Environmental Noise Regulations in Thailand

Krittika Lertsawat
Department of Natural Resources and Environmental Law
Faculty of Law, Thammasat University, Thailand

ABSTRACT

The environmental noise regulations take key roles to protect and control noise pollution in the human society as known as “legal measures” bringing the scientific methodology of noise abatement into the practical situation. Like other societies, Thai society conducts many researches and comparative studies on environmental noise abatement in order to manage the domestic environmental noise pollution for many years. The environmental noise regulation in Thailand mostly lays down a set of noise emission control and ambient noise limits for protecting human hearing loss similar to the other national, regional or international regulations, particularly the exhausted noise from the end of pipe from various motor vehicles and inland vessels, since 15 years ago. The noise annoyance standard was enacted in 1999, following the concept of BS-4142 of the United Kingdom and its amendment in 2007, influencing by measurement situation and experience in Thai society. This paper will visualize the structure of the environmental noise regulation in Thailand in present day and the future trends.

1. INTRODUCTION

The environmental noise pollution is the one of the top rank of annual environmental pollution complaints from the community, particularly noise annoyance. Transportation noise is the most significant noise sources in the environmental noise problems. As recommended by the noise control engineering techniques, the best way of the noise reduction at its source is the hardest way to achieve among those other three classic reduction methods. The common way to resolve noise problems in practice is to implement the long-term plan on noise source reduction, gradually while the effectiveness is reinforced by applying the other noise reduction techniques, concurrently. The legal measures are the main pathway to deliver those techniques into practices.

2. ENVIRONMENTAL NOISE REGULATIONS IN THAILAND

The legal instrument takes a leading role to widely abate and control the environmental noise pollution in various societies around the world. The recommended noise control engineering techniques: noise control at its source, noise control at its path, and noise control at the receiver are the structure of applied environmental noise control approaches to various solving instruments in practical world. Those of three approaches can typically illustrate the structure of environmental noise related regulation in Thailand.

Various regulations and laws are applied for practicing the environmental noise control engineering techniques, depending on considerable factors in each society—i.e. the legal system,
the law-enforcement authority, the way of life, the pattern of community, the local culture, the social responsibility of emission controller, etc. Consequently, the similar environmental noise regulations and laws may not be similarly implemented and provided with comparable results in different society with regard to the spatial distribution.

The environmental noise related regulations in Thailand can be described in the above structure as shown in Table 1 and Table 2. Noise Regulations in Thailand are dominated by noise controlling approaches at its sources, particularly motor vehicles, inland vessels depending on the specific noise sources in local communities such as motorcycle, tricycle (Tuk Tuk) and long-tailed boat. Almost of them were developed by adopting the other national standards—i.e. Japanese regulations, EU regulations in compliance with the ISO standards for noise determination and measurement methods.

3. ANALYSIS

Like other developing countries, in the beginning of the environmental noise regulation development in Thailand was induced by the enforcement of the international regulations—i.e. the general occupational safety and health (noise exposure in workplaces) of the International Labour Organization (ILO), the Annex 16 Volume I: Aircraft Noise under the Convention on Civil Aviation 1944, EU Regulations and Directives for noise emission from motor vehicles and home appliance products, etc. Those noise permissible limits and their measurement method were transferred into Thai regulations gradually by trading activities, mainly.

In 1975, the first natural resources and environment law was enacted by gaining momentum from the sustainable development principle. Finally, the new generation of the fundamental law was enacted in 1992 as named “the Enhancement and Promotion Environmental Quality Act B.E.2535 (EPEQA B.E.2535)” which includes noise pollution management scheme.

The first noise emission standards under EPEQA B.E.2535 were enacted as known as “noise standards” –i.e. motor vehicle noise levels, noise and vibration control standard from quarry, inland vessels noise levels. The general noise limit for protecting human hearing loss as named “general noise standards” was following by 1997. They were several improvements and changes on the noise levels of those standards. They were dominated by only noise emission control approaches while the other approaches are left behind. As the matter of fact, all of those standards are “noise permissible limits” for noise sources and noise perception of receiver.

Then, the “annoyance noise annoyance standard” was enacted in 1999, following by the concept of annoyance noise from British Standards on BS-4142:1997 with different angle of scope of implementation and background study. Its amendment was introduced in 2007 under consideration of the local measurement experiences. It occupied in wide range of noise sources in determining the environmental noise annoyance levels including transportation sources in terms of the equivalent continuous sound pressure levels while the original determination in BS-4142 focuses only on steady noise characteristics from industrial premises in outdoor environment—i.e. refinery plants, petrochemical plants. Besides, its scope excludes transportation sources—i.e. aircraft fly-over noise, pass-by of motor vehicles, or tonal noise in separate determination method.

However, the concept of “Rating Level”, taking into account of many factors attached to noise descriptor to identify annoyance noise effect, was firstly introduced into Thai regulation. It applied in environmental noise complaints around the country related to various noise sources in the local community environment. There are some difficulties to determine the represented noise annoyance levels in terms of $L_{eq,t}$ in specific sources—i.e. fly-over aircraft, pass-by noise of motor vehicle or train, tonal noise from industrial noise sources, etc., the same as the determination of represented background noise in $L_{90}$ in practice. The penalty levels take lead in
consideration process with unfairness situation, especially night time and impulsive characteristics of noise.

Considering the ISO working groups of acoustics tasks, the harmonized determination and measurement methods for specific noise sources and environmental noise in various measurement conditions—i.e. ISO 3744 for determination of stationary noise sources, ISO 362 for determination of noise from vehicles, ISO 3891 for aircraft noise heard on the ground, etc., were introduced to be code of practice to determine noise levels of various sources, respectively. ISO standards are introduced harmonized measurement and calculation method for determining various kinds of noise sources and noise exposure at the receivers. Apparently, these recommended methods are comparable and recognized methodology by international levels.

In 2003, the ISO 1996-1: 2003 was introduced as typical determination for environmental noise, illustrating the definition terms, noise descriptors for environmental noise, noise signature, calculation method, what need to put in the measurement report. The concise of measurement and determination details were published in 2007 in ISO 1996-2: 2007 including the recommended measurement methods for each significant noise source of environmental noise—i.e. aircraft noise, road traffic noise, rail noise with specific terms of uncertainty of test methods.

All prescribed procedures are obviously easy to understand and reasonable for practices. Nevertheless, the “Rating Level” descriptor plays a very important role in environmental noise control, particularly “Rating Level” is related to equivalent continuous concept, influencing by the “percent highly annoyed” explanation in transportation noise from the past decade. The sound exposure level of single events of specific sources is measured and calculated in terms of equivalent continuous noise to illustrate the long-term noise levels at receiver position.

Moreover, most of the recommended standards remark their excluding conditions with regard to the setting of “noise permissible limits” in the published standards. Except loud noise beyond the thresholds of comfortable perception of sound, the annoyance effects are definitely sensitive to many factors—i.e. personal perception of sound, age, activities, time of day, health condition, frequency range of sound, tone, pitch, etc. Hence, the permissible limits should be identified by local research, adding input aspects from those many factors with public hearings process and pilot test periods of legal implementation before formal notification.

With regard to mentioned above, the new standardized method plays key role in the practicable measurement and determination of the environmental noise aspects for achieving the goal of environmental protection related to noise pollution issues while the local authorities are responsible for permissible limits as mentioned above. When the recognized measurement and determination methods are using to clarify the environmental noise situation, the comparable illustration of environmental noise situation in specific case are more clarify to resolve in appropriate manner.

At present, there is no particular noise regulation related to environmental noise abatement and control of specific sources to distribute noise limits on community noise in Thailand. The present annoyance noise standard does not also include the specific source of the most contribution of environmental noise from single events of transportation noise measurement and determination. Does the standard make any change to the noise regulation for environmental noise management in Thailand? The upcoming enhancement of the present regulation for assessing annoyance noise in environment needs more contribution of the standardized measurement and determination method from ISO 1996-1 and 2, particularly on how to take into account of noise levels from transportation noise sources—i.e. fly-over aircraft, pass-by train or motor vehicle fairly.

Considerably, the present annoyance noise standards and upcoming noise permissible limits for community noise shall reasonably take into account of rating levels of the recommended
method of determination and measurement by both books from ISO in order to resolve some difficulties of determination of represented noise annoyance levels and background noise as mentioned above. In addition, the noise permissible limits for community noise with regard to land use types or local activities—i.e. residential area, industrial area, outdoor activities area, specific zone, etc., shall be enacted under the EPEQA B.E.2535 to provide the guidance appropriated noise level as to the scope of limitation in land use planning and housing code of conduct incompatible with community noise level.

Table 1: Environmental Noise Regulation in Thailand

<table>
<thead>
<tr>
<th>Code/Act</th>
<th>Regulation</th>
<th>Authority</th>
<th>Effective Year</th>
<th>Noise Descriptor</th>
<th>Noise Limits</th>
<th>Measurement Conditions/Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPEQA B.E.2535</td>
<td>Notification of the Ministry of Natural Resource and Environment on Inland Vessel Noise Level</td>
<td>PCD</td>
<td>7-12-1994 Amend. by 14-06-2005</td>
<td>$L_p$ (dBA) 0.5 m. at the end of pipe</td>
<td>$\leq$ 100</td>
<td>-with 45° of horizontal plane within pipe level - $3/4$ of maximum for gasoline engine and maximum for diesel engine -without load -Background noise $&lt; 90$ dBA</td>
</tr>
<tr>
<td>IPSA B.E.2511</td>
<td>Notification of the Ministry of Industry No. 2629 on Silencer for Motorcycle Exhausted pipe</td>
<td>TISI</td>
<td>2000</td>
<td>$L_p$ (dBA)</td>
<td>$\leq$ 95</td>
<td>Product standards: (TIS.341-2000FD1100 THAILAND)</td>
</tr>
<tr>
<td>EPEQA B.E.2535</td>
<td>Notification of the Ministry of Natural Resource and Environment on Motorcycle Noise Level</td>
<td>PCD</td>
<td>2000 Amend. by 17-07-2003</td>
<td>$L_p$ (dBA) 0.5 m. at the end of pipe</td>
<td>$\leq$ 95</td>
<td>-with 45° of horizontal plane within pipe level - $3/4$ of maximum of $\leq$ 5,000 cycle/min or $1/2$ of maximum of $&gt;5,000$ cycle/min</td>
</tr>
<tr>
<td>EPEQA B.E.2535</td>
<td>Notification of the Ministry of Natural Resource and Environment on Motor Vehicle Noise Level</td>
<td>PCD</td>
<td>28-8-1992 Amend. by 7-07-2003</td>
<td>$L_p$ (dBA) 0.5 m. at end of pipe</td>
<td>$\leq$ 100</td>
<td>-with 45° of horizontal plane within pipe level - $3/4$ of maximum for gasoline engine and maximum for diesel engine</td>
</tr>
<tr>
<td>EPEQA B.E.2535</td>
<td>Notification of the Ministry of Natural Resource and Environment on Noise and Vibration Control Standards from Quarry</td>
<td>PCD</td>
<td>23-11-1996 Amend. by 2005</td>
<td>$L_{max}$ (dBA)</td>
<td>$\leq$ 115</td>
<td>-properties line or buffer zone of quarry</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$L_{eq,8hr}$ (dBA)</td>
<td>$\leq$ 75</td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>$L_{eq,24hr}$ (dBA)</td>
<td>$\leq$ 70</td>
<td></td>
</tr>
</tbody>
</table>


Table 2: Environmental Noise Regulation in Thailand
<table>
<thead>
<tr>
<th>Code/Act</th>
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<th>Authority</th>
<th>Effective Year</th>
<th>Noise Descriptor</th>
<th>Noise Limits</th>
<th>Measurement Conditions/Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPEQA B.E.2535</td>
<td>Notification of the National Environmental Board No.15 on General Noise Standards</td>
<td>PCD</td>
<td>12-03-1997</td>
<td>$L_{\text{max}}$ (dBA) $L_{\text{eq},24\text{hr}}$ (dBA)</td>
<td>$\leq 115$ $\leq 70$</td>
<td>Free field Outdoor: at least 3.0 meter from any reflecting plane Indoor: at least 1.0 meter from any reflecting plane or 1.5 meter from openings</td>
</tr>
<tr>
<td>IWA B.E.2535</td>
<td>Notification of the Ministry of Industry on the Occupational Safety Measure of Workplaces in the Industrial Plant</td>
<td>DIW</td>
<td>2003</td>
<td>TWA $L_{\text{eq},8\text{hr}}$ (dBA)</td>
<td>$\leq 140$</td>
<td>Noise restriction zone</td>
</tr>
<tr>
<td>EPEQA B.E.2535</td>
<td>Notification of the National Environmental Board No. 29 on Annoyance Noise Level Standard</td>
<td>PCD</td>
<td>6-06-2000 Amend. By 2007</td>
<td>$L_{\text{eq},1\text{hr}} - L_{\text{eq},90}$ (dBA)</td>
<td>$\leq 10$</td>
<td>-Free field at receiver -Sensitive receiver or during 22:00-06:00, penalty +3 dB to $L_{\text{eq},1\text{hr}}$ -Impulsive noise, penalty +5 dB to $L_{\text{eq},1\text{hr}}$ -three conditions to take $L_{\text{eq},1\text{hr}}$ and Background noise</td>
</tr>
</tbody>
</table>

Remarks:
1. The Enhancement and Promotion Environmental Quality Act B.E.2535 (EPEQA B.E.2535)
2. The Industrial Work Act B.E.2535 (IWA B.E.2535)
3. The Industrial Product Standard Act (IPSA B.E.2511)
4. Pollution Control Department (PCD)
5. Department of Industrial Works (DIW)
6. Thai Industrial Standard Institution (TISI)


### 4. CONCLUSIONS

In short, the present environmental noise regulations in Thailand are definitely in compliance with the other national or international laws like many other developing countries. On the other hand, the enforcement of those regulations may not be the same implementation as in original places in many aspects. The flexibility of implementation depends on local necessities under the fundamental recognized methodology as shown in the international standards of measurement and determination. Does the standardized method make any changes to the noise regulation for environmental noise management in Thailand? Next generation of environmental noise regulation in Thailand will be broadly influenced by the recognized determination and measurement concepts of rating levels, illustrating as of ISO 1996-1:2003 and ISO 1996-2:2007. Pollution Control Department are now working on the initiative of new noise permissible limits at the receiver for specific noise sources with regard to land use in community.

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REFERENCES