PROBLEMS RELATED TO AIRCRAFT NOISE IN SWITZERLAND

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SUMMARY

Some of the problems related to aircraft noise such as aircraft noise indices, immission standards, land use planning, en route noise and general sensitivity to noise are briefly discussed.

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In Switzerland the Noise and Number Index (NNI) has been chosen to quantify the exposure to aircraft noise in the communities surrounding the three national airports (Geneva-Cointrin, Basle-Mulhouse and Zürich-Kloten):

$$NNI = \overline{PNL} - 80 + 15\log N$$

$\overline{PNL}$ is the mean value of the peak perceived noise levels exceeding 80 PNdB, and N is the daily number of aircraft movements (exceeding that level) from 06 to 22 hours averaged over a year.

The regulations concerning land use restrictions around these airports are based on the NNI index and apply to three noise zones. Zone A is the noisiest with NNI values of above 65, zone B is located between 55 and 65 NNI contours, and zone C between 45 and 55 contours. Construction of new dwellings, with proper sound insulation, are allowed only in zone C.

Surveys around the three national airports were conducted in the early seventies' (ref. 1) and the authors at that time found a good correlation between community annoyance and the Noise and Number Index (the correlation was even higher when a slightly modified NNI formula was used). However, over the last years, this index has come under criticism, especially in the United Kingdom where it was first introduced (ref. 2). The Swiss federal commission of experts for the evaluation of maximal noise immission values (immission standards) is also considering the possibility of switching from the NNI index to a sound equivalent level (Leq) based index, as is already the case in Switzerland for exposure to other types of noises, according to the general formula: Lr = Leq + K. The commission has still to determine these immission values with regard to exposure to aircraft noise around the national airports. This has already been done for other types of noises (road traffic noise, regional airports and helistations, train noise, etc.) and the corresponding Lr values are published in the Ordinance on protection against noise "OPB" (ref. 3) as required by the Federal law of environmental protection "LPE" (ref. 4).

Three sets of standards are generally given for noise immission values: a) planning values (the lowest, are concerned for example with dwellings in new building zones); b) maximal immission values (concern existing building zones); and c)

"alarm" values (are the highest, and when exceeded, some action like the sound insulation of dwellings must be undertaken).

Another problem that has arisen, as in other countries, is that of annoyance caused by military aircraft noise. As a result, tentative regulations have been submitted for consultation to all the interested parties (state, political and other interested organizations) which is the usual procedure before the final regulations are issued and enforced.

Helicopter noise has also become a source of annoyance, especially in mountain areas. The noise of helicopters is generally well accepted by the local communities when they are on a life saving mission, but not when they are used for heliskiing; consequently, the number of sites where heliskiing is permitted has had to be limited to a maximum of 48.

People are now well aware and sensitive to environmental problems; not wanting to be exposed to aircraft noise, they often solicit the airport noise authorities for advice concerning the location of the property they intend buying.

Two other major problems of concern are how to reconcile the continuous growth of airports and the land use restrictions in the surrounding communities; secondly, how to maintain the night curfew presently in force in the mentioned airports.

It is worthwile to notice that complaints regarding aircraft noise arise now from areas more distant from airports than they used to be ten years ago. En route noise itself is still a minor problem. Most of the complaints come from the Swiss Plateau (close to the German border) and concern mostly propeller airplanes, although some complaints about jet aircraft have been reported in very quiet touristic regions. The major reason for complaints is sleep disturbance, and en route noise might become a problem if the frequency of night overflights increases sharply.

Some concern also arises from the possible future introduction of aircraft powered by new technology engines (ie. propfans) and which may have significant different noise characteristics compared to jet airplanes of today. One of the subjects discussed in this context is the introduction of en route noise certification. If such a procedure should be adopted, despite costs and inherent difficulties of reliable measurements, one of the criteria to be taken into account should be that en route aircraft do not wake up people in bedrooms with open windows in otherwise quiet areas. Generally recommended levels to avoid sleep disturbance is that in bedrooms Leq (night) should not exceed 35-40 dB(A) and that individual peak levels should remain under 50-55 dB(A), depending on the type of noise (continuous or intermittent), the number of peaks and the difference between peak level and background level (refs. 5, 6 and *).

Since the surveys concerning the three national airports were done some 17-18 years ago, check studies could be necessary to ascertain that those results are still valid. Such check studies have been conducted in France (ref. 7), the Netherlands (ref. 8) and the United Kingdom (refs. 9 and 10), and suggest that

* Griefahn, B.: Sleep in noisy environments. Review and further research. To be published in Environment International.

community annoyance (or sleep disturbance) related to aircraft noise exposure indices used in those countries (dose-response relationship) has not changed significantly over the years.

General sensitivity to noise is one of the important emotional variables affecting individual response to noise. People are generally divided into three noise sensitivity categories: high, moderate (or normal) and low. In a recent survey in Geneva (ref. 11), we found that around 25 per cent of the population in noisy (exposed to road traffic noise) and quiet neighborhoods considered themselves as being very sensitive to noise and that this percentage was not significantly age dependent (except for adolescents aged 13 to 15 years). But low sensitivity to noise decreased with age up to 65 years and then increased sharply. It would be interesting to verify if comparable results are obtained from the population exposed to aircraft noise. A better apprehension of the effects of aircraft noise in the presence of other noise sources is also desirable.

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