SOUND LEVEL LIMITS FOR STATIONARY SOURCES IN CLASS 3 AREAS (RURAL)

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Sound Level Limits for Stationary Sources in Class 3 Areas (Rural) Publication NPC-232

October 1995

This Publication establishes sound level limits for stationary sources such as industrial and commercial establishments or ancillary transportation facilities, affecting points of reception in Class 3 Areas (Rural). It replaces Publication NPC-132 "Guidelines for Noise Control in Rural Areas" of the "Model Municipal Noise Control By-Law, Final Report, August 1978".

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1. SCOPE

This Publication establishes sound level limits for stationary sources of sound such as industrial and commercial establishments or ancillary transportation facilities, affecting points of reception in Class 3 Areas (Rural). The limits apply to noise complaint investigations carried out in order to determine potential violation of Section 14 of the Environmental Protection Act. The limits also apply to the assessment of planned stationary sources of sound in compliance with Section 9 of the Environmental Protection Act, and under the provisions of the Aggregate Resources Act and the Environmental Assessment Act.

This Publication does not address sound and vibration produced by blasting; blasting in quarries and surface mines is considered in Reference [7].

The Publication includes an Annex, which provides additional details, definitions and rationale for the sound level limits.

2. REFERENCES

Reference is made to the following publications:

[1] NPC-101 - Technical Definitions

[2] NPC-102 - Instrumentation

[3] NPC-103 - Procedures

[4] NPC-104 - Sound Level Adjustments

[5] NPC-205 - Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)

[6] NPC-206 - Sound Levels due to Road Traffic

[7] NPC-119 - Blasting

[8] NPC-216 - Residential Air Conditioning Devices

[10] NPC-233 - Information to be Submitted for Approval of Stationary Sources of Sound

[12] ORNAMENT, Ontario Road Noise Analysis Method for Environment and Transportation, Technical Document, Ontario Ministry of the Environment, ISBN 0-7729-6376, 1989

References [1] to [4] and [7] can be found in the
Model Municipal Noise Control By-Law, Ontario Ministry of the Environment, Final Report, August 1978.

2. DEFINITIONS

"Ambient sound level"
means Background sound level.

"Background sound level"
is the sound level that is present in the environment, produced by noise sources other than the source under impact assessment. Highly intrusive short duration noise caused by a source such as an aircraft fly-over or a train pass-by is excluded from the determination of the background sound level.

"Class 1 Area"
means an area with an acoustical environment typical of a major population centre, where the background noise is dominated by the urban hum.

"Class 2 Area"

means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

- absence of urban hum between 19:00 and 23:00 hours;
- evening background sound level defined by natural environment and infrequent human activity; and
- no clearly audible sound from stationary sources other than from those under impact assessment.

"Class 3 Area"

means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

- a small community with less than 1000 population;
- agricultural area;
- a rural recreational area such as a cottage or a resort area; or
- a wilderness area.

Other technical terms are defined in Reference [1] and in the Annex to Publication NPC-232.

3. ESTABLISHMENT OF LIMITS - OBJECTIVE

The sound level limit at a point of reception must be established based on the principle of "predictable worst case" noise impact. In general, the limit is given by the background sound level at the point of reception. The sound level limit must represent the minimum background sound level that occurs or is likely to occur during the operation of the stationary source under impact assessment.

4. BACKGROUND SOUND LEVELS OF THE NATURAL ENVIRONMENT

The One Hour Equivalent Sound Level (L_{eq}) and/or the One Hour Ninetieth Percentile Sound Level (L_{90}) of the natural environment shall be obtained by measurement performed in accordance with Section 7. The results of the measurements must not be affected by the sound of the stationary source under impact assessment.

The time interval between the background sound level measurement and the measurement of the sound level produced by the stationary source under impact assessment should be minimized as much as possible. Preferably, the two measurements should be carried out within one hour of each other.

5. SOUND LEVELS DUE TO STATIONARY SOURCES

(1) Complaint Investigation of Stationary Sources

The One Hour Equivalent Sound Level (L_{eq}) and/or the Logarithmic Mean Impulse Sound Level (L_{LM}) produced by the stationary sources shall be obtained by measurement performed in accordance with Section 7.

(2) Approval of Stationary Sources

The One Hour Equivalent Sound Level (L_{eq}) and/or the Logarithmic Mean Impulse Sound Level (L_{LM}) produced by the stationary sources shall be obtained by measurement or prediction. The estimation of the L_{eq} and/or L_{LM} of the stationary source under impact assessment shall reflect the principle of "predictable worst case" noise impact. The "predictable worst case" noise impact occurs during the hour when the difference between the predicted sound level produced by the stationary source and the background sound level of the natural environment is at a maximum.

6. PROCEDURES

All sound level measurements of the One Hour Equivalent Sound Level (L_{eq}) and the Logarithmic Mean Impulse Sound Level (L_{LM}) shall be made in accordance with Reference [3].

All sound level measurements of the One Hour Ninetieth Percentile Sound Level (L_{90}) shall be made using a Sound Level Meter capable of measuring percentile sound levels. The meter shall meet the applicable requirements for an Integrating Sound Level Meter of Reference [2]. The measurements shall be carried out following procedures for the measurement of varying sound described in Reference [3].

Sound from existing adjacent stationary sources may be included in the determination of the background hourly sound levels L_{eq} and L_{90}, if such stationary sources are not under consideration for noise abatement by the Municipality or the Ministry of Environment and Energy.

7. SOUND LEVEL LIMITS - GENERAL

(1) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source, the sound level limit at a point of reception within 30 m of a dwelling or a camping area, expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}), is the lower of:

- the background One Hour Equivalent Sound Level (L_{eq}) obtained pursuant to Section 5; and
- the background One Hour Ninetieth Percentile Sound Level (L_{90}) plus 15 dB, i.e. L_{90} + 15 dB, obtained pursuant to Section 5.

(2) For sound from a stationary source, including Quasi-Steady Impulsive Sound but not including other impulsive sound, the sound level limit at a point of reception within 30 m of a dwelling or a camping area, expressed in terms of the One Hour Equivalent Sound Level (L_{eq}), is the lower of:

- the background One Hour Equivalent Sound Level (L_{eq}) obtained pursuant to Section 5; and
- the background One Hour Ninetieth Percentile Sound Level (L_{90}) plus 10 dB, i.e. L_{90} + 10 dB, obtained pursuant to Section 5.

8. SOUND LEVEL LIMITS - SPECIFIC IMPULSIVE SOUNDS

(1) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source which is an industrial metal working operation (including but not limited to forging, hammering, punching, stamping, cutting, forming and moulding), the sound level limit at a point of reception within 30 m of a dwelling or a camping area, expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}), is 60 dBAI, if the stationary source were operating before January 1, 1980, and otherwise is 50 dBAI.

(2) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source which is the discharge of firearms on the premises of a licensed gun club, the sound level limit at a point of reception within 30 m of a dwelling or a camping area, expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}), is:

- 70 dBAI if the gun club were operating before January 1, 1980; or
- 50 dBAI if the gun club began to operate after January 1, 1980; or
- the L_{LM} prior to expansion, alteration or conversion.

(3) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source which is not a blasting operation in a surface mine or quarry, characterized by impulses which are so infrequent that they cannot normally be measured using the procedure for frequent impulses of Reference [3], the sound level limit at a point of reception within 30 m of a dwelling or a camping area, expressed in terms of the impulse sound level, is 100 dBAI.

9. SOUND LEVEL LIMITS - PEST CONTROL DEVICES

(1) For impulsive sound, other than Quasi-Steady Impulsive Sound, from a pest control device employed solely to protect growing crops, the sound level limit at a point of reception within 30 m of a dwelling or a camping area, expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}), is 70 dBAI.

(2) For sound, including Quasi-Steady Impulsive Sound but not including other impulsive sound, from a pest control device employed solely to protect growing crops, the sound level limit at a point of reception within 30 m of a dwelling or a camping area, expressed in terms of the One Hour Equivalent Sound Level (L_{eq}), is 60 dBA.

10. PROHIBITION - PEST CONTROL DEVICES

The operation of a pest control device employed solely to protect growing crops is prohibited during the hours of darkness, sunset to sunrise.

11. PRE-EMPTION

The least restrictive sound level limit of Sections 8, 9 and 10 applies.

12. EXCLUSION

No restrictions apply to any stationary source resulting in a One Hour Equivalent Sound Level (L_{eq}) or a Logarithmic Mean Impulse Sound Level (L_{LM}), at a point of reception within 30 m of a dwelling or a camping area, lower than the minimum values for that time period, as specified in Table 232-1.

TABLE 232-1
Minimum Values of One Hour L_{eq} or L_{LM} by Time of Day

Time of Day	One Hour L_{eq} (dBA) or L_{LM} (dBAI)
0700 - 1900	45
1900 - 2300	40
2300 - 0700	40

May 21, 1999

Annex to Publication NPC-232
Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)

October 1995

A.1. GENERAL

The definitions in Publication NPC-232 of a Class 3 Area (Rural), as well as Class 1 and 2 Areas (Urban), provide a broad characterization of the areas including a range of localities. In formulating the definitions, consideration was given to the fact that the terms "rural" and "urban" embody a conception of distinct types of dwelling habitat.

On one hand, the term "urban" traditionally conveys a distinct image of a concentration of people and activities in a predominantly man-made environment dominated by road traffic noise, making intensive use of the space available. On the other hand, the term "rural" brings to mind a sparse distribution of people and activities in a predominantly natural environment using land extensively (farming) or not at all (wilderness areas). In between these two categories fall areas that exhibit characteristics of both "urban" and "rural" areas, particularly at different times of the day.

It is, however, evident that not all of the environment will fit neatly into one of these categories. The predominance of road traffic in the area is a significant factor in determining rurality. For example, a residential property in an isolated recreational area, but close to a major roadway, would not be considered to be located in a Class 3 Area.

While examples of a rural setting, described in Publication NPC-232 provide some general guidelines, any classification of a point of reception as being in a Class 1, 2 or 3 Area should be made on an individual basis. The classification can, and should, utilize normally available information on zoning by-laws, official plans, and other policy statements, as well as the future character of the particular piece of land in question and the land in its vicinity.

The standard of environmental noise acceptability for a stationary source is, in general, expressed as the difference between the noise from the source and the background noise. In rural areas, this background noise is formed by natural sounds rather than man-made sounds.

The background noise may also include contributions from existing stationary sources adjacent to the stationary source under impact assessment. Contributions of these secondary stationary noise sources are considered to be a part of the existing noise environment, and may be included in the measurement of the background sound levels, provided that they are not under consideration for noise abatement by the Municipality or the Ministry of Environment and Energy.

In Class 1 and 2 Areas where the acoustical environment is governed primarily by road traffic, the background noise is best described by the energy equivalent sound level (L_{eq}). However, the background noise in Class 3 Areas is often better described in terms of the ninetieth percentile sound level (L_{90}). Therefore, Publication NPC-232 has established both the L_{90} as well as the L_{eq} of the background as the limits against which the intrusion of the source, measured in terms of the L_{eq}, is assessed.

A.2. APPLICATION

Sound level limits contained in this Publication do not apply to non-stationary noise sources nor to any equipment, apparatus or device used in agriculture for food crop seeding, chemical spraying or harvesting. In addition, several specific noise sources have been addressed in separate Publications. Limits for residential air conditioners are contained in Publication NPC-216 - Residential Air Conditioning Devices, Reference [8], and the limits for blasting operations in quarries and surface mines are contained in Publication NPC-119 - Blasting, Reference [7].

A.3. STATIONARY SOURCES

The objective of the definition of a stationary source of sound is to address sources such as industrial and commercial establishments or ancillary transportation facilities. In order to further clarify the scope of the definition, the following list identifies examples of installations, equipment, activities or facilities that are included and those that are excluded as stationary sources.

(1) Included Sources

Individual stationary sources such as:

- Heating, ventilating and air conditioning (HVAC) equipment;
- Rotating machinery;
- Impacting mechanical sources;
- Generators;
- Burners;
- Grain dryers.

Facilities, usually comprising many sources of sound. In this case, the stationary source is understood to encompass all the activities taking place within the property boundary of the facility. The following are examples of such facilities:

- Industrial facilities;
- Commercial facilities;
- Ancillary transportation facilities;
- Aggregate extraction facilities;
- Warehousing facilities;
- Maintenance and repair facilities;
- Snow disposal sites;
- Routine loading and unloading facilities (supermarkets, assembly plants, etc.).

Other sources such as:

- Car washes;
- Race tracks;
- Firearm Ranges.

(2) Excluded Sources

Specific sources or facilities:

- Construction activities;
- Transportation corridors, i.e. roadways and railways;
- Residential air conditioning devices including air conditioners and heat pumps;
- Gas stations;
- Auditory warning devices required or authorized by law or in accordance with good safety practices;
- Occasional movement of vehicles on the property such as infrequent delivery of goods to convenience stores, fast food restaurants, etc.

Other noise sources, normally addressed in a qualitative manner in municipal noise by-laws:

- The operation of auditory signalling devices, including but not limited to the ringing of bells or gongs and the blowing of horns or sirens or whistles, or the production, reproduction or amplification of any similar sounds by electronic means;
- Noise produced by animals kept as domestic pets such as dogs barking;
- Tools and devices used by occupants for domestic purposes such as domestic power tools, radios and televisions, etc., or activities associated with domestic situations such as domestic quarrels, noisy parties, etc;

Noise resulting from gathering of people at facilities such as restaurants and parks.

Activities related to essential service and maintenance of public facilities such as but not limited to roadways, parks and sewers, including snow removal, road cleaning, road repair and maintenance, lawn mowing and maintenance, sewage removal, garbage collection, etc.

A.4. PREDICTABLE WORST CASE IMPACT

The assessment of noise impact requires the determination of the "predictable worst case" impact. The "predictable worst case" impact assessment should establish the largest noise excess produced by the source over the applicable limit. The assessment should reflect a planned and predictable mode of operation of the stationary source.

It is important to emphasize that the "predictable worst case" impact does not necessarily mean that the sound level of the source is highest; it means that the excess over the limit is largest. For example, the excess over the applicable limit at night may be larger even if the day-time sound level produced by the source is higher.

A.5. DEFINITIONS

In the interpretation of Publication NPC-232, the following definitions are of particular relevance:

- Ancillary Transportation Facilities
  "Ancillary transportation facilities" mean subsidiary locations where operations and activities associated with the housing of transportation equipment (or personnel) take place. Examples of ancillary transportation facilities include, but are not limited to, substations, vehicle storage and maintenance facilities, fans, fan and vent shafts, mechanical equipment plants, emergency services buildings, etc;

- Construction
  "Construction" includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, moving, land clearing, earth moving, grading, excavating, the laying of pipe and conduit whether above or below ground level, street and highway building, concreting, equipment installation and alteration and the structural installation of construction components and materials in any form or for any purpose, and includes any work in connection therewith; "construction" excludes activities associated with the operation at waste and snow disposal sites;

- Construction Equipment
  "Construction equipment" means any equipment or device designed and intended for use in construction, or material handling including but not limited to, air compressors, pile drivers, pneumatic or hydraulic tools, bulldozers, tractors, excavators, trenchers, cranes, derricks, loaders, scrapers, pavers, generators, off-highway haulers or trucks, ditchers, compactors and rollers, pumps, concrete mixers, graders, or other material handling equipment;

- Conveyance
  "Conveyance" includes a vehicle and any other device employed to transport a person or persons or goods from place to place but does not include any such device or vehicle if operated only within the premises of a person;

- Highway
  "Highway" includes a common and public highway, street, avenue, parkway, driveway, square, place, bridge, viaduct or trestle designed and intended for, or used by, the general public for the passage of vehicles;

- Motor Vehicle
  "Motor vehicle" includes an automobile, motorcycle,and any other vehicle propelled or driven otherwise than by muscular power, but does not include the cars of diesel, electric or steam railways, or other motor vehicles running only upon rails, or a motorized snow vehicle, traction engine, farm tractor, self-propelled implement of husbandry or road-building machine within the meaning of the Highway Traffic Act;

- Motorized Conveyance
  "Motorized conveyance" means a conveyance propelled or driven otherwise than by muscular, gravitational or wind power;

- Noise
  "Noise" means unwanted sound;

- Point of Reception - Class 3 Area
  "Point of reception - Class 3 Area" means a point on the premises of a person within 30 m of a dwelling or a camping area, where sound or vibration originating from other than those premises is received.

  For the purpose of approval of new sources, including verifying compliance with Section 9 of the Environmental Protection Act, the point of reception may be located on any of the following existing or zoned for future use premises: permanent or seasonal residences, hotels/motels, nursing/retirement homes, rental residences, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship.

  For equipment/facilities proposed on premises such as nursing/retirement homes, rental residences, hospitals, and schools, the point of reception may be located on the same premises;

- Stationary Source
  "Stationary source" means a source of sound which does not normally move from place to place and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction or a conveyance;

- Urban Hum
  means aggregate sound of many unidentifiable, mostly road traffic related noise sources.

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