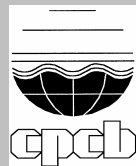


Requirement and Procedure for Monitoring Ambient Noise Level due to Aircrafts

June, 2008



CENTRAL POLLUTION CONTROL BOARD
Ministry of Environment & Forests
Parivesh Bhawan
East Arjun Nagar, Delhi – 110 032
Website: www.cpcb.nic.in; e-mail: cpcb@alpha.nic.in



ज. मो. माऊसकर, भा.प्र.से.
अध्यक्ष

J. M. MAUSKAR, IAS
Chairman

केन्द्रीय प्रदूषण नियंत्रण बोर्ड

(भारत सरकार का संगठन)

पर्यावरण एवं वन मंत्रालय

Central Pollution Control Board

(A Govt. of India Organisation)

Ministry of Environment & Forests

Phone : 22304948 / 22307233

FOREWORD

Aircrafts are a major source of noise particularly during the take-off and the landing. Ideally, the airports should therefore be away from human habitation so that people are not affected by the noise caused by the air traffic. However, this is not the case in many areas, where the human habitation has come up subsequently in close proximity of airports. People who live away from airports but under the flight path are also being disturbed by high noise levels especially during the night hours.

At present a number of new airports are coming up and many existing airports are being expanded and upgraded. Noise levels around airports due to air traffic are therefore expected to increase. Considering the likely increase in noise levels due to air traffic and the need to generate uniform and reliable data base essential for better noise control, the Central Pollution Control Board has prepared "Requirement and Procedure for Monitoring Ambient Noise Level due to Aircrafts" under the guidance of the National Committee on Noise Pollution Control.

The objective of this document is to specify suitable requirements and procedures to help the Airport Authorities, Pollution Control Boards and other agencies to carry out monitoring of ambient noise levels around airports due to aircrafts.

I express my thanks to the members of the National Committee on Noise Pollution Control for giving their valuable time and suggestion in preparation of this Report.

I hope the Report will be useful to the Airport Authorities, Pollution Control Boards and other agencies concerned with noise pollution due to aircrafts.

25 June 2008

(J.M. Mauskar)

Contents

Item No.		Page
1.	Objective	2
2.	Background	2
3.	Minimum Size of Airport requiring Ambient Noise Monitoring	3
4.	Noise Index	3
5.	Event Detection	5
6.	Site Selection	5
7.	Type of Monitoring Stations	5
8.	Number and Location of Monitoring Stations	5
9.	Instrumentation	5
10.	Installation of Sound Level Meter	6
11.	Meteorological Measurement	6
12.	Noise Monitoring	6
13.	Parameters to be Monitored	6
14.	Data Reporting	6
	References	7

CENTRAL POLLUTION CONTROL BOARD

Requirement and Procedure for Monitoring Ambient Noise Level due to Aircrafts

1. Objective:

The objective of this document is to specify suitable requirements and procedures for carrying out monitoring of ambient noise levels around airports due to aircrafts. A proper database is essential for planning and executing suitable noise control programme for airports in the country.

2. Background:

There are 126 airports, which include 11 international, 89 domestic airports and 26 civil enclaves at Defence airfields in our country (Airport Authority of India official website). The air traffic in these airports is increasing every year. The civil aircraft movements in major airports during last five years are given below:

S No.	Name of Airport	Civil Aircraft Movement				
		2002-03	2003-04	2004-05	2005-06	2006-07
1	Mumbai	125,551	137,212	153,166	171,145	201,780
2	Delhi	93,463	105,540	122,123	151,117	185,174
3	Chennai	44,353	51,251	61,233	69,055	99,775
4	Bangalore	-	46,975	55,547	69,680	94,398
5	Kolkata	32,359	38,820	42,374	51,553	65,687
6	Hyderabad	-	28,077	35,473	50,030	68,175

It is expected that the ambient noise levels around these airports would be increasing at rapid pace. The ambient noise level study carried out by IIT, Roorkee (sponsored by Central Pollution Control Board) during January 2002, around Indira Gandhi International Airport, Delhi, and then repeated by Central Pollution Control Board during April 2004, indicates higher noise levels as compared to international norms. Also Central Pollution Control Board carried out the ambient noise level study around Subhash Chandra Bose Airport, Kolkata, during September 2001. The monitoring indicates higher noise levels.

It is proposed that ambient noise levels shall be monitored regularly around airports with higher aircraft movements as proposed below.

The noise monitoring data shall be regularly compiled, documented and published by the Authorities designated by the Ministry of Civil Aviation.

3. Minimum Size of Airport requiring Ambient Noise Monitoring:

Noise monitoring shall be carried out at all civil airports, which has more than 50,000 aircraft (Civil) movements per year (a movement being a take-off or a landing).

4. Noise Index:

It is proposed that Day-Night Average Sound Levels (DNL) shall be used to know the sound exposure on people / residents due to aircrafts and for land use planning around airports.

Day-Night Average Sound Levels (DNL) is the Energy-Averaged Sound Level (L_{eq}) measured over a period of 24 hours, with a 10 dB penalty applied to night-time (10:00 PM and 6:00 AM) sound levels to account for increased annoyance during the night hours.

Total Day-Night Average Sound Levels, Background Day-Night Average Sound levels and Event Day-Night Average Sound Levels shall be determined at locations around airports as defined below:

a) Total Day-Night Average Sound Levels (TDNL)

$$\text{Total DNL} = 10 \text{ Log}_{10}(1/T) \left[\sum 10^{L_{A,eq,d,i}/10} + \sum 10^{(L_{A,eq,n,i} + 10)/10} \right]$$

for $i = 1 \dots \dots \dots$ to T secs

Where

$L_{A,eq,d,i}$ = Equivalent Sound Level, for one second, in day time (6 AM to 10 PM), measured with slow response and A-weighted filter, in dB.

$L_{A,eq,n,i}$ = Equivalent Sound Level, for one second, in night time (10 PM to 6 AM), measured with slow response and A-weighted filter, in dB

T = Total period of time under consideration, in seconds

b) Event Day-Night Average Sound Levels (EDNL)

$$\text{Event DNL} = 10 \text{Log}_{10}(1/T) \left[\sum 10^{L_{A,eq,d,i}/10} + \sum 10^{(L_{A,eq,n,i} + 10)/10} \right]$$

for $i \in$ noise event

c) Background Day-Night Average Sound Levels (BDNL)

$$\text{Background DNL} = 10 \text{Log}_{10}(1/T) \left[\sum 10^{L_{A,eq,d,i}/10} + \sum 10^{(L_{A,eq,n,i} + 10)/10} \right]$$

for $i \notin$ noise event

5. Event Detection:

Different event detection techniques can be used depending on the situation, as given below:

- i) Event may be considered to start and end 10 dB below the A-weighted maximum sound pressure level of an aircraft operation.
- ii) Event may be considered above a threshold value, which may be kept 5 dB above the background sound level.

Events of less than 10 seconds duration shall not be recorded as these may be from sources other than aircraft movements. Experience shall also be used to differentiate and exclude noise from sources other than aircraft operations.

6. Site Selection:

The site shall be so selected to minimise disturbances from other sources for proper event detection. The minimum A-weighted maximum sound pressure level from aircraft movements shall be at least 15 dB above the background noise level.

7. Type of Monitoring Stations:

Monitoring stations can be permanent or temporary. Either mobile vans or Portable Noise Monitoring Terminal can be used as temporary stations.

8. Number and Location of Monitoring Stations:

At least two permanent stations shall be installed per runway, which has more than 25,000 movements per annum. The permanent monitoring stations shall be located on both sides of the runway, at the nearest residential area / silence zone and as far as possible under the flight paths of the aircrafts.

In addition, at least four temporary stations can be installed at the residential area / silence zone and under the flight paths, where noise levels are expected to be higher.

9. Instrumentation:

The instrument system, shall meet the requirements for a class 1 instrument specified in IEC 61672-1 (2002) Class 1.

Noise monitoring station shall consist of a weatherproof microphone, a data storage and analysis device and an information transmission system such as a land line phone / GSM (Global System for Mobile Communications).

10. Installation of Sound Level Meter:

Sound Level Meter shall be installed in flat terrain having no excessive sound absorption characteristics such as thick, matted or tall grasses, shrubs, or wooded areas. No obstructions significantly influencing the sound field from the aircraft shall exist within a conical space above the point on the ground vertically below the microphone. The cone is defined by an axis normal to the ground and by a half-angle of 80 degrees from this axis.

The microphone height shall be at least 4 m, preferably 10 m, above the ground level.

11. Meteorological Measurement:

Meteorological parameters such as wind speed, wind direction, relative humidity, air temperature and occurrence of rain shall be recorded.

12. Noise Monitoring:

Noise monitoring shall be carried out continuously for 24 hours a day, 365 days a year in permanent stations.

In temporary stations, noise shall be monitored continuously for 7 days in each season (Summer and Winter).

13. Parameters to be monitored:

One second sound level ($L_{Aeq i}$) shall be recorded for 16 hrs day time (6:00 AM to 10:00 PM) and for 8 hrs night time (10:00 PM to 6:00 AM) shall be monitored and Total Day-Night Average Sound Levels (DNL), Background Day-Night Average Sound Levels and Event Day-Night Average Sound Levels for 24 hour period shall be calculated.

14. Data Reporting:

The noise monitoring data shall be regularly compiled, documented and published by the Authorities designated by the Ministry of Civil Aviation.

References:

1. Directorate General of Civil Aviation (DGCA) Aircraft Statistics Report: 2003-2004.
2. ISO 3891:1978 (E): Acoustics – Procedure for describing Aircraft Noise heard on the ground.
3. 'Directive 2002/49/EC of the European Parliament and of the Council' of June 2002: Relating to the Assessment & Management of Environmental Noise.
4. Technical Note on Airport Noise Monitoring by Bruel & Kjaer.
5. Traffic-trend from Airport Authority of India official website (March 2007, Annexure-II).
