

# ENVIRONMENTAL NOISE POLICIES AND NOISE CONTROL PRACTICE IN CHINA

Jing Tian  
Institute of Acoustics, Chinese Academy of Sciences  
Beijing 100080, P.R.China  
E-mail: [tian@mail.ioa.ac.cn](mailto:tian@mail.ioa.ac.cn)

## **ABSTRACT**

In China, environmental noise policies are composed of correlated laws adopted by the Standing Committee of the National People's Congress and promulgated by the President of the country, regulations promulgated by the State Council and/or local government, standards issued by the Standardization Administration Committee (SAC) under the State Council. The laws mainly include the "Environmental Protection Law" and the "Law on Prevention and Control of Pollution From Environmental Noise". Regulations are often applied to a special noise pollution phenomenon of wide influence. They are generally only effective in a given area and/or a specific period. Tens of correlated standards specify the noise level limits of different functional zones of land use and of different equipment, machines, devices, appliances etc., and the measurement methods. In this presentation, a brief introduction to these policies and their operations is given and discussed. The conclusion is that the policies supply an effective legislative basis for environmental noise prevention and control in China, but still a lot of work should be conducted and completed to strive for a quiet society.

## **1. Administration System for Environment Protection in China**

In China, the National People's Congress is the only lawmaker. The executives include the central government, i.e. the State Council and the competent departments of environmental protection administration under the State Council, and the local governments at or above the county level. Here the competent departments of environmental protection administration are the Bureau of Environment Protection, the Standardization Administration Committee (SAC), the state administrative department of marine affairs, the harbour superintendency, the fisheries, the environmental protection department of the armed forces and the administrative departments of public security, transportation, railways and civil aviation at various levels etc.

## **2. Environmental Protection Law**

The law was adopted at the 11th Meeting of the Standing Committee of the 7th National People's Congress on 1989-12-26, and promulgated by Order No. 22 of the President of the People's Republic of China on 1989-12-26, and effective as of the same day. The 1979's Trial Implementation of the law was repealed at the same time. The

content of the law includes 6 chapters and 47 articles.

In the general provisions, it was said that the law was enacted for the purpose of protecting and improving people's environment and the ecological environment, to coordinate the work of environmental protection with economic construction and social development and to define the obligation to protect the environment of the governments, units and individuals.

The law prescribes the supervision and management of the environment. It is clearly said that the governments shall establish the standards and monitoring systems for environment quality, formulate the monitoring norm and organize a monitoring network, the governments at or above the county level shall make an investigation and an assessment of the environmental situation. It is also pointed out that the local governments at various levels shall be responsible for the environment quality. The targets and tasks for protecting and improving the environment shall be defined in urban planning.

The law prescribes the prevention and control of environmental pollution and other public hazards. Units shall incorporate the work of environmental protection into their plans, establish a responsibility system for environmental protection, adopt effective measures to prevent and control the pollution and harms caused by waste gas, water, residues, **noise, vibration** and electromagnetic radiation generated in the course of production, construction or other activities.

### **3. Law On Prevention And Control Of Pollution From Environmental Noise**

The law was adopted at the 22nd Meeting of the Standing Committee of the 8th National People's Congress on 1996-10-29, promulgated by Order No. 77 of the President of the People's Republic of China on 1996-10-29, and effective as of 1997-3-1. "The Regulations on Prevention and Control of Environmental Noise" promulgated by the State Council on 1989-9-6 was repealed at the same time. The law is composed of 8 chapters and 64 articles.

In the general provisions, it was said that the law was enacted for the purpose of preventing and controlling environmental noise pollution. Here, "environmental noise" means the sound that is emitted in the course of industrial production, construction, transportation and social activities. The law also defined the obligation of the governments, units and individuals in acoustic environment protection.

Chapter 2 prescribes the supervision and administration of the prevention and control of environmental noise pollution. It is said that the government shall establish national standards for acoustic environmental quality for different functional zones, fix national limits for environmental noise emission. Local governments shall divide their respective administrative regions into different zones for application of different standards. Where a construction project might cause environmental noise pollution, the unit undertaking the project must prepare an environmental impact statement. Units that produce environmental noise pollution shall take measures to control it and pay fees for excessive emission. Any enterprise or institution that produces serious environmental noise pollution in an area where noise-sensitive structures are concentrated shall be ordered to control the pollution within a time limit.

The State applies an elimination system for out-dated equipment that produces serious environmental noise pollution. Unavoidable sporadic strong noise within an urban area must first be applied to the local public security organ for approval. The government shall establish a system for monitoring environmental noise, establish monitoring standards, and set up a monitoring network.

In chapter 3 of the law, the items for prevention and control of industrial noise pollution are given. It is claimed that the noise shall be kept within the limits set by the State on emission of environmental noise within the boundary of an industrial enterprise. Industrial enterprises shall take effective measures to minimize the impact of noise on the living environment of the neighbourhood. Noise level limits shall be gradually included in the national standards and trade standards for products and specified in relevant technical documents.

Chapter 4 gives the articles on prevention and control of construction noise pollution. It shall be kept within the limits set by the State on the emission of environmental noise within the boundary of a construction site. The unit in charge of a construction project which may produce environmental noise pollution due to the use of machines and other equipment, must report, 15 days before, the construction site, the length of time, the possible level of environmental noise and the measures taken for prevention and control of such pollution. In an urban area, construction operation that produces environmental noise pollution is forbidden at night, with some exceptions.

Chapter 5 prescribes the prevention and control of traffic noise pollution. It is forbidden to manufacture, sell or import automobiles that emit noise beyond the limits set on noise level. Mufflers and horns of motor vehicles driven within urban areas must meet the requirements of the State. To build expressways, urban overhead road and light-tract lines that traverse areas where there are concentrated noise-sensitive structures and that might produce environmental noise pollution, sound barriers shall be erected or other effective measures shall be taken. Noise-sensitive structures shall keep a certain distance away from existing urban traffic trunk lines. Where locomotives when traversing urban residential, cultural and education districts, the local governments shall work out plans for mitigating such pollution. With the exception of take-off, landing or other situations as provided for by law, no civil aircraft may fly over the urban areas of cities.

The sound emitted by man-conducted activities, other than industrial, construction and traffic noise, is generally named as noise of social activities, that include the noises generated from commercial, cultural and entertainment activities, from high-intensity loudspeakers, air-conditioners and cooling towers, household appliances or musical instruments, as well as from indoor decoration and refitting.

#### **4. Regulations**

In addition to the basic laws on environmental noise prevention and control, there are still some regulations enacted generally by the local people's congresses or the governments above the county level. Most of those regulations are temporarily and locally effective. Night construction work suspending regulations during the period of university entrance examination and fireworks forbidden regulations in various big cities, such as in Beijing and Shanghai, are typical examples.

## 5. Standards on Environmental Noise

To support the basic laws, a series of standards on environmental noise have been issued, which include mainly 4 types: the environmental noise limits, environmental noise measurement methods, noise emission limits of different sources and sound emission measurement methods.

**Standards of Environmental Noise Limits** mainly include,

- GB3096-93 Standard of environmental noise of urban area,
- GB12348-90 Standard of noise at boundary of industrial enterprises,
- GB12523-90 Noise limits for construction site,
- GB12525-90 Emission standards and measurement methods of railway noise on the boundary alongside risky line,
- GB9660-88 Environment standard of aircraft noise around airport.

**Standards of Environmental Noise Measurement Methods** mainly include,

- GB/T14623-93 Measuring method of environmental noise of urban area,
- GB/T15190-94 Technical specifications to determine the suitable areas for environmental noise of urban area,
- GB12524-90 Measurement method for noise from construction site,
- GB12349-90 Method of measuring noise at boundary of industrial enterprises,
- GB9661-88 Measurement of aircraft noise around airport.

The noise evaluation indicators used in standard GB3096, GB/T14623 and GB/T15190 are currently as follows,

- Equivalent Continuous A-weighted Sound Level

$$L_{Aeq} = 10 \log \left[ \frac{1}{T} \int_0^T 10^{0.1L_{pd}(t)} dt \right] \quad (1)$$

where the measurement shall be made at a given position that can represent the assessed area and 1.2 m above the ground.

- Day-Night Equivalent Sound Level

$$L_{dn} = 10 \log \left[ \frac{16 \times 10^{0.1L_d} + 8 \times 10^{0.1(L_n+10)}}{24} \right] \quad (2)$$

The following noise evaluation indicators are also used in standard GB3096, GB/T14623 and GB/T15190.

● Average Sound Level

$$L_c = \frac{1}{n} \sum_{i=1}^n L_{eqi} \quad (\text{for the whole city}) \quad (3)$$

$$L_r = \frac{1}{\Lambda} \sum_{i=1}^n \lambda_i \cdot L_i \quad (\text{for the road system}) \quad (4)$$

where  $L_{eqi}$  and  $L_i$  are the equivalent continuous A-weighted sound levels of a given area and a section of road respectively.  $n$  is the total number of sampling measurement sites.  $\lambda_i$  is the length of the road section and  $\Lambda$  is the total length of all assessed roads in a city.

● Accumulated Percentage Sound Level  $L_N$ :  $L_5$ ,  $L_{50}$ ,  $L_{95}$ .

Noise evaluation indicators used in GB9660 and GB9661 is Weighted Equivalent Continuous Perceived Noise Level for aircraft noise.

$$WECPNL = \overline{EPNL} + 10 \log(N_d + 3N_e + 10N_n) - 40$$

$$\overline{EPNL} = 10 \log \left[ \frac{1}{N_d + N_e + N_n} \sum_{i=1}^N 10^{0.1 EPNL_i} \right] \quad (5)$$

$$EPNL_i = L_{A_{max}} + 10 \lg(T_p / 20) + 13$$

$$L_{D_{max}} + 10 \lg(T_p / 20) + 7$$

In GB3096, the urban area is divided into 5 functional areas,  
 Zone 0: Area for superior hotel, villa and recreation,  
 Zone 1: Area for residence, culture and education,  
 Zone 2: Mixed area for residence, commerce and industry,  
 Zone 3: Area for industry,  
 Zone 4: Area beside main roads, inner rivers, light trams and railways.  
 Table 1 gives the out-door noise limits for the 5 different types of area.

**Table 1** Out-door noise limits for urban area

Type of Zone	Day Time	Night Time
0	50	40
1	55	45
2	60	50
3	65	55
4	70	55

Still some other notes on noise limits,

- Noise environments in rural areas could also be evaluated according to GB3096 or 5 dB lower.
- Noise burst at night shall not exceed 15 dB above the limits.
- Noise at the boundary of industrial enterprises shall not exceed the limits of the functional area around, except in Zone 0.
- 70 dB both for day and night beside railways.

Aircraft noise limits around airport can be given as follows,

- WECPNL  $\leq 70$  for residential, cultural and educational areas,
- WECPNL  $\leq 75$  for other kinds of area.

Noise limits for construction sites are listed in Table 2.

**Table 2** Noise limits for construction sites

Period of construction	Daytime	Nighttime
Digging	75	55
Piling	85	Forbidden
Structure	70	55
Decoration	65	55

Noise emission limits of different sources are generally given with the indicators of noise power level  $L_w$  and noise exposure level  $L_p$ . GB16170-1996 gives the "Limits of noise emitted by stationary road vehicles", and GB16169-1996 gives the "Limits of noise emitted by motorcycles and mopeds". Table 3 and 4 give the limits of noise level for household appliances.

**Table 3** Limits of noise level for household appliances

No. of Standard	Name of Standard	Noise Level Limit
GB/T7725 - 1996	Room Air-Conditioners	Next Table
GB/T8059.1 - 1995	Household Refrigerators	$L_w \leq 52$ dBA(<250L) $L_w \leq 55$ dBA(>250L)
GB/T4288 - 92	Household Electric Washing Machines	$L_w \leq 75$ dBA
QB1562 - 92	Vacuum Cleaners	$L_w \leq 84$ dBA
QB/T2452 - 99	Cold and Hot Drinking Water Appliances	$L_w \leq 45$ dBA(Heating only) $L_w \leq 50$ dBA (Others)

**Table 4** Noise limitation for air-conditioners in rooms(dBA)

Labeled Refrigeration capability (W)	Indoor		Outdoor	
	All-in-One	Separated	All-in-One	Separated
< 2500	≤ 53	≤ 45	≤ 59	≤ 56
2500~4500	≤ 56	≤ 48	≤ 62	≤ 56
4500~7100	≤ 60	≤ 55	≤ 65	≤ 62
> 7100		≤ 62		≤ 68

## 6. Environmental Noise Control Practice in Mainland China

To reduce the environmental noise, a lot of control measures were taken by the governments at or above the county level in China, such as moving noisy industrial enterprises out of cities, discarding noisy vehicles and limiting new noise sources into the market, renovation of concentrated air-heating boilers in north China, establishing quiet districts, as well as other administrative measures such as horn blowing prohibition in big cities.

Especially, to control the road traffic noise which is the main noise pollution source, the government paid great attention on road system reconstruction and improvement, such as extending road length to control vehicle flow, broadening road width to 60~80 m wide now for main roads, pushing new buildings 50~100 m away from the main roads, designing and applying noise barriers, canal and channel-like roads in noise sensitive sections, applying automatic flow control and signal systems, improving the quality of road surface, extending the city area to reduce the residential density alongside roads, limiting the use of noisy vehicles such as heavy trucks, motorcycles and those in bad conditions, reducing the number of plane crossroads and lights, with 3-D interchanges (crossovers) etc.

These actions improved the sound environment significantly together with the fast development of the country. Table 5 gives the percentage of urban areas out of the standard limits in main cities of China in 1995 and 2001, from which it can be seen that noise level was reduced in residential and roadside districts.

**Table 5** Percentage of urban areas out of the standard limits in china

Type of Area	Y1995 (%) (46 cities surveyed)	Y2001 (%) (43 cities surveyed)
0	100	57.1
1	97.6	71.1
2	86.1	80.4
3	19.4	21.7
4	71.4	50.0
Average	66.0	40.0

## **7. Conclusions**

The environmental noise policies are very effective to control the noise level in urban areas, but it was also noticed that noise complaints rose from 35.6% in 1995 to 43.0% in 2003 in the total complaint events of environmental problems. Noise pollution is still a big environmental problem that needs even more actions and endeavors.

## **References**

Mainly the annual gazettes on environments of China, by the Environmental Protection Agency of China.