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FRA-1999-6439-12

Regulatory Evaluation and Initial Regulatory Flexibility Assessment
for
Use of Locomotive Horns at Highway-Rail Grade Crossings
(49 CFR PART 222)
December 27, 1999

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Appendices:

I. Introduction

One of the more persistent problems facing the railroads and the public is highway-rail grade crossing collisions and their associated casualties. Significant improvements have been made by Federal, State, Local, labor and industry initiatives both to improve the safety of grade crossings and to increase the motorist's awareness of approaching trains at crossings. Of the nearly 167,000 public grade crossings, 59,000 public crossings are equipped with gates and/or flashing lights. However, many motorists fail to heed even these warnings and somewhat limit their effectiveness.

Efforts to improve the visibility of the locomotive to the motorist have recently been enacted by the Federal Railroad Administration (FRA). The locomotive visibility rule requires locomotives which operate at speeds greater than 20 mph to be equipped with bright lights which form a triangular pattern. This requirement will give the motorist an additional visual indication that a train is approaching. The rule required compliance by December 31, 1997. These alerting lights have already been applied to the majority of the fleet.

Train whistles are another means to alert the motorist that a train is approaching. The train whistle also gives speed, direction and proximity indications to the motorist, providing awareness not only of the presence of a train, but also how close it is to the crossing. If a whistle ban is in effect in a particular location, the motorists in that location are not given the audible sound of a train horn as a warning that a train is approaching, nor can they get a better sense of how much time they have to cross the track if they cannot see the train. This type of information can be crucial to the motorist at crossings with only a crossbuck sign as warning.

Some communities, especially those with many crossings and a high volume of train traffic, believe that the sounding of train whistles at every crossing is excessive and may diminish community quality of life, and have enacted "whistle bans" that prevent the trains from sounding their whistles entirely, or during particular times (usually at night). FRA is concerned that with the increased risk at grade crossings without the sounding of train whistles or other means of warning, collisions and casualties at grade crossings may increase.

This document presents the results of an evaluation of the economic impact of FRA's Notice of Proposed Rulemaking (NPRM), which would require use of the train horn to warn motorists at highway-rail crossings. The proposed rule would also define conditions under which existing whistle bans could be maintained or new bans might be instituted in the future.

II. Problem Statement

The problem considered by this rule are collisions and their associated casualties and property damage involving vehicles on public highways and the front ends of trains at whistle-ban grade crossings. Although accident severity and the probability of a fatal accident is most strongly related to train speed, every whistle-ban crossing is a potential accident site. In 1996 there were 79 accidents at whistle-ban crossings which resulted in 2 fatalities, 39 injuries to non-railroad employees, and 2 injuries to railroad employees.

Both the increase in risk at whistle-ban crossings and train horn effectiveness have been documented by FRA. A national study using both empirical data and a computer model showed significant increases in the number of accidents on crossings with whistle bans'. Using an initial base of 2,122 public, at-grade crossings, accidents while whistle bans were imposed numbered 130; without whistle bans (horn blowing allowed), the number of accidents dropped to 80, a 38% decline. Train whistles were also shown to have a deterrent effect on motorists attempting to go around lowered crossing gates.

FRA was concerned about the higher risk disclosed by the nationwide study. While crossing collisions are infrequent events at individual crossings, the nationwide study, and the experience in Florida, showed they were more frequent when train horns were not sounded.

This rule is required by law. The Swift Rail Development Act was enacted on November 2, 1994.[2] This law requires the use of locomotive horns at grade crossings, but gives FRA authority to make reasonable exceptions. Congress amended this law on October 9, 1996.[3] The amended law now requires the FRA to take into account the interest of communities that have in effect restrictions on the sounding of a locomotive horn at highway-rail crossings. In addition it requires FRA to work in partnership with affected communities to provide technical assistance, and to provide a reasonable amount of time for local communities to install supplementary safety measures taking into account local safety initiatives.

Congress intended for this proposed rule once enacted to enhance safety at whistle ban crossings, either by sounding the whistle or by the community selecting alternative safety measures to reduce the risk for the motorist. The risk reduction will result in fewer accidents, injuries and fatalities at grade crossings.

III. Findings

The benefits in terms of lives saved and injuries prevented will exceed the costs imposed on society for this proposed rule. Even under the best case scenario (falling accident rates over time) the safety benefits alone, excluding any benefit to railroads, exceed the most costly realistic scenario for community safety enhancements. FRA has a preliminary assessment of the effects to homeowners or businesses adjacent to railroads tracks, where an existing whistle-ban exists, should the community elect not to pursue a qualifying quiet zone. The results of this study are summarized in Section VII of this report, and conclude that there is not a significant long-run impact on residential housing markets. For purposes of this analysis FRA assumes that such communities will choose to take actions that have the least cost (i.e. a cost that will not exceed

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'US Department of Transportation, Federal Railroad Administration, *Nationwide Study of Train Whistle Bans,* April 1995.

[2] Public Law 103-440.

[3] Public Law 104-264.

the costs of supplementary or alternative safety measures).

The estimated benefits of this proposed rule exceed the estimated costs over a 20 year period at a 7% discount rate. Various benefit and cost scenarios are established in the following sections. The costs are summarized in Table 1, the benefits resulting from casualties prevented are shown in Table 2. These findings are somewhat preliminary as FRA does not have detailed data for the effectiveness or costs for some of the supplementary safety measures. FRA does not have adequate information on what choices a given community will make regarding either blowing the train whistle or installing or implementing alternatives to the train whistle. FRA seeks comment and additional information from communities regarding choices they will make so that a more complete estimate of the costs and benefits of this rule may be made prior to the issuance of the final rule.

Table 1. Estimated Costs[4]

Whistle Boards	$20,250
Installation of Gates & Lights(878 crossings)[5]	$67,109,706
Increased Maintenance Gates/Lights (878)	$11,201,974
Signs	$375,500
Community Planning	$134,000
Government Costs	$134,000
Medians (mountable at 878 crossings)	$11,060,183
Medians (mountable at all crossings)	$26,453,740
Police Enforcement	$24,805,600
Photo Enforcement	$124,955,453

The estimated safety benefits of this proposed rule are derived from the prevention of accidents and the resulting fatalities and injuries. Benefits also exist for railroads in terms of reduced train delay, debris removal and repairs. Two benefit scenarios were estimated, one where the accident rate remains constant over time and one where the accident rate declines by about 4% per year.

[4]This table cannot be summed for a total cost of the rule, much of the cost depends on community choice. Numbers for Police and Photo Enforcement are shown, however they are also contained in the benefits section.

[5]The number of passive crossings in the data set that are assumed to require upgrades.

Table 2. Estimated Benefits

Category	Effectiveness ~ .38[6]	Effectiveness ~ .75[7]
Collision Rate Constant	$258,641,800	$510,477,200
Collision Rate Decline	$188,273,400	$371,592,200

A scenario where median barriers are installed at each crossing, signs are installed at each crossing and crossing upgrades to a minimum of gates and lights for all passive crossings would be justified on the basis of casualties prevented alone (at 2,100 crossings total costs for all required improvements, including changes in direction of horn sound, and maintenance equal $116,395,343).

[6] Equivalent to effectiveness of train whistle at crossings with gates and lights.

[7] Equivalent to effectiveness of median barrier with frangible delineators at crossings with gates and lights.

Table 3. Costs and Benefits of Alternative Implementation Scenarios for Proposed Rule, Net Present Value 1999-2019[1]

Implementation Scenario	Costs Monetized/ Non-Monetized	Benefits		Net Monetized Benefits
		Injury/Fatality Reduction	Monetized Injury/Fatality	
Train whistles at crossing with gates and lights, collision rate constant[2]	$89,313,931 Indeterminate level of noise costs	(68 Fatalities) (342 Injuries)	$258,641,800	$169,327,869
Train whistles at crossing with gates and lights, collision rate decline[3]	$89,313,931 Indeterminate level of noise costs	(47 Fatalities) (235 Injuries)	$188,273,400	$98,959,469
Median barrier with frangible delineators at crossings with lights and gates, collision rate constant[4]	$116,395,343	(135 Fatalities) (675 Injuries)	$510,477,200	$394,081,857
Median barrier with frangible delineators at crossings with lights and gates, collision rate decline'	$116,395,343	(97 Fatalities) (463 Injuries)	$371,592,200	$255,196,857

All figures assume 7% discount rate. The baseline to which these scenarios are compared is the continuation of the whistle-bans in the communities that now have them. See table below for categories of costs and benefits included in these monetized estimates.

2. Assumes a 38% reduction in fatalities and injuries and an accident rate that is constant over time. Reduction in fatalities and injuries is the same 38%, the equivalent effectiveness of a train horn whether the horn is sounded or not. Costs include installation and maintenance of gates and lights at 878 passive crossings.

3. Assumes a 38% reduction in fatalities and injuries and an accident rate that declines by about 4% per year. Reduction in fatalities and injuries is the same 38%, the equivalent effectiveness of a train horn whether the horn is sounded or not. Costs include installation and maintenance of gates and lights at 878 passive crossings.

4. Assumes a 75% reduction (effectiveness rate of median barrier) in fatalities and injuries and an accident rate that is constant over time.

5. Assumes a 75% reduction (effectiveness rate of median barrier) in fatalities and injuries and an accident rate that declines by about 4% per year.

Table 4. Categories of Monetized and Non-monetized Costs and Benefits Included in Above Analysis

Category		Monetized	Non-monetized
Costs	train whistles at crossings with gates and lights	-whistle boards(see §222.21) -directionality provision (see §229.129) -upgrades to gates and lights at passive crossings	-indeterminate level of noise costs
	supplementary safety measures	-upgrades to gates and lights at passive crossings -community costs -government costs -whistle boards -directionality -Supplementary Safety Measures and Alternative Safety Measures (see §222.33)	-none
Benefits	train whistles at crossings with gates and lights	-reduction in injuries and fatalities	-community noise reduction through whistle boards and the directionality provision
	supplementary safety measures	-reduction in injuries and fatalities (greater reduction than train horn is likely as all SSM's have higher effectiveness rate than train horn)	-reduced train delay, debris removal and repairs -collisions/incidents involving pedestrians and bicyclists -incidents where car struck train at behind the first five cars -community noise reduction through quiet zones in communities where state law currently requires the use of the train horn

IV. Collisions at Whistle-Ban Crossings

Data

As of FRA's 1991 nationwide survey, there were 2,122 crossings subject to whistle bans. FRA subsequently received information that there are an additional 1,500 to 1,800 crossings in the Chicago area where train horns are not sounded as well as other crossings throughout the country where whistles are not sounded. FRA made a substantial effort to collect this information with the City of Chicago, the Chicago Area Transportation Study (CATS), the Chicago Operating Rules Association (CORA), the Association of American Railroads (AAR), the Association of Short Line Railroads of America (ASLRA) and FRA Grade Crossings Managers. CATS was especially helpful with this endeavor. As a result of these efforts, FRA added about 700 crossings to the list of whistle ban crossings and dropped crossings where the whistle ban was no longer in effect or where the crossing had been closed.

However, data on the location of whistle-ban grade crossings is difficult to obtain. Some towns may have informal understandings with a railroad and FRA may not have successfully collected this information. Other locations may have so much railroad activity and so many whistle-ban crossings that even with extensive data collection efforts some crossings may be missed. The Chicago metropolitan area has nearly 2,000 public at-grade crossings and is the rail hub of the United States. However, despite repeated attempts by FRA to obtain whistle-ban crossing data, information from every railroad was not obtainable. Analysis of the collisions in the Chicago metropolitan area may be somewhat understated or overstated due to the lack of data.

Data is also not readily available on non-motor vehicle highway user[8] collisions. Analysis of whistle-ban crossing collisions will focus on motor vehicle collisions. Estimated benefits of the rule will be somewhat understated due to the exclusion of non-motor vehicle highway user collisions.

Crossing data may come from two sources. Inventory data, or information about the location and protection devices in place at the crossings, comes from voluntary submission of information to FRA by the states or by the railroads. Collision data, or information about any collisions/incidents which took place at the crossing, is collected on FRA form 6180-57 and submitted to FRA by the railroad.

FRA created a database of whistle-ban crossings. One tile is a concatenated data tile containing collision information as contained on FRA form 6180-57, as well as the inventory on record for the date on which the collision occurred from FRA form 6180-71. The other tile contains inventory information for those crossings where no collisions occurred. Data was collected for

*Non-motor vehicle highway users include pedestrians, bicyclists and others.

the time period of 1992 to 1996. The database used in this analysis is preliminary and will be further refined for future analysis, FRA collected information on 2,658 crossings with whistle bans; data was available or applicable' for 2,366 crossings. There were 793 collisions at whistle ban crossings over the time period of 1992-1996.

Collision Comparisons

In this section, collisions that took place at whistle ban crossings are compared to grade-crossing collisions at all crossings. All collisions which took place at whistle ban crossings, without regard to the effectiveness of a train whistle potentially preventing these collisions, were employed for comparative purposes. Therefore, there are more collisions used in the comparison than are claimed as potential benefits of the proposed rule.

Collisions at whistle ban crossings took place more frequently during the winter months than during the summer months, 10.7% of the collisions occurred in January while 5.0% took place in July. This is fairly consistent with collisions at all public grade crossings, 10.5% of all collisions took place in January and 7.0% in July in 1995.[10]

Collisions at whistle-ban crossings where the motorist was struck by the train comprised 80.1% of the collisions (in the other 19.9%, the motorist struck the train), while the motorist was struck by a train in 74% of all public-grade crossings in 1995. This is generally consistent with the theory that the sound of the train horn may deter a driver from entering the crossing

However, motorists were more likely to be killed at all public grade crossings than at whistle ban crossings, with 11.5% of all motor vehicle collisions at public grade crossings resulting in a fatality compared with 5.4% of motor vehicle collisions at whistle ban crossings (both for 1995). This is likely due to the greater percentage of whistle-ban crossings with active devices than public grade crossings nationally. At the national level, fatalities are highest at crossings equipped only by cross-bucks, and most of the whistle-ban crossings are equipped with more than cross-bucks.

"Crossings that are private or closed, for example, were excluded.

"Highway-Rail Crossing Collision/Incident and Inventory Bulletin. USDOT-FRA ,1996

Collision Descriptions

Over the period of 1992-1996 there were 793 collisions at 2, 366 crossings. These collisions resulted in the fatalities and injuries displayed in Table 5, as well as more than $ 2 million in vehicle damages.

Table 5. Collision Injuries and Fatalities by Type of Person Involved.

Type of Person Involved	Injuries	Fatalities
Motorist	258	56
Pedestrian	17	41
Railroad Employee	56	0

The types of collisions which took place at whistle ban crossings are shown in Table 6. It is interesting to note that the mean train speed (train speed is positively correlated with fatalities) varies by type of collision. Please note that the number of fatalities shown for the category "hit by second train" are included in the categories "Struck Train or Train Struck (97 fatalities).

Table 6. Type of Collision

Type of Collision	Injuries	Fatalities	Mean Train Speed
Struck Train	51	8	15.5
Train Struck	224	89	25.4
Hit by Second Train	11	5	28.5

The driver was killed in the collision in 42 instances (5.3% of collisions), the remaining 55 fatalities were either passengers or pedestrians. The driver passed standing vehicles to go over the crossing in 37 of the collisions (4.7%). The driver was more likely to be killed when moving over the crossing at the time of the collision (35 of the driver fatalities), rather than when the vehicle was stopped or stalled at the crossing, and in most of the collisions (69.6%) at whistle-ban crossings the driver was moving over the crossing. Additionally, in almost every collision (97%), a warning device" was located on the vehicle's side of the crossing; supporting the theory that the additional warning given by the train horn could deter the motorist from entering the crossing.

"A warning device may be a passive device, such as crossbucks or an active device, such as gates.

Collisions which took place when the motorist was moving over the crossing were more likely to be fatal, with 72% of the fatalities. This type of collision was also more likely to result in injury with 209 of the 258 motorist injuries occurring under these circumstances. These are the types of collisions the proposed rule is designed to prevent. Motorists that fail to heed the warning devices in place at a crossing, may be deterred by the sound of a train horn. The motorist is also given information by the horn about the proximity, speed, and direction of the train.

V. Safety Measures

Train Whistle

Recently, FRA updated its analysis of the safety at whistle ban crossings, expanding it to include data for all the Chicago area crossings as well as for a few other newly identified locations.

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). In addition, FRA excluded from the analysis certain collisions where the sounding of the train horn would not have been a deterrent to the collisions. These included cases where there was no driver in the vehicle and collisions where the vehicle struck the side of the train beyond the fourth locomotive unit (or rail car). FRA also excluded events where pedestrians were struck. Pedestrians, compared to vehicle operators, have a greater opportunity to see and recognize an approaching train because they can look both ways from the edge of the crossing. They can also stop or reverse their direction more quickly than a motorist if they have second thoughts about crossing safely.

Data for the five-year time period from 1992 through 1996 was used for the updated analysis in place of the 1989 through 1993 data of the 1995 Nationwide Study. For the updated analysis, the collision rate for whistle ban crossings in each device category was compared to similar crossings in the national inventory using the ten range risk level method used in the original study.

The analysis showed that 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 will use this value as the increased risk associated with whistle bans instead of the 84 percent cited in the Nationwide Study of Train Whistle Bans released in April 1995. FRA believes that 62 percent is appropriate because it represents the elevated risk associated with crossings with gates, which are the only category of crossings that will be eligible for "quiet zones" (except for certain crossings where train speeds do not exceed 15 miles per hour).

The updated analysis also indicated that whistle ban crossings without gates, but equipped with flashing light signals and/or other types of active warning devices, on average, experienced 130 percent more collisions than similar crossings without whistle bans. This finding made it clear that the train horn was highly effective in deterring collisions at crossings equipped with active

devices, but without gates. The only exception was in the Chicago area where collisions were 11 percent less frequent. FRA does not have an explanation for this anomaly. One possibility is that approximately one third of the crossings in the city of Chicago are rumored to have been closed, but many continue to be included in FRA's inventory because they have not been reported as closed by local officials nor as abandoned by railroads and cannot be identified. FRA believes this could contribute to the low collision count for Chicago area crossings without gates.

By separating crossings according to the different categories of warning devices installed, FRA has better identified and, in effect, lowered the risk compensation that must be implemented for crossings with gates in order to allow whistle bans.

FRA's national study of train horn effectiveness indicates that the probability of a collision at a whistle-ban crossing is 62 % greater than the probability of a collision where a train sounds the whistle. In order to reduce the probability of a collision where whistles are not sounded to the probability of collision where a whistle is sounded, a community must meet a standard effectiveness rate of .38. This applies to all states except Florida, where a 1989 FRA study showed that in Florida the whistle had an effectiveness rate of .68.[12] FRA is assuming that a similar effectiveness rate will be gained by Florida in 1997 as in 1989, although effectiveness rates for train whistles seem to have fallen somewhat over time in the rest of the United States.

Alternative Measures

A list of allowable alternative safety measures used in the regulatory evaluation follows. As FRA does not know which options a community will choose, the least costly alternatives were considered more likely to be selected. This list is not all inclusive and FRA intends to rely on the creativity of communities to formulate solutions which will work for that community. For more information concerning alternative safety measures, please refer to Appendices A and B of the NPRM. All supplementary safety measures listed in Appendix A of the NPRM will meet (and in most cases also exceed) the effectiveness requirements. The alternative safety measures listed in Appendix B may require more frequent monitoring, however they should all meet the effectiveness requirements and some are likely to exceed them.

Gates with Median Barriers

Opposing traffic lanes on both highway approaches to the crossing must be separated by either: (1) medians bounded by barrier curbs, or (2) medians bounded by mountable curbs if equipped with traffic separators. Such medians must extend at least 100 feet from the gate, unless there is an intersection within that distance. If so, the median or traffic separator must extend at least 60 feet from the gate. Intersections within 60 feet of the gate must be closed or moved. The crossing warning system must be equipped with constant warning time system. Additionally, the gap between the lowered gate and the median or traffic separator must be one foot or less. As in

[12] For more information, please see the *Florida Whistle Bun Study.*

other installations, “break-away” or frangible traffic separators must be monitored frequently, and broken elements replaced. Also, as at all crossings within a quiet zone, signs should be posts alerting motorists to the fact that the train horn does not sound.

The cost of 200 feet of mountable median barriers with high intensity yellow reflective sheeting and reflective arcs installed is about $11,070. Estimated costs for installing median barriers are shown in Appendix A.

This alternative safety measure is the most cost-effective. In test situations in North Carolina, the effectiveness rate was almost twice that of a train horn.

Four-Quadrant Gate System:

Typical crossing gate systems today have two gates on a two-way street. One gate is located on each side of the track(s), blocking traffic in the right lane(s) approaching the crossing. The left lanes are typically not blocked, which sometimes tempts motorists to swing into the left lane and drive around the gate onto the crossing.

Under a four-quadrant gate system, a sufficient number of gates are installed to fully block traffic from entering the crossing when the gates are lowered (no median barrier required).

It is assumed for purposes of this analysis costs are about $244,000. Annual maintenance costs range between $2,500-$5,000; for purposes of this analysis, the average of $3,750 is used. Installation of additional gates and circuitry where 2 gates are in place are about $74,000. Detailed cost information on installation of 4-quadrant gates may be found in Table A-l 5 of Appendix A.

Photo Enforcement

Photo enforcement systems involve the use of high-resolution cameras to photograph violators and provide one or more photographs of the vehicle, its license plate, and the driver's face as the basis for issuing a citation, Superimposed onto each photograph is the date, time and location of the violation, as well as the speed of the violating vehicle and the number of seconds of elapsed time since the red flashing lights were activated.

The FRA, FHWA, and FTA funded an evaluation of the effectiveness of photo enforcement at Metro Blue Line (Los Angeles) crossings.

1.) high resolution camera	$50,000
2.) bulletproof cabinet and 12 foot pole	$ 4,500
3.) installation of pole, cabinet, and inductive roadway loops	$11,000
4.) annual film processing (view film and issue tickets)	$24,000

Source: Los Angeles Metropolitan Transportation Authority (MTA) based on installation along the Pasadena Blue Line.

Assume for purposes of analysis first costs range between $55,000 $75,000 and annual costs range between $20,000-$30,000. These costs may be offset by revenue generated by citation collection. Please note that all of these costs need not be incurred at every crossing, dummy boxes may be used in some. A town, for example, may have ten crossings. It may set up all ten crossings for photo enforcement by installing poles, circuitry, and cabinets, but it may only purchase five cameras (the most expensive item). These cameras can be rotated among the set up crossings. Motorists will not know whether they are actually being filmed, and very high levels of compliance may be achieved at significantly reduced cost. The ratio of 1 camera per every 2 crossings was used for the purpose of illustrating the potential costs of this supplementary safety device.

The useful life of the high resolution camera is assumed to be 10 years. The cabinet, pole, and inductive roadway loop maintenance is included in the annual maintenance costs. Costs are shown in Appendix A.

Law Enforcement

Enforcement activities aim to reduce the number of motorists violating railroad crossing devices by changing their behavior. Enforcement activities may involve developing departmental policies on railroad safety, training officers in enforcing safety regulations, monitoring crossings and issuing citations, as well as collecting data on program effectiveness. A schedule of enforcement activities assists continued program effectiveness over time.

Educational programs are often combined with enforcement programs. Police departments usually precede enforcement activities with educational efforts to increase awareness of railroad

crossing dangers, to inform the public of the laws against violating railroad safety devices and of the departments' intention to enforce railroad crossing laws. Some activities to make people conscious of railroad safety are distributing informational pamphlets at crossings, display booths, posting the penalty for ignoring railroad crossing safety devices, and coordinating with local media to publicize the program. As part of the awareness campaign, officers or other trained personnel (such as Operation Lifesaver volunteers) may present safety information at public places, such as malls, schools or libraries.

Information was collected from several municipalities on the costs of law enforcement programs and the revenues generated by such programs. The average cost per crossing per year is $3,000 and the average revenue per crossing per year is $10,600. It is likely that violations will decrease somewhat over time as drivers become more aware of crossing laws, however violations are not expected to decrease rapidly or cease to exist." Revenue is dependent on the tine structure as well, the state of Illinois has implemented a $500 fine for crossing violations. *Each municipality that provided information to FRA has greater revenues than the cost of the program.* Cost and revenue information is shown in Table A-14 of Appendix A, and more information is shown in Appendix C.

[13] A program that generates the feeling that crossing violations are socially unacceptable, similar to drunk driving campaigns, would be more likely to have a dramatic effect.

VI. Benefits

The safety benefits of this rule are primarily a reduction in fatalities, injuries, and collisions. A train whistle's effectiveness is greatest at the source of sound where it will be the loudest, or at the locomotive and the effectiveness is reduced the farther away from the source of sound. *For purposes of estimating benefits, only collisions which took place where the train hit the motorist, or where the motorist struck the locomotive or the first four cars are considered to he potentially preventable. Further, the driver must have been in the vehicle at the time of the collision to eliminate instances where the vehicle was stalled or abandoned on the tracks.*

There are also benefits to railroads in terms of reduced train delay and reduced legal activity. FRA is uncertain of the magnitude of these costs and seeks additional information. In particular, FRA would like additional information on the following:

1. What is the cost of train delay on an hourly basis for freight, passenger and short line railroads?

2. What is the average length of train delay when a grade-crossing collision takes place?

3. What is the average cost to the railroad involved for collision investigation, repairs, and legal activity?

Avoided Costs of Casualties and Property Damage

Preventable Collisions

There were 521 potentially preventable collisions over the past 5 years, including 44 fatalities and 229 injuries at about 2,100 crossings[14]. Of the injuries about half took place at train speeds in excess of 25 mph. Assuming that collisions in the future will be similar to those in the period of 1992-1996, about 9 fatalities, 45 injuries and 104 collisions could be prevented annually (at all whistle ban crossings except those in Florida). Property damages, such as the estimated value of repairs to highway vehicles or the replacement value of the vehicle if the vehicle is beyond repair were not included in the benefits estimation. The estimated benefits for this proposed **rule are** derived from the prevention of fatalities and injuries.

Collision Descriptions

[14] These totals are different from those shown on page 9, as only collisions which took place where the train hit the motorist, or where the motorist struck the locomotive or the first four cars are considered to be potentially preventable. Further, the driver must have been in the vehicle at the time of the collision to eliminate instances where the vehicle was stalled or abandoned on the tracks. Also, the number of crossings was rounded up to 2100 for estimation purposes.

Over the period of 1992-1996 there were 521 potentially preventable collisions at approximately 2,100 crossings. These collisions resulted in the fatalities and injuries displayed in Table 7, as well as more than $ 2 million in vehicle damages.

Table 7. Potentially Preventable Collision Injuries and Fatalities by Type of Person Involved[15].

Type of Person Involved	Injuries	Fatalities
Motorist	220	44
Railroad Employee	9	0
Total	229	44

The types of collisions which took place at whistle ban crossings are shown in Table 8. Please note that the number of fatalities shown for the category "Hit by Second Train" are included in the categories "Struck Train or Train Struck" (44 fatalities).

Table 8. Type of Collision

Type of Collision	Injuries	Fatalities	Mean Train Speed
Struck Train	33	2	14.5
Train Struck	187	42	22.9
Hit by Second Train	12	4	28

Injury and Fatality Values

The number and type of injuries and fatalities that are considered potentially preventable are based on the assumption that similar casualties will occur in the future without the intervention represented by this rule. The casualties predicted to be avoided are based on the projections discussed in the previous section.

The value ofprevented injuries was determined using the Abbreviated Injury Scale (AIS) which

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is shown in Appendix B. The term injury refers to a broad range of severity, from a small bruise to amputation of limbs. Clearly, a greater value would be associated with a more severe injury. The AIS separates various types of injury by their severity. The determination of willingness-to-pay to avoid injuries is based on the findings of experienced physicians that relate injuries by type to loss of quality and quantity of life. The value of life is $2.7 million in accordance with DOT guidance.

There is a positive statistically significant correlation (ρ=.33) between fatalities, and train speed. Injuries from collisions that took place at train speeds in excess of 25 mph were rated an AIS level 5 or about $2 million, Injuries which resulted from collisions involving trains traveling under 25 mph were rated an AIS level 2 or about $42,000. About half of all collisions that resulted in injury took place at speeds less than 25 mph, yielding a weighted average injury value per collision of $1,021,000.

Benefits, derived primarily from avoided casualties, for the first year are calculated for .33 of the collisions prevented, benefits for the second year are calculated as all of the collisions prevented in year one plus .33 of those in year 2. Thus, the benefits are phased in at the same pace as the costs.

Under the assumption that collisions in the future will resemble those in the past, benefits over 20 years are $258,641,800 as shown in Appendix A[16]. However, it is more likely that grade crossing collisions will continue to decline as safety initiatives by FRA and state and local governments take effect (i.e. locomotive visibility improvements, Operation Lifesaver, etc...). Therefore, another potential benefits scenario is a 4 %[17] decrease annually in the number of fatalities, injuries, and collisions prevented by this rule. Under these assumptions, benefits over 20 years are $188,273,400 as shown in Appendix A.

A similar set of scenarios using an effectiveness rate of .75[18] generates benefits of $510,477,200 where collision rates and values are held constant, $371,592,200 where there is a decline in the collision rate over time.

VII. costs

The costs of this rulemaking will be incurred predominantly by communities, however there are also costs to railroads and to the federal government. This section contains a description of the costs associated with the distinct requirements proposed. All estimated costs are shown in

[16]Using the previously discussed effectiveness rate for train whistles of .38, please refer to page 11.

"Based on the annual decline in collision rates at all whistle-ban crossings between the time periods 1989-1993 and 1992-1996.

"Equivalent to gates with median barriers.

Appendix A.

Whistle Blowing

The costs of sounding a train horn where none has been previously sounded are difficult to measure. While the actual cost of sounding a horn is minimal, a few seconds of a locomotive engineer's time, FRA realizes that this minimal amount is not likely to represent the true costs of increasing noise levels in a particular community. An attempt to quantify possible economic impacts on residential property values has been undertaken, residential land use is considered a more noise sensitive land use than either mixed or industrial purposes. Impacts on small businesses are discussed in the section concerning regulatory flexibility, Appendix D of this report, even though the statute does not permit FRA to make exceptions from train horn use based on balancing safety and the impacts. FRA solicits input from affected parties on this topic. FRA will consider negative impacts to the extent possible consistent with the statute's safety purpose. The results will also be presented at the public hearings. A description of the study follows.

Residential Property Values

Residential property markets have been shown to be influenced by a variety of influences including structural features of the property, local fiscal conditions, and neighborhood characteristics. The hedonic housing price model views housing as a bundle of characteristics, with each individual characteristic generating an influence on the price of the property. For example, additional structural characteristics such as bathrooms, bedrooms, interior or exterior square footage, have been shown to increase the value of residential properties. Likewise, neighborhood characteristics are also expected to influence the property prices. For example, homes that are in relatively close proximity to noxious activities such as hazardous waste sites, incinerators, etc. have been shown to have lower values, other things equal. Assuming that the hedonic model is carefully designed, it can be used to implicitly value locational attributes that have no explicit market price. Deriving market signals of these prices are especially useful when attempting to address concerns of property owners, especially those related to phenomenon that are highly localized. Instead of relying on what homeowners believe will be the influence of a change in a locational attribute such as the lifting of a whistle ban, this influence can be statistically measured. Past hedonic studies which derive actual measures of locational influences have generated a number of important insights.

- Proximity to local disamenities such as crime and congestion and proximity to noxious activity such as incinerator activity do lower property values.
- The property value influence of undesirable activities are highly localized and they appear to decay relatively quickly with distance from the activity.
- Property impacts frequently decline over time, as highly sensitive homeowners relocate away from the activity, and are replaced by homeowners who arc less concerned with the activity.
- Estimates of the economic impact derived from hedonic analyses, which show how housing markets actually respond to changes in local market conditions,

frequently show different influences than what local homeowners claim will be the influence.

The lifting of train whistle bans represents an interesting application of the hedonic housing price technique for a number of reasons. First, train traffic generates a number of highly localized activities, not all of which are related to the blowing of whistles. These include engine noise, vibration, and increased congestion as a result of stopped traffic. It would be incorrect to attribute all of these potential influences to the lifting of whistle bans, and hence the hedonic model must control for these influences in addition to whistle noise. Second, the influence of whistle noise will depend on several factors. These include proximity of the home to the tracks, and to an intersection, the frequency of train traffic, the time of day in which whistles are blown, and the dBA level of the whistle. Third, homes that are in close proximity of railroads may also be close to other types of local activity which depress housing prices, but are unrelated to the rail activity. For example, neighborhoods which are near heavy manufacturing activities, may have lower property values as a result of that activity.

This study evaluates homes that sold within 1 mile of a Conrail line over the period 1988 to 1996. By examining individual home sales, the structural features of the property can be adequately controlled. In addition, Geographic Information System tools can be used to accurately determine the proximity of the property to the rail line, as well as to other local factors (e.g., related to air quality, toxic waste activities, etc.). The Conrail line is of interest because it represents a rail line where some communities had whistle bans, while others did not. In addition, over the time period in question, Conrail ignored the whistle ban in some communities.

The various influences associated with train activity are analyzed, with and without whistle noise, as well as ascertaining whether there is an impact of whistle noise on local property markets.

The rail industry has maintained that whistle bans imposed by municipalities increase the probability of train-vehicle accidents, and two recent studies conducted for the Federal Railroad Administration support that hypothesis. In 1991, Conrail began ignoring whistle bans that had been enacted by local communities along its train lines. Critics of that policy argued that the whistle noise would have permanent detrimental impacts on residential housing markets.

Summary of Hedonic House Pricing Analysis

This section contains a summary of findings of the study entitled “Ignoring Whistle Bans and Residential Property Values: An Hedonic Housing Price Analysis.” A complete draft version of the study may be found in the docket.

To test whether housing markets are impacted, data for more than 12,000 single-family residential home sales in two Ohio communities (Middletown and Niles) over the period 1988-1997 are analyzed. A statistical model is used to determine the independent influence of proximity to Conrail crossings where whistle bans were ignored. After accounting for the influence of numerous characteristics of the property (e.g., bedrooms, bathrooms, size of garage,

lot size, etc.) as well as neighborhood attributes (e.g., air quality, school district, proximity to local hazards, proximity to noise, etc.), the model generates the following findings:

- **Proximity to rail lines depresses property values.** An increase in one additional rail line within ¼ mile of a property lowers sale prices by approximately 2.1% in Middletown and 2.8% in Niles.
- **Proximity to rail crossings lowers property values.** Being within approximately ½ mile of a Conrail crossing lowers property values by approximately 6.2% in the Middletown area and by 17.4% in the Niles area. In contrast, being within ½ mile of a rail crossing for another rail company that is not sounding whistles, lowers sale prices 7.8% and 8.4% for Middletown and Niles respectively.
- **Conrail's action of ignoring the whistle ban generated temporary but not permanent housing price impacts.** There is evidence of a temporary increase in home sale prices with greater distance from the crossing (i.e., a so-called housing price gradient). For the Middletown area, this price gradient at Conrail crossings results after the whistle ban is ignored (i.e., housing prices rise by about 4.5% over the distance from the crossing to the edge of the audible range for train whistles). However, the impact in Middletown does not appear to remain statistically important once temporary vs. permanent impacts are distinguished. In the Niles region, the price impact of proximity rises temporarily after ignoring the ban, but the detrimental effect of the action taken by Conrail subsides after 4.5 years.

These preliminary findings suggest that although the housing market does reflect the influence of proximity to rail lines and rail crossings, there does not appear to be a permanent impact resulting from the actions taken by Conrail."

Railroad Costs

Whistle Boards (222.21)

'"A 1998 working paper cited studies performed in the 1980's which purportedly estimated a range of 0.10 to 1.60 percent housing value reduction per increased decibel level near airports. Morrison, et al., "Fundamental Flaws of Social Regulation; The Case of Airplane Noise", American Enterprise Institute and Brookings Institution, 1998. While the differences in the subjects of these studies cast doubt on their applicability to property abutting railroads, they are perhaps helpful for comparison purposes. Significant differences between airplane noise and train horn noise in terms of the geographical size of the area affected (and population size), the frequency and duration of the noise, and other factors caution against the use of airplane noise study conclusions to determine the impact of train horns. Some of the lessons learned in airplane noise studies may, however, have value for further investigation of the possible impacts of train horn noise.

A whistle board is a sign or a post that indicates to the locomotive engineer the point at which the locomotive whistle should be sounded before the grade crossing. The rule requires that if there are no state requirements for whistle boards and no state requirement that locomotive horns be sounded at a specific distance from the crossing, and the railroad does not operate in positive train control territory, railroads need to either install a whistle board or make sure by any other means that the locomotive horn is sounded about 20 seconds before the locomotive enters a crossing. The railroad must also adjust the location of each whistle board to reflect changes in maximum authorized track speeds, excluding temporary slow orders.

Track improvements such that the maximum track speed would increase are relatively rare and would predominantly occur on Class I railroad track. However, track downgrades occur frequently when a Class I railroad sells track to short line railroads. The major portion of these costs would be incurred by short line railroads.

At this time FRA does not have good information concerning the number of whistle boards that would be moved or added due to this requirement, However it is not believed that many changes would be required. For purposes of this analysis the following assumptions are employed:

Movement of a whistle board requires:

Labor required - 2 workers @ $13.00/hour
Approximate Time: 1 hour per board
Equipment: Truck @ $5.00/hour, equipment @ $10.00/hour.
Transportation Time (assuming 3 boards are changed per trip): 1 hour
Total Cost per board change: $55.00 [((2X$13)4 hours + ($5+$10)4 hours))/3 boards]
Railroad will use existing whistle board whenever possible.

It is also assumed that due to recent merger activity which will increase the number of lines sold to short line railroads, there will be 100 whistle board changes in the first 2 years[20] and 25 a year for each remaining year. The present value costs over a 20 year period at 7% equal $20,250. Please refer to Table A-5 of Appendix A.

Increased Maintenance Costs

Under current regulations (49 CFR 234), railroads are required to maintain automated warning devices, such as gates and lights at grade crossings. To the extent that communities choose to install devices that have higher maintenance costs than existing devices, there will be increased maintenance costs to the railroad. For example, maintenance costs for a standard 2 gates and lights device are about $1,500; for a 4-quadrant gate arrangement annual maintenance costs are between $2,500 and $5,000 (average $3,750). The average difference or increase in maintenance cost would be $2,250. Please refer to Table A-6 of Appendix A.

[20]The effective date for this rule is 365 days after the final rule is published. Costs will begin to be incurred on the effective date for purposes of this analysis.

Directionality Provision

The directionality provision basically requires railroads to ensure that sound levels at 90 degrees and 100 feet from the center of the locomotive not exceed the value 100 feet in front of the locomotive. FRA does not explicitly require railroads to relocate the horn on the locomotive, the requirement could be met by shrouds, shims or other devices that help direct the sound forward. At this time these types of devices are not common, however at least one Class 1 railroad is currently testing different shrouding methods. FRA realizes that many railroads have placed the horn behind the cab of the locomotive in an effort to provide a more comfortable working environment to the train crew. FRA does not suggest that horns must be relocated to meet the proposed requirements, however it is recognized that this proposed provision will in reality result in horn relocation on some locomotives and additional horns on some locomotives used in long-hood forward operations.

Horn relocation typically requires some movement of air pipes and potentially installation of new switches. FRA has cost estimates between $1,000 to $1,500 depending on the type of locomotive.

FRA provides three years for railroads to meet these proposed requirements so that any changes in horn placement or configuration may be accomplished during routine maintenance cycles.

At this time FRA does not have good information concerning the number of horns that would be moved or added or modified due to this requirement. Locomotives ordered on or after issuance of the final rule are assumed to meet the requirements. For purposes of this analysis the following assumptions are employed :

Number of locomotives with horn moved, modified or added : 10,000
Cost per locomotive (including downtime): $1,250

The estimated costs of the directionality provision for horns that would be moved or added or modified due to this proposed requirement over a twenty year period is $9,455,200. Please refer to Table A-7 of Appendix A.

The proposed requirement would require an additional testing cost for all locomotives. Railroads do not routinely test the sound levels at the sides of the locomotives today, however, they are required to meet minimum sound levels in 100 feet in front of the locomotive. An additional two tests would be required on the right and left side of the locomotive. Train horns may be subject to damage due to derailments, clearances or vandalism. As these are rare occurrences, FRA assumes that about 20 additional tests would be performed annually.

Test Assumptions:
Number of tests required initial: 20,000
Number of additional annual tests: 20

Cost per test per side[21]: $50

The estimated costs of the additional testing required by the directionality provision for horns that would be moved or added or modified due to this proposed requirement over a twenty year period is $1,526,800. Please refer to Table A-8 of Appendix A.

Community Costs[22]

If a community decides that it would rather reduce risk at grade-crossings by means other than having trains sound horns in the community, there are a number of options available. The community is required to establish a quiet zone, notify relevant railroads, traffic and law enforcement control authorities, state agencies and FRA, and to implement supplementary or alternative safety measures.

The supplementary safety measures available to communities are listed under Appendices A and B of the NPRM. The costs of the supplementary safety measures will be incurred by those communities that wish to pursue exceptions to the use of locomotive whistles. While FRA cannot predict with certainty how many communities will select these exceptions, it is reasonable to assume that many communities will, particularly those with longstanding whistle bans, such as many suburban Chicago communities.

Communities which elect to implement Appendix B alternatives must also establish before and after violation rates at crossings in the quiet zone. The violation rate is the number of crossing violations (such as failing to stop for railroad flashing signals or driving around closed crossing gates) divided by the number of train movements over the crossing. Violation rates may be established as described in the Introduction and Community Guide of the NPRM.

For the purposes of this analysis, it is assumed that 90% of the communities with whistle bans will, at least initially seek exceptions to the use of the locomotive whistle. Other assumptions employed in this cost estimate are as follows:

- 30 % of communities will select alternatives from Appendix A. These communities would probably be relatively wealthy and have a small number of crossings. It is also assumed that the least costly alternative, installation of median barriers, will be selected by this group of communities.

- 40% of the communities will select alternatives from Appendix B. It is also assumed that the option which has a potential revenue offset, law enforcement, will be selected by this group of communities.

[21]FRA does not have reliable information on this cost and encourages comment.

[22]FRA strongly encourages comment on this section.

- 20% of the communities will create their own alternatives. This group of alternatives relies strongly on the creativity of communities and is more time consuming to implement, It is further assumed that the long term costs of these plans will be no greater than the least costly alternative in Appendix A. An example of this type of alternative would be median barriers of less than 100 feet on either side of the crossing or a decorative median barrier that is not described in the NPRM.

The estimated costs based on the above assumptions are shown in Table A-9 of Appendix A, as are tables showing the costs if all crossings are treated for some options. Please refer to Tables A-12 through A-16.

Costs for 2100 crossings for signs ($647,921), crossing improvements required under this proposal ($78,311,680) and median barriers with frangible delineators ($26,453,700) would total $105,413,343 discounted over 20 years.

Costs for police enforcement are about $25 million over 20 years, however they may generate as much as $58 million over 20 years in revenues, Depending on the tine structure, police enforcement may pay for itself. Please refer to Table A-14 of Appendix A and to Appendix C.

In order for the reader to gain a measure of understanding of the nature of the proposed alternative safety measures and the magnitude of their costs, a preliminary cost estimate may be found in Appendix A of this report. In general, the options listed in Appendix A of the NPRM are more expensive or more difficult to implement but have higher effectiveness ratings than those listed in Appendix B.

Crossing Upgrades

The proposed rule requires some active means to warn roadway users for each crossing in a quiet zone. In order for a community to have a quiet zone, the crossings in that community must be protected by active warning devices, at a minimum they must have gates and lights. While it is unclear who would pay for the initial installation of gates and lights for crossings that have passive devices, however, the maintenance costs would be incurred by the railroad.

Since, these types of costs are not attributable to distinct elements of the proposed rule, FRA is not requiring these investments. However, depending on the decision of the community, these types of costs could be incurred by the railroad where in the absence of this rulemaking, they would not. It is unlikely that communities would make these types of expenditures on their own and the cost difference (or the difference between what costs are likely to be incurred without the rule and costs likely to be incurred with the rule) is attributable to the rulemaking.

There were 976 crossings in the whistle ban database that had passive warning devices or other active devices, Assuming that 90% of the communities with whistle bans would choose to follow the options specified in 222.33 and establish quiet zones, and assuming that the passive devices are evenly distributed amongst the communities, installations of gates and lights would be required. An additional cost would be incurred (on about 878 crossings) for maintenance.

The cost of installing gates and lights is about $100,000 per crossing. The twenty year costs associated with this requirement are $67,109,700. Please refer to Table A-6 of Appendix A. The maintenance costs would potentially be $11,202,000. The total cost would be $78,311,681.

Signs

Every crossing at which the train horn is not sounded will require an advance warning sign advising the motorist the horn is not sounded. For the purposes of this analysis, it is assumed that the cost of the sign, pole and installation is about $200. The twenty year costs for this proposed requirement equal $647,900, as shown in Table A-l 0.

Government Costs

The exceptions to the use of the locomotive whistle (222.33) would require an increased allocation of government resources dedicated to this task. There would be additional review, approval or modification by the Office of Safety Analysis, Regional Administrators and Grade Crossing Managers, These costs will vary greatly depending on the options selected by the community. The more communities choose to create their own solutions for risk reduction, the greater the costs to the government.

For the purposes of this analysis, it is assumed that 90% of the communities with whistle bans will, at least initially seek exceptions to the use of the locomotive whistle. Other assumptions employed in this cost estimate are as follows:

- 30% of communities will select alternatives from Appendix A. The alternatives in Appendix A are pre-defined approaches which will automatically be approved by FRA. There are therefore, minimal review or approval costs to the Federal Government.

- 40% of the communities will select alternatives from Appendix B. For these alternatives it is assumed that review and approval will require a minimum of 5 hours review time per community by a Grade Crossing Manager, and 2 hours review time by headquarters staff.

- 20% of the communities will develop their own alternatives. This will require a substantial amount of time from Grade Crossing Managers, the Grade Crossing Division Staff and Regional Administration. It is assumed that 40 hours of review and approval time will be required for each community.

- It is also assumed that the labor costs for a Grade Crossing Manager is $31.25 an hour, or approximately GS 13/14, headquarters staff is $36.00 an hour (GS13/14/15 or SES).

The estimated costs based on the above assumptions are about $134,000 over 20 years at 7% as shown in Appendix A, Table A-16.

Community Noise

Communities will have a broad range of options to deal with the issue of safety at crossings. They may allow the trains to blow their horns, they may pick from among the pre-defined alternative measures, or they may design their own custom approach to achieving an equivalent level of safety. It is impossible for us, at this time, to estimate how many communities will make which choices. Even if we were able to predict which options would be pursued, it would be extremely hard for us to quantify the societal impacts of those choices because the “non-safety” impacts of train horns are often “quality of life” issues which do not lend themselves to easy quantification in monetary terms.

While we are attempting to quantify these impacts by measuring their impact on real estate values (see Section VII), the following discussion describes, in qualitative terms, some of the characteristics of these quality of life impacts and their order of magnitude.

The Volpe National Transportation Systems Center (Volpe) conducted a small scale survey[23] in Gering, Nebraska as part of a test of stationary horns. The telephone surveys asked residents how annoyed they were by the warning devices, what activities were affected, and what actions they took in response. The survey results indicated that the frequency of horn sounding best predicted if a resident was highly annoyed. The more times per day the resident heard the train horn, the more likely he or she was to report being highly annoyed. The survey results also indicated that high annoyance levels were also related to the resident's activity at that time. During the day, interference with conversation contributed to reported high annoyance levels, while during the evening, high annoyance was reported for inference with both conversation and reading. At night, inference with sleep was associated with high annoyance levels.

Additionally the Volpe study[24] found that as little as 1 train per hour per day results in sound levels greater than 65 dBA which are characterized as unacceptable by the Department of Housing and Urban Development (HUD). While 24 trains a day is more train traffic than most areas will have, the database of whistle-ban crossings indicates that of the whistle-ban crossings, many have 24 or more trains per day and night. An example where noise levels could be greatly increased, depending on the community decision, would be La Grange, IL (Chicago Area) a densely populated urban area, with primarily residential housing along tracks and 162 trains per day and 14 crossings (2,268 train horns a day in the community). Noise levels would probably not be significantly increased where there are very few trains.

VIII. Conclusions

The benefits in terms of lives saved and injuries prevented will exceed the costs imposed on society for this proposed rule. Even under the best case scenario (falling collision rates over time) the safety benefits alone, excluding any benefit to railroads, exceed the most costly realistic scenario for community safety enhancements, One caveat must be noted at this time, FRA does not yet have adequate information to assess the short-run costs to homeowners or businesses adjacent to railroads tracks, where an existing whistle-ban exists.

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[23] Volpe National Transportation Systems Center. (1996) *Evaluation of a Wayside Horn at Two Highway-Railroad Grade Crossings.*

[24] Volpe National Transportation Systems Center. (1996) *Evaluation of a Wayside Horn at Two Highway-Railroad Grade Crossings.*

Appendix A: Cost and Benefit Tables

Table A-l
Potential Benefits
Effectiveness Rate .38

Year		Fatalities	Iniuries
	1	$3,047,220	$5,778,432
	2	$6,094,440	$11,556,864
	3	$9,234,000	$17,510,400
	4	$9,234,000	$17,510,400
	5	$9,234,000	$17,510,400
	6	$9,234,000	$17,510,400
	7	$9,234,000	$17,510,400
	8	$9,234,000	$17,510,400
	9	$9,234,000	$17,510,400
	10	$9,234,000	$17,510,400
	11	$9,234,000	$17,510,400
	12	$9,234,000	$17,510,400
	13	$9,234,000	$17,510,400
	14	$9,234,000	$17,510,400
	15	$9,234,000	$17,510,400
	16	$9,234,000	$17,510,400
	17	$9,234,000	$17,510,400
	18	$9,234,000	$17,510,400
	19	$9,234,000	$17,510,400
	20	$9,234,000	$17,510,400
Sum		$175,353,660	$332,522,496
NPV		$89,300,877	$169,340,922
		$258,641,799	

Value per Fatality Prevented	$2,700,000
Value per Injury Prevented	$1,024,000
Effectiveness	0.38
Potential Fatalities/ year	9
Potential Injuries/year	45
year 1	0.33
year 2	0.66
year 3	1

Table A-2
Potential Benefits
Effectiveness Rate .38
Accident Rate With 4.2 % Decline Assumption

Year	Fatalities	Injuries
1	$3,047,220	$5,778,432
2	$5,838,474	$11,071,476
3	$8,474,633	$16,070,415
4	$8,118,698	$15,395,457
5	$7,777,713	$14,748,848
6	$7,451,049	$14,129,396
7	$7,138,105	$13,535,962
8	$6,838,304	$12,967,451
9	$6,551,096	$12,422,818
IO	$6,275,950	$11,901,060
11	$6,012,360	$11,401,216
12	$5,759,841	$10,922,365
13	$5,517,927	$10,463,625
14	$5,286,174	$10,024,153
15	$5,064,155	$9,603,139
16	$4,851,461	$9,199,807
17	$4,647,699	$8,813,415
18	$4,452,496	$8,443,251
19	$4,265,491	$8,088,635
20	$4,086,340	$7,748,912
Sum	$117,455,185	$222,729,833
NPV	$65,004,882	$123,268,517
	$188,273,399	

Value per Fatality Prevented	$2,700,000
Value per Injury Prevented	$1,024,000
Effectiveness	0.38
Base Fatalities/year	9
Base Injuries/year	45
year 1	0.33
year 2	0.66
year 3	1

Table A-3
Potential Benefits
Effectiveness Rate .75

	Fatalities	Injuries
1	$6,014,250	$11,404,800
2	$12,028,500	$22,809,600
3	$18,225,000	$34,560,000
4	$18,225,000	$34,560,000
5	$18,225,000	$34,560,000
6	$18,225,000	$34,560,000
7	$18,225,000	$34,560,000
8	$18,225,000	$34,560,000
9	$18,225,000	$34,560,000
10	$18,225,000	$34,560,000
11	$18,225,000	$34,560,000
12	$18,225,000	$34,560,000
13	$18,225,000	$34,560,000
14	$18,225,000	$34,560,000
15	$18,225,000	$34,560,000
16	$18,225,000	$34,560,000
17	$18,225,000	$34,560,000
18	$18,225,000	$34,560,000
19	$18,225,000	$34,560,000
20	$18,225,000	$34,560,000
Sum	$346,092,750	$656,294,400
NPV	$176,251,731	$334,225,504

Total	$510,477,235
Value per Fatality Prevented	$2,700,000
Value per Injury Prevented	$1,024,000
Effectiveness	0.75
Potential Fatalities/ year	9
Potential Injuries/year	45
year 1	0.33
year 2	0.66
year 3	1

Table A-4
Potential Benefits
Effectiveness Rate .75
Accident Reduction With 4.2 % Decline Annually

Year	Fatalities	Injuries
1	$6,014,250	$11,404,800
2	$11,523,303	$21,851,597
3	$16,726,249	$31,717,924
4	$16,023,746	$30,385,771
5	$15,350,749	$29,109,569
6	$14,706,018	$27,886,967
7	$14,088,365	$26,715,714
8	$13,496,654	$25,593,654
9	$12,929,794	$24,518,721
10	$12,386,743	$23,488,934
11	$11,866,500	$22,502,399
12	$11,368,107	$21,557,298
13	$10,890,646	$20,651,892
14	$10,433,239	$19,784,512
15	$9,995,043	$18,953,563
16	$9,575,251	$18,157,513
17	$9,173,091	$17,394,898
18	$8,787,821	$16,664,312
19	$8,418,732	$15,964,411
20	$8,065,146	$15,293,906
Sum	$231,819,445	$439,598,355
NPV	$128,299,109	$243,293,125
Total	$371,592,234	
Fatality	$2,700,000	
Injury	$1,024,000	
Effectiveness	0.75	
Fatalities/year	9	
Injuries/year	45	
year 1	0.33	
year 2	0.66	
year 3	1	

Table A-5
Whistle Boards

Year	Boards	cost
1	0	$0
2	100	$5,500
3	100	$5,500
4	25	$1,375
5	25	$1,375
6	25	$1,375
7	25	$1,375
8	25	$1,375
9	25	$1,375
10	25	$1,375
11	25	$1,375
12	25	$1,375
13	25	$1,375
14	25	$1,375
15	25	$1,375
16	25	$1,375
17	25	$1,375
18	25	$1,375
19	25	$1,375
20	25	$1,375
Total	625	$34,375
NPV		$20,252
Cost per Board		$55
Labor/hr		$26
Equipment/hr		$15
Time per 3 boards (including travel) hrs		4

Table A-6
Crossing Improvement Costs

Year	Cost	Maintenance
1	$28,974,000	$434,610
2	$28,974,000	$869,220
3	$28,974,000	$1,317,000
4	$100,000	$1,318,500
5	$100,000	$1,320,000
6	$100,000	$1,321,500
7	$100,000	$1,323,000
8	$100,000	$1,324,500
9	$100,000	$1,326,000
10	$100,000	$1,327,500
11	$100,000	$1,329,000
12	$100,000	$1,330,500
13	$100,000	$1,332,000
14	$100,000	$1,333,500
15	$100,000	$1,335,000
16	$100,000	$1,336,500
17	$100,000	$1,338,000
18	$100,000	$1,339,500
19	$100,000	$1,341,000
20	$100,000	$1,342,500
Sum	$88,622,000	$25,239,330
NPV	$67,109,706	$11,201,974
Total	$78,311,681	

Number of Crossings(90% of Passive Crossings)	878
Cost of New Installations	$100,000
Annual Maintenance Cost	$1,500

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Table A-7
Directionality Provision

Year	cost	
1	$4,125,000	
2	$4,125,000	
3	$4,125,000	
4	$0	
5	$0	
6	$0	
7	$0	
8	$0	
9	$0	
10	$0	
11	$0	
12	$0	
13	$0	
14	$0	
15	$0	
16	$0	
17	$0	
18	$0	
19	$0	
20	$0	
Sum	$12,375,000	
NPV	$9,455,239	
Total	$9,455,239	
Number of Horns Moved		10000
Cost of Installation		$1,250

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Table A-8
Directionality Provision Testing

Year	Cost	
1	$660,000	
2	$660,000	
3	$660,000	
4	$2,000	
5	$2,000	
6	$2,000	
7	$2,000	
8	$2,000	
9	$2,000	
10	$2,000	
11	$2,000	
12	$2,000	
13	$2,000	
14	$2,000	
15	$2,000	
16	$2,000	
17	$2,000	
18	$2,000	
19	$2,000	
20	$2,000	
Sum	$2,014,000	
NPV	$1,526,760	
Total	$1,526,760	
Number of tests		20000
cost per test		$100
Testing Replacement Horns per year		20

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Table A-9

Community Planning Costs

Year	Number of Communities	Cost
1	90	$43,708
2	90	$43,708
3	90	$43,708
4	10	$4,856
5	10	$4,856
6	10	$4,856
7	10	$4,856
8	10	$4,856
9	10	$4,856
10	10	$4,856
11	10	$4,856
12	10	$4,856
13	10	$4,856
14	10	$4,856
15	10	$4,856
16	10	$4,856
17	10	$4,856
18	10	$4,856
19	10	$4,856
20	10	$4,856
Total	440	$213,685
NPV		$133,993

Number of Communities	300
Percentage of Communities selecting:	
Appendix A Options	30%
Appendix B Options	40%
Creating Own Options	20%
No Acton Horn Sounds	10%
Total	100%

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Table A-IO
Signs

Year	Cost
1	$277,200
2	$277,200
3	$277,200
4	$1,800
5	$1,800
6	$1,800
7	$1,800
8	$1,800
9	$1,800
10	$1,800
11	$1,800
12	$1,800
13	$1,800
14	$1,800
15	$1,800
16	$1,800
17	$1,800
18	$1,800
19	$1,800
20	$1,800
Sum	$862,200
NPV	$647,922
Total	$647,922

Number of Installations (2 per crossing)	4200
Cost of New Installation	$200
New Signs Per year	9

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Table A-l 1
Medians with Frangible Delineators

Year	Cost	Maintenance
1	$3,207,422	$144,870
2	$3,207,422	$289,740
3	$3,207,422	$439,000
4	0	$439,000
5	0	$439,000
6	0	$439,000
7	0	$439,000
8	0	$439,000
9	0	$439,000
10	0	$439,000
11	0	$439,000
12	0	$439,000
13	0	$439,000
14	0	$439,000
15	0	$439,000
16	0	$439,000
17	0	$439,000
18	0	$439,000
19	0	$439,000
20	0	$439,000
Sum	$9,622,265	$8,336,610
NPV	$7,351,986	$3,708,197
Total	$11,060,183	

Number of Crossings (90% of Passive Crossings)	878
Cost of New Installations	$11,070
Annual Maintenance Cost	$500

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Table A-12
All Crossings
Medians with Frangible Delineators

Year			Maintenance	
	1	$7,671,510	$346,500	
	2	$7,671,510	$693,000	
	3	$7,671,510	$1,050,000	
	4	0	$1,050,000	
	5	0	$1,050,000	
	6	0	$1,050,000	
	7	0	$1,050,000	
	8	0	$1,050,000	
	9	0	$1,050,000	
	10	0	$1,050,000	
	11	0	$1,050,000	
	12	0	$1,050,000	
	13	0	$1,050,000	
	14	0	$1,050,000	
	15	0	$1,050,000	
	16	0	$1,050,000	
	17	0	$1,050,000	
	18	0	$1,050,000	
	19	0	$1,050,000	
	20	0	$1,050,000	
Sum		$23,014,530	$19,939,500	
NPV		$17,584,476	$8,869,264	
Total		$26,453,740		
Number of Crossings				2100
Cost of New Installation				$11,070
Maintenance Cost				$500

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Table A-13
Photo Enforcement

	Cost	Maintenance
1	$9,416,550	$3,621,750
2	$9,416,550	$7,243,500
3	$9,416,550	$10,975,000
4	0	$10,975,000
5	0	$10,975,000
6	0	$10,975,000
7	0	$10,975,000
8	0	$10,975,000
9	0	$10,975,000
10	$7,243,500	$10,975,000
11	$7,243,500	$10,975,000
12	$7,243,500	$10,975,000
13	0	$10,975,000
14	0	$10,975,000
15	0	$10,975,000
16	0	$10,975,000
17	0	$10,975,000
18	0	$10,975,000
19	0	$10,975,000
20	$7,243,500	$10,975,000
Sum	$57,223,650	$208,415,250
NPV	$32,250,524	$92,704,929
Total	$124,955,453	

Number of Installations*	439
Cost of New Installation	$65,000
Maintenance Cost (Film)	$25,000
Useful Life 10years(Camera)	$50,000

*Photo enforcement does not require treatment at every crossing

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Table A-14
Alternative Safety Measures Police Enforcement

Year	Cost	Revenue
1	$969,091	$3,010,115
2	$1,938,182	$6,020,230
3	$2,936,640	$9,121,560
4	$2,936,640	$8,665,482
5	$2,936,640	$8,232,208
6	$2,936,640	$7,820,598
7	$2,936,640	$7,429,568
8	$2,936,640	$7,058,089
9	$2,936,640	$6,705,185
10	$2,936,640	$6,369,926
11	$2,936,640	$6,051,429
12	$2,936,640	$5,748,858
13	$2,936,640	$5,461,415
14	$2,936,640	$5,188,344
15	$2,936,640	$4,928,927
16	$2,936,640	$4,682,481
17	$2,936,640	$4,448,357
18	$2,936,640	$4,225,939
19	$2,936,640	$4,014,642
20	$2,936,640	$3,813,910
Total	$55,766,794	$118,997,260
NPV	$24,805,558	$58,224,849

Number of Crossings	840
Avg. Cost per Crossing	$2,996
Avg. Revenue per Crossing	$10,859
Annual Monitoring Costs	$500

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1
Rev. Retention Rate	0.95

Table A-15
Cost of 4 Quad Upgrade where Gates Currently in Place

Year	First Cost	Maintenance
1	$15,384,600	$779,625
2	$30,769,200	$1,559,250
3	$46,620,000	$2,362,500
4	$0	$2,362,500
5	$0	$2,362,500
6	$0	$2,362,500
7	$0	$2,362,500
8	$0	$2,362,500
9	$0	$2,362,500
10	$0	$2,362,500
11	$0	$2,362,500
12	$0	$2,362,500
13	$0	$2,362,500
14	$0	$2,362,500
15	$0	$2,362,500
16	$0	$2,362,500
17	$0	$2,362,500
18	$0	$2,362,500
19	$0	$2,362,500
20	$0	$2,362,500
Sum	$92,773,800	$44,863,875
NPV	$69,271,507	$19,955,845
Total	$89,227,352	
Crossings	630	
Initial Cost	$74,000	
Annual Maintenance	$3,750	

Table A-l 6
Government Costs

Year	Number of Communities	Cost
1	90	$43,708
2	90	$43,708
3	90	$43,708
4	10	$4,856
5	10	$4,856
6	10	$4,856
7	10	$4,856
8	10	$4,856
9	10	$4,856
10	10	$4,856
11	10	$4,856
12	10	$4,856
13	10	$4,856
14	10	$4,856
15	10	$4,856
16	10	$4,856
17	10	$4,856
18	10	$4,856
19	10	$4,856
20	10	$4,856
Total	440	$213,685
NPV		$133,993

Number of Communities	300
Percentage of Communities selecting:	
Appendix A Options	30%
Appendix B Options	40%
Creating Own Options	20%
No Option horns sound	10%
Total	100%

*See assumptions

Year 1	0.33
Year 2	0.66
Year 3	1

Appendix B: AIS Scale

Table B-l AIS Values

AIS Level Severity	Injury Type	% Life Value	Monetary Value
1	Minor	0.20%	$5,400
2	Moderate	1.55%	$41,850
3	Serious	5.75%	$155,250
4	Severe	18.75%	$506,250
5	Critical	76.25%	$2,058,750
6	Fatal	100.00%	$2,700,000

Where the value of a life is $2,700,000 per the USDOT.

Appendix C: Determining Enforcement Costs and Revenues

Communities which increase enforcement of railroad safety regulations at highway-railroad grade crossings will likely incur greater costs, and also enhanced revenues, from the enforcement effort, Costs and revenues consist of:

1) Cost of time spent monitoring crossings for violators
2) Costs of training officers in the department's or municipality's railroad safety enforcement policy and/or Operation Lifesaver training costs
3) Revenues from tickets and tines.

I. MONITORING COSTS

A. Annual Salary $50,000

An average for officers and sergeants in several communities in the East, Midwest, Southwest, and West.

B. Number of Hours the Crossing was Monitored, Per Year:

1) Los Angeles	2080 or Full-Time
2) Berwyn, Brookfield, Elmurst, LaGrange, Riverside, Western Springs - all in Illinois.	104 or 5% of Full-Time

The number of hours provided by the Elmhurst, IL Police Department are also used as an estimate for the other listed Illinois communities. The monitoring effort in Los Angeles was full-time, so the amount of annual monitoring hours for one shift was calculated as: 40 hours/week X 52 weeks/year = 2080 hours/year (Metropolitan Transportation Authority (MTA) report, *Los Angeles Metro Blue Line Enforcement Program,* p.3).

C. Number of Officers Assigned to Monitor Crossings:

1) Los Angeles	10
2) Berwyn, Brookfield, Elmurst, LaGrange, Riverside, Western Springs - all in Illinois.	1

Elmhurst data is used as an estimate for the other Illinois communitics. Los Angeles data is from the MTA report cited above.

D. Annual Monitoring Cost @ $50,000 per Officer

1) Los Angeles	$500,000
2) Berwyn, Brookfield, Elmurst, LaGrange, Riverside, Western Springs all in Illinois	$ 2,500

E. Number of Grade Crossings

1) Los Angeles	28
2) Berwyn, IL	8
3) Brookfield, IL	3
4) Elmhurst, IL	16
5) LaGrange, IL	12
6) Riverside, IL	9
7) Western Springs, IL	4

From the U.S. DOT - AAR Crossing Inventory Database as of September 9, 1997.

F. Annual Monitoring Cost per Crossing

1) Los Angeles	$17,857
2) Berwyn, IL	$ 313
3) Brookfield, IL	$ 833
4) Elmhurst, IL	$ 156
5) LaGrange, IL	$ 208
6) Riverside, IL	$ 278
7) Western Springs, IL	$ 625

II. TRAINING COSTS

A. Operation Lifesaver Training

1) Tuition	$ 0
2) Materials	$ 40
3) Average Length of Course, in Hours	14
4) Opportunity Cost of Course, in Terms of Officers's Salary @ $24 per Hour	$ 336
5) Total Financial and Opportunity Cost per Officer	$ 376

Information from Operation Lifesaver, except officer salary information which is calculated from "IA" above. Operation Lifesaver training courses arc flexible and adaptable to local conditions, the data above are an average for a trespassing course, which was the suggested course in order to train officers to enforce

violators of railroad crossing safety devices and educate people on railroad safety issues.

B. Departmental/Municipal Training

1) Estimated Number of Hours	4
2) Opportunity Cost @ $24 per Hour per Officer	$ 96

A consideration of the time needed to review and discuss the railroad grade crossing enforcement policy of the department with officers.

C. Annual Training Cost per Crossing

1) Number of Operation Lifesaver Trained Officers in the 6 Illinois Communities	II
2) Total Departmental/Municipal Training Costs @ $96 per Officer	$ 1,056
3) Total Operation Lifesaver Training Costs @ $376 per Officer	$ 4,136
4) Total Training Costs	$ 5,192
5) Number of Grade Crossings in the 6 Illinois Communities	52
6) Average Training Cost per Crossing	$ 100

Based on the Illinois communities of Berwyn, Brookfield, Elmurst, LaGrange, Riverside, and Western Springs.

III. TOTAL ANNUAL COSTS PER CROSSING

A.	Los Angeles	$17,957
B.	Berwyn, IL	$ 413
C.	Brookfield, IL	$ 933
D.	Elmhurst, IL	$ 256
E.	LaGrange, IL	$ 308
F.	Riverside, IL	$ 378
G.	Western Springs, IL	$ 725

Sum of monitoring costs detailed in “I” and training costs listed in “II” above. Training costs from the Illinois communities were also used for Los Angeles.

IV. TICKET REVENUES FROM GRADE CROSSING VIOLATORS

A. Number of Tickets Issued Annually

1) Los Angeles	15736
2) Berwyn, IL	24
3) Brookfield, IL	7
4) Elmhurst, IL	83
5) LaGrange, IL	72
6) Riverside, IL	73
7) Western Springs, IL	42

Los Angeles tickets calculated from data in the MTA report, p. 3, and rounded to the nearest integer. Number of tickets for all Illinois communities except Elmhurst are from the West Central Municipal Conference (WCMC). Elmhurst, IL data is from the Elmhurst Police Department.

B. Annual Ticket Revenue @ $104 Fine per Ticket for Los Angeles and $500 Fine per Ticket for Illinois Communities

1) Los Angeles	$1,636,498
2) Berwyn, IL	$ 12,000
3) Brookfield, IL	$ 3,500
4) Elmhurst, IL	$ 41,500
5) LaGrange, IL	$ 36,000
6) Riverside, IL	$ 36,500
7) Western Springs, IL	$ 21,000

C. Annual Ticket Revenue per Crossing

1) Los Angeles	$ 58,446
2) Berwyn, IL'	$
3) Brookfield, IL	$ 1,167
4) Elmhurst, IL	$ 2,594
5) LaGrange, IL	$ 3,000
6) Riverside, IL	$ 4,056
7) Western Springs, IL	$ 5,250

Appendix D: Initial Regulatory Flexibility Assessment for Use of Locomotive Horns at Highway-Rail Grade Crossings (49 CFR PART 222)

The purpose of this document is to provide information and further detail on the assessment of the impacts on small entities by the "Use of Locomotive Horns at Highway-Rail Grade Crossings" Notice of Proposed Rulemaking (49 CFR Part 222). This document is also intended to address the issues and concerns outlined in the Regulatory Flexibility Act.[25] Finally, this document demonstrates the "thought processes" that the Federal Railroad Administration (FRA) has followed to minimize adverse economic impact on small entities, and to ensure that sufficient outreach to such affected entities has occurred.

This Initial Regulatory Flexibility Assessment (IRFA) concludes that only a few small railroads might be minimally impacted by this proposed rule. In addition, some small businesses that operate along or nearby rail lines that currently have whistle bans in place that potentially may not after the implementation of this proposed rule, could be moderately impacted. The most significant impacts from this proposed rule could be on "governmental jurisdictions" of communities which are considered to be small entities. FRA estimates that approximately 70 percent of the affected governmental jurisdictions of small communities are considered to be small entities. For communities that elect to not implement supplementary safety measures to establish a quiet zone the potential impact includes the noise disturbance of homeowners located near the affected crossings. This proposed rule may have effects on some small entities, and therefore input is needed to attain better information. FRA does not have data which would support a certification that this proposed rule would not have a significant economic impact on a substantial number of small entities, FRA specifically requests data that would clarify what the impacts would be for the potentially affected small entities. The Agency will consider the comments and data it receives - or lack of comments and data - in making a final decision on whether a substantial number of small entities would be significantly impacted.

FRA encourages small entities that willpotentially he impacted by this proposed rule to participate in the public comment process. Such small entities should participate in this process by submitting comments to the docket and/or participating in one more of the public hearings.

I. Rationale for Choosing Regulatory Action and Problem Statement

The problem considered by this proposed rule is collisions and their associated casualties involving motor vehicles on public highways, and the front ends of trains at highway-rail grade crossings where whistle bans exist. Both the increase in risk at whistle ban crossings, and train

[25] 5 U.S.C. 601 et seq.

horn effectiveness have been documented by FRA.[26] A national study using both empirical data and a computer model showed significant increases in the number of accidents on crossings with whistle bans, Train whistles were also shown to have a deterrent effect on motorists attempting to go around lowered gates at rail-highway crossings.

Train whistles are a means to alert motor-vehicle operators that a train is approaching. The train whistle also helps to provide the operator with information about the approaching train. This includes the direction of the train and proximity to the operator.

In the United States there are approximately 167,000 public highway-rail grade crossings. Only 59,000 of these crossings are equipped with gates and/or flashing lights. The effectiveness of some of these systems is compromised when some motorists fail to heed their warnings, and still proceed through the crossings. In 1996, there were 79 accidents at crossings that had whistle bans in place. These accidents resulted in 2 fatalities, 39 injuries to non-railroad employees, and 2 injuries to railroad employees.

FRA has recently updated its analysis of the safety at whistle ban crossings. This analysis showed that an average of 62 percent more collisions occurred at whistle ban crossings equipped with gates than at similar crossings across the nation without bans. This updated analysis also indicated that whistle ban crossings without gates, but equipped with flashing light signals and/or other types of active warning devices, on average experience 130 percent more collisions than similar crossings without whistle bans.

FRA is proposing rules to require a locomotive horn to be sounded while a train is approaching and entering a public highway-rail crossing. The proposed rules provides for exceptions to this requirement in circumstances in which there is not a significant risk to life or serious personal injury, or when the use of the locomotive horn is impractical, or when supplementary safety measures fully compensate for the absence of the warning provided by the horn.

Some communities believe that the sounding of train whistles at every crossing is excessive and an infringement on community quality of life, and therefore have enacted “whistle bans” that prevent the trains from sounding their whistles entirely, or during particular times (usually at night). FRA is concerned that with the increased risk at grade crossings where train whistles are not sounded, or another means of warning utilized, accidents and casualties may increase significantly.

In 1996 at least 52 percent of the 79 grade crossing accidents that occurred at crossings with whistle bans in place, occurred in a small community where the governmental jurisdiction is considered to be a small entity. Actually, the risk could be even higher in these small communities since these locations have an average annual daily traffic of over 7,900 vehicles

[26] U.S. Department of Transportation, Federal Railroad Administration, *Nationwide Study of Train Whistle Bans,* April 1995.

The whistle ban crossings in the larger communities have an average annual daily traffic of approximately 5,100 vehicles.

II. Legal Authority

This proposed rule is required by law. Congress passed the Swift Rail Development Act on November 2, 1994.[27] This law requires the use of locomotive horns at grade crossings, but gives FRA authority to make reasonable exceptions. Congress amended this law on October 9, 1996.[28] The amended law now requires the FRA to take into account the interest of communities that have in effect restrictions on the sounding of a locomotive horn at highway-rail crossings. In addition, it requires FRA to work in partnership with affected communities to provide technical assistance and to provide a reasonable amount of time for local communities to install supplementary safety measures and take into account local safety initiatives.

Legal Authority: 29 U.S.C. 20102-20103, 20110-20112, 20114, 20137, 20138, 20143, 20301-20303, 20306, 20701-20703, 21301-20302, 21304, 21306, and 21311; 49 CFR 1.49(c), (g), and (m).

III. Small Entities Affected

Communities: Small Governmental Jurisdictions

This proposed regulation potentially impacts a greater audience of small entities than most of FRA regulations. The potential audience includes small entities that are classified as governmental jurisdictions of small communities. As defined by SBA, this term means governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000.

Potentially this proposed regulation could immediately affect approximately 265 governmental jurisdictions whose communities currently have either formal or informal whistle bans in place. FRA estimates for this group of 265 communities that the number of small entities is approximately 70 percent of the total. Thus, it is estimated that potentially 186 small entities (i.e., the jurisdictional governments of 186 small communities) could be affected by the implementation of this rulemaking. FRA also estimates that 40 percent of the affected crossings are contained in small communities whose governmental jurisdictions are considered to be small entities.[29] The impact on these governments will vary according to whether they elect to institute

[27] Public Law 103-440.

[28] Public Law 104-264.

[29] Based on FRA research of 155 communities, 115 communities, which have governmental jurisdictions that are considered small entities currently have whistle bans in place.

supplementary measures to establish a quiet zone or allow the locomotive horns to be blown at the affected crossings. The impact of this decision will also vary according to the traffic volume on the pertinent rail lines, and the population density of the community neighborhoods that immediately surround the affected areas of the rail lines and the grade crossings. In addition, the impact will vary according to which method(s) a government selects to establish a quiet zone.

FRA expects a majority of all other small governmental jurisdictions which have not attempted to institute whistle bans in their communities to continue just as they are today, and there would be no impact for them. But, a relatively small number of governmental jurisdictions will have their situation changed either by a merger, or other traffic shift (i.e., an increase in the number of trains a day on a particular rail line), new development, or some other reason, and these governmental jurisdictions and their communities would be impacted by this rule once it has been finalized and implemented. Thus, this proposed rule could potentially affect a larger audience of governmental jurisdictions than 265, and these governmental jurisdictions would be faced with fewer and more expensive alternatives than existed prior to this rulemaking.

It is important to remember that some of the roads that are part of some current whistle bans and therefore potentially part of a proposed "quiet zone," may be located within the boundary of a small community, but the legal and responsible entity of another entity. Many roads that are located within the boundaries of a town or other small community actually are the responsibility of a larger community governmental jurisdiction such as a county or state. Thus, the financial burden for some roadway's crossings would be the county, state or possibly even federal government.

Small Railroads

The U.S. Small Business Administration (SBA) stipulates in its "Size Standards" that the largest a railroad business firm that is "for-profit" may be, and still be classified as a "small entity" is 1,500 employees for "Line-Haul Operating" Railroads, and 500 employees for "Switching and Terminal Establishments."[30] "Small entity," is defined in 5 U.S.C. 601 as a small business concern that is independently owned and operated, and is not dominant in its field of operation. FRA proposed an interim policy to formally establish "small entities" as being railroads which meet the line haulage revenue requirements of a Class III railroad. For other entities, the same dollar limit on revenues is established to determine whether a railroad shipper or contractor is a small entity." FRA is proposing to use this alternative definition of "small entity" for this

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These communities also contain 597 out of 1,387 crossings, This research does not include a large number of potentially affected communities and crossings in the metropolitan Chicago area, nor does it contain former whistle ban communities in Florida.

[30] "Table of Size Standards," U.S. Small Business Administration, January 31, 1996, 13 CFR Part 121.

[31] As defined by the Interstate Commerce Commission (ICC) - now the Surface Transportation Board (S.B.), all "switching and terminal" railroads are classified as Class III,

rulemaking. **Since this is still considered to he an alternative definition, FRA is using this definition in consultation with the Office of Advocacy, SBA, and therefore requests public comments regarding its use.**

Given FRA's proposed definition of small entity it is difficult to determine exactly how many of the estimated 665 railroads are considered small entities.[32] It is safe to conclude that at least 45 to 50 railroads are not small entities. These 45 to 50 railroads provide approximately 90 percent or more of the industry's employment; own almost 90 percent of the track; and operate over 90 percent of the ton-miles. In addition, included in this group of railroads are passenger railroads that provide well over 95 percent of the passenger miles, FRA estimates that at least 600 railroads are considered to be small entities.

Almost all of the passenger/commuter railroads are not considered small entities by SBA definition. This is because most of these entities are owned by governmental jurisdictions or transit authorities that serve populations of over 50,000.

A majority of the existing whistle bans cover rail lines that are not owned by entities that are considered small entities, However, FRA is aware that there are a few Class III railroads that are subject to local whistle bans, This number is estimated to be very small (i.e., less than 10).

Small Businesses

It is very difficult for FRA to survey or determine how many small businesses might be affected by the implementation of this proposed rule. Therefore, FRA seeks input and comments from small businesses that feel they will be adversely impacted by this proposed rule (i.e., businesses that operate along or near a rail line that currently have grade crossings and which have an instituted whistle ban). FRA is aware of concerns advanced by owners and operators of hotels, motels and some other establishments as a result of numerous town meetings and other outreach sessions in which FRA has participated during development of this proposed rule.

This proposed rule may also potentially affect small businesses that might set-up shop in an area that borders or is nearby a rail corridor that formerly had a whistle ban in effect prior to this rulemaking process. For these potentially affected small entities the existence of an established "quiet zone" could or could not be a factor in their decision to open for business in such a location. FRA is also concerned about such future small businesses and requests pertinent comments on any potential impact on these potential small entities.

regardless of their operating revenue.

[32] Approximately 665 railroads report accident/incident data and statistics to the FRA.

IV. Reporting, Recordkeeping, and other Compliance Requirements

The proposed rule will permit governmental jurisdictions of communities to establish quiet zones in order to maintain the quiet (i.e., no noise) effect of a whistle ban. This will require notifying the relevant railroads, traffic law enforcement control authorities, state agencies and FRA. The notification to FRA will vary according to the category of the supplementary measure implemented. Some require notifying FRA and some require requesting FRA's concurrence.

When a state or local government designates a quiet zone under §222.33(a), it is required to provide notice of such designation to all operating railroads over the crossings within the quiet zone, the highway or traffic control authority or law enforcement authority that has control over vehicular traffic at the crossings within the quiet zone, the state agency responsible for highway and road safety, and FRA. In addition, the quiet zone that is established will not take effect until an accurate and complete U.S. DOT-AAR National Highway-Rail Grade Crossing Inventory Form, reflecting supplementary and alternative safety measures in place upon establishment of the quiet zone, are provided to FRA.

Alternative options for complying with this proposed rule include allowing the train whistle to be blown. This alternative has no direct costs associated with it for the governmental jurisdiction. Other alternatives include "gates with median barriers" which are estimated to cost $11,070 for the median barrier. Four-quadrant gate system is estimated to cost $244,000, and have an annual maintenance of $2,500 -$5,000. "Photo enforcement is estimated to cost $55,000-$75,000, and have an annual costs of $20,000-$30,000. A "law enforcement" program is estimated to cost $3,000 annually, and it has an expected annual benefit $10,600. An alternative that does not impact the governmental jurisdiction with any costs is running trains at speeds of 15 miles per hour or less with flagging being performed at the crossing. Finally, FRA has not limited compliance to the lists provided in Appendix A or Appendix B of the proposed rule. The NPRM provides for supplementary safety measures that might be unique or different, For such an alternative an analysis would have to accompany the option that would demonstrate that the number of motorists that violate the crossing is equivalent or less than that of blowing the whistle. FRA intends to rely on the creativity ofcommunities to formulate solutions which will work for that community.

V. Impacts

FRA's Regulatory Evaluation for this NPRM notes that it believes that the costs of this rulemaking will be incurred predominantly by communities. FRA also believes that there are some states that will assist the governments of its communities in this endeavor. These state governments could elect to use federal highway allocations (i.e., funds) that are permitted for such use. As noted above, FRA estimates that **70 percent** of the approximately 265 jurisdictional governments of small communities that have whistle bans in place, are considered to be small entities. For these affected small entities the impacts will vary. Some will not elect to initiate supplementary measures in order to establish a quiet zone. Thus, for these small entities there will be minimal to no impact.

For small governmental jurisdictions that elect to implement supplementary safety measures to establish a quiet zone the impact will vary according to which initiatives are chosen. One of the less expensive options for establishing a quiet zone is the implementation of photo enforcement. This option has start-up cost estimates of $55,000 - 75,000 for the installation of one camera at one crossing location, and annual operating costs of $20,000 - 30,000 per crossing. The overall cost in a quiet zone can be lowered by installing "dummy" boxes at half of the affected crossings. This would save the one-time cost of the camera, and the on-going cost of film and processing. The costs from this initiative would be somewhat directly offset by revenue generated by citation collection. Another inexpensive option for crossings that currently have gates in place is frangible barriers on curbs. This option costs about $11,000 to implement. Other quiet zone options can be more expensive. Additional options include four-quadrant gate system with median barriers to separate traffic lanes, law enforcement, temporary closure of highway-rail crossings, one-way street with gates at the crossing, and grade separation. Systems such as four-quadrant gates also have higher maintenance costs than existing crossing devices. Maintenance and upkeep for automated warning devices are the responsibility of the pertinent railroad, per *49 CFR part 234*.

One supplementary safety measure that could prove to be very viable to the governmental jurisdiction of a small community is "law enforcement." This enforcement activity would be aimed at reducing the number of motorists violating railroad crossing devices by changing behavior. Such activities may involve developing departmental policies on railroad safety, training officers in enforcing safety regulations, monitoring crossings and issuing citations, as well as collecting data on program effectiveness. Information collected from municipalities on the costs of law enforcement programs and the revenues generated by such programs indicate that average cost per crossing per year is $3,000 and the average revenue per crossing is $10,600 per year.[33]

FRA is also concerned that the impact of establishing supplementary safety measures could eventually be felt by governmental jurisdictions of communities that will have increases in rail traffic due to railroad mergers or a commuter railroad start-up. Hence, comments are also requested from government jurisdictions that are classified as small entities that could potentially be impacted due to such situations.

For the few small railroads that will be affected by this proposed rule the burdens will be minimal. FRA expects short line railroads that acquire rail lines which were formally owned by a larger railroad, and which have not established a "quiet zone" to be impacted with the cost necessary to move whistle boards. These shortline railroads will have to move the whistle boards because it is a common practice for these types of railroads to re-designate the track of acquired rail lines to lower track classes which have lower speed limits. A lower top speed on such track will warrant the movement of the whistle board. This is because the proposed rule stipulates that unless a state regulation exists, a locomotive horn must be sounded no less than 20 seconds, and

[33] This is based on information collected from several municipalities in Illinois and Los Angeles.

no more than 24 seconds before the locomotive enters the crossing. FRA has estimated that this cost would be $55 per whistle board moved. Over a ten-year period of time FRA estimates that approximately 400 of these will be moved by new shortline railroads or existing ones that acquire track from a large Class I railroad. Any potential impact from the elimination of whistle bans can be minimized for small railroads where the maximum speed at the crossing is 15 mph or less, and crossing is flagged by railroad personnel, since this proposed rule does not require locomotive horns to be blown under this scenario.

Under current regulations (49 CFR 234), railroads are required to maintain automated warning devices, such as gates and lights at grade crossings. To the extent that communities choose to install devices that have higher maintenance costs than existing devices, there will be increased maintenance costs to the railroad. For example, maintenance costs for a standard 2 gates and lights device is about $1,500 per year, and for a 4-quadrant gate arrangement annual maintenance costs are between $2,500 and $5,000 (average $3,750) per year.

When proposing new rules or changes in current regulations FRA is usually concerned with any potential impact on tourist railroads. These are passenger railroads that operate scenic, excursion and dinner train operations, and almost all of these are considered to be small entities. FRA does not know of any whistle bans in place on lines that are operated on or owned by tourist operators. Most people find the sound of steam whistles on these operations to be more enjoyable and nostalgic, and therefore the noise from these operations if it were to exist is less likely to be seen as noise pollution. Thus, FRA does not expect any impact, now or in the future, to be imposed on entities that operate in this sector of the industry.

For small businesses that are located along or near a rail line that currently have a whistle ban, the impacts will vary. As noted prior, FRA does not have a good idea of just how many small businesses will be impacted. Obviously the concern and the impact will be the noise from the locomotive horns. This is because the noise from the horn travels beyond its intended alerting zone and potentially becomes noise pollution. FRA estimates that approximately ninety percent of the communities that currently have whistle bans will initiate supplementary safety measures to establish a quiet zone. Thus, a large number of the potential small businesses should not be impacted.

For small businesses that are located along or near a rail line that currently have a whistle ban in place, but the local community does not elect to establish a quiet zone, there will be a varied impact. The impact will be minimal for small businesses, other than hotels, operating along rail lines where the whistle ban was only in effect during night-time hours. For small business located along or near a rail line that formerly operated a whistle ban during day-time hours there would be an impact. The impact will vary according to the number of crossings in the former whistle ban zone, and by how many trains are operated along the pertinent rail line(s), as well as the distance of the commercial property from the rail line and the extent to which structures are effectively sound insulated.

In summation, since FRA does not know exactly how each community will elect to proceed on the future of its existing whistle ban(s), it is difficult to fully predict or estimate what the actual

impact of this proposed rule would be on small entities. Therefore, it is impossible to determine if such an impact is a significant impact. Hence, FRA requests comments to the docket indicating what alternatives will be selected and why. FRA would also like to know how many communities will select none of the options, and allow the whistle to be blown

VI. Alternative Treatment for Small Entities

Congress has ensured that all communities that might be adversely affected by this rule be provided adequate time to initiate changes. This is because the law requires that this proposed rule, after it is made a final rule, not be effective for 365 days. In addition, FRA has provided up to two years of additional time for communities that currently have formal or informal whistle bans in effect to implement the supplementary safety measures necessary to establish quiet zones.

FRA has provided numerous alternatives for establishing a quiet zone which can be found in Appendices A, & B of the NPRM. These alternatives vary in cost impact and expected effectiveness. Appendix C lists which scenarios don't require supplementary safety measures. Communities can apply for permission to use systems that are not listed in the Appendixes. If such systems are found to be sufficient then they would be added the appropriate appendix. One exception that would not be permitted is the current status which for safety reasons and multiple acts of Congress is not feasible.

VII. Outreach to Small Entities

After issuing its Nationwide Study of Train Whistle Bans in 1995, FRA went to great lengths to reach out to communities. FRA directly wrote to each community that was known to have a whistle ban in affect and offered to come in and talk to the community about the increased risk associated with whistle bans and provisions of the Swift Act. The Agency's Regional Grade Crossing Managers followed-up with additional community meetings. During this same time period FRA also provided the same information to associations that represented cities and counties. The Agency worked with some of these communities (e.g., Louisville, KY, and Spokane, WA) to plan the necessary supplementary safety measures for quiet zones. The NPRM identities communities that FRA proposes to treat as pre-approved contingent upon completion of supplemental safety measures.

FRA has provided additional outreach to potentially affected small entities in several ways. First, the proper notice of the publication of the NPRM specifically addresses the Agency's concern for the affected small entities. Issues and areas on which the Agency needs further input are noted in the NPRM's preamble. Second, FRA will notify Congressional representatives whose districts would potentially be impacted by this proposed rule. Third, FRA will arrange a public hearing schedule in locations where it knows small entities that are governmental jurisdictions that have a population of less than fifty thousand are located nearby. The pertinent

public hearings will be held in the Chicago metropolitan region, the Pacific northwest, the Commonwealth of Massachusetts and other locations to be determined.

FRA's eight regional grade crossing managers and their assistants continue to work with the potentially affected communities and railroads. These program managers will continue to work with the governmental jurisdictions of affected communities during the NPRM process and through the final rule implementation. FRA has answered hundreds of letters from citizens, community officials, and members of Congress on issues related to this NPRM.

VIII. Conclusion

This is a proposed rule which essentially is a safety rule that implements as well as minimizes the potential negative impacts of a Congressional mandate to blow train whistles and horns at highway-rail grade crossings. It provides provisions for exceptions, and it provides communities with the ability to reduce the impact of the locomotive horns within their jurisdictions. However, this proposed rule will be responsible for varying amounts of impact on some of the potentially affected small entities, no matter how the outcome for each whistle ban is determined. This basically means that if a community elects to simply follow the mandate, and become subject to whistle blowing at crossings where a whistle ban had been prior, then there will be a noise impact to any potential small business that exists along that route. If a community elects to implement supplementary safety measures that are necessary to establish a "quiet zone," then the local government jurisdiction will be impacted by the cost of such program or system. It is important to note that the impacts discussed in this assessment are inherent in the requirements of the law, which allows recognition of supplementary safety measures provided by traffic control and law enforcement authorities of the affected communities.