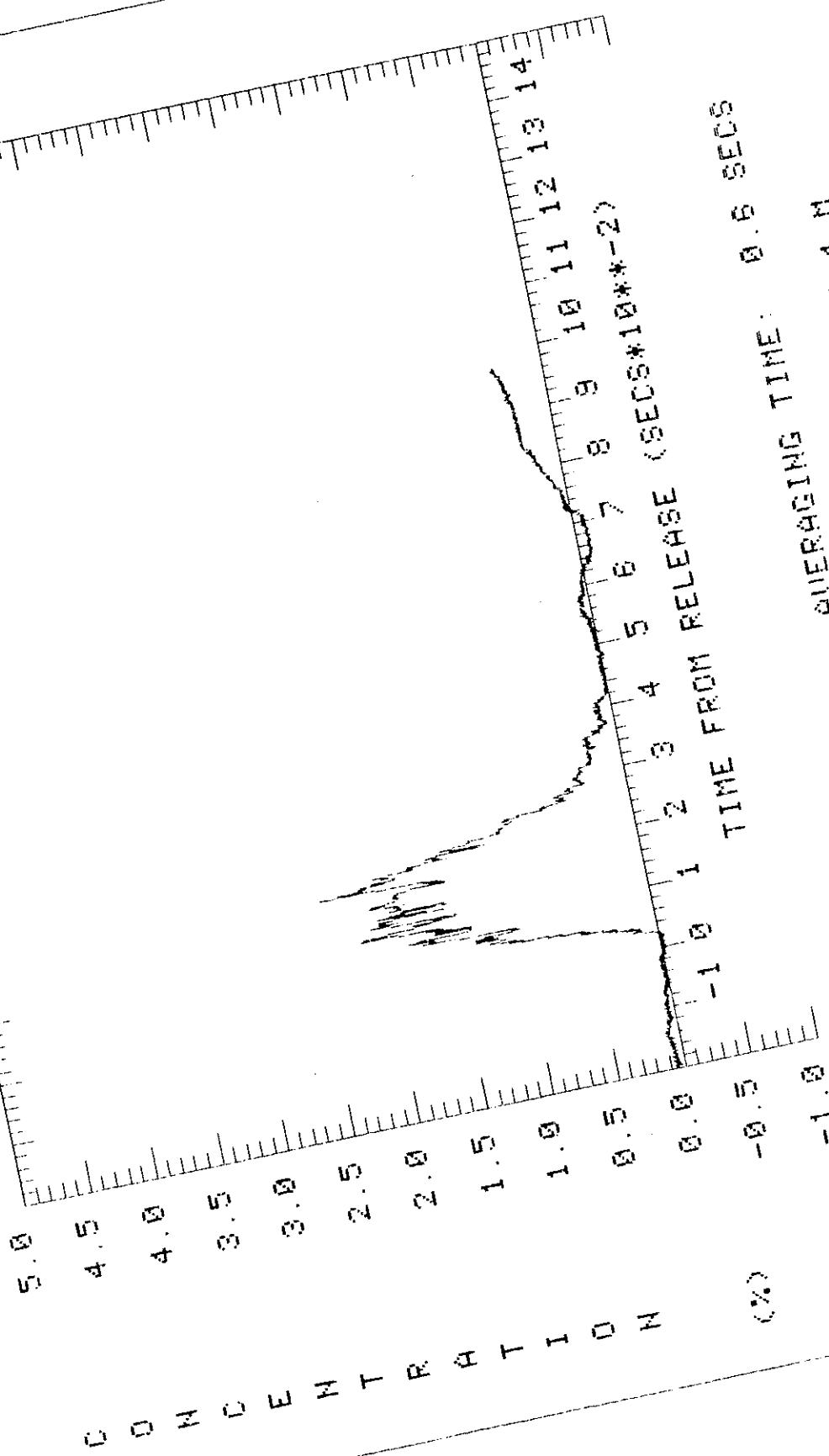
X: 400 M Y: 220 M Z: 1.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

G06



G07

TRIAL: 051

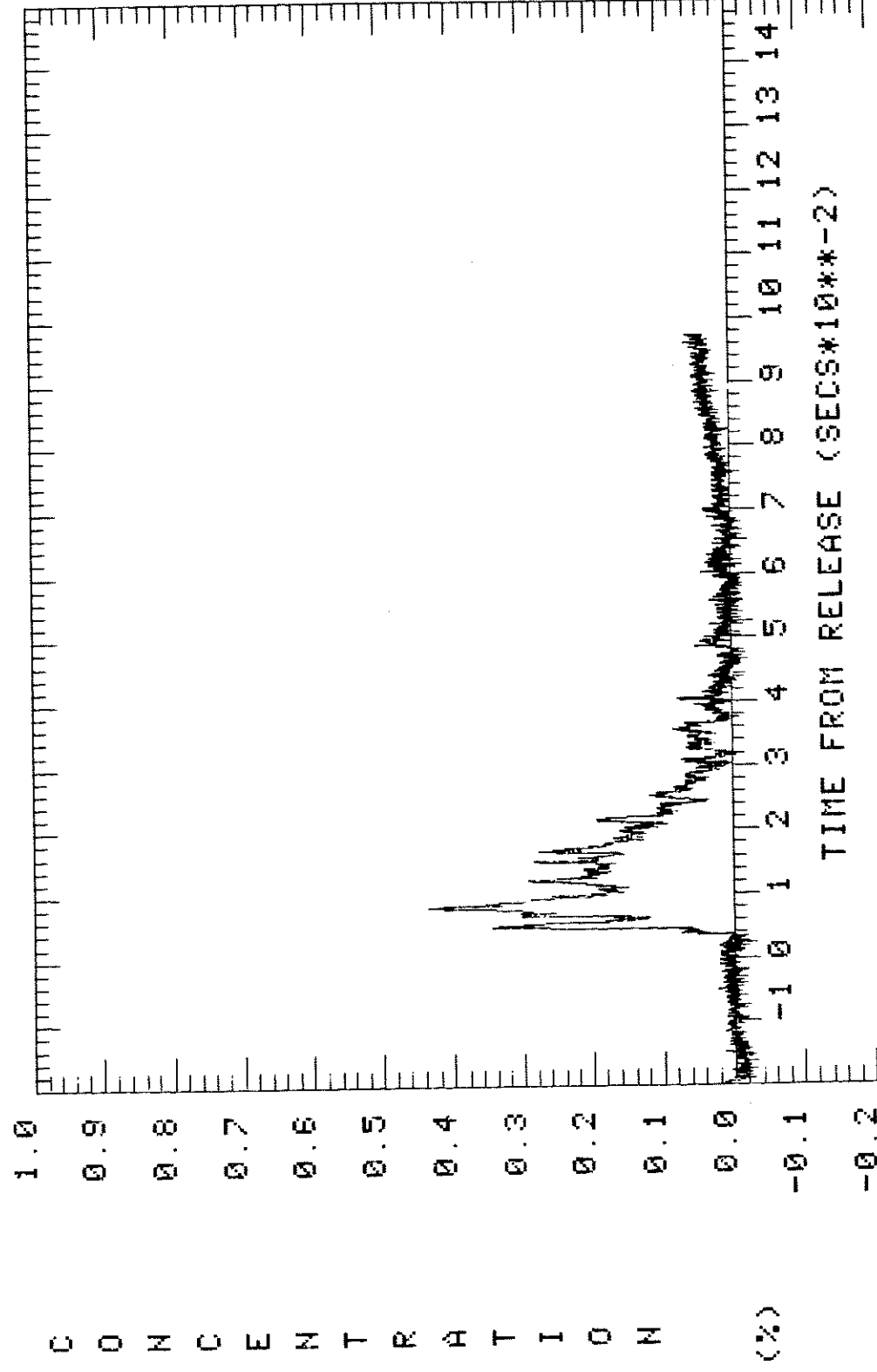
TYPE: GAS

AVERAGING TIME: 0.6 SECS

X: 419 M

Y: 220 M

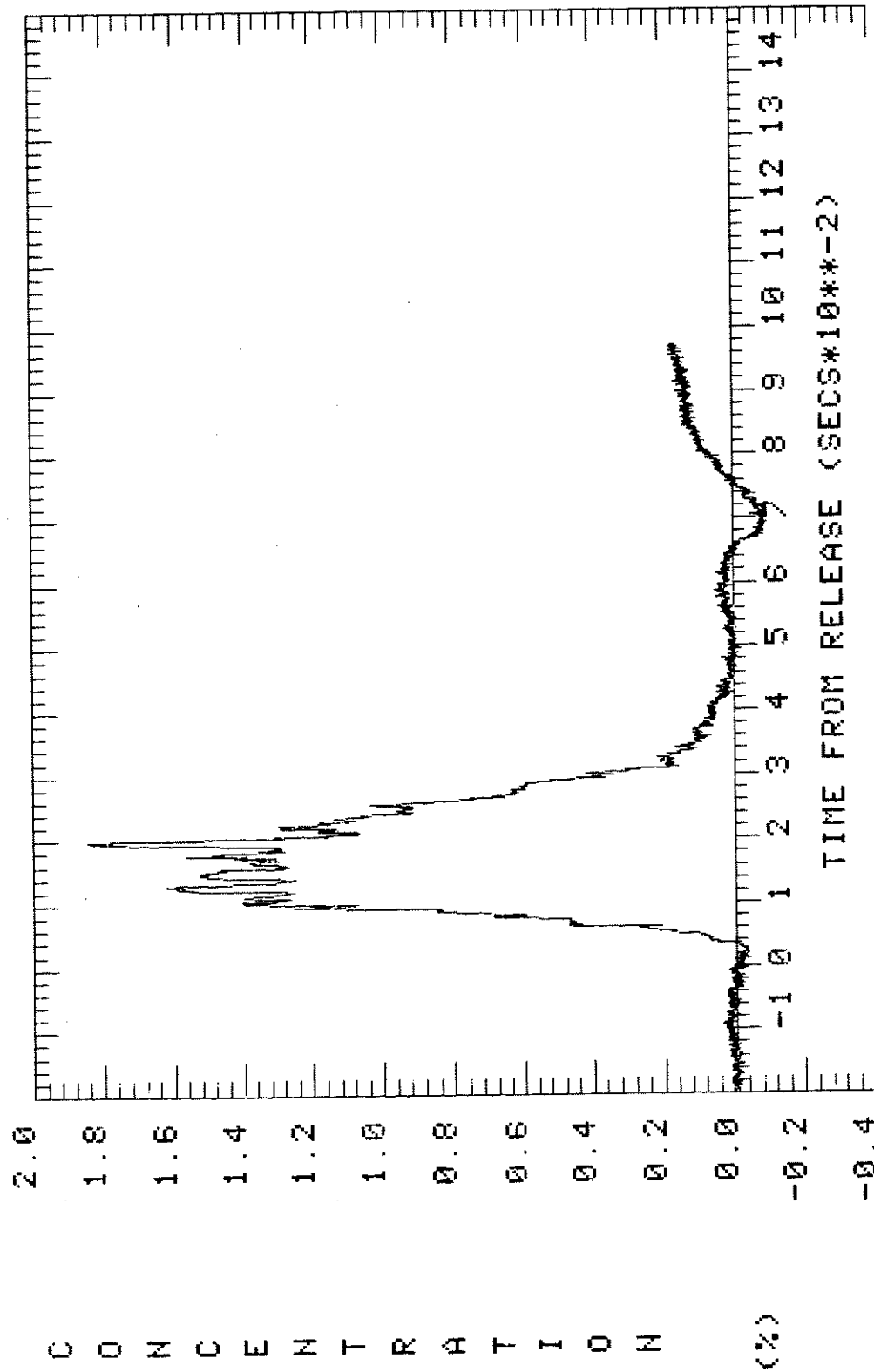
Z: 0.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

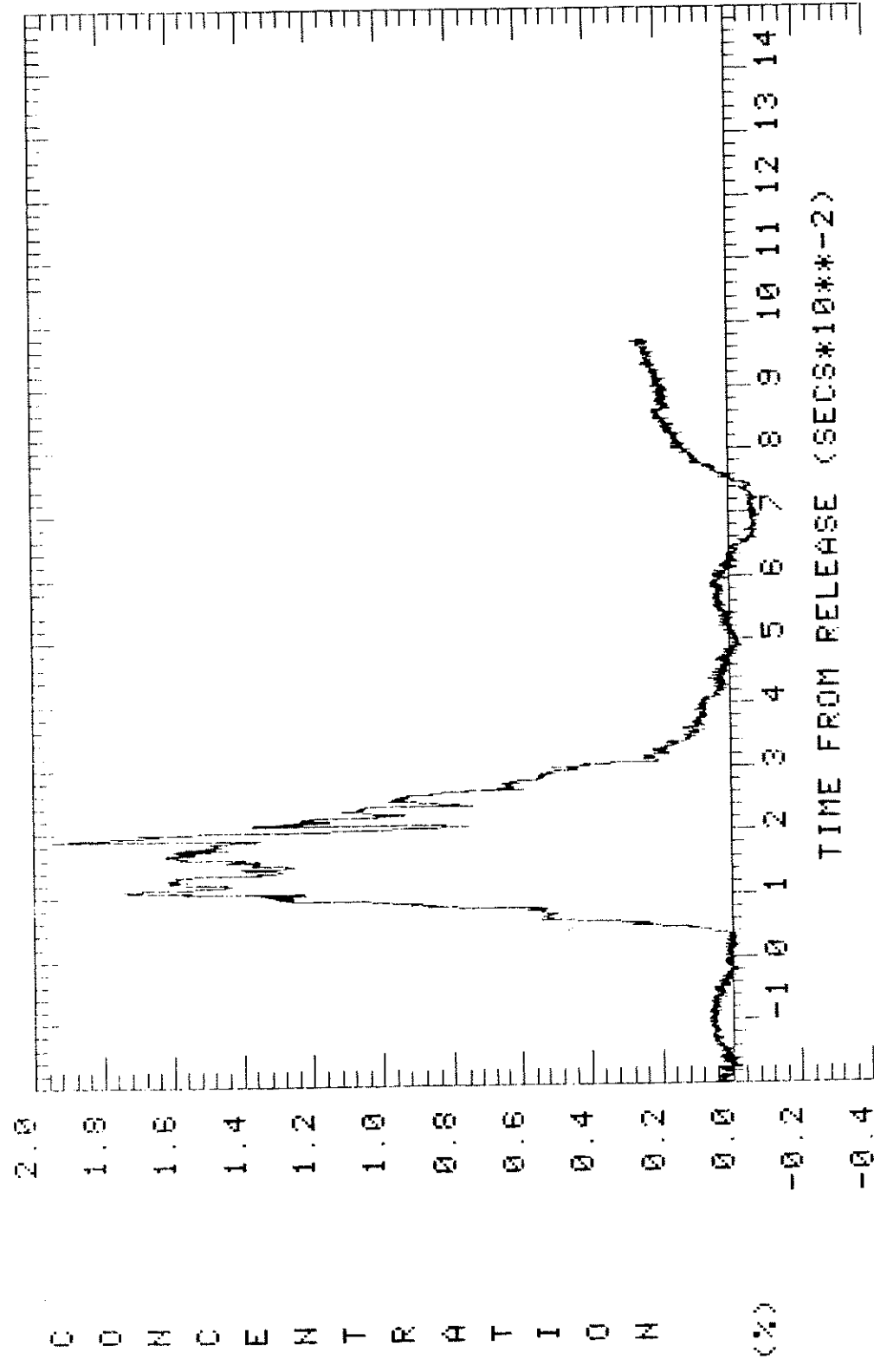
G08



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

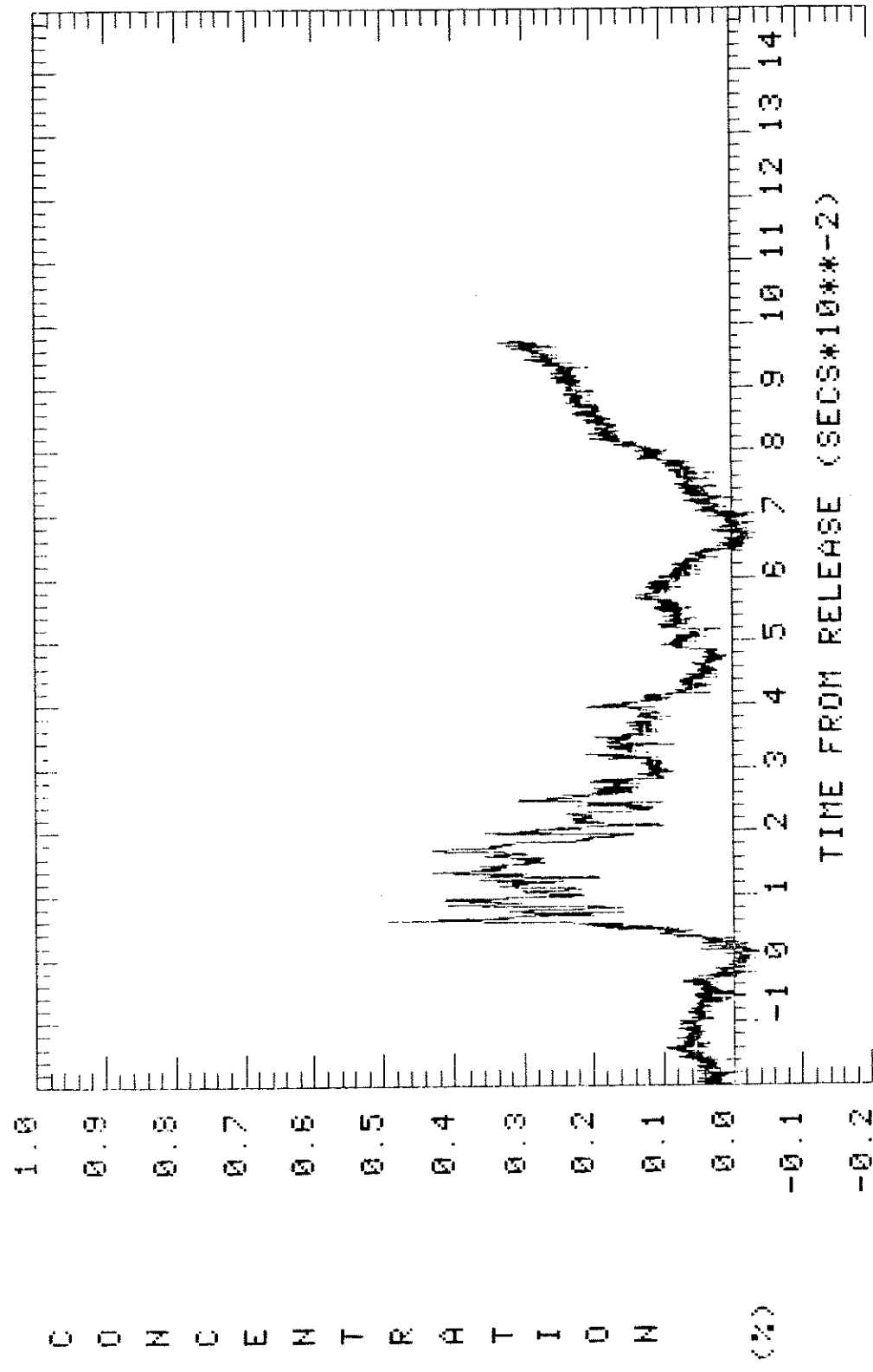
X: 414 M Y: 214 M Z: 0.4 M

G09



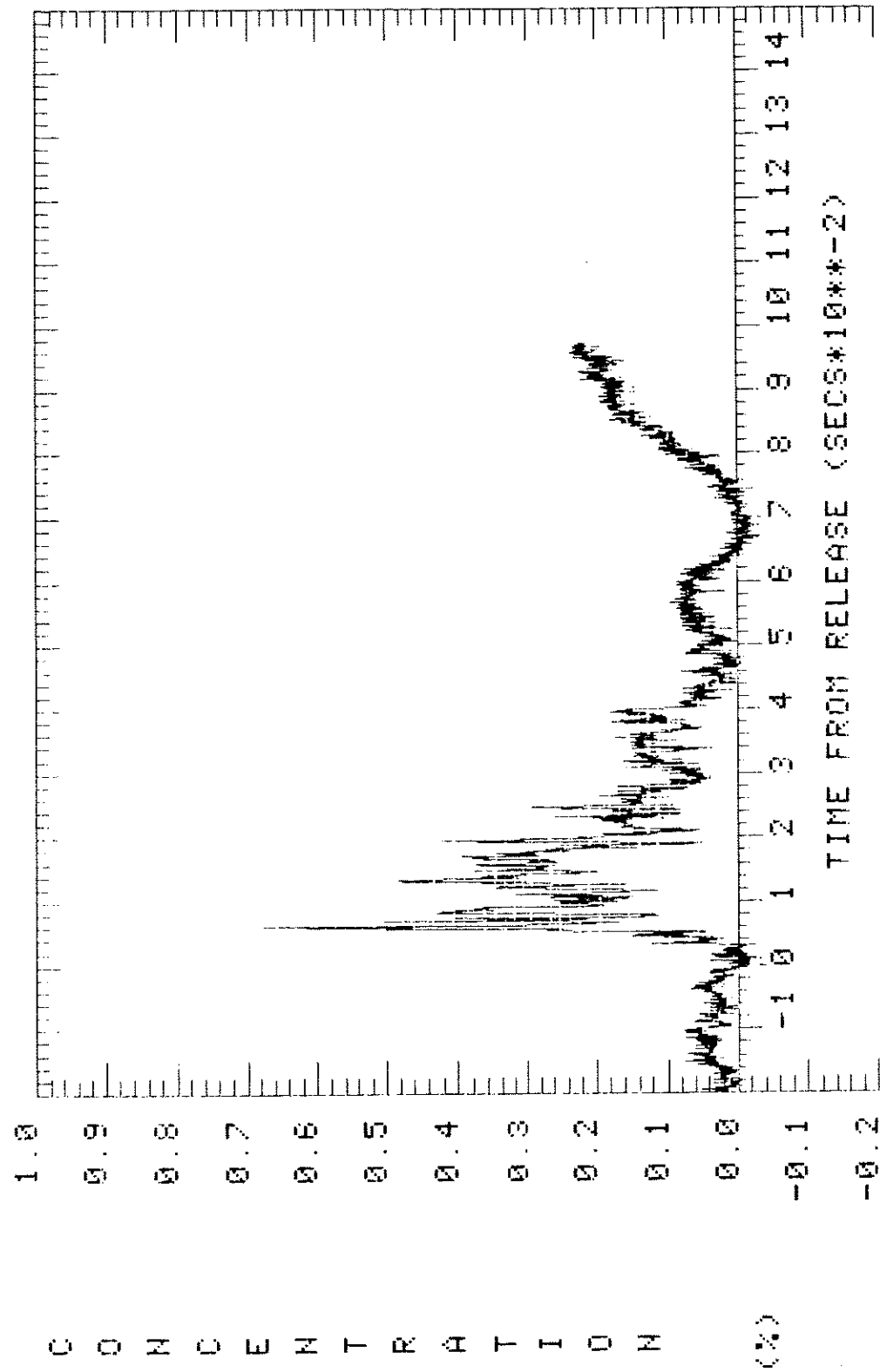
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 414 M Y: 214 M Z: 1.4 M



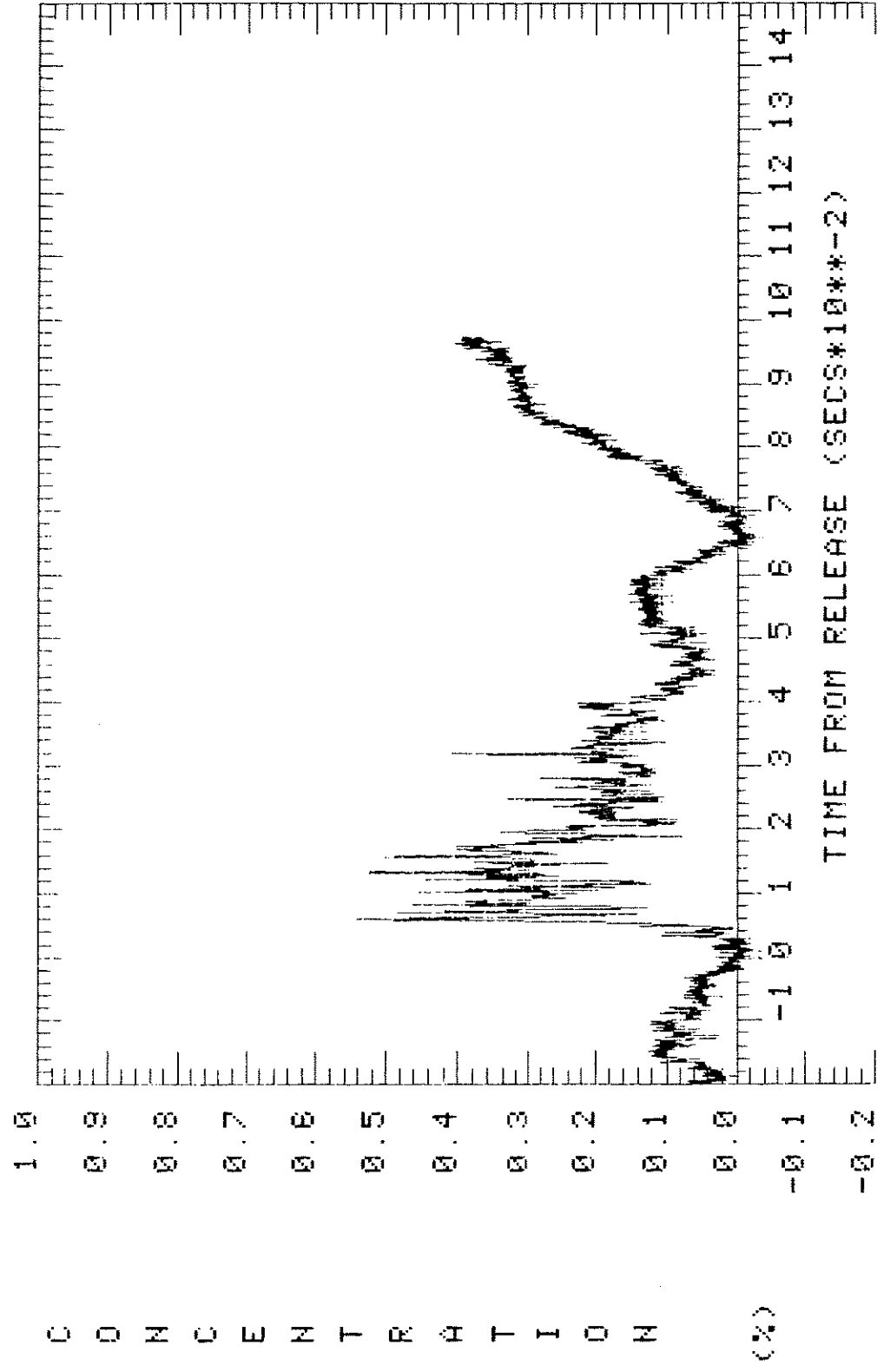
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



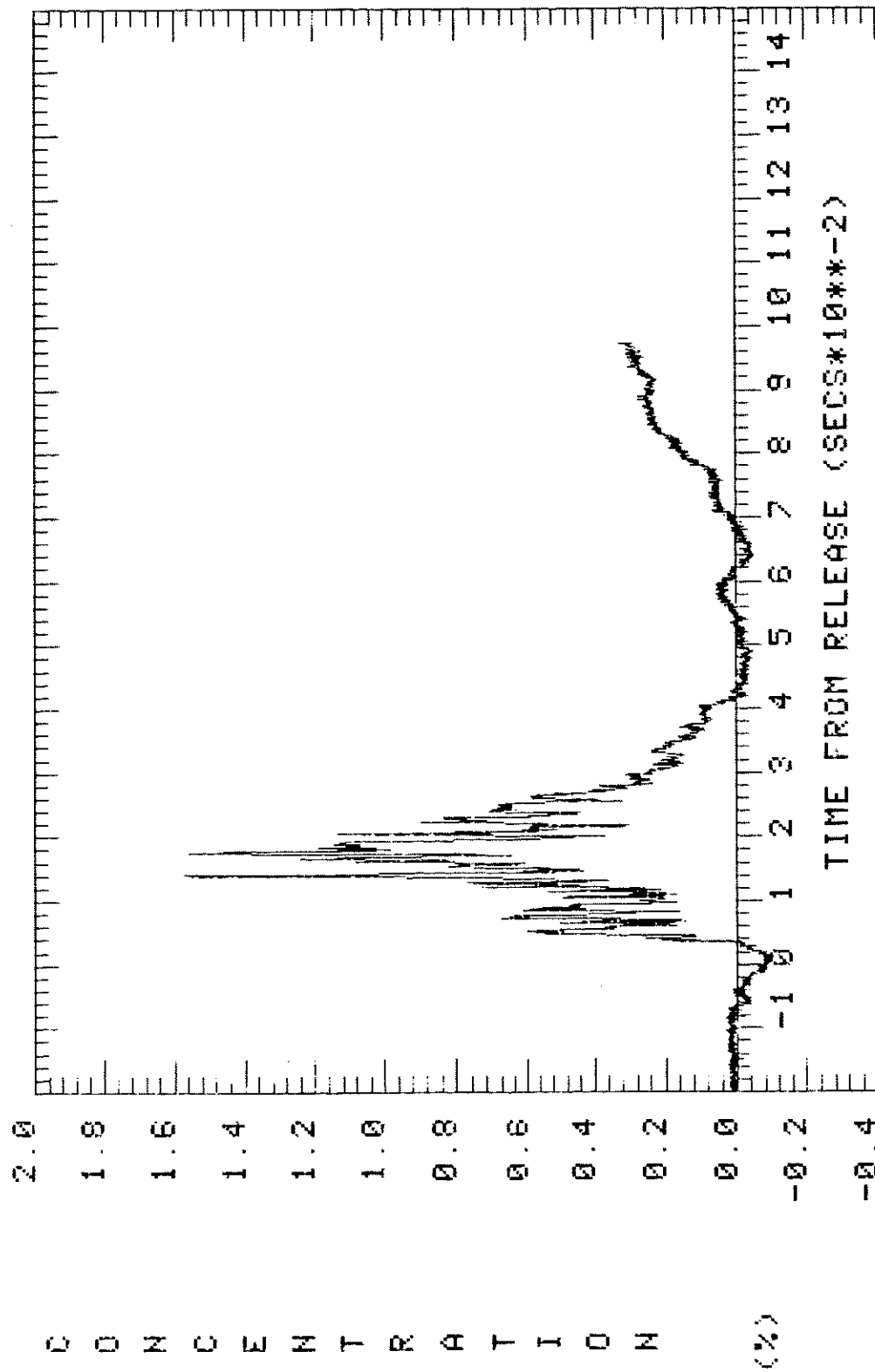
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



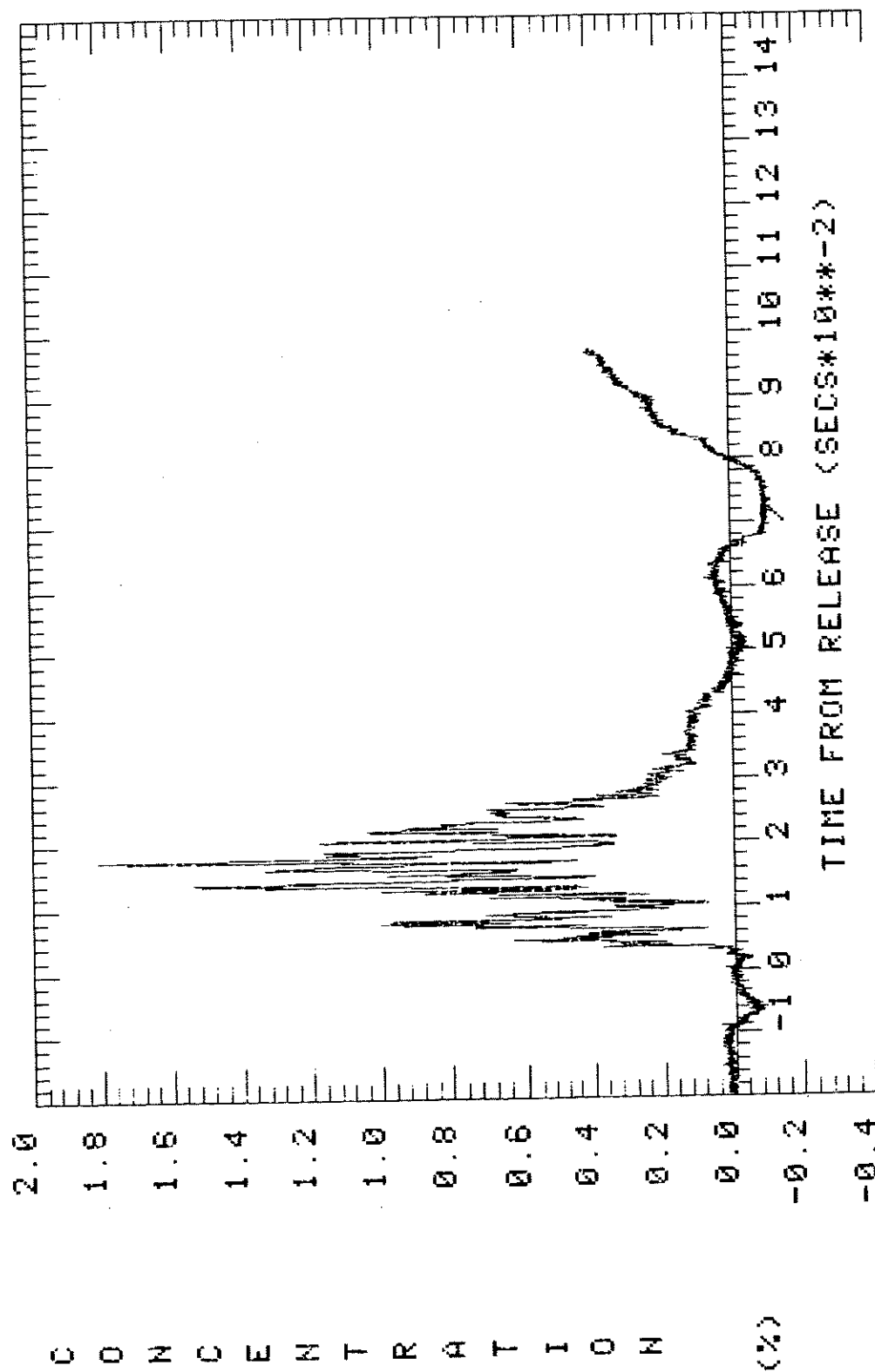
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

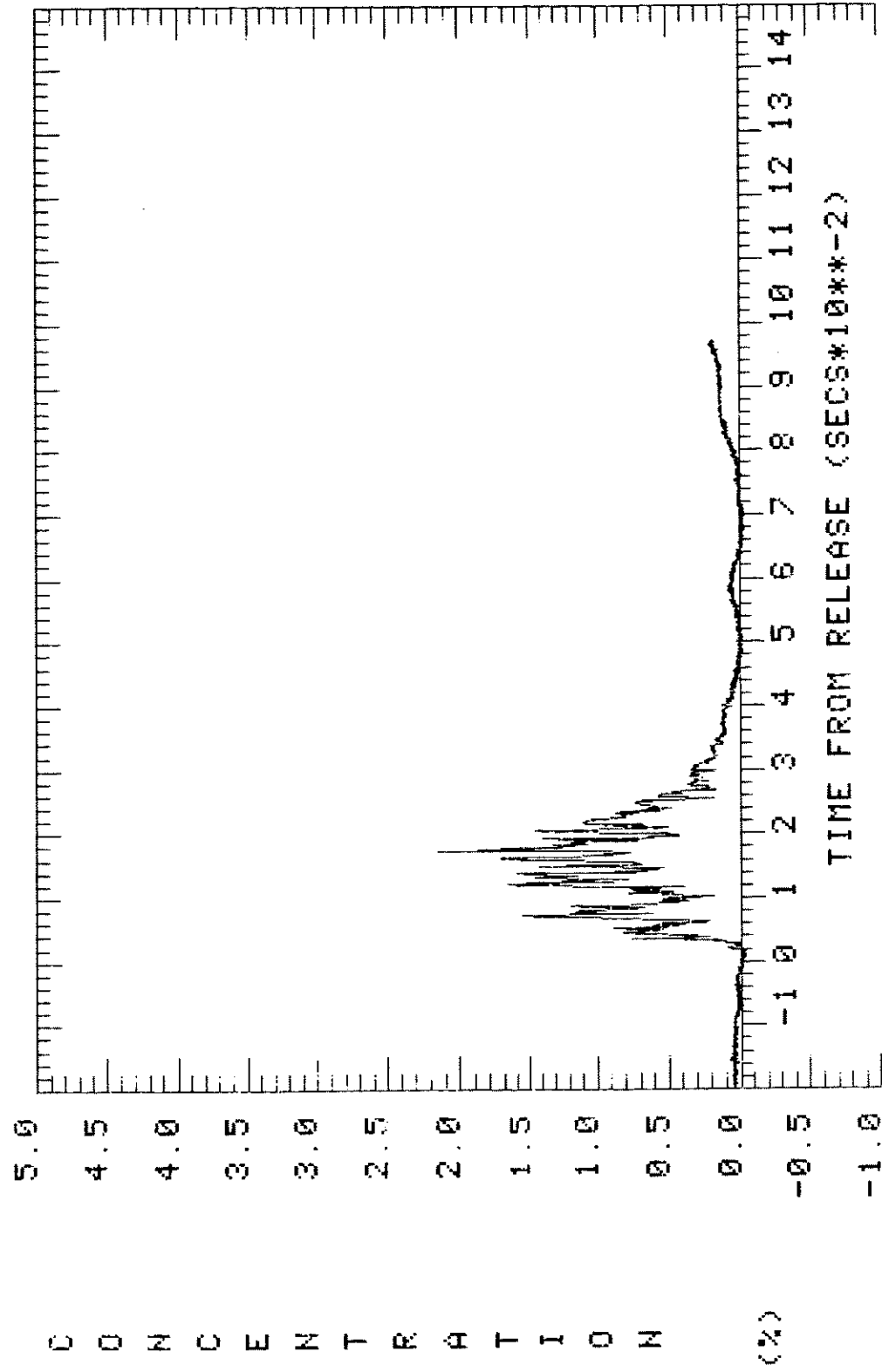
X: 428 M Y: 228 M Z: 0.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

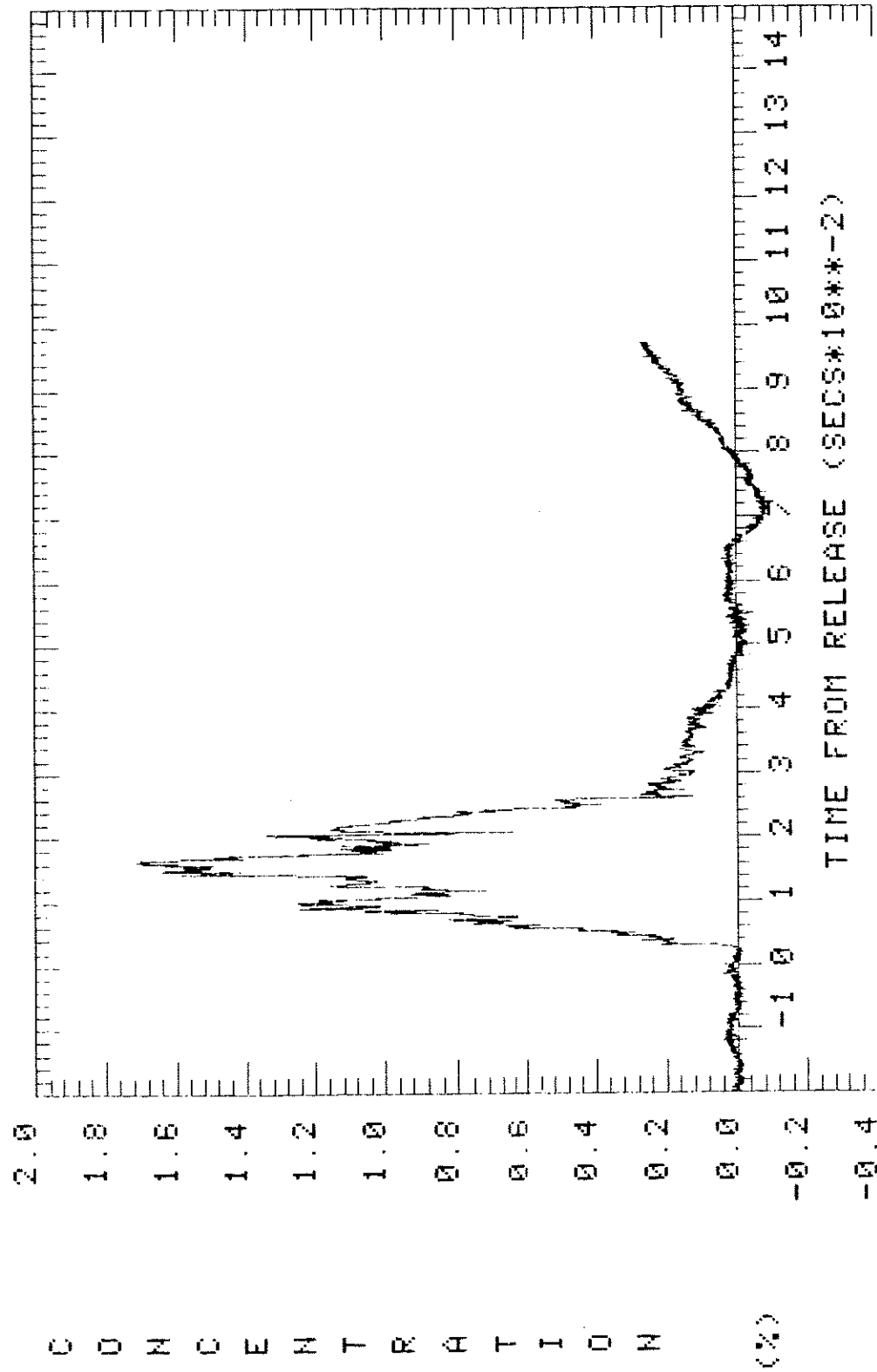
X: 428 M Y: 228 M Z: 1.4 M

G15



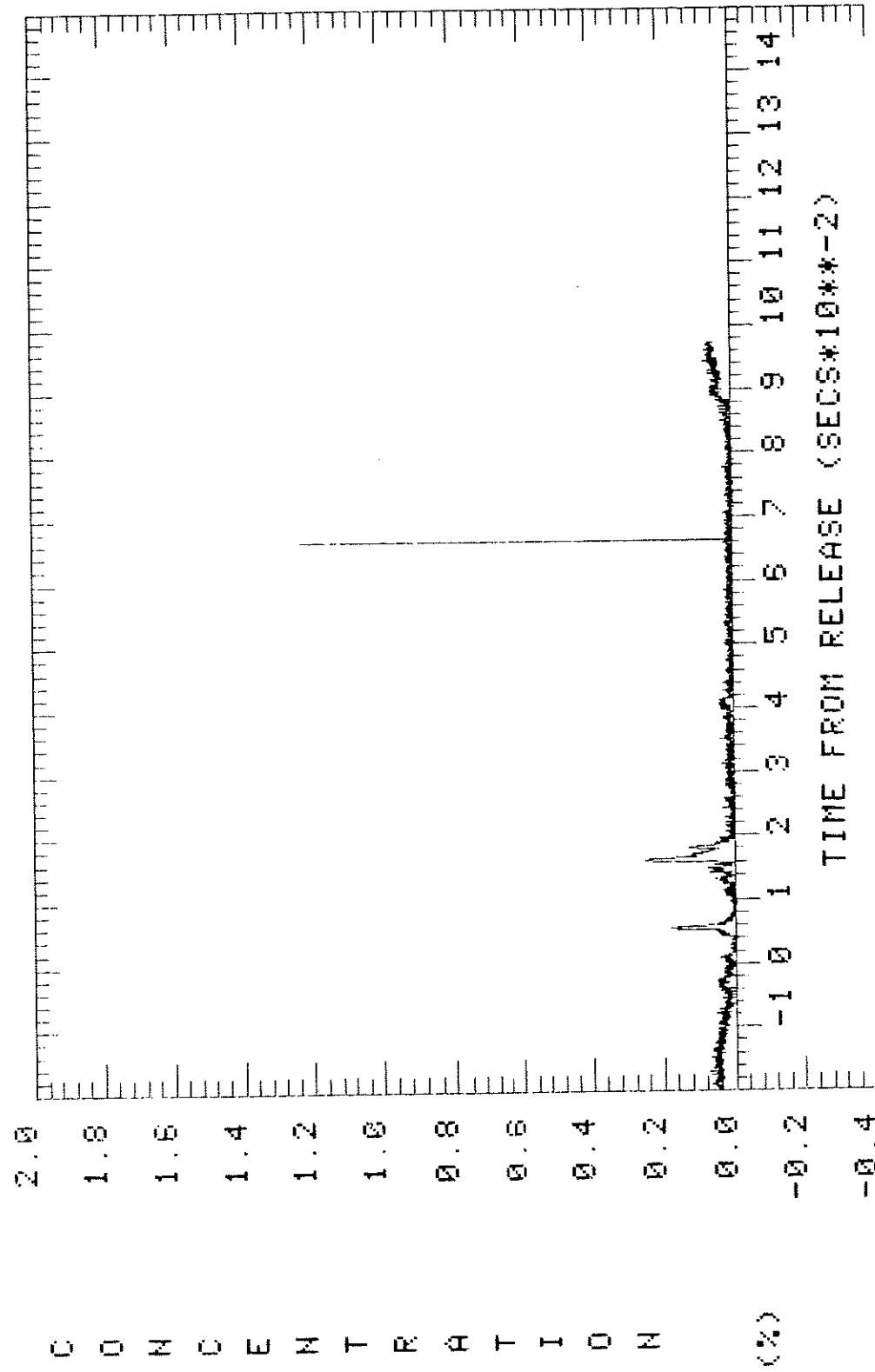
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



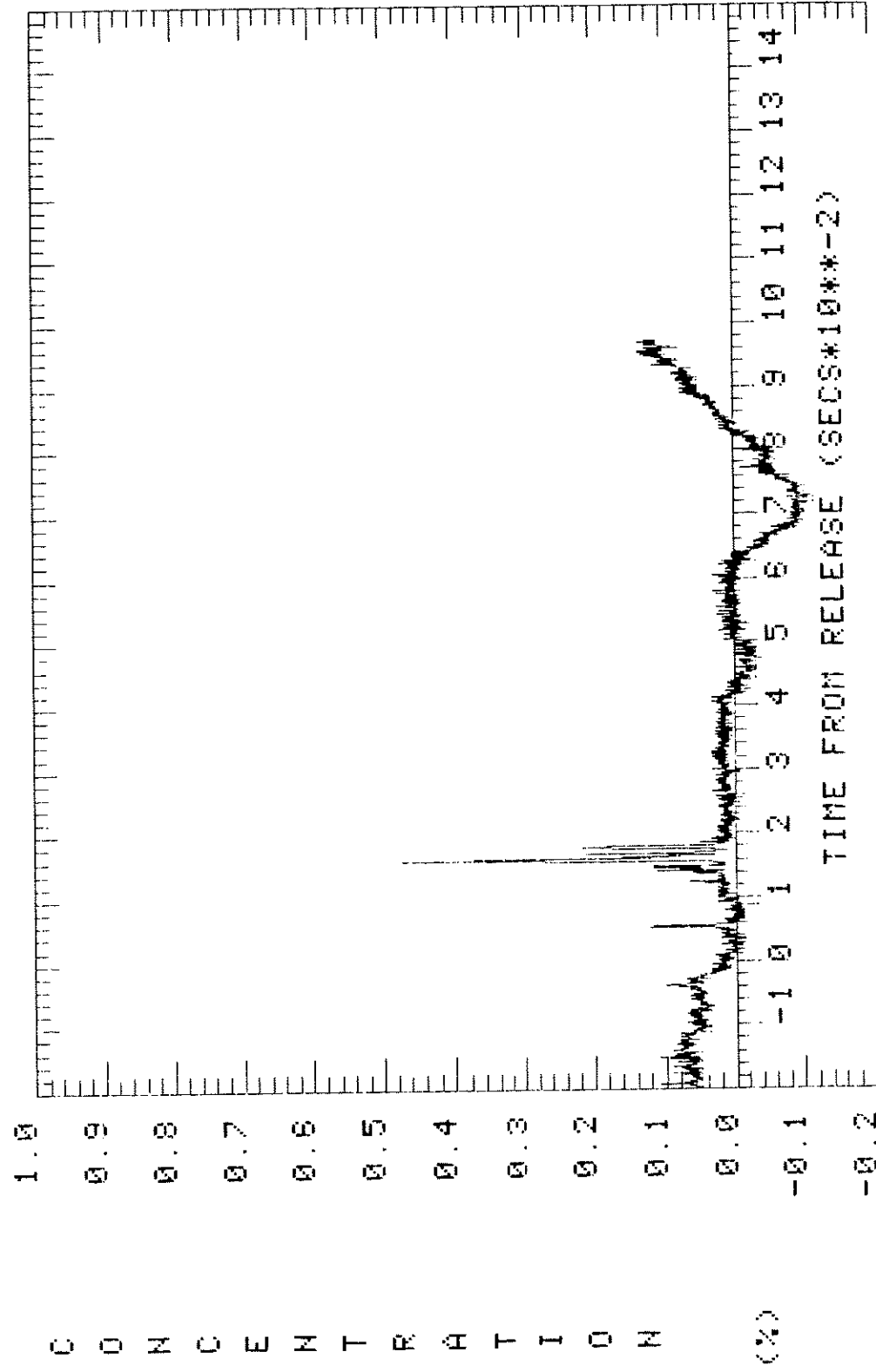
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 419 M Y: 240 M Z: 0.4 M



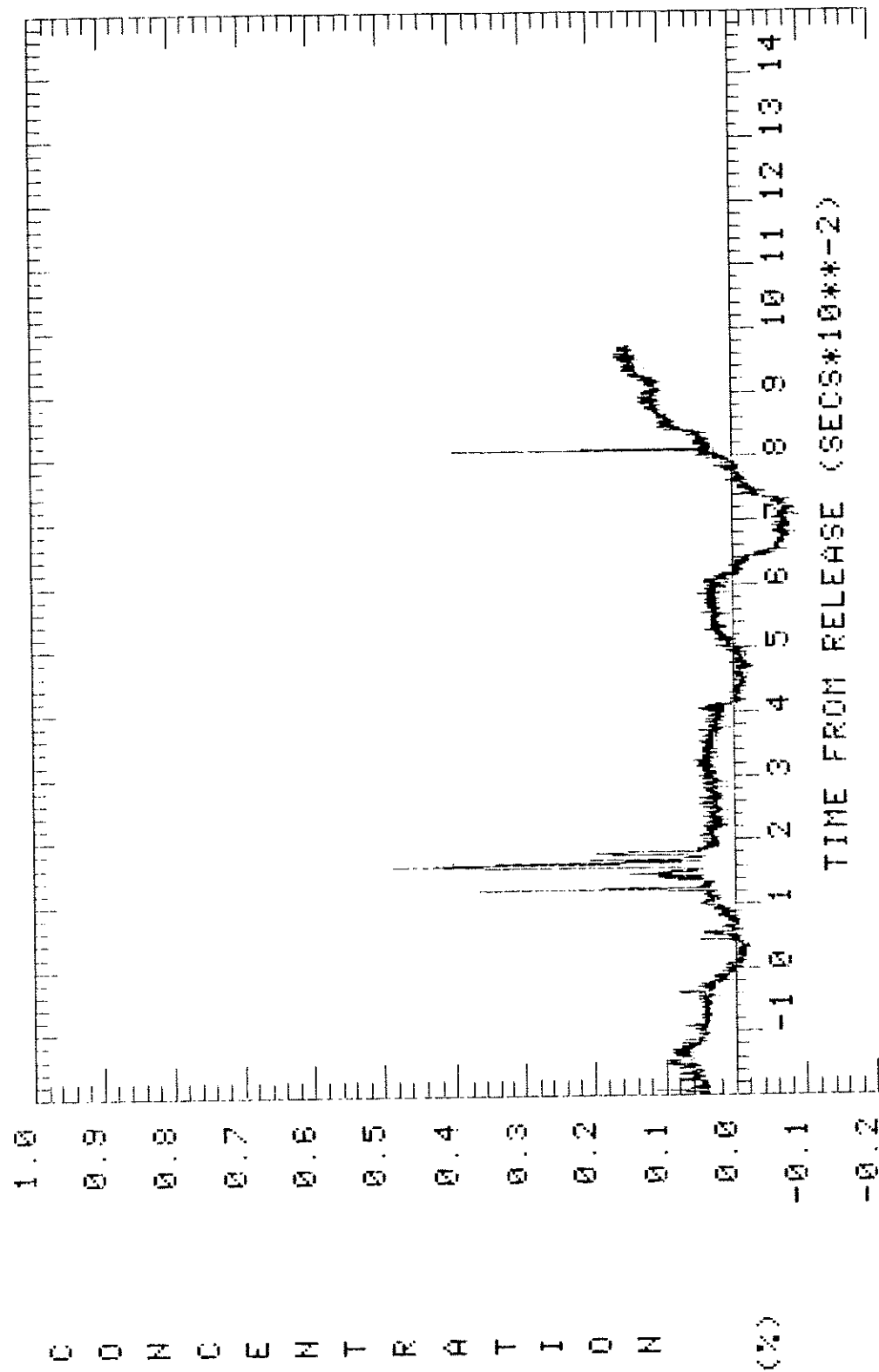
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 388 M Y: 250 M Z: 0.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

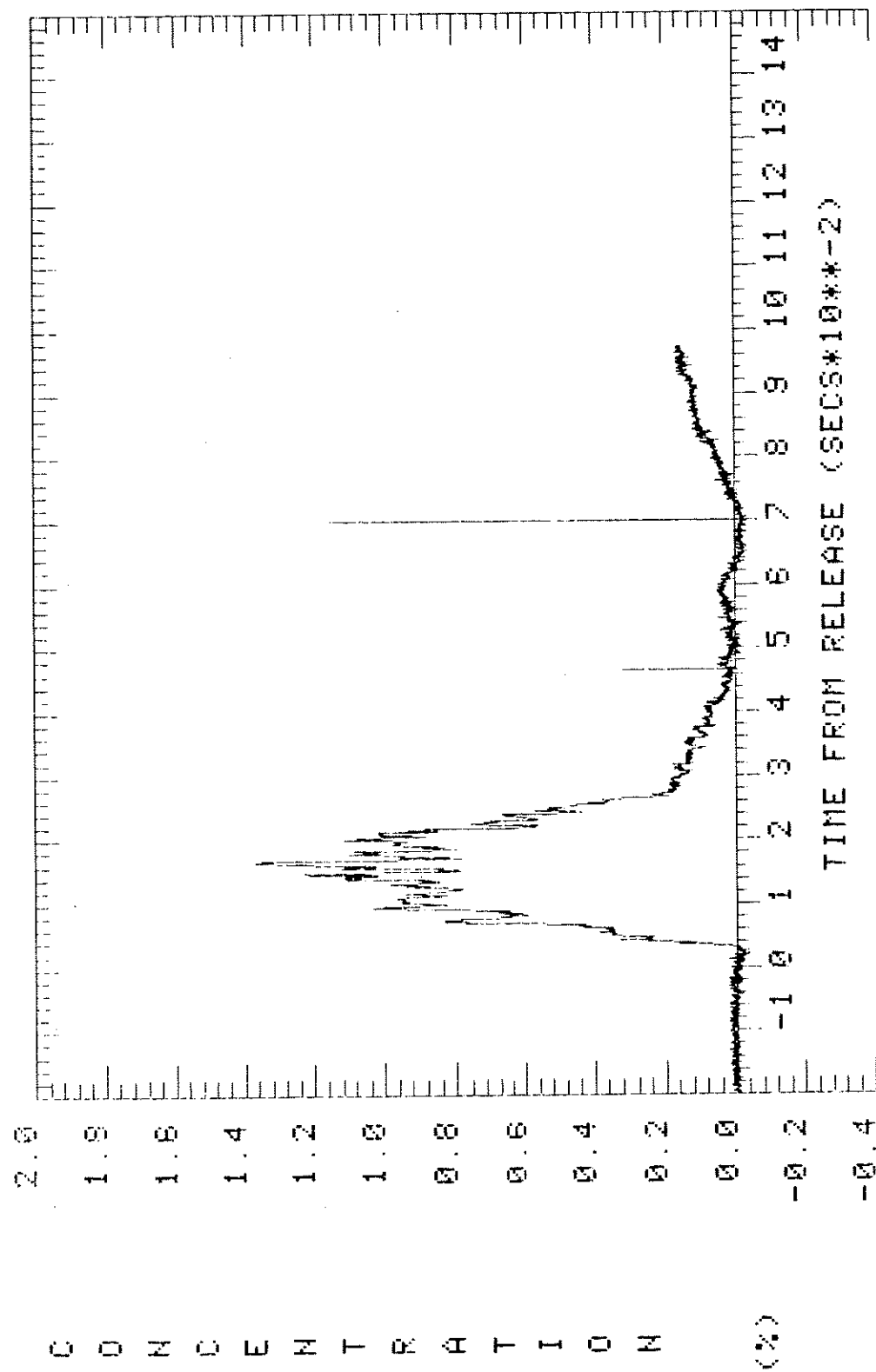
X: 388 M Y: 250 M Z: 1.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

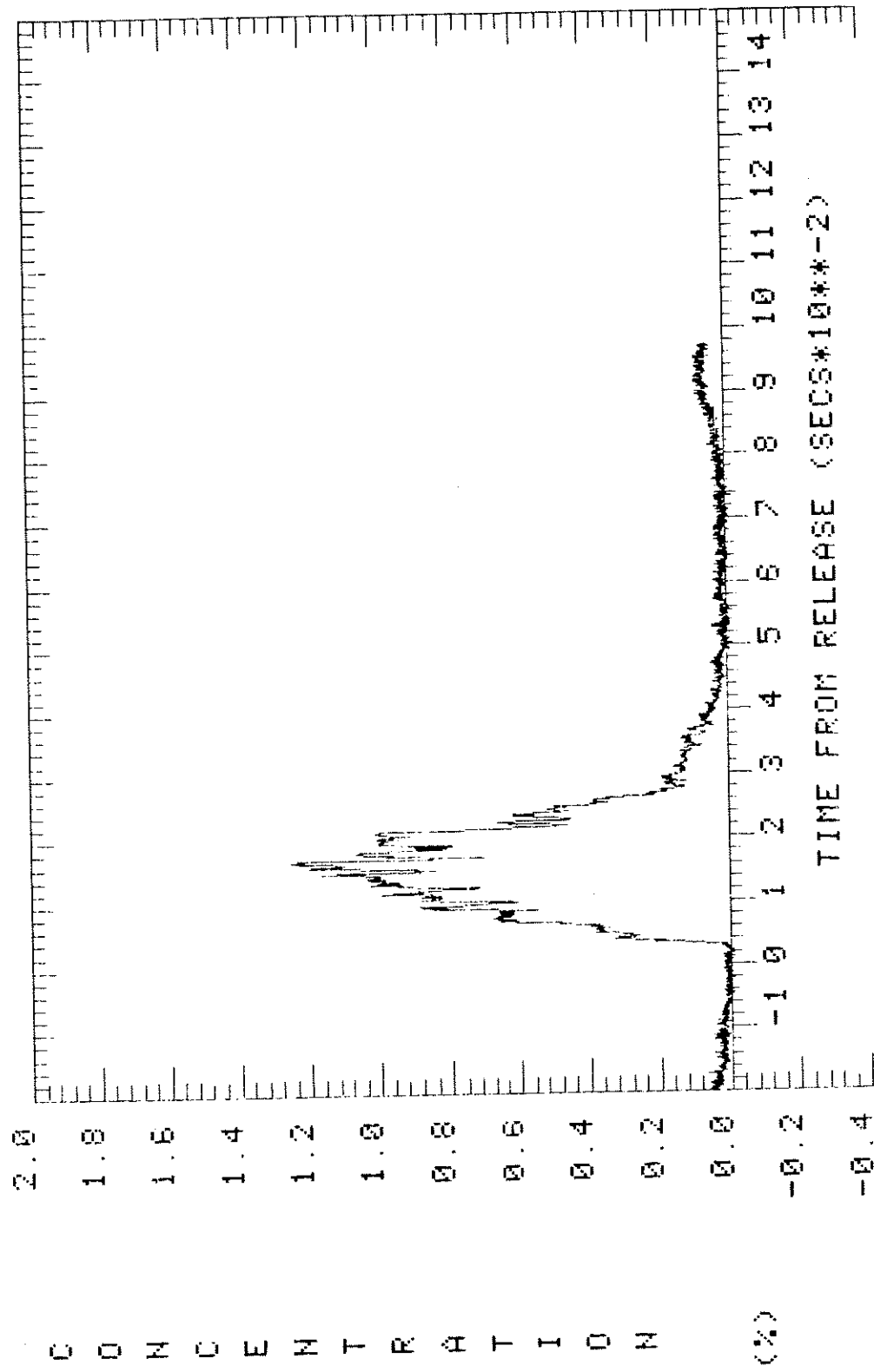
X: 388 M Y: 250 M Z: 2.4 M

G20



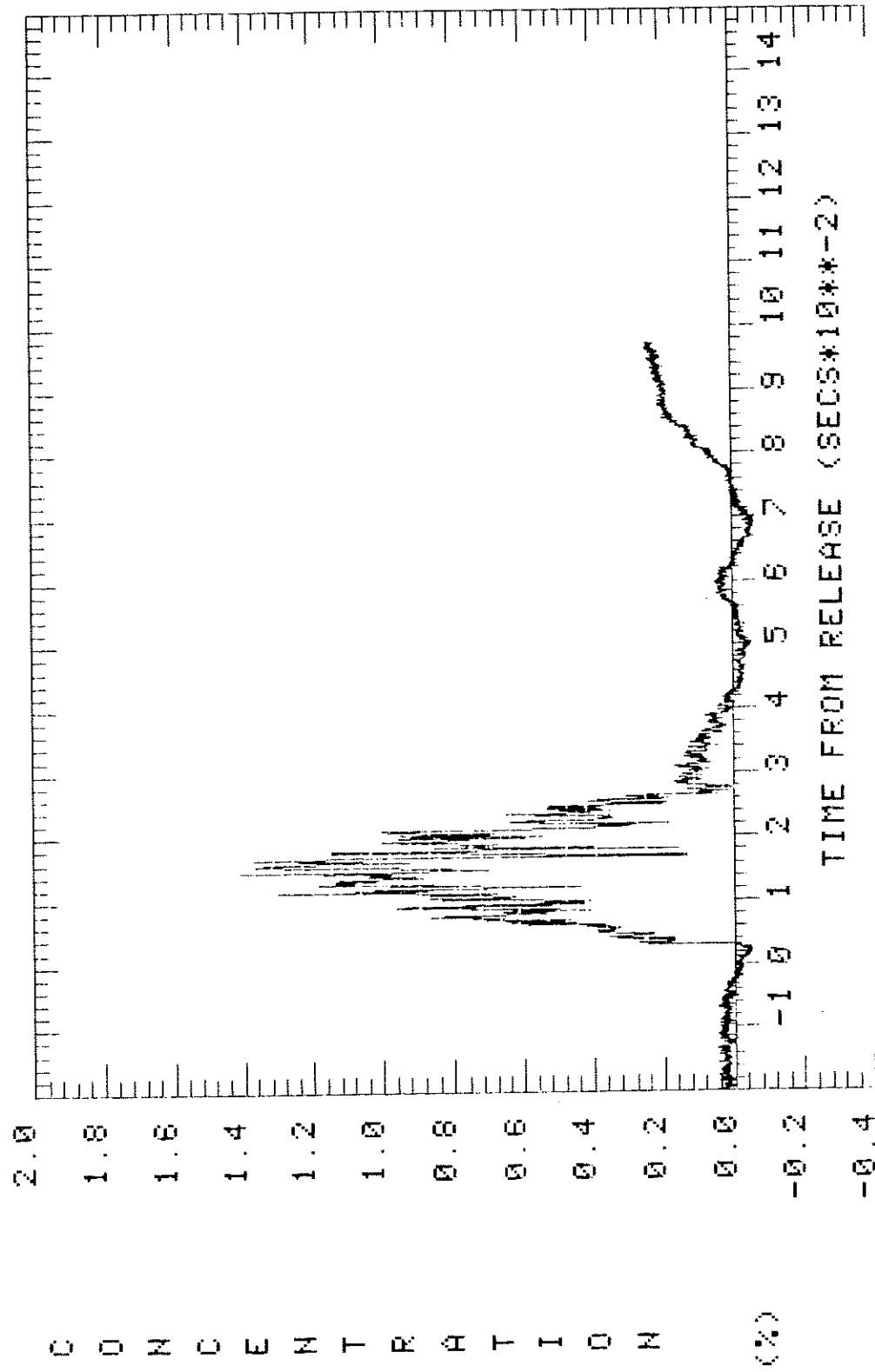
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 418 M Y: 250 M Z: 0.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

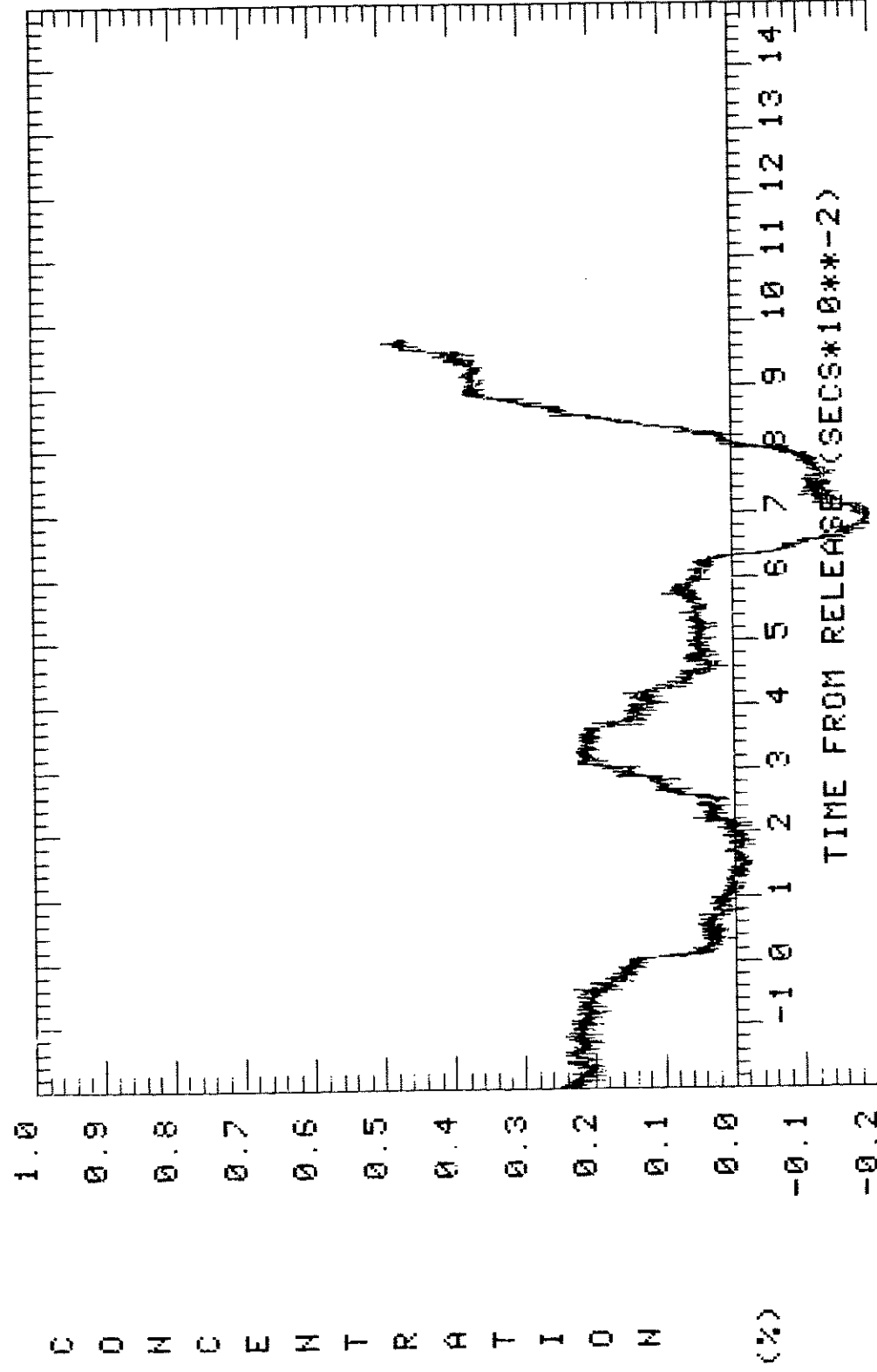
X: 418 M Y: 250 M Z: 1.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

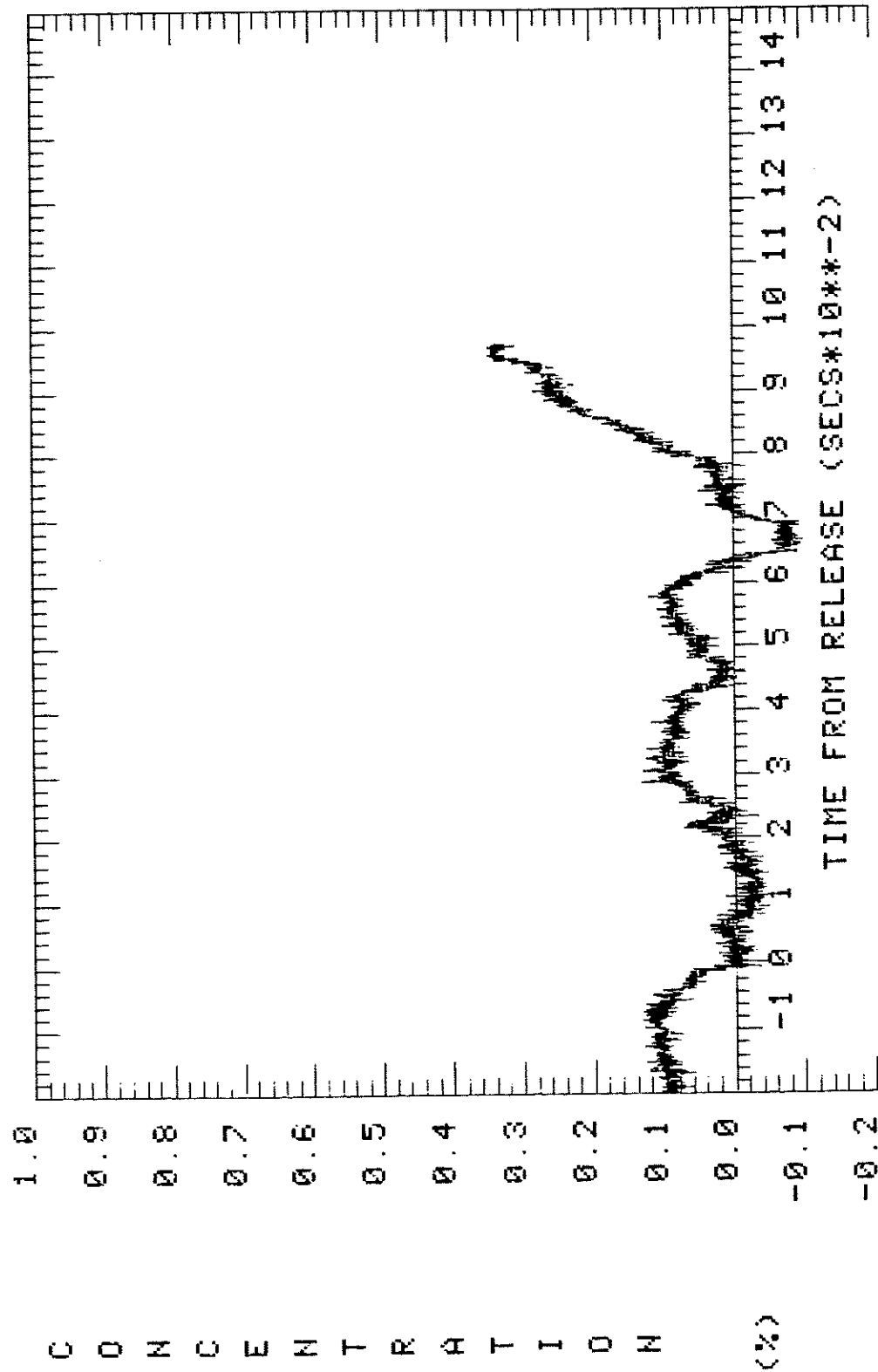
X: 418 M Y: 250 M Z: 2.4 M

G23



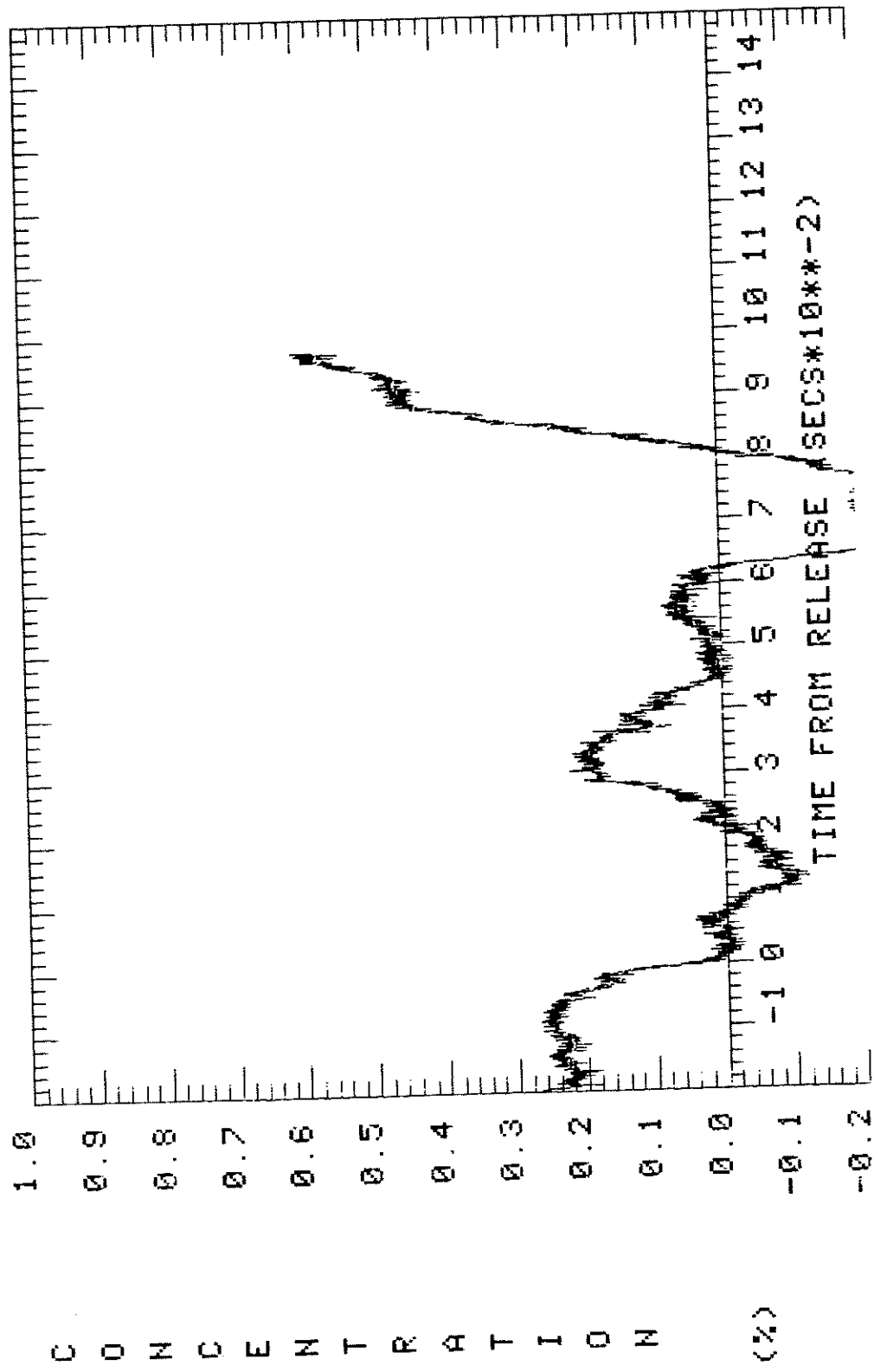
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



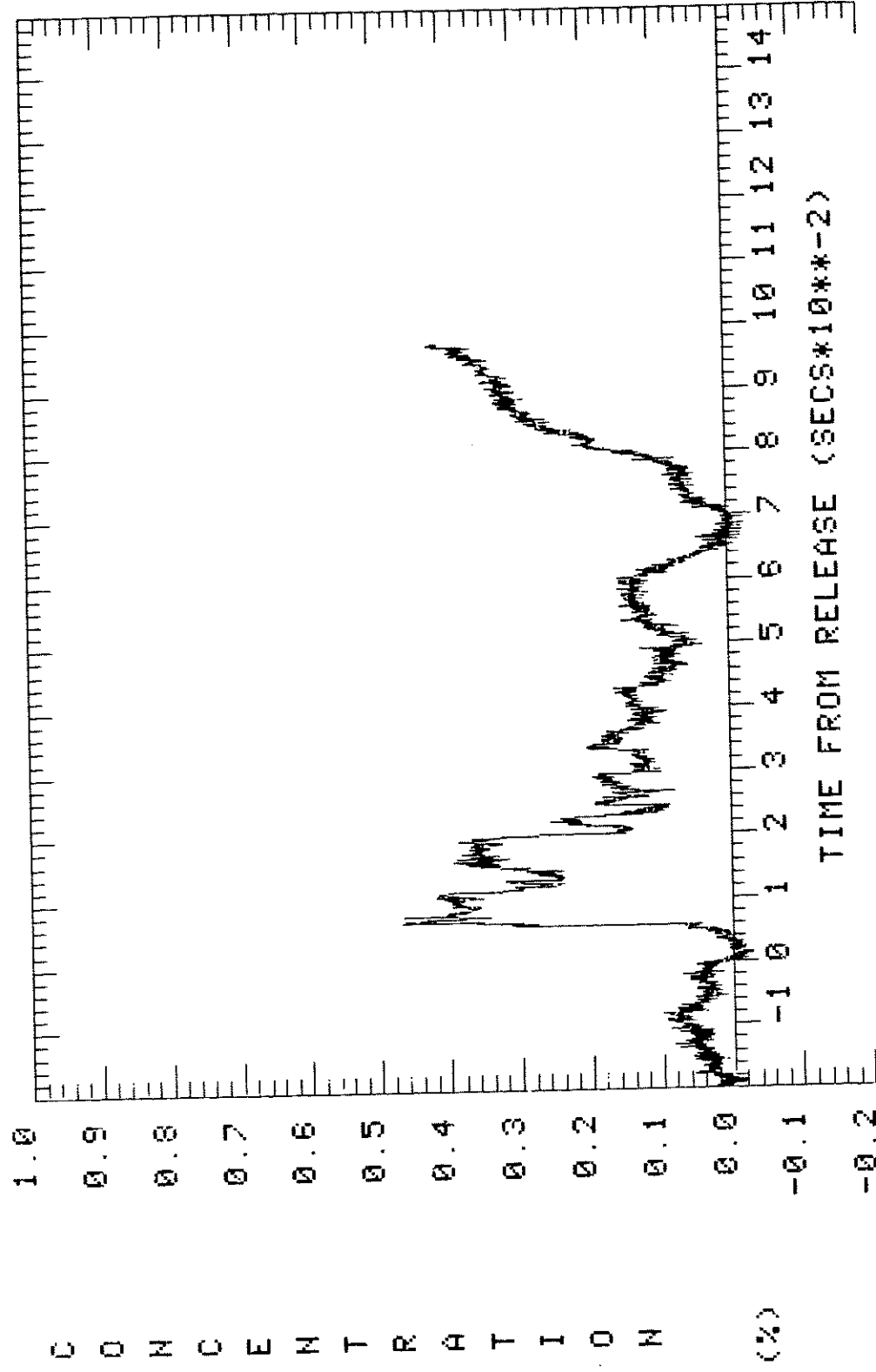
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



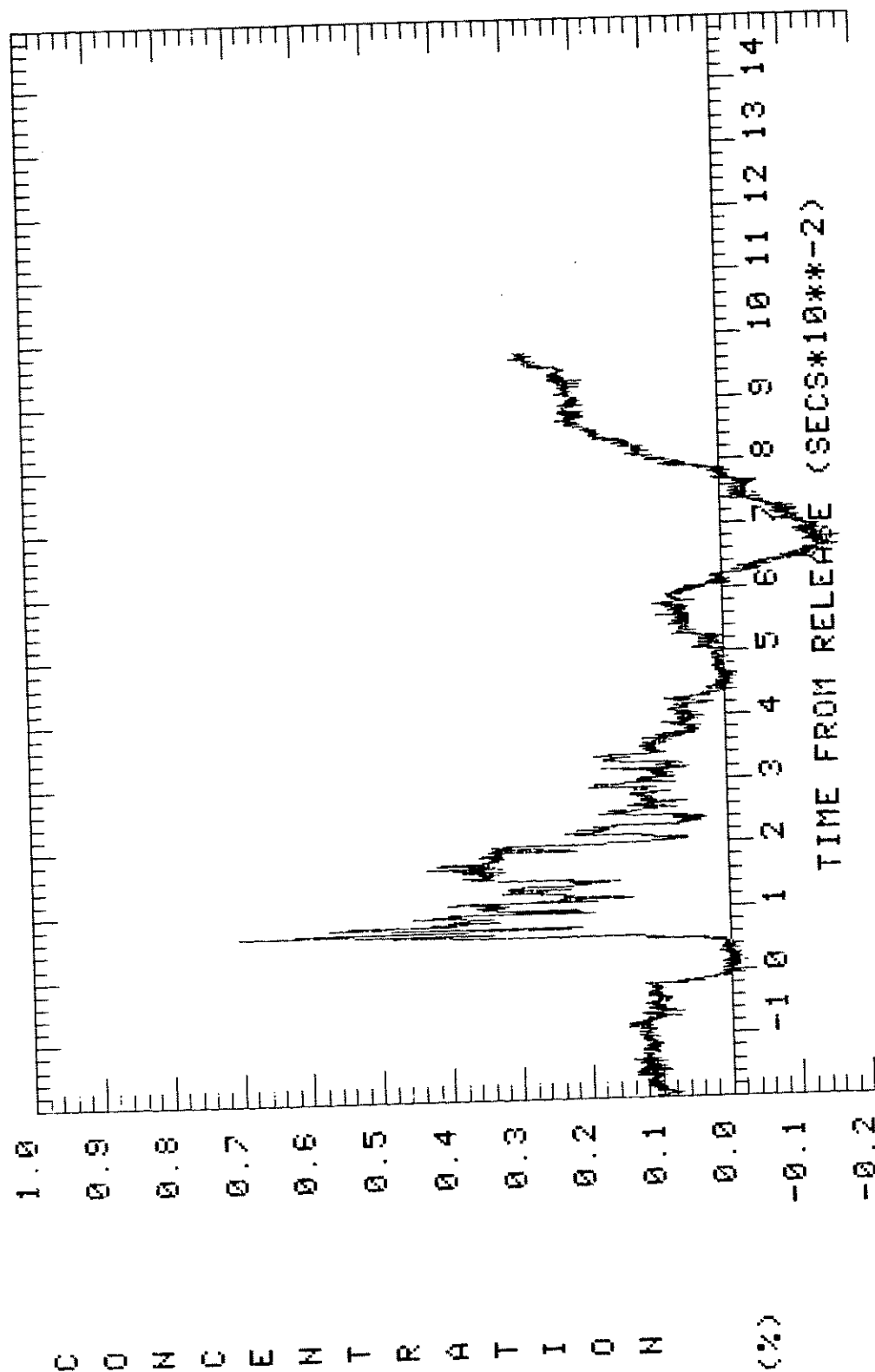
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



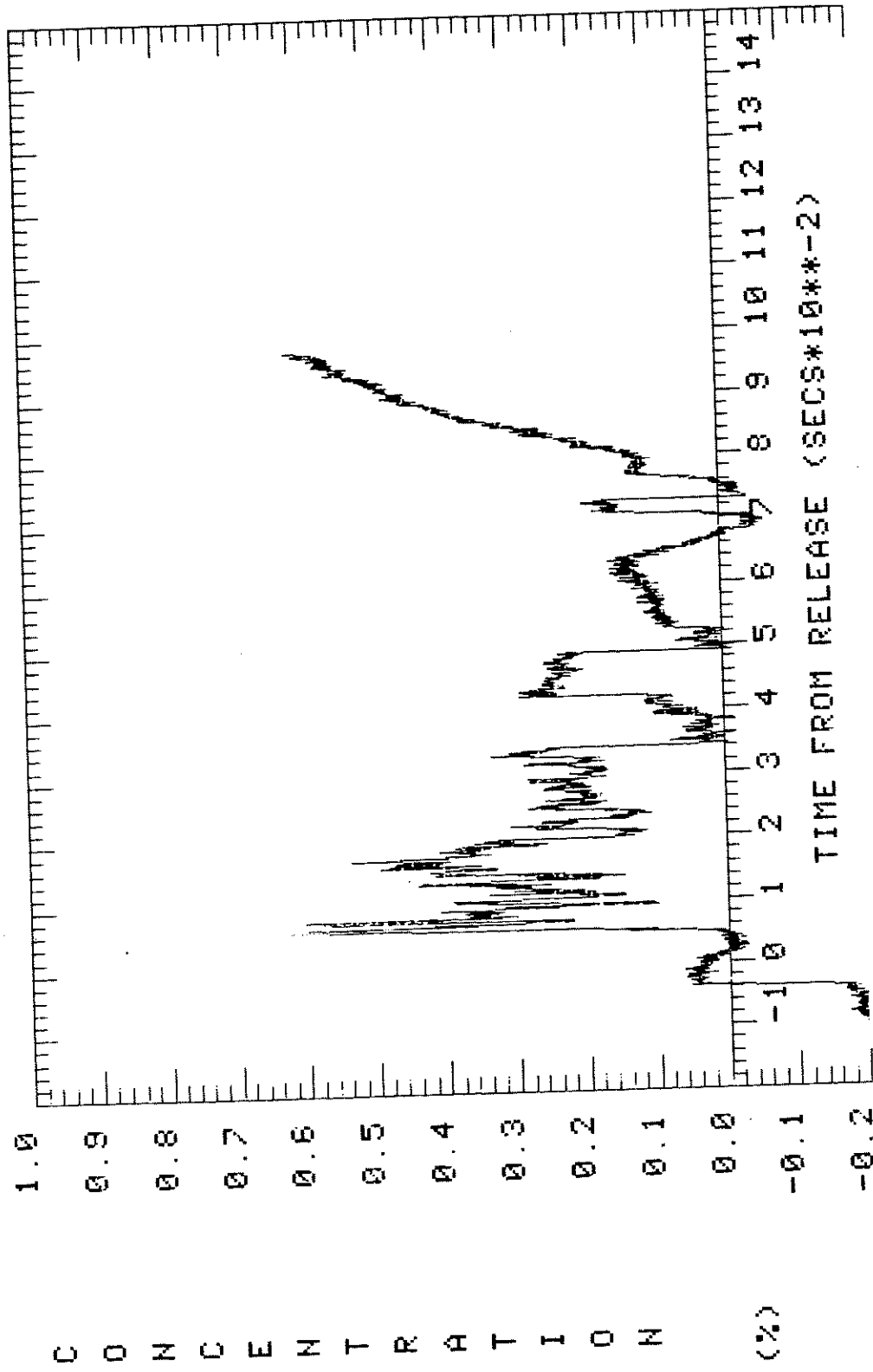
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



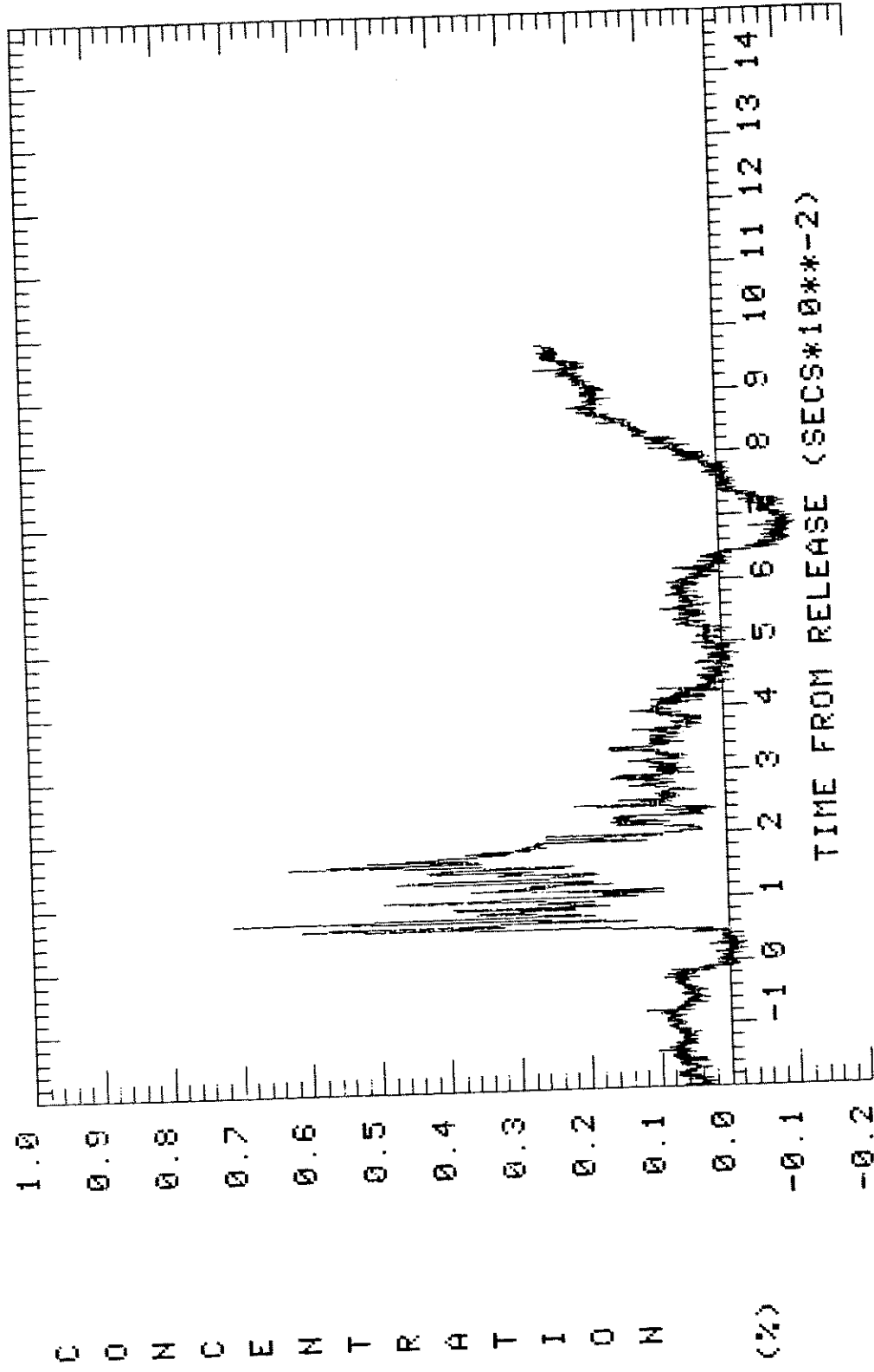
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

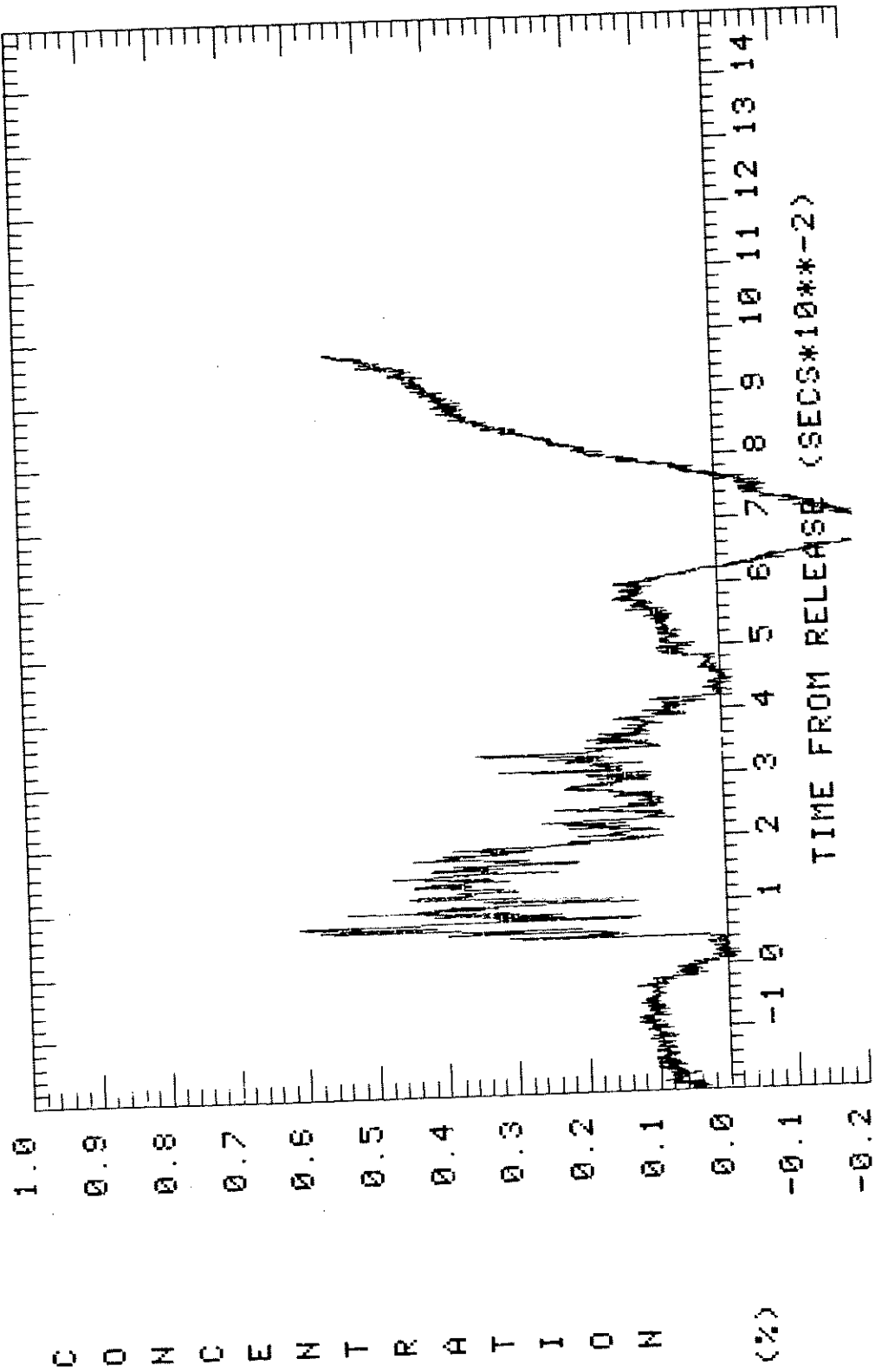
X: 400 M Y: 275 M Z: 2.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

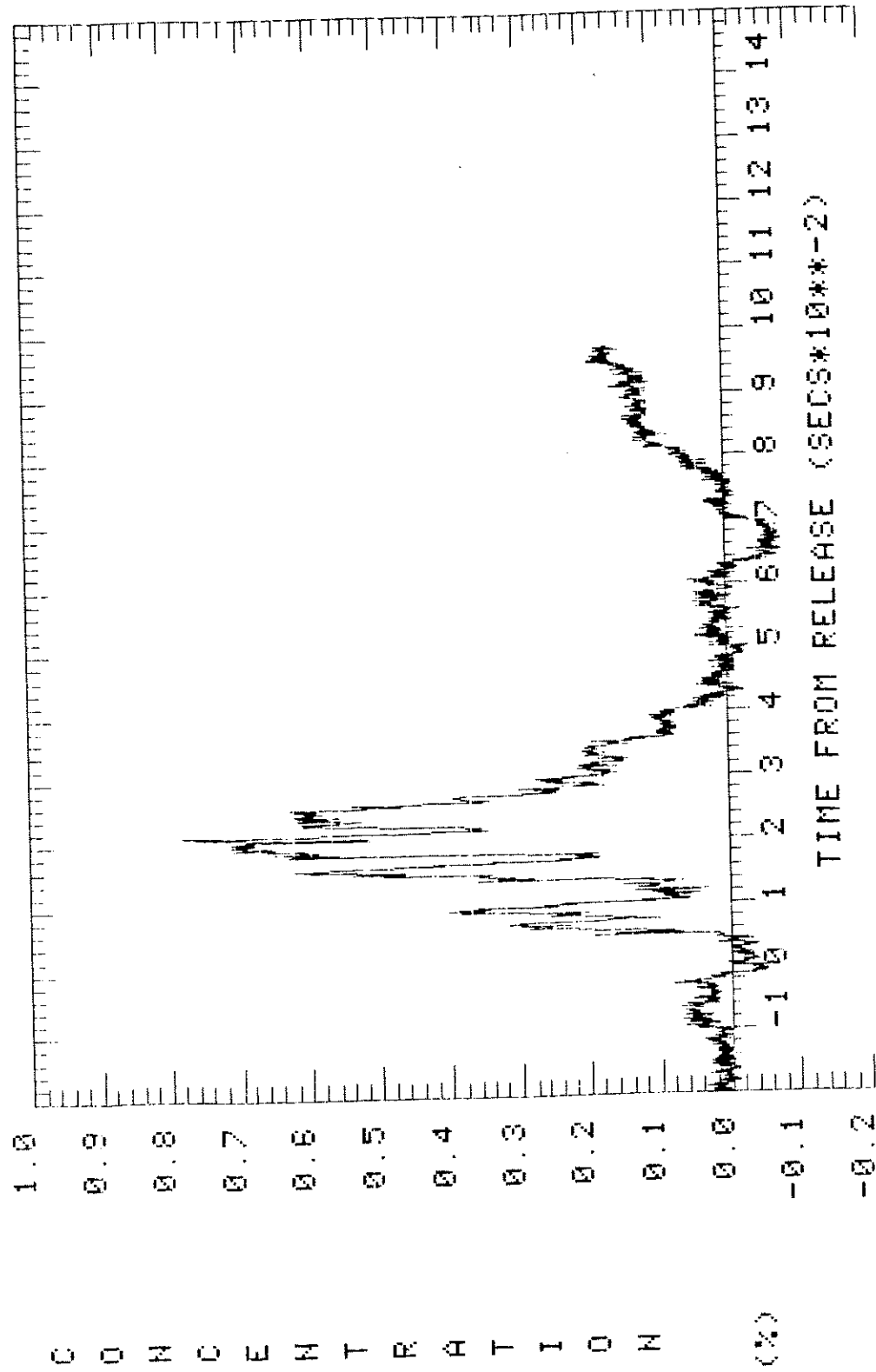
G30



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

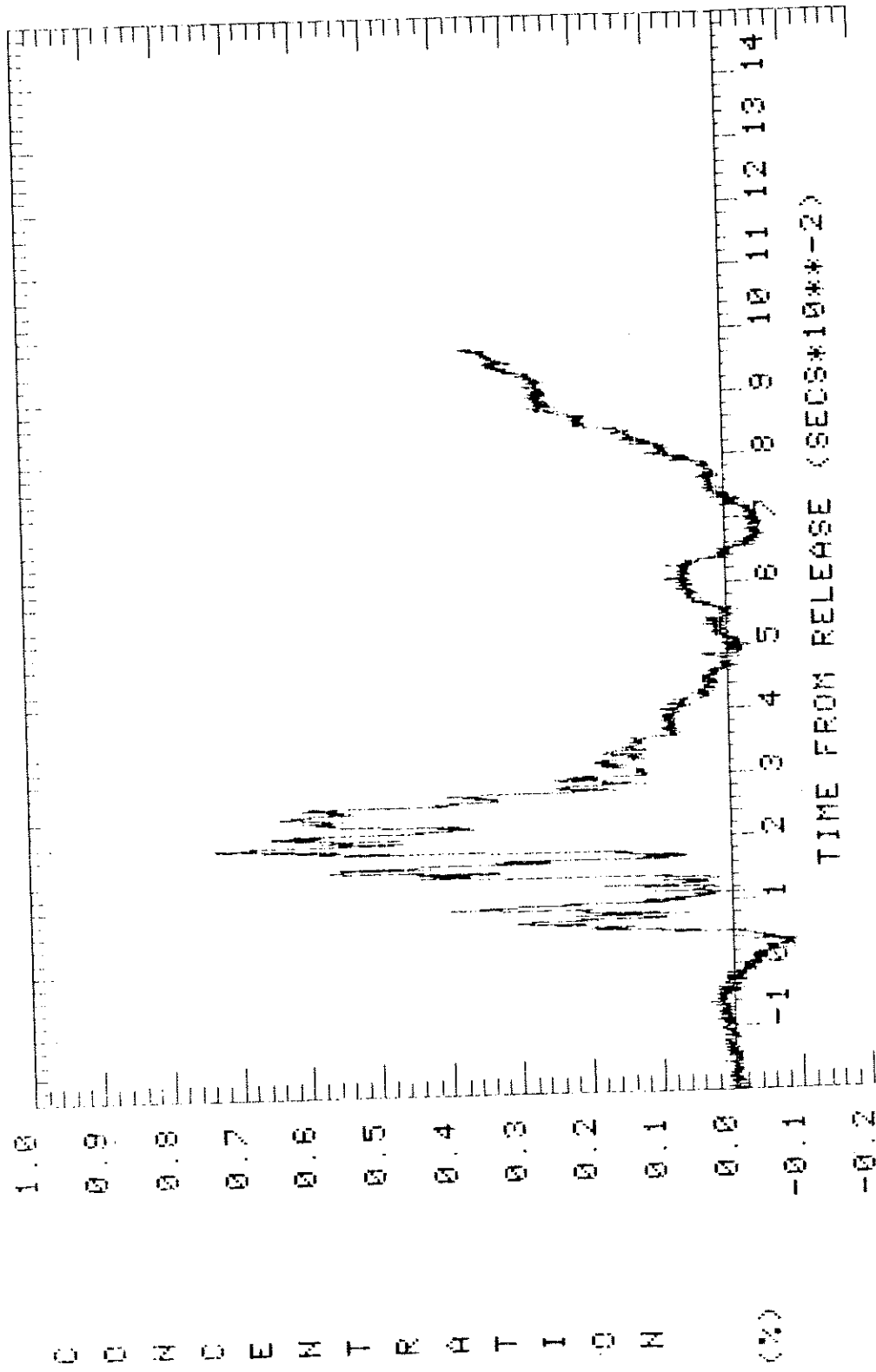
X: 400 M Y: 275 M Z: 10.4 M

G31



TRIAL: 051 TYPE: GAS AVERAGING TIME: 9.9 SECS

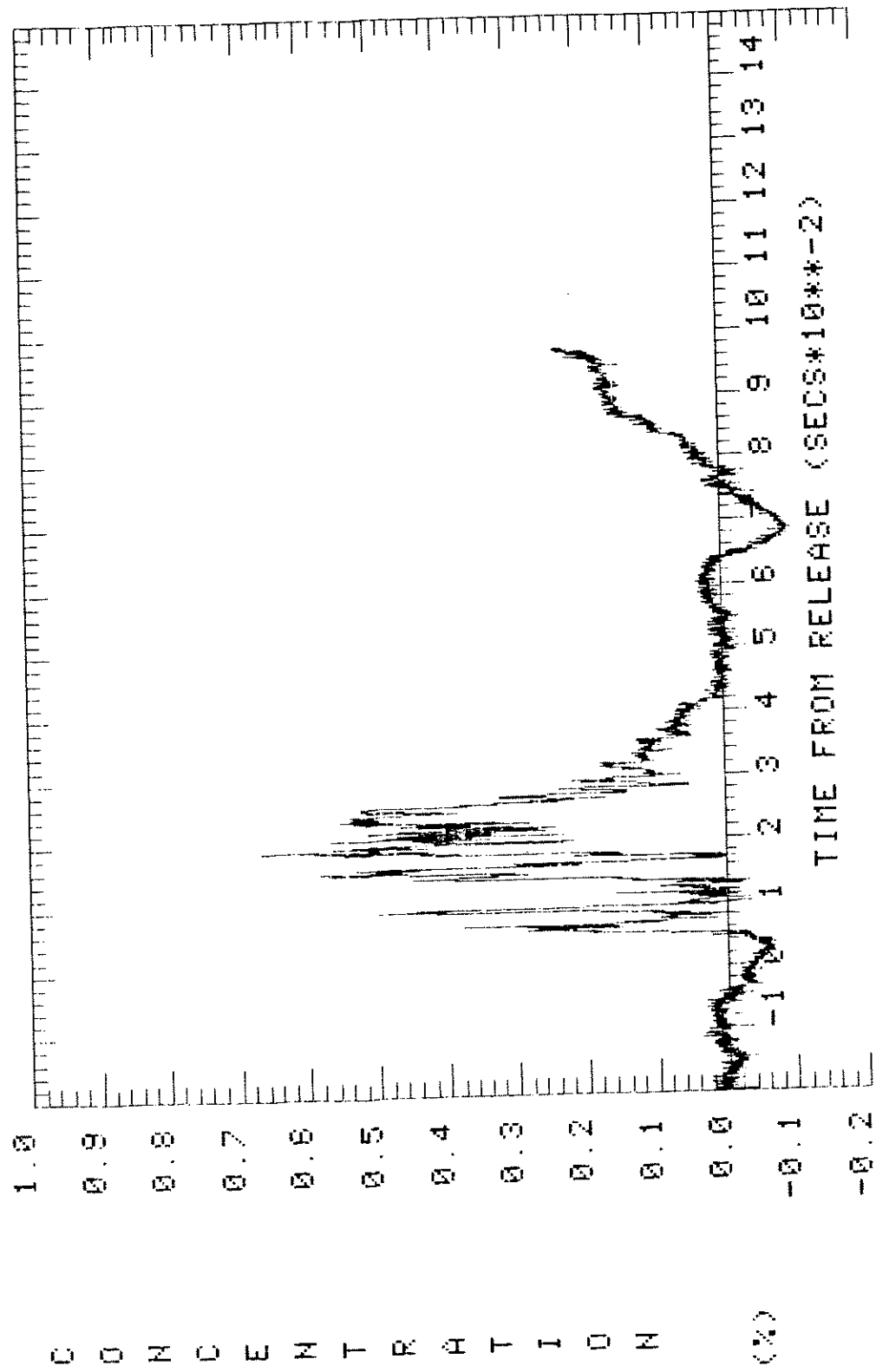
X: 429 H Y: 289 H Z: 0.4 H



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

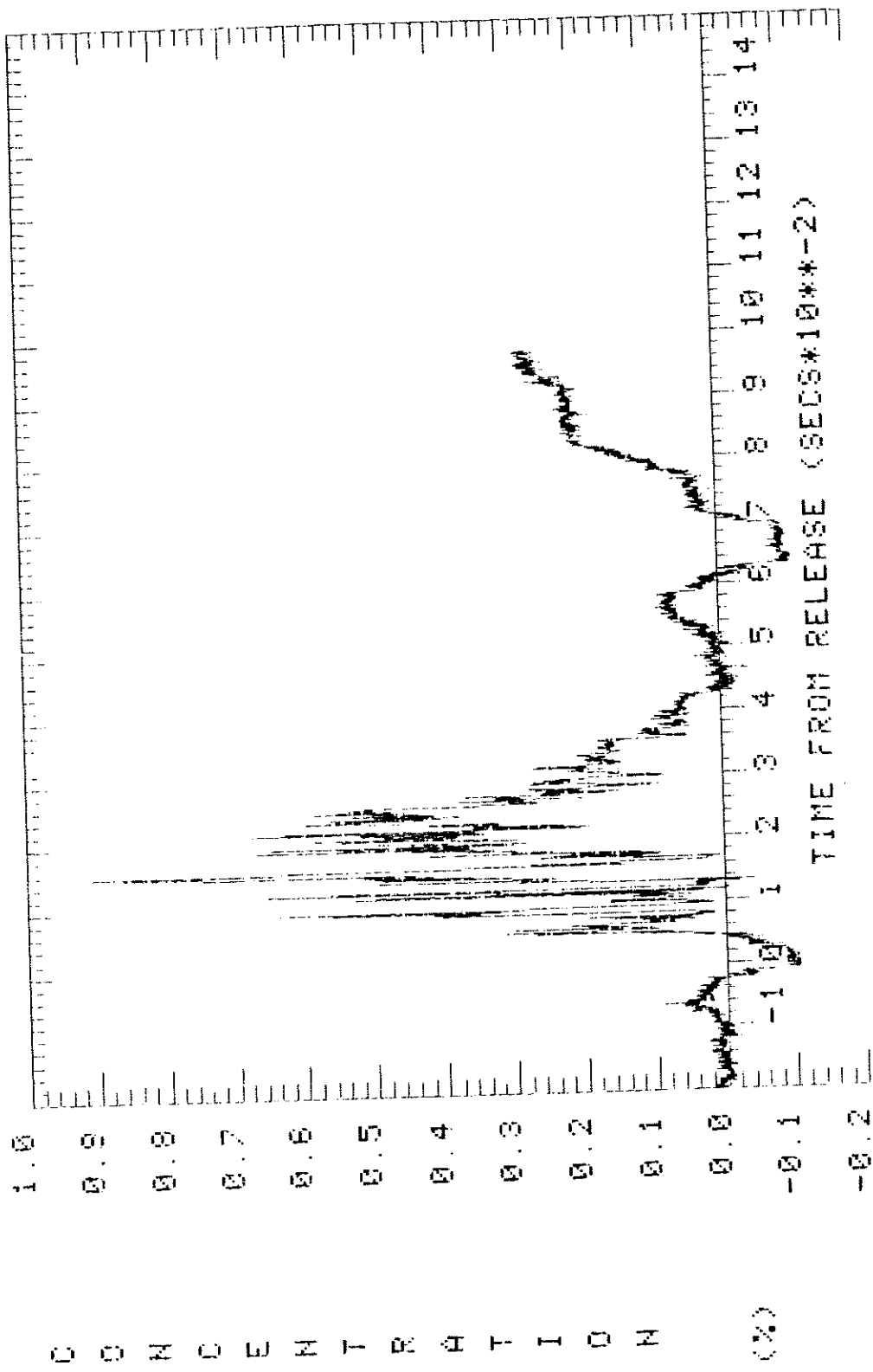
X: 429 M Y: 289 M Z: 1.4 M

G33



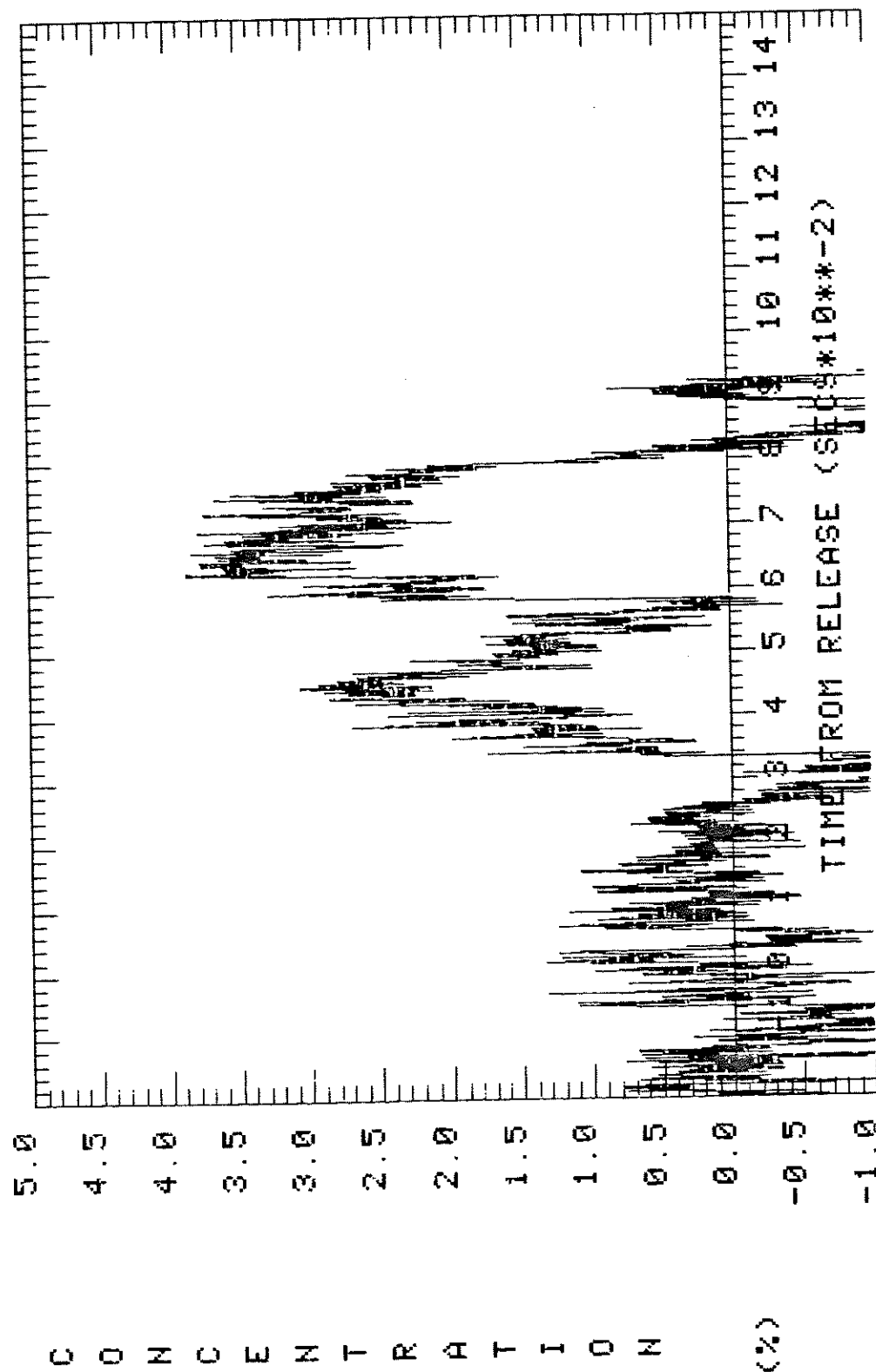
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 429 M Y: 299 M Z: 2.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.5 SECS

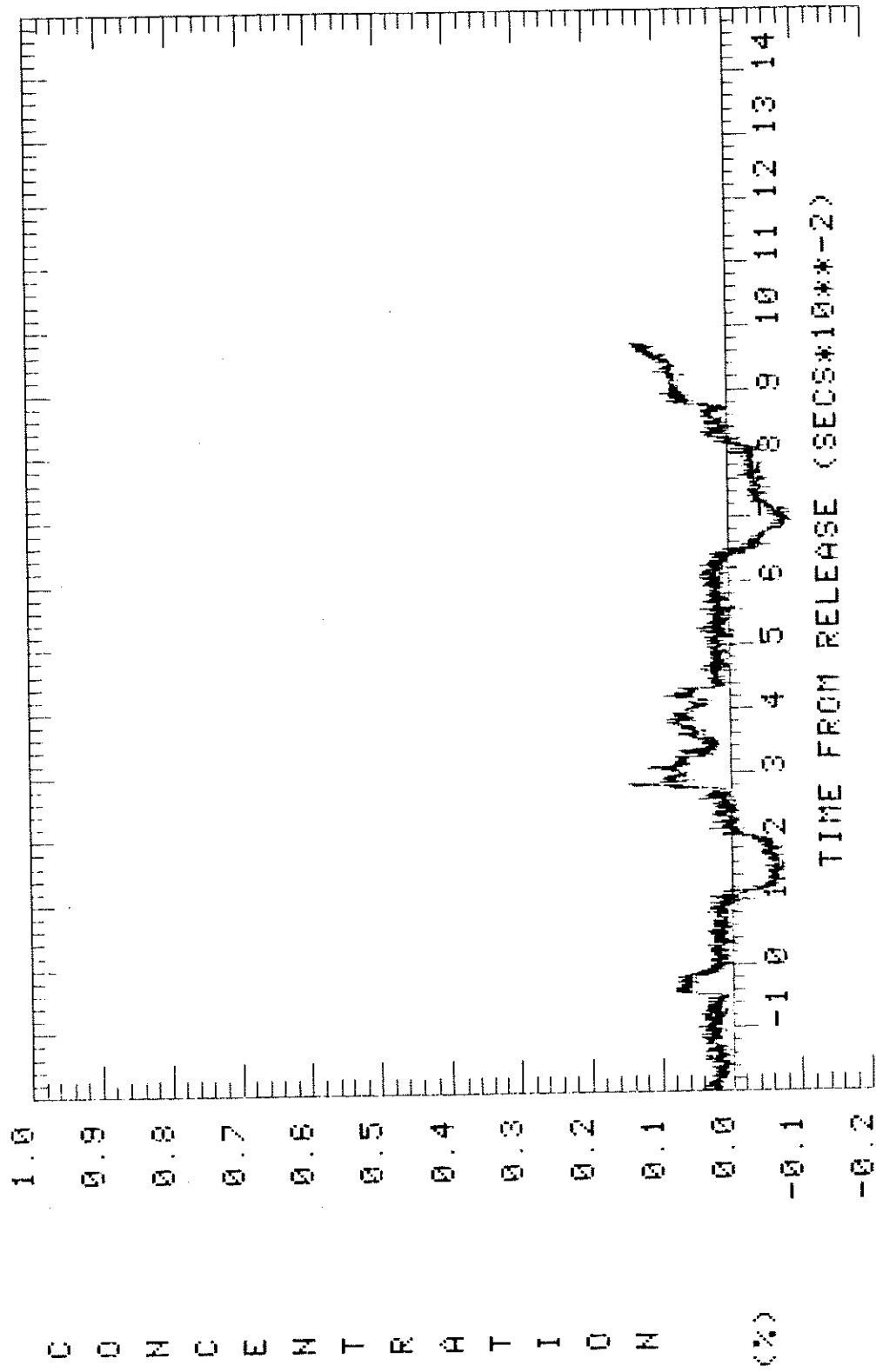
W: 428 M Y: 288 M Z: 4.4 M



TRIAL: 051 TYPE: HGAS AVERAGING TIME: 0.6 SECS

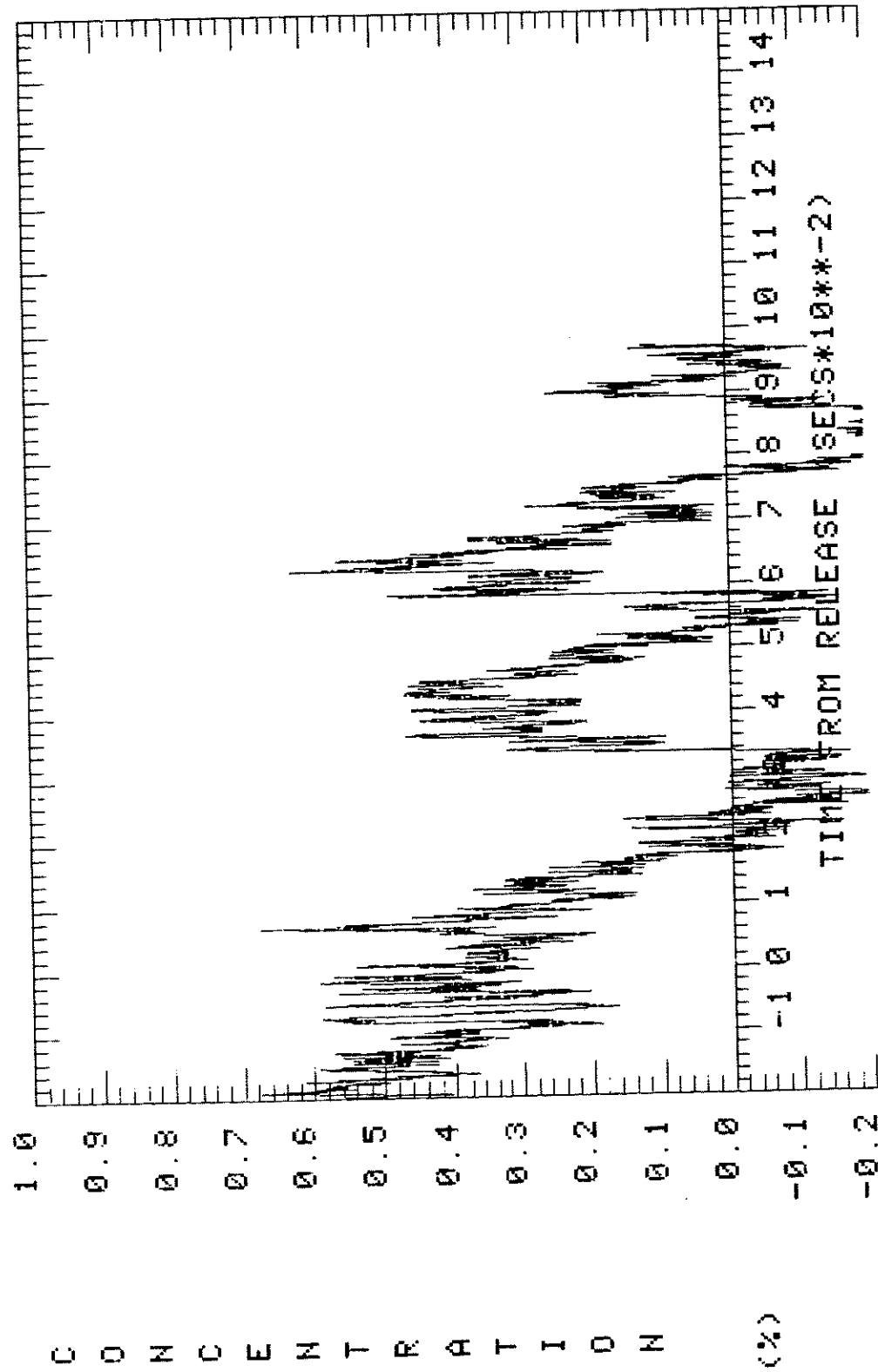
X: 450 M Y: 275 M Z: 1.0 M

G36



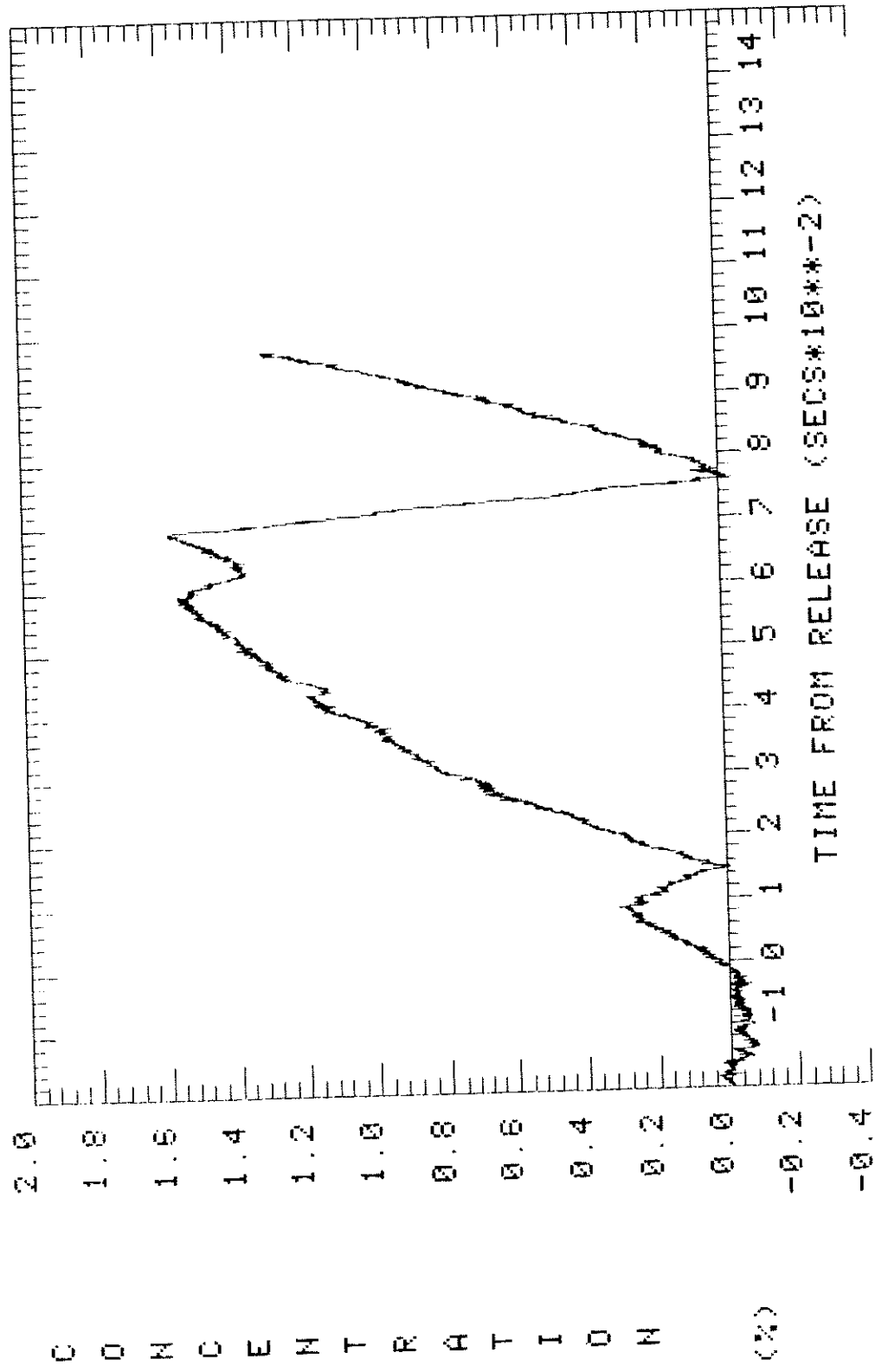
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



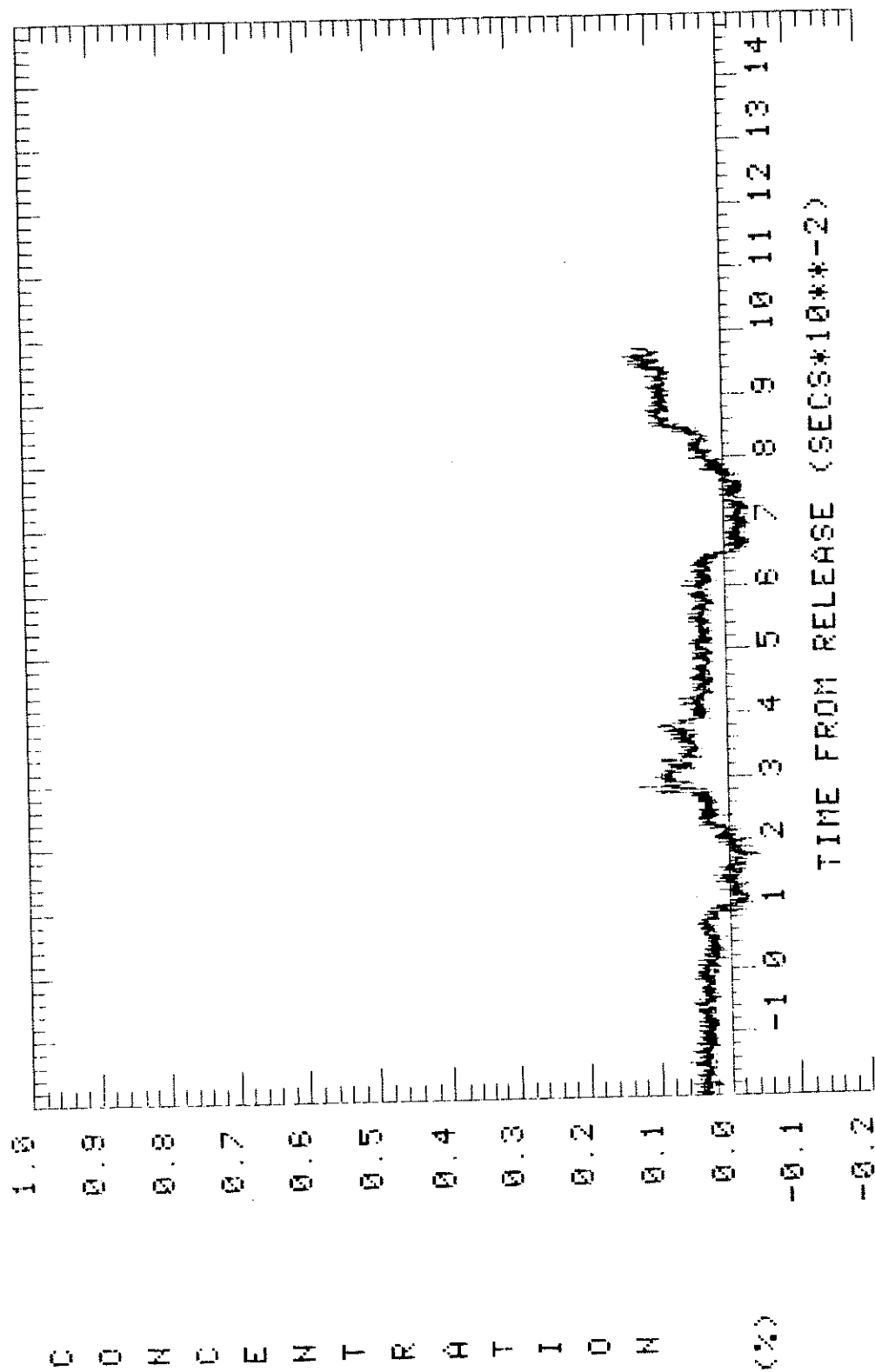
TRIAL: 051 TYPE: HGAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 275 M Z: 2.0 M



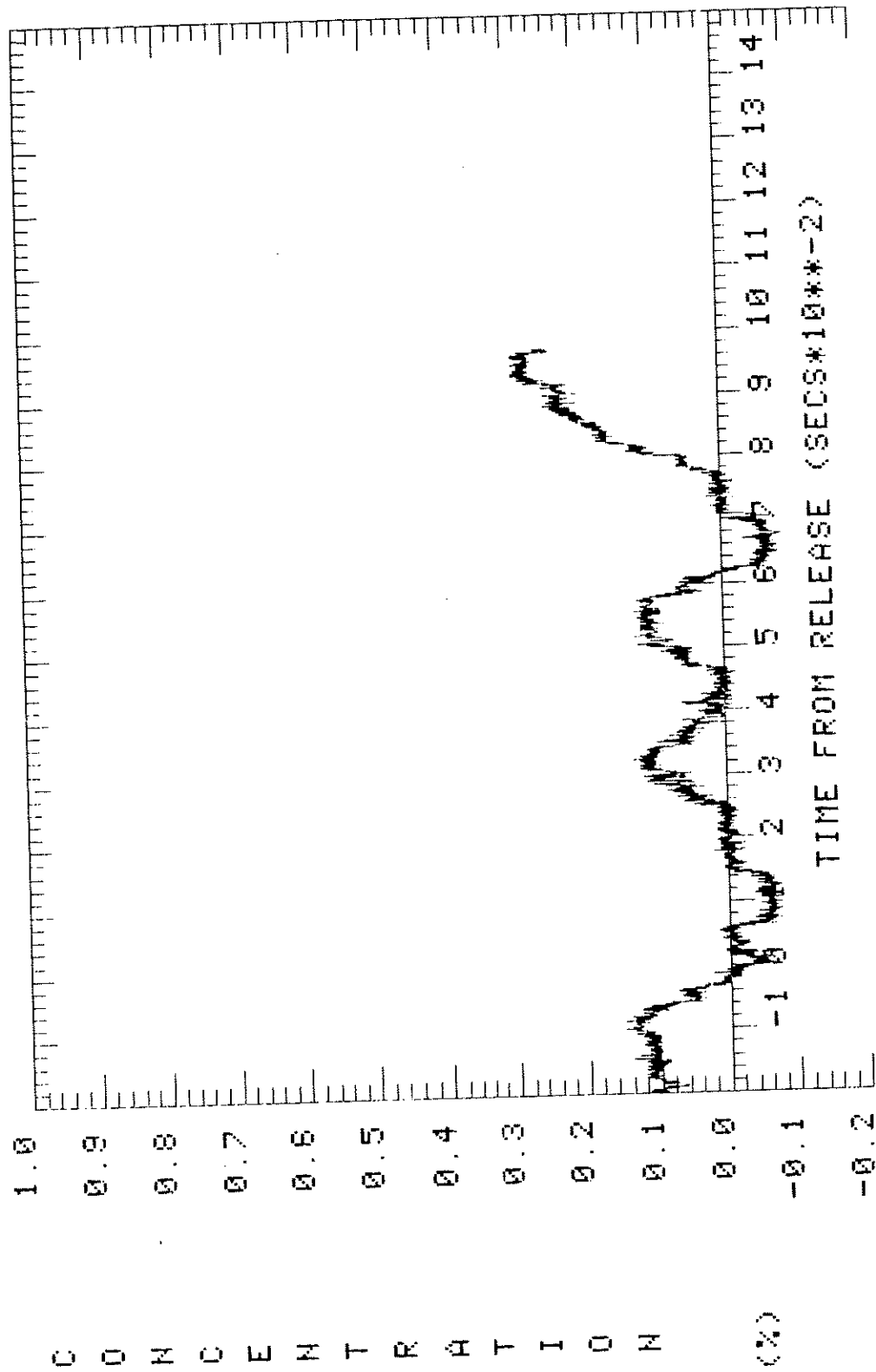
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 275 M Z: 2.4 M



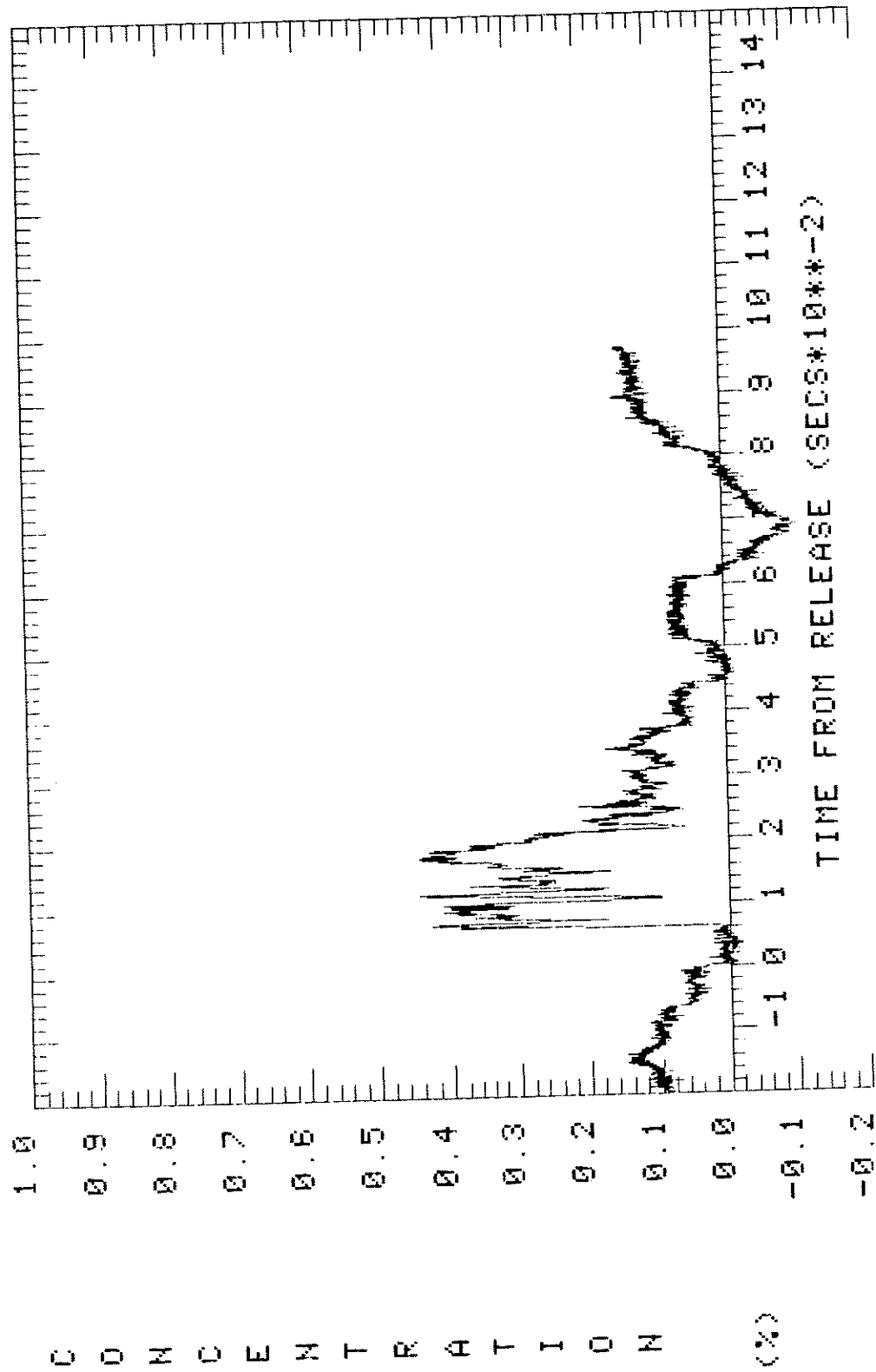
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



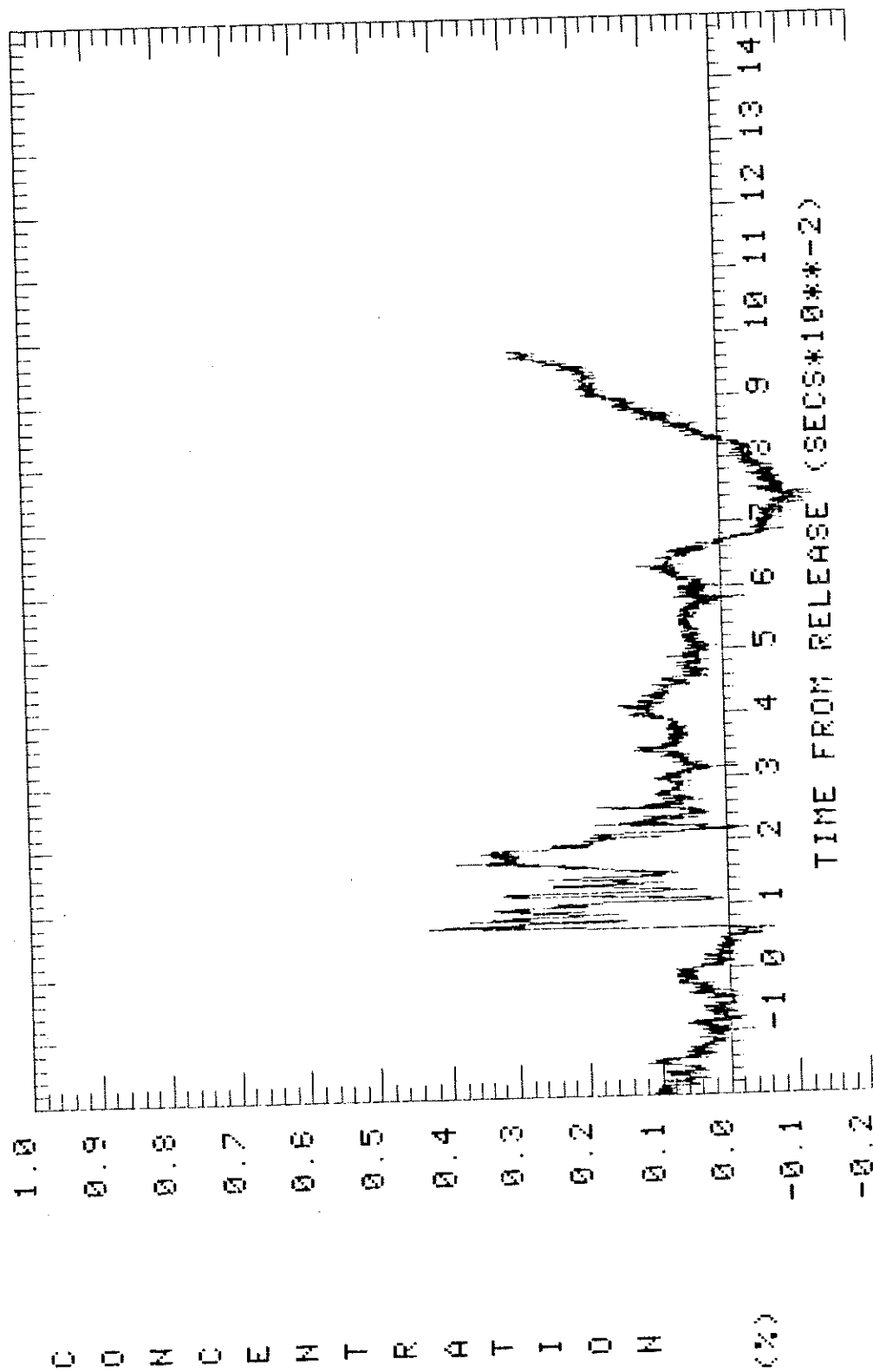
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

X: 450 M Y: 275 M Z: 10.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

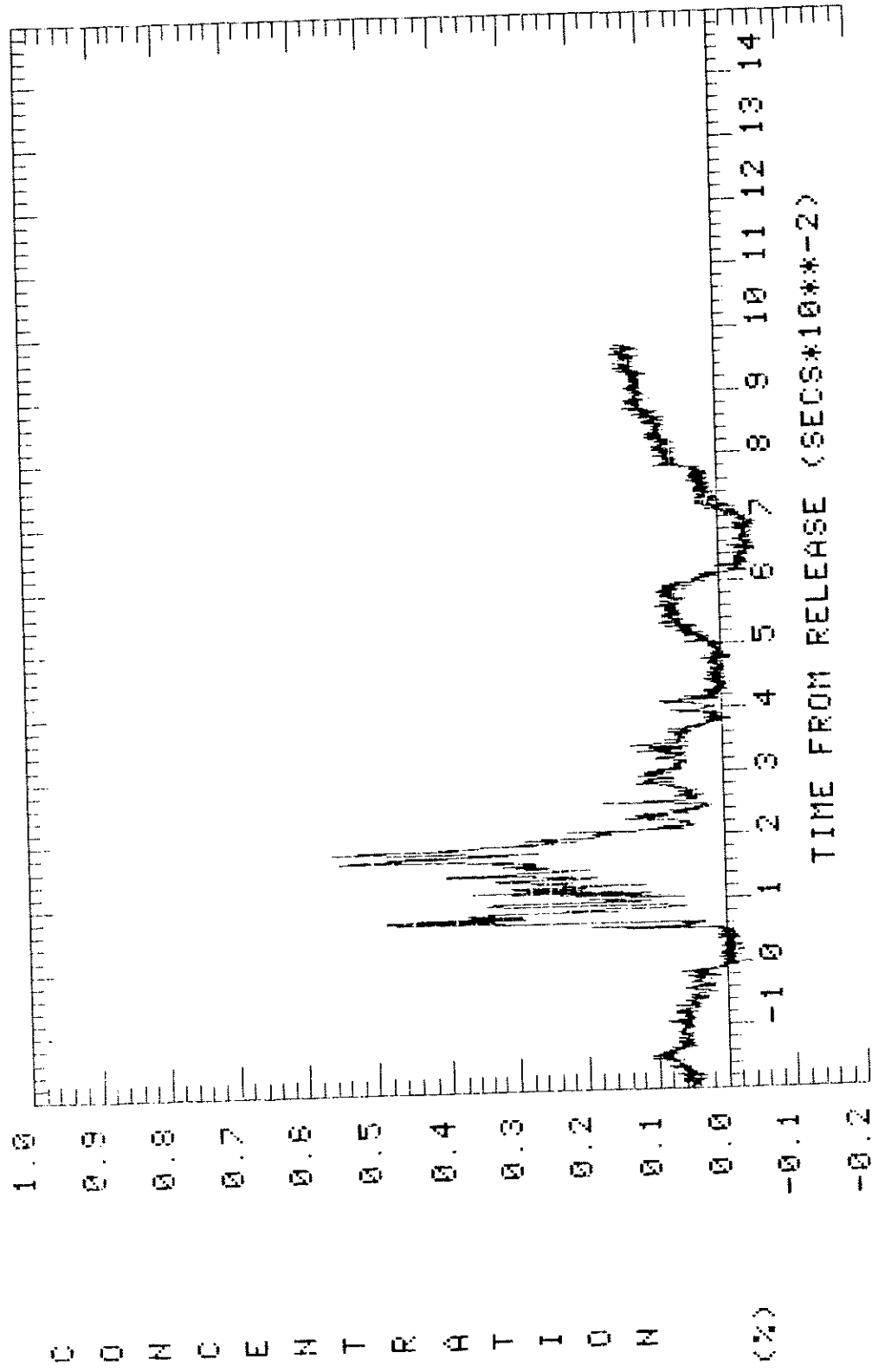
X: 400 M Y: 300 M Z: 0.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

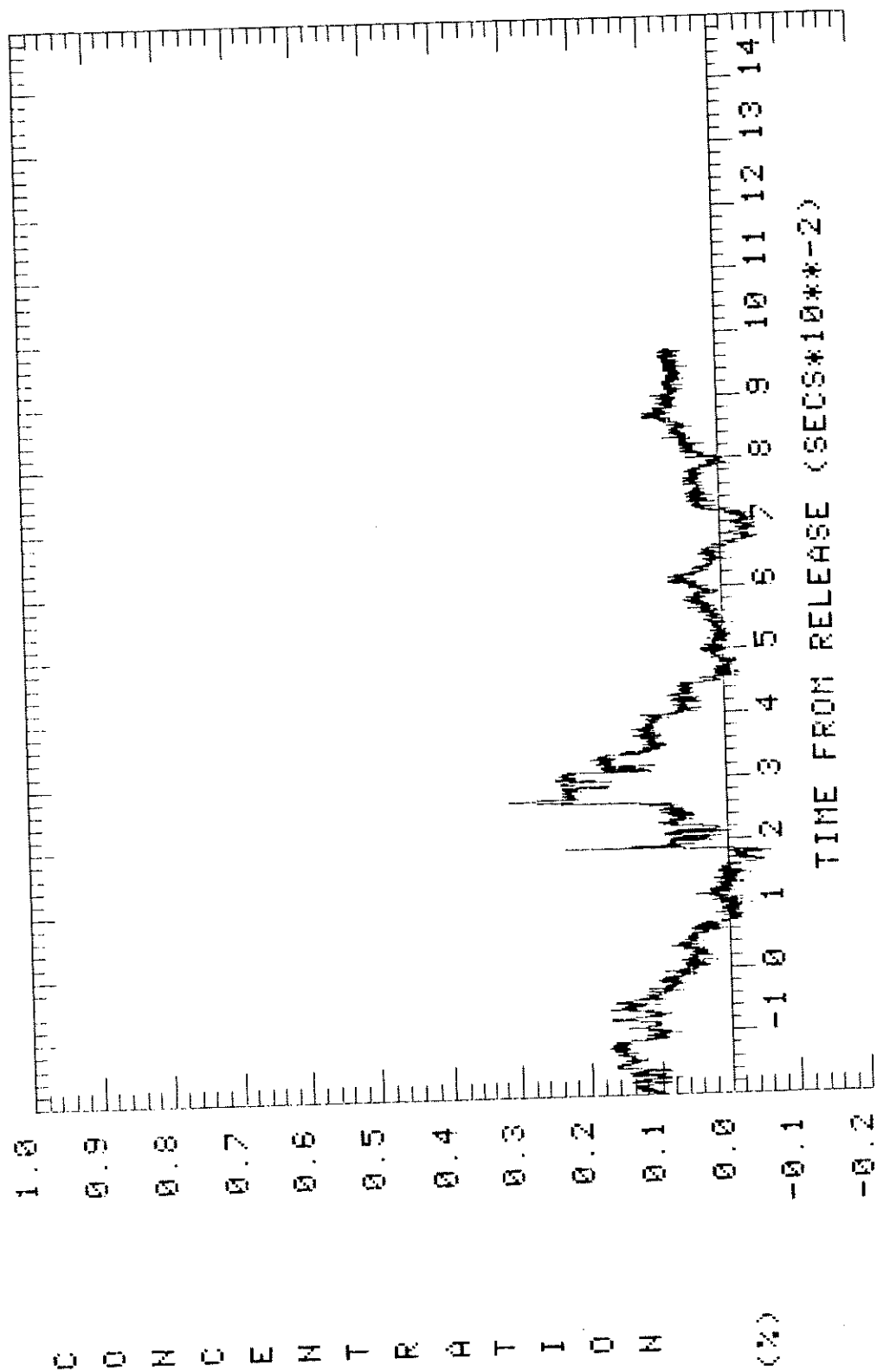
X: 400 M Y: 320 M Z: 1.4 M

G43



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

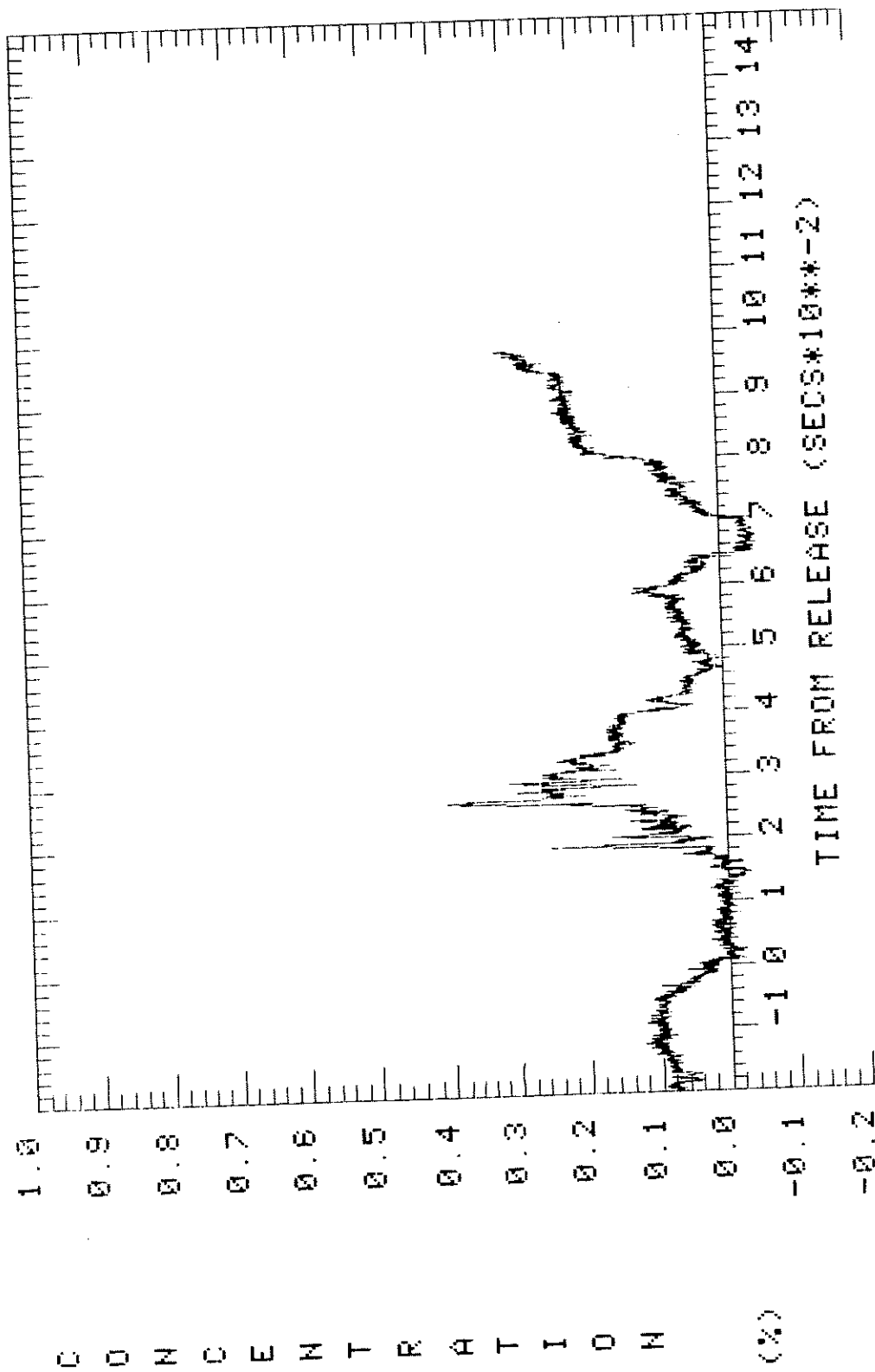
X: 400 M Y: 300 M Z: 4.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

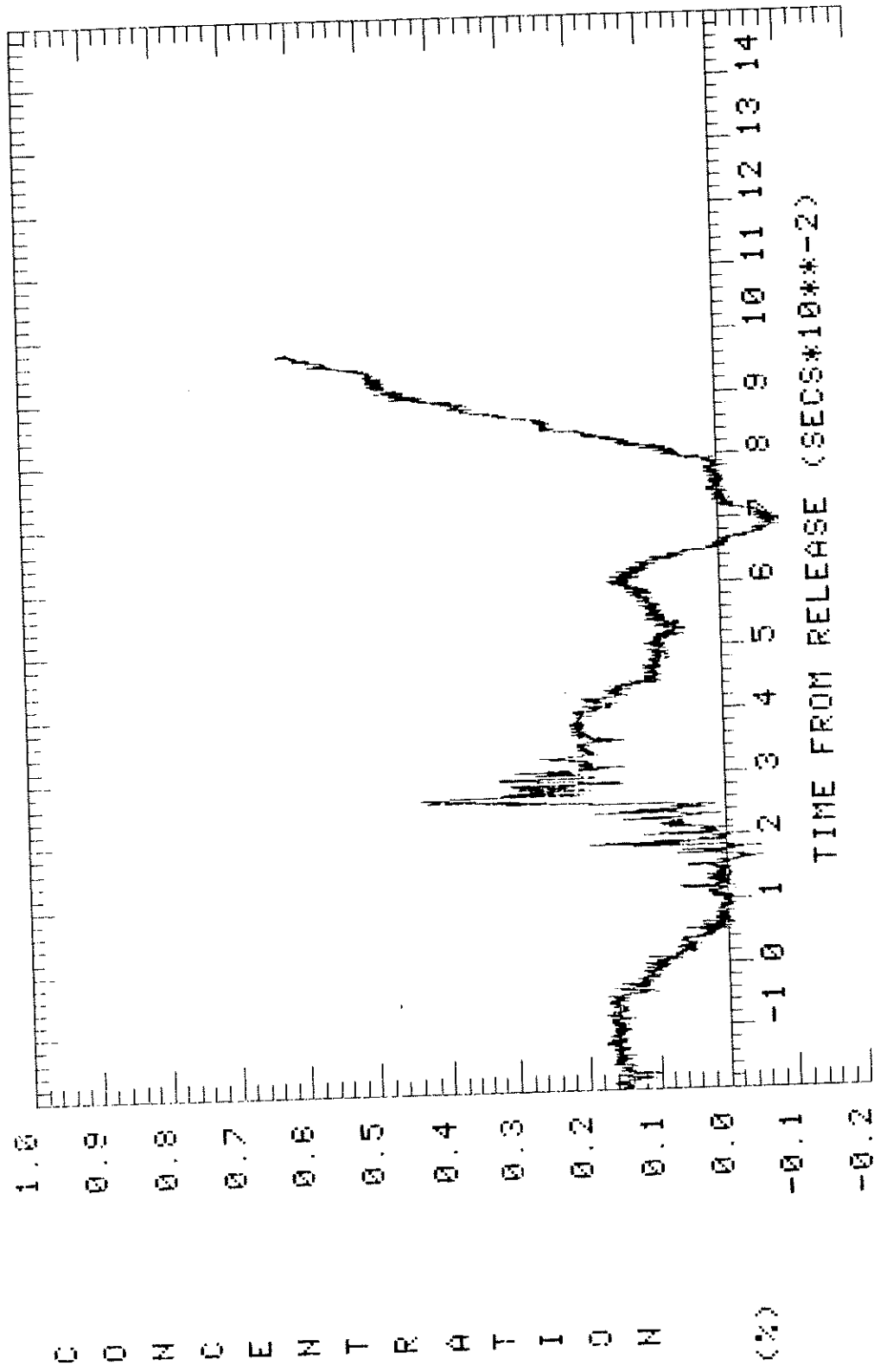
X: 438 M Y: 292 M Z: 0.4 M

G45



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

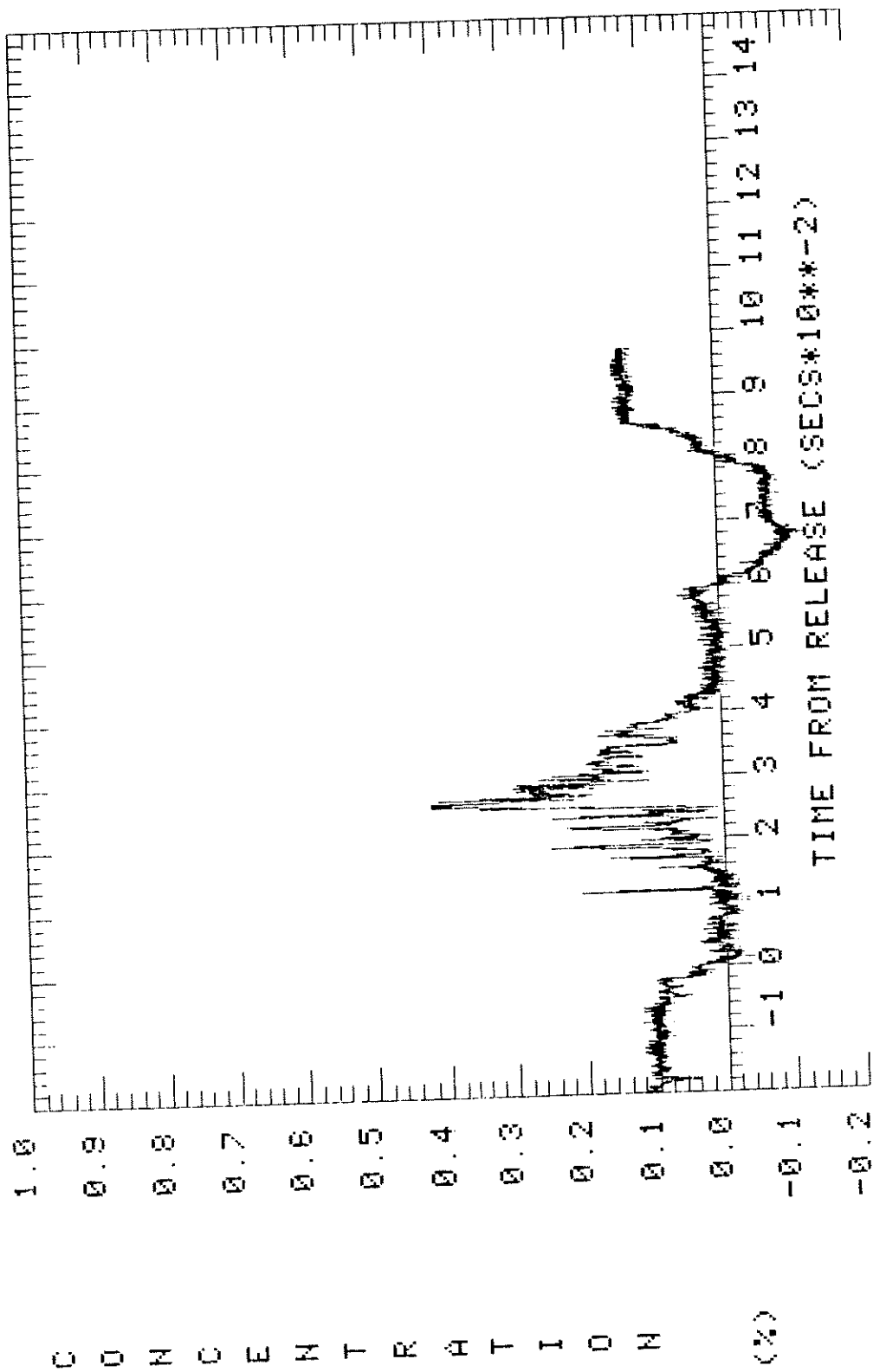
X: 438 M Y: 292 M Z: 1.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

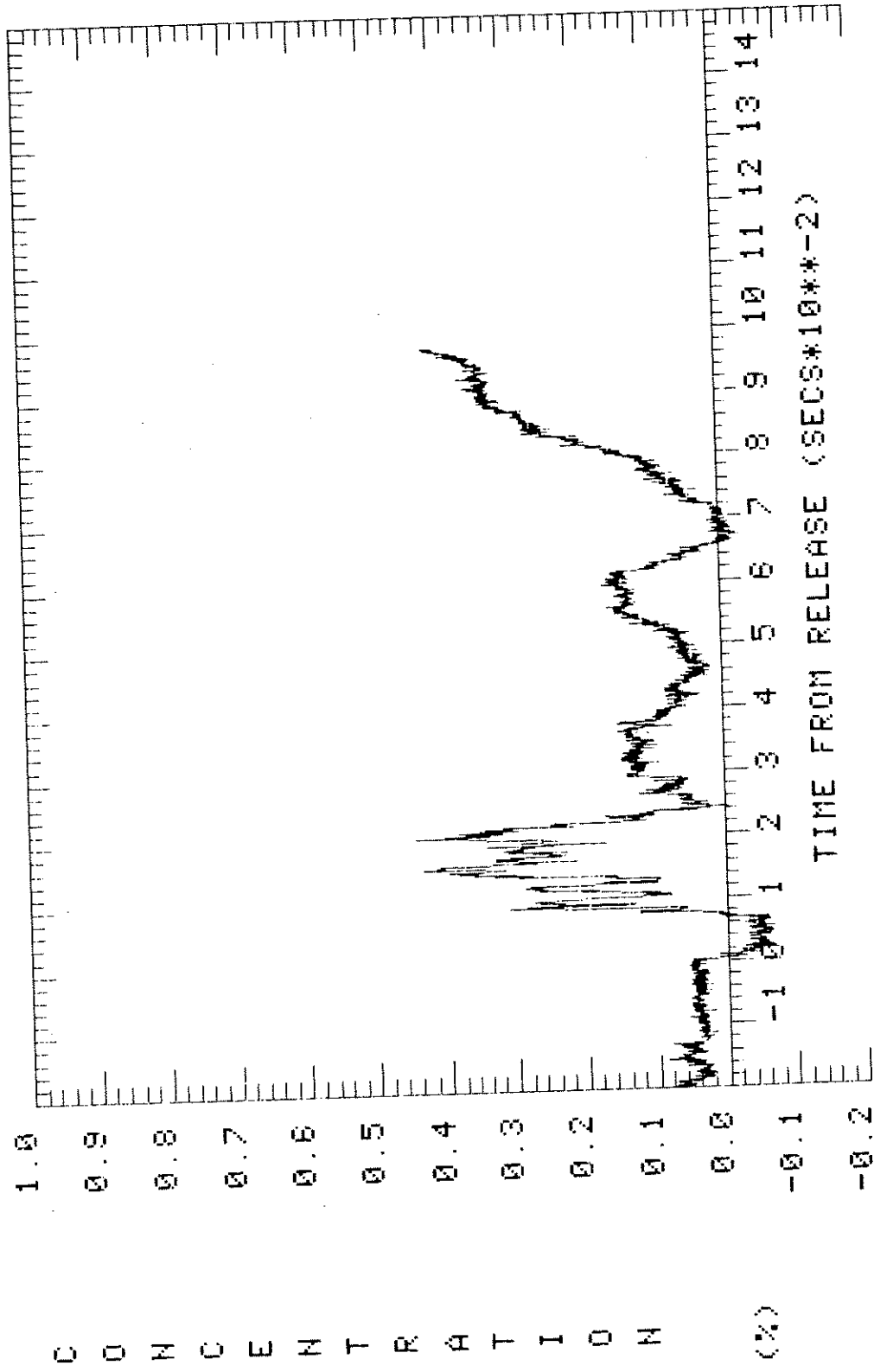
X: 438 M Y: 292 M Z: 2.4 M

G47



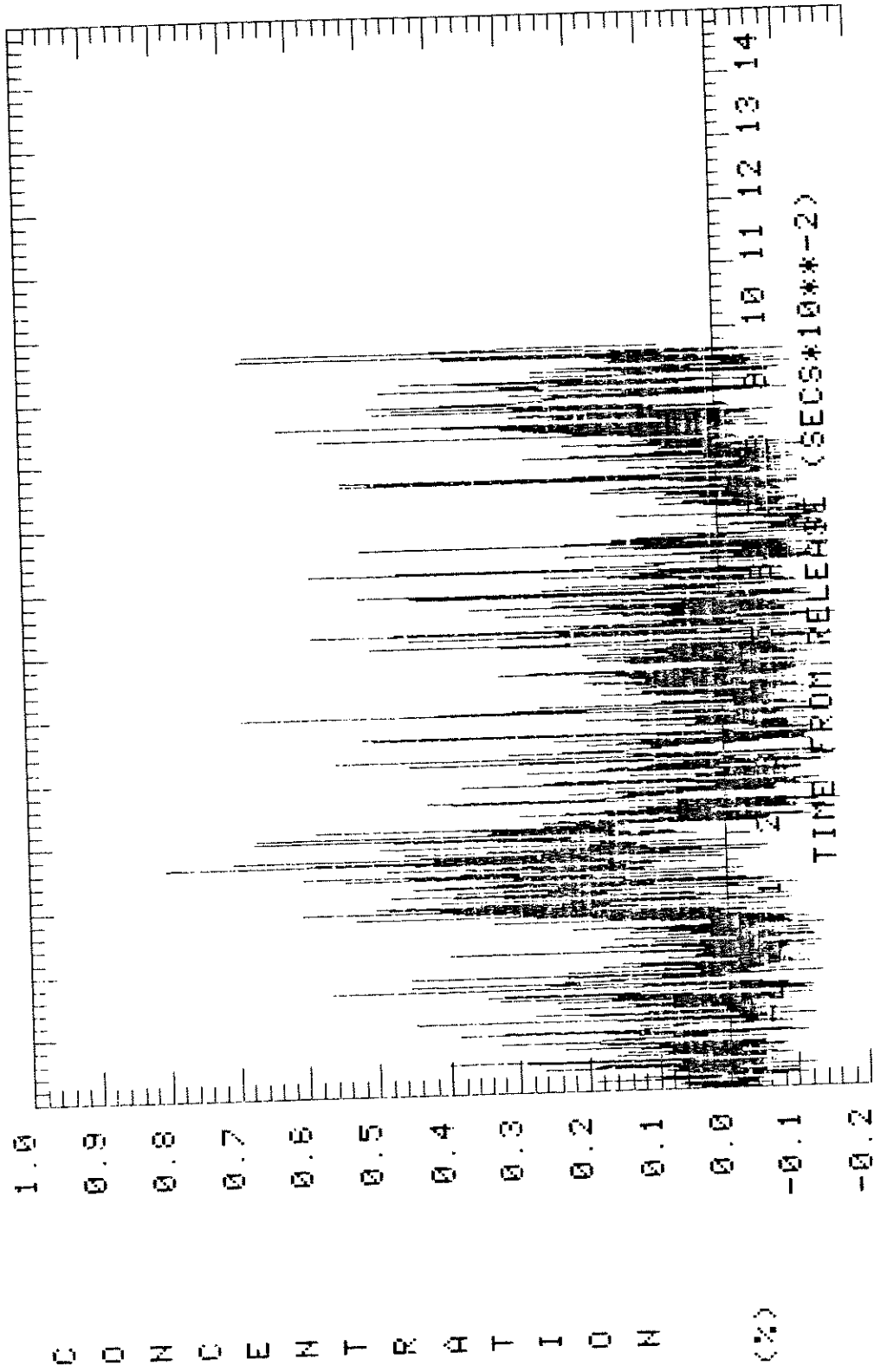
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



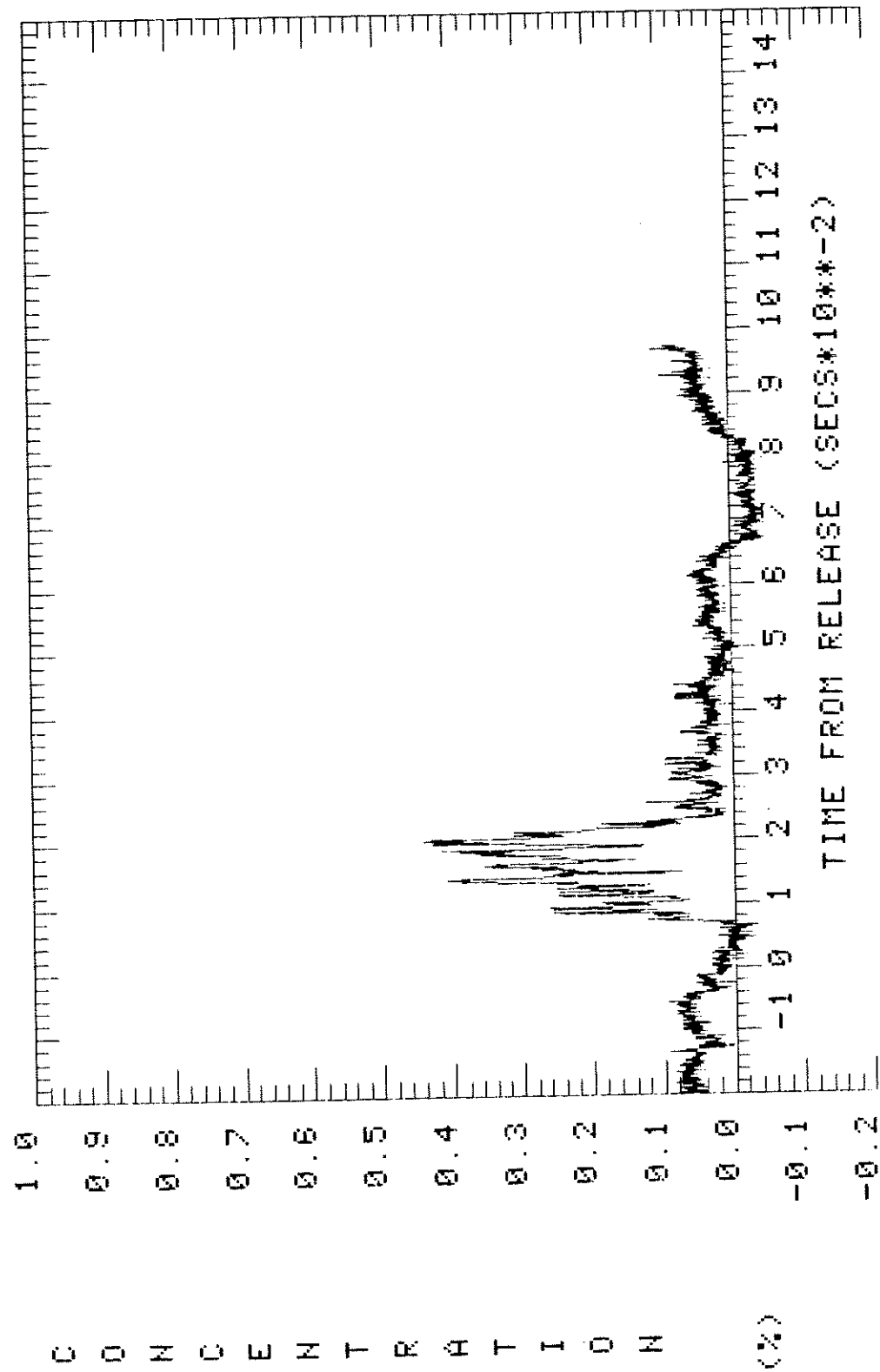
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

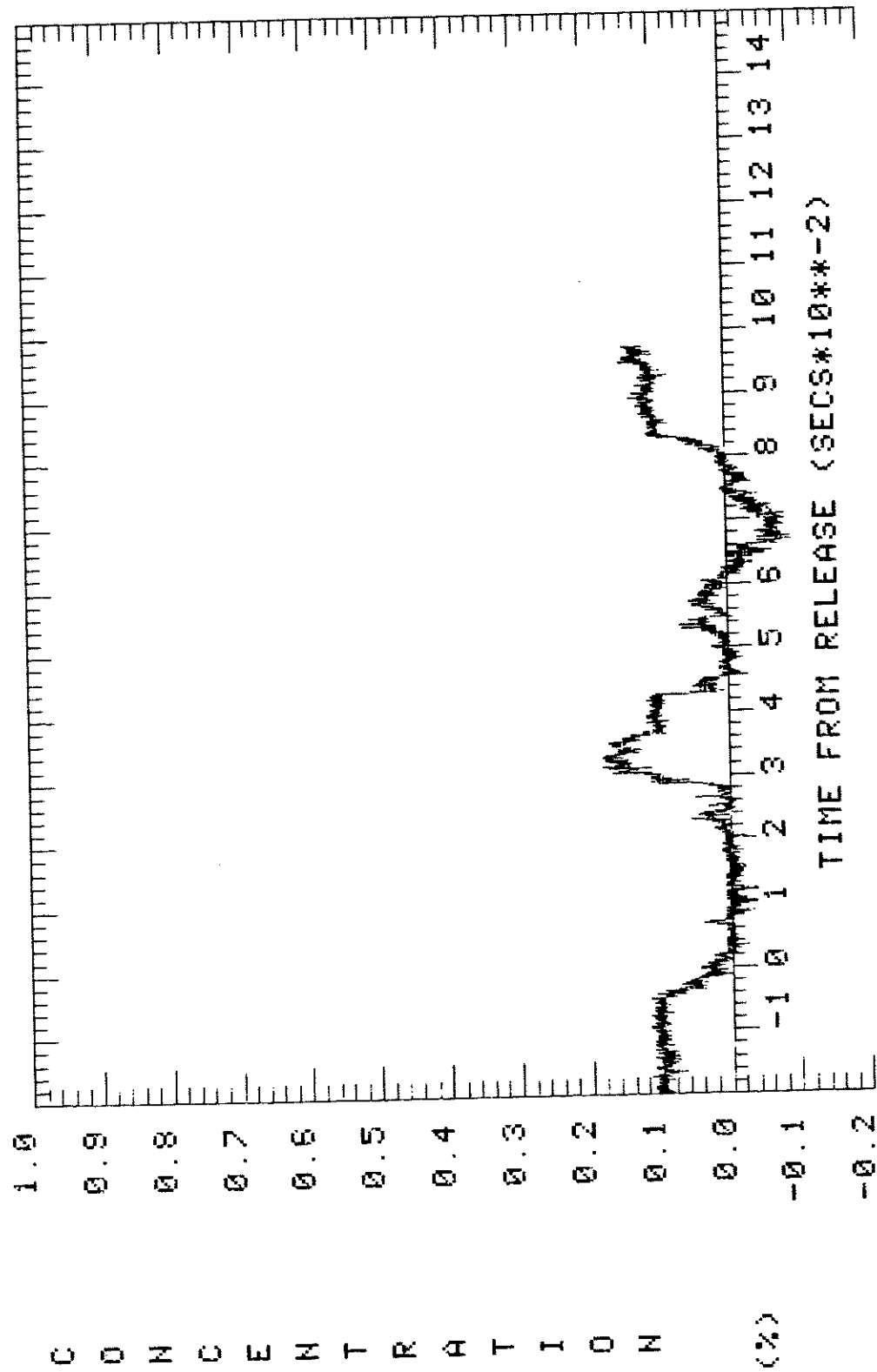
X: 400 M Y: 350 M Z: 1.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

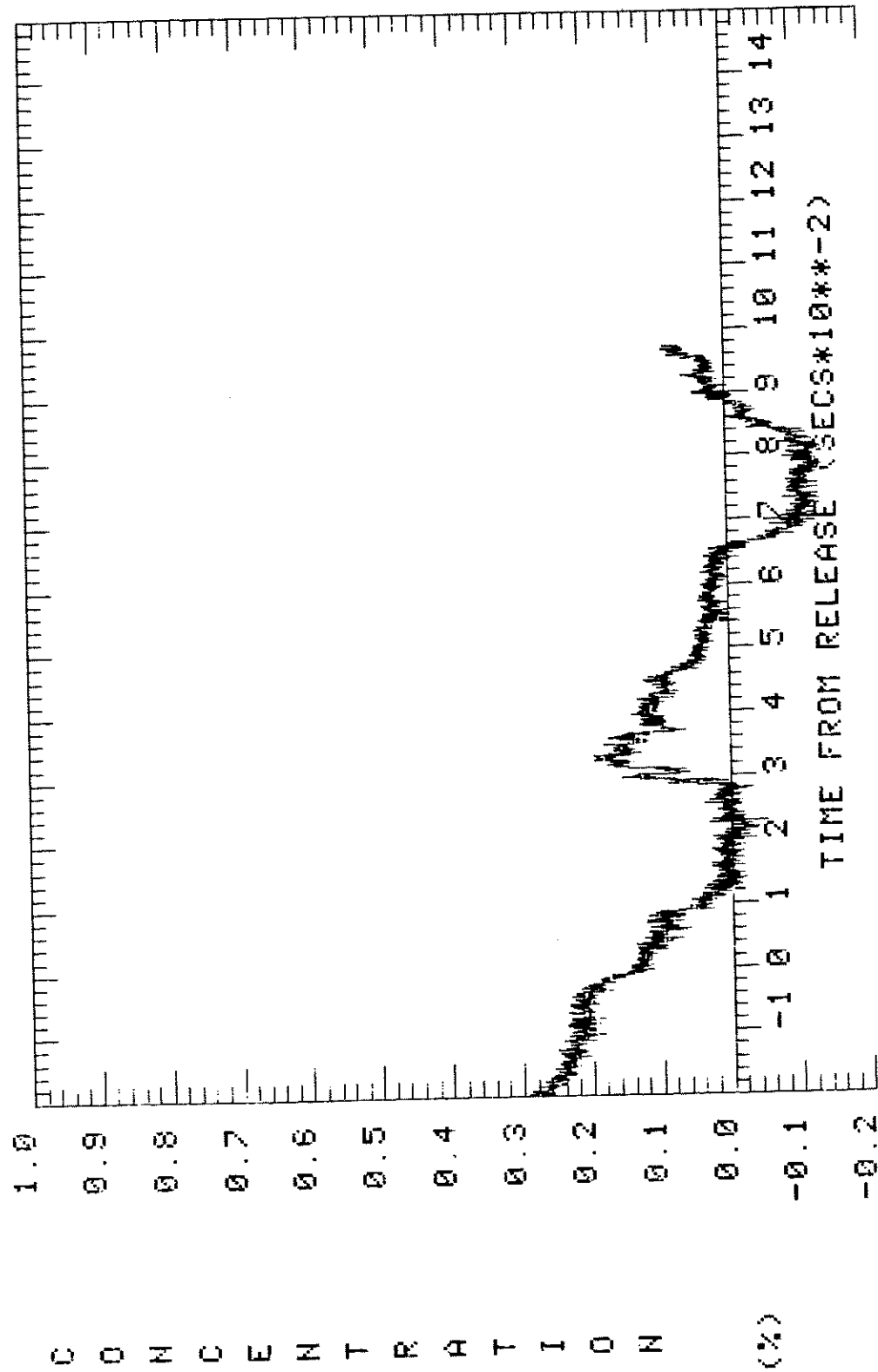
X: 400 M Y: 350 M Z: 4.4 M

G51



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

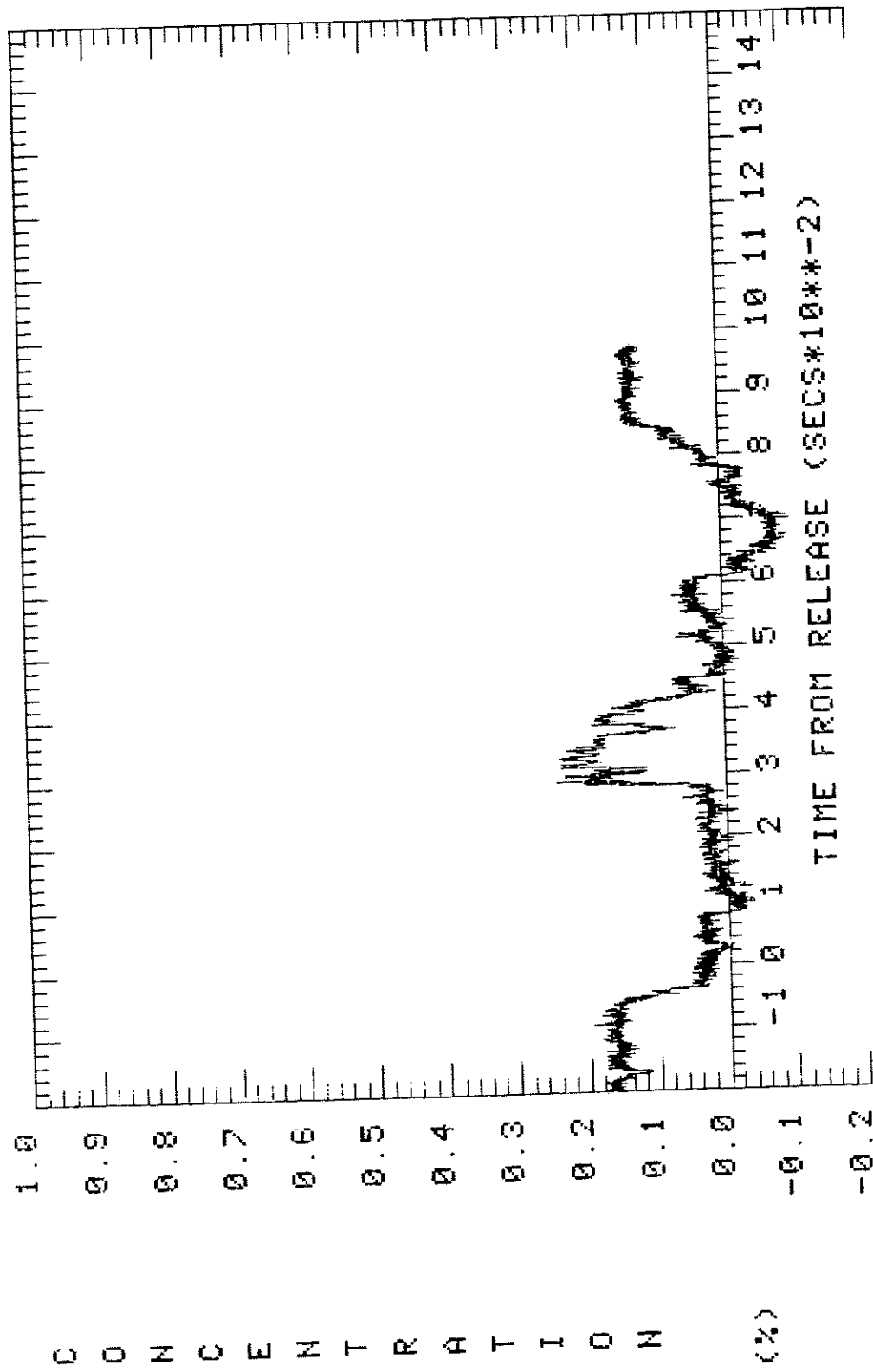
X: 450 M Y: 350 M Z: 0.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

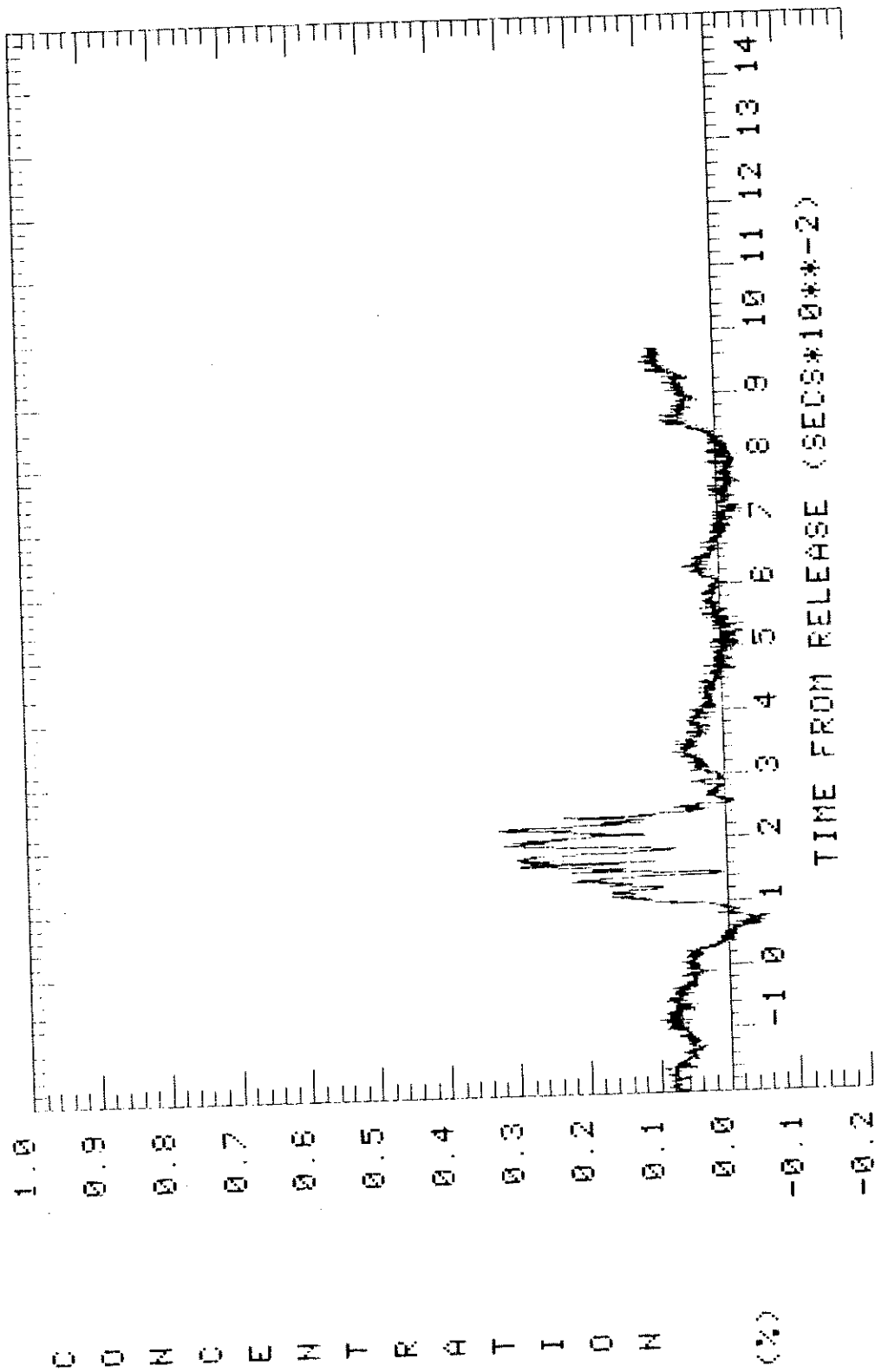
X: 450 M Y: 350 M Z: 1.4 M

G53



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

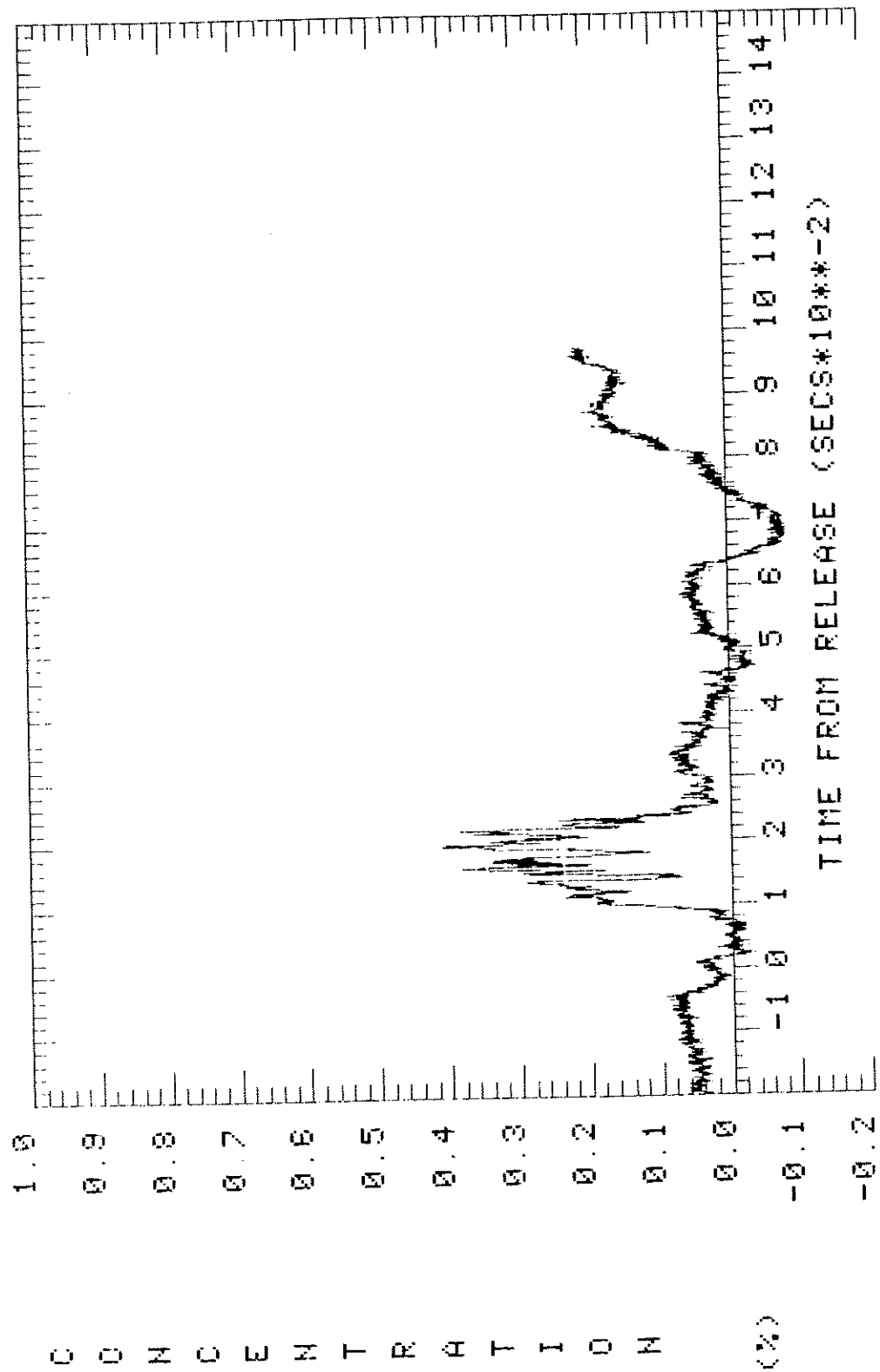
X: 450 M Y: 350 M Z: 4.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

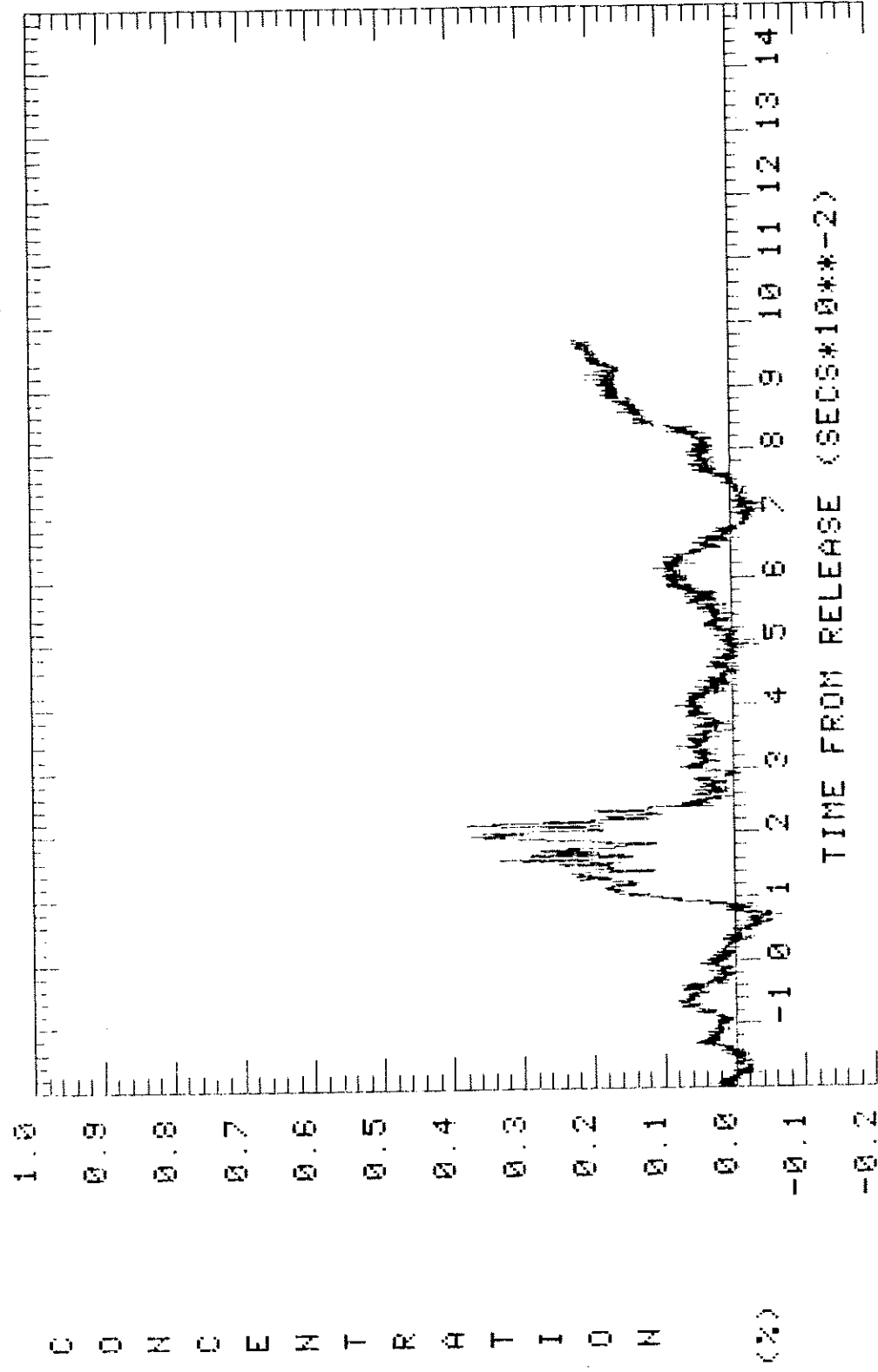
X: 400 M Y: 400 M Z: 0.4 M

G55



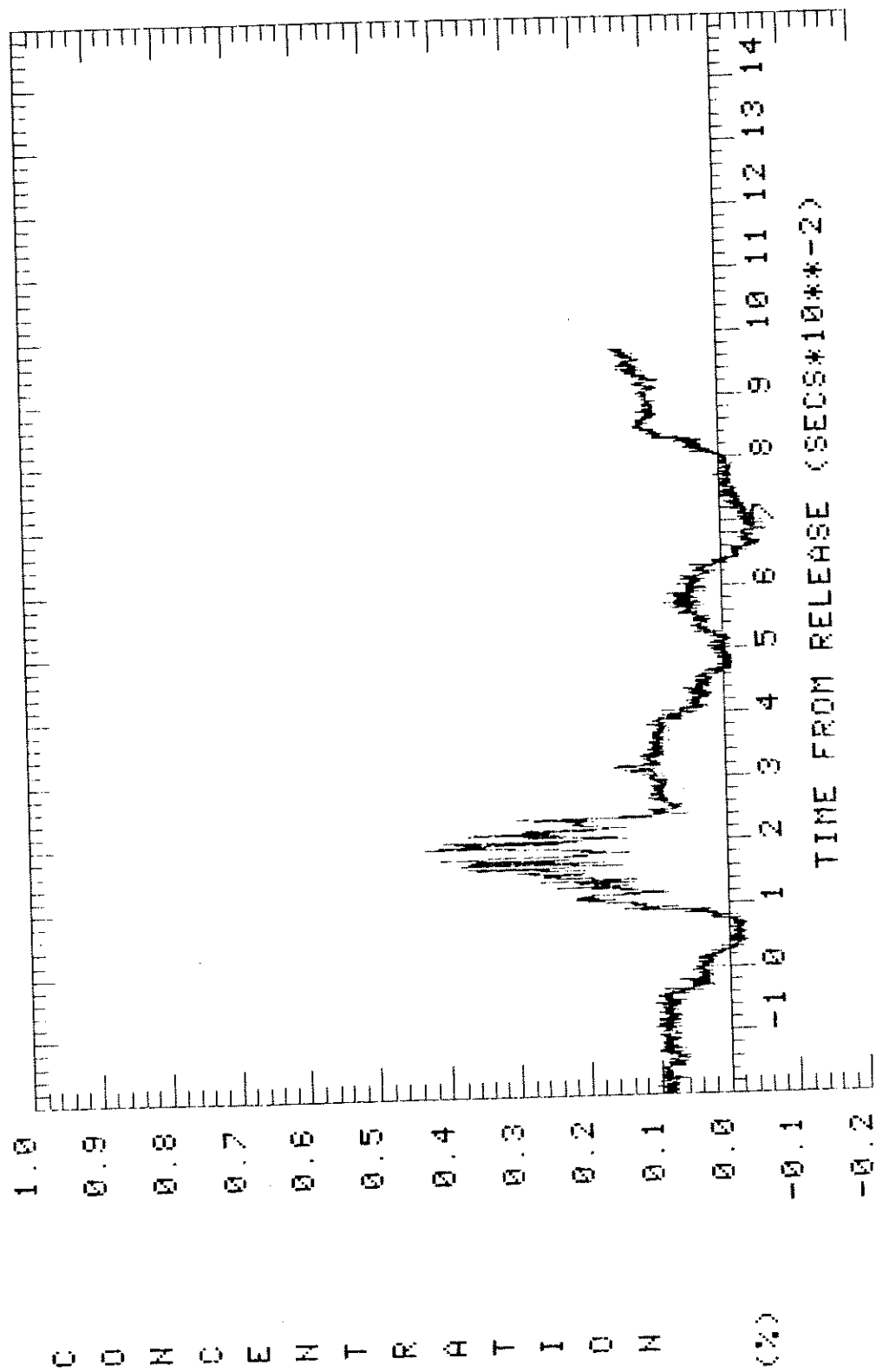
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



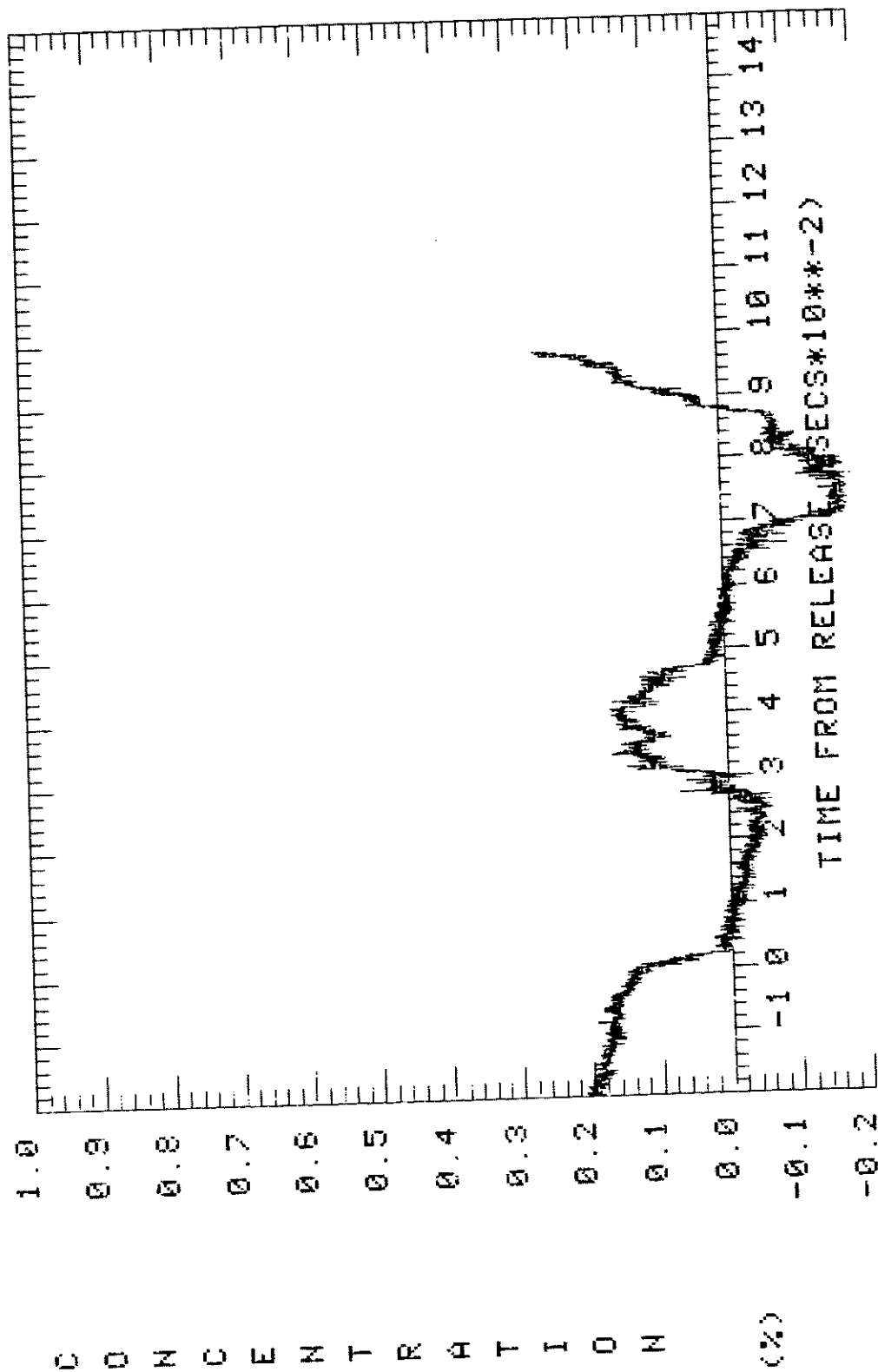
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

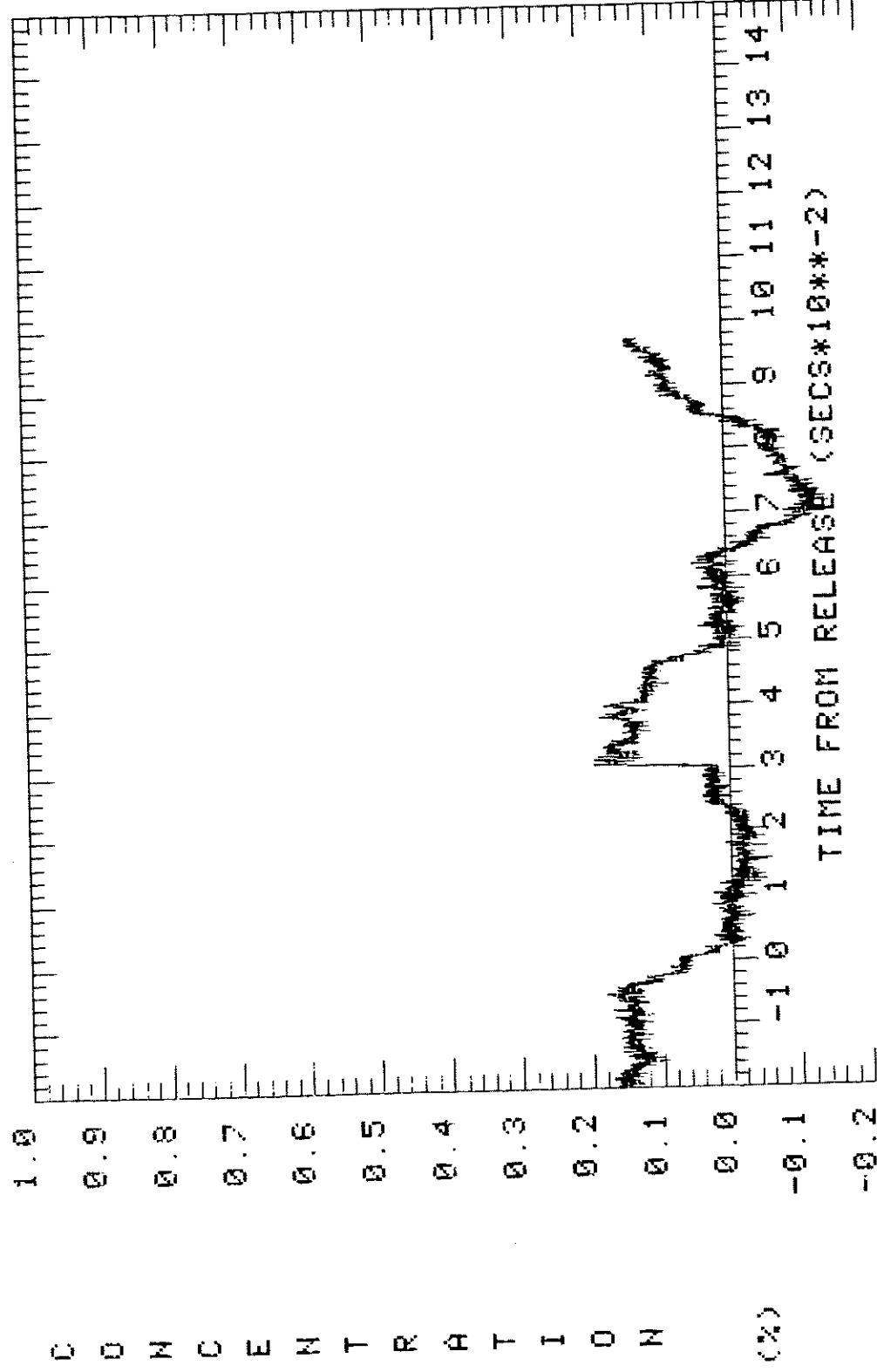
X: 400 M Y: 400 M Z: 6.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

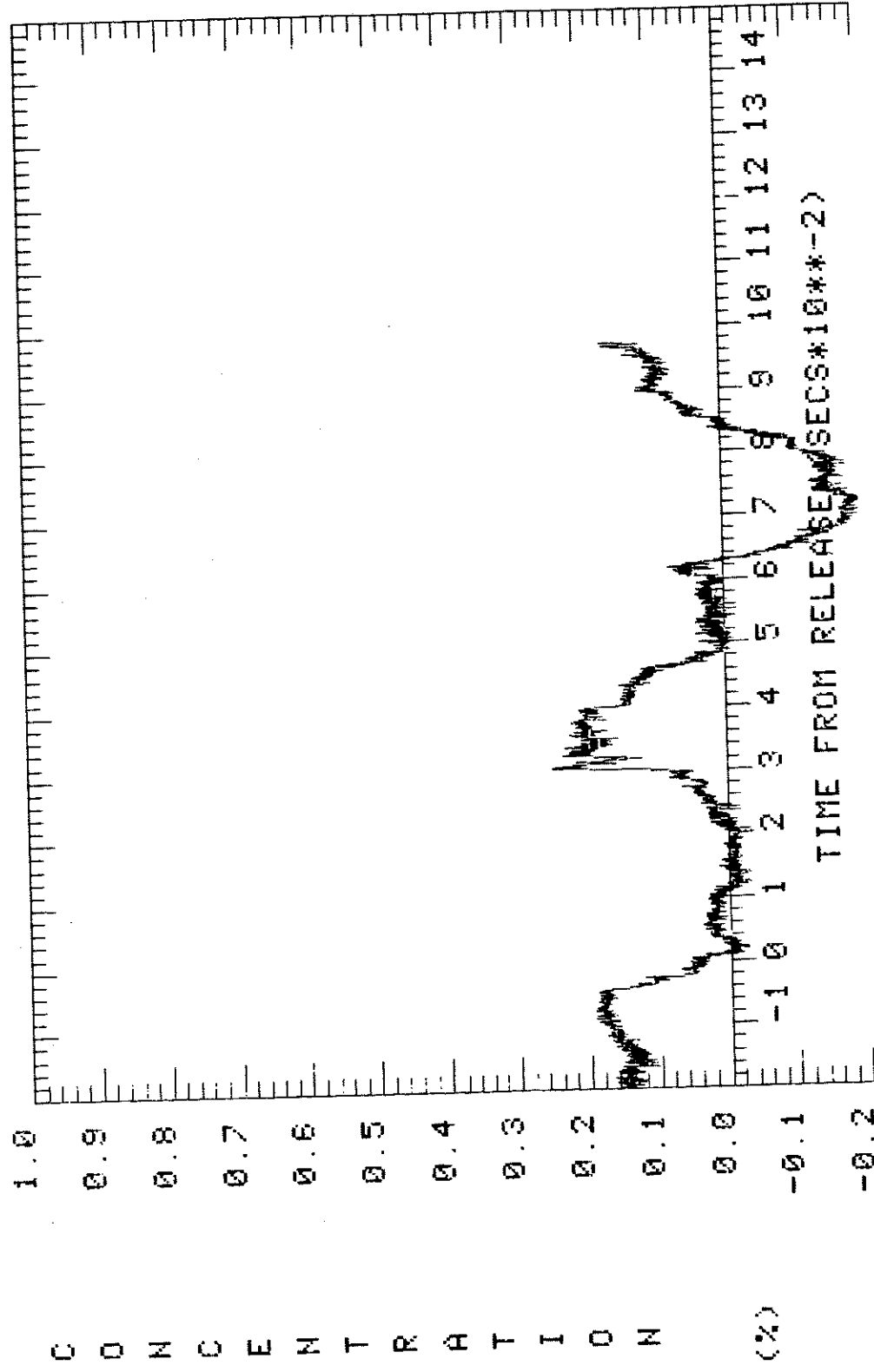
G59



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

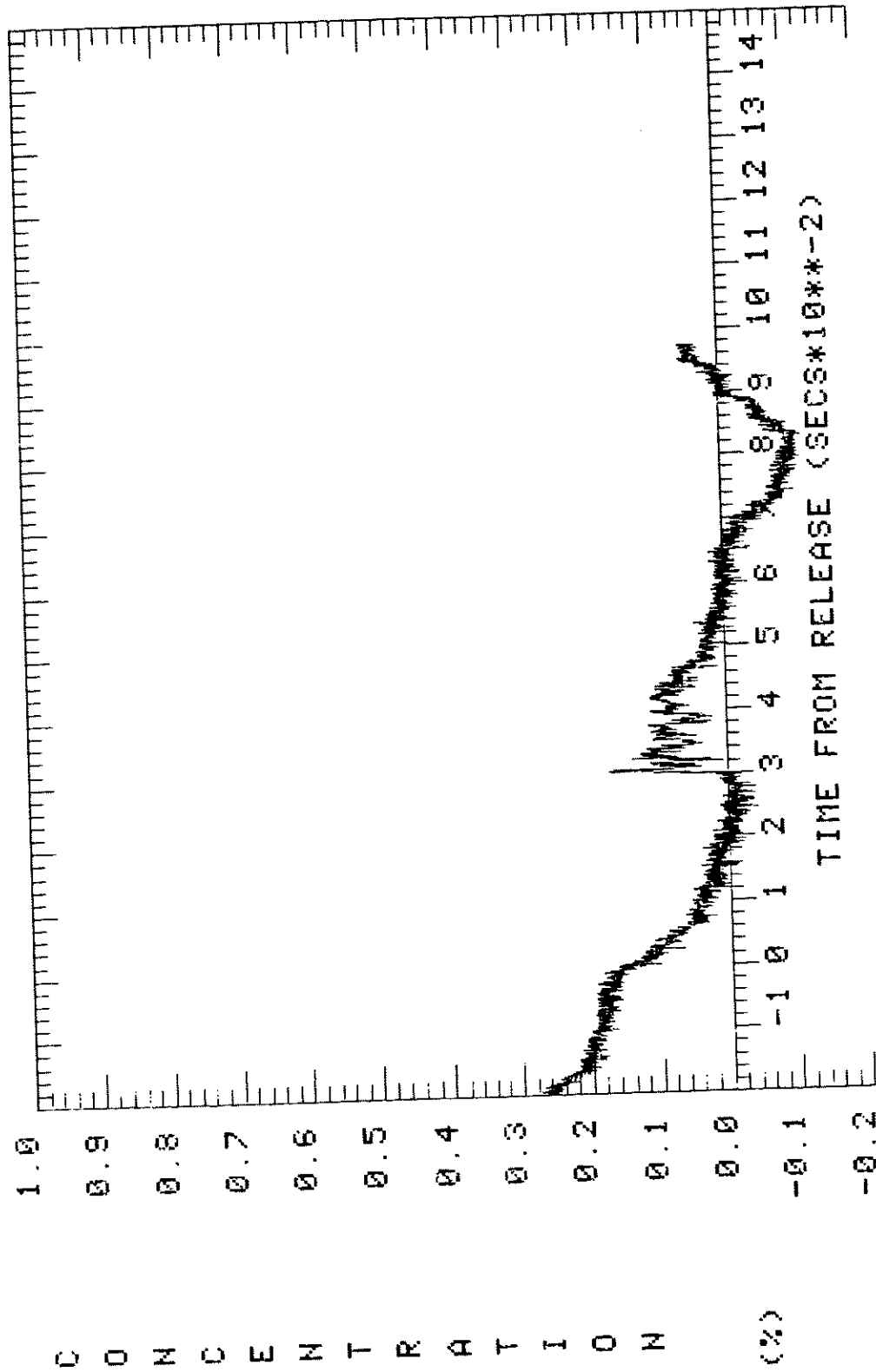
X: 450 M Y: 400 M Z: 2.4 M

G60



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

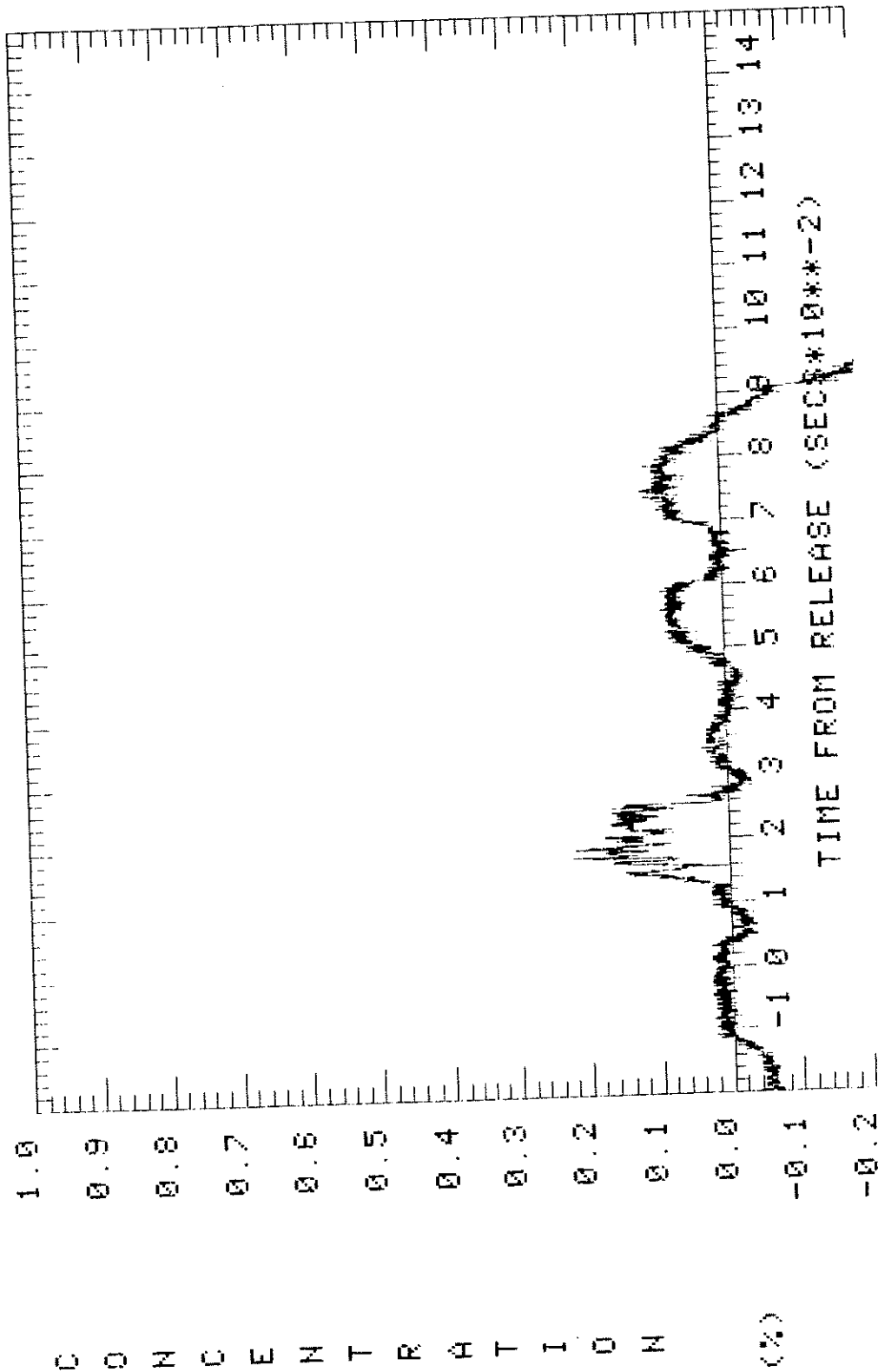
X: 450 M Y: 400 M Z: 4.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

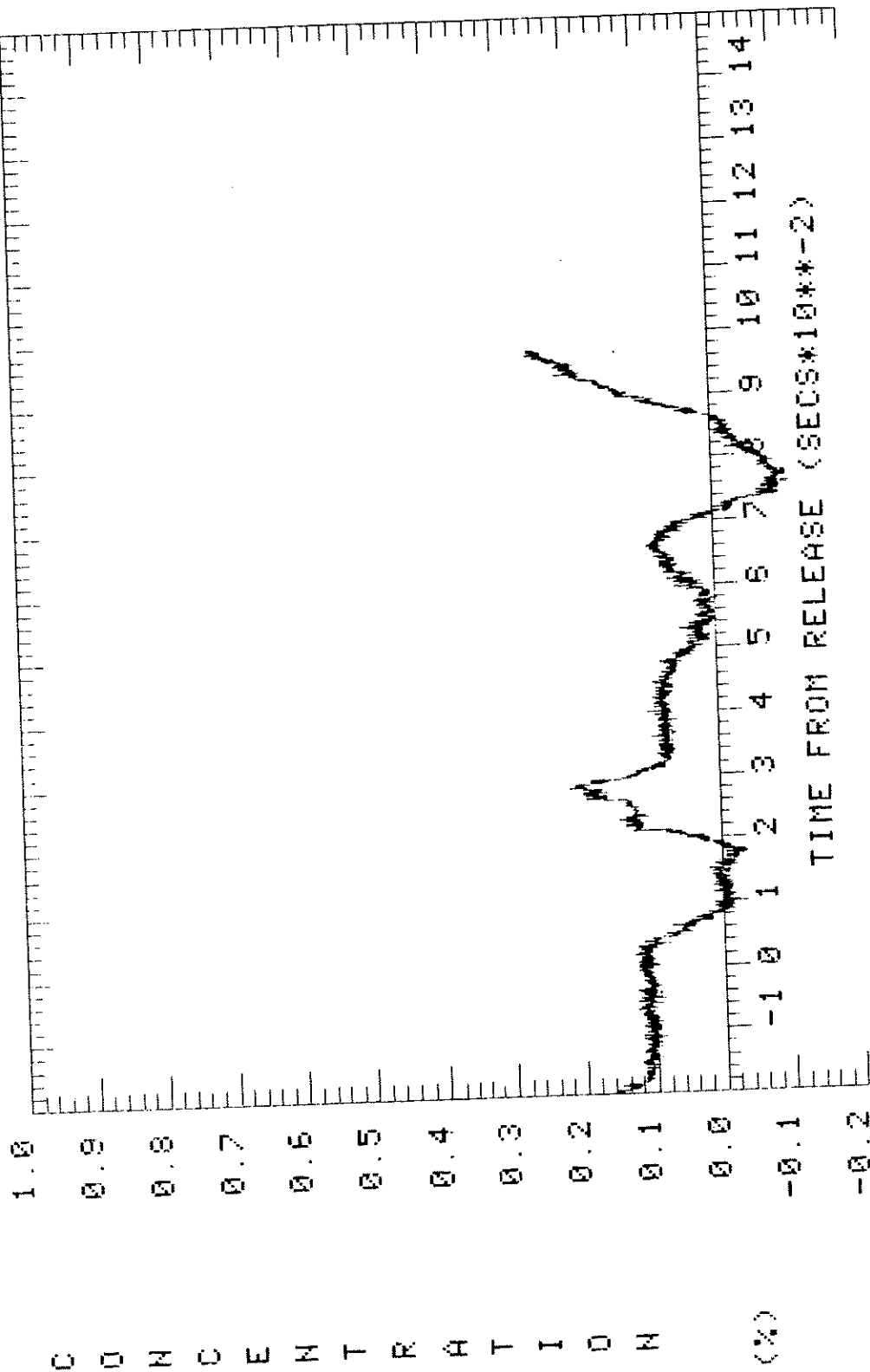
X: 450 M Y: 400 M Z: 6.4 M

G62



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

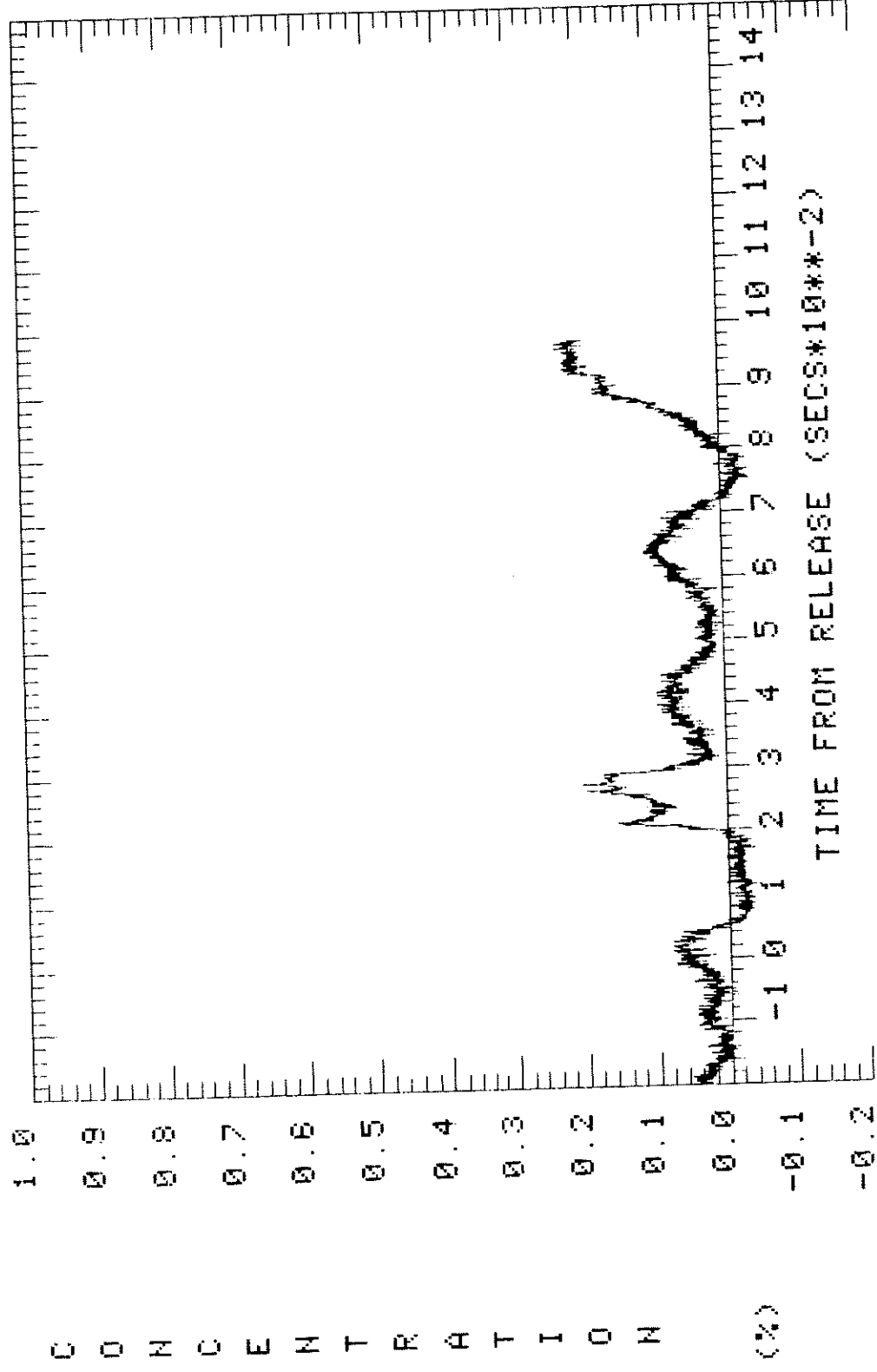
X: 400 M Y: 500 M Z: 2.4 M



TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

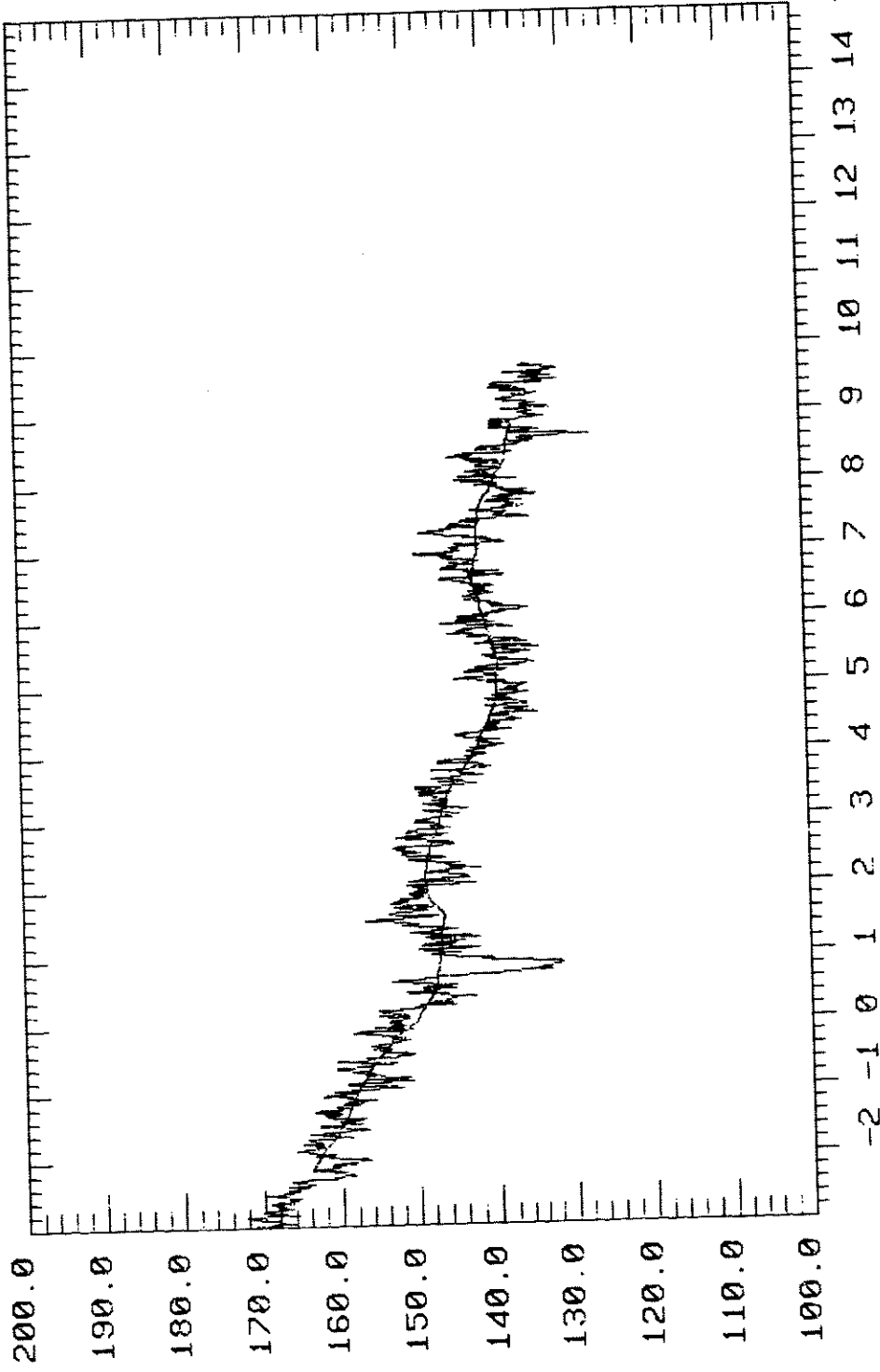
G64



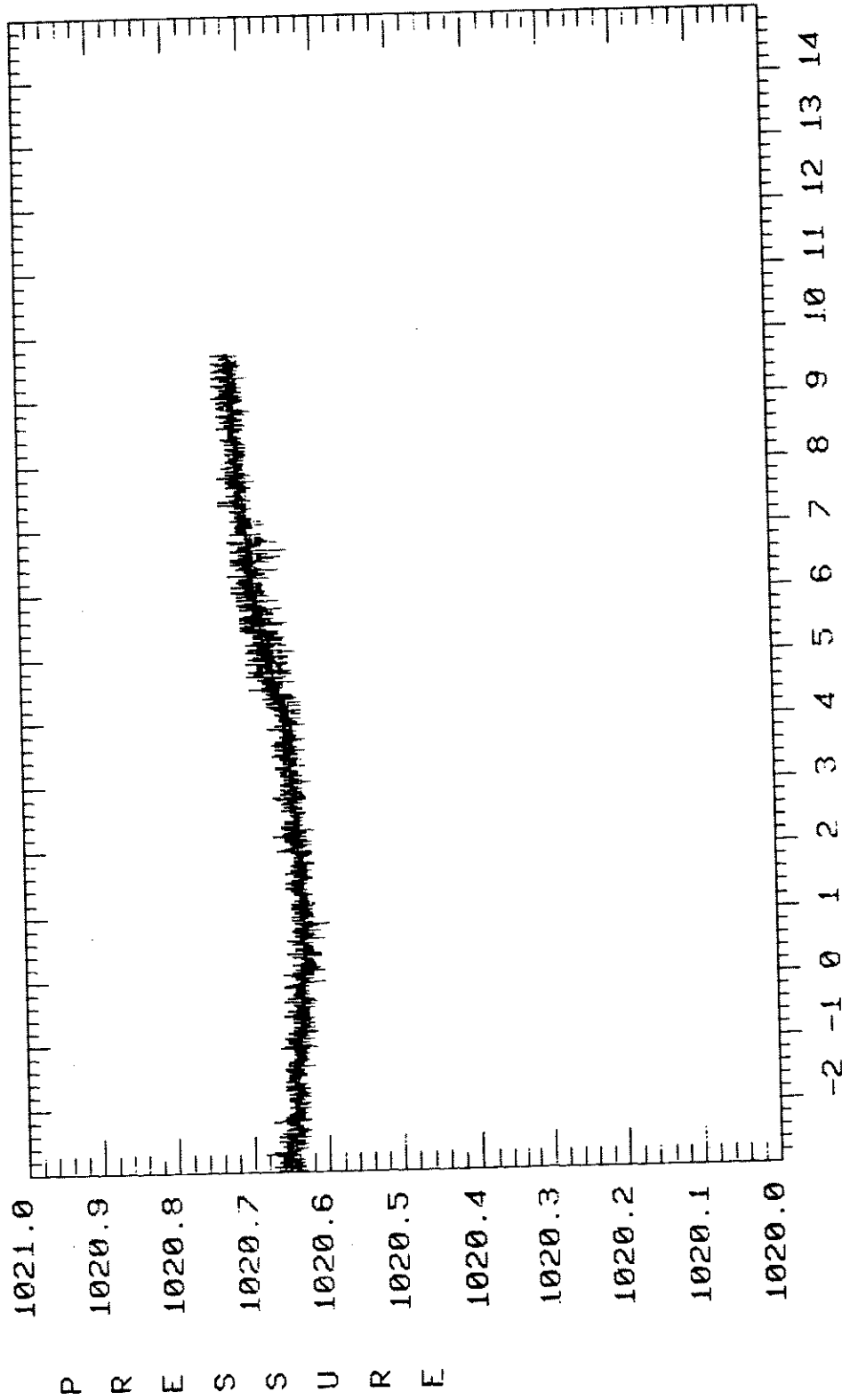
TRIAL: 051 TYPE: GAS AVERAGING TIME: 0.6 SECS

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

G65

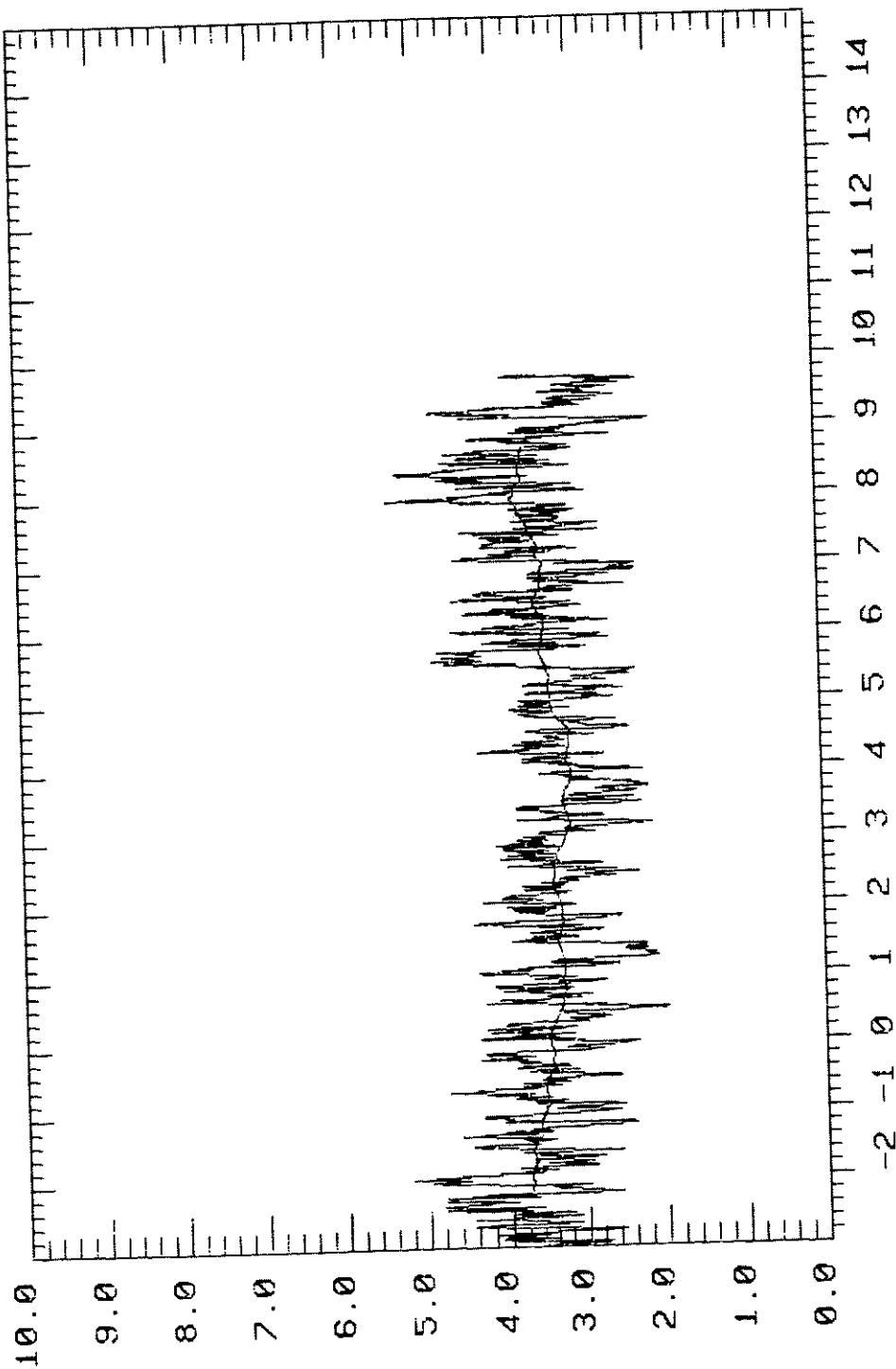


TRIAL: 051 TYPE: SOLA UNITS: W/M**2
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 0.4 M
 MEAN OF RUN UP: 170.05 MEAN OF RUN DOWN: 119.38



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

TRIAL: 051 TYPE: BROM UNITS: MBAR
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 0.4 M
MEAN OF RUN UP: 1020 MEAN OF RUN DOWN: 1021



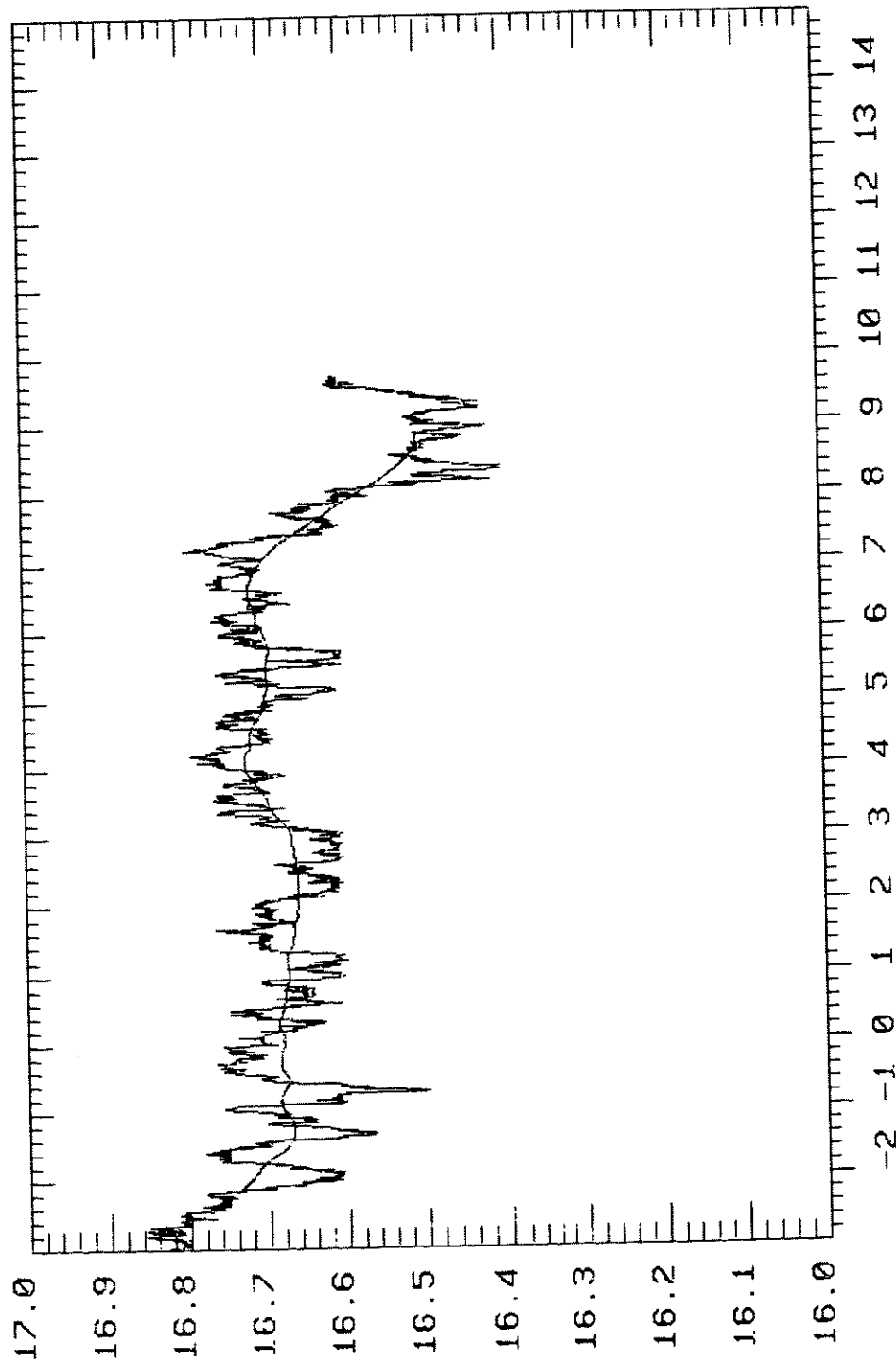
TRIAL: 051 TYPE: WSPD UNITS: M/S

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

MEAN OF RUN UP: 3.56 MEAN OF RUN DOWN: 3.38

E03

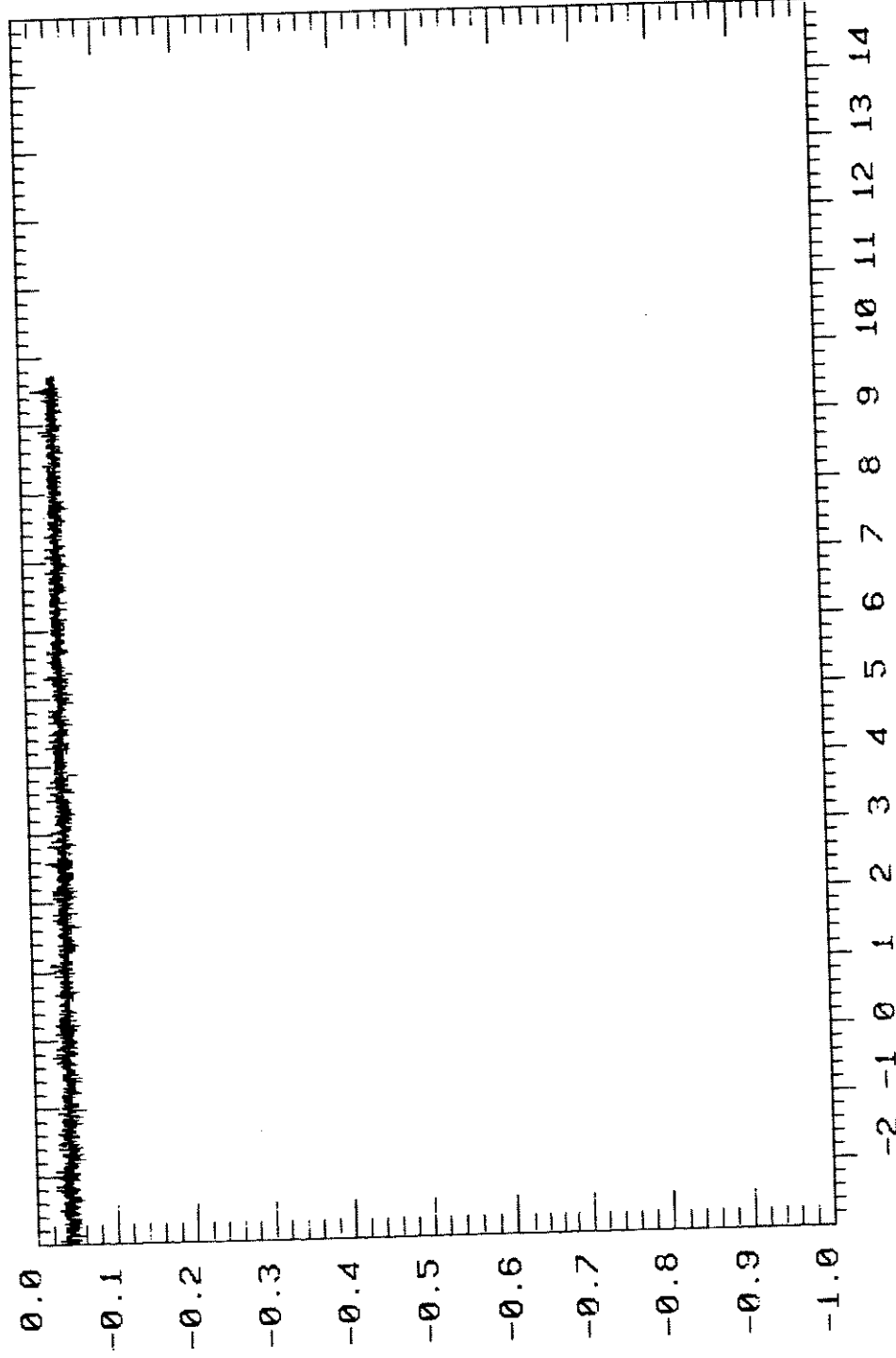
T E M P E R A T U R E



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

TRIAL: 051 TYPE: AIRT UNITS: DEGREES C
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 2.0 M
MEAN OF RUN UP: 16.24 MEAN OF RUN DOWN: 16.36

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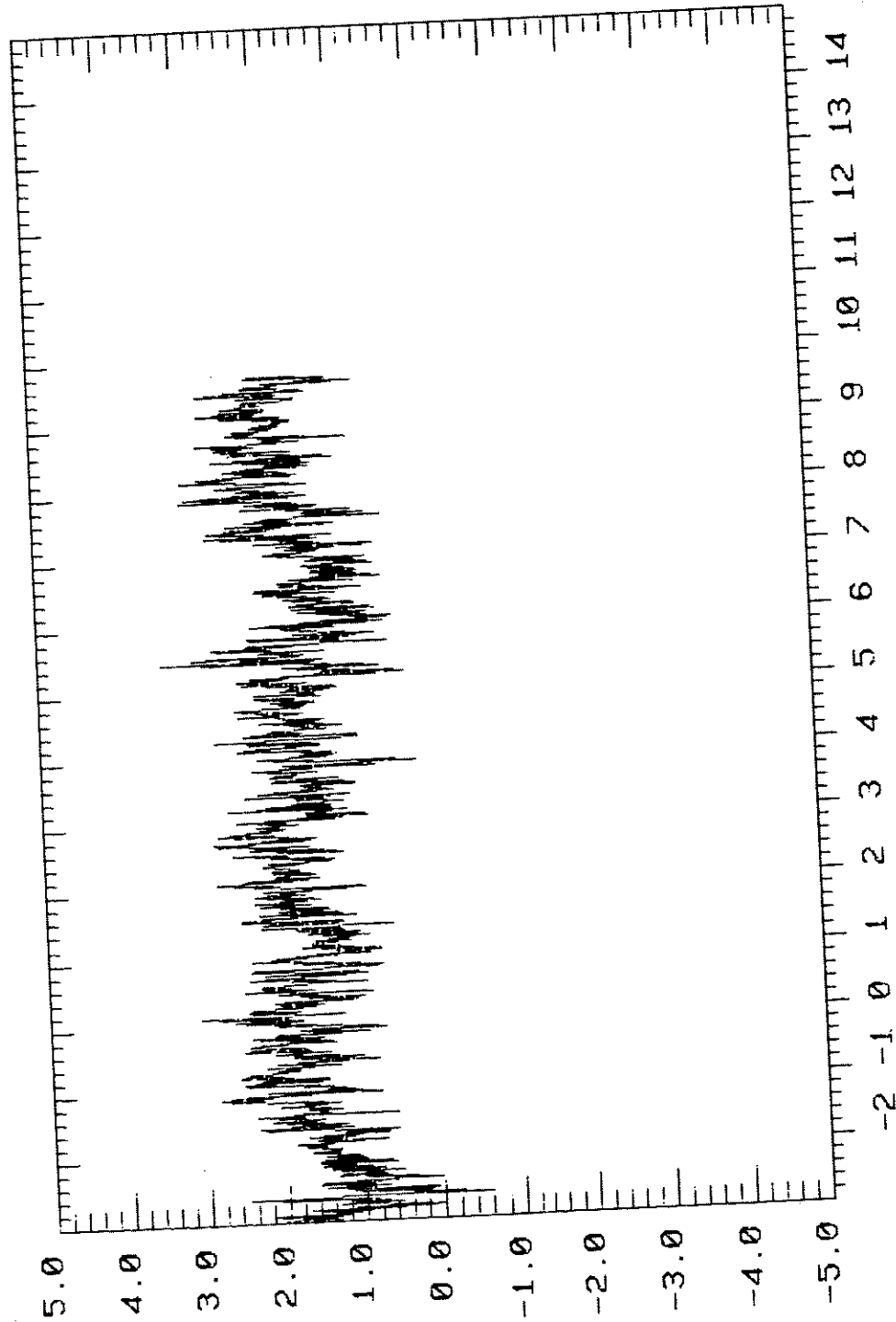
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 051 TYPE: RHUM UNITS: PER CENT

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

MEAN OF RUN UP: -0.04 MEAN OF RUN DOWN: -0.04

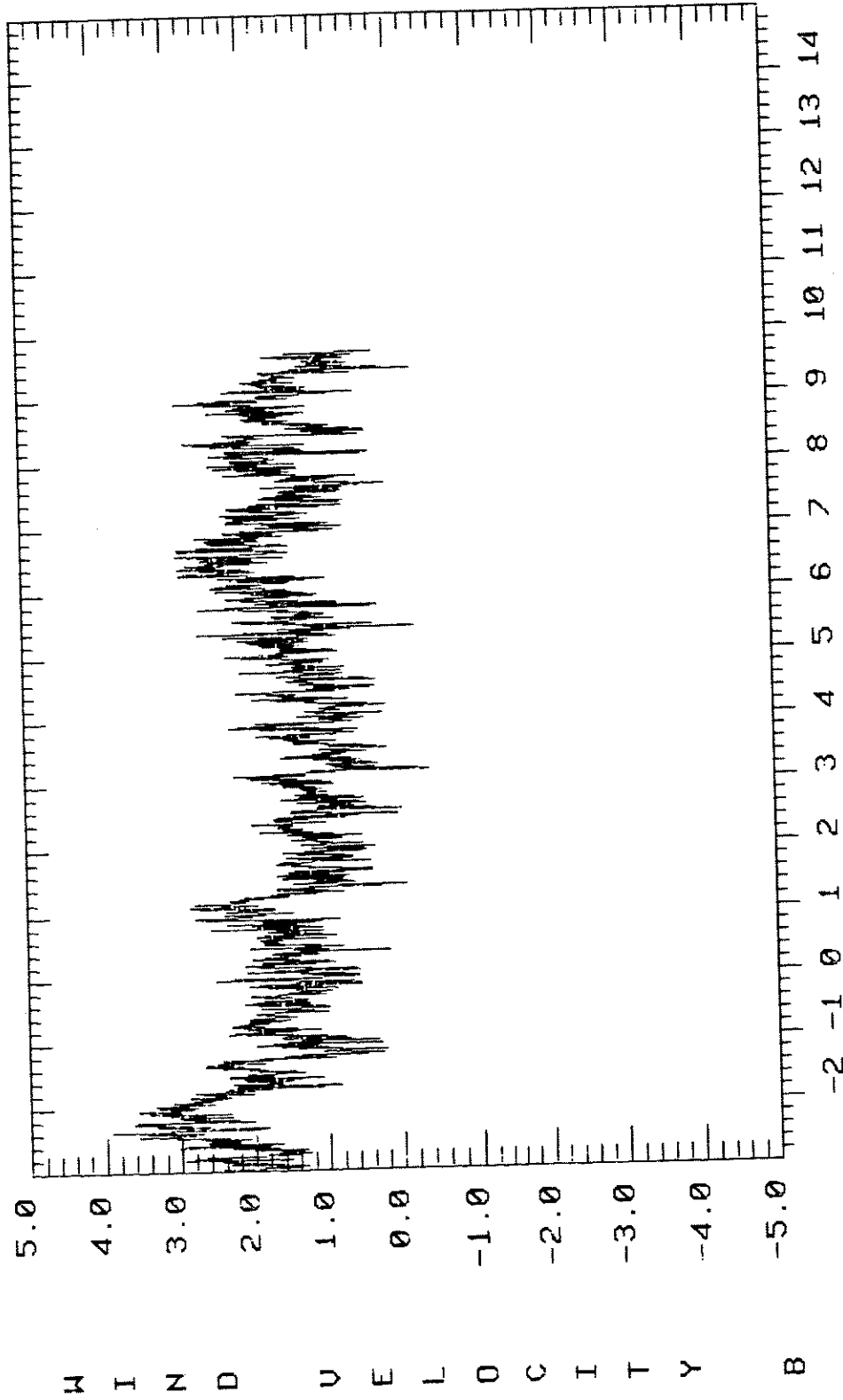
W I N D V E L O C I T Y A



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

TRIAL: 051 TYPE: UANA UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 2.0 M
MEAN OF RUN UP: 0.35 MEAN OF RUN DOWN: 2.05

E06

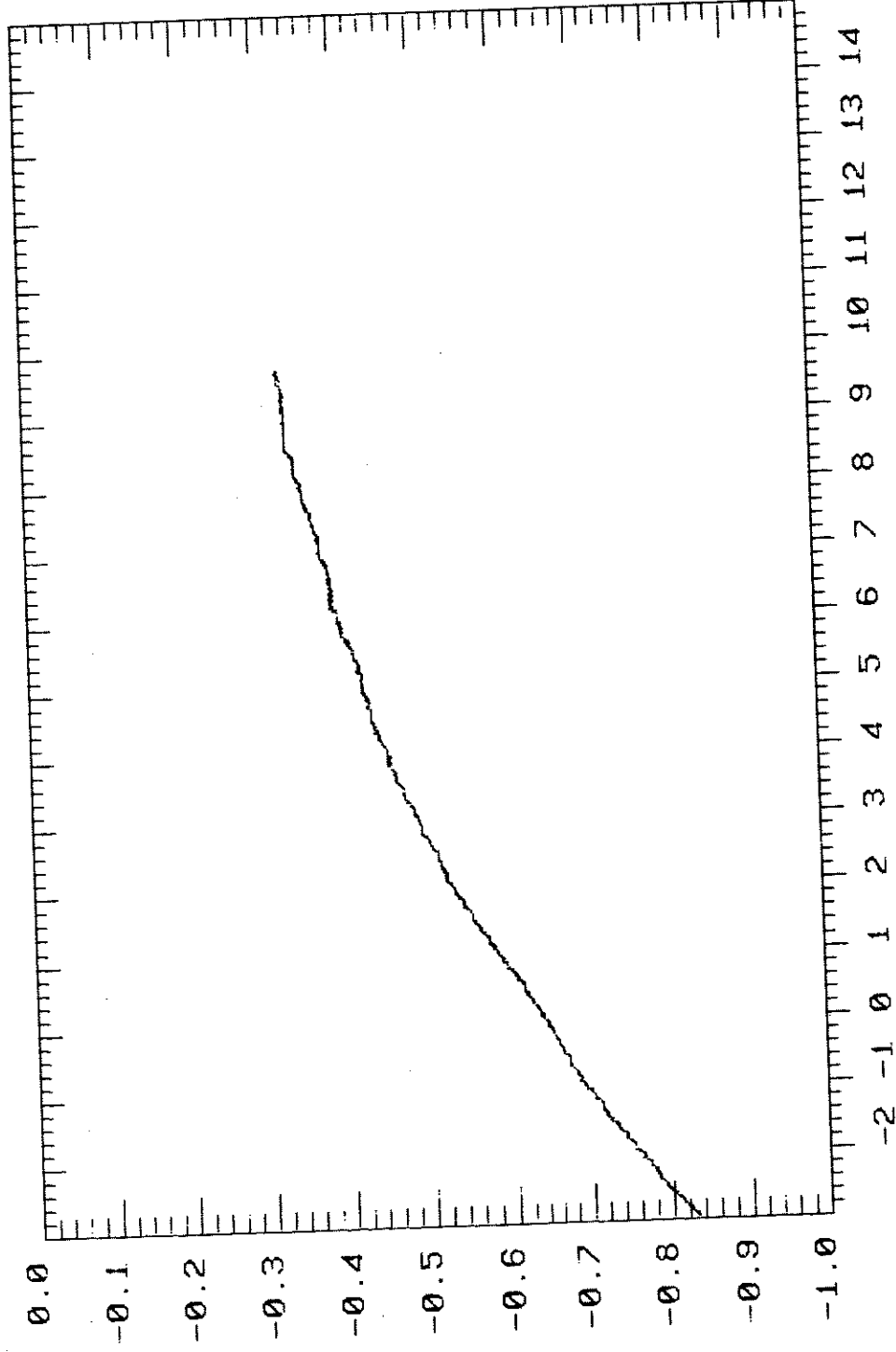


TRIAL: 051 TYPE: UANB UNITS: M/S

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

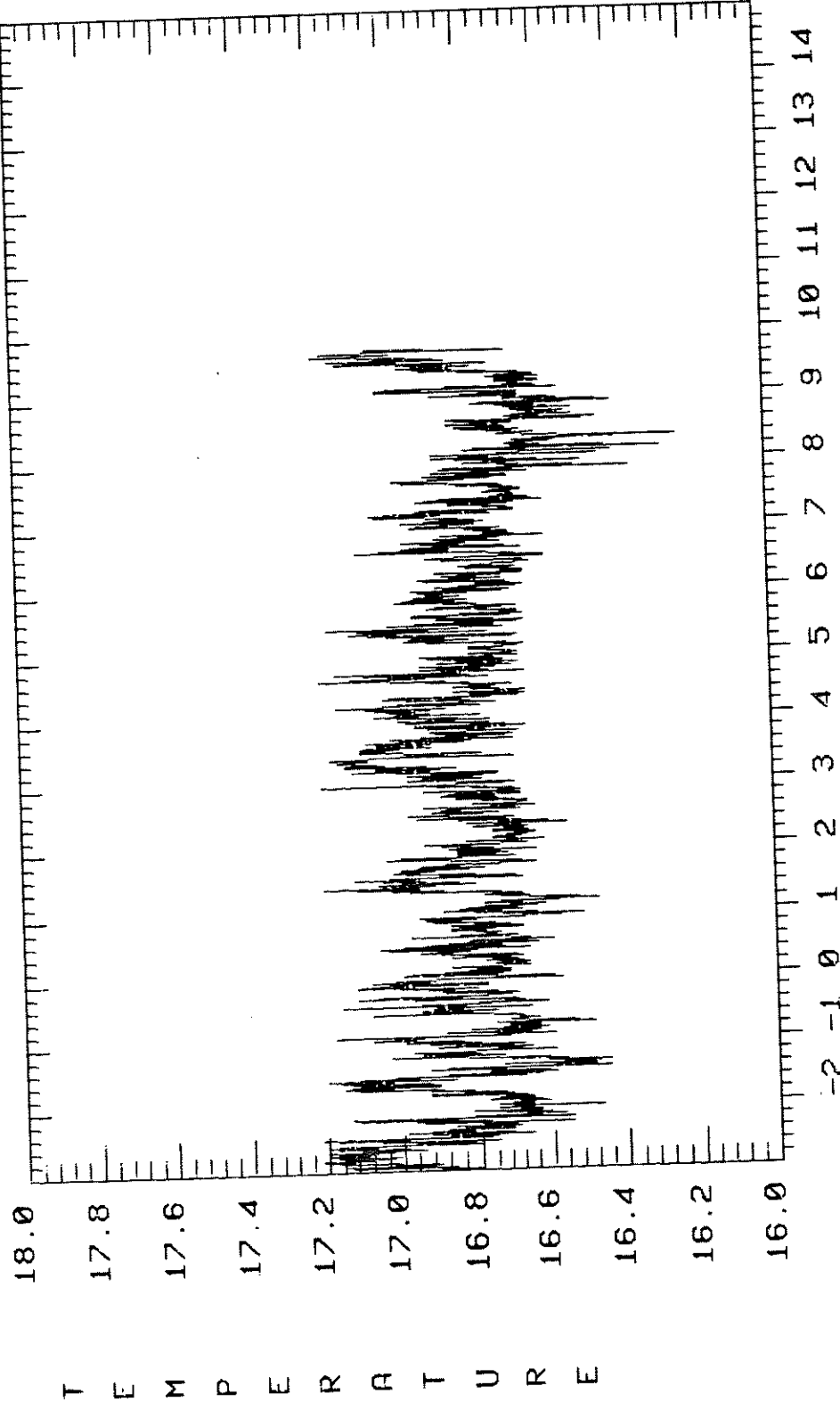
MEAN OF RUN UP: 2.45 MEAN OF RUN DOWN: 0.98

MIN DUE LOCITY W



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

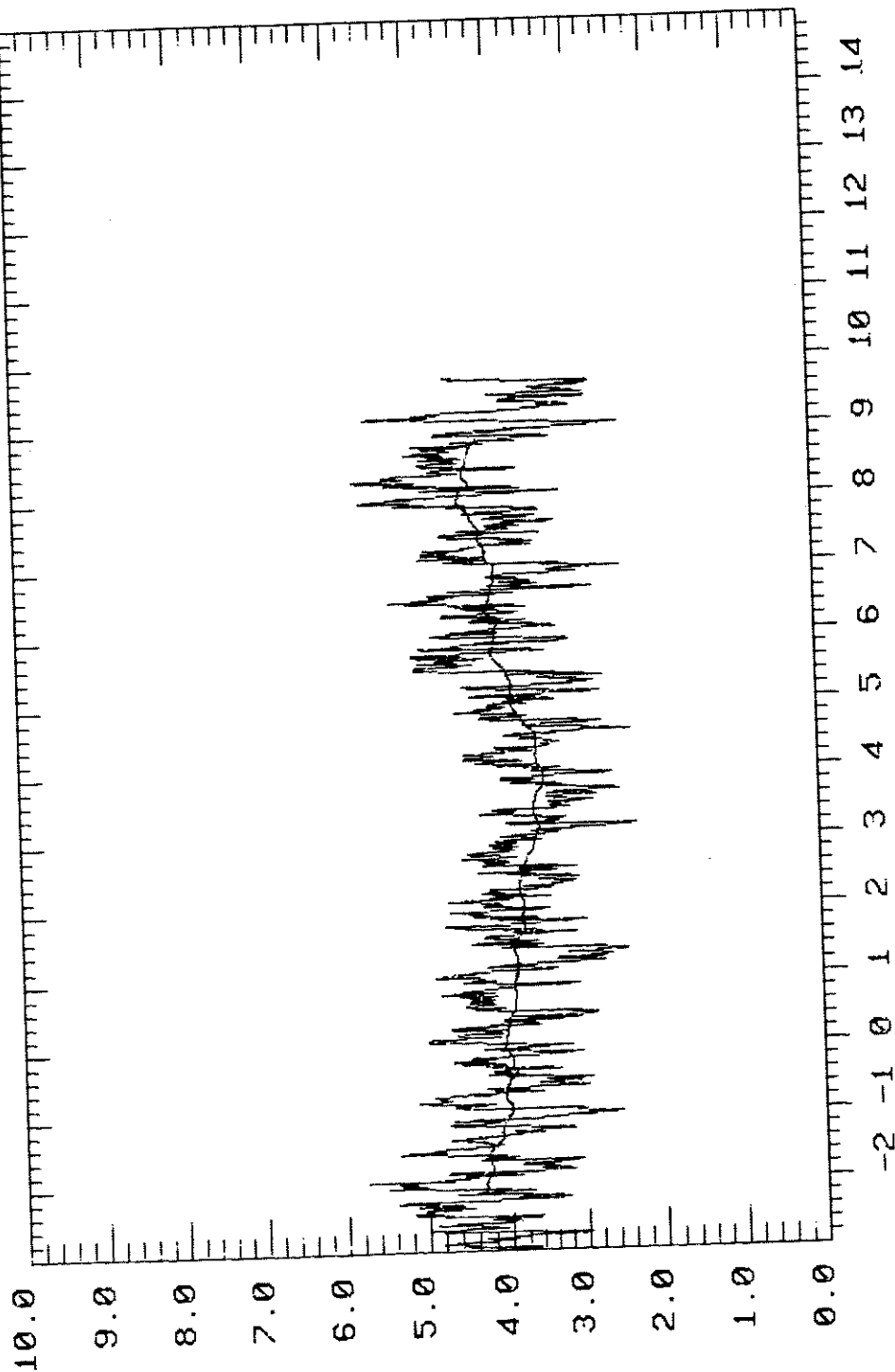
TRIAL: 051 TYPE: UANW UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 2.0 M
MEAN OF RUN UP: -0.63 MEAN OF RUN DOWN: -0.39



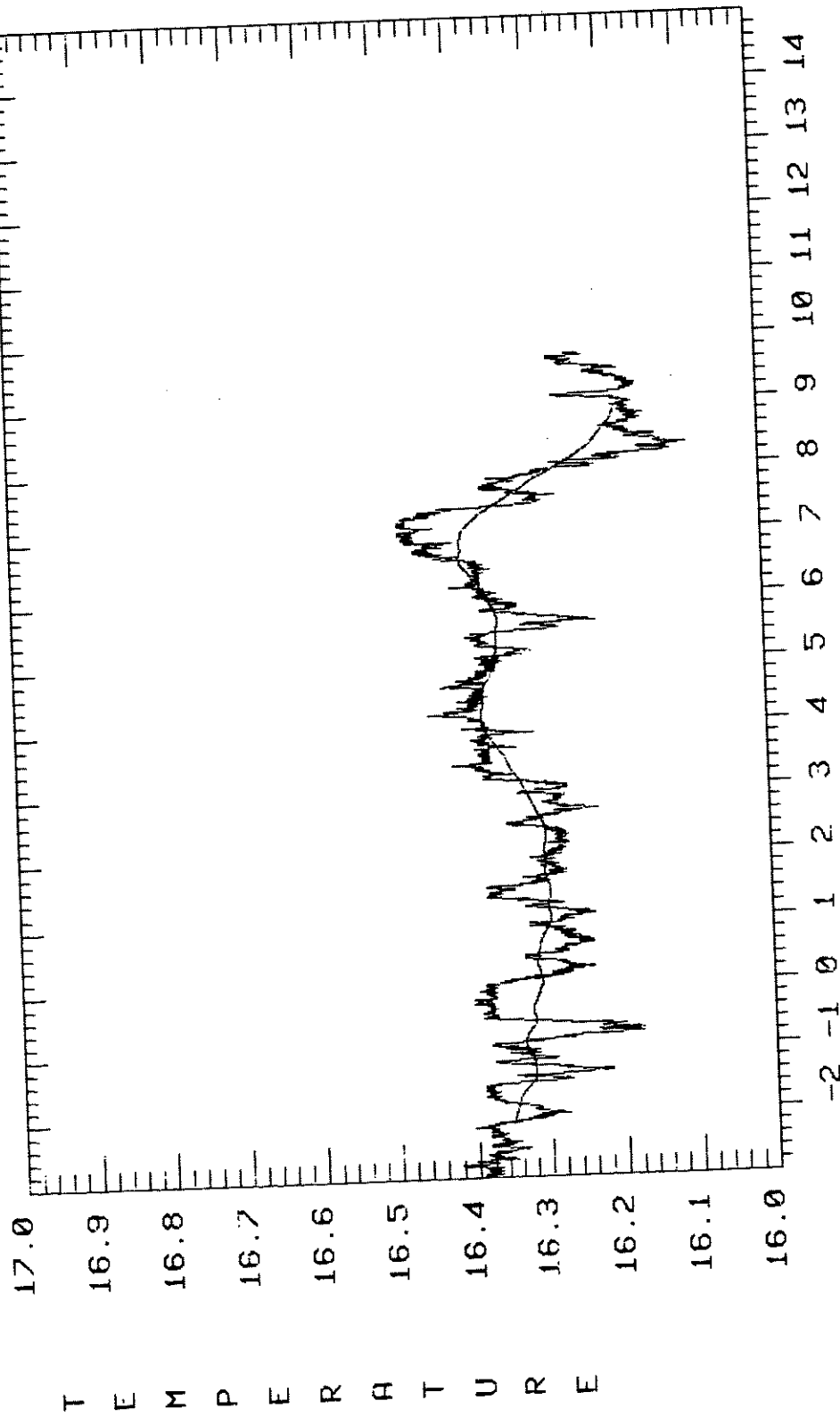
TRIAL: 051 TYPE: UANT UNITS: DEGREES C

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

MEAN OF RUN UP: 16.55 MEAN OF RUN DOWN: 16.62



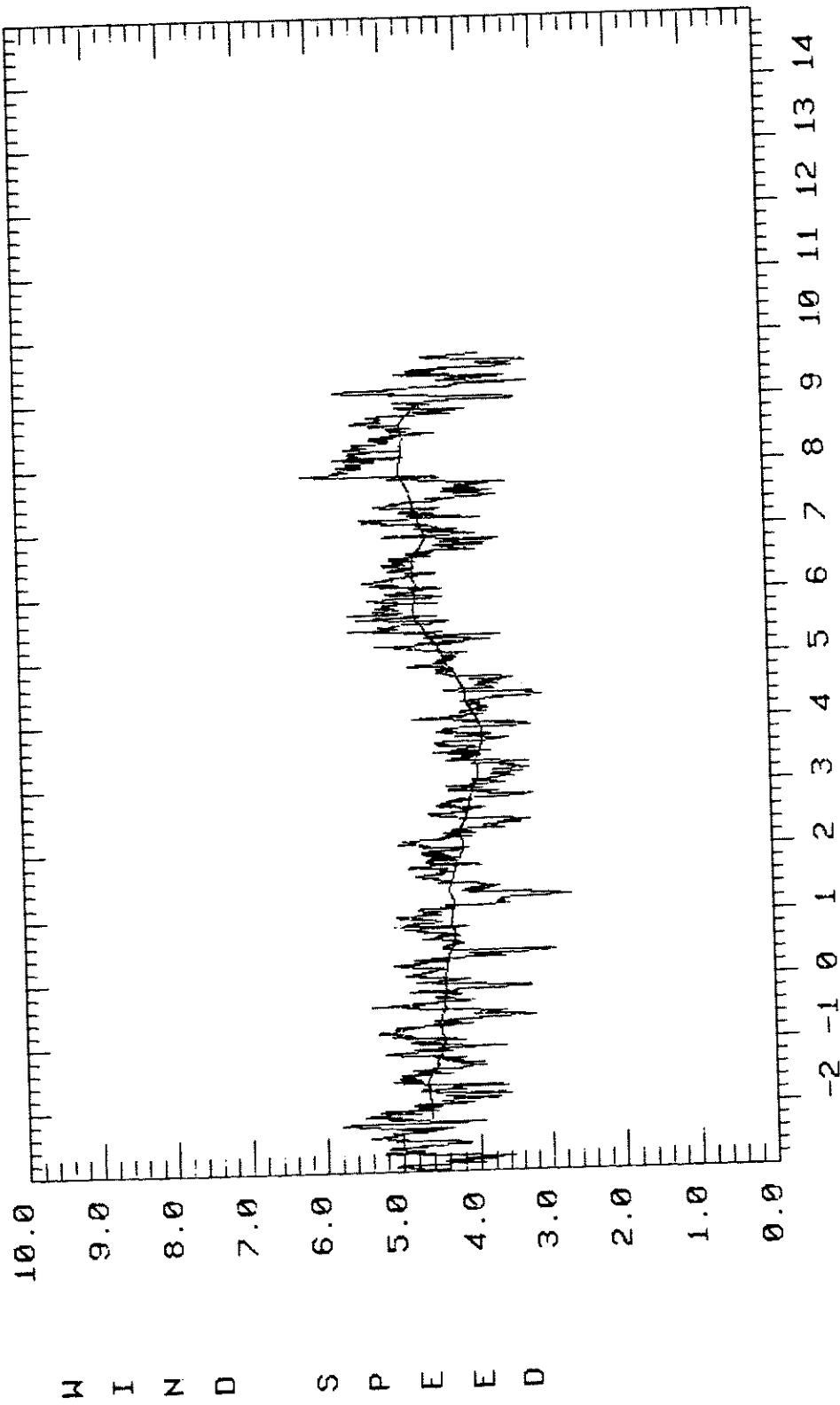
TRIAL: 051 TYPE: WSPD UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 4.5 M
MEAN OF RUN UP: 3.99 MEAN OF RUN DOWN: 3.87



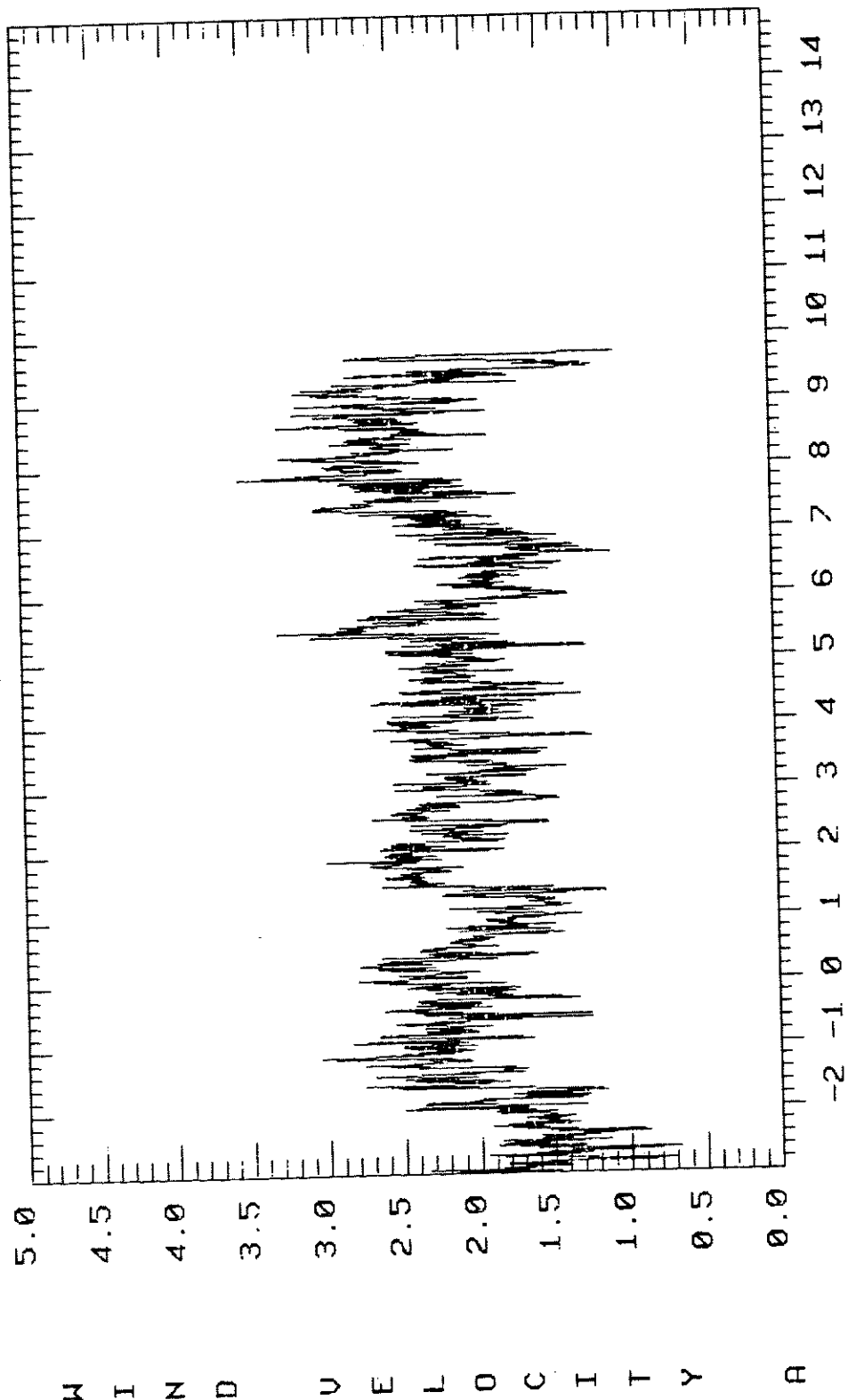
TRIAL: 051 TYPE: AIRT UNITS: DEGREES C

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

MEAN OF RUN UP: 15.91 MEAN OF RUN DOWN: 16.01



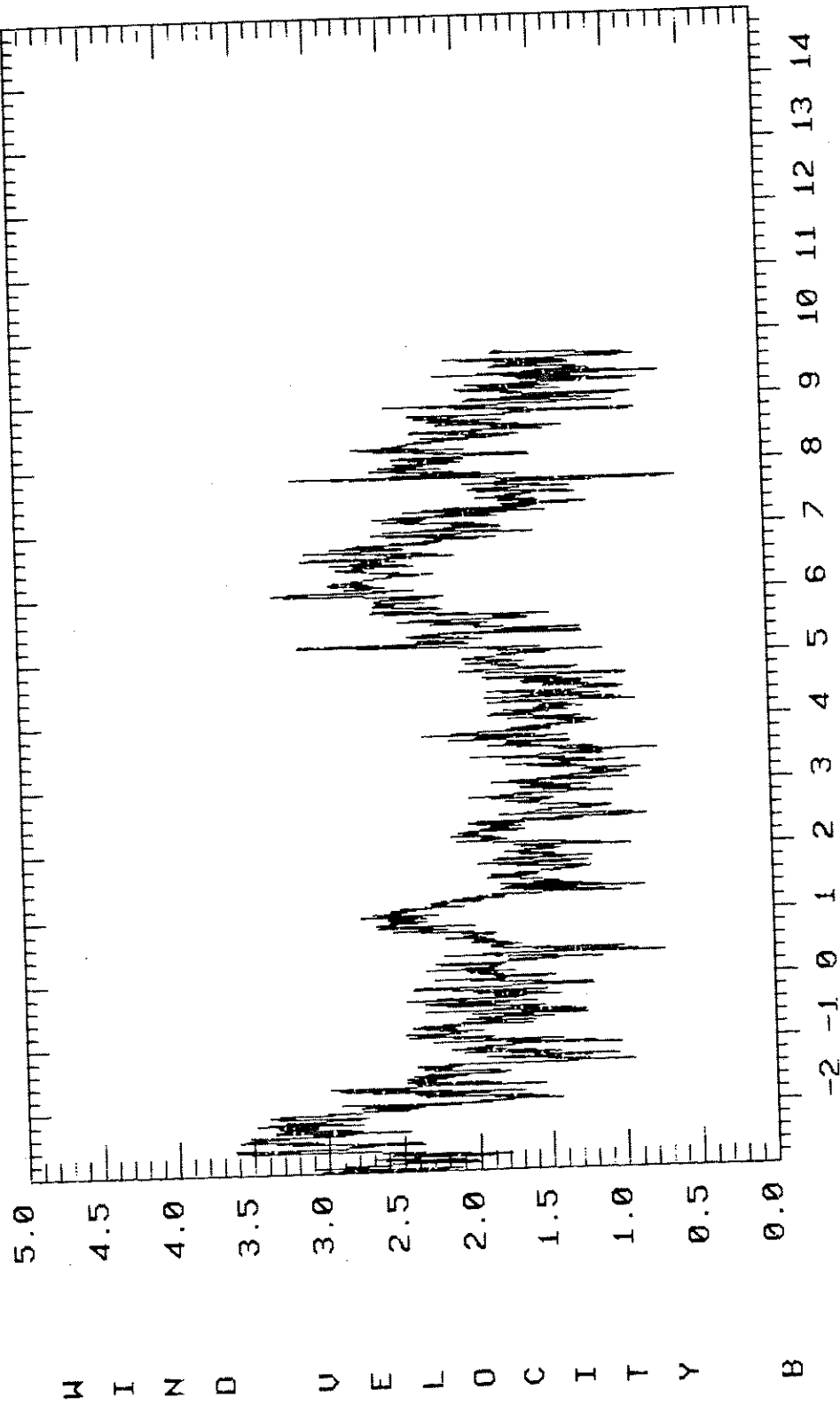
TRIAL: 051 TYPE: WSPD UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M
MEAN OF RUN UP: 4.45 MEAN OF RUN DOWN: 4.27



TRIAL: 051 TYPE: UANA UNITS: M/S

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

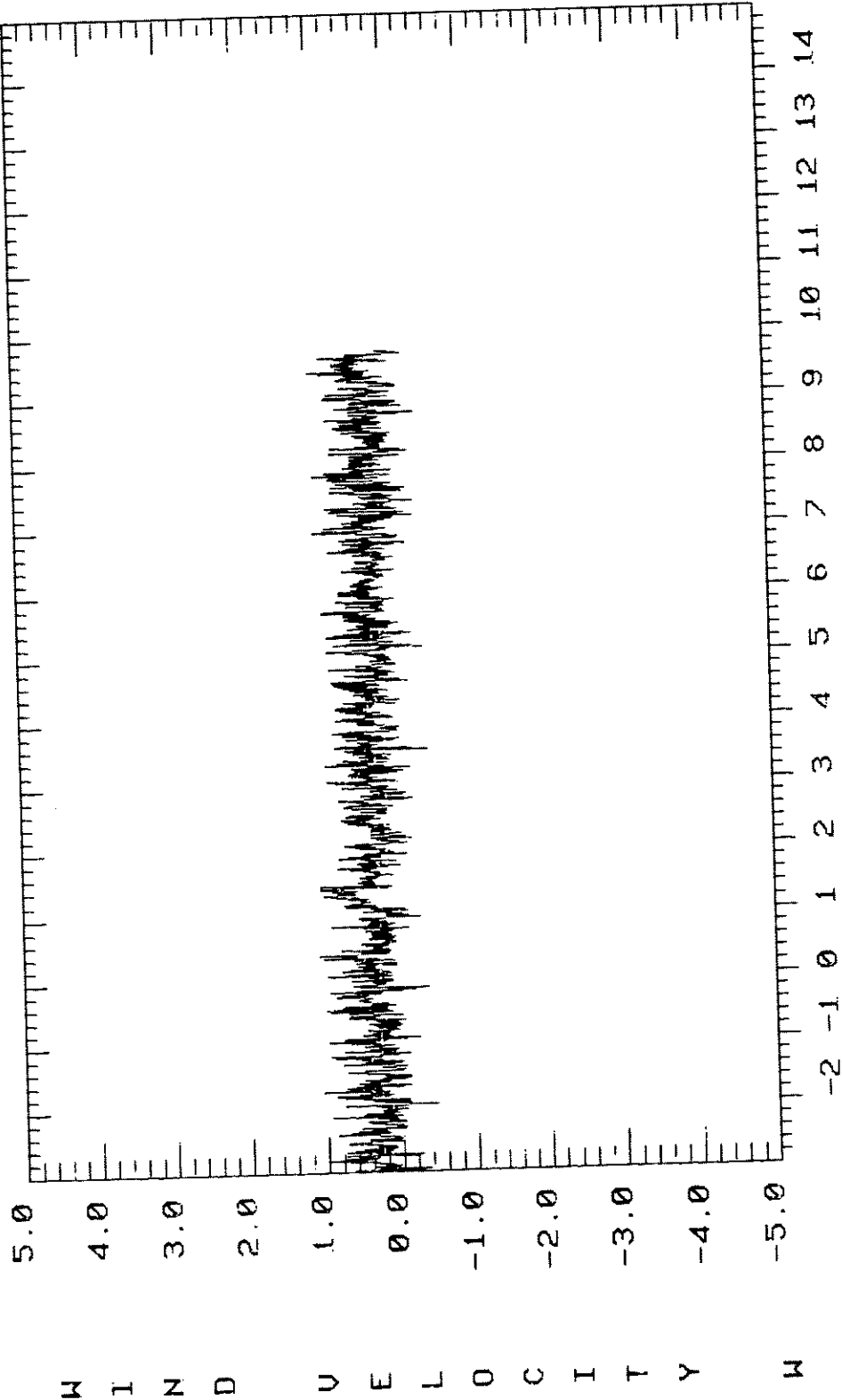
MEAN OF RUN UP: 0.59 MEAN OF RUN DOWN: 2.39



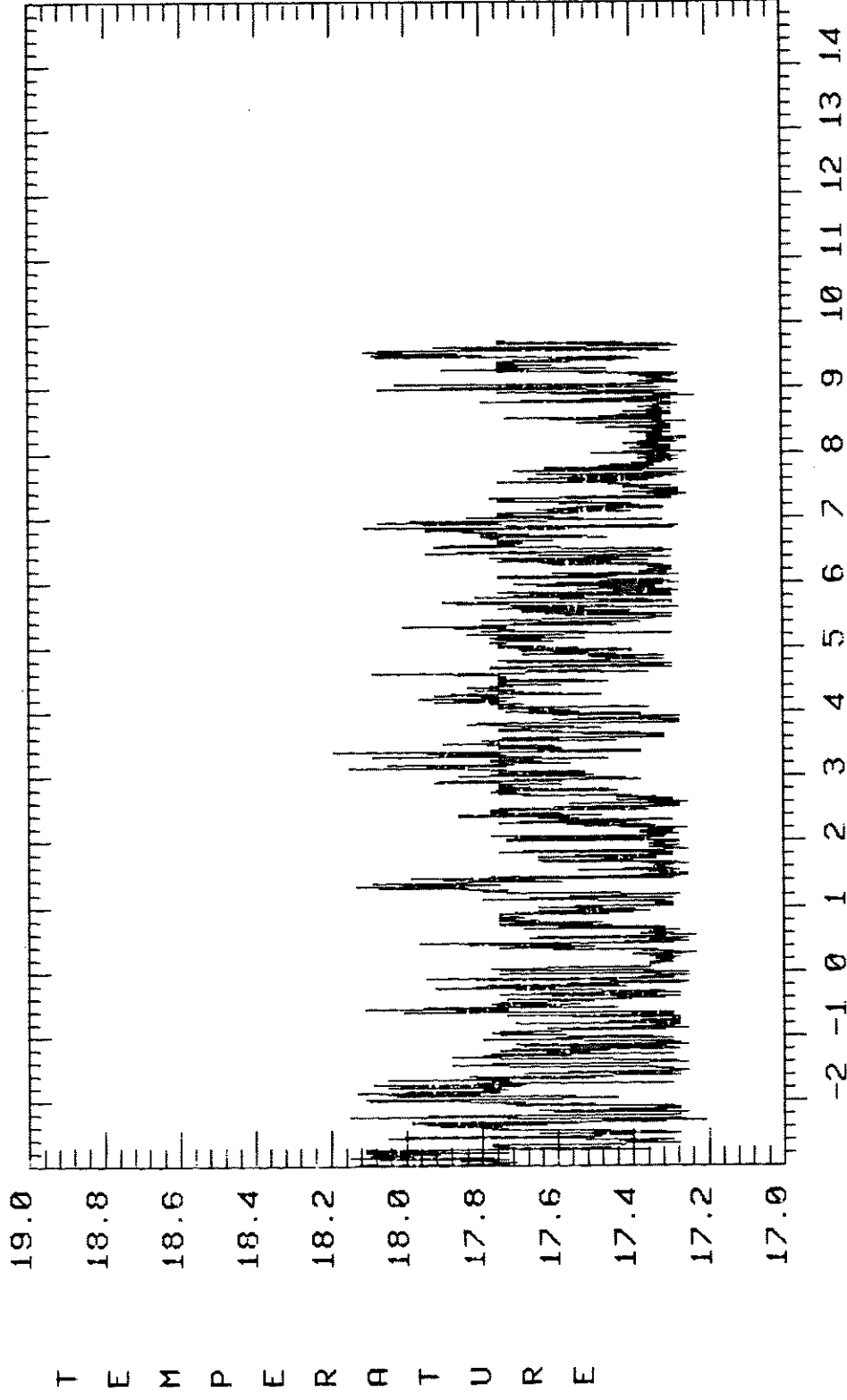
TRIAL: 051 TYPE: UANB UNITS: M/S

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

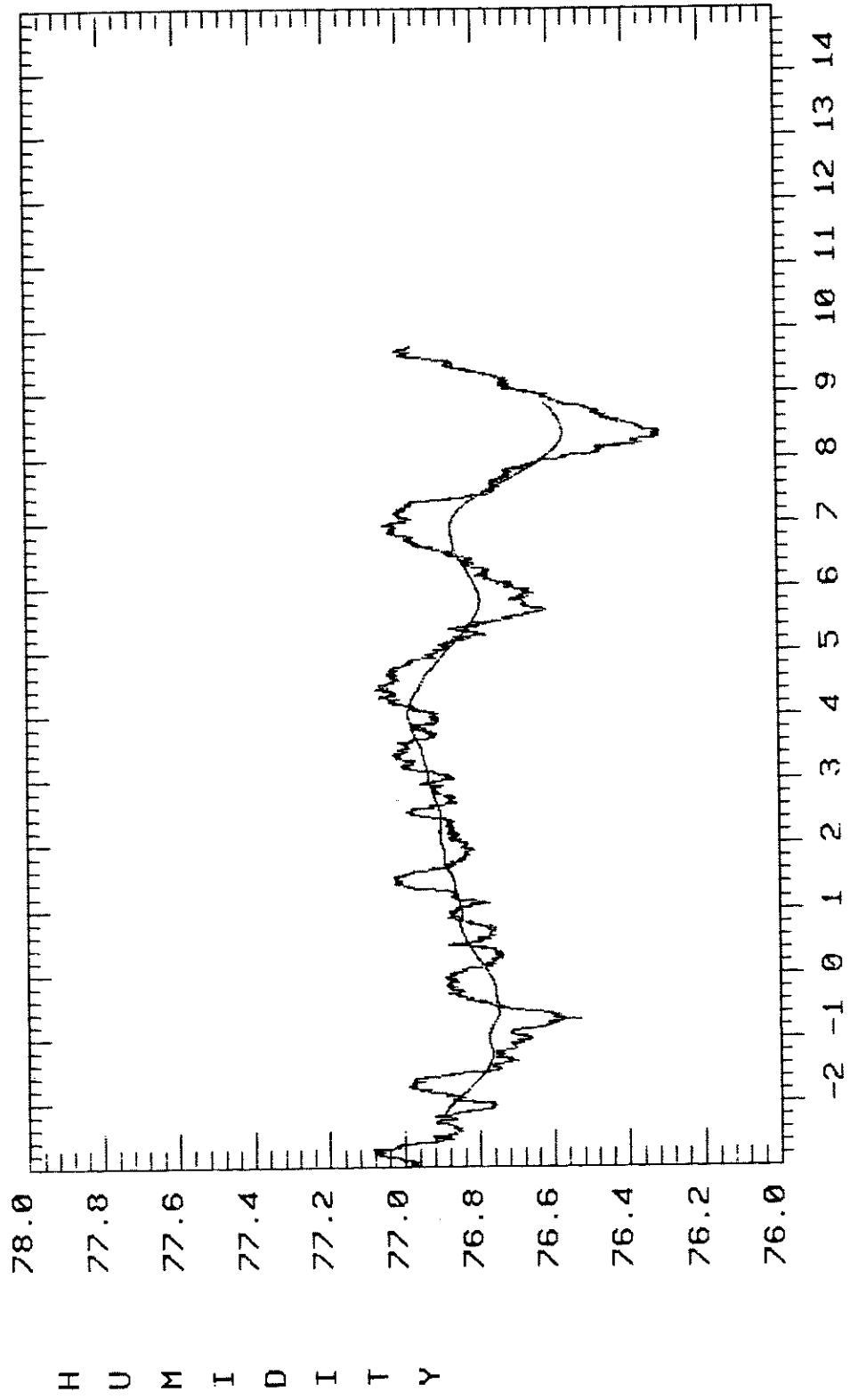
MEAN OF RUN UP: 3.28 MEAN OF RUN DOWN: 1.37



TRIAL: 051 TYPE: UANW UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M
MEAN OF RUN UP: 0.29 MEAN OF RUN DOWN: 0.33

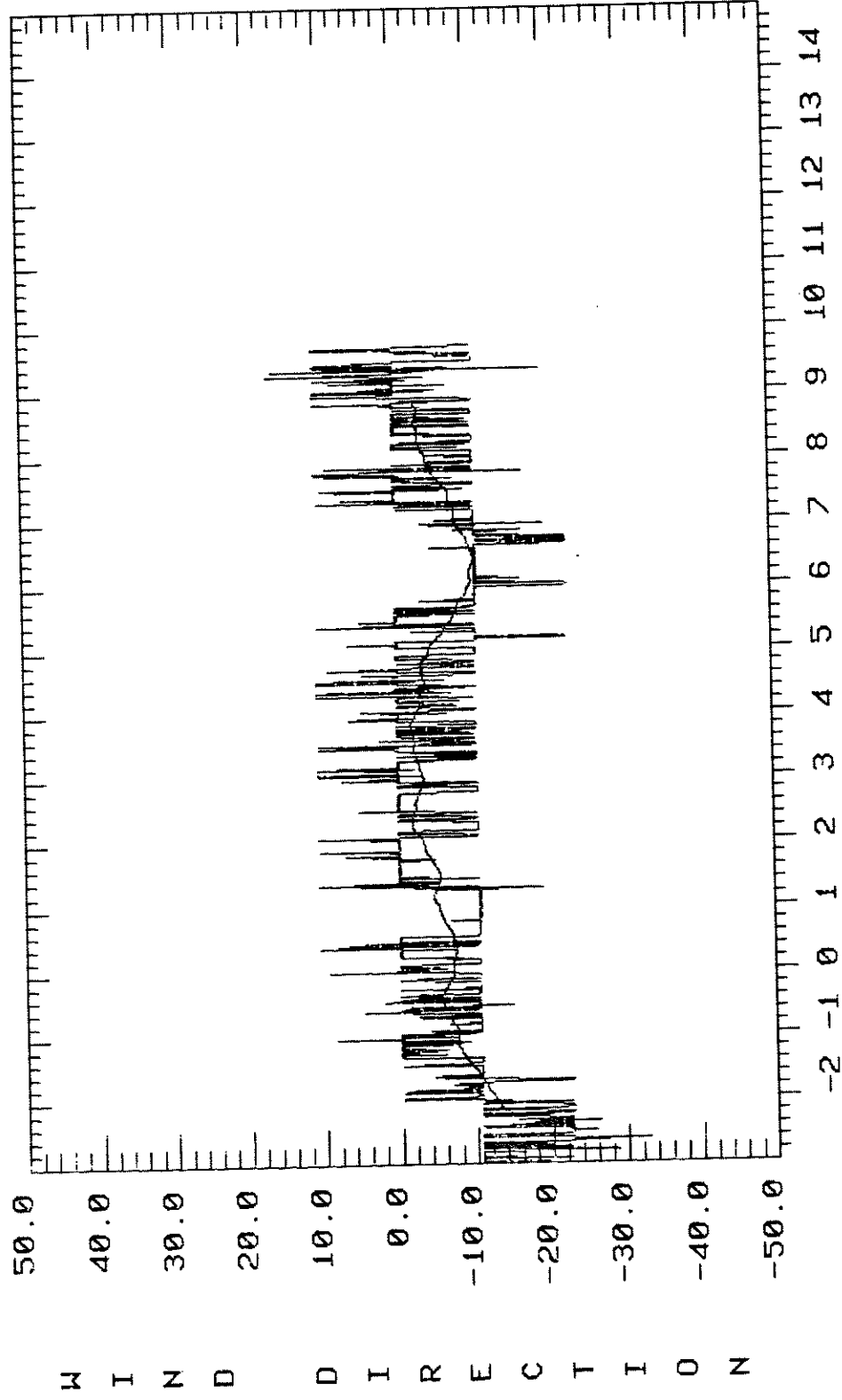


TRIAL: 051 TYPE: UANT UNITS: DEGREES C
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M
MEAN OF RUN UP: 17.37 MEAN OF RUN DOWN: 17.37



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

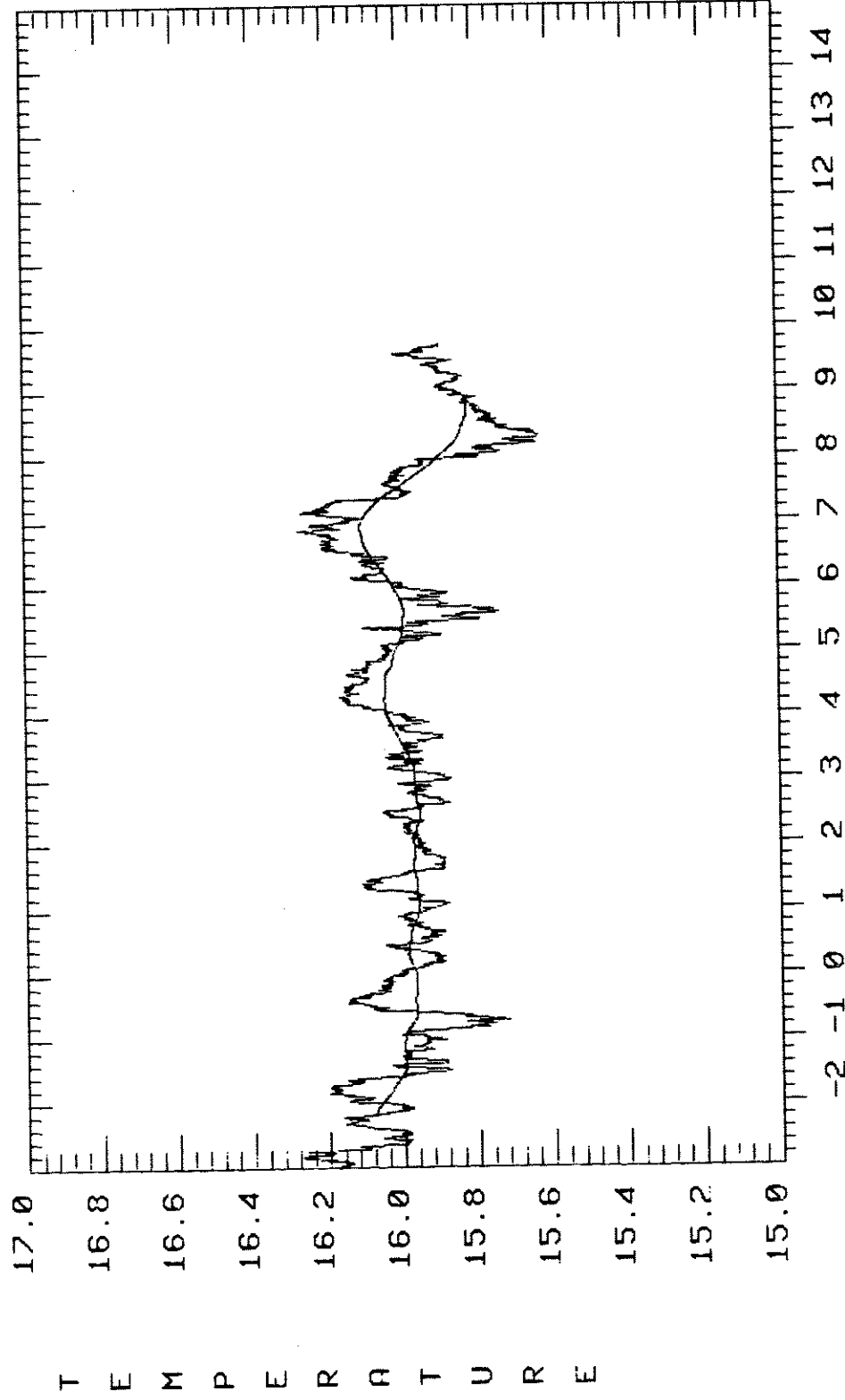
TRIAL: 051 TYPE: RHUM UNITS: PER CENT
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M
 MEAN OF RUN UP: 80.05 MEAN OF RUN DOWN: 77.16



TRIAL: 051 TYPE: WHDG UNITS: DEGREES

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

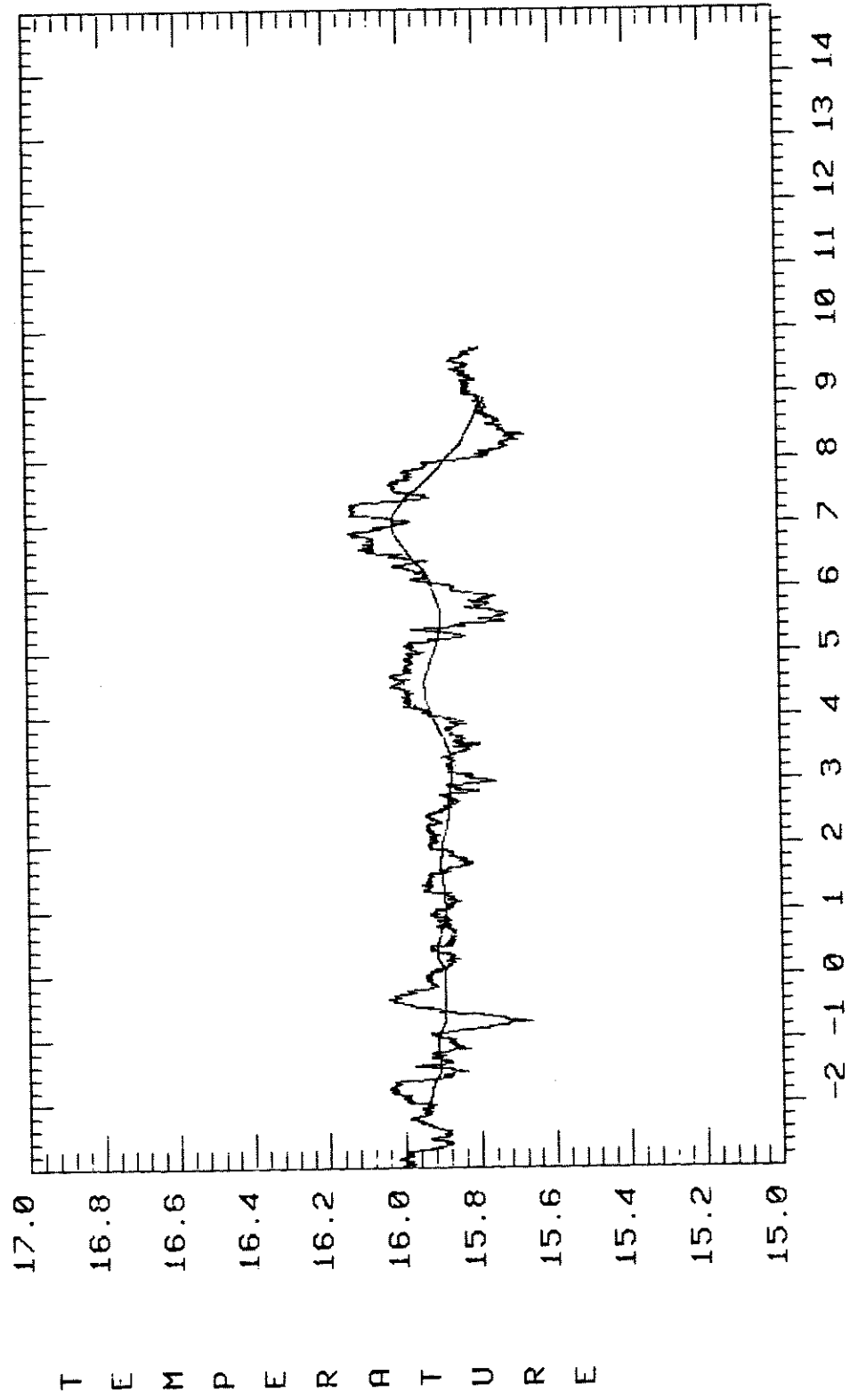
MEAN OF RUN UP: Φ -28.94 MEAN OF RUN DOWN: 1.49



TRIAL: 051 TYPE: AIRT UNITS: DEGREES C

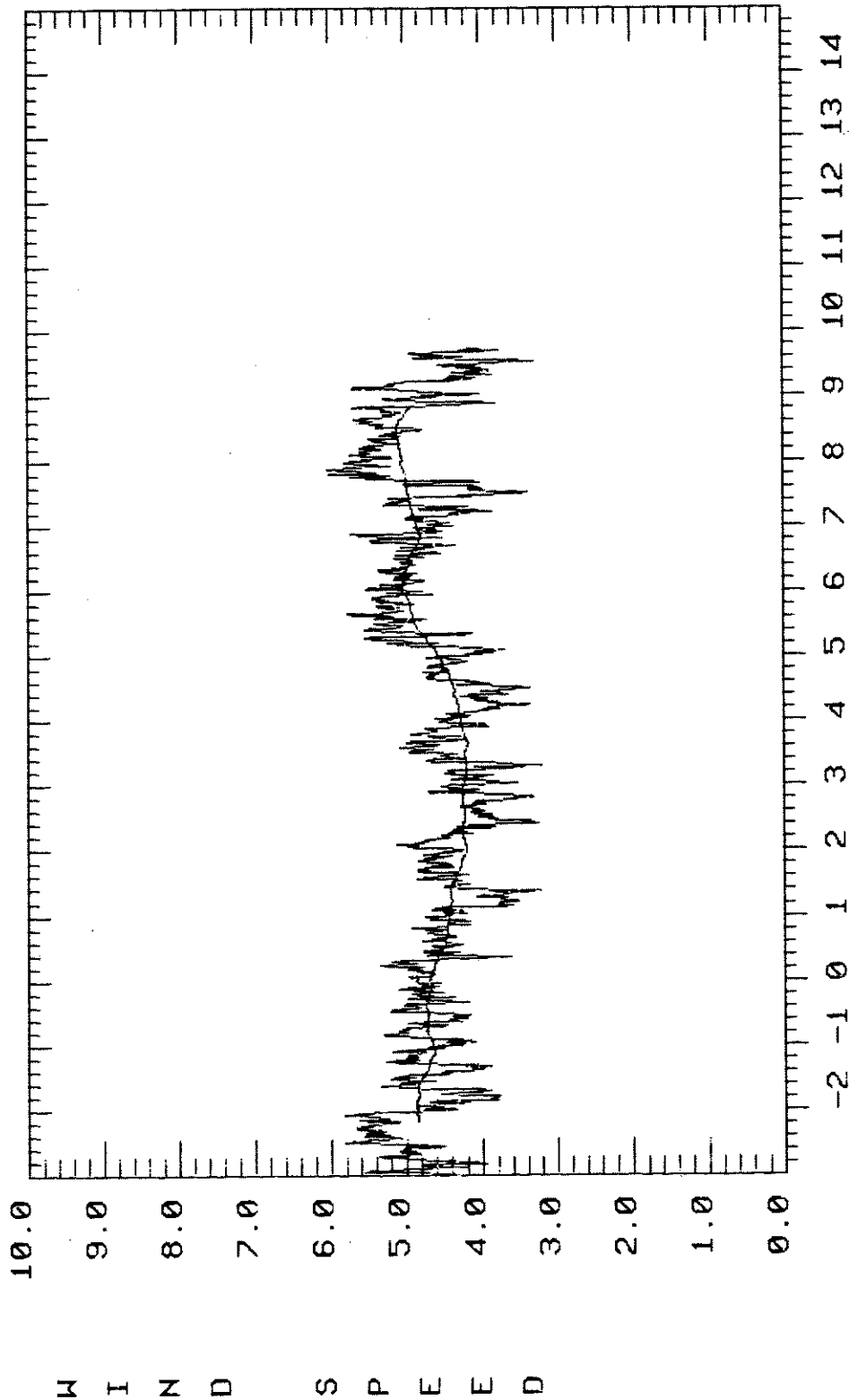
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 10.0 M

MEAN OF RUN UP: 15.64 MEAN OF RUN DOWN: 15.66

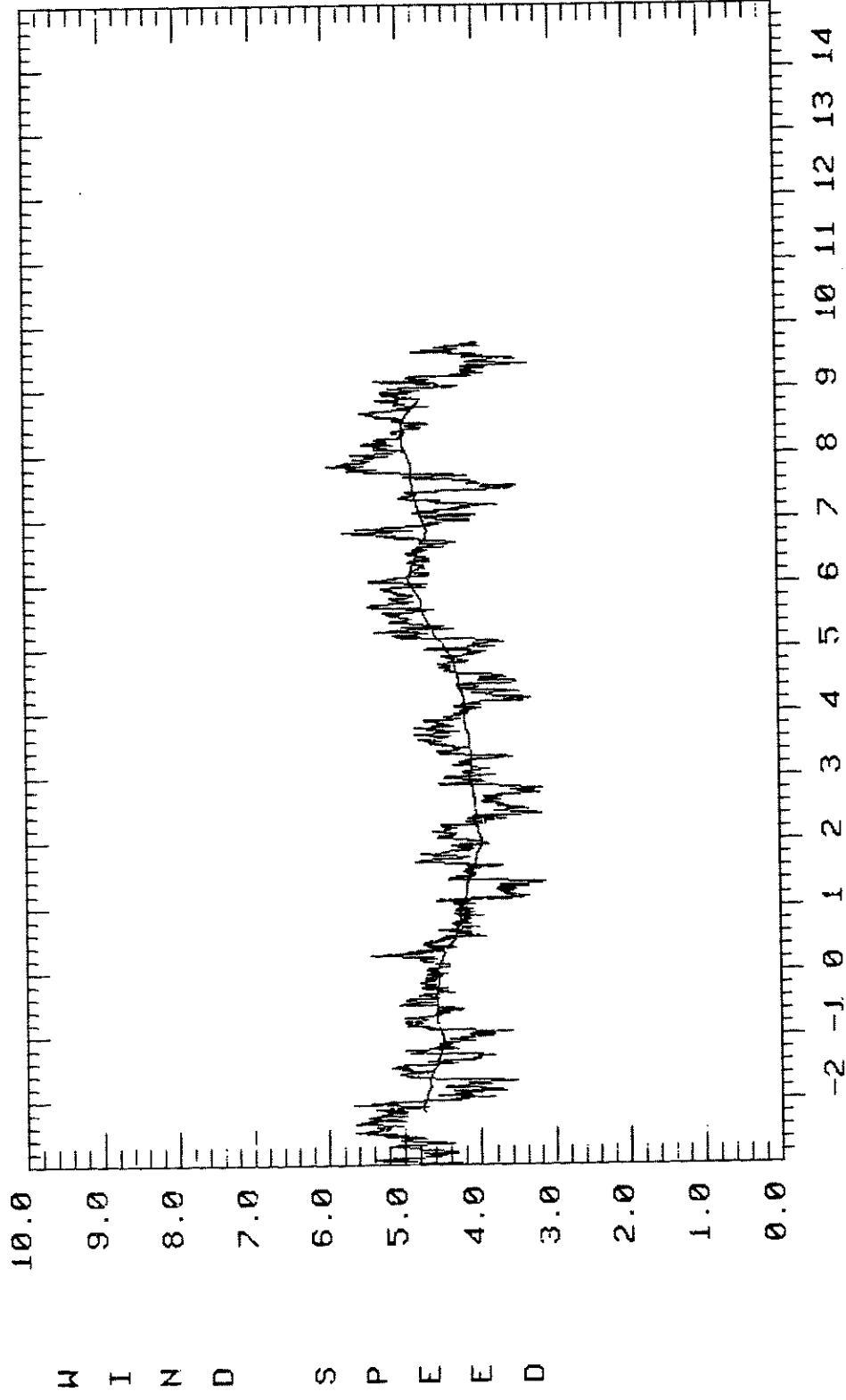


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 051 TYPE: AIRT UNITS: DEGREES C
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 14.0 M
 MEAN OF RUN UP: 15.54 MEAN OF RUN DOWN: 15.59



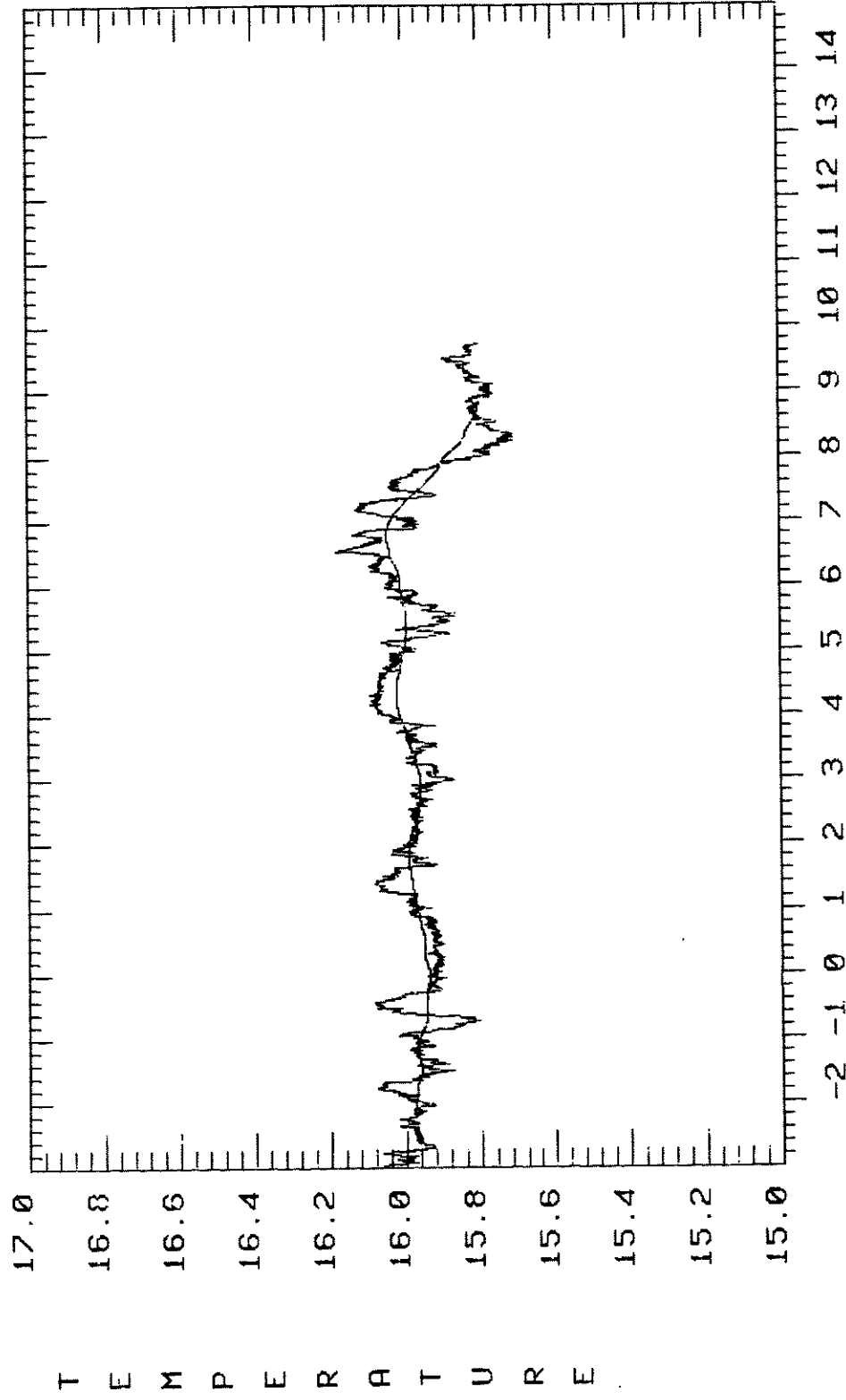
TRIAL: 051 TYPE: WSPD UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 50 M Z: 17.3 M
MEAN OF RUN UP: 4.65 MEAN OF RUN DOWN: 4.49



TRIAL: 051 TYPE: WSPD UNITS: M/S

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

MEAN OF RUN UP: 4.63 MEAN OF RUN DOWN: 4.36

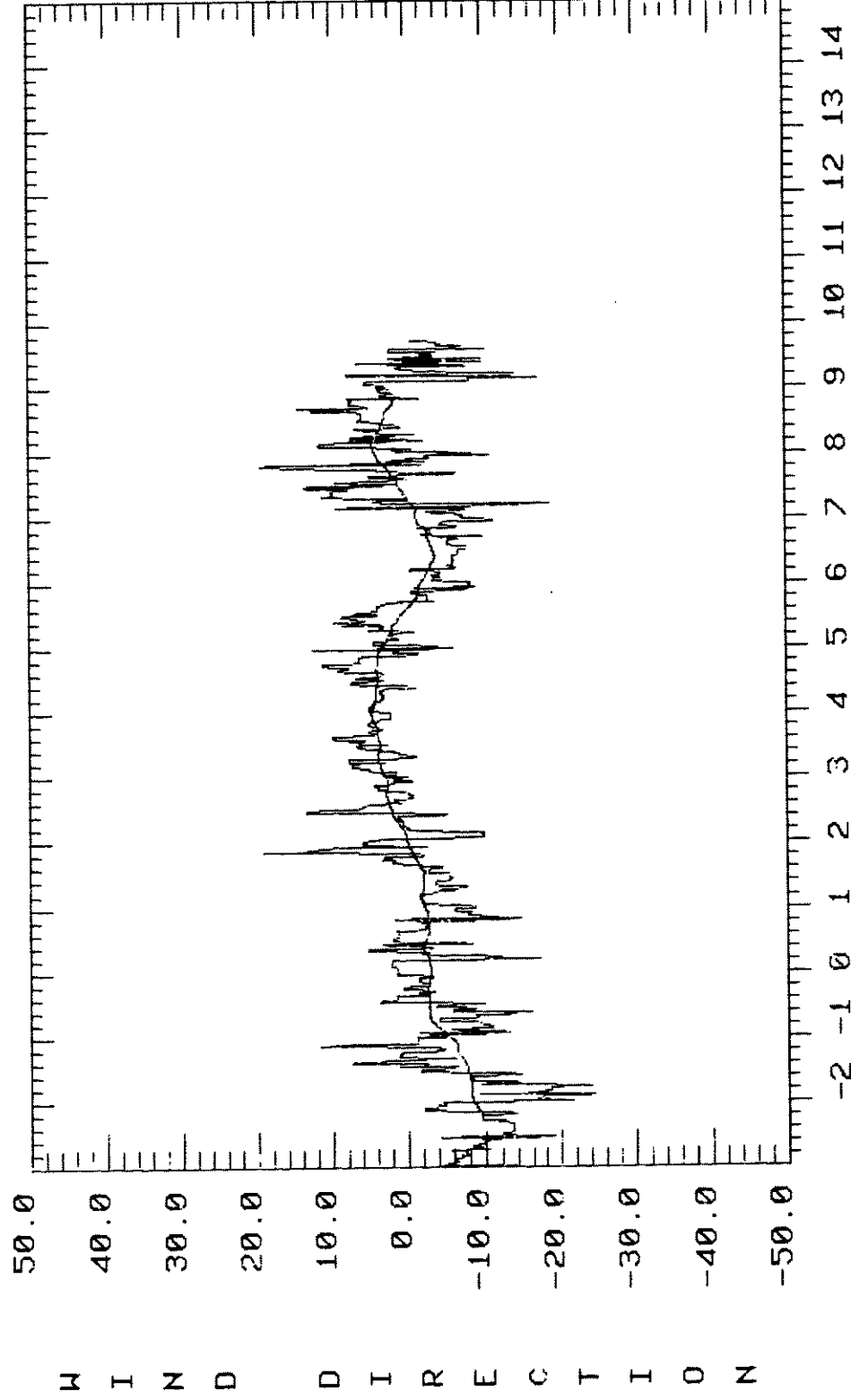


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 051 TYPE: AIRT UNITS: DEGREES C

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

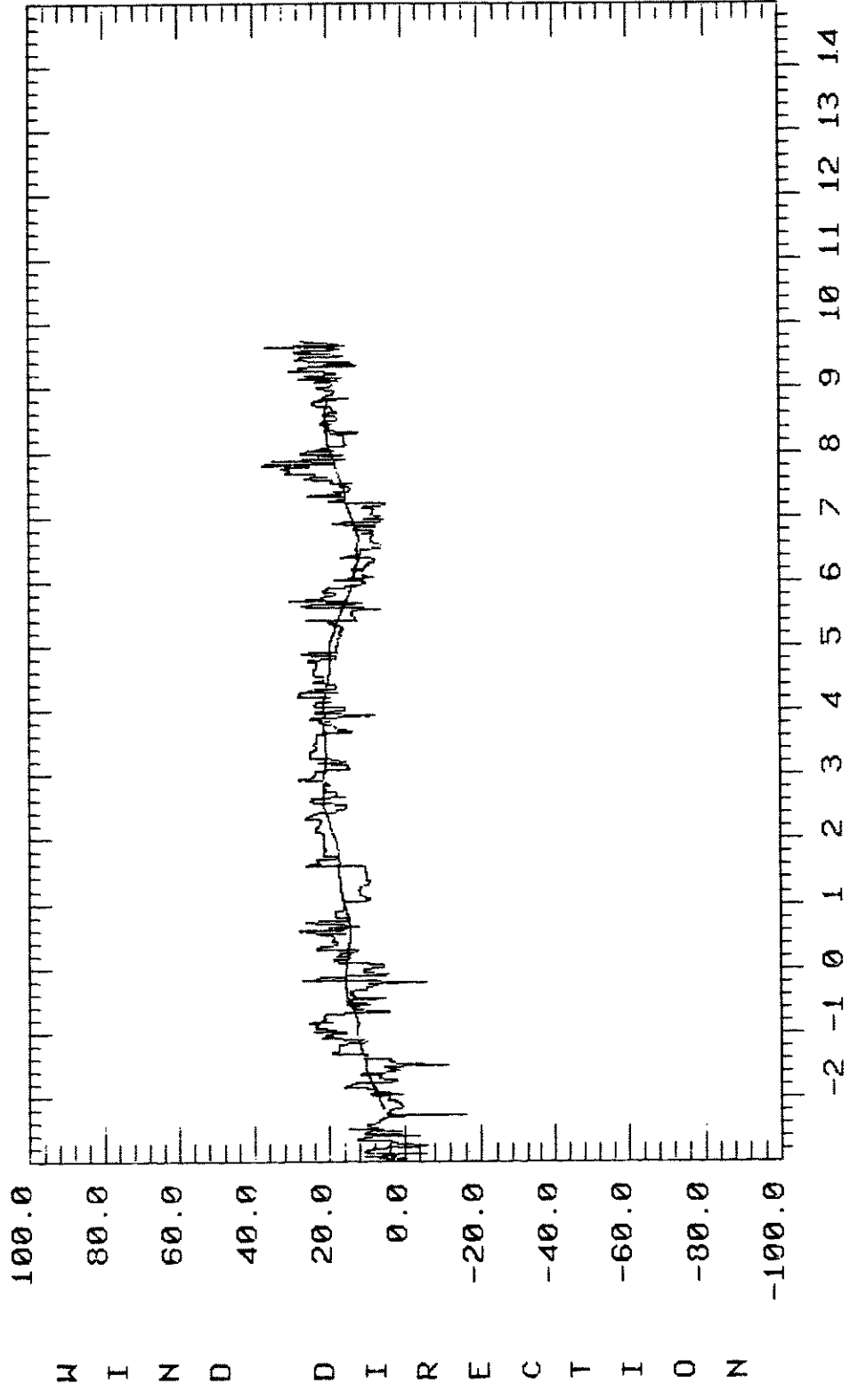
MEAN OF RUN UP: 15.67 MEAN OF RUN DOWN: 15.70



TRIAL: 051 TYPE: WHDG UNITS: DEGREES

AVERAGING TIME: 0.6 SEC X: 420 M Y: 50 M Z: 10.0 M

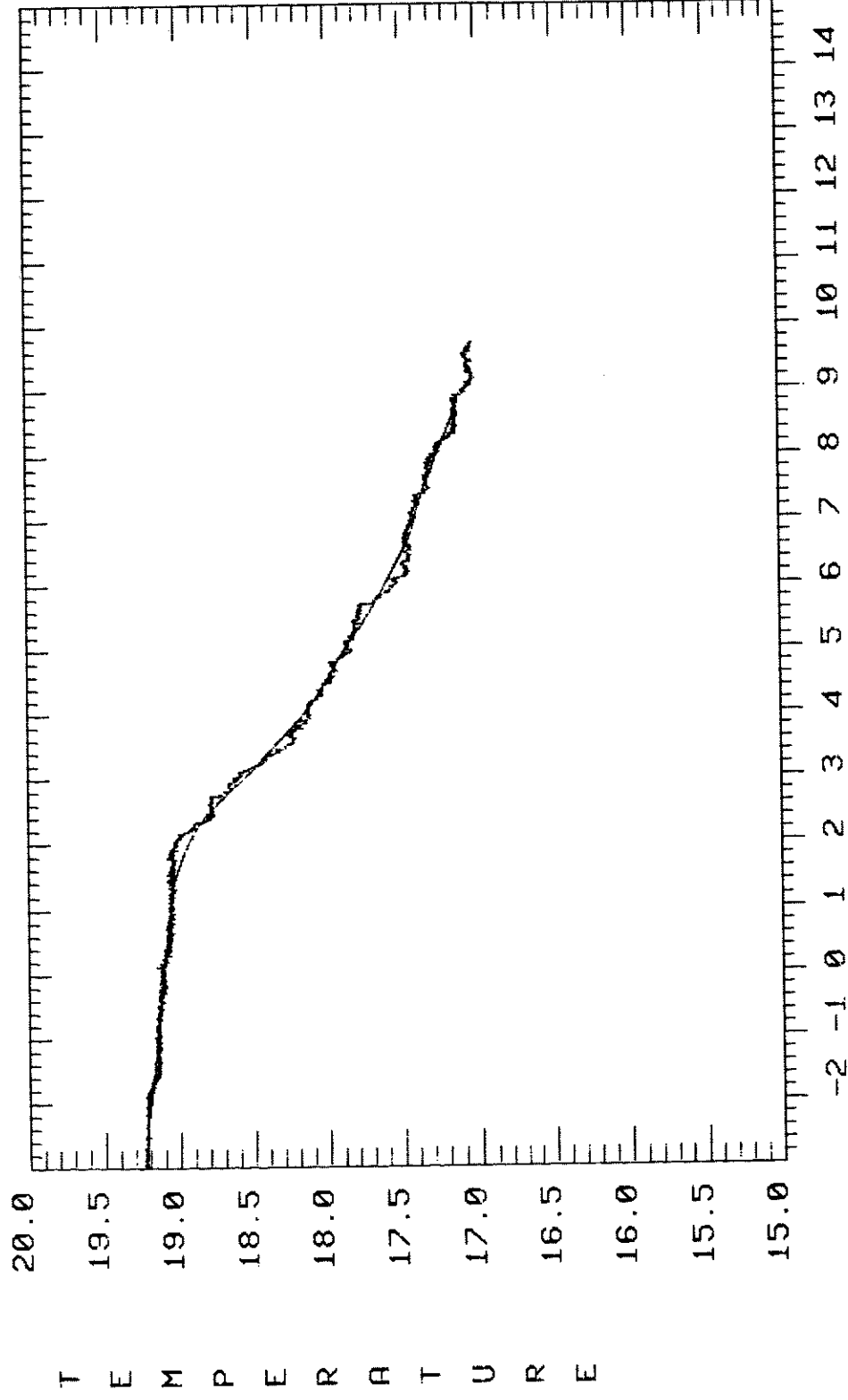
MEAN OF RUN UP: -23.83 MEAN OF RUN DOWN: 7.25



TRIAL: 051 TYPE: WHDG UNITS: DEGREES

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

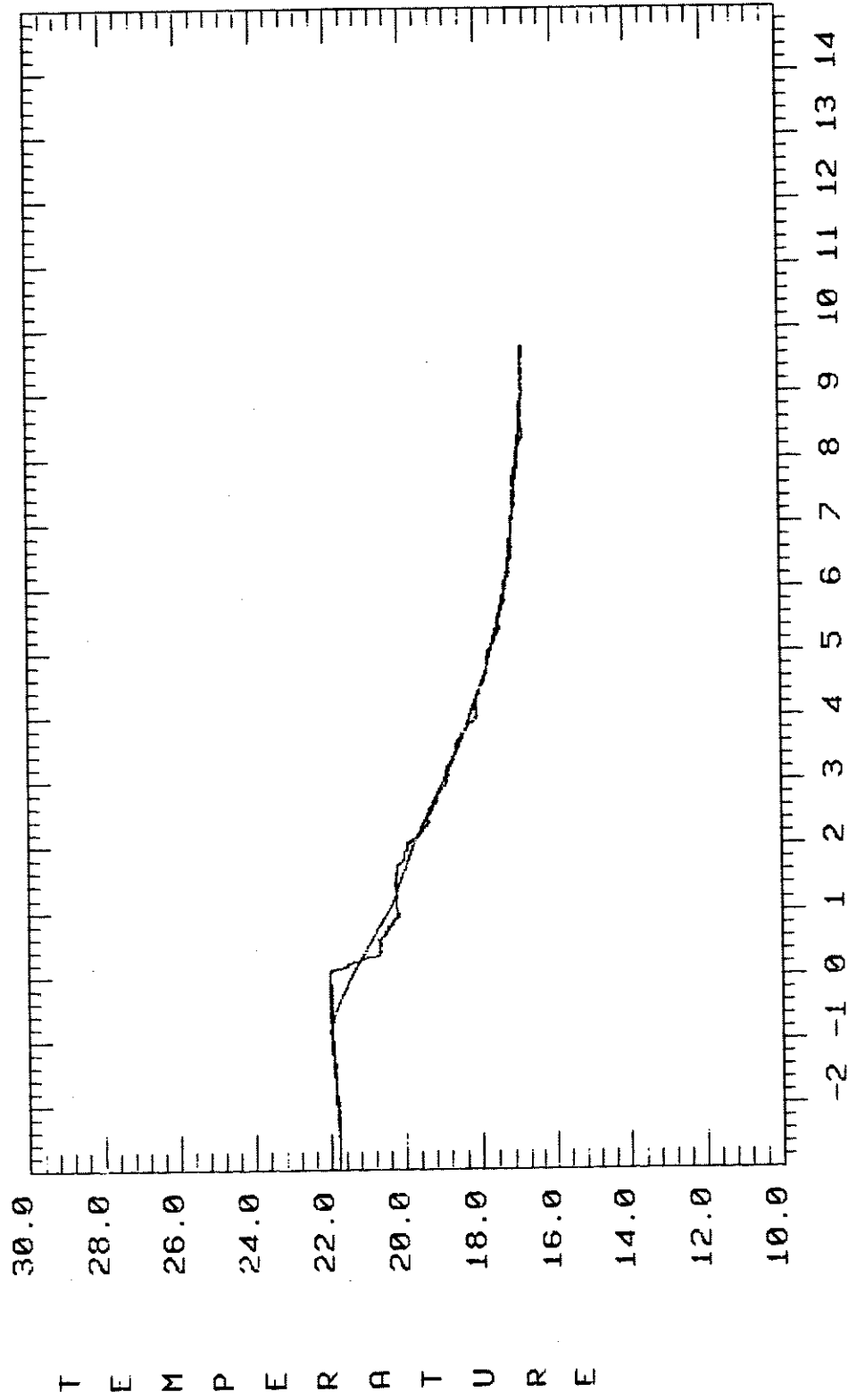
MEAN OF RUN UP: -8.50 MEAN OF RUN DOWN: 24.69



TRIAL: 051 TYPE: AIRT UNITS: DEGREES C

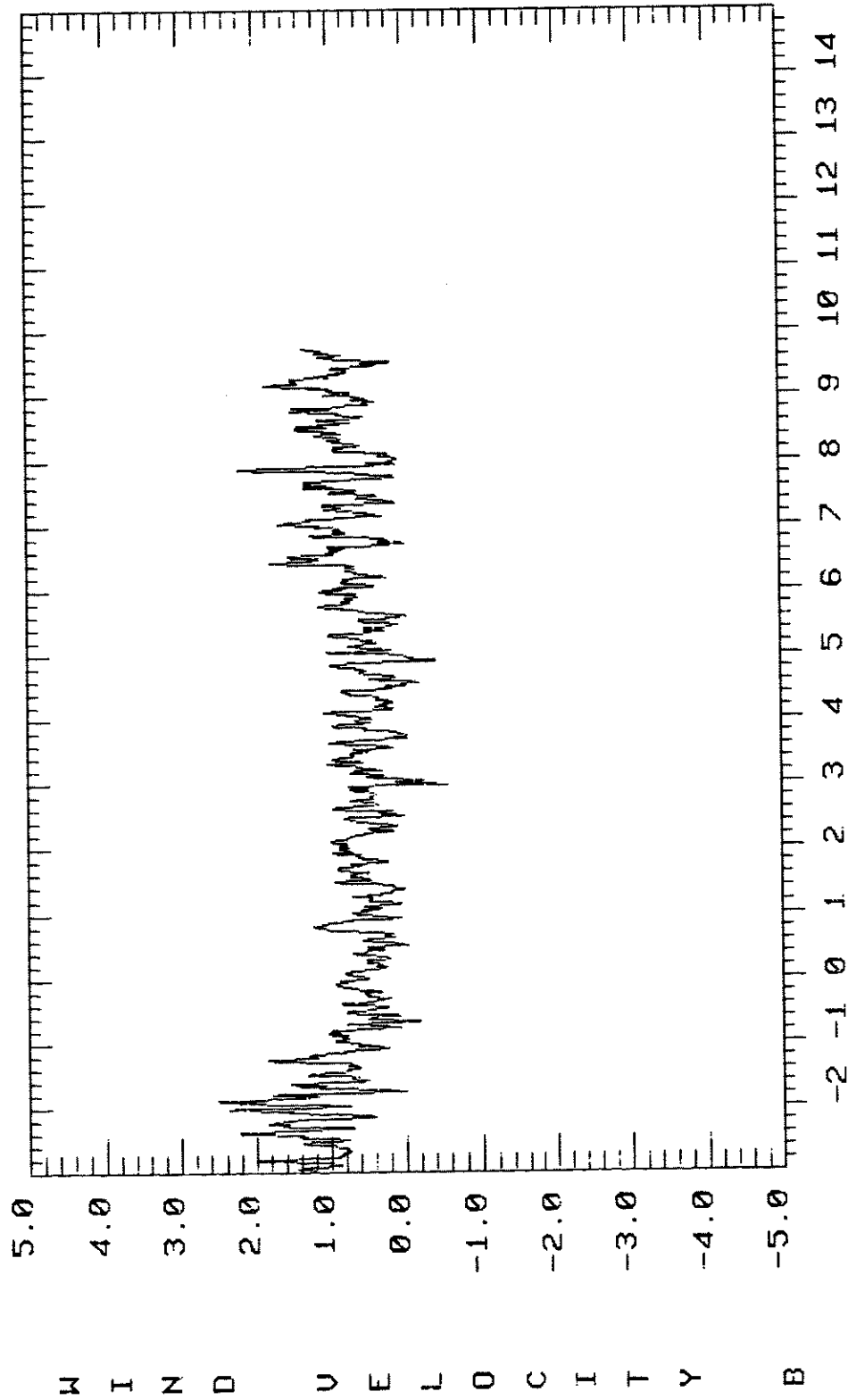
AVERAGING TIME: 0.6 SEC X: 400 M Y: 200 M Z: 0.4 M

MEAN OF RUN UP: 17.83 MEAN OF RUN DOWN: 16.82



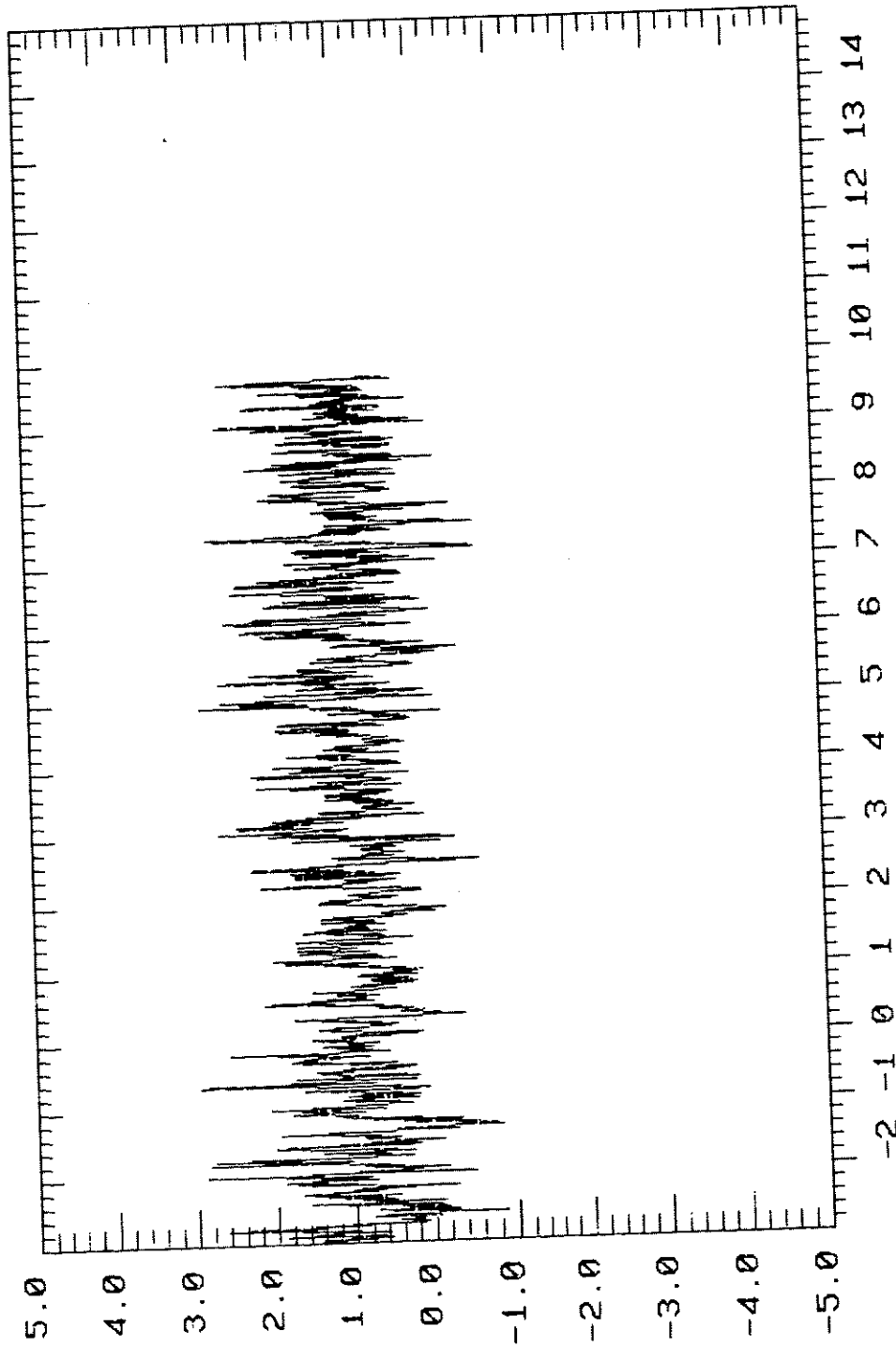
TIME FROM RELEASE (SECS*10**-2)

TRIAL: 051 TYPE: AIRT UNITS: DEGREES C
AVERAGING TIME: 0.6 SEC X: 400 M Y: 200 M Z: 12.0 M
MEAN OF RUN UP: 18.35 MEAN OF RUN DOWN: 16.39



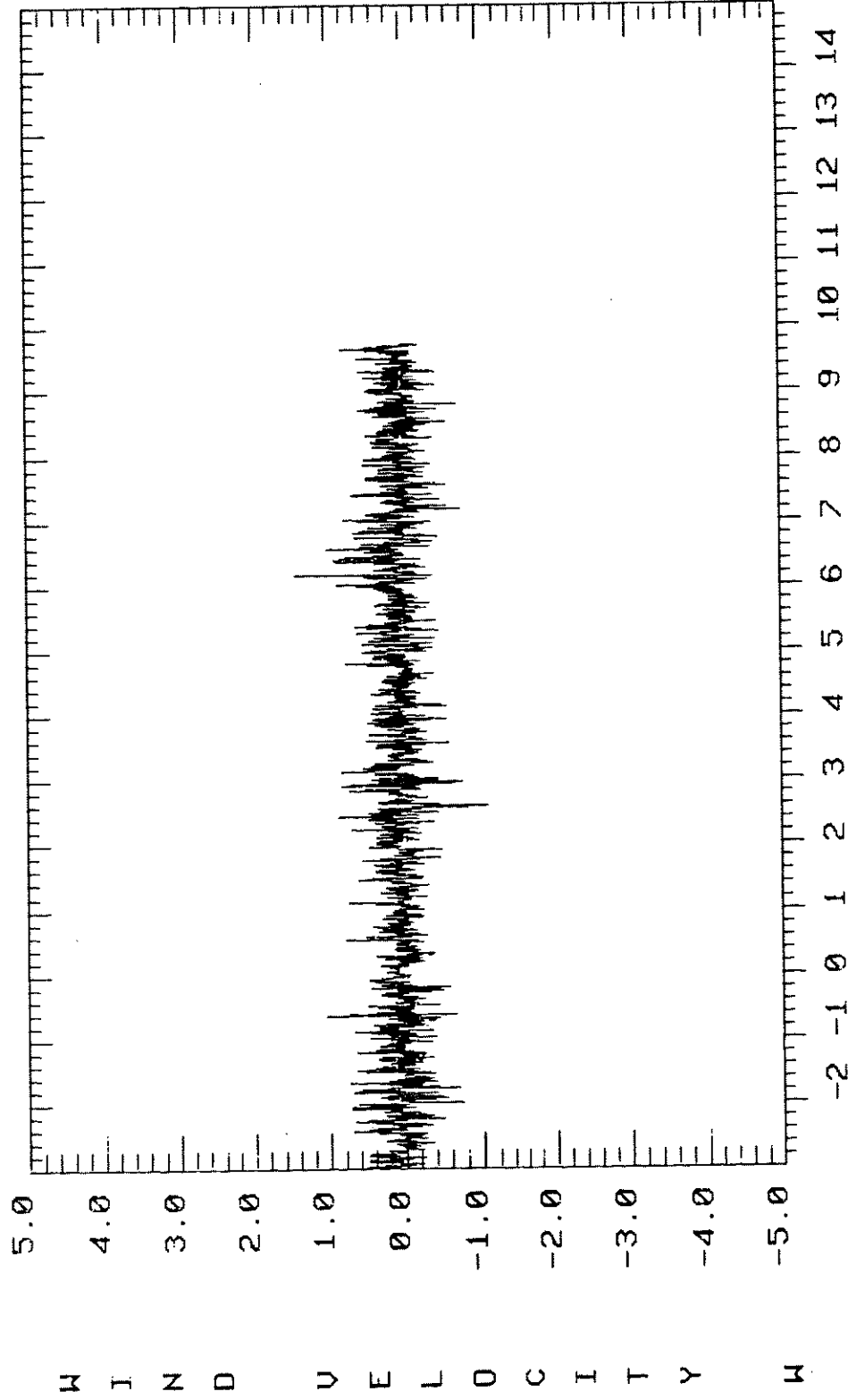
TRIAL: 051 TYPE: UANB UNITS: M/S
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 270 M Z: 1.0 M
 MEAN OF RUN UP: 1.64 MEAN OF RUN DOWN: 0.77

H I N D V E L O C I T Y A



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

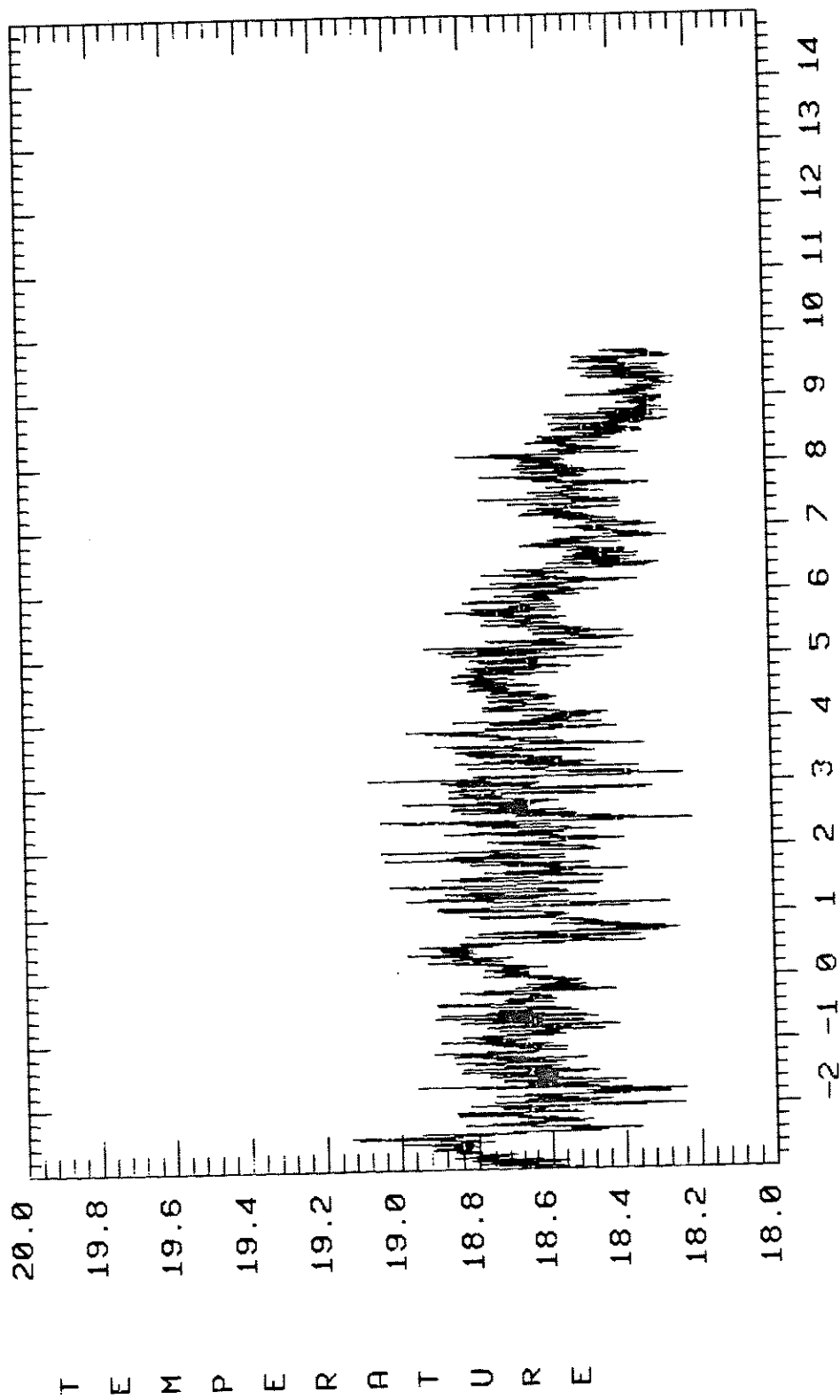
TRIAL: 051 TYPE: UANA UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 270 M Z: 1.0 M
MEAN OF RUN UP: 0.38 MEAN OF RUN DOWN: 1.09



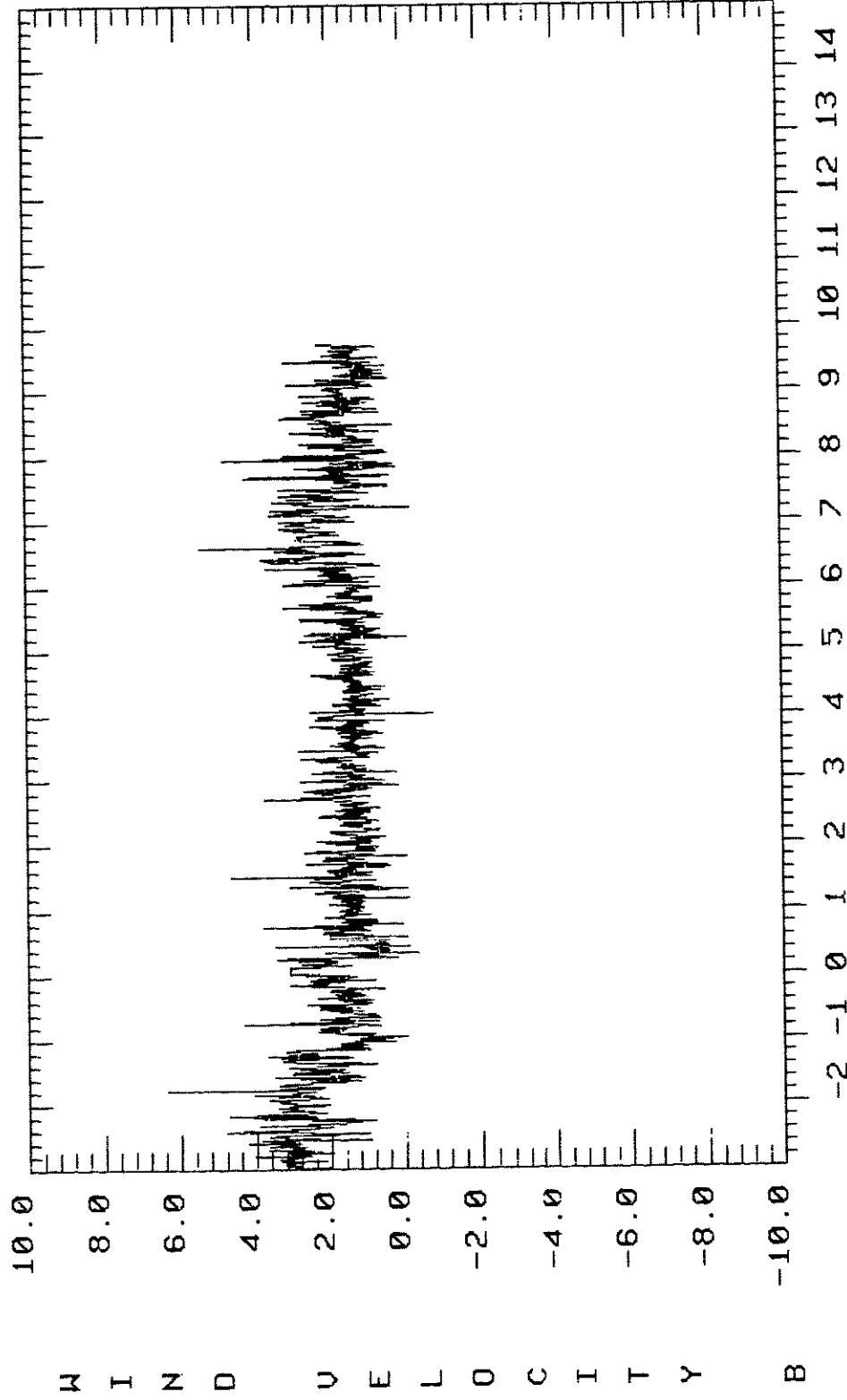
TRIAL: 051 TYPE: UANW UNITS: M/S

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

MEAN OF RUN UP: 0.01 MEAN OF RUN DOWN: 0.04

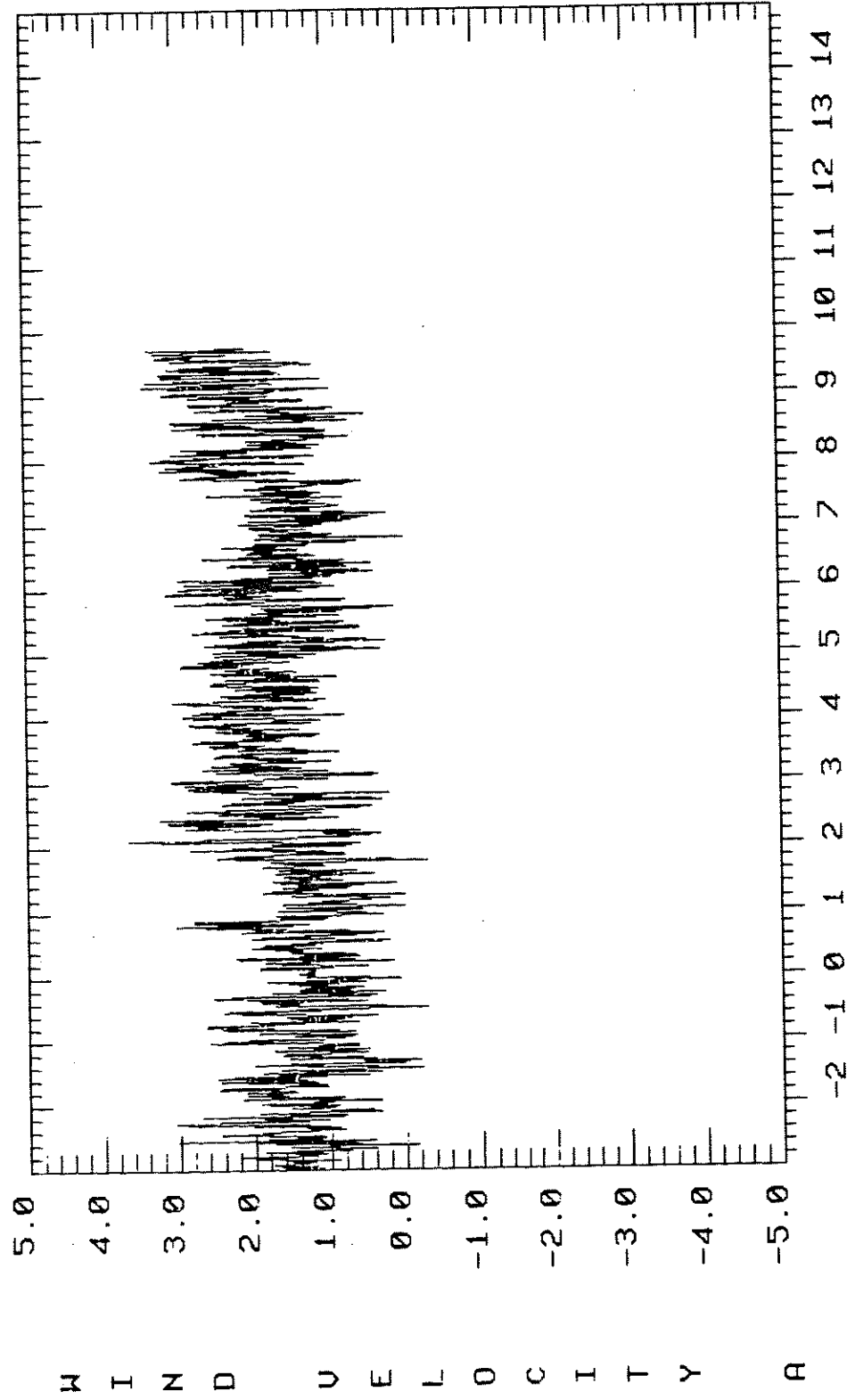


TRIAL: 051 TYPE: UANT UNITS: DEGREES C
AVERAGING TIME: 0.6 SEC X: 400 M Y: 270 M Z: 1.0 M
MEAN OF RUN UP: 18.39 MEAN OF RUN DOWN: 18.26



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

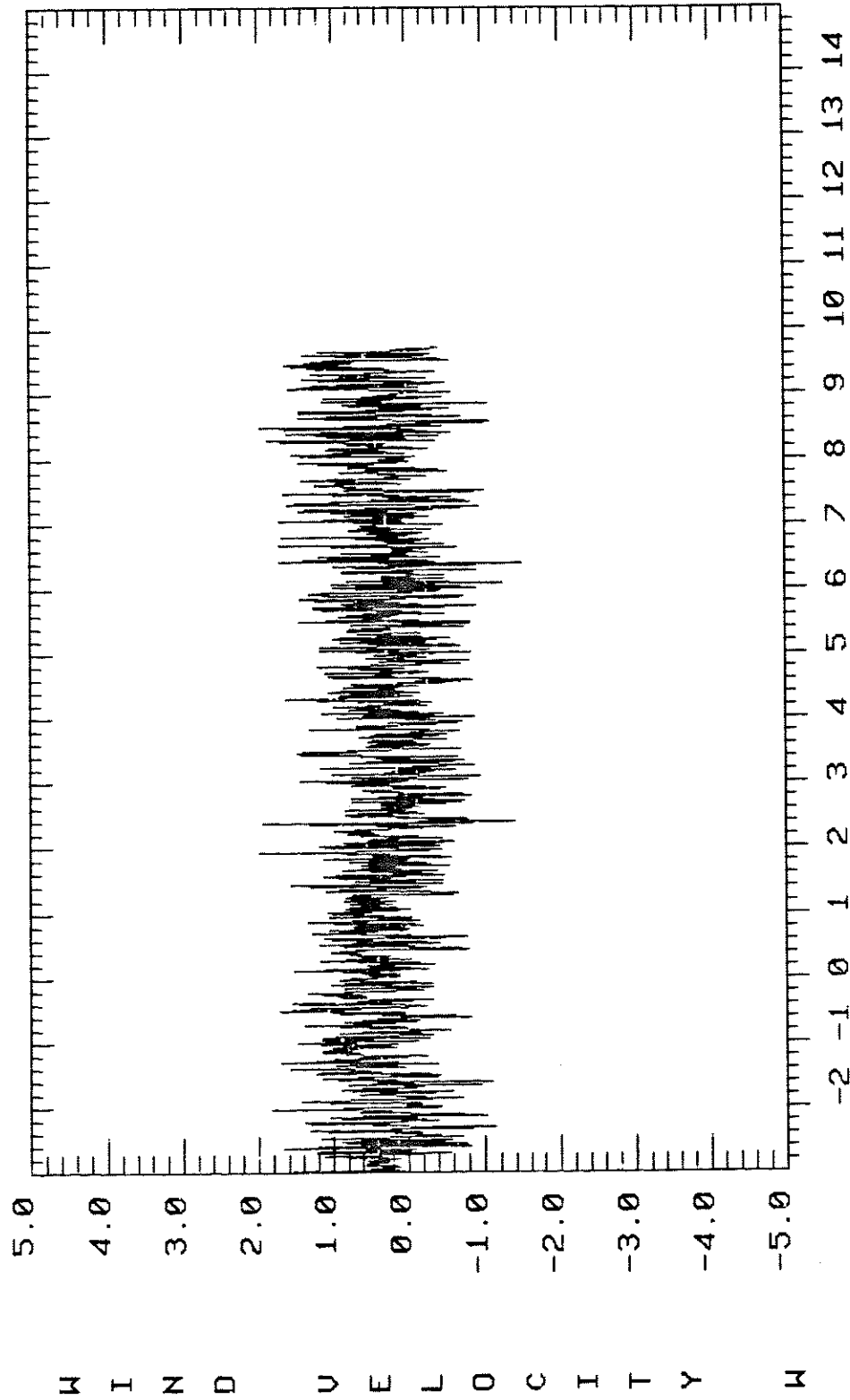
TRIAL: 051 TYPE: UANB UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 400 M Y: 275 M Z: 15.0 M
MEAN OF RUN UP: 3.30 MEAN OF RUN DOWN: 1.42



TRIAL: 051 TYPE: UANA UNITS: M/S

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

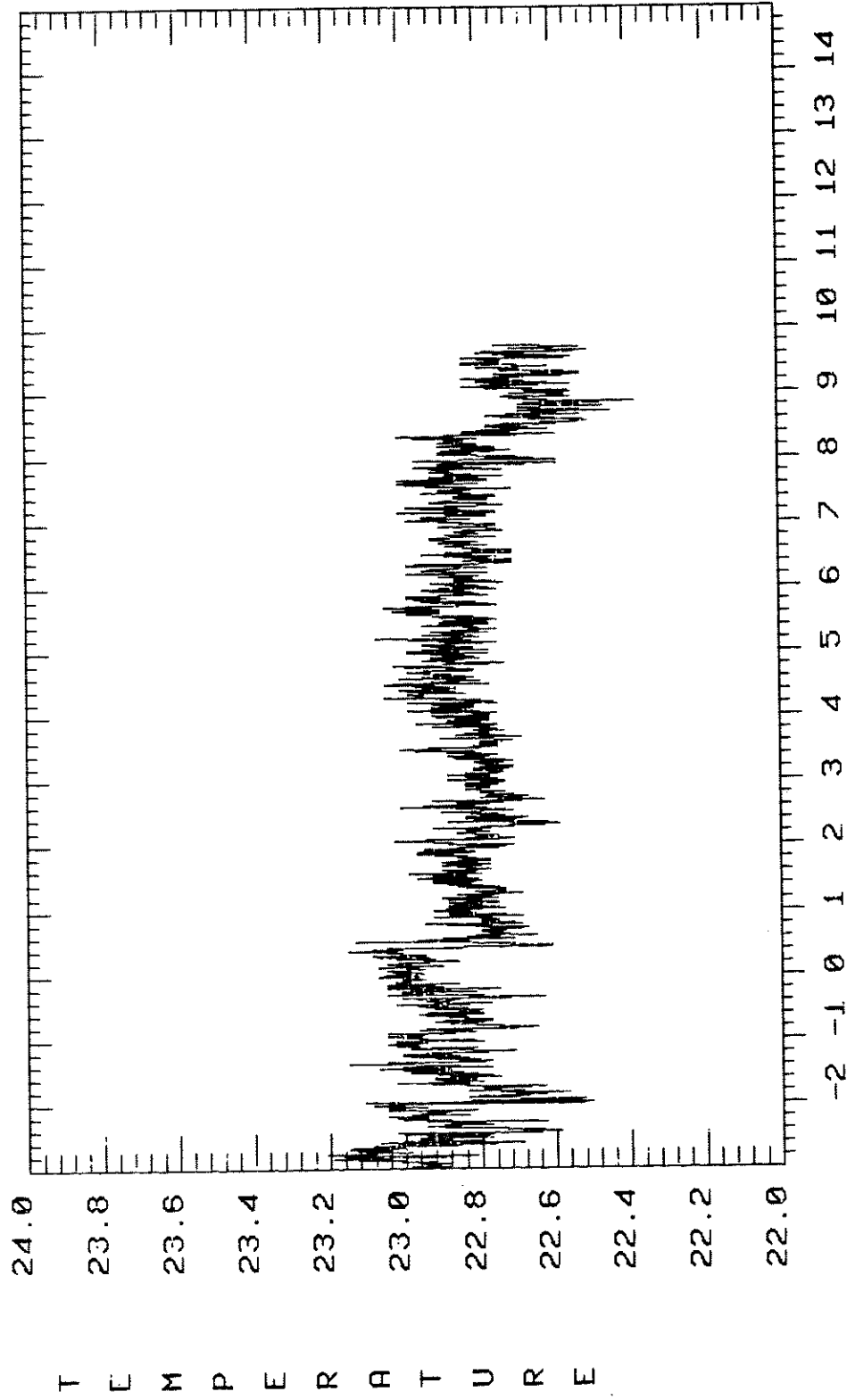
MEAN OF RUN UP: 0.74 MEAN OF RUN DOWN: 2.48



TRIAL: 051 TYPE: UANW UNITS: M/S

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

MEAN OF RUN UP: 0.26 MEAN OF RUN DOWN: 0.30

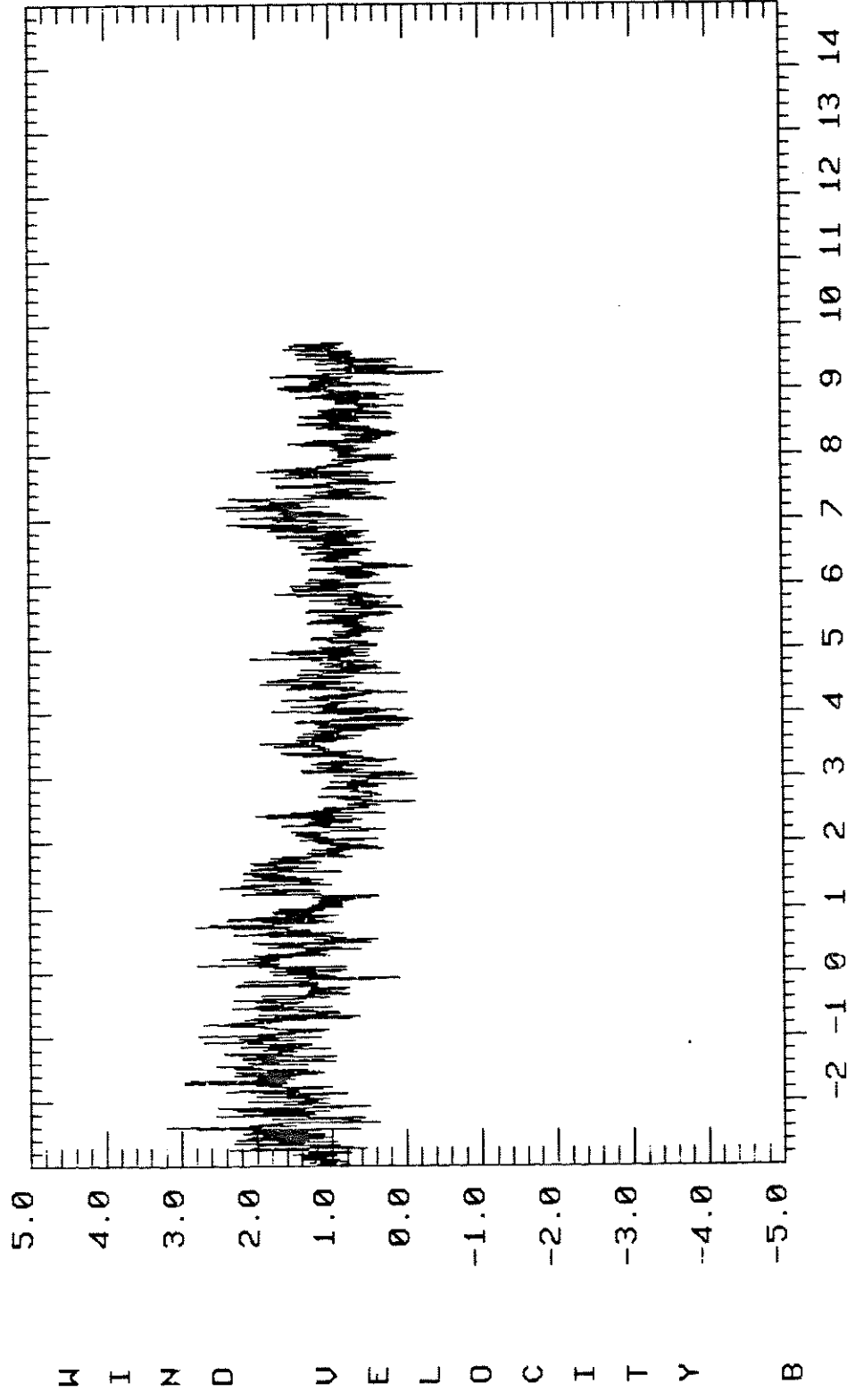


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 051 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 400 M Y: 255 M Z: 15.0 M

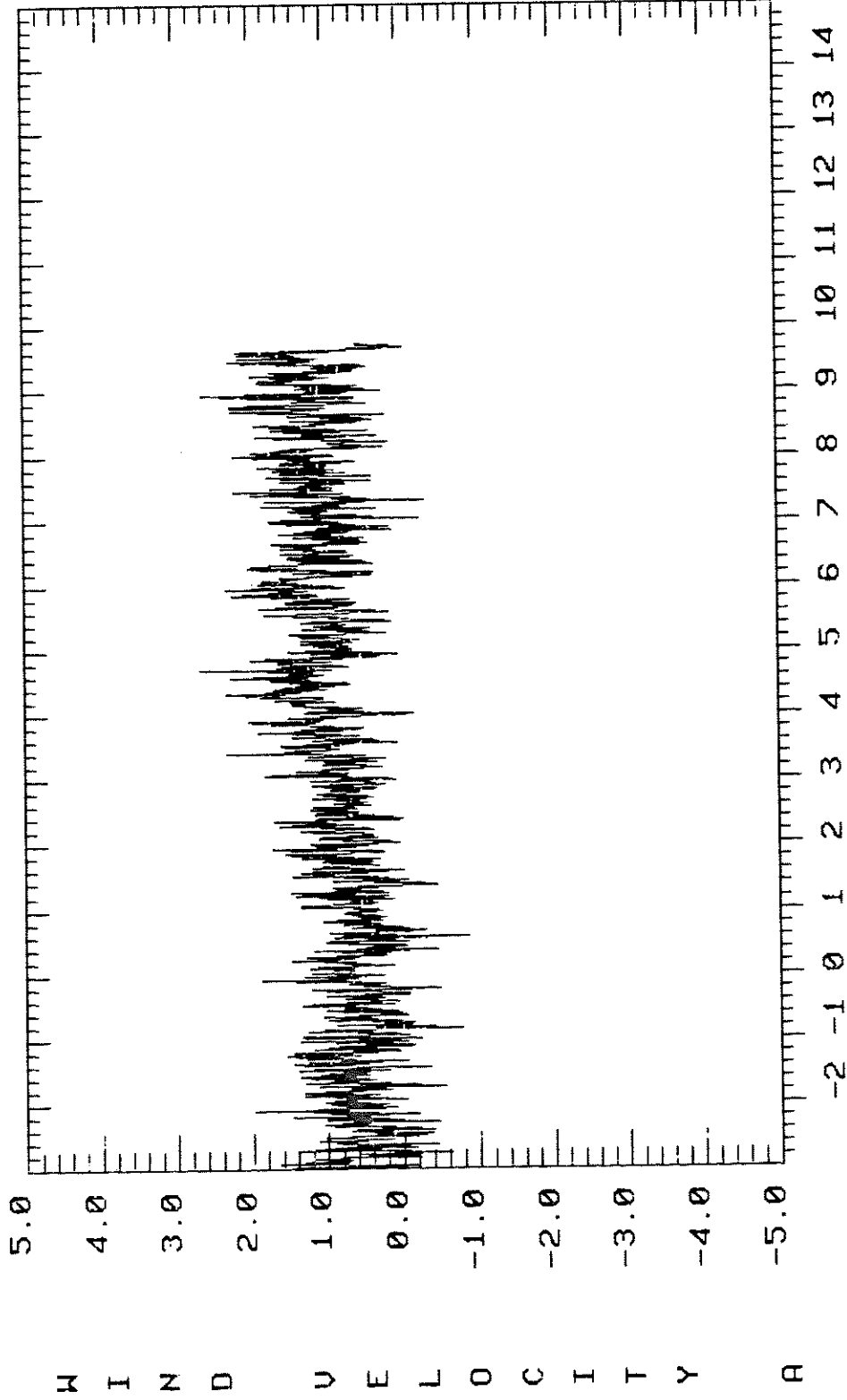
MEAN OF RUN UP: 22.55 MEAN OF RUN DOWN: 22.50



TRIAL: 051 TYPE: UANB UNITS: M/S

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

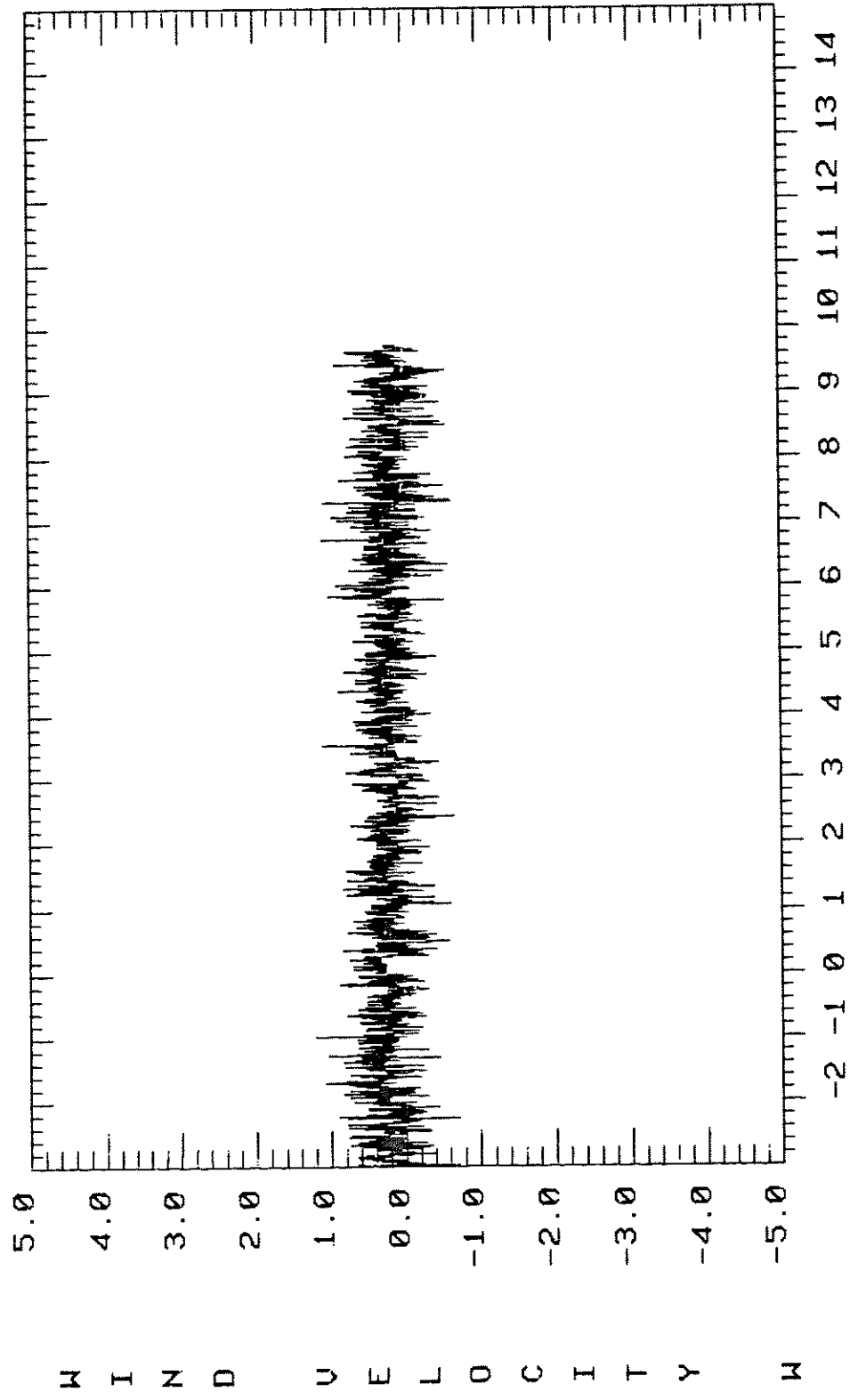
MEAN OF RUN UP: 1.83 MEAN OF RUN DOWN: 0.55



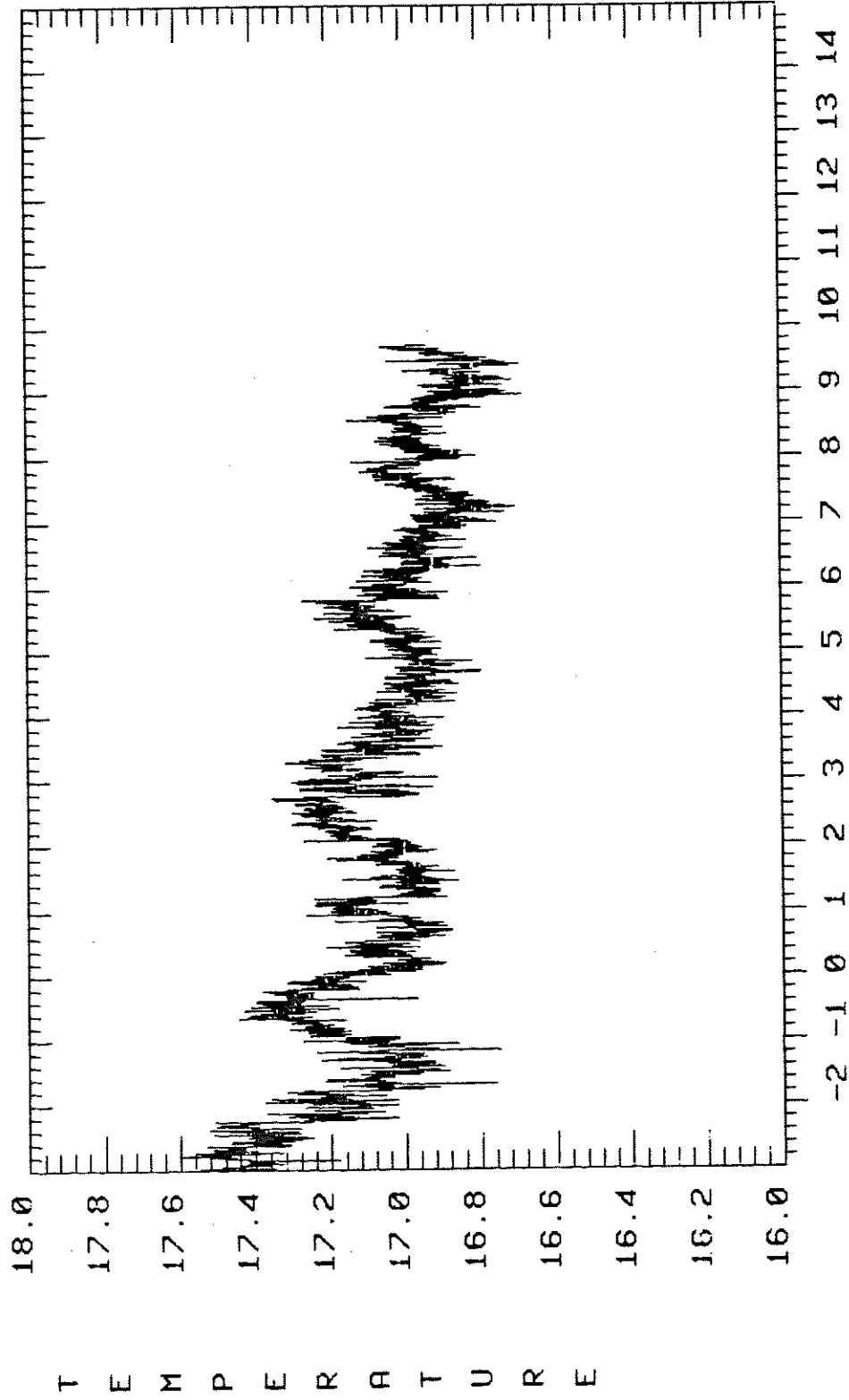
TRIAL: 051 TYPE: UANA UNITS: M/S

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

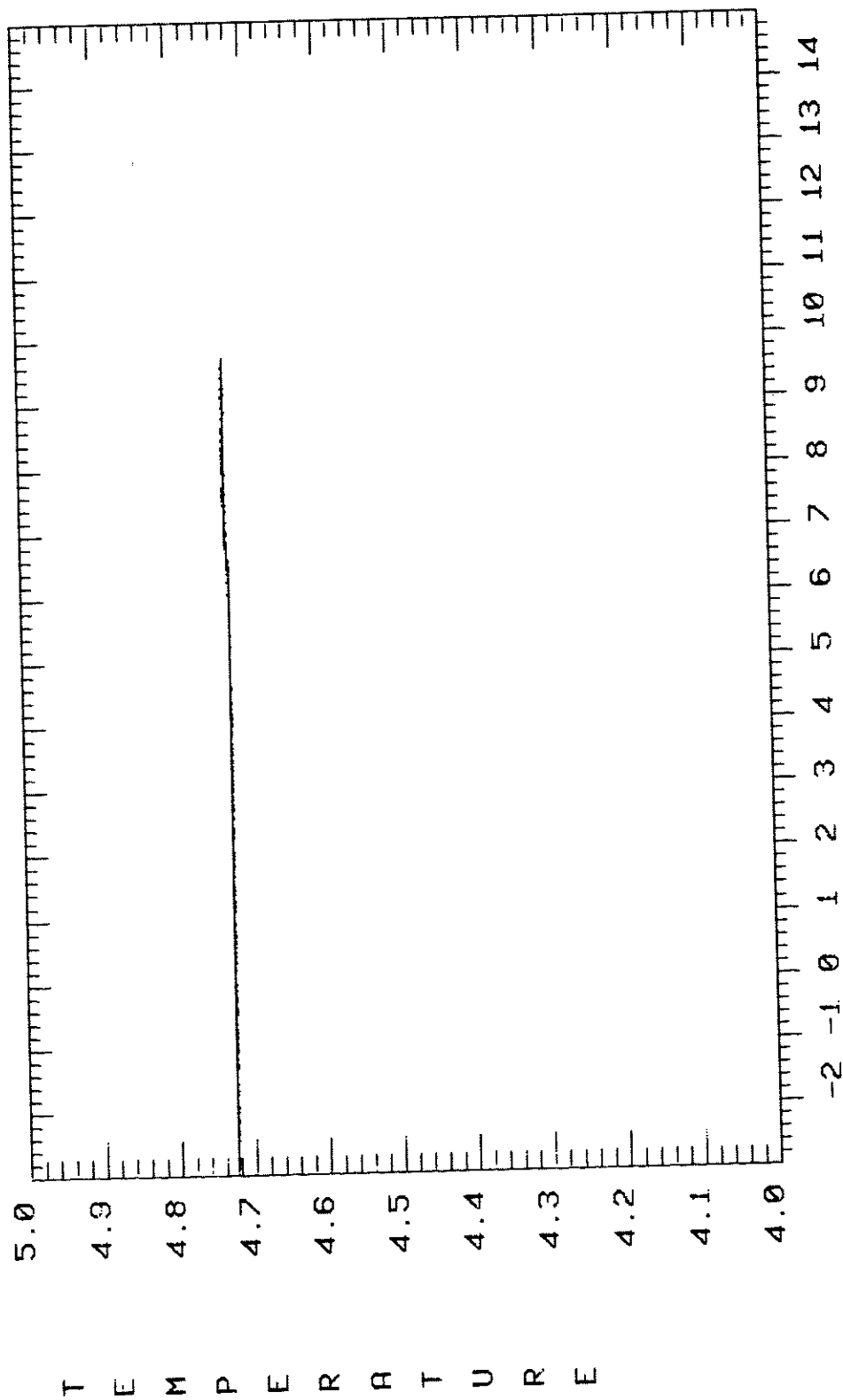
MEAN OF RUN UP: 0.32 MEAN OF RUN DOWN: 1.22



TRIAL: 051 TYPE: UANW UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 450 M Y: 270 M Z: 1.0 M
MEAN OF RUN UP: 0.24 MEAN OF RUN DOWN: 0.17



TRIAL: 051 TYPE: UANT UNITS: DEGREES C
AVERAGING TIME: 0.6 SEC X: 450 M Y: 270 M Z: 1.0 M
MEAN OF RUN UP: 16.83 MEAN OF RUN DOWN: 16.73

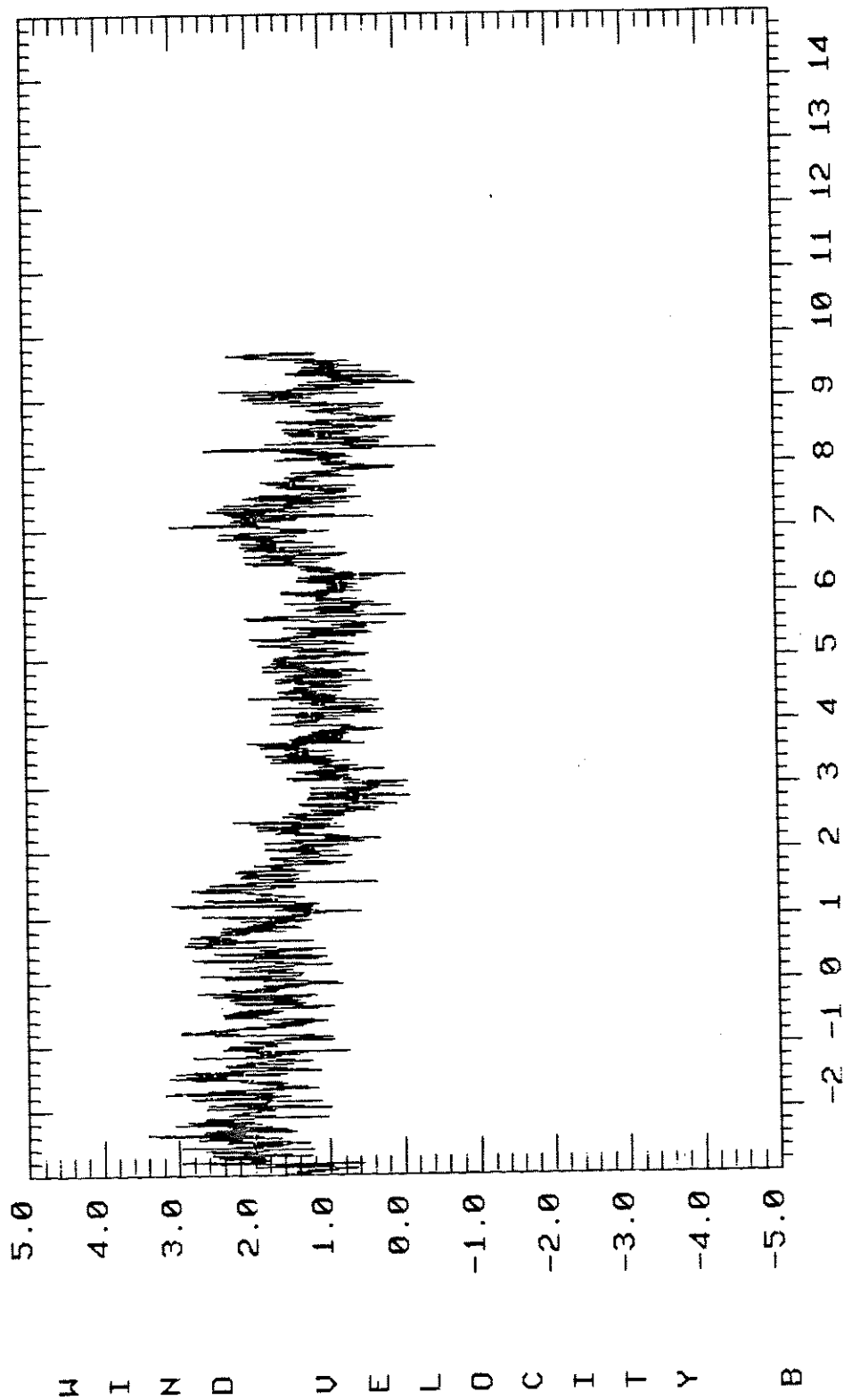


TIME FROM RELEASE (SECS*10**-2)

TRIAL: 051 TYPE: TEMP UNITS: DEGREES C

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

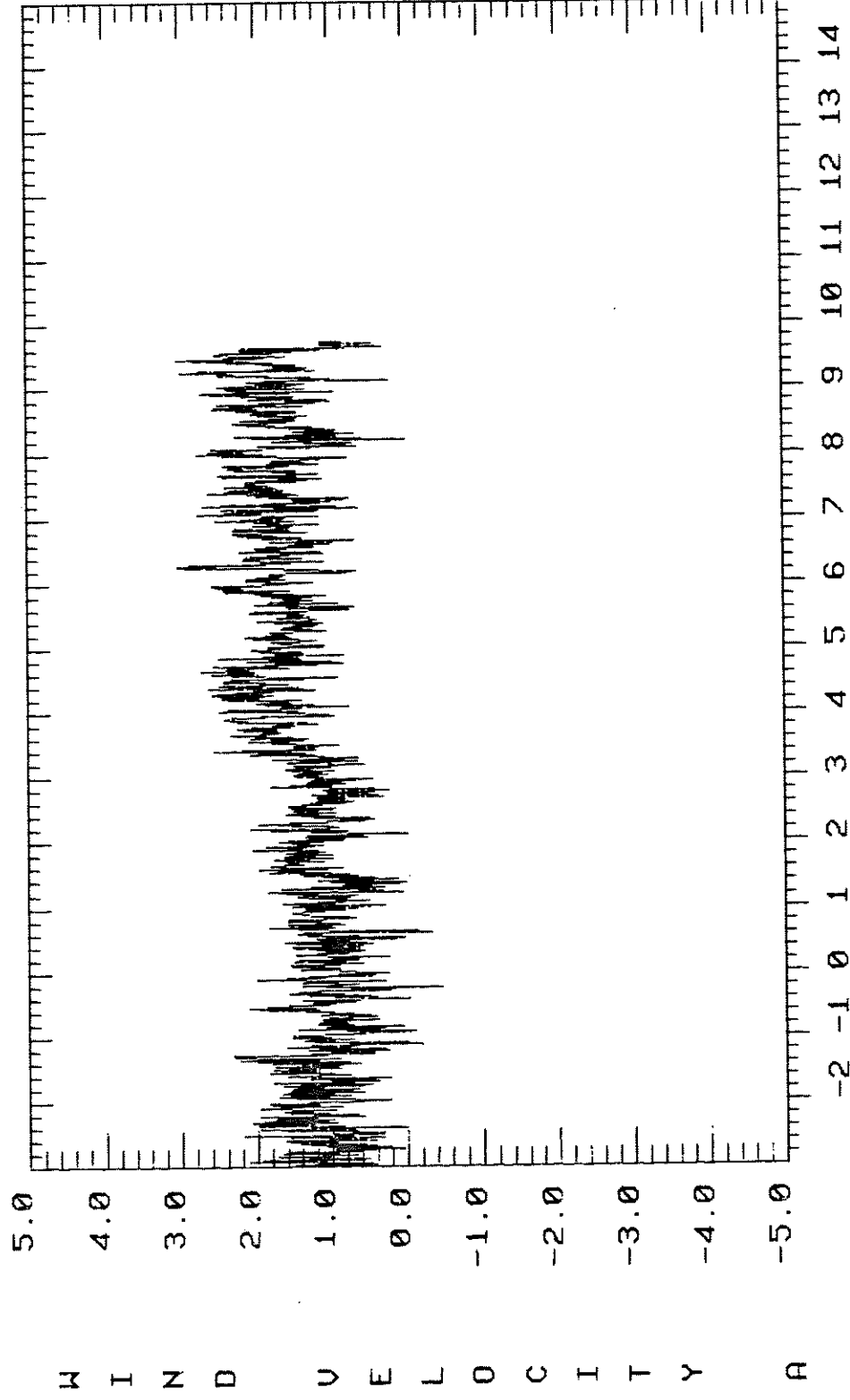
MEAN OF RUN UP: 4.73 MEAN OF RUN DOWN: 4.73



TRIAL: 051 TYPE: UANB UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.4 M

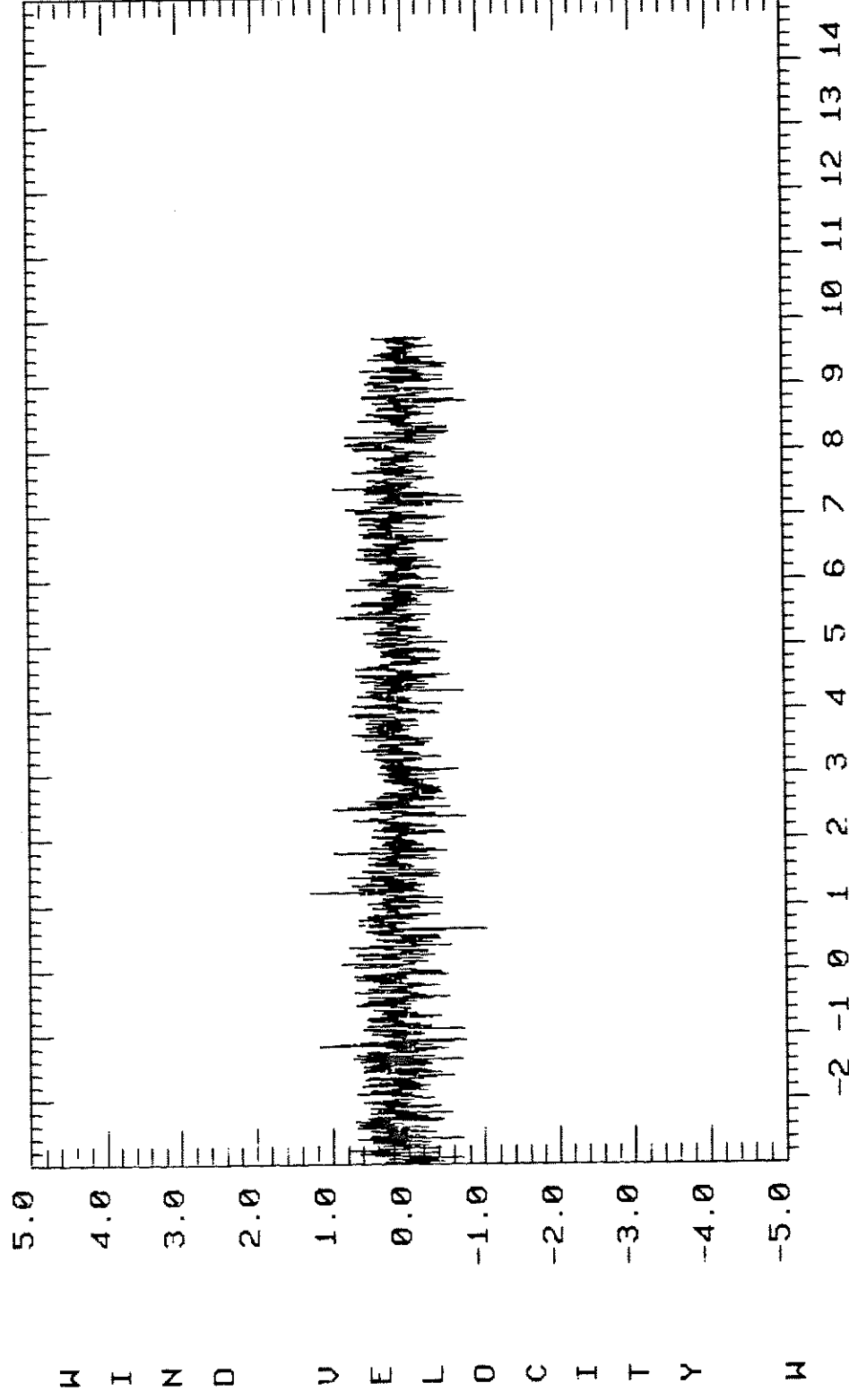
MEAN OF RUN UP: 2.20 MEAN OF RUN DOWN: 0.62



TRIAL: 051 TYPE: UANA UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.4 M

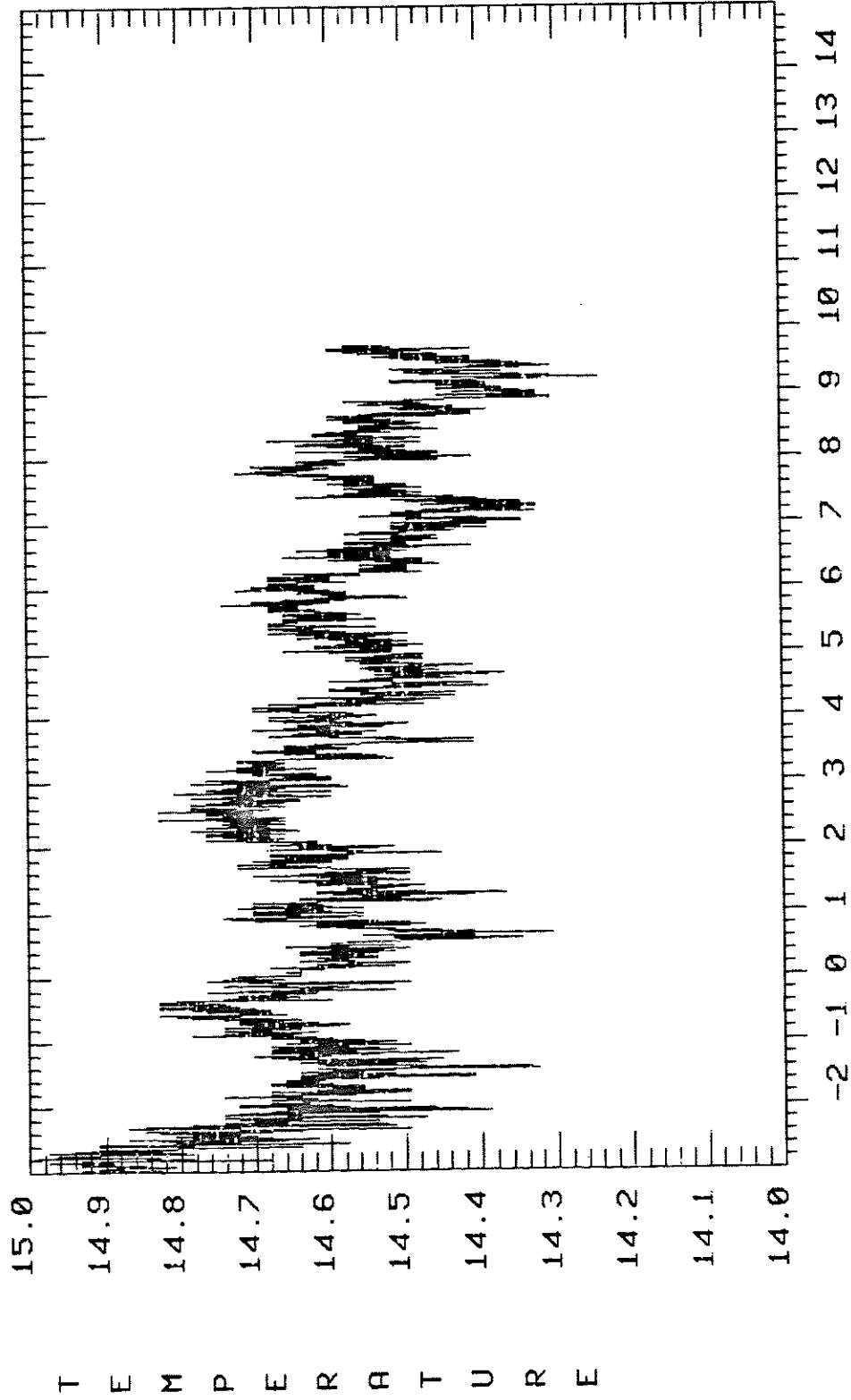
MEAN OF RUN UP: 0.82 MEAN OF RUN DOWN: 1.82



TRIAL: 051 TYPE: UANW UNITS: M/S

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.4 M

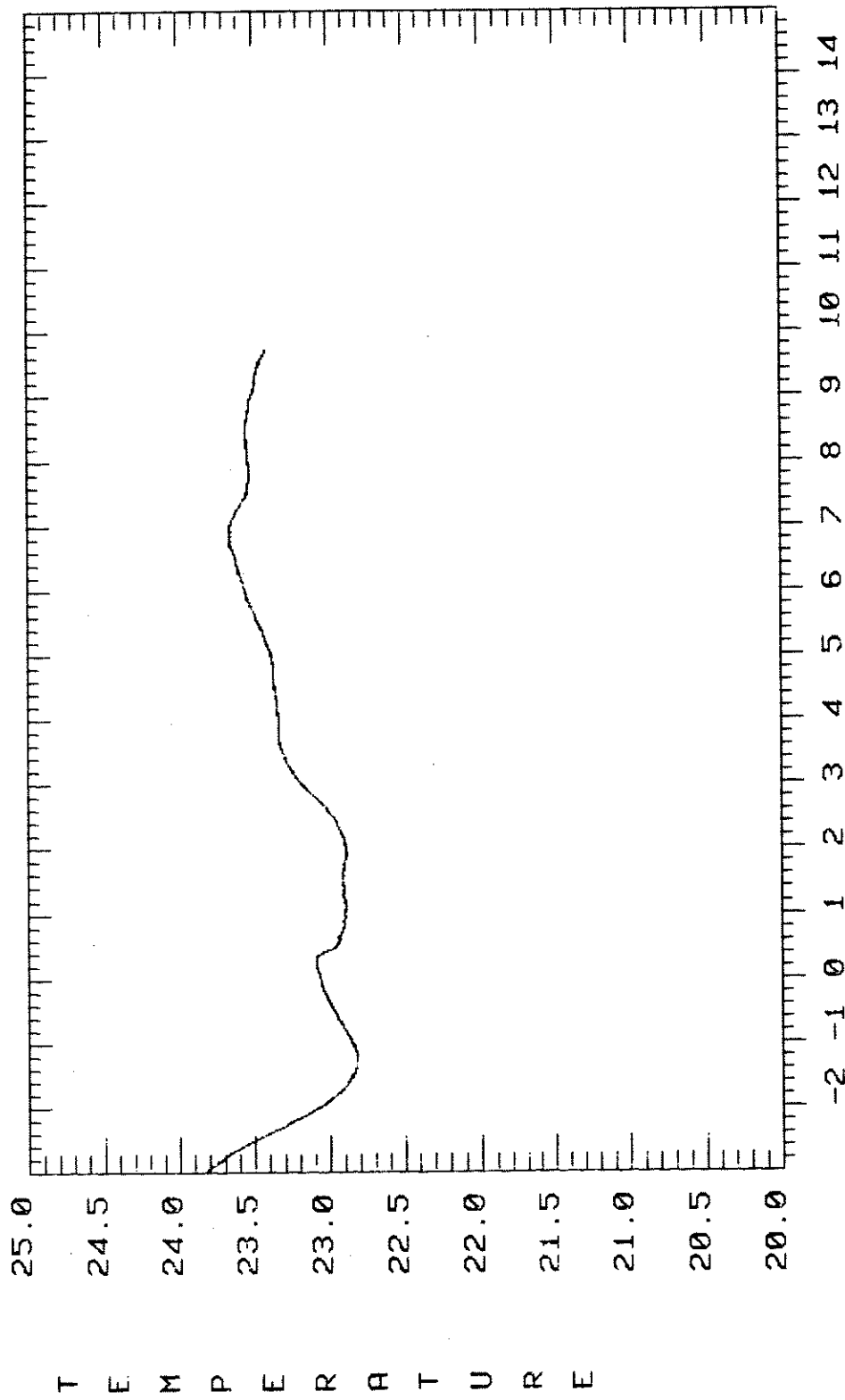
MEAN OF RUN UP: 0.11 MEAN OF RUN DOWN: 0.04



TRIAL: 051 TYPE: UANT UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.4 M

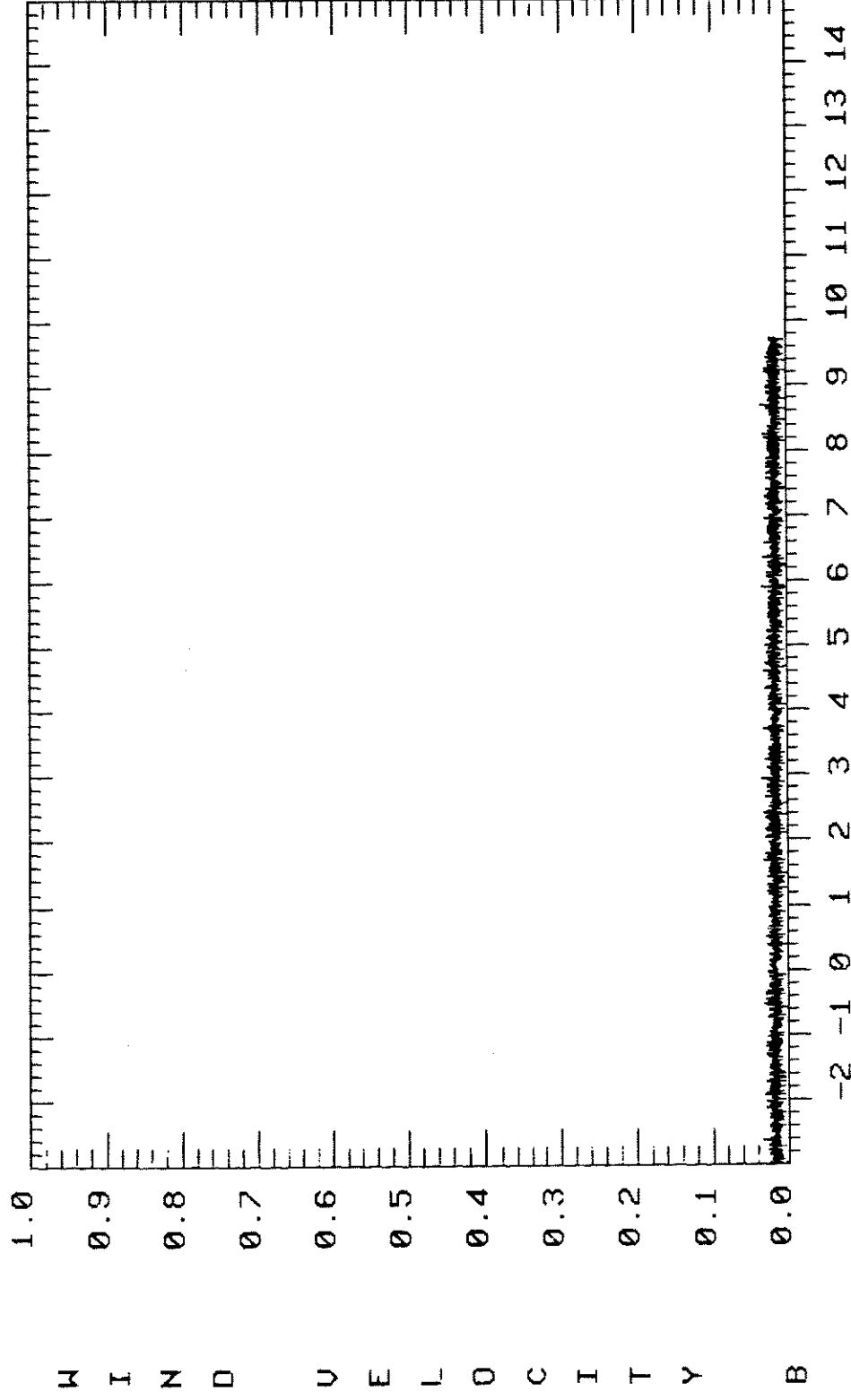
MEAN OF RUN UP: 14.28 MEAN OF RUN DOWN: 14.31



TRIAL: 051 TYPE: TEMP UNITS: DEGREES C

AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 2.4 M

MEAN OF RUN UP: 20.11 MEAN OF RUN DOWN: 22.31

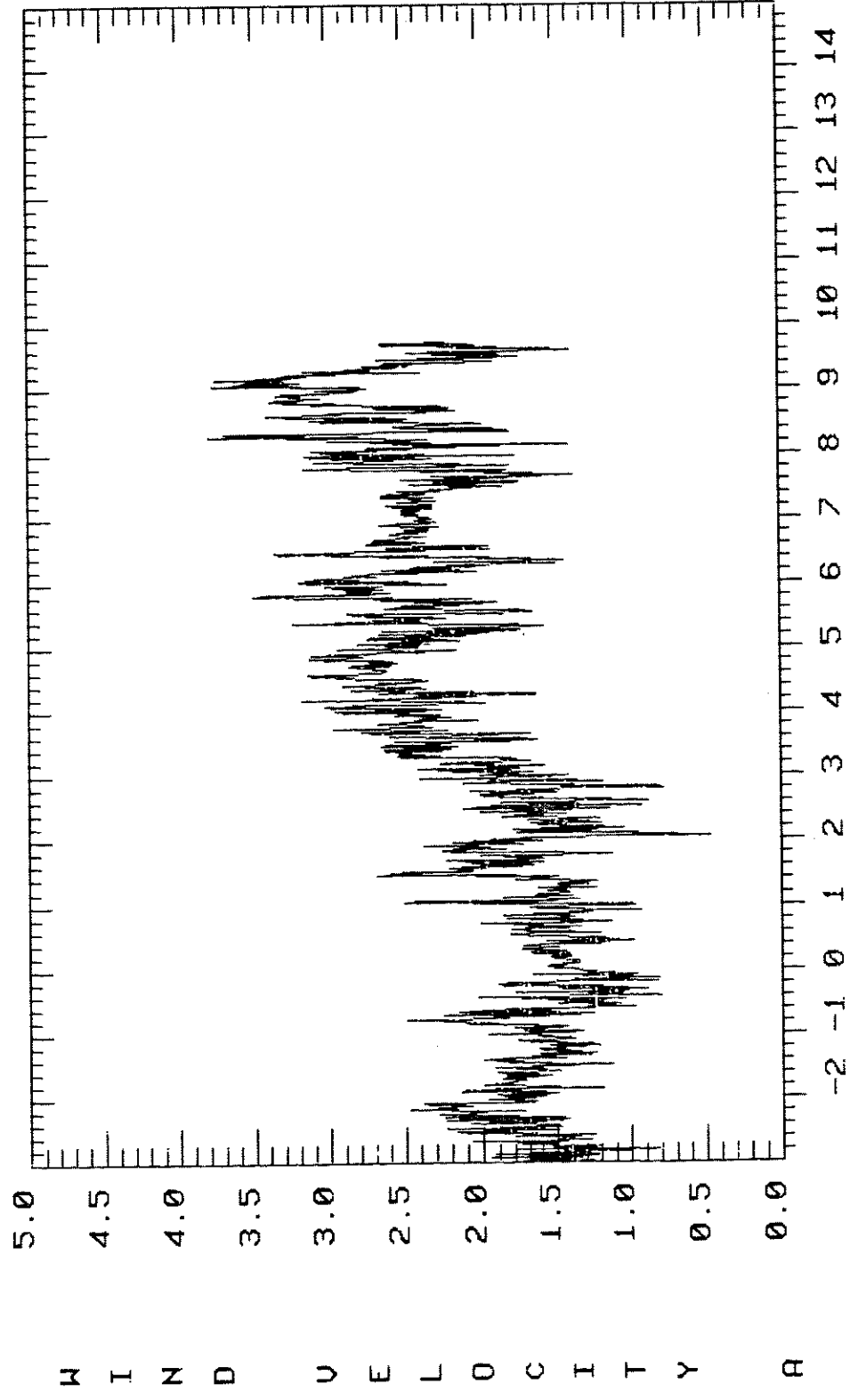


TIME FROM RELEASE (SECS*10**-2)

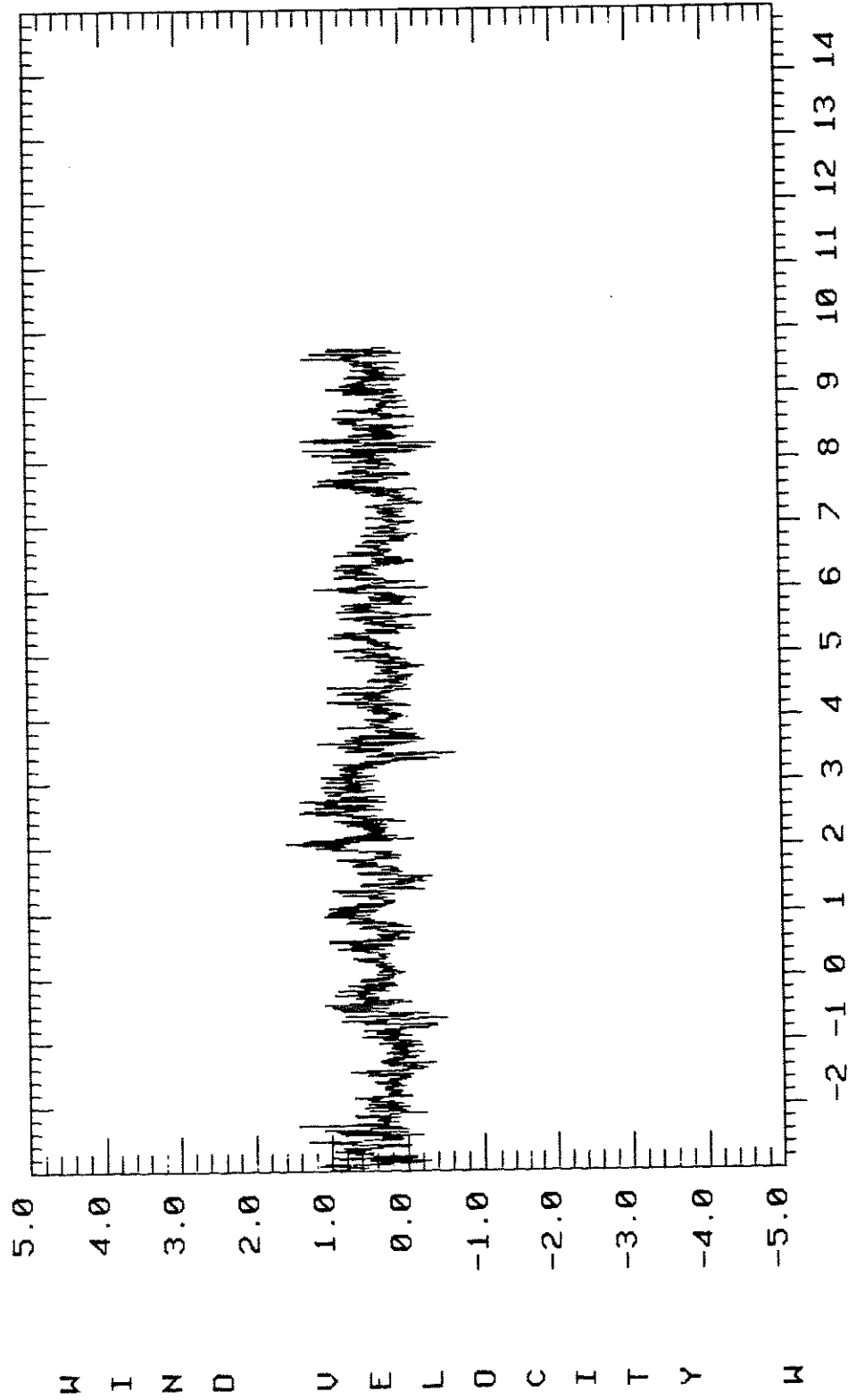
TRIAL: 051 TYPE: UANB UNITS: M/S

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: 0.01



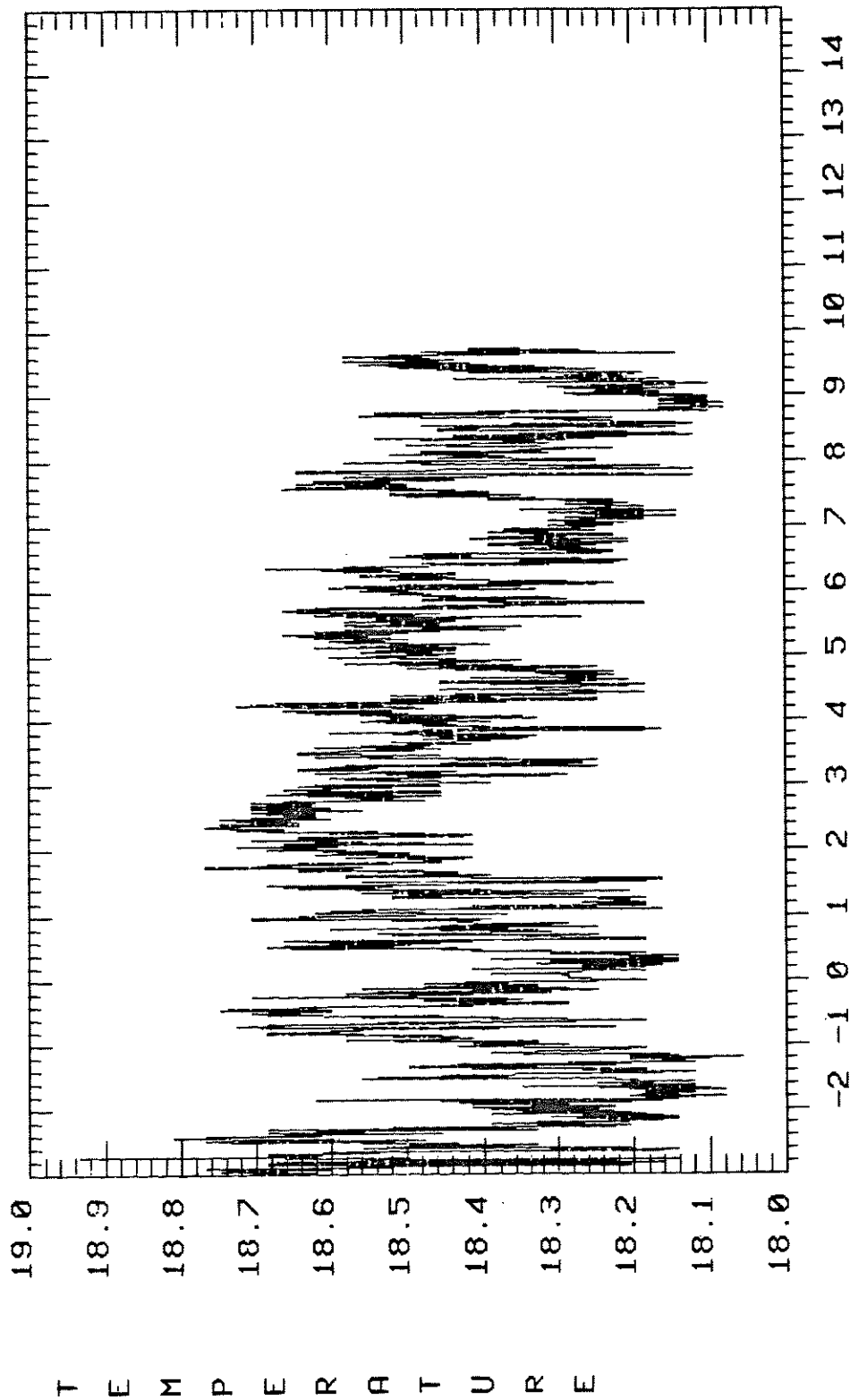
TRIAL: 051 TYPE: UANA UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 15.0 M
MEAN OF RUN UP: 1.14 MEAN OF RUN DOWN: 2.68



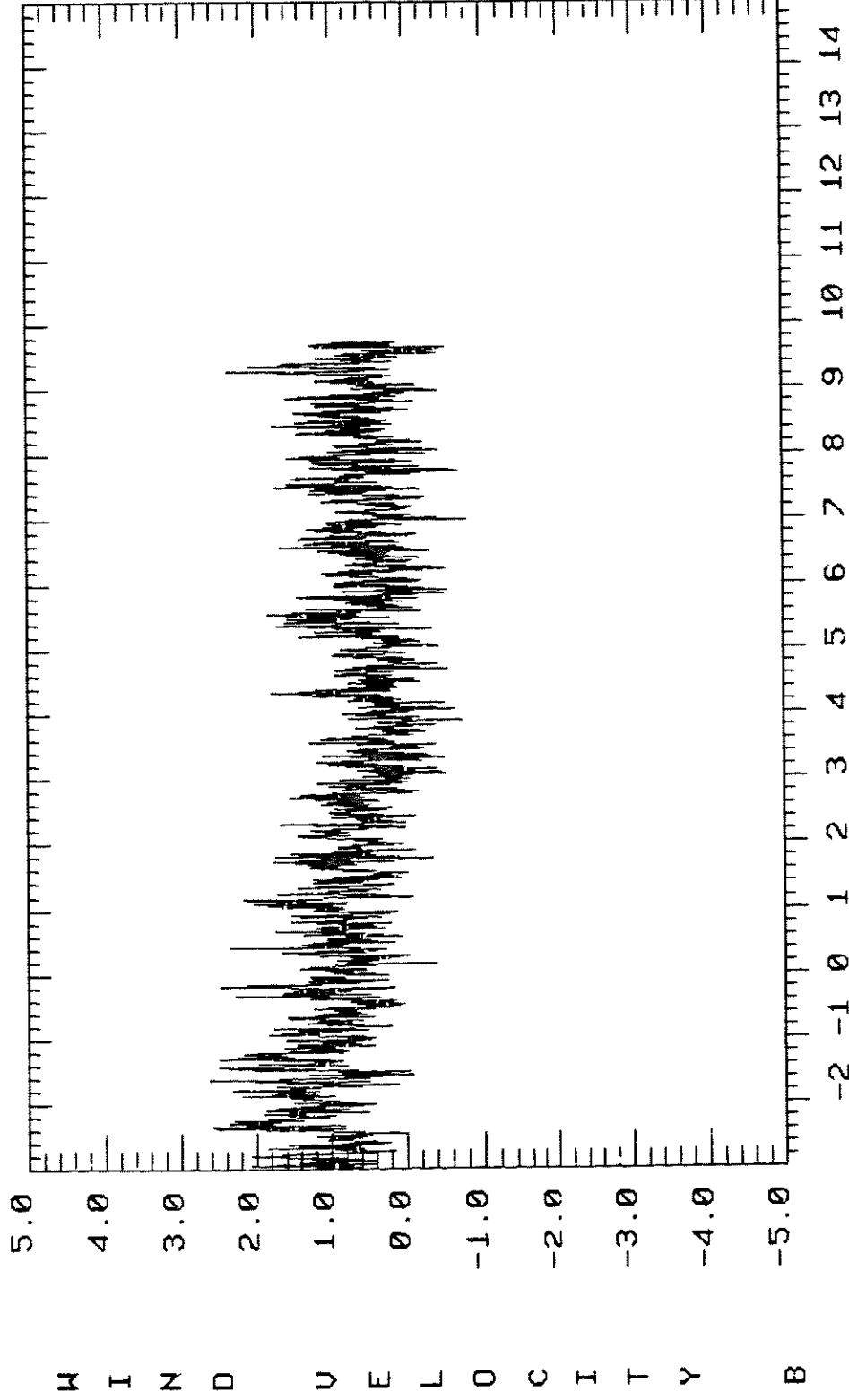
TRIAL: 051 TYPE: UANW UNITS: M/S

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

MEAN OF RUN UP: 0.21 MEAN OF RUN DOWN: 0.29

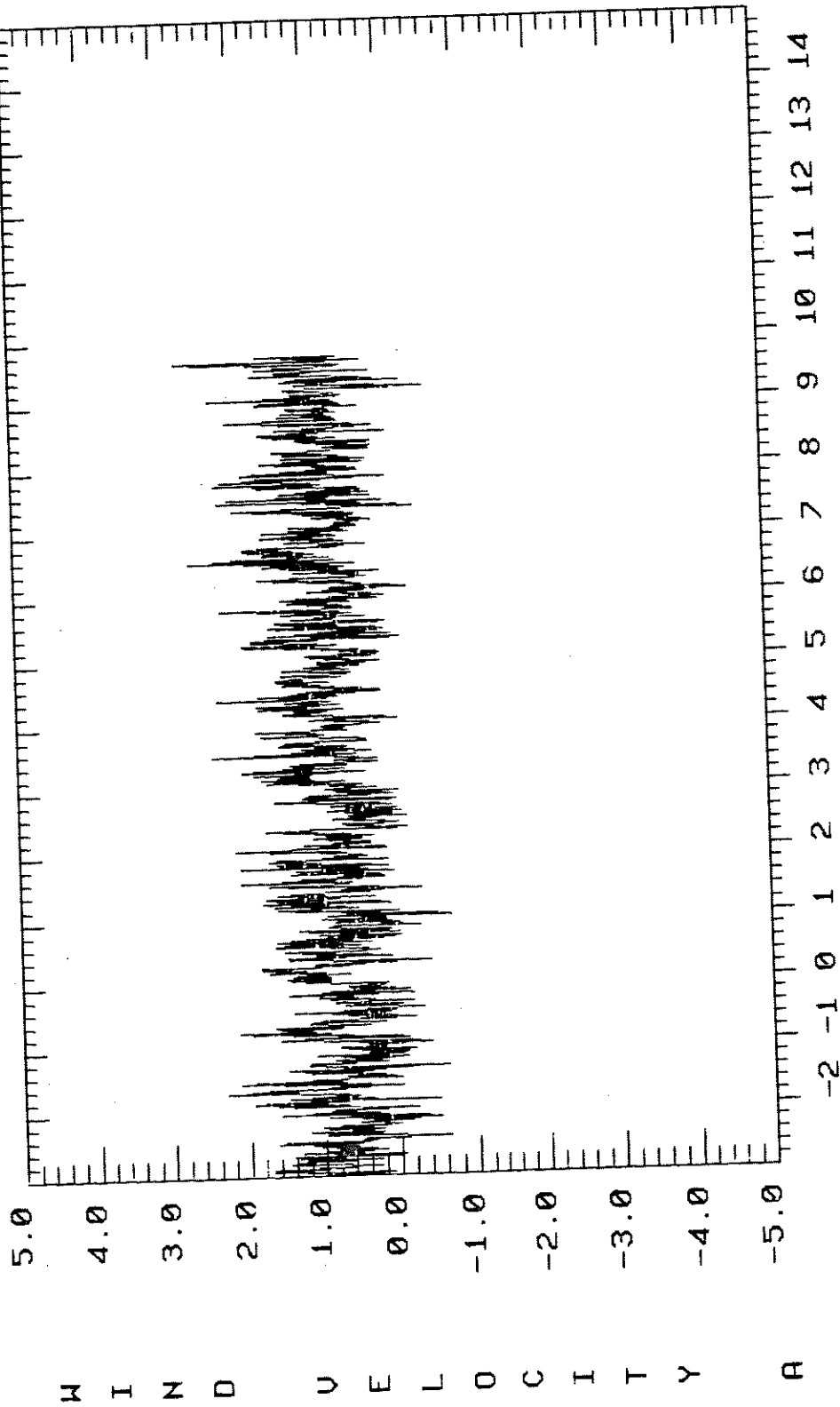


TRIAL: 051 TYPE: UANT UNITS: DEGREES C
AVERAGING TIME: 0.6 SEC X: 450 M Y: 275 M Z: 15.0 M
MEAN OF RUN UP: 18.10 MEAN OF RUN DOWN: 18.21

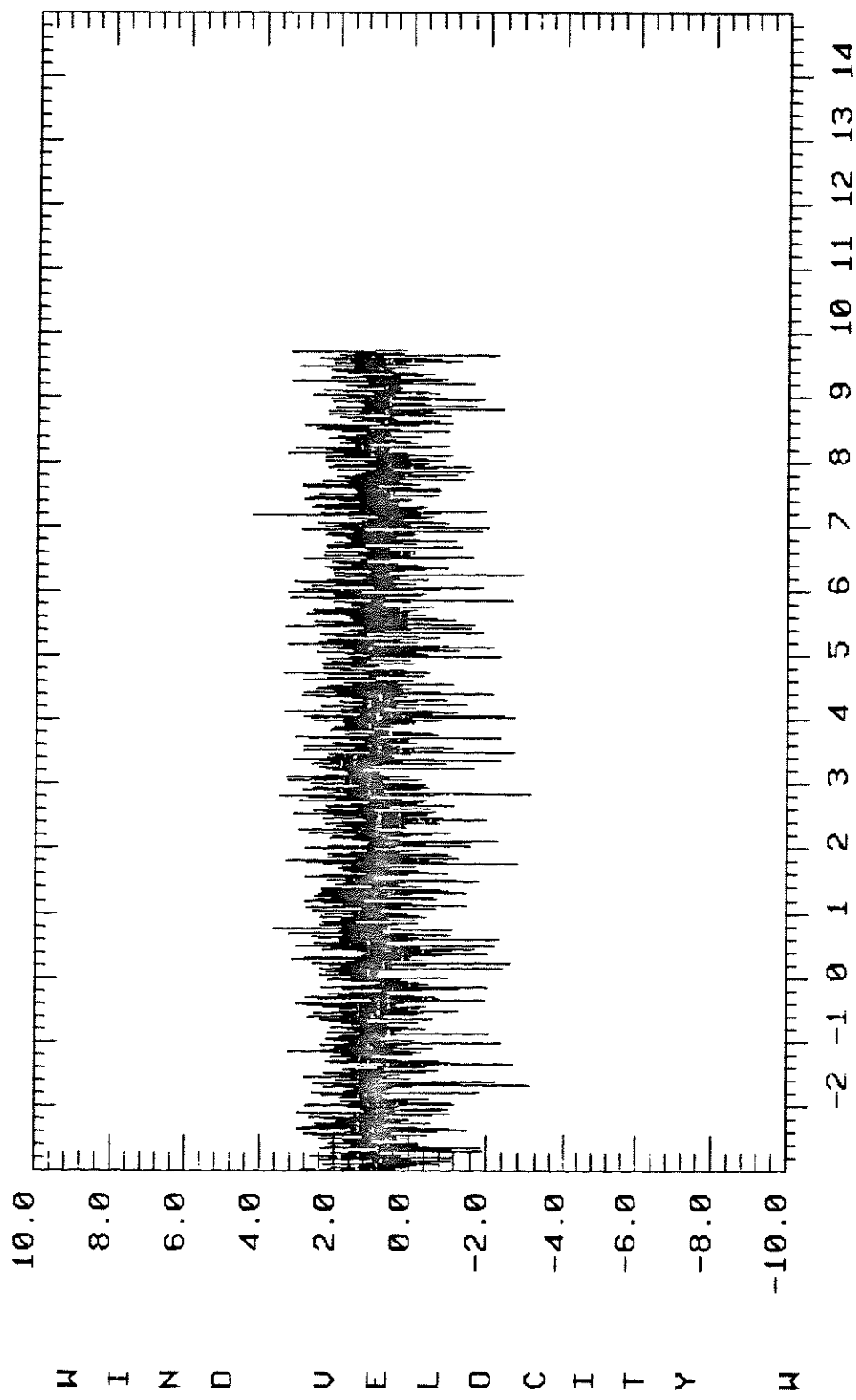


TIME FROM RELEASE (SECS*10**-2)

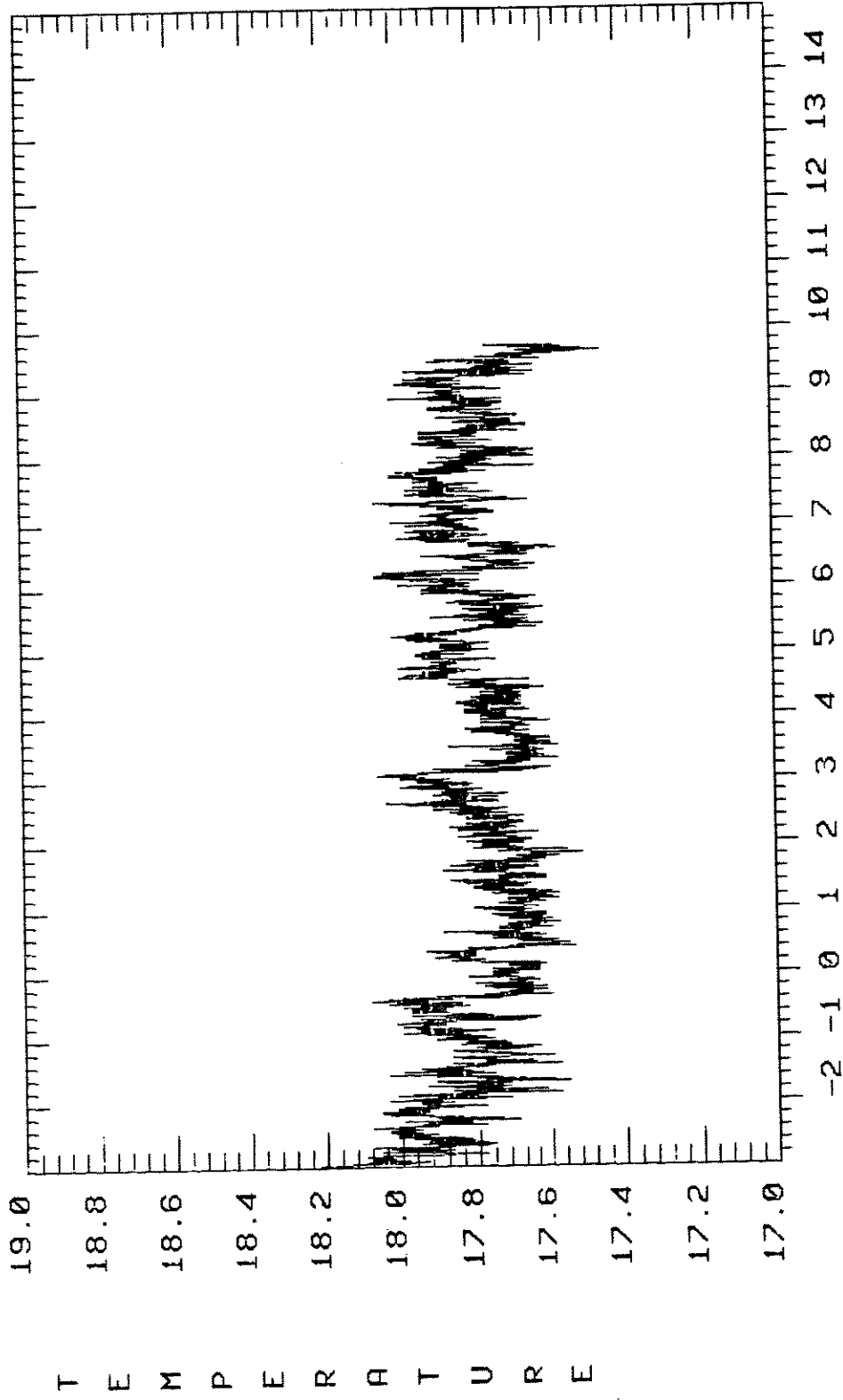
TRIAL: 051 TYPE: UANB UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 500 M Y: 270 M Z: 1.0 M
MEAN OF RUN UP: 1.08 MEAN OF RUN DOWN: 0.17



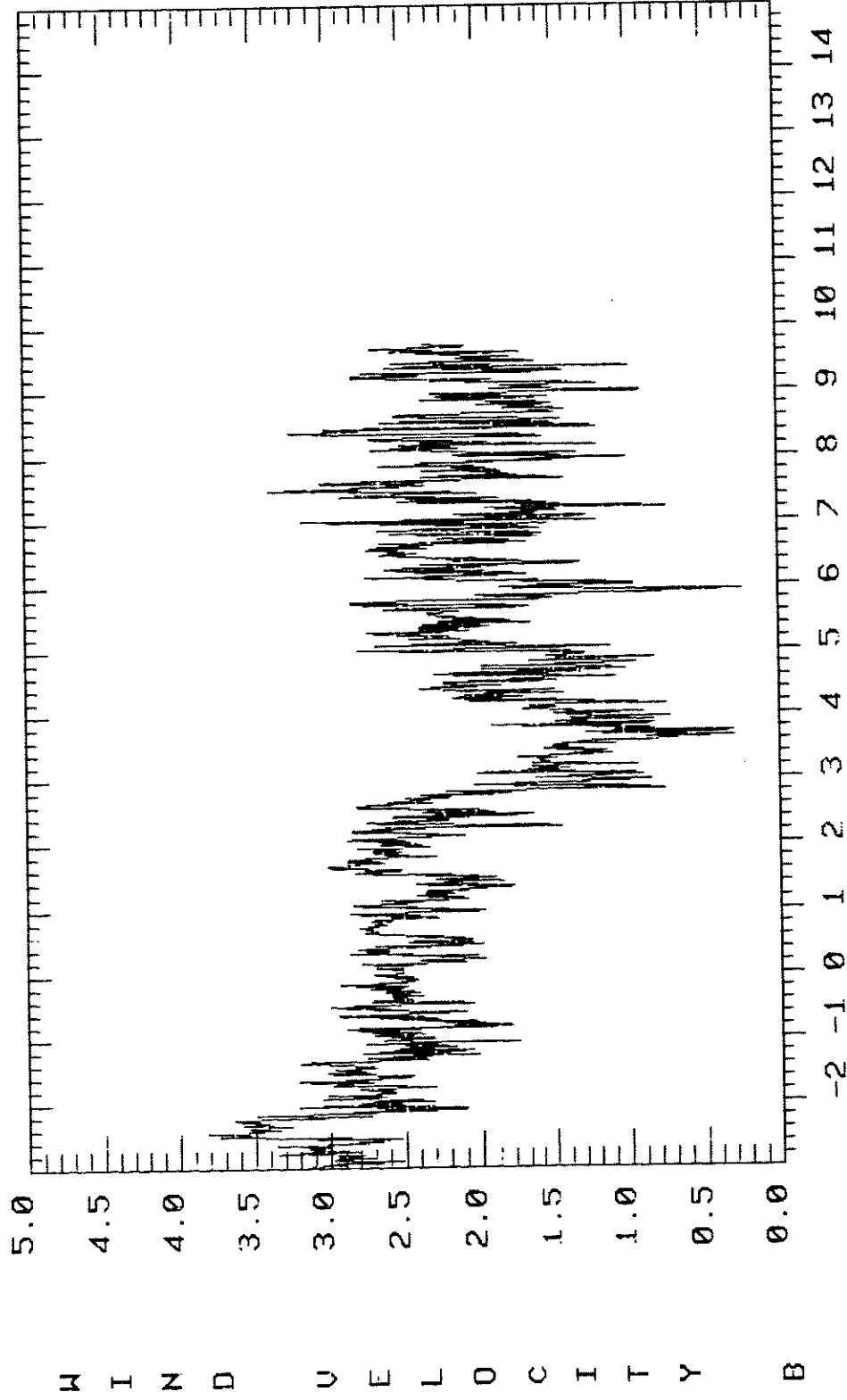
TRIAL: 051 TYPE: UANA UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 500 M Y: 270 M Z: 1.0 M
MEAN OF RUN UP: 0.60 MEAN OF RUN DOWN: 1.15



TRIAL: 051 TYPE: UANW UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 500 M Y: 270 M Z: 1.0 M
MEAN OF RUN UP: 0.96 MEAN OF RUN DOWN: 0.86



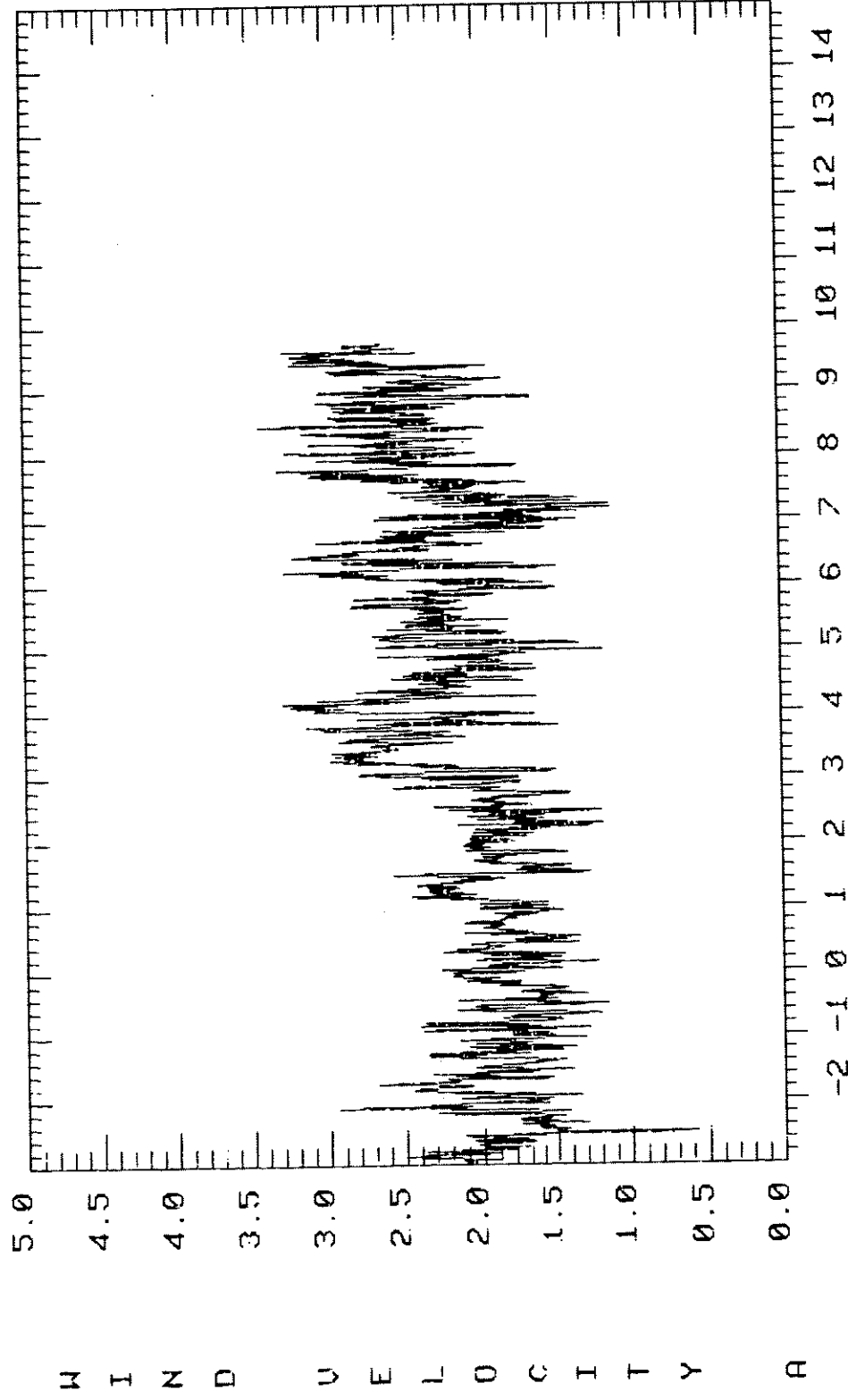
TRIAL: 051 TYPE: UANT UNITS: DEGREES C
 AVERAGING TIME: 0.6 SEC X: 500 M Y: 270 M Z: 1.0 M
 MEAN OF RUN UP: 17.67 MEAN OF RUN DOWN: 17.43



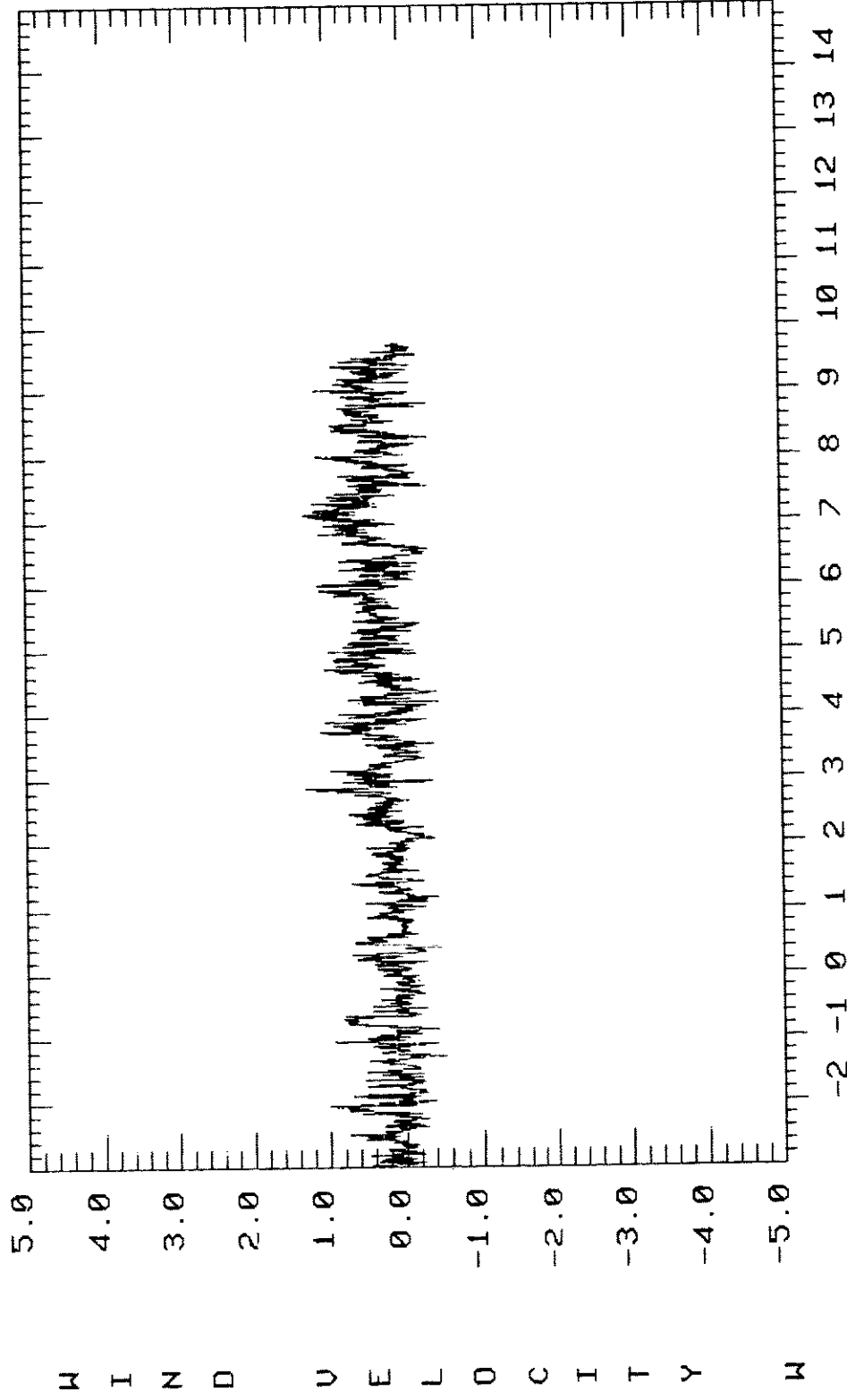
TRIAL: 051 TYPE: UANB UNITS: M/S

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

MEAN OF RUN UP: 3.08 MEAN OF RUN DOWN: 1.25



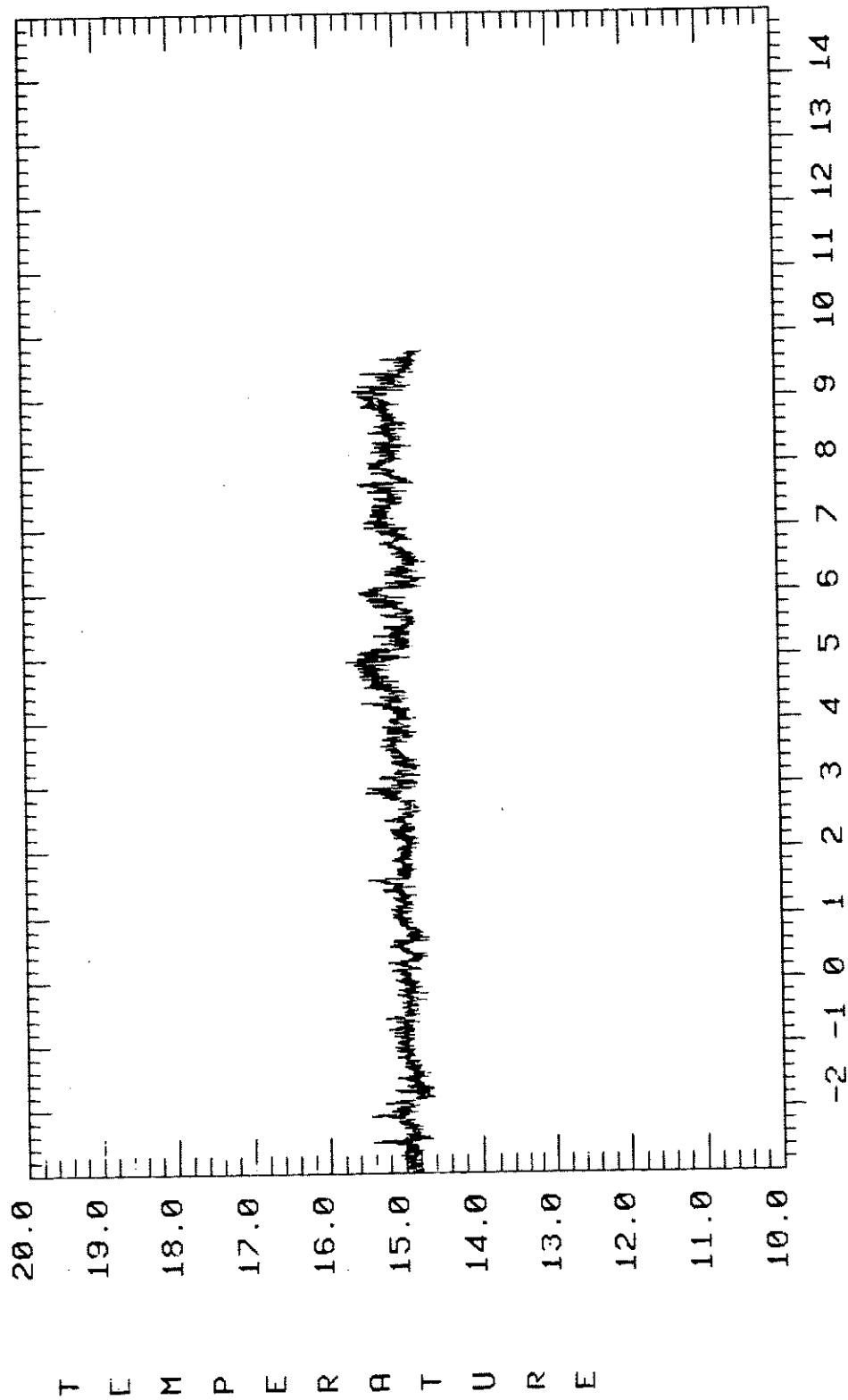
TRIAL: 051 TYPE: UANA UNITS: M/S
AVERAGING TIME: 0.6 SEC X: 500 M Y: 275 M Z: 15.0 M
MEAN OF RUN UP: 1.41 MEAN OF RUN DOWN: 2.73



TRIAL: 051 TYPE: UANW UNITS: M/S

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

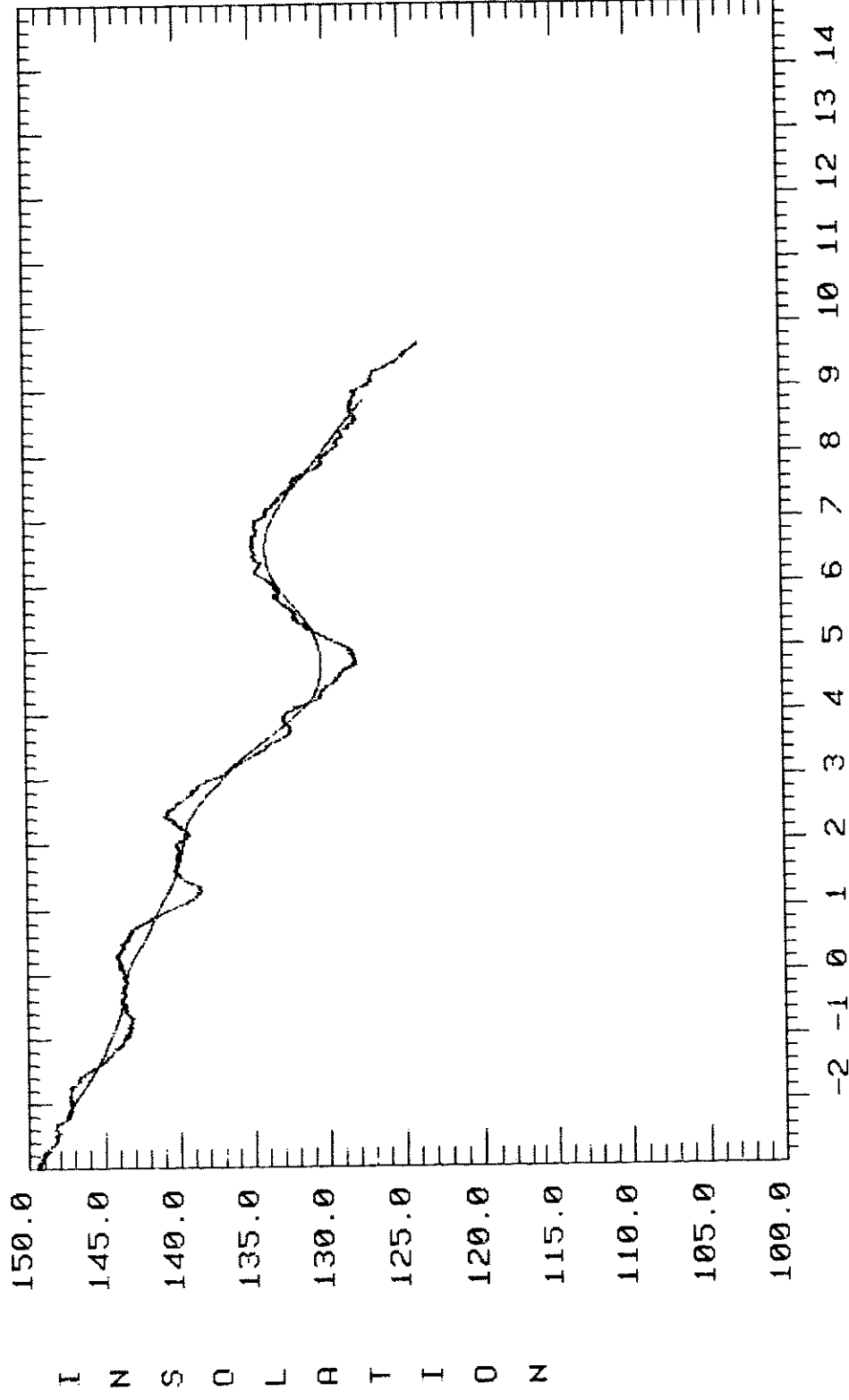
MEAN OF RUN UP: 0.11 MEAN OF RUN DOWN: 0.20



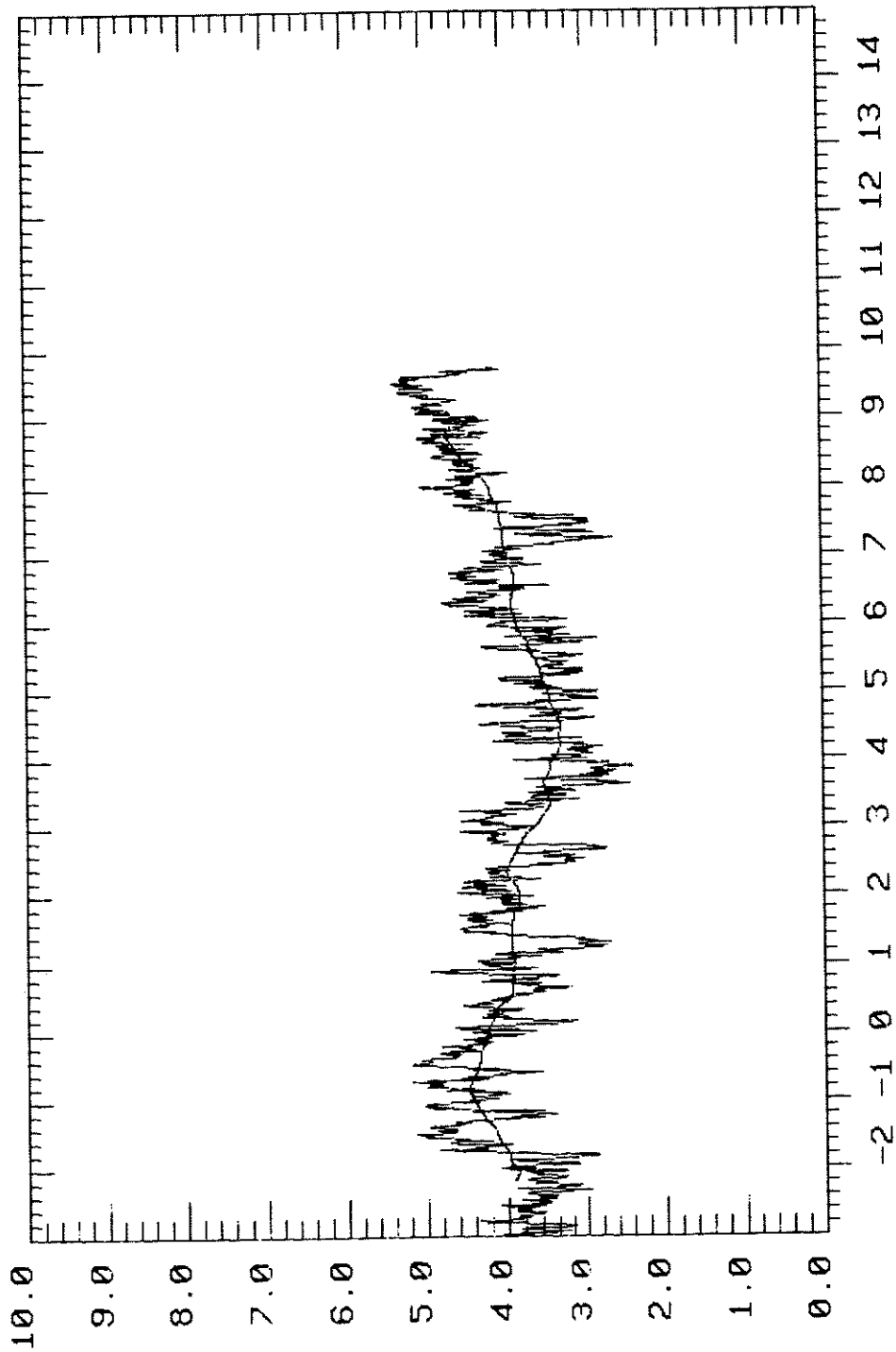
TRIAL: 051 TYPE: UANT UNITS: DEGREES C

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

MEAN OF RUN UP: 14.71 MEAN OF RUN DOWN: 14.81



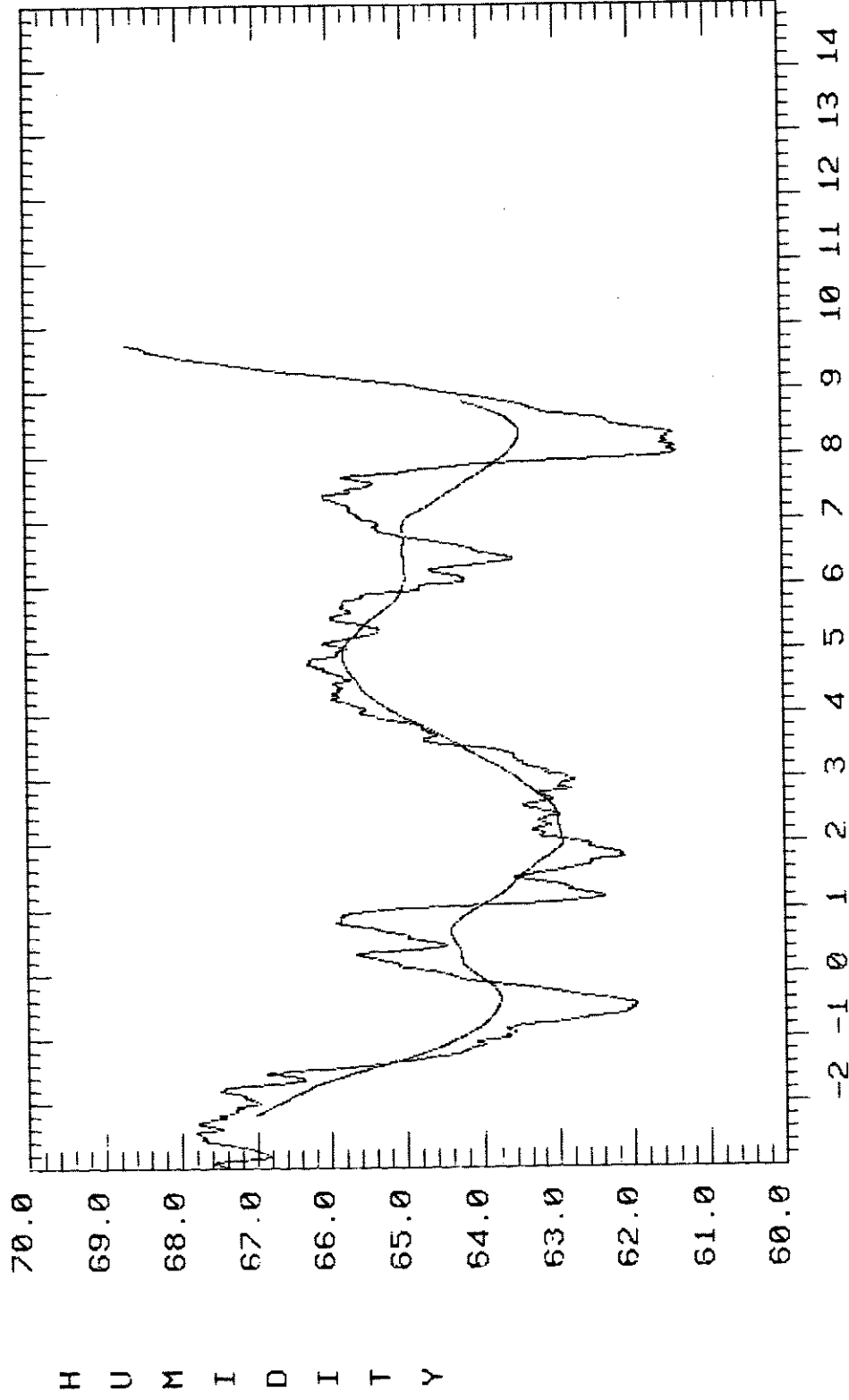
TRIAL: 051 TYPE: SOLA UNITS: W/M**2
AVERAGING TIME: 0.6 SEC X: 700 M Y: 500 M Z: 0.4 M
MEAN OF RUN UP: 252.23 MEAN OF RUN DOWN: 112.02



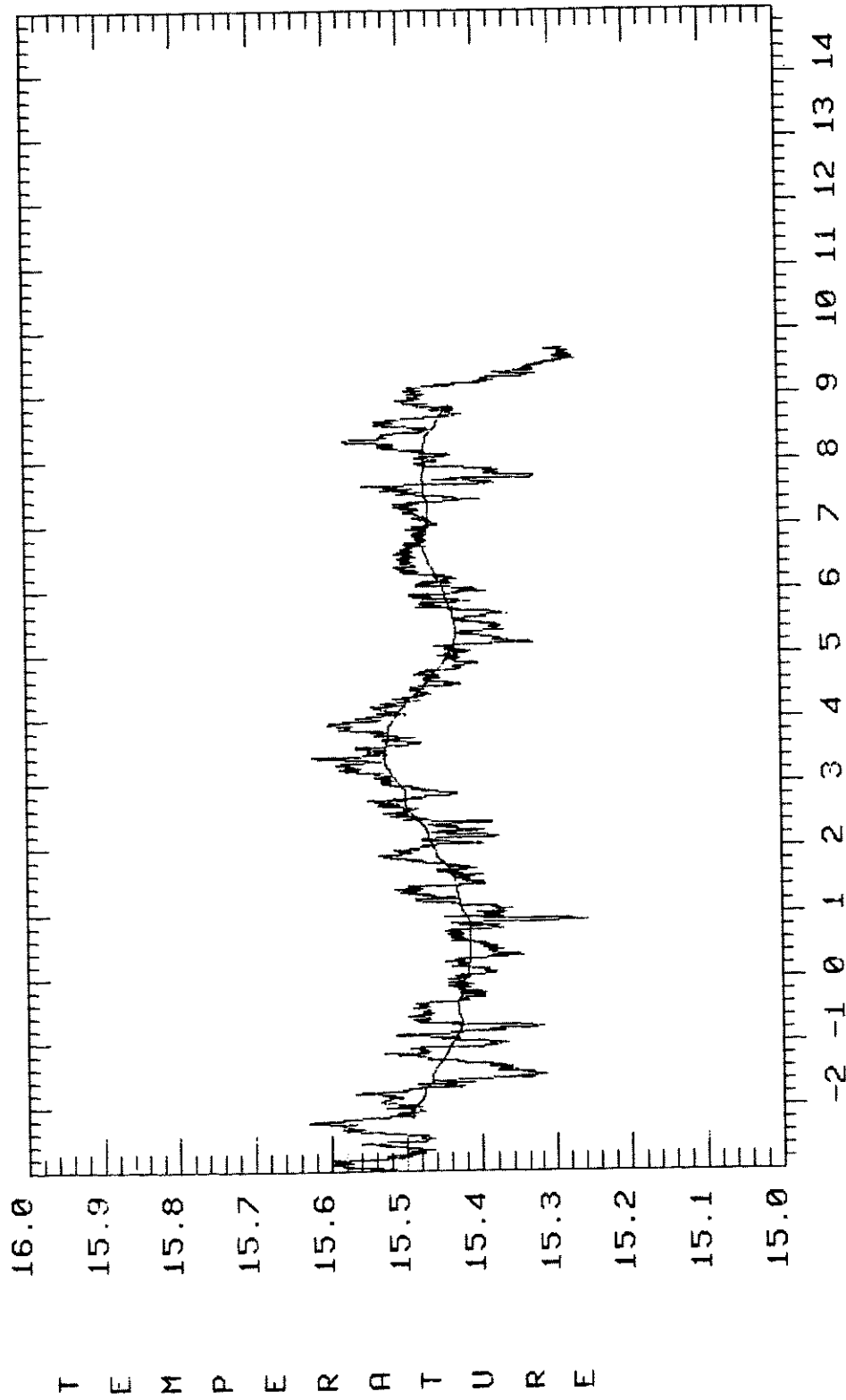
TRIAL: 051 TYPE: WSPD UNITS: M/S

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

MEAN OF RUN UP: 4.04 MEAN OF RUN DOWN: 4.14



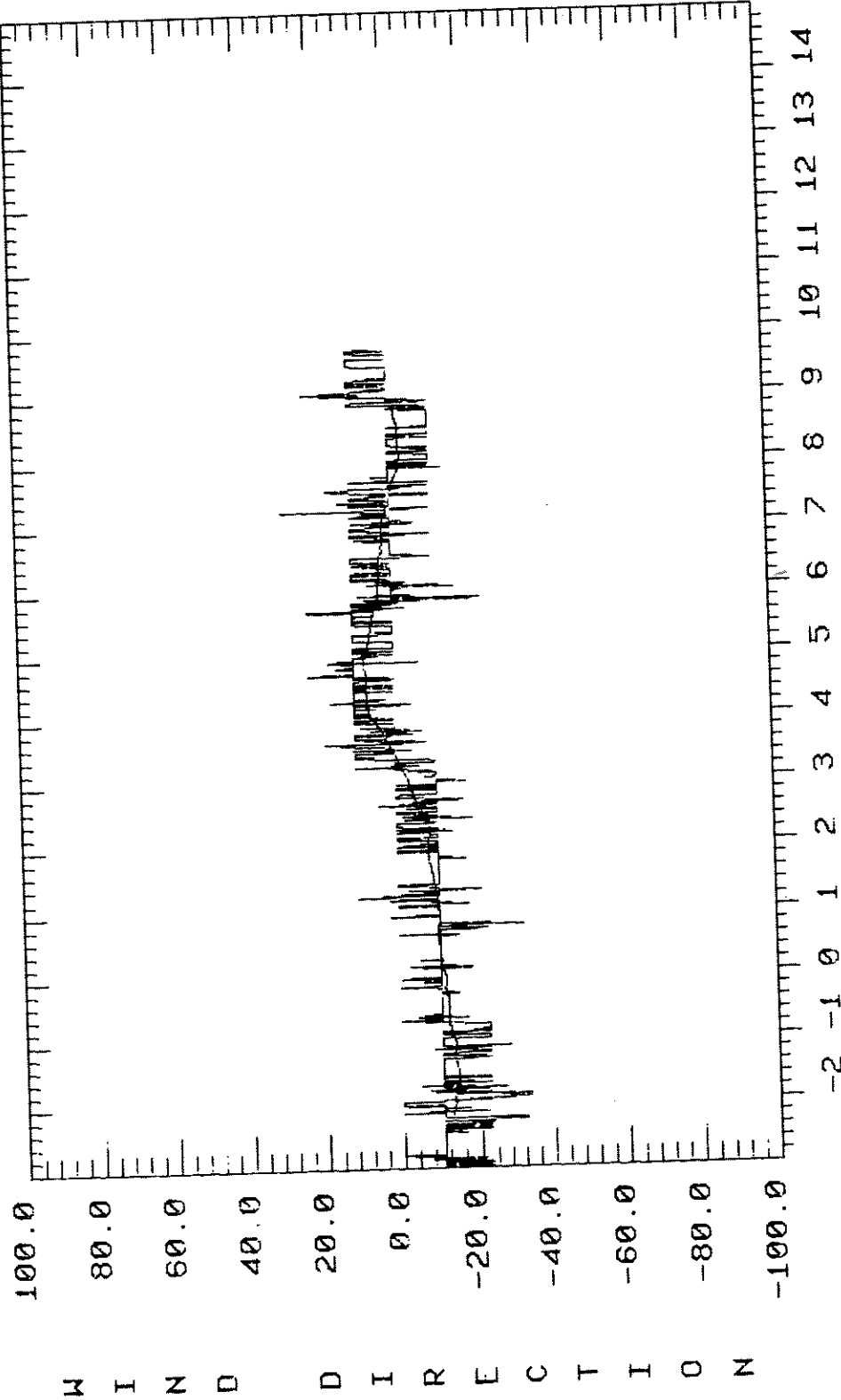
TRIAL: 051 TYPE: RHUM UNITS: PER CENT
AVERAGING TIME: 0.6 SEC X: 400 M Y: 950 M Z: 10.0 M
MEAN OF RUN UP: 69.93 MEAN OF RUN DOWN: 71.64



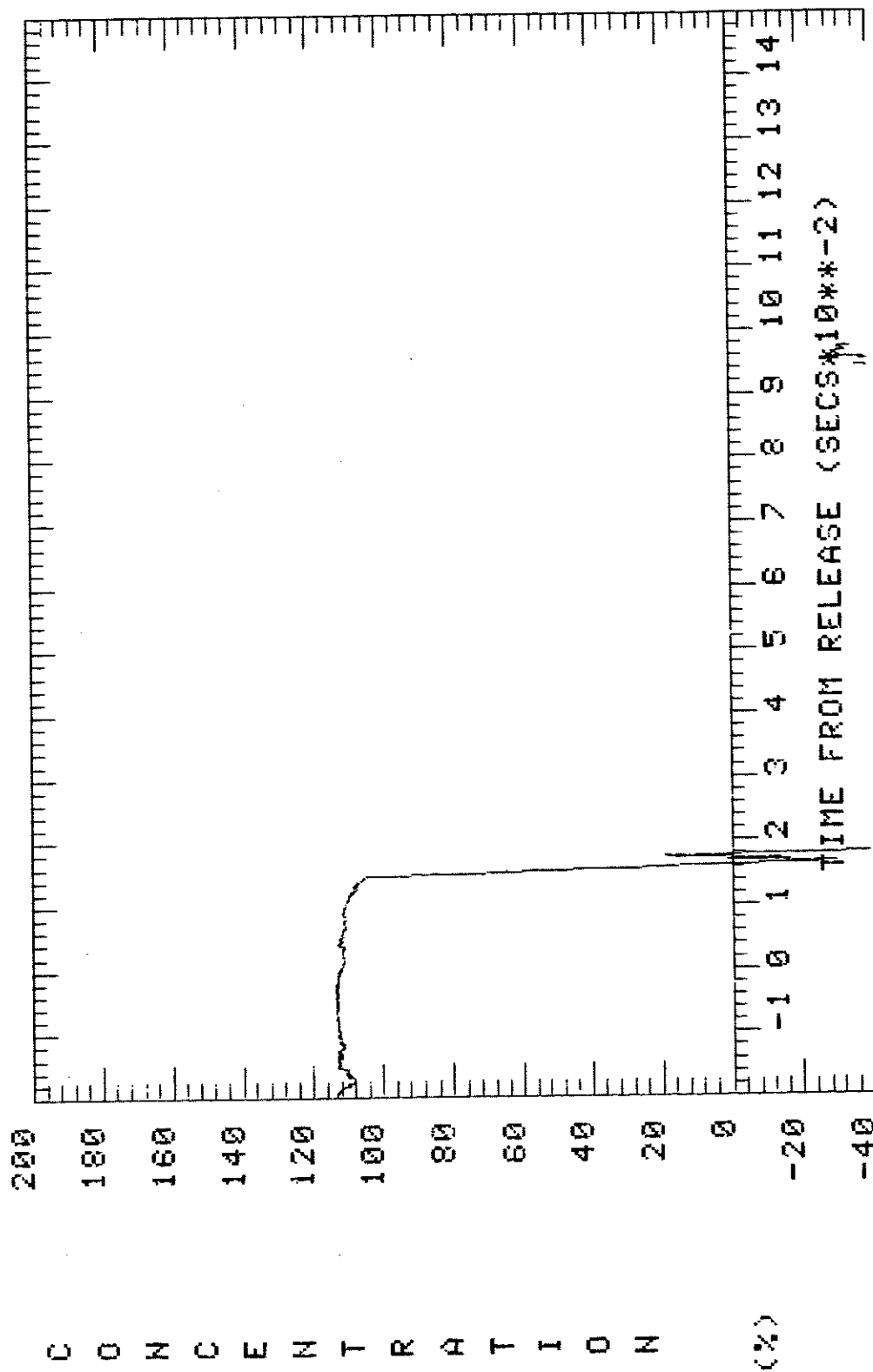
TRIAL: 051 TYPE: AIRT UNITS: DEGREES C

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

MEAN OF RUN UP: 15.06 MEAN OF RUN DOWN: 15.13



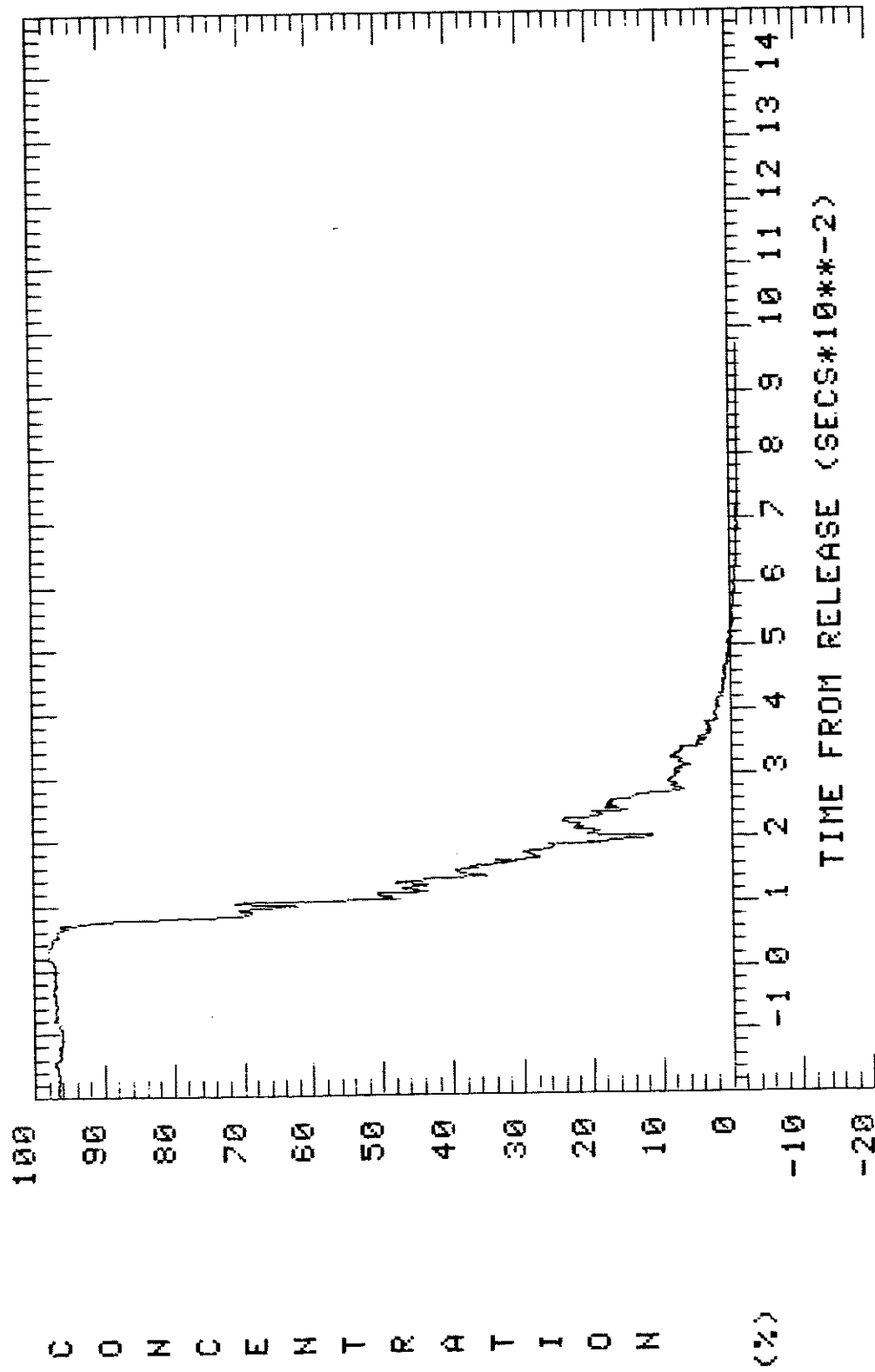
TRIAL: 051 TYPE: WHDG UNITS: DEGREES
 AVERAGING TIME: 0.6 SEC X: 400 M Y: 950 M Z: 10.0 M
 MEAN OF RUN UP: -17.72 MEAN OF RUN DOWN: 6.14



TRIAL: 051 TYPE: GAB AVERAGING TIME: 0.6 SECS

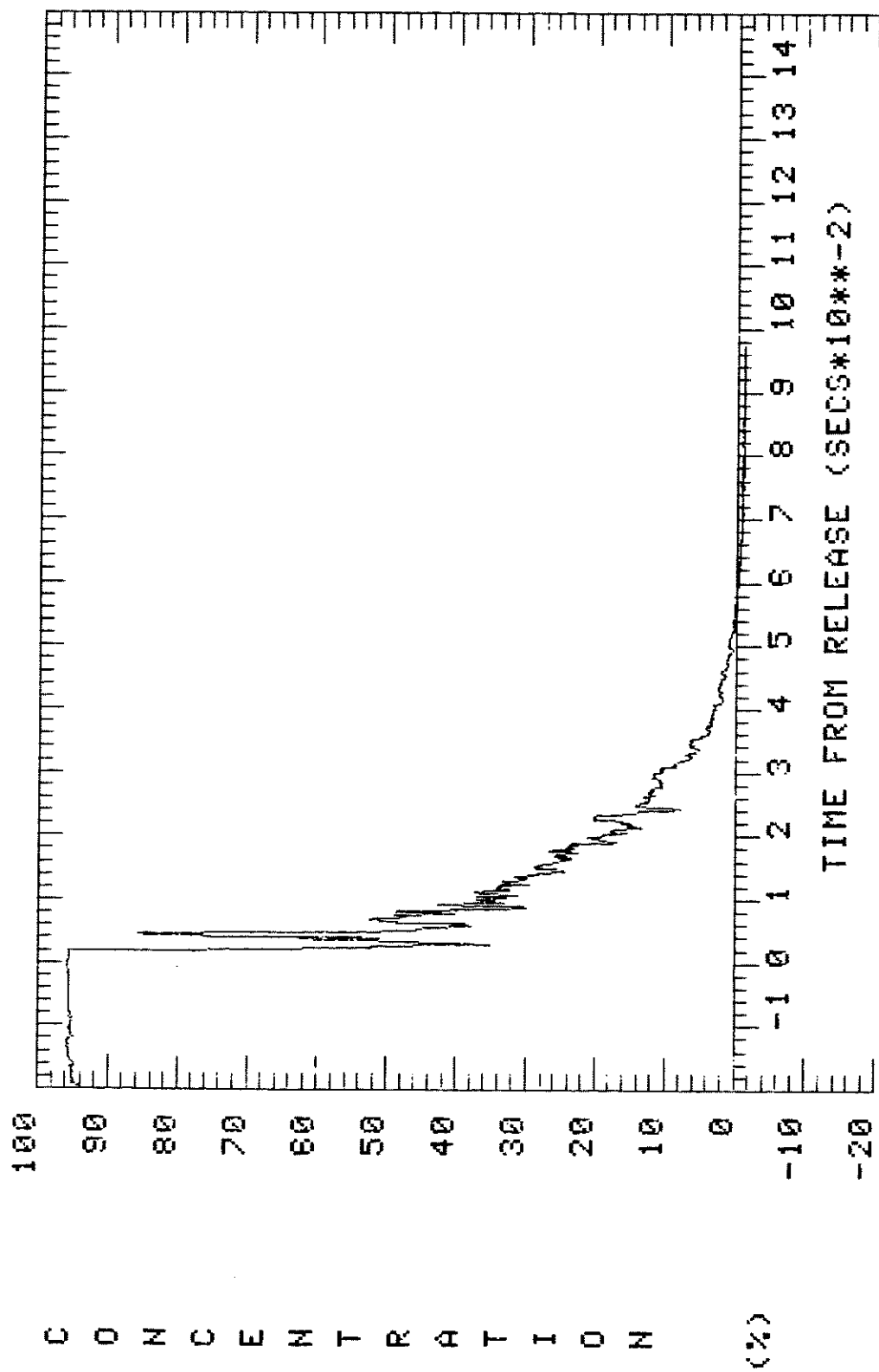
X: 400 M Y: 200 M Z: 0.4 M

GB1



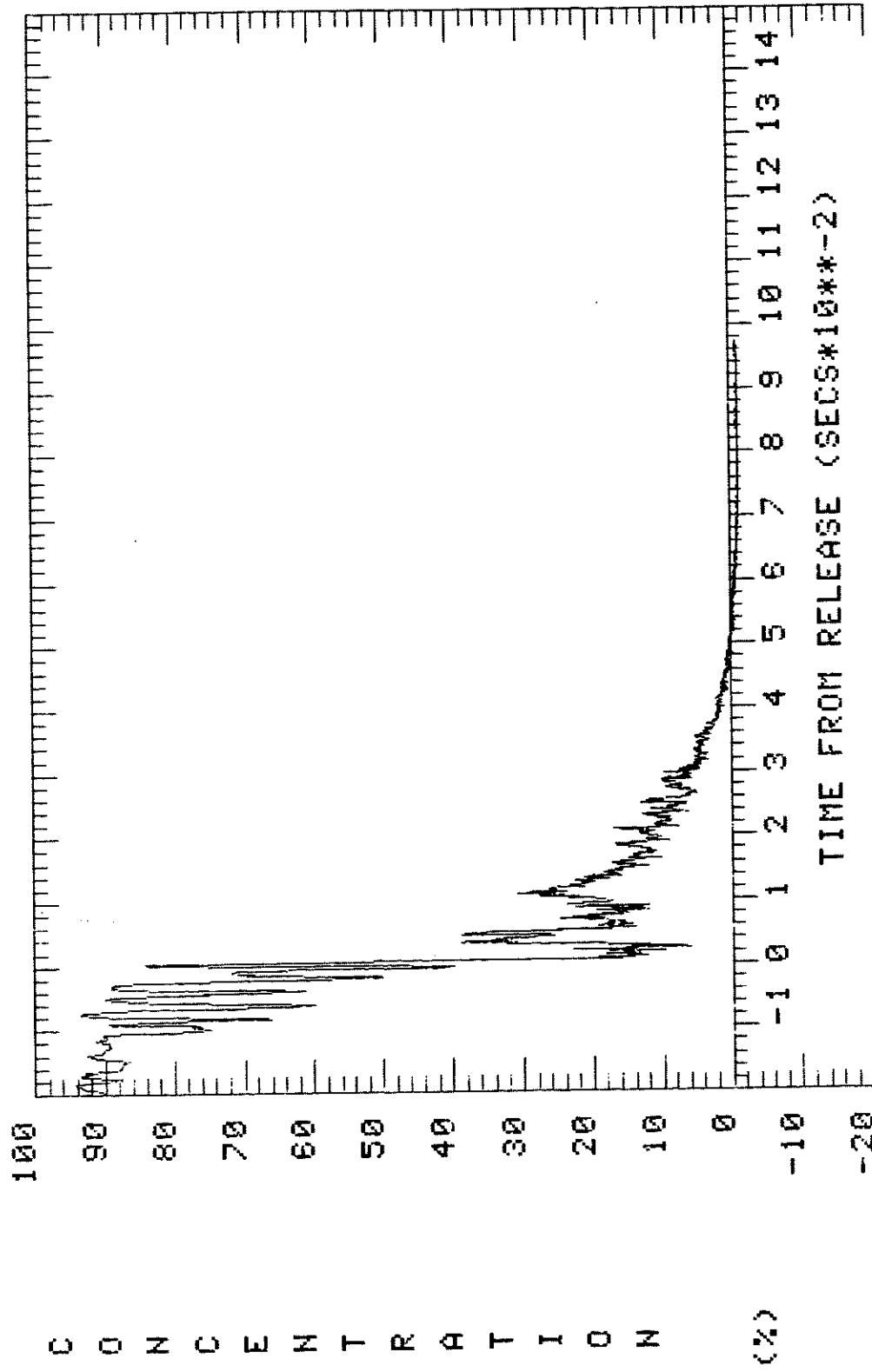
TRIAL: 051 TYPE: GASB AVERAGING TIME: 0.6 SECS

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



TRIAL: 051 TYPE: GASB AVERAGING TIME: 0.6 SECS

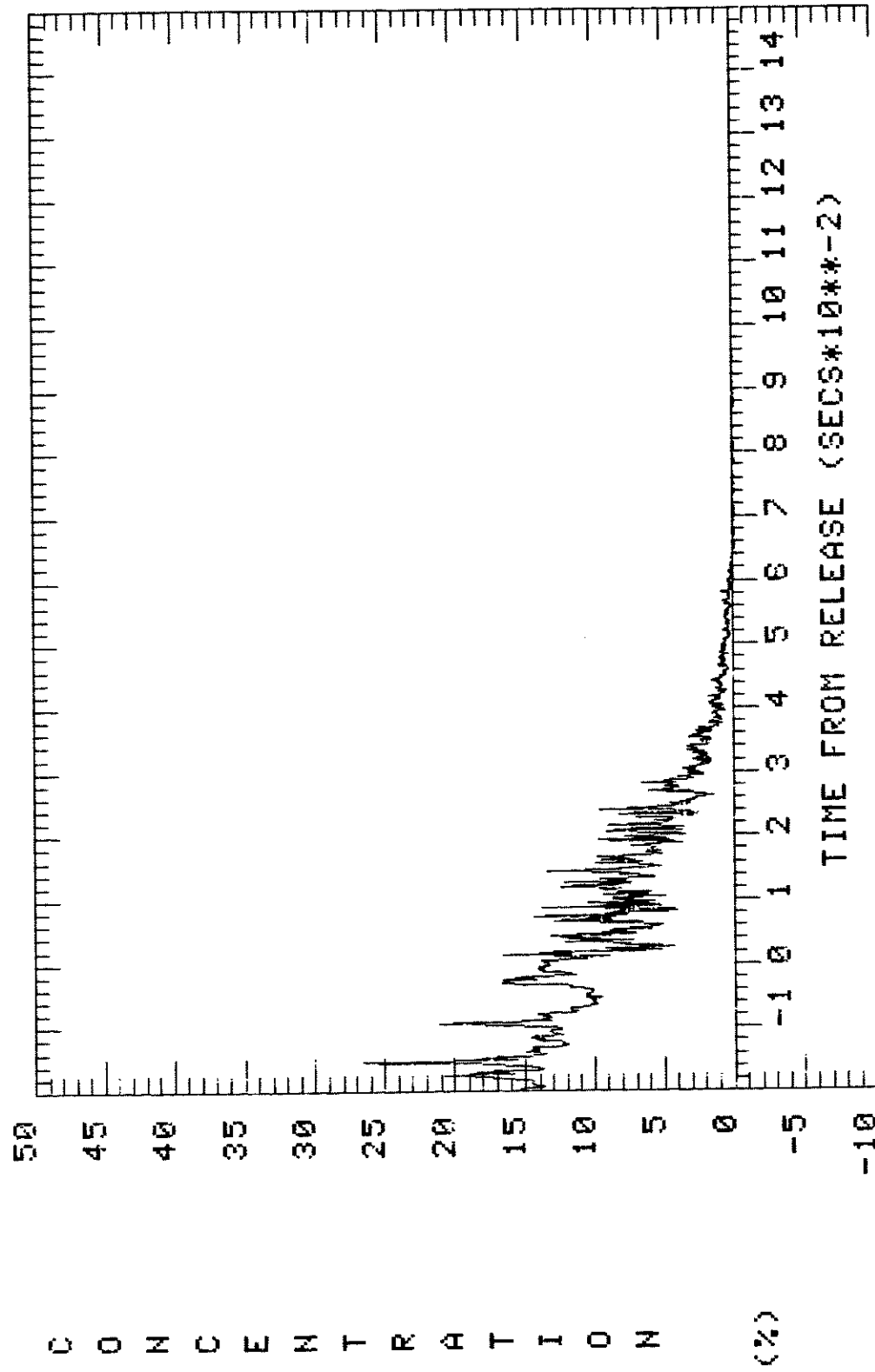
X: 400 M Y: 200 M Z: 9.0 M



TRIAL: 051 TYPE: GASB AVERAGING TIME: 0.6 SECS

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

GB4



TRIAL: 051 TYPE: GASB AVERAGING TIME: 0.6 SECS

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

GB5