Day Night Average Sound Level

(DNL)

The Descriptor of Choice for Airport Noise Assessment

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U.S. Department of Transportation
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Office of Environment and Energy

2. This measure should be used for aircraft noise studies and aircraft noise standards.

3. The prediction procedures should be standardized.

In 1976, EPA formally recommended that FAA adopt DNL as the standard aircraft noise descriptor. FAA's decision to adopt DNL was also based on a number of other factors. In 1980, the Federal Interagency Committee on Urban Noise consolidated Federal guidance on the incorporation of noise considerations in local land planning and site review "to encourage noise sensitive development, such as housing, to be located away from major noise sources." Members of the committee included U.S. EPA, U. S. Department of Transportation (DOT), U.S. Department of Housing and Urban Development (HUD), U.S. Department of Defense (DOD) and the Veterans Administration (VA). The Committee adopted DNL as the best descriptor of noise for land use planning and established related land use compatibility guidelines. In the same year, the Acoustical Society of America developed an American National Standard (ANSI S3.23-1980) which specified DNL as the acoustical measure to be used in assessing compatibility between various land uses and the outdoor noise environment. In addition, Congress established a voluntary program of airport noise compatibility planning (Aviation Safety and Noise Abatement Act) and directed FAA to issue regulations which would:

a. establish a single system of noise measurement to be uniformly applied in measuring noise at airports and in surrounding areas for which there is a highly reliable relationship between projected noise and surveyed reaction of people to noise;

b. establish a single system for determining the exposure of individuals to noise which results from the operations of an airport; and

c. identify land uses which are normally compatible with various exposures of individuals to noise.

Accordingly, in 1981, FAA issued Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning*. As part of this regulation, FAA formally adopted DNL.

Beyond the political and regulatory factors and the need for standardization, the adoption of DNL was the clear choice on scientific grounds. In general, the effects of noise on people results from complex relationships of numerous factors, and separating the effects of these often confounding factors is impractical if not impossible. The variability in the way individuals react to noise makes it impossible to accurately predict how any one individual will respond to a given noise. However, when the community is considered as a whole, trends emerge which relate noise to annoyance. DNL alone provides an adequate indicator of community annoyance to aircraft noise. EPA, in the publication titled "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (550/9-74-004), states "This formula of equivalent level [DNL] is used here to relate noise in residential environments to chronic annoyance by speech interference and in some part by sleep and activity interference." This report, which is usually identified as EPA's 'Levels Document,' goes on to say that "The short-term annoyance reaction to individual noise events, which can be studied in the field as well as in the laboratory, is not explicitly considered, since only the accumulating effects of repeated annoyance by environmental stimuli can lead to environmental effects on public health and welfare."

But, single event noise levels have never been shown to be of any use in predicting community reactions to aircraft noise or developing compatible land use plans. EPA selected DNL as the single-number measure for the purpose of identifying levels of environmental noise, in part to achieve, as is stated in the Levels Document: "...the ultimate goal is to characterize with reasonable accuracy the noise exposure of whole neighborhoods (within which there may actually exist a fairly wide range of noise levels), so as to prevent extremes of noise exposure at any given time, and to detect unfavorable trends in the future noise climate. For these purposes, pinpoint accuracy and masses of data for each location are not required, and may even be a hindrance, since one could fail to see the forest for the trees."