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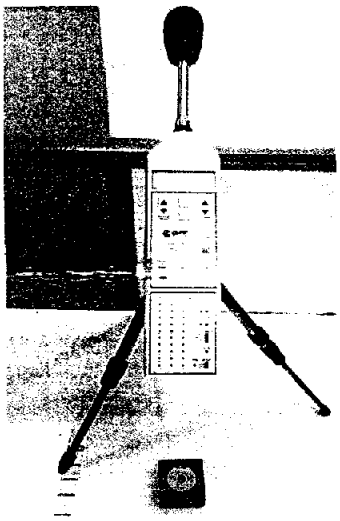
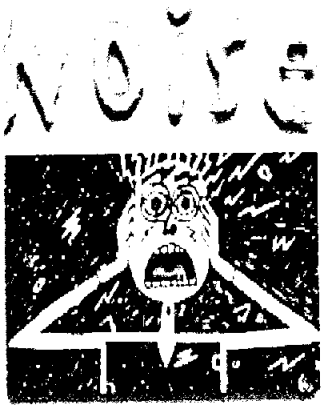
PROTOCOL FOR AMBIENT LEVEL NOISE MONITORING



$$L_{pressure} = 10.\log\left[10^{(Lp/10)} - 10^{(LpBackground/10)}\right]$$



CENTRAL POLLUTION CONTROL BOARD

PARIVESH BHAVAN, EAST ARJUN NAGAR, DELHI-110032

Protocol for Ambient Level Noise Monitoring

1.0 Purpose:

This protocol presents the protocol for Ambient Noise monitoring to be carried out on routine basis or to address the public complaints. The objective is to monitor the noise level at a particular site or as described in the complaints. The data generated by the method shall also evaluate with prescribed noise level standards.

2.0 Introduction

The unit of noise is decibel, one-tenth of a bell and denotes as d(B), however the monitoring unit is considered as dB(A) Leq denotes the time weighted average 'A' of the level of sound in decibels on **scale A** and it has been found related to **human hearing.** Thus in, dB(A)Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear. The unit of frequency is hertz (Hz) and is defined as the number of compressions and rarefactions per unit time (sec.). Human hearing is sensitive to frequencies in the range of about 20-20,000 Hz (the audio frequency range).

Sound pressure is used as the fundamental measure of sound (amplitude) as it is measurable directly by any standard instruments. The weakest sound pressure disturbance that can be detected by an "average" person at 1,000Hz has been found to be 20 $\mu N/m^2$ and the largest 10^7 $\mu N/m^2$. Because of such a wide range, the use of a linear pressure scale has been found to be non-scientific. It has been found convenient to employ sound pressure level, a quality, which is proportional to the logarithm of sound pressure. By this, the sound pressure range of interest is compressed between 0 to 130 dB.

3.0 Site Selection Criteria:

Site of an area shall be selected such that it meets the land use pattern as prescribed in the standard e.g. Industrial, Commercial, Residential & Silence Zone.

(A) General:

1. The station should be located at the ambient level i.e. away from the direct source, away from any vibration and any obstruction.
2. Categorize the area with land use pattern.

(B) Specific :

Always use tripod stand at above the ground level of 1 to 1.5 m for areas. Hand held monitoring should be avoided.

(C) Case Specific Locations:

- DG Sets up to 800 kW at about 1 m distances from all sides. DG Sets more than 800 kW at about 1 m distance of acoustic enclosure.

Concerned State PCBs / PCCs may regulate the norms with minimum reduction of 25 dB(A) to see the effectiveness of the enclosure.

- Petrol and Kerosene Gensets Sound power level is measured in anechoic room so as to have segregated noise level.
- Fire crackers 4 m from the bursting point, there shouldn't be reflecting surface around 15m radius.
- Vehicle 0.5m from the exhaust point.

(D) Positioning of the instrument:

- Microphone must be placed 1.2 -1.5m above the ground level.
- In dry conditions with a wind speed of less than 5 m/s.
- Isolate the instrument from strong vibration and shock.

4.0 Selection of Noise level meter:

Noise measurements will be made with a Type 1 integrating sound level meter with free-field microphone which meets the Accuracy of noise measurement as per IEC 804 (BS 6698) Grade I or ANSI Type I or equivalent IEC 61672-1(2002-05) Class-I.

5.0 Calibration:

Make sure that the instrument is properly calibrated. Measurements should be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB. The sound level meter and calibrator will hold a current calibration certificate traceable to national standards.

Start the calibrator and put on 1 KHz frequency calibration on two values 94 dB and 114 dB. If instrument is shows more than ± 0.3 dB differences adjust the calibration. Calibration is done O.K. now instrument is ready for monitoring.

6.0 Monitoring time:

The monitoring should be carried out minimum 75% of the prescribed Day time (06.00 am to 22.00 pm) and Night time (22.00 pm to 06.00 am).The exercise has to be carried out for 6 to 8 hrs. in the said time frame of day & night. It is always preferable to have large number of data sets thus 1sec sampling frequency is recommended.

7.0 Monitoring Parameters:

Leq, L_{10}, L_{90}, L_{50}, L_{max}, L_{min}, (with 1 sec sampling period at all locations).

8.0 Monitoring Protocol:

The following criteria will be observed when undertaking the noise monitoring:

a) During ambient noise monitoring sound comes from more than one direction, it is important to choose a microphone and mounting which gives the best possible Omni directional characteristics;

b) The noise measurement equipment will be supervised continuously during the monitoring period and notes will be made of the date, time and prevailing weather conditions;
c) Immediately prior to and following each noise measurement session the accuracy of the noise level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency.
d) Noise measurements should not be made in fog and rain;
e) A wind shield will be used at all times to prevent interference of reflecting noise;
f) As far as is practicable, the pause facility on the noise measurement equipment will be used to exclude extraneous noise (e.g. low flying aircraft and road traffic passing in front of the microphone) so that the results recorded are representative of the site noise. If possible for extraneous noise/other source background noise can be eliminated from final reading by using the following formula:

$$L_{pressure} = 10.\log\left[10^{(Lp/10)} - 10^{(LpBackground/10)}\right]$$

10.0 Monitoring records:

(i) The date, time, location and duration of the measurement;
(ii) All predominant noise sources will be noted, which may include extraneous noise such as road traffic, aero-planes and other activity;
(iii) Weather conditions will be recorded including wind speed and approximate direction, cloud cover, rain and ground frost;

11.0 Monitoring data submission:

The particulars of the measurements recorded by the noise level meter shall be furnished in the monitoring data sheet, as at **Annexure I.** A typical flow chart may be adopted for uniformity in the monitoring.

12.0 Monitoring Inferences:

The monitoring inferences should be drawn on the basis of final data sheet viz. compliance to the specified standard, violation of standard, average Leq, noise intensity L_{50}, L_{90} etc. and suggest corrective action.

Annexure-I

Data sheet for Ambient Noise Monitoring

Description of Location:		Date:
Noise Level Meter		
Make	:	
Model	:	
Serial No.	:	
Calibration Result of Noise Level Meter		
Calibration	94 dB at 1000 Hz	114 dB at 1000 Hz
Initial		
Final		
Sampling Rate		

S. No.	Time duration	File No.	Sound Parameters (dBA)					
			Leq	L_{ea}	L_{50}	L_{90}	L_{min}	L_{max}
1								
2								
3								
4								
5								
6								
Average L equivalent dB(A)								
Monitoring team & signature								

Notes: (1) The method for calculation of average Leq: To convert average of dB(A), each value is to be divided by 10, followed by antilog and finally calculate arithmetic mean. The final value is converted in logarithm followed by multiplication with 10., (2) monitoring must be carried for 75% of the prescribed day time and night time for legal compliance, (3) L_{max} and L_{min} are toe reported hourly basis and (4) L_{50} & L_{90} also recorded to understand the intensity of the noise for further course of action.

Manual Ambient Noise Monitoring Flow Chart