

Environmental Assessments of Rail Projects - the Noise Factor

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1. ENVIRONMENTAL ASSESSMENT

Under the *Canadian Environmental Assessment Act* (CEAA), a responsible authority must identify all potential adverse effects of the construction and operation of a proposed project and determine whether those effects are significant. Projects with insignificant effects are permitted to proceed while those with significant effects may require further study or may be prevented from proceeding at all.

2. RAIL INFRASTRUCTURE

There are two main types of rail infrastructure projects under the *Canada Transportation Act* (CTA) which require an (EA) - rail crossings and the construction and operation of new railway lines.

3. NOISE COMPLAINTS

The Canadian Transportation Agency (Agency) has received a variety of noise complaints over the past decade. Those have focussed on: idling diesels (steady drumming), car shunting (impulse), whistling (steady) and pass-by (steady). The Federal Court has ruled that the Agency has no authority, under its present legislation, to deal with noise complaints. Amendments to the CTA are being contemplated to give the Agency the authority to deal with noise complaints.

4. RAIL NOISE

The sensible noise level generated by idling locomotives is a combination of the noise of the diesel engines and the drumming effect of the multiple internal combustion engines running at the same time. A single idling diesel can generate as much as 93 dBA (at source) while with 2 diesels the noise rises to 101 dBA and with 16 diesels it can be 110 dBA.

Car shunting can involve noise as high as 100 dBAI while a train whistle must be 110 dBA, at source. Pass-by trains tend to generate 95 to 100 dBA of noise.

Idling locomotives are the predominant type of complaint received. The drumming contributes significantly to the annoyance. The worst case encountered by the author involved the storage of 32 idling locomotives over a Christmas season. In that case the predicted noise level was over 108 dBA in the complainant's yard. In most cases, the noise levels range from 80 to 90 dBA.

5. EFFECTS OF RAIL NOISE

Many rail yards are located within 100 m of sensitive areas. In some cases, a railway may have built or re-activated a yard near homes while in many cases, residential areas have encroached on rail yards. In other cases, a rail yard which was built over 1 km from homes, now has homes almost up to the yard fence.

Rail noise can interfere with sleep, awaken residents, cause fatigue, irritability and general stress. Impulse noises are novel, unheralded, or unexpectedly loud and thus can startle people or awaken them.

When examining the effects of rail noise one must look at the source type, the location of the source relative to the receiver, the time of day and the noise level at the receiver. Table 1 summarizes the possible effects of various rail noise sources.

Table 1. Effects of Rail Noise

Noise Source	Time of Day	Effect
idling	day	annoyance
	night	sleep prevention
shunting	day	startle, stress
	night	startle awakening
pass-by	day	minimal
	night	minimal

6. NOISE ASSESSMENT

When conducting an EA, one must determine whether an adverse effect is potential and whether it will be significant. Rail noise can definitely be an adverse effect and in some cases it can be significant.

Present noise standards fall into one of two types: emission or receiving. Table 2 summarizes the United States Environmental Protection Agency USEPA emission standards for railway operations:

Table 2 USEPA RAIL NOISE STANDARDS

Source	Level (dBA at 32 m)
idling locomotive	70 - 93
moving locomotive	90 - 96
idling switcher	70 - 87
moving switcher	90
coupling (impulse at receiver property line)	92 dBAI

Source rail noise levels are normally quoted at 32 m from the source. According to the laws of physics, noise tends to decay 6 dB per doubling of distance over bare ground or 3 dB per doubling over vegetated or rough surfaces. Given the attenuation of noise and the proximity of homes to rail yards, it is not surprising that rail operations can cause noise levels in the range of 60 to 110 dBA at nearby residences.

Health officials, on the other hand, consider the noise levels at the receiver. For residential areas, the generally accepted noise standards are: 55 dBA at night (2300 to 0700) and 45 or 50 dBA daytime (0700 to 2300).

If one uses the USEPA levels as typical rail noise source levels and seeks to achieve the residential noise standards, one quickly sees that rail operations should be separated 500 m to 1 km away from residential areas. If such an approach were to be applied in Canada, either the noise from many rail operations would have to be seriously curtailed or many residential areas should never have been built near rail operations in the first place. Thus neither the USEPA nor residential standards provide a workable model for assessing rail noise.

Regulators have turned to another approach when

assessing airport noise. They examine the possibility of annoyance as reflected in the likelihood of complaints:

Noise Level (dBA)	Annoyance
less than 55	minimal
55-60	sporadic complaints
60-65	increasing complaints
65 plus	widespread complaints and increasing likelihood of legal action

When assessing the noise factor for a proposed rail project, one should consider the following information:

- ▶ land-use including sensitive areas (residential, hospitals, nursing homes, schools and day-cares)
- ▶ typical historical noise levels in sensitive areas
- ▶ predicted noise levels in sensitive areas during the construction and operation of the proposed project
- ▶ prediction of per centage of population in sensitive areas that will experience noise levels in excess of 65 dBA (DNL)

7. DISCUSSION

No single noise standard exists which can be used to effectively determine the significance of potential noise from rail operations.

- ▶ A predicted DNL above 65 dBA indicates that widespread complaints or legal action should be expected
- ▶ An increase of 10 dB above existing noise levels would be noticeable and could lead to complaints
- ▶ As the per centage of the population that will experience a DNL above 65 dB increases, one would expect increased complaints
- ▶ The EA community needs guidance to make noise assessment more easily understood by practitioners, proponents and the public at large.

NOTE: the views expressed in this paper are those of the author alone and do not reflect the policy of the Canadian Transportation Agency