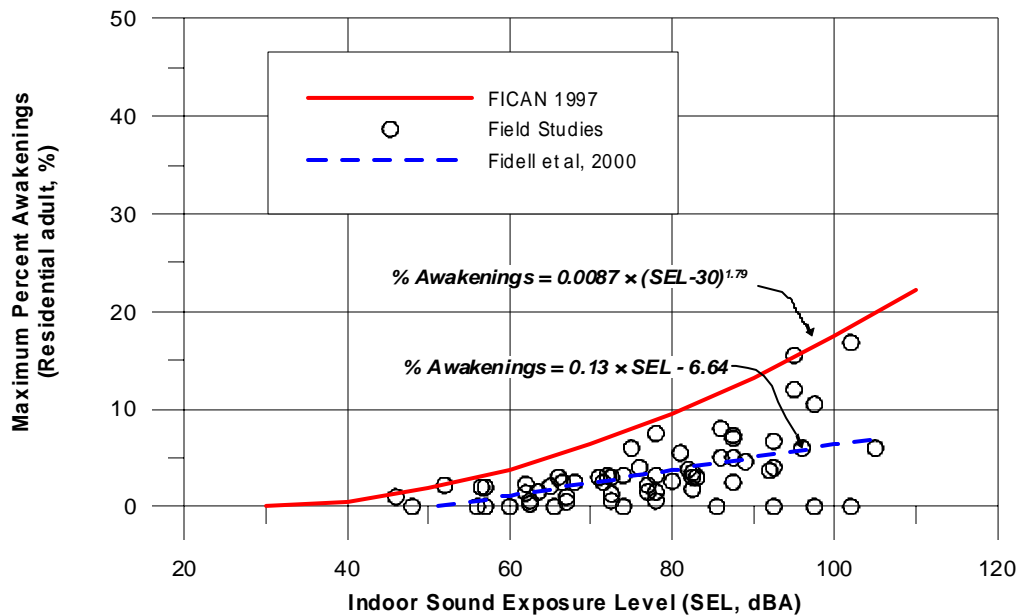


**Sleep Disturbance** - The U.S. Environmental Protection Agency identified an indoor DNL of 45 dB as necessary to protect against sleep interference (EPA, 1974). Assuming a conservative structural noise insulation of 20 dB for typical dwellings with windows closed, an indoor DNL of 45 dB corresponds to an outdoor DNL of 65 dB as minimizing sleep interference.

Prior to and after the EPA's 1974 guidelines, research on sleep disruption from noise has led to widely varying observations. In part, this is because: (1) sleep can be disturbed without causing awakening, (2) the deeper the sleep the more noise it takes to cause arousal, (3) the tendency to awaken increases with age, (4) the person's previous exposure to the intruding noise and other physiological, psychological and situational factors. The most readily measurable effect of noise on a sleeping person is the number of arousals or awakenings.

In June 1997, the U.S. Federal Interagency Committee on Aviation Noise (FICAN) reviewed the sleep disturbance issue along with data from the 1992 Federal Interagency Committee on Noise recommendations (which was primarily the result of many laboratory studies) and presented a new sleep disturbance dose-response prediction curve (FICAN, 1997) as the recommended tool for analysis of potential sleep disturbance for residential areas. The FICAN curve, shown in **Figure D-16.8**, was based on data from field studies of major civilian and military airports. For an indoor SEL of 60 dBA, **Figure D-16.8** predicts a maximum of approximately 5 percent of the exposed residential population would be behaviorally awakened. FICAN cautions that this curve should only be applied to long-term adult residents, i.e., not to campgrounds, trailer parks, or other temporary residences.

**FIGURE D-16.8**  
**SLEEP DISTURBANCE DOSE-RESPONSE RELATIONSHIP**



Source: FICAN, 1997; Fidell, et. al., 2000;