WATER QUALITY

SAN MATEO LANDFILL
Water Sampling Results
Date of Sampling: February 19, 1998

Station No.	S-5	S-6	S7
DO (mg/l)	2.1	1.8	2.3
pH	5.9	7.3	8.1
BOD (mg/l)	1	2	51
TSS (mg/l)	11	10	113
Total Coliform (MPN/100ml)	16	9	280
Fecal Coliform (MPN/100ml)	6	<2	280
Heterotrophic Plate Count (CFU/ml)	593	370	826
Water Temperature (°C)	28	28	28
Air Temperature (°C)	31	31	31

Station Identification:

S-5	Residential area, north of landfill site
S-6	Elementary school, south of landfill site
S7	Upper Bosoboso River

Description of Sampling Condition:

Water sampling was conducted during sunny weather condition. Dissolved oxygen was measured on site while water samples was sent to Ostrea Mineral Laboratory for analysis. Dissolved oxygen at Bosoboso River was measured in still water (without agitation). D.O. at S-5 and S-6 was taken from the water being pumped from the well, thus, agitation enhanced D.O. concentration.

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TEEM, INCORPORATED

DATE March 5, 1998
CLIENT REF. NO.
R.A. NO. 13399
CERT. NO. 98 – 243
INVOICE NO. 11968
SHEET NO. 1 OF 2 PAGES

CERTIFICATE OF ANALYSIS

Samples received
February 19, .1998

	pH	BOD, mg / L	TSS, mg / L
STATION S – 5	5.9	1	11
STATION S – 6	7.3	2	10
STATION S 7 & S 9	8.1	51	113
METHOD	4500 H – B	5210 B	2540 D

***** O V E R *****

The test results pertain only to the samples submitted and tested.

ANALYTICAL METHOD/REMARKS
Ref. Std. Methods for Water & Wastewater, 19th Ed.

TOTAL SAMPLES 3 TOTAL ANALYSIS 12

N. D. = Element is not detected by the method employed.

CERTIFIED BY:

LORNA G. SY
Manager, Analytical Services

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AMERICAN SOCIETY FOR TESTING MATERIALS
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TEEM, INCORPORATED

DATE March 5, 1998
CLIENT REF. NO.
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CERT. NO. 98 – 243
INVOICE NO. 11968
SHEET NO. 2 OF 2 PAGES

CERTIFICATE OF ANALYSIS

Samples received
February 19, 1998

	STATION S-5	STATION S-6	STATION S7 & S9
I. Total Coliform Test			
a) Presumptive Test	Positive	Positive	Positive
b) Confirmatory Test	Positive	Positive	Positive
M P N / 100 ml.	16	9	280
II. Fecal Coliform Test	Positive	Negative	Positive
M P N / 100ml.	6	<2	280
III. Heterotrophic Plate Count			
C F U / ml.	593	370	826

***** NOTHING FOLLOWS *****

ANALYTICAL METHOD/REMARKS
The test results pertain only
to the samples submitted & tested.

TOTAL SAMPLES 3 TOTAL ANALYSIS 12

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ODOR

SAN MATEO LANDFILL
Odor Concentration

Station: S-1 Leachate Treatment Pond

Sampling Time	LEL	H2S	CO
Morning 5:00 - 5:30 am	2%	< 1	< 1
Daytime 12:00 - 12:30 pm	1 %	< 1	< 1
Evening 6:00 - 6:30 pm	2 %	< 1	< 1
Night time 0:00 - 12:30 am	2 %	< 1	< 1

Station: S-5 Residential area, north of landfill site

Sampling Time	LEL	H2S	CO
Morning 5:30 - 6:00 am	1%	< 1	< 1
Daytime 12:30 - 1:00 pm	1 %	< 1	< 1
Evening 6:30 - 7:00 pm	1 %	< 1	< 1
Night time 12:30 - 10:00 am	1 %	< 1	< 1

Sampling Procedure: Direct reading using Quest Envirotract IV Gas Monitor (UL registered instrument with accuracy traceable to US-NIST; with disposable sensors)

Note: LEL is a lower explosive limit, combustible gas levels (like methane) are measured as a percent of LEL.

Since we do not have a procedure and instrument to measure the odor per se, we measured H2S and methane. These are the primary gases that are produced by anaerobic decomposition which emit nuisance odor, especially in a landfill. Methane is measured in terms of % of the lower explosive limit (LEL) of combustible gases.

Based on the instrument reading (using Quest envirotrack IV gas analyzer), H2S level in the area is less than 1 ppm or insignificant. Combustible gases read 1% and 2% of the LEL on separate occasions. Since combustible gases in the landfill are expected to be methane, the reading is computed to the LEL of methane which is 5% by volume (from Material Safety Data Sheet). Therefore 1% and 2% of the LEL are around 0.05% and 0.01% by volume respectively. These are also equivalent to a concentration of 500-1000 ppm.

NOISE/VIBRATION

VIBRATION INVESTIGATION IN SAN MATEO SANITARY LANDFILL SITE

INTRODUCTION

Ground vibration measurements were conducted in the vicinity of the Waste Disposal Sanitary Landfill Area in San Mateo, Rizal, to estimate the level and characteristics of ambient ground vibration at various conditions in the site.

SURVEY AND DATA ANALYSIS METHODS

Measurements were conducted within a span of 24 hours to determine differences in ground behaviour between day and night activities in the site. The survey was conducted from 19-21 February 1998 on four sites within the vicinity of San Mateo Landfill.

Seismic instrumentation was installed at four sites (*Figure 1*). Three of the observation points were installed to measure the ground motion resulting from vehicular traffic, mainly garbage trucks, and another observation point near the leachate treatment pond which was also meant to measure the possible effect of operating heavy equipment like bulldozers. To support the study, an hourly traffic count was also carried out along the two measurement points with relatively heavy vehicular activity. The first two points are both along the main road, one leading to the entrance/exit of the Garbage Landfill Area (P1), and the other along the road a few kilometers before the Landfill site at Sapinit Elementary School, San Juan, Antipolo, Rizal (S6). The third observation point (S5) lies along the road, a few meters away from the flow or turning point of garbage trucks to Landfill dumping site. The fourth point (S1) is located several meters from the main road. It is near the leaching ponds and is proximal to the compaction and dumping site.

For each observation point, horizontal and vertical seismometers with 1.0 sec natural period were deployed and connected to two digital recorders (EDR-1000). Horizontal sensors were positioned radially from the main source of ground vibration and in this case, considered to be mostly from traffic along the main road. Recording parameters and threshold were set to be similar for all recorders. A series of five-minute ground motion data sample were simultaneously recorded on all points every hour for at least 24 hours. The hourly record of each recorder consists of five one-minute files to represent the activity of the hour. Data are digitally stored by the recorders on a 3.5-inch high-density diskette.

Waveform analysis was conducted using an Epson program EDRSEL to view EDR-1000 waveform data and determine maximum velocity values. Selected waveforms to represent background noise and vehicular noise were converted and imported to DADiSP for spectral analysis.

Ambient source of ground motion in the area is primarily dominated by the passing heavy trucks. To correlate this to the variation of ground motion amplitude, traffic count was carried out at points where these trucks are passing by. During the traffic count, vehicles were classified according to their direction and their estimated weights. A garbage truck was considered heavy while jeepneys and cars were classified as light vehicles.

RESULTS AND DISCUSSION

Response to Vehicular Activity along the Main Road

Basically, measurements were made to assess the ground motion resulting from passing vehicles on the road and from other sources like bulldozers and other compaction equipment. Points P1 and S6 are the closest to the flow of traffic. Although point S5 is also along the road, it is relatively farther from the source of noise affecting points P1 and S6. Likewise, Point S1 is relatively farther from vehicular noise but is the closest to other heavy equipment. This monitoring configuration is designed to estimate the extent of vibration generated by these possible sources of ground vibration and the differences among affecting sources to the vibration recorded at different sites.

Vibration signature excited by traffic exhibits gradual increase in amplitude while a vehicle travels from distance towards the observation site, and then, exhibits a smooth decay while the vehicle is moving away (*Figure 2*). In some recorded vibrations at points P1 and S6, sudden changes in amplitudes were also recorded due to the condition of the road, corresponding to the road's roughness and smoothness.

Temporal Variation of Noise Level (Background & Vehicular)

The level of vibration at all sites is not uniform throughout the observation period. There are two levels of temporal variation in the data gathered. The first level is the general difference in the daytime and night time noise level in the area.

Amplitude levels recorded at point S5 showed relatively insignificant variation between ambient natural disturbance (or background noise level) and vehicular noise (*Figure 3*). Likewise, compaction and other heavy equipment activity did not significantly affect point S1 (*Figure 4*). These imply that the recorded ground vibrations at these points were within their natural or background noise level. However, maximum velocity values of each five-minute records show increase of background noise (natural disturbance) during daytime which corresponds to an increase in vehicular activity from distant places and/or those directly affects points along the flow of traffic at points P1 and S6.

The second level of temporal variation is in the hourly variation of traffic volume during daytime. Maximum velocity values of ground motion taken from recorded vehicular activity at points P1 and S6, behave in periodic highs and lows (*Figures 5 and 6*). The changes in envelopes of the highs and lows of the hourly maximum amplitudes was observed to correspond to the change in volume of vehicular activity (*Figures 7 and 8*). These show better correlation with the level of traffic and the hourly count of passing vehicles in the area (*Figures 9 and 10*).

Temporal Variation of Spectral Content

Spectral analysis from hourly samples of records of the passing vehicles at point P1 clearly show that the predominant frequency of vehicular

activity lies within 25 Hz. Using this marker frequency, it can be seen that there is significant increase in background noise along this frequency during episodes of increased vehicular activity (*Figures 11*).

Extracting two recorded data from S1 at different recording times (12:00 MN and 8:00 AM), response spectra show that the predominant frequency at point S1 lies within a bandwidth from 3 Hz to 20 Hz. Low frequency content corresponds to the oscillation of liquid in the leachate treatment ponds which is being affected by the operating heavy equipment in the nearby dumping site. Attenuated amplitudes of higher frequency contents correspond to vehicular activity in the nearby area (*Figures 12*).

CONCLUDING REMARKS

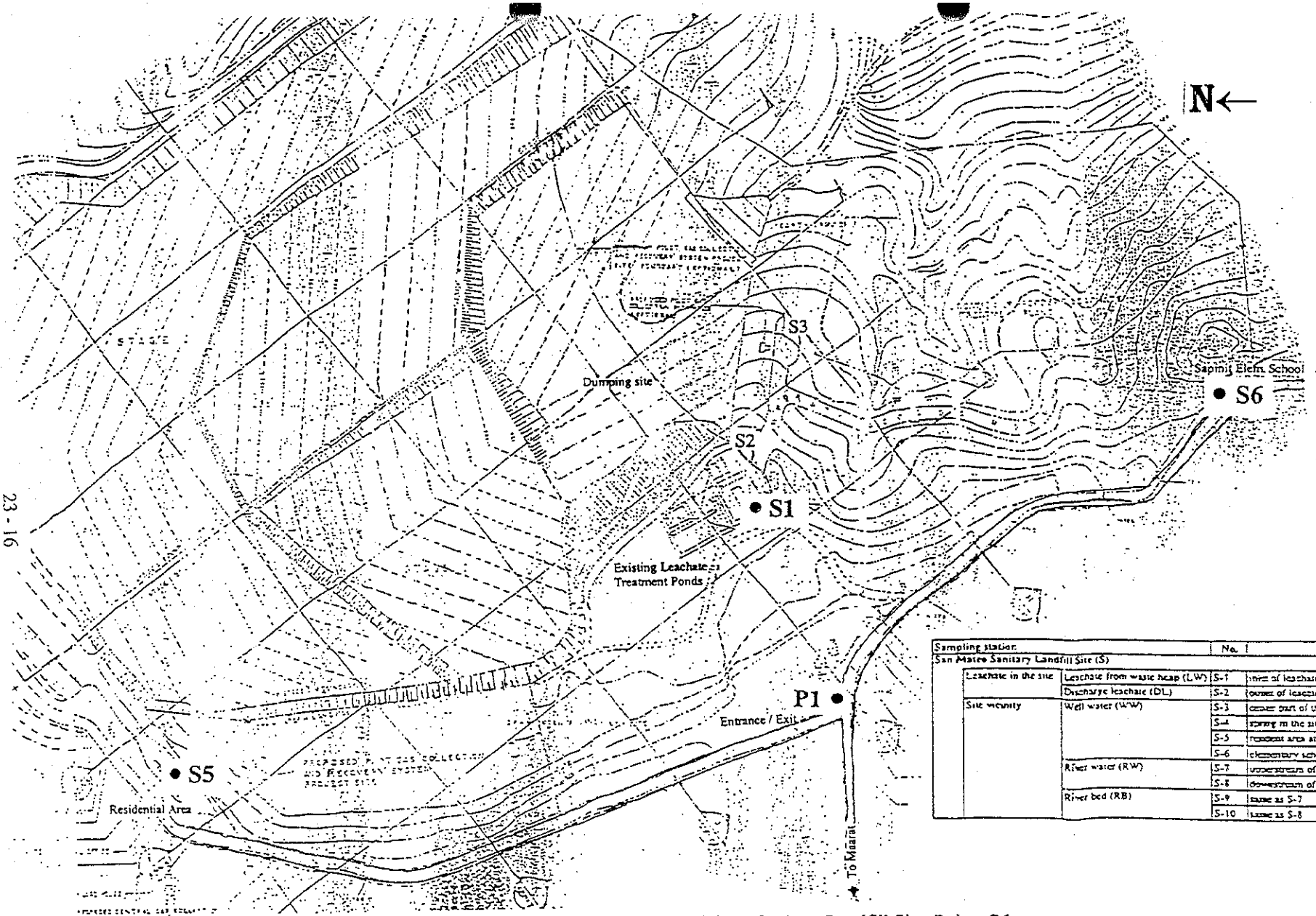
With similar recording parameters, recorded vertical ground motion exhibited larger recorded values than horizontal components since in most cases, horizontal transducers did not have significant response as vertical transducers.

Response spectra of the vibration measurement showed that the predominant wave frequency content lies within 25 Hz. This corresponds to vehicular activity mainly resulting from successive vehicular garbage trucks, and sometimes increased by other type of vehicles during daytime.

Traffic count affirmed the amplitude fluctuation of the recorded vibration at two points located along the road (P1 and S6). However, at point S5, there's no significant variation of the vibration between natural disturbance and the traffic. Moreover, compaction equipment and traffic did not show any significant effect at observation point S1 located near the leaching ponds or several meters away from dumping site and road.

Amplitude levels at points S5 and S1 does not reach similar levels as P1 and S6 which indicate that ground vibration due to vehicular activity is significantly attenuated.

Pavement discontinuities and road condition, vehicle type and condition can alter the source feature.



Sampling station			No.	Location
San Mateo Sanitary Landfill Site (S)				
	Leachate in the site	Leachate from waste heap (LW)	S-1	inlet of leachate treatment pond (anaerobic pond)
		Discharge leachate (DL)	S-2	outlet of leachate treatment pond (maturation pond)
	Site vicinity	Well water (WW)	S-3	upper part of the site (monitoring well #3)
			S-4	spring in the site
			S-5	resident area at the north of the site
			S-6	elementary school at the south of the site
		River water (RW)	S-7	upperstream of Bosoboso River at Upper Bosoboso
			S-8	downstream of Bosoboso River
		River bed (RB)	S-9	same as S-7
			S-10	same as S-8

FIGURE 1. Ground vibration measurement points in San Mateo Sanitary Landfill Site. Points S6 is along the road few kilometers before the landfill. Point P1 is leading to the entrance/exit of the Landfill Area. S5 is also along the road but few meters away from the flow or turning point of trucks to dumping site. And S1 is the furthest from any road but the nearest to the dumping site and leachate treatment ponds.

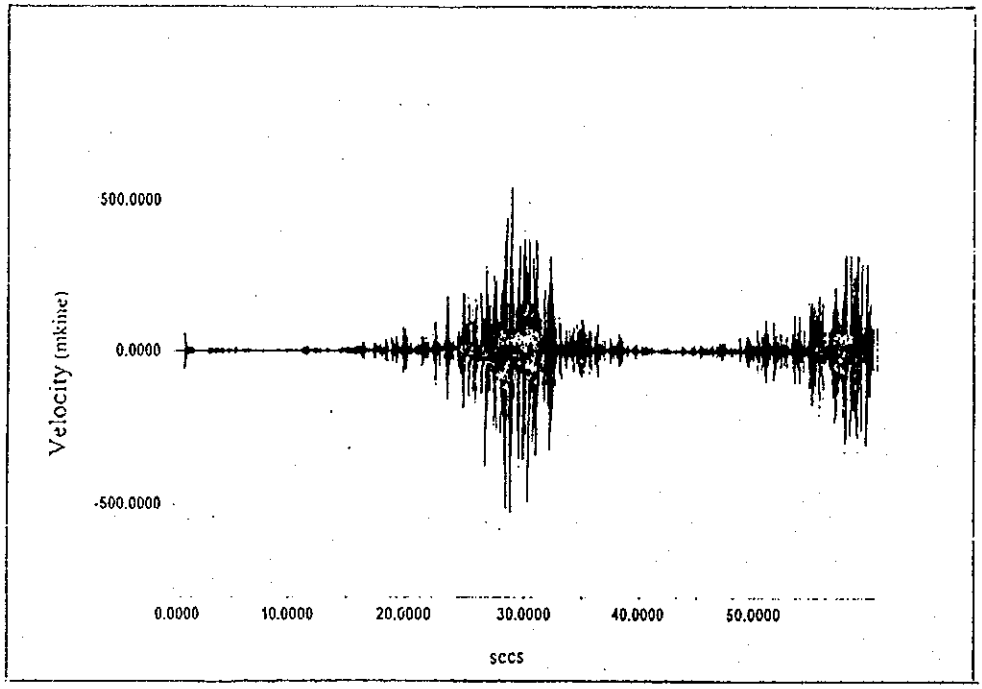


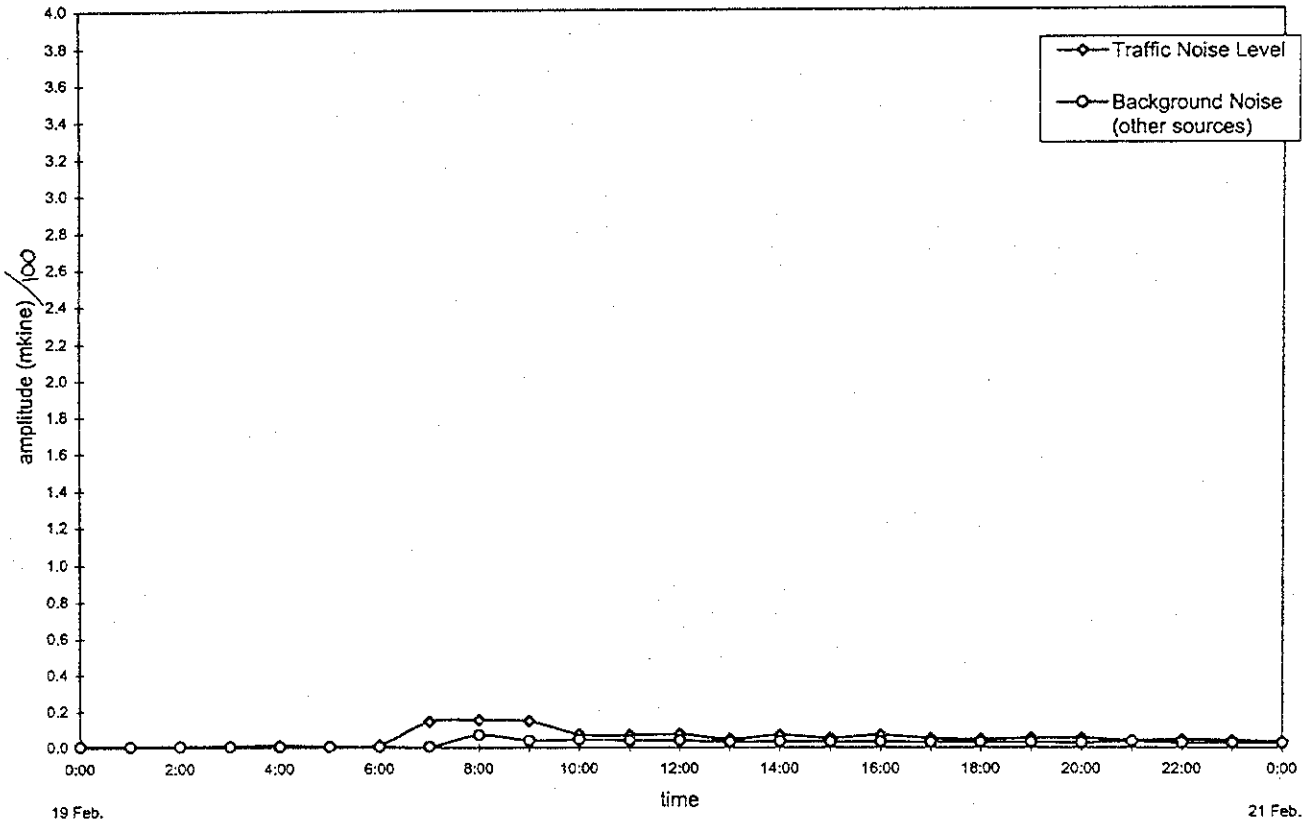
FIGURE 2. Typical waveform (with smooth onset and tail) generated by a moving vehicle recorded at point P1. Y-axis represents the amplitude levels of velocity values in mkine and X-axis represents the duration in seconds.

SAN MATEO LANDFILL AREA VIBRATION TEST

(19 February - 21 February 1998)

Barangay Bocaue

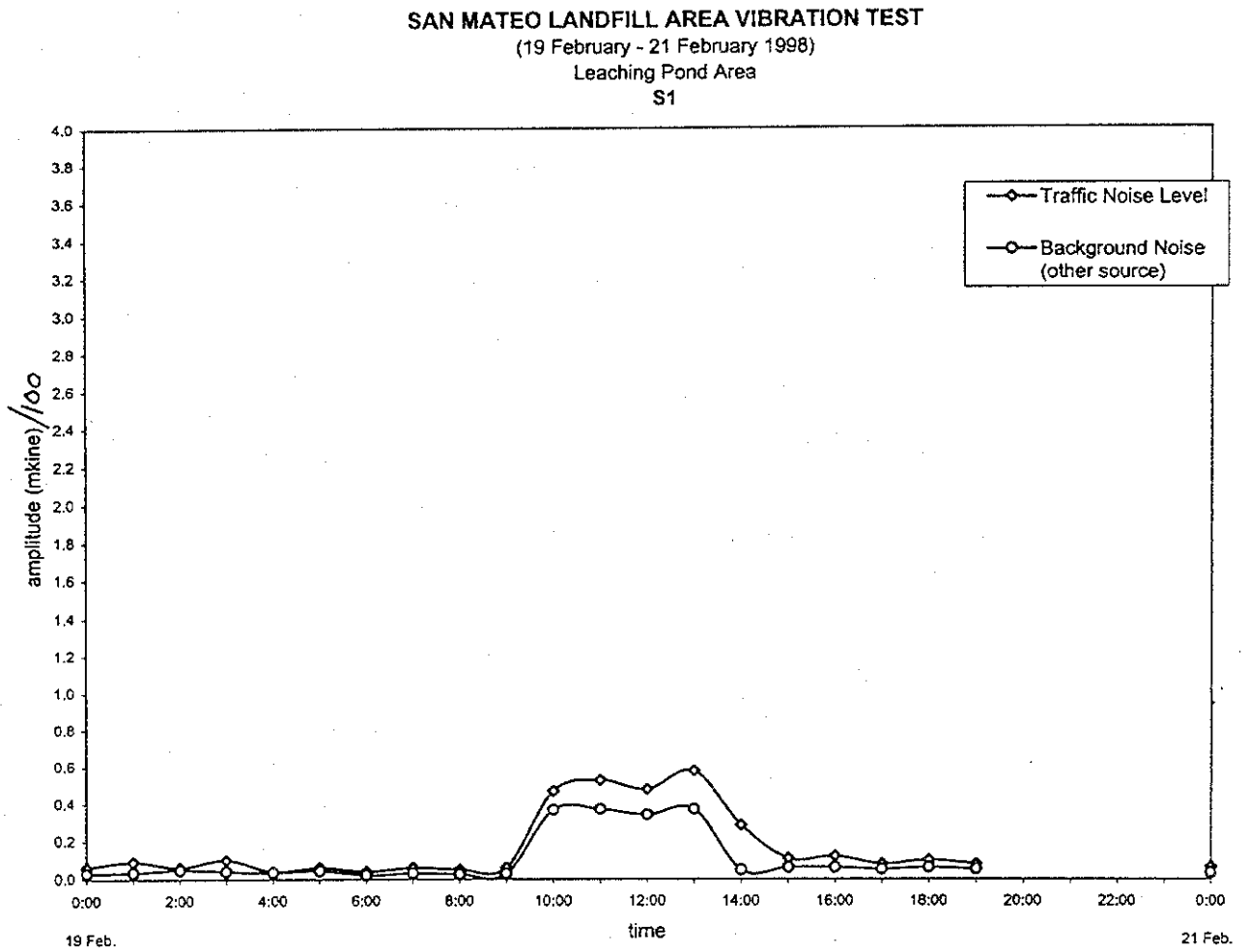
S5



STATION 4

TIME	Traffic Noise Level	ground Noise (other sources)
0:00	0.0086	0.0043
1:00	0.0086	0.0043
2:00	0.0086	0.0043
3:00	0.0086	0.0043
4:00	0.0130	0.0043
5:00	0.0086	0.0043
6:00	0.0170	0.0043
7:00	0.1450	0.0043
8:00	0.1510	0.0680
9:00	0.1460	0.0380
10:00	0.0730	0.0430
11:00	0.0690	0.0390
12:00	0.0730	0.0390
13:00	0.0470	0.0300
14:00	0.0690	0.0340
15:00	0.0540	0.0316
16:00	0.0680	0.0316
17:00	0.0510	0.0278
18:00	0.0470	0.0280
19:00	0.0518	0.0290
20:00	0.0514	0.0250
21:00	0.0403	0.0340
22:00	0.0450	0.0257
23:00	0.0403	0.0269
0:00	0.0340	0.0244

÷ 100


SAN MATEO LANDFILL AREA VIBRATION TEST
(19 February - 21 February 1998)
Leaching Pond Area
S1
Traffic Noise Level
Background Noise (other source)
amplitude (mkine)/100
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
19 Feb.
time
21 Feb.

STATION 2

TIME	Traffic Noise Level	Background Noise (other source)
0:00	0.060	0.029
1:00	0.090	0.034
2:00	0.060	0.047
3:00	0.100	0.039
4:00	0.040	0.034
5:00	0.060	0.042
6:00	0.040	0.021
7:00	0.060	0.030
8:00	0.050	0.026
9:00	0.060	0.029
10:00	0.470	0.370
11:00	0.530	0.373
12:00	0.480	0.342
13:00	0.580	0.373
14:00	0.287	0.047
15:00	0.110	0.060
16:00	0.120	0.060
17:00	0.080	0.050
18:00	0.100	0.060
19:00	0.080	0.050
20:00		
21:00		
22:00		
23:00		
0:00	0.064	0.034

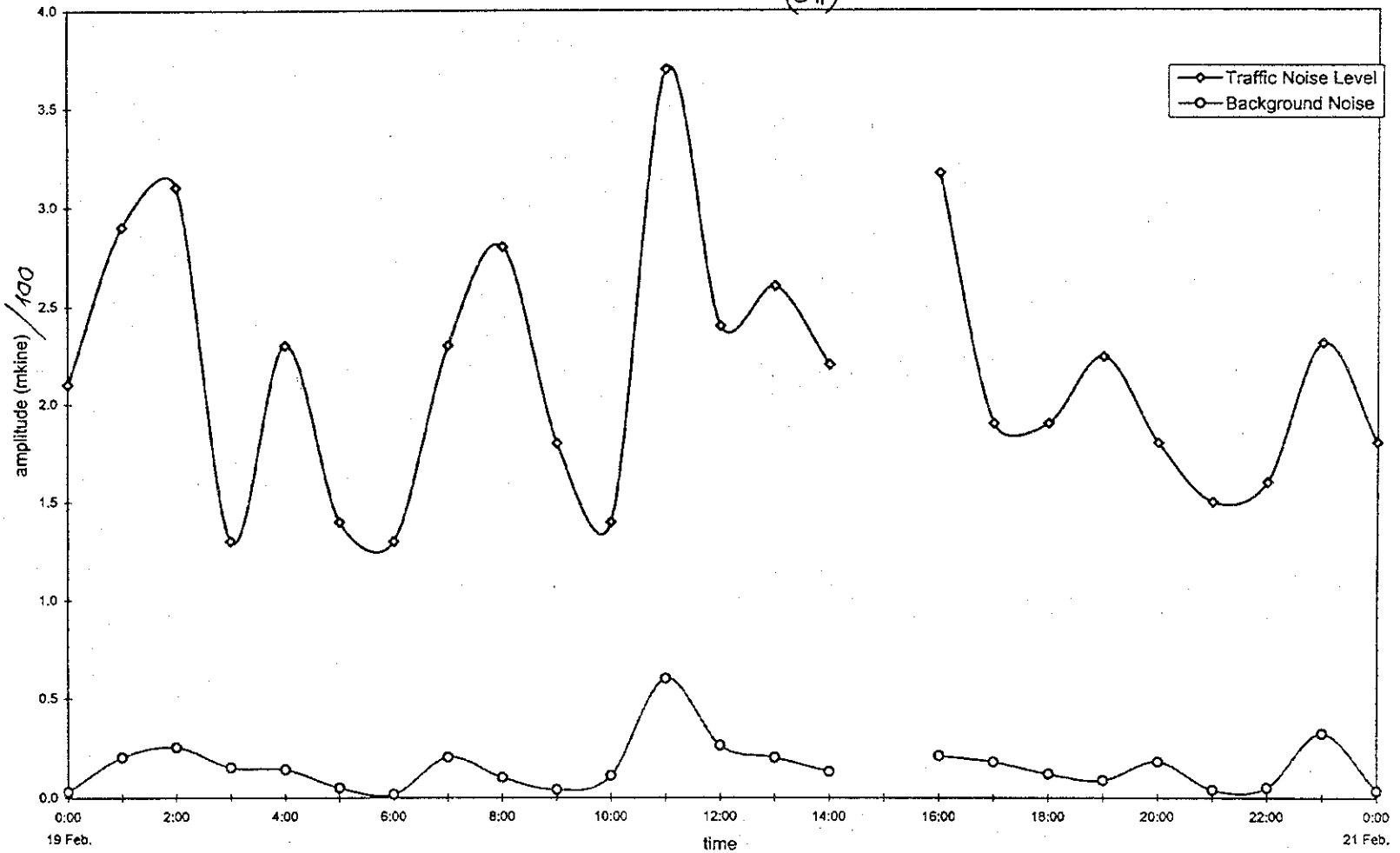
100

SAN MATEO, RIZAL LANDFILL AREA VIBRATION TEST

(19 February - 21 February 1998)

Landfill Entrance - Exit

P1 (S11)



STATION 3

TIME	Traffic Noise Level	Background Noise
0:00	2.100	0.030
1:00	2.900	0.200
2:00	3.100	0.250
3:00	1.300	0.150
4:00	2.300	0.140
5:00	1.400	0.050
6:00	1.300	0.017
7:00	2.300	0.200
8:00	2.800	0.100
9:00	1.800	0.040
10:00	1.400	0.110
11:00	3.700	0.600
12:00	2.400	0.260
13:00	2.600	0.200
14:00	2.200	0.130
15:00		
16:00	3.170	0.210
17:00	1.900	0.180
18:00	1.900	0.120
19:00	2.240	0.086
20:00	1.800	0.180
21:00	1.500	0.040
22:00	1.600	0.051
23:00	2.310	0.320
0:00	1.800	0.034

÷ 100

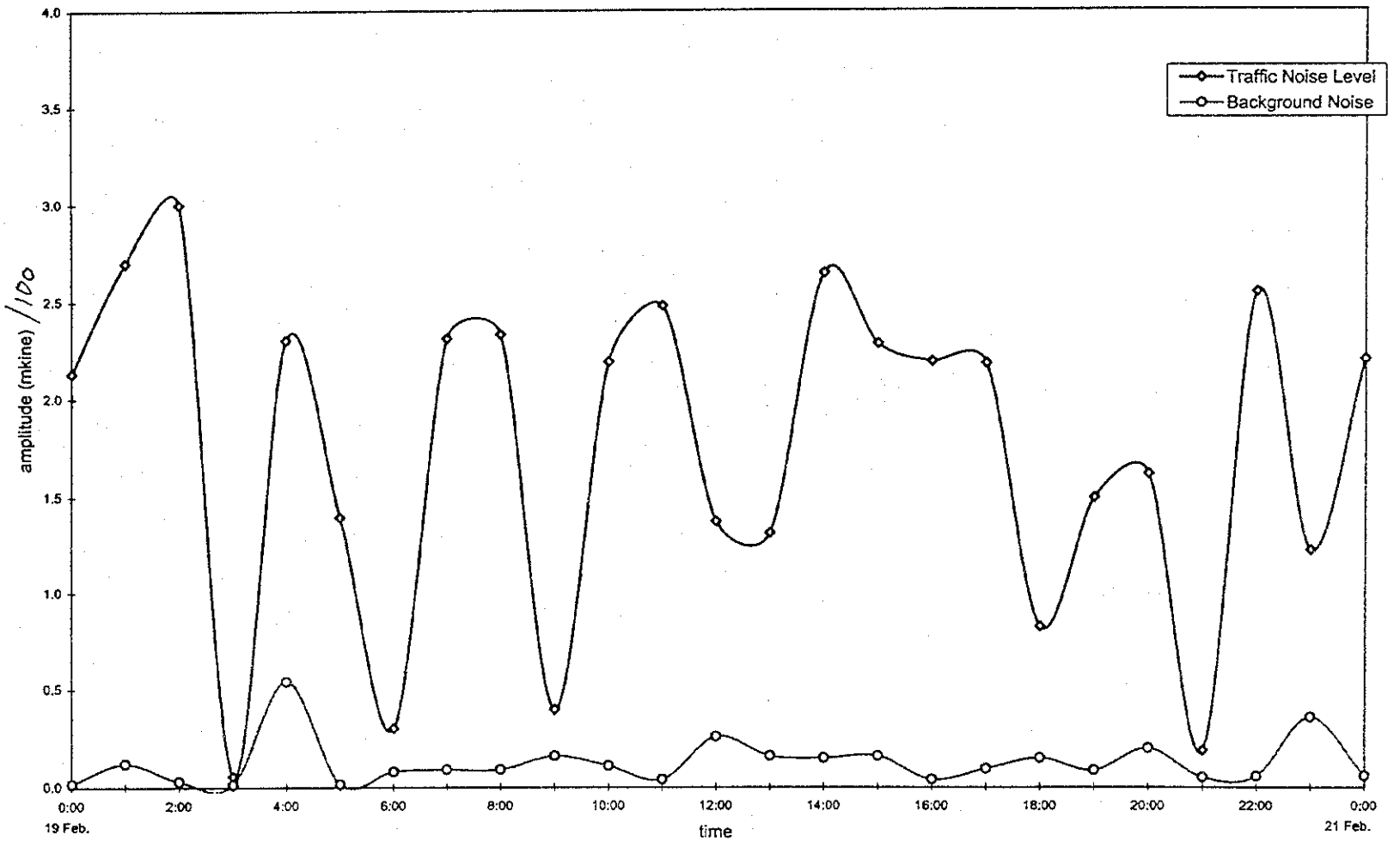
40 dB ⇒ all numbers should be devided to 100 in order to compare to current data.

SAN MATEO, RIZAL LANDFILL AREA VIBRATION TEST

(19 February - 21 February 1998)

Sapinit Elementary School, San Juan, Antipolo, Rizal

S6



STATION 1

TIME	Traffic Noise Level	Background Noise
0:00	2.130	0.017
1:00	2.700	0.120
2:00	3.000	0.030
3:00	0.056	0.013
4:00	2.300	0.540
5:00	1.400	0.017
6:00	0.300	0.080
7:00	2.310	0.090
8:00	2.330	0.090
9:00	0.400	0.160
10:00	2.190	0.110
11:00	2.480	0.040
12:00	1.380	0.260
13:00	1.320	0.160
14:00	2.650	0.150
15:00	2.280	0.160
16:00	2.190	0.040
17:00	2.180	0.094
18:00	0.830	0.150
19:00	1.500	0.086
20:00	1.620	0.201
21:00	0.190	0.051
22:00	2.550	0.056
23:00	1.230	0.360
0:00	2.200	0.059

40dB gain (all numbers ÷ 100)

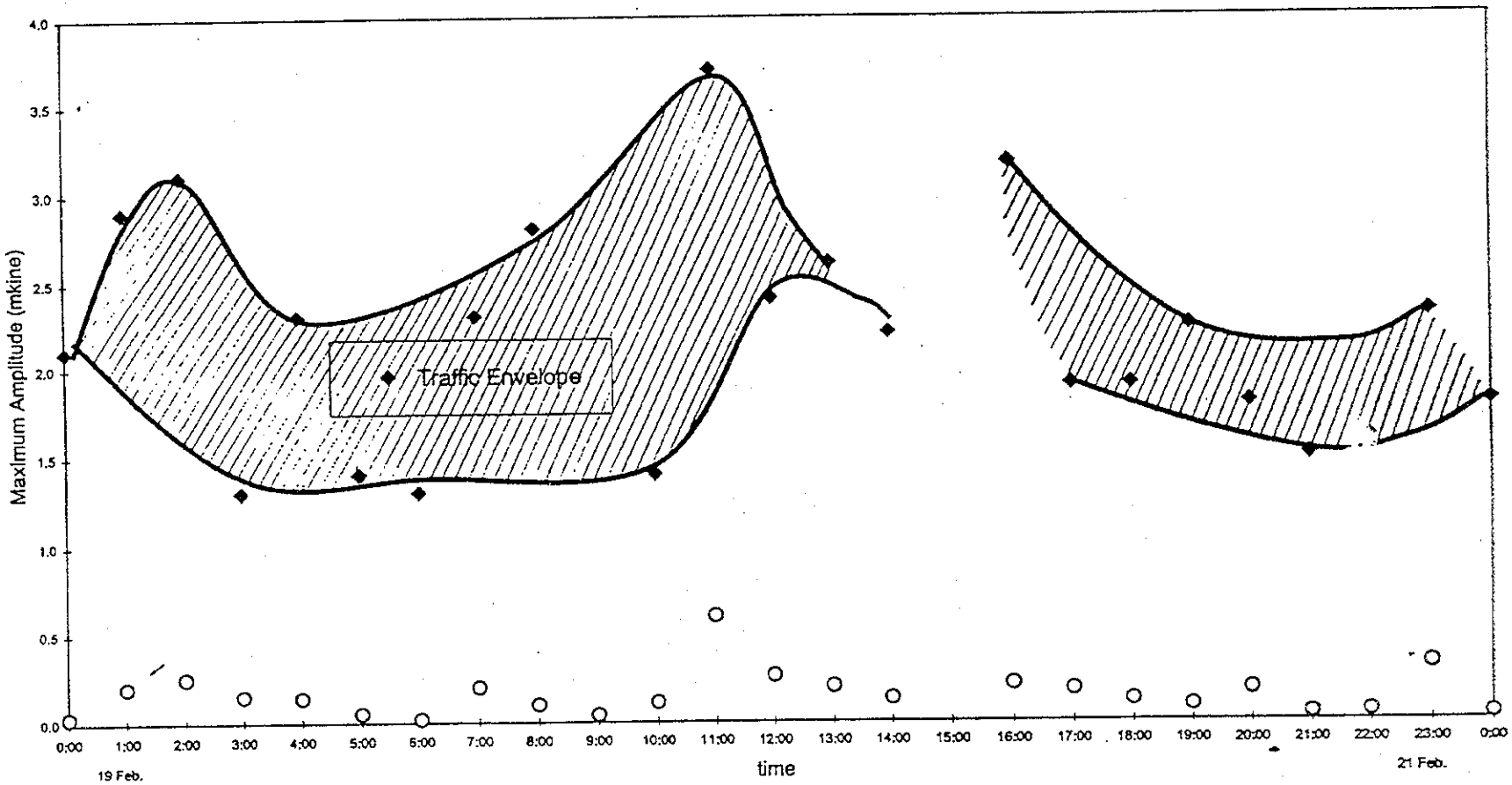


FIGURE 7. Envelope of the highs & lows of the hourly maximum amplitudes of vehicular activity at point P1 which correlates with the hourly traffic count.

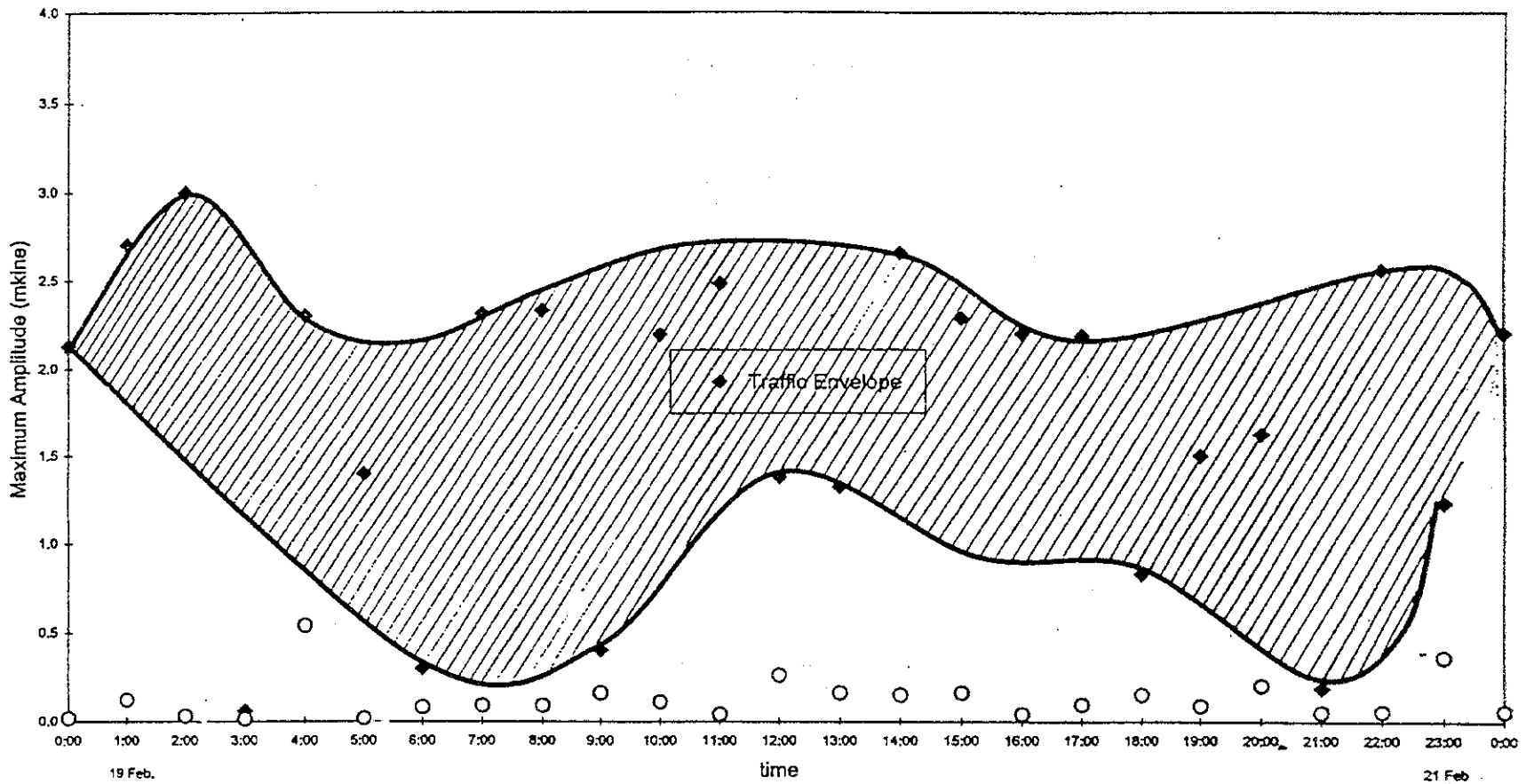
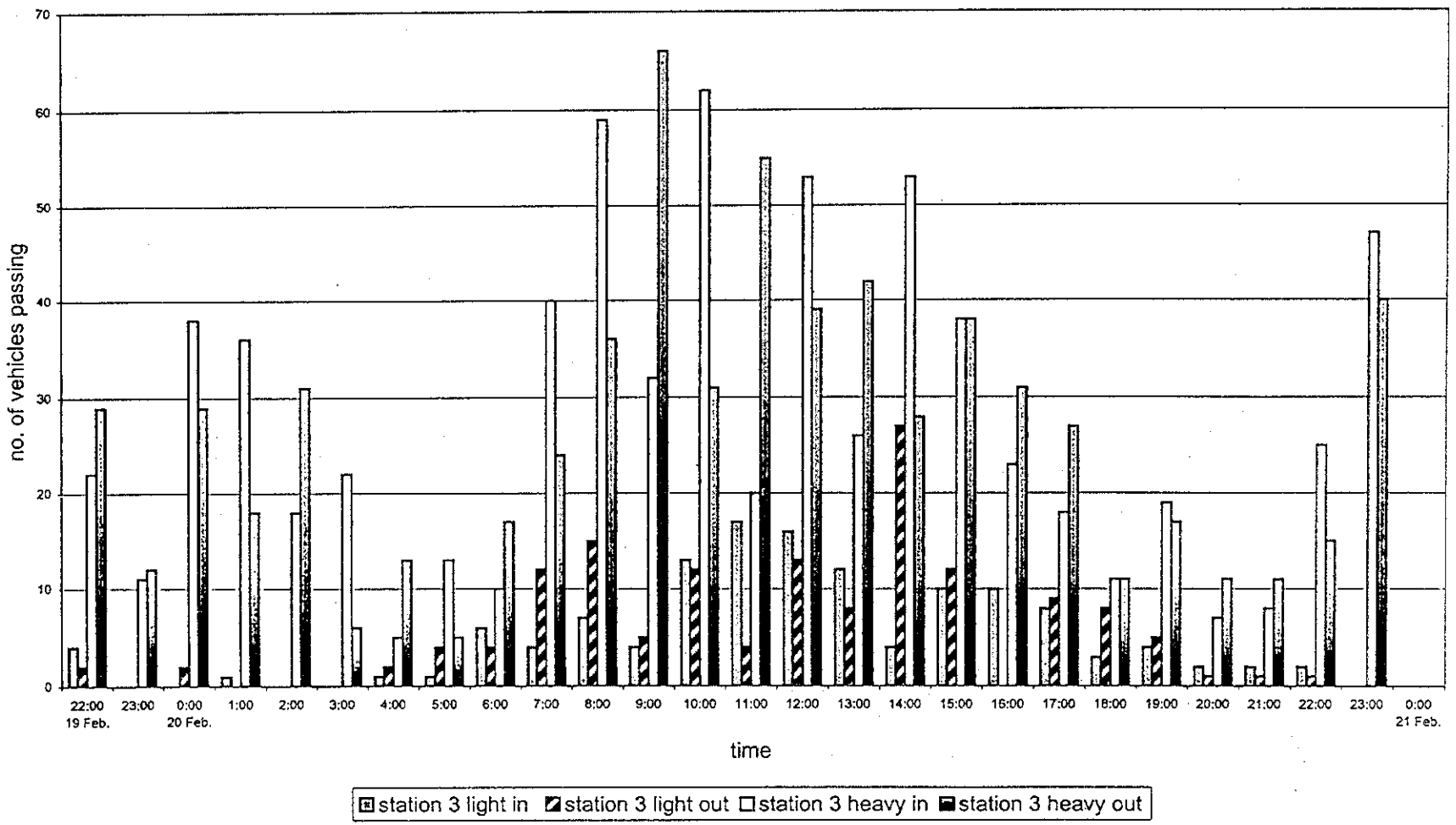


FIGURE 8. Envelope of the highs & lows of the hourly maximum amplitudes of vehicular activity at point **S6** which correlates with the hourly traffic count.

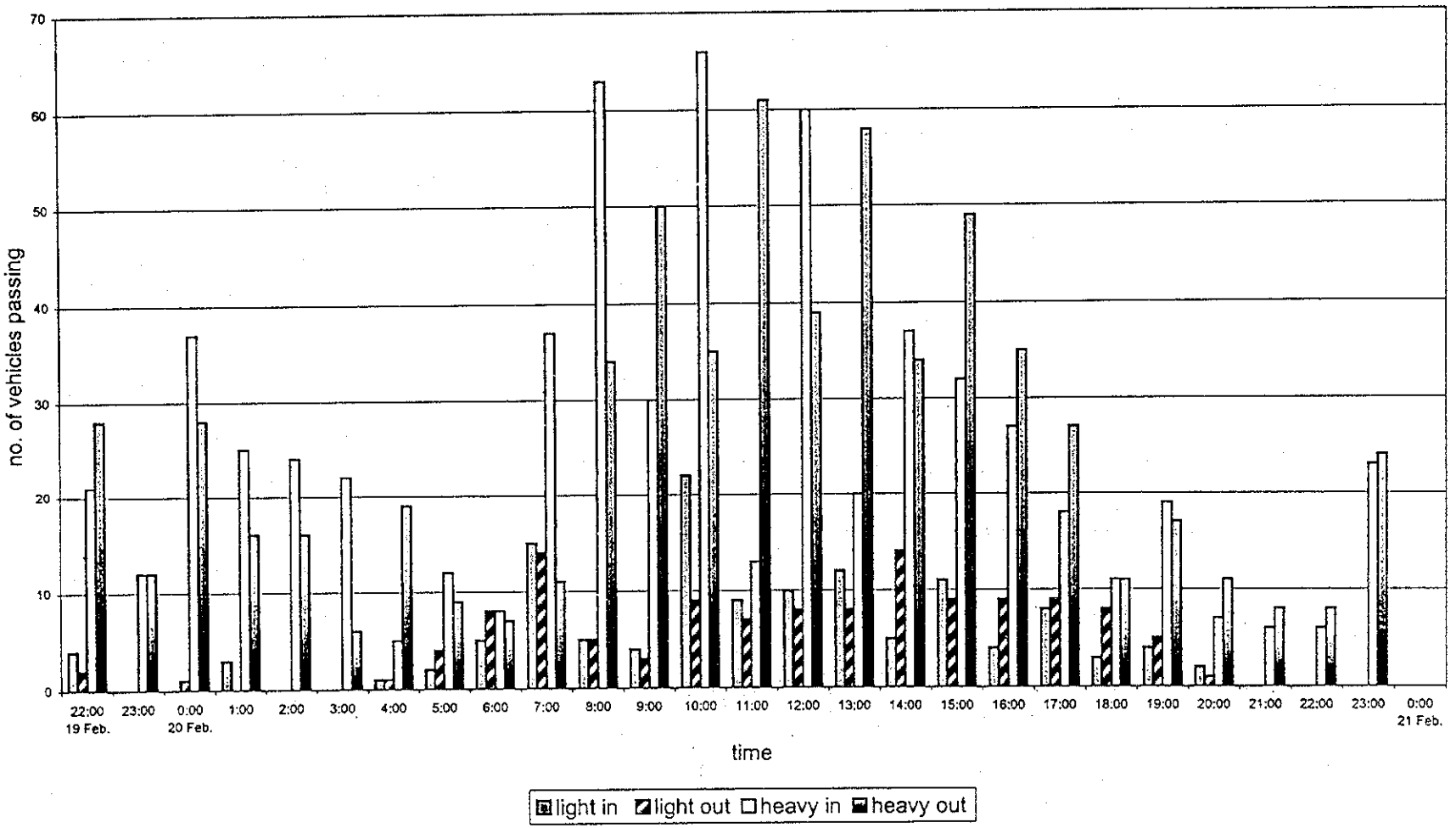
SAN MATEO, RIZAL - LANDFILL AREA VIBRATION TEST
(19 February - 21 February 1998)
Landfill Entrance-Exit
P1 (S11)



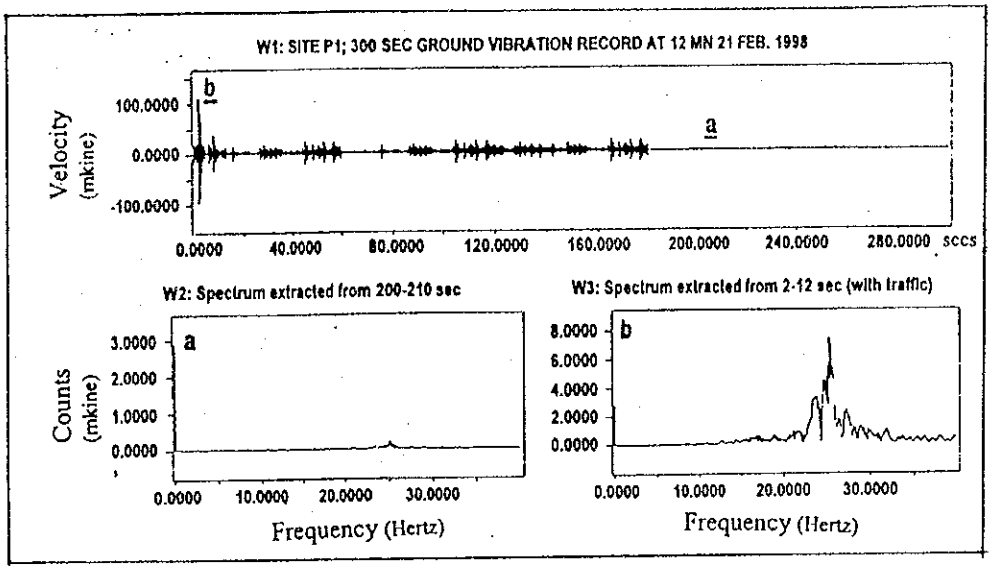
station 3

		light		heavy	
		in	out	in	out
19 Feb	22:00	4	2	22	29
	23:00			11	12
20 Feb	0:00		2	38	29
	1:00	1		36	18
	2:00			18	31
	3:00			22	6
	4:00	1	2	5	13
	5:00	1	4	13	5
	6:00	6	4	10	17
	7:00	4	12	40	24
	8:00	7	15	59	36
	9:00	4	5	32	66
	10:00	13	12	62	31
	11:00	17	4	20	55
	12:00	16	13	53	39
	13:00	12	8	26	42
	14:00	4	27	53	28
	15:00	10	12	38	38
	16:00	10		23	31
	17:00	8	9	18	27
	18:00	3	8	11	11
	19:00	4	5	19	17
	20:00	2	1	7	11
	21:00	2	1	8	11
	22:00	2	1	25	15
	23:00			47	40
21 Feb	0:00				

SAN MATEO, RIZAL - LANDFILL AREA VIBRATION TEST
(19 February - 21 February 1998)
Sapinit Elementary School, San Juan, Antipolo, Rizal
S6

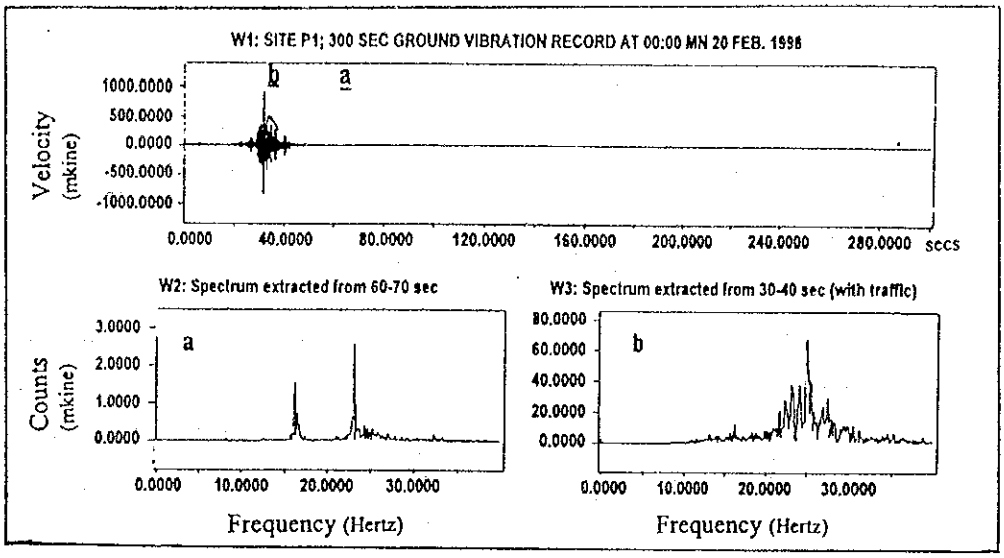


		light		heavy	
		in	out	in	out
19 Feb	22:00	4	2	21	28
	23:00			12	12
20 Feb	0:00		1	37	28
	1:00	3		25	16
	2:00			24	16
	3:00			22	6
	4:00	1	1	5	19
	5:00	2	4	12	9
	6:00	5	8	8	7
	7:00	15	14	37	11
	8:00	5	5	63	34
	9:00	4	3	30	50
	10:00	22	9	66	35
	11:00	9	7	13	61
	12:00	10	8	60	39
	13:00	12	8	20	58
	14:00	5	14	37	34
	15:00	11	9	32	49
	16:00	4	9	27	35
	17:00	8	9	18	27
	18:00	3	8	11	11
	19:00	4	5	19	17
	20:00	2	1	7	11
	21:00			6	8
	22:00			6	8
	23:00			23	24
21 Feb	0:00				

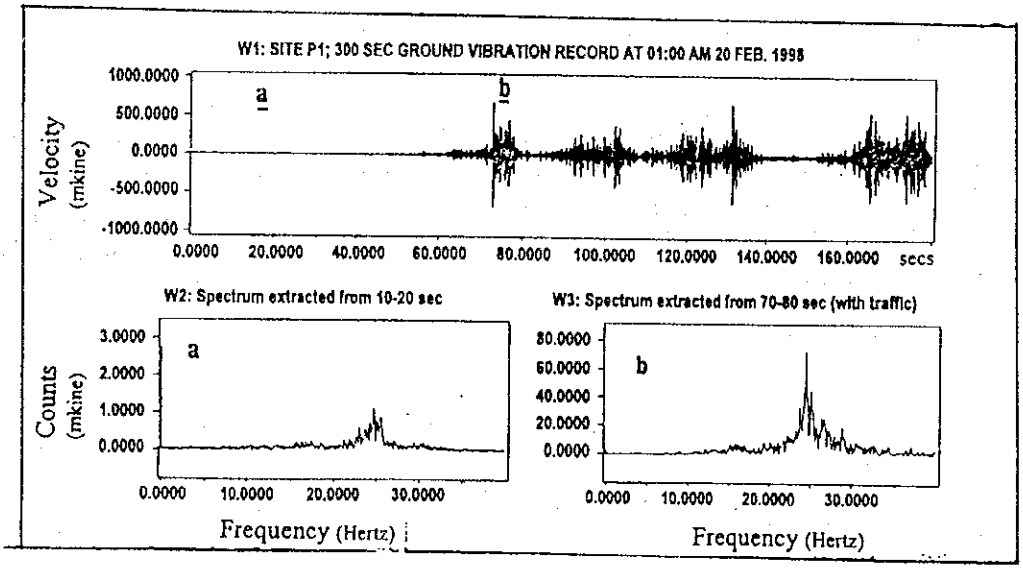


11A

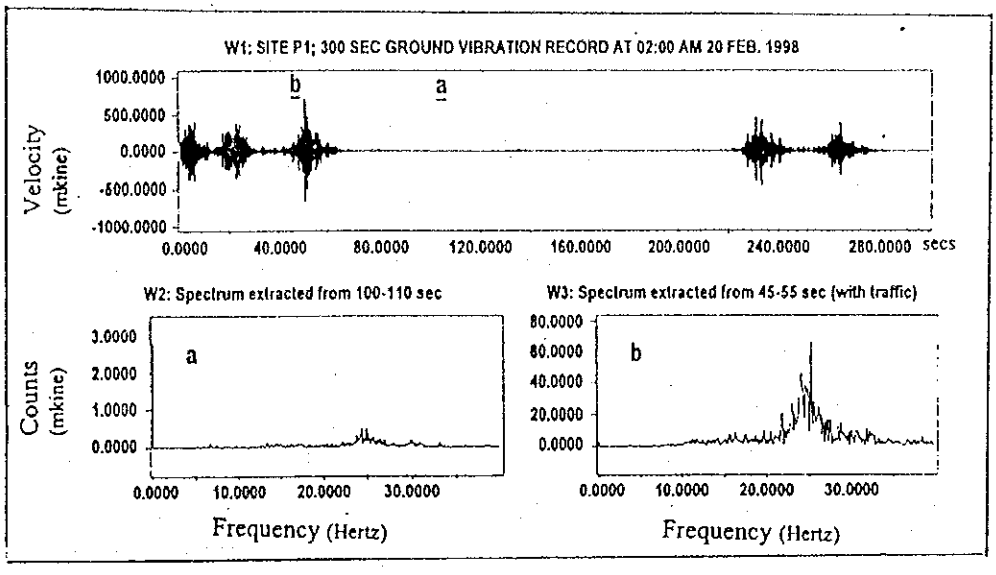
FIGURE 11. Temporal variation of spectral content within 25 hours at point **P1**. Predominant frequency of all activities in the area lies within 25 Hertz. Boxes "a" show the spectral contents for the natural frequency of the site and boxes "b" show the spectral contents of vehicular activity. It can be observed that the increase in natural noise level was during episodes of increased vehicular activity.


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 00:00 MN 20 FEB. 1998
Velocity (mkine)
1000.0000
500.0000
0.0000
-500.0000
-1000.0000
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 60-70 sec
W3: Spectrum extracted from 30-40 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
80.0000
60.0000
40.0000
20.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

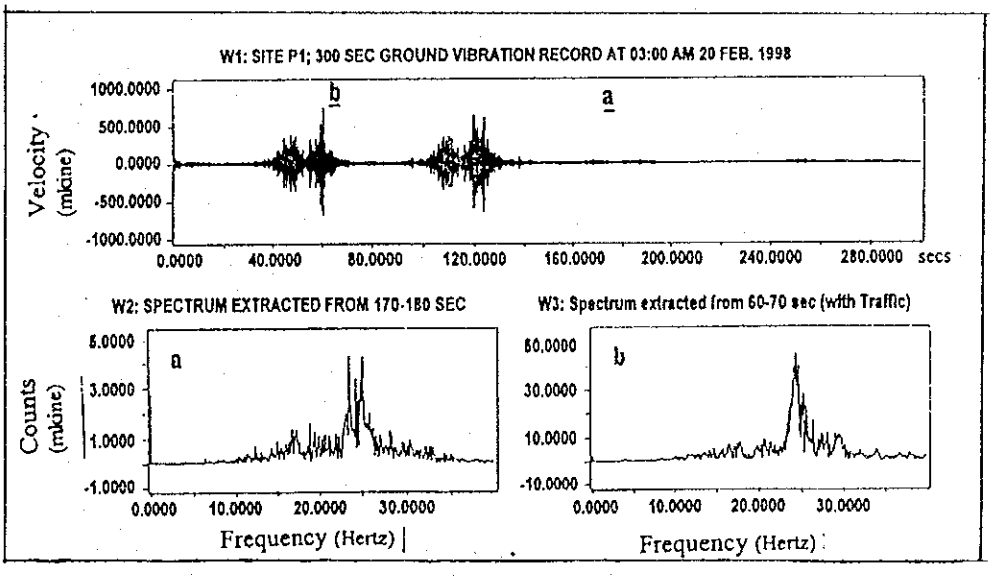
11B


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 01:00 AM 20 FEB. 1998
Velocity (mkine)
1000.0000
500.0000
0.0000
-500.0000
-1000.0000
0.0000
20.0000
40.0000
60.0000
80.0000
100.0000
120.0000
140.0000
160.0000
secs
W2: Spectrum extracted from 10-20 sec
W3: Spectrum extracted from 70-80 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
80.0000
60.0000
40.0000
20.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

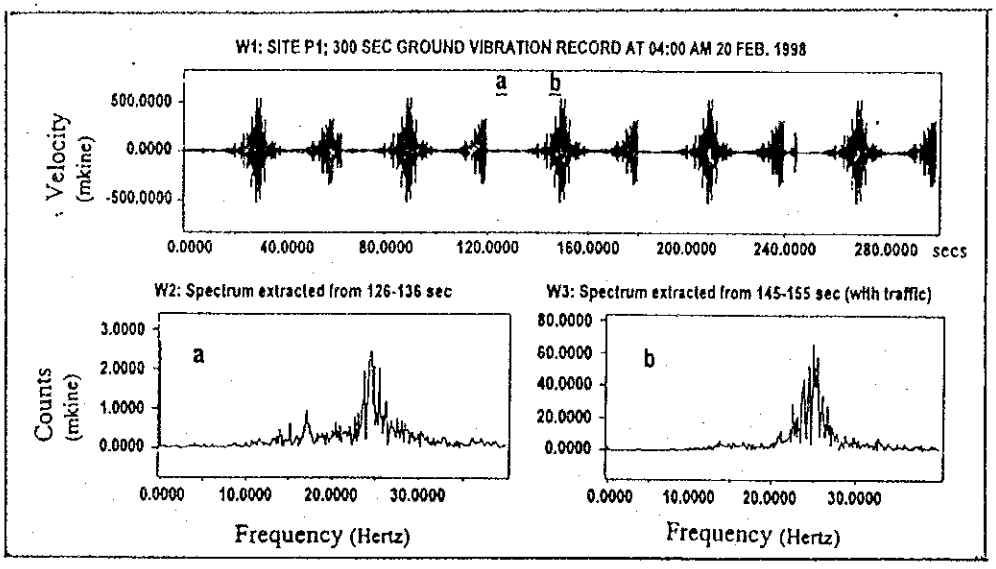
11C


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 02:00 AM 20 FEB. 1998
Velocity (mkine)
1000.0000
500.0000
0.0000
-500.0000
-1000.0000
b
a
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 100-110 sec
W3: Spectrum extracted from 45-55 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
a
80.0000
60.0000
40.0000
20.0000
0.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

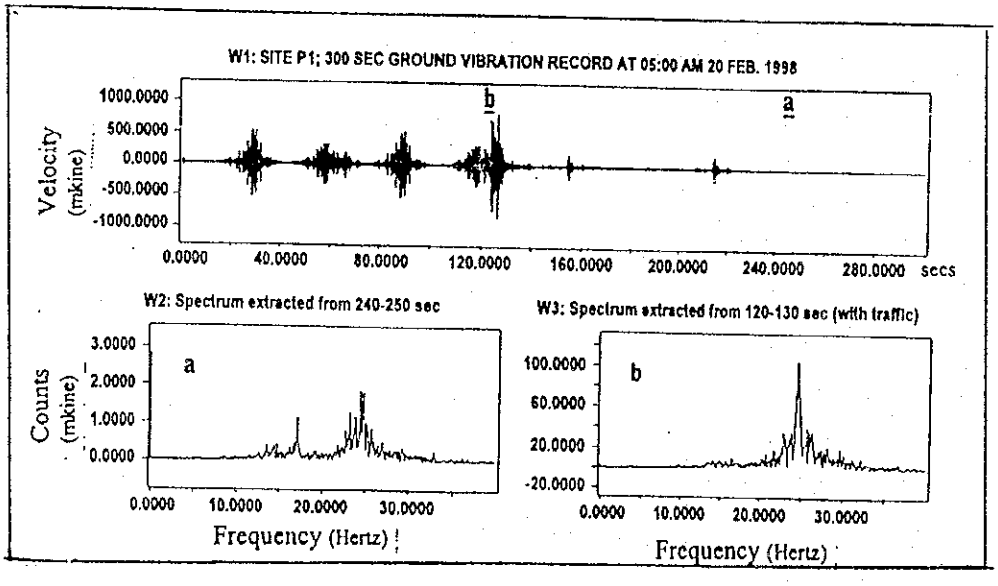
11D


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 03:00 AM 20 FEB. 1998
Velocity (mkine)
1000.0000
500.0000
0.0000
-500.0000
-1000.0000
b
a
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: SPECTRUM EXTRACTED FROM 170-180 SEC
W3: Spectrum extracted from 60-70 sec (with Traffic)
Counts (mkine)
5.0000
3.0000
1.0000
-1.0000
a
50.0000
30.0000
10.0000
-10.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

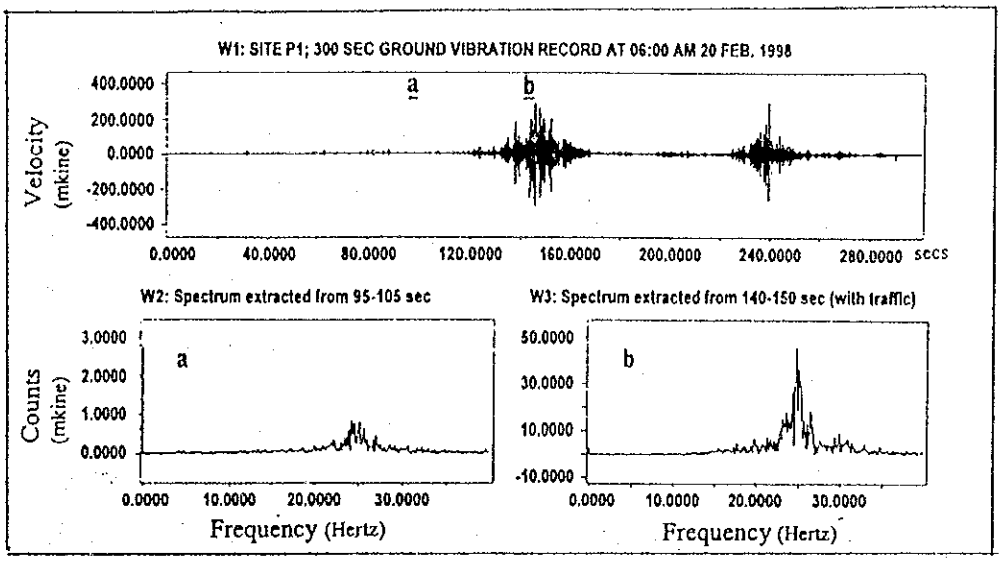
11E


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 04:00 AM 20 FEB. 1998
Velocity (mkine)
500.0000
0.0000
-500.0000
a
b
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 126-136 sec
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
a
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
W3: Spectrum extracted from 145-155 sec (with traffic)
80.0000
60.0000
40.0000
20.0000
0.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)

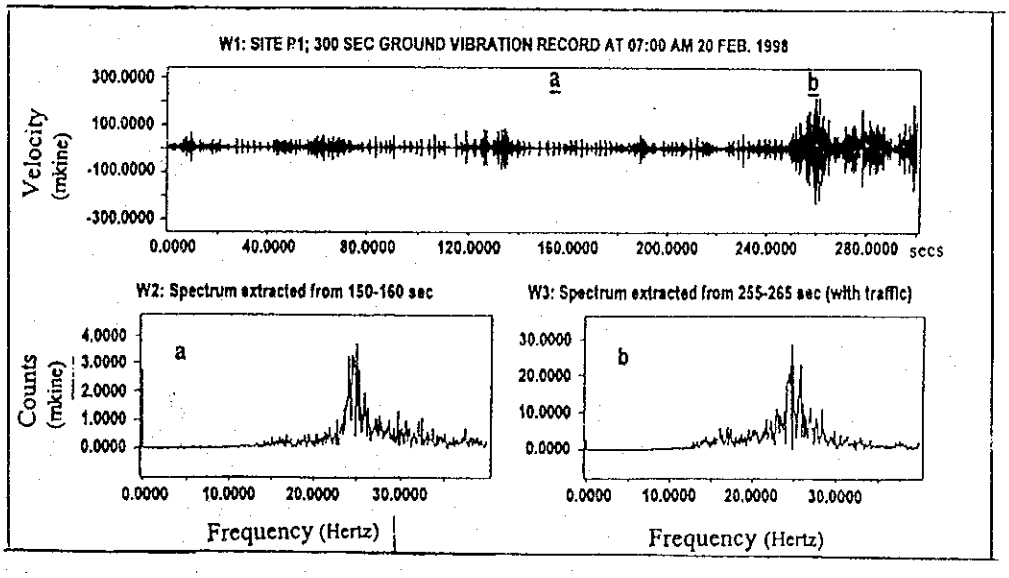
11F


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 05:00 AM 20 FEB. 1998
Velocity (mkine)
1000.0000
500.0000
0.0000
-500.0000
-1000.0000
b
a
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 240-250 sec
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
a
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
W3: Spectrum extracted from 120-130 sec (with traffic)
100.0000
60.0000
20.0000
-20.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)

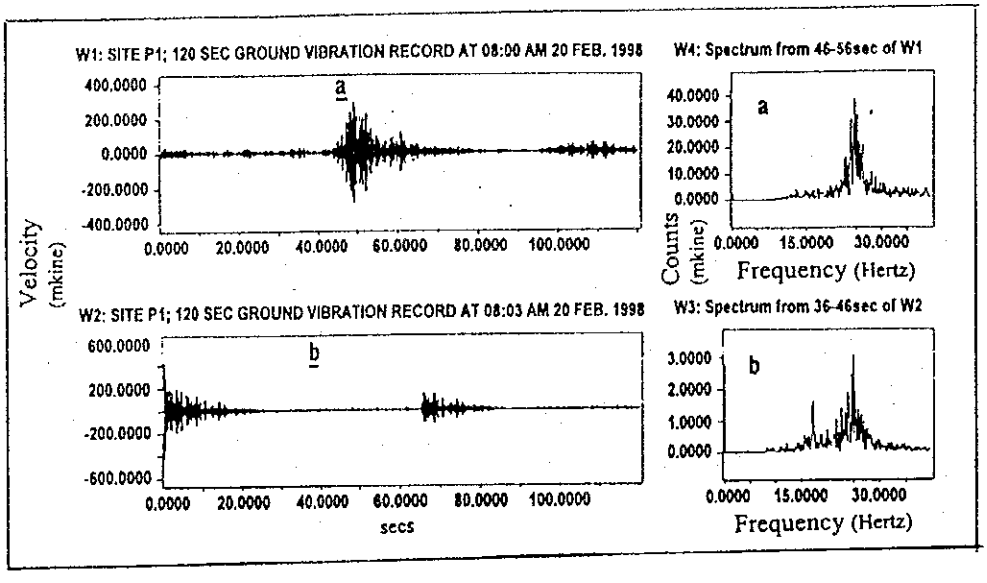
11G


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 06:00 AM 20 FEB. 1998
Velocity (mkine)
400.0000
200.0000
0.0000
-200.0000
-400.0000
a
b
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 95-105 sec
W3: Spectrum extracted from 140-150 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
50.0000
30.0000
10.0000
-10.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

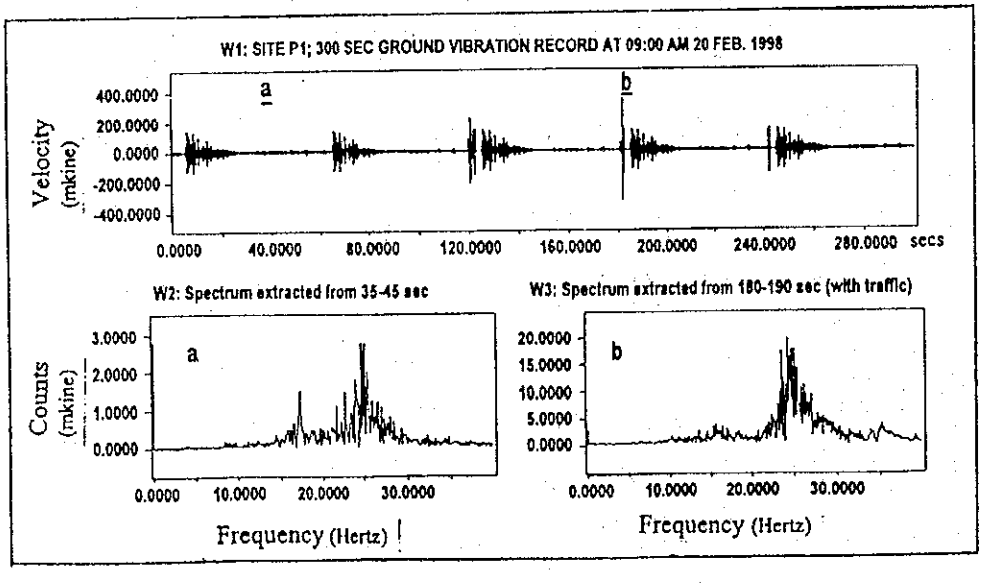
11H


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 07:00 AM 20 FEB. 1998
Velocity (mkine)
300.0000
100.0000
-100.0000
-300.0000
a
b
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 150-160 sec
W3: Spectrum extracted from 255-265 sec (with traffic)
Counts (mkine)
4.0000
3.0000
2.0000
1.0000
0.0000
30.0000
20.0000
10.0000
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

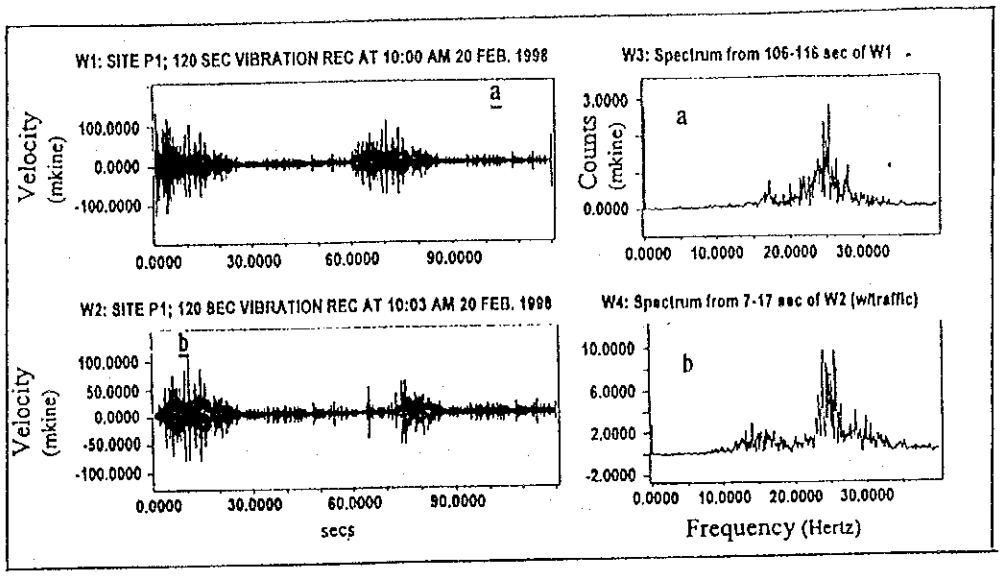
11I


W1: SITE P1; 120 SEC GROUND VIBRATION RECORD AT 08:00 AM 20 FEB. 1998
W4: Spectrum from 46-56sec of W1
W2: SITE P1; 120 SEC GROUND VIBRATION RECORD AT 08:03 AM 20 FEB. 1998
W3: Spectrum from 36-46sec of W2
Velocity (mkine)
Counts (mkine)
Frequency (Hertz)
secs

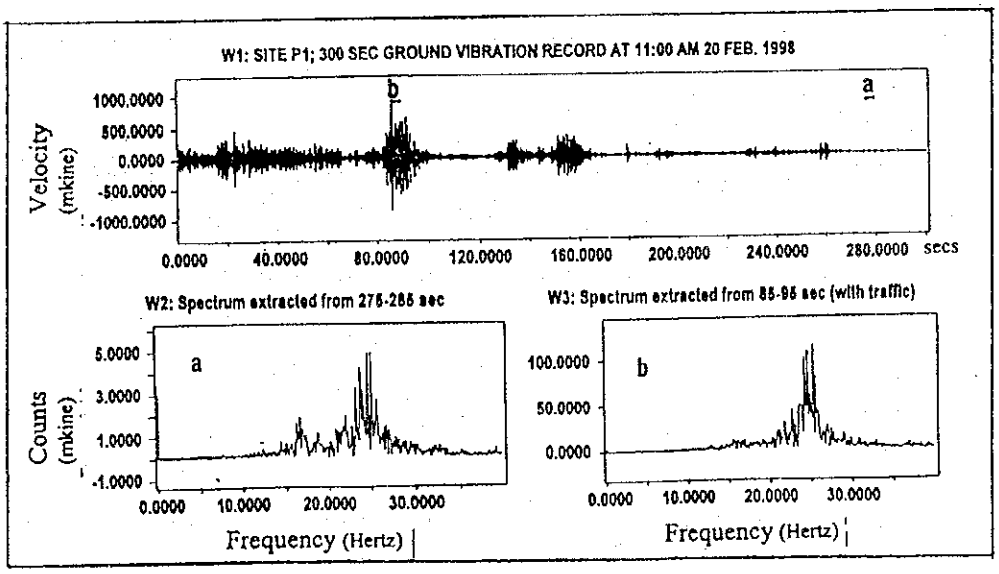
11J


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 09:00 AM 20 FEB. 1998
W2: Spectrum extracted from 35-45 sec
W3: Spectrum extracted from 180-190 sec (with traffic)
Velocity (mkine)
Counts (mkine)
Frequency (Hertz)
secs

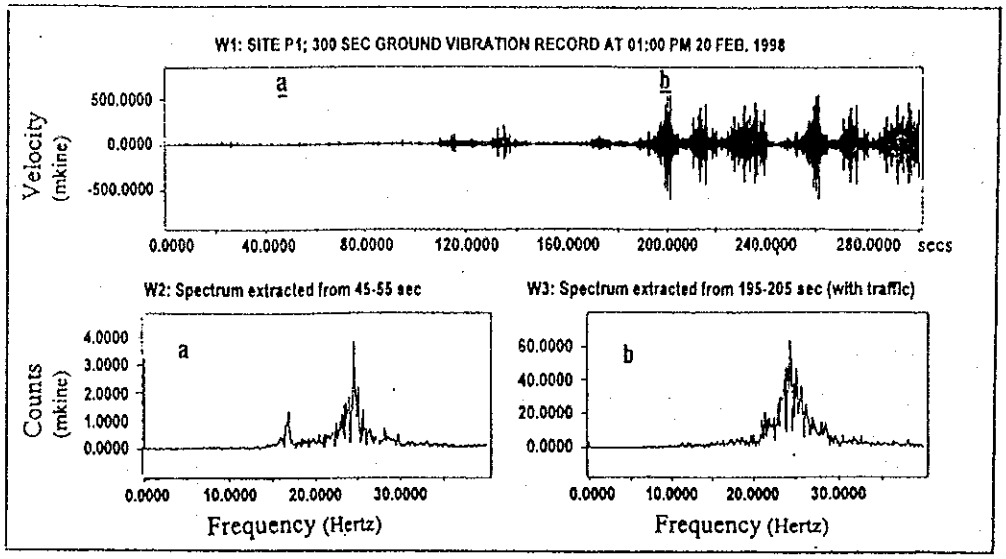
11K


W1: SITE P1; 120 SEC VIBRATION REC AT 10:00 AM 20 FEB. 1998
W3: Spectrum from 106-116 sec of W1
Velocity (mkine)
Counts (mkine)
W2: SITE P1; 120 SEC VIBRATION REC AT 10:03 AM 20 FEB. 1998
W4: Spectrum from 7-17 sec of W2 (w/traffic)
secs
Frequency (Hertz)

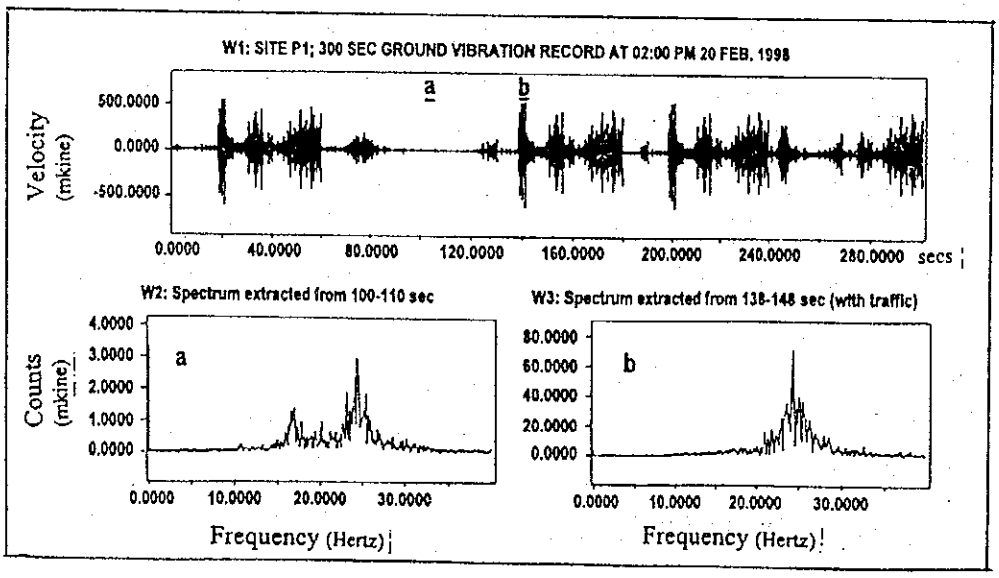
11L


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 11:00 AM 20 FEB. 1998
Velocity (mkine)
secs
W2: Spectrum extracted from 275-285 sec
W3: Spectrum extracted from 85-95 sec (with traffic)
Counts (mkine)
Frequency (Hertz)
Frequency (Hertz)

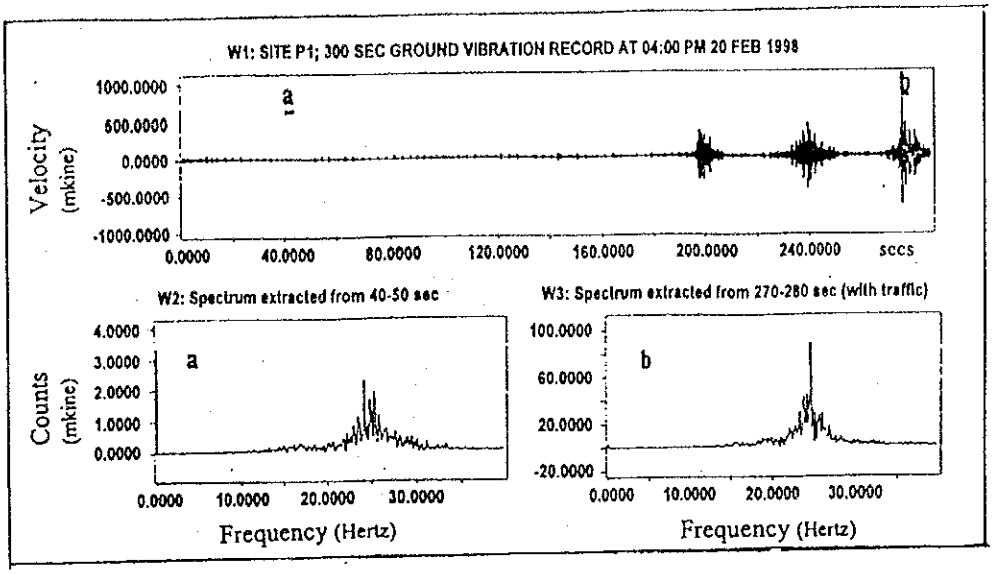
11M


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 01:00 PM 20 FEB. 1998
Velocity (mkine)
500.0000
0.0000
-500.0000
a
b
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 45-55 sec
W3: Spectrum extracted from 195-205 sec (with traffic)
Counts (mkine)
4.0000
3.0000
2.0000
1.0000
0.0000
60.0000
40.0000
20.0000
10.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

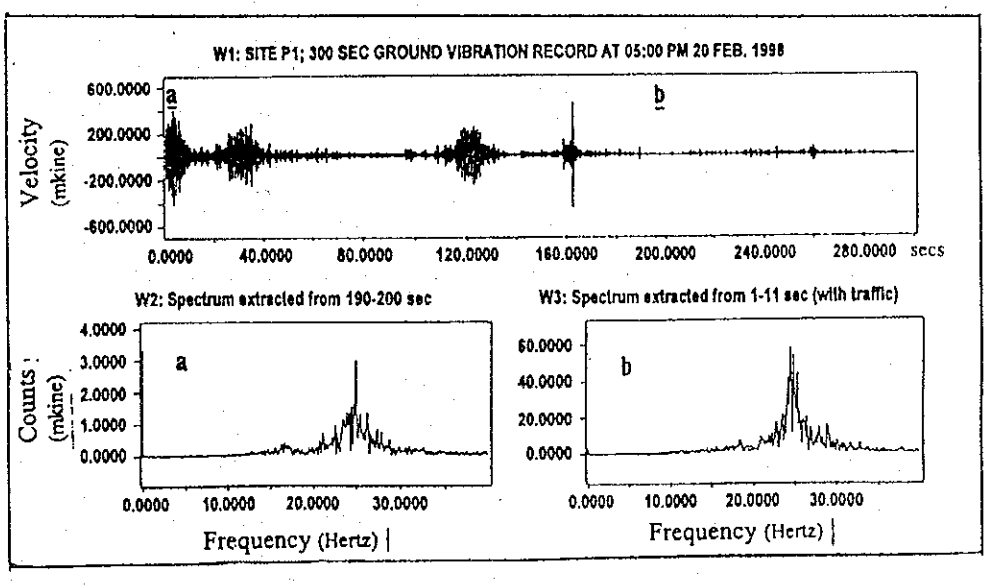
11N


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 02:00 PM 20 FEB. 1998
Velocity (mkine)
500.0000
0.0000
-500.0000
a
b
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 100-110 sec
W3: Spectrum extracted from 138-148 sec (with traffic)
Counts (mkine)
4.0000
3.0000
2.0000
1.0000
0.0000
80.0000
60.0000
40.0000
20.0000
10.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

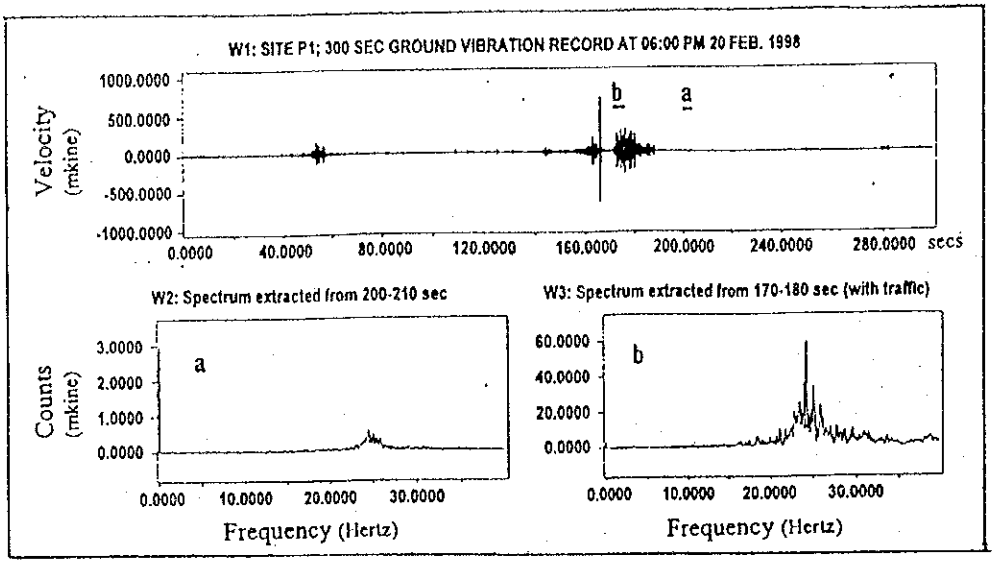
11O


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 04:00 PM 20 FEB 1998
Velocity (mkine)
1000.0000
500.0000
0.0000
-500.0000
-1000.0000
a
b
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
secs
W2: Spectrum extracted from 40-50 sec
W3: Spectrum extracted from 270-280 sec (with traffic)
Counts (mkine)
4.0000
3.0000
2.0000
1.0000
0.0000
100.0000
60.0000
20.0000
-20.0000
10.0000
20.0000
30.0000
Frequency (Hertz)

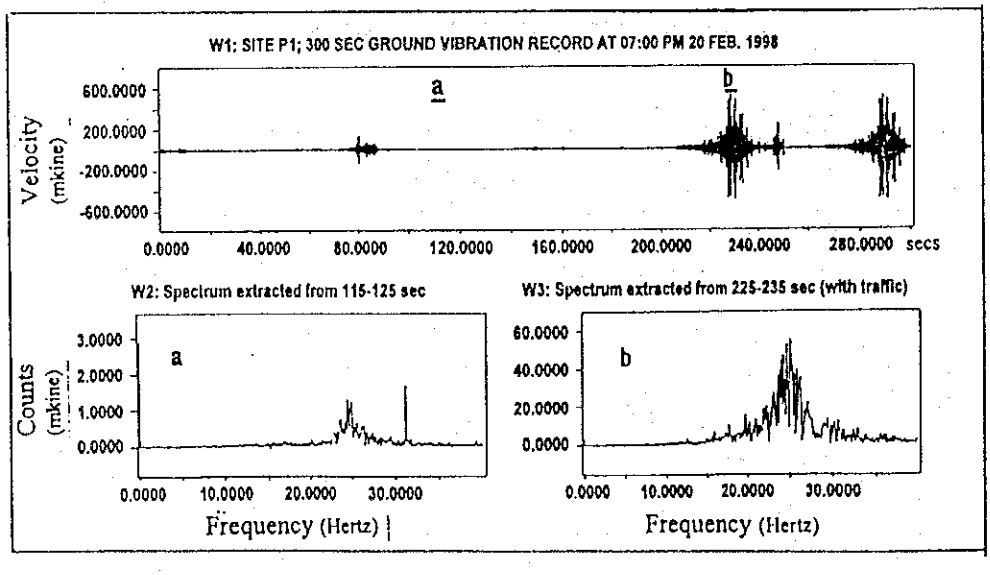
11P


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 05:00 PM 20 FEB. 1998
Velocity (mkine)
600.0000
200.0000
-200.0000
-600.0000
a
b
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 190-200 sec
W3: Spectrum extracted from 1-11 sec (with traffic)
Counts (mkine)
4.0000
3.0000
2.0000
1.0000
0.0000
60.0000
40.0000
20.0000
10.0000
20.0000
30.0000
Frequency (Hertz)

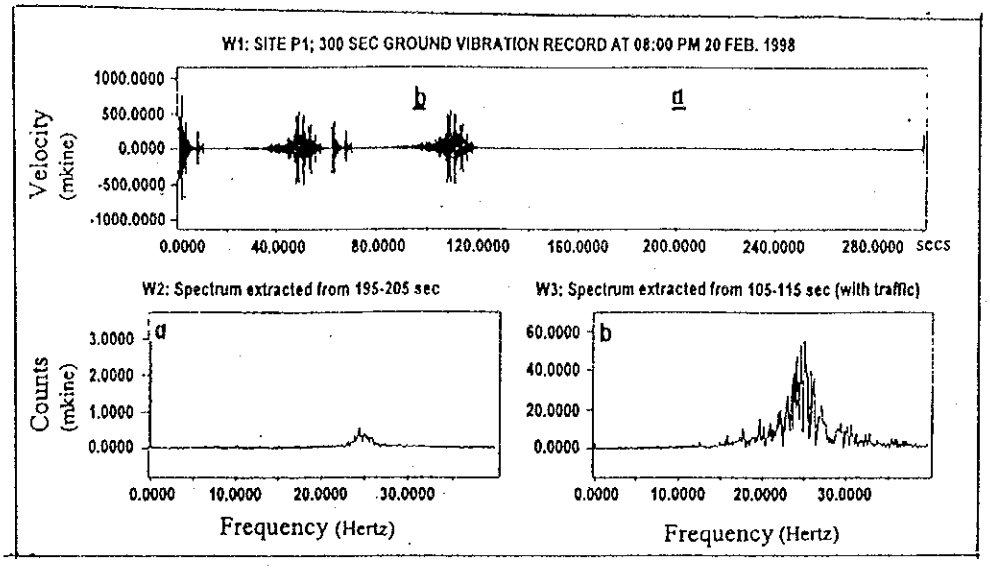
11Q


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 06:00 PM 20 FEB. 1998
Velocity (mkine)
1000.0000
500.0000
0.0000
-500.0000
-1000.0000
b
a
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 200-210 sec
W3: Spectrum extracted from 170-180 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
a
60.0000
40.0000
20.0000
0.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

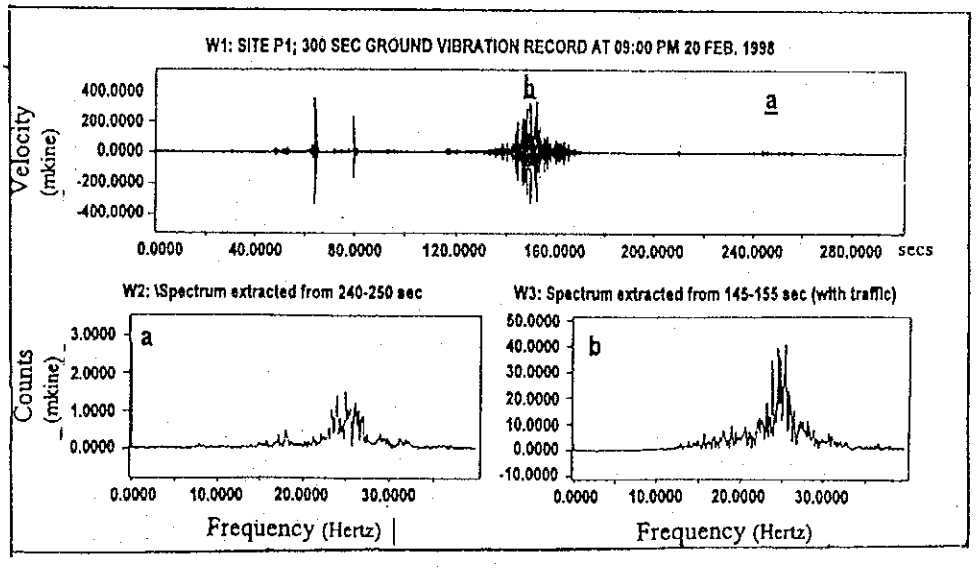
11S


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 07:00 PM 20 FEB. 1998
Velocity (mkine)
600.0000
200.0000
-200.0000
-600.0000
a
b
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 115-125 sec
W3: Spectrum extracted from 225-235 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
a
60.0000
40.0000
20.0000
0.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

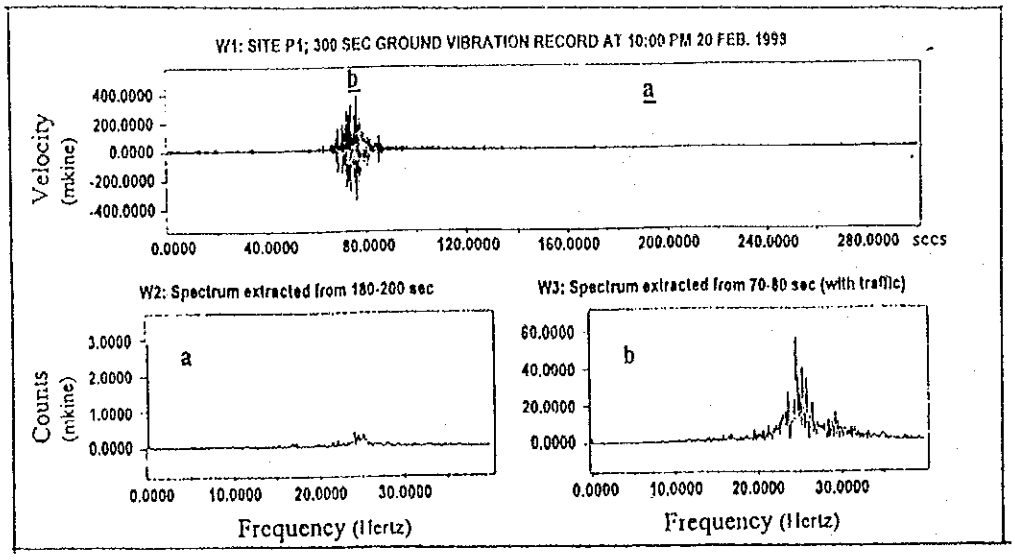
11R


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 08:00 PM 20 FEB. 1998
Velocity (mkine)
1000.0000
500.0000
0.0000
-500.0000
-1000.0000
b
d
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 195-205 sec
W3: Spectrum extracted from 105-115 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
d
60.0000
40.0000
20.0000
0.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

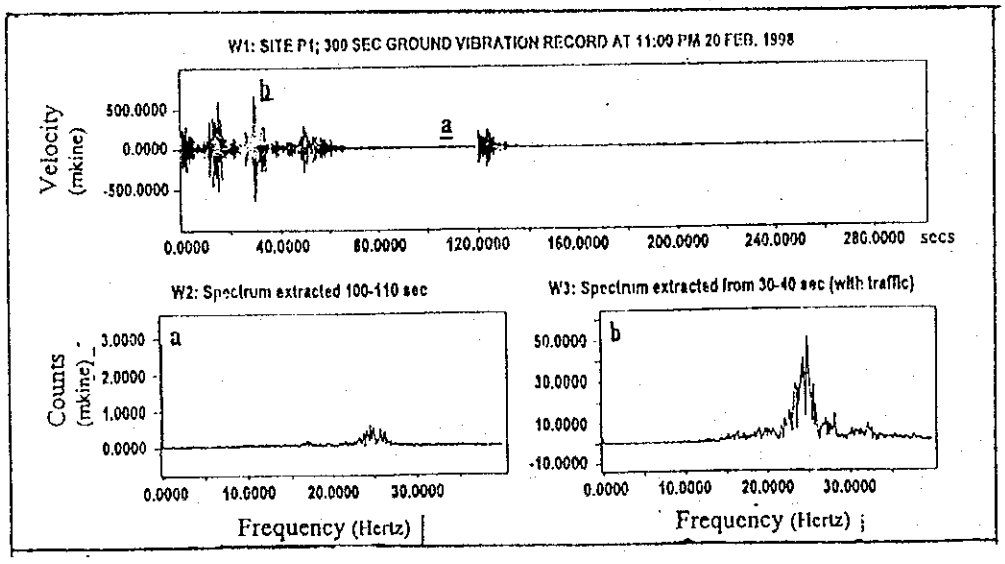
11T


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 09:00 PM 20 FEB. 1998
Velocity (mkine)
400.0000
200.0000
0.0000
-200.0000
-400.0000
b
a
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: \Spectrum extracted from 240-250 sec
W3: Spectrum extracted from 145-155 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
a
50.0000
40.0000
30.0000
20.0000
10.0000
0.0000
-10.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

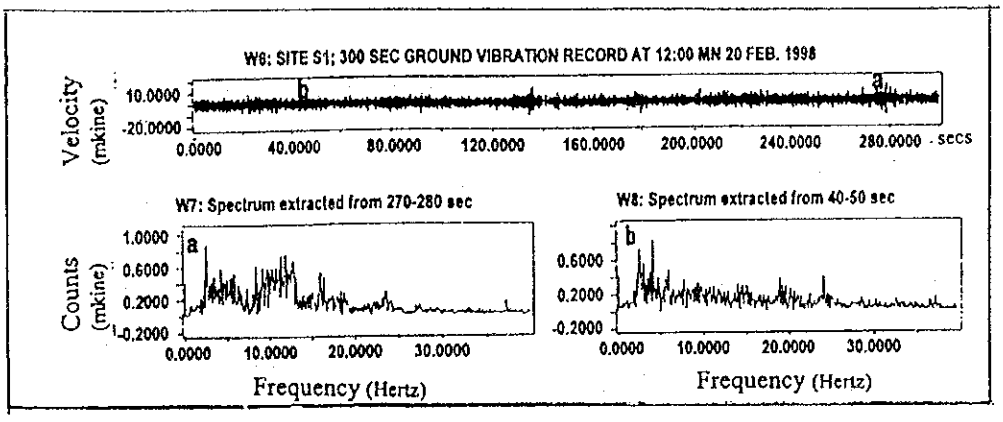
11U


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 10:00 PM 20 FEB. 1998
Velocity (mkine)
400.0000
200.0000
0.0000
-200.0000
-400.0000
b
a
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted from 180-200 sec
W3: Spectrum extracted from 70-80 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
a
60.0000
40.0000
20.0000
0.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

11V


W1: SITE P1; 300 SEC GROUND VIBRATION RECORD AT 11:00 PM 20 FEB. 1998
Velocity (mkine)
500.0000
0.0000
-500.0000
b
a
0.0000
40.0000
80.0000
120.0000
160.0000
200.0000
240.0000
280.0000
secs
W2: Spectrum extracted 100-110 sec
W3: Spectrum extracted from 30-40 sec (with traffic)
Counts (mkine)
3.0000
2.0000
1.0000
0.0000
a
50.0000
30.0000
10.0000
-10.0000
b
0.0000
10.0000
20.0000
30.0000
Frequency (Hertz)
Frequency (Hertz)

11W



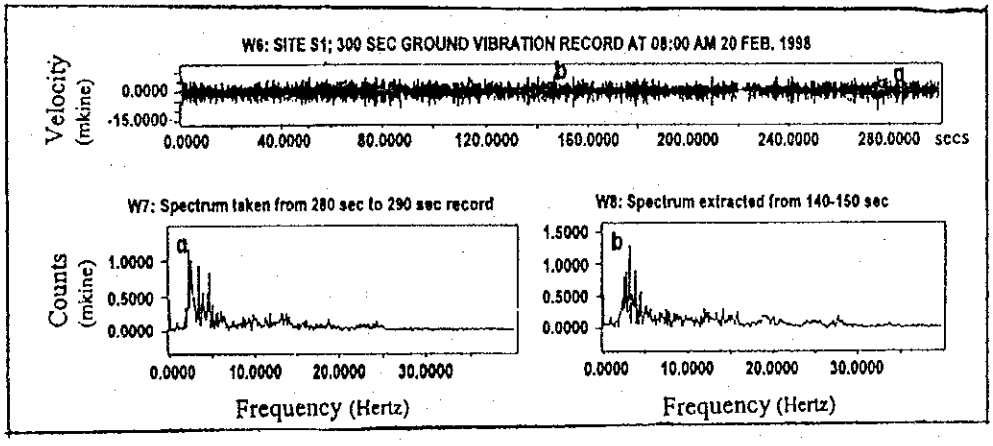


FIGURE 12. Spectral content at point S1 extracted from 2 different recording times.Predominant frequency lies within a bandwidth from 3 Hz to 20 Hz. Low frequency corresponds to liquid oscillation in the leachate treatment ponds while high frequency is from other source such as traffic and other equipment.

NOISE READING DATA @ SAN MATEO LANDFILL.

TWENTY FOUR HOUR NOISE MONITORING @ STATION # 1 SAPINIT ELEM. SCHOOL

S-6 (Sapinit Elem. School)
Date: Feb.19, 1998
Time: 7:00 - 8:00 PM
Duration : 1hour

79.90	59.00	50.70	51.20
80.50	55.50	54.80	51.20
78.60	56.10	53.90	52.30
79.50	54.70	50.30	49.60
62.20	77.80	70.30	74.50
64.80	75.80	72.50	75.30
61.10	68.30	74.90	76.30
61.50	69.50	75.80	75.60
62.30	59.10	50.50	51.30
62.30	60.90	48.80	52.50
77.40	56.30	52.30	56.10
100.10	54.30	52.30	51.20
98.30	78.50	86.00	75.80
95.60	76.30	84.50	76.30
96.40	77.60	90.20	78.90
		Averages	*67.60* dbA

Note: Peak values are attributable to passing dumptrucks.

S-6 Sapinit Elementary School

Time : 9:00 to 10:00 pm Feb. 19 1998

Duration 1 hour

84.20	52.20	55.30	53.20
80.20	56.10	54.90	53.40
81.00	61.70	56.70	54.20
84.50	54.80	56.00	56.40
62.20	83.80	56.90	55.30
60.00	81.50	54.60	53.00
58.40	80.20	56.20	53.90
54.20	82.50	52.90	52.20
53.90	51.40	53.40	52.70
54.60	55.90	52.80	54.00
74.40	54.80	54.80	54.40
80.20	54.20	53.50	54.00
90.20	54.40	54.10	54.10
85.20	54.80	57.00	55.10
62.40	54.30	57.90	58.70
60.50	54.00	54.60	56.10

Average = *60.39* dbA

Note: Peak values are attributable to passing dumptrucks.

S-6 Sapinit Elementary School

Time: 1:00 TO 2:00 am Feb. 20 1998

Duration : 1 hour

48.00	49.80	71.20	49.70
50.40	44.23	70.40	50.50
54.70	52.30	65.00	49.40
52.30	49.80	64.00	49.50
77.10	75.10	72.80	52.10
61.00	75.00	51.40	69.50
66.00	75.40	49.50	75.50
60.30	68.00	49.20	72.30
65.90	71.00	48.00	75.40
50.20	51.50	47.40	74.20
50.30	49.50	74.80	72.30
49.90	49.20	75.40	50.20
66.00	48.00	75.80	51.60
68.00	47.40	74.20	52.40
65.40	49.60	70.50	49.80

Average = ***59.92*** dbA

Note: Peak values are attributable to passing dumptrucks.

S-6 Sapinit Elementary School
Time : 3:00 to 4:00 am Feb. 20 1998
Duration :1 hour

65.20	47.50	65.80	48.90
67.90	49.60	68.40	49.30
63.30	48.00	69.40	47.80
68.40	47.90	68.40	48.80
68.10	63.90	48.30	44.40
48.70	59.20	45.60	72.30
52.70	60.40	46.20	74.50
48.60	60.40	45.20	72.10
48.90	64.20	72.50	75.20
49.00	46.60	73.40	74.50
67.00	46.20	80.60	49.90
64.70	48.80	75.30	48.60
64.20	48.70	70.20	45.60
69.00	45.90	72.50	48.90

Average = *58.67* dbA

Note: Peak values are attributable to passing dumptrucks.

S-6 Sapinit Elementary School
Time: 6:00 to 7:00 am Feb. 20 1998
Duration :1hour

45.70	59.20	48.30	48.40
54.00	60.40	45.60	46.80
44.00	64.20	46.20	46.70
44.40	59.20	44.70	46.80
63.20	60.40	72.50	74.20
58.20	63.90	73.40	75.20
77.20	46.60	80.60	71.20
64.20	46.20	75.30	74.50
74.10	48.00	70.20	71.20
75.20	48.70	47.00	50.20
74.50	45.80	49.30	51.20
46.20	68.40	46.20	52.10
42.20	69.30	48.00	45.20
43.10	70.10	54.60	48.90
44.10	71.10	65.80	69.10
44.40	69.90	68.40	70.30
45.60	65.40	69.40	72.30

Average = ***58.48*** dbA

Note: Peak values are attributable to passing dumptrucks.

S-6 Sapinit Elementary School
Time: 8:00 TO 9:00 am Feb 20 1998.
Duration: 1hour

65.20	47.50	72.50	65.50
67.90	49.60	73.00	63.90
63.30	48.00	80.60	68.70
68.10	47.90	75.30	65.40
48.70	63.90	48.30	44.30
50.20	59.25	45.60	50.90
48.60	60.40	46.20	48.00
48.90	64.20	44.70	49.20
67.00	61.50	67.60	68.50
67.00	46.20	64.80	65.50
64.70	48.00	65.40	68.40
64.20	48.70	58.40	49.50
69.00	45.90	68.90	48.50
62.90	44.40	67.40	47.60

Average = *58.46* dbA

Note: Peak values are attributable to passing dumptrucks.

S-6 Sapinit Elementary School
Time : 10:00 to 11:00 am Feb.20 1998
Duration : 1hour

60.70	65.20	63.00	62.30
64.90	66.80	64.50	62.60
65.80	69.10	65.30	62.30
66.90	68.00	66.80	64.20
91.40	80.30	73.30	75.60
70.50	75.20	74.10	74.80
77.80	71.00	76.20	75.60
73.90	73.00	68.70	79.80
65.20	65.30	67.70	81.20
66.80	66.60	62.10	59.60
65.30	60.70	59.60	58.20
65.00	57.10	58.60	54.30
73.90	82.10	54.20	54.20
88.50	71.90	79.30	77.60
79.40	70.40	73.70	72.40

Average = ***69.01*** dbA

Note: Peak values are attributable to passing dumptrucks.

S-6 Sapinit Elementary School
Time: 1:00 to 2:00 pm Feb. 20 1998
Duration:1 Hour

60.10	59.10	71.20	52.30
54.80	57.70	70.30	51.20
56.50	57.30	72.30	54.30
56.60	53.70	74.40	54.10
76.00	72.40	75.60	67.00
70.30	73.20	76.20	68.20
65.40	74.80	51.10	59.10
76.80	75.60	54.40	67.00
52.60	79.80	52.20	49.50
54.70	81.20	53.20	57.60
52.60	55.40	54.30	61.30
62.20	49.90	74.90	59.90
66.20	50.30	75.60	48.50
63.80	54.90	79.80	46.30

Average = ***62.42*** dbA

Note: Peak values are attributable to passing dumptrucks.

S-6 Sapinit Elementary School
Time: 4:00 TO 5:00 pm Feb 20, 1998 7:50 - 7:55 am
Duration: 1Hour

73.00	59.40	68.30	55.60
67.60	57.10	67.10	54.60
66.90	58.80	68.90	58.40
67.30	58.60	65.00	56.30
67.70	59.00	63.70	67.40
62.70	67.20	59.30	70.30
62.10	70.30	58.40	74.20
61.50	73.60	58.20	69.30
67.10	68.90	54.00	65.40
61.90	67.80	50.00	71.00
70.10	62.30	67.50	57.10
66.60	69.50	65.60	58.40
71.30	65.20	70.60	56.30
68.00	57.70	72.90	54.60

Average = ***64.06*** dbA

Note: Peak values are attributable to passing dumptrucks.

S1 Landfill Area
Date: Feb. 20 1998
Time: 12 : 40 to 12 : 50 am (night time)
Duration : 10 minutes

55.20	59.00	58.60	59.40
54.90	59.80	63.10	61.10
51.10	57.00	62.80	60.20
55.50	60.40	55.00	59.80
58.30	57.40	59.40	57.70
61.70	54.40	55.60	59.00
62.10	65.50	57.10	58.40
63.00	59.40	56.00	60.00
62.50	58.70	56.90	59.30
61.20	58.70	58.80	63.50
61.50	80.50	61.70	56.60
63.00	82.70	61.20	62.30
61.70	81.30	61.10	60.20
59.30	59.50	67.20	61.20
59.60	57.50	69.90	58.20
58.60	57.80	62.80	59.30
52.70	56.10	53.50	52.90
		Averages =	*60.26* dbA

Note: Peak readings are attributable to operating dumptrucks and bulldozers

S1 Landfill Area
Date: Feb. 19, 1998
Time: 7:40 to 7:50 p.m. (evening)
Duration: 10 Minutes

63.50	70.30	64.00	56.30
57.30	64.30	68.80	58.20
65.30	62.20	62.90	59.20
59.30	51.30	66.20	55.80
54.90	56.30	64.80	58.30
52.80	61.30	71.40	60.40
51.30	57.30	71.20	52.30
53.20	52.40	56.10	54.90
52.20	52.40	54.20	50.80
53.50	54.00	56.20	55.50
66.60	55.70	58.90	64.80
68.80	54.00	57.70	62.20
50.70	55.70	64.90	63.60
52.30	54.80	64.00	63.80
50.70	53.00	66.60	65.20
51.50	55.50	67.10	60.20
62.80	56.60	68.50	63.10
		Averages =	***59.15*** dbA

Note: Peak readings are attributable to operating dumptrucks and bulldozers

S-6 Sapinit Elementary School
Time:6:00 to 7:00 pm Feb 20, 1998
Duration: 1 Hour

61.00	61.00	70.90	60.80
63.30	67.40	68.70	65.30
62.20	63.90	69.60	61.50
60.30	65.80	68.10	64.00
63.50	63.80	73.70	64.70
80.20	79.70	72.10	63.50
82.30	75.60	59.60	72.30
84.80	77.80	60.30	72.10
82.40	82.30	59.60	75.60
83.70	83.90	56.20	71.30
73.20	92.40	71.30	75.90
63.90	67.90	69.10	58.20
63.70	63.80	70.40	54.20
64.50	65.80	67.10	58.90
65.30	67.90	69.20	54.60
69.60	64.50	68.50	59.20

Average = *68.34* dbA

Note: Peak values are attributable to passing dumptrucks.

S1 Landfill Area
Date: Feb. 20, 1998
Time:5:40 to 5:50 am (morning time)
Duration 10 minutes

50.60	52.60	54.70	51.20
51.80	49.20	54.30	55.50
53.90	48.70	59.20	53.60
49.10	50.70	63.80	50.60
55.60	52.80	60.40	53.90
51.20	53.90	58.40	51.30
50.50	52.20	53.00	54.40
53.80	53.20	54.70	54.60
50.50	57.20	52.80	55.50
53.00	52.20	58.60	54.10
54.60	53.60	54.30	55.50
53.10	49.60	53.00	54.10
54.60	50.30	51.60	55.20
53.10	48.90	51.20	59.20
56.30	50.00	55.60	57.50
49.50	51.40	51.10	54.40
53.60	55.60	49.90	56.40
52.40	51.10	54.70	54.90
		Averages =	*53.52* dbA

Note: Peak readings are attributable to operating dumptrucks and bulldozers

S1 Landfill Area
Date: Feb. 20, 1998
Time: 12:40 to 12:50 pm (day time)
Duration: 10 minutes

58.20	56.70	56.70	56.60
54.60	56.20	56.90	61.90
54.90	57.30	56.10	60.00
54.80	54.40	57.30	55.40
55.60	57.80	55.90	56.80
57.20	57.50	57.30	55.90
64.10	61.80	59.60	53.90
57.20	57.80	55.80	57.20
58.60	60.10	67.70	53.40
57.10	59.40	58.40	56.20
57.80	57.60	54.80	56.10
58.20	55.80	55.80	54.20
59.80	57.00	54.30	59.50
63.00	60.40	55.20	52.30
57.70	57.60	53.40	55.40
55.40	57.70	52.20	57.40
59.60	55.80	56.50	56.10
58.00	57.60	52.90	56.00
56.60	57.40	53.90	57.70
		Averages =	*57.07* dbA

Note: Peak readings are attributable to operating dumptrucks and bulldozers

Exit / Crossing Bulldozer garrage.
Date: Feb. 19, 1998
Time: 7:30 to 7:40 pm (evening)
Duration: 10 minutes

66.80	58.20	54.40	62.20
67.60	68.00	54.00	53.60
69.80	67.30	50.00	48.80
71.60	72.90	79.50	49.00
70.50	72.20	56.70	48.70
66.00	71.80	53.90	47.80
66.70	80.00	50.90	50.80
67.00	66.20	47.00	52.20
58.60	70.50	48.20	49.90
63.80	55.20	56.20	45.60
66.80	50.80	73.40	54.10
68.60	55.30	74.80	50.00
68.00	51.90	61.00	54.90
52.20	54.30	63.30	57.70
73.80	60.80	71.20	52.60
49.00	48.50	48.00	51.70
54.60	60.10	65.80	61.40
47.40	53.20	50.00	53.70
		Averages =	*59.29* dbA

Note: Peak values attributable to existing dumptrucks.

Exit / Crossing Bulldozer garrage.
Date: Feb. 20, 1998
Time: 12:30 to 12:40 pm (day time)
Duration : 10 minutes

51.60	65.80	56.00	58.70
48.40	64.80	55.60	55.70
57.50	73.00	57.50	56.10
49.00	69.70	58.80	57.80
49.70	65.60	66.20	55.30
55.00	66.20	56.50	56.10
54.40	62.30	57.50	55.30
50.80	57.20	54.60	56.10
54.40	60.50	58.10	55.40
50.80	63.90	58.80	55.00
50.00	69.10	60.10	55.90
52.60	61.40	62.70	56.00
53.60	60.10	61.30	57.60
53.40	58.00	63.00	56.10
56.50	64.30	59.20	56.40
60.20	59.50	56.40	58.40
58.80	56.10	56.30	60.00
55.20	56.40	55.60	57.20
61.30	54.20	55.80	66.60
61.80	55.20	58.30	58.60
63.20	52.80	64.70	54.20
		Averages =	*58.05* dbA

Note: Peak values attributable to existing dumptrucks.

Exit / Crossing Bulldozer garrage.
Date: Feb 20 1998
Time : 5:30 to 5:40 am (morning time)
Duartion: 10 minutes

50.60	49.20	55.60	51.20
51.00	52.60	51.10	55.50
51.80	48.70	49.90	53.60
53.90	50.70	50.20	50.60
49.10	52.80	54.70	53.90
55.60	53.90	49.90	51.30
51.20	52.20	58.20	54.40
50.50	53.20	51.20	54.60
53.40	57.30	50.70	55.50
53.80	52.20	50.80	54.10
50.50	53.60	49.40	55.20
53.00	49.60	57.70	59.20
54.60	50.30	50.90	57.50
53.10	48.90	55.00	54.40
56.30	53.10	51.70	54.90
49.50	50.00	50.30	56.50
53.60	51.40	53.40	54.60
52.40	51.20	49.80	52.10
		Averages =	*52.70* dbA

Note: Peak values attributable to existing dumptrucks.

Exit / Crossing Bulldozer garrage.
Date: Feb. 20 1998
Time:12:40 to 12:50 am (night time)
Duration: 10 minutes.

48.90	46.10	60.20	47.60
46.80	44.90	62.00	48.50
46.60	44.60	60.60	49.30
47.40	45.70	63.10	53.10
44.90	46.20	53.70	57.80
46.20	45.70	49.30	52.10
47.90	46.20	46.80	51.80
44.90	48.10	48.00	54.50
45.30	48.80	47.00	53.40
49.70	48.20	49.40	66.40
44.10	49.60	47.10	64.30
45.20	53.80	51.30	62.70
47.90	55.50	44.50	60.30
47.00	55.60	41.00	64.20
46.20	61.60	44.70	65.30
44.30	59.00	46.80	54.30
46.70	63.00	50.00	52.30
44.70	59.30	47.20	54.10
44.80	61.80	47.40	62.30
		Averages =	**51.28** dbA

Note: Peak values attributable to existing dumptrucks.

S5 Residential Area, North of Site.
Date: Feb. 19: 1998
Time: 7: 00 to 7:10 pm (evening)
Duration: 10 minutes

51.60	57.10	53.20	60.90
46.60	57.40	58.70	59.60
49.70	61.60	51.10	60.50
50.20	60.60	50.60	51.50
55.60	59.90	48.90	60.40
51.90	59.10	50.90	50.40
54.10	52.90	48.10	50.70
51.90	60.20	54.40	51.10
55.20	58.20	49.80	56.30
58.20	55.30	48.70	50.50
53.10	48.90	48.40	52.20
49.80	57.50	49.10	58.50
54.00	56.10	56.40	52.00
49.20	59.30	54.20	59.00
51.10	52.00	52.40	49.60
49.90	56.20	57.70	48.20
57.80	60.00	59.80	50.90
56.10	52.60	49.60	50.50
53.20	51.60	57.00	50.30
		Averages =	*53.92* dbA

Note: Peak readings are attributable to operating bulldozers.

S5 Residential Area, North of Site.
Date: Feb. 20 1998
Time: 12:10 to 12:20 am (night time)
Duration 10 minutes

48.40	44.20	49.90	50.00
49.20	44.90	46.90	47.10
47.20	44.40	47.20	44.80
46.80	46.80	48.20	46.00
50.90	45.30	45.80	45.80
45.10	44.00	46.80	45.60
44.70	45.20	46.20	46.00
46.00	44.40	45.50	48.10
45.20	44.10	44.70	44.30
45.10	45.20	45.30	46.00
46.50	46.60	46.80	45.60
45.50	45.20	45.00	45.20
44.90	45.40	46.40	45.30
45.70	46.90	46.00	48.20
44.90	48.10	46.30	46.00
44.90	46.90	57.30	46.30
		Averages =	*46.30* dbA

Note: Peak readings are attributable to operating bulldozers.

S5 Residential Area, North of Site.
Date: Feb. 20 1998
Time: 5:40 to 5:50 am (morning time)
Duration: 10 minutes

52.40	55.00	55.30	54.80
56.70	53.40	52.60	53.20
54.00	56.40	55.30	55.50
56.10	52.40	52.60	53.60
56.10	55.10	51.80	54.00
55.70	53.00	54.20	53.20
56.60	57.10	56.60	54.90
53.90	52.20	53.60	57.90
56.60	58.60	55.30	55.00
53.90	51.70	50.90	53.80
56.60	51.40	54.90	49.60
54.00	52.60	55.00	60.60
50.90	55.80	54.30	56.30
56.20	59.50	65.80	55.70
56.80	49.80	64.80	54.40
54.70	53.70	54.30	58.60
58.60	54.00	61.10	60.40
56.40	52.10	51.30	54.30

Averages = ***55.08*** dbA

Note: Peak readings are attributable to operating bulldozers.

S5 Residential Area, North of Site.
Date: Feb. 20 1998
Time: 12 :15 - 12:25 pm (day time)
Duration: 10 minutes.

58.20	69.60	57.60	54.30
54.60	58.00	57.70	55.20
54.60	56.60	55.80	53.40
54.90	56.70	56.20	54.80
54.80	56.20	58.80	52.20
55.80	57.20	57.60	56.40
57.20	54.40	57.40	52.90
64.10	57.80	56.70	53.60
57.20	57.50	56.70	56.60
57.10	61.80	56.10	61.90
57.80	57.80	57.30	55.40
58.20	60.10	55.90	58.80
59.20	59.40	57.30	55.90
59.80	57.60	59.60	53.90
63.00	55.60	55.80	57.20
57.70	57.00	67.70	53.40
55.40	60.40	55.80	56.20
52.30	59.50	54.20	56.10
		Averages =	*57.19* dbA

Note: Peak readings are attributable to operating bulldozers.

CLIMATE

HOURLY VALUES

Date/Time	T	U	U9	VT	RG	P
03/04/1900	24.0	90.0	0h12	8	0	968.5
2000	23.6	90.0	1h00	9	0	969.0
2100	23.1	90.5	0h48	9	0	969.4
2200	22.6	93.5	1h00	8	0	969.5
2300	22.4	94.5	1h00	6	0	969.8
03/05/0000	21.7	96.5	1h00	4	0	968.5
0100	21.8	96.5	1h00	2	0	968.0
0200	21.0	100.0	1h00	2	0	967.5
0300	20.3	100.0	1h00	4	0	967.0
0400	20.9	99.5	1h00	3	0	967.7
0500	21.2	98.0	1h00	2	0	968.3
0600	21.9	98.5	1h00	5	0	969.2
0700	22.4	99.0	1h00	4	4	969.8
0800	24.8	91.5	1h00	3	38	969.5
0900	26.6	87.0	0h24	5	84	969.3
1000	28.5	77.0	0h00	7	132	969.2
1100	29.7	75.0	0h00	4	146	968.4
1200	31.0	71.0	0h00	5	108	967.8
1300	30.4	76.0	0h00	3	110	966.3
1400	28.9	80.0	0h00	3	92	966.3
1500	29.7	78.0	0h00	6	100	966.5
1600	29.2	76.0	0h00	4	50	966.8
1700	27.9	76.5	0h00	3	26	967.4
1800	26.4	80.0	0h00	6	8	967.9
1900	25.5	83.0	0h00	9	0	968.0
2000	24.6	86.0	0h00	6	0	969.0
2100	24.3	84.5	0h00	7	0	969.0
2200	24.3	83.0	0h00	9	0	968.9
2300	24.3	83.0	0h00	7	0	968.7
03/06/0000	22.7	90.0	0h24	1	0	968.5
0100	22.1	96.0	0h54	3	0	968.4
0200	22.2	95.5	1h00	2	0	968.2
0300	21.8	98.5	1h00	1	0	968.0
0400	21.4	97.0	1h00	2	0	968.4
0500	21.5	100.0	1h00	1	0	968.8
0600	20.8	100.0	1h00	0	0	968.9
0700	22.2	100.0	1h00	1	6	970.0
0800	25.5	89.5	1h00	1	36	970.0
0900	26.7	85.0	0h06	4	88	968.8
1000	27.0	79.5	0h00	5	110	968.5
1100	29.5	73.0	0h00	8	126	968.3
1200	31.0	68.0	0h00	8	194	967.5

03/06/1300	30.9	69.0	0h00	8	196	966.7
1400	30.6	68.0	0h00	7	184	965.5
1500	29.8	70.5	0h00	9	162	965.2
1600	28.5	73.0	0h00	11	124	965.7
1700	27.2	79.5	0h00	12	76	966.0
1800	25.2	86.5	0h00	12	26	966.7
1900	24.2	87.5	0h00	14	0	967.5
2000	23.9	90.5	0h18	11	0	967.8
2100	23.5	92.0	1h00	13	0	968.0
2200	23.4	91.0	1h00	13	0	967.8
2300	23.2	90.0	1h00	14	0	967.0
03/07/0000	23.2	86.5	0h12	10	0	967.9
0100	23.4	80.0	0h00	6	0	967.3
0200	22.8	80.0	0h00	8	0	967.3
0300	22.6	81.0	0h00	7	0	966.8
0400	22.5	82.5	0h00	8	0	966.9
0500	22.7	81.5	0h00	12	0	967.5
0600	22.7	81.0	0h00	8	0	967.9
0700	23.3	81.5	0h00	8	4	967.9
0800	24.8	79.5	0h00	6	36	968.5
0900	27.2	75.0	0h00	10	90	968.9
1000	28.9	69.0	0h00	9	136	968.3
1100	29.7	70.0	0h00	9	172	967.8
1200	30.6	69.5	0h00	9	194	967.0
1300	31.0	69.0	0h00	9	202	966.0
1400	32.1	68.5	0h00	8	194	965.3
1500	30.6	72.0	0h00	7	158	965.0
1600	29.1	77.0	0h00	9	108	965.2
1700	27.8	78.5	0h00	9	68	965.5
1800	25.8	85.0	0h00	9	20	966.0
1900	24.5	90.0	0h24	8	0	966.5
2000	23.8	92.0	1h00	8	0	966.9
2100	22.9	92.5	1h00	9	0	967.0
2200	22.8	91.0	1h00	7	0	967.0
2300	22.2	93.0	1h00	6	0	967.3

Legend:

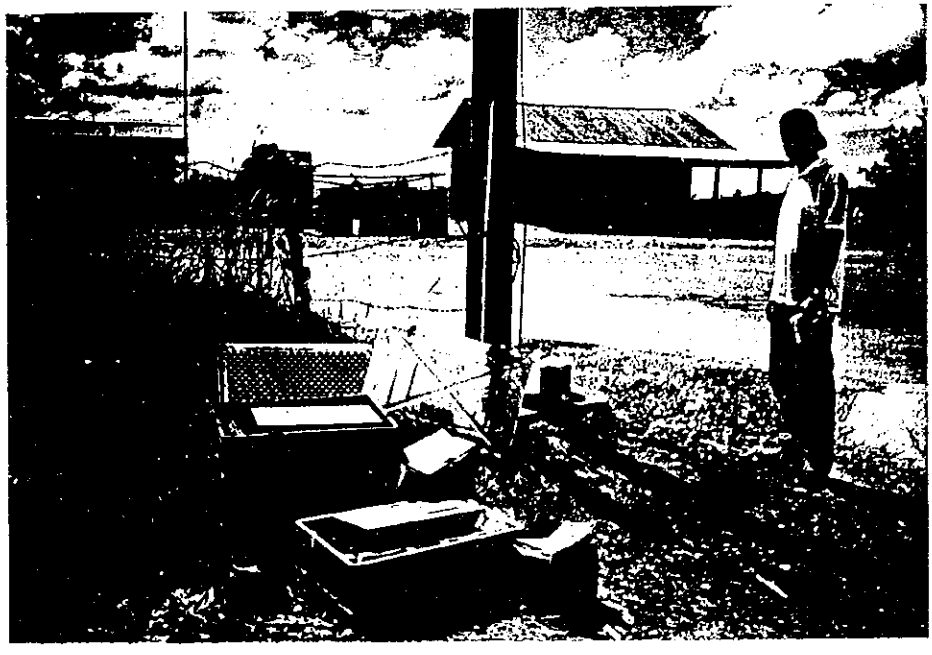
T	= Temperature in Celsius (^{0}C)
U	= Relative Humidity in percent
U9	= Duration of RH>90%
VT	= Total wind run (km)
KG	= Solar Radiation (joules/cm^2)
P	= Pressure (HPa)

DAILY VALUES

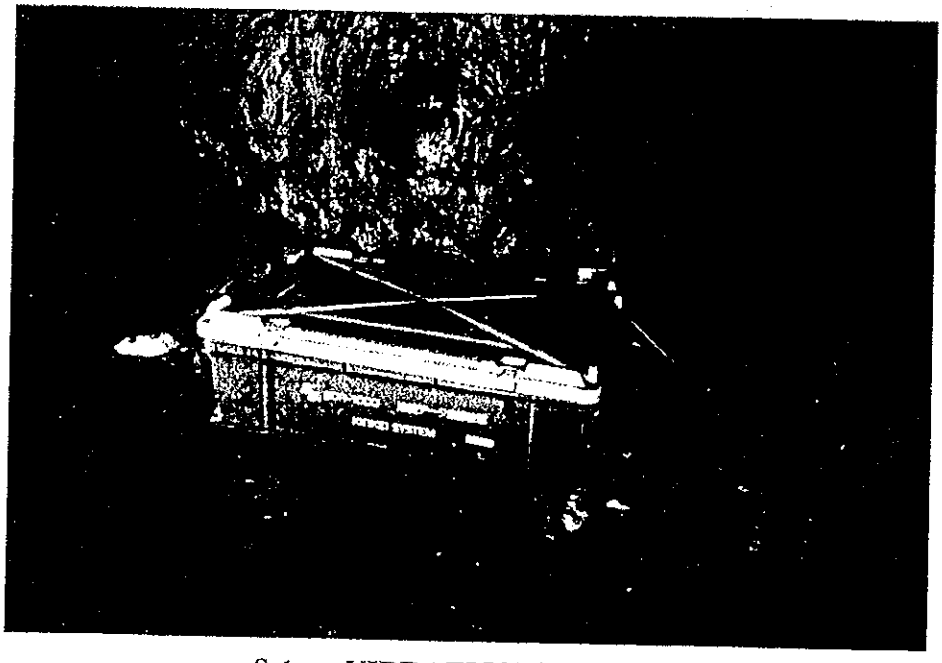
	03/04	03/05	03/06	03/07	
TN	/////	20.3	20.1	22.0	Minimum Temperature
TX	24.8	32.2	32.2	32.8	Maximum Temperature
TM	/////	25.4	25.2	25.7	Average Temperature
UN	/////	69.5	65.5	66.5	Minimum Relative Humidity
UX	98.0	100.0	100.0	96.6	Maximum Relative Humidity
UM	/////	86.5	86.0	80.0	Average Relative Humidity
U9	5h00	8h48	11h30	5h00	Duration of RH>90%
RG	/////	899	1327	1383	Total Solar Radiation
VX	8	7	10	9	Maximum Gustiness
IVX	18h42	18h36	23h06	9h06	Time of Occurrence of Max. Gust
VT	44	110	170	193	Total Wind Run
VN	0	8	13	8	Wind Run from the North
VNE	17	34	71	79	Wind Run from the Northeast
VE	24	46	65	90	Wind Run from the East
VSE	1	5	8	13	Wind Run from the Southeast
VS	0	1	1	1	Wind Run from the South
VSW	0	4	6	0	Wind Run from the Southwest
VW	0	7	2	1	Wind Run from the West
VNW	0	5	3	1	Wind Run from the Northwest
ITN	/////	4h36	5h30	3h42	Time of Occurrence of Min. Temp.
ITX	18h06	12h18	12h00	14h18	Time of Occurrence of Max. Temp.
IUN	/////	12h18	13h30	13h30	Time of Occurrence of Min. RH
IUX	23h54	3h00	5h36	22h12	Time of Occurrence of Max. RH

PICTURES

S-6 VIBRATION SAMPLING
(NEAR SAPINIT ELEMENTARY SCHOOL)



S-11 VIBRATION SAMPLING
(VEHICULAR EXIT POINT OF THE LANDFILL AREA)



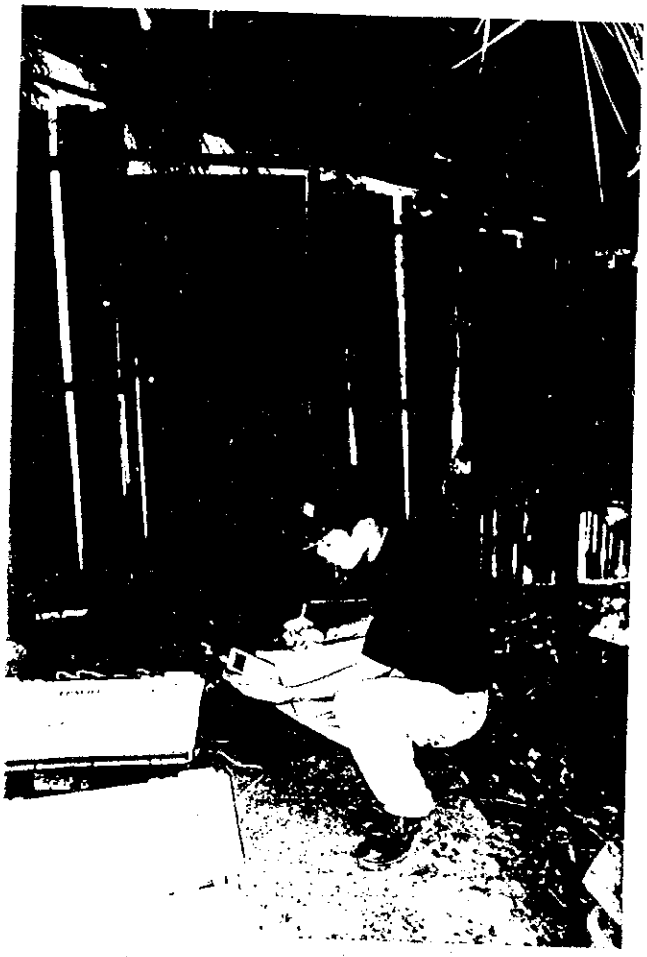
S-1 VIBRATION SAMPLING
(WITHIN THE LANDFILL SITE)

S-5 VIBRATION SAMPLING
(NEARBY RESIDENTS)

S-6 NOISE SAMPLING
(NEAR SAPINIT ELEMENTARY SCHOLL)

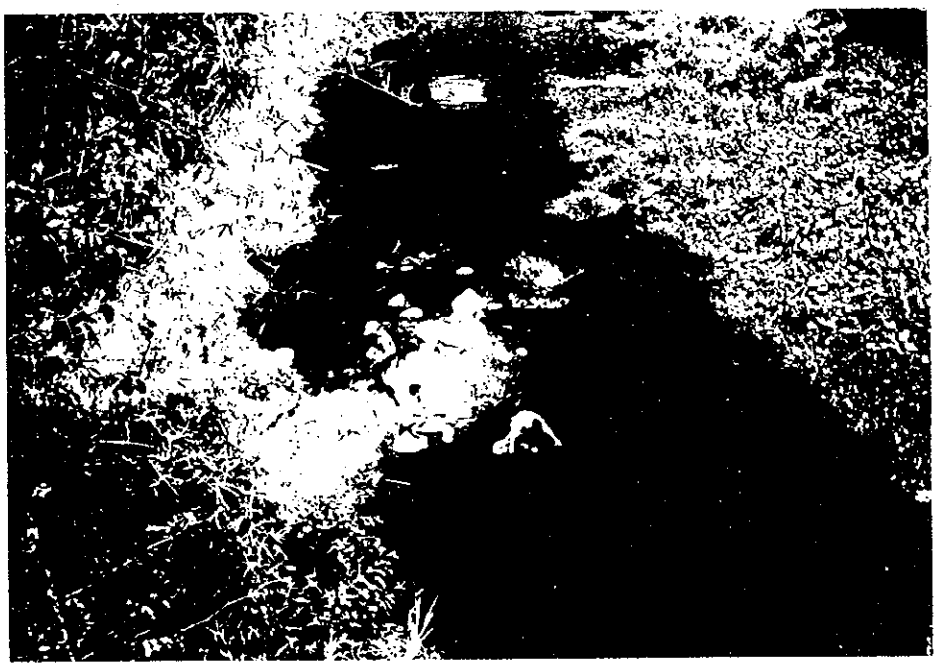
S-11 NOISE SAMPLING
(VEHICULAR EXIT POINT OF THE LANDFILL AREA)

S-1 NOISE SAMPLING
(WITHIN THE LANDFILL SITE NEAR THE LEACHATE POND)



S-5 NOISE SAMPLING
(NEARBY RESIDENT)

S-6 ELEMENTARY SCHOOL
SOUTH OF SITE



S7 & S9 UPPER BOSOBOSO RIVER

S-5 RESIDENTIAL AREA
NORTH OF SITE

INSTRUMENT FOR AIR QUALITY SAMPLING
(NORTH OF LANDFILL SITE)

PAGASA's INSTRUMENT FOR WIND DIRECTION, TEMPERATURE, HUMIDITY AND PRESSURE SAMPLING
(NORTH OF LANDFILL SITE)

S-12 **PINTONG BOCAUE ELEMENTARY SCHOOL**
(NORTH OF LANDFILL SITE)

23.1.2 Survey for Wet Season

ENVIRONMENTAL SURVEY II (WET SEASON)
FOR
SAN MATEO ENVIRONMENTAL IMPROVEMENT PROJECT
OF
THE STUDY ON SOLID WASTE MANAGEMENT
FOR METRO MANILA IN THE REPUBLIC OF THE PHILIPPINES

A OBJECTIVE

The objective of the survey is to obtain information on the existing condition of the environment around the San Mateo Sanitary Landfill Site, which will be used as basic data to forecast and evaluate the environmental impacts caused by the project.,

B SAMPLING POINTS AND SCHEDULE

TABLE 1 shows the sampling stations at San Mateo Sanitary Landfill Site. The exact sampling points shown in FIGURES 1 to 2 were indicated by the Environmental Engineer of the JICA Study Team, and descriptions of which are shown also in TABLE 1. Method of sampling followed the Philippine standards.

The wet season sampling was conducted on October 13 to 31, 1998 for Noise and Vibration, Water Quality, and Air Quality and Odor.

C ITEMS FOR ANALYSIS

TABLE 1 also shows the items for analysis, sampling stations and sampling time.

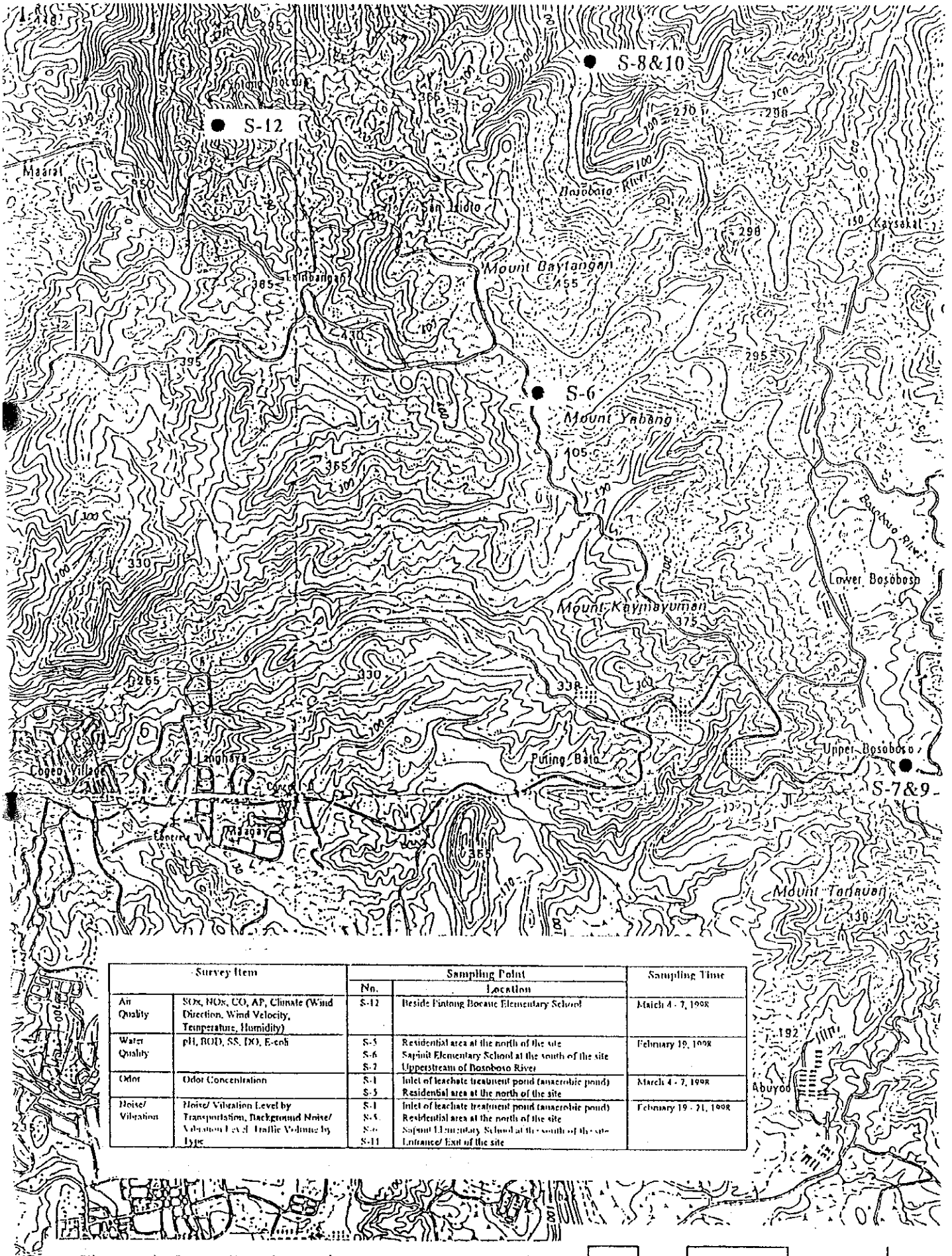
D RESULTS OF ANALYSIS

The methods of analysis and results of the laboratory tests are shown and discussed in following sections.

Table 1 **Survey Item, Sampling Point and Sampling Time**

Survey Item		Sampling Point		Sampling Time
		No.	Location	
Air Quality	SOx, NOx, CO, AP, Climate (Wind Direction, Wind Velocity, Temperature, Humidity)	S-12	Beside Pintong Bocaue Elementary School	October 17 - 20, 1998
Water Quality	pH, BOD, SS, DO, E-coli	S-5 S-6 S-7	Residential area at the north of the site Sapinit Elementary School at the south of the site Upperstream of Bosoboso River	October 13, 1998
Odor	Odor Concentration	S-1 S-5	Inlet of leachate treatment pond (anaerobic pond) Residential area at the north of the site	October 17 - 18, 1998
Noise/ Vibration	Noise/ Vibration Level by Transportation, Background Noise/ Vibration Level, Traffic Volume by Type	S-1 S-5 S-6 S-11	Inlet of leachate treatment pond (anaerobic pond) Residential area at the north of the site Sapinit Elementary School at the south of the site Entrance/ Exit of the site	October 30 - 31, 1998

Sampling Points of Environmental Survey at San Mateo Sanitary Landfill Site

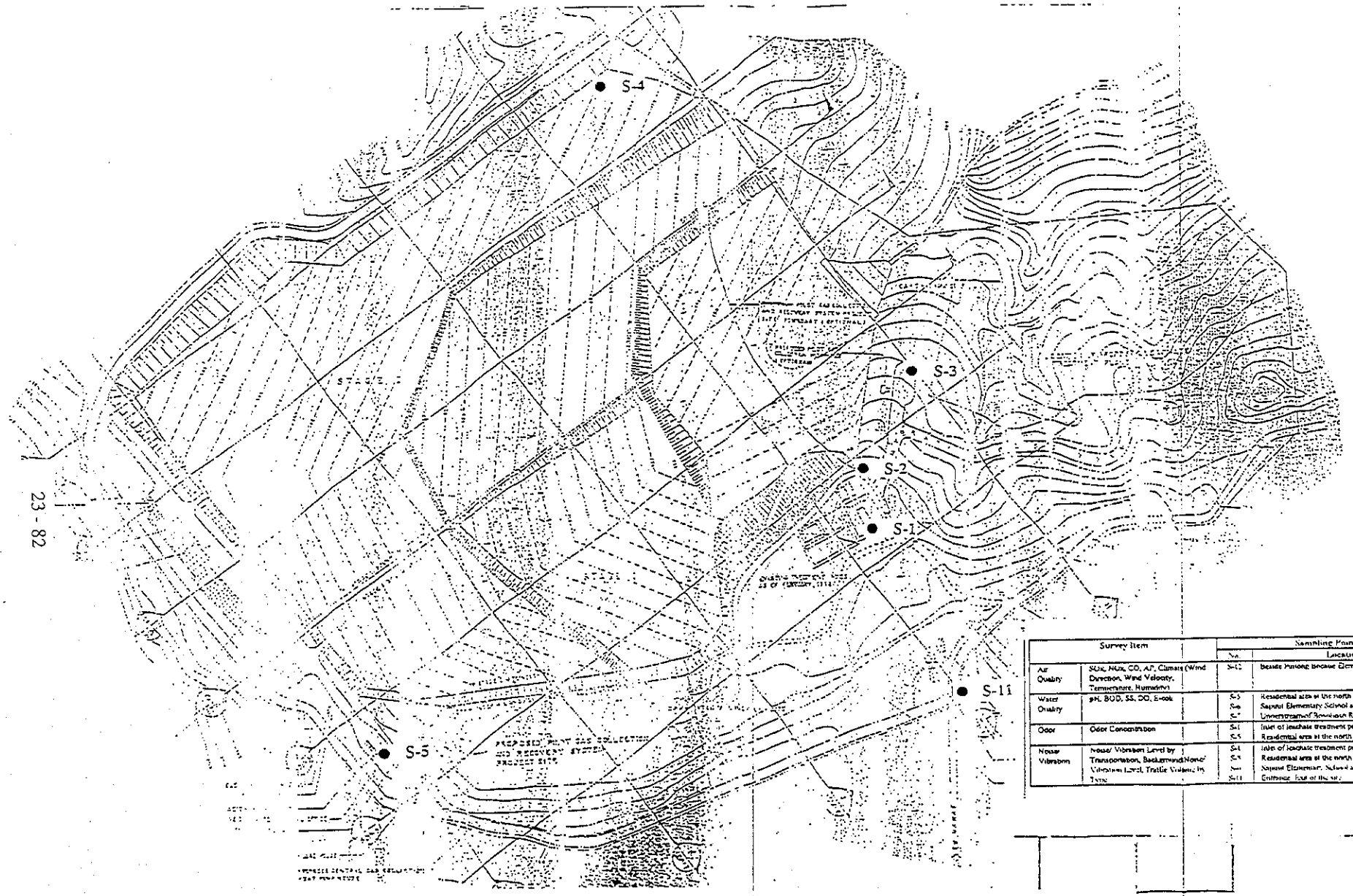


Survey Item		Sampling Point		Sampling Time
		No.	Location	
Air Quality	SOx, NOx, CO, AP, Climate (Wind Direction, Wind Velocity, Temperature, Humidity)	S-12	Beside Pintong Bocaue Elementary School	March 4 - 7, 1998
Water Quality	pH, BOD, SS, DO, E-coli	S-5 S-6 S-7	Residential area at the north of the site Sapinit Elementary School at the south of the site Upperstream of Bosoboso River	February 19, 1998
Odor	Odor Concentration	S-1 S-5	Inlet of leachate treatment pond (anaerobic pond) Residential area at the north of the site	March 4 - 7, 1998
Noise/ Vibration	Noise/ Vibration Level by Transportation, Background Noise/ Vibration Level, Traffic Volume by Type	S-1 S-5 S-6 S-11	Inlet of leachate treatment pond (anaerobic pond) Residential area at the north of the site Sapinit Elementary School at the south of the site Entrance/ Exit of the site	February 19 - 21, 1998

Figure 1 Sampling Locations S-6, S-7 and S-12

0 500 1,000 2,000 3,000 m

Sampling Points of Environmental Survey at San Mateo Sanitary Landfill Site



Survey Item		Sampling Point No.	Sampling Point Location	Sampling Time
Air Quality	SO_2, NO_x, CO, A_P, Climate (Wind Direction, Wind Velocity, Temperature, Humidity)	S-12	beside Pulong Bocaue Elementary School	March 4 - 5, 1998
Water Quality	pH, BOD, SS, DO, E-coli	S-5 S-9 S-7	Residential area at the north of the site Sapang Elementary School at the north of the site Downstream of Bocaue River	February 19, 1998
Odor	Odor Concentration	S-1 S-5	Inlet of leachate treatment pond (anaerobic pond) Residential area at the north of the site	March 4 - 5, 1998
Noise Vibration	Noise/ Vibration Level by Transportation, Background Noise/ Vibration Level, Traffic Volume by Type	S-1 S-5 S-9 S-11	Inlet of leachate treatment pond (anaerobic pond) Residential area at the north of the site Sapang Elementary School at the north of the site Entrance Gate of the site	February 19 - 21, 1998

Figure 2 Sampling Locations S-1, S-5 and S-11

AIR QUALITY

AIR SAMPLING of TSP, SO2 AND NO2

Sampling Event	Date & Time	TSP ug/Ncm	SO2 ug/Ncm	NO2 ug/Ncm
S-12 - Beside Pintong Bocaue Elementary School				
Day 1	Oct. 17 - 18, 1998 (7:30 am to 7:30 am)	52.12	<4	3.78
Day 2	Oct. 18 - 19, 1998 (8:00 am to 8:00 am)	37.16	5.83	4.72
Day 3	Oct. 19 - 20, 1998 (9:00 am to 9:00 am)	38.97	<4	4.72

Note: Ncm - Normal Cubic Meter (at temp = 25°C, p=1 atm)

Sampling & Analytical Procedure

TSP	Graseby high volume sampler	Gravimetric analysis
SO2	Graseby gas bubbler sampler	Pararosaniline method
NO2	Graseby gas bubbler sampler	Greiss saltzman method

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TEEM, INCORPORATED

DATE: October 28, 1998
CLIENT REF. NO.:
R.A. NO.: 14540
CERT. NO.: 98-1442
INVOICE NO.: 13082
SHEET NO. 1 OF 1 PAGES

CERTIFICATE OF ANALYSIS

Sample Source : San Mateo Landfill
Date Received : October 20, 1998
Date Analyzed : October 20 - 27, 1998

	TSP, ug/ncm	SO2, ug/ncm	NO2, ug/ncm
SMF - 001	52.12	<4	3.78
SMF - 002	37.16	5.83	4.72
SMF - 003	38.97	<4	4.72

* * * * * NOTHING FOLLOWS * * * * *

ANALYTICAL METHOD/REMARKS:
The test results pertain only to the samples submitted and tested.
TOTAL SAMPLES 3 TOTAL ANALYSIS 9
N.D. = Element is not detected by the method employed.

CERTIFIED BY:
for LORNA G. SY
Manager, Analytical Services

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AMERICAN SOCIETY FOR TESTING MATERIALS

WATER QUALITY

WATER SAMPLING

Station No.	Location	Date/Time	Ta	Tw	DO	pH	BOD	SS	E-coli
S5	Residential Area, North of Site	Oct.13, ' 98/ 10:25 am	24	25	5.7	5.7	11	10	neg.
S6	Sitio Sapinit, Bgy. San Juan Elem. Sch.	Oct.13, ' 98/ 10:10 am	25	26	5.5	6.6	12	1	neg.
S7	Upperstream of Boso-boso River	Oct.13, ' 98/ 11:20 am	25	26	5.1	7.3	13	7	neg.

Legend:	Ta - ambient air temperature	°C
	Tw - ambient water temperature	°C
	DO - dissolved oxygen	mg/l
	pH - pH scale	pH unit
	BOD - biochemical oxygen demand	mg/l
	SS - suspended solids	mg/l
	E-coli - E-coli bacteria	MPN/100 ml

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TEEM, INCORPORATED

DATE October 23, 1998
CLIENT REF. NO.
R.A. NO. 14521
CERT. NO. 98 – 1424
INVOICE NO. 13066
SHEET NO. 1 OF 3 PAGES

CERTIFICATE OF ANALYSIS

Date Sampled : Not Indicated
Date Received: October 14, 1998
Date Analyzed: October 14 – 21, 1998

	S – 5	S – 6	S – 7	METHOD
pH	5.7	6.6	7.3	Electrometric Method
BOD, mg / L	11	12	13	(5 – Day BOD Test) Modified Winkler
TSS, mg / L	10	1	7	Gravimetric (dried at 103^{0}C)
E. Coli	Negative	Negative	Negative	

***** OVER *****

The test results pertain only to the samples submitted & tested.

ANALYTICAL METHOD/REMARKS:
Ref. Std. Methods for
Water & Wastewater, 19th Ed.

TOTAL SAMPLES 7 TOTAL ANALYSIS 35

N.D. = Element is not detected by the method employed.

CERTIFIED BY:

LORNA G. SY
Manager, Analytical Services

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