NOISE FROM RAILWAY OPERATIONS IN CANADA

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1. INTRODUCTION

Railway operations by their very nature generate sounds. Those sounds are caused by the engines in the locomotives, the wheel/rail contact, coupling collisions, and whistles or bells. The sound of a passing train is intermittent while bell ringing and shunting collisions are impulsive. The intermittent rail sounds may vary from 73 to 96 dBA in intensity at 30 m while impulsive ones may vary from 75 to 90 dBAI at 30 m.

Noise is the human reaction to sound and reflects the level of human annoyance generated by the unwantedness of sound. Loudness alone is not an accurate measure of the degree of annoyance that a sound generates. A dripping tap can be very annoying while 110 dBA symphony or rock music can be very pleasing to the listener. Location is also an important factor. A train whistle in an industrial park can be accepted as a way of life while a whistle even many kilometres away, in a wilderness park, can be very annoying to wilderness campers.

When evaluating noise in residential areas, the universally accepted levels are 55 dBA during the day and 50 dBA at night. The latter level has been adopted to ensure an indoor level of 35 dBA which is the level for undisturbed sleep. The major Canadian railways support those residential levels. The Canadian National Guidelines for Environmental Noise Control call for a reception point limit of 50 dBAI for stationary impulsive sounds. Shunting collisions are considered stationary sources.

Source of Railway Noise	Noise Level (dBA at 30 m)	Setback (to achieve 50 dBA)
idling locomotive	70 -73 (summer)	420 m
idling locomotive	90 - 96 (winter)	5980 m
moving locomotive	90- 96	5980 m
coupling cars	80 - 90 dBAI (at 100 m)	10,000 m

Table 1: Sample Rail Noise Levels (Based on EPA levels)

Table 1 indicates the loudness of the sound emanating from four typical rail operations. It also shows that, in order to achieve a night-time residential level of 50 dBA across open ground, significant setbacks (assuming a 6 dB attenuation of sound per doubling of distance) may be involved.

2. EFFECTS OF NOISE

Noise has both physiological (hearing loss, increased blood pressure) and psychological (sleep disturbance, annoyance or emotional stress and violence) effects on people. Rail noise, as a form of community noise, leads to the interruption of rest, relaxation and sleep as well as speech interference. Annoyance is increased when people feel they have no control over the noise source.

People cope with noise by turning their emotions inward, changing their environment, complaining or taking legal action. Only a very small per centage of a population will actually complain or take legal action. Thus these two actions are very poor indicators of annoyance. There is no such thing as acclimatization to noise. Rather the human brain reduces an individual's conscious awareness of noise while the body continues to suffer the physiological and psychological effects (i.e. the body still experiences the fight or flight response.

Complainants indicate that rail noise affects the use of their outdoor spaces, interferes with conversation and disturbs their sleep. Some complainants report not being able to get a good night's sleep for months at a time ie. They are suffering from sleep depravation. Shunting noise is especially disturbing as it is unpredictable and usually involves loud impulses which can bring people bolt upright in their beds.

3. NOISE CONTROL

Environmental guidelines attempt to define exposure limits beyond which the impacts of a stressor are intolerable or unacceptable. Noise guidelines can be imperfect as it is difficult to establish the dose/effect relationship of noise due to the wide variability of individual responses to noise.

At present, there are no rail noise guidelines in Canada. The United States Environmental Protection Agency has issued source guideline lines for railway equipment. The major Canadian railways have expressed an interest in developing Canadian rail noise guidelines. The European Community is ahead of North America in that it has undertaken noise mapping and thus can identify areas of concern.

Rail noise can be controlled at source by installing mufflers on equipment, lubricating rails to reduce wheel squeal or making changes in railway operations . Noise barriers and

berms have been effective for abating road noise. However, due to the low frequency of diesel noise, the drumming of multiple diesels and impulsive nature of coupling noise, barriers and berms have often not been effective in controlling rail noise.

In urban areas, incompatible land use development has led to conflict e.g. where airports or railways and residential housing are adjacent to each other. Separation of source and receptor can be an effective approach at the project planning and design stages. However, this is not always possible when existing railways and homes are adjacent to each other. Many rail yards and airports alike were built at some distance from residential areas but subsequent residential development has occurred which has brought houses into close proximity of the yards or airports. Other presentations in this session deal more specifically with this land-use conflict.

4. RAIL COMPLAINTS

In the case of rail noise complaints, the source (railway) and receptors (residents) fall under different jurisdictions. Railways, which cross provincial or international boundaries, are under federal jurisdiction ie. the Canadian Transportation Agency (Agency). Under the *Canada Transportation Act* (Act), the Agency is responsible for regulating rail construction and operations including noise. Housing falls under provincial jurisdiction. The public is often confused because the provincial or municipal regulatory requirements, with which they are familiar don't apply to federal railways.

The Agency, in consultation with the Railway Association of Canada, has developed a process for investigating rail noise complaints under the Act. Complainants are urged to initially deal directly with the railway and to attempt to resolve the complaint at that level. If the parties cannot resolve the complaint, one of them can request the Agency to either mediate the dispute or formally investigate the complaint under the Act. The Agency's goal for mediation is to help parties to resolve their disputes as an alternative to the formal adjudicative process.

Agency investigations determine whether a railway company has done as little damage as possible in its construction and operation. The Agency then renders a decision and may order a railway to take corrective action. The wording of the Act does not anticipate either the incompatibility of rail operations with residential land use or the issue of which land use occurred first.

As stated above, there are no federal rail noise standards in Canada. Thus each complaint is dealt with on its own merit. Investigations centre on what steps a railway has or can take to minimize the noise from its construction or operation.

5. CASE STUDIES

The Agency has dealt with a variety of noise complaints involving various rail operations:

- pass-by trains,
- idling diesels,
- shunting, and
- bells and whistling.

The presentation will outline examples of each type of operation and the Agency's decision in such cases case.

6. FUTURE OUTLOOK

Many rail noise complaints have arisen because of the incompatibility of rail and residential land-uses. This is because residential development has been permitted in close proximity to rail yards. Conversely with the improved Canadian economy, railways are using more yards than before and formerly idle rail lines or yards are being put into service again. The result is more rail traffic near homes. It is estimated that over 600,000 Canadians are exposed to excessive rail noise. To ultimately resolve the issue of rail noise, one must address both:

- new home construction near existing railways, and
- the increase or relocation of rail traffic near existing homes.

Canadian rail noise guidelines would be helpful to more objectively assess the impact of noise from rail operations and to evaluate the effectiveness of abatement measures.

8. REFERENCES

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