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Part III

Environmental Protection Agency

Noise Emission Standards for Transportation Equipment; Interstate Rail Carriers

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 201]

Noise Emission Standards for Transportation Equipment; Interstate Rail Carriers

AGENCY: U.S. Environmental Protection Agency.

ACTION: Notice of Proposed Rulemaking.

SUMMARY: The United States Court of Appeals for the District of Columbia Circuit has directed the U.S. Environmental Protection Agency to propose and promulgate final noise emission regulations for facilities and equipment of the nation's interstate rail carriers.

This notice proposes an amendment to the existing railroad noise emission regulation. Standards are being proposed which would limit overall facility and equipment noise emissions. Standards are also being proposed which would limit the noise caused by specific pieces of equipment, or operations of equipment.

The standard to control overall facility and equipment noise is a receiving property limit. Measurements are made on property around railroad yards to determine whether the standard is being met.

The standards for specific pieces of equipment, or operations of equipment, apply to retarders, mechanical refrigeration cars and car coupling. Measurements are made at a specific distance from the equipment, or where the activity takes place, to determine whether the standards are being met.

DATES: All interested persons are invited to submit comments on the proposed regulation up until 4:30 p.m., Friday, June 1, 1979.

ADDRESSES: A docket, No. ONAC 79–01 has been established for this rulemaking and will be open to public inspection and copying during normal business hours at the U.S. Environmental Protection Agency's Public Information Reference Unit, Room 2922, 401 M Street, SW, Washington, D.C. 20460. Written comments to the docket should be forwarded to the following address: Rail Carrier Docket Number ONAC 79–01, Office of Noise Abatement and Control (ANR–490), U.S. Environmental Protection Agency, Washington, D.C. 20460.

Commenters may submit one copy to the docket, although five (5) copies would be appreciated.

FOR FURTHER INFORMATION CONTACT: Dr. William E. Roper, Office of Noise Abatement and Control (ANR–490), U.S. Environmental Protection Agency, Washington, D.C. 20460, (703) 557–7747.

To receive copies by mail of the proposed regulation, and/or the Background Document contact: Mr. Charles Mooney, EPA Public Information Center (PM–215), Room 2119, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, (202) 755–0717.

SUPPLEMENTARY INFORMATION:

11.0 Background Information

The U.S. Environmental Protection Agency developed a noise emission regulation for railroad locomotives and railcars operated by interstate carriers. The regulation was promulgated on December 31, 1975. The Association of American Railroads challenged the regulation (Association of American Railroads vs Costle, 562 F. 2d 1310, D.C. Cir. 1977) on the basis it did not include standards for all railroad equipment and facilities as required by Section 17 of the Noise Control Act of 1972.

In developing the December 31, 1975 railroad noise emission regulation, we addressed the issue of broadening the scope of the regulation to include facilities and additional equipment. We decided that railroad facility and equipment noise, other than locomotives and railcars, was best controlled by measures which did not require national uniformity of treatment. We wanted to leave State and local authorities freedom to address site specific problems, on a case by case basis, without Federal hindrance. If the Federal government establishes standards for railroad facilities and equipment, States and local authorities cannot adopt or enforce any standard (for facilities and equipment covered by the Federal standard) unless it is identical to the Federal standard. In instances, however, where a local situation demands a more stringent noise regulation, State and local authorities could establish and enforce standards or controls and take other actions, provided there is no conflict with the Federal regulation. However, before a State or local government can implement this right, Federal review of their contemplated action is required. We decided that the health and welfare of the Nation's population being jeopardized by railroad facility and equipment noise, other than locomotives and railcars, was best served by specific controls at the State and local level and not by the Federal government regulations which would have to address railroads on a national and therefore on a more general basis.

As a result of the Association of American Railroads' (AAR) legal action, the U.S. Court of Appeals for the District of Columbia Circuit ruled that we must broaden the scope of the existing regulation to include virtually all [1] railroad facilities and equipment. The regulation being proposed broadens the scope of the December 31, 1975 regulation to comply with this directive. The standards have been developed in terms of typical and average situations, as indeed they must, to arrive at national uniformity of treatment. We were unable to translate the solutions to the many local and site-specific problems to a single Federal solution. The uniform national standards we are proposing go only part of the way in controlling railroad facility and equipment noise throughout the country. This is because of the lack of control technology at costs which are reasonable on an aggregate basis to reduce the noise to acceptable levels. Our health and welfare analysis indicates there are an appreciable number of people in the nation who will still be significantly and adversey impacted by railroad noise once this rule is in effect. Because of the preemptive nature of the Federal law, States and localities may not be able to provide further relief to their citizens in many of these cases.

The current date by which the court has ordered publication of final regulations is February 23, 1979. We will seek an extension of this date to facilitate public comment and to prepare our response to those comments in preparation of the final regulations. The 45 day comment period identified for public comment in this NPRM anticipates the Court's granting an extension. Should the Court's action necessitate a change in this schedule, we will publish a notice in the **Federal Register** announcing such a change.

2.0 The Proposed Regulation

The regulation establishes standards for overall railroad facility and equipment noise, as well as specific standards for retarders, refrigerator cars and car coupling operations. The regulation applies to most railroad facilities and equipment contained within the facilities, including equipment previously regulated by 40 CFR Part 201.

[1] Facilities and equipment *not* covered by this regulation include: Mainline rail operations, bells and whistles, facilities not directly associated with railroad trackage (e.g. an office building in a downtown area) and maintenance-of-way equipment.

Overall Facility and Equipment Noise

It is proposed that, effective on the dates listed, noise levels on property on or beyond a railroad yard boundary line shall not exceed the levels of Table 2.1 (a), (b), (c), and (d). Noise levels are to be measured as prescribed in Subpart D.

Measurements are made only on developed adjoining or nearby property, so that costs of noise abatement are not imposed on railroads in locations where the noise does not intrude on people. Receiving property is defined in 201.1(kk) as any property that receives the sound from railroad facility operations, but that is not undeveloped or owned or controlled by a railroad; except that occupied residences located on property owned or controlled by the railroad are included in the definition of "receiving property." Railroad crew sleeping quarters located on property owned or controlled by the railroad are not considered in this rulemaking since these quarters are the subject of regulation by the FRA of DOT.

Through trains (as defined in 201(ss)) are also not subject to the receiving property standards below, since they are already regulated under the noise control standards earlier promulgated by EPA. Through train operation on mainline roadbed from a noise emission standpoint is essentially the same whether the roadbed is located within a rail yard facility or elsewhere. At this time no additional noise control is considered necessary for through trains.

Table 2.1(a).—*Proposed Receiving Property Standards—24-Hour Period*

Effective date	Standard, (L_{dn})	Facility
Jan. 1, 1982	70 dB	All Facilities & Equipment.
Jan. 1, 1985	65 dB	Hump Yard Facilities & Equipment.

Table 2.1(b).—*Proposed Receiving Property Standards—1-Hour Period*

Effective date	Standard, ($L_{eq(1h)}$)		Facility
	Daytime	Nighttime	
Jan. 1, 1982.	84 dB	74 db	All Facilities & Equipment.
Jan. 1, 1985	79 dB	69 dB	Hump Yard Facilities & Equipment.

The letters L_{dn} stand for Day-Night Sound Level. Further definition, and the rationale for the use of this descriptor appears in Section 4.

These standards meet the requirement of the Court order of providing comprehensive preemption, because they encompass essentially all equipment within the facilities.

Table 2.1(c).—*Equivalent of 70 L_{dn} for 24 Hours in A-weighted dB*[3]

Cumulative hours	Day (15 hours)	Night (9 hours)
2	81	71
3	79	69
4	78	68
5	77	67
6	76	66
8	75	65
10	74	.....
12	73	.....
15	72	.....

[3] Values are rounded up to next dB.

Table 2.1(d).—*Equivalent of 65 L_{dn} for 24 hours in A-weighted dB*[3]

Cumulative hours	Day (15 hours)	Night (9 hours)
2	76	66
3	74	64
4	73	63
5	72	62
6	71	61
8	70	60
10	69	.....
12	68	.....
15	67	.....

[3] Values are rounded up to next dB.

Tables 2.1(c) and 2.1(d) provide a simplified reference for determining the compliance or non-compliance of a railroad facility. The tables delineate the mathematical maximum L_{eq} limits, for a specified number of hours over one hour, that are equivalent to the L_{dn} 70 and L_{dn} 65. (E.g. If one is measuring L_{eq} at a railroad facility for 2 hours during the day and attains a value of 81 L_A, from Table 2.1(c), this would be considered equivalent to 70 L_{dn}. Thus the facility would be considered in compliance, unless a subsequent L_{dn} measurement shows otherwise. if the measured L_{eq} value does not exceed the appropriate value of Table 2.1(c) or 2.1(d), it is still possible that the L_{dn} standard is exceeded, meaning the facility is not in compliance. A facility is not in compliance if its measured noise level exceeds either the L_{dn} standard or the L_{eq} standard. if the measured L_{eq} were to be greater than 81 L_A, for the 2 hour daytime measurement period, the facility would be considered in non-compliance since the equivalent L_{dn} would mathematically exceed the 70 L_{dn} standard).

Retarder Noise

It is proposed that, effective on the date shown, retarder noise levels shall not exceed the level specified in Table 2.2, when measured at a distance of 30 meters as prescribed in Subpart C.

Table 2.2.—*Proposed Retarder Noise Standard*

Effective Date	Standard, L_A
January 1, 1982	90 dB

The rationale for a specific standard for retarders also appears in Section 4.

Refrigerator Car Noise

It is proposed that, effective January 1, 1982, refrigerator car noise, when the car is not in motion shall not exceed 78 dBA at 7 meters, as shown in Table 2.3. Noise levels are to be measured as prescribed in Subpart C.

Table 2.3.—*Proposed Refrigerator Car Noise Standard*

Effective date	Standard, L_A
January 1, 1982	78 dB

The rationale for a separate standard for refrigerator cars appears in Section 4.

Car Coupling Noise

It is proposed that, effective January 1, 1982, noise measured during car coupling operations shall not exceed 95 dBA at 30 meters, as indicated in Table 2.4, when measured as specified in Subpart C. This requirement is waived for situations where it is demonstrated that car creating levels in excess of the standard are not traveling at greater than 4 mph at the point of impact.

Table 2.4.—*Proposed Car Coupling Noise Standard*

Effective date	Standard, L_A
January 1, 1982	95 dB

The rationale for a car coupling standard appears in Section 4.

3.0 Technology and Cost

According to Section 17 of the Noise Control Act of 1972, entitled *Railroad Noise Emission Standards*, and as ordered by the Court, we are required to publish noise emission standards which set limits on the noise emission resulting from the operation of equipment and facilities of interstate rail carriers. Standards established must reflect the degree of noise reduction achievable through the application of the best available technology, taking into account the cost of compliance.

In order to fulfill the requirements of Section 17, we undertook a study of the interstate rail carrier industry, the principal sources of railroad noise, available noise control technology to quiet the sources of railroad noise, and the costs to implement the noise control and technology.

Technology

In our study to identify the best available technology, we were guided by the following definitions.

"Best available technology" is that noise abatement technology or technique available for application to equipment and facilities of surface carriers engaged in interstate commerce by railroad which produces the greatest achievable reduction in the noise produced by such equipment and facilities. "Available technology" is further defined to include:

1. Technology or techniques which have been demonstrated and are currently known to be feasible.

2. Technology or techniques for which there will be a production capacity to produce the estimated number of parts required in reasonable time to allow for distribution and installation prior to the effective date of the regulation.

3. Technology or techniques that are compatible with all safety regulations and takes into account operational considerations including maintenance, and other pollution control equipment.

Noise Sources

Noise resulting from rail facilities is a complex mixture of sounds generated by many different pieces of equipment and operations. Before identifying whether and what technology was available to quiet the noise from such facilities, we first had to identify the specific sources and operations causing the noise. Studies and investigations were conducted to give us this information.

Railyard facilities may be categorized into two basic types: hump yards and flat yards. Hump yards perform both the classification and industrial service functions for U.S. railroads. This type of yard generally consists of a subyard to receive incoming line-haul traffic, a subyard where these trains are broken up and reassembled into outbound configurations, and a subyard for outbound traffic. The unique characteristic of hump yards is that they employ a gravity-feed system between the receiving subyard and the classification subyard. This system consists of a hump crest and a series of devices called retarders to control the speed of cars as they are routed to areas where trains are assembled.

Flat yards also perform the classification and industrial service functions for the railroad system. Yard switch locomotives replace the crest/retarder system of the hump yards to move cars out of the receiving tracks and use either continuous push or acceleration/braking techniques to distribute them into specific classification tracks. The continuous push or the accelerate/brake action of the switch locomotive accomplishes the same function in a flat yard as the "crest-roll-retard" action in a hump yard.

Listed below are the significant noise sources associated with railyards:

- Engine noise from locomotives and switch engines
- Retarder squeal
- Refrigerator car noise
- Car-coupling noise
- Load cell testing, repair facilities and locomotive service area noise
- Wheel/Rail noise
- Horns, bells, whistles
- Trailer on flat car, container on flat car (TOFC/COFC)

The above sources of noise are common in both flat an hump yard facilities, except for retarder squeal which is common only in hump yard facilities. In flat yards, locomotives are a particularly important noise source due to their number and high activity requirement to physically move rail cars within the yard in the car classification process.

Because of such differences in importance of various individual noise sources between hump and flat yard facilities, different degrees of technology would be required for important noise sources to enable hump and flat yard facilities to meet the same property line noise level. In the case of flat yards where locomotives are an important noise source the amount of noise reduction technologically achievable at this time is more limited than the noise reduction technologically achievable for retarders for example. As a result of these differences it is expected to be more difficult and costly for flat yard facilities to meet property line noise levels at this time as low as hump yard facilities.

We investigated whether technology existed to control all but the wheel/rail noise and the warning or information imparting systems. The noise from wheel/rail interactions was not addressed. Present railroad maintenance practice of grinding car wheels (to assure their roundness) and rails (to assure their smoothness) is one of the principal currently available methods for reducing moving railcar noise. Both of these maintenance practices are addressed in the December 31, 1975 regulation. Federal Railroad Safety Regulations require wheel and rail grinding. Continued adherence to these regulations should minimize wheel/rail noise.

We have determined that technologies listed below are currently available to control the sources listed. It is these technologies that we have factored into our cost of compliance assessment.

Noise source	Noise control technology
Switch Engine Noise	Exhaust muffling and cooling fan treatment.
Retarders (master & group)	Barriers; retarder lubricating and ductile iron shoes.
Inert Retarders	Replace with releasable type.
Refrigerator Car Noise	Exhaust muffler and partial enclosure.
Load Cell Testing, repair facilities and service areas.	Enclose facility or relocate facility.
Car Coupling	Speed control.

Cost

"Cost of compliance" is the cost of identifying what action must be taken to meet the specified noise emission level, the cost of taking that action, and any additional cost of operation and maintenance caused by that action.

We have estimated the capital investment necessary to apply the available noise control technologies. The estimates consider the capital resources to purchase, fabricate and install the noise control technology. Capital investment represents the initial and subsequent investments that would be required to implement the technologies. We have also estimated total compliance costs on an annualized basis. The annualized costs also include incremental operating costs such as maintenance and fuel. These costs were developed from considerations of the elements of capital recovery, based on a 10 percent interest factor and the expected useful life for each type of noise abatement procedure.

In developing the cost of compliance, we have not included costs for disruption of service or removal of equipment and facilities from service. We believe we have established noise limits and allowed sufficient time for the implementation of the standards to avoid disrupting effects on rail operations. We are particularly interested in hearing from any who do not share this view and solicit information or data we may factor into our analysis.

We request comment not only on the cost and feasibility of attaining the standard, but also on the additional cost and financial impact on railroads due to moving from a 70 decibel to a 65 decibel standard for hump yards. This information will help the Agency to conclude whether the incremental costs of the 65 decibel standard for hump yards is reasonable.

4.0 Rationale for Standards Selection

Need for Health and Welfare Analysis

The Association of American Railroads has argued that public health and welfare related to noise are to be totally absent from the Agency's consideration. EPA does not share this view.

The Noise Control Act of 1972, 42 U.S.C. 4901 et seq., which places the duty upon EPA to reduce the noise from certain sources by regulations, declares that the policy of the United States is "to promote an environment for all Americans free from noise that jeopardizes their health or welfare." 42 U.S.C. 4901. Section 17 of that Act, which requires the EPA Administrator to publish regulations establishing noise emission limits on the facilities and equipment of interstate rail carriers, directs EPA to set standards that reflect the degree of noise reduction achievable through application of the best available technology taking into account the cost of compliance. 42 U.S.C. 4916(a). While that charge does not include a requirement for the consideration of the necessity for the protection of the public health and welfare, it is manifest that the standards cannot and should not be set in a void of information concerning those needs.

First, it is not possible to assess the best available noise reduction technology without having as a guide a noise control objective. There must be a target noise reduction in order to assess how effective technology is in accomplishing its objective. Since the reason that noise is sought to be reduced by any level of government to prevent the impingement on health and welfare, it is reasonable that the noise descriptor used be one that relates best to protecting the public health and welfare. For this reason, EPA has used a descriptor (L_{dn}) which correlates well with human response to assess the effectiveness of various types of available technology and to identify the "best".

Second, it is not possible to meaningfully take into account the cost of compliance without having an objective toward which those costs are imposed. The very best available technology is not always affordable. By the same token, the greatest reasonable cost that could be imposed is not always justifiable by the objectives of the regulation. Yet the Noise Control Act does not say that no costs should be imposed upon the industry. Rather, it is inherent in Section 17(a) that the costs that are imposed for noise control must be reasonable. The only means of judging whether they are reasonable is to scrutinize what they purchase, and the only utility of noise reduction is the protection of public health and welfare.

An additional way in which public health and welfare must affect cost determinations is in selecting the types of controls that the Agency will require. For instance, if EPA were to determine that the railroad industry could expend "x" million dollars per year for noise control, it would be irrational public policy to require that these funds be spent in areas where no one would benefit from them, if there were another way to benefit "y" people by spending the same "x" million dollars. This rationale is applied in this proposal by limiting facility noise measurements to receiving property as defined in § 201.1(kk), thereby eliminating the requirement to comply where people are not exposed to railroad noise.

In summary, EPA has concluded that public health and welfare plays an important role in setting standards under Section 17 of the Noise Control Act. The Act does not authorize the Agency to set standards at costs that are unreasonable in order to protect the public health and welfare. For this reason, the standards proposed in this regulation do not require abatement to the levels necessary to provide total protection to the public health and welfare. However, in assessing what available technology can accomplish in terms of meaningful noise reduction, in determining the limits beyond which costs should not be imposed, and in selecting the types of controls that should be imposed at that level of expenditure, consideration of the effects of noise reduction on public health and welfare are within the intent of the Act.

Overall Standard for Facilities and Equipment

Our studies show there exists available technology to reduce rail facility noise significantly at reasonable cost. We therefore are proposing standards which will limit the noise emissions from railroad equipment and facilities.

Specifically, the proposed regulation is applicable to all railroad equipment and facilities except: Mainline rail operations, horns, bells and whistles, facilities not directly associated with railroad trackage (e.g. an office building in a downtown area) and maintenance-of-way equipment.

- Mainline Rail: The control of noise from locomotives and rail cars is the principal noise abatement approach to the control of noise along the main lines. EPA could impose further limitations on the main line, but probably not without imposing major restrictions on the frequency of operations or the construction of barriers at an exorbitant cost. We therefore have proposed that the locomotive and rail car regulation limits contained in our previous regulation will be the only EPA restrictions on mainline operations.
- Horns, Bells and Whistles: Horns, bells and whistles and other warning devices produce a form of noise intended to be heard for safety reasons, instead of being an unwanted by-product of some activity. We do not intend therefore to set standards affecting these devices through this regulation.
- Facilities Not Directly Associated With Railroad Trackage: These regulations are not applicable to facilities such as tug boats, downtown office buildings and micro-wave relay towers. These items are not considered to be common noise sources forming the typical mix of railroad equipment and facilities.
- Maintenance-of-Way Equipment: EPA has identified some 17 pieces of equipment, not counting variations, comprising this category. To date, the Agency has been unable to identify clearly the noise levels of the specific pieces of equipment or the collective levels of possible combinations in which they might be used. Without this, the availability of technology or the costs of compliance cannot be determined. Consequently, EPA cannot set a specific aggregate noise limit (such as a not-to-exceed property-line limit circumscribing given maintenance-of-way work situations) or source limits on individual pieces of equipment.

To characterize rail facility noise and to place a limit on its level, we have chosen L_{dn}. L_{dn} is the Day-Night Sound Level. It is the primary community noise descriptor used by EPA to correlate with known effects of the noise environment on an individual and the general public. In the process of arriving at an L_{dn} value, noise levels occurring during the nighttime hours are weighted, 10 dB is added to the noise occurring during nighttime hours, to account for a greater degree of intrusiveness and its impact during the quieter nighttime ambient. L_{dn} is recognized within the scientific community as a good descriptor of the effect of noise on people and has been used by EPA in all of its previous noise control regulations in assessing the health and welfare benefits of regulatory actions.

Before settling on the L_{dn} descriptors, we reviewed several types of descriptor, including $L_{eq(24)}$ which has been

recommended by the AAR. The L_{eq} descriptor does not account for the greater degree of nighttime intrusiveness of noise by the addition of 10 dB to noise occurring during nighttime hours.[4] As such, L_{eq} does not correlate as well with known effects of the noise environment on the public. Since a noise control program is designed to reduce noise as it adversely affects the public health and welfare, if appears fundamental to us to account for known effects at nighttime. The disruption of sleep is one known effect. In this spirit, we have incorporated two L_{eq} descriptors; one for daytime and one for nighttime. Thus, we have not dismissed the use of the L_{eq} descriptor. We are proposing an hourly equivalent sound level, $L_{eq(1)}$ which is a separate standard independent of the L_{dn} standard. In actual use a one hour $L_{eq(1)}$ measurement would be made and compared with the daytime or nighttime $L_{eq(1)}$ limit as appropriate. A principal reason for including the hourly equivalent standards was to provide a short, simpler method for determining compliance with this regulation.

The standard as proposed sets limits for hourly L_{eq} values that are equivalent to a 24-hour L_{dn} assuming all of the acoustic energy which occurred during a 24-hour period occurred only during the hour or hours included in the L_{eq} measurement. More simply put, it is physically impossible to exceed the hourly L_{eq} value and not also exceed the 24-hour L_{dn} standard. Tables are also provided to determine compliance, based on the same principal if cumulative L_{eq} measurements are made for more than 1 hour. Because the L_{eq} and L_{dn} 24-hour standards are independent, it is possible to meet the hourly L_{eq} standard or its equivalent as specified in the tables and still fail the 24-hour L_{dn} standard. The technology and cost considerations upon which this regulation is proposed are based on the 24-hour L_{dn} standard, which is the most stringent of the standards required under this proposal. Therefore, the cost and technology projections presented are conservative from this perspective. It is anticipated however, that the principal compliance actions which may result from this regulation would utilize the shorter, simpler hourly L_{eq} standard. We welcome comments on this approach to an hourly L_{eq} standard.

We have determined that technology associated with the noise abatement techniques listed in Table 4.1 is available to limit flat and hump yard noise to an L_{dn} of 70, at or beyond the yard boundary. Details of the technology are discussed in the Background Document.

Table 4.1.—*Noise Abatement Techniques to Limit Flat and Hump Yard Noise to L_{dn} = 70*

Technique	Flat yard	Hump yard
Refrigerator Car Treatment	x	x
Switch Engine Treatment	x	x
Relocate or Enclose Load Cell Test Site	x	x
Relocate or Shut Down Idling Locomotive	x	x
Retarder Noise Barriers	x	x

We have also determined that technology associated with the noise abatement techniques listed in Table 4.2 is available to further limit flat and hump yard noise to an L_{dn} of 65, at or beyond the yard boundary. Details of the technology are discussed in the Background Document.

Because of the differences between hump yard facilities and flat yard facilities previously discussed, different techniques are required to control the noise level. The two types of yards require the same techniques to meet an L_{dn} = 70 (aside from retarder noise barriers for hump yards); however meeting an L_{dn} = 65 requires hump yards to further control retarder noise while flat yard facilities must make operational changes.

Table 4.2.—*Noise Abatement Techniques to Limit Flat and Hump Yard Noise to L_{dn} = 65*

Technique	Flat yard	Hump yard
Refrigerator Car Treatment	x	x
Switch Engine Treatment	x	x
Relocate or Enclose Load Cell Test Site	x	x
Relocate or Shut Down Idling Locomotive	x	x
Retarder Noise Barriers	.....	x
Fully Enclose Engine Repair/Car Service	x	.....
Reschedule Nighttime Activities/Limit Number of Classifications	x	.....
Ductile Iron Retarder Shoes	.....	x
Releasable Inert Retarders	.....	x

We have assessed the cost of compliance, including the economic impact associated with the cost, and taken it into account in selecting our standards. This assessment led to the conclusion that the cost to quiet flat yards to an L_{dn} of 70 and hump yards to an L_{dn} of 65 was not unreasonable. The L_{dn} 65 standard for hump yards increases the cost of the regulation over a general L_{dn} 70 standard and does not improve the benefit/cost ratio. We are proposing this standard because the technology required is available and we believe that the costs are reasonable. Our analysis of the cost for flat yards to achieve an L_{dn} of 65 indicated it would cost over 200 times the cost to quiet hump yards to this level because of the necessity for the flat yard to alter operations to achieve the 65 L_{dn} value and because of the very large number of flat yards. We therefore concluded it would not be reasonable to impose an L_{dn} of 65 on flat yards until noise abatement techniques, other than the alteration of existing railyard activities, became available, or unless an appropriate subcategorization of flat yards could reasonably be made thus requiring only some to attain this noise level. Comments contending operational changes should clearly demonstrate that all available noise control hardware were assessed before operational changes were considered necessary.

Standards for Specific Pieces of Equipment or Operations

In addition to the L_{dn} property line standard, standards are being proposed for three specific sources of railroad noise. These standards would limit the noise emissions from retarders, mechanical refrigeration cars and railcar coupling operations. Specific standards are being proposed for these three sources for the following reasons.

Retarder Standard. The retarder is a braking device used to reduce railcar speeds during classification operations in hump yards. The clamping action of the retarder against the wheels of the rail cars causes a highly audible and annoying screech to be emitted. Though the screeches are each of short duration, their character is such that they represent a major problem in terms of annoyance. A property line limit in terms of L_{dn} that measures the average level of noise occurring over a 24 hour period and does not account sufficiently for this source of irritating and intrusive noise. Technology is available to control retarder noise and we are, therefore, proposing an A-weighted sound level standard of 90 dB at 30 meters. Compliance with the standard would reduce retarder noise by as much as 20 dB or more.

The retarder standard does not apply to the inert retarders commonly located near the end of each classification track. Inert retarders act to hold the first rail car in place while additional cars are coupled to it forming a consist of cars on a classification track. Squeals may be produced by inert retarders when the consist of railcars are coupled to a locomitive and the train pulled through the inert retarder. Due partly to lower braking pressure, shorter retarder length, and very short duty cycle inert retarders generally create lower noise levels and much less frequent squeals than the other types of retarders described above. Consequently, EPA is not proposing a specific noise source standard for inert retarders. However a good noise abatement approach that is available for inert retarders is to install releasable units (which create no noise)

[4] The AAR recommendation for Leq is to avoid the application of 10 dB nighttime weighting factor. They are concerned that such an imposition "has the potential of severely hampering rail operations unless great care is taken in setting the allowed levels."

for all new construction and replacement appplications.

The only case where replacement requirement for and cost of releasable inert retarder replacement was considered necessary was to meet the proposed final hump yard facility receiving property standard.

Mechanical Refrigerator Car Standard. Refrigerator cars are special purpose cars used to transport perishable goods. The car cooling systems are powered by diesel engine-driven compressor units. The cars are often parked in large groups consisting solely of these units. They are often parked near a rail carrier's property line and the incessant drone created by the equipment on the cars can be a serious noise problem. Since refrigerator cars travel from yard to yard, a souce standard for this equipment is being proposed to place the burden of compliance on the car owner and not on each yard operator where the cars travel. Better mufflers for the diesel engine and engine enclosures treated with absorptive foam are available for quieting these noise emission levels at a reasonable cost. Compliance with the proposed A-weighted sound level standard of 78 dB at 7 meters is expected to reduce mechanical refrigerator car nose by about 10 dB in the noisiest known situation.

Car Coupling Standard. Impact noise resulting from the coupling of railroad cars is a major noise problem for those living around railyards. Where few couplings occur in a yard over a 24–hour period, it is possible for the overall facility and equipment standard to be met without the best available technology being applied to reduce noise emissions. The reason for this again relates to the short duration of peak noise levels.

We have conducted car coupling noise tests to determnine the relationship between car coupling speed and noise. The results of our study show a direct relationship between noise and speed. As car coupling speed increases so does the level of noise emitted upon car coupling.

We reviewed car coupling practices of several yards to learn of the rules that govern the speeds at which cars are coupled. Our information indicates that a 4 mile per hour guideline has been adopted as a generally accepted "best practice" by rail carriers to prevent damage to cars and freight alike.

The studies we conducted show that for all known situations noise levels resulting from car couplings at or below 4 miles per hour do not exceed an average A-weighted sound level of 95 dB at 30 meters. Therefore, we are proposing a standard to limit car coupling noise to an A-weighted sound level of 95 dB at 30 meters, since this limit has offsetting benfits in protection of cars and freight, and appears to be an accepted "best practice" present procedure in use by many rail carriers as well. This regulation essentially codifies existing general practice and thus should result in no additional costs to rail carriers. This standard is waived where it is demonstrated that cars are not travelling at greater then 4 mph at point of impact and yet exceed the specified noise level.

5.0 Impact of the Proposed Regulation

Health and Welfare

The impact of the proposed regulations on rail carrier facility and equipment noise can be expressed as the reduction in the number of people subjected to noise that may jeopardize their health and welfare. The number of people affected depends upon the penetration of the noise into the community and the number of people in proximity to the railroad property. To investigate this impact we seleced over 100 railroad yard sites throughout the country and studied information relative to population densities and types of land use around the site. We combined these results with the total number of railroad yard facilities by type of yard and predicted noise impact on the population. From the analysis, we estimate that there are about four million people in the United States exposed to day-night average railyard noise levels of 55 L_{dn} or greater. An outdoor L_{dn} value of 55 dB is the level of noise EPA has identified as being protective of public health and welfare with an adequate margin of safety.[5]

[5] Information of Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. 550/9–74–004, U.S. EPA. Washington, D.C., 1974.

Compliance with our proposed standards for existing yards is, therefore, expected to provide an environment free from railroad noise that jeopardizes the health and welfare for about 830 thousand of our Nation's people. The benefits are likely underestimated since they were computed from census data and, thus, only include residential impact while ignoring commercial and industrial impact.

Cost

In developing the estimated cost of this proposed regulation the following sequential procedure was used:

1. Identify noise sources located in rail yards.
2. Identify noise abatement procedures that can be applied to each source.
3. Estimate the noise abatement resulting from the application of each procedure.
4. Determine the number and type of procedures which must be applied to achieve selected noise levels at yard boundaries.
5. Estimate the costs incurred to measure yard noise levels.
6. Calculate the costs incurred to apply all necessary procedures.
7. Estimate the costs incurred to measure yard noise levels.
8. Calculate the total costs to achieve specified maximum noise levels at yard boundaries for all rail yards.
9. Develop cost estimates to achieve the same maximum noise level at yard boundaries through the acquisition of additional property around each yard.
10. Apply the above cost estimates to all major and other railroad companies.

In summary from table 4.3 presents the estimated cost by noise source and railyard facility type for compliance with a 70 L_{dn} standard effective in 1979.

Table 4.3.—*Cost Estimates for Noise Abatement of U.S. Railroads to Reach L_{dn} 70*

Noise sources	Control techniques			
Type	Type	Unit cost	Capital costs ($000)	Annualized costs ($000)
Hump Yards: 124:				
Master Retarders	Barrier Sets	$22,500	$2,790	$594
Group Retarders	Barrier Sets	15,000	11,160	2,374
Switch Engines	Mufflers and Fan Treatment	1,200	372	170
Load Test Site	Relocate or Enclose	90,000	2,790	575
Measurement	Instru	10,000	1,240	582
Subtotal—Hump yard costs			18,352	4,295
Flat Classification Yards: 1113:				
Switch Engines	Mufflers and Fan Treatment	1,200	3,340	1,527
Load Test Site	Relocate or Enclose	90,000	16,650	3,430
Measurement			1,013	
Subtotal—Flat classification yard costs			19,990	5,970

Table 4.3.—*Cost Estimates for Noise Abatement of U.S. Railroads to Reach L_{dn} 70*—Continued

Noise sources	Control techniques			
Type	Type	Unit cost	Capital costs ($000)	Annualized costs ($000)
Industrial Yards: 1381:				
Switch Engines	Mufflers and Fan Treatment	1,200	4,142	1,894
Measurement	Instru	10,000	4,630	4,311
Subtotal—Industrial yards			8,772	6,205
Refrigerator Cars	Mufflers and Fan Treatment		110	2,640
Grand total			49,764	18,798

Table 4.4 identifies the additional control technique and costs that would be necessary for hump yard facilities to meet a 65 L_{dn} standard in 1979.

2Additional Costs for Hump Yard Facilities To Go From L_{dn} 70 to L_{dn} 65

Noise sources	Control techniques			
Type	Type	Unit cost	Capital costs ($000)	Annualized costs ($000)
Hump Yards: 124:				
Master and Group Retarders	Ductile Iron Shoes	$112,000		$13,061
Inert Retarders	Releasable Retarders	10,000	$10,960	10,496
Total—Hump yard costs			39,960	24,357

After making the necessary adjustment for the effective dates in the proposed regulation, the total capital investment to the railroad industry for compliance with the proposed regulation is estimated to be approximately $91 million. The total annualized cost for compliance is estimated to be about $27 million industry-wide. By contrast, were we to require a level of 65 L_{dn} at all railyards (both flat yards and hump yards), the annulized cost would be over 4 billion dollars. This large increase in cost is due to the non-availability of technology to further quiet flat yard equipment, thus requiring either curtailment of operations or purchase of additional buffer land around rail yard facilities. Because the cost of operational curtailment was extremely difficult to estimate with any confidence, purchase of noise buffer land was assessed and resulted in the 4 billion dollar estimate. On this basis, it was determined that the more stringent standard cannot be imposed at a reasonable cost at this time.

Economic Impact

A separate analysis of the economic impact upon the railroad industry and individual firms comprising Class I and Class II railroads [6] was undertaken. Our analyses are purely statistical in nature and relay on assumptions regarding future conditions of the railroad industry and the U.S. economy. The economic impact analysis (cash flow/closure analysis) is based on projections determined from the previous three years of historic data. The financial ratio analysis is based on 1976 statistics. The possible loss of revenue to trucks is likely to be mitigated as a result of the noise regulations which are presently in effect for new medium and heavy duty trucks and motor carriers. However, EPA solicits additional information on the cross-elasticities of transportation modes. Therefore, our estimates of the impact on railroad cost of doing business and employment are at best a first approximation.

Although we recognize the financial problems of the railroads we conclude that the proposed noise regulation will not result in a significant burden on either the railroad industry or any of the individual Class I and Class II railroads that are in relatively good financial condition. We realize that the borrowing capacity to finance noise abatement equipment is limited and that railroads already have negative net worth or cash flows. Those railroad companies that are in marginal financial condition and whose parent company (where applicable) is also in marginal financial condition may be more severely impacted. Based upon our analysis of potential closure, we feel there is limited potential for closure directly caused by the regulation and request limited potential for closure directly caused by the regulation and request comments from individual railroads on this. It is anticipated that the implementation of the proposed standards could increase the average unit price of principal freight shipment services by 0.4 percent. It is also anticipated that the demand for rail carriers to transport freight could decrease on the average by 0.5 percent.

To assess the potential impact on employment that might occur as the result of this rulemaking, we first looked at present employment levels and revenues of the railroad industry. Extrapolating from the costs that could be incurred to meet the proposed rule, we statistically determined the net railroad revenue reductions could affect employment in two sectors: the railroad industry and suppliers of noise abatement materials and equipment. After the regulations are in effect, and over a subsequent 19 year compliance period, the railroad industry could experience a cumulative *decrease* of up to fourteen hundred employees. This decrease accounts for anticipated changes in the total operating revenues of railroads resulting from the estimated compliance costs to meet the regulation proposed. The suppliers on the other hand could experience an *increase* of up to two hundred employees. This increase takes into account the average employment change resulting from the procurement and fabrication of the noise control materials and equipment. The overall employment effect is, then, estimated to be an approximate cumulative twelve hundred worker decrease between the year 1981 and 2000.

We conducted an analysis of economic impact of bankrupt roads as well as those recently reorganized to form the Consolidated Rail Corporation (Conrail). The bankrupt roads included Boston and Maine; Chicago, Milwaukee, St. Paul & Pacific; Chicago, Rock Island & Pacific; and Morristown & Erie. From the analyses, we concluded that the proposed noise regulation could increase the average unit price of commodity shipments by up to 0.4 percent. Further, we concluded that there could be a decrease in the demand for railroad carrier services up to 0.5 percent on all bankrupt roads, except Boston and Maine Railroad where the decrease could approach 0.6 percent. We estimate a net employment decrease in the workforce of these roads by a

[6] Operating railroads (including switching and terminal companies) are classified by the Interstate Commerce Commission in terms of annual operating revenues. Effective January, 1976 the break point between Class I and Class II railroads was $10 million; and on January 1, 1978 it was raised to $50 million.

total of about 400 workers, with over 300 workers related to those firms comprising Conrail.

The proposed regulation is not expected to have a measureable effect upon the Gross National Product (GNP).

In developing the proposed regulation we endeavored to acquire and use all available and accessible data in the timeframe available to us under the court order. We will continue our efforts to evaluate the impact on all railroads for which the regulations apply as we move to finalize our revised regulation. We welcome comments on the impact of the proposed regulation on individual railroads, with specific indication of the role which financial assistance already being made available by the Federal Government might play in mitigating any adverse economic impact.

6.0 Enforcement

The Noise Control Act places primary enforcement responsibility with the Federal Railroad Administration (FRA) of the Department of Transportation (DOT). Specifically, Section 17 of the Act directs the Secretary of DOT to promulgate regulations to ensure compliance with the EPA railroad noise standards. In addition, Section 17 directs the Secretary of DOT to carry out such regulations through the use of his powers and duties of enforcement and inspection authorized by the Safety Appliance Act, the Interstate Commerce Act, and the Department of Transportation Acts.

The FRA has indicated EPA that it will promulgate compliance regulations and will conduct compliance investigations. However, resource constraints may result in limited enforcement activity at the Federal level.

Since the needs for strict enforcement of the regulations may vary considerably among localities, EPA anticipates that the major enforcement activity will need to be conducted by State and local agencies if the regulations are to be effective. In fact, EPA has designed these regulations in a manner which will facilitate the adoption and enforcement of identical regulations by State and local governments. In addition EPA does plan to provide some technical assistance to State and local agencies to assist them with their enforcement programs.

7.0 Public Comment

The Agency is committed by statute and policy to public participation in the decision making process for its environmental regulations. We encourage and solicit communications and comments from as many diverse views as possible on all aspects of the proposed regulation. Normally the Agency allows 90 days for public comment on a proposed rule such as this. However, Section 17 of the Noise Control Act limits the amount of time between proposal and final publication of railroad noise emission standards to 90 days. This means we must limit the public comment period to allow time to fully review comments received so that we may weigh them appropriately in drafting the final regulation. Therefore, the public comment period will close at 4:30 pm on June 1, 1979.

8.0 Background Document

We have compiled information and data used as a basis for the proposed regulation into a single document entitled "Background Document for Proposed Revision to Rail Carrier Noise Emission Regulation". The document may be obtained from: U.S. Environmental Protection Agency, Public Information Center (PM–215, Room M2194D), Waterside Mall, Washington, D.C. 20460, (202) 755–0717.

Evaluation Plan

We intend to review the effectiveness and need for continuation of the provisions contained in this action no more than five years after initial effective date of the final regulation. In particular, we will solicit comments from affected parties with regard to actual cost incurred and other burdens associated with compliance and will also review noise data after the interstate rail carrier noise emission regulations go into effect as to its effectiveness.

Reporting and Recordkeeping Requirements

We are not aware that this proposed regulation would impose any significant new or additional reporting or recordkeeping requirements on affected parties. We, therefore, specifically invite comment as to any substantial additional budens and how they might be reduced.

Regulatory Analysis

We have determined that this action is not a "significant" regulation and therefore have not prepared a Regulatory Analysis as would be required by Executive Order 12044.

Environmental Impact Statement

We have prepared a draft Environmental Impact Statement which presents the effect of the proposed regulation. This document may be obtained from our Public Information Center whose address appears above.

This regulation is proposed under the authority of Section 17 of the Noise Control Act of 1972, (42 U.S.C. 4916).

Dated: April 4, 1979.

Douglas Costle,

Administrator.

It is proposed to amend 40 CFR Chapter 1 by amending Part 201 as follows:

1. The Table of Contents for Part 201 reads as follows:

Subpart A—General Provisions

Sec.
201.1 Definitions.

Subpart B—Interstate Rail Carrier Operations Standards

201.10 Applicability
201.11 Standard for locomotive operation under stationary conditions.
201.12 Standard for locomotive operation under moving conditions.
201.13 Standard for rail car operations.
201.14 Standard for refrigeration cars under stationary conditions.
201.15 Standard for car coupling operations.
201.16 Standard for retarders.
201.17 Standard for noise on receiving property.

Subpart C—Measurement Criteria for Specific Equipment/Facility Items

201.20 Applicability and purpose.
201.21 Quantities measured.
201.22 Measurement instrumentation.
201.23 Acoustical environment, weather conditions, and background noise for locomotives and rail cars.
201.24 Procedures for the measurement of locomotive and rail car noise.
201.25 Acoustical environment, weather conditions background noise for stationary refrigeration cars, car coupling operations, and retarders.
201.26 Procedures for the measurement of stationary refrigerator cars, car coupling operations and retarders.

Subpart D—Measurement Criteria for Noise on Receiving Property

201.30 Applicability and purpose.
201.31 Measurement instrumentation.
201.32 Measurement locations and weather conditions.
201.33 Procedures for measurement.

Authority: Section 17 of the Noise Control Act of 1972 (42 U.S.C. 4916).

PART 201—RAILROAD NOISE EMISSION STANDARDS

2. Section 201.1 is amended by deleting paragraph (l), redesignating paragraphs (m) and (n) as new paragraphs (l) and (m) respectively, and by adding new paragraphs (n) through (tt) to read as set forth below.

Subpart A—General Provisions

§ 201.1 Definitions.

* * * * *

(n) "Adjusted Measured Sound Level" means the measured day-night sound level of the combination of all sounds received at the measurement location minus one decibel.

(o) "Car Coupling Test" means measurements made to determine the level of noise produced when one or more rail cars couple with one or more other rail cars or when a locomotive couples with one or more rail cars.

(p) "Clearly Dominant Sound" means a sound which contributes ⅘ of the total value of the day-night weighted, or hourly, A-weighted squared sound pressure resulting from that sound and all other sounds. The level of a clearly dominant sound is within one decibel of the adjusted measured sound level; or equivalently, the component day-night sound level associated with the combination of all other sounds is at least 6 decibels below the level of the component which is clearly dominant.

(q) "Component Sound Level" means the sound level, in decibels, associated with a single class of sounds, or with the sound from a specific source or type of source.

(r) "Component Sounds from Railroad Facility Operations" means all sounds emanating from equipment operating within railroad facilities, except for the sounds of through trains.

(s) "Component Sounds from Non-railroad Facility Operations" means all sounds that contribute to the measured sound at a community measurement location which emanate from sources not under the operational control of a railroad; e.g. residential neighborhood component, aircraft component, traffic component, etc.

(t) "Component Sounds from Through Trains" means all sounds emanating from through trains.

(u) "Day-night Sound Level" means the 24-hour equivalent sound level, in decibels, for the period from midnight to midnight, obtained after addition of ten decibels to sound levels produced from midnight to 7 a.m. and 10 p.m. to midnight (0000 to 0700 and 2200 to 2400 hours). When the day-night sound level is measured, it is not necessary that the measurement period begin at midnight. It is abbreviated by L_{dn}.

(v) "Day Sound Level" means the equivalent sound level, in decibels, over the 15-hour time period from 7 a.m. to 10 p.m. (0700 to 2200 hours).

(w) "Decibel" means the unit measure of sound level and other kinds of levels. It is abbreviated as dB.

(x) "Dominant Sound Component" means that the sound from a defined class of sound contributes at least one-half of the total value of the day-night weighted, or hourly, A-weighted squared sound pressure resulting from that sound and all other sounds.

(y) "Energy Average Level" means a quantity calculated by taking ten times the common logarithm of the arithmetic average of the antilogs of one-tenth of each of the levels being averaged. The levels may be of any consistent type, e.g. maximum sound levels, sound exposure levels, equivalent sound levels, day-night sound levels, etc.

(z) "Energy Summation of Levels" means a quantity calculated by taking ten times the common logarithm of the sum of the antilogs of one-tenth of each of the levels being summed. The levels may be of any consistent type, e.g. day-night sound level, equivalent sound level, etc.

(aa) "Equivalent Sound Level" means the level, in decibels, of the mean-square A-weighted sound pressure during a stated time period, with reference to the square of the standard reference sound pressure of 20 micropascals. It is the level of the sound exposure divided by the time period.

(bb) "Hourly Equivalent Sound Level" means equivalent sound level, in decibels, over a one-hour time period, usually, but not necessarily, reckoned between integral hours. It may be identified by the beginning and ending times, or by the ending time only. It is abbreviated as $L_{eq(1)}$.

(cc) "Mainline Operations" means the movement of trains over the rail lines classified as "main track". "Main track" means a track, other than an auxiliary track, which may extend through yards or between stations, upon which trains are operated by timetable or train order or both, or the use of which is governed by a signal system.

(dd) "Maximum Sound Level" means the greatest A-weighted sound level in decibels measured during the designated time interval or during the event.

(ee) "Measured Day-night Sound Level" means the level measured in accordance with the procedures in this part during any continuous 24-hour period with an integrating sound level meter set to read out the day-night sound level, or calculated using the measured hourly equivalent sound levels.

(ff) "Measured Hourly Equivalent Sound Level" means the level measured in accordance with the procedures in this part during a total period of one hour.

(gg) "Night Sound Level" means the equivalent sound level, in decibels over the split 9-hour period from midnight to 7 a.m. and from 10 p.m. to midnight (0000 to 0700 and 2200 to 2400 hours).

(hh) "Partial Day-night Sound Levels" means the quantity calculated in accordance with the rules for calculating day-night sound level, but utilizing only some of the hourly values of equivalent sound level and substituting zeros for the hourly values not utilized.

(ii)"Railroad Equipment and Facilities" encompasses most equipment and facilities for the maintenance or operation of common carriers engaged in the transportation of persons or property by rail and directly associated with track operations. These terms are more particularly specified as including, but not necessarily limited to, the following:

(1) *Equipment.* (i) Locomotives (self-propelled vehicles designed for and used on railroad tracks in the transport of rail cars, including self-propelled rail passenger vehicles),

(ii) rail cars (non-self-propelled vehicles designed for and used on railroad tracks),

(iii) special purpose equipment (including but not limited to ballast cribbing machines, bolt machines, brush cutters, compactors, welding machines, snow plows, and other numerous types of maintenance-of-way equipment), and

(iv) car ferries, and carfloats.

Note.—Paragraphs (ii)(1)(i) and (ii) of this section are controlled by 40 CFR Part 201, §§ 201.11, 201.12, and 201.13.

(2) *Facilities.* (i) Track, roadbed, and related structures, such as retarders, switches, tunnels, bridges, trestles, stations, yards and shop buildings and the real property upon which they are placed.

(ii) Railroad yards such as flat yards, hump yards, trailer-on-flat car and container-on-flatcar yards, freight house facilities, and locations used for routine maintenance or performance testing of railroad equipment.

(iii) Railroad owned or operated terminal and storage facilities and their related structures used for loading and unloading bulk commodities.

(iv) Railroad owned or operated shops, equipment maintenance facilities, equipment service and testing facilities and engine houses.

(jj) "Railroad Facility Boundary" means the line that separates the property owned or controlled by the railroad and used for movement of rail equipment on railroad track and for other railroad purposes from receiving property. Railroad facilities are linked

together to form an extensive, continuous railroad system (i.e., railroad yard, railroad line, railroad station, railroad line, etc.). Separate boundaries shall be determined for each facility; that is, the simple continuous boundary around each such facility shall be continued through the juncture with any adjacent facility which serves as a link in the rail system; i.e., through a juncture between a mainline roadbed facility and a railroad yard facility, or between a railroad yard facility and a branch line roadbed facility.

(kk) "Receiving Property"means any property that receives the sound from railroad facility operations, but that is not undeveloped or owned or controlled by a railroad; except that occupied residences located on property owned or controlled by the railroad are included in the definition of "receiving property." Railroad crew sleeping quarters located on property owned or controlled by the railroad are not considered as residences.

(ll) "Receiving Property Measurement Location" means a location on receiving property that is on or beyond the railroad facility boundary, or on a residential dwelling measurement surface, and that meets the receiving property measurement location criteria of Subpart D.

(mm) "Refrigeration Car Test" means measurements made to determine the level of noise produced by stationary mechanical refrigerator cars.

(nn) "Retarder Test" means measurements made to determine the level of noise produced when rail car wheels pass through a retarder.

(oo) "Residential Dwelling Measurement Surface" means a connected set of surfaces that are parallel to and are spaced 2 ± 0.5 meters, outside the walls of a residential dwelling.

(pp) "Sound Exposure Level" means the time integral of squared A-weighted sound pressure over a given time period or event, with reference to the square of the standard reference sound pressure of 20 micropascals and a reference duration of one second. When used to characterize the noise of a single event, the sound exposure level is measured over the time interval between the initial and final times for which the noise level of the single event exceeds a specified threshold sound level. For implementation in these procedures, the threshold sound level shall be at least ten decibels below the maximum sound level of the event, and otherwise selected such that the sound exposure level measured during the interval in which the sound level exceeds the threshold is within 1.0 decibel of the sound exposure level for a threshold that is 20 decibels below the maximum sound level.

(qq) "Sound Level" means the level, in decibels, measured by an instrument which satisfies the requirements of American National Standard Specification for Sound Level Meters S 1.4–1971 Type 1. For the purpose of these procedures the sound level shall be measured using the A-frequency weighting and the FAST dynamic averaging characteristic, unless designated otherwise.

(rr) "Sound Pressure Level" (in stated frequency band) means the level, in decibels, calculated as 20 times the common logarithm of the ratio of a sound pressure to the reference sound pressure of 20 micropascals (20 micronewtons/square meter). The frequency band must be stated.

(ss) "Through Trains" means trains operating on a mainline roadbed moving continuously (without stopping) through a railroad facility regulated under § 201.17.

(tt) "Undeveloped Property" means any land property that has not been developed for human use in any of the following Standard Land Use Coding Manual (SLUCM) general land use classifications: residential; manufacturing; transportation; communication and utilities; trade; services; and cultural, entertainment and recreational.

Subpart B—Interstate Rail Carrier Operations Standards

3. In Subpart B, § 201.10 is revised, and §§ 201.14, 201.15, 201.16, and 201.17 are added to read as follows:

§ 201.10 Applicability.

The provisions of this subpart apply to equipment and facilities which operate within a railroad facility boundary and under the control of interstate rail carriers, except they do not apply to street, suburban, or interurban electric railways unless operated as a part of a general railroad system of transportation, or as noted in the following:

(a) Provisions are made for noise emission standards which are applicable to the following equipment/facility items:

(1) All locomotives, except steam locomotives, manufactured before December 31, 1979; and except that § 201.11 does not apply to any locomotive type that cannot be connected by any standard method to a load cell.

(2) All rail cars in motion

(3) All mechanical refrigeration cars when stationary

(4) All car coupling operations

(5) All retarders

(b) Provisions are made for noise radiated across the railroad facility boundary to receiving property. These provisions apply to the total noise from all equipment/facility operations within the railroad facility, except that part of the total noise resulting from the operation of through trains that move continuously through the facility. The provisions apply to all receiving property except undeveloped property. When undeveloped property is developed for human use, the initial standards shall become effective 3 years after the change in land use and the final standards effective 6 years after the change.

§ 201.14 Standard for mechanical refrigerator cars under stationay conditions.

After January 1, 1982, the sound level from stationary mechanical refrigerator cars shall not exceed an A-weighted sound level of 78 dB at 7 meters from the centerline of the refrigerator car track at any throttle setting. Compliance with this limit shall be based on measurements made in accordance with the procedures of §§ 201.25 and 201.26 for any throttle setting of the engine.

§ 201.15 Standard for car coupling operations.

After January 1, 1982, the sound level for car coupling operations shall not exceed an A-weighted sound level of 95 dB at 30 meters from centerline of the track on which the coupling occurred. Compliance with this limit shall be based on measurements made in accordance with the procedures of Secs. 201.25 and 201.26. The car coupling requirement can be alternatively met by demonstrating that the car coupling operations are not performed at speeds greater than 4 miles per hour at point of impact.

§ 201.16 Standard for retarders.

After January 1, 1982, the sound level for retarders except inert retarders shall not exceed an A-weighted sound level of 90 dB at 30 meters from the centerline of the retarder track. Compliance with this limit shall be based on measurements made in accordance with §§ 201.25 and 201.26.

§ 201.17 Standards at receiving properties.

(a) The component day-night sound level resulting from railroad facility operations shall not exceed the following limits, except that if it is not

the dominant sound component at the appropriate limit level, it shall not exceed the component day-night sound level resulting from non-railroad operations.

Effective date	Limit $L_{dn(ss)}$ in dB	Facility
January 1, 1982.	70	All Facilities and Equipment.
January 1, 1985.	65	Hump Yard Facilities and Equipment, only.

(b) The component hourly equivalent sound level resulting from railroad facility operations shall not exceed the following limit levels, except that if it is not the dominant sound component at the appropriate limit level, it shall not exceed the component hourly equivalent sound level resulting from non-railroad facility operations.

Effective Date	Limit $L_{eq(1)}$ in dB		Facility
	Day	Night	
January 1, 1982.	84	74	All Facilities and Equipment.
January 1, 1985.	79	69	Hump Yard Facilities and Equipment, only.

A railroad facility shall also be found in non-compliance with this standard if the measured L_{eq} for a specified number of hours, over one hour, exceeds the associated L_{eq} limits delineated in Tables 1 and 2, for L_{dn} 70 and L_{dn} 65 respectively.

(c) The determination of the component sound level resulting from railroad facility operation and the demonstration of its dominance for paragraph (a) and (b), of this section, shall be made in accordance with the procedures of Subpart D.

Table 1.—Equivalent of 70 L_{dn} for 24 hours in A-weighted dB [7]

Cumulative hours	Day (15 hours)	Night (9 hours)
2	81	71
3	79	69
4	78	68
5	77	67
6	76	66
8	75	65
10	74	.....
12	73	.....
15	72	.....

Table 2.—Equivalent of 65 L_{dn} for 24 hours in A-weighted dB [7]

Cumulative hours	Day (15 hours)	Night (9 hours)
2	76	68
3	74	64
4	73	63
5	72	62
6	71	61
8	70	60
10	69	.....
12	68	.....
15	67	.....

[7] Values are rounded up to next dB.

Subpart C—Measurement Criteria for Specified Railroad Equipment/Facility Items

4. In Subpart C, § 201.22 is revised, and §§ 201.25 and 201–.26 are added to read as follows:

§ 201.22 Measurement instrumentation.

(a) A sound level meter or alternate sound level measurement system that meets, as a minimum, all the requirements of American National Standard S1.4—1971 [8] for a Type 1 instrument shall be used with the "fast" meter response characteristic. To insure Type 1 response, the manufacturer's instructions regarding mounting of the microphone and positioning of the observer shall be observed.

(b) In conducting the sound level measurements, the general requirements and procedures of American National Standard S1.3—1971 [8] shall be followed, except as specified otherwise herein.

(c) A microphone windscreen and an acoustic calibrator of the coupler type shall be used as recommended by: (1) the manufacturer of the sound level meter or (2) the manufacturer of the microphone.

§ 201.25 Acoustical environment, weather conditions and background noise during retarder, car coupling, and mechanical refrigeration car noise measurements.

(a) Measurement locations shall be selected such that the maximum sound level from railroad equipment is not increased by more than 1.0 dB by sounds reflected from any surface located behind the microphone. The phrase "located behind the microphone" means located beyond a line (or family of lines) drawn through the microphone and perpendicular to the line(s) between any point on the rail equipment and the microphone. (Area A in Figure 2). This acoustical condition shall be considered fulfilled if the following conditions exist:

(1) No substantially vertical surfaces of greater than 1.2 meters height (i.e. walls, cliffs, etc.) are located within an arc of 30 meters radius behind the microphone (Area B in Figure 2).

(2) No substantially vertical surfaces, placed so they reflect significant railroad sound to the microphone, which subtend an angle of greater than 20 degrees when measured from the microphone in either the vertical and most nearly horizontal planes, are located within an arc of 100 meters behind the microphone (Area C in Figure 2).

[8] American National Standards are available from the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018

(b) Miscellaneous objects may be located between the railroad equipment and microphone, except that all objects which break the line-of-sight of the equipment must be closer to the equipment than to the microphone; that is, along a line between the microphone and any point on the equipment, at the point of intersection with the object the distance to the equipment must be shorter than the distance to the microphone.

(c) Other railroad equipment may be located behind the equipment whose noise is being measured (Area D in Figure 2).

(d) The ground elevation at the microphone location shall be within plus 5 ft. or minus 10 ft. of the ground elevation of the source whose sound level is being measured.

(e) Measurements shall not be made during precipitation.

(f) Noise measurements may only be made if the average measured wind velocity is 12 mph (19.3 kph) or less, and the maximum wind gust velocity is less than 20 mph (33.2 kph).

§ 201.26 Procedures for the measurement of retarder, car coupling, and mechanical refrigeration car noise.

(a) *Refrigeration Car Test.* The microphone shall be positioned at any location 7 meters from the centerline of the refrigeration car track, and between 1.2 meters above the ground and the height corresponding to the top of the refrigeration car. The microphone shall be oriented with respect to the equipment in accordance with the manufacturer's recommendations. No observer shall stand between the microphone and the equipment being measured. The observer shall position the microphone in accordance with the manufacturer's instructions for Type 1 performance. The standard shall not be exceeded during any thirty second period after the throttle setting is established.

(b) *Car Coupling Test.* The microphone shall be positioned at a location 30 meters from the centerline of the coupling track, and at a height between 1.2 and 1.5 meters above the ground. The microphone shall be oriented with respect to the equipment in accordance with the manufacturer's recommendations. No observer shall stand between the microphone and the equipment being measured. The observer shall position the microphone in accordance with the manufacturer's instructions for Type 1 performance. The maximum sound level, L_{max} of individual car impacts shall be measured, and the average value (energy average) of these

maximum levels, L_{max}, shall not exceed the standard. The total number of measurements shall be at least ten.

(c) *Retarder Test.* The microphone shall be positioned at a location 30 meters from the centerline of the retarder track, and at a height between 1.2 and 1.5 meters above the ground. The microphone shall be oriented with respect to the equipment in accordance with the manufacturer's recommendations. No observer shall stand between the microphone and the equipment being measured. The observer shall position the microphone in accordance with the manufacturer's instructions for Type 1 performance. The maximum sound level, L_{max}, of individual retarder squeals shall be measured, and the average value (energy average) of these maximum levels L_{max} shall not exceed the standard.

Inert retarders shall be deemed to comply with the standard, and shall not be subjected to this test when engaged for the purpose of stopping rail cars.

The total number of measurements shall be at least ten.

(d) *Alternative Microphone Locations.* (1) If the criteria of § 201.26 do not permit measurements at the distances defined above, the measurement location may be adjusted within the distance limits listed in Table 1 below. When such an alternate location is selected, the measured maximum sound level shall be adusted by addition of the amount listed in Table 1 for the appropriate distance.

(2) The microphone shall be oriented with respect to the equipment in accordance with the manufacturer's recommendations. No observer shall stand between the microphone and the equipment being measured. The observer shall position the microphone in accordance with the manufacturer's instructions for Type 1 performance.

Table 3.—*Adjustment to L_{max} for Variable Measurement Distances*

Measurement Distance from Equipment, Meters		Adjustment to L_{max} dB
Retarders and car couplings	Refrigerator cars	
16.0–17.8		−5
17.9–20.0		−4
20.1–22.5		−3
22.6–25.2		−2
25.3–28.3		−1
28.4–31.7	6.7–7.3	0
31.8–35.8	7.4–8.2	1
35.7–39.9	8.3–9.2	2
40.0–44.8	9.3–10.4	3
44.9–50.3	10.5–11.7	4
50.4–56.4	11.8–13.1	5
	13.2–14.7	6
	14.8–16.5	7
	16.6–18.5	8
	18.6–20.8	9
	20.9–23.2	10

5. Subpart D is added to read as set forth below:

Subpart D—Measurement Criteria for Receiving Property

§ 201.30 Applicability and Purpose.

The following criteria are applicable to the measurement of the sound levels prescribed in the standards of Subpart B of this Part for receiving property.

§ 201.31 Measurement Instrumentation.

(a) An integrating sound level meter, or instrumentation system, that meets all of the requirements of American National Standard for Sound Level Meters S1.4–1971, Type 1 shall be used. The integrating sound level meter shall be capable of meeting the Type 1 tolerances for the sound level meter when used with an ideal integrator for the following functions (where applicable) and signals:

(1) *Sound Exposure Level:* For sinusoidal signals in its stated operating range with duration varying between 1 second and 3600 seconds, with the maximum sound exposure level of at least 135 dB re (20 micro pascals) squared and one second. An additional tolerance of ±1 dB is allowed for events which have a duration of between 100 milliseconds and 1 second.

(2) *Equivalent Sound Level:* For sinusoidal signals with sound levels varying between 45 and 125 dB, and frequencies between 200 and 1000 Hertz, and for any combination of sound levels whose durations range between 1 second and 3600 seconds for hourly equivalent sound level, except that the maximum hourly equivalent sound level need not exceed 100 dB.

(3) *Day-Night Sound Level:* For signals specified in paragraph (a)(2) of this section during daytime hours and for signals that are ten decibels lower during nighttime hours (0000 to 0700) and (2200 to 2400).

(b) A microphone windscreen and an acoustic calibrator of the coupler type shall be used as recommended by: (1) The manufacturer of the sound level meter or (2) the manufacturer of the microphone.

§ 201.32 Measurement Location and Weather Criteria.

(a) Enforcement measurements shall be conducted only at receiving property locations where the sound from railroad facility operations is dominant.

(b) No measurement shall be made within 10 meters distance from any substantially vertical reflecting surface that exceeds 1.2 meters in height, except for measurements on a residential dwelling measurement surface.

(c) No measurement shall be made when the average wind velocity during the period of measurement exceeds 12 mph (19.3 kph) or when the maximum wind gust velocity exceeds 20 mph (32.2 kph).

(d) No measurement shall be taken when precipitation (rain, snow, sleet, etc.) occurs for a period exceeding 20% of the measurement period, unless it can be demonstrated that the precipitation does not increase the sound level at the microphone.

§ 201.33 Procedures for Measurement.

(a) *General Approach.* The procedures for determination of the component sound level resulting from railroad facility operations and demonstration that it is the dominant sound component for the purpose of Subpart B of this part are as follows:

(1) Select a location for measurement;

(2) Determine the level, either hourly equivalent sound level, or day-night sound level, by measurement;

(3) Determine the railroad facility component sound level and demonstrate dominance by using either the procedures for clear dominance when it exists, or the procedure for dominance where the existence of clear dominance cannot be demonstrated.

(b) *Microphone Location.* The microphone shall be positioned at a height between 1.2 and 1.5 meters above the ground, except that on a residential dwelling measurement surface as exemplified in Figure 3 the microphone may be positioned at any height that is greater than 1.2 meters above the ground and less than the height of the uppermost interior ceiling immediately adjacent to the location on the measurement surface, or 7 meters, whichever is less. The location shall be selected where it is expected that dominance can be demonstrated, and the conditions of measurement shall be selectesd such that the criteria of Sec. 201.32 are satisfied.

(c) *Determine the Measured Level.* The hourly equivalent sound level in any daytime or nighttime hour, or the day-night sound level in any continuous

24-hour period, as desired, shall be measured.

(d) *Rail Facility Component Hourly Equivalent Sound Level or Day-Night Sound Level When it is the Clearly Dominant Sound.* Clear dominance exists when the measured hourly equivalent or day-night sound level exceeds the component hourly equivalent or day-night sound level from non-railroad facility and through train operations by 6 dB or more. When clear dominance is shown to exist, the rail facility component hourly equivalent sound level or day-night sound level for the purpose of Subpart B shall be determined by subtracting one decibel from the measured level. For this purpose, the following procedures shall be used to estimate the non-railroad facility component hourly equivalent or day-night sound level:

(1) The component hourly equivalent sound level or day-night sound level resulting from non-railroad and through train operations shall be calculated by summing on an energy basis the component sound levels from each of the significant source components present. For this purpose a source is considered significant if its component sound level is within 12 dB of the measured sound level. Methods for determining the component sound levels for several types of sources are given in the following:

(i) For a measurement location in a residential neighborhood, in which the sound from non-neighborhood sources, such as major streets or highways, industrial, commercial, or public establishment, aircraft, construction, etc., is not identifiable, the residential neighborhood component day-night sound level shall be estimated to be equal to or less than the quantity [22 + 10 log (population density)]. The population density shall be determined by dividing the population of the census tract which contains the measurement location, by the area in square miles of the residential portion of the census tract. The residential neighborhood component hourly equivalent sound level for daytime hours shall be estimated by adding 1 dB to the estimated day-night sound level, and for nighttime hours by subtracting 6 dB from the estimated day-night sound level.

(ii) For a measurement location where a significant source of noise is civil aircraft, the aircraft component hourly equivalent sound level or day-night sound level shall be estimated using the procedures contained in the EPA document, "Calculation of Day-Night Levels Resulting From Civil Aircraft Operations," EPA 550/9–77–450 (January 1977). In using these procedures, the number of aircraft operations on flight tracks which affect the noise at the community location shall be that occurring during the period of measurements.

(iii) For a measurement location where a significant source of noise is the motor vehicle traffic on a nearby roadway, the traffic component hourly equivalent sound level or day-night sound level shall be estimated using the procedures contained in the Federal Highway Administration document, "User Manual: TSC Highway Noise Prediction Code: Mod 04," FHWA–RD–77–18 (January 1977). In using these procedures, the traffic flow characteristics during each hour of the measurement day shall be used to estimate the hourly equivalent sound levels throughout the day; these shall be weighted for time of day and summed on an energy basis to obtain the traffic component day-night sound level.

(iv) For a measurement location where a significant source of noise is through trains which move continuously through a railroad facility during the measurement period the through train component hourly equivalent sound level or day-night sound level shall be measured during the period.

Alternatively, if through trains operate on a regular basis, the through train component hourly equivalent and day-night sound level for these trains may be computed, assuming the scheduled times for purposes of nighttime weighting (unless the actual times are known), from the average sound exposure level measured for through trains at the location. The average sound exposure level shall be determined from an energy average of the measured sound exposure levels. For computation, the total number of measurements shall be at least five through trains.

(v) For a measurement location where a significant source of noise is other than the above, the component hourly equivalent sound level or day-night sound level for each significant source shall be determined from measurements.

(2) For any measurement at a receiving property location the demonstration of clear dominance for the measured hourly equivalent sound level may be based on a comparison of the value of the measured hourly equivalent sound level obtained in an hour in which operations in the railroad facility were judged to dominate the sound with the value of an hourly equivalent sound level obtained in a prior or subsequent period, or a combination of both, in which the sound from operations in the railroad facility were judged to be less dominant, with both of these values measured within a total elapsed time not exceeding four hours. When the difference between the former and latter values of measured hourly equivalent sound level equals or exceeds 6 dB, clear dominance is demonstrated.

(e) *Rail Facility Component Hourly Equivalent or Day-Night Sound Level and Dominance when Clear Dominance cannot be Demonstrated.* Dominance exists when the measured hourly equivalent or day-night sound level exceeds the rail facility component level by 3 dB or less. Dominance of the rail facility component day-night sound level shall be demonstrated for the purpose of subpart B of these regulations by showing that the calculated rail facility component sound level is zero to 6 dB above the non-railroad facility component sound level, and that the level calculated on an energy basis from these two quantities is within 2 dB of the measured sound level less the through trains component sound level. For this purpose the non-railroad facility component sound level and the through train component sound level may be determined by the procedures in Sec. 201.33d, and the rail facility component level determined by the following, or functional equivalent thereof:

(1) Calculate the rail facility component partial day-night sound level from the values of rail facility component equivalent sound level measured under conditions of clear dominance, Sec. 201.33d above.

(2) Determine the energy average sound exposure level for each noise source which contributes significantly to the noise at the measurement location. For this determination, the average value for each type of source should be based on at least five measurements or a number equal to the range of measured levels in decibels. Compute the rail facility component sound level from the energy average sound exposure levels for each significant source, type, the number of such source types operating per hour or day (by time of day), and the distance between source and receiver

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