U.S. Department of Transportation

Federal Railroad Administration

Final Environmental Impact Statement

Interim Final Rule for the Use of Locomotive Horns at Highway-Rail Grade Crossings

Office of Railroad Development
Washington, D.C. 20590

DEC 5 2003

Date

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Implementation of the rule would require that locomotive horns be sounded at most public highway-rail grade crossings in the United States. The rule contains provisions that would set a maximum sound level for locomotive horns, limit the duration of horn sounding, and prescribe when and how to sound the horn. The rule also provides opportunities for any community to establish a quiet zone and eliminate the requirement for sounding locomotive horns.

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EXECUTIVE SUMMARY

ES-1 INTRODUCTION

The railroad transportation system is an essential component of the nation's vital transportation infrastructure. This system incorporates 153,975 public and approximately 98,000 private highway-rail at-grade crossings throughout the country. The Federal Railroad Administration (FRA) is responsible for promoting the safety of America's railroads for both railroad employees and the public and is committed to improving the safety of highway-rail crossings.

Collisions at highway-rail crossings are second only to trespassing as the leading cause of death and serious injury associated with railroad operations. Locomotive horns provide an audible warning of approaching trains with an indication of their speed, direction, and proximity. A number of communities across the Nation have regulated or attempted to regulate the use of locomotive horns in their jurisdictions in order to lessen the noise impacts associated with the sounding of locomotive horns at grade crossings. Following the large-scale imposition of train whistle bans in Florida, FRA became aware that there was a strong relationship between the use of locomotive horns and collision rates at highway-rail crossings. In April 1995, FRA prepared its *Nationwide Study on Train Whistle Bans* (Nationwide Study), to examine the nationwide safety implications of whistle bans. The study, updated in 2000, showed that, absent compensatory safety measures, whistle bans substantially increase the risk of deaths and injuries at highway-rail crossings.

In 1994, Congress passed the Swift Rail Development Act, Public Law 103-440, which, *inter alia*, added Section 20153, *Audible Warnings at Highway-Rail Grade Crossings*, to Title 49 of the United States Code. In 49 USC 20153, Congress directed FRA to issue a rule requiring the use of locomotive horns at all public highway-rail crossings. FRA also was given the authority to make reasonable exceptions to the use of locomotive horns in certain qualified circumstances. As directed by 49 USC 20153, FRA prepared a Notice of Proposed Rulemaking (NPRM) to address the use of locomotive horns at highway-rail grade crossings. In preparing the NPRM, FRA determined that the implementation of the proposed rule constitutes a "major federal action" within the meaning of §102(c) of the National Environmental Policy Act (NEPA, 42 USC 4321 *et seq.*). Accordingly, FRA developed the appropriate environmental documentation required by NEPA and issued a Draft Environmental Impact Statement (DEIS) in December 1999. The DEIS evaluated the potential environmental impacts that could result from the implementation of the proposed rule.

FRA solicited public comments on both the NPRM and DEIS. All comments were reviewed by FRA and considered in preparing the interim final rule and this Final Environmental Impact Statement (FEIS). FRA is issuing an interim final rule to provide an additional opportunity to comment on aspects not previously published in the NPRM. By issuing an interim final rule FRA is providing an additional opportunity for public comment on significant differences between the NPRM and the interim final rule. This FEIS updates

several key elements of the DEIS, including a summary of the interim final rule, the results of additional safety-related studies conducted by FRA, updated analyses of environmental impacts using current grade crossing and census data, expanded mitigation options and flexible implementation requirements, and a summary of public comments on the DEIS with FRA's responses. This FEIS is being issued concurrently with the interim final rule and notifications sent to organizations and individuals that received and/or commented on the DEIS. The FEIS and interim final rule are also available in electronic format on FRA's Internet site, www.fra.dot.gov, or upon written request from FRA.

ES-2 PURPOSE AND NEED

FRA is developing the train horn rule to satisfy the statutory requirements of section 20153 of Title 49 of the United States Code in a manner consistent with maximizing railroad safety, making regulations related to railroad safety nationally uniform to the extent practicable (49 U.S.C. 20106), other regulations and Department of Transportation (U.S. DOT) initiatives and programs related to the safety of highway-rail grade crossings, and minimizing the impact of train horn noise where possible without compromising safety.

Locomotive horns are an important element of highway-rail grade crossing safety. The locomotive horn is effective at alerting motorists to the presence of a train, and also provides some indication of train speed, direction, and proximity. If a horn is not sounded at a particular location, the public is deprived of an important source of information as to when a train is approaching, the direction from which the train is coming, and approximately how soon the train will reach the crossing. This can be crucial life-saving information, especially when only passive warnings, such as crossbucks, are present at the crossing.

Some communities, especially those with multiple crossings and high train volumes, have enacted whistle bans affecting crossings within their jurisdictions in the belief that the sounding of locomotive horns at every crossing poses an excessive burden to the quality of life of its residents. Studies have demonstrated that, without the benefit of locomotive horns or other substitute warning devices, there is an increased rate of collision at highway-rail crossings leading to injury and death. Overall, the results of the FRA's Nationwide Study indicate that there is a pervasive safety risk associated with whistle bans.

FRA is faced with the task of providing safety at public grade crossings while minimizing the intrusion of train horn noise into the surrounding community. The rule details when and how locomotive horns must be sounded and when and how a quiet zone, in which horns are not sounded, may be established. The interim final rule also limits the maximum sound level of locomotive horns to provide some relief to the surrounding population while still ensuring that the sound level is high enough to provide the required warning to the motorist.

ES-3 ALTERNATIVES CONSIDERED

In reviewing the comments on the DEIS and the NPRM, FRA identified five additional alternatives for determining where train horns must sound as well as the Proposed Action and the No-Action alternative. The environmental effects of these alternatives would not be materially different from those of the No-Action alternative or the Proposed Action represented by the interim final rule. The information and analyses presented in this FEIS permit the reader to understand and evaluate the environmental effects of any of the alternatives. Upon examination, FRA concluded that these five additional alternatives are not reasonable options given the agency's purpose and need for the action.

No-Action Alternative. The No-Action Alternative would preserve the *status quo:* states and municipalities could try to regulate the sounding of locomotive horns and railroads could continue to resist such regulation through litigation and other means. FRA lacks the authority to implement the No-Action alternative, and adoption of the No-Action alternative would involve congressional action to reverse its mandate to require the use of locomotive horns at highway-rail grade crossings as set forth in 49 USC 20153.

Proposed Action. Implementation of the interim final rule would require that horns be sounded at all public at-grade highway-rail crossings in the United States, set a maximum sound level for locomotive horns, prescribe how and when locomotive horns are to be sounded, and provide an opportunity for any community in the nation to establish a quiet zone. These provisions would apply to the use of locomotive horns at all public highway-rail grade crossings, including those currently subject to whistle bans established by local or state authorities.

ES-4 AFFECTED ENVIRONMENT

Locomotive horns and whistles have been employed as effective grade crossing safety devices for well over 100 years of railroad operations. The loud auditory warning provided by the locomotive horn provides the motorist with information that a train is approaching, its relative speed and from what direction. This information is important at both actively and passively signed crossings. Current regulations require that each lead locomotive be provided with an audible warning device and that the audible warning device produce a minimum sound level of 96 dB(A) at 100 feet forward of the locomotive in its direction of travel, 49 C.F.R. §229.129. The existing regulations do not restrict the maximum sound level of a locomotive horn. In addition, train horn noise has been excepted from Environmental Protection Agency limits on railroad noise emissions. Without a maximum sound level requirement, current railroad practices vary across the country and between different types of railroad operations.

There are approximately 153,975 public grade crossings in the United States that would be subject to provisions of the interim final rule. In addition, all locomotives operating on the general railroad system of the United States would be subject to provisions of the interim final rule. Overall, the crossings over which these locomotives operate and surrounding

areas are considered by FRA to represent the affected environment for the purposes of preparing this FEIS.

ES-5 ENVIRONMENTAL CONSEQUENCES

Potential positive and negative impacts of the proposed rule are identified and discussed in this FEIS with the focus on two principal areas of concern: safety and noise. Provisions that reduce existing horn noise exposure as well as potential direct noise impacts are prominent features of the interim final rule. These provisions would allow affected communities to create new quiet zones or retain existing quiet zones. In addition, the rule contains mitigating provisions for a maximum horn sound level and duration limits that would reduce community noise impacts nationally. These provisions reflect the intent of Congress and meet the requirements for an integral opportunity for mitigation set forth in 49 USC 20153 and would be available to all localities, including those communities that do not currently have whistle bans. The potential for direct impacts to the human environment at approximately 153,975 public at-grade highway-rail crossings are analyzed in this FEIS. At the 2,418 highway-railroad at-grade crossings identified as potentially adversely affected, FRA estimated the potential for noise impacts to the human environment using computer-based noise modeling and geographic analysis techniques.

To the best of FRA's knowledge, the environmental resources potentially affected by undertaking the proposed action have been identified as the human environment with respect to noise exposure and the safety of the transportation network. FRA has studied these issues and the potential for community disruption, impacts on commerce, and impacts on local government. FRA is not aware of any direct or indirect effects of the interim final rule on the following areas: air quality; water quality; solid waste disposal; ecological systems; impacts on wetlands areas; impacts on endangered species or wildlife; flood hazards and floodplain management; coastal zone management; use of energy resources; use of other natural resources, such as water, minerals, or timber; aesthetic and design quality impacts; possible barriers to the elderly and handicapped; land use, existing and planned; other impacts on the socioeconomic environment, including the number and kinds of available jobs, and the need for and availability of relocation housing; public health; human health impacts due to hazardous materials; recreational opportunities; locations of historic, archeological, architectural, or cultural significance; use of Section 4(f)-protected properties.

ES-5.1 Safety Effects

The effect of the locomotive horn rule on public safety was assessed using the results of the FRA's updated Nationwide Study. That study found that the crossings with whistle bans had a significantly higher average collision frequency than the non-ban crossings. The crossings evaluated reflect a very diverse population with respect to physical configurations, motorist warning devices, and highway and rail traffic mixes. Their geographical dispersion contributed to a credible indication of the national safety implication of train whistle bans. FRA refined the analysis procedures by conducting separate analyses for three different categories of warning devices in place at the

crossings (e.g. automatic gates with flashing lights, flashing lights or other active devices without gates, and for passive devices, such as "crossbucks" and other signs). FRA also made a substantial effort to collect information on additional whistle ban locations not previously identified. FRA's updated analyses showed that an average of 66 percent more collisions occurred at whistle ban crossings equipped with gates than at similar crossings across the nation without bans.

Using these figures, the Proposed Action is expected to have a public safety benefit in terms of lives saved as well as injuries and accidents averted. With the resumption of horn sounding, FRA expects at least 123 collisions, 13 fatalities, and 60 injuries to be avoided over twenty years. Since interest in silencing locomotive horns extends to many more communities throughout the nation than those with current whistle bans, much greater safety benefits may accrue as a result of the proposed rule as more crossings are made safer so as to qualify for the establishment of quiet zones.

The No-Action Alternative would continue the 66 percent greater frequency of collisions at whistle ban crossings where they exist today, and would lead to more frequent collisions at every location where a ban is instituted in the future. Additionally, it is possible that in the absence of a mandate to regulate the use of locomotive horns at highway-rail grade crossings, whistle bans could proliferate and result in more collisions and injuries. The No-Action Alternative would not incur the potential impacts of more noise exposure at current whistle ban locations, but neither would it result in the benefits of the proposed rule. On balance, it is likely that a No-Action Alternative would result in more noise exposure over time to communities throughout the nation, and a greater loss of life and injuries.

ES-5.2 Noise Effects

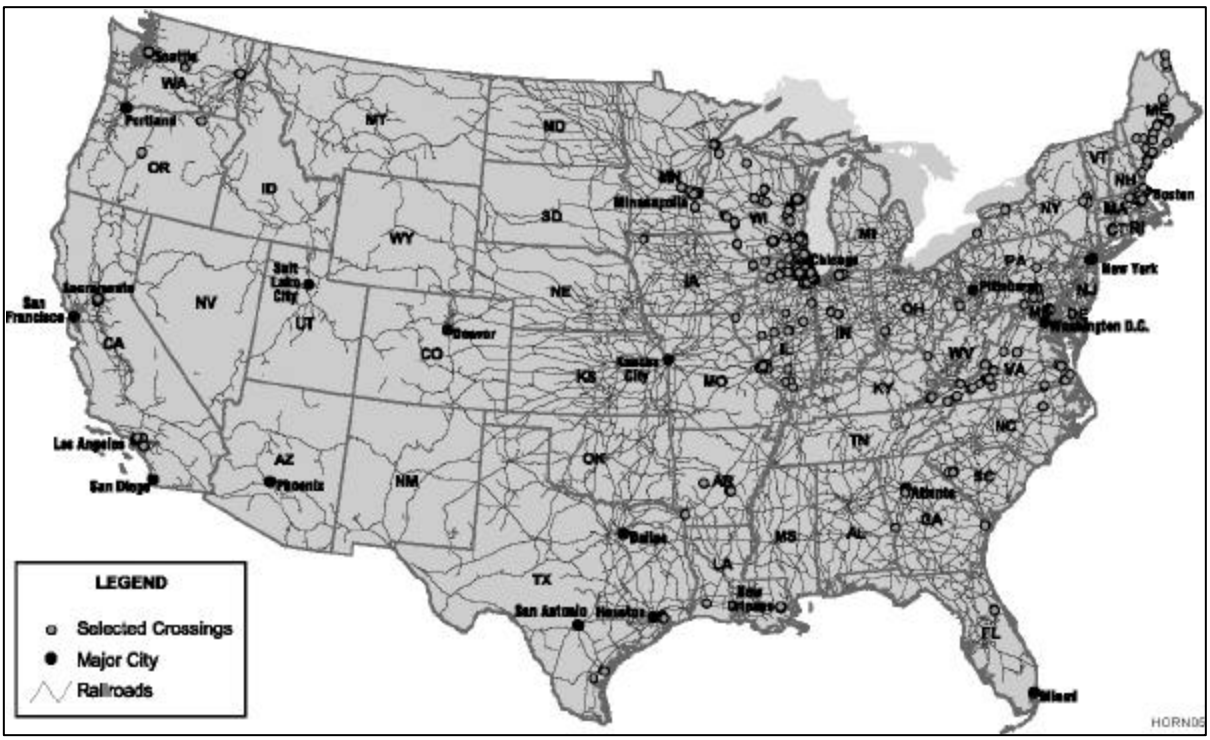
The effects of the rule related to noise and noise impacts were analyzed using empirical information about locomotive horn sound levels and the computer models described in Chapter 3. The No-Action Alternative would not have any of these potential impacts, but neither would it provide the cumulative benefits of the rule.

FRA estimated the potential cumulative effects of the rule provisions setting the horn sounding pattern and duration and a maximum horn sound level at the country's 153,975 public highway-rail grade crossings with available location data. The horn noise model was applied to an average crossing using the average population within a 1-mile radius of the crossings. Nationwide (or cumulative) impacts were estimated by calculating the impacts at a typical crossing and applying those estimated impacts to all crossings. The maximum number of persons estimated to be currently impacted by locomotive horn noise is more than 9.3 million. Of this total, 4.6 million may be severely impacted. The rule would reduce this total noise exposure nationwide by setting a maximum horn sounding duration, a maximum horn sound level, and by allowing the establishment of quiet zones. These provisions would apply to all crossings, including current whistle ban crossings, (although they would have little effect where Pre-Rule Quiet Zones are created). These rule provisions would eliminate existing impacts to more than 3.4 million persons, 1.9

million of them with severe impacts resulting in horn noise impact reductions of about 38 percent.

The potential adverse noise impacts of the rule on populations adjacent to whistleban crossings were analyzed although FRA expects most whistlebans to convert to Pre-Rule Quiet Zones. Using empirical information about locomotive horn sound, current population statistics, and computer models, potential noise impacts were modeled to estimate the maximum number of people potentially affected in the vicinity of the 2,027 crossings with current whistle bans shown in Figure ES-1. These impact estimates assume the typical ¼-mile sounding distance commonly found on the nation's railroads. Because FRA estimates that approximately 66% of whistleban crossings may be eligible for conversion to Pre-Rule Quiet Zones without any initial improvements, the potential for adverse noise impacts is less than the noise analysis indicates and could be less than 44% of the numbers reported in chapter 4 of this FEIS. FRA also estimates that only 1% of current whistleban crossings are likely to be discontinued and that most needed improvements will be made so that whistlebans can be converted into Quiet Zones. Additionally, any persons impacted or severely impacted would also share in the benefits of the maximum horn sound level and horn sounding duration provisions of the rule.

FIGURE ES-1
WHISTLE BAN CROSSING LOCATIONS EVALUATED



ES-5.3 Quiet Zones

The interim final rule provides several options for establishing quiet zones in order to give communities more flexibility as to how and where they implement the safety improvements prescribed by 49 USC 20153. In response to comments received at public hearings and throughout the scoping process, FRA included in the interim final rule a performance-based approach that credits successful safety strategies and allows communities to choose the most appropriate means of reducing risk at highway-rail grade crossings.

The interim final rule contains provisions allowing communities to create new quiet zones or retain existing quiet conditions, which mitigate potential direct noise impacts. In addition, the rule contains provisions for a maximum horn sound level that would reduce community noise impacts nationally. These provisions reflect the intent of Congress and meet the requirements for an integral opportunity for mitigation set forth in the 49 USC 20153. FRA views the provisions for quiet zones as an ample and unlimited measure to address direct impacts that would be available to all localities, including those communities that do not currently have whistle bans. FRA is also confident that many communities will seek to formally adopt quiet zones to further mitigate locomotive horn noise impacts. FRA estimates that over half of the current whistle ban crossings would not require any improvements for inclusion in pre-rule quiet zones that would maintain the existing prohibition on the sounding of locomotive horns. Approximately 44 percent of current whistleban crossings would require some sort of warning gates, supplementary safety measures or alternative safety measures to be included in a quiet zone status.

After consideration of the mitigation opportunities offered by the quiet zone provisions, FRA is confident that the adoption of quiet zones by local jurisdictions would be widespread. In principle, quiet zones could be adopted by all localities that currently have whistle bans where significant numbers of residents would otherwise be impacted. In addition to communities with current whistle bans, there are many more localities in the country that may opt to implement quiet zones. The effect of these new quiet zones, coupled with the quiet zones that are formed within jurisdictions with current whistle bans, would very likely be enough to fully compensate for any direct noise impacts of the rule where whistle bans now exist.

ES-5.4 Other Considerations

Environmental Justice. FRA assessed potential impacts to environmental justice populations using the methodology and thresholds described in Chapter 3. Implementation of the interim final rule could result in potential environmental justice impacts to minority or Hispanic populations in 22 counties located in 11 states. States with the greatest potential impacts to environmental justice populations are California and Virginia. None of the affected crossings are located in areas where the average household income is below the Federal poverty level, though there are residents within most of the crossing areas that would be considered low-income. In total, impacts to environmental justice populations represent about 4 percent of the total impacts estimated by FRA.

While FRA's analysis shows that there could be some impacts to environmental justice populations at grade crossing locations in several states and counties, these estimated impacts do not account for the reduction in impacts associated with the mitigating provisions of the rule. The required limits on maximum horn levels and sounding duration would reduce these impacts substantially, and further reductions are possible by establishing new quiet zones. Minority, Hispanic or low-income communities would have equal opportunity to designate a quiet zone under the rule, and the rule includes an extended implementation option (up to 8 years) intended to elicit state-level aid for these communities.

Health and Human Welfare Impacts. Sound exposure from locomotive horns in communities abutting railroad lines does not reach the cumulative levels that would exceed risk criteria for hearing damage. The horn noise model established by measurements for the Federal Railroad Administration is based on a sound exposure level of 107 dBA at 100 feet from the tracks for locations not closer than 1/8 mile from a grade crossing. In order to risk the onset of hearing damage, a person at that distance would have to hear more than 180 horn events during each 8-hour period for five days a week and continuously for 40 years. These conditions would yield an 8-hour L_{eq} of 85 dBA. In fact, the risk of hearing damage may be even less because the sound is not actually continuous and the ear has time to recover between horn soundings.

Other noise effects on health have been researched with ambiguous results. Stress related syndromes, especially relevant to mental health, are the result of a complex interaction of many factors. Noise exposure can be a contributor when an emotional factor, such as an attitude toward the source of noise, comes into play. Several airport noise surveys have indicated stress-related disorders result from continuous exposure to high noise levels, but it has not been conclusively shown that the actual physical stimulus of noise is the cause of the health effect.

Economic Impacts. Implementation of this rule would reduce the risk of collisions at grade crossings by requiring the sounding of the locomotive horn at grade crossings unless it has been specifically determined that the crossings in question have a risk profile that justifies silencing the horn. FRA believes communities would take advantage of the many options available to compensate, in terms of risk, for the silencing of the horn. FRA is confident that the benefits in terms of lives saved and injuries prevented will exceed the costs imposed on society by this rule. FRA estimated costs and benefits for approximately 2,000 existing whistleban crossings and about 450 potential New Quiet Zone crossings. FRA estimates the rule would have net benefits of approximately $36 million.

ES-6 PUBLIC PARTICIPATION

Throughout the rulemaking and environmental review process, public input and participation was important to FRA. Many opportunities were provided to organizations, government officials, and individuals to submit comments and express their concerns.

The DEIS and the NPRM were issued concurrently by FRA. These documents were distributed to all persons or organizations that expressed interest in the rulemaking process, as well as to each member of the United States Congress. FRA encouraged interested parties to comment on either the DEIS, the NPRM, or both. Public hearings on the DEIS and the proposed rulemaking were held across the nation in areas with whistle bans and known concerns about locomotive horn noise, including Washington, DC; Salem, Massachusetts; Chicago, Illinois; Western Springs, Illinois; Des Plaines, Illinois; South Bend, Indiana; Berea, Ohio; Madison, Wisconsin; Ft. Lauderdale, Florida; Costa Mesa, California; and Pendleton, Oregon. The hearings provided interested parties an opportunity to make oral presentations or offer comments. For the purposes of this FEIS, FRA treated comments submitted to the DEIS docket and those made at public hearings as comments on the DEIS. All comments received by FRA were considered equally regardless of the form, (verbal, letter, or e-mail) in which they were delivered to FRA.

Approximately 950 individuals and organizations commented on the DEIS, making almost 1,900 written and approximately 1,000 oral comments. FRA reviewed these comments in developing the interim final rule and revising the analyses included in this FEIS.

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CHAPTER 1

PURPOSE AND NEED FOR THE PROPOSED ACTION

1.0 INTRODUCTION

Collisions at highway-rail crossings are second only to trespassing as the greatest cause of death and serious injury associated with railroad operations. Locomotive horns provide an audible warning of approaching trains with an indication of their speed, direction, and proximity. A number of communities across the Nation have regulated or attempted to regulate the use of locomotive horns in their jurisdictions. Following large-scale imposition of train whistle bans in Florida, it became apparent to the Federal Railroad Administration (FRA) that there was a strong relationship between collision rates at highway-rail crossings and the use of locomotive horns.

In 1994, Congress enacted Public Law 103-440, which, *inter alia*, added Section 20153, *Audible Warnings at Highway-Rail Grade Crossings* to Title 49 of the United States Code (see Appendix B). In 49 USC 20153, Congress directed FRA to issue a rule requiring the use of locomotive horns at all public highway-rail crossings. FRA also was given the authority to make reasonable exceptions to the use of locomotive horns in certain qualified circumstances. In enacting Public Law 103-440, Congress made a determination that locomotive horns provide a measure of safety at highway-rail crossings beyond that provided by other warning systems. FRA's *Nationwide Study of Train Whistle Bans* (Nationwide Study), completed in April 1995 and updated in January 2000, further supported the safety benefits of locomotive horn use at grade crossings. The Nationwide Study results showed a greater rate of collisions occurring at crossings with whistle bans than at crossings where locomotive horns are sounded.

As directed by 49 USC 20153, FRA prepared a Notice of Proposed Rulemaking (NPRM)[1] to address the use of locomotive horns at highway-rail grade crossings. The NPRM proposed regulations that would require a locomotive horn to be sounded when a train is approaching and entering a public highway-rail grade crossing. It also identified circumstances where exceptions to use of locomotive horns would be allowed. In preparing the NPRM, FRA determined that the implementation of the proposed rule constituted a "major federal action" within the meaning of §102(c) of the National Environmental Policy Act (NEPA, 42 USC 4321, *et seq.*). Accordingly, FRA developed the appropriate environmental documentation required by NEPA and issued a Draft Environmental Impact

[1] Federal Railroad Administration, *Use of Locomotive Horns at Highway-Rail Grade Crossings; Proposed Rule*, Notice of Proposed Rulemaking. 65 FR 2230, January 13, 2000.

Statement (DEIS) in December 1999. The DEIS evaluated the potential environmental impacts that could result from implementing the proposed rule.[2]

FRA solicited public comments on both the NPRM and the DEIS. All comments were reviewed by FRA and considered in preparing the interim final rule and this Final Environmental Impact Statement (FEIS). By issuing an interim final rule FRA is providing an additional opportunity for comment on significant differences between the NPRM and the interim final rule. The interim final rule governing the use of locomotive horns at highway-rail grade crossings is being issued concurrently with this FEIS. The FEIS includes the following revisions or updates to the DEIS:

- Summary of interim final use of locomotive horns rule (see Chapter 2);
- Results of Additional Safety-Related Studies Conducted by FRA (see Chapter 3);
- Updated analyses of environmental impacts and benefits using current grade crossing and census data (see Chapter 4);
- Description and analysis of the expanded options and more flexible implementation requirements for establishing quiet zones (see Chapter 4); and
- Summary of public comments on the DEIS and FRA's Responses (see Appendix C).

1.1 PURPOSE AND NEED

FRA is issuing the train horn rule to satisfy the statutory requirements of 49 U.S.C. 20153 in a manner consistent with: maximizing railroad safety, making regulations related to railroad safety nationally uniform to the extent practicable (49 U.S.C. 20106), other regulations and Department of Transportation initiatives and programs related to the safety of highway-rail grade crossings, and the goal of minimizing the impact of train horn noise where possible without compromising safety.

The basic command of the statute is clear and straightforward:

> The Secretary of Transportation shall prescribe regulations requiring that a locomotive horn shall be sounded while each train is approaching and entering upon each public highway-rail crossing. [49 U.S.C. 20153(b)]

Then in 49 U.S.C. 20153(c)(1), Congress gave the Secretary discretion to issue regulations that except from the requirement to sound the horn any categories of rail operations or grade crossings:

[2] Federal Railroad Administration, Office of Railroad Development, *Draft Environmental Impact Statement – Proposed Rule for the Use of Locomotive Horns at Highway-Rail Grade Crossings*, Washington, D.C., December 1999.

(A) that the Secretary determines not to present a significant risk with respect to loss of life or serious personal injury;
(B) for which use of the locomotive horn as a warning measure is impractical; or
(C) for which, in the judgment of the Secretary, supplementary safety measures fully compensate for the absence of the warning provided by the locomotive horn.

In authorizing exceptions, Congress took note of the Department of Transportation's policy favoring analyzing and treating in a related and coherent manner all grade crossings along a rail corridor, 49 U.S.C. 20153(c)(2). Having received Congressional endorsement of this policy, FRA intends in this rule to make exceptions to the requirement to sound the horn only in defined corridors identified as quiet zones, within which all grade crossings must be addressed.

In 49 U.S.C. 20153(i)(1), Congress also directed FRA, when issuing regulations, to take into account the interest of communities that:

(A) have in effect restrictions on the sounding of a locomotive horn at highway-rail grade crossings; or
(B) have not been subject to the routine...sounding of a locomotive horn at highway-rail grade crossings;

FRA intends to implement this statutory directive in a manner consistent with nationally uniform regulation of railroad safety and the safety purposes of the statute. FRA interprets the statute to mean that Congress places a higher value on saving lives and preventing serious injuries than on preventing train horn noise at grade crossings, but wants to afford communities the opportunity to silence the train horn where possible, consistent with railroad safety, by substituting other defined safety measures for the warning afforded by train horns.

In enacting the statutory requirement for this rule, Congress was responding to very serious safety issues. The railroad system, which is a vital component of the Nation's transportation infrastructure, incorporates more than 252,000 highway-rail grade crossings throughout the country. Of those crossings, 153,975 are public crossings, locations at which a public road crosses railroad tracks at grade. Safety at highway-rail grade crossings is one of the more enduring challenges facing highway authorities, railroads, and the public. Approximately 4,000 times a year, a train and a motor vehicle collide at one of the country's highway-rail grade crossings, causing many deaths and serious injuries. For perspective, deaths from all other causes associated with railroad operations, except for trespassing, typically amount to less than 10 percent of the deaths caused by collisions at grade crossings. During the years 1989 through 1994, the five-year period before Congress acted, there were 32,405 collisions at highway-rail crossings in the United States. These collisions resulted in roughly 600 deaths each year during that period. For example, in the 1989 to 1994 period, 3,927 people died in these collisions.

Another 13,142 people were injured. Approximately 50 percent of these collisions occur at highway-rail crossings equipped with active warning devices such as bells, flashing lights, or gates.

Locomotive horns are an important element of highway-rail grade crossing safety. The locomotive horn is effective at alerting motorists to the presence of a train and also provides some indication of train speed, direction, and proximity. If a horn is not sounded at a particular location, the public is deprived of an important source of information as to when a train is approaching, the direction from which the train is coming, and approximately how soon the train will reach the crossing. This can be crucial life-saving information, especially when only passive warnings, such as crossbucks, are present at the crossing.

Some communities, especially those with multiple crossings and high train volumes, have enacted whistle bans affecting crossings within their jurisdictions in the belief that the sounding of locomotive horns at every crossing poses an excessive burden to the quality of life of its residents. Studies have demonstrated that, without the benefit of locomotive horns, there is an increased rate of collisions at highway-rail crossings leading to injury and death.

Overall, the results of FRA's Nationwide Study indicated that there is a pervasive safety risk associated with whistle bans.[3] This review of twelve case studies, involving 831 crossings in 8 states other than Florida, showed an overall 38 percent decline in the accident rate after whistle bans were repealed. Furthermore, this study found that there was a reduction in accident rates of 53 and 59 percent respectively, when whistle bans were canceled on 288 Consolidated Rail Corporation (Conrail) and 293 CSX Transportation Inc. (CSX) crossings. An update of the Nationwide Study confirmed the previous study's finding that accident rates are higher at crossings subject to whistle bans than at equivalent crossings where locomotive horns are routinely sounded.[4]

FRA also reassessed the statistical methods used in the Nationwide Study in response to public and agency comments.[5] This reassessment, using the same study years as the Nationwide Study update (1992-1996), clearly showed that grade crossings with a whistle ban had substantially higher accident rates than grade crossings with no whistle ban. When these methods were reapplied to all grade crossings in the continental U.S., the results showed statistically significant increases in grade crossing accidents ranging from an increase of 43.3 percent for grade crossings with flashing lights to an increase of 52.6 percent for grade crossings with only passive devices.

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3 Federal Railroad Administration, Office of Safety, *Nationwide Study of Train Whistle Bans*, Washington, D.C., April 1995.

4 Federal Railroad Administration, Office of Safety, *Updated Analysis of Train Whistle Bans*, Washington, D.C., January 2000.

5 Federal Railroad Administration, Office of Safety, *Analysis of the Safety Impact of Train Horn Bans at Highway-Rail Grade Crossings*, Washington, D.C., April 2002.

The Nationwide Study was preceded by a study of the nighttime accident rate at the crossings in Florida that formerly had nighttime whistle bans.[6] In this study, FRA found that between 1984 and 1989, the accident rate increased 195 percent following the imposition of whistle bans, while daytime accident rates at the same crossings remained virtually unchanged.

FRA is faced with the task of providing safety at public grade crossings while minimizing the intrusion of train horn noise into the surrounding community. The rule details when and how locomotive horns must be sounded and when and how a quiet zone, in which horns are not sounded, may be established.

The interim final rule also limits the maximum sound level of locomotive horns to provide some relief to the surrounding population while still ensuring that the sound level is high enough to provide the required warning to the motorist. While FRA's studies have established the important safety benefits of the locomotive horn, this rulemaking has afforded the FRA with the opportunity to evaluate appropriate sound levels that will achieve the safety purpose and limit noise production.

1.2 THE PROPOSED ACTION

With the addition of 49 USC 20153, the Secretary of Transportation (delegated to FRA) was directed to prescribe regulations requiring locomotive horns be sounded at all highway-rail grade crossings in the country. FRA has reviewed information obtained through its outreach efforts and comments submitted to the agency by businesses, concerned citizens, communities, labor unions, local and state government agencies, and railroads. FRA has considered that information and has attempted, within the statutory framework established by Congress, to accommodate all of the legitimate concerns expressed. Following an extensive rulemaking process, FRA is issuing an interim final rule concurrently with this FEIS that specifies the technical requirements and implementation procedures for the use of locomotive horns at highway-rail grade crossings. In drafting the interim final rule, FRA has attempted to reconcile Congress' two, somewhat conflicting, directives. The first directive, which is unambiguous, is that "the Secretary of Transportation shall prescribe regulations requiring that a locomotive horn shall be sounded while each train is approaching and entering upon each public highway-rail grade crossing." This directive does not allow any discretion as to issuance of the regulation requiring the sounding of horns. The Secretary, and by delegation, the Federal Railroad Administrator, must require that horns be sounded at every public highway-rail grade crossing.

The second directive, however, is entirely discretionary. The Secretary may "exempt from the requirement to sound the locomotive horn certain categories of rail operations or

[6] Federal Railroad Administration, Office of Safety, *Florida's Train Whistle Ban*, Washington, D.C., July 1990.

categories of crossings." While exceptions may be crafted, they are not required. The interim final rule contains provisions for such exceptions so as to reduce the environmental impact of the congressional locomotive horn mandate. It provides communities with the ability to reduce the impact of locomotive horns within their jurisdictions while assuring that the level of safety reflected in the congressional mandate is maintained.

Implementation of the interim final rule will require that horns be sounded at public at-grade crossings in the United States. The rule also contains provisions that set a maximum sound level for locomotive horns, limit sound directed to the side, prescribe when and how to sound the horn, and provide an opportunity to any community in the Nation to establish a quiet zone. These provisions will apply to the use of locomotive horns at all public highway-rail grade crossings, including those currently subject to whistle bans established by local or state authorities. Additional details on the specific provisions of the interim final rule are included in Chapter 2.

1.2.1 Locations Affected

The rule will apply to all locomotives operating on the general railroad system of the United States and to all public highway-rail grade crossings. Provisions of the rule could potentially affect all 153,975 public highway-rail crossings (including those currently subject to whistle bans) and a few private crossings that fall within proposed quiet zones. In 1992, to support the FRA in preparing the Nationwide Study, the Association of American Railroads (AAR) surveyed member railroads for the locations of highway-rail grade crossings subject to whistle bans. The survey asked for information on all crossings at which whistle bans were imposed at any time from 1984 to the time of the request. Subsequent to the Nationwide Study, a record of whistle ban crossings has been maintained to reflect any change in the status of whistle bans to the extent FRA knew of the changes. Of the 2,565 crossings believed to have had whistle bans in effect at the time this FEIS was completed, 2,418 were deemed to be subject to the provisions of the interim final rule. The remaining 147 crossings would be exempt from the rule because of low operating speeds and/or the presence of flagging personnel.

1.3 PUBLIC PARTICIPATION

Throughout the rulemaking and environmental review process, public input and participation was important to FRA. Many opportunities were provided to organizations, government officials, and individuals to submit comments and express their concerns.

1.3.1 Pre-NPRM Comments

Because of the intense interest in the locomotive horn issue, FRA established a public docket before initiating the rulemaking proceeding to provide interested parties access to all the relevant documents and materials pertaining to the preparation of the NPRM. This docket included comments, petitions, recommendations, resolutions, documents, and information requests from individual citizens, public officials, community organizations,

and city and regional entities. Approximately 100 pre-NPRM comments concerning the legislation and the proposed rulemaking were recorded in the docket.

1.3.2 Scoping Comments

Several comments about the proposed rule and its potential environmental impacts were submitted during the scoping process for the DEIS. Scoping is an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR 1507.1). A series of public scoping meetings held in the Chicago area and Massachusetts between the fall of 1997 and spring of 1998 helped shape the initial direction of the NPRM and DEIS. FRA published a formal Notice of Intent to prepare the DEIS in the *Federal Register* on May 26, 1998 (63 FR 28549) and solicited comments on the scope of the environmental analysis to be conducted. FRA also published a web page describing the scoping process and making it possible for the public to submit comments by e-mail. More than 200 comments were received during the scoping process and summarized in the DEIS.

1.3.3 Comments on the DEIS and NPRM

FRA completed the DEIS in December 1999 and released it concurrently with the NPRM in January 2000. These documents were distributed to all persons or organizations who expressed interest in the rulemaking process and DEIS, as well as to each member of the United States Congress. FRA encouraged interested parties to comment on either the DEIS, the NPRM, or both. Separate dockets were established to receive and catalog the public comments submitted to FRA in writing or via e-mail. To ensure that parties had sufficient time to comment, the DEIS comment period was open for an extended six-month duration. FRA held public hearings on the DEIS and the proposed rulemaking across the nation in areas with whistle bans and in areas with known concerns about locomotive horn noise. Hearings were held in the following cities: Washington, DC; Salem, Massachusetts; Chicago, Illinois; Western Springs, Illinois; Des Plaines, Illinois; South Bend, Indiana; Berea, Ohio; Madison, Wisconsin; Ft. Lauderdale, Florida; Costa Mesa, California; and Pendleton, Oregon. The hearings provided interested parties an opportunity to make oral presentations or offer comments. The hearings were advertised through publication of notices in the *Federal Register* and on the FRA website as well as through press releases to local news media. Copies of the DEIS and NPRM as well as informational documents were distributed to speakers and attendees at every hearing. Transcripts of the hearings detailing individual comments on the DEIS or the NPRM were prepared for FRA.

Comments were placed in docket number FRA-1999-6440 in the Department of Transportation's electronic Docket Management System, which is available on the Internet at http://dms.dot.gov. For the purposes of this FEIS, FRA treated comments submitted to the DEIS docket and those made at public hearings as comments on the DEIS. FRA considered all comments received equally regardless of the form (verbal, letter, or e-mail) in which they were delivered to FRA. Approximately 950 individuals and organizations commented on the DEIS, making almost 1,900 written and approximately

1,000 oral comments. FRA reviewed these comments in developing the interim final rule and revising the analyses included in this FEIS. Summaries of the comments received on the DEIS with FRA's responses are provided in Appendix C.

1.4 FEIS DISTRIBUTION

FRA has prepared this FEIS to analyze the potential environmental impacts of the interim final locomotive horn rule. The FEIS is being issued concurrently with the interim final rule and notifications sent to organizations and individuals who received and commented on the DEIS, and for whom contact information was provided. The FEIS and interim final rule are also available in electronic format on FRA's Internet site, http://www.fra.dot.gov, or upon written request from FRA at the following address:

Office of Safety
Federal Railroad Administration
1120 Vermont Avenue, Mail Stop 25
Washington, DC 20590

Attn. Locomotive Horns FEIS

CHAPTER 2

ALTERNATIVES CONSIDERED

2.0 INTRODUCTION

To implement 49 USC 20153, FRA is adopting a rule requiring that a locomotive horn be sounded while a train approaches a public highway-rail grade crossing. The rule also provides that other safety measures can be used by local jurisdictions to establish a quiet zone and suspend the requirement for engineers to regularly sound the locomotive horn at public at-grade crossings. A quiet zone is a segment of a rail line, within which is situated one or more consecutive public highway-rail grade crossings at which locomotive horns are not routinely sounded. A quiet zone would constitute mitigation for potential impacts of the locomotive horn rule and substitute for the need to sound locomotive horns. Based on comments received during the rulemaking process, FRA has provided additional options for communities to establish quiet zones or seek waivers from the regulations.

In reviewing the comments on the DEIS and the NPRM, FRA identified five additional alternatives for determining where train horns must sound in addition to the Proposed Action and the No-Action alternative. These alternatives are discussed in more detail in Section 2.3. The environmental effects of these alternatives would not be materially different from those of the No-Action alternative or the Proposed Action represented by the interim final rule. All of the alternatives involve the same basic environmental effects and benefits: wherever the train horn sounds, the noise impacts and safety benefits will be the same; wherever the train horn is silenced, the benefits in terms of noise reduction will be the same and the same safety risks will be present unless compensated by the addition of gates and lights, supplementary safety measures (SSMs), or alternative safety measures (ASMs). The information and analyses presented in this FEIS permit the reader to understand and evaluate the environmental effects of any of the alternatives. Upon examination, FRA concluded that these five additional alternatives are not reasonable options given the agency's purpose and need for the action and does not discuss their environmental effects separately in other chapters of this FEIS.

2.1 NO-ACTION ALTERNATIVE

This alternative would preserve the status quo: states and municipalities could try to regulate the sounding of locomotive horns while railroads could continue to resist such regulation through litigation and other means. This rule is a statutory obligation and that does not provide the FRA with the authority to implement the No-Action Alternative. Adoption of the No-Action Alternative would involve congressional action to reverse its mandate to require the use of locomotive horns at highway-rail grade crossings as set forth in 49 USC 20153. FRA rejected seeking repeal of the statutory requirement because it would represent a default by the agency charged with addressing this issue. Congress initially addressed this issue in 1994 and again in 1996, after FRA had engaged in an

extensive program of local outreach. The House Committee on Transportation and Infrastructure held a hearing on the issues in the proposed rule on July 18, 2000, and Congress subsequently delayed issuance of the final rule until July of 2001 (declaring through a committee report that this would be the final legislative action on the subject). It is clear that, had Congress wished to terminate this rulemaking, it would have done so. FRA has the responsibility to deliver a final rule, and Congress retains the discretion to review and enact a joint resolution of disapproval if it finds the rule unacceptable. FRA concluded that taking no-action would almost certainly lead to a further reduction in safety over time as State-level officials, many of whom today oppose bans imposed without considering safety, found the ground cut out from underneath them with the retreat of Federal leadership. Ironically, at least in the short term, it would further frustrate communities seeking quiet zones that are unable to realize them under existing State laws. Finally, from an economic standpoint, it would result in continued subsidy of bans benefiting a small minority of citizens by all of those who pay State and Federal taxes, businesses who pay unemployment insurance, and all those who pay liability, life and health insurance premiums. The No-Action Alternative serves as an environmental baseline against which the impacts of the agency's preferred alternative can be compared.

2.2 PROPOSED ACTION

FRA's locomotive horn rule has several provisions. First, it requires that horns be sounded at all public at-grade highway-rail crossings in the United States. Second, it sets a maximum sound level for the sounding of locomotive horns. Third, it prescribes how and when locomotive horns are to be sounded. Fourth and finally, it provides an opportunity for any community in the nation to establish a quiet zone.

The opportunity to establish a quiet zone is intended to minimize potential direct noise impacts in communities that are now subject to whistle bans and assist communities that may want to establish quiet zones in the future. The interim final rule delineates and describes a series of supplementary and alternative safety measures that can be employed through two methods to establish a quiet zone. These provisions constitute a means of substituting other safety measures for locomotive horns. A full description of what constitutes a quiet zone and the process for establishing a quiet zone is provided below. Establishment of a quiet zone could fully mitigate any potential direct impacts of the locomotive horn rule.

As required by 49 USC 20153, FRA has taken into account the interest of communities that either have whistle bans in effect or are not yet subject to the routine sounding of locomotive horns. In implementing the rule, FRA will work in partnership with affected communities to provide technical assistance and allow a reasonable amount of time for the communities to install added safety measures.

2.2.1 Summary of Locomotive Horn Rule

The key substantive elements of the Proposed Action are summarized below in Items 1 through 8. Additional details on the rule's procedural and administrative elements are contained in the interim final rule, which is being published in the *Federal Register* and is available on the FRA's website at: www.fra.dot.gov.

1. Requirement for Sounding Horn. Locomotive horns must be sounded while each train is approaching and entering upon each public highway-rail grade crossing.

2. Maximum Horn Sound Level. Locomotive horn sound levels shall be at least 96 dB(A) and no louder than 110 dB(A) measured at 100 feet in front of the locomotive and at 15 feet above the rail.

3. How Locomotive Horns are to be Sounded. All trains must sound the horn in the standard signal sequence of two longs, a short, and a long, starting at least 15 seconds, but no more than 20 seconds, before reaching the crossing, however, in no case may locomotive horns be sounded more than ¼ mile in advance of a crossing, regardless of train speed.

4. Application of Use of Locomotive Horn Rule. Applies to all railroads, both freight and passenger, that operate on the general railroad system of transportation throughout the country. Rapid transit operations sharing tracks and public crossings with general system railroads, or otherwise sharing public crossings with general system railroads, are connected to the general railroad system at the crossing and are thus subject to the rule, except that rapid transit operations are not subject to the horn volume provisions. The quiet zone provisions of the rule also apply to public authorities responsible for safety and maintenance at public highways, streets, or roads crossing railroad tracks at grade.

The use of locomotive horn rule applies to every railroad except:

1) Rapid transit systems within urban areas that are not connected to the general railroad system of transportation.

2) Railroads that exclusively operate freight, tourist, or scenic trains only on track that is not part of the general railroad transportation system.

3) A railroad may, with certain exceptions, decide to not sound the locomotive horn at a crossing if the locomotive speed is 15 miles per hour or less and train crew members or equipped flaggers flag the crossing to provide warning of the approaching train to motorists.

5. Creation of a Quiet Zone in Lieu of Sounding Horns.

a) Definition of a Quiet Zone. A *quiet zone* means a segment of rail line containing one or more consecutive highway-rail grade crossings at which locomotive horns are not routinely sounded. The rule distinguishes between two types of quiet zones. A Pre-Rule Quiet Zone refers to crossings at which local ordinances restricted the routine sounding of locomotive horns, or at which locomotive horns did not sound due to formal or informal agreements between the community and railroads, enforced or observed as of both October 9, 1996 and the date of publication of the interim final rule. A New Quiet Zone refers to crossings at which routine sounding of locomotive horns would be restricted pursuant to provisions of FRA's locomotive horn rule and which does not qualify as a Pre-Rule Quiet Zone.

b) Methods For Establishing Quiet Zones.

Method 1: Public Authority Designation allows communities to establish quiet zones without formal application to FRA, provided one of three conditions is met:

1) One or more supplementary safety measures (SSMs) are applied to every public grade crossing within the proposed quiet zone; or

2) The Quiet Zone Risk Index is at, or below the Nationwide Significant Risk Threshold. Additional safety measures beyond the minimum quiet zone requirements discussed in item c) below are not required; or

3) SSMs are implemented that are sufficient to reduce the Quiet Zone Risk Index either to a level at, or below the Nationwide Significant Risk Threshold or to the risk level which would exist if locomotive horns sounded at all crossings within the quiet zone. The public authority has discretion as to how the Quiet Zone Risk Index is reduced, and may choose the type of SSMs to be applied and the crossings at which they are to be applied.

A complete description of SSMs and the various indices used to determine risk is provided in Chapter 4.

Method 2: Public Authority Application to FRA is a flexible method that uses SSMs and alternative safety measures (ASMs) to deal with problem crossings. The public authority has discretion as to the type of SSMs and ASMs to apply and the crossings at which they are to be applied. If, in response to an application from a public authority, FRA determines that safety improvements will compensate for the absence of the locomotive horn or that safety improvements will reduce risk with respect to loss of life or serious injury to a level at, or below the Nationwide Significant Risk Threshold, a quiet zone may be established.

If Method 2 is selected by the public authority, it must demonstrate, in an application to FRA, through data and analysis that implementation of the proposed measures will reduce the Quiet Zone Risk Index to either the risk level that would exist if locomotive horns sounded at all crossings in the quiet zone or to a risk level below the Nationwide Significant Risk Threshold.

c) Minimum Length of Quiet Zone. The minimum length of a New Quiet Zone shall be one-half mile (2,640 feet or 805 meters) along the length of railroad right-of-way, while the length of a Pre-Rule Quiet Zone may continue unchanged. The addition of any crossing to a Pre-Rule Quiet Zone ends the grandfathered status of the quiet zone, resulting in the requirement that the zone be at least one-half mile in length. The deletion of any crossing from a Pre-Rule Quiet Zone, with the exception of a grade separation or crossing closure, must result in a quiet zone of at least one-half mile in order to retain Pre-Rule Quiet Zone status.

d) Requirement For Active Grade Crossing Warning Devices. Except for those situations defined in the rule, each public highway-rail grade crossing in a New Quiet Zone must be equipped with active grade crossing warning devices comprising both flashing lights and gates that control traffic over the crossing and that conform to the standards contained in the Manual on Uniform Traffic Control Devices (MUTCD). Such warning devices must be equipped with power out indicators and constant warning time devices. Pre-Rule Quiet Zones may retain, but not downgrade, the grade crossing safety warning devices that exist as of the date of publication of the interim final rule.

e) Requirement For Advance Warning Signs. Each highway approach to each public and private highway-rail crossing within a Pre-Rule Quiet Zone or a New Quiet Zone shall be equipped with an advance warning sign advising the motorist that locomotive horns are not sounded at the crossing. Signs must conform to the standards contained in the MUTCD. Such signs must be installed at crossings in Pre-Rule Quiet Zones within three years of publication of the interim final rule.

6. Supplementary and Alternative Safety Measures. Section 222.41 of the rule discusses those measures that can be employed by public authorities to designate a quiet zone. Appendix A: Supplementary Safety Measures and Appendix B: Alternative Safety Measures are included as appendices to 49 CFR 222. These SSMs and ASMs represent mitigation strategies and are described in Chapter 4. Implementation of these measures in accordance with the procedures outlined by FRA would constitute mitigation of potential impacts resulting from adoption of the rule.

7. Communities With Pre-Existing Restrictions on the Use of Locomotive Horns. Section 20153(i)(1) requires that FRA take into account the interests of communities that "have in effect restrictions on the sounding of a locomotive horn at highway-rail grade crossings, or have not been subject to routine sounding of a locomotive horn at

highway-rail grade crossings." FRA is taking the following measures to address the interests of these communities:

a) A Pre-Rule Quiet Zone will be considered approved and may remain in effect if (1) the Pre-Rule Quiet Zone is in compliance with the requirements for Method 1; or (2) if there have been no relevant collisions at any public grade crossing within the quiet zone for the five years preceding the date of publication of the interim final rule and the Quiet Zone Risk Index was less than twice the Nationwide Significant Risk Threshold as last published by FRA.

b) If a Pre-Rule Quiet Zone cannot qualify for approval under 7(a)(1) or 7(a)(2) above, the restrictions may remain in place on an interim basis. Such restrictions may continue for a period of five years if, within three years from the date of publication of the interim final rule, the public authority files with FRA a detailed plan for maintaining the Pre-Rule, or establishing a New Quiet Zone. Locomotive horn restrictions may continue for an additional three years beyond the five-year period if, prior to the date three years after publication of the interim final rule, the appropriate state agency provides FRA a comprehensive statewide implementation plan and makes physical improvements within the quiet zone, or in a quiet zone elsewhere within the State, within three years and four years after publication respectively.

8. Wayside Horns. Section 222.59 of the interim final rule provides for the use of wayside horns to be used in lieu of locomotive horns at individual or multiple at-grade crossings, including those within quiet zones. Certain requirements must be met by the wayside horn system and the crossing must be equipped with flashing lights, gates, a constant warning device and a power out indicator. Wayside horns have not yet been classified by FHWA as a traffic control device. If FHWA does classify them as a traffic control device, the wayside horn must also be approved in the Manual of Uniform Traffic Controls Devices or FHWA must issue an exemption before it may be used.

2.2.2 Implementation Flexibility

FRA will have the following responsibilities in implementing the locomotive horn rule:

1. FRA will take action in response to a public authority application for the establishment of a Quiet Zone under Method 2 that uses measures identified in Appendices A and B of the rule. Based on the requirements of the rule, FRA will accept a proposed Quiet Zone, accept a proposed Quiet Zone with conditions, or reject a proposed Quiet Zone.

2. Upon receipt of an application, FRA will review and comment on a community's data, methodologies and supporting analysis to determine the effectiveness of strategies and countermeasures that would be used within a Quiet Zone.

3. FRA will annually calculate the Quiet Zone Risk Index for New Quiet Zones created under public authority designation with a Quiet Zone Risk Indices less than the

Nationwide Significant Risk Threshold achieved with or without the application of SSM's. FRA will notify each public authority of the Quiet Zone Risk Index for the preceding calendar year for each quiet zone in its jurisdiction. If the Quiet Zone Index is above the Nationwide Significant Risk Threshold, the quiet zone will terminate six months from the date of notification from FRA, unless the public authority (a) provides FRA with a written commitment to lower the potential risk at crossings within the quiet zone to below the Nationwide Significant Risk Threshold, or to a level fully compensating for the absence of a locomotive horn, and (b) completes within three years implementation of SSMs or ASMs sufficient to reduce the Quiet Zone Risk Index to a level below the Nationwide Significant Risk Threshold, or to a level fully compensating for the absence of a locomotive horn.

4. FRA will annually calculate the Quiet Zone Risk Index for each Pre-Rule Quiet Zone. FRA will notify each public authority of the Quiet Zone Risk Index for the preceding calendar year for each quiet zone in its jurisdiction, and if a relevant collision occurred at a grade crossing within one of its quiet zones during that year. If the Pre-Rule Quiet Zone was created with a Quiet Zone Risk Index of less than the National Significant Risk Threshold and if the newly calculated Quiet Zone Risk Index exceeds a value equal to the National Significant Risk Threshold, the quiet zone will terminate six months from the date of notification from FRA, unless the public authority within three years implements SSMs or ASMs in accordance with Section 222.39(b) of the rule. If the Pre-Rule Quiet Zone was created with a Quiet Zone Risk Index of less than twice the National Significant Risk Threshold with no relevant collisions, and if the newly calculated Quiet Zone Risk Index exceeds a value equal to twice the National Significant Risk Threshold, or if a relevant collision occurred at a grade crossing within the quiet zone during the preceding year, the quiet zone will terminate six months from the date of notification from FRA, unless the public authority within three years implements SSMs or ASMs in accordance with Section 222.39(b) of the rule.

5. FRA may at any time review the status of any quiet zone and determine whether the safety measures in place fully compensate for the absence of the warning provided by the locomotive horn under the conditions then present at the public highway-rail grade crossings within a quiet zone.

6. FRA will add new listings to SSMs or ASMs when it determines that such measures or standards are effective substitutes for the locomotive horn in the prevention of highway-rail grade crossing casualties.

7. FRA may order a railroad to cease sounding of horns at public highway grade crossings to demonstrate and test proposed new SSMs.

8. FRA will not fund the construction or operation of SSMs or ASMs or other mitigation techniques or countermeasures used in the establishment of quiet zones. Local jurisdictions and states have the option to fund mitigation measures pursuant to the optional strategies allowed under the requirements of the rule. Federal surface

transportation funds are available for the construction of SSMs or ASMs and are allocated to specific projects by state agencies.

9. FRA may grant a waiver from its regulations as prescribed in 49 CFR 211. Additionally, 49 USC 20153(i)(3) gives the FRA Administrator the authority to waive in whole or in part any requirement of 49 USC 20153 if it is determined not to contribute significantly to public safety.

2.2.3 Waivers

FRA has historically considered waiver petitions from parties affected by an FRA regulation. In many instances, a regulation or specific section of a regulation, while appropriate for the general regulated community, may be inappropriate when applied to a specific entity. Circumstances may make application of the regulation to the entity counter-productive. An extension of time to comply with a regulatory provision may be needed, or technological advancements may result in a portion of a regulation being inappropriate in a certain situation. FRA may grant a waiver from its regulations in such instances. The rules governing FRA's waiver process are found in 49 CFR Part 211. In summary, the waiver process is as follows:

- A petition for a waiver is received by FRA;
- A notice of the waiver request is published in the *Federal Register*;
- An opportunity for public comment is provided; and
- An opportunity for a hearing is afforded the petitioning or other interested party.

FRA, after reviewing information from the petitioning party and others, will grant or deny the petition. In certain circumstances, if FRA concludes that conditions are necessary to assure safety or if they are in the public interest, conditions may be imposed on the grant of a waiver.

Sections 222.15 (a) and (b) of the rule discuss the waiver process that is unique to this rule. However, as paragraph (c) of §222.15 makes clear, once an application is made pursuant to either paragraph (a) or (b), FRA's normal waiver process applies, as specified in 49 CFR 211. Section 222.15(a) of the rule addresses jointly submitted waiver petitions as specified by 49 USC 20153(d). Such a petition must be submitted by both the railroad whose tracks cross the highway, and the appropriate public authority that has jurisdiction over the roadway in question. If the two parties cannot reach agreement to file a joint petition, Section 222.15(b) of the rule allows either party to file individually, provided it specifies in its petition the steps it has taken in an attempt to reach agreement with the other party and provides the other party a copy of the petition filed with FRA. FRA will thus accept individually filed waiver applications (under certain conditions), as well as jointly filed applications. Section 222.15(c) of the rule states that each petition for a waiver must be filed in the manner required by 49 CFR 211. Section 222.15(d) provides that the FRA Administrator may grant the waiver if the Administrator finds that it is in the public

interest and that safety of highway and railroad uses will not be diminished. The FRA Administrator may also grant the waiver subject to any necessary conditions required to maintain public safety.

2.3 ALTERNATIVES CONSIDERED AND DISMISSED

In reviewing the comments on the DEIS and the NPRM, FRA identified five additional alternatives for determining where train horns must sound. The environmental effects of these alternatives are not materially different from those of the No-Action alternative or the Proposed Action represented by the interim final rule. All of these alternatives involve the same basic environmental effects and benefits: wherever the train horn sounds, the noise impacts and safety benefits will be the same; wherever the train horn is silenced, the benefits in terms of noise reduction will be the same and the same safety risks will be presented unless compensated by the addition of gates and lights, SSMs, or ASMs. Upon examination, FRA concluded that these alternatives are not reasonable options given the agency's purpose and need for the action and dismissed them from further consideration. These alternatives are described below.

2.3.1 No Exceptions

This alternative would implement the non-discretionary command of the statute by requiring trains horns to be sounded at all public highway-rail grade crossings. This would be what the statute would require if FRA were unable to devise a workable means of providing for quiet zones that satisfies the statute. FRA would set a maximum sound level for locomotive horns. Changes from the NPRM provisions related to the actual sounding of the horn and maximum sound levels could be accommodated within this option.

Advantages: This option has the advantage of simplicity. It would result in a high level of safety at highway-rail crossings, and the costs of administration would be negligible.

Disadvantages: This approach is not responsive to the statutory command to consider the interests of communities with existing train horn bans because FRA can devise a regulatory regime permitting communities to reduce noise by substituting other safety measures for the sounding of train horns and this option fails to address the issue. Aside from the statutory command, providing a means for communities to quiet train horns has been urged on FRA by the great majority of commenters and their elected representatives (including many who supported the proposed rule as a good means of achieving community quiet and safety). It is simply untenable to say that the final rule should provide no alternative to a high noise load for communities on rail lines with high train counts. Taking this course would also create unnecessary conflict between commuter rail service and the communities served, potentially compromising this important element of a balanced transportation system in many major metropolitan areas.

Had this alternative not been eliminated on statutory grounds, the environmental effects of this alternative would not require separate analysis. Analysis of the effects of the "no-

action" alternative shows the effect of sounding train horns at highway-rail grade crossings across the Nation and the effects of permitting the continuation of existing train horn bans. This alternative would differ only in the elimination of the existing train horn bans, resulting in the known effects of sounding the train horn in those locations as well, including the known safety benefits flowing from sounding the train horn.

2.3.2 Make The NPRM Final

The Notice of Proposed Rulemaking required trains horns to be sounded at all public grade crossings; set a maximum sound level for locomotive horns; and provided an opportunity for any community to establish a quiet zone where all public grade crossings are equipped with gates and lights and data and analysis show that implementation will reduce risk in the quiet zone to sufficiently compensate for the absence of the horn sounding: by implementing one or more Supplementary Safety Measures (SSM) at each crossing (does not require FRA approval); or by implementing a combination of SSMs or Alternative Safety measures (ASM) at some or all crossings within a proposed quiet zone with FRA approval. Communities with present whistle bans would have up to three years in which to implement SSMs and ASMs. Crossings with track speeds of 15 mph or less at which people bearing flags warn motorists of the passage of a train would not need SSMs.

Advantages: Pursuing this option would serve the interest of safety and community quiet. It would be less complex than the option selected.

Disadvantages: FRA found this option to be unacceptable because it would be unresponsive to hundreds of commenters who strongly urged improvements in the rule before its adoption. Many of those commenters live in or represent communities where the train horn is not now sounded, so being unresponsive to them would arguably be unresponsive to the statutory direction to take into account the interest of those communities. FRA agrees with those commenters that the proposed rule offered insufficient time for implementation and would have made the situation particularly difficult for public authorities and railroads in regions where impacts would be most substantial. FRA agrees with the tenor of many comments that the proposed rule would have required compensation for loss of the train horn even where risk is very low (or would be projected to be low even after the horn was silenced). The result of maintaining that requirement would have been poor cost-benefit tradeoffs for many communities. Staying with the literal text of the NPRM would also have missed opportunities for refinement of SSMs/ASMs and would not have captured noise reductions associated with the shift from distance- to time-based horn use.

The environmental effects of the NPRM were analyzed thoroughly in the DEIS and taken into account by the FRA in framing the proposed action represented by the interim final rule, which is a logical outgrowth of the NPRM.

2.3.3 Grandfather All Whistle Bans Existing As Of 10/9/96

This alternative would allow communities that had whistle bans in effect on October 9, 1996 to retain those bans as long as the level of risk does not increase. Risk would be

calculated using the US DOT Accident Prediction Formula (APF) for the entire whistle ban corridor. FRA would essentially be accepting the level of risk the community itself has determined to be acceptable - and would hold the community to that same level of risk. If a whistle ban community exceeded its risk threshold, it would have three years to implement changes (e.g. install SSMs) sufficient to reduce risk to below its risk threshold. Changes related to use of train horns, including the maximum sound level, could be accommodated within this option.

Advantages: This approach would have avoided conflict with current whistle ban communities and, in theory, might have capped the negative safety impacts of bans. As under the proposed rule, new quiet zones would be instituted without any loss of safety.

Disadvantages: This option was rejected for the following reasons, any one of which is independently sufficient: It is unresponsive to the purpose of the statute to the extent excess risk associated with existing bans would be allowed to continue unabated; it does not directly take into account predicted accident severity, and therefore does not truly consider risk (frequency times severity); the Administrator could not have made the statutorily required determination that these exceptions would not "present a significant risk with respect to loss of life or serious personal injury;" it would not provide a uniform level of safety across the Nation; it would not afford new quiet zones the same exceptions allowed for pre-rule quiet zones, thus undermining uniformity of application and requiring local authorities to expend funds on improvements for which the safety pay-back could not be reasonably assured at the system level; it would permit communities with bans to transfer costs to the society at large through insurance, public health and welfare programs, and court judgments; and administration of the approach is not technically feasible. FRA noted that factors other than silencing the train horn would typically be responsible for the growth in calculated risk in the subject communities (e.g., increase in motor vehicle traffic as a result of residential or commercial development in an adjoining jurisdiction; growth in rail traffic). It was not sensible to permit excess risk to continue, provided nothing changes in a community, while requiring new increments of risk in other communities to be addressed without regard to whether the current level of risk is excessive (i.e., FRA realized that this option did not address the right question).

The environmental effects of this option were not analyzed further because this was not a reasonable option to pursue.

2.3.4 Grandfather All Whistle Bans Existing As Of 10/9/96 – Combine Collision-Free Exemption With Severity-Weighted Single Threshold

This very complex option was a precursor to the path taken in the interim final rule. It took a much different approach to pre-rule and new quiet zones. It would allow communities with whistle bans in effect on October 9, 1996 to retain those for the first 5 years following publication of the interim final rule. Thereafter such communities could retain bans as long as: there have been no collisions within the past 5 calendar years ***or*** risk has not increased above a pre-established threshold calculated using the FRA Accident Prediction Formula (APF) for the past 5 years; ***and*** at least flashing lights and

gates have been provided at all such crossings. The option included a severity element in the risk computation for the threshold. A corridor risk index and national threshold would be used, as in the interim final rule. The option provided further flexibility for retaining whistle bans during the transition period as follows: a State Department of Transportation (or other authorized state-level body) could request extended implementation beyond the 5-year period on the basis that the State is assisting local jurisdictions in implementing quiet zones and requires additional time due to funding and/or administrative constraints. The following would apply: each project must be the subject of a filing with FRA (i.e., the rule otherwise applies as revised); actual implementation of initial projects will begin not later than year four; consistent with efficient completion of required work and corridor-related safety considerations, improvements will be implemented at the most hazardous crossings first (where risk reduction opportunities are greatest) and then proceed to less hazardous crossings; no less than 25% of identified excess risk must be abated by the end of year five, 50% by the end of year six, 75% by the end of year seven, and 100% by the end of year eight; and this relief will expire eight years following publication of the interim final rule (seven years from the effective date). If a community exceeded the severity threshold in any annual review thereafter, actions would be taken as necessary to fall back below the threshold within a three-year period or the train horn would be required to sound; or actions sufficient to compensate for the loss of the train horn would have to be taken. Communities establishing new quiet zones would be required to follow the standards set forth in the NPRM (and would not be able to take advantage of low baseline risk, even after adjustment for loss of the train horn).

Advantages: This option would take into consideration the interests of communities with existing bans in a manner similar to interim final rule, except flashing lights and gates would be required where not present. It would set a requirement of flashing lights and gates for all crossings where the train horn is silenced, enhancing safety. It would also avoid any negative flow of safety benefits related to toleration of new unabated risk in new quiet zones.

Disadvantages: FRA rejected this option principally because it did not afford new quiet zones the same exceptions allowed for pre-rule quiet zones, thus undermining uniformity of application and requiring local authorities to expend funds on improvements for which the safety pay-back could not be reasonably assured at the system level. Further, FRA noted that the costs of flashing lights and gates in existing ban areas would be substantial, in some cases potentially resulting in loss of quiet zone status (with resulting disruption of settled expectations) due to financial inability of communities. Again, in many cases costs might not be fully recovered through safety benefits. FRA also discarded the rigid implementation schedule for pre-rule quiet zones on the ground it could not be effectively policed in an environment where local authorities would find it necessary to move to a large extent on their own schedules (albeit in some cases with State assistance). FRA also concluded that excepting pre-rule quiet zones from the requirement to make safety improvements solely on the basis of no accident history (with necessarily limited exposure) could not be supported as based on sound safety analysis (and opted, instead, for a limited exception based on both accident history and underlying estimated risk).

This option was rejected as unreasonable and its environmental effects would be very similar to the proposed action.

2.3.5 Require Horns Or SSMs At Highest Risk Crossings Within Each State

This alternative would have required that train horns be sounded at all grade crossings except those where (1) maximum train speed is 15 m.p.h. or less and flaggers are provided or (2) a whistle ban permitted under the rule is in effect. Existing whistle bans could continue provided high risk crossings are addressed within three years. New whistle bans could be created only if crossings within them were equipped with gates and lights. No whistle ban could include a grade crossing categorized as high risk, except crossings within existing whistle bans that are remedied within three years. High risk crossings are those with an Accident Prediction Formula (APF) greater than or equal to .05 (i.e., a five percent chance of an accident occurring at that crossing in the next 12 months). Where train horns are now sounded, the crossing's APF would be increased by 44 percent to account for the absence of the train horn. Within one year of the rule's issuance, any community with an existing whistle ban would have to certify that it has reviewed FRA data on effectiveness of horns, whistle ban effects, and relative merits of SSMs and consulted with affected railroads and state officials about possible safety improvements. Any community imposing a new whistle ban must first provide the same certification. Communities with existing whistle bans may continue to include crossings lacking gates and lights unless and until the crossing has an APF of .05 or more. Once a whistle ban is in effect, any crossing that reaches an APF of .05 must be remedied within two years.

Advantages: This option was viewed as attractive because it would have mandated safety improvements at very high risk crossings within a relatively short time and provided categorical relief for crossings deemed relatively low risk. It defined risk uniformly for all crossings and all jurisdictions. It is relatively simple. It defined significant risk very clearly: equal to or greater than one predicted collision every 20 years. It captured nearly all predicted casualties.

Disadvantages: This option was rejected because: it does not directly take into account predicted accident severity, and therefore does not truly consider risk (frequency times severity); it does not permit sufficient flexibility to reduce risk within a quiet zone by dealing with crossings other than ones with the highest APF values and, therefore, does not adequately take into account the interest of communities with existing whistle bans; and it is not in harmony with the corridor improvement concept underlying the proposed rule. The statute addresses all crossings, not merely the most hazardous. The option focuses more on absolute risk rather than compensation for loss of the train horn (the focus of the law). A crossing-by-crossing approach to horn use would abandon the corridor approach to crossing safety improvements advocated by the US DOT for many years (including eliminating the incentive for consolidation of redundant crossings), and it could result in very uneven results in terms of community quiet, depending on local implementation. The option could result in a patchwork of ban areas, adding to burden on locomotive engineers to pick out, crossing by crossing, where the horn must be sounded. This option could be more costly per unit of risk reduced because the community is

required to take risk reduction at specified crossings rather than where means and need best correspond (e.g., foreclosing the option of putting in medians at two moderate-risk crossings for a total cost of $40,000 rather than installing four-quadrant gates at one higher risk crossing for an incremental cost of $75,000-$150,000, even though the resulting risk reduction is the same).

This alternative was not considered reasonable. If the environmental effects of this option were to be considered, the noise impact of sounding a train horn at a crossing would be the same as it would be for the preferred option and the safety benefits of sounding the train horn or fully compensating for the absence of the train horn would be the same as for the preferred option.

CHAPTER 3

AFFECTED ENVIRONMENT

3.0 INTRODUCTION

As defined by the Council on Environmental Quality, a Programmatic EIS is designed to consider the effects of a "broad federal action." This FEIS addresses issues appropriate for a decision on a rule of national applicability.

3.1 USE OF LOCOMOTIVE HORNS

Locomotive horns and whistles have been employed as effective grade crossing safety devices for well over 100 years of railroad operations. The loud auditory warning provided by the locomotive horn provides the motorist with information that a train is approaching, its relative speed and from what direction. This information is important at both actively and passively signed crossings. Current regulations found at 49 C.F.R. §229.129 require that each lead locomotive be provided with an audible warning device and that the audible warning device produce a minimum sound level of 96 dB(A) at 100 feet forward of the locomotive in its direction of travel. The existing regulations do not restrict the maximum sound level of a locomotive horn. In addition, train horn noise has been excepted from Environmental Protection Agency limits on railroad noise emissions. Without a maximum sound level requirement, current railroad practices vary across the country and between different types of railroad operations. Even the maximum sound level available from the horn has varied widely among segments of the locomotive and cab car fleets. FRA is aware that a major commuter authority sets the sound output of the horns on at least a portion of its commuter equipment at the minimum allowed (96 dB(A) at 100 feet, "plus or minus" 4dB for actual field testing). Many freight locomotives have horns that deliver as much as 114dB(A) at 100 feet in front of the locomotive.

The industry standard for the sounding of the locomotive horn at a grade crossing is a pattern of two long, one short and one long blast beginning approximately ¼ mile in advance of the crossing and continuing until the locomotive or train occupies the crossing. This is not a regulatory requirement but a standard industry practice that has evolved over time. Research has shown that the sound of a locomotive horn at distances greater than ¼ mile from a crossing is attenuated to the extent that it does not provide an effective warning to the motorist. Typically, a whistle board is placed ¼ mile in advance of the grade crossing to signal the engineer of the need to blow the locomotive whistle.

3.2 LOCATIONS AFFECTED

All locomotives operating on the general railroad system of the United States would be subject to the provisions of the locomotive horn rule. According to the U.S. DOT Grade Crossing Inventory, as of June 2002, the rule provisions could potentially affect all of the

approximate 153,975 public grade crossings in the United States. These crossings over which locomotives operate, and the surrounding areas are considered by FRA to represent the affected environment for the purposes of preparing this FEIS. Private highway-rail at-grade crossings would not be subject to the locomotive horn rule, and therefore potential effects at these locations were not evaluated for this FEIS.

Some jurisdictions have enforced whistle bans on a subset of the total of 153,975 public crossings and these crossings would be subject to certain additional provisions of the locomotive horn rule.

3.2.1 Identification of Whistle Ban Crossings

At FRA's request, the Association of American Railroads (AAR) surveyed member railroads in 1991/1992 for the locations of highway-rail grade crossings subject to whistle bans. The survey asked for information on all crossings at which whistle bans were imposed at any time between 1984 and 1992. FRA used this information to complete its Nationwide Study on whistle bans. Subsequent to the Nationwide Study, FRA has kept a record of whistle ban crossings to reflect any change in the status of whistle bans (to the extent FRA knew of the changes). Of the 2,057 crossings believed to have had whistle bans in effect as of the beginning of this environmental study in 1998, 1,978 were considered to be subject to the provisions of the NPRM requiring that locomotive horns be sounded. Potential environmental impacts at these locations were evaluated in the DEIS.

Based on public comments on the DEIS, FRA removed approximately 770 crossings from this list that no longer have whistle bans or have been closed or changed, and identified approximately 800 additional crossings with current whistle bans. Information provided by the AAR on October 24, 2000 indicated a total of 255 in the Chicago Region. At approximately the same time Metra informed FRA that 130 crossings on their property were no-whistle crossings. Between the year 2000 and 2002 some of these crossings were reported in the inventory as being closed or no longer public. When combined and checked against year 2002 inventory records some 304 Chicago area crossings were considered no-whistle based upon AAR and Metra sources. In November of 2002, the ICC provided their inventory of crossings in the state of Illinois indicating current whistle status (based on actual practice). It showed 278 no-whistle crossings in the Chicago Region and of those 226 corresponded with the 304 provided by AAR and Metra. FRA also learned of 29 additional quiet crossings in some other suburban Chicago communities for a total of 385. FRA was careful to eliminate all private crossings, pedestrian-only crossings, crossings not at grade (railroad over or under roadway), and closed crossings that would not be subject to the horn sounding requirement of the rule.

Because the rule excludes crossings where train speeds are below 15 miles per hour and where train crew members or properly equipped flag personnel provide a warning to motorists, any crossings that met this criteria were also excluded from the final list of crossings analyzed. The 2,086 active public crossings were subsequently screened to eliminate these low speed crossings with flag warning from further noise impact analysis.

Based on this analysis, FRA identified 2,027 crossings with current whistle bans for evaluation of potential adverse noise impacts in this FEIS. The number of whistle ban crossings and types of bans now in effect are shown in Table 3-1.

TABLE 3-1
HIGHWAY-RAILROAD CROSSINGS STUDIED

Whistle Ban Type	Number of Crossings
24 Hour	1,970
Nighttime-Only	57
TOTAL	**2,027**

Source: Federal Railroad Administration

3.2.2 Highway-User Warning Devices at Whistle Ban Crossings

Table 3-2 lists the types of highway-user warning devices installed at the 2,027 crossings with current whistle bans that were evaluated for the FEIS, and at all public highway-rail at-grade crossings within the United States. Crossings with whistle bans are more likely to be gated as compared to the proportion of all public crossings in the United States that are gated. For example, as reported in FRA's Nationwide Study, only 23 percent of crossings are equipped with gates compared to 51 percent of the whistle ban crossings studied in the FEIS.

TABLE 3-2
WARNING DEVICE COMPARISON:
CROSSINGS WITH WHISTLE BANS VS. TOTAL PUBLIC CROSSINGS IN U.S.

Crossings with Whistle Bans:		
Warning Device	**Number of Crossings**	**Share of Total Crossings**
Gates	1027	50.7 %
Flashing Lights	450	22.2 %
Passive	490	24.2 %
None	60	2.9 %
TOTAL:	**2,027**	**100.0 %**
Public Crossings in U.S (as of 2002)		
Gates	35,639	23.2 %
Flashers	31,357	20.4 %
Crossbucks	81,624	53.1 %
None/Other	5076	3.3 %
TOTAL:	**153,696**	**100.0 %**

Source: Federal Railroad Administration

The 2,027 evaluated crossings are located in 24 states, as shown in Figure 3-1. The state with the most crossings with current whistle bans is Wisconsin, with 655. Other states with significant numbers of crossings subject to current whistle bans include: Illinois (407), Minnesota (158), Missouri (103), Virginia (101), Indiana (101), and Maine (100). At 120 (6 percent) of the crossings evaluated, the current bans are effective only during nighttime hours, usually between 6:30 P.M. and 6:30 A.M. Figure 3-2 shows the states and the number of crossings with nighttime-only bans.

3.2.3 Former Locations of Whistle Bans

In conducting the Nationwide Study, FRA learned that, during the study period, cancellations of whistle bans occurred at approximately 1,400 highway-rail crossings throughout the United States. A significant number of these cancellations are due to FRA Emergency Order No. 15 discussed below. In the DEIS, FRA separately assessed the noise impacts at crossings that previously had whistle bans to determine the cumulative effects of the rule. These estimates are used again in the FEIS to indicate level of latent demand for quiet zones across the country.

FIGURE 3-1
CROSSINGS BY STATE SUBJECT TO CURRENT WHISTLE BANS

Number of Crossings: 2,027
Number of States: 24

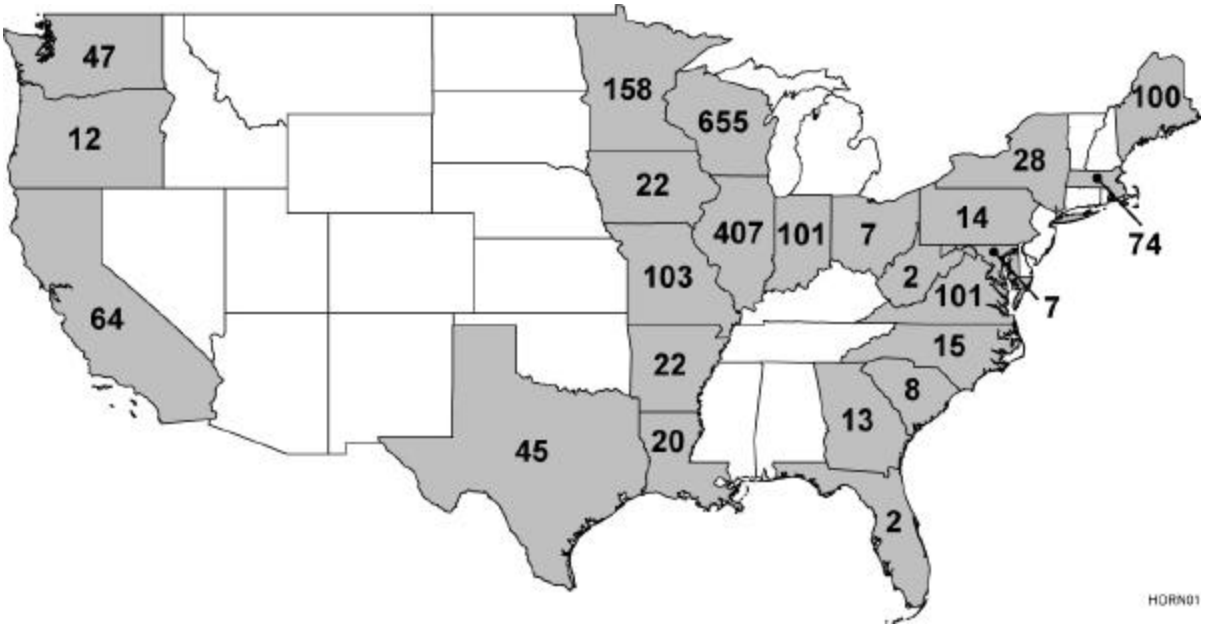
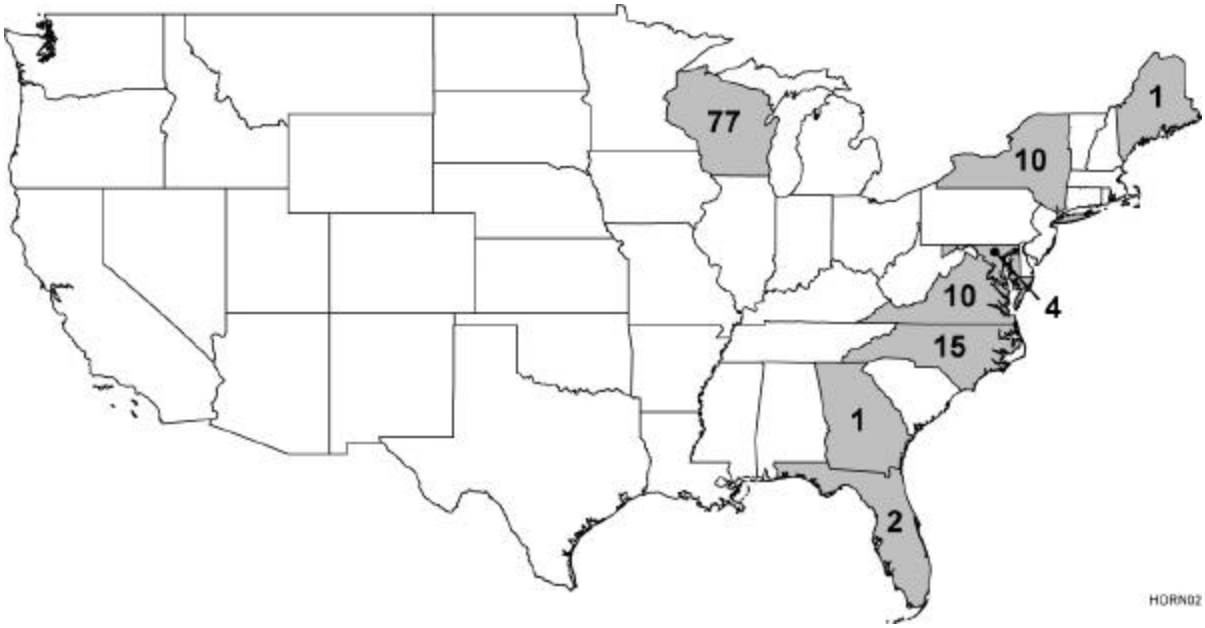


FIGURE 3-2
CROSSINGS BY STATE WITH NIGHTTIME-ONLY WHISTLE BANS

Number of Crossings: 120
Number of States: 8



3.3 SAFETY OF HIGHWAY-RAIL GRADE CROSSINGS

3.3.1 Safety Affected Environment

FRA is responsible for balancing the need for an effective warning to the motorist while minimizing the horn's intrusion into the surrounding community. There are a number of factors that influence the ability of a motorist to hear a train horn. These include: the sound spectrum level (intensity at each frequency) of the horn, distance from the horn, ambient noise spectrum level in the motor vehicle, the acoustic insertion loss of the vehicle (sound reflected and absorbed by the vehicle which does not enter the vehicle interior), and the characteristics of the grade crossing. The human ear is only sensitive to sounds between 20 and 20,000 hertz (Hz), and is most sensitive in the range between 500 and 5,000 Hz. Hearing sensitivity declines sharply for higher and lower frequencies. As distance from a sound source increases, the effective intensity of the sound decreases by approximately 7.5 dB for every doubling of the distance. In addition, ambient noise in the vehicle can reduce the motorist's ability to hear the train horn through masking. Masking would be strongest when the frequency of the noise is at the same frequency as the train horn. Sound from the horn has to be sufficiently loud to be heard by the motorist, particularly at passively signed crossings. Even with all lights (headlights and "ditch" lights) functioning, a train is sometimes difficult to pick out against the visual background. Further, due to such factors as buildings, mature stands of trees, track curvature, and the angle of motorists' approach, sight distances at many crossings do not permit a long preview of the train's approach. A sufficiently loud auditory warning will tell

the motorist that a train is approaching and from what direction. This will give the motorist more opportunity to sight the oncoming train at the first opportunity, evaluate its rate of approach, and make a safe decision.

The challenge at passively signed crossings is to provide warning sufficiently early to affect motorist behavior. This is more difficult, because the motorist approaching the crossing in most cases (except where an enforced STOP sign is present) will not stop and may not slow down except as required by unevenness of the road surface. The motorist's decision point is thus farther away from the crossing and (in the typical case) from the train horn. According to the Volpe National Transportation Systems Center (Volpe Center), a vehicle traveling at 30 miles per hour may have interior noise level in the range of 21 to 63 dB(A) from its engine and typical road noise. A loud sound system playing music or other programming will add to this background noise.

The Volpe Center has been studying train horn issues for FRA in support of this rulemaking. In addition, following publication of the Notice of Proposed Rulemaking, FRA held a Technical Conference on Locomotive Horns that was attended by railroads, the Association of American Railroads, locomotive builders General Electric and General Motors and other industry representatives. The Technical Conference and subsequent Volpe Center testing confirmed that the existing locomotive horn testing procedures set forth in 49 C.F.R. §229.129 were causing a misperception regarding center mounted locomotive horns. The existing regulation requires measurement of horns 100 feet in front of the locomotive and 4 feet above the rail. This approach places the measurement device in an acoustical shadow cast by the locomotive body when center mounted horns are sounded. This procedure causes railroads to set a higher volume level for center mounted horns to compensate for the shadow. This shadow also causes measurements close to the locomotives to show higher sound levels to the side than to the front of some locomotives.

3.3.2 Florida Train Whistle Ban Study

The Florida state legislature enacted a statute that permitted communities to establish nighttime whistle bans at gated crossings beginning in 1984. This statute applied only to the Florida East Coast Railway Company (FEC), an intra-state railroad, from 10:00 P.M. to 6:00 A.M. Eventually, 511 of 600 public grade crossings on the FEC line carried bans. Unfortunately, the nighttime accident rate increased at the crossings with whistle bans. During hearings held in 1990 by the U.S. House of Representatives Committee on Appropriations, FRA was requested to determine if there was a correlation between the rise in accident rates with whistle bans in Florida. FRA studied the nighttime accident rate at the 511 affected crossings using a 1984-to-1989 study period and found that the rate increased 195 percent following the imposition of whistle bans, while daytime accident rates at the same crossings remained virtually unchanged.[1] Based on its investigation and the lack of any FEC response to correct the safety hazard, FRA issued

[1] Federal Railroad Administration, Office of Safety, *Florida's Train Whistle Ban*, Washington, D.C., July 1990.

Emergency Order No. 15 on July 26, 1991. This order requires the FEC to sound locomotive horns when approaching public highway-rail grade crossings, which essentially requires the FEC to follow the operating procedures in place for the use of horns before the whistle bans were passed. The effect on accident rates following Emergency Order No. 15 was significant. While daytime (6:01 A.M. - 9:59 P.M.) accidents declined by 8.8 percent, nighttime accidents (10:00 P.M. - 6:00 A.M.) declined by 68.8 percent to equal pre-whistle ban levels.

3.3.3 1995 Nationwide Study

FRA's 1995 Nationwide Study followed two analytical approaches: the first analyzed empirical data using a case study approach; the second examined the entire crossing database.[2] The Nationwide Study used an established analytical model to predict the likelihood of collisions at highway-rail crossings based on certain physical (e.g., the type of roadway traveling over the tracks) and operational (e.g., the speed of the train) characteristics. The predicted collision rates were compared with the actual collision histories for crossings with whistle bans. As an independent control group, collision predictions for all of the other 167,000 crossings in the U.S. DOT Grade Crossing Inventory at the time of the Nationwide Study were computed and compared to their actual collision histories. FRA then examined the variance between the predicted and actual collisions for whistle ban and non-whistle ban groups. Of special interest was any difference in how well each group conformed (or did not conform) to its predicted frequency of collisions. The variance between the whistle ban groups and non-whistle bans groups was of interest because significant variances suggest that the sounding of locomotive horns has an effect on the rate of collisions at public highway-railway grade crossings. The following description of the condition of public safety at affected crossings is drawn from the Nationwide Study.

Data Description. The primary data source supporting the rule is the U.S. DOT Grade Crossing Inventory database of all highway-rail crossings in the United States. This database, created by states, railroads, and the U.S. DOT, is voluntarily updated by states and railroads providing information to the FRA on new crossings and changes to crossings by using U.S. DOT Crossing Inventory Form (Form FRA F 6180.71) and/or electronic equivalents.

In 1991, FRA asked the AAR to provide information on all crossings subject to whistle bans. AAR's survey identified 2,705 crossings reported to be subject to either 24-hour or nighttime-only bans as of the time of the survey. In the survey, 25 railroads responded, 17 of which reported operating over crossings subject to whistle bans. The respondents operate over a total of 102,737 public grade crossings. This number represents about 61 percent of the national total of approximately 168,000 crossings at the time. Crossings not included in the survey are on the properties of approximately 603 other railroads, all of which are smaller railroads.

[2] Federal Railroad Administration, Office of Safety, *Nationwide Study of Train Whistle Bans*, Washington, D.C., April 1995.

FRA believes that nearly all Class I railroad crossings were covered by the survey. Because Class I railroads, as a group, accounted for about 91 percent of the total annual train miles operated in 1993, the crossings listed in the AAR survey experience a very large share of the total interactions between highway-users and trains that occur at crossings subject to whistle bans. Therefore, the survey was deemed an adequate basis for this analysis.

Before-and-After Case Studies. Using information about whistle ban cancellations and implementations from the AAR survey, in addition to collision data from FRA's crossing accident/incident file[3], the Nationwide Study includes direct comparisons of collision occurrences for 12 groups of crossings. This type of "before-and-after" comparison is similar to the technique used to study the impact of whistle bans in Florida.

Each crossing was studied for equivalent time periods before and after the date a whistle ban was terminated (or in a few cases, implemented). Since the time periods were not equal for all cases, a normalizing procedure was required. For the twelve case studies, a total of 130 collisions occurred during whistle bans while 80 collisions occurred when horns were sounded, indicating a 38 percent reduction in the overall rate of collisions after whistle bans were canceled. 41 injuries and 11 fatalities occurred during the whistle bans, compared to 28 injuries and 4 fatalities for periods without whistle bans.

In conducting these case studies, FRA noted that several crossings had more than one collision. One crossing in Georgia had five collisions during the 33 months and 2 weeks of the "no-ban" period reviewed. Three crossings had 4 collisions, five crossings had 3 collisions, and 13 crossings had 2 collisions during the periods when horns were not sounded. The case studies reflect a very diverse group of crossing configurations, warning devices, traffic mixes, and locations. Unlike the Florida crossings, which were relatively homogeneous (especially with regard to the number of trains), the crossings in these case studies embody such a variety of situations that the results should be free from significant bias. In addition, the wide geographical distribution represented in the case studies contributes to a more credible portrayal of the safety implications of whistle bans.

National Comparison. For a more generalized indication of the impact of whistle bans, FRA collected crossing information for the entire nation for the five-year period from January 1989 through December 1993. Without regard to state borders or railroad identities, national information and information about the crossings with whistle bans were compared as two large groups. FRA used its analytical model to predict the expected frequency of collisions within the two groups and compared the results with actual collision

[3] Pursuant to 49 USC §20901, railroads are required to file accident/incident reports with the FRA. Any contact involving on-track equipment and an automobile, bus, truck, motorcycle, bicycle, farm vehicle, pedestrian, or other highway user at a highway-rail grade crossing must be reported to the FRA on the "Highway-Rail Grade Crossing Accident/Incident Report," Form FRA F 6180.57. The FRA has maintained a computer-based file of these reports since 1975.

information. This model, referred to as the "Accident Prediction Formula" (APF), is routinely used to identify crossings at which warning devices should be given priority for upgrading. The APF was developed using data from thousands of collisions and incidents spanning many years. It does not consider whether a crossing has a whistle ban.

The APF uses information about the physical characteristics of a crossing, such as the number of tracks, the number of highway lanes, types of existing warning devices (gates, flashing lights, and signs), whether its location is urban or rural, and whether the roadway is paved. The formula also considers operational information about the number of highway vehicles using the crossing per day and the number and maximum speed of trains in order to predict the frequency of collisions at a particular crossing. For this comparison, the APF was used without a supplemental factor normally used to adjust its output for recent collision occurrences at a specific crossing. As a result, the analysis considered only the essential crossing characteristics, and was not skewed by local, collision-causing anomalies.

For this comparison, the "study group" of 2,122 crossings was purged of 900 crossings that either had a change in whistle ban status or a change to the type of motorist warning device installed between 1989 and 1993. Either change would have invalidated the results of the APF for the crossings. The resulting collision estimates were based solely on each crossing's physical and operational parameters. FRA applied the APF to estimate the five-year collision rates for the remaining 1,222 crossings reported to be subject to whistle bans. These crossings were sorted in order of increasing risk according to their APF ratings, divided into 10 groups of nearly equal size, and labeled A through J, as shown in Table 3-3. Based on the APF ratings, Group "A" had the least risk and Group "J" had the highest risk.

FRA used the APF to estimate the five-year collision rates for crossings in the 167,000 crossings in the U.S. DOT Grade Crossing Inventory that did *not* have whistle bans in effect for the period 1989 through 1993. As with the whistle ban crossings, the inventory crossings were sorted and divided into corresponding risk groups A through J according to their APF ratings. For each group, "with" and "without" whistle bans[4], the number of collisions for the five-year period for the group was divided by the number of crossings. This calculation produced a collision rate per crossing risk group, independent of group size, as shown in Table 3-3 and Figure 3-3. Finally, subtracting the non-ban rate from the whistle ban rate, and then dividing by the non-ban rate determined the percentage difference in the collision rates between whistle ban and non-ban crossings. This

[4] Crossings that had a ban for part of the period were included in the "no-ban" group. This inclusion caused the differences between the two groups to be understated. The ten groups vary in size, but because the subsequent analysis is based on collision rate per crossing, the variance in group size did not affect the validity of the analysis. The technique of stratification is normally used to prevent a preponderance of a certain characteristic, or a large number of low- or high-risk values from masking differences or skewing a comparison based on fully aggregated groups.

produced the percentage by which the whistle ban rate exceeded the non-ban rate. These percentage increases are shown in Figure 3-4.

The results of this collision rate per crossing analysis were dramatic. For nine out of ten theoretically similar risk groups, the whistle ban crossings had significantly higher collision rates over the five-year period than did the non-ban crossings. While one group showed whistle ban crossings with 17.5 percent fewer collisions per crossing, the other nine groups clearly showed that crossings with five-year whistle bans were less safe than similarly grouped "no-ban" crossings. The average difference for all ten groups, including the group with the 17.5 percent reduction, was an 84 percent increase in the collision rate per crossing.

TABLE 3-3
NATIONWIDE STUDY CROSSING COLLISIONS
(WITH AND WITHOUT WHISTLE BANS)

	WITHOUT WHISTLE BANS			5-YEAR WHISTLE BANS			
APF Group	Crossings	5-Year Collisions	Collision Rate	Crossings	5-Year Collisions	Collision Rate	Percent Change with Ban
A	35,056	954	0.02721360	123	9	0.07317073	168.88%
B	38,460	1,786	0.04643786	121	8	0.06611570	42.37%
C	25,059	2,199	0.08775290	122	20	0.16393443	86.81%
D	19,761	2,443	0.12362735	122	46	0.37704918	204.99%
E	18,552	3,232	0.17421302	126	43	0.34126984	95.89%
F	9,478	2,207	0.23285503	119	58	0.48739496	109.31%
G	7,205	2,219	0.30798057	122	31	0.25409836	- 17.50%
H	6,291	2,543	0.40422826	121	74	0.61157025	51.29%
I	4,556	2,230	0.48946444	122	66	0.54098361	10.53%
J	2,582	1,707	0.66111541	124	156	1.25806452	90.29%
TOTALS:	**167,000**			**1,222**			**84.29%**

Source: Federal Railroad Administration, Office of Safety, *Nationwide Study of Train Whistle Bans*, Washington, D.C., April 1995.

FIGURE 3-3
CROSSING COLLISION HISTORY: 1989 – 1993

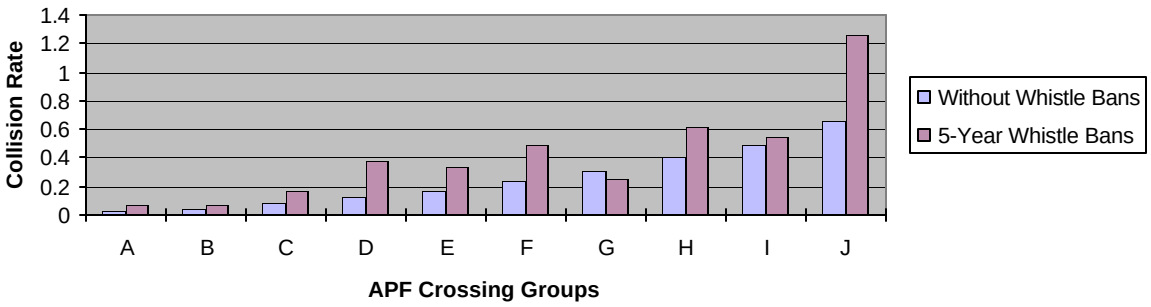
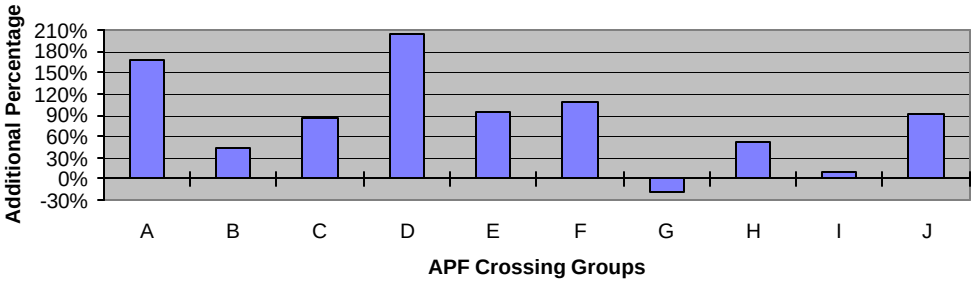


FIGURE 3-4
INCREASE IN COLLISIONS:
WHISTLE BAN VS. NON-WHISTLE BAN CROSSINGS



Collision Conditions. The circumstances of collisions occurring during periods of whistle bans were compared with those of collisions during non-ban periods to determine whether the sounding of locomotive horns reduced or prevented collisions under certain conditions. Collisions at the crossings where whistle bans were canceled or enacted were grouped according to whether they occurred during the ban or non-ban periods. Almost two thirds of the collisions occurred in clear weather (65 and 62 percent). Collisions during bad weather, including rain, fog, sleet, and snow, showed a negligible difference when horns were sounded (14 percent vs. 13 percent). Night collisions accounted for 48 percent of the total during the ban period, compared to 43 percent when horns were permitted. Collisions at dawn and dusk were about the same during the ban and non-ban periods (7 percent vs. 5 percent).

However, collisions that occurred when motorists drove around lowered gates accounted for 28 percent of the cases when horns were banned and only 15 percent when horns were sounded. Motorists were struck by a second train with the same frequency during both ban and no-ban periods (about 2 percent of the cases).

Similarly, collisions where motorists struck the side of the train occurred with about equal frequency during both ban and non-ban periods (22 percent vs. 21 percent). In the combined total of 1,068 collisions, there was only one instance where the crossing warning device had failed to operate. That one collision was at a crossing with a whistle ban in effect.

Collisions at night or involving motorists who drove around lowered gates happened less often when locomotive horns were sounded, suggesting that horns reduce collisions in instances of darkness and motorist impatience.

When FRA examined the collision histories of the crossings subject to nighttime-only whistle bans, the data were found to be insufficient to support statistically meaningful conclusions. Low highway and/or train traffic volumes after midnight are probably responsible for the relatively small number of collisions that occurred during the nighttime whistle ban hours (12:00 a..m. to 6:30 a.m). Only 2 of the 17 collisions (approximately 12 percent) occurred during those hours.

3.3.4 2000 Nationwide Study Update

Prior to the publication of the NPRM and DEIS, FRA updated its 1995 Nationwide Study to reflect more recent data.[5] The 2000 Nationwide Study Update incorporated information on a larger number of crossings than the 1995 analysis, expanding it to include data for all Chicago area crossings, as well as several other newly identified locations. This study also presented a more refined comparison of accident rates according to the type of warning device in place at each crossing (e.g., automatic gates with flashing lights, flashing lights or other active devices without gates, or passive devices such as crossbucks or other signs).

FRA's analysis confirmed the previous finding that accident rates are higher at crossings subject to whistle bans than at equivalent crossings where locomotive horns are routinely sounded. This pattern was observed at all categories of crossings. For instance, an average of 62 percent more collisions occurred at whistle ban crossings equipped with gates than at similar crossings across the nation without bans. FRA used this value in the NPRM as the increased risk associated with whistle bans instead of the 84 percent cited in the 1995 Nationwide Study. The 62 percent risk was thought to be more appropriate because it represented the risk associated specifically with gated crossings, which more accurately reflected the type of crossing that was proposed to be eligible for quiet zone designation.

The Nationwide Study Update also showed that the added warning provided by the locomotive horn is most critical at ungated crossings that are equipped with flashing lights or other active warning devices. These crossings experienced 119 percent more collisions than similar crossings without whistle bans, due both to the ambiguity of flashing lights at

[5] Federal Railroad Administration, Office of Safety, *Updated Analysis of Train Whistle Bans*, Washington, D.C., January 2000.

crossings, which in other traffic control situations indicate that a motorist may proceed after stopping, and the difficulty of judging the rate of approach of a large object like a locomotive. Crossings where passive signage is the only type of warning device showed an average of 27 percent more collisions for crossings subject to whistle bans.

3.3.5 Safety Impact Analysis of Locomotive Horn Bans at Highway-Rail Grade Crossings

In 2003, FRA conducted a statistical review of the methods used in previous studies of highway-rail grade crossing safety.[6] This study revisited the methods used in the earlier Nationwide Study and the 2000 and 2002 updates. It also explored the use of alternative methods to study the safety impact caused by the lack of train horns. The analysis studied the current list of crossings with whistle bans for the time period of 1997 through 2001. The nationwide effect that banning locomotive horns had on collisions at highway-rail grade crossings was re-estimated by a method different from the previous studies. A Poisson regression analysis was applied to the entire data set. The regression included all of the variables used in the U.S. D.O.T. Accident Prediction Formula plus others including a 1/0 flag for whistle bans. The regression coefficient for the whistle bans was used to estimate the effect of the ban. This new method was chosen as it had the best statistical fit on a nationwide basis.

When this method was applied to grade crossings in the continental United States, excluding Florida and the Chicago Region, the results showed statistically significant and substantial increases in accidents at crossings with bans, ranging from an increase of 30.9 percent for grade crossings with flashing lights to an increase of 74.9 percent for grade crossings with only passive devices. FRA determined that 66.8 percent more collisions occurred at whistle ban crossings equipped with gates than at similar crossings across the nation without bans. This figure was used to assess the safety benefits of the interim final rule.

Regional analyses were also conducted, though smaller datasets made the results less meaningful. Results similar to the national condition were found when the method was applied only to crossings in Wisconsin, but they were less statistically significant. Results for the Chicago area showed a different risk factor although they were less conclusive, possibly due to small number of data points. Gated whistle ban crossings in the Chicago Region experienced a 17.3 percent increase in collisions when compared to the national pool of crossings. Overall, the results of the nationwide comparisons reinforce the previous FRA finding that locomotive horn bans substantially increase the risk of collision at highway-rail grade crossings in the nation as a whole.

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[6] Federal Railroad Administration, Office of Safety, *Analysis of the Safety Impact Of Train Horn Bans At Highway-Rail Grade Crossings: An Update Using 1997 – 2001 Data*, Final Report, Washington, D.C., June 2003.

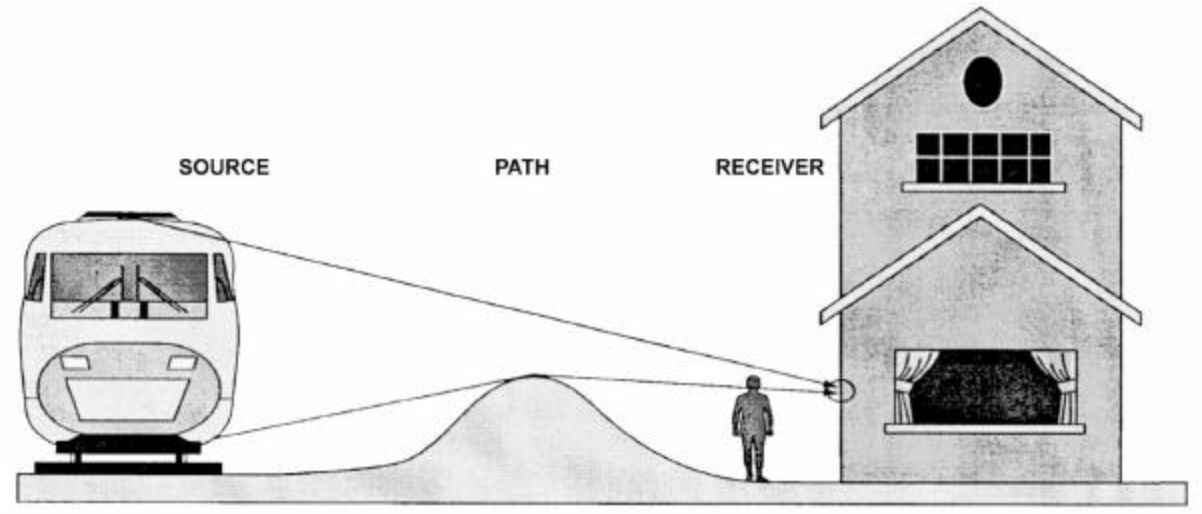
3.4 NOISE AT HIGHWAY-RAIL GRADE CROSSINGS

FRA recognizes that railroad noise and locomotive horn noise in particular can exceed desirable sound levels near railroad tracks. While significant horn sound levels are necessary to meet the intent of this safety device, sound generated by railroad vehicles (exclusive of sound from safety devices, which are exempt from U.S. Environmental Protection Agency (EPA) regulation) must not exceed a maximum acceptable standard set by EPA.[7] FRA enforces this standard through its Railroad Noise Emission Compliance Regulation, 49 CFR 210. The provisions of 49 USC 20153 and the locomotive horn rule both recognize the significant annoyance that locomotive horn noise can cause.

3.4.1 Noise and Acoustics Concepts

Noise generated by ground transportation is commonly expressed by the conceptual framework of source - path – receiver as shown in Figure 3-5. A noise-generating transportation **source** creates sound that propagates along a **path** to a **receiver.** Sound levels from the source are reduced (attenuated) by distance, intervening obstacle, and other factors. Finally, the receiver perceives the sound in the context of all other sounds that create a background sound level. The degree of impact that a particular noise event causes depends principally upon the sensitivity of the receiver and the relative increase in cumulative noise exposure (event + background noise vs. background noise).

FIGURE 3-5
SOURCE-PATH-RECEIVER FRAMEWORK



Source: Federal Railroad Administration, *High Speed Ground Transportation Noise and Vibration Impact Assessment* Manual, Washington, D.C., December 1998.

[7] U.S. Environmental Protection Agency, *Noise Emission Standards for Transportation Equipment: Interstate Rail Carriers*, 40 CFR 201.

The universal descriptor used for environmental noise is the A-weighted sound level.[8] It describes the level of noise measured at a receiver at any moment in time and is read directly from noise-monitoring equipment, with the weighting switch set on "A." Typical A-weighted sound levels range from the 40 dBA to 90 dBA, where 40 dBA is very quiet (e.g., a refrigerator) and 90 dBA is very loud (e.g, shop tools). The scale notation "**dBA**" indicates A-weighted sound levels. The letters "dB" signify "decibels" and refer to the general strength of the noise. The letter "A" indicates that the sound has been filtered to reduce the strength of very low and very high frequency sounds, much as the human ear does. Without this A-weighting, sound-monitoring equipment would respond to events people cannot hear, such as high-frequency dog whistles and low-frequency seismic disturbances. On the average, each A-weighted sound level increase of 10 decibels corresponds to an approximate doubling of subjective loudness.

The **Maximum Sound Level (L_{max})** describes the highest exponential-time-average sound level in A-weighted decibels that occurs during a certain measurement period. It is a descriptor of the maximum sound energy level from a source, such as a locomotive horn.

The **Sound Exposure Level (SEL)** describes a receiver's cumulative sound exposure from a single sound event. It represents the total A-weighted sound energy during an event, normalized to a one-second interval. It is the primary descriptor of rail vehicle noise emissions and an intermediate value in the calculation of both L_{eq} and L_{dn} (defined below).

The **Hourly Equivalent Sound Level [$L_{eq}(h)$]** describes a receiver's cumulative sound exposure L_{eq} from all events over a one-hour period. The underlying metric for calculating $L_{eq}(h)$ is SEL. $L_{eq}(h)$ is used to assess noise for non-residential land uses. For assessment, $L_{eq}(h)$ is computed for the loudest operating hour during the hours of noise-sensitive activity.

The **Day-Night Sound Level (L_{dn} or DNL)** describes a receiver's cumulative sound exposure from all events over a 24-hour period. The basic unit used in calculating L_{dn} is the L_{eq} (h) for each one-hour period. It may be thought of as a sound exposure, totaled after increasing all nighttime A-Levels (between 10 p.m. and 7 a.m.) by 10 decibels. Every sound event during the 24-hour period increases this exposure, louder events more than quieter events, and events that are of longer duration more than briefer events. L_{dn} is used to assess noise for residential land uses. Typical community L_{dn}'s range from about 50 to 70 dBA, where 50 dBA represents a quiet environment and 70 dBA is a noisy one.

3.4.2 Noise Impact Criteria

Noise can interrupt ongoing activities and can result in community annoyance, especially in residential areas. In general, most residents become highly annoyed when noise

[8] Detailed definitions and mathematical representations of these noise descriptors can be found in the FRA's *High Speed Ground Transportation Noise and Vibration Impact Assessment Manual* (December 1998).

interferes significantly with activities such as sleeping, talking, noise-sensitive work, and listening to radio, TV, or music. In addition, some land uses, such as outdoor concert pavilions, are inherently incompatible with high background noise levels.

Annoyance from noise has been investigated and approximate exposure-response relationships have been quantified by the U.S. EPA.[9,10] The selection of noise descriptors used in this document is largely based upon this EPA work. Beginning in the 1970s, EPA undertook a number of research and synthesis studies relating to community noise of all types. The results of these studies have been widely published, and the basic conclusions of these studies have been adopted by the Federal Interagency Committee on Urban Noise[11], the Department of Housing and Urban Development (HUD)[12], the American National Standards Institute[13], and even internationally.[14] Conclusions from EPA's seminal work remain scientifically valid to this day.

In a large number of attitudinal surveys, transportation noise has been ranked among the most significant causes of community dissatisfaction.[15,16] A synthesis of several surveys on annoyance is shown in Figure 3-6. Different neighborhood noise exposures are plotted horizontally. The percentage of people who are *highly annoyed* by their particular level of neighborhood noise is plotted vertically. As shown in the figure, the percentage of high annoyance is approximately 0 percent at 45 decibels, 10 percent around 60 decibels and increases quite rapidly to approximately 70 percent around 85 decibels. The scatter about the synthesis line is due to variation from community to community and to some wording differences in the various surveys. A recent update of the original research, containing

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9 U.S. Environmental Protection Agency, *Impact Characterization of Noise Including Implications of Identifying and Achieving Levels of Cumulative Noise Exposure*, Report NTID 73.4, Washington, D.C., July 1973.

10 U.S. Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, Report No. 550/9-74-004, Washington, D.C., March 1974.

11 Federal Interagency Committee on Urban Noise, *Guidelines for Considering Noise in Land Use Planning and Control*, Joint publication of the U.S. Environmental Protection Agency, Department of Transportation, U.S. Department of Housing and Urban Development, U.S. Department of Defense, and the Veterans Administration, Washington, D.C., June 1980.

12 U.S. Department of Housing and Urban Development, *Environmental Criteria and Standards of the Department of Housing and Urban Development*, 24 CFR 51; 44 FR 40861, Washington, D.C., July 12,1979.

13 American National Standards Institute, *American National Standard: Compatible Land Use With Respect to Noise*, Standard S3.23-1980, New York, NY, May 1980.

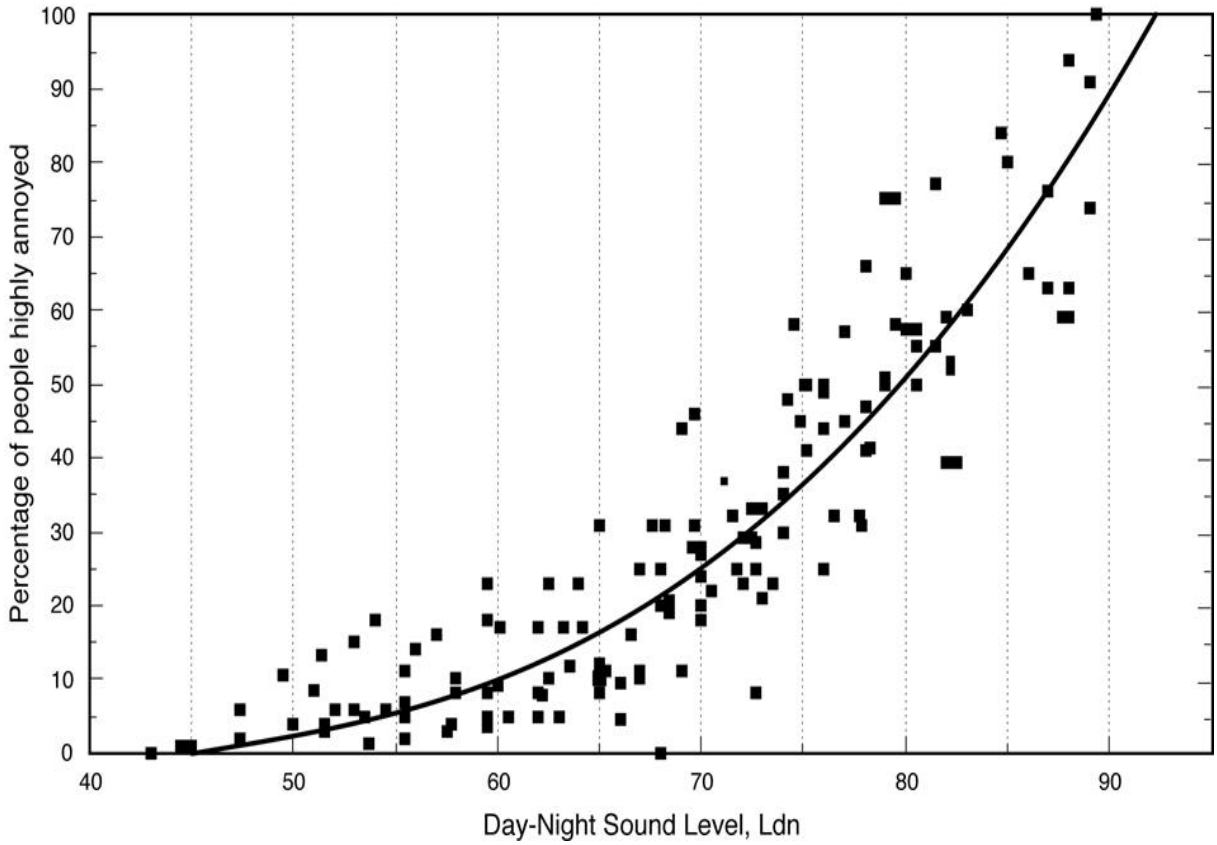
14 International Standards Organization, *Assessment of Noise with Respect to Community Response*, Recommendation R- 1996, Geneva, Switzerland, 1971.

15 Urban Mass Transit Administration, *Noise Rating Criteria for Elevated Rapid Transit Structures*, Report No. UMTA-MA-06-0099-79-3, Washington D.C., May 1979.

16 Schultz, T.J., "Synthesis of Social Surveys on Noise Annoyance," *Journal of the Acoustical Society of America*, Vol. 63, No. 8, August 1978.

several additional railroad, transit, and street traffic noise surveys, confirmed the shape of the original Schultz curve.[17]

FIGURE 3-6
NOISE ANNOYANCE CURVE



Source: Schultz, T.J., "Synthesis of Social Surveys on Noise Annoyance," *Journal of the Acoustical Society of America*, Vol. 63, No. 8, August 1978.

In response to comments received during the DEIS public hearing process, FRA commissioned a new review of the scientific literature to further consider the health effects of noise. An independent study conducted by the John A. Volpe National Transportation Systems Center confirmed the previous findings that there appears to be no better noise annoyance assessment methodology than that used in preparing the DEIS.[18] This methodology was used again in updating the noise impact analysis for the FEIS.

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[17] Fidell, S., D.S. Barber, and T.J. Schultz, "Updating a Dosage-Effect Relationship for the Prevalence of Annoyance Due to General Transportation Noise," *Journal of the Acoustical Society of America*, Vol. 89, No. 1, January 1991.

[18] U.S. Department of Transportation, John A. Volpe National Transportation Systems Center, *General Health Effects of Transportation Noise*, Report No. DTS-34-RR297-LR2, June 2002.

As a result, the findings of the Schultz analysis research were incorporated into the noise criteria used for the FEIS. Absolute thresholds, which consider activity interference caused by the transportation noise source alone, and relative thresholds, which consider annoyance due to the change in the noise environment caused by the transportation noise source were both represented. The criteria used were developed to apply to a wide variety of surface transportation modes, to recognize the heightened community annoyance caused by late-night or early-morning operations, and to respond to the varying sensitivities of communities to projects under different background noise conditions. The noise criteria and descriptors for human annoyance depend on land uses designated Category 1, Category 2, or Category 3 as presented in Table 3-4.

TABLE 3-4
LAND USE CATEGORIES AND METRICS FOR NOISE IMPACT CRITERIA

Land Use Category	Noise Metric* (dBA)	Description of Land Use Category
1	Outdoor $L_{eq}(h)$**	Tracts of land where quiet is an essential element of their intended purpose. This category includes lands set aside for serenity and quiet such as outdoor amphitheaters, concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq}(h)$**	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches, and other places where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios and concert halls fall into this category, as well as places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks and recreational facilities are also included.

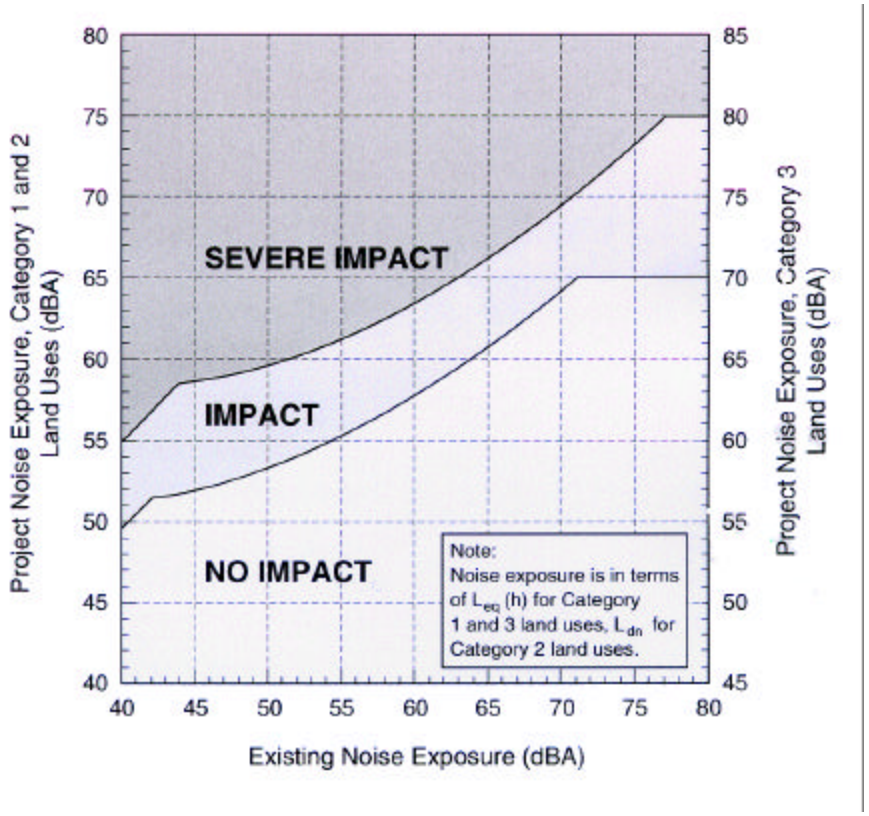
*Onset-rate adjusted sound levels (L_{eq}, L_{dn}) are to be used where applicable.
**L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity.

Source: Federal Railroad Administration, *High Speed Ground Transportation Noise and Vibration Impact Assessment Manual,* Washington, D.C., December 1998.

These categories consider such functions as residences and buildings where people normally sleep and institutional land uses with primarily daytime and evening use. The criteria do not apply to most commercial or industrial uses because the activities within these buildings are generally compatible with higher noise levels. They do apply, however, to business uses that depend on quiet as an important part of operations, such as sound and motion picture recording studios.

The noise impact criteria are represented by two curves in Figure 3-7 relating source noise levels to existing noise. The complex shapes of the curves represent a scale of cumulative noise exposure and are used to compare existing outdoor noise levels with future outdoor noise levels, including a transportation noise source. A transportation source that generates noise below the lower curve is considered to have no noise impact because on average the increase in the number of people highly annoyed by the added noise source has been shown to be insignificant.

FIGURE 3-7
NOISE IMPACT CRITERIA BY LAND USE

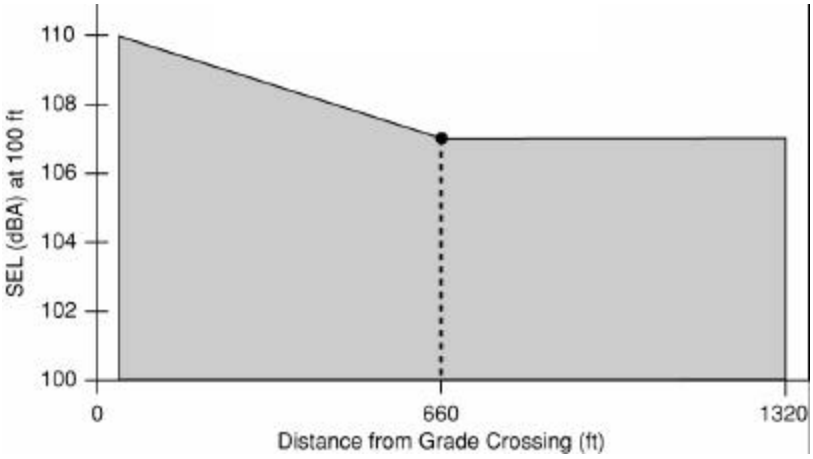


Source: Federal Railroad Administration, *High Speed Ground Transportation Noise and Vibration Impact Assessment Manual*, Washington, D.C., December 1998

A noise source that falls between these two curves is judged to have some impact, although not severe. The change in the cumulative sound level here is noticeable to most people, but it may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other source-specific factors must be considered to determine the magnitude of the impact and the need for mitigation, such as the predicted level of increase over existing sound levels and the types and numbers of noise-sensitive land uses affected. The curve defining the onset of noise impact stops increasing at 65 dBA for Category 1 and 2 land uses, a standard limit for an acceptable living environment as defined by a number of federal agencies.

Transportation noise above the upper curve is considered to cause a severe impact because a significant percentage of people would be highly annoyed by the new noise. This curve flattens out at 75 dBA for Category 1 and 2 land uses, a level associated with an unfavorable living environment. As indicated by the right-hand scale on Figure 3-8, the project noise criteria are 5 decibels higher for Category 3 land uses since these types of land use are considered to be slightly less sensitive to noise than the types of land use in Categories 1 and 2.

FIGURE 3-8
SOURCE LEVEL MODEL



The lower curve in Figure 3-7 represents the impact area, and is based on the following considerations:

- The EPA finding that a community noise level of L_{dn} less than or equal to 55 dBA is requisite to protect public health and welfare with an adequate margin of safety.

- The conclusion by EPA and others that a 5 dBA increase in L_{dn} or L_{eq} is the minimum required for a change in community reaction.

- The research finding that there are very few people highly annoyed when the L_{dn} is 50 dBA, and that an increase in L_{dn} from 50 dBA to 55 dBA results in an average of 2 percent more people highly annoyed.

The severe impact curve is based on the following considerations:

- HUD's environmental noise standards define an L_{dn} of 65 dBA as the onset of a normally unacceptable noise zone. Moreover, the Federal Aviation Administration (FAA) considers that residential land uses are not compatible with noise environments where L_{dn} is greater than 65 dBA.

- The common use of a 5-dBA increase in L_{dn} or L_{eq} as the minimum required for a change in community reaction.

The introduction of horn noise into a community where a whistle ban is in effect may have two undesirable effects. First, it may significantly increase existing sound levels in the community, beyond levels to which residents have become accustomed. This effect is called "relative" noise impact. Evaluation of this effect is "relative" to existing sound levels; relative criteria are based upon noise increases above existing levels. Second, newly introduced sound may interfere with community activities, independent of existing sound levels; it may be simply too loud to converse or to sleep. This effect is called "absolute" noise impact, because it is expressed as a fixed level not to be exceeded and is independent of existing sound levels. Both of these effects, relative and absolute, enter into the assessment of noise impact.

3.4.3 Development of a Predictive Locomotive Horn Noise Model

The noise concepts and criteria described in the previous section were used to assess the noise impacts of the rule. A computer model was developed that uses a reference SEL for a typical locomotive horn event at a highway-rail grade crossing to estimate the noise exposure contours for impact and severe impact areas near and along a typical railroad line. The model assumed suburban residential development in the vicinity of the typical grade crossing and used the residential criteria, the most stringent, to assess impacts. A second integration procedure was developed using other computer software and data to apply the horn noise model to the 2,418 locations known to FRA to be potentially affected by the rule. This integration adds to the accuracy of the modeling procedure to reflect the expected characteristics of the affected population and to account for the varying density of affected populations across the nation. The model was also applied to locations previously known to have had whistle bans in order to assess the significance of potential cumulative and secondary effects that may contribute to the potential for mitigation. Field measurements were taken to arrive at a scientifically valid locomotive horn reference SEL as part of the effort to complete this analysis.[19]

[19] See the *Technical Supplement* to the DEIS for more information about the data gathered and derivation of the horn reference SEL.

Reference SEL. Although the maximum sound output of a horn can be determined in a laboratory, it is how the horn is used in the real world that determines its effect on the environment. For this reason and because there are a wide variety of actual horn sounding practices, an empirical reference SEL was developed using field measurements at grade crossings in numerous states. Although not all engineers commence sounding horns ¼ mile in advance of a grade crossing, this starting point was noted as the average starting location during recent field observations. The rule also includes a maximum distance of ¼ mile where the horn sequence may begin. While ¼ mile was the empirical assumption, further analysis using other starting locations related to the 20-second provision for consideration was also performed and will be discussed in Chapter 4.

FRA found that a reference level that varies from the beginning of the horn sequence to the grade crossing accurately represents the noise reference level. Recently collected data show an average reference SEL of 107 dBA at 100 feet perpendicularly away from the nearest track represents the horn noise in the stretch from ¼ mile to $^1/_8$ mile in advance of a crossing. Starting at the $^1/_8$-mile point, the data show that the horn is sounded more continuously in the last part of the sequence as the train approaches the crossing. Consequently, the SEL is assumed to increase linearly to 110 dBA at the edge of the crossing. These assumptions result in the five-sided polygon shown shaded in Figure 3-8. This figure is the basis for the horn-noise model and the impact and severe impact areas at each grade crossing. The reference SEL and the number of train passes during day and night are used as the basis for calculating the L_{dn} for use with the noise impact criteria.

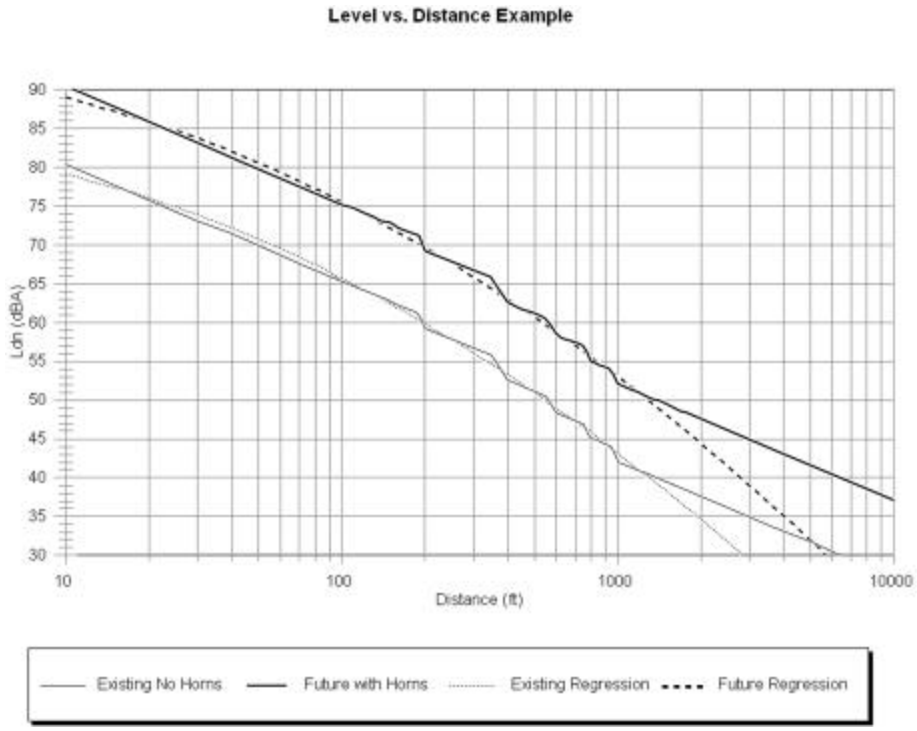
Propagation. Sound propagation depends on a number of factors discussed in much greater detail in the *DEIS Technical Supplement*. The key effects of geometric spreading (divergence), ground effects, atmospheric effects, and shielding are built into the horn noise model, as described in the following subsections. The assumed propagation effects are shown in Figure 3-9. Each of the following effects are important in determining the distance to impact and severe impact, which in turn determine the size of the impact polygons.

Divergence: The sound from a horn is assumed to act as if it were emitting from a moving point source that acts like a line source with a 3-dB reduction for every distance doubling, when averaged over the length of track.

Ground effect: The model takes into account a generalized soft ground condition, assuming that most grade crossings with whistle bans are located in residential areas with grass and vegetation. This assumption results in an additional 1.5-dB reduction per distance doubling, so that when combined with the divergence relationship, a total of a 4.5-dB reduction per distance doubling applies.

Atmospheric effects: The model does not take into account atmospheric effects, assuming that if averaged over an entire year, the average condition is a uniform, quiescent atmosphere.

FIGURE 3-9
ASSUMED PROPAGATION EFFECTS OF LEVEL VS. DISTANCE OF SOUND



Shielding. The model also accounts for shielding from rows of buildings. A general model for a national average of shielding at grade crossings was assumed. The general model was based on observations of urban and suburban grade crossings combined with field verification of the FRA noise prediction method with shielding. The generalized finding is that the first row of buildings occurs at 200 feet from the tracks, with succeeding rows of buildings at 200-foot intervals, with gaps between buildings constituting between 35 and 65 percent of the length of the row. Given this assumption, the model attributes a 3-dB reduction at the first row of buildings at 200 feet from the tracks, and a 1.5-dB reduction for each succeeding row of buildings at 400, 600, 800, and 1,000 feet. This assumption is relatively conservative, as denser development would result in more shielding.

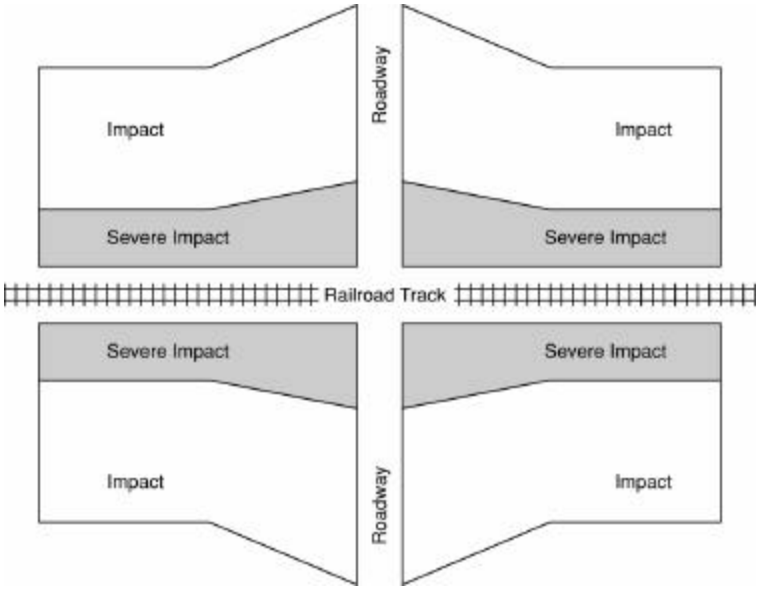
Impact Zones. Noise impact criteria used by the FRA are based on an increase in noise exposure. Consequently, the existing sound exposure with the whistle ban in place and the future sound levels with horns were estimated and compared for every grade crossing. Trains dominate the existing levels in the immediate vicinity of the tracks. The train noise L_{dn} depends on the number of trains passing during the day and night. At some distance from the track, however, a general ambient sound level is attained that is characteristic of the general ambient environment away from the influence of the railroad. According to the U.S. EPA, the typical ambient noise level (L_{dn}) in a suburban

residential area is 55 dBA.[20] This level represents the noise "floor" in the noise impact calculation method.

The horn noise model computes the horn noise in terms of L_{dn} as a function of distance from the tracks, and the train noise without horns as a function of distance from the track down to a noise floor, established by the ambient sound level. These calculations form two curves that were compared in the model at each distance from the railroad until the noise impact criteria ratings of impact and severe impact are reached for land use Category 2, residential land use. Because the original source model, shown shaded in Figure 3-8, is a polygon with five sides, the impact areas were similar polygons.

Typical impact and severe impact polygons are shown in Figure 3-10. The entire impact area is made up of two sets of four identical polygons for each grade crossing, each set representing either the Impact and Severe Impact areas. Each of the polygons are mirror images reflected around the axis represented by the road and the axis represented by the tracks. Consequently, the horn noise model calculates the vertices of the impact polygon in one quadrant only. The other three quadrants are determined by symmetry.

FIGURE 3-10
TYPICAL IMPACT POLYGONS



3.4.4 Application of the Horn Noise Model

The horn noise model discussed in the preceding sections was designed to use data from the U.S. DOT Grade Crossing Inventory, a database containing information about individual grade crossings. A C++ computer program was used as the basis of the model. A

[20] U.S. Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA Report No. 550/9-74-004, Washington, D.C., March 1974.

supplemental spreadsheet program was developed to generate noise impact polygons and then to convert x-y coordinates to latitude and longitude for use with GIS and census block data. The following sections detail the steps the computer model, the spreadsheet, and a GIS system played in estimating impacts at each of the grade crossings under analysis. Further application of these computer programs was used to assess the effects of the quiet zone provisions of the rule at the crossings under study and the maximum horn level and horn sounding duration provisions of the rule at all public highway-rail grade crossings.

Horn Noise Prediction. The horn noise computer model was used to develop the Impact and Severe Impact distances for each grade crossing under study. The calculation of these distances involves complex functions of sound level versus distance, and is much easier to model with a computer program. Each of the steps taken in the computer program and the input and output of the program are detailed in the following section.

Each grade crossing is identified with an alphanumeric code unique to the grade crossing. The U.S. DOT Grade Crossing Inventory contains a large amount of information related to each grade crossing, including information on the railroad using the tracks, the type of signaling at the crossing, the location, and several other data fields. The program selects the following specific data fields: train traffic by daytime and nighttime split; speed; number of tracks; number of roadway lanes, and the latitude and longitude of the center point of the grade crossing. This unique information about the grade crossings being analyzed was combined with generalized information used for every crossing.

The next set of inputs was the assumed background L_{dn} and the propagation characteristics due to residences and terrain at the grade crossings. To analyze the effects of the rule, the background L_{dn} was set at 55 dBA, the standard background L_{dn} discussed previously. Propagation characteristics, such as distances to rows of houses and the amount of shielding attributed to each row, were other inputs into the program.

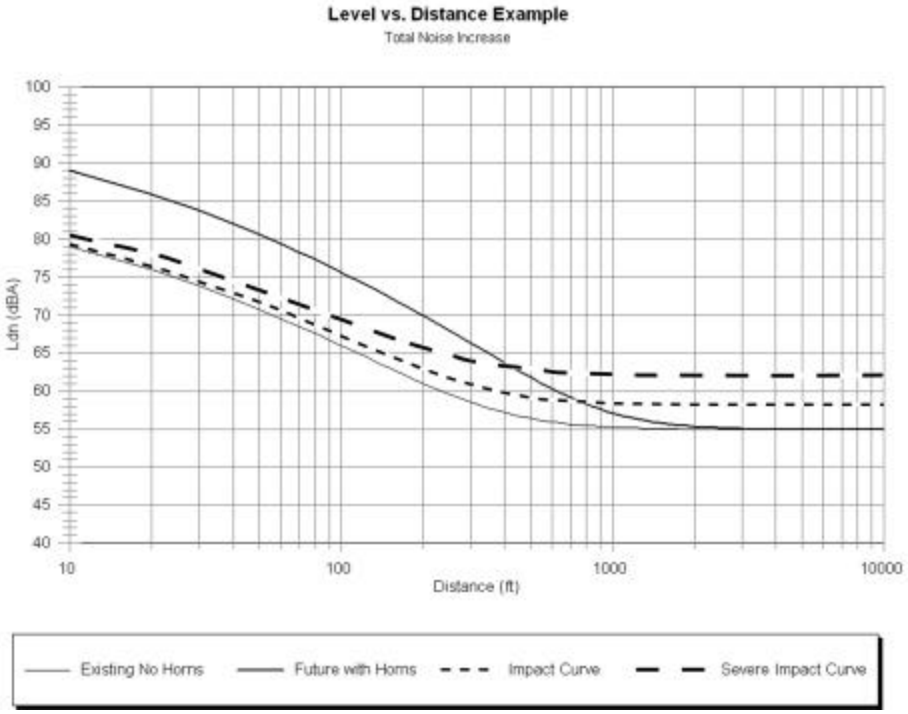
Calculating the sound levels without horns is the first step in determining the impact from locomotive horns at a grade crossing. The existing sound level when a train is passing is dominated by sound generated by the train. Existing sound levels in the vicinity of the grade crossing were calculated at 100 feet perpendicular to the tracks using a reference SEL from a single train. The reference train SEL obtained from measurement data was 100 dBA at 40 mph. This reference SEL was adjusted for the speed at the crossing (unless the default speed of 40 mph was assumed) and the number of trains using the grade crossing in a single day. These data were drawn from the crossing inventory. L_{dn} from the reference SEL was calculated where first the L_{eq} (day) and L_{eq} (night) are derived and then combined to develop the day-night descriptor (L_{dn}).

Sound exposure levels from trains using horns were calculated similarly, with some exceptions. The first exception is that the horn sound is not dependent on speed. The next exception is that instead of one reference SELs, two reference SELs were used. Shown in Figure 3-8, the two reference SELs are 110 dBA and 107 dBA. The numbers of day trains and night trains are used to calculate L_{dn}. The sound levels from the horns

decrease as a function of distance until the horn sound is equal to the background L_{dn} (55 dBA in the default setting), at which point the existing sound level was assumed to be uniform and any further effect of the locomotive horn to be negligible.

The final calculations performed by the computer program determined the distances to Impact and Severe Impact areas. Sound levels without horns were applied to noise impact criteria (see Figure 3-7) to arrive at two curves: Impact and Severe Impact level versus distance. The two points at which these curves intersect the curve of noise with horns versus distance are the threshold distances for determining Impacts and Severe Impacts. Example curves are shown in Figure 3-11. The computer program generated two sets of these points. The first set was for the locomotive horn SEL of 110 dBA (at the grade crossing) and the second set was for the locomotive horn SEL of 107 dBA (for distances greater than $^1/_8$ mile from the grade crossing).

FIGURE 3-11
IMPACT AND SEVERE IMPACT NOISE CURVES



After completing all the above calculations for each of the grade crossings being analyzed, the computer program generated an output file that recorded the distances for Impacts and Severe Impacts used in creating impact polygons.

Population Exposure Prediction. For the noise impact polygons to be used in the impact assessment, it was necessary to overlay them on census data. The tool for performing the overlay function was a Geographical Information System (GIS) program. The information

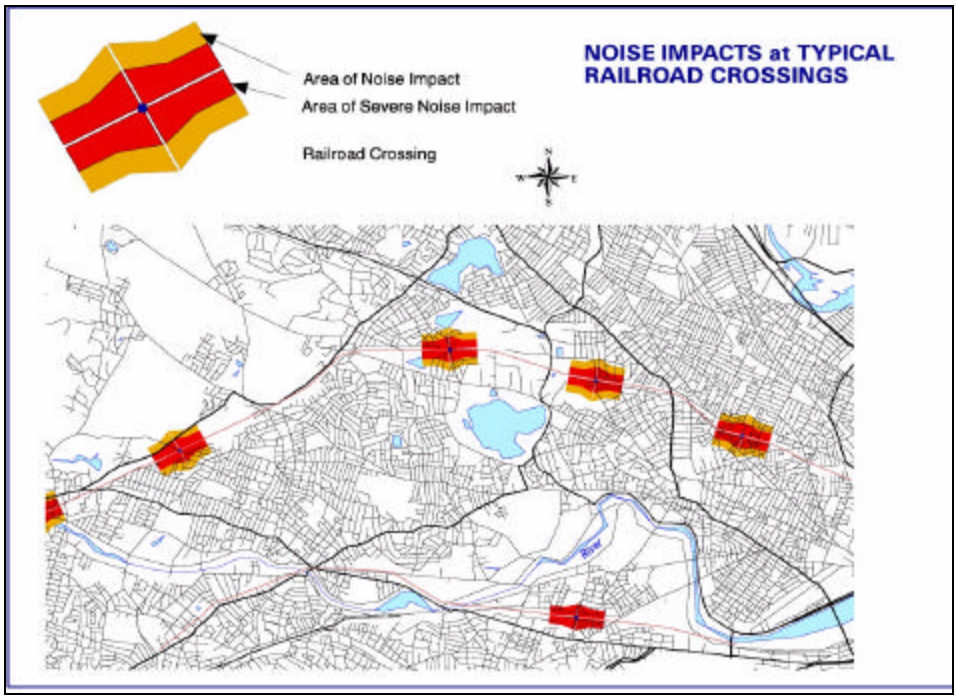
from the horn noise model was converted using a spreadsheet program into geographic impact polygons that the GIS system could interpret and use.

A spreadsheet was developed to calculate the impact polygons at each grade crossing. As shown in Figure 3-10, the polygons have five sides and five vertices in each quadrant of the highway-rail grade crossing. The five vertices of a polygon were generated in Cartesian (X-Y) coordinates. The spreadsheet took into account the width of the road and the railroad tracks in calculating the impact polygons by using the number of tracks and the number of roadway lanes at each grade crossing. The vertices of the impact polygons were calculated accounting for this information and the Impact and Severe Impact polygon distances at the grade crossing and at $^1/_8$ mile from the grade crossing. The output of the spreadsheet was a series of five X-Y coordinates for each polygon (both Impact and Severe Impact) in each of the four quadrants of each grade crossing. However, for these points to be used in the GIS program, two steps were taken. First, the angle of railroad tracks at each crossing with respect to a reference direction from GIS databases was entered. The second step was to determine the latitude and longitude of every set of points on the vertices for each of the polygons at the grade crossings.

This resulted in a representation of the vertices of all the impact polygons in a form used by the GIS program to determine the location of every set of Impact and Severe Impact polygons at each grade crossing. The GIS program was then used to append polygons that overlapped, which when crossings are close together, to avoid counting impact zones and their populations more than once. The GIS program was then used to overlay the census block data on the polygons and tabulate the estimated number of people “Impacted” and “Severely Impacted” at each of the analyzed grade crossings. It was necessary to automate this computer routine to complete these steps for all of the crossings under analysis. A generic example of the GIS overlay output is shown in Figure 3-12.

The horn noise model was also used to assess noise exposure conditions at all 153,975 public at-grade highway-rail crossings. The U.S. DOT Grade Crossing Inventory was used to derive an average public highway-rail grade crossing using the 137,113 database records with geographic location codes. Noise impact polygons were then modeled for the average public grade crossing. Finally, an average population density in proximity to public highway-rail crossings was derived. Data from the US 2000 census was in the process of being finalized during the preparation of this analysis. Population data from the census was released over a period of months on a state by state basis, but was not available for all of the states that had crossings within the nationwide data set. In order to determine the average population density and use one consistent source of information, a national dataset developed by ESRI which estimated 2000 totals was used in this analysis. Based on this computerized analysis, FRA estimates that on average 623 persons are located within a 1-mile radius of public grade crossings nationwide. The total population that is affected by locomotive horn noise was estimated using this average crossing estimated population and the typical noise polygons were applied to all highway-rail grade crossings.

FIGURE 3-12
SAMPLE OF NOISE IMPACT



3.5 OTHER CONSIDERATIONS

3.5.1 Environmental Justice

This section describes how environmental justice impacts were identified and evaluated in connection with the locomotive horn rule. The environmental justice definitions, methodology, and results of the analysis are summarized below. Executive Order No. 12898 directs federal agencies to examine the effects of their actions on minority and low-income communities in order to ensure that all communities and persons live in a safe and healthful environment.[21]

Definitions. Terms used in the environmental justice analysis are defined as follows:

Minority Population: According to Council on Environmental Quality (CEQ) Guidelines, minority populations should be identified where either (a) "the minority population of the affected area exceeds 50% or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis."[22] The appropriate unit of geographic

[21] The Order requires executive branch agencies, and requests independent agencies to comply.

[22] Council on Environmental Quality, *Guidance for Considering Environmental Justice Under the National Environmental Policy Act*, December 10, 1997.

analysis could be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit as long as it does not artificially dilute or inflate the affected minority population.

Minority Individuals: *Minority* individuals are classified by the U.S. Bureau of the Census into the following racial groups: American Indian (or Alaskan Native), Asian, Hawaiian or Pacific Islander, and Black. Beginning with the 2000 Census, persons can also be classified as multi-racial if individuals indicated a bi-racial origin on completed census forms. Hispanics (or Latinos) are not considered a racial group by the Census Bureau; however, persons reporting a Hispanic origin are recorded and totaled for all racial groups.

Low-Income Population: A *low-income* person is someone whose median household income is below the U.S, Department of Health and Human Services poverty levels.[23] These poverty thresholds, used by federal agencies to determine eligibility for benefits and assistance programs, vary based on household size and are adjusted annually. FRA used poverty thresholds based on 1999 household income (as reported in the 2000 Census).

Noise Impacts in Minority or Low-Income Communities. To determine whether any potential environmental effects would occur in predominantly minority or low-income communities, the following were identified:

- locations where potential effects are likely to occur; and
- minority, Hispanic origin, and low-income populations within each area.

The geographic locations considered in the environmental justice assessment included all current whistle ban crossings identified by FRA. For each of the crossing areas potentially affected by the rule, FRA collected and analyzed the following census data to determine the minority and low-income characteristics of the population within the noise impact area:

- total population;
- total minority population;
- total population with Hispanic origin;
- average household size; and
- average household income.

FRA used the computerized GIS and the Impact and Severe Impact polygons from the horn noise model to determine the extent of impacts to persons and households in the vicinity of each crossing.

Establishment of Criteria. Neither the Executive Order nor the U.S. DOT's policy on environmental justice defines what constitutes an impact to an area with a predominantly minority or low-income population. Therefore, using the Council on Environmental Quality and U.S. EPA draft guidance, FRA developed the following thresholds for

[23] U.S. Department of Health and Human Services, *1999 HHS Poverty Guidelines*, 64 FR 13428-13430, March 18, 1999.

determining whether the impacts within the noise impact area affected environmental justice populations: [24] [25]

- The percent of the minority persons in a noise impact area equaled or exceeded 50 percent of the total population impacted; or
- The percent of the persons of with Hispanic origins (any race) in a noise impact area equaled or exceeded 50 percent of the total population impacted; or
- The average household income in a noise impact area was below the poverty level.

A second threshold used in the DEIS was not retained for the FEIS. Previously, FRA had also identified areas where the minority population in an impact area was at least 10 percentage points higher than the minority population of the county in which it was located. However, this threshold was not used in the FEIS because almost all of the impacts to areas with predominantly minority populations (over 97 percent) were identified using the first threshold and a similar measure is not possible for low-income populations because of data limitations.

3.5.2 Health and Human Welfare Impacts

Results of a general literature search and discussion regarding noise impacts on the health and human welfare of the population exposed to noise from locomotive horns sounded at highway–rail grade crossings are included in Chapter 4.

3.5.3 Economic Impacts

FRA studied the issue of potential economic impacts resulting from the rule as part of the NPRM. This study was updated during the development of the interim final rule.[26] The estimated benefits of the locomotive horn rule are derived from its prevention of collisions and the resulting reduction in accident fatalities and injuries. Costs are analyzed as those incurred by local communities in designating quiet zones and any potential economic externalities incurred by those communities due to noise exposure. Additional details on the economic impacts of the interim final rule are provided in Chapter 4.

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[24] Council on Environmental Quality, *Draft Guidance for Considering Environmental Just ice Under the National Environmental Policy Act*, May 7, 1997.

[25] U.S. Environmental Protection Agency, *Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis*, July 12, 1996.

[26] Federal Railroad Administration, *Regulatory Evaluation and Initial Regulatory Flexibility Assessment for Use of Locomotive Horns at Highway-Rail Grade Crossings*, Washington, D.C., 2003.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

To the best of FRA's knowledge, the environmental resources potentially affected by undertaking the proposed action are the human environment with respect to noise exposure and the safety of the transportation network. FRA has studied these issues and the potential for community disruption, impacts on commerce, and impacts on local government. FRA is not aware of any direct or indirect effects of the interim final rule on: air quality; water quality; solid waste disposal; ecological systems; impacts on wetlands areas; impacts on endangered species or wildlife; flood hazards and floodplain management; coastal zone management; use of energy resources; use of other natural resources, such as water, minerals, or timber; aesthetic and design quality impacts; possible barriers to the elderly and handicapped; land use, existing and planned; other impacts on the socioeconomic environment, including the number and kinds of available jobs, and the need for and availability of relocation housing; human health impacts due to hazardous materials; recreational opportunities; locations of historic, archeological, architectural, or cultural significance; or use of Section 4(f)-protected properties.

The potential positive and negative impacts of the proposed rule are identified and discussed in this chapter. This discussion focuses on the principal areas of concern: safety and noise. The potential for direct impacts to the human environment at the 153,975 public at-grade highway-rail crossings are analyzed.

Provisions that reduce existing horn noise exposure as well as potential direct noise impacts are a prominent feature of the final rule. These provisions would allow affected communities to create new quiet zones or retain existing quiet zones. In addition, the provisions for a maximum horn sound level and duration limits would reduce community noise impacts nationally. These provisions reflect the intent of Congress and meet the requirements for an integral opportunity for mitigation set forth in 49 USC 20153 and would be available to all localities, including those communities that do not currently have whistle bans.

Some 2,027 highway-rail at-grade crossings have been identified as potentially impacted by the provision requiring the use of locomotive horns where FRA believes horns are not sounded on a regular basis today. The potential noise impacts are estimated using the modeling techniques described in Chapter 3. The potential impacts are described in this chapter by state, county, and municipality.

To make quiet zones both effective and available, the final rule details a list of supplementary safety measures (SSMs) and alternative safety measures (ASMs) that would be available to local jurisdictions that wish to avoid potential noise impacts in their communities. As proposed, communities would have sole discretion to designate a quiet zone, if the SSMs listed in Appendix A of the final rule are used. Alternatively, a

community may pursue a corridor-wide strategy to implement a quiet zone using differing treatments at individual crossings upon demonstrating the total effectiveness of the strategy to FRA. FRA is prepared to provide technical assistance to communities seeking to implement quiet zones, including information regarding public education and awareness resources.

The No-Action alternative would not set a maximum horn sound level nor prescribe the horn sounding distance. The No-Action alternative would also not incur the potential impacts of requiring routine horn sounding at current whistle ban locations, but neither would it result in the safety benefits of the rule. On balance, it is likely that a No-Action alternative could result in more noise exposure over time to communities throughout the nation because some horns would produce more sound and the opportunity to create New Quiet Zones would not be consistently available.

4.1 EFFECTS ON SAFETY AT HIGHWAY-RAIL GRADE CROSSINGS

The effect of the locomotive horn rule on public safety was assessed using the results of the FRA's updated Nationwide Study. That study found that the crossings with whistle bans had a significantly higher average collision frequency than the non-ban crossings. The crossings evaluated reflect a very diverse population with respect to physical configurations, motorist warning devices, and highway and rail traffic mixes. Their geographical dispersion contributed to a credible indication of the national safety implication of train whistle bans. FRA refined the analysis procedures by conducting separate analyses for three different categories of warning devices in place at the crossings (automatic gates, flashing lights or other active devices without gates, and passive devices such as crossbucks or signs). FRA also made a substantial effort to collect information on additional whistle ban locations not previously identified. FRA's analysis showed that an average of 44 percent more collisions occurred at whistle ban crossings equipped with gates than at similar crossings across the nation without bans.

In light of these findings, the Proposed Action is expected to have a public safety benefit in terms of lives saved as well as injuries and accidents averted. With the resumption of horn sounding, FRA expects at least 13 fatalities, and 60 injuries to be avoided over a 20-year period. To the extent that SSM's and ASM's are used to designate quiet zones in communities with current whistle bans, then additional safety benefits would be gained. Since interest in silencing locomotive horns extends to many more communities throughout the nation than those with current whistle bans, much greater safety benefits may accrue as a result of the final rule as more crossings are made safer so as to qualify for the establishment of quiet zones.

The interim final rule's provisions for a maximum horn sound level and for new measurement procedures were carefully selected to maintain the safety benefits that accrue from current use of locomotive horns but also to eliminate unnecessary or unintentional excess noise. FRA, with the assistance of the Volpe National Transportation Systems Center, conducted stationary tests of locomotive horns to more fully understand

the relationship of horn location and volume level with the distribution of the warning signal. Further studies using computer models assessed the relationship between horn sound levels and detectability to identify sound levels for needed effective warning.

The No-Action Alternative would continue the 44 percent greater frequency of collisions at gated whistle ban crossings where they exist today and would lead to more frequent collisions at every location where a ban is instituted in the future. Additionally, it is possible that in the absence of a mandate to regulate the use of locomotive horns at highway-rail grade crossings, whistle bans could proliferate without the application of supplementary safety measures and could result in more injuries, collisions, and a greater loss of life.

4.2 EFFECTS ON NOISE AT HIGHWAY-RAIL GRADE CROSSINGS

The effects of the rule related to noise and noise impacts were analyzed using empirical information about locomotive horn sound levels and the computer models described in Chapter 3. The No-Action Alternative would not have any of these potential impacts, but neither would it provide the cumulative benefits of the rule. Figures 4-1 through 4-4 show the locations of existing whistle ban crossings by region.

4.2.1 Number of Persons Potentially Positively Impacted

FRA estimated the potential cumulative effects of the interim final rule provisions setting the horn sounding pattern and duration and a maximum horn sound level at the country's 153,975 public highway-rail grade crossings with available location data. The horn noise model was applied to an average crossing using the average population within a 1-mile radius of the all crossings based upon year 2000 census data. Nationwide (or cumulative) impacts were estimated by calculating the impacts at a typical crossing and applying those estimated impacts to all crossings. As shown in Table 4-1, the maximum number of persons estimated to be currently impacted by locomotive horn noise is more than 9.3 million. Of this total, 4.6 million persons are estimated to be severely impacted. The rule would reduce this total noise exposure nationwide by setting a maximum horn sounding duration, a maximum horn sound level, and by allowing the establishment of quiet zones. These provisions would apply to all crossings, including current whistle ban crossings, (although they would have little effect where Pre-Rule Quiet Zones are created). FRA estimates that these provisions would eliminate existing impacts to more than 3.4 million persons, 1.9 million of them with severe impacts, and would result in horn noise impact reductions of about 38 percent.

Horn Sounding Duration. The rule contains a provision that would set a maximum 20-second duration for horn sounding. Potential benefits from reducing the horn sounding duration were estimated by FRA. FRA's analysis estimated that application of the 20-second provision would relieve an average of 20 people per crossing of locomotive horn noise annoyance. When implemented everywhere in the nation, some 2.5 million persons could benefit from the 20-second provision, a 27 percent reduction in the total persons currently impacted and severely impacted.

Horn Sound Level. The rule also contains a provision that sets a maximum sound level for horns from the front of the locomotive. This provision also has beneficial effects and would further reduce the cumulative effects of the rule. The original modeling for the DEIS used a reference wayside SEL of 110 dBA at the grade crossing 100 feet from the tracks. This SEL was based on an extensive number of measurements throughout the country. Besides SEL, many measurements of the L_{max} of horns were available for moving trains at the wayside and a relationship between them was determined. In order to estimate the SEL at the wayside from the L_{max} in front of the locomotive, a model was developed based on horn sounding characteristics measured by the Volpe Center.[1] Their measurements of horns were taken 100 feet in front and around the sides of several stationary locomotives. Detailed information was obtained about the length of the long and short horn blasts, and the amount of time between each horn blast.

Following publication of the DEIS, the Volpe Center conducted additional measurements of horn characteristics on stationary locomotives.[2] The measurements clarified the relationship between sound levels to the front and to the side of the locomotives as well as the extent of the acoustical shadow cast when horns are located half-way from the front to the back of the locomotive roof. These relationships were incorporated into the model, and a difference was estimated between the L_{max} at 100 feet in front of a locomotive and the SEL measured at 100 feet at the wayside, near the grade crossing. This relationship was then used with the horn noise data previously collected to estimate a reference SEL based on capping the maximum horn sound at 110 dBA at 100 feet in front of the locomotive and at a height of 15 feet. A concurrent modeling analysis was completed to assess the sound level needed to provide an effective warning for motorists.[3] A maximum horn sound level of L_{max} 110 dBA is predicted to, on average, reduce community horn noise exposure by approximately 14 percent compared to current exposure levels. When implemented, approximately 1.2 million persons would benefit from the lower maximum horn levels.

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1 Federal Railroad Administration, *The Safety of Highway-Railroad Grade Crossings: Study of the Acoustic Characteristics of Railroad Horn Systems*, Report No. DOT-FRA-ORD-93/25, Washington, D.C., June 1993.

2 U.S. Department of Transportation, *The Effect of Installation Location on Railroad Horn Sound Levels*, Letter Report No. DTS-34-RR297-LR1, September 2002.

3 U.S. Department of Transportation, *Determination of a Sound Level for Railroad Horn Regulatory Compliance*, Letter Report No. DTS-34-RR397-LR1, October 2002

FIGURE 4-1
CURRENT WHISTLE BAN CROSSINGS – NORTHEAST REGION

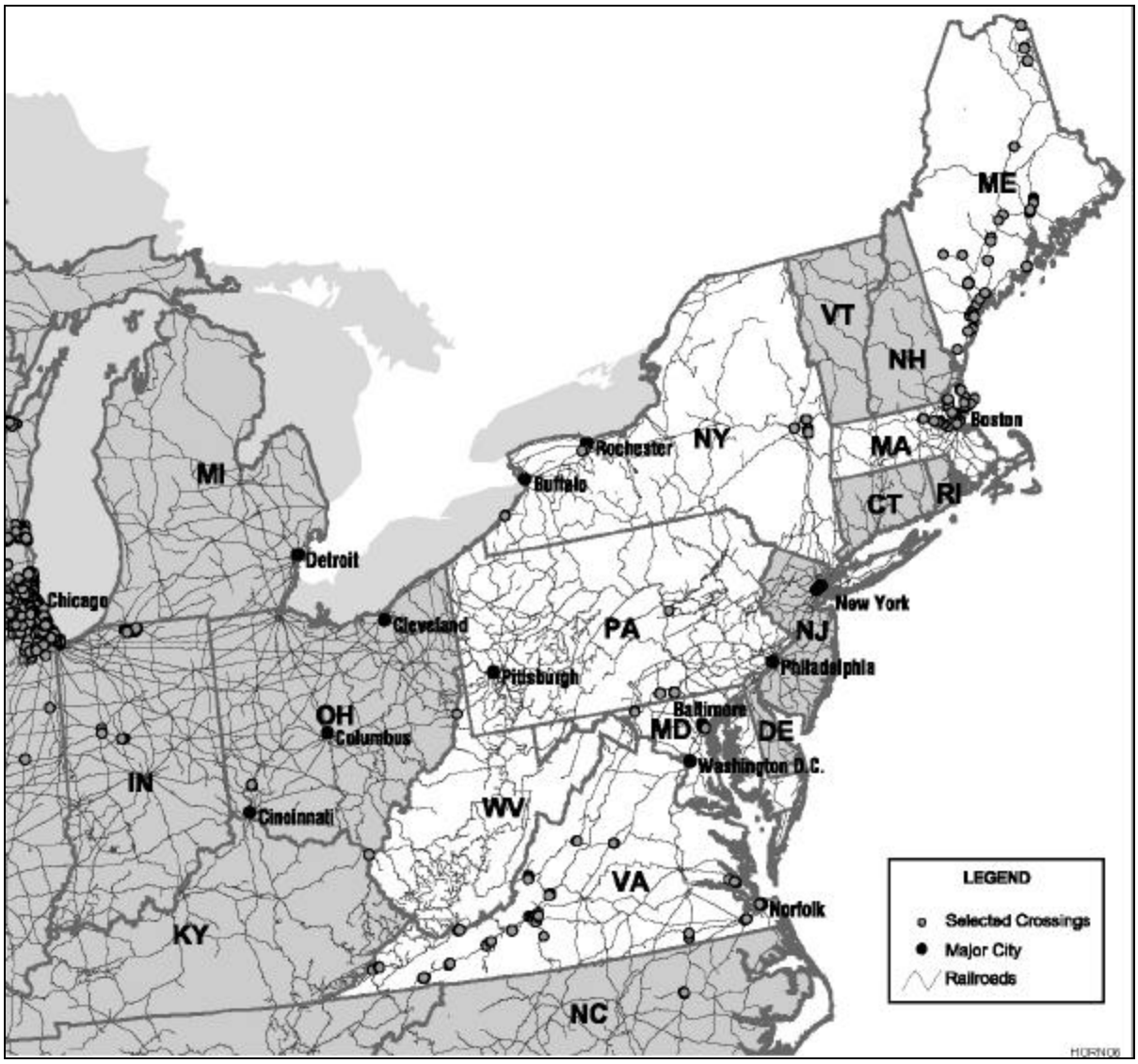

FIGURE 4-2
CURRENT WHISTLE BAN CROSSINGS – SOUTHERN REGION

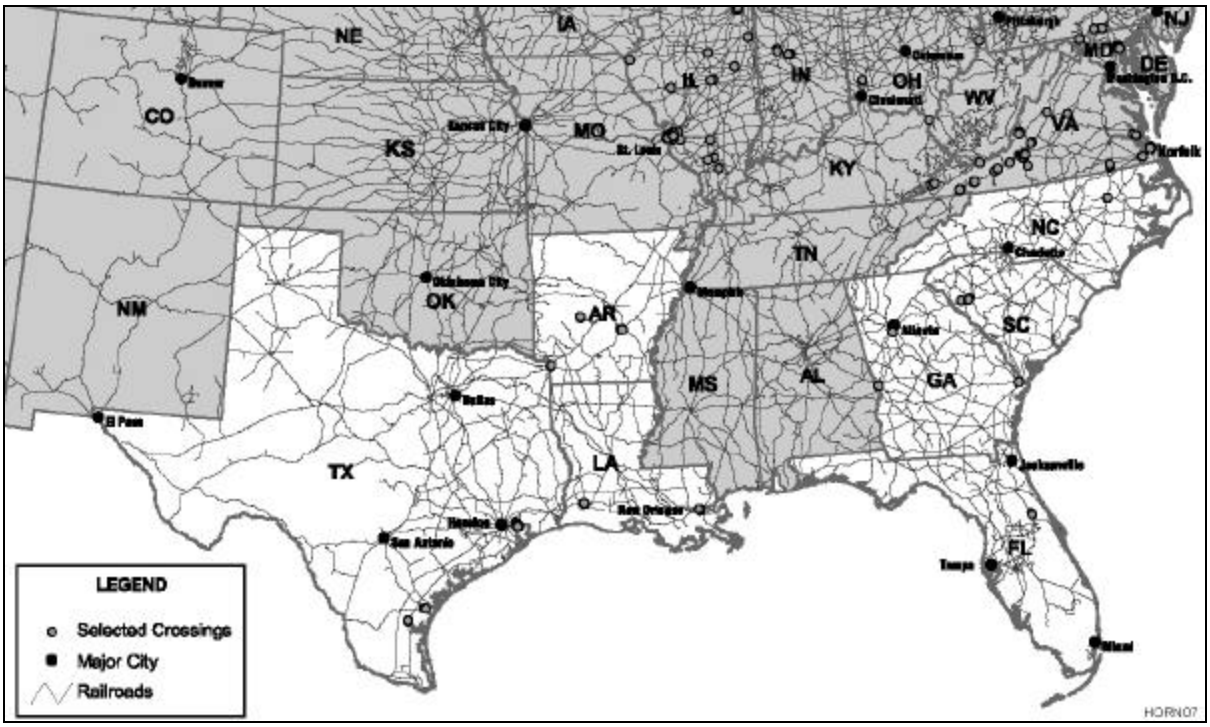

FIGURE 4-3
CURRENT WHISTLE BAN CROSSINGS – CENTRAL REGION

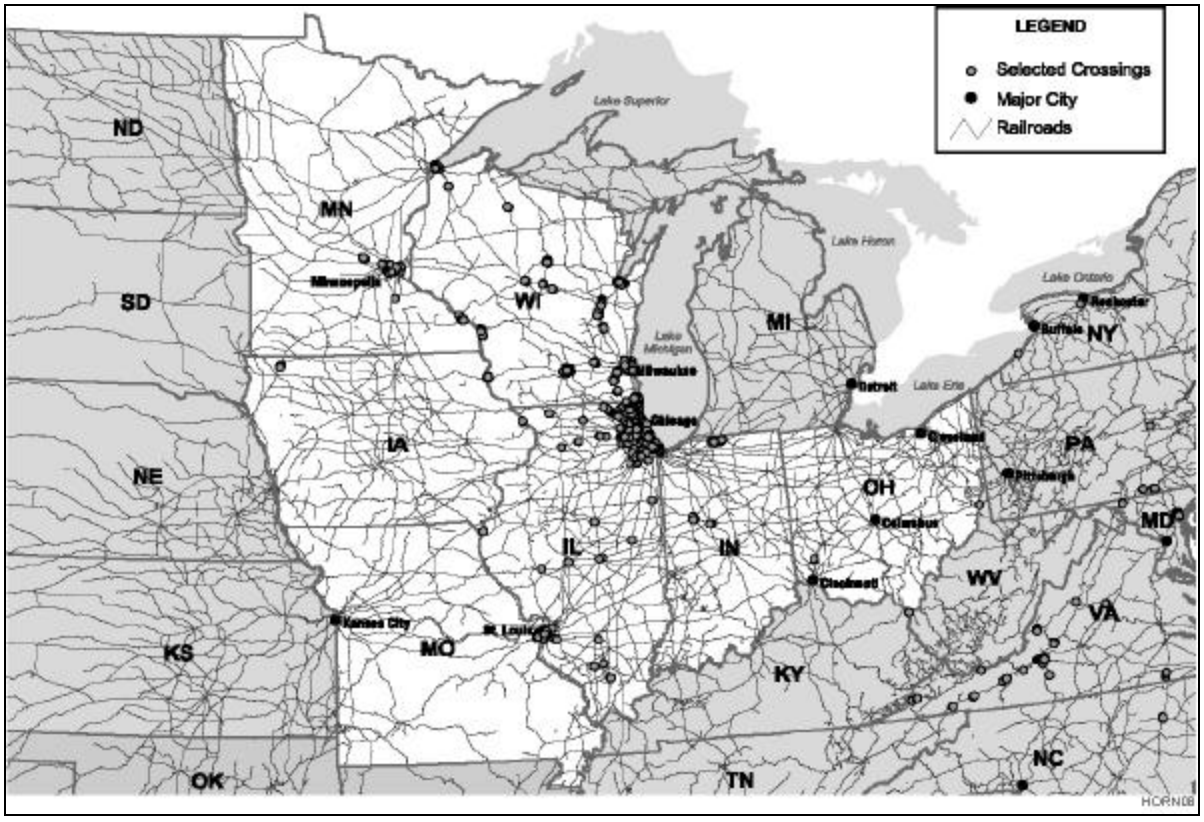

FIGURE 4-4
CURRENT WHISTLE BAN CROSSINGS – WESTERN REGION

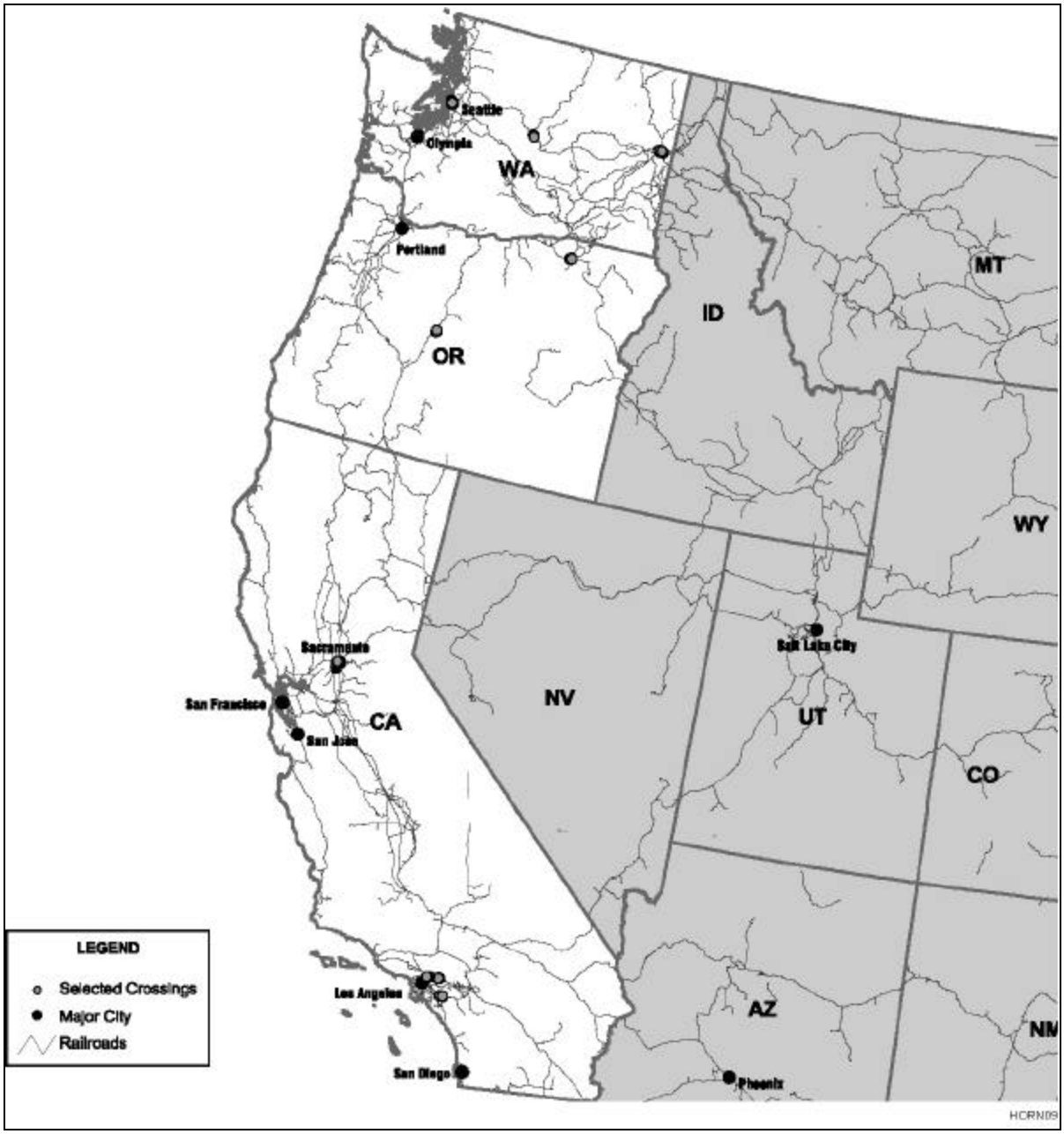

TABLE 4-1
NOISE EFFECTS OF HORN PROVISIONS

	Impacts	Severe Impacts
		Current Conditions (¼-Mile)
Crossing Impact Area (million square feet)	2.71	1.34
Crossing Impact Area (square miles)	0.097	0.048
Affected Population per Crossing	60	30
National Affected Population	9,305,000	4,604,000
		Horn Sounding Limit of 20 seconds
Crossing Impact Area (million square feet)	1.99	0.98
Crossing Impact Area (square miles)	0.071	0.035
Affected Population per Crossing	22	22
National Affected Population	6,811,000	3,357,000
National Population Relieved	*2,494,000*	*1,247,000*
Population Exposure Reduction	*27%*	*27%*
Combined Population Exposure Reduction	*27%*	
Maximum Horn Level (L_{max} at 110 dBA, 15' height)		
Crossing Impact Area (million square feet)	2.36	1.09
Crossing Impact Area (square miles)	0.085	0.039
Affected Population per Crossing	53	24
National Affected Population	8,154,000	3,741,000
National Population Relieved	*1,151,000*	*863,000*
Percent Population Exposure Reduction	*12%*	*19%*
Combined Population Exposure Reduction	*14%*	
Final Rule – Horn Sounding Limit and Maximum Horn Level Combined		
Crossing Impact Area (million square feet)	1.73	0.79
Crossing Impact Area (square miles)	0.062	0.028
Affected Population per Crossing	21	17
National Affected Population	5,947,000	2,686,000
National Population Relieved	*3,358,000*	*1,918,000*
Percent Population Exposure Reduction	*36%*	*42%*
Combined Population Exposure Reduction	*38%*	

Note: Persons “severely impacted” are a subset of the number of persons “impacted”.

4.2.2 Persons Potentially Adversely Impacted

FRA estimated the number of persons who currently live near highway-rail grade crossings where locomotive horns are not routinely sounded today, who may be adversely impacted by provisions of the rule requiring horn sounding. This estimate is a worst-case analysis of potential adverse noise impacts without the establishment of any quiet zones or implementation of beneficial provisions of the rule. The summary tables that follow provide estimates of the number of persons potentially impacted and of those, the number of persons potentially impacted severely by locomotive horn noise. These impact estimates assume the typical ¼-mile sounding distance commonly found on the nation's railroads and current horn sound levels. When fully implemented, the horn sounding duration and maximum horn level requirements of the rule will reduce these impact estimates by approximately 38%.

Because FRA can not predict which communities will qualify for or choose to implement a quiet zone after issuance of the rule, potential adverse impacts from noise exposure has been represented as if no quiet zones are created and all whistlebans are removed. However, the interim final rule would allow many whistleban locations to qualify as Pre-Rule Quiet Zones, quite a few without making any physical changes to the crossings or incurring associated costs. FRA estimates that approximately 66% of whistleban crossings may be eligible for conversion into Pre-Rule Quiet Zones without any initial improvements. Therefore, the potential direct noise impacts resulting from the requirement to sound horns at all public crossings will be significantly lower and could be less than 44% of the potential adverse noise exposure impacts represented below.

Number of Persons Potentially Adversely Impacted by State. FRA has estimated the number of persons potentially adversely impacted and the subset of those people severely impacted by locomotive horn noise, if no Pre-Rule Quiet Zones are created, for each of the 24 states across the country with highway-rail grade crossings subject to current whistle bans. As shown in Table 4-2, there would be 445,611 persons potentially impacted by horn noise nationally; 217,504 of those would be severely impacted. The state of Illinois contains the greatest number of potentially impacted persons (203,385 persons), representing approximately 46 percent of the total impacts. Other states with large numbers of potentially impacted persons include Wisconsin (61,964), Massachusetts (39,116), California (29,027), Indiana (22,931), and Minnesota (22,496). The same states also have the greatest number of persons potentially severely impacted by the rule provisions: Illinois (102,344); Wisconsin (28,586), Massachusetts (18,972), California (14,798), Indiana (11,093), and Minnesota (10,608).

TABLE 4-2
TOTAL PERSONS POTENTIALLY AFFECTED BY STATE

State	Population	
	Impacted	Severely Impacted
Arkansas	1,407	487
California	29,027	14,798
Florida	8	4
Georgia	1,387	766
Iowa	676	465
Illinois	203,385	102,344
Indiana	22,931	11,093
Louisiana	4,166	2,142
Massachusetts	39,116	18,972
Maryland	1,425	739
Maine	12,043	5,536
Minnesota	22,496	10,608
Missouri	10,543	4,459
North Carolina	405	107
New York	6,486	3,155
Ohio	761	328
Oregon	3,110	1,722
Pennsylvania	2,384	1,121
South Carolina	1,041	338
Texas	3,579	1,638
Virginia	11,523	5,235
Washington	5,244	2,615
West Virginia	504	246
Wisconsin	61,964	28,586
TOTALS:	**445,611**	**217,504**

Note: Persons “severely impacted” are a subset of the number of persons “impacted”.

Number of Persons Potentially Adversely Impacted by County. A complete listing of the number of persons potentially adversely impacted and severely impacted by locomotive horn noise under the final rule, if no Pre-Rule Quiet Zones are created, for each county within the 24 states with current whistle bans is provided in Appendix D. The 20 counties with the greatest potential impacts are listed in Table 4-3. The counties with the highest number of impacted persons are Cook County, Illinois (150,310 persons), DuPage County, Illinois (25,965), Middlesex County, Massachusetts (24,504), St. Joseph County, Indiana (15,688), and Lake County, Illinois (13,406). Those with the greatest number of persons potentially severely impacted by the rule provisions are Cook County, DuPage County, Middlesex County, St. Joseph County, and Los Angeles County, California. Four of the 20 most-affected counties are located within the Chicago metropolitan region.

TABLE 4-3
PERSONS POTENTIALLY AFFECTED IN 20 COUNTIES WITH GREATEST IMPACTS

County	State	Population	
		Impacted	Severely Impacted
Cook	Illinois	150,310	78,058
DuPage	Illinois	25,965	12,877
Middlesex	Massachusetts	24,504	12,710
St. Joseph	Indiana	15,688	7,901
Lake	Illinois	13,406	5,526
Los Angeles	California	13,358	7,439
Milwaukee	Wisconsin	12,649	5,346
Essex	Massachusetts	9,300	4,567
Winnebago	Wisconsin	8,523	4,206
Orange	California	8,269	4,065
Hennepin	Minnesota	8,057	3,123
Sacramento	California	7,400	3,294
Brown	Wisconsin	7,190	4,106
Winona	Minnesota	7,179	3,700
Dane	Wisconsin	6,937	2,788
Ramsey	Minnesota	6,841	3,667
McHenry	Illinois	6,404	3,030
St. Louis City	Missouri	6,117	2,433
Waukesha	Wisconsin	5,323	2,444
Suffolk	Massachusetts	5,312	1,695

Note: Persons “severely impacted” are a subset of the number of persons “impacted”.

Number of Persons Potentially Adversely Impacted by City. A complete listing of the number of persons potentially adversely impacted and the subset potentially severely impacted by locomotive horn noise, if no Pre-Rule Quiet Zones are created, for each city within the 24 impacted states with current whistle bans is provided in Appendix E. The 20 cities with the greatest potential impacts are listed in Table 4-4. Each of these cities contains approximately 5,000 or more persons who would be potentially impacted by locomotive horn noise when the rule is implemented. The cities with highest number of impacted persons include: Chicago, Illinois (73,380 persons), Los Angeles, California (9,998), LaGrange, Illinois (9,242), Mishawaka, Indiana (7,877), and South Bend, Indiana (7,811). Seven of the 20 most-affected cities are located within the Chicago metropolitan region. Some cities currently have nighttime-only train whistle bans in place. Persons in these communities potentially impacted by locomotive horn rule are listed in Table 4-5.

TABLE 4-4
PERSONS POTENTIALLY AFFECTED IN 20 CITIES WITH GREATEST IMPACTS

City	State	Population	
		Impacted	Severely Impacted
Chicago	Illinois	73,379	40,715
Los Angeles	California	9,998	5,336
La Grange	Illinois	9,242	4,829
Mishawaka	Indiana	7,877	3,907
South Bend	Indiana	7,811	3,994
Des Plaines	Illinois	7,549	3,515
Sacramento	California	7,400	3,294
Minneapolis	Minnesota	7,267	2,762
Green Bay	Wisconsin	7,190	4,106
Winona	Minnesota	7,179	3,700
Berwyn	Illinois	6,952	3,440
Madison	Wisconsin	6,937	2,788
St. Louis	Missouri	6,117	2,433
St. Paul	Minnesota	6,076	3,227
Chelsea	Massachusetts	5,312	1,695
Maywood	Illinois	5,151	1,744
Arlington Heights	Illinois	5,049	2,827
Melrose	Massachusetts	4,830	2,656
West Allis	Wisconsin	4,748	2,102
Downers Grove	Illinois	4,724	2,340

Note: Persons “severely impacted” are a subset of the number of persons “impacted”.

TABLE 4-5
PERSONS AFFECTED IN CITIES WITH NIGHTTIME-ONLY BANS

City	State	Population Impacted	Severely Impacted
Wausau	Wisconsin	1,798	913
Prairie Du Chien	Wisconsin	1,522	601
Baltimore Highlands	Maryland	1,107	570
Dunkirk	New York	897	386
Marshfield	Wisconsin	561	160
Abingdon	Virginia	546	271
Pulaski	Virginia	274	71
Solon Springs	Wisconsin	162	69
Rocky Mount	Virginia	122	75
Van Buren	Maine	25	9
Fountain City	Wisconsin	20	13
Columbus	Georgia	12	4
Deland	Florida	8	4

Note: Persons "severely impacted" are a subset of the number of persons "impacted".

4.3 QUIET ZONE IMPLEMENTATION

The final rule provides several options for establishing quiet zones in order to give communities more flexibility as to how and where they implement the safety improvements prescribed by 49 USC 20153. In response to comments received at public hearings and throughout the scoping process, FRA included in the final rule a performance-based approach that credits successful safety strategies and allows communities to choose the most appropriate means of reducing risk at highway-rail grade crossings.

In order to comply with the final rule, jurisdictions wishing to establish quiet zones must demonstrate that the risk of fatality or severe injury in the corridor in question would be either lower than the average risk level at gated public highway-rail grade crossings nationwide, or no higher than the risk level expected for that corridor if horns were sounded, whichever is higher. The rule provides numerous ways for communities to accomplish this, whether the goal is to create a New Quiet Zone or maintain a Pre-Rule Quiet Zone. It also allows state or local governments to manage risk along a corridor as a whole rather than treating each crossing separately, further easing implementation in jurisdictions with a high density of crossings. Quiet zones can be established with or without formal application to FRA according to the provisions discussed below, in certain cases without adding additional SSMs or ASMs. All public crossings in New Quiet Zones must be equipped with automatic warning devices consisting of flashing lights and gates.

FRA evaluated the potential disposition of current whistle bans as Pre-Rule Quiet Zones in the Regulatory Evaluation and Regulatory Flexibility Assessment published with the Rule. In evaluating the impacts of the final rule, FRA estimated the types of improvements that would be needed to establish quiet zones at crossings with current whistle bans. As shown in Table 4-6, FRA anticipates that more than half of the current whistleban crossings would not require any improvements to qualify as Pre-Rule Quiet Zones and maintain the standing prohibition on the sounding of locomotive horns. Approximately 34 percent of these crossings would require some sort of warning gates, SSMs, or ASMs to achieve quiet zone status. FRA also estimated that in the first year of the rule's implementation, approximately 1 percent of whistle ban crossings would not be converted by local communities into Pre-Rule Quiet Zones for reasons of minimal noise impacts compared with significant safety improvement costs. In addition, FRA expects that over the next 14 years, communities would discontinue Pre-Rule Quiet Zones at less than one percent of the current whistle ban crossings due to changes in the Crossing Corridor Risk Index and local decisions. Overall, FRA expects the quiet zone provisions of the rule to initially reduce the potential for direct adverse noise impacts by at least 66 percent even if no community invests in SSM's or ASM's.

TABLE 4-6
CROSSING IMPROVEMENTS TO MAINTAIN PRE-RULE QUIET ZONES

Crossing Improvements	Crossings Affected
No Improvements Needed Initially:	
Crossing Corridor Risk Index below the National Significant Risk Threshold	52 %
Crossing Corridor Risk Index between the National Significant Risk Threshold and Twice the National Significant Risk Threshold with no Relevant Collisions	14 %
Warning Gates, SSMs, or ASMs Required:	
Crossing Corridor Risk Index more than Twice the National Significant Risk Threshold with no Collisions	6 %
Crossing Corridor Risk Index over the National Significant Risk Threshold with Relevant Collisions	28 %

New Quiet Zone Demand. It is reasonable to assume that many communities beyond those with existing whistle bans would wish to designate a quiet zone in their jurisdiction. However, the number of communities that may opt for the establishment of quiet zones and the persons living in proximity to highway-rail grade crossings that would benefit is unknown. To estimate all reasonable and foreseeable future consequences of the rule, FRA used crossings that once had whistlebans to assess the potential latent demand for quiet zones across the country.

Because locations that formerly had whistle bans clearly favored having trains operate without horn sounding at highway-rail grade crossings, these crossings are seen by FRA to represent an indication of future demand from local communities to designate quiet zones. Many crossing locations are known by FRA that had whistle bans in effect after 1988, which were later discontinued. These bans were discontinued due to various factors, including state or local legislation, FRA Emergency Order #15 in Florida, and the anticipation of FRA's locomotive horn rule. Based on an analysis conducted for the DEIS, FRA estimated that as many as 140,000 persons in 185 communities that formerly had whistle bans may seek to establish quiet zones. These communities are concentrated in Florida, Michigan, Pennsylvania, and Kentucky. More communities have discontinued or lost their quiet status in recent years and they would add to this estimate.

4.3.1 Measures of Risk

Three measures of risk are used to determine whether a proposed or existing quiet zone will maintain an adequate level of safety in the corridor in question:

1. The *Nationwide Significant Risk Threshold* is calculated on a nationwide basis and represents the average level of risk at public highway-rail crossings equipped with lights and gates and at which locomotive horns are sounded. A risk level above the Nationwide Significant Risk Threshold constitutes a significant risk with respect to loss of life or serious personal injury.
2. The *Crossing Corridor Risk Index* indicates both the number of predicted collisions per year at each specific grade crossing within a corridor and the predicted likelihood and severity of casualties resulting from those collisions. The results for all crossings within the corridor are summed and then divided by the number of crossings to derive the index for the corridor.
3. The *Quiet Zone Risk Index* reflects the Crossing Corridor Risk Index for a quiet zone, after adjustment to account for the increased risk due to lack of locomotive horn use at the crossings within the quiet zone and the reduced risk due to implementation of SSMs and ASMs.

4.3.2 Options for Implementing a Quiet Zone

In addition to offering communities flexibility through the variety of supplementary and alternative safety measures that may be used to improve safety at grade crossings, the final rule provides a range of options by which a community may implement a quiet zone. Local jurisdictions thus have the ability to tailor risk reduction to the unique requirements of their particular community, as well as choices as to how they comply with the provisions of the rule.

Method 1: Public Authority Designation allows communities to establish quiet zones without formal application to FRA, provided one of three conditions is met:

1. One or more SSMs are applied to every public grade crossing within the proposed quiet zone;
2. The Crossing Corridor Risk Index is below the Nationwide Significant Risk Threshold. Additional safety measures beyond the minimum quiet zone requirements discussed below are not required; or
3. SSMs are implemented that are sufficient to reduce the Quiet Zone Risk Index either to a level below the Nationwide Significant Risk Threshold or to the risk level which would exist if locomotive horns sounded at all crossings in the quiet zone. The public authority has discretion as to how the Quiet Zone Risk Index is reduced. It may choose the type of SSMs to be implemented and the crossings at which they are to be implemented.

Method 2: Public Authority Application to FRA is a flexible method that uses SSMs and ASMs to deal with problem crossings. The public authority has discretion as to the type of SSMs and ASMs to be implemented and the crossings at which they are to be implemented. If FRA determines that safety improvements will compensate for the absence of the locomotive horn or that safety improvements will sufficiently reduce risk with respect to loss of life or serious injury, a quiet zone may be established.

If Method 2 is selected by the state or local jurisdiction, it must demonstrate, in an application to FRA, that implementation of the proposed measures will reduce the Quiet Zone Risk Index to either the risk level which would exist if locomotive horns sounded at all crossings in the quiet zone or to a risk level below the Nationwide Significant Risk Threshold. The application must include:

- Details of the existing engineering improvements at the crossings to be included in the quiet zone;
- A description of which SSMs or ASMs will be implemented and at which public crossings;
- A written commitment to implement and maintain the proposed safety measures within the quiet zone; and
- Data and analysis, based on calculations defined in the final rule, that demonstrate that implementation of these measures will reduce the Quiet Zone Risk Index to either the risk level which would exist if locomotive horns sounded at all crossings in the quiet zone or to a risk level below the Nationwide Significant Risk Threshold.
- FRA may include in any decision of approval conditions it deems necessary to ensure that the proposed safety improvements are effective. If the quiet zone is not approved, FRA will make clear the basis upon which the decision was made.

Collision-Free Quiet Zones in Which SSMs or ASMs are Not Necessary. Finally, a Pre-Rule Quiet Zone may remain in effect if there have been no relevant collisions at any public grade crossing within the quiet zone for five years and the Quiet Zone Risk Index is less than twice the Nationwide Significant Risk Threshold. This stipulation credits corridors with low accident rates by relieving them of unnecessary safety requirements.

4.3.3 Procedures for Implementing a Quiet Zone

Jurisdictions with existing whistle bans have five years to comply with the provisions contained in the final rule. The time frame for implementation can increase to eight years if the State DOT assists in funding, an implementation plan is provided to FRA within three years, and construction of the improvements begin by year four. FRA has developed web-based guidelines and complete instructions for communities wishing to establish quiet zones. Additional details and application materials are provided at www.fra.dot.gov.

4.3.4 Notification and Review

Once a quiet zone is established by compliance with one of the options discussed above, the jurisdiction must provide written notice to all railroads operating over the crossings within the quiet zone, the law enforcement authority responsible for vehicular traffic at the crossings within the zone, landowners having control of any private crossings within the quiet zone, the state agency responsible for road safety, and the Associate Administrator of the FRA. The notice must identify the grade crossings within the quiet zone by both U.S. DOT Grade Crossing Inventory Number and street or highway name and indicate the specific date on which the quiet zone will take effect. It also must provide to FRA a U.S. DOT Grade Crossing Inventory Form (FRA F6180.71 or Inventory Form) for each public highway-rail grade crossing within the quiet zone dated within six months prior to designation of the zone, an Inventory Form describing the SSMs and ASMs in place within the quiet zone, and the name, title and contact information of the state or local officer responsible for monitoring compliance with the final rule.

After receipt of notification from a community that a quiet zone is being established, railroads must cease routine use of the locomotive horn at all crossings identified by the community upon the date set.

Periodic Updates. All quiet zones are subject to a periodic update to ensure that the safety measures implemented remain adequate. Updates must affirm in writing that the SSMs or ASMs implemented continue to conform to the requirements of the final rule or the terms of the Quiet Zone approval, and include an accurate U.S. DOT Inventory Form for each crossing within the zone. The update must be submitted within six months before the expiration of five years from the date the quiet zone was established or last updated for quiet zones with an SSM at every crossing, and within six months before the expiration of three years from the date the quiet zone was established or last updated for quiet zones that do not have an SSM at every crossing.

A quiet zone in which SSMs or ASMs are not necessary may remain in effect indefinitely, provided that within six months of the expiration of three years from the date the quiet zone was established or last updated, the state or local authority affirms in writing that the conditions that qualified the quiet zone continue to be met.

Annual Risk Review. FRA will annually calculate the Quiet Zone Risk Index for quiet zones established with a Quiet Zone Risk Index below the Nationwide Significant Risk Threshold, or below two times the Nationwide Significant Risk Threshold with no relevant collisions. FRA will notify local governments of the new Quiet Zone Risk Index for each quiet zone of these types in its jurisdiction. In the case of Pre-Rule Quiet Zones, FRA will also notify local governments if a relevant collision occurred at a grade crossing in its quiet zone.

If the Quiet Zone Risk Index for a New Quiet Zone is above the Nationwide Significant Risk Threshold, the quiet zone will terminate six months from the date of receipt of notification, unless the community (a) provides FRA with a written commitment to lower the potential risk at crossings within the quiet zone to below the Nationwide Significant Risk Threshold or to a level fully compensating for the absence of the locomotive horn, and (b) completes implementation of SSMs or ASMs sufficient to reduce the Quiet Zone Risk Index to an acceptable level within three years of FRA notification.

If the Quiet Zone Risk Index for a Pre-Rule Quiet Zone is more than twice the Nationwide Significant Risk Threshold, or if a relevant collision occurred at a grade crossing within the quiet zone during the preceding calendar year, the quiet zone will terminate within six months, unless the public authority takes the same steps applicable to New Quiet Zones discussed above.

In addition to its annual risk review, FRA may, at any time, review the status of any quiet zone and determine whether, under conditions then present, there is significant risk with respect to loss of life or serious personal injury. If FRA makes a preliminary determination that the safety measures implemented do not fully compensate for the absence of the locomotive horn, or that there is significant risk with respect to loss of life or serious personal injury, FRA will provide written notice to the appropriate public authority and will publish notice of the determination in the *Federal Register*. After providing an opportunity for comment and an informal hearing, FRA may require that additional safety measures be implemented or that the quiet zone be terminated.

4.4 MITIGATION TOOLS

Communities that want to avoid the sounding of locomotive horns have a means of mitigating the potential negative noise impacts of the final rule through the establishment of a quiet zone. For communities interested in creating quiet zones under the first method for quiet zone designation, the interim final rule allows public authorities to designate quiet zones with minimal effort when the corridor has a good safety record. If

the Crossing Corridor Risk Index for the proposed quiet zone is above the Nationwide Significant Risk Threshold, at least one SSM is required for each highway-rail grade crossings in the corridor. FRA has identified several SSMs in the final rule, any one of which can be applied to a crossing. These safety measures have been determined by FRA to have a certain effectiveness rate that would effectively compensate for the absence of sound from the locomotive horn. SSMs are described in detail in Appendix A of the rule. FRA has also identified ASMs that can be used by communities seeking to designate a quiet zone under the second optional method. ASMs are described in detail in Appendix B of the rule. Wayside horns may also be installed within a quiet zone. For purposes of calculating the length of a quiet zone, the presence of a wayside horn at a highway-grade crossing within a quiet zone shall be considered in the same manner as a grade crossing treated with a SSM. A grade crossing equipped with a wayside horn shall not be considered in calculating the Quiet Zone Risk Index or Crossing Corridor Risk Index. Approved SSMs and ASMs are described below.

4.4.1 Supplementary Safety Measures

Four SSMs designated by FRA as mitigation tools are available to local jurisdictions and railroads. In addition, FRA has included a provision in the interim final rule that allows for the use of wayside horns to substitute for the routine use of locomotive horns. Wayside horns are audible warning devices that would be placed at a crossing and directed at oncoming motorists. The same track circuits used to detect the train's approach to trigger automated warning devices at the crossing would typically activate such a device. The use of these devices within quiet zones is not expected to be common because wayside horns would compromise the quietude of the quiet zone environment.

A. Temporary Closure of a Public Highway-Rail Grade Crossing. The temporary closure of a public highway-rail grade crossing has the advantage of obvious safety and thus would more than compensate for the lack of a locomotive horn during the periods of crossing closure. The required conditions for closure are intended to ensure that vehicles are not able to enter the crossing. To avoid driver confusion and uncertainty, the crossing must be closed during the same hours every day and may only be closed during one period each 24 hours. The consistency of closure periods would avoid unnecessary automobile-to-automobile collisions in addition to avoiding collisions with trains. Activation and deactivation of the system is the responsibility of the local traffic control authority or the entity responsible for maintenance of the street or highway that crosses the railroad. Responsibility for activation and deactivation of the system may be contracted to another party. However, the appropriate governmental entity shall remain fully responsible for compliance with the requirements of this section. In addition, the system must be tamper-proof and vandal-resistant to the same extent as other traffic control devices.

B. Four-Quadrant Gate System. A four-quadrant gate system involves the installation of gates at a public highway-rail grade crossing to fully block highway traffic from entering the crossing when the gates are lowered. This system includes at least one gate for each direction of traffic on each approach. A four-quadrant gate system is meant to prevent a

motorist from entering the oncoming lane of traffic to avoid a fully lowered gate in the motorist's lane of traffic. Because an additional gate also would be fully lowered in the other lane of the road, the motorist would be fully blocked from entering the crossing.

C. Gates with Medians or Channelization Devices. Keeping highway traffic on both highway approaches to a public highway-rail grade crossing in the proper lane denies the highway user the option of circumventing gates in the approach lanes by switching into the opposing (oncoming) traffic lane in order to drive around a lowered gate to cross the tracks. FRA provides that gates with medians or channelization devices are considered SSMs if they meet certain conditions.

D. One-Way Streets with Gates. This installation consists of one-way streets with gates installed so that all approaching highway lanes are completely blocked. The gate arms on the approach side of the highway-rail grade crossing must extend across the road to within 1 foot of the far edge of the pavement. If no median is present and two gates are used, with one on each side of the road, the gap between the ends of the gates when they are in the down position should be no more than 2 feet. If the highway approach is equipped with a median, the lowered gates should reach to within 1 foot of the median. The measurement should be horizontal across the road from the end of the lowered gate to the median or to a point over the median edge. The gate and the median top do not have to be at the same elevation.

In situations where only one gate is used, the edge of the road opposite the gate mechanism must have a non-traversable curb extending for at least 100 feet, so that the motorist cannot veer onto the shoulder of the road and drive around the gate tip. Crossing warning systems must be equipped with constant-warning time devices and power out indicators. Signs must be posted alerting motorists that the locomotive horn does not sound at the crossing.

4.4.2 Alternative Safety Measures

Communities seeking to designate a quiet zone under the second optional method can use ASMs. This method requires the completion of studies for submission to FRA. When a SSM is altered, such that it does not conform to FRA requirements, it can be considered as an ASM in applications under the second optional method. Approved ASMs are described below.

A. Photo Enforcement. An automated means of gathering valid photographic or video evidence of violations of traffic laws relating to highway-rail grade crossings can be an effective ASM, if there is sufficient support and follow-through by the law enforcement and judicial communities. FRA would require that state law authorize use of photographic evidence both to bring charges against the vehicle owner and sustain the burden of proof that a traffic law violation has occurred.

The rule requires that the photo enforcement system have a means to detect violations (such as loop detectors or video imaging technology) and photo or video equipment deployed to capture images sufficient to convict violators under state law. Every public highway-rail grade crossing would not need to be equipped with cameras for continual monitoring. The goal of deterrence may be accomplished by moving the surveillance equipment among several crossing locations, as long as the motorist perceives the strong possibility that a violation of the law would lead to sanctions. Therefore, each location should appear identical to the motorist, whether or not the camera or video equipment is actually within the housing or equivalent equipment.

Implementation of photo enforcement as an ASM would require appropriate integration, testing, and maintenance of the system to provide evidence-supporting enforcement. Periodic data analysis would be performed to verify that violation rates remain below a baseline level (level with locomotive horns sounding). Also, signs would be required that alert motorists that locomotive horns are not sounded at such crossings and that the crossings are monitored for compliance with the law. Public awareness efforts are critical to the success of this program. The public must be informed that the horns are not being sounded and that violation of crossing laws would result in fines and penalties.

B. Programmed Enforcement. This measure involves community and law enforcement officials committed to a systematic and measurable crossing monitoring and traffic law enforcement program at the public highway-rail grade crossings in question. This may be accomplished alone or in conjunction with the subsequently described public education and awareness program. Programmed enforcement requires a sustainable law enforcement effort combined with continued crossing monitoring.

C. Public Education and Awareness. This ASM alone, or in conjunction with programmed enforcement, is a program of public education and awareness directed at motor vehicle drivers, pedestrians, and residents near the railroad to emphasize the risks associated with highway-rail crossings and emphasize applicable requirements of state and local traffic laws at those crossings.

FRA recognizes the importance of public education and awareness efforts to safety at public highway-rail grade crossings. FRA and other modal administrations and offices within the U.S. Department of Transportation have promoted the Always Expect a Train campaign, Operation Lifesaver, Inc., Safe Communities, and other public outreach efforts. However, FRA is concerned that the desire of communities to implement quiet zones could lead to redirection of scarce safety resources from these initiatives. This redirection of safety resources could seriously tax the capacity of crossing safety programs provided by railroads and supported by the federal government, leading to a net reduction in crossing safety. Accordingly, it is critical that public education and awareness programs represent valid new increments of effort by the localities where quiet zone benefits would accrue.

The public education and awareness option must have a sustained level of effort. Public safety campaigns generally have temporary value when conducted over a short period or

during widely separated periods of emphasis. Campaigns, such as those promoting seat belt use or child safety seat use, have long-term and sustained impact only to the extent the message is delivered repeatedly and with varied or innovative techniques. FRA is concerned that government entities wishing to utilize the public education and awareness option would need to find effective means of targeting the relevant audience (concentrating the impact where it will have utility) and ensuring that the message is reinforced over time.

4.4.3 Effectiveness of Supplementary and Alternative Safety Measures

FRA has calculated an effectiveness rate for each SSM. These rates, listed in Table 4-7, indicate the effectiveness of the SSMs in reducing the probability of a collision at a highway-rail grade crossing. Effectiveness rates are based on available empirical data and experience with similar approaches. The effectiveness rates are subject to adjustment as research and demonstration projects are completed and data are gathered and refined. FRA proposes to use these estimates as benchmark values to determine the effectiveness of all SSMs along a proposed quiet zone.

FRA's most recent update to the Nationwide Study concluded that collision probabilities increase an average of 44 percent at gated crossings when horns are silenced. As such, the SSM should have an effectiveness rate of at least 0.31 (reducing the probability of a collision by at least 31 percent) to compensate for this 44 percent increase. For example, if a select group of 1,000 crossings are expected to have 100 collisions per year with locomotive horns being sounded, this same group of crossings would be expected to have 144 collisions per year once the sounding of the locomotive horns is banned if no other safety measures are implemented and other factors remain unchanged. Conversely, if these same crossings were experiencing 144 collisions per year while the horn was banned, it is expected that this number would decrease to 100 once use of the horn is reinstated.

TABLE 4-7
EFFECTIVENESS AND COSTS OF MITIGATION MEASURES

Supplementary Safety Measures	**Effectiveness Rate**	**Costs**
Temporary Closure of a Public Highway-Rail Grade Crossing	1.00 (for closed periods)	Nighttime or other time-of-day whistle bans; hours at the discretion of the community. Daily use of swinging or sliding gates, $2,000 initial cost plus $2,000 annual cost.
Permanent Closure of a Public Highway-Rail Grade Crossing	1.00	$5,000
Grade Separation of a Public Highway-Rail Grade Crossing	1.00	$3-5 million
Four-Quadrant Gates	0.82	Gates and circuitry to upgrade from two-quadrant gates are estimated to cost $100,000. Additional annual cost estimated to be $2,500 per crossing. Installation of four-quadrant gates where no-gates exist would cost approximately $280,000 per crossing. Annual maintenance costs are estimated at $5,000 per crossing.
Four-Quadrant Gates with Vehicle Presence Detection	0.77	Costs of $23,000 to $27,000 per crossing for vehicle presence detection in addition to the cost for gates.
Four-Quadrant Gates, with Medians of at Least 60 Feet, with or without Presence Detection	0.92	Costs of medians in addition to the cost for gates and for presence detection.
Mountable medians with Reflective Traffic Channelization Devices	0.75	Costs of $13,000 per crossing for two 100-foot medians. Annual costs of $500 are anticipated.
Non-Traversable Curb Medians with or without Channelization Devices	0.80	Costs of $15,000 per crossing for two 100-foot medians.
One-Way Streets with Gates	0.82	Relocation of existing gates would cost $35,000.
Alternative Safety Measures	**Effectiveness Rate[1]**	**Costs**
Photo Enforcement	At Least 0.31	Start-up costs estimated at $28,000 to $65,500 per crossing. Annual operating costs of $6,600 to $24,000 per crossing. Costs would be offset by revenue generated by fines for violations. Must establish baseline at crossings to define effectiveness.
Programmed Enforcement	Variable	Cost to establish baseline of $20,000 to $25,000 per Quiet Zone. Average cost per crossing is $4,600 per year. Costs would be offset by revenue generated by fines for violations.
Public Education and Awareness	Variable	Cost to establish baseline of $20,000 to $25,000 per Quiet Zone. Average cost per program of $10,000 per year.

Other Mitigation Required To Implement A Quiet Zone	Effectiveness Rate[1]	Costs
Advance Warning Signs	N/A	Cost of sign, pole, and installation is estimated at $200 per crossing.
Installation Of Train Activated Gates and Flashing Lights	N/A	Costs of $150,000 per crossing. Annual costs of $2,000 per crossing.

[1] For ASMs, effectiveness rate is determined by multiplying the overall effectiveness of a program in reducing observed violations by conversion factor of 0.78.

4.5 ENVIRONMENTAL JUSTICE

FRA assessed potential impacts to environmental justice populations using the methodology and thresholds described in Chapter 3. If no Pre-Rule Quiet Zones were established, implementation of the final rule would result in environmental justice impacts from noise exposure to minority or Hispanic populations in 22 counties located in 11 states. Counties where a majority of the potential impacts would affect minority populations are listed in Table 4-8. The counties with the greatest environmental justice impacts to minority populations are located in California and Virginia. A large minority population is potentially impacted in Cook County, Illinois, but those impacts are below the environmental justice thresholds. Counties where a majority of the potential impacts would affect populations of Hispanic origin are listed in Table 4-9. These impacts are greatest in California, Massachusetts, and Texas. None of the affected crossings are located in areas where the average household income is below the federal poverty level, though there are residents within most of the crossing areas that would be considered low-income. In total, potential impacts to environmental justice populations represent about 4 percent of the total impacts estimated by FRA.

While FRA's analysis shows that there could be impacts to environmental justice populations at grade crossing locations in several states and counties, these estimated impacts do not account for the reduction in impacts associated with the beneficial provisions of the rule. The required limits on maximum horn levels and sounding duration would reduce these impacts substantially, and the designation of pre-rule quiet zones would greatly reduce these potential impacts. Furthermore, minority, Hispanic, or low-income communities would have an equal opportunity under the rule to designate a quiet zone. FRA has included a provision in this rule providing an incentive, in the form of an extended phase-in of safety requirements at Pre-Rule Quiet Zones, to encourage state-level involvement in mitigating any environmental justice impacts (e.g. by allocating flexible Federal-aid highway funding).

TABLE 4-8
POTENTIAL ENVIRONMENTAL JUSTICE IMPACTS TO MINORITY POPULATIONS

County	State	Minority Persons Impacted	Percent of Persons Impacted	Minority Persons Severely Impacted	Percent of Persons Severely Impacted
Jefferson	Arkansas	912	86.0%	310	88.1%
Miller	Arkansas	215	64.4%	87	64.4%
Los Angeles	California	6,787	50.8%	3,604	48.4%
Fulton	Georgia	397	57.6%	226	56.9%
Champaign	Illinois	290	87.1%	76	84.4%
Macon	Illinois	240	52.6%	84	44.4%
Calcasieu	Louisiana	805	82.6%	369	81.1%
Suffolk	Massachusetts	2,729	51.4%	881	52.0%
Nash	North Carolina	333	82.2%	81	75.7%
Abbeville	South Carolina	53	85.5%	16	76.2%
Greenwood	South Carolina	739	75.5%	230	72.6%
Nueces	Texas	110	56.1%	53	63.1%
Charlottesville (City)	Virginia	168	48.3%	76	51.7%
Emporia (City)	Virginia	508	53.5%	234	55.8%
James City	Virginia	21	58.3%	4	50.0%
Norfolk (City)	Virginia	224	88.2%	132	89.8%
Suffolk (City)	Virginia	3,030	85.2%	1,515	86.4%
Williamsburg (City)	Virginia	42	56.0%	5	38.5%
York	Virginia	3	75.0%	1	100.0%
TOTALS:		**17,606**		**7,984**	

Note: Persons “severely impacted” are a subset of the number of persons “impacted”.

TABLE 4-9
POTENTIAL ENVIRONMENTAL JUSTICE IMPACTS TO HISPANIC POPULATIONS

County	State	Hispanic Persons Impacted	Percent of Persons Impacted	Hispanic Persons Severely Impacted	Percent of Persons Severely Impacted
Los Angeles	California	8,957	67.1%	4,931	66.3%
Fulton	Georgia	396	57.5%	246	62.0%
Suffolk	Massachusetts	3,007	56.6%	952	56.2%
Harris	Texas	1,335	57.4%	753	62.5%
Kleberg	Texas	796	75.4%	253	72.3%
Chelan	Washington	166	56.7%	48	49.0%
TOTALS:		**14,657**		**7,183**	

Note: Persons “severely impacted” are a subset of the number of persons “impacted”.

4.6 HEALTH EFFECTS OF NOISE

Many laboratory and field tests have been conducted to determine the effects of noise on people. The U.S. Environmental Protection Agency (EPA) summarizes the results of these testing programs in its "Levels Document”.[4] In their summary, the U.S. EPA adopts the term “health” to include physiological and psychological well-being in addition to absence of disease. Consequently, noise effects on people are considered in two categories: (1) behavioral indicators of well-being, and (2) physiological and medical indicators of disease.

The first category includes the subjective indicators, activity interference and annoyance, which can change as people become familiar with the noise source. Environmental noise impact assessment uses noise annoyance as the key indication of behavioral well-being. Among the contributors to annoyance are noise interference with speech communication, learning process, mental activity, and sleep. Research has lead to quantitative relationships between noise and annoyance for these factors. Other contributors to noise annoyance, such as emotional attitude toward the noise source, are less well defined.

The second category includes the objective indicator of hearing loss, which is the only proven physiological effect of noise. It is important to emphasize that noise is not the only cause of hearing loss. A natural diminution of hearing acuity with age, called “presbycusis,” is one of several other medical causes of hearing loss. The onset of hearing damage can occur from exposure to either high sound levels for a short period, or lower sound levels for a longer time. The person exposed suffers what is termed, “temporary threshold shift” (TTS), reduced hearing ability for some period of time after exposure, usually lasting for a period up to a day. If allowed to recover by a period of quiet time, the

[4] U.S. Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA Report 550/9-74-004, Washington, D.C., March 1974.

person's hearing returns to normal. However, if such exposure continues to be repeated again before the ear is allowed to recover, the TTS can become permanent hearing loss.

After extensive research on noise-induced hearing loss, researchers have established general relationships between noise exposure and hearing loss. At the upper end of noise exposure, the U.S. Occupational Safety and Health Administration published limits on the levels of noise exposure in the industrial workplace to avoid permanent hearing loss over a working life.[5] The limit is a maximum permissible A-weighted exposure level (L_{eq}) of 90 dBA for an 8-hour workday. For each halving of exposure time, the level is allowed to increase by 5 dB, up to a maximum of 115 dBA for 15 minutes. Hearing conservation programs are required when the 8-hour equivalent exposure exceeds 85 dBA. At the lower end, a conservative criterion was recommended by EPA to protect hearing with an adequate margin of safety; a continuous 24-hour L_{eq} of 70 dB should protect the general population when exposed to such a level over a 40-year period. Between these extremes, the International Organization for Standards has established a standard and a procedure for calculating potential hearing damage from exposures during 8-hour workdays over periods ranging from 0 to 40 years.[6]

Sound exposure from locomotive horns in communities abutting railroad lines does not reach the cumulative levels that would exceed risk criteria for hearing damage. The horn noise model established by measurements for the FRA is based on a sound exposure level of 107 dBA at 100 feet from the tracks for locations not closer than 1/8 mile from a grade crossing. In order to risk the onset of hearing damage, a person at that distance would have to hear more than 180 horn events during each 8-hour period for five days a week and continuously for 40 years. These conditions would yield an 8-hour L_{eq} of 85 dBA. In fact, the risk of hearing damage may be even less because the sound is not actually continuous and the ear has time to recover between horn soundings.

Other noise effects on health have been researched with ambiguous results. Stress-related syndromes, especially relevant to mental health, are the result of a complex interaction of many factors. Noise exposure can be a contributor when an emotional factor, such as an attitude toward the source of noise, comes into play. Several airport noise surveys have indicated stress-related disorders result from continuous exposure to high noise levels, but it has not been conclusively shown that the actual physical stimulus of noise is the cause of the health effect. Quoting the World Health Organization, "research on this subject has not yielded any positive evidence, so far, that disease is caused or aggravated by noise exposure, insufficient to cause hearing impairment." [7]

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5 U.S. Department of Labor, *Department of Labor Occupational Noise Exposure Standard*, Amended Code of Federal Regulations, Title 29, XVII, Part 1910, 1983.

6 International Organization for Standards, *Acoustics – Determination of Occupational Noise Exposure and Estimation of Noise-Induced Hearing Impairment*, International Standard (ISO) 1999.2, Geneva, Switzerland, 1989.

7 World Health Organization, *Environmental Health Criteria 12: Noise*, Geneva, Switzerland, 1980.

In response to questions and comments made on the DEIS, FRA commissioned a new review of the scientific literature concerning general health effects of transportation noise.[8] This research, conducted by the U.S. Department of Transportation Volpe Transportation Systems Center, found no new research on the health effects of specific noise sources such as locomotive horns. The literature review found that horn sounding is not an issue in Europe, where much of the current research on the health effects of noise is being conducted, nor is it a topic of concern in U.S. scientific literature.

Because researchers cannot reliably relate sleep awakenings to health effects, and sleep interference is likely to be one of the key attributed consequences of renewed horn sounding, the noise impacts cited by FRA in this FEIS are expressed in terms of annoyance rather than "health effects." The annoyance criteria used by FRA are based upon the 1978 Schultz curve, the generally accepted methodology for characterizing the average community response to transportation noise, as updated by the U.S. Air Force in 1993. This seminal research included railroad noise annoyance surveys, although it did not specifically address locomotive horn noise. Consequently, even the accepted criteria for noise annoyance used throughout the United States by FTA and FRA do not measure the health effects of locomotive horn use. However, these are the best criteria scientists in the noise assessment field have at this time, and until further research relevant to this specific question is conducted, the criteria used herein are the most appropriate available to FRA to assess the impact of locomotive horn sounding.

4.7 ECONOMICS

FRA assessed the costs and benefits of implementing the interim final rule in the final Regulatory Evaluation and Initial Regulatory Flexibility Assessment for Use of Locomotive Horns at Highway-Rail Grade Crossings. Implementation of this rule would reduce the risk of collisions at grade crossings by requiring the sounding of the locomotive horn at grade crossings unless it has been specifically determined that the crossings in question have a risk profile that justifies silencing the horn. FRA believes communities would take advantage of the many options available to compensate, in terms of risk, for the silencing of the horn. FRA is confident that the benefits in terms of lives saved and injuries prevented will exceed the costs imposed on society by this rule. FRA estimated costs and benefits for approximately 2,000 existing whistleban crossings and about 450 potential New Quiet Zone crossings.

[8] U.S. Department of Transportation, *General Health Effects of Transportation Noise*, Final Report, DTS-34-RR297-LR2, June 2002.

Twenty-Year Costs. FRA estimates that the Present Value (PV) of the total twenty-year costs is approximately $41 million. This includes costs associated with complying with the requirements for maximum horn sound level, establishing and maintaining Pre-Rule and New Quiet Zones, as well as relocation of residents to avoid locomotive horn noise.

Twenty-Year Benefits. The safety benefits of this rule are derived from the prevention of grade crossing collisions and the resulting casualties. Railroads will also experience economic benefits in terms of reduced train delay, debris removal, and repairs. Residents of communities with grade crossings will benefit from the mitigation of locomotive horn noise impacts. In terms of collisions and casualties, over the next twenty years, FRA anticipates implementation of this rule will result in the prevention of 123 collisions, 13 fatalities, and 60 injuries. FRA estimates that the twenty-year PV of the safety benefits derived from sounding the locomotive horn and establishing Pre-Rule and New Quiet Zones will be approximately $77 million. This estimate understates expected safety benefits because some benefits are un-quantifiable. Some of the un-quantified benefits of this interim final rule include: reductions in highway vehicle damage, railroad equipment damage, freight and passenger train delays, both of which can be very significant when grade crossing collisions occur, and collision investigation efforts. Although these benefits are not quantified in this analysis, their monetary value is significant. For instance the average highway vehicle damages resulting from grade crossing collisions at gated crossings during the 5-year period between 1996 and 2000 was $5,330 per collision.

The maximum horn sound level will limit community disruption by preventing horns from being louder than necessary to provide motorists with adequate warning of a trains approach. Another un-quantified benefit of this rule is the elimination of some locomotive horn noise disruption to some railroad employees and those who may reside near industrial areas served by railroads. Locomotive horns will no longer have to be sounded at individual highway-rail grade crossings at which the maximum authorized operating speed for that segment of track is 15 miles per hour or less and properly equipped flaggers (as defined in by 49 CFR 234.5, but who for purposes of this rule can also be crew members) provide warning to motorists. This rule will allow engineers, who were probably already exercising some level of discretion as to the duration and sound level of locomotive horn sounding, to stop sounding the horn under these circumstances at no additional cost.

FRA did not quantify the benefit of eliminating community disruption caused by the sounding of train horns in New Quiet Zones. Since this rule is permissive as to the establishment of quiet zones, communities will establish quiet zones to the extent that elimination of the train horn disruption coupled with the safety benefit exceeds the costs of compliance associated with the requirements for establishing new quiet zones.

4.8 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

FRA is not aware of any use or commitment of environmental resources as part of the final rule that are irreversible or irretrievable. The effect of the rule, sounding of locomotive horns where they are not presently sounded, could be reversed at some time in the future. Indeed the rule provides specific opportunities to accomplish this through the quiet zone provisions. Railroads and governments at the local, state, and federal levels may incur certain costs that would not be otherwise required if the rule was not implemented. However, these expenditures would serve to enhance public safety and would continue to avert some number of future collisions involving loss of life, injury, and property damage, even if the rule were repealed in the future.

4.9 UNAVOIDABLE ADVERSE EFFECTS

The final rule may unavoidably affect a number of locations currently having whistle bans with added sound from the regular use of the locomotive horn by trains traversing highway-rail grade crossings. The actual number of locations and the actual number of people impacted will depend upon future decisions by communities to implement quiet zones as provided for in the rule.

4.10 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The final rule for the use of locomotive horns at highway-rail grade crossings would, in the short term, produce the desired public safety improvement at the cost of some increase in noise from locomotive horns at certain highway-rail grade crossings across the nation at which there presently are whistle bans. In the long term, the rule would maintain the public safety benefit achieved initially and would allow community impacts from locomotive horns to be decreased at many additional locations with the potential to designate new quiet zones. Additionally, every community in the nation with a public highway-rail grade crossing would be relieved over time of some noise impact through the maximum horn sound level and the limit on the duration of horn sounding.

CHAPTER 5

PARTICIPANTS AND AVAILABILITY OF FEIS

5.0 AVAILABILITY OF THE FEIS

Letters of notification that this FEIS is available have been sent to all interested parties who submitted comments on the Draft EIS and included complete address information. The FEIS is available electronically on the FRA website, [**www.fra.dot.gov**], or upon written request from FRA at the following address:

Office of Safety
Federal Railroad Administration
1120 Vermont Avenue, Mail Stop 25
Washington, DC 20590

Attn. Locomotive Horns FEIS

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5.2 LIST OF PERSONS, ELECTED OFFICIALS, PUBLIC AGENCIES AND ORGANIZATIONS WHO COMMENTED ON THE DEIS AND HAVE BEEN NOTIFIED OF THE AVAILABILITY OF FEIS[1]

Federal Agencies:

U.S. Environmental Protection Agency

Members of the United State Congress:

The Honorable Marty Meehan, 5th District - Massachusetts
The Honorable Judy Biggert, Congresswoman 13th District – Illinois
The Honorable Philip Crane, Congressman – 8th District – Illinois
The Honorable Gil Gutknect, Congressman – 1st District - Minnesota
The Honorable Dennis Kucinich, Congressman – 10th District - Ohio
The Honorable William Lipinski, Congressman – 3rd District - Illinois
The Honorable Steven LaTourette, Congressman – 14th District - Ohio
The Honorable John Tierney, Congressman – 6th District - Massachusetts
The Honorable Greg Walden, Congressman – 2nd District - Oregon
The Honorable Janice Schakowsky, Congresswoman – 9th District - Illinois
The Honorable Mark Souder, Congressman – 3rd District - Indiana
The Honorable Henry Hyde, Congressman –11th District - Illinois
The Honorable Gordon Smith, Senator, U.S. Senate – Oregon
The Honorable Ron Wyden, Senator, U.S. Senate – Oregon

State and Local Elected Officials:

Name	Affiliation/Location
David Anderson	City of Willoughby, OH
Edward Athey	City of Cumberland, MD
Evelyn Baker	Michigan City, IN
Anne Marie Battistone	Board of Selectmen, Norfolk, MA
Stacy Bauerman	Village of Grayslake, IL
Susanna Bell	City of Park Ridge, IL
Arthur Berger	City of Aventura, FL
Joseph Biddlecomb	City of Berea, OH
Steven Bjerke	City of Pendleton, OR
Robert Bloomquist	City of Olmstead Falls, OH
Irwin Bock	Village of Hanover Park, IL
Carl Brommerich	City of Fountain City, WI
Robert Buetter	City of Mishawaka, IN
Edward Burke	City of Chicago, IL
Michael Cahill	Massachusetts House of Representatives

[1] Includes only commentors for whom complete address information was available.

Name	Affiliation/Location
Anthony Calderone	Village of Forest Park, IL
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Robert Castoro	Orange Heights, FL
Joe Caterini	City of Middleburg Heights, OH
John Cavalier	City of Miami Springs, FL
Thomas Coyne, Jr.	City of Brook Park, OH
Edward Dean	Olmstead Falls, OH
Carol Dooley	City of Mishawaka, IN
Kerry Durkin	Village of Glenwood, IL
Janet Edgley	City of Elmhurst, IL
Bob Ehmann	City of Pendleton, OR
Michael Einhorn	Village of Crete, IL
Dorothy Kelly Gay	City of Somerville, MA
Lawrence Gibbs	City of Gering, NE
James Gibfrey	Board of Selectmen, Norfolk, MA
Ronald Hamelberg	Village of Barrington, IL
Carol Hanson	City of Boca Raton, FL
Thomas Heinz	19th Ward, Chicago, IL
Patrick Hughes	Village Board of Trustees, Wilmette, IL
Jim Hunt	Village of Golf, IL
F. Hunter	Town of Acton, MA
Jean Johnson	City of Olmstead Falls, OH
Allan Kauffman	City of Goshen, IN
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Kenneth Meyer	Village President, Round Lake Village, IL
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David Neill	City of Hamilton, MA
Ursula Oktavec-Mixon	City of Olmstead Falls, OH
Mary Olson	City Council, Elkhart, IN
Attillio Paglia	Town of Rowley, MA
Kenneth Patton	City of Brooklyn, OH
Daniel Pierce	City of Highland Park, IL
Pamela Resor	Massachusetts Senate
Julio Robaina	City of Hialeah, FL

Name	Affiliation/Location
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Virginia Rugai	19th Ward, Chicago, IL
William Scanlon, Jr.	City of Beverly, MA
Cal Skinner	Illinois House of Representatives, Crystal Lake, IL
Doyle Slater	La Grande, OR
Rae Rupp Srch	Village of Villa Park, IL
Paul Stack	Village of Riverside, IL
Gary Starr	City of Middleburg Heights, OH
Erin Sullivan	City of Middleburg Heights, Oh
Arthur Snyder	City of Aventura, FL
Stephen Tasch	Village of Fox River Grove, IL
Nancy Tavernier	Town of Acton, MA
Steve Taylor	City of Pendleton, OR
Peter Torigian	City of Peabody, MA
Richard Turnak	City of Portage, IN
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Ron Wietecha	City of Park Ridge, IL
Paul Wilson	Olmstead County, MN

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Henry Booker	Town of Marion, VA
William Brimm	Village of Buffalo Grove, IL
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William Burke III	Board of Health, City of Beverly, MA
Gerald Clausen	City of Carroll, IA
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John Dalicandro	Village of Elmwood Park, IL
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Frank Mitchell	City of Lockport, IL
Peter Munoz	City of Madison, WI
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Steve Nenonen	City of Fond du Lac, WI
G. Newman	Town of Abingdon, VA
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Leon Porter	Village of Glenview, IL
John Pugh	Michigan City, IN
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Albert Rigoni	Village of Skokie, IL
Mark Schoeffmann	Village of Arlington Heights, IL
Charles Swanson, P.E.	Town of Winter Park, CO
Edwin Tabor	City of Pendleton, OR
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C. Vanderhoef	Office of the County Executive, County of Rockland, NY
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Other Local Governments/Agencies:

Name	Affiliation/Location
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Mark Damisch	Northwest Municipal Conference, Des Plaines, IL
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Regional Agencies:

Name	Affiliation/Location
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State Agencies:

Name	Affiliation/Location
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Citizen Groups/Homeowners Associations:

Name	Affiliation/Location
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Interest Groups/Organizations:

Name	Affiliation/Location
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Jeff Barry	Acton Citizens for Train Safety, Acton, MA
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Neil Chayet	H.O.R.N. Committee, Manchester-by-the-Sea, MA
Sue Geer	H.O.R.N. Committee, Manchester-by-the-Sea, MA
Lance LaDuke	Wisconsin Great River Road Committee; Mississippi Valley Partners, Fountain City, WI

Name	Affiliation/Location
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Railroads and Railroad Organizations:

Name	Affiliation/Location
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Businesses and Business Organizations:

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Jack Randorff, Ph.D., P.E.	Randorff and Associates, Inc., Ransom Canyon, TX
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Religious Organizations:

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Citizens:

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Lindsay Anderson	Park Ridge, IL
Sandra Anzelmo	Wadsworth, IL
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Gary and Gillian Benton	Prides Crossing, MA
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Lawrence Berman	Skokie, IL
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Laurie Bertram	Beverly, MA
William Bertucci	Chicago, IL
Rhonda Besander	Palatine, IL
D. Biank	Woodridge, IL
Alfred Bianucci	Oak Brook, IL
Raymond Biber	Pompano Beach, FL
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Elwood Braunum	Pilot Point, TX
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Michael Brown	Naperville, IL
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Melrose Cole	Prides Crossing, MA
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Jarvis Cribb	Beverly, MA
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Ronald Daley	Beverly, MA
Frances Dalton	Newburyport, MA
Susan Dalton	Prides Crossing, MA
Lester Daraga	Lisle, IL
George and Della Davis	Newbury, MA
Richard Davis	Beverly, MA
Anthony J. and M. Patricia DeRosa	Pompano Beach, FL
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Peter Dombrowski	Mount Prospect, IL
Mary Donahue	Chicago, IL
Rhonda Donovan	Beverly, MA
Jacek and Cheryl Doros	Grayslake, IL
Carol Dougherty	Boca Raton, FL
Virginia Drieze	Beverly, MA
Wendy Drinkwater	Beverly Farms, MA
Ann Driscall	Beverly, MA
George Drost	Arlington Heights, IL
Susan Duchek	Arlington Heights, IL
Melanie Dukas	Beverly, MA
W. Duke	Peoria, IL
Rob and Peggy Dunleavy	Chicago, IL
Beth Eddleman	Arlington Heights, IL
Heather and William Edens	Tucker, GA
Mike Eichten	Chicago, IL
Charles Eldredge	Richmond, IL
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Katherine Gallagher	Beverly, MA
Ronald Gallagher	Hollywood, FL
Diane and Frank Galli	Blauvelt, NY
Frank Gaudenzi	Beverly, MA
Joyce Gillis	Pompano Beach, FL
Dave Giuffre	Lombard, IL
Barry Glasgal	Strongville, OH
John Glazbrook	Rolling Meadows, IL
Stuart Gohd	Missouri City, TX
Philip Goldberg	Beverly, MA
Donna Gosey	Goshen, IN
Joan Graff	Hollywood, FL
Diane Griffin	Hinsdale, IL
John Griggs	Mount Prospect, IL
Paul Guanci	Beverly, MA
John Guilfoil	Palatine, IL
Robert Guttuaw	Gloucester, MA
Ronald Haaker	Arlington Heights, IL
Joann Hand	Beverly, MA
John and Joyce Hanselman	Acton, MA
Jacquelyn Harris	Ipswich, MA
Robert Harris	Riverside, IL
Michael Hartigan, P.E.	Oak Brook, IL
Lynda Hartwig	Park Ridge, IL
Richard Hartwig	Park Ridge, IL
S. Hausen	Barrington, IL
Joel Havian	Beverly, MA
Dorothy Hayes	Beverly, MA

Name	Location
Eric Hayes	Beverly, MA
Blaine Hebbel	Ipswich, MA
Karen Heckmann	Des Plaines, IL
Jackie Hesser	Park Ridge, IL
Paul Hester	Arlington Heights, IL
Donna Copeland Hill	Naperville, IL
Bert Hodges	Ipswich, MA
M. Holec	Mount Prospect, IL
Nancy Holik	Westmont, IL
Mena Holmes	Prides Crossing, MA
David Hood	Palo Alto, CA
Sarah Hopper	Mishawaka, IN
Gretchen Horsch	Lombard, IL
Catherine Howe	Ipswich, MA
Eleanor Howell	Beverly Farms, MA
Robert Howell	Beverly, MA
Joseph Howicz	Park Ridge, IL
Edward Huff	Newbury, MA
Maureen Hunt	La Grange, IL
Robert Hunt	Beverly, MA
David and Barbara Hurr	Geneva, IL
Gordon Iversen	Barrington, IL
Roger Jacobson	West Palm Beach, FL
Robert Janek	Naperville, IL
Denis Jaros	Chicago, IL
Ruth Jedrey	Beverly Farms, MA
Wayne and Meredith Jennings	Newbury, MA
Richard Johnson	Arlington Heights, IL
Virginia Jones	Beverly, MA
Vydas Juskelis	Villa Park, IL
Marjorie Kamora	Palatine, IL
Loren Kaszubowski	Des Plaines, IL
Jaimie Kay	Wheaton, IL
Gerard Kaye	Wilmette, IL
Susan Kayton	Menlo Park, CA
Bob Keefe	Woodridge, IL
Sheila Kellogg	Prides Crossing, MA
Eileen Kelly	Chicago, IL
Robert Kelly	Pendleton, OR
Kevin Kendig	Arlington Heights, IL
Elizabeth Kercher	Beverly, MA
Anthony Khawaja	Libertyville, IL
Harry King	Buffalo Grove, IL
Cathy Knight	Grayslake, IL

Name	Location
Edward Knowles	Barrington, IL
Ken Kochmit	Park Ridge, IL
Lynne Koenigsberg	Fort Lauderdale, FL
Gaston Kohn	Prides Crossing, MA
Joanne Kohn	Prides Crossing, MA
Marilyn Kohn	Palatine, IL
Steve Kolar	Park Ridge, IL
Lynn Kopon	Park Ridge, IL
Marianne Kountoures	Evanston, IL
Julius Krajewski	Boca Raton, FL
Walter and Marilyn Kramer	Niles, IL
Brenda Kreplick	Beverly, MA
Gregory and Suzanne Kress	Newbury, MA
Mildred Kriz	Chicago, IL
Paul Kroushl	Aurora, IL
Patricia Kukla	Park Ridge, IL
Ken Kutska	Wheaton, IL
Robert Labrie	Pompano Beach, FL
Janet LaDuke	Fountain City, WI
Elizabeth Lahey	Westmont, IL
Robert Lahey	Westmont, IL
Andrea Lamac	Boca Raton, FL
Patricia Langvis	La Grange, IL
Diane Lapkin	Beverly, MA
Milton Lapkin	Beverly, MA
John Laplante, P.E., P.T.O.E.	Chicago, IL
Dean Larson	Libertyville, IL
John Larson	Beverly, MA
Paul LaVasseur	Prides Crossing, MA
David Lee	Chicago, IL
Claude Lemoi	Beverly, MA
Anne Lewis	Beverly, MA
Cheri Lewis	Elgin, IL
Thomas Linke	Chicago, IL
Bill Littell	Downers Grove, IL
Louis Litterello	Hollywood, FL
Robert Lockwood	Beverly Farms. MA
Elizabeth Loomis	Beverly, MA
David Loring	Newbury, MA
Elisabeth Loring	Beverly, MA
Elizabeth Loring	Prides Crossing, MA
Jan Loring	Newbury, MA
Peter Loring	Prides Crossing, MA
William Loring	Prides Crossing, MA

Name	Location
V. Loven	Chicago, IL
Paulette Lucas	Brook Park, OH
John Lukas	Stickney, IL
Van Metre Lund	Evanston, IL
Jamy Lyne	Naperville, IL
Tim Mack	Chicago, IL
Fred MacKenzie	South Hamilton, MA
Barbara Mackey	Lisle, IL
James MacMillan	Beverly Farms, MA
Donald MacQuarrie	Beverly, MA
John Madell	Western Springs, IL
H. Maffei	Gloucester, MA
Harry Magrane	Mishawaka, IN
Thomas Malhal	Blauvelt, NY
Jim and Jamie Manahan	Chicago, IL
Florence Marcucci	Brookfield, IL
Gary Marcucci	Brookfield, IL
Madeline Marone	Berea, OH
A. Martin	Beverly, MA
David Martin	Beverly, MA
Michael and Lisa Marucci	Blauvelt, NY
Renee Mary	Prides Crossing, MA
Joseph Maurer	Wheaton, IL
Loyal Mayers	Haltom City, TX
Bob McAndrew	Chicago, IL
Ted and Penny McDermott	Palatine, IL
Kevin and Karen McDonald	Blauvelt, NY
Faye McDow	Gilberts, IL
Virginia McGinness	Beverly, MA
Timothy McInnis	Beverly Farms, MA
John M. and Katherine E. McKenzie	Riverside, IL
Robert McKnight	Rochester, NY
Charles McLean	Chicago, IL
John McTighe	Ipswich, MA
Silvia Meels	Lake Forest, IL
Carolyn Merrifield	Park Ridge, IL
Wendy Mertes	Arlington Heights, IL
R. and L. Metayer	Pompano Beach, FL
Barbara Milling	Park Ridge, IL
Edith Minick	Boca Raton, FL
Susan Minott	Palatine, IL
Carrie Monahan	Beverly, MA
Dan Montanaro	Hamilton, MA
Dixianna Monteabaro	Pompano Beach, FL

Name	Location
Barbara Moore	Northfield, IL
Martha Moore	Gloucester, MA
William Moore	Northfield, IL
F. Paul and Jean C. Mooring	Glen Ellyn, IL
John Moran	Beverly, MA
Warren Mulherin	Hallandale, FL
Kenneth Murray	Newbury, MA
Martha Murray	Newbury, MA
John and Meg Myalls	Park Ridge, IL
David Napalo	Wilmette, IL
Raymond Nelson, M.D.	Plains, MT
Wilhelm and Magdalena Neumann	Park Ridge, IL
John Newberry	Beverly, MA
Ramona Nitzschke	Skokie, IL
Kristin Oestmann	Arlington Heights, IL
Kathy Olinger	Palatine, IL
Rodney Oppriecht	Fountain City, WI
Gary Ossenwande	Chicago, IL
Jennifer Otis	Prides Crossing, MA
Michael Otis	Prides Crossing, MA
Linda Overberg	Beverly, MA
Anna Ozols	Beverly, MA
Steven Pandolfelli	Blauvelt, NY
Nick and Anita Pandolfi	Brookville, NY
Nancy Pankin	Schaumburg, IL
Maria Pappas	Beverly, MA
Jesse Pariso	Skillman, NJ
Kelly Parker	Hamilton, MA
Clive Patience	Beverly, MA
Bradley Patten	Lisle, IL
Robert Paul	Brookfield, IL
Rose Peebles	Brook Park, OH
Louis Perna	Libertyville, IL
Godrey Perrott	Beverly, MA
Kathleen Petrouske	Pompano Beach, FL
Jean Pettiford	Des Plaines, IL
Bruce and Anne Philbrick	Beverly, MA
Lorraine Phillips	Brook Park, OH
Carol Piccone	Pompano Beach, FL
June Pimpo	Antioch, IL
Lee Plate	Palatine, IL
Joseph Platnick	Miami, FL
John Pohl	Anchorage, KY
Burton Power	Prides Crossing, MA

Name	Location
Andrew Pozdol	Arlington Heights, IL
Ellen Quigley	Beverly, MA
Donald Quill	Newbury, MA
Neal and Jill Radke	Cudahy, WI
Marguerite Rambert	Newbury, MA
G. Randall	Wilmette, IL
Kathy Redding	Naperville, IL
Vincent Reynolds	Beverly, MA
Thomas and Suzanne C. Richardson	Beverly Farms, MA
Jenny Riley	Park Ridge, IL
Jim and Jeri Robb	Arlington Heights, IL
G. Roberson, Jr.	Wilmette, IL
Paul Roberts	Beverly, MA
F. Robinson	Prides Crossing, MA
Laura Rodgers	Wilton Manors, FL
Sharon Romack	Arlington Heights, IL
David Ross	Newbury, MA
John Roy	Beverly, MA
Patrick Ryan	Beverly, MA
Deb Safford	Hamilton, MA
Carolyn Saladino	Park Ridge, IL
Philip Sampson	Beverly, MA
Gail Sandolf	Newbury, MA
Bob Sanok	Mount Prospect, IL
Stephen Santarelli de Brash	South Hamilton, MA
M. Scannell	Evergreen Park, IL
Glenn Schirmer	Arlington Heights, IL
Stephen Schlickman	Wilmette, IL
Russell Schmerl, Jr.	Wauconda, IL
William Schneider	Park Ridge, IL
Lane Schnotala	Chicago, IL
Mike Schulefield	Oak Park, IL
Ernest Schumann	Arlington Heights, IL
Steve Scott	Riverside, CA
Betty Seagrave	Beverly Farms, MA
Stella-Mae Seamans	Beverly, MA
John and Fay Senner	Acton, MA
Peter Sexton	Lake Bluff, IL
Bonnie Shay	Highland Park, IL
Dan Shea	Fox River Grove, IL
Harvey Sheldon	Chicago, IL
Christine Sherill	Beverly Farms, MA
Madelyn Sheilds	Beverly Farms, MA
Charles Shultz	Mihead, MA

Name	Location
Ken Siegel	Grayslake, IL
Randi Simmons	Ipswich, MA
Robert Simpson	Mount Tabor, NJ
Mark Siwek	Park Ridge, IL
C. Smallhorn	Beverly, MA
Charles Smith	Decatur, IL
Rita Smith	Mount Prospect, IL
Amy Snow	Beverly, MA
Erica Solodkin	Hollywood, FL
Frank Soprano	Arlington Heights, IL
Kristine Stabler	Palatine, IL
Amy Stattman	Arlington Heights, IL
Barbara Staubly	Hollywood, FL
Barbara Stefani	Elk Grove Village, IL
Joseph Sterba, Jr.	Berwyn, IL
Rich Stoltis	Brook Park, OH
Margaret Storer	Beverly Farms, MA
Nacy Strait	Brookfield, IL
Peggy Stretch	Menlo Park, CA
Phil Sullivan	Beverly Farms, MA
Jane Summers	Prides Crossing, MA
Bonnie Sunde	Prospect Heights, IL
Warren Sunde	Prospect Heights, IL
Laurelle Swanberg	Brookfield, IL
Brette Swanson	Hamilton, MA
Kirk Swanson	Hamilton, MA
Megan Swanson	Chicago, IL
Melissa Swanson	River Forest, IL
Michael Swiental	South Bend, IN
Lorey Tam	South Hamilton, MA
Ann Tappan	Beverly, MA
Ben Taylor	Hammond, LA
Jack Thomason	Olmstead Falls, OH
George Thomson	Blauvelt, NY
Samuel Thorne	Manchester, MA
Thomas Toddy	Berea, OH
Adrienne Trattner	Western Springs, IL
Joseph Trebat	Mount Prospect, IL
James Trizna	Joliet, IL
Deborah Twining	South Hamilton, MA
Suzanne Tyler	Sacramento, CA
Richard and Mary Hunter Utt	Acton, MA
Lisa Vais	Riverside, CA
Katie Vande Water	Beverly, MA

Name	Location
Michael Van Ripen	Salem, MA
Samuel Vaughan	Prides Crossing, MA
M. Vaughn	Houston, TX
William Velasquez	Blauvelt, NY
Guy Vorsanger	La Grange, IL
Tracy Vrenios	Rolling Meadows, IL
Ann Walsh	Wilmette, IL
George Waring	Chicago, IL
Fern Watts	Riverside, CA
Scott Whisler	Arlington Heights, IL
Janet Whitson	Beverly, MA
Bob Wickencamp	Ingleside, IL
Lois Wiley	North Palm Beach, FL
Ed Wilson	Glen Ellyn, IL
Rick Wilson	Des Plaines, IL
Susan Wise	Beverly Farms, MA
J. Witt	Wilmette, IL
Mildred Woitavich	Berwyn, IL
Janice Wolfensperger	Chicago, IL
Charles Wood	Pendleton, OR
John Wunlay	Blauvelt, NY
Lois Yukins	Manchester, MA
Gloria Zalkoruiski	Holland, IL
George Zelcs	Barrington, IL
Michael and Mary Zeugian	Newbury, MA
Terese Zingg	Gloucester, MA
Wayne and Arlene Zingsheim	Park Ridge, IL

APPENDIX A

GLOSSARY

A-weighting: A method used to alter the sensitivity of a sound level meter with respect to frequency so that the instrument is less sensitive at frequencies where the human ear is less sensitive. Sound levels (decibels) measured using this method are written as dBA.

"Absolute" noise impact: Newly introduced noise may interfere with community activities, independent of existing noise levels; e.g., it may be too loud to converse or sleep. This effect is called "absolute" noise impact because it is expressed as a fixed level not to be exceeded and is independent of existing noise levels. This factor enters into the assessment of a noise impact.

Active warning devices: Traffic control devices that give positive notice to highway users of the approach or presence of a train. These devices may include a flashing red light signal (a device that, when activated, displays red lights flashing alternately), a bell (a device which, when activated, provides an audible warning, usually used with a flashing red light signal), automatic gates (a mechanism added to flashing red light signals to provide an arm that can lower across the lanes of the roadway), or a cantilever (a structure equipped with flashing red light signals and extending over one or more lanes of traffic).

Administrator: The Administrator of the Federal Railroad Administration or the Administrator's delegate.

Adverse environmental impact: A negative effect, resulting from the implementation of a proposed action, that serves to degrade or diminish an aspect of human or natural resources.

Ambient: The pre-project background noise or vibration level.

Alternative safety measure or ASM: A safety system or procedure, other than a supplementary safety measure, established in accordance with the final rule that is provided by the appropriate traffic control authority or law enforcement authority and which, after individual review and analysis by the Associate Administrator, is determined to be an effective substitute for the locomotive horn in the prevention of highway-rail casualties at specific highway-rail grade crossings. Appendix B of the final rule lists such measures.

Associate Administrator: The Associate Administrator for Safety of the Federal Railroad Administration or the Associate Administrator's delegate.

Block group: A small population area that the U.S. Census Bureau uses to measure and record demographic characteristics. The population of a block group typically ranges from 600 to 3,000 persons and is defined to reflect homogeneous living conditions, economic status, and population characteristics. Block group boundaries follow visible and identifiable features, such as roads, canals, railroads, and aboveground high-tension power lines.

Centralized traffic control system: A signal system that allows for the movement of trains in either direction on designated tracks at the maximum authorized speed, in accordance with wayside or cab signals or both.

Census tract: Small, relatively permanent statistical subdivision of a county containing between 2,500 and 8,000 persons. The U.S. Census Bureau designs census tracts to reflect homogeneous living conditions, economic status, and population characteristics.

Channelization device: One of a continuous series of highly visible obstacles placed between opposing highway lanes designed to alert or guide traffic around an obstacle or to direct traffic in a particular direction. Design specifications are determined by the standard MUTCD-compliant traffic design specifications used by the governmental entity installing the channelization device.

Chimes: The individual horns in a cluster of horns, each sounding a distinct frequency.

Constant warning time: A train detection system with the capability of measuring train speed and providing a relatively uniform warning time by warning signal devices to highway traffic at highway-rail grade crossings.

Council on Environmental Quality (CEQ): Federal agency responsible for developing regulations and guidance for agencies implementing the National Environmental Policy Act.

Crossing Corridor Risk Index: A number reflecting a measure of risk, calculated in accordance with the procedures in the final rule, representing (a) the summation of both the number of predicted collisions per year at every public grade crossing within a corridor of crossings and the predicted likelihood and severity of casualties resulting from those collisions (b) divided by the number of public crossings in such corridor.

Cumulative effects: Effects resulting from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (Federal or non-Federal) or person undertakes such actions, as described in 40 CFR 1508.7. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Decibel (dB): A unit of noise measured on a logarithmic scale that compresses the range of sound pressures audible to the human ear over a range from 0 to 140, where 0 decibels represents sound pressure corresponding to the threshold of human hearing, and 120 decibels corresponds to a sound pressure at which pain occurs. Noise analysts measure sound pressure levels that people hear in decibels, much like other analysts measure linear distances in yards or meters. A-weighted decibel (dBA) refers to A-weighting that accounts for the various frequency components in a way that corresponds to human hearing.

Diagnostic Team: A group of knowledgeable representatives of parties of interest in a highway-rail grade crossing, organized by the public authority responsible for that crossing, who, using crossing safety management principles, evaluate conditions at a grade crossing to make determinations or recommendations for the public authority concerning safety needs at that crossing.

Directivity: The variation in sound level around a source. The distribution of sound around a locomotive horn depends on the orientation of the individual horns in a cluster and the position of the cluster on the locomotive.

Effectiveness rate: A number between 0 and 1 that represents the reduction of the probability of a collision at a public highway-rail grade crossing as a result of the installation of a supplementary safety measure when compared to the same crossing equipped with conventional active warning systems of flashing lights and gates**.** Zero effectiveness means that the supplementary safety measure provides no reduction in the probability of a collision, while an effectiveness rating of 1 means that the supplementary safety measure is totally effective in reducing collisions. Measurements between 0 and 1 reflect the percentage by which the supplementary safety measure reduces the probability of a collision.

Engineer (railroad): Employee responsible for operating a railroad locomotive in accordance with train-handling practices, signal indications, operating rules, speed limits, and the technical requirements of the particular locomotive.

Environmental Impact Statement (EIS): A document required by the National Environmental Policy Act that Federal agencies must prepare for major projects or legislative proposals having the potential to significantly affect the environment. A tool for decision-making, it describes the positive and negative environmental effects of the undertaking and alternative actions and measures to reduce or eliminate potentially significant environmental impacts.

Environmental Justice (EJ): For purposes of this document, FRA defines environmental justice as the mission discussed in Executive Order (EO) 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (59 FR 7629, February 11, 1994). This EO directs Federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of their programs, policies, and activities on minority and low-income populations in the United States.

Executive Order (EO) 12898: Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," issued in February of 1994, directs Federal agencies to identify and address as appropriate "disproportionately high and adverse human health or environmental effects," including interrelated social and economic effects, of their programs, policies, and activities on minority populations and low-income populations in the United States.

Frequency spectrum: The distribution of sound frequency. The human hearing spectrum is generally expressed over a range from 20 to 20,000 Hertz, with maximum sensitivity between 1000 and 5000 Hertz. The horn system must emit considerable sound energy at frequencies in which the human hearing system is most sensitive to warn people.

FRA: The Federal Railroad Administration.

Geographic Information System (GIS): A computer system for storing, retrieving, manipulating, analyzing, and displaying geographic data. GIS combines mapping and databases.

Geometric spreading: When sound waves radiate in all directions from a source. The locomotive horn acts as a stationary point source, as opposed to the line source represented by the train. A stationary point source sends sound energy in all directions, thereby resulting in a spherical spreading of sound energy. Mathematically, this is a $1/R^2$ type of spreading where R is the radial distance traveled by the sound, similar to the so-called "inverse square law" in the radiation of light waves from a light bulb.

Grade crossing: See *highway-rail grade crossing.*

Grade Crossing Inventory Form: U.S. DOT National Highway-Rail Grade Crossing Inventory Form, FRA Form F6180.71. This form is available through FRA's Office of Safety, or on FRA's web site at www.fra.dot.gov.

Grade separation: See *separated grade crossing.*

Highway-rail grade crossing: The general area of an intersection of a public or private road and a railroad where the intersecting rail and highway traffic are at the same level.

Hispanic: Person of any race with Hispanic (or Latino) origin.

Historic property: Any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP). The term "eligible for inclusion in the NRHP" pertains to both properties that the Secretary of the Interior has formally determined to be eligible and to all other properties that meet NRHP listing criteria.

Horn noise: Noise that occurs when locomotives sound warning horns in the vicinity of highway-rail grade crossings.

Impact zone: A zone where the change in the noise level is expected to be noticeable to most people but may not be sufficient to cause strong, adverse reactions from the community.

Indian tribe: According to Indian Self-Determination and Education Assistance Act (25 USC 450-458; PL 93-638), any Indian tribe, band, nation, or other organized group or community recognized as eligible for the special programs and services that the United States provides to Indians because of their status as Indians.

Interlocking: An arrangement of switch, lock, and signal devices that is located where rail tracks cross, join, or separate. The devices are interconnected in such a way that their movements must succeed each other in a predetermined order, thereby preventing opposing or conflicting movements.

L_{dn}: The day-night average sound level, which is the receptor's cumulative noise exposure from all noise events over a full 24 hours. This is adjusted to account for the perception that noise at night is more bothersome than the same noise during the day.

$L_{eq(h)}$: The hourly (energy-averaged) equivalent sound level.

Locomotive: A piece of on-track equipment other than hi-rail, specialized maintenance, or other similar equipment (1) with one or more motors designed for moving other equipment; (2) with one or more propelling motors designed to carry freight or passenger traffic or both; or (3) without propelling motors but with one or more control stands.

Locomotive horn: A locomotive air horn, steam whistle, or similar audible warning device mounted on a locomotive or control cab car. The terms "locomotive horn," "train whistle," and "train horn" are used interchangeably in the railroad industry.

Low-income population: A population composed of persons whose median household income is below the U.S. Department of Health and Human Services poverty guidelines.

Maximum authorized speed: Maximum permitted speed for a specific train at a specific location, taking into account the track and signal conditions.

Maximum sound level: The highest exponential-time-average sound level, in decibels, that occurs during a stated time period. Also written as L_{max}.

Median: The portion of a divided highway separating the travel ways for traffic in opposite directions.

Minority individuals: Individuals classified by the U.S. Census Bureau as belonging to one or more of the following racial groups: Black, American Indian (Native American) or Alaskan Native, Hawaiian or Pacific Islander, and Asian.

Mitigation: An action taken to prevent, reduce, or eliminate adverse environmental effects.

MUTCD: The Manual on Traffic Control Devices published by the Federal Highway Administration.

National Environmental Policy Act (NEPA): The National Environmental Policy Act of 1969, as amended (42 USC 4321-4347; PL 91-190), is the basic national charter for the protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy. Its purpose is to provide for the establishment of a Council on Environmental Quality and to instruct Federal agencies on what they must do to comply with the procedures and achieve the goals of NEPA.

National Historic Preservation Act (NHPA): The National Historic Preservation Act of 1966, as amended (16 USC 470-470t *et seq.*; PL 89-665), is the basic legislation of the nation's historic preservation program that established the Advisory Council on Historic Preservation and the Section 106 review process. Section 106 of the NHPA requires every Federal agency to "take into account" the effects of its undertakings on historic properties.

National Register of Historic Places (NRHP): Administered by the National Park Service, the nation's master inventory of known historic properties, including buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the Federal, state, and local levels.

Nationwide Significant Risk Threshold (NSRT): A number reflecting a measure of risk, calculated on a nationwide basis, which reflects the average level of risk at public highway-rail grade crossings equipped with lights and gates and at which locomotive horns are sounded. For the purposes of the final rule, a risk level above the Nationwide Significant Risk Threshold represents a significant risk with respect to loss of life or serious personal injury. The Nationwide Significant Risk Threshold is calculated in accordance with the procedures in Appendix E of the final rule.

Native American: According to the Native American Graves Protection and Repatriation Act of 1990, as amended (25 USC 3001 *et seq.*; PL 101-601), of, or relating to, a tribe, people, or culture that is indigenous to the United States.

New Quiet Zone: Segment of a rail line within which is situated one or a number of consecutive public highway-rail crossings at which routine sounding of locomotive horns is restricted pursuant to the final rule and which does not qualify as a Pre-Rule Quiet Zone.

No-Action Alternative: Under this alternative, the Use of Locomotive Horns At Highway-Rail Grade Crossings Rule is not implemented and other legislative action is sought.

Noise: Any intruding or unwanted sound. Noise impacts essentially depend on the amount and nature of the intruding sound, the amount of background sound already present before the intruding or unwanted sound occurred, and the nature of the working or living activity of the people occupying the area where the sound occurs.

Noise contours: Lines plotted on a map or drawing connecting points of equal sound levels.

Noise-sensitive receptor: Location where noise can interrupt ongoing activities and can result in community annoyance, especially in residential areas. These areas may include schools, libraries, hospitals, residences, retirement communities, and nursing homes.

Noise model: A generalized noise model developed to apply to all grade crossings with current whistle bans listed in FRA's database. The model includes noise source levels based on measurements and previous studies, noise exposure calculations based on train speeds and the number of trains passing during day and night at each crossing, propagation of sound to nearby neighborhoods based on typical suburban terrain and building configurations, and estimates of community reaction based on EPA and FRA noise research. A computer program takes relevant data such as number of trains per day and night, speed, and number of tracks for grade crossings being modeled and generates noise impact areas at each location.

Non-traversable curb: A highway curb designed to discourage a motor vehicle from leaving the roadway. Design specifications are determined by the standard MUTCD compliant traffic design specifications used by the governmental entity installing the non-traversable curb.

Passive warning devices: Traffic control devices that do not give positive notice to highway users of the approach or presence of a train. These devices may include signs and pavement markings, located at, or in advance of, railroad crossings to indicate the presence of a crossing and the potential presence of a train. These signs are either regulatory or non-regulatory and may include crossbucks, stop signs, yield signs, and constantly flashing lights.

Positive train control territory: A line of railroad on which railroad operations are governed by a train control system capable of determining the position of the train in relation to a public highway-rail at-grade crossing and capable of computing the time of arrival of the train at the crossing, resulting in the automatic operation of the locomotive horn (or automatic prompting of the locomotive engineer) such that the horn is sounded at a predetermined time prior to the locomotive's arrival at the crossing.

Positive train separation: Mechanism included in positive train control. An experimental, automated safety system, using Global Positioning System (GPS) technology, onboard computers, and wayside information inputs to control train movement. In the event of failure of the primary safety system, positive train control reduces the risk of single-point failure (that is, human error).

Power out indicator: A device capable of indicating to trains approaching a grade crossing equipped with an active warning system whether commercial electric power is activating the warning system at that crossing. This term includes remote health monitoring of grade crossing warning systems if such monitoring system is equipped to indicate power status.

Pre-Rule Quiet Zone: Segment of a rail line within which is situated one or a number of consecutive public highway-rail crossings at which state statutes or local ordinances restricted the routine sounding of locomotive horns, or at which locomotive horns did not sound due to formal or informal agreements between the community and the railroad or railroads, and such ordinances or agreements were in place and enforced or observed as of both October 9, 1996 and January 13, 2000.

Private highway-rail grade crossing: A highway-rail at-grade crossing which is not a public highway-rail grade crossing.

Public authority: Public entity responsible for safety and maintenance of the roadway crossing the railroad tracks at a public highway-rail grade crossing. This term includes the traffic control authority or law enforcement authority, or the governmental jurisdiction having responsibility for motor vehicle safety at the crossing.

Public highway-rail grade crossing: A location where a public highway, road, or street, including associated sidewalks or pathways, crosses one or more railroad tracks at grade. In the event a public authority maintains the roadway on at least one side of the crossing, the crossing is considered a public crossing for purposes of the final rule.

Quiet zone: A segment of rail line within which is situated one or a number of consecutive public highway-rail crossings at which locomotive horns are not routinely sounded.

Quiet Zone Risk Index (QZRI): A measure of risk which reflects the Crossing Corridor Risk Index for a quiet zone, after adjustment to account for (1) increased risk due to lack of locomotive horn use at the crossings within the quiet zone (if horns are presently sounded at the crossings), and (2) reduced risk due to implementation, if any, of supplementary safety measures and alternative safety measures within the quiet zone. The Quiet Zone Risk Index is calculated in accordance with the procedures in Appendix D of the final rule.

Railroad: Any form of non-highway ground transportation that runs on rails or electromagnetic guideways and any entity providing such transportation, including (1) commuter or other short-haul railroad passenger service in a metropolitan or suburban area and commuter railroad service that was operated by the Consolidated Rail Corporation on January 1, 1979; and (2) high speed ground transportation systems that connect metropolitan areas, without regard to whether those systems use new technologies not associated with traditional railroads; but not including rapid transit operations in an urban area that are not connected to the general railroad system of transportation.

Rail line segment: Portion of rail line that extends between two terminals or junction points.

Rail spur: A railroad track that typically connects to the main line at only one end and provides rail service to one or more railroad freight customers. A rail spur also could parallel the main line.

Rail yard: A location or facility with multiple tracks where rail operators switch and store rail cars.

Receptor: See *noise-sensitive receptor*.

Reflected path: When sound energy that radiates in all directions from a horn “reflects” off the ground between source and receiver.

“Relative” noise impact: Evaluation of newly introduced noise effects “relative” to existing noise levels. “Relative” noise criteria are based upon noise increases above existing noise levels and are a basis for the assessment of noise impact.

Relevant collision: A collision at a highway-rail grade crossing between a train and a motor vehicle, excluding the following: a collision resulting from an activation failure of an active grade crossing warning system; a collision in which there is no driver in the motor vehicle; a collision where the highway vehicle strikes the side of the train beyond the fourth locomotive unit or rail car; and cases where pedestrians are struck.

Separated grade crossing: The place where a railroad intersects with a roadway or another railway at different elevations such that the railroad goes under or over the intersecting roadway or railway.

Severe impact zone: A zone where a significant percentage of people are likely to be highly annoyed by horn blowing.

Siding: A track parallel to a main track that is connected to the main track at each end. A siding is used for the passing and/or storage of trains.

Sound exposure level (SEL): For a transient noise event such as a passing train, equivalent to the maximum A-weighted sound level that would occur if all of the noise energy associated with the event were restricted to a time period of 1 second. The SEL accounts for the sound sweeping along a section of track near a grade crossing, the sound energy received at a single point as a train passes. The SEL accounts for both the magnitude and the duration of the noise event; noise analysts use SEL to calculate the day-night average noise level.

Sound level: FRA regulations mandate a minimum sound pressure level of 96 dBA at a distance of 100 feet (30.5m) in front of the locomotive, or leading car. Sounds from locomotive horns are intended to warn people at relatively large distances from the leading vehicle of a train so that they can take evasive action if in danger of being struck by the train. As a result, horn systems are very loud.

Sound path: The path by which sound passes through the air between a source and receiver. The path includes the direct line of sight from a locomotive horn to nearby buildings, but also several potential reflected and refracted paths over the ground, terrain features, vegetation, fences, walls, and buildings.

Supplementary safety measure or SSM: A safety system or procedure established in accordance with the final rule that is provided by the appropriate traffic control authority or law enforcement authority responsible for safety at the highway-rail grade crossing, and which is determined by the Administrator to be an effective substitute for the locomotive horn in the prevention of highway-rail casualties. Appendix A of the final rule lists such supplemental safety measures.

Switching: The activity of moving cars from one track to another in a yard or where tracks go into a railroad customer's facility.

Temporal train separation: The time separation of trains that share rail lines, in order to reduce the possibility of train collisions.

Time variation: Time variation affects the SEL in proportion to the time that the signal is on compared to the total time of the pattern. Locomotive horns are used as warning devices at grade crossings and are supposed to be sounded in a "long-long-short-long" sequence with the last "long" blast lasting until the leading equipment has traversed the grade crossing.

Traffic volume (highway): The number of highway vehicles that pass over a given point during a given period of time, often expressed on an annual, daily, hourly, or sub-hourly basis.

Traffic volume (rail): The total volume of rail traffic that passes over a given rail line segment, typically expressed in either trains per day or annual million gross tons.

Waiver: A temporary or permanent modification of some or all of the requirements of the final rule as they apply to a specific party under a specific set of facts. Waiver does not refer to the process of establishing quiet zones or approval of quiet zones in accordance with the provisions of the rule.

Wayside horn: A stationary horn located at a highway rail grade crossing and designed to provide, upon the approach of a locomotive or train, audible warning to oncoming motorists of the approach of a train.

Whistle board: A post or sign directed toward oncoming trains and bearing the letter “W” or equivalent symbol, erected at a distance from the next public highway-rail grade crossing, which indicates to the locomotive engineer that the locomotive horn should be sounded beginning at that point.

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APPENDIX B

49 USC 20153

§ 20153. Audible warnings at highway-rail grade crossings

(a) DEFINITIONS.—As used in this section—

(1) the term "highway-rail grade crossing" includes any street or highway crossing over a line of railroad at grade;

(2) the term "locomotive horn" refers to a train-borne audible warning device meeting standards specified by the Secretary of Transportation; and

(3) the term "supplementary safety measure" refers to a safety system or procedure, provided by the appropriate traffic control authority or law enforcement authority responsible for safety at the highway-rail grade crossing, that is determined by the Secretary to be an effective substitute for the locomotive horn in the prevention of highway-rail casualties. A traffic control arrangement that prevents careless movement over the crossing (e.g., as where adequate median barriers prevent movement around crossing gates extending over the full width of the lanes in the particular direction of travel), and that conforms to standards prescribed by the Secretary under this subsection, shall be deemed to constitute a supplementary safety measure. The following do not, individually or in combination, constitute supplementary safety measures within the meaning of this subsection: standard traffic control devices or arrangements such as reflectorized crossbucks, stop signs, flashing lights, flashing lights with gates that do not completely block travel over the line of railroad, or traffic signals.

(b) REQUIREMENT.—The Secretary of Transportation shall prescribe regulations requiring that a locomotive horn shall be sounded while each train is approaching and entering upon each public highway-rail grade crossing.

(c) EXCEPTION.—(1) In issuing such regulations, the Secretary may except from the requirement to sound the locomotive horn any categories of rail operations or categories of highway-rail grade crossings (by train speed or other factors specified by regulation)—

(A) that the Secretary determines not to present a significant risk with respect to loss of life or serious personal injury;

(B) for which use of the locomotive horn as a warning measure is impractical; or

(C) for which, in the judgment of the Secretary, supplementary safety measures fully compensate for the absence of the warning provided by the locomotive horn.

(2) In order to provide for safety and the quiet of communities affected by train operations, the Secretary may specify in such regulations that any supplementary safety measures must be applied to all highway-rail grade crossings within a specified distance along the railroad in order to be excepted from the requirement of this section.

(d) APPLICATION FOR WAIVER OR EXEMPTION.—Notwithstanding any other provision of this subchapter, the Secretary may not entertain an application for waiver or exemption of the regulations issued under this section unless such application shall have been submitted jointly by the railroad carrier owning, or controlling operations over, the crossing and by the appropriate traffic control authority or law enforcement authority. The Secretary shall not grant any such application unless, in the judgment of the Secretary, the application demonstrates that the safety of highway users will not be diminished.

(e) DEVELOPMENT OF SUPPLEMENTARY SAFETY MEASURES.—(1) In order to promote the quiet of communities affected by rail operations and the development of innovative safety measures at highway-rail grade crossings, the Secretary may, in connection with demonstration of proposed new supplementary safety measures, order railroad carriers operating over one or more crossings to cease temporarily the sounding of locomotive horns at such crossings. Any such measures shall have been subject to testing and evaluation and deemed necessary by the Secretary prior to actual use in lieu of the locomotive horn.

(2) The Secretary may include in regulations issued under this subsection special procedures for approval of new supplementary safety measures meeting the requirements of subsection (c)(1) of this section following successful demonstration of those measures.

(f) SPECIFIC RULES.—The Secretary may, by regulation, provide that the following crossings over railroad lines shall be subject, in whole or in part, to the regulations required under this section:

(1) Private highway-rail grade crossings.

(2) Pedestrian crossings.

(3) Crossings utilized primarily by nonmotorized vehicles and other special vehicles.

Regulations issued under this subsection shall not apply to any location where persons are not authorized to cross the railroad.

(g) ISSUANCE.—The Secretary shall issue regulations required by this section pertaining to categories of highway-rail grade crossings that in the judgment of the Secretary pose the greatest safety hazard to rail and highway users not later than 24 months following November 2, 1994. The Secretary shall issue regulations pertaining to any other categories of crossings not later than 48 months following November 2, 1994.

(h) IMPACT OF REGULATIONS.—The Secretary shall include in regulations prescribed under this section a concise statement of the impact of such regulations with respect to the operation of section 20106 of this title (national uniformity of regulation).

(i) REGULATIONS.—In issuing regulations under this section, the Secretary—

(1) shall take into account the interest of communities that—

(A) have in effect restrictions on the sounding of a locomotive horn at highway-rail grade crossings; or

(B) have not been subject to the routine (as defined by the Secretary) sounding of a locomotive horn at highway-rail grade crossings;

(2) shall work in partnership with affected communities to provide technical assistance and shall provide a reasonable amount of time for local communities to install supplementary safety measures, taking into account local safety initiatives (such as public awareness initiatives and highway-rail grade crossing traffic law enforcement programs) subject to such terms and conditions as the Secretary deems necessary, to protect public safety; and

(3) may waive (in whole or in part) any requirement of this section (other than a requirement of this subsection or subsection (j)) that the Secretary determines is not likely to contribute significantly to public safety.

(j) EFFECTIVE DATE OF REGULATIONS.—Any regulations under this section shall not take effect before the 365th day following the date of publication of the final rule.

APPENDIX C

COMMENTS ON THE DRAFT EIS

Approximately 950 individuals and organizations commented on the DEIS, making almost 1,900 written and approximately 1,000 oral comments. FRA reviewed these comments and considered them in developing the interim final rule and revising the analyses in the FEIS.

Although FRA received comments on a wide range of topics related to implementation of the locomotive horn rule, the issues cited most often were: (1) the adverse health effects from increased noise levels, (2) community requests for whistle bans, (3) sleep disruption or disturbance, (4) the negative effects on a community's quality of life, and (5) the adverse effects to residents living near crossings. Several comments also questioned the effects of the rule on property values, the need for sounding horns at all, and the likely effectiveness of the rule in improving grade crossing safety. Geographically, comments were received from most of the States evaluated in the DEIS, but the greatest number of comments were from Illinois, Massachusetts, Florida, Ohio, and Indiana. Cities with the most comments included Chicago and Park Ridge, Illinois, and Beverly, Newberry, and Action, Massachusetts.

A summary of the comments received on the DEIS and FRA's responses are provided in the following table.

CATEGORY SUB-CATEGORY	NO. OF COMMENTS	COMMENT SUMMARY	FRA RESPONSE
Alternatives Evaluated in the DEIS			
Implementation Flexibility	6	Allow local whistle bans to remain in place if safety measures have been put in place.	Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT), below twice the NSRT with no relevant collisions, or if the Quiet Zone Risk Index is sufficiently reduced through the use of supplementary safety measures or alternative safety measures.
Implementation Flexibility	23	Provide additional time for jurisdictions to comply with proposed rule or to install other safety measures.	The interim final rule provides a minimum of three years for Pre-Rule Quiet Zones to come into compliance with the rule. If an approved implementation plan is provided before the end of the 3 years, the community will be given a total of 5 years to complete implementation of the safety measures. If the State is involved in the process, an additional 3 years are available to complete implementation of the safety measures. Under those circumstances, a total of 8 years can be provided communities for compliance after publication of the interim final rule.
Implementation Flexibility	24	Allow greater flexibility and local control in implementing safety measures and waiver criteria outlined in the proposed rule.	The interim final rule provides additional flexibility for the implementation of safety measures and allows communities to establish quiet zones if they meet either of two risk threshold goals: the Nationwide Significant Risk Threshold or reduction of existing risk equal to the effectiveness of the train horn [varies for pre-rule quiet zones depending upon warning device]. This provides communities flexibility in complying with the provisions of the rule. The waiver criteria are defined in 49 CFR 222.15. Additional flexibility is provided by FRA since it allows single parties to make waiver requests.

Implementation Flexibility	6	It will not be possible to implement safety measures proposed in the rule because of land use density and/or the number of crossings in our community.	The interim final rule provides a wide variety of supplementary safety measures and alternative safety measures (ASMs) that a community may use to create a quiet zone. ASMs provide a non-engineering means to reduce risk in order to create a quiet zone. If a corridor approach is used, the rule does not require that each crossing be treated separately from the others in that corridor.
Implementation Flexibility	40	The proposed rule is a "one-size-fits-all" solution that cannot be applied equally to all jurisdictions. States and/or local jurisdictions should have the responsibility to determine what are the best solutions to problems in their areas.	The interim final rule provides a wide variety of supplementary safety measures and alternative safety measures that a community may use to create a quiet zone. Local jurisdictions thus have the ability to tailor risk reduction to problems in the particular community. By reducing the risk that exists in its quiet zone corridor, the community is addressing the risk that pertains to its unique situation. The rule provides options so that the community itself determines the manner by which risk is reduced. Communities are not held to one standard.
Exemption	4	Limit duration of horn whistles or exempt crossings with low accidents rates or improved warning devices.	The interim final rule will limit the sounding of train horns to 15 to 20 seconds before the train's arrival at the crossings for distances no greater than ¼ mile from the crossing. This time-based method will reduce the duration of the horn for the typical crossing where the train speed is less than 45 mph. Communities with low collision rates or improved warning devices are more likely to be below the Nationwide Significant Risk Threshold since fewer collisions and improved warning devices cause the Accident Prediction Formula to be lower than similar crossings with higher collision rates or passive warning devices.

Exemption	7	The proposed rule should provide an exemption if a community has a record of enhanced enforcement or an accident rate below a specified threshold.	Pre-rule quiet zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT), an indicator of effective enhanced enforcement, or below twice the NSRT with no relevant collisions, which indicates a low accident rate.
Exemption	3	Our community should be exempted from requirements of proposed rule and additional guidelines for waivers should be incorporated into the rule.	Noted. The interim final rule provides additional flexibility for the implementation of safety measures and allows communities to establish quiet zones if they meet either of two risk threshold goals: the Nationwide Significant Risk Threshold or reduction of existing risk equal to the effectiveness of the train horn [varies for pre-rule quiet zones depending upon warning device]. This provides communities flexibility in complying with the provisions of the rule.
Exemption	5	FRA should grant Illinois a waiver or exemption from the proposed rule's requirements.	Illinois's Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT) or below twice the NSRT with no relevant collisions. Since data analysis shows that the increase in collision rate for gated whistle ban communities in Illinois is less than what is experienced across the nation, the effectiveness of the train horn in preventing collisions is reduced for Illinois communities in the greater Chicago area. This reduction will make it easier for communities to meet the needed risk threshold in order to maintain a quiet zone.
Exemption	1	The process for requesting exemption should be simplified with a greater emphasis on local authority.	Communities with Pre-Rule Quiet Zones will be notified by FRA of their existing corridor risk. If the risk level is below the Nationwide Significant Risk Threshold (NSRT), or less than twice the NSRT with no relevant collisions, those communities will have simple notification procedures to follow in order to maintain the quiet zones. FRA is providing a web-based quiet zone calculator to assist with, and simplify, the application process.

Local Variations	32	Local constraints prevent implementation of alternative safety measures, such as four-quadrant gates and median barriers.	The rule provides that when local constraints prevent full implementation of supplementary safety measures (SSMs) such as four-quadrant gates or median barriers, modifications of such SSMs may be submitted to FRA for consideration under Appendix B. For example, this would allow a community to submit a proposal to use medians shorter than stated in the rule due to local conditions. The rule also provides that communities may use non-engineering alternative safety measures to reduce risk. Four-quadrant gates are now standard MUTCD devices.
Local Variations	4	Relaxed whistle requirements should be considered in areas where crossings or stations are closely spaced.	Noted, however effective warning must be provided at each crossing.
Local Variations	14	States and/or local jurisdictions should have responsibility to determine best solutions in their areas. Their past efforts have been effective in reducing accidents.	The interim final rule provides a wide variety of supplementary safety measures and alternative safety measures that a community may use to implement a quiet zone best suited to its circumstances. Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT) or below twice the NSRT with no relevant collisions, both of which are indicative of effective accident reduction efforts.
Local Variations	6	The Chicago area and northeastern Illinois have low accident rates despite having the highest concentration of grade crossings in the nation as well as a number of whistle bans in place.	The absolute level of risk at Illinois crossings is generally high, due to traffic volumes, train speeds and the high number of trains. Data analysis shows that the increase in collision rate for gated whistle ban communities in Illinois is less than that experienced elsewhere. The effectiveness of train horns in preventing collisions is reduced for communities in the greater Chicago area. This reduction will make it easier for communities to meet the required risk threshold in order to maintain a quiet zone. Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT) or below twice the NSRT with no relevant collisions.

Local Variations	4	Any regulations governing grade crossings or quiet zones should be consistent and applied to all crossings across the nation.	The interim final rule will provide consistent treatment of crossings and quiet zones across the nation, while permitting localities to tailor their quiet zones to local needs.
Demonstration Testing	5	The rule should require demonstration of safety deficiencies and testing of other safety measures before requiring use of locomotive horns.	Noted. The rule is being developed to reduce the number of people killed or injured under present circumstances. If the rule is delayed in its issuance, grade crossing safety will be delayed and lives will be lost. Therefore, the FRA has determined that the rule should be pursued with all deliberate speed.
Demonstration Testing	6	Implement demonstration program of alternative safety measures in our community.	Noted. The rule is being developed to reduce the number of people killed or injured under present circumstances. If the rule is delayed in its issuance, grade crossing safety will be delayed and lives will be lost. Therefore, the FRA has determined that the rule should be pursued with all deliberate speed.
Community Impacts			
Local Impacts	22	Locomotive horns would have adverse impacts on the community (e.g., residents, parks, hospitals, historic districts)	FRA recognizes that there may be adverse noise impacts from the sounding of locomotive horns where they are not currently sounded. However, given (1) the increased flexibility that communities will have to implement safety measures relative to the Notice of Proposed Rulemaking (NPRM), (2) the lengthened compliance schedule for establishing quiet zones, relative to the NPRM, and (3) the low-risk based exceptions contained in the interim final rule for establishing quiet zones, FRA expects that most communities that currently have whistle bans will be able to establish quiet zones. The interim final rule also contains requirements for maximum horn sound levels that will limit the level of disruption to communities where locomotive horns are sounded. FRA expects that the safety benefits of the rule will outweigh any community disruption that may occur as a result.

Local Impacts	2	Locomotive horns would not benefit elderly, blind, or hearing-impaired residents.	The sounding of locomotive horns may have a smaller benefit for certain members of the community. However, those persons will still benefit from the increased safety at grade crossings when they occupy highway vehicles that traverse the affected crossings, whether as drivers themselves or as passengers.
Housing	15	Locomotive horns would force residents to sell houses and discourage relocations to area.	FRA recognizes that some residents of some communities where whistle bans may be cancelled or quiet zones not established might move away and that potential new residents may choose not to relocate there. However, given (1) the increased flexibility that communities will have to implement safety measures relative to the Notice of Proposed Rulemaking (NPRM), (2) the lengthened compliance schedule for establishing quiet zones, relative to the NPRM, and (3) the low-risk based exceptions contained in the interim final rule for establishing quiet zones, FRA expects that relocations to and from communities with whistle bans in place will be minimal. Relocation impacts may occur only to the extent that communities do not implement safety measures to mitigate unacceptable collision risk levels present along rail corridors currently covered by the whistle bans.
Development/ Land Use	2	The Draft EIS should examine potential conflicts between the proposed rule and land use plans in urban areas.	Any potential conflicts between the interim final rule and land use plans in urban areas can be resolved by the establishment of quiet zones. The rule allows the establishment of quiet zones in urban areas and thus encourages the development of housing and commerce near crossings where train horns are sounded today.

Development/ Land Use	16	The proposed rule threatens the viability of transit-oriented development and would discourage people from living near rail stations.	Train horns are currently sounded on a regular basis at many crossings nationwide that have commuter train operations. Many passenger rail users reside near rail stations located near crossings, despite the sounding of locomotive horns. To the extent that rail stations attract development, the communities' tax base should increase. An increase in the tax base would increase funds available to implement compliance with this rule through safety measures required to establish quiet zones.
Development/ Land Use	1	Communities cannot afford to rezone land adjacent to railroads to create buffer zone for noise impacts.	This rule does not require any re-zoning of land.
Residents	75	Locomotive horns would cause disruptive negative impacts to residential communities and developments near affected grade crossings.	The sounding of locomotive horns where they do not now sound may have negative impacts on local businesses and on productivity. However, given (1) the flexibility that communities will have to implement safety measures, (2) the compliance schedule for establishing quiet zones of up to eight years, and (3) the low-risk based exceptions contained in the interim final rule for establishing quiet zones, FRA expects that most communities that currently have whistle bans will establish quiet zones. Negative impacts on local businesses and productivity should occur only to the extent that communities do not implement the safety measures needed to provide a sufficient level of safety at grade crossings.

Business	23	Locomotive horns would have negative impacts on local businesses and productivity.	Noted. The sounding of locomotive horns where they do not now sound may have negative impacts on local businesses and on productivity. However, given (1) the flexibility that communities will have to implement safety measures, (2) the compliance schedule for establishing quiet zones of up to eight years, and (3) the low-risk based exceptions contained in the interim final rule for establishing quiet zones, FRA expects that most communities that currently have whistle bans will establish quiet zones. Negative impacts on local businesses and productivity should occur only to the extent that communities do not implement the safety measures needed to provide a sufficient level of safety at grade crossings.
Data Sources			
Data Sources	2	1990 Census data used in Draft EIS is outdated.	FRA has revised the impact analyses using 2000 Census data. The updated findings are reported in Chapter 4 of the FEIS.
Data Sources	1	Is before and after safety information based on empirical data or FRA projections?	The “before and after” studies that FRA conducted (part of the “Florida Whistle Ban Study” and the first “Nationwide Study”) used empirical data of actual collisions.
Data Sources	10	The proposed rule is based on questionable data and cannot be extrapolated to cover all areas nationwide.	FRA is confident that the “Florida Whistle Ban Study” and the “Nationwide Study“ provide statistically significant evidence that demonstrates the effectiveness of train horns in improving safety at highway-rail grade crossings.

Data Sources	5	The FRA grade crossing database used to develop the proposed rule is outdated and inaccurate.	FRA is aware of the deficiencies of the crossing inventory database and strongly advocates the need for States and railroads to provide accurate information to the database. It is however, the only national database in existence. FRA is confident that the inadequacies of the database do not affect the applicability of this rulemaking. FRA took extraordinary efforts to obtain valid information from the greater Chicago area, which contains the highest concentration of whistle bans in the country.
Enforcement			
Techniques/ Existing Laws	25	Existing laws are adequate. They should be enforced and fines for violators increased.	Data shows that the lack of train horns increases collisions even where enforcement is present. The rule provides means for communities to create a quiet zone through the use of programmatic enforcement. FRA is a strong proponent of fines that are large enough to deter violations.
Techniques/ Existing Laws	2	Aggressive enforcement of current laws negates, or makes it difficult to establish, a baseline for future reduction in accidents.	Pre-Rule Quiet Zones that have had an effective enforcement program will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT), which would be an indicator of effective enforcement, or below twice the NSRT with no relevant collisions.
Techniques/ Existing Laws	14	Legalize (if necessary), test, and deploy alternative safety measures such as photo enforcement.	Photo enforcement is an approved Alternative safety measure under the interim final rule. The rule also provides a mechanism to enable development of alternative safety measures, which can be tailored to the community. Enactment of statutes enabling use of photographic evidence is the prerogative and responsibility of States.
Techniques/ Existing Laws	3	The proposed rule should allow communities to pass ordinances and impose fines for violations of the rule.	The rule will allow communities to create quiet zones through a variety of methods. It also provides a fine schedule to be enforced by FRA if railroads fail to comply with the provisions of a quiet zone created under the rule.

Responsibility	3	Local governments should fund safety improvements, not the railroads.	Railroads are responsible for providing audible warnings at all crossings, with the exception of those in quiet zones. The statute specifies that the traffic control authority or law enforcement authority responsible for the crossing provide supplementary safety measures.
Responsibility	2	Railroad liability should be limited for accidents where safety devices are in place and working properly.	The courts will determine liability questions as they arise. Historically, the party having maintenance responsibility for a safety device at a crossing has generally been found liable for its failure.
Responsibility	2	Owners should be responsible for warning devices at private crossings.	In general, holders of private crossing rights are responsible under common law for the safety of their crossings. Where the community seeks to silence the horn, the shared responsibility of the holder and the community will be resolved through negotiation.
Economic Impacts			
Property Values	69	Implementation of the proposed rule reduces property values and affects a community's tax base.	The effects of sounding locomotive horns on property values have been studied recently in response to this rulemaking. The results neither establish nor exclude the possibility of adverse effects on property value.

Local Impacts	14	The proposed rule will adversely affect the local economy.	Continuation of whistlebans transfers costs from the community to the economy at large as accidents and casualty impacts are absorbed through insurance, lost productivity, and public benefits programs. The interim final rule may adversely affect some local economies and it may positively affect other local economies. Local economies of communities that do not establish quiet zones containing crossings that currently are covered by whistle bans may suffer to the extent that train horn noise is a disruption to certain economic activities. Local economies of communities that are able to establish quiet zones where whistle ban ordinances that once were in place were cancelled may benefit. With this rule in place and with railroad collaboration, many communities will be able to establish new quiet zones that take into account the safety of motor vehicle operators as well as the desire of the community to decrease noise levels.
General Costs	2	Recommended safety measures will be too costly and difficult to implement.	FRA expects that communities will implement the least costly approved safety measures. In many cases the least costly safety measure to implement will be traffic channelization devices, which are not difficult to install. The average cost for installing channelization devices extending 100 feet on each approach is approximately $13,000. Average annual maintenance costs for these medians are $500. Communities may be able to select enforcement options that return a revenue stream to defer direct costs.

General Costs	16	Costs of implementing the proposed rule have been underestimated and the benefits exaggerated.	The impacts of requirements contained in the interim final rule are significantly different from those of requirements contained in the Notice of Proposed Rulemaking (NPRM). FRA reviewed comments received in response to the cost and benefit estimates presented in the Regulatory Impact Assessment that accompanied the NPRM and took those into consideration when estimating the costs and benefits of the interim final rule. Costs and safety benefits were quantified to the extent possible and their results are presented in the Regulatory Evaluation, which is available for examination in the docket for this rulemaking.
Environmental Justice			
Local Impacts	11	Residents in low-income or minority communities will disproportionately suffer impacts from the proposed rule.	Under the rule's provisions, all communities will have an equal opportunity to designate a quiet zone to reduce or eliminate any potential environmental impacts. States and Metropolitan Planning Organizations will have ample time to program transportation funds to address local community needs. The process for establishing a quiet zone is described in Chapter 5 of the FEIS.

Lack of Funding	8	Impoverished communities do not have the funds necessary to improve railroad crossings and establish quite zones.	FRA has included a provision in this rule providing an incentive, in the form of an extended phase-in of safety requirements at Pre-Rule Quiet Zones, to encourage state-level involvement in mitigating any environmental justice impacts (e.g. by allocating flexible Federal-aid highway funding). Not all quiet zones will require additional safety measures at crossings. Pre-Rule Quiet Zones with relatively low collision risk may be established without the addition of safety measures. New Quiet Zones may also be established without improving any crossings if the crossings in the Quiet Zones are already equipped with flashing lights and automatic gates. For those pre-rule quiet zone communities that have to abate risk to establish quiet zones, the rule allows up to eight years to secure funding from State DOTs and make any necessary improvements.
Environmental Review Process			
DEIS	4	Effectiveness of supplementary safety measures is not adequately discussed in the proposed rule.	The Notice of Proposed rulemaking (NPRM) provided a lengthy discussion of supplementary safety measures and their effectiveness ratings.
DEIS	2	Some communities were excluded from the analysis.	Updated data was used for the crossings evaluated in the FEIS, which takes into account changes and omissions known to FRA at this time.
DEIS	3	Illinois's experience with a law similar to the proposed rule demonstrates that environmental impacts will be greater than predicted in the Draft EIS.	Illinois's law and FRA's rule are very different in approach. While Illinois's law resulted in an immediate commencement of the sounding of locomotive horns, FRA's rule provides ample time for existing whistle ban communities to create a quiet zone (up to 8 years). It also provides a variety of methods to create or continue locomotive horn-free areas. Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT) or below twice the NSRT with no relevant collisions, both of which are indicative of effective accident reduction efforts.

DEIS	2	Additional analysis is needed on the effects that locomotive horn noise has on adjacent properties.	The effects of sounding locomotive horns on property values have been studied in response to this rulemaking. Results are not conclusive. The interim final rule provides means for establishing a quiet zone that would avoid any such impacts.
DEIS	2	Alternatives evaluated in the Draft EIS should be redefined.	In response to comments on the Notice of Proposed Rulemaking and DEIS, FRA has revised the rule to provide many more opportunities to create quiet zones. The interim final rule is much more flexible than was the proposed rule and addresses risk on the corridor level. If the risk level is below the Nationwide Significant Risk Threshold (NSRT), or less than twice the NSRT with no relevant collisions, those communities will have simple notification procedures to follow in order to maintain quiet zones. FRA is providing a web-based quiet zone calculator to assist with the application process.
DEIS	1	Analyses required for supplementary safety measures are too complex.	The accident prediction formulas that provide the basis for risk calculation under the rule are complex; however, understanding the formulas is not necessary in order to create a quiet zone. FRA has provided a web-based, user-friendly quiet zone calculator that will step communities through the process needed to design a quiet zone within the guidelines of the rule. FRA's regional crossing managers will also be available to provide assistance in understanding how to create a quiet zone.
DEIS	1	The Draft EIS does not adequately address the occupational safety impacts of the proposed rule.	No occupational safety concerns associated with the rule have been identified.
DEIS	1	Proposed rule and Draft EIS do not account for frequency of trains or number of crossings.	In the DEIS and FEIS the FRA accounted for the frequency of trains in the horn noise model and assessed noise impacts for each crossing known to have an existing whistle ban.
DEIS	1	Where are FRA regulations regarding Environmental Impact Statement format and content?	FRA's Procedures for Considering Environmental Impacts (64 FR 28545) are available at FRA's website (www.fra.dot.gov).

DEIS	2	The EIS should address trespassing, the leading cause of railroad fatalities.	FRA is very aware of the consequences of trespassing and is addressing the issue in a variety of ways. The statute authorizing this rule deals solely with public crossings. At this time there is no data that links trespassing to the use of train horns.
DEIS	1	Responses to comments included in Draft EIS were insufficient.	Scoping comments were addressed as they related to the scope of the DEIS. Issues and results reported in the DEIS were available for public comment, and those comments are addressed in this FEIS document.
Public Involvement	5	FRA has not allowed adequate time for review and comment on the Draft EIS and proposed rule.	FRA allowed more than four months for public comment. FRA widely distributed the DEIS and Notice of Proposed Rulemaking (NPRM) and posted them on the internet at www.fra.dot.gov. FRA has also considered late filed comments to the extent practicable.
Public Involvement	6	Informational materials provided by FRA were incomplete or unclear.	FRA provided informational documents, press briefings, fact sheets, public hearings, and internet sites and believes these efforts were comprehensive and clear.
Public Involvement	6	Some persons were not notified of, or were unable to attend, public hearings.	Public hearings were held in many regions of the country. The press was widely notified of the hearings and they were noted in many news publications and broadcasts. Notices of the time, date, and place of the hearings were printed in the Federal Register.
Public Involvement	2	Communities will not act on citizens' complaints about noise. What is the specific FRA address for filing official complaints?	Contact the regional FRA office in your area. Addresses are listed on the FRA website at www.fra.dot.gov/faq/fieldoffices.htm.
Public Involvement	1	Why has FRA not listened to the public at previous hearings?	FRA listened to the public at all hearings but could not revise the proposal or respond to comments during the comment period. The interim final rule represents FRA's response to these comments.

Public Involvement	1	Use of locomotive horns has been reduced during comment period on regulations and Draft EIS. Will horns resume when comment period closes?	FRA had no part in reducing or increasing the use of locomotive horns during the comment period or immediately after the comment period.
Public Involvement	1	Responses to comments made at public hearings should be distributed to attendees.	All persons or organizations that made comments on the DEIS and who also provided mailing addresses will receive copies of the FEIS and these responses. The FEIS and other documents are also available on FRA's website, www.fra.dot.gov, and in the public docket at http://dms.dot.gov/ (Docket No. FRA-1999-6440).
Analytical Methods	7	Noise models or data used in noise models are not appropriate for evaluating locomotive horn noise impacts.	The selected noise model is based on well-accepted acoustical principles and methods. Input data were based on an extensive program of sampling noise from trains at crossings throughout the country. Community reaction criteria are based on U.S. Environmental Protection Agency and Federal Railroad Administration research. In response to this and related questions and comments raised during the DEIS Public Hearing, FRA commissioned a further review of the scientific literature by the Volpe Transportation Systems Center concerning general health effects of transportation noise. This report found no better noise annoyance assessment methodology than the approach FRA used in this EIS.
Analytical Methods	3	Additional analysis is needed to determine if locomotive horns reduce accidents at high-accident crossings.	Studies have shown that the locomotive horn is an effective safety device in reducing grade crossing collisions. While there have been some slight variances noted in the effectiveness rating of horns in preventing collisions for different types of crossings and crossing treatment, the data shows that the train horn is effective.
Analytical Methods	1	Air quality analysis should include effects of supplementary safety measures, such as increased delay and congestion.	Supplementary safety measures are used in conjunction with existing automatic warning devices to control traffic. There is no evidence that the use of supplementary safety measures increases delay or congestion.

Analytical Methods	2	Safety difference between new and existing bans, and full- and part-time bans, needs evaluation.	The rule treats existing and new quiet zones as equally and as equitably as possible. The differences in treatment that do exist in the rule are the result of the evaluation of these differences. Apart from crossings covered by E.O. 15, there is insufficient data to evaluate separately the issue of partial bans.
Analytical Methods	5	FRA should develop a noise model that accurately measures effects on adjacent residents.	Noise impacts are based on accepted noise criteria derived from fundamental research on community reaction and annoyance using accepted methodologies promulgated by the U.S. Environmental Protection Agency. These criteria are believed in the profession to be the best available for assessment of transportation noise impacts at this time. In response to this and related questions and comments raised during the DEIS Public Hearing, FRA commissioned a further review of the scientific literature by the Volpe Transportation Systems Center concerning general health effects of transportation noise. This report found no better noise annoyance assessment methodology than the approach FRA used in this EIS.
Analytical Methods	1	Performance-based measures are unproven.	FRA has structured the rule in such a manner that performance-based alternative safety measures (ASMs) (e.g., programmatic education) are allowed in the creation of a quiet zone. However, train horns will not be silenced until data analysis has shown that the measure is effective. Performance based ASMs will also require periodic monitoring to ensure that the program is still effective.

Analytical Methods	3	The Draft EIS focuses on crossings with whistle bans and ignores other crossings that account for most accidents.	Train horns are routinely sounded at 98% of the public crossings in the Nation under State regulations or railroad operating rules. The rule will not negatively impact the environment at these crossings, as the horn is already being sounded. Moreover, the rule may benefit communities containing these crossings by providing the means to create quiet zones and reducing the amount of time the horn would be sounded approaching a crossing for trains traveling at less than 45 mph. The DEIS focuses on whistle ban communities where the environmental impacts will be felt if the community does not create a quiet zone.
Analytical Methods	8	Effectiveness of supplementary safety measures cannot be statistically validated.	A variety of demonstration projects have been used to determine the effectiveness of supplementary safety measures. FRA is confident that the effectiveness ratings are conservative. Provisions in the rule allow for re-adjustment of effectiveness ratings, if necessary.
Analytical Methods	2	Provide a threshold of incidents that would require sounding of locomotive horns.	The rule provides that Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT), an indicator of effective enhanced enforcement, or below twice the NSRT with no relevant collisions, which credits a low accident rate.
Analytical Methods	2	Proposed rule should allow accident reduction credit for local safety measures.	The rule credits accident reduction effort through the provision that Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT), an indicator of effective enhanced enforcement, or below twice the NSRT with no relevant collisions, which credits a low accident rate.

Analytical Methods	1	Improvement requirements should be based on local experience, not national averages.	The rule allows the use of local experience to compute the effectiveness of the locomotive horn when such results are statistically significant (e.g., Chicago experiences a somewhat lower effectiveness of locomotive horns in preventing collisions at gated crossings). In many communities, however, the relatively small number of whistle ban crossings and collisions results in collision data that is not statistically significant. Lacking such significance, the national averages provide the best information on the effectiveness of train horns.
Analytical Methods	14	Assumptions used for noise analysis in Draft EIS are unreasonable or deficient.	Assumptions are based on observations of typical horn sounding practices throughout the country, along with typical sound propagation conditions in environments near grade crossings. These representative findings define typical conditions expected at any one particular crossing. The derived assumptions are, therefore, applicable for the prediction of average conditions.
Analytical Methods	12	Draft EIS analyses conducted by FRA are flawed and based on inaccurate data.	The conclusions in the Draft EIS were based on established evaluation methods applied to the U.S. DOT/AAR grade crossing inventory. FRA considers this to be the best available and most comprehensive source of data on grade crossings across the country. Additional information on the methods used to assess potential environmental impacts is outlined in Chapter 3 of the FEIS.
Analytical Methods	6	Statistical analyses supporting proposed rule are questionable.	FRA has reviewed the statistical analyses used to develop the rule and found them to be consistent with actual grade crossing accident experience nationwide.
Relevancy	4	Inconsistent application of whistle bans may have adverse impacts, as was the experience in Florida.	There was no evidence in the Florida study that indicated that increased nighttime collision rates at gated crossings (195%) were the result of inconsistent application.

Relevancy	12	Whistle bans have minimal effects on safety and the proposed rule may not reduce accidents.	FRA's study on train whistle bans indicates that the collision rate at gated crossings increases by 44% at whistle ban crossings as compared to similar crossings where locomotive horns are sounded.
Other	4	Correlation of increased accidents at whistle ban locations does not indicate cause and effect relationship.	FRA has performed several studies that show that the collision rate increases at locations where whistle bans are in place. At locations where whistle bans have been repealed and the use of locomotive horns reinstated, the collision rate has been significantly reduced, indicating the whistle ban had an adverse affect on safety.
Other	3	Varying operating and environmental conditions will make testing unreliable.	Assumptions are based on observations of typical horn sounding practices throughout the country, along with typical sound propagation conditions in environments near grade crossings. These representative findings define typical conditions expected at any one particular crossing. The derived assumptions are, therefore, applicable to the prediction of average conditions.
Other	2	The proposed rule will detract from existing State programs that focus on most urgent grade crossing problems and inundate agencies with requests for improvements.	Supplementary safety measures (SSMs) will be eligible for funding from Federal monies available through the Section 130 program; however, the improvements will have to compete on a safety priority basis against other grade crossing needs. SSMs would only be funded if the project had a higher safety benefit than other crossing improvement requests. Since quiet zone improvements will generally be safety neutral (trading off improvements for the loss of the train horn), these projects would compete for Section 130 funding only to the extent safety gains exceed train horn effectiveness.
Other	3	The proposed rule will harm the environment.	Potential environmental impacts identified by FRA are discussed, evaluated, and considered in Chapter 4 of the FEIS.
Other	2	The proposed rule should provide mitigation for affected communities.	Possible mitigation strategies and implementation options are outlined in Chapter 5 of the FEIS.

Grade Crossing Safety			
Past Accident Records	136	Whistle bans should be continued, or quiet zones established, in communities with demonstrated safety records.	Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT) or below twice the NSRT with no relevant collisions (which credits a low accident rate). New quiet zones may be created without additional safety measures if the Quite Zone Risk Index is less than the NSRT, which demonstrates safety, and the public crossings are equipped with gates.
Past Accident Records	18	Existing crossing gates are adequate safety measures.	Conventional gates and lights are not considered to be supplementary safety measures. FRA's research indicates that grade crossing collisions increase at crossings with conventional gates and lights when train horns are silenced. However, the rule does provide for establishment of quiet zones under certain circumstances in which some crossings are equipped with conventional gates and lights and where risk levels are reduced.
Past Accident Records	15	The proposed rule does not take into account past safety record or recent safety improvements.	Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT), an indicator of a good safety record, or below twice the NSRT with no relevant collisions, which credits a low accident rate.
Past Accident Records	59	The proposed rule would not improve safety where an area already has an excellent safety record.	Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT), an indicator of a good safety record, or below twice the NSRT with no relevant collisions, which credits a low accident rate.
Crossing Protection in Place	3	Existing warning devices and safety measures are not adequate.	The rule does not allow quiet zones with existing warning devices unless the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT), an indicator of a good safety record, or below twice the NSRT with no relevant collisions, which credits a low accident rate.

Crossing Protection in Place	7	Differences in safety requirements at various types of grade crossings should be considered.	The rule provides for a wide variety of treatments that can be tailored to meet the needs at a particular crossing. This flexibility, coupled with the corridor risk methodology, allows communities to address the safety requirements at different types of crossings.
Crossing Protection in Place	23	The proposed rule will not be more effective than existing safety features and warning devices.	Several quiet zone demonstration projects have shown that supplementary safety measures (SSMs) have greatly increased the safety at crossings even with the locomotive horn silenced. Studies have shown that SSMs are an effective way of increasing the safety benefits of conventional warning devices.
Crossing Protection in Place	63	Some communities already have "optimum safety" measures in place. Why do locomotive horns need to be sounded?	Studies have shown that crossing collisions increase by 44% at gated crossings, which is the most optimum safety measure in common use today, when the locomotive horn is silenced. The rule will provide a means to enhance the effectiveness of these devices through installation of supplementary safety measures and to create a quiet zone.
Crossing Protection in Place	3	The State of Illinois has effectively improved safety by focusing efforts on upgrading the State's most dangerous grade crossings.	FRA strongly supports focusing grade crossing safety efforts by addressing the most dangerous crossings in a State. The Section 130 Program (i.e., Federal funding to improve crossing safety) requires that projects be funded to address the greatest safety needs first. This rule will require that locomotive horns be sounded in order to enhance safety, unless steps are taken to replace these safety benefits that are lost by silencing the horn.

Desensitize the Public	63	Mandatory and frequent use of locomotive horns at every crossing will desensitize the public and reduce the horn's effectiveness as a warning device.	This hypothesis is not borne out by experience. Several studies have shown that when whistle bans are ended and locomotive horns are sounded, collisions decrease. The Florida study showed that there was a dramatic (195%) increase in crossing collisions during nighttime whistle bans. Gated whistle ban crossings experience a 44% higher collision rate than gated crossings where the horn is sounded.
Improvement	6	The proposed rule will result in only marginal safety improvements and threatens the success of current grade crossing improvement programs.	The rule should not have a negative impact on current crossing improvement programs. Improvements for quiet zones will be eligible for funding from Federal monies available through the Section 130 program; however, the improvements will have to compete on a safety priority basis against other grade crossing needs. Supplementary safety measures would only be funded if the project had a higher safety benefit than other crossing improvement requests. Since quiet zone improvements will generally be safety neutral (trading off improvements for the loss of the train horn), these projects would compete for Section 130 funding only to the extent safety gains exceed train horn effectiveness.
Improvement	12	Government has a responsibility to make communities safer. The lives saved by locomotive horns outweigh the noise impacts.	The rule not only provides safety by ensuring that the horn is sounded but also provides for community noise mitigation safety through the installation of supplementary safety measures or alternative safety measures to compensate for the loss of the locomotive horn.
Improvement	12	The rule should focus on improving dangerous crossings or crossings with no safety measures.	The statute mandating this rule addresses locomotive horn use. It generally does not address dangerous crossings. Federal initiative and funding to improve the most dangerous crossings with no safety measures are provided through the Section 130 Program and other safety efforts of the DOT.

Improvement	2	How can communities with only a few crossings demonstrate statistical improvement in safety?	The risk of a potential quiet zone corridor is calculated using site-specific information for the crossings in question. Supplementary safety measures with effectiveness values may then be applied to the crossings to reduce the risk. Measuring safety relative to corridor risk instead of collisions at the crossings provides an excellent method for communities with only a few crossings to create quiet zones.
Improvement	17	The rule should implement other safety measures at grade crossings instead of requiring locomotive horns.	The statute mandating this rule addresses locomotive horn use and does not address dangerous crossings generally. Federal initiative and funding to improve the most dangerous crossings with no safety measures are provided through the Section 130 Program and other safety efforts of the DOT.
Funding	30	The proposed rule is an unfunded mandate.	The rule is not subject to the special assessment requirements of the Unfunded Mandates Reform Act of 1995, since the cost to State, local, and tribal governments, in the aggregate, or to the private sector, is less than $100 million in each year. However, FRA recognizes the potential impact for communities that elect to establish quiet zones and has sought to mitigate that impact to the extent possible.
Funding	44	Some communities do not have funding available to upgrade crossings or implement quiet zones.	FRA recognizes that some local governments may find other uses of available funding to have a higher priority. FRA has included in the interim final rule an extended implementation schedule that (i) provides existing whistle ban communities with additional time to plan and acquire resources for quiet zones and (ii) encourages State departments of transportation to assist local communities through allocations of Federal and State funds.

Funding	39	Railroads should fund all or a portion of costs associated with implementing quiet zones or of installing additional safety measures.	Railroads are responsible for providing audible warnings at all crossings, with the exception of those in quiet zones. The statute specifies that supplementary safety measures be provided by the traffic control authority or law enforcement authority responsible for the crossing.
Funding	26	The proposed rule would divert funds from other grade crossing improvement programs.	Federal railroad crossing safety funds are reserved by law for priority safety projects (Section 130). In general, quiet zone projects will be neutral with respect to safety. Accordingly, use of Section 130 funds will normally not be authorized. (See 23 CFR Part 924.) There is no reason to believe that responsible State officials would violate restrictions on use of Federal funds. Diversion of funding from State sources is a matter within control of State officials. To the extent State funds are allocated to existing whistle ban locations for implementation of innovative safety improvements, and to the extent that these actions preserve community quiet while reducing accidents and casualties, the allocations may be warranted. It should be noted that State officials in Illinois recently identified five whistle ban crossings as among the top 10 in the State with respect to risk of fatal injury, and all of the 10 crossings on the State list already have flashing lights and gates. One of the benefits of this rule is to make communities aware of the availability of additional safety strategies that can dramatically reduce risk at crossings regardless of locomotive horn status.

Funding	20	Additional or special funding should be provided to cover costs of implementing the proposed rule.	It is the responsibility of Congress to make this determination. State and local governments are allocated substantial funding annually through the Surface Transportation Program (STP) and the National Highway System Program; and, with the likely exception of the 10% STP safety set-aside, these projects should be eligible for funding out of these sources. The STP and NHS are "block grant" programs preferred by the States because of the flexibility they provide to meet changing local needs. It is not clear to FRA why a categorical program would be preferred here, given the flexibility built into existing funding mechanisms.
Funding	35	Federal and/or State governments should fund costs of implementing the proposed rule.	The statute states that alternatives to the locomotive horn are to be provided by the public authorities responsible for traffic control or law enforcement at the subject crossings. In most cases, the roads involved are under city or county jurisdiction. From a purely economic standpoint, by maintaining whistle bans without offsetting safety countermeasures, communities transfer societal costs to victims and their insurers. Insurers pass on the costs to affected segments of the society at large. Accordingly, some local contribution to the solution would appear warranted. Refer to the two prior responses.
Funding	34	Measures in proposed rule are expensive and potential benefits do not justify costs.	Safety improvements carry costs. FRA has made every effort in the interim final rule to hold costs to the minimum necessary to achieve the statutory objective and to avoid the imposition of any cost where risk is low. Analysis supports the conclusion that benefits will significantly exceed costs under the interim final rule.

No Benefit	25	The proposed rule would not provide a benefit to public safety or reduce accidents.	FRA has performed several studies that show that the collision rate increases at locations where whistle bans are in place. At locations where whistle bans have been repealed and the use of locomotive horns reinstated, the collision rate has been significantly reduced. This indicates that the whistle ban had an adverse affect on safety. The rule will improve safety and has a positive benefit to cost ratio.
No Benefit	9	The proposed rule does not address pedestrian safety issues.	The statutory authority for this rule addresses highway vehicle safety at crossings and not pedestrian safety.
Governmental Role			
Violator's Responsibility	7	Locomotive horns will not prevent suicide attempts.	Noted.
Violator's Responsibility	48	Individuals are responsible for obeying warning devices. Those who avoid warning devices and crossing gates should not be protected.	FRA is a strong proponent for effective enforcement of grade crossing laws and penalties that are severe enough to deter such illegal activities. However, a driver losing his or her life at a crossing for making a poor decision is too stiff of a penalty to gain the support of FRA. Additionally, innocent people such as passengers in the car, crew members and passengers on the train, and motorists and residents near a crossing affected by a derailment caused by a highway-rail crossing collision may also be severely affected.
Violator's Responsibility	25	People who circumvent safety devices are choosing to risk their own lives.	FRA is a strong proponent for effective enforcement of grade crossing laws and penalties that are severe enough to deter such illegal activities. However, a driver losing his or her life at a crossing for making a poor decision is too stiff of a penalty to gain the support of FRA. Additionally, innocent people such as passengers in the car, crew members and passengers on the train, and motorists and residents near a crossing affected by a derailment caused by a highway-rail crossing collision may also be severely affected.

Violator's Responsibility	38	Locomotive horns will not prevent drivers from going around crossing gates to beat the train.	Nothing short of physical barriers will prevent some drivers from going around lowered crossing gates. However, FRA studies have shown that gated whistle ban crossings experience a 44% higher collision rate than gated crossings where the horn is sounded. Horns do provide an additional warning that results in better driver compliance with the automatic warning devices at the crossing.
Authority	2	Neither government agencies nor the railroads should be liable for accidents at grade crossings with local whistle bans.	This rule has not been undertaken to allocate liability. A public authority of railroad faced with a suit relying upon the absence of train horn's audible warning should be able to cite compliance with this interim final rule as a full ban to liability.
Authority	8	The proposed rule is an example of government intrusion and is unlikely to achieve intended purpose of improving safety.	FRA studies document a significant increase in grade crossing collisions when locomotive horns are not sounded. The rule provides a means to silence locomotive horns without compromising safety. The rule is expected to enhance safety and create quieter communities.
Authority	5	Local governments do not have the authority to seek improvements to grade crossings under the jurisdiction of State agencies.	FRA anticipates that the various governmental jurisdictions that have authority over roadways will work together to improve safety and to reduce noise impacts.
Authority	26	FRA should work with States and communities to allow implementation of cost-effective safety programs tailored to unique local circumstances.	FRA is committed to working with States and communities to implement cost-effective safety programs that can be shown to address local issues. FRA's 16 regional crossing managers will be available to work with communities in the creation of quiet zones. The rule provides the means to develop education and enforcement programs that can be used as alternative safety measures to create quiet zones. Regional FRA contacts are listed on FRA's website: www.fra.dot.gov/faq/fieldoffices.htm.

Health and Human Welfare Impacts			
General Impacts	10	The proposed rule does not adequately address public health concerns.	Public health and other health concerns have been addressed in the FEIS.
General Impacts	3	Alternative measures that protect public health and welfare should be considered.	The rule is expected to result in a saving of human life and reduced injury that will benefit society. There is no readily available alternative to the locomotive horn, and supplementary safety measures and alternative safety measures that can compensate for not sounding the locomotive horn have been identified in the rule.
General Impacts	175	The proposed use of locomotive horns would have adverse effects on the physical and mental health of residents.	A survey of literature on noise health effects has not found research that indicates there would be quantifiable adverse physical and mental health effects from environmental exposure to locomotive horns.
General Impacts	118	Sudden and loud sounds of locomotive horns cause sleep disturbance and/or sleep deprivation.	Many commentors noted that locomotive horns can disturb their sleep, and these impacts are considered in the assessment of noise annoyance documented in this FEIS.
Impacts Understated in DEIS	23	The Draft EIS does not adequately address the health impacts of the proposed rule and of locomotive horn noise on adjacent population.	The DEIS and the FEIS use an accepted method in the acoustics profession for measuring the likely impacts of locomotive horn noise on adjacent populations.
Hearing Impacts	45	Decibel levels required in the proposed rule are harmful to hearing.	The rule does not require a certain decibel level but maintains the current minimum level and establishes a new maximum level. These levels are not shown to harm the hearing of anyone exposed in communities through which locomotives pass.

Legal Issues			
Legal Issues	10	A local ordinance overrides regulations mandating use of locomotive horns at grade crossings.	Under 49 USC 20106, issuance of this rule preempts any State law, rule, regulation, or order covering the same subject matter of this rule, except as such controls are additional or more stringent law, regulation, or order that is necessary to eliminate or reduce an essentially local safety hazard, and that is not incompatible with a law, regulation, or order of the United States government and does not unreasonably burden interstate commerce. This rule preempts any local ordinance covering the same subject matter of this rule.
Legal Issues	1	Consider laws that require railroad companies to limit horn use.	The law mandates that locomotive horns must be sounded when approaching and entering upon each public highway-rail crossing, unless they are exempted from the requirement to sound the horns by rules issued by DOT (FRA). These rules provide an opportunity for the establishment of quiet zones in which locomotive horns will not be routinely sounded.
Legal Issues	2	Railroad companies should not be responsible for upgrading safety controls at grade crossings.	49 USC 20153, which mandates issuance of this rule, requires that supplementary safety measures be "provided by the appropriate traffic control authority or law enforcement authority responsible for safety at the highway-rail grade crossing."
Legal Issues	2	Railroads should be at fault in an accident where people circumvent safety devices.	This rule addresses liability of railroads only in situations in which the locomotive horn is not sounded in a quiet zone established under this rule. The rule does not preclude sounding the horn in an emergency, nor does it impose a legal duty to sound the horn in such situation.
Legal Issues	1	The proposed rule is unconstitutional.	Issuance of this rule is required by 49 USC 20153. FRA is aware of no circumstances in which this rule could be considered to be unconstitutional.

Legal Issues	3	Who is liable if safety measures in a Quiet Zone fail?	The courts will determine liability questions as they arise. Historically, the party having maintenance responsibility for a safety device at a crossing has generally been found liable for its failure.
Legal Issues	4	Local jurisdictions do not have the authority or expertise to ban use of locomotive horns.	This rule preempts State law covering the subject matter of this rule. This rule provides local authorities with the authority to establish quiet zones. The rule does not require a community to establish quiet zones if it does not consider it capable of making such a decision. However, resources are available which can provide a level of expertise to a community in making that decision.
Noise Decibel Levels			
Establish Maximum Level/Minimum Duration	16	Consider a maximum locomotive horn volume and length of sounding period.	The rule has provisions setting a maximum locomotive horn volume and duration. For more information see the rule and chapter 2 of the FEIS.
Establish Maximum Level/Minimum Duration	9	The rule should place limits on the timing and sequence of locomotive horn use.	The rule has a provision setting the horn sounding duration and pattern. For more information see the rule and chapter 2 of the FEIS.
Establish Maximum Level/Minimum Duration	18	The rule should reduce the decibel level and duration of horn blasts.	The rule has provisions setting a maximum locomotive horn volume and its duration. The rule provision setting the horn sounding duration specifies no more than 20 seconds of sounding before the crossing. For more information see the rule and chapters 2 and 5 of the FEIS.
Levels Exceed	30	Locomotive horns are too loud and exceed recommended levels.	The rule has provisions setting a maximum locomotive horn volume. FRA estimates that this will result in reductions in horn sound levels from the loudest horns presently in use. See chapter 5 of the FEIS for more information.
Levels Exceed	8	Locomotive horns are louder now than in the past.	Some horns may be louder today than was experienced historically. The rule establishes a new maximum locomotive horn sound level, which is lower than the sound levels of the loudest horns now in use.

Consistency	8	Engineers continuously sound locomotive horns between crossings.	When crossings are closely spaced, it may be necessary to sound the horn in a continuous sequence in that area. The rule provision setting the horn sounding duration specifies no more than 20 seconds of sounding before the crossing. That control may reduce the amount of continuous horn sounding that exists today in some locations.
Consistency	10	Individual engineers do not use locomotive horns consistently.	Consistent locomotive horn use is subject to the engineer's judgment and by the equipment in the locomotive. Automatic horn sequencers are used by some railroads and they automatically produce a full horn sounding sequence. Locomotive horns also vary in their output.
Consistency	1	Maximum sound levels in the locomotive cab should be measured.	FRA has considered locomotive cab sound levels in this rule. New testing methods for the loudness of the horn will help to ensure that the necessary sound level is provided to the public without requiring the relocation of the horn to the front of the locomotive near the cab. FRA is also addressing locomotive cab sound levels in a separate rulemaking.
Distance to Receptors	4	The Draft EIS underestimates the number of persons negatively affected by the proposed rule.	FRA has revised the impact analyses in the DEIS using recent information about whistle ban locations, the latest U.S. DOT grade crossing inventory, and 2000 Census data. The updated findings are reported in Chapter 4 of the FEIS.
Distance to Receptors	1	What will the locomotive horn volume be in areas without attenuating barriers? Does the horn model accurately represent reality?	Assumptions are based on observations of land uses found near typical crossings with whistle bans in suburban residential areas throughout the country. Under such conditions, a row of homes provides partial shielding of sound with large gaps constituting 35% to 65% of the length of the row. Consequently, the horn noise is not calculated without shielding. These typical conditions are reasonably expected to be encountered at any specific crossing. In urban areas, the shielding is likely to be greater due to more densely situated buildings.

Noise Pollution			
Noise Pollution	5	Noise levels from locomotive horns will be an illegal nuisance in my community.	Locomotive horns cause unwanted noise while they also provide an important warning signal for public safety. Local noise control ordinances have limited applicability to interstate rail carriers, which are subject to Federal law.
Noise Pollution	56	Locomotive horns are intrusive and the rule will lead to an increase in noise pollution.	The rule has many opportunities for mitigation of potential noise impacts and for existing noise exposure due to locomotive horns. See chapter 5 of the FEIS for more information about mitigation.
Noise Pollution	11	Noise from locomotive horns is a significant environmental impact to my community.	The rule provides an opportunity for communities throughout the United States to use quiet zones to address noise impacts from locomotive horns.
Noise Pollution	22	Noise from locomotive horns sounding at night or early in the morning is disturbing.	Quiet zones enabled by this rule can be created in order to reduce disturbing noise from locomotive horns.
Noise Pollution	4	Noise pollution from trains should be mitigated.	The rule sets a maximum locomotive horn sound level that did not previously exist.
Other Alternatives Suggested			
Horn Design	27	Wayside or stationary horns should be included as a supplementary safety measure.	FRA has made a provision in the rule that the wayside horn may be used as a substitute for the locomotive horn.
Horn Design	10	Modify the locomotive horn design to direct noise more effectively.	Technology is not presently available that could accomplish this. Developing new horn designs remains a potential topic for future research.
Horn Design	7	The rule should require railroads to install horns that direct noise down the tracks.	Technology is not presently available that could accomplish this. Developing new horn designs remains a potential topic for future research.
Horn Design	4	Horns should be installed on the front of locomotive at automobile driver level.	Many factors need to be considered in choosing a location. Front horn locations expose train crews to higher noise levels and low mounting heights produce less effective warning signals. For more information see the rule and its supporting documents.

Different Day vs. Night	12	Lower locomotive horn levels or alternative measures should be used at night.	FRA requested comments in the Notice of Proposed Rulemaking (NPRM) of the concept of using locomotive horns with different sound levels but did not receive comments that demonstrated that this would be an effective means of providing for the safety of motorists. The rule provides a variety of methods to enable locomotive horns to be silenced through the implementation of quiet zones. Other provisions of the rule (maximum sound level and maximum time of duration) also will lessen the impact of locomotive horn noise.
Different Day vs. Night	11	Nighttime ban on use of locomotive horns is needed.	FRA studies document significant increases in grade crossing collisions when locomotive horns are not sounded. In Florida, a nighttime ban on locomotive horns at gated crossings resulted in a 195% increase in collisions during ban hours. The rule provides a means to silence locomotive horns without compromising safety.
Gates/Arms/ Barriers	17	Consider alternatives to four-quadrant gates, such as articulated gates, 'breakaway' gates, and extended gate arms.	FRA considered alternatives to four-quadrant gates and will continue to work with those interested in developing such alternatives. North Carolina DOT has tested articulated gates and longer gate arms. It appears that the articulated gates have maintenance and operating issues that must be resolved. Initial results with extended gate arms are promising. It should be noted that the rule provides for the implementation of new supplementary safety measures.
Gates/Arms/ Barriers	5	Require mandatory installation of gates where none currently exist.	The rule will require that all public crossings be equipped with flashing lights and gates in new quiet zones.
Gates/Arms/ Barriers	37	Four-quadrant gates provide a safe alternative to the use of locomotive horns.	FRA has included four-quadrant gates as a supplementary safety measure that may be used in a quiet zone.

Gates/Arms/ Barriers	1	Modify gate deployment based on train speed (faster deployment for higher speed trains).	The rule provides that all crossings in new quiet zones must be equipped with automatic warning devices consisting of at least flashing lights and gates and that they have constant warning time (CWT) train detection circuitry. CWT provides the same amount of warning time regardless of the speed of the approaching train. Studies indicate that a consistent warning time to motorists enhances the motorists' ability to make proper choices at the warning device.
Education/ Awareness	59	Expand safety education programs and public awareness campaigns.	FRA is a strong proponent of safety education and actively works in this area. The rule provides for the use of safety education programs as an alternative safety measure that can be used to create a quiet zone.
New Technology	22	FRA should consider the use of new technology to improve safety and reduce noise levels from locomotive horns.	FRA is interested in new technology and actively works with researchers to find ways to improve safety. This rule uses a variety of means to reduce noise from locomotive horns. It also provides for means to demonstrate new technologies that can be used as supplementary safety measures.
Signs, Signals, Reflectors, Lights	28	FRA should consider the use of improved lighting, warning signals, and/or signage at grade crossings.	FRA is very interested in finding ways to improve crossing safety. FRA has issued regulations that require installation of additional lights on locomotives to make them more conspicuous and that require regular inspection, testing, and maintenance of automatic warning devices. It also works closely with FHWA on ways to improve signage at crossings.
Other	7	The types of supplementary safety measures should be expanded.	FRA has approved five supplementary safety measures (SSMs) that may be used to create a quiet zone. The rule also provides for means to expand the list of approved SSMs by demonstrating the effectiveness of new technologies.
Other	6	FRA should develop cost effective warning systems.	FRA is very interested in the development of cost effective warning devices and works with researchers to facilitate the creation of these systems.

Other	12	Curbs, median barriers, pylons, and channelization devices should be considered to improve grade crossing safety.	The rule provides for the use of channelization devices at gated crossings as one of the approved supplementary safety measures that may be used to create a quiet zone.
Other	1	Require local jurisdictions to plant trees or shrubs to provide buffer from locomotive horn noise.	The use of vegetation to provide a buffer from locomotive horn noise may provide some relief from noise; however, vegetation would not provide the noise mitigation that is available through this rule. Local jurisdictions may, of course, plant vegetation buffers outside the railroad right-of-way where possible. The use of vegetation as a noise barrier may also reduce a motorist's ability to see an approaching train, creating a situation where there are fewer cues upon which to make a proper driving decision.
Other	3	Install noise barriers along railroad tracks.	While noise barriers may provide a reduction in the noise to the community, barriers may also reduce the amount of noise available to warn the motorist of an approaching train. The locomotive horn provides a warning to the motorist in advance of the crossing so that an informed driving decision can be made. Noise barriers may hinder the delivery of the information needed and thus reduce safety at the crossing.
Other	3	Modify locomotives or trains to improve safety in accidents.	FRA has issued regulations that require the installation of additional lights on locomotives to make them more conspicuous. It has also issued regulations that require the regular inspection, testing, and maintenance of automatic warning devices. FRA is actively looking for ways to improve the safety of the railroad industry.

Other	1	Clear visual obstructions at grade crossings.	FRA is a strong proponent of providing good sight distances as a motorist is approaching or is at the crossing so that necessary visual information is available and proper action may be taken. It is noted that many visual obstructions are not on railroad rights-of-way. The rule requires that all new quiet zone public crossings be equipped with flashing lights and gates so that the visual evidence of an approaching train (i.e., flashing lights and gates) is directly in front of the motorist.
Other	3	The proposed rule recommends warning devices and signals that violate good traffic engineering practices.	Supplementary safety measures (SSMs) defined in this regulation are approved engineering methods to improve safety. A variety of SSMs are provided so that local traffic engineers have a number of alternatives to consider in designing a quiet zone that best meets the traffic needs of the local community.
Other	13	Eliminate grade crossings to improve safety.	FRA is a long time proponent of crossing elimination as a means to improve safety. Crossing closure is one of the actions to be considered when creating a quiet zone.
Quality of Life			
Quality of Life	116	Locomotive horn noise will adversely affect the quality of life in my community.	In communities that have silenced locomotive horns and that do not take advantage of the mitigation opportunities in the rule, the railroads will be required to sound the locomotive horn. If such communities decide not to create quiet zones, horn noise, like other sources of transportation noise, will probably be disturbing and may annoy people in those communities without quiet zones.
Quality of Life	3	The proposed rule will improve the quality of life in my community.	Provisions of the rule will allow communities now experiencing locomotive horn noise to create new quiet zones.

Rule Provisions			
Location (Rural vs. Urban)	4	The proposed rule is not appropriate for rural areas.	The rule provides a variety of methods that may be used to create a quiet zone in both rural and urban settings. This variety should enable a community, whether rural or urban, to provide for safety and reduce noise impacts through the creation of a quiet zone.
Location (Rural vs. Urban)	8	The proposed rule should have different requirements for rural and populated areas.	The rule provides a variety of methods that may be used to create a quiet zone in both rural and urban settings. This variety should enable a community, whether rural or urban, to provide for safety and reduce noise impacts. The rule attempts to provide equity of noise impact mitigation for all communities.
Location (Rural vs. Urban)	18	The proposed rule is not appropriate for urban or suburban areas.	The rule provides a variety of methods that may be used to create a quiet zone in both rural and urban settings. This variety should enable a community, whether rural or urban, to provide for safety and reduce noise impacts through the creation of a quiet zone.
Commuter vs. Freight	4	Locomotive horns are intended for freight trains, not commuter service. Requirements of the proposed rule should apply only to freight trains.	Locomotive horns are devices that provide an audible warning to motorists of an approaching train. A motorist needs to have information that a train is approaching, regardless of whether it is a freight or a commuter train, in order to make an informed driving decision at the crossing. It is noted that a collision with a commuter train imposes the risk of injury to the passengers in the commuter train. Therefore the locomotive horn provides a safety benefit to the passengers of the train as well.

Quiet Zones	23	FRA should provide flexibility and expand options for establishing quiet zones.	The interim final rule provides additional flexibility for the implementation of safety measures and allows communities to establish quiet zones if they meet either of two risk threshold goals: the Nationwide Significant Risk Threshold or a 31% reduction of existing risk. This provides communities flexibility in complying with the provisions of the rule. It also provides a means to demonstrate new technologies that can be used as supplementary safety measures (SSMs), so that the number of approved SSMs can be expanded.
Quiet Zones	1	The notification period for establishment of quiet zone is insufficient.	The rule provides that written notice be given to all railroads that operate over the crossings, the highway traffic control authority or law enforcement authority responsible for vehicular traffic over the crossings, all landowners having control over private crossings within the quiet zone, and the State agency responsible for crossing safety a minimum of 21 days prior to the effective date of the quiet zone. This 21-day notification period is increased from the 14 days provided in the Notice of Proposed Rulemaking.
Quiet Zones	7	A quiet zone should be considered if communities have improved safety at crossings or if adequate safety measures are in place.	Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT) or below twice the NSRT with no relevant collisions (which credits a low accident rate). New quiet zones may be created without additional safety measures if the Quiet Zone Risk Index is less than the NSRT (which demonstrates safety) and the public crossings are equipped with gates. This will enable communities with proven safety records to have quiet zones with minimal effort.
Quiet Zones	2	How many additional staff will FRA require to implement the proposed rule?	FRA does not plan on adding any additional staff other than the staff presently authorized. Previous staffing requests took into consideration workload associated with this rule.

Quiet Zones	15	State agencies and/or local jurisdictions should be allowed to establish quiet zones	The rule provides the means by which local jurisdictions may establish quiet zones with only minimal reporting requirements to FRA. This is explained in Part 222.39(a) of the rule, which is entitled "Public Authority Designation."
Quiet Zones	2	Congress should provide funding to establish quiet zones.	It is the responsibility of Congress to make this determination. State and local governments are allocated substantial funding annually through the Surface Transportation Program (STP) and the National Highway System (NHS) Program; and, with the likely exception of the 10% STP safety set-aside, these projects should be eligible for funding out of these sources. The STP and NHS are "block grant" programs preferred by the States because of the flexibility they provide to meet changing local needs.
Quiet Zones	1	The Surface Transportation Board should be informed of appropriate safety measures necessary to establish quiet zones.	The rule will be published in the Federal Register and will be available to the Surface Transportation Board. FRA will continue to make the Board aware of the implications of this rulemaking for pending transactions.
Quiet Zones	11	Some communities want existing whistle bans maintained.	Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT) or below twice the NSRT with no relevant collisions (which credits a low accident rate). If a community does not qualify for one of these two options, it may take the necessary steps to comply with the provisions of the rule and thus create a quiet zone.

Quiet Zones	16	Costs and/or procedures for meeting quiet zone requirements are excessive for the community.	The rule provides a variety of methods that may be used to create a quiet zone including both engineering and education/enforcement solutions. This variety of options should provide communities with sufficient alternatives to reduce the cost of implementing a quiet zone. A community that chooses to use the corridor risk reduction methods may not have to treat every crossing with supplementary safety measures in order to create a quiet zone, which will reduce costs.
Quiet Zones	38	Some communities would like to establish quiet zones.	The rule provides a variety of methods that may be used to create a quiet zone including both engineering and education/enforcement solutions.
Quiet Zones	3	Local noise reduction solutions should be used before establishing quiet zones.	The rule provides a mechanism to create a quiet zone that provides for safety and noise reduction. Studies show that local noise reduction solutions that silence locomotive horns without providing for enhanced safety (i.e., whistle bans without supplementary safety measures) result in a higher collision rate at ban crossings as compared with similar crossings where horns are sounded.
Quiet Zones	2	Uniform standards for establishing quiet zones should be established by FRA.	The rule provides a variety of methods that may be used to create a quiet zone in both rural and urban settings. This variety should enable a community, whether rural or urban, to provide for safety and reduce noise impacts through the creation of a quiet zone. The rule attempts to provide equal safety objectives for all communities and has established uniform standards for creating new quiet zones.
Quiet Zones	1	We are unclear about the quiet zone application procedure and approval process.	FRA has developed a web-based quiet zone calculator that provides a step-by-step process to follow in order to apply for a quiet zone. FRA's regional crossing managers will also be available to provide guidance.

Operating Speed	11	Exemption from the proposed rule should be provided for slower operating speeds.	The rule does provide an exemption from the requirement to sound horns for trains moving 15 mph or less and if the crossing is flagged by a crewmember or appropriately equipped flaggers.
Operating Speed	2	There is a conflict between the requirement for 20-second warnings and horn usage no more than 1/4 mile from crossing at higher operating speeds.	The rule provides that a train must provide a 15 to 20 second audible warning when approaching a public crossing and that the warning should not be sounded more than ¼ of a mile from the crossing. This means that a train traveling in excess of 45 mph will provide less than 15 seconds of warning. There is minimal safety benefit for the motorist when a train horn is sounded more than a quarter of a mile away due to the loss of sound volume over distance.
Operating Speed	2	No exemption should be provided for slow operating speeds.	The rule does provide an exemption from the requirement to sound the horn for trains moving 15 mph or less and if the crossing is flagged by a crewmember or appropriately equipped flaggers. However, unless there is a flagger at the crossing, slow moving trains must comply with the regulations and sound the horn unless in a quiet zone created under the regulations.
Grandfathering	5	Communities with existing whistle bans should be "grandfathered" in the proposed rule.	Pre-Rule Quiet Zones will be allowed to remain in place if the quiet zone's risk is below the Nationwide Significant Risk Threshold (NSRT) or below twice the NSRT with no relevant collisions (which credits a low accident rate). If a community does not qualify for one of these two options, it may take the necessary steps to comply with the provisions of the rule to create a quiet zone.

Scope of Rule	6	A uniform rule should not be applied nationwide.	The rule provides a variety of methods that may be used to create a quiet zone. This variety should enable a community, whether rural or urban, to provide for safety and reduce noise impacts through the creation of a quiet zone. The rule attempts to provide equity for all communities. The use of the corridor risk reduction method allows for variations that may exist from community to community to account for differences in train operations, highway traffic, and safety records at the crossings.
Scope of Rule	14	The proposed rule should take into account variations in types of trains, crossing devices, operating speeds, and service frequencies.	The use of the corridor risk reduction method allows for variations in train operations, highway traffic, and safety records at the crossings.
Scope of Rule	2	Portions of the proposed rule are unclear, and a simpler rule that is easier to implement is needed.	FRA has endeavored to be as clear and concise as possible in the interim final rule. FRA has developed a web-based quiet zone calculator that will provide a step-by-step process to follow in order to aid communities in their application for a quiet zone. FRA's regional crossing managers will also be available to provide guidance. These managers are listed at: www.fra.dot.gov/faq/fieldoffices.htm.
Scope of Rule	1	Review provisions of proposed rule (Section 222.9) to determine whether they adequately address safety of operating locomotive with defective horn.	Noted. See 49 CFR §229.9.
Scope of Rule	1	The proposed rule includes unwarranted data collection and monitoring requirements.	Data collection required by the rule includes updating the crossing inventory to ensure that the data needed to calculate the quiet zone risk index is present and correct. This verification/update is required only every three or five years, depending on how the quiet zone was created. Monitoring of alternative safety measures is necessary to ensure that education or enforcement efforts are still effective as a replacement of the locomotive horn.
Scope of Rule	8	Implementation of the proposed rule should be expedited.	Noted.

Scope of Rule	2	Joint application requirement for waiver from the proposed rule or for establishment of a quiet zone gives veto power to railroads.	A waiver is different from an application for a quiet zone. A waiver is a request to waive a provision of the regulation. The rule provides that a waiver should be from both the railroad and the community; however it does provide a means to submit single party waivers so that one party does not have veto powers. A quiet zone application is not a waiver application and does not require a joint application.
Traffic Issues			
Traffic Issues	2	Vehicles stopping on railroad tracks are an important factor in accidents.	Protection and warning devices are installed at grade crossings to warn motorists of approaching trains. Where there is a demonstrated history of vehicles queuing onto the tracks, existing traffic engineering practice provides options for local jurisdictions to reduce this potential occurrence.
Traffic Issues	15	Increased railroad traffic is causing increased locomotive horn noise.	Changes in railroad traffic occur in response to economic conditions, as well as marketing and routing considerations of the various railroads. These changes in railroad traffic are independent of the requirement to sound locomotive horns at grade crossings.
Traffic Issues	2	The proposed rule will divert passengers from railroads to automobiles.	There is no logical or accepted causal link, of which FRA is aware, between the sounding of locomotive horns and the diversion of railroad passengers to automobiles.
Traffic Issues	3	Increased train traffic increases risk of collision or derailment.	Increased train traffic is one of many factors affecting the risk of railroad accidents.

Traffic Issues	2	Growth in vehicular and train traffic is the cause of grade crossing safety problems.	The prediction of grade crossing safety is complex and is dependent on many different factors including speed, visibility, weather, crossing geometry, protection/warning device(s), traffic levels, and others. Increased vehicular and train traffic interacting at grade crossings is one of these many factors affecting the risk of railroad grade crossing accidents. However, implementation of safety programs like this rule has driven down risk on a normalized basis (i.e., per train or per 1,000 motor vehicles).
Whistles and Horns			
Effectiveness	4	Due to their disruptive effect, locomotive horns are safety hazards.	This hypothesis is not borne out by empirical experience. Several studies have shown that when whistle bans are ended, and train horns sounded, collisions decrease. The Florida study showed that there was a dramatic (195%) increase in crossing collisions during nighttime whistle bans. Gated whistle ban crossings experience a 44% higher collision rate than gated crossings where the horn is sounded.
Effectiveness	9	Locomotive horns are needed to ensure safety at grade crossings.	Several studies have shown that when whistle bans are ended, and train horns sounded, collisions decrease. The Florida study showed that there was a dramatic (195%) increase in crossing collisions during nighttime whistle bans. Gated whistle ban crossings experience a 44% higher collision rate than gated crossings where the horn is sounded.
Type of Whistle/Horn	4	Locomotive horns should use a uniform sound pattern.	The rule requires that the traditional sound pattern of two longs, one short, and one long will be the uniform sound pattern for trains that are approaching a grade crossing.
Type of Whistle/Horn	2	Will the rule require locomotives to be equipped with dual (front and rear) horn systems?	No. However it does require that the lead locomotive be equipped with a horn that complies with the minimum and maximum sound levels specified in the rule in its direction of travel.

Type of Whistle/Horn	1	Do new locomotives need to be equipped with 114 dBA horns?	No. New locomotives would need to be equipped with horns that comply with the minimum (96 dB) and maximum (110 dB) sound level requirements.
Other	1	Safety recordings of horn usage should be automatically activated.	FRA requires event recorders on the lead locomotive on any train that travels faster than 30 mph (49 CFR Part 229.135(a)). While not required by regulation, most event recorders collect data on the use of locomotive horns. This issue is being further considered through the Railroad Safety Advisory Committee.
Other	5	Support use of variable sound levels for locomotive horns.	FRA requested comments in the Notice of Proposed Rulemaking (NPRM) of the concept of using train horns with different sound levels but did not receive comments that demonstrated that this would be an effective means of providing for the safety of motorists.
Other	3	Are locomotive horns the appropriate technology for future railroad safety?	FRA is interested in any new technology that will improve railroad safety. The locomotive horn has proved to be an effective device in improving safety at crossings and should be used until more effective technology has been created to replace it.
Other	1	Directionality requirements will harm occupants of locomotive cabs.	FRA is not specifically addressing the issue of directionality in the rule. New testing requirements for the sound level of the horn are expected to reduce the volume of the loudest horns, including noise that is emitted to the sides of the locomotive. Research and testing have indicated technical and implementation issues that are not resolved.
Other	1	Whistle blowing should be stopped prior to the crossing.	The rule will require that the horn be sounded until the train occupies the crossings. 25% of motor vehicle and train accidents involve motorists striking the side of the train.

Other	3	Will subway trains and all commuter rail cars are required to have horns?	This rule applies to all trains that operate on the general railroad system of transportation. It does not apply to rapid transit operations within an urban area that are not connected to the general railroad system. Subway trains will not be subject to this rule. Commuter trains that operate on the general system will be subject to the rule.
Other	2	Locomotive horn use by freight railroads is poorly monitored.	Noted.
Other	2	The proposed rule would add to locomotive engineers' responsibilities.	Locomotive horns are currently sounded at 98% of all public crossings under State regulations or under railroad operating rules. This rule will not create any additional responsibilities to the locomotive engineers with the exception of the institution of new quiet zones. Representatives of locomotive engineers indicated support for time-based sounding of the horn. The quiet zone concept will hold down the number of variations in horn use patterns. FRA does not believe that this will unduly burden locomotive engineers.

APPENDIX D

TOTAL PERSONS POTENTIALLY AFFECTED BY COUNTY

County	State	Persons Impacted	Persons Severely Impacted
Garland County	Arkansas	13	0
Jefferson County	Arkansas	1,060	352
Miller County	Arkansas	334	135
Los Angeles County	California	13,358	7,439
Orange County	California	8,269	4,065
Sacramento County	California	7,400	3,294
Volusia County	Florida	8	4
Chatham County	Georgia	686	365
Fulton County	Georgia	689	397
Muscogee County	Georgia	12	4
Jackson County	Iowa	508	377
Lee County	Iowa	7	3
Osceola County	Iowa	161	85
Champaign County	Illinois	333	90
Cook County	Illinois	150,310	78,058
De Kalb County	Illinois	2,390	858
Du Page County	Illinois	25,965	12,877
Franklin County	Illinois	4	1
Iroquois County	Illinois	392	193
Kane County	Illinois	543	188
Lake County	Illinois	13,406	5,526
Lee County	Illinois	670	325
Macon County	Illinois	456	189
Madison County	Illinois	62	23
Marion County	Illinois	2	0
McHenry County	Illinois	6,404	3,030
McLean County	Illinois	323	139
Morgan County	Illinois	228	83
Perry County	Illinois	34	15
Sangamon County	Illinois	715	286
St. Clair County	Illinois	564	230
Stephenson County	Illinois	218	67
Will County	Illinois	287	151
Williamson County	Illinois	79	15
Winnebago County	Illinois	0	0
Clinton County	Indiana	1,870	884

County	State	Persons Impacted	Persons Severely Impacted
Lake County	Indiana	3,846	1,614
St. Joseph County	Indiana	15,688	7,901
Tippecanoe County	Indiana	1,527	694
Calcasieu County	Louisiana	975	455
Jefferson County	Louisiana	3,191	1,687
Essex County	Massachusetts	9,300	4,567
Middlesex County	Massachusetts	24,504	12,710
Suffolk County	Massachusetts	5,312	1,695
Baltimore County	Maryland	1,107	570
Washington County	Maryland	318	169
Androscoggin County	Maine	1,737	673
Aroostook County	Maine	402	161
Cumberland County	Maine	4,505	2,027
Knox County	Maine	215	86
Oxford County	Maine	3	2
Penobscot County	Maine	2,779	1,464
Somerset County	Maine	680	312
York County	Maine	1,722	811
Dakota County	Minnesota	95	35
Hennepin County	Minnesota	8,057	3,123
Ramsey County	Minnesota	6,841	3,667
Rice County	Minnesota	131	25
Winona County	Minnesota	7,179	3,700
Wright County	Minnesota	193	58
St. Louis County	Missouri	4,426	2,026
St. Louis City	Missouri	6,117	2,433
Nash County	North Carolina	405	107
Albany County	New York	3,291	1,770
Chautauqua County	New York	1,472	641
Monroe County	New York	240	110
Saratoga County	New York	1,154	535
Schenectady County	New York	329	99
Belmont County	Ohio	72	3
Butler County	Ohio	689	325
Deschutes County	Ohio	424	187
Umatilla County	Oregon	2,686	1,535
Adams County	Pennsylvania	652	275
Northumberland County	Pennsylvania	521	264
York County	Pennsylvania	1,211	582

County	State	Persons Impacted	Persons Severely Impacted
Abbeville County	South Carolina	62	21
Greenwood County	South Carolina	979	317
Harris County	Texas	2,327	1,204
Kleberg County	Texas	1,056	350
Nueces County	Texas	196	84
Botetourt County	Virginia	333	163
Charlottesville (City)	Virginia	348	147
Covington (City)	Virginia	172	55
Emporia (City)	Virginia	950	419
Franklin County	Virginia	122	75
Greensville County	Virginia	63	15
James City County	Virginia	36	8
Montgomery County	Virginia	349	156
Norfolk (City)	Virginia	254	147
Pulaski County	Virginia	274	71
Roanoke County	Virginia	254	134
Roanoke (City)	Virginia	1,744	672
Salem (City)	Virginia	576	190
Smyth County	Virginia	538	235
Staunton (City)	Virginia	84	28
Suffolk (City)	Virginia	3,558	1,754
Tazewell County	Virginia	703	429
Washington County	Virginia	707	336
Williamsburg (City)	Virginia	75	13
Wise County	Virginia	379	187
York County	Virginia	4	1
Chelan County	Washington	293	98
King County	Washington	4,385	2,328
Spokane County	Washington	566	189
Brown County	Wisconsin	7,190	4,106
Buffalo County	Wisconsin	28	13
Crawford County	Wisconsin	1,674	637
Dane County	Wisconsin	6,937	2,788
Dodge County	Wisconsin	77	28
Douglas County	Wisconsin	4,130	1,863
Fond Du Lac County	Wisconsin	3,092	1,524
Jefferson County	Wisconsin	1,233	494
Kenosha County	Wisconsin	597	223
La Crosse County	Wisconsin	4,149	1,846

County	State	Persons Impacted	Persons Severely Impacted
Marathon County	Wisconsin	3,711	1,938
Milwaukee County	Wisconsin	12,649	5,346
Outagamie County	Wisconsin	673	349
Portage County	Wisconsin	440	218
Price County	Wisconsin	145	61
Racine County	Wisconsin	751	309
Walworth County	Wisconsin	8	1
Waukesha County	Wisconsin	5,323	2,444
Winnebago County	Wisconsin	8,523	4,206
Wood County	Wisconsin	634	192
Wayne County	West Virginia	504	246
TOTALS:		**457,265**	**224,410**

Note: Persons "severely impacted" are a subset of the number of persons "impacted".

APPENDIX E

TOTAL PERSONS POTENTIALLY AFFECTED BY CITY

City	State	Persons Impacted	Persons Severely Impacted
Hot Springs Naval Base	Arkansas	6	0
Mountain Pine	Arkansas	7	0
Pine Bluff	Arkansas	1,060	352
Texarkana	Arkansas	334	135
Anaheim	California	3,689	1,794
Duarte	California	129	27
Los Angeles	California	9,998	5,336
Placentia	California	4,580	2,271
Sacramento	California	7,400	3,294
South Pasadena	California	3,231	2,076
Deland	Florida	8	4
Columbus	Georgia	12	4
Garden City	Georgia	259	134
Hapeville	Georgia	689	397
Savannah	Georgia	427	231
Ashton	Iowa	161	85
Bellevue	Iowa	508	377
Keokuk	Iowa	7	3
Alsip	Illinois	676	211
Arlington Heights	Illinois	5,049	2,827
Ashton	Illinois	669	325
Aurora	Illinois	167	15
Bannockburn	Illinois	104	32
Barrington	Illinois	1,462	631
Bedford Park	Illinois	1,152	548
Belleville	Illinois	564	230
Berwyn	Illinois	6,952	3,440
Bloomington	Illinois	323	139
Blue Island	Illinois	1,597	1,060
Bridge View	Illinois	194	67
Brookfield	Illinois	4,164	2,066
Burnham	Illinois	109	45
Calumet Park	Illinois	2,245	1,517
Cary	Illinois	512	207
Centralia	Illinois	2	0
Champaign	Illinois	333	90
Chicago	Illinois	73,380	40,715
Chicago Ridge	Illinois	1,514	794

City	State	Persons Impacted	Persons Severely Impacted
Cicero	Illinois	3,058	1,628
Clarendon Hills	Illinois	3,234	1,505
Crystal Lake	Illinois	2,069	1,047
De Kalb	Illinois	2,390	858
Decatur	Illinois	456	189
Deerfield	Illinois	1,615	694
Des Plaines	Illinois	7,549	3,515
Dixmoor	Illinois	614	352
Dolton	Illinois	541	214
Downers Grove	Illinois	4,724	2,340
Du Quoin	Illinois	34	15
Elmhurst	Illinois	739	324
Fox River Grove	Illinois	872	425
Frankfort	Illinois	246	143
Franklin Park	Illinois	990	560
Geneva	Illinois	376	173
Glen Ellyn	Illinois	1,106	408
Glencoe	Illinois	374	161
Glenview	Illinois	1,036	470
Golf	Illinois	257	86
Granite City	Illinois	62	23
Harvard	Illinois	1,726	830
Herrin	Illinois	79	15
Highland Park	Illinois	3,302	1,373
Highwood	Illinois	2,908	1,478
Hinsdale	Illinois	1,160	480
Jacksonville	Illinois	228	83
Kenilworth	Illinois	701	307
La Grange	Illinois	9,242	4,829
Lake Forest	Illinois	1,711	689
Lena	Illinois	218	67
Lombard	Illinois	2,182	931
Maywood	Illinois	5,151	1,744
Melrose Park	Illinois	82	27
Morton Grove	Illinois	1,267	626
Mt. Prospect	Illinois	3,130	1,146
Naperville	Illinois	2,503	1,321
New Lenox	Illinois	27	7
Niles	Illinois	263	71
Normandy	Illinois	1	0
North Chicago	Illinois	667	313

City	State	Persons Impacted	Persons Severely Impacted
Northbrook	Illinois	947	373
Palatine	Illinois	3,435	1,607
Park Ridge	Illinois	3,006	1,234
Prairie View	Illinois	460	173
River Forest	Illinois	454	241
River Grove	Illinois	21	3
Riverside	Illinois	3,200	1,888
Rockford	Illinois	0	0
Romeoville	Illinois	14	1
Round Lake	Illinois	539	256
Round Lake Beach	Illinois	297	142
Sesser	Illinois	4	1
Springfield	Illinois	715	286
Summit	Illinois	3	1
Villa Park	Illinois	3,994	2,202
Watseka	Illinois	392	193
Waukegan	Illinois	682	228
West Chicago	Illinois	500	410
Western Springs	Illinois	3,045	1,346
Westmont	Illinois	1,145	559
Wheaton	Illinois	4,073	2,145
Wheeling	Illinois	292	131
Wilmette	Illinois	3,326	1,571
Winfield	Illinois	605	252
Winthrop Harbor	Illinois	101	15
Woodstock	Illinois	1,225	521
Zion	Illinois	852	139
East Chicago	Indiana	1,416	463
Frankfort	Indiana	1,870	884
Hammond	Indiana	2,430	1,151
Lafayette	Indiana	1,527	694
Mishawaka	Indiana	7,877	3,907
South Bend	Indiana	7,811	3,994
Lake Charles	Louisiana	975	455
New Orleans	Louisiana	3,191	1,687
Acton	Massachusetts	101	48
Andover	Massachusetts	643	331
Belmont	Massachusetts	977	412
Beverly	Massachusetts	4,476	2,308
Cambridge	Massachusetts	2,793	1,482
Chelsea	Massachusetts	5,312	1,695

City	State	Persons Impacted	Persons Severely Impacted
Concord	Massachusetts	1,931	1,032
Everett	Massachusetts	31	25
Gloucester	Massachusetts	1,390	673
Hamilton	Massachusetts	342	134
Ipswich	Massachusetts	664	343
Lawrence	Massachusetts	1,034	418
Lincoln	Massachusetts	307	192
Manchester	Massachusetts	374	200
Medford	Massachusetts	2,260	1,160
Melrose	Massachusetts	4,830	2,656
Newbury	Massachusetts	8	0
North Andover	Massachusetts	306	126
Reading	Massachusetts	1,504	850
Shirley	Massachusetts	439	222
Somerville	Massachusetts	2,789	1,383
Wakefield	Massachusetts	2,717	1,459
Waltham	Massachusetts	3,268	1,500
Wenham	Massachusetts	63	34
Weston	Massachusetts	557	289
Baltimore Highlands	Maryland	1,107	570
Hagerstown	Maryland	318	169
Auburn	Maine	1,053	400
Augusta	Maine	194	53
Bangor	Maine	21	11
Biddeford	Maine	611	258
Brewer	Maine	1,147	715
Brunswick	Maine	123	37
Caribou	Maine	180	67
Fairfield	Maine	584	284
Falmouth	Maine	43	21
Freeport	Maine	73	27
Lewiston	Maine	638	262
Livermore Falls	Maine	46	11
Milford	Maine	213	113
Millinocket	Maine	543	289
Newport	Maine	80	33
North Berwick	Maine	170	78
Old Orchard Beach	Maine	941	475
Old Town	Maine	353	111
Orono	Maine	422	192
Pittsfield	Maine	96	28

City	State	Persons Impacted	Persons Severely Impacted
Portland	Maine	3,052	1,417
Presque Isle	Maine	197	85
Rockland	Maine	215	86
Rumford	Maine	3	2
Van Buren	Maine	25	9
Waterville	Maine	402	171
Westbrook	Maine	568	286
Yarmouth	Maine	50	15
Buffalo	Minnesota	193	58
Maplewood	Minnesota	198	83
Minneapolis	Minnesota	7,327	2,784
New Hope	Minnesota	43	14
North St. Paul	Minnesota	507	335
Northfield	Minnesota	131	25
Plymouth	Minnesota	747	347
South St. Paul	Minnesota	95	35
St. Paul	Minnesota	6,076	3,227
Winona	Minnesota	7,179	3,700
Kirkwood	Missouri	2,128	997
St. Louis	Missouri	6,117	2,433
Webster Groves	Missouri	2,298	1,029
Rocky Mount	North Carolina	405	107
Cohoes	New York	2,435	1,315
Dunkirk	New York	1,472	641
Mechanicville	New York	1,154	535
Rochester	New York	240	110
Schenectady	New York	329	99
Watervliet	New York	856	455
Bellaire	Ohio	72	3
Middletown	Ohio	689	325
Bend	Oregon	424	187
Pendleton	Oregon	2,686	1,535
Gettysburg	Pennsylvania	652	275
Hanover	Pennsylvania	1,211	582
Sunbury	Pennsylvania	521	264
Abbeville	South Carolina	62	21
Greenwood	South Carolina	979	317
Baytown	Texas	1,800	957
Corpus Christi	Texas	196	84
Highlands	Texas	420	200
Kingsville	Texas	1,056	350

City	State	Persons Impacted	Persons Severely Impacted
McNair	Texas	107	47
Abingdon	Virginia	707	336
Appalachia	Virginia	377	187
Bluefield	Virginia	703	429
Buchanan	Virginia	333	163
Charlottesville	Virginia	348	147
Christiansburg	Virginia	349	156
Covington	Virginia	172	55
Emporia	Virginia	1,013	434
Marion	Virginia	538	235
Norfolk	Virginia	254	147
Norton	Virginia	2	0
Pulaski	Virginia	274	71
Roanoke	Virginia	1,998	806
Rocky Mount	Virginia	122	75
Salem	Virginia	576	190
Staunton	Virginia	84	28
Suffolk	Virginia	3,558	1,754
Williamsburg	Virginia	115	22
Dishman	Washington	149	69
Seattle	Washington	4,385	2,328
Spokane	Washington	417	120
Wenatchee	Washington	293	98
Appleton	Wisconsin	673	349
Burlington	Wisconsin	751	309
Elm Grove	Wisconsin	375	144
Fond Du Lac	Wisconsin	2,791	1,431
Fountain City	Wisconsin	28	13
Fox Point	Wisconsin	762	308
Green Bay	Wisconsin	7,190	4,106
Junction City	Wisconsin	232	127
La Crosse	Wisconsin	3,700	1,658
Madison	Wisconsin	6,937	2,788
Marshfield	Wisconsin	634	192
Menasha	Wisconsin	1,588	870
Milwaukee	Wisconsin	4,181	1,683
Mosinee	Wisconsin	0	0
Mukwonago	Wisconsin	523	220
N. Fond Du Lac	Wisconsin	301	93
Neenah	Wisconsin	2,433	1,241
Onalaska	Wisconsin	449	188

City	State	Persons Impacted	Persons Severely Impacted
Oshkosh	Wisconsin	4,502	2,095
Park Falls	Wisconsin	145	61
Pleasant Prairie	Wisconsin	597	223
Prairie Du Chien	Wisconsin	1,674	637
Saint Francis	Wisconsin	1,077	427
Solon Springs	Wisconsin	162	69
Superior	Wisconsin	3,968	1,794
Watertown	Wisconsin	1,310	522
Waukesha	Wisconsin	4,433	2,081
Wausau	Wisconsin	3,711	1,938
Wauwatosa	Wisconsin	1,642	710
West Allis	Wisconsin	4,748	2,102
West Milwaukee	Wisconsin	239	116
Whiting	Wisconsin	208	91
Kenova	West Virginia	504	246
TOTALS:		**445,611**	**217,504**

Note: Persons "severely impacted" are a subset of the number of persons "impacted".

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