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IDENTIFICATION OF PRODUCTS AS MAJOR SOURCES OF NOISE

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Publication of Report

As specified in the Noise Control Act of 1972 (Public Law 92-574, 86 Stat. 1234), the first step toward promulgation of noise standards for new products is identification of those products that are major sources of noise. Section 5(b) of the Act provides as follows:

> The Administrator shall, after consultation with appropriate Federal agencies, compile and publish a report or series of reports (1) identifying products (or classes of products) which in his judgment are major sources of noise, and (2) giving information on techniques for control of noise from such products, including available data on the technology, costs, and alternative methods of noise control. The first such report shall be published not later than eighteen months after the date of enactment of this Act.

Accordingly, this report is the initial identification of those products which in the judgment of the Administrator are major sources of noise. Additional products will be identified as major sources of noise in other reports that will be issued from time to time. In future identification of products as major sources of noise, those products listed in Table 2 are presently considered the principal candidates. However, the specific regulation of products in accordance with the Act will be based on further developments in the knowledge of health effects, number of people affected, and consideration of cost and technology factors which have a bearing on the feasibility of controls.

The Act does not provide a mechanism by which the Administrator shall identify products which are a major source of noise nor is there any one universally accepted method to determine which noise sources pose the most serious threat to public health and welfare. In the absence of a standard approach, an effort has been made in the identification process to take into account the many factors affecting public health and welfare. Ultimately, however, the indentification of major noise sources must be partly subjective. At this point, reliance on judgment was necessary, with the recognition that other reasonable approaches might exist. The identification of major sources of noise under section 5 is in addition to the regulation of in-use interstate rail carriers and motor carriers under sections 17 and 18 of the Act. A Notice of Proposed Rule Making has been published for motor carrier regulations and similar action is proceeding with respect to rail carrier regulations.

Factors affecting public health and welfare. Many factors together determine whether the sound emitted by a product will have a serious adverse effect on public health and welfare. These factors include the frequency characteristics of the products operating, the length of time each product operates, the proximity of people to the products, the time of day or other situational variables, the presence of other noise sources, and the degree to which the people exposed to the product can control the product and/or its sound emission.

Many attempts have been made to combine these factors into quantitative measures of noise in a way that can be directly related to human response. At the present time, the A-weighted scale is widely used to convert the sound pressure at different frequencies into one indicator of loudness known as the sound level (dB(A)).

The accumulated evidence of research indicates that human response to sound (hearing loss and annoyance) is a function of exposure to sound energy (frequently represented by sound level). Hearing loss or annoyance may occur either due to exposure to high sound levels for short periods (impulses) or due to exposure to moderate sound levels over long periods of time.

Two cumulative equivalent sound level measures have been developed to indicate a long-term hazard to public health and welfare. The first measure is the equivalent sound level (Leq), which is the constant sound level (dB(A)) that in a given situation and time period would convey the same sound energy as does the actual time-varying sound; Leq is used to indicate a long-term hazard to hearing. A variation of Leq, the day-night sound level (Ldn) is the equivalent sound level during a 24 hour period with a 10 dB(A) penalty added to events occurring at night to account for the increased annoyance; Ldn is used to indicate long-term annoyance. These measures are not the most appropriate to indicate health and welfare effects due to high level noise of short duration.

In situations where the effects of noise exposure are well represented by Leq and Ldn, the problem of identifying the major source(s) of the noise still remains. This task is not difficult in a given situation, but it is very difficult to do for the nation as a whole, since in different situations and in different geographic areas of the country, different products are the major source(s) of noise.

Since public health and welfare deals with populations, noisy products must be compared through an analysis of the size of the population affected and the way it is affected by their noise emissions. However, even when this is done, it is difficult to compare annoyance to hearing loss or to determine whether severely annoying a few people is more serious from a public health and welfare standpoint than slightly annoying a vast number of people.

General agreement exists that incidence of hearing loss is a more severe health and welfare effect than annoyance. However, the varying situations in which these effects occur make this generalization difficult to apply. Human exposure to products whose noise emissions are capable of causing hearing loss or annoyance may occur in-occupational, recreational, or residential settings and such exposure may be to a greater or lesser degree a matter of personal choice. Evidence exists that noise exposure capable of causing hearing loss may not be annoying if the person exposed has some measure of control over the source of the noise. To give a specific example, it is difficult to determine whether the potential hearing loss associated with the use of a recreational vehicle is worse from the standpoint of public health and welfare than the annoyance and interference with activities associated with freeway noise.

Another situation is the case of products used in occupational settings, since they may be designed to be compatible with OSHA noise standards. Even if a product meets OSHA requirements, it may still be a major source of noise and may ultimately be so identified. In many cases the same product may be both a source capable of producing hearing loss and causing community annoyance. This

would simplify the identification dilemma except that efforts to quiet exterior (passby) noise on some products may actually intensify the sound level at the operator's ear.

Approach used by EPA to identify major sources of noise. In an effort to develop an EPA criteria for identifying products as major sources of noise, first priority has been given at this time to sources that contribute to community noise exposure. Community noise exposure is that exposure experienced by the community as a whole as a result of the operation of a product, as opposed to that exposure experienced by the users of the product. Ultimately, of course, noise that adversely affects public health and welfare in any setting must be controlled when this is technologically feasible and economically reasonable.

In this report, a two-step approach has been used to identify major sources of community noise. First, the Ldn index has been used to identify residential areas where a large number of people are exposed to high day-night sound levels. Then in these areas, major contributors to the cumulative day-night sound level have been identified as a major source of noise.

The day-night sound level (Ldn) has been specifically developed as a measure of community noise. Since it is a cumulative energy measure, it can be used to identify areas where noise sources operate continuously, or where sources operate intermittently but are present enough of the time to emit a great deal of sound energy in a 24 hour period.

A number of attempts have been made to estimate the daily exposure of people to various kinds of community noise. Table 1 summarizes the estimated number of people in residential areas subjected to urban traffic noise, aircraft noise, construction site noise, and freeway traffic noise at or above an outdoor Ldn of 60, 65, and 70 dBA.

EPA has identified an outdoor Ldn of 55 dBA as the day-night sound level requisite to protect the public from all long-term adverse public health and welfare effects in residential areas. Table 1 indicates that it will be necessary to quiet the major sources contributing to urban traffic noise, construction noise, freeway traffic noise, and aircraft noise if this level is to be achieved. In other situations, it will be necessary to quiet other products.

TABLE 1.—*Number of people subjected (millions)*

Outdoor L_{dn} level	Urban traffic noise	Aircraft noise	Construction site noise	Freeway noise
70 dB +	4–12	4–7	1–3	1–4
65 dB +	15–35	8–15	2–6	2–5
60 dB +	40–70	16–32	7–13	3–8

NOTE: Estimated number of people in residential areas subjected to noise of different kinds at or above specified day-night sound levels (outdoors).

Identification of major sources. Aircraft are a major source of noise and regulations for aircraft will be proposed to FAA as described in Section 7 of the Noise Control Act. Aircraft are, pursuant to section 3(3)(A), excluded as products under section 6 of the Act.

Section 6(a)(1)(C) sets out four categories of products that may be regulated by the Administrator for noise emissions:

(1) Construction equipment.

(2) Transportation equipment (including recreational vehicles and related equipment).

(3) Any motor or engine (including any equipment of which an engine or a motor is an integral part).

(4) Electrical or electronic equipment.

Section 6(b) states that regulations may also be prescribed for products other than those indicated in section 6(a).

The newly-manufactured construction equipment and transportation equipment categories have been selected as first priority for regulatory attention because of the extensive community exposure to noise emanating from products in these categories.

Table 2 indicates both the typical sound level (dB(A)) associated with each product at fifty feet (Column 1) and the estimated total sound energy (lkw-hr) emitted by all existing models of each product per day (Column 2). These measures are useful tools for evaluating the noise problem associated with the operation of certain products, but neither is sufficient to identify major sources because they do not take into account the situation in which the products operate.

TABLE 2

Transportation vehicles	Typical sound level dB(A) at 50 ft	Estimated total sound energy kWh/day
1. Trucks (medium and heavy over 10,000 No. GVWR)	84	5,800
2. Automobiles (sports, compacts)	75	1,150
3. Automobiles (passenger)	69	800
4. Trucks (light, pickup)	72	570
5. Motorcycles (highway)	82	325
6. Buses (city and school)	73	20
7. Buses (highway)	82	12
8. Snowmobiles	85	500
9. Motorcycle (off-road)	80	160

Construction equipment	Typical sound level dB(A) at 50 ft	Estimated total sound energy kWh/day
1. Dump truck	88	290
2. Portable air compressor	81	147
3. Concrete mixer (truck)	85	111
4. Jackhammer	88	84
5. Scraper	88	79
6. Dozer	87	78
7. Paver	89	78
8. Generator	78	65
9. Pile driver	101	63
10. Rock drill	98	53
11. Pump	76	47
12. Pneumatic tools	85	36
13. Backhoe	84	34

The sound level (dB(A)) at 50 feet is an indication of the perceived loudness at that distance from the product when it is operating. This measure suggests which products will be perceived as noisy by the community when they are operated alone. The daily total sound energy emission is useful because it is an aggregate measure that takes into account the sound energy emission rate of the product, the number of products operating, and the amount of time they are operated each day. Neither measure directly relates human exposure or response to the product's noise emissions; but when several products are operated in similar situations, these two measures serve to indicate which are the major sources of noise (i.e., it is possible to compare two pieces of construction equipment operating at the same site).

Transportation vehicles. Table 2 indicates that medium and heavy duty trucks contribute the most sound energy to the environment of any highway vehicle and that an individual truck will be perceived to be louder than most other transportation vehicles. These values are a composite of noise emitted in both urban traffic conditions and on freeways, and there can be little doubt that trucks are one of the major contributors to traffic noise.

Consequently, in accordance with section 5(b) of the Noise Control Act, this report identifies medium and heavy duty trucks having a gross vehicle weight rating (GVWR) in excess of 10,000 pounds as a major source of noise. GVWR means the value specified by the manufacturer as the loaded weight of a single vehicle.

Construction Equipment. Table 2 indicates that pile drivers and rock drills are perceived as the loudest pieces of construction equipment when they are operating, but the sound energy measure indicates that these products do not contribute as much sound energy to the environment as other products operating on construction sites. The fact that dump trucks, portable air compressors, and concrete mixers (trucks) have sound levels equal to or lower than other construction equipment, and higher total sound energy emissions means that these are the most widely used pieces of construction equipment.

A control technology report prepared for the Environmental Protection Agency on dump trucks and concrete mixers (Bolt, Beranek, and Newman, *Specialty Construction Trucks: Noise and Cost of Abatement*) indicates that their contribution to construction site noise is largely engine-related noise that will be controlled when these trucks meet the standards to be proposed for medium and heavy duty trucks. This leaves portable air compressors as the major source of sound energy and the most widely used product among pieces of construction equipment contributing to construction site noise.

Consequently, in accordance with section 5(b) of the Noise Control Act, this report identifies portable air compressors

rated above 75 cubic feet per minute as a major source of noise.

Preliminary information on the cost and technology of newly-manufactured medium and heavy duty trucks and portable air compressors is available for public inspection in the Environmental Protection Agency Freedom of Information Center, 401 M Street SW., Washington, D.C. Additional information, as prescribed in section 5(b)(2), will be published in advance of rulemaking.

This report on the identification of Major Noise Sources is issued under the authority of section 5(b) of the Noise Control Act of 1972 (86 Stat. 1234, Public Law 92-574).

JOHN QUARLES,
Acting Administrator.

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