



U.S. Department
of Transportation

Federal Railroad
Administration

FLORIDA'S TRAIN WHISTLE BAN



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FLORIDA'S TRAIN WHISTLE BAN

In 1990, the Federal Railroad Administration (FRA) studied train whistle bans in Florida.¹ The study shows a strong correlation between nighttime whistle bans and the number of accidents at highway-rail crossings. This report summarizes and updates the second edition of the study.² The report also incorporates FRA administrative decisions issued subsequent to earlier editions of *Florida's Train Whistle Ban*.

I. INTRODUCTION

Railroads are powerless to restrain the growth of residential populations along their rights-of-way. Train whistle use is an important deterrent to highway-rail crossing accidents in densely populated areas. However, special interest groups formed in the late 1970s, sought ways to silence train whistles. Their attention concentrated on nighttime bans, which gained much support from nearby residents. One Florida-based group, Project Whistle Stop, Inc., approached Federal agencies and the State of Florida's Federal legislators to sponsor a national whistle ban.

¹ U.S., Federal Railroad Administration, *Florida's Train Whistle Ban*, July 1990.

² U.S., Federal Railroad Administration, *Florida's Train Whistle Ban*, 2nd edition, September 1992.

When these efforts failed, the Florida State Legislature was persuaded to enact state whistle ban legislation. Effective July 1, 1984, local jurisdictions were allowed to establish nighttime (10:00 p.m. to 6:00 a.m.) train whistle bans. The bans only apply to certain crossings on the Florida East Coast Railway Company (FEC). Eligible crossings must be equipped with active warning devices.³ Figure 1 shows a map of the FEC system.

Figure 2 shows the special advance warning sign attached below the traditional "advance warning" sign. Appendix A is an excerpt of the authorizing law, Florida Statute No. 351.03.

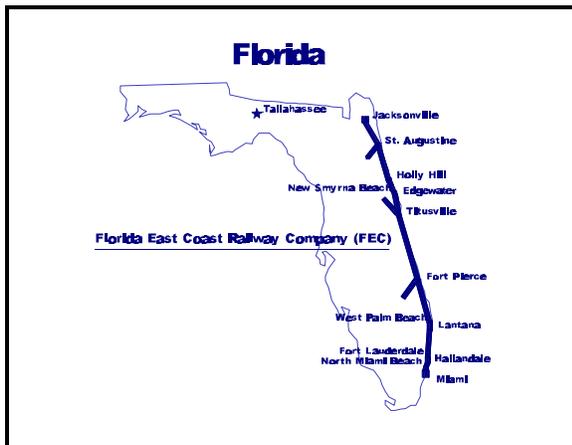


Figure 1 - Map of FEC System

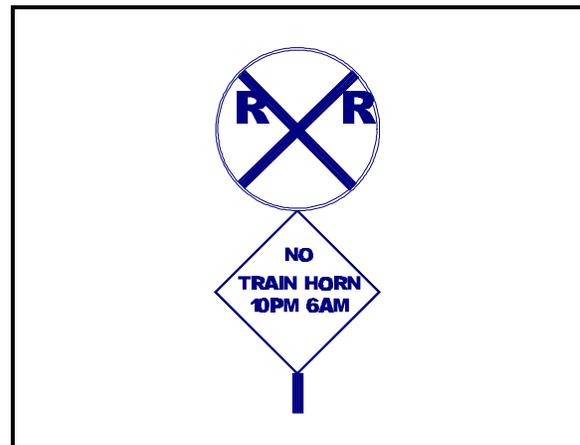


Figure 2 - Special Advance Warning Sign

The Dade County Board of Commissioners passed the first widespread ordinance meeting State requirements. This ordinance affects 107 crossings. After numerous legal challenges, the Dade

³ All affected highway-rail grade crossings are required to be equipped with crossing gates, flashing lights, bells, and special highway advance warning signs.

County FEC whistle ban began July 29, 1984. Appendix B is a draft of the Dade County Whistle Ban Ordinance.

Other jurisdictions followed. Seven counties and a dozen additional cities established bans. By December 31, 1984, 511 FEC public grade crossings were effected by the bans.⁴

Florida's east coast is the only locale in the nation where a ban on railroad whistles became extensive. Local bans have been established in other states. However, safety concerns generally prevail over noise concerns.

FEC's nighttime accident rate at affected crossings nearly tripled after whistle bans were imposed. The daytime accidents at affected crossings remained virtually unchanged. In contrast, nighttime accidents increased 23 percent at 89 FEC crossings where there were no bans.

II. STUDY METHODOLOGY

Approach

The Florida Whistle Ban analysis is straightforward. Use the "Scientific Approach" to examine accidents at whistle ban locations.⁵ Make a statistical comparison of the number of

⁴ During 1990, 26 additional crossings became subject to bans. The total FEC crossings subject to bans increased to 537.

⁵ The scientific approach is a systematic, controlled, empirical, and critical investigation of hypothetical propositions about the presumed relations among natural phenomena.

accidents reported before the ban to the number of accidents reported after the ban. Use control groups to identify or reduce the influence of outside factors.⁶ Finally, "normalize" data.⁷ Appendix C discusses Normalizing Historical Data.

A chi-square test of homogeneity is used to compare the expected and observed accidents at impacted crossings. The detailed chi-square statistical analysis is found in Appendix D.

To begin its study, FRA formed the study hypothesis.⁸ Hypothesis formation helps to direct the investigation.

Study Hypothesis

If nighttime whistle bans are imposed at highway-rail crossings, the number of accidents occurring at these crossings will significantly increase.

Null Hypothesis⁹

The number of accidents at highway-rail crossings will not significantly increase if nighttime whistle bans are imposed.

⁶ For example, changes in highway and rail traffic, could affect the number of accidents at particular crossings.

⁷ To compare before and after data whose histories are not equal (i.e., length of time), researchers "normalize" the data. This technique expresses data in a common unit of measure, e.g., accidents per month.

⁸ A *hypothesis* is a conjectural statement of the relation between two or more variables.

⁹ The *null hypothesis* is a statistical proposition which states that there is no relation between the variables (of the problem). The null hypothesis is a succinct way to express the testing of obtained data against chance expectation.

III. DATA COLLECTION

Selection of Crossings Studied

The National Rail-Highway Crossing Inventory provides a list of FEC's at-grade, highway-rail crossings.¹⁰ All selected FEC crossings are public crossings. All selected FEC crossings have active warning devices. FRA identified 600 FEC

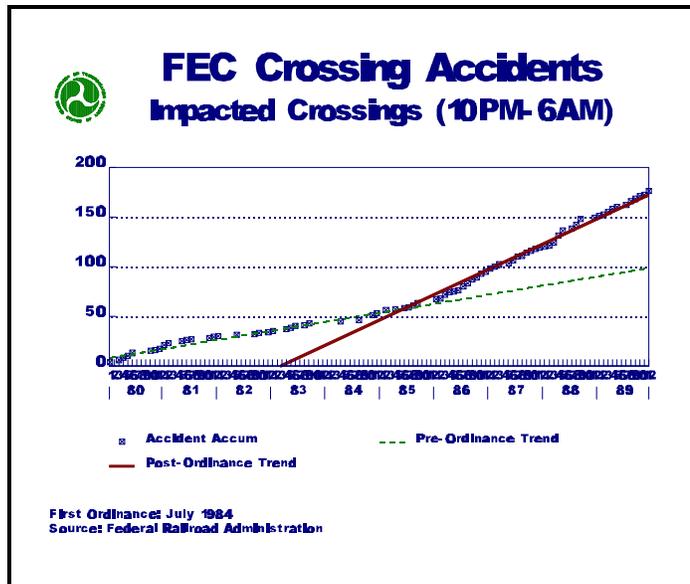


Figure 3 - FEC Crossing Accidents

crossings for its study. These crossings are found in 11 counties along Florida's east coast. Figure 3 shows FEC Crossing Accidents at Impacted Crossings. By 1990, 511 of FEC's crossings were affected by whistle bans. The remaining 89 highway-rail crossings were not affected by whistle bans. Figure 4 shows the growth in FEC ordinance impacted crossings subsequent to permissive state legislation in 1984.

¹⁰ FRA maintains a computer-based file of all highway-rail crossings in the United States. States and railroads voluntarily provide changes in crossing information to FRA. In the year ended March 31, 1990, the FRA processed more than 90,000 inventory updates. Each crossing is assigned a unique number. This number allows precise crossing identification. The number is included in all crossing accident reports.

FEC Crossing Ordinances

The effective dates for each crossing ordinance were obtained from FEC. A chronological list of whistle bans by jurisdiction and milepost boundaries is found in Appendix F.

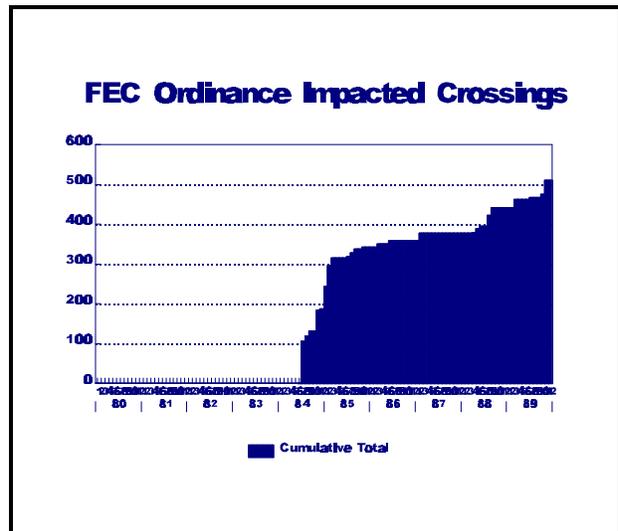


Figure 4 - FEC Ordinance Impacted Crossings

Accident Data Selected

FEC's highway-rail crossing accident reports were segregated into two groups¹¹. The "subject group" contained reports for accidents that occurred between 10:00 p.m. and 6:00 a.m. The "control group" contains reports for accidents occurring between 6:01 a.m. and 9:59 p.m. FEC reported a total of 785 crossing accidents between 1975 through 1989. Accident reports with missing or garbled data were eliminated. Also eliminated were reports for accidents at ineligible crossings.¹² The study

¹¹ The Federal Railroad Safety Act of 1970 (P.L. 91-458) and the Accident Reports Act (45 U.S.C. 38-34), require railroads to file accident reports with FRA. Any accident involving trains and an automobile, bus, truck, motorcycle, bicycle, farm vehicle, pedestrian, or other highway user at a highway-rail crossing must be reported to the FRA. Since 1975, data from these reports has been captured into FRA databases.

¹² Ineligible crossings include private, closed, and grade separated crossings, crossings located on abandoned track, and crossings without active warning devices.

examined 681 accident reports. The subject group contains 253 accident reports. The control group contains 428 accident reports. Appendix E shows FRA's "Rail-Highway Grade Crossing Accident/Incident Report" (Form FRA F 6180-57).

For comparison, 224 CSX Transportation, Incorporated (CSX) highway-rail grade crossings were identified. The CSX crossings also have active warning devices. In addition, these crossings are located in the six Florida counties where both CSX and FEC operate.¹³

CSX's highway-rail crossing accident reports, totaling 324, also were segregated into two groups. The subject group contains 90 accident reports. The control group contains 234 accident reports.

IV. DATA ANALYSIS

Categorizing Data

The analysis focuses on changes in accident rates once bans are imposed. Florida whistle bans are not effective during the day. Therefore, nighttime accident rates should theoretically increase at crossings affected by bans. In addition, accident rates for the daytime control group were compared to accident rates for the nighttime control group. Since comparisons of

¹³ The counties are Broward, Dade, Duval, Martin, Palm Beach, and Volusia.

daytime and nighttime rates were made for the same crossings, all conditions were identical except the whistle ban itself.

Table 1 shows FEC's nighttime grade crossing accident experience. FEC reported 39 accidents at affected crossings during the pre ban period. During the post ban period, FEC reported 115 accidents at affected crossings.

Table 1

**FEC IMPACTED CROSSINGS
Nighttime Accident Experience
(10:00 p.m. - 6:00 a.m.)**

	<u>Accidents</u>	<u>Accident Rate</u>
Pre-ordinance	39	0.00166
Post-ordinance	115	0.00490
Number of Crossing-months:	23,474	

FRA's statistical model predicts 49 post ban accidents if there are no whistle bans. Thus, 66 post ban accidents are unexplained. The 66 unexplained accidents resulted in 11 fatalities and 34 injuries.

The gap, depicted in Figure 3, widened while whistle bans remained in effect.

Daytime Control Group

Table 2 shows no significant change in accident rates during the daytime periods when whistle blowing is permissible.

Table 2

FEC IMPACTED CROSSINGS
Daytime Accident Experience
(6:01 a.m. - 9:59 p.m.)

	<u>Accidents</u>	<u>Accident Rates</u>
Pre-ordinance	110	0.00469
Post-ordinance	109	0.00464
Number of Crossing-months:	23,474	

No-Ordinance FEC Control Group

This control group establishes accident rates for crossings unaffected by whistle ban ordinances. Pre ban accidents were collected for the years, 1975-1984. Post ban accidents were collected for the years 1985-1989. Table 3 shows daytime accident rates were 30 percent lower in the 5 year post ban period. The nighttime rate was 23 percent higher. One explanation for the increase in nighttime rates could be changes in rail or highway operations. For example, annual locomotive miles reported by the FEC for the same periods increased by 11.5 percent.

Table 3

NO-ORDINANCE (FEC) CROSSINGS

<u>Accidents/Accident Rates</u>	<u>1975 - 1984 10-Year History</u>	<u>1985 - 1989 5-Year History</u>
Daytime (6:01 a.m. - 9:59 p.m.)		
Accidents Per Crossing-Month	40 .00375	14 .00262
Nighttime (10:00 p.m. - 6:00 a.m.)		
Accidents Per Crossing-Month	13 .00122	8 .0015
Number of Crossing-months:	10,680	5,340

CSX Transportation, Inc. (CSX) Control Group

Table 4 shows data for CSX. This interstate railroad is not affected by the Florida intrastate railroad whistle ban.

Table 4
CSX TRANSPORTATION (NO ORDINANCE) CROSSINGS

<u>Accidents/Accident Rates</u> <u>History</u>	<u>1975 - 1984</u> <u>10-Year History</u>	<u>1985 - 1989</u> <u>5-Year</u>
Daytime (6:01 a.m. - 9:59 p.m.)		
Accidents Per Crossing-Month	196 .00729	38 .00283
Nighttime (10:00 p.m. - 6:00 a.m.)		
Accidents Per Crossing-Month	49 .00182	41 .00305
Number of Crossing-months:	26,880	13,440

The trend of daytime CSX accident rates is comparable to FEC in the 1985-1989 period. In addition, each carrier showed a decline in accident rates (30 percent for FEC, 61 percent for CSX) between 1985-1989 when compared to the previous 1975-1984 period.

Nighttime accident rates increased on both railroads-- 67 percent at CSX's crossings and 23 percent at FEC's non ordinance crossings. Overall, daytime and nighttime combined, CSX experienced a 36 percent decline in accidents--from .00911 accidents per crossing month in the 1975-1984 period to .00588 accidents per crossing-month in the 1985-1989 period. FEC's accident rates at no-ordinance crossings declined 17 percent-- from .00496 accidents per crossing month in the 1975-1984 period to .00412 accidents per crossing month in the 1985-1989 period.

Concurrently, the combined accident rate at FEC's impacted crossings increased 75 percent since the bans went into effect.

V. CONCLUSION

FRA conducted contingency table analyses using the chi-square statistic for subject and control groups. The purpose of a contingency table analysis is to determine whether a dependence exists between two qualitative variables. In this case, the objective of the study is to research whether the ordinance on whistle blowing increases freight crossing accidents.

The chi-square statistic for the study group of FEC nighttime accidents was compared to control groups. The differences between expected and observed accidents are great enough to reject the null hypothesis. The study confirms that nighttime whistle bans at impacted crossings cause highway-rail crossing accidents.

The value of the chi-square statistic determined that whistle ban ordinances were the only identifiable difference between crossings in the subject data set and those in the control groups. If nighttime whistle bans are imposed at highway-rail crossings, the number of accidents will significantly increase.

VI. ACTIONS FOLLOWING COMPLETION OF STUDY

In August 1990, FRA provided its study to officials of each Florida municipality with bans in effect. The study was also

given to the Florida State Department of Transportation, and 15 State legislators. FRA requested that each recipient offer explanations, other than the whistle bans, which might account for the near tripling of the accident rates for subject groups. Several explanations were offered. Appendix G shows FRA's response to Florida State Representative Cosgrove. Appendix H shows FRA's response to Roman A. Yoder, Jr. The respondents' explanations include changes in population density, seasonal fluctuations in highway traffic, general increases in rail and highway traffic, and drug use (including alcohol). However, none of these variables explained the variance. If the above variables are responsible for the increase in crossing accidents, then the total number of fatal highway accidents should increase proportionately. Appendix I shows population increases in Florida. Appendix J shows that the number of fatal highway accidents did not increase significantly in Florida during the study.

Despite study results, no municipality rescinded its ban. Also, the Florida legislature offered no changes to the enabling legislation that authorizes the bans. Subsequently, 26 more crossings became subject to ordinances in 1990. The total number of crossings subject to bans increased to 537.

FRA does not object to whistle bans per se. However, state and local authorities need to compensate for the hazard created by whistle bans. Remedies acceptable to FRA include increasing law enforcement, installing immovable highway dividers, grade

separating high-traffic crossings, or closing low-use crossings.

Analysis of 1990 and preliminary 1991 data (first half of the year) shows a continuation of the post ban accidents. Appendix K illustrates FEC accident trends. Since July 1984, an upward increase in FEC crossing accidents has occurred.

A 1990 study of Oregon train whistle bans showed similar accident trends. The Public Utility Commission of Oregon (OPUC) discovered an increase in grade crossing accidents where whistle bans were in effect. Appendix L shows excerpts from the OPUC study. Based on the studies of OPUC and FRA, the whistle prohibition order issued by the OPUC was rescinded on September 13, 1991. Appendix M is a copy of the OPUC decision.

Following its investigation of FEC whistle ban accidents, FRA issued Emergency Order No. 15 on July 26, 1991. This decision requires the FEC to sound train horns when approaching public highway-rail crossings. Specifically, FEC was ordered to follow the operating rules governing horn use that were in effect before the state-permissive train whistle ban. FRA recognizes that nighttime train whistles can be an inconvenience to residents near the railroad right-of-way. However, whistles can also save lives. Appendix N is FRA's Emergency Order No. 15.

FRA received 21 petitions requesting withdrawal or modification of Emergency Order No. 15. The Petitioners included 2 counties and 13 cities. About 31 percent of the impacted crossings are represented by the petitions. During the administrative review of this order, FRA addressed arguments

concerning the accuracy of the FRA's whistle ban study, other potential causes for the accident increase, the FRA's justification for issuing the Emergency Order, and the FRA's willingness to consider alternative or mitigating remedies. These issues are discussed in Appendix O, FRA's Conference Notice No. 3, issued December 5, 1991. Appendix P is FRA's response to U.S. Representative Ileana Ros-Lehtinen. Her constituents questioned FRA's findings and conclusions.

On November 3, 1992, FRA issued Conference Notice No. 7. Conference Notice No. 7 provides performance specifications for full highway-rail crossing barriers, traffic divisional islands, and temporary crossing closures. Conference Notice No. 7 is found in Appendix Q.

In response to comments received from petitioners, FRA reviewed Emergency Order No. 15. Also, FRA studied alternate remedial measures. On August 31, 1993, FRA amended Emergency Order No. 15. The amended order is found in Appendix R.

As one alternative to the Emergency Order, FRA proposed the temporary, night time closure of selected highways leading to crossings. Some communities have placed many crossings close together. The lower volume of highway traffic at night could be redirected to fewer crossings without a significant impact on traffic flow.

Nationwide, the FRA is actively working to close 25 percent of public highway-rail crossings. Many of these crossings are redundant. Redundant crossings can be eliminated with little

impact on the traveling public. When crossings cannot be closed, FRA recommends a number of alternatives. Communities can grade separate crossings, i.e., build bridges, or install 4-quadrant gates. At crossings with standard gates, traffic divisional islands can be installed. These barriers prevent highway users from driving around crossing gates. Because barriers are a highway device, FRA is working with State and Federal highway authorities to define the requirements for installation. If measures are taken to assure highway-rail crossing safety, the FRA will modify the Emergency Order.

FRA has issued no other emergency orders regarding train whistles or horns. For safety reasons, the FRA will not approve train whistle ban ordinances without alternate safety criteria. These criteria are outlined in Appendix S.

Locomotive horns and whistles are exempt from noise emission standards established by the Environmental Protection Agency (EPA). However, FRA has contracted the Volpe National Transportation Systems Center (VNTSC) to develop an optimal warning signal for locomotive whistles. If successful, whistle noise can be reduced for communities while not compromising safety. VNTSC also is investigating the installation of audible warning devices directly at crossings.

APPENDIX A

FLORIDA STATUTES APPLICABLE TO RAILROADS AND OTHER UTILITIES

Florida Statute: 351.03

Date: 8/20/91

Railroad-Highway Grade Crossing Warning Signs and Signals; Audible Warnings; Exercise of Reasonable Care; Blocking Highways, Roads, and Streets During Darkness.*

- (1) Every railroad company shall exercise reasonable care for the safety of motorists whenever its track crosses a highway and shall be responsible for erecting and maintaining crossbuck grade crossing warning signs in accordance with the uniform system of traffic control devices adopted pursuant to Florida Statute 316.0745. Such crossbuck signs shall be erected and maintained at all public or private railroad-highway grade crossings.
- (2) Advance railroad warning signs and pavement markings shall be installed and maintained at public railroad-highway grade crossings in accordance with the uniform system of traffic control devices by the governmental entity having jurisdiction over or maintenance responsibility for the highway or street. All persons approaching a railroad-highway grade crossings shall exercise reasonable care for their own safety and for the safety of railroad train crews as well as for the safety of train or vehicle passengers.
- (3) Except as provided in subsection (4), any railroad train approaching within 1,500 feet of a public railroad-highway grade crossing shall emit a signal audible for such distance.
- (4) (a) No railroad train of a railroad company operating wholly within this state may emit an audible warning signal between the hours of 10:00 p.m. and 6:00 a.m. in advance of any public railroad-highway grade crossing with train-activated automatic traffic control devices, which include flashing lights, bells, and crossing gates, where the municipality or county has in effect an ordinance that unconditionally prohibits the sounding of

railroad train horns and whistles during such hours at all public railroad-highway grade crossings so signalized within that municipality or country and where the municipality, county, or state has erected signs at the crossings involved announcing that railroad train horns and whistles may not be sounded during such hours. Signs so erected shall be in conformance with the uniform system of traffic control devices as specified in Florida Statute 316.0745.

- (b) Nothing in this subsection shall be construed to nullify the liability provisions of Florida Statute 768.28.
- (5) (a) Whenever a railroad train engages in a switching operation or stops so as to block a public highway, street, or road at any time from one-half hour after sunset to one-half hour before sunrise, the crew of the railroad train shall cause to be placed a lighted fusee or other visual warning device in both directions from the railroad train upon or at the edge of the pavement of the highway, street, or road to warn approaching motorists of the railroad train blocking the highway, street, or road. However, this subsection does not apply to railroad-highway grade crossings at which there are automatic warning devices properly functioning or at which there is adequate lighting.
- (b) A person who violates any provision of paragraph (a) is guilty of a misdemeanor of the second degree, punishable as provided in Florida Statute 775.082, or 775.083.

History. s. 34, ch. 1987, 1874; RS 2264; GS 2841; ch. 7940, 1919; RGS 4529; CGL 6592; s. 1, ch. 73-336; s. 52, ch. 76-31; s. 5, ch.80-289; ss. 2, 3, ch. 81-318; ss. 1, 12, 14, ch. 82-90; s.1, ch. 84-73; s. 39, ch. 86-243.

*Note. Expires October 1, 1992, pursuant to s. 14, ch. 82-90, and is scheduled for review pursuant to s. 11.61 in advance of that date.

APPENDIX B

CODE OF METROPOLITAN DADE COUNTY (Sections 21-27.3 and 21-27.4)

Agenda Item No. 4 (a)
6-5-84

ORDINANCE NO. _____

ORDINANCE AMENDING SECTION 21-27.3 AND REPEALING SECTION 21-27.4 OF THE CODE OF METROPOLITAN DADE COUNTY, FLORIDA, RELATING TO PROHIBITION OF RAILROAD TRAIN WHISTLE AND HORN NOISE POLLUTION; PROVIDING FOR COUNTY-WIDE UNIFORM PROHIBITION FOR PUBLIC AT-GRADE CROSSINGS HAVING TRAIN-ACTIVATED TRAFFIC CONTROL DEVICES; PROVIDING SEVERABILITY, INCLUSION IN THE CODE, AND AN EFFECTIVE DATE

BE IT ORDAINED BY THE BOARD OF COUNTY COMMISSIONERS OF DADE COUNTY, FLORIDA:

Section 1. Section 21-27.3 of the Code of Metropolitan Dade County, Florida, is hereby amended as follows:

Section 21-27.3 Railroad train whistle and horn noise pollution prohibited--generally.

(a) Definitions.

"Person" means any individual, corporation, partnership, other legal entity, or any agent or employee thereof.

(b) Applicability.

The provisions of this section shall be applicable only to public railroad train crossings at grade within the incorporated or unincorporated areas of Dade County, which are equipped with train-activated, automatic traffic control devices, which shall include ringing bell, flashing light signals, and automatic crossing gates on both sides of the railroad train track.

(c) Prohibited acts.

Notwithstanding anything in this Code to the contrary, it shall be unlawful and a public nuisance for any person operating a railroad train of a railroad company operating wholly within this state to blow or activate, or permit to be blown or activated, any horn or whistle from the railroad train between 10:00 p.m. and 6:00 a.m. at and in advance of any public at-grade crossing where the municipality, county, or state has erected a sign at the crossing involved announcing that railroad train horns and whistles will not be sounded during the aforesaid hours.

(d) Enforcement; costs and attorneys' fees; injunctions; criminal penalty.

- Section 2. Section 21-27.4 of the Code of Metropolitan Dade County, Florida, is hereby repealed in its entirety.
- Section 3. If any section, subsection, sentence, clause or provision of this ordinance is held invalid, the remainder of this ordinance shall not be affected thereby.
- Section 4. It is the intention of the Board of County Commissioners, and it is hereby ordained that the provisions of this ordinance shall become and be made a part of the Code of Metropolitan Dade County, Florida; and that the sections of this ordinance may be renumbered or relettered to accomplish such intention, and the word "ordinance" may be changed to "section," "article," or other appropriate word.
- Section 5. The provisions of this ordinance shall become effective on July 1, 1984.

PASSED AND ADOPTED:

Approved by County Attorney as
to form and legal sufficiency.

Initialed by NAG

Prepared by:

Initialed by PST

APPENDIX C

NORMALIZING DATA

"Normalizing" is a data averaging technique. This convention expresses data in a common unit of measure. For the purposes of this study, railroad-highway crossing accident data is expressed in "crossing accidents per month." This allows the comparison of data for the 10 years preceding the Florida whistle ban on July 1, 1984 to accidents for the 5 years following the ban. This study examined 68,024 crossing-months of pre-ordinance accident experience and 23,474 crossing-months of post-ordinance accident experience.¹

Normalizing Techniques

Two "normalizing" techniques are used in this study. The "Maximum History" technique uses all 15 years of available data (1975-1989). The "60 Month History" technique uses 60 months of pre- and post-whistle ban accident observations (1979-1984 and 1984-1989) Table C1 shows the nighttime crossing months, number of accidents and accident rates for each of these techniques.

Table C1

FEC IMPACTED CROSSINGS NIGHTTIME ACCIDENTS (10:00 P.M. - 6:00 A.M.)

	<u>Maximum History</u>		<u>60-Month History</u>	
	<u>Pre-Ban</u>	<u>Post-Ban</u>	<u>Pre-Ban</u>	<u>Post-Ban</u>
Crossing Months	68,024	23,474	30,660	22,800
Number of Accidents	117	115	47	109
Accidents Per Month	.00172	.0049	.00153	.00478

Under either "normalizing" technique, the number of nighttime accidents in the post-ordinance period is three times larger than the accident rate before the ordinance was implemented.

¹ The product of the number of crossings affected by each ordinance and the number of pre ordinance, or after ordinance months, is summed for all the impacted crossings.

Control Groups

Table C2 shows the daytime crossing months, number of accidents, and accident rates using normalizing techniques. Daytime accident rates increased 19 and 23 percent, respectively, under the "maximum history" and "60-month history" measures. The increase may be due to demographic changes and increases in traffic volumes. For example, FEC locomotive mileage increased 11.5 percent between the 1975-1984 10-year average and the 1985-1989 5-year average.

Table C2

**FEC IMPACTED CROSSINGS
DAYTIME ACCIDENTS (6:01 A.M. - 9:59 P.M.)**

	Maximum History		60-Month History	
	<u>Pre-Ban</u>	<u>Post-Ban</u>	<u>Pre-Ban</u>	<u>Post-Ban</u>
Crossing Months	68,024	23,474	30,660	22,800
Number of Accidents	265	109	115	105
Accidents Per Month	.0039	.00464	.00375	.00461

APPENDIX D

DETAILED STATISTICAL ANALYSIS

This appendix contains three contingency table analyses, which incorporate exposure data (a measure of a crossing's accident potential) for subject and control groups. Because definitive data was not available for highway traffic and train counts for each crossing, this study used crossing-months experience as a measure of exposure. In the first contingency table analysis, the number of crossing-months was equal for the subject group and control group for the before and after periods. However, the number of hours differed between the two groups. The subject group represented the nighttime period (8 hours) impacted by the ban. The control group, unaffected by the ordinance, represented the daytime period (16 hours). This difference in number of hours was considered in calculating the number of expected accidents. Since the time period for the control group was twice as long as that for the subject group, the opportunity for accident occurrence was two times greater for the control group.

The purpose of a contingency table analysis is to determine whether a dependence exists between two qualitative variables. In this case, the objective of the study is to research whether the ordinance on whistle blowing increased freight crossing accidents. The appropriate test statistic, in this analysis for a test of hypothesis is the chi-square (χ^2) statistic. The chi-square test of homogeneity is computed for each analysis. This test computes a discrepancy measure based on observed and expected frequencies (if bans had not been imposed) for the individual cells. The value of the chi-square statistic determines if the differences between the observed and expected cell counts is large enough to reject the null hypothesis (H_0).

A rejection of the null hypothesis asserts acceptance of the alternative hypothesis (H_1). The hypotheses are:

H_0 : Ordinance did not increase freight crossing accidents.

H_1 : Ordinance did increase freight crossing accidents.

The test statistic (chi-square) to test the hypotheses is:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \sim \chi^2_{(r-1)(c-1)} \quad **$$

O_{ij} is the observed frequency for level i of the first classification method and level j of the second classification method.

r = # of rows.

c = # of columns.

Decision Rule: Reject H_0 if $\chi^2 \geq H_{\alpha}^2$, where H_{α}^2 is the upper α point of the χ^2 distribution with degrees of freedom = (# of rows - 1)(# of columns - 1).

Do not reject H_0 if $\chi^2 < H_{\alpha}^2$

The contingency table analyses for the three different control groups are presented below.

CONTROL GROUPS:

1. Daytime

		Observed Accidents		
		Before	After	
Subject		39	115	154
Control		110	109	219
		149	224	373

** John E. Freund, Ronald E. Walpole, *Mathematical Statistics*, Fourth ed. (Englewood Cliffs: Prentice, 1987) pg. 438.

Exposure (In Hours)

	Before	After	
Subject	8	8	16
Control	16	16	32
	24	24	48

Proportions

	Before	After	
Subject	$8/48 = .167$	$8/48 = .167$.334
Control	$16/48 = .333$	$16/48 = .333$.666
	.500	.500	1.000

Expected Accidents

	Before	After	
Subject	$(373)(.167) = 62$	$(373)(.167) = 63$	125
Control	$(373)(.333) = 124$	$(373)(.333) = 124$	248
	186	187	373

Decision Rule: Reject H_0 if $\chi^2 \geq 7.88$

Do not reject H_0 if $\chi^2 < 7.88$

(7.88 is the value of $\chi_{.005,1}$)

$$\chi^2 = \frac{(39-62)^2}{62} + \frac{(115-63)^2}{63} + \frac{(110-124)^2}{124} + \frac{(109-124)^2}{124}$$

$$\chi^2 = 54.84$$

Since $\chi^2 = 54.84$ exceeds 7.88, the null hypothesis must be rejected. Therefore, the regulations on whistle blowing after dark did increase freight crossing accidents.

2. No-Ordinance FEC Crossings

Observed Accidents

	Before	After	
Subject	39	115	154
Control	13	8	21
	52	123	175

Exposure (Crossing-Months Experience)

	Before	After	
Subject	23,474	23,474	46,948
Control	10,680	5,340	16,020
	34,154	28,814	62,968

Proportions

	Before	After	
Subject	$23,474/62,968 = .373$	$23,474/62,968 = .373$.746
Control	$10,680/62,968 = .170$	$5,340/62,968 = .084$.254
	.543	.457	1.000

Expected Accidents

	Before	After	
Subject	$(175)(.373) = 65$	$(175)(.373) = 65$	130
Control	$(175)(.170) = 30$	$(175)(.084) = 15$	45
	95	80	175

Decision Rule: Reject H_0 if $\chi^2 \geq 7.88$

Do not reject H_0 if $\chi^2 < 7.88$

(7.88 is the value of $\chi_{.005,1}$)

$$\chi^2 = \frac{(39-65)^2}{65} + \frac{(115-65)^2}{65} + \frac{(13-30)^2}{30} + \frac{(8-15)^2}{15}$$

$$\chi^2 = 60.90$$

Since $\chi^2 = 60.90$ exceeds 7.88, the null hypothesis must be rejected. Therefore, the regulations on whistle blowing after dark did increase freight crossing accidents.

3. CSX Transportation (No-Ordinance) Crossings

Observed Accidents			
	Before	After	
Subject	39	115	154
Control	49	41	90
	88	156	244

Exposure (Crossing-Months Experience)			
	Before	After	
Subject	23,474	23,474	46,948
Control	26,880	13,440	40,320
	50,354	36,914	87,268

Proportions			
	Before	After	
Subject	23,474/87,268 = .269	23,474/87,268 = .269	.538
Control	26,880/87,268 = .308	13,440/87,268 = .154	.462
	.577	.423	1.000

Expected Accidents					
		Before	After		
Subject		(244)(.269) = 66	(244)(.269) = 65		131
Control		(244)(.308) = 75	(244)(.154) = 38		113
		141	103		
					244

Decision Rule: Reject H_0 if $\chi^2 \geq 7.88$

Do not reject H_0 if $\chi^2 < 7.88$

(7.88 is the value of $\chi_{.005,1}$)

$$\chi^2 = \frac{(39-66)^2}{66} + \frac{(115-65)^2}{65} + \frac{(49-75)^2}{75} + \frac{(41-38)^2}{38}$$

$$\chi^2 = 57.43$$

Since $\chi^2 = 57.43$ exceeds 7.88, the null hypothesis must be rejected. Therefore, the regulations on whistle blowing after dark did increase freight crossing accidents.

SUMMARY The absolute magnitude of the chi-square test results is very real. The data was analyzed with three well chosen control groups. Each analysis showed highly significant results at the .005 level of significance, which is more stringent than the normal (.05) level of significance. The ordinance on whistle blowing remains the only apparent explanation for the tripling in nighttime accidents at the impacted crossings.

APPENDIX E

RAIL-HIGHWAY GRADE CROSSING ACCIDENT/INCIDENT REPORT

1. NAME OF REPORTING RAILROAD <div style="text-align: right; margin-right: 20px;">Amtrak Autotrain</div>	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
2. NAME OF OTHER RAILROAD INVOLVED IN TRAIN ACCIDENT/INCIDENT	2a. Alphabetic Code	2b. Railroad Accident/Incident No.
3. NAME OF RAILROAD RESPONSIBLE FOR TRACK MAINTENANCE <i>(single entry)</i>	3a. Alphabetic Code	3b. Railroad Accident/Incident No.
4. U. S. DOT-AAR GRADE CROSSING IDENTIFICATION NUMBER	5. DATE OF ACCIDENT/INCIDENT month day year	6. TIME OF ACCIDENT/INCIDENT am <input type="checkbox"/> pm <input type="checkbox"/>

LOCATION

7. NEAREST RAILROAD STATION	8. COUNTY	9. STATE <i>(two letter code)</i> CODE
10. CITY <i>(if in a city)</i>	11. HIGHWAY NAME OR NUMBER <i>(if private crossing, so state)</i>	

ACCIDENT/INCIDENT SITUATION

HIGHWAY USER INVOLVED			RAILROAD EQUIPMENT INVOLVED		
2. TYPE 1. Auto 2. Truck 3. Truck-Trailer 4. Bus 5. School Bus 6. Motorcycle 7. Pedestrian 8. Other <i>(specify)</i>	CODE		16. EQUIPMENT 1. Train <i>(units pulling)</i> 2. Train <i>(units pushing)</i> 3. Train <i>(standing)</i> 4. Car(s) <i>(moving)</i> 5. Car(s) <i>(standing)</i> 6. Light loco(s) <i>(moving)</i> 7. Light loco(s) <i>(standing)</i> 8. Other <i>(specify)</i>	CODE	
1. SPEED <i>(estimated mph at impact)</i>	14. DIRECTION <i>(geographical)</i> 1. North 3. East 2. South 4. West	CODE	17. POSITION OF CAR/UNIT IN TRAIN		
5. POSITION 1. Stalled on crossing 2. Stopped on crossing 3. Moving over crossing	CODE	18. CIRCUMSTANCE 1. Train struck highway user 2. Train struck by highway user			
9. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway user 2. Rail equipment 3. Both 4. Neither					

ENVIRONMENT

20. TEMPERATURE <i>(specify, if minus)</i> °F	21. VISIBILITY <i>(single entry)</i> 1. Dawn 3. Dusk 2. Day 4. Dark	CODE	22. WEATHER <i>(single entry)</i> 1. Clear 3. Rain 5. Sleet 2. Cloudy 4. Fog 6. Snow	CODE
--	---	------	--	------

TRAIN AND TRACK

1. TYPE OF TRAIN 1. Freight 2. Passenger 3. Mixed 4. Work 5. Yard/Switching 6. Light Locomotive(s)	CODE	24. TRACK TYPE USED BY TRAIN INVOLVED 1. Main 3. Siding 2. Yard 4. Industry	CODE
3. TRACK NUMBER OR NAME	26. FRA TRACK CLASSIFICATION	27. NUMBER OF LOCOMOTIVE UNITS	
4. NUMBER OF CARS	29. TRAIN SPEED <i>(recorded speed, if available)</i> MPH Recorded	30. TIME TABLE DIRECTION 1. North 3. East 2. South 4. West	

CROSSING WARNING

1. TYPE <i>(place X in appropriate box(es))</i>	1 <input type="checkbox"/> Gates	5 <input type="checkbox"/> Hwy. Traffic Signals	9 <input type="checkbox"/> Watchman	32. SIGNALLED CROSSING WARNING Was the signaled crossing warning identified in item 31 operating? 1. Yes 2. No	CODE
	2 <input type="checkbox"/> Cantilever FLS	6 <input type="checkbox"/> Audible	10 <input type="checkbox"/> Flagged by crew		
	3 <input type="checkbox"/> Standard FLS	7 <input type="checkbox"/> Crossbucks	11 <input type="checkbox"/> Other <i>(specify)</i>		
	4 <input type="checkbox"/> Wig Wags	8 <input type="checkbox"/> Stop Signs	12 <input type="checkbox"/> None		
3. LOCATION OF WARNING 2. Side of vehicle approach 1. Both sides 3. Opposite side of vehicle approach	CODE	34. CROSSING WARNING INTERCONNECTED WITH HIGHWAY SIGNALS 1. Yes 2. No 3. Unknown	CODE	35. CROSSING ILLUMINATED BY STREET LIGHTS OR SPECIAL LIGHTS 1. Yes 2. No 3. Unknown	CODE

MOTORIST ACTION

5. MOTORIST PASSED STANDING HIGHWAY VEHICLE 1. Yes 2. No 3. Unknown	CODE	37. MOTORIST DROVE BEHIND OR IN FRONT OF TRAIN AND STRUCK OR WAS STRUCK BY SECOND TRAIN 1. Yes 2. No 3. Unknown	CODE		
6. MOTORIST 1. Drove around or thru the gate 2. Stopped and then proceeded 3. Did not stop 4. Other <i>(specify)</i> 5. Unknown	CODE				
7. VIEW OF TRACK OBSCURED BY <i>(primary obstruction)</i> 1. Permanent structure 2. Standing railroad equipment	3. Passing train	5. Vegetation	7. Other <i>(specify)</i>	CODE	
	4. Topography	6. Highway vehicles	8. Not obstructed	CODE	

HIGHWAY VEHICLE PROPERTY DAMAGE/CASUALTIES

8. HIGHWAY VEHICLE PROPERTY DAMAGE <i>(est. dollar damage)</i>	41. DRIVER WAS 1. Killed 2. Injured 3. Uninjured	CODE	42. WAS DRIVER IN THE VEHICLE? 1. Yes 2. No	CODE
3. TOTAL NUMBER OF OCCUPANTS KILLED	44. TOTAL NUMBER OF OCCUPANTS INJURED	45. TOTAL NUMBER OF OCCUPANTS <i>(include driver)</i>		
16. IS A RAIL EQUIPMENT ACCIDENT/INCIDENT REPORT BEING FILED? 1. Yes 2. No				
17. TYPED NAME AND TITLE	48. SIGNATURE	49. DATE		

APPENDIX F

CHRONOLOGICAL LIST OF WHISTLE BANS BY JURISDICTION

<u>Municipality</u>	<u>Effective Date</u>	<u>Boundaries Covered</u>
Dade County	7-29-84	N.E. 215th St., MP 351 + 1686' to Access Rd. #4, MP LR 17 + 306'
City of Boca Raton*	8-4-84	Hidden Valley Rd., MP 319 + 4510' to S.W. 18th St., MP 326 + 102'
City of Boynton Beach*	9-23-84	N.E. 22nd Ave., MP 310 + 4102' to S.E. 23rd Ave., MP 313 + 3517'
City of Hypoluxo*	9-24-84	Hypoluxo Rd., MP 309 + 808' to Miner Rd., MP 310 + 943'
Village of Tequesta*	10-23-84	Tequesta Dr., MP 281 + 4095' (only crossing involved)
City of Melbourne**	11/7/84	Post Rd., MP 186 + 4530' to University Blvd., MP 195 + 1772'
City of Hollywood	11-11-84	Sheridan St., MP 347 + 1350' to Pembroke Rd., MP 349 + 4205'
City of Daytona Beach	11-12-84	Mason Ave., MP 108 + 2674' to Beville Ave., MP 111 + 4021'
City of South Daytona	11-19-84	Big Tree Rd., MP 112 + 2502' to Reed Canal Rd., MP 113 + 2845'
City of Palm Bay**	12-17-84	N.E. Palm Bay Rd., MP 197 + 1883' to S.E. Port Blvd., MP 198 + 2100'
Town of Lantana*	1/7/85	MP 307 + 3696' to Central Blvd., MP 308 + 4573'
City of New Smyrna Beach	1/7/85	Whispering Pine, MP 122 + 1515' to 10th Street, MP 126 + 231'
City of Delray Beach*	1/8/85	N.E. 14th St., MP 315 + 3138' to Lindell Blvd., MP 319 + 1920'

<u>Municipality</u>	<u>Effective Date</u>	<u>Boundaries Covered</u>
Martin County (Except City of Stuart, MP 260 + 3231' to MP 263)	1-21-85 to 8/1/85 (See Note Below)	Skyline Dr., MP 255 + 2680' to County Line Rd., MP 280 + 4653' Lake Harbor Branch: Martin Hwy., MP K-26 + 2587' to Gaines Hwy., MP K-40 + 763'
Town of Jupiter*	1-29-85	Riverside Dr., MP 282 + 2264' to Toney Penna Dr., MP 284 + 750'
City of West Palm Beach*	2-4-85	54th St., MP 296 + 612' to Gregory Rd., MP 303 + 5089'
City of Lake Worth*	2-15-85	22nd Ave. N., MP 304 + 1830' to Washington Ave., MP 307 + 2489'
City of Fort Lauderdale	3-4-85	N.E. 17th Ct., MP 338 + 4215' to S.W. 24th St., MP 343 + 472'
City of Hallandale	7-1-85	N.E. 3rd St., MP 350 + 1598' to S.W. 3rd St., MP 350 + 4272'
City of Wilton Manors	8-12-85	N.E. 26th St., MP 338 + 864' to N.E. 24th St., MP 338 + 1615'
Martin County	8-30-85	Skyline Dr., MP 255 + 2680' to County Line Rd., MP 280 + 4653' Lake Harbor Branch: Martin Hwy., MP K-26 + 2587' to Gaines Hwy., MP K-40 + 763'
City of Pompano Beach	9-9-85	N.E. 10th St., MP 332 + 2620' to S.W. 6th St., MP 333 + 4193' Pompano Market Spur: Dixie Hwy., MP 333 to N.W. 6th Ave., MP 333
City of Deerfield Beach	11-27-85	N.E. 2nd St., MP 326 + 4302' to S.W. 15th St., MP 328 + 2553'
City of Oakland Park	3-20-86	Cypress Creed Rd., MP 335 + 663' to Oakland Pk. Blvd., MP 337 + 3517'
City of Fort Pierce***	6-28-86	Fishermans Warf Dr., MP 240 + 4154' to Savannah Rd., MP 243 + 3828' Lake Harbor Branch: MP K-0 + 910', Water Palnt Rd., to U.S. 1 North, MP K-0 + 4968'

<u>Municipality</u>	<u>Effective Date</u>	<u>Boundaries Covered</u>
Indian River County**** (Except City of Sebastian, MP 214 + 2238' to MP 218 + 171' and the City of Vero Beach, MP 226 + 2987' to MP 228 + 118')	2-25-87	Bay St., MP 212 + 2310' to 20th Place, MP 232 + 4523'
Town of Malabar**	4-13-88	Malabar Rd., MP 199 + 4954' to Jordan Rd., MP 201 + 2642'
City of Titusville**	5-20-88	Garden St., MP 154 + 530' to Chevey Hwy., MP 158 + 669'
City of Port Orange	6-4-88	Charles St., MP 114 + 2386' to Daytona By-Pass (Nova Rd.), MP 116 + 3484
St. Lucie County***	8-1-88	Indian River Rd., MP 235 + 340' to County Line Rd., MP 255 + 1593' Lake Harbor Branch: Water Plant Rd., MP K-0 + 910' to Allapattah Rd., MP K-13 + 3195'
St. Johns County	9-27-88	Race Track Rd., MP 18 + 4856' to Kersey Rd., MP MJ-16 + 3041' Palatka Industrial Lead: MP P-37 to MP 39.7
Palm Beach County*	3-25-89	County Line Rd., MP 280 + 4653' to S.W. 18th St., MP 326 + 4653'
City of Sebastian****	7-14-89	Main St., MP 214 + 2238' to Stratton Ave., MP 218 + 171'
City of Ormond Beach	10-9-89	Hull Rd., MP 100 + 1951' to Hand Ave., MP 105 + 219'
City of Holly Hill	11-4-89	Flomich Ave., MP 106 + 1513' to 2nd St., MP 108 + 1643'
Brevard County (Except City of Cocoa, MP 170 + 2981' to MP 173 + 27111' and City of Rockledge, MP 175 + 110' to MP 177 +	11-27-89	Huntington Rd., MP 143 + 619' to Holly St., MP 211 + 3210' Titusville Branch: Main St., MP E-0 + 290' to Aurantia Rd., MP E-9 + 1953'

4924')

<u>Municipality</u>	<u>Effective Date</u>	<u>Boundaries Covered</u>
City of Edgewater	1-29-90	Park Ave., MP 127 + 287' to 30th St., MP 130 + 1150' Edgewater Cut-Off: MP 126 + 3671' to MP EJ-4 + 5000'

- * These cities now covered under Palm Beach County Ordinance.
- ** These Cities now covered under Brevard County ordinance.
- *** These cities now covered under St. Lucie County ordinance.
- **** Sebastian is in Indian River County.

NOTE: On August 1, 1985, the Martin County Ordinance was found to be illegal. However, another ordinance was passed which included the city of Stuart and whistle ban was put back into effect August 30, 1985.

APPENDIX G

LETTER TO FLORIDA LEGISLATOR JOHN F. COSGROVE



U.S. Department
of Transportation

**Federal Railroad
Administration**

[DATED OCT 29, 1990]

The Honorable John F. Cosgrove
Representative, 119th District
Florida House of Representatives
201 West Flagler Street
Miami, Florida 33130

Dear Mr. Cosgrove:

Thank you for your letter of September 12 regarding the Federal Railroad Administration's (FRA's) study, *Florida's Train Whistle Ban*.

You enclosed a letter from Mr. John A. Cavalier in which several issues were raised regarding the study, its approach and findings. I have addressed each point in the enclosure to this letter.

The basic finding of the original study is that nighttime accidents are occurring at nearly three times the rate that they were before the whistle bans became effective. I have asked everyone who might be knowledgeable regarding this subject to account for this increase in accident rates. None have, but several have questioned the report, its procedures and even its facts. I trust that all the discussion about control groups, measures of rate, population densities, etc. will not serve to cloud the basic issue. So far, there is no other supportable explanation.

In answer to a question you forwarded, I have provided an account of FRA's other activities, which seek to improve highway-rail crossing safety. I am proud of FRA's record of accomplishment and current activities regarding crossing safety, but I am chagrined by the continuing toll of crossing casualties. I would suggest it might be time for all of us concerned with public safety, and particularly with crossing safety, to ask, "what more can I do?"

I appreciate your interest in this matter. I hope we can work together to improve highway-rail crossing safety.

Sincerely,

[SIGNED]

J. W. Walsh

Associate Administrator
for Safety

Enclosure w/attachments (6)

Enclosure

Quoting from Mr. John A. Cavalier's letter of September 7:

"1. I question the use of "control groups" based on multiplying the number of months times the number of crossings. A more accurate report would show the traffic count of automobiles at the crossing, the frequency of trains, and the length (sic) of trains for both CSX and FEC." (Florida East Coast Railway)

Four control groups were used in this study:

- (1) Pre-ordinance periods for the impacted crossings equal in duration to the post-ordinance periods through December 1989.
- (2) The daytime experience for the impacted crossings during pre-and post-ordinance periods of equal duration.
- (3) The nighttime experience for eligible FEC crossings for which no ordinance had been implemented as of December 1989.
- (4) CSX Transportation crossings equipped with devices similar to the impacted FEC crossings in those counties in which both FEC and CSX operate.

Multiplying the number of crossings times the number of months of experience to realize a figure for "crossing-months" of experience is a common statistical procedure used to measure and express collective experience. The technique does not even enter into those findings based on the first two control groups noted, and is used only to normalize accident rates in the latter two control groups.

Reliable current and historical highway traffic counts for individual crossings (State, county and municipal streets and highways) are not available to the Federal Railroad Administration (FRA). A coordinated and collective effort by concerned highway authorities may possibly produce such information from local records. Similarly, the historical frequency of trains and the current day-to-day schedules are not available in sufficient detail. Schedules are too variable. The length of trains is not available.

As a surrogate for traffic and train counts, I have compiled data regarding FEC's Locomotive Miles Operated, by year (See Attachment #1), and regarding Vehicle Miles Driven in Florida, also by year (See Attachment #2). The latter, by county, would be useful, but is not

available to the FRA. Neither of these measures would account for the near tripling of the nighttime accident rate at FEC's impacted crossings, nor for the differential in the change in nighttime versus daytime accident rates.

"2. The study includes data from 1975 through 1989. Again, traffic counts for these periods plus population densities around crossings need to be considered. Growth along the east coast in condos, shopping malls, new highways, etc. are important factors, as well as the number of trains daily by both CSX and FEC."

In addition to the data for vehicle and train miles driven/operated noted above, I have compiled information on the number of registered motor vehicles and drivers in Florida for each year, 1975 through 1988. (1989 data is unavailable.) (See Attachments #3 and #4.) These are reasonable surrogate measures for population density and vehicle usage. We have asked the Florida Department of Transportation to provide this information by county, by year for the 11 counties in which the FEC operates. Once again, these figures do not explain the sudden increase in the FEC nighttime accident rate.

"3. Table 4 shows that CSX nighttime accidents up 67% versus FEC up 23% at no-ordinance crossings. Why? Again, each accident needs review as to cause. How many were a result of cars going around gates that are down? Should the fine for this be increased?"

The increase in nighttime accident rates at CSX Transportation and FEC no-ordinance crossings is probably attributable to the many factors Mr. Cavalier has already cited, e.g., traffic (both rail and highway) and population growth. The point in including these numbers in the original report was to provide control groups (bases for comparison) against which the subject group (FEC's impacted crossings) could be compared. In making such comparisons, one makes assumptions that the control groups are similar to the subject group in all or most essential characteristics. One includes multiple control groups (we used four) in order to minimize the impact of any discrepancies or biases which may be present in any one control group. "Why" these control groups showed increases could be the subject of another, probably more complex, study. For the purposes of this study, the fact that the increase in these control groups amounted to only a fraction of the increase in the subject group reinforces the point that something is unique about the subject group, and provides a base, along with other factors noted in the FRA report, on which to establish "expectations" for the subject group.

We have made a review of each FEC nighttime accident, both before and

after ordinance implementation, 1975 through 1989, at both impacted and no-ordinance crossings. The FRA does not determine "cause" for highway-rail crossing accidents. Rather, we collect "circumstances" and "actions" of the parties and equipment involved. Reviewers are left to make their own judgments. The table, titled "FEC Nighttime Crossing Accidents, Tabulated Circumstances, 1975-1989, " (Attachment #5) provides a breakdown of our findings. The comparable columns are the middle two, which display accident experience for equal (EVEN) pre- and post-ordinance periods at the impacted crossings. Proportionally, the major changes are in the category where the motorist reportedly, "drove around or thru the gate." Pre-ordinance--there were 17 such reports (43.6 percent of the 39 accidents)--versus 96 (83.5 percent) of the post-ordinance 115 accidents. The number of trucks involved went from 3 (7.7 percent) to 16 (13.9 percent) in the post-ordinance period. The number of occurrences where the "motorist passed standing highway vehicle," i.e., another vehicle already stopped at the crossing, jumped from two to nine, while the number of instances where a "motorist drove behind or in front of train and struck or was struck by second train" increased from zero to four. Also of interest, and tending to substantiate these numbers, is the reported number of instances where the motorist action is listed as "other." This is usually used to report instances where a vehicle is trapped on the crossing by standing highway traffic. Eighteen occurrences were reported in both the pre- and post-ordinance periods, a proportional decrease of 66.1 percent. This is intuitively acceptable in that the circumstances which would lead to a vehicle being trapped on a crossing would not be affected one way or another by whether or not the train used a whistle. The number of occurrences should remain the same.

Mr. Cavalier asked whether the fine should be increased for driving around or through a gate. This is certainly a local decision. But I would first ask, "How many time have motorists be cited for such an infraction, after an accident and when no accident occurred?" I would guess, especially in the latter instance, "None!" Increased fines are of little importance without effective enforcement.

"4. The chart on page 10 [FRA's *Florida's Train Whistle Ban*, July 1990] needs further analysis.

- A. Is there a similar chart for CSX?
- B. Why is the accident rate curve from July 1984 thru July 1986 relatively flat?
- C. Why is the accident rate curve from July 1986 thru December 1989 at a higher rate?"

A similar chart for CSX is attached. (Attachment #6) Three factors mitigate against the immediate (July 1984) appearance of changes in

accident rates under the conditions cited. The first ordinance was not effective until July 29, 1984. Additional ordinances went into effect in each month through March 1985 and sporadically in subsequent months, each accompanied by a flurry of controversy and publicity. Ordinances are still being implemented. Figure 3 [FRA's *Florida's Train Whistle Ban*, July 1990], graphically displays the phased implementation of the ordinances. Obviously, more effect will be apparent in the latter months and years. Also, there is a phenomenon that highway traffic engineers call the "novelty effect" which occurs anytime highway traffic control signal and sign standards are changed. This effect is most pronounced when publicity has preceded, appeared concurrent with, or followed implementation of a change. It causes a sometimes significant delay in the return to "normal," in this case, a wearing-off of the heightened awareness occasioned by the publicity which accompanied the passage and implementation of these ordinances. Lastly, a sharp decline or leveling in FEC's statistics in the fall of 1985 would temporarily have suppressed accident rates, countering forces (the whistle bans) which may have been tending to force rates higher. The delay Mr. Cavalier has noted is most likely attributable to a combination of these factors. The accident rate subsequent to July 1986 appears to be attributable, in large measure, to the bans on whistles.

"5. A study of bans in other states needs to be conducted."

I agree, and my staff has been seeking the cooperation of major railroads and the Association of American Railroads (AAR). Such a study will not be as straight forward as the Florida effort because, to our knowledge, no bans as widespread and as sweeping as the Florida provision have been implemented in other jurisdictions.

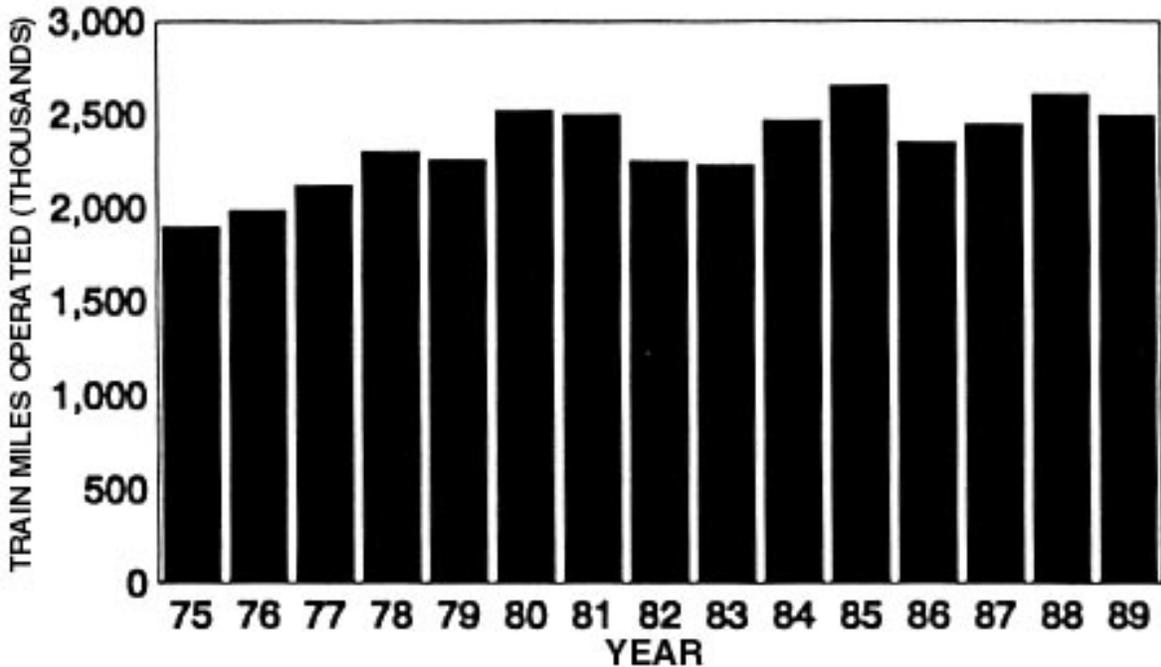
"6. What is the F.R.A. doing to improve safety at crossings other than relying on train horns that cannot be heard by automobiles with air conditioning or heaters operating and radio playing?"

Current activities include substantial financial and in-kind support of Operation Lifesaver, a nationwide program which promotes public education regarding hazards at crossings, engineering safety improvements and enforcement of crossing related traffic laws. The FRA is also sponsoring research: at the Volpe National Transportation Systems Center in Cambridge, Massachusetts regarding the efficacy of placing reflectors on the sides of rail cars in order to improve the conspicuity of the rail cars; and, at the Texas Transportation Institute in College Station, Texas regarding public perception and credibility of automatic warning devices and railroad response to, and findings regarding, notification by the public of warning device problems. The FRA is underwriting the cost of

producing a pamphlet for national distribution promoting the evaluation of school bus driver training needs (re: crossing safety) based on a program developed in the Lamar Consolidated Independent School District, Texas. Demonstration projects, with FRA sponsorship, are being cooperatively conducted by Kansas State University, the University of Kansas, the Kansas Department of Transportation, the Atchison, Topeka and Santa Fe Railway, the Burlington Northern Railroad and the Union Pacific Railroad at rural crossings equipped with passive devices in southeastern Kansas. These demonstrations will report on motorists reaction to a variety of innovative uses of signs (some new) and reflectors. The FRA has recently negotiated and signed a financial assistance agreement, on behalf of three Department of Transportation (DOT) agencies, with the Law Enforcement Television Network (LETN). This grant will underwrite LETN's development costs for a series of police officer oriented program which will deal with law enforcement at highway-rail crossings, crossing accident investigations, the proper response to hazardous materials involvement in crossing accidents, trespasser prevention, etc. These programs will air on LETN and will reach more than 1,800 police stations nationwide, potentially more than 75,000 sworn officers. The FRA is also pursuing an open regulatory procedure, titled, "Grade Crossing Signal System Safety," FRA Docket No. RSCG-3. This procedure was prompted by concerns for crossing signal system maintenance, inspection and testing procedures currently in use within the industry. Further information is contained in the Federal Register of September 20, 1990, Volume 55, Number 183, pages 38707-38712. Lastly, the FRA collects and maintains a database regarding all highway-rail crossing accidents and is custodian of the U.S. DOT/AAR National Rail-Highway Crossing Inventory System, a computerized database, which contains records for all crossings in the United States. The FRA provides support from the databases, e.g., accident and inventory histories for crossings, accident predictions, etc., to public authorities and to railroads free of charge. FRA's crossing related concerns are broad based and comprehensive and certainly address more than railroad whistle bans along the east coast of Florida.

FLORIDA EAST COAST

Locomotive Train Miles Operated 1975 - 1989

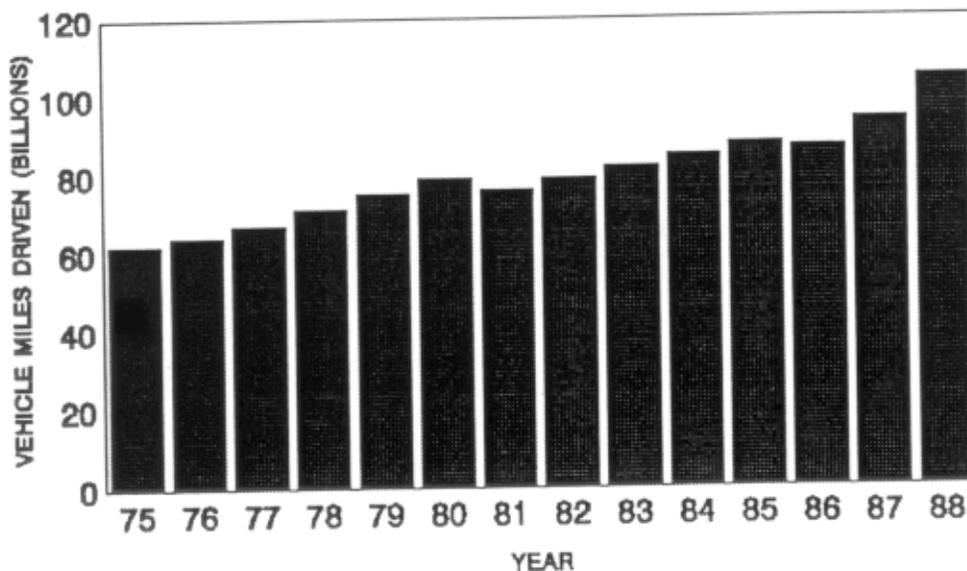


FLORIDA EAST COAST RAILWAY COMPANY
LOCOMOTIVE TRAIN MILES OPERATED

1989	2,493,172
1988	2,606,970
1987	2,447,322
1986	2,348,930
1985	2,652,163
1984	2,464,471
1983	2,228,141
1982	2,249,352
1981	2,496,035
1980	2,517,805
1979	2,254,279
1978	2,301,156
1977	2,120,780
1976	1,983,979
1975	1,896,657

VEHICLE MILES DRIVEN

Florida
1975 - 1988

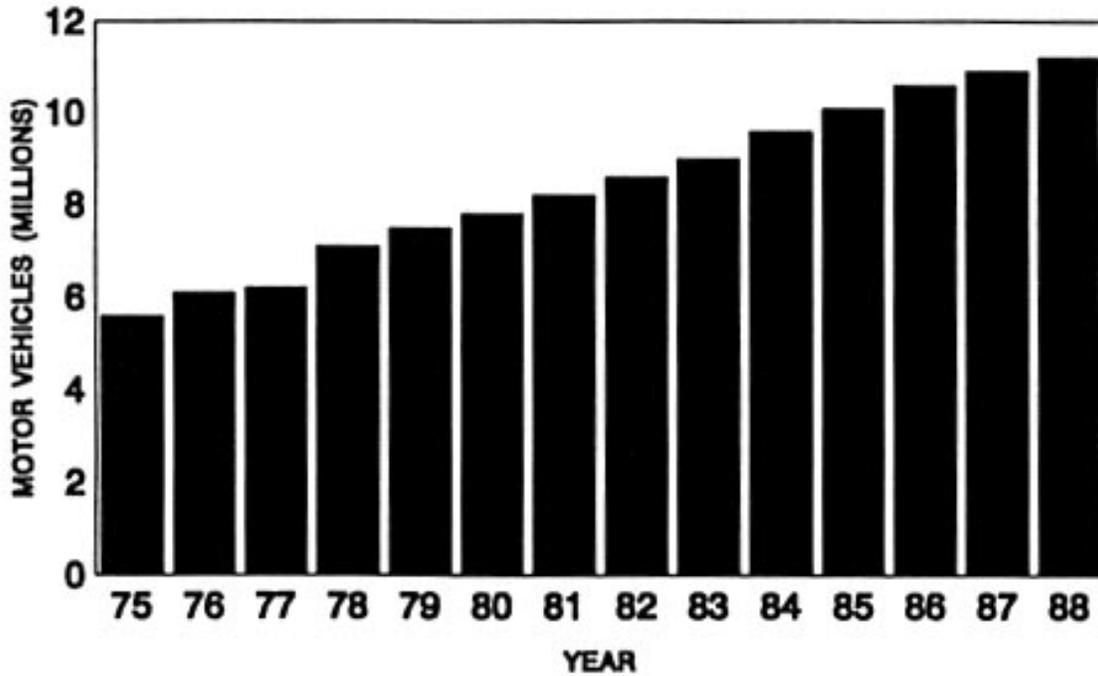


VEHICLE MILES DRIVEN IN FLORIDA
(000,000)

1988	105,319
1987	93,639
1986	87,272
1985	88,056
1984	85,475
1983	81,776
1982	79,498
1981	76,145
1980	79,002
1979	74,651
1978	71,437
1977	67,007
1976	64,492
1975	61,715

MOTOR VEHICLES REGISTERED

Florida
1975 - 1988

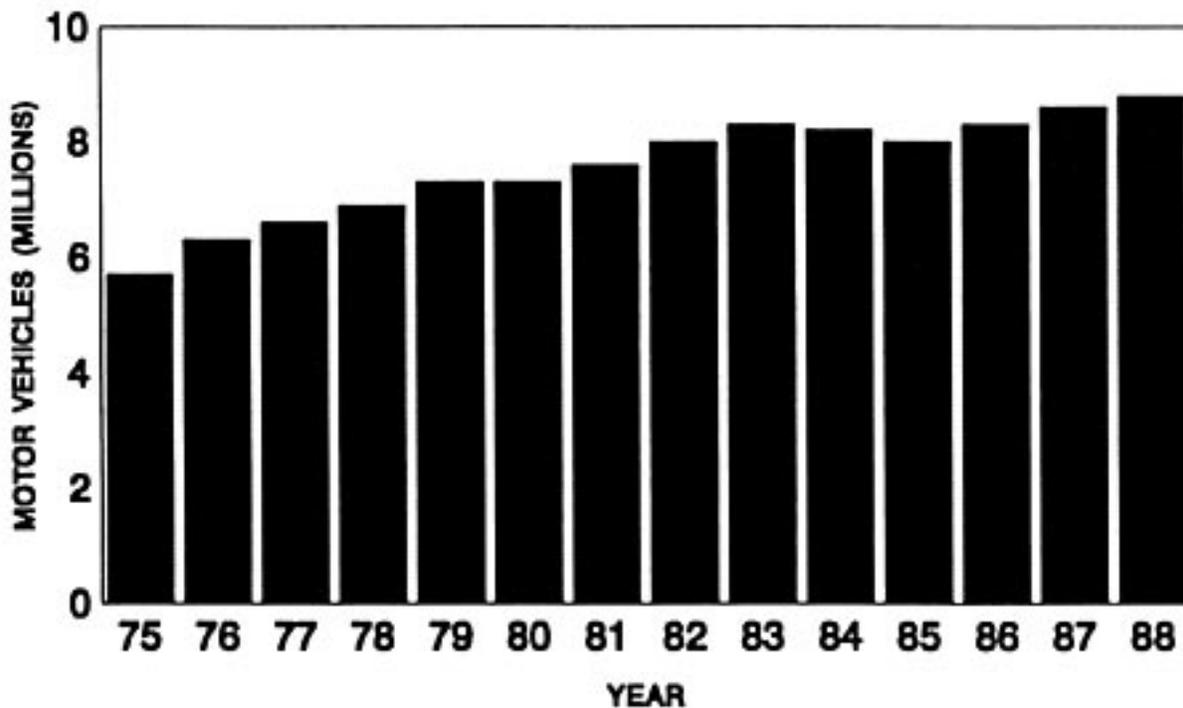


MOTOR VEHICLES REGISTERED IN FLORIDA

1988	11,183,114
1987	10,903,111
1986	10,591,197
1985	10,096,849
1984	9,635,054
1983	9,040,974
1982	8,560,997
1981	8,194,081
1980	7,833,024
1979	7,519,427
1978	7,068,875
1977	6,241,692
1976	6,077,862
1975	5,560,354

DRIVERS LICENSED

Florida
1975 - 1988



DRIVERS LICENSED IN FLORIDA

1988	8,790,000
1987	8,593,000
1986	8,335,000
1985	8,016,000
1984	8,186,000
1983	8,347,000
1982	7,979,000
1981	7,641,000
1980	7,268,000
1979	7,290,000
1978	6,868,000
1977	6,572,000
1976	6,256,000
1975	5,674,000

ATTACHMENT #5

FEC NIGHTTIME CROSSING ACCIDENTS
Tabulated Circumstances
1975 - 1989

<u>MOTORIST:</u>	<u>PRE-ORDINANCE</u>		<u>POST-ORDINANCE</u>	<u>NO-ORD</u>
	<u>MAX</u>	<u>EVEN</u>	<u>IMPACTED</u>	
Drove Around or Thru Gate	51	17	96	13
Stopped and Then Proceeded	3	-	-	1
Did Not Stop	23	4	1	2
Other	<u>40</u>	<u>18</u>	<u>18</u>	<u>5</u>
TOTAL	117	39	117	21

OF THE FOREGOING, MOTORIST

Passed Standing Highway Vehicle	4	2	9	1
Struck the train	32	9	26	7 ¹
Drove Behind or in Front of Train and Struck or Was Struck By Second Train	1	-	4	-
Stalled on Crossing	13	5	3	3
Stopped on Crossing	28	13	14	3

HIGHWAY USER INVOLVED

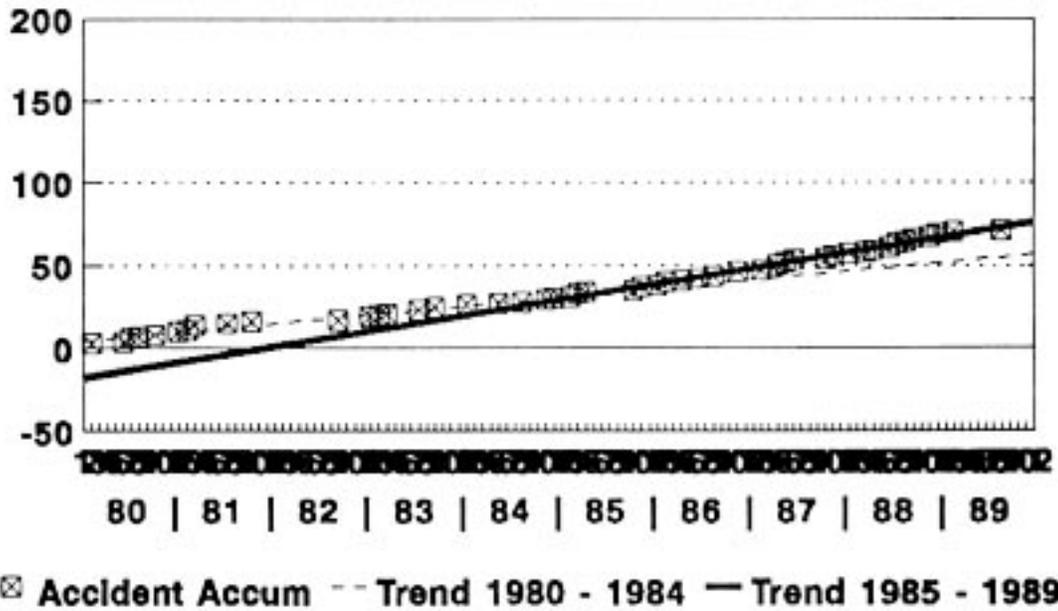
Auto	97	32	90	16
Truck	8	3	16	3
Tractor-Trailer	4	1	2	-
Bus (Other Than School Bus)	1	-	-	-
School Bus	-	-	-	-
Motorcycle	2	-	2	2
Pedestrian	4	2	4	-
Other	1	1	1	-

¹ Average car of train struck: pre-ordinance (max) = 30, pre-ordinance (even) = 37, post-ordinance impacted = 12, and no-ordinance = 12.

CSX CROSSING ACCIDENTS

Equipped With Lights, Bells & Gates

(10:00 P.M.-6:00 A.M.)



APPENDIX H

LETTER TO ROMAN A. YODER, JR.



U.S. Department
of Transportation

**Federal Railroad
Administration**

January 8, 1991

Mr. Roman A. Yoder, Jr.
Assistant City Manager
120 Malabar Road, S.E.
City of Palm Bay, Florida 32907-3009

Dear Mr. Yoder:

Thank you for your letter of September 12 regarding the Federal Railroad Administration's (FRA's) study, *Florida's Train Whistle Ban*. You raised several questions regarding the study, its approach and findings. I have addressed each point in the enclosure to this letter.

The basic finding of the original study is that nighttime accidents are occurring at nearly three times the rate that they were before the whistle bans became effective. I have asked everyone who might be knowledgeable regarding this subject to account for this increase in accident rates. None have, but several have questioned the report, its procedures and even its facts. I trust that all the discussion about control groups, measures of rate, population densities, etc. will not serve to cloud the basic issue. So far, there is no other supportable explanation.

I appreciate your interest in this matter. If you have any further questions please write again.

Sincerely,

[SIGNED]
Philip Olekszyk
Acting Associate Administrator
for Safety

Enclosure

Enclosure

Quoting from your letter of September 12:

- "1. It is difficult to determine what trends may have been filtered out of the original data such as increases in accidents or volumes, particularly when the control groups (CSX and non-ban FEC crossings) utilize a ten-year pre-history versus a five-year post history."

We are aware of no trends which have been filtered out of the original data. As pointed out in the report, since no bans have been established for the CSX and the non-ban FEC crossings, there is no post-ban history for the crossings. In order to make a comparison, 10 versus 5 years was arbitrarily selected because it approximated the maximum post-ban history period (65 months). Data was normalized to a "per month" base in order to facilitate comparisons. If you would like to recommend a different split, and a rationale, we will recalculate the accident rates.

- "2. What was average train traffic volume by year for post- and pre-ban crossings and for the control groups? This data would be useful to determine the number of accidents per rail mile traveled--a more useful measure than accidents per crossing or accidents per month."

The historical frequency of trains and the current day-to-day schedules are not available in sufficient detail to support such a comparison. Schedules are too variable. I have compiled data regarding FEC's locomotive Miles Operated, by year. (See Attachment #1.) This data offers no explanation for the near tripling of the nighttime accident rate at FEC's impacted crossings. FEC's non-ban crossings are exposed to the same rail traffic as the impacted crossings (See discussion on page 7 of the report). Similar data for CSX's operations within Florida is not available.

- "3. No trend is shown for increases/decreases occurring over time, i.e., it can be assumed that in year one of the ten-year pre-ban history, that accidents were lower than in year ten of that ten-year history. Projecting whatever trends this data depicts would be useful as a measure of actual versus projected accidents."

Conditions change. "Old" data must be judiciously applied. The oldest data from the 10 year pre-ban period is now 15 years old. For example, your assumption that the number of accidents in year one of the 10 year pre-ban period was lower than in year ten of the

10 year period is wrong. The number of FEC crossings has decreased. The number of FEC crossings equipped with automatic warning devices has increased. Some sort of normalizing, e.g., accidents per crossing per month by type of warning device, is necessary in order to apply this data. However, in order to address your concern, I have prepared a graphic (Attachment #2), which tallies all FEC crossing accidents through the pre- and post-ban periods, from 1975 through 1989. A review of this data shows that the gains achieved by the FEC by eliminating some trackage and by equipping numerous crossings with gates, flashing lights and bells have been lost since the advent of the Florida whistle bans.

- "4. Local population, average daily traffic or other measures of increased crossing use were not analyzed. It is apparent that the faster growing and more populated areas have the whistle ban while the less populated and slower areas do not. For example, the City of Palm Bay's population has increased by over 220 percent in the ten-year period 1980 to 1990, so even a 200 percent increase in crossing accident would still maintain an equivalent accidents per capita figure."

Local population and average daily traffic were not included for two reasons. First, such data was not readily available to the Federal Railroad Administration (FRA). Second, by judicious selection of the control groups such influences have been accommodated. However, on the first point, we have compiled some state-wide data regarding the number of registered motor vehicles and licensed drivers in Florida for each year, 1975 through 1988. (1989 data is unavailable.) (See Attachments #3 and #4) Also, on the second point (daily traffic), we have gathered data on Vehicle Miles Driven in Florida, Attachment #5. Data regarding the number of registered vehicles, drivers and vehicle miles driven, by county, would be useful, but is not available to the FRA. Florida's Department of Transportation has already provided some additional data and is considering further compilations. A coordinated and collective effort by concerned municipal or highway authorities could possibly produce such information (especially historical crossing specific traffic counts) from local records. The selection of the control groups, daytime at the same crossings, FEC crossings not impacted, and similarly equipped CSX crossings in the same counties, should have accounted for the factors you have cited. For example, if accidents per capita is a valid measure, and your population has increased so sharply, is this reflected in the daytime accident experience at those same crossings, or in the non-impacted crossings, both FEC and CSX? It is not. The data so far available to this office offer no explanation for the near tripling of the nighttime accident rate at FEC's impacted

crossings, nor for the differential in the change in nighttime versus daytime accident rates.

"5. The study failed to utilize more advanced statistical modeling and measures of validity such as regression analysis and variance measures."

An analysis has been performed using a chi-square (χ^2) test of homogeneity for each control group versus the impacted (or treatment) group. The test computes a discrepancy measure based on observed and expected frequencies for individual cells. The value of the chi-square statistic determines if the differences between the observed and expected cell counts is large enough to reject the null hypothesis (H_0). A rejection of the null hypothesis asserts acceptance of the alternative hypothesis (H_1). The hypotheses are:

H_0 : Ordinance did not increase freight crossing accidents.

H_1 : Ordinance did increase freight crossing accidents.

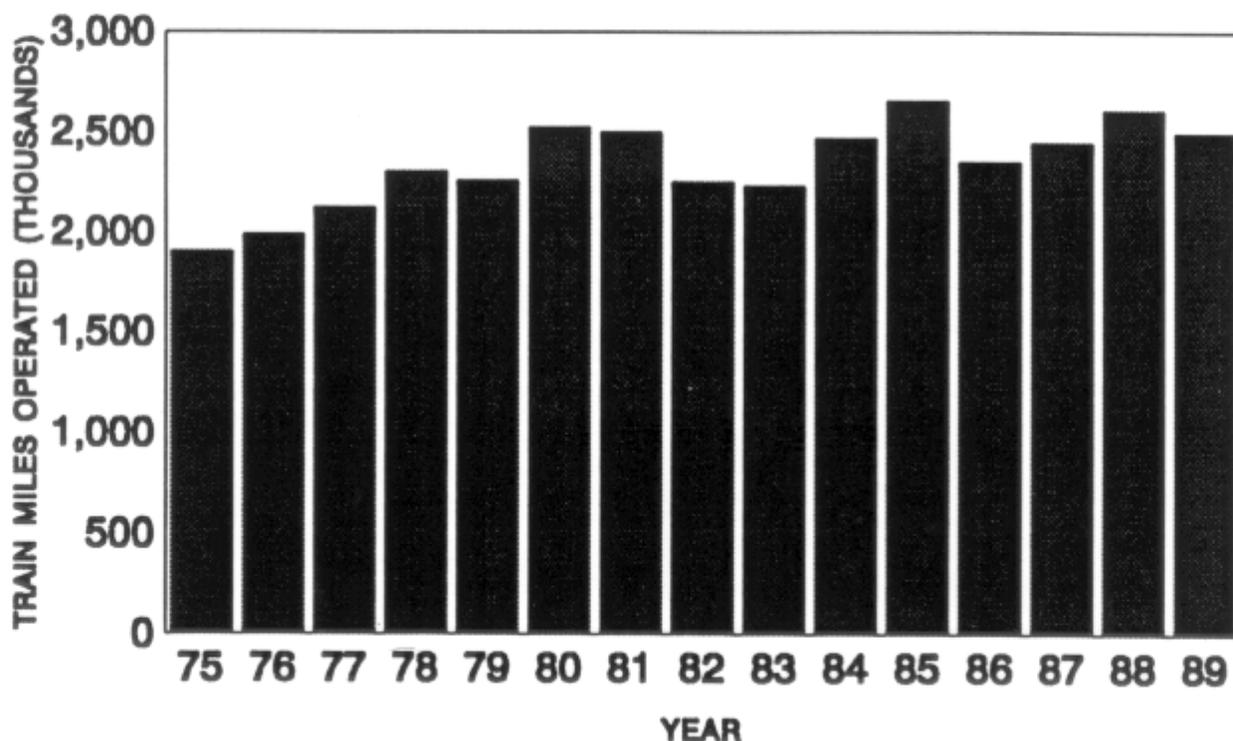
In each analyses (daytime experience at impacted crossings, non-impacted FEC crossings and similarly equipped CSX crossings) the null hypothesis was rejected. [The full analysis is included as the Appendix D to this report.]

"6. The obvious bias shown in the language of the report, particularly in the Synopsis and Background sections and the lack of statistically valid procedures presented by the report lead to questionable findings."

This project, an assessment of the Florida whistle bans, was begun pursuant to a specific Congressional mandate. The request and our initial efforts were neutral. In fact, we were genuinely dubious about finding anything of substantive value. We were as surprised with the findings as I am sure you were. We have checked and rechecked the data and our procedures. We continue to seek explanations for the change, which might point to something other than the whistle bans. None have been offered, which have withstood scrutiny. If the language of the report is biased, we offer no apology. The findings are startling, even shocking, and if our bias in favor of safety is reflected in the report, we have done our job!

FLORIDA EAST COAST

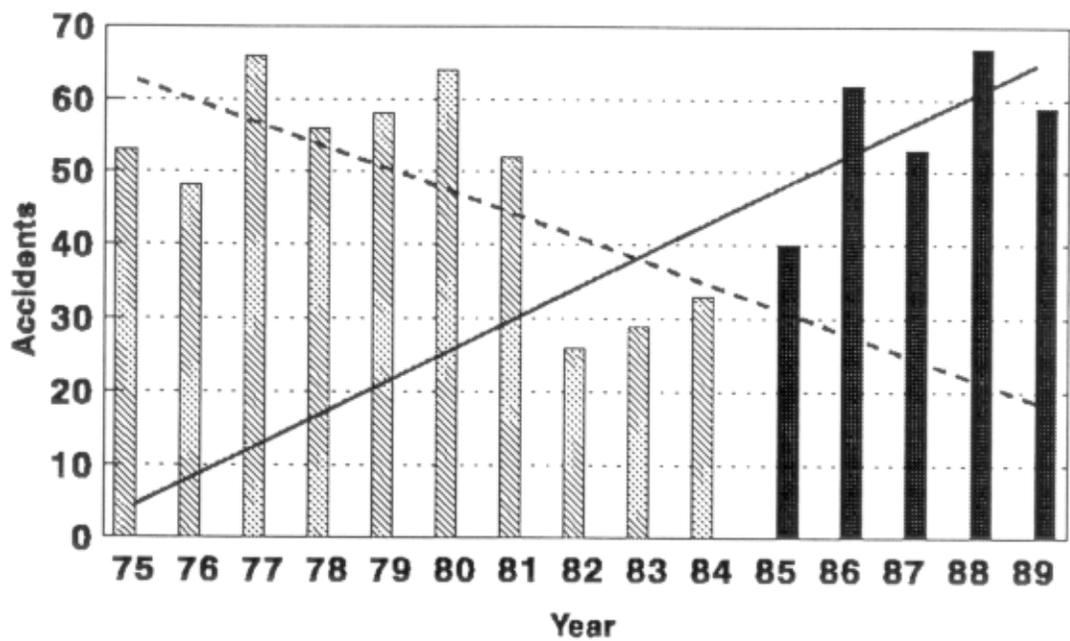
Locomotive Train Miles Operated 1975 - 1989



Source: FEC's Railroad Illness Summary Reports Submitted to FRA.

ATTACHMENT 2
 Florida East Coast Railway Company
 Public Highway-Rail Grade Crossing Accidents
 1975 - 1989

FLORIDA EAST COAST RAILWAY Public Highway-Rail Crossing Accidents

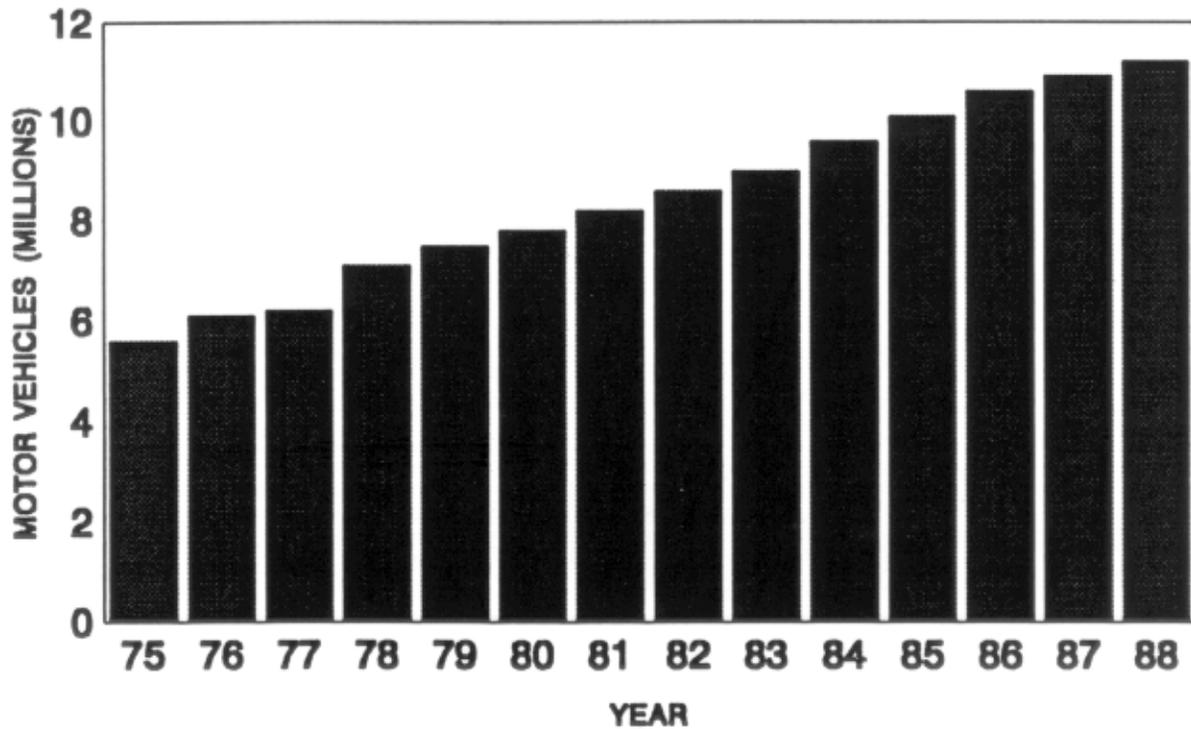


Pre-Ban
 Post-Ban
 -- Pre-Ban Trend
— Post-Ban Trend

Source: Federal Railroad Administration

MOTOR VEHICLES REGISTERED

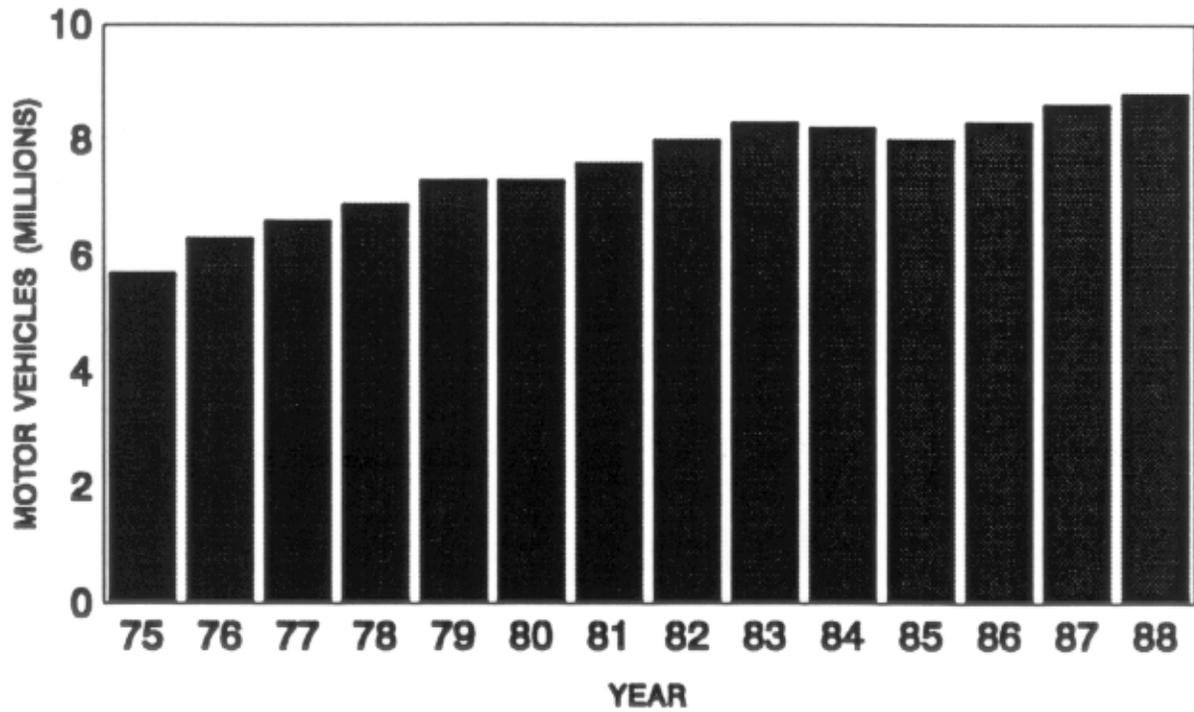
Florida
1975 - 1988



Source: Federal Highway Administration.

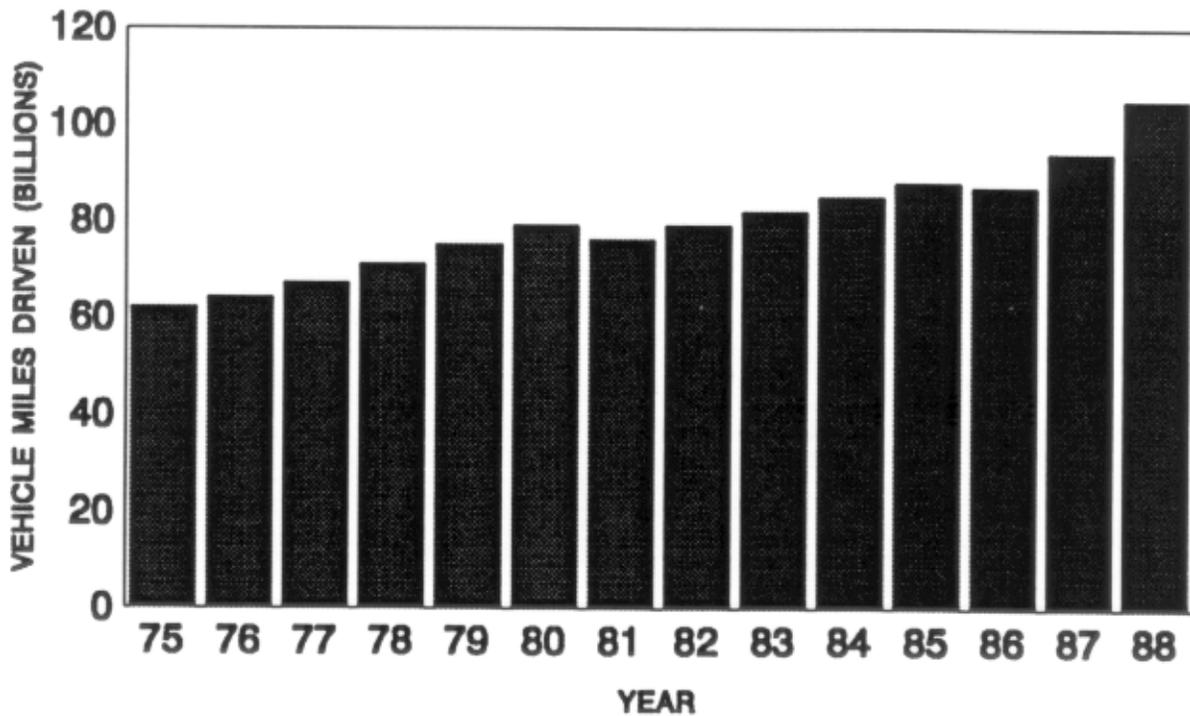
DRIVERS LICENSED

Florida
1975 - 1988



VEHICLE MILES DRIVEN

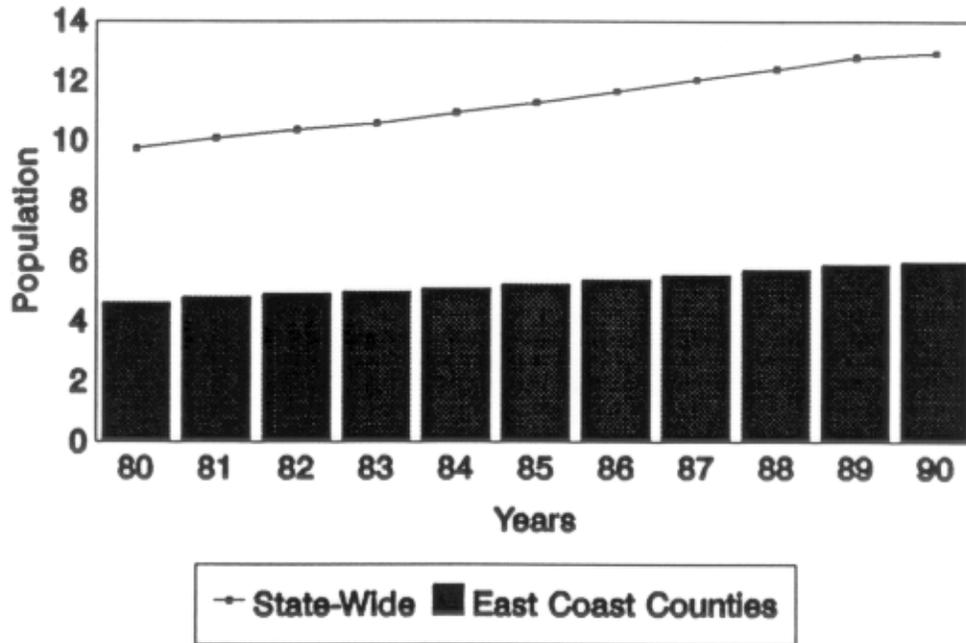
Florida
1975 - 1988



Source: Federal Highway Administration.

APPENDIX I

POPULATION OF FLORIDA (in Millions)

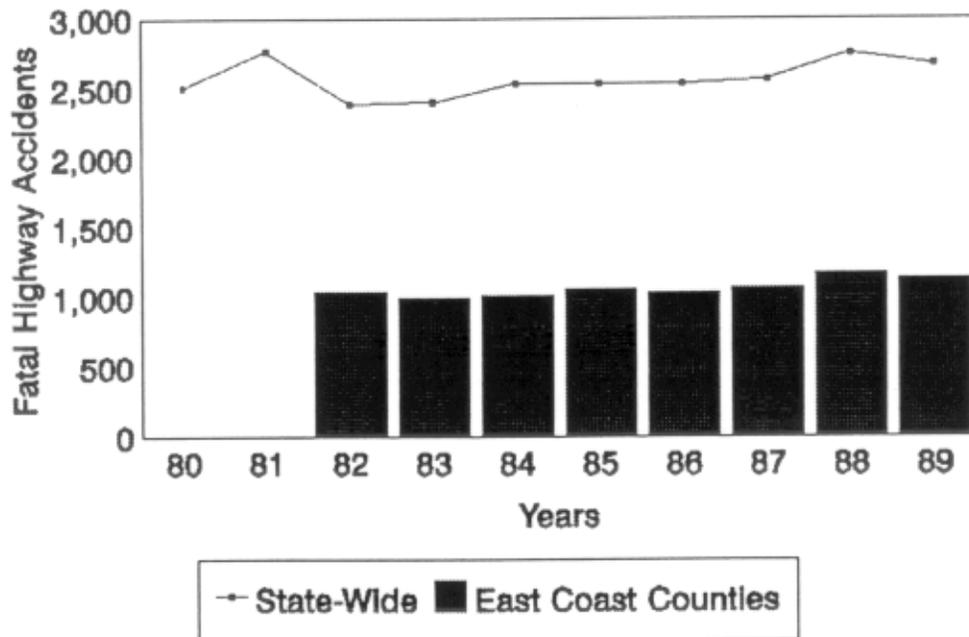


Source: Florida DOT Office of Policy and Planning

APPENDIX J

FATAL HIGHWAY ACCIDENTS

In Florida And Selected Florida Counties

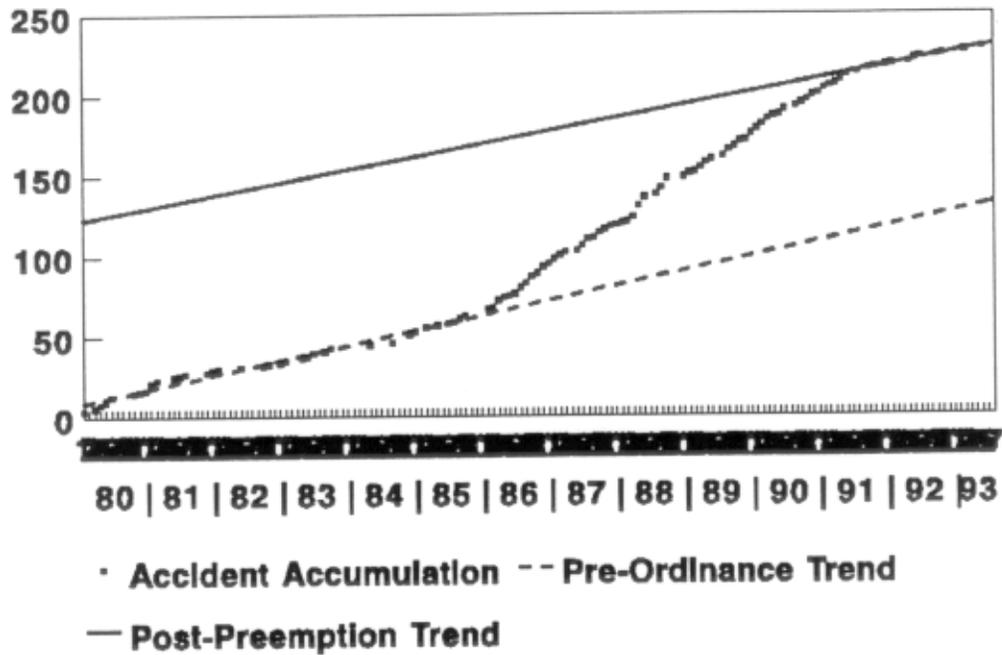


Source: Federal Highway Administration

APPENDIX K



FEC CROSSING ACCIDENTS Impacted Crossings (10:00PM-6:00AM)



Source: Federal Railroad Administration. First Ordinance: July 1984--Preempted: July 1991.
1993 Data (Through July) is Preliminary.

APPENDIX L

PUBLIC UTILITY COMMISSION OF OREGON

LABOR & INDUSTRIES BUILDING, SALEM, OREGON 97310-0335 PHONE (503) 378-6660

December 19, 1990

Bruce George
Federal Railroad Administration
400 Seventh Street S.W.
Washington, D.C. 20590

RE: Oregon Train Whistle Bans

The State of Oregon is still very interested in the results of the FRA report entitled "Florida's Train Whistle Ban." Following the International Symposium On Railroad-Highway Grade Crossing Research and Safety in Knoxville, Tennessee, October 31-November 3, 1990, Oregon Public Utility Commission (OPUC) staff conducted a study of public crossings in Oregon where the OPUC had invoked a train whistle ban.

We tried to model our study after the Florida study. We have 26 public crossings with OPUC invoked train whistle prohibitions. All of these prohibitions are 24 hour bans, not the nighttime bans in place in Florida. All the crossings with train whistle bans are equipped with flashing light and automatic gate signals and audible warning devices.

We compared accidents for equal periods before and after the whistle ban took effect to evaluate the effectiveness of train whistling at crossings. We were able to evaluate 1,401 months of pre and post whistle ban at fully signalized crossings.

Our study revealed an increase in the number of crossing accidents from two to nine during the study period. Like the Florida study, we were unable to find any other factors that could have contributed to the increase in accidents.

I have attached a summary of our study. If you are interested in any additional information regarding the study or the crossings involved, please call me at (503) 378-6660. Have you received any feedback contrary to the findings of the Florida study? Specifically, have you heard anything from the cities, counties or Florida Secretary of Transportation regarding possible flaws or contributory factors to the accident increase cited in your study?

[SIGNED]

Craig J. Reiley
Manager, Crossing Safety Section

OREGON CROSSINGS WITH TRAIN WHISTLE PROHIBITIONS
(All Prohibitions Are 24-Hour Bans)

NO.	CROSSING NO.	CROSSING NAME/LOCATION	WHISTLE BAN DATE MO/YR	PERIOD	A C C I D E N T H I S T O R Y						DATE GATES INSTALLED	
					PRE-WHISTLE BAN MONTHS	# ACC	POST-WHISTLE BAN PERIOD	MONTHS	# ACC			
1.	C-716.2	Madrona, Salem	3/84	10/77 to	3/84	77	0	4/84 to	9/90	77	0	--/75
2.	C-717.1	McGilchrist, Salem	3/84	10/77 to	3/84	77	0	4/84 to	9/90	77	0	6/69
3.	C-717.8	Hines, Salem	3/84	10/77 to	3/84	77	0	4/84 to	9/90	77	0	7/76
4.	C-718.0	Mission, Salem (Closed)	3/84	1/80 to	3/84	50	0	4/84 to	6/88	50	0	3/75
5.	C-718.3	Mill St., Salem	3/84	11/80 to	3/84	40	0	4/84 to	8/87	40	0	10/80
6.	C-718.52	State St., Salem	3/84	10/77 to	3/84	77	0	4/84 to	9/90	77	2	11/80
7.	C-718.6	Court St., Salem	3/84	10/77 to	3/84	77	0	4/84 to	9/90	77	1	11/56
8.	C-718.67	Chemeketa St., Salem	3/84	10/77 to	3/84	77	1	4/84 to	9/90	77	0	11/56
9.	C-718.76	Center St., Salem	3/84	10/77 to	3/84	77	1	4/84 to	9/90	77	0	11/56
10.	C-718.83	Marion St., Salem	3/84	10/77 to	3/84	77	0	4/84 to	9/90	77	2	11/56
11.	C-719.2	"D" St., Salem	3/84	10/77 to	3/84	77	0	4/84 to	9/90	77	0	11/56
12.	C-719.4	Market St., Salem	3/84	10/77 to	3/84	77	0	4/84 to	9/90	77	0	11/56
13.	C-720.0	Sunnyview (Tile Rd.), Salem	12/86	5/83 to	12/86	44	0	1/87 to	9/90	44	0	6/82
14.	C-720.1	Woodrow St., Salem	12/86	5/83 to	12/86	44	0	1/87 to	9/90	44	0	6/82
15.	C-720.3	Silverton Road, Salem	12/86	4/83 to	12/86	44	0	1/87 to	9/90	44	1	8/64
16.	C-722.7	Blossom Dr., Salem	12/86	4/83 to	12/86	44	0	1/87 to	9/90	44	0	6/65
17.	3E-66.25	Chemawa Rd., Salem	1/83	6/76 to	1/83	79	0	2/83 to	9/89	79	2	3/75
18.	3E-68.9	Salem Ind. Dr., Salem	1/83	6/76 to	1/83	79	0	2/83 to	9/89	79	1	9/73
19.	3E-70.11	Liberty St., Salem	1/83	2/80 to	1/83	35	0	2/83 to	1/86	35	0	1/80
20.	3E-70.18	Commercial St., Salem	1/83	2/80 to	1/83	35	0	2/83 to	1/86	35	0	1/80
21.	3E-70.9	Front S. of Division, Salem	1/83	12/81 to	1/83	13	0	2/83 to	3/84	13	0	11/81
22.	3E-70.98	Union Near Front, Salem	1/83	12/81 to	1/83	13	0	2/83 to	3/84	13	0	11/81
23.	3E-71.31	Court at Front, Salem	1/83	1/82 to	1/83	12	0	2/83 to	2/84	12	0	12/81
24.	3E-73.1	Minto Island Road, Salem	1/83	3/81 to	1/83	22	0	2/83 to	12/84	22	0	2/81
25.	10A-0.45	Wilson Ave., Bend	8/84	10/79 to	8/84	58	0	9/84 to	7/89	58	0	9/79
26.	10A-3.29	Murphy Rd., Bend	1/89	6/87 to	1/89	19	0	2/89 to	9/90	19	0	5/87
TOTALS						1,401	2		1,401	9		

PERIOD--1st of the month listed to (but not including) the last month shown. The month the ban became effective is not included in the study.
GATE INSTALLATION DATE--sometimes limits the evaluation period.
CRITERIA of crossing being equipped with flashing lights, gates and bells has been met.
ACCIDENT reported at each crossing have not been studied to determine whether or not whistling would have prevented the accident.

APPENDIX M

ORDER NO. 91-1164

ENTERED SEPT 13, 1991

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

RX 355

In the Matter of the Petition of the CITY OF)
EUGENE to Establish a Whistle-Free Zone on) ORDER
the Southern Pacific Transportation Company's)
Main Line, Between Hilyard and Van Buren)
Streets, in Eugene, Lane County. Oregon.)

DISPOSITION: EUGENE WHISTLE PROHIBITION ORDER
RESCINDED, EXCEPT AS TO SAFETY
IMPROVEMENTS

Procedural History

On August 2, 1989, the Commission issued Order No. 89-1037 in this docket. The order granted, in part, the petition of the City of Eugene for a whistle prohibition order for ten public rail crossings on a section of Southern Pacific (SP) main line which runs through central Eugene. An appeal was filed by SP. *Southern Pacific Transportation Company v. Oregon PUC*, Marion County Circuit Court, Civil No. 90C10181.

On October 22, 1990, the Marion County Circuit Court, pursuant to a motion by SP, entered an order directing the Commission to reopen the record to consider a federal government report on Florida's nighttime train whistle ban.

On March 26, 1991, a hearing was held before Hearings Officer Simon J. Fitch to take additional evidence relating to the federal report. The following appearances were entered:

For Southern Pacific Transportation Company:

Ian Whitlock
Attorney at Law
Portland, Oregon

For the City of Eugene:

Milo Mecham
Attorney at Law
Eugene, Oregon

For the Commission staff:

Machael Weirich
Assistant Attorney General
Salem, Oregon

Based upon the record herein, the Commission makes the following:

FINDINGS OF FACT

The "Florida Study"

In July 1990, the United States Department of Transportation, Federal Railroad Administration (FRA) issued a study entitled "*Florida's Train Whistle Ban*" (the "Florida Study"). The study reviewed the nighttime accident history of the Florida East Coast Railway Company (FEC) at highway-rail crossings where a nighttime whistle prohibition was in effect.

The study covered a 65-month period beginning in 1984. The whistle bans, imposed by individual counties and cities, applied only to crossing equipped with gates, flashing lights, bells, and special advance warning signs. The whistle bans involved in the study were in effect only between the hours of 10:00 p.m. and 6:00 a.m. The advance warning signs read: NO TRAIN HORN, 10:00 P.M. TO 6:00 A.M.

The study reviewed accident statistics for 511 FEC crossings subject to whistle prohibitions, in each case comparing equal periods of time before and after the implementation of the ban. The number of nighttime accidents at these crossings increased 195 percent, from 39 accidents in the period before the bans to 115 after the bans.

The study compared these accident statistics with those for three control groups. The first control group consisted of the same 511 FEC crossings during daytime (6:00 a.m. to 10:00 p.m.) when whistles were still sounded at each crossing. For the same time periods, daytime accidents increased less than 1 percent, from 108 to 109.

The second control group consisted of FEC crossings with no whistle ban. In this category, accident rates between 1974 and 1984 were compared with rates between 1984 and 1989. Because the whistle bans began to be implemented in 1984, this provided similar "before and after" comparison periods. The daytime accident rate at these crossings was 30 percent lower in the five-year period than in the preceding ten years. The nighttime accident rate increased 23 percent in the five-year period, compared to the preceding ten years.

The third control group consisted of data from another railroad with Florida operations, CSX Transportation (CSX). Accident data for the same fifteen-year period (1975-89) were available for 224 similarly equipped CSX crossings in the six counties in which both railroads operate. CSX was not required to comply with the whistle bans because it operated interstate. CSX daytime accident rates decreased 61 percent between the five- and ten-year comparison periods. Nighttime rates increased 67 percent.

The combined daytime and nighttime accident rate at FEC's crossings with a whistle ban has increased 75 percent. The combined rate at crossings without a ban had decreased 17 percent.

The study concludes:

The only identifiable difference between the crossings in the subject data set (the [whistle ban] ordinance impacted crossings) and the control groups remains the [whistle ban] ordinances. FEC compliance with the ordinances, the failure to use train whistles, remains the only explanation for the abrupt (200 percent) increases in the nighttime accident rate at the impacted crossings).

Florida Study, SP Ex. 1R, p.1.

Statistical Accuracy

Subsequent to the distribution of the Florida Study, the Federal Highway Administration conducted a statistical analysis¹ of the study data to determine the reliability of the conclusions. The analysis, made a part of the record in this docket, concluded that the initial study findings were

¹ The analysis was performed using a chi-square test of homogeneity for each control group versus the impacted group.

correct and withstood critical statistical analysis.

Additional Information

FRA received questions from a Florida legislator and a Florida city official regarding the methodology of the study. FRA conceded that the study did not look at highway traffic counts at individual crossings, at frequency of trains or at train schedules. This data was not available to FRA. As a surrogate, FRA did look at FEC Locomotive Miles Operated, by year and month, and at Vehicle Miles Driven in Florida, by year.² It concluded that neither measure could account for the significant increase in the nighttime accident rate.

FRA was asked if it took population density and development such as condos, new shopping malls, and new highways into account. The study did not specifically do so. As a surrogate for population density, FRA looked at registered motor vehicles and drivers by county and year and concluded that the increased registration did not explain the sudden increase in crossing accidents. FRA did state that the increase in volume, since the increases at crossings without a whistle ban were probably attributable to such factors.

Accident Circumstances

In response to the foregoing inquiries, FRA also reviewed the individual circumstances of the nighttime accidents. Staff Ex. 2R, Attachment 5. The data reflected an increase after whistle prohibition in the proportion of accidents caused by motorists driving around or through the crossing gates from 43.6 percent to 83.5 percent of the total. The number of occurrences where a motorist passed another vehicle stopped at the crossing increased from two to nine. The number of times a motorist drove behind or in front of a train and struck or was struck by the train increased from zero to four. Staff Ex. 2R, p.3.

Oregon Study

Staff conducted a study of crossings in Oregon where whistle prohibitions have been ordered by the Commission. The data base, 18 crossings, is much smaller than that used in the Florida Study.

In its study, staff identified those crossings where the Commission had ordered a train whistle ban and compiled the accident history for each crossing. The accident history was limited by the length of time either prior or subsequent to the effective date of a whistle ban. Staff found that accidents increased from two to six (200 percent) at the crossings in the

² Vehicle Miles Driven statistics were not available by county. FRA noted that these county statistics would have been helpful.

Oregon study after the whistle ban had been in effect.

All six of the accidents at whistle-free crossings occurred at four crossings in Salem in an area where a 24-hour whistle prohibition was ordered by the Commission. RX 22, Order No. 84-158. Of the remaining 14 crossings in staff's study, the twelve crossings in Salem and two in Bend with whistle bans experienced no accidents after implementation of the ban. Staff Ex. 1R, Appendix "A."

The Oregon study does not state the time of day nor the circumstances of the Salem accidents. The number of accidents is too small to be statistically significant, although the increase is consistent with the trend identified with the Florida Study. The data used in staff's study was available at the time of the December 1988 evidentiary hearing in this docket but was not gathered or analyzed. In its prior order, the Commission concluded that the part which the train whistle, or the lack of a whistle, played in the Salem accidents is uncertain. Order No. 89-1037 at 15.

Since 1984 when the Commission received statutory authority to regulate the sounding of train whistles, Oregon experienced an overall decrease in the number of crossing accidents. Between 1984 and 1989, the last year that complete accident data is available, total crossing accidents in Oregon declined from 70 to 47, a reduction of 33 percent. The percentage of these accidents which occurred at gated crossings, however, varied dramatically from a low of 14 percent in 1988 to a high of 38 percent in 1989.

There have been no significant changes in conditions at the affected Eugene crossings since the first hearing.

"Railroad Accidents In Oregon" Annual Report

The Commission publishes annually a report entitled *Railroad Accidents in Oregon: Statistics, Summary, and Analysis* (Railroad Accidents Report). The report is prepared by the Commission's Crossing Safety and Rail staff. The most recent edition was published in 1989. The Railroad Accidents Report reviews a wide variety of factors in relation to accident statistics including type of protection (warning device), accidents by county, government jurisdiction, railroad, month of occurrence, hour and day of occurrence, weather conditions, daylight and darkness, population density, size of train, number of tracks, type of railroad equipment, type of motor vehicle, train movement volume, speed of train, and highway volume.

The introductory section of the report states:

In the past two decades the Commission has responded to the legislative mandate to reduce crossing accidents at public grade crossings, wherever possible by closing some crossings and by improving the protection at crossings that remain open . . .

The most effective way to reduce accidents at crossings that remain open continues to be through the installation of automatic protection devices.

1989 Railroad Accident Report, p.1.

Effectiveness of crossing protection devices is compared by means of a formula which takes into account "exposure factor." Exposure factor is the daily average number of trains times the daily average number of vehicles using the crossing with an adjustment for train length and speed.³ In 1989, grade crossings protected by automatic gates represented 84 percent of the total exposure factor in Oregon and experienced 38 percent of the accidents.

To date the Railroad Accident Report has not included statistics correlating accidents to crossings where whistle prohibitions are in effect.

The section of the report depicting train vehicle accidents by hour of occurrence and day of occurrence (day of the week) states:

"It is believed that the determining variables for the relationships shown are train and traffic volume, rather than any special characteristics of a particular hour of day."

Southern Pacific (SP)

In April 1990, SP performed a survey of its "closed out" cases involving Oregon crossing accidents for the previous five years. Thirty-two crossing accident files were reviewed. Of these, 13 occurred during the daylight, 18 during darkness, and one occurred at dusk. Of six pending crossing accident cases as of April 29, 1990, four occurred in the darkness.

Only four of the accidents occurred at crossings with gates. Of the 18 accidents occurring in darkness, ten occurred between 10:00 p.m. and 6:00 a.m., the hours of the Eugene Whistle ban. One of these occurred at a private crossing. The SP study did not contain information about the presence or absence of whistle prohibitions at crossings involved. The study included only three accidents from 1989, while staff reported 17. SP did not explain the discrepancy.

Parties' Positions

Southern Pacific asks the Commission to vacate its prior order and not impose a nighttime whistle prohibition at the affected Eugene crossings. The Commission staff has changed its position from that taken at the prior

³ See "A Formula for Predicting Train-Vehicle Accidents at Rail-Highway Grade Crossings," C.E. Jaqua, Transportation Division, Public Utility Commission of Oregon.

hearing and now agrees with SP that the order should be vacated. The City of Eugene asks the Commission to stand by its original decision, arguing that the Florida Study is not determinative of the Eugene crossing issues.

Previous Findings

The Commission incorporates by reference in this order the Findings of Fact in its prior order, Order No. 89-1037, pp. 3-15. With regard to visibility, the order states in part:

Visibility is limited at most crossings in the section. Buildings line the tracks on both sides, blocking the view of approaching traffic for locomotive crews. Similarly traffic on roadways and sidewalks has only limited views up and down the track before entering the crossing.

Id., p. 11. The previous order also includes the finding that "[e]ach of the ten public crossings on this section of line has at least one blind quadrant. Five of the crossings are blind in all four quadrants." *Id.*, p. 12. "Many of the crossings with severely restricted visibility for motorists are also located on or near curves in the tracks. As a result, visibility is very poor for train engineers as well as motorists." *Id.*, p. 13.

OPINION

Crossing safety is affected by a large number of factors. These include, among other factors, the type of warning devices in place, the volume and speed of vehicle and train traffic, visibility for train crews and motorists, track geometry, weather conditions, and time of day. These factors vary from crossing to crossing.

The City of Eugene correctly points out that the Florida Study does not examine the FEC accident data with the same level of detail as that contained in Oregon's Railroad Accidents Report. It is reasonable to conclude from the Railroad Accidents Report that factors such as train volume, traffic volume, and the type of crossing protection devices have a greater relationship to safety than does the sounding of the whistle. Nevertheless, the Florida Study does contain a very large amount of data and covers a significant period of time. The comparison to control groups and the statistical accuracy analysis performed lend credibility to the results. The Commission is persuaded that the Florida Study has some relevance to and should be given weight in the determination in this docket.

In its prior order in this docket, the Commission noted that this is a "difficult case." Order No. 89-1037 at 20. The Commission found that "poor track visibility, obstructed signal visibility, and high traffic problems create significant safety problems" and that "train whistles provide a necessary margin of safety in addition to that provided by the crossing signals." *Id.*

The Commission went on to find that safety improvements related to signal visibility would improve safety, but that high traffic volume in the daytime still tipped the balance in favor of a ban at night because of the increased annoyance to residents and the reduced danger because of reduced traffic volume. The Commission must now revisit this balancing test and take into account the new information from the Florida Study.

The study indicates that the absence of train whistles at night significantly increases the likelihood of accidents, even where crossings are protected with gates, flashing lights, bells, and warning signs. The Commission did not have statistical evidence of this nature in the record when it rendered its prior order. At that time, the evidence in the record did not show any definite relation between train whistles and accidents. Now there is such evidence in the record. The Commission concludes that, because of the specific characteristics of the Eugene section, in particular the limited visibility, train whistles also provide a necessary additional margin of safety at night. The risk to the public is likely to increase at the Eugene crossings at night if the whistle ban is implemented.

The Commission recognizes the annoyance and inconvenience suffered by some Eugene residents as a result of current whistle activity. Their

interests are not insignificant and in an appropriate case would warrant protection where noise abatement could be made consistent with safety. On the other hand, Eugene residents, and crossing users in particular, have a strong interest in safe railroad crossings. Here, in light of the new evidence, the level of risk is sufficient, in the Commission's view, to tip the balance in favor of safety.

The Commission's decision in this order should not be interpreted as a determination that nighttime whistle prohibition is never appropriate. As the Commission said in the prior order in this docket:

Each petition for a whistle prohibition order presents a unique combination of safety and environmental factors. The Commission must balance these competing considerations and decide each petition on a case by case basis, based on the facts in the record.

Order No. 89-1037 at 20.

Safety Improvements Previously Ordered

Order No. 89-1037 at 21-22 and Appendix "E." The safety improvements were later modified pursuant to a staff motion. Order No. 90-1195. The Commission is aware of no reason why these improvements should not be made, notwithstanding the rescission of the whistle prohibition order.

CONCLUSIONS

1. Prohibition of routine train whistles at protected crossings in Eugene during nighttime hours will significantly increase the risk of accidents at those crossings.

2. The Commission's prior order in this docket should be rescinded, except as to the safety improvements.

ORDER

IT IS ORDERED that:

1. The provisions of Order No. 89-1037 prohibiting train whistles at the subject crossings in central Eugene are rescinded.
2. The provisions of Order No. 89-1037 and 90-1195 requiring certain safety improvements at the subject crossings shall remain in effect.

Made, entered, and effective SEPT 13 1991.

[NOT SIGNED]

Myron B. Katz
Chairman

[SIGNED]

Ron Eachus
Commissioner

[SIGNED]

Joan H. Smith
Commissioner

A party may request rehearing or reconsideration of this order pursuant to ORS 756.561.

A party may appeal this order pursuant to ORS 756.580

DISSENT of Commissioner Myron B. Katz:

I dissent from the majority's order in this docket.

I am persuaded both by logic and the Florida Study, as inapplicable as it may be to the Eugene situation, that nighttime accidents may increase as a result of implementation of a train whistle prohibition during the hours of 10:00 p.m. to 6:00 a.m.

The question is one of balance; of weighing benefits (fewer accidents) and costs (the nuisance of train whistles blowing in the dead of night in an urban community). As with all such questions, it is inappropriate to assign an infinite value to avoiding railroad accidents. At a very high cost, a modest increase in accidents might be a bargain.

I am inclined to assign a high value to nighttime tranquility. Reducing the number of accidents is desirable but the number of railroad accidents is small today with whistles blowing at night and is likely to remain small, albeit increase, if nighttime whistles are prohibited.

All grade crossings in the Eugene area are "signalized" with automatic flashing lights, gates and gongs. It is evidently the case that the visibility at some of these crossings is less than ideal. Before allowing railroads to blow whistles at night, I would prefer taking steps to improve signal visibility. Other measures might also be taken, not without cost to the railroads, to improve grade crossing safety without the need for nighttime whistles.

In short, I do not believe that the increased speculative risk in Eugene from prohibiting nighttime whistles is sufficient to warrant the continued imposition of significant nuisance on central Eugene residents. Southern Pacific receives a benefit from blowing its train whistles in that it reduces its financial liability. The impact of nighttime whistle blowing imposes a social cost on the community, a cost which should be borne by the cost-causer; namely, the railroad and its shippers.

Theoretically, if nighttime whistles are to be permitted, Southern Pacific should internalize the cost by compensating the community in some appropriate fashion and having those costs reflected in the rates it charges to its shippers. As an alternative to compensation, SP could discontinue whistle blowing, take less objectional steps toward improving safety, and internalize the potential cost of additional liability, if indeed, there is any. Either approach seems to me to be more appropriate than the current situation where the railroad's nighttime whistles impose uncompensated costs of a most disagreeable kind on other parties.

[SIGNED]

Myron B. Katz
Commission Chairman

APPENDIX N

[4910-06]

DEPARTMENT OF TRANSPORTATION
Federal Railroad Administration

[FRA Emergency Order No. 15]

FLORIDA EAST COAST RAILWAY COMPANY

Emergency Order Requiring Use of Train Borne
Audible Warning Devices

The Federal Railroad Administration (FRA) of the United States Department of Transportation has determined that public safety compels issuance of this Emergency Order requiring that the Florida East Coast Railway Company (FEC) sound audible warning devices on lead locomotives of trains approaching public highway-rail grade crossings, and that FEC revoke any operating rules bulletins that restrict the use of these devices at such crossings.

Authority

Authority to the enforce Federal railroad safety laws has been delegated by the Secretary of Transportation to the Federal Railroad Administrator. 49 CFR § 1.49. The FEC is a "railroad" subject to FRA's safety jurisdiction pursuant to the Federal Railroad Safety Act of 1970, 45 U.S.C. §§ 421, 431(e), 438. FRA is authorized to issue emergency orders where an unsafe condition or practice creates "an emergency situation involving a hazard of death or injury." These orders may immediately impose "such restrictions or prohibitions as may be necessary to bring about the abatement of such emergency situation." 45 U.S.C. § 432(a).

Background

FRA has long identified the train borne audible warning

device, commonly referred to as a train whistle, as an important feature in the safe operation of a train. One use of these whistles has been to complement other warning devices to promote safety at highway-rail grade crossings. FRA locomotive safety regulations require that each lead locomotive of a train be equipped with a device that can produce a minimum sound level in the direction of

travel. 49 CFR § 229.129. FRA's Railroad Noise Emission Standards, based on standards issued by the Environmental Protection Agency, specifically exempt audible warning devices such as "horns, whistles, or bells when operated for the purpose of safety." 49 CFR § 210.3(b)(3).

Grade crossing collisions between trains and motor vehicles differ in severity from those that occur on the highways. A crash at a highway-rail crossing is eleven times more likely to result in a fatality, and five and a half times more likely to result in a disabling injury than a collision between two motor vehicles. Approximately 700 lives are lost and 2,400 people seriously injured each year in grade crossing accidents nationwide.

In addition to the threat to motorists, highway-rail crossing accidents can result in death and injury to railroad employees, particularly in collisions with large trucks or other heavy equipment. Collisions and emergency applications of train brakes greatly increase the risk of derailment and consequent injury or death to rail passengers and train crew. Moreover, the presence of hazardous material in the train consist or truck cargo can endanger anyone near the right-of-way.

A highway-rail grade crossing presents a unique traffic environment for motorists, and many drivers do not cross railroad tracks often enough to be familiar with the warning devices designed for their safety. More than 50 percent of highway-rail collisions occur at crossings equipped with bells, flashing lights, or gates. The train whistle enhances the safety effect of these other devices by giving the motorists an indication of a train's proximity.

Motorists are often unaware that trains cannot stop as quickly as motor vehicles to avoid a collision. It takes a 100 car train traveling 30 miles per hour approximately half a mile to come to a stop. At fifty miles per hour that train's stopping distance increases to one and a third miles. The average freight locomotive weighs between 140 and 200 tons, compared to the average car weight of approximately 1 to 2 tons. Any motor vehicle, even a large truck, would be crushed when colliding with the force of a moving train.

In response to the risks of death or injury at grade crossings, FRA will soon initiate a proceeding to collect nationwide data on highway-rail grade crossing safety, including the effect of the use of train borne audible warning devices.

The Florida Whistle Ban

Effective July 1, 1984, a Florida statute authorized counties and

municipalities to restrict the nighttime sounding of train whistles on trains operated by intrastate railroads. The law authorizes local governments to ban the use of train borne audible warning devices between the hours of 10 p.m. and 6 a.m. by trains approaching highway-rail crossings that are equipped with train-activated flashing lights, bells, crossing gates, and highway signs indicating that train whistles will not be sounded at night. Fla. Stat. § 351.03(4)(a) (1984). Since enactment of this law, at least eight counties and twelve cities have passed whistle ban ordinances. As detailed below, the result has been an alarming increase in highway-rail grade crossing accidents, with a concomitant increase in fatalities and injuries.

In August 1990, FRA issued a study of the effect of the Florida train whistle ban through 1989. The study compared the FEC's post-ban accident record at crossings subject to a ban with four control groups to determine the impact of the ban and to eliminate variables that may otherwise have affected the results. The study indicated a strong correlation between nighttime bans and the number of accidents at highway-rail crossings subject to bans.

Using the first control group, a comparison of FEC's pre-ban and post-ban accident records was made. FRA found a 195 percent increase in accidents. Based on the experience of the other control groups and the pre-ban trend, it was estimated that 49 post-ban accidents would have been expected. In fact, however, 115 post-ban accidents occurred, which is an increase of 167 percent over the number that would have been consistent with the pre-ban trend, leaving 66 crossing accidents statistically unexplained. Nineteen people died and fifty-nine people were injured in the 115 crossing incidents after establishment of the bans. Proportionally, at least 11 of the fatalities and 34 of the injuries can be attributed to the 66 unexplained accidents.

With the second control group comparison, FRA determined that the pre- and post-ban daytime accident rates remained virtually unchanged for the same highway-rail crossings at which the whistle ban was in effect during nighttime hours.

The third control group showed that at the 89 FEC crossings where the bans were not imposed, the number of nighttime accidents increased by only 23 percent.

Finally, FRA compared the 1984 through 1989 accident record of the FEC, which is required to comply with local whistle sounding ordinances, with that of the parallel rail line of CSX Transportation Company (CSX), which is not subject to such ordinances because it operates interstate. By December 31, 1989, 511 of the FEC's 600

gate-equipped crossings were affected by whistle bans. Accident data from the same period was available for 224 similarly equipped CSX crossings in the 6 counties in which both railroads operate. FRA found that FEC's nighttime accident rate at impacted crossings increased 195 percent after whistle bans were imposed. At similarly equipped CSX crossings, the number of accidents increased 67 percent.

The only identifiable difference between the crossings subject to the ban and the control groups was the whistle ban itself. Malfunctioning of safety controls at grade crossings would affect both daytime and nighttime accidents rates. An increase in rail traffic might account for a partial increase, but the average annual locomotive miles reported by the FEC increased only 22.3 percent during the period studied. Increased use of highways should also have resulted in higher accident rates at CSX crossings, at crossings in daytime, and at crossings unaffected by the bans.

In August of 1990, in an effort to develop further information and to advise local authorities of the risks apparently posed by the ordinances, FRA provided copies of its study to officials of each county and municipality with bans in effect, to the Florida Department of Transportation, and to fifteen members of the state legislature. No county or municipality acted to repeal or modify its whistle ban ordinance in light of the report. The Florida state legislature also did not act in response to FRA's findings. In fact, the number of FEC highway-rail crossings subject to the ban actually increased to 537.

Nor, so far as FRA has been advised, did state and local authorities take other actions to compensate for the hazard introduced by the whistle bans, such as increased law enforcement, installation of immovable highway dividers, grade separation at high traffic crossings, or closure of low use crossings.

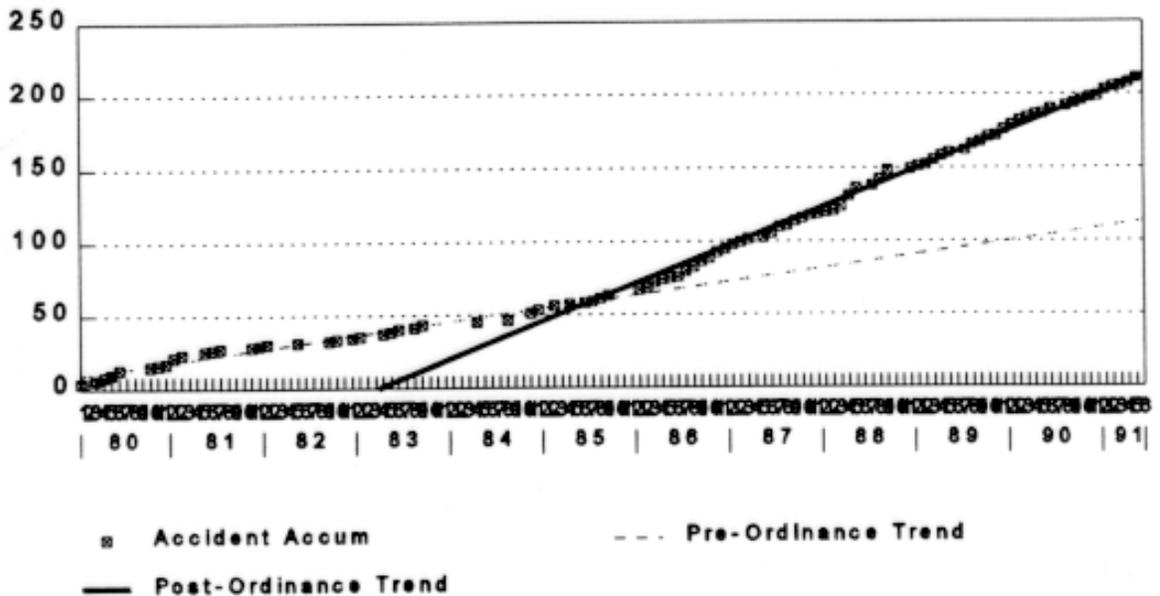
FRA has continued to monitor accident data for FEC crossings. Analysis of the 1990 data shows a continuation of the post-ban trend. There were 23 nighttime accidents at crossings subject to bans, but only one accident at the FEC's remaining 65 grade crossings. The 55 highway-rail crossing accidents reported by the FEC resulted in 15 deaths and 20 injuries. Six of these fatalities and seven injuries occurred at crossings during the ban period of 10 p.m. to 6 a.m.

In 13 of the nighttime accidents at crossings subject to the bans, the highway vehicle went around or through the gate. In the other ten, the highway user failed to clear the crossing prior to the train's arrival, suggesting the motorists were unaware of the proximity of the train.

Preliminary 1991 data for the first six months of the year shows six fatalities and six injuries at whistle ban crossings during nighttime hours. The accumulation of nighttime accidents at crossings subject to the bans in the post-ban period, illustrated below, did not abate during the first six months of 1991. The trend line of accumulated accidents since July 1984 still reflects a major divergence from the pre-ban trend.



FEC Crossing Accidents Impacted Crossings (10 PM-6 AM)



First Ordinance: July 1984
 Source: Federal Railroad Administration
 1991 data is preliminary.

The Florida ban confuses the public's understanding of grade crossing warning devices. The local ordinances require that intrastate railroads comply with whistle bans while interstate carriers are

exempt. This distinction means, for example, that at a CSX grade crossing, locomotive borne audible warning devices are used, but at a similar FEC crossing a short distance away, these devices are not sounded. Motorists will not know whether or not they can expect to hear a train whistle when a train nears a highway-rail crossing. This confusion is further compounded by the existence of whistle ban ordinances in certain counties and municipalities and their absence in others.

FRA is concerned with issues of noise pollution. As noted, FRA enforces noise control regulations on the railroad industry. While the sound of a train whistle can be disturbing to people who live by highway-rail crossings, that same warning note can save lives. The FEC's alarming post-ban grade crossing accident record mandates FRA action despite the inconvenience to people living near the railroad right-of-way.

Preemption

This Emergency Order addresses the same subject matter addressed by the Florida statute and the county and municipal ordinances and, therefore, pursuant to section 205 of the Federal Railroad Safety Act of 1970, 45 U.S.C. § 434, preempts state and local requirements pertaining to the sounding of train borne audible warning devices at the highway-rail crossings of the FEC.

Finding and Order

Based on FRA's investigation, I have determined that, given the unsafe conditions at highway-rail grade crossings over which motorists cross the FEC in the State of Florida, the continued failure of the FEC to sound its train borne audible warning devices at night as provided in its operating rules creates an emergency involving a hazard of death or injury to persons. Accordingly, pursuant to the authority of section 203 of the Federal Railroad Safety Act of 1970, 45 U.S.C. § 432, delegated to me by the Secretary of Transportation (49 CFR § 1.49(m)), it is ORDERED, effective 10 p.m., July 26, 1991:

That the Florida East Coast Railway Company shall sound its train borne audible warning devices whenever a train approaches a public highway-rail grade crossing, consistent with its operating rules. The pattern of the sounding will be two long notes, a short note, and one long note of the whistle. This pattern can be repeated or the last sound prolonged until the lead locomotive has passed through the crossing.

That the Florida East Coast Railway Company shall revoke any

operating rules bulletin that restricts the sounding of train borne audible warning devices on trains approaching highway-rail grade crossings.

Relief

The FEC may obtain relief from this Order by either of the following:

1. By filing a written notification with the Docket Clerk, Federal Railroad Administration, that a highway-rail crossing, or any number of highway-rail crossings, is no longer subject to a municipal or county ordinance that would limit the sounding of train borne audible warning devices. Such filing must include a written representation that the railroad has revoked any restrictive operating rules bulletins and will continue to retain in force its operating rule requiring sounding of locomotive audible warning devices.

2. By filing in writing with the Docket Clerk, Federal Railroad Administration, evidence that sufficient safety measures are planned at a highway-rail crossing, or any number of highway-rail crossings, to alleviate the risk of injury and death created by the failure to use train borne audible warning devices. The measures to be taken at each crossing must be specifically identified, and supported with safety data and/or engineering studies that demonstrate that the planned measures will be effective and will be in place within thirty days of FRA approval of the plans.

Within thirty days of receipt of the notice described in paragraph 2, above, FRA will review the measures planned for each identified highway-rail crossing and evaluate the safety improvements and supporting documentation. FRA will then make a written finding whether the Order will be lifted, in whole or in part. If FRA does not lift the Order, the written response will specifically describe what additional measures need to be taken to abate the hazard. If FRA lifts the Order, this lifting will take effect on the date the planned crossing measures are completed and begin functioning.

Penalties

Each train movement in violation of this Order shall subject the respondent committing such violation to a civil penalty of up to \$20,000. 45 U.S.C. §§ 432, 438. FRA may, through the Attorney General, also seek injunctive relief to enforce this order. 45 U.S.C. § 439.

Notice

This Emergency Order was hand delivered to the Florida East Coast Railway Company on July 26, 1991. In addition, copies were provided this day by mail or facsimile to the Governor of Florida, the Florida Department of Transportation, St. Johns County, St. Lucie County, Brevard County, Indian River County, Martin County, Palm Beach County, County of Ft. Lauderdale, Dade County, and the cities and towns of Jacksonville, St. Augustine, Ormond Beach, Holly Hill, Daytona Beach, South Daytona, Port Orange, New Smyrna Beach, Malabar, Edgewater, Melbourne, Palm Bay, Titusville, Cocoa, Rockledge, Vero Beach, Sebastian, Fort Pierce, Stuart, Riviera Beach, West Palm Beach, Tequesta, Boynton Beach, Delray Beach, Hypoluxo, North Palm Beach, Lantana, Lake Worth, Boca Raton, Deerfield Beach, Pompano Beach, Oakland Park, Wilton Manors, Fort Lauderdale, Dania, Hollywood, and Hallandale.

Review

Opportunity for formal review of this Emergency Order will be provided in accordance with section 203(b) of the Federal Railroad Safety Act of 1970, 45 U.S.C. § 432(b), and section 554 of Title 5 of the United States Code. Administrative procedures governing such review are found 49 CFR Part 211 (see § 211.47, .71-.75).

Issued in Washington, D.C., on July 26, 1991.

[SIGNED]

Gilbert E. Carmichael
Administrator

APPENDIX O

UNITED STATES DEPARTMENT OF TRANSPORTATION
Federal Railroad Administration
Office of Chief Counsel

Conference Notice No. 3

On July 26, 1991, the Federal Railroad Administration (FRA) issued Emergency Order No. 15 requiring that trains operated by the Florida East Coast Railway Company sound their whistles when approaching public highway-rail grade crossings. This Order preempted Florida laws banning the nighttime use of train whistles.

I. FRA's Consideration of the Florida Whistle Ban

A Florida statute, effective July 1, 1984, authorizes local governments to ban the use of train borne audible warning devices between the hours of 10 p.m. and 6 a.m. by trains approaching highway-rail crossings that are equipped with train-activated flashing lights, bells crossing gates, and highway signs indicating that train whistles will not be sounded at night. Fls. Stat. § 351.03(4)(a) (1984). After enactment of this law, many local jurisdictions passed whistle ban ordinances.

In August 1990, FRA issued a study of the effect of the Florida train whistle ban through 1989. The study compared the FEC's post-ban accident record at crossings subject to a ban with four control groups to determine the impact of the ban and to eliminate variables that may otherwise have affected the results. The study indicated a strong correlation between nighttime bans and the number of accidents at highway-rail crossings subject to bans.

Using the first control group, a comparison of FEC's pre-ban and post-ban accident records was made. Post-ban records revealed a 195 percent increase in accidents. Based on the experience of the other control groups and the pre-ban trend, it was estimated that 49 post-ban accidents would have been expected. In fact, however, 115 post-ban accidents occurred, which is an increase of 167 percent over the number that would have been consistent with the pre-ban trend, leaving 66 crossing accidents statistically unexplained. Nineteen people died and fifty-nine people were injured in the 115 crossing incidents after establishment of the bans. Proportionally, at least 11 of the fatalities and 34 of the injuries can be attributed to the 66 unexplained accidents.

With the second control group comparison, FRA determined that the pre- and post-ban daytime accident rates remained virtually unchanged for the same

highway-rail crossings at which the whistle ban was in effect during nighttime hours.

The third control group showed that at the 89 FEC crossings where the bans were not imposed, the number of nighttime accidents increased by only 23 percent.

Finally, FRA compared the 1984 through 1989 accident record of the FEC, which is required to comply with local whistle sounding ordinances, with that of the parallel rail line of CSX Transportation Company (CSX), which is not subject to such ordinances because it operates interstate. By December 31, 1989, 511 of the FEC's 600 gate-equipped crossings were affected by whistle bans. Accident data from the same period was available for 224 similarly equipped CSX crossings in the 6 counties in which both railroads operate. FRA found that FEC's nighttime accident rate at impacted crossings increased 195 percent after whistle bans were imposed. At similarly equipped CSX crossings, the number of accidents increased 67 percent.

In August of 1990, in an effort to develop further information and to advise local authorities of the risks apparently posed by the ordinances, FRA provided copies of its study to officials of each county and municipality with bans in effect, to the Florida Department of Transportation, and to fifteen members of the state legislature. No county or municipality acted to repeal or modify its whistle ban ordinance in light of the report. In fact, the number of FEC highway-rail crossings subject to the ban actually increased to 537.

FRA continued to monitor accident data for FEC crossings. Analysis of the 1990 data shows a continuation of the post-ban trend. There were 23 nighttime accidents at crossings subject to bans, but only one accident at the FEC's remaining 65 grade crossings. The 55 highway-rail crossing accidents reported by the FEC resulted in 15 deaths and 20 injuries. Six of these fatalities and seven injuries occurred at crossings during the ban period of 10 p.m. to 6 a.m.

In 13 of the nighttime accidents at crossings subject to the bans, the highway vehicle went around or through the gate. In the other ten, the highway user failed to clear the crossing prior to the train's arrival, suggesting the motorists were unaware of the proximity of the train.

Preliminary 1991 data for the first six months of 1991 show six fatalities and six injuries at whistle ban crossings during nighttime hours. The accumulation of nighttime accidents at crossings subject to the bans in the post-ban period did not abate in the first half of 1991. During this time, a smaller study, conducted by the Public Utility Commission of Oregon,

corroborated FRA's effort and led to the rescission of whistle bans in Oregon.

Since the Emergency Order was issued, FRA has received twenty-one petitions requesting withdrawal or modification of the Emergency Order.¹ See Table One attached. Included as petitioners are two counties and thirteen cities containing approximately 31 percent of the impacted crossings.

Review of the Order is provided for in section 203(b) of the Federal Railroad Safety Act of 1970, 45 U.S.C. § 432(b), and section 554 of Title 5 of the United States Code. Administrative procedures governing such review are found in 49 CFR Part 211 (see § 211.47, .71-.75). By agreement with the original petitioner, the City of Hollywood, the opening meeting of the conference process was held on September 13, 1991. Representatives of fourteen petitioners attended this meeting, the first stage in the administrative review of the Order.

At the meeting the parties agreed on the following informal, target schedule: (1) by October 15, the petitioners would make written submissions to FRA, presenting facts, arguments, and proposals for modification or withdrawal of the Emergency order, and (2) by November 15, FRA would respond in writing.

Subsequent to this initial meeting fifteen petitioners submitted additional information and comments. One of these submissions was a collaborative effort endorsed by six of the original cities and one county. The other original county withdrew its appeal stating, "the evidence presented by the FRA . . . convinced the County representative that the . . . emergency order . . . was in the public interest." In addition, two late petitioners have been added to the list, a city and a county.

Due to the late receipt of some petitioner filings and the complexity of the issues involved, FRA's response has been delayed. This Notice provides FRA's written response. In preparing this notice, FRA considered the petitions of the twenty active petitioners, the submissions of additional data and arguments, and the comments of the participants in the meeting of September 13.

II. FRA's Response to Petitioner Filings

FRA responds below to each argument advanced by the petitioners in four sections. These arguments were divided by the subjects they address; first, the accuracy of FRA's whistle ban study, second, other potential

¹ One of the twenty-one petitioners, Indian River County, withdrew its petition on September 25, 1991.

causes for the accident increase, third, FRA's justification for issuing the Emergency Order, and fourth, FRA's willingness to consider alternative or mitigating remedies.

A. FRA's Whistle Ban Study.

Nearly every petitioner has questioned of the accuracy of some part of FRA's whistle ban study. However, FRA's analyst used the most conservative methods to complete this study. For example, in comparing pre- and post-ban data, the assumption was made that all crossings involved were gated throughout the time studied. In fact, many crossings were not gated until the bans took effect. Previous studies have shown that installing gates reduces accidents by 85 percent. Gating additional crossings should therefore have produced a reduction in post-ban accidents, making more alarming the increase that actually occurred.

The petitioners have criticized the data FRA used in its study and the relevancy of certain control groups.

Regarding the underlying data, five petitioners stated that collisions occurring when the motor vehicle either is stalled or stopped on the crossing, runs into the side of a train, or is hit by a second train, after waiting for the first, should not have been included in our study, because the "lack of whistle should not be considered a factor." Three petitioners excluded these accidents from their own analysis citing this justification.

A total of 35 accidents were included in our July 1990 report where it was reported that the motor vehicle was stopped or stalled on the crossing. Whistles would probably not have prevented these accidents. In our Even-History analysis, 18 of these accidents occurred pre-ban and 17 were recorded post-ban. When these figures are excluded, the number of accidents in the pre-ban period changes from 39 to 21, and the number of accidents in the post-ban period decreases from 115 to 98. The resulting comparison of 21 to 98 accidents produces a 367 percent increase, compared to the 195 percent increase cited in our original report. FRA, however, made the conservative choice to include all accidents which occurred within the study period.

FRA made a similar choice by not subtracting accidents where a motor vehicle struck the side of a train. If the 9 pre-ban and 26 post-ban vehicle hitting train accidents are excluded, the pre-to-post comparison would be 12 versus 72 accidents, an increase of 500 percent.

FRA's data, however, records that the average position of the train car struck by the nine vehicles in the pre-ban period was number 37 in line. The average position of the train car struck by the 26 vehicles which hit trains in the post-ban period was number 12. This seems to indicate that

cars stop when approaching a crossing as a whistle sounding locomotive is passing, while cars approaching a few seconds or minutes later, when the locomotive and whistle have moved well up the line, are hitting the train, on average, at the 37th car. The post-ban data suggests that the same driver who stopped earlier on hearing the whistle, no longer receives this warning and hits the train much further forward at the 12th car. Although this is intuitively acceptable, the numbers appear to be too small and variable for real statistical confidence. Consistent with our conservative approach to this analysis, we retained these accidents within the pool for consideration.

Finally, FRA believes the whistle is particularly pertinent in accidents involving a second train. For example, a driver whose view is blocked by the first train and who decides to go around the down gate, is totally dependent upon hearing the second train. The whistle serves that purpose admirably. The number of second train accidents for the pre-ban period was zero, while four were reported post-ban. We would disagree with dropping these reports from consideration, however the overall impact would be minimal.

One petitioner has suggested that accidents which occur at crossings with a history of being blocked by frequent train movements should be excluded from consideration. Though we can appreciate a driver's frustration when faced with such a situation, we do not understand the rationale for excluding such accidents. The whistle may well provide the driver (and the flagman in the case cited) the realization that another train is approaching the crossing.

The collaborative submission, subscribed to by six jurisdictions as well as the originator, raises questions of the reliability of using CSX Transportation's corridor as one of the four controls. These petitioners note that FRA had not done a county-by-county comparison of CSX and FEC accident experience. One other petitioner also cited this omission. Such a comparison can now be made and is attached. See attached Table Two.

The county level comparison of FEC and CSX revealed that CSX's 67 percent post-ban increase in accidents was caused almost entirely by accidents occurring in Duval County. FEC and CSX operations do not parallel in Duval County. If one considers only data from counties in which both companies' mainline tracks parallel, CSX shows only a ten percent increase in accidents. The data indicate that something changed for CSX operations and crossings in Duval County during the period studied to create this anomaly. A county-by-county comparison, therefore, only serves to reinforce the conclusion of the study.

Four petitioners assert that the data fails to support the conclusion in the study. Three parties predicated their argument on fragmented data,

looking only at the small number of crossings in their jurisdiction. The fourth did not understand that the FRA study contrasted periods of crossing experience of identical duration. This fourth petitioner considered the whistle bans to be universal subsequent to June 1984 and predicated arguments on a simple comparison of pre- and post-June 1984 accidents per crossing numbers.

The whistle bans were not universally adopted in 1984. They were incrementally established and complied with by the FEC in 36 different jurisdictions between July 1984 and December 1989, the end of the FRA study period. In fact, the process continued, with two more jurisdictions issuing bans in 1990. This incremental implementation of the bans, which never did become universal, must be considered when making before and after comparisons.

In addition, in order to calculate ratios for accidents per gated crossing, one petitioner cites data on the number of FEC crossings equipped with gates. Such data was derived from FRA's annual Rail-Highway Crossing Accident/Bulletins and reflects a sharp increase in gated crossings in 1985 (from 480 in 1984 to 602 in 1985). Such a precipitous increase did not occur, and we feel obligated to comment on this oversight and to correct the record. The source material is in error. Inventory data about crossings is voluntarily provided to FRA by states and railroads. No regulations apply. Some providers do a better job than others at keeping the Inventory data current. (It should be noted, however, that accident reports are filed with the FRA pursuant to law, and omission and errors regarding these reports subject the originator to considerable fines.) The number of FEC public crossings equipped with gates from 1979 through 1990 is attached. See attached Table Three.

B. Other Potential Causes for the Accident Increase.

The collaborative submission asserts FRA has taken "an unsatisfactory, one-dimensional approach to its analysis of the problem," and cites a number of "highly relevant factors" FRA "failed to evaluate properly" These "factors" and FRA's responses follow:

1. Train speed.

Previous analytic research of the FRA and the Transportation Systems Center has established that train speed is not a factor in determining the likelihood of a traffic accident at a highway-rail crossing which is equipped with automatic warning devices (as are all of the impacted crossings). Speed is a factor in determining the severity of an accident once it has occurred. This work is well documented in Rail-Highway Crossing Resource Allocation Procedure, User's Guide, Third Edition, August 1987.

2. Train operator error or negligence.

None has been alleged or brought to the attention of the FRA. In fact, there is little a train operator can do to avoid a traffic accident at a highway-rail crossing other than blow the whistle, which had been enjoined.

3. Population density.

Comparisons to population growth in Florida and in Florida's eleven east coast counties have been reviewed vis-a-vis the increase in nighttime train-involved traffic accidents. Also reviewed, as possible indicators or surrogate measures, were numbers of fatal highway accidents, registered drivers and motor vehicles. None of these, individually or in combination, provide more than a partial explanation for the 195 percent increase in nighttime crossing accidents at the impacted crossings. See attached Tables Four to Six.

4. The deliberate, reckless actions of drivers and pedestrians who ignore traffic control devices.

There is no doubt that a driver or pedestrian who deliberately ignores a traffic control device and strikes or is struck by a train is performing in a reckless manner. No evidence exists, however, to suggest that reckless driving increased, resulting in the dramatic growth in the number of accidents. In fact, nighttime highway accidents and collisions at the crossings in the controls indicates that driving habits did not make such a change. The number of fatal highway accidents tracks closely to population and does not reflect a change in accident rates during the period studied. See attached Table Seven.

5. Whether traffic control devices were functioning properly at the occurrence of accidents.

Nine FEC highway-rail crossing accidents, since 1975, have been reported concurrent with the warning device's failure to operate. Only one of these occurred at night during the post-ban period. Accordingly, this consideration is not relevant to the issue at hand.

6. The number of trains in operation before and after the train whistle ban.

Unfortunately, such data is not readily available, if at all, and there is no reasonable way to gather it. Definitions are a problem. The first question which arises is, when was the whistle ban established? The answer is different depending on which crossing is being discussed. The problem is compounded when one considers that many trains are enroute at the hours of 10:00 p.m. and 6:00 a.m. when the bans become effective and ineffective respectively. How should these trains be counted? FEC's submission to this docket indicates once again that "the number of trains increased slightly during the period between 10:00 p.m. and 6:00 a.m. but did not begin to approach the increase in accident rate discovered by FRA."

7. The number of train miles before and after the train whistle ban.

FRA has compiled and graphed the total number of train miles accumulated and reported by the FEC for each month as required by 49 CFR Part 225. This graphic displays no precipitous change in accumulated train miles to account for the sharp increase in accidents. See attached Table Eight. The FEC docket submission notes "that its operations have kept pace with its increases in traffic and that the 10% to 11% increase in locomotive miles reflects it (sic) overall traffic patterns." The definition of "train miles" is "[t]he movement of a train for a distance of one mile. Mileage is not to be increased because of the presence of multiple locomotives in the train." *FRA Guide for Preparing Accident/Incident Reports*, July 1986.

8. The impact of drugs or alcohol on individual accidents.

No breakdown of drug and alcohol impaired drivers was made for three reasons; first, such data is not available to the FRA; second, there is no ancillary evidence of a *change* in the rate of drug or alcohol impairment rates during the study period, and third, the effect of a train whistle on an impaired driver is not known except by the empirical evidence generated by this study. Conceivably, a whistle might be the very stimulus which attracts an impaired driver's attention.

9. Whether accidents occurred with more frequency at certain railroad crossings.

Certainly they did, but they are possible at any and all crossings! Since 1975 through August 1991, the FEC has reported 302 accidents between 10:00 p.m. and 6:00 a.m. inclusive. These occurred at 176 different crossings. The distribution was as follows:

Accidents reported per crossing:	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
Crossings:	119	29	10	8	2	5	2		1
Accidents:	119	58	30	32	10	30	14		9

As can be seen, a majority of the accidents (177) occurred at crossings (148) experiencing only one or two accidents since 1975. Accident experience is wide spread. The petitioners' request for the number of accidents in a particular city or county is attached. See attached Table Nine.

FRA concludes that the only likely cause for the increase is the implication of local whistle bans.

C. Justification for Issuing the Emergency Order.

The Federal Railroad Administrator is empowered to issue an emergency order wherever there is a risk of death or injury to the public or railway employees. The most frequently cited argument raised by the petitioners is that the threat to safety was not sufficient to outweigh the intrusiveness of train whistles on the peace and tranquility of local communities. In support of their position, the petitioners cited the infrequency of accidents, the culpability of motor vehicle operators, and the existence of warning devices at impacted crossings.

During the period studied, which varied by crossing based on the effective dates of the whistle ban ordinances, there were 373 highway-rail crossing accidents at 511 crossings. Of these, 154 occurred during nighttime hours, 10:00 p.m. to 6:00 a.m., 39 before the bans were in effect and 115 in an identical period after the bans were implemented. (Day time accident rates, when whistle bans are not effective, did not change.) Though crossing accidents are relatively rare occurrences, this collective

experience, especially the remarkable escalation in accident frequency, begs for recognition.²

Charging drivers with responsibility for their own actions is as appealing as it is right, but sentencing them to a one in five chance of death for a motor vehicle infraction is draconian. (Better than one in five highway-rail crossing accidents reported by the FEC in 1990 resulted in one or more fatalities.) Overlooked in the argument that "drivers ... go around the gates, assuming their own risk..." are potentially innocent victims, such as other passengers, railroad crew, other motorists and pedestrians, and property owners near the rail right-of-way. Nationally, five railroad crewmembers died as a result of highway-rail crossing accidents in 1990, and 147 crewmembers were injured. Nine railroad passengers were also injured. Of the 15 highway-rail crossing fatalities reported by the FEC in 1990, only eleven were drivers.

The collaborative petition alleges that the FRA study was "merely a justification of assumptions held for the convenience of the FEC." The petitioners imply that FRA conducted this study with pre-set assumptions. Nothing could be farther from the truth. Our effort was entered into without anticipating or establishing any expected results. In fact, we were doubtful we would find any clear demarcation attributable to the whistle bans, and we were genuinely surprised by the findings. We were so surprised, almost incredulous, that we issued the report with a request for comments "particularly on the question of whether the trend can be explained by factors other than the whistle ban." We waited a year, only to find that the trend was continuing, and that no offered explanation had withstood scrutiny.

While it is not true that FRA sought to justify some preconceived assumptions, it is true that lifting the bans is a position supported by the FEC. The FEC has requested that the Emergency Order be made permanent. While the FEC argues that the use of strobe lights and reduced train speeds are ineffective replacements for train whistles, the railroad does

² Both because of the size of this data base (511 impacted crossings and a total of 46,748 crossing-months of pre- and post-ban experience) and because of the magnitude of the increase in accident frequency, FRA confidence in these data, findings and conclusions is high. However, such confidence would be misplaced if conclusions were to be drawn from subdivisions of the data, for example, from specific crossings in individual towns, cities and most counties. It is as wrong as it is tempting to isolate a few crossings in one jurisdiction and to cite recent accident experience as indicative of conditions which may or may not occasion a crossing accident. Crossing accidents are relatively rare events, and conclusions should only be drawn from aggregations of similar data sufficient to produce statistically reliable results.

not present a conclusive case. As we will discuss below, there are several proven measures that could be taken to increase safety absent the use of train whistles. In addition, there are experimental devices which cannot be categorically rejected because there is no evidence to prove or disprove their effectiveness.

FRA also believes that the intrusion of noise endured by the citizens of Florida, represented by the petitioners, demands that the agency not discount future innovation in eliminating the need for train whistles.

Several petitioners have argued there was insufficient evidence of an emergency to authorize action by the agency. FRA can issue emergency orders where an unsafe condition or practice creates "an emergency situation involving a hazard of death or injury." Federal Railroad Safety Act of 1970, 45 U.S.C. 432(a). FRA's study of crossing data concluded that the number of accidents, and therefore the risk of injuries and fatalities, had tripled since the implementation of whistle bans by local governments. The finding of an "emergency" was clearly supported by the accident data.

One petitioner argued that the use of train whistles is contrary to Environmental Protection Agency (EPA) noise reduction standards. This is not true. EPA regulations specifically exempt train whistles from noise standards.

40 CFR § 201.10. It is the conclusion of FRA's Florida whistle ban study that the use of whistles reduces accidents. It is therefore "for safety" that FRA has ordered their use.

D. Experimental Measures and Exceptions to the Emergency Order.

Several petitioners attempted to identify instances where the ban allegedly does not impair safety. Some parties also proposed measures which they believe would enhance safety in compensation for the whistle bans. While FRA is willing to consider alternate safety measures, there are currently no grounds for creating exceptions to the Order.

Frequently cited suggestions were selectively banning whistles at specific crossings or narrowing the time the ban is in effect. Lifting the order for crossings that have not had accidents fails to consider that accidents at highway-rail crossings are relatively infrequent events. The accident rate increase occasioned by the whistle bans is evident only when all similarly impacted crossings are considered together. The causal condition, the whistle bans, affects all crossings in the group. Therefore, the accident rate increased at all crossings in the group, though it is not yet evident at all crossings on an individual basis because of the relative infrequency of crossing accidents.

Similarly, narrowing the time frame for whistle bans also seems unacceptable due to the fact that the accident rate is so wide spread. In addition, just because the number of accidents is lower at a given hour does not mean that the whistle bans have not increased the accident rate for that hour. Night time accidents on the FEC between 1975 and August 1991 inclusive have been distributed as follows:

	PM		AM							
Hour:	<u>10</u>	<u>11</u>	<u>12</u>	<u>01</u>	<u>02</u>	<u>03</u>	<u>04</u>	<u>05</u>	<u>TTL</u>	
Accidents:	52	42	46	39	40	33	25	25 ³	302	
Percent:	17	14	15	13	13	11	8	8	100	

As can be seen, the distribution is weighted toward the evening hours and slowly declines.

It has also been asserted that safety can be enhanced by allowing the locomotive engineer greater discretion to use the whistle when an accident is imminent. Discussion with locomotive engineers and consideration of the physics involved will dissuade the objective observer from this course. As a motor vehicle approaches a highway-rail crossing, or any intersection, it enters what traffic engineers call "the non-recovery zone." This is the final length of roadway on the approach to the tracks. Its length varies according to the speed and braking system of the motor vehicle, the reaction time of the driver, road and tire conditions, and the warning devices at the crossing. By definition, just prior to the non-recovery zone is the last opportunity for the driver to make a decision which will provide him sufficient distance to stop. At many crossings, the highway vehicle enters the non-recovery zone long before it can even be seen by the locomotive engineer. At other crossings, the vehicle may be visible, but the driver's intent is not discernible to the locomotive engineer. By the time the driver's intent not to stop is recognized, it is too late to sound the whistle to give effective warning. The prudent locomotive engineer, given the option, will sound the whistle for all crossings, if for no other reason but to protect himself from a wrong decision.

Jurisdictions have proposed to improve signs or install four-quadrant gates. Such innovations must be considered as potential, but long term solutions. Four-quadrant gates are warning device gates which block the highway's exit lanes as well as the approach lanes, thus closing off the option of going around a gate. Traffic engineers will argue the merits of this approach, but FRA believes it deserves further experimentation. Procedures for initiating a traffic control device

³ Includes five accidents which occurred at 6:00 a.m.

experiment are detailed in the Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices*, Part 1A-6, Section 3. Prior field experimentation has been reported in a study prepared by the University of Tennessee for the FHWA titled, *Field Evaluation of Innovative Active Warning Devices for Use at Railroad-Highway Grade Crossings*, Publication Number FHWA-RD-88-135, August 1988. The FRA would not be the proper agency to conduct such experiments, though we would willingly participate or assist in planning and analysis, support the request to experiment, and would consider allowing reimposition of the ban for crossings involved in the experiment for the duration of the period studied.

One petitioner has offered stricter law enforcement in exchange for retaining the whistle bans. Aggressive law enforcement has repeatedly made a difference in safety, reducing violations, accidents and casualties. Experience shows that successful law enforcement initiatives should be coordinated with the railroads, the media, and local elected and administrative officials. A minimum program would result in citations to perpetrators following crashes. A more sophisticated option would result in citations being issued to individuals who go around gates. This can be accomplished by synchronizing police surveillance of crossings with advance knowledge of railroad operations, thus minimizing police patrol time at crossings.

Some programs have occasionally placed officers on trains, who then communicate with patrols. Operation Lifesaver (OL) has often been the local catalyst for such efforts. Operation Lifesaver, Inc. has published a brochure called "Law Enforcement Guide for Rail/Highway Grade Crossing Crash Prevention/Investigation." Two individuals who can provide additional details include the Florida State coordinator for Operation Lifesaver and the Executive Director of Operation Lifesaver, Inc.'s national office:

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1000 AAA Drive
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Both the Florida East Coast Railway Company and CSX Transportation have participated in such programs. Florida's Highway Patrol Academy in Tallahassee periodically conducts a three day railroad crash investigation course which includes prevention elements for highway patrol officers. Possibly a regional training effort for police personnel from Florida's east coast counties and cities, patterned after the State program, could be arranged.

A variation of the enforcement theme is to place an automated video monitoring device at the crossing. Such devices are in use in Europe and have recently been demonstrated in this country in Jonesboro, Arkansas. Citations are issued on the strength of video evidence showing violators going around gates. This, of course, requires coordination between police, railroad and judicial officials. Petitioners may wish to contact the Chief of Police in Jonesboro, Mr. John Morgan, for a first hand account. At least two hardware suppliers are known to FRA. Such information will be provided should a petitioner choose to pursue this option.

As with the four-quadrant gates and improved signs, the enforcement option is considered to have merit, but it is also a long term solution, needing to be proven in the Florida setting. FRA is willing to participate in the design, conduct and assessment of an enforcement effort but would consider the banning of whistles only after it was shown that infractions have been significantly reduced if not eliminated. Periodic assurances of a sustained enforcement effort and reassessment of the infraction levels would probably be necessary.

III. FRA's Proposed Remedies

FRA has determined that Emergency Order 15 will remain in effect. While the agency has considered the petitioner's submissions, no party has proven that the findings of FRA's whistle ban study are inaccurate or proposed an immediately acceptable alternative to the Order.

FRA, however, is determined to continue to work with the petitioners to promote crossing safety and reduce the impact of train whistle noise. As the next step in this conference process, the agency has identified certain options that might lead to increased safety and reduced noise.

FRA presents these potential remedial actions for discussion among the parties. The options are described in brief.

A. FRA's Proposed Remedial Actions.

First, FRA would like to study police reports of accident investigations to compile a profile of victims and more detailed causal information for accidents. If the necessary data are contained in police records, this study could lead to a better understanding of why train whistles contribute to safety and in determining where crossing safety education efforts need to be directed. The study could also identify the impact of drug and alcohol use on crossing accident rates. Local jurisdictions can assist by providing FRA the necessary police reports so that the agency can produce profiles of accident victims and causes.

Second, FRA will initiate a study on modifying the train horns in use on the FEC. The model currently used by the FEC, the S-3L-RF three-chime warning device, manufactured by Leslie Controls, Inc., is an air horn. Without sufficient air pressure, it is FRA's understanding that air horns will not consistently sound. FRA would like to determine this minimum level of air pressure and examine the impact the use of this sound level produces on crossing safety. FRA would also consider whether there is an ability to focus the sound safely down the right-of-way, limiting noise on neighboring communities. If FRA proceeds, the transportation safety experts at the Volpe National Transportation Systems Center in Cambridge, Massachusetts, will be asked to conduct the study.

And third, FRA will soon be issuing an Advanced Notice of Proposed Rule Making to determine whether a nationwide rule is needed regarding the use of train whistles at highway-rail grade crossings. When this process is initiated, FRA will schedule a public hearing in Florida on this issue and open the rulemaking docket to comments from the communities impacted by this Emergency Order.

B. Remedial Actions by the Petitioners.

FRA also believes there are several steps the petitioners can take to resolve the safety issues raised by the whistle bans.

First, highway authorities can invest in grade separation to eliminate problem crossings. Grade separation not only enhances safety and limits the use of train whistles, but also contributes to the smooth flow of both rail and highway traffic. In this coming year, FRA will be initiating a nationwide effort to reduce the number of highway-rail grade crossings. This reduction can also be achieved by the closing of low traffic crossings, and the rerouting of highway traffic.

A less expensive alternative would be the nighttime closing of select roads leading to crossings. Several petitioners noted the large numbers of crossings in their communities placed closely together. FRA suggests that the lower volume of highway traffic at night could be redirected to fewer crossings without significant impact on traffic flow.

Second, local highway authorities can consider installing barriers to restrict motor vehicles from driving around downed gates. Referred to as "traffic divisional islands," these barriers "may be used at crossings on multi-lane roadways to prevent motorists from driving around a lowered gate." Federal Highway Administration, *Railroad-Highway Grade Crossing Handbook*, 1986, pp. 142-143. (The *Handbook* provides explicit guidance regarding engineering considerations, which should be assessed when considering the use of such barriers.) Further study of individual grade crossings and accident data would be necessary to determine the

requirements for installing barriers. Barriers are a highway device; therefore, FRA must work in consultation with FHWA to define the requirements for installation.

And third, FRA will support a waiver request to FHWA, seeking approval to experiment with four-quadrant gates. As noted above in the discussion of petitioners' submissions on this point, FRA will cooperate with any study of the results of installing the gates. Local highway authorities must apply for a waiver from FHWA for the gates to be installed. In addition, the petitioners need to identify crossings and funding sources for these experimental devices.

C. Concluding the Conference Process.

FRA believes that steps listed above offer the opportunity to increase safety and reduce noise levels. In order to fulfill the promise of these options, FRA and the petitioners will need to work together to make these proposals a reality. If sufficient measures are taken to assure highway-rail grade crossing safety, FRA could then modify the Emergency Order.

When the parties met in Miami on September 13, it was agreed that another opportunity to meet and discuss solutions to the problems raised by the whistle bans could be arranged if the parties so requested. FRA has identified December 12, as the date when its representatives will be available to come to Miami and meet once again with the petitioners. FRA is willing to discuss alternative dates for this meeting if the petitioners so request.

FRA regrets the delay in its response, but once again states that the agency is committed to resolving the conference process by January 1, 1992, if the parties so choose.

As this process continues, FRA will monitor accident/incident information for the FEC as it is collected. FRA will provide periodic updates of its findings to the petitioners.

Issued in Washington, D.C., on December 5, 1991.

[SIGNED]

S. Mark Lindsey
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16. CITY OF PALM BEACH GARDENS

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17. MARTIN COUNTY

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18. FLORIDA EAST COAST RAILWAY COMPANY

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19. CITY OF WEST PALM BEACH

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20. PALM BEACH COUNTY

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Petition Withdrawn

INDIAN RIVER COUNTY

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OBSERVERS

Carol Hanson

TABLE TWO

Nighttime (10 PM -- 6 AM) Accidents
 January 1975 -- August 1991

CSX at Gated Crossings by					
<u>County</u>	<u>Pre80</u>	<u>80-84</u>	<u>85-89</u>	<u>Post89</u>	<u>Total</u>
Broward	5	13	8	0	26
Dade	3	3	5	0	11
Duval	7	9	26	5	47
Martin	0	0	0	0	0
Palm Beach	5	3	8	3	19
Volusia	<u>1</u>	<u>3</u>	<u>0</u>	<u>0</u>	<u>4</u>
Total	21	31	47	8	107

FEC by					
<u>County</u>	<u>Pre80</u>	<u>80-84</u>	<u>85-89</u>	<u>Post89</u>	<u>Total</u>
Brevard	4	6	10	8	28
Broward	13	17	31	9	70
Dade	26	13	38	8	85
Duval	3	1	0	0	4
Flagler	0	1	0	0	1
Indian River	0	1	5	1	7
Martin	1	1	2	1	5
Palm Beach	18	20	37	11	86
St Johns	0	0	0	1	1
St Lucie	3	1	2	0	6
Volusia	<u>0</u>	<u>1</u>	<u>5</u>	<u>3</u>	<u>9</u>
Total	68	62	130	42	302

Comparing those three counties (Broward, Dade and Palm Beach) where FEC and CSX operate in relatively similar corridors:

CSX	13	19	21	3	56
FEC	57	50	106	28	241

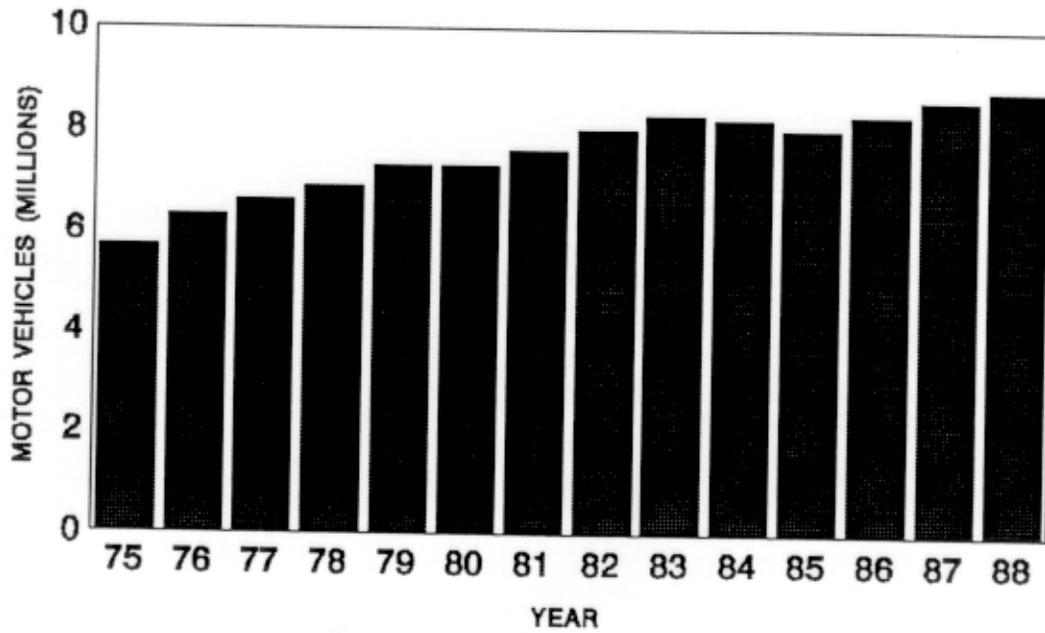
TABLE THREE

<u>Year</u>	<u>Gated Crossings</u>
1979	447
1980	510
1981	567
1982	608
1983	613
1984	613
1985	621
1986	621
1987	649
1988	649
1989	608
1990	608

TABLE FOUR

DRIVERS LICENSED

Florida
1975 - 1988

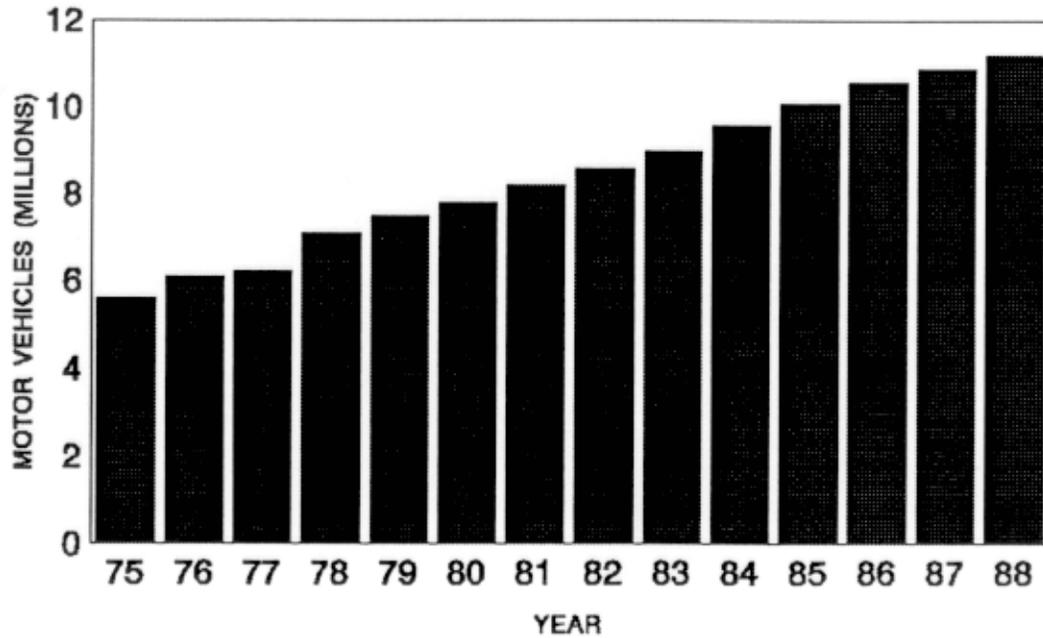


Source: Federal Highway Administration.

TABLE FIVE

MOTOR VEHICLES REGISTERED

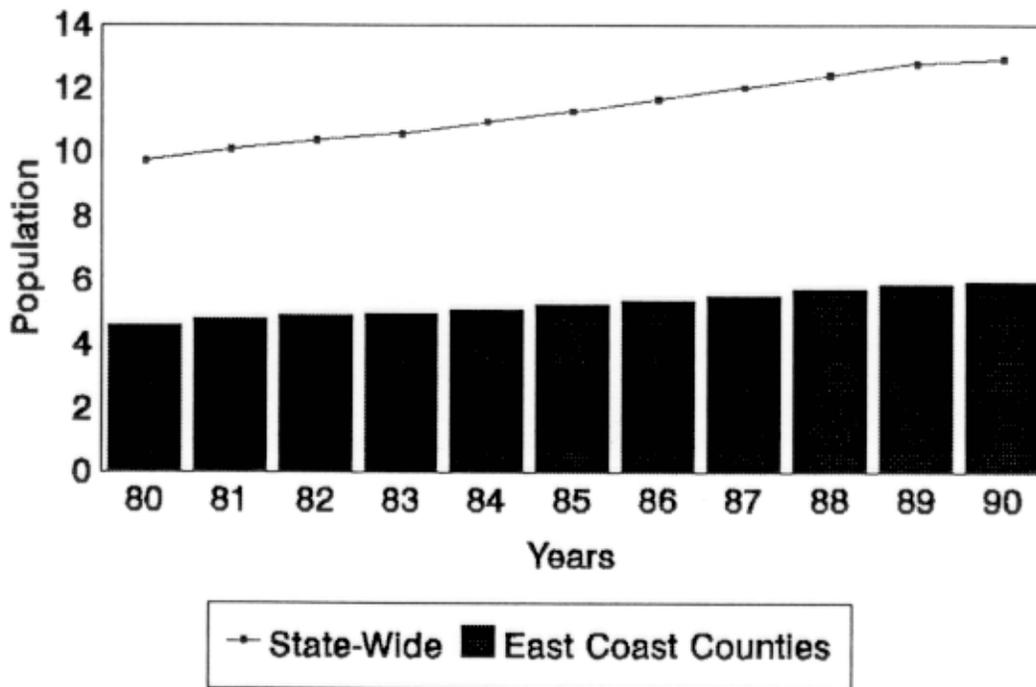
Florida
1975 - 1988



Source: Federal Highway Administration.

TABLE SIX

POPULATION OF FLORIDA (in Millions)

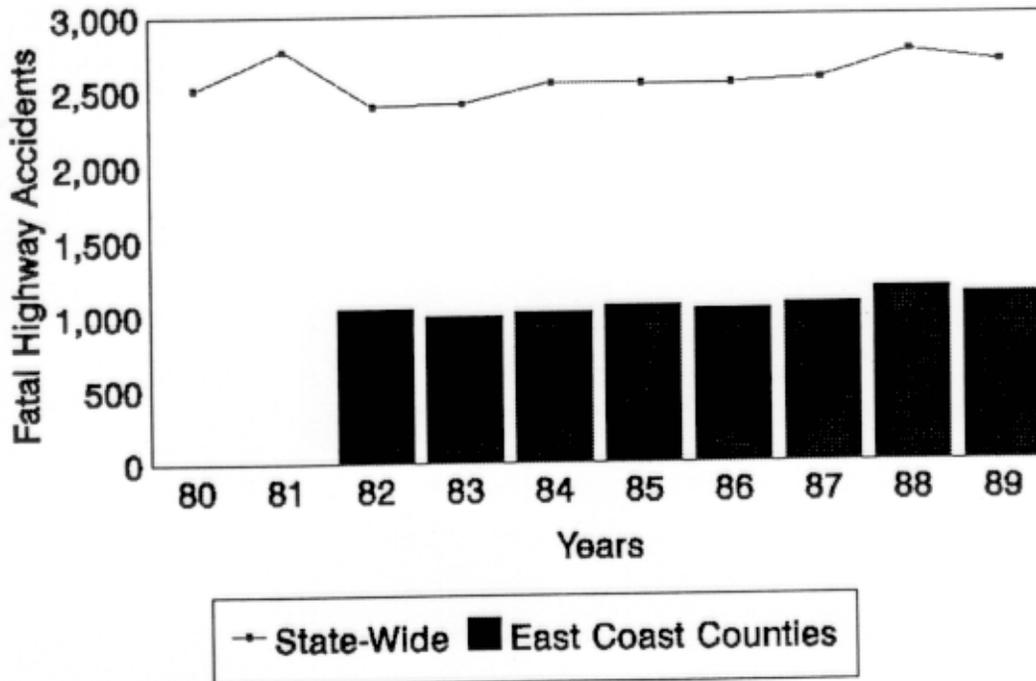


Source: Florida DOT Office of Policy and Planning

TABLE SEVEN

FATAL HIGHWAY ACCIDENTS

In Florida And Selected Florida Counties

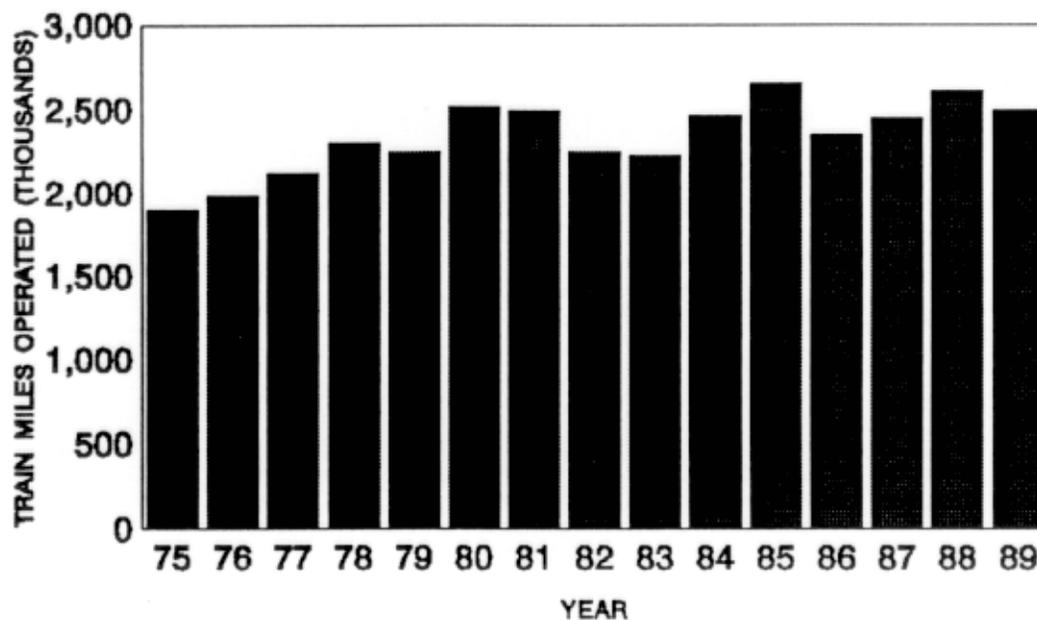


Source: Federal Highway Administration

TABLE EIGHT

FLORIDA EAST COAST

Locomotive Train Miles Operated 1975 - 1989



Source: FEC's Railroad Illness Summary Reports Submitted to FRA.

TABLE NINE

This list contains the approximate locations of all accidents between 10 PM and 6 AM inclusive, 1975 through August 1991 inclusive:

<u>County</u>	<u>City</u>	<u>Accidents</u>	<u>Total</u>
Brevard	Wiley	1	
	Scottsmoor	1	
	Titusville	4	
	City Point	1	
	Cocoa	7	
	Rockledge	2	
	Eau Gallie	5	
	Melbourne	3	
	Palm Bay	1	
	Micco	2	
	Bugbee	1	
			28
Broward	Deerfield Beach	10	
	Pompano Beach	17	
	Oakland Park	7	
	Wilton Manor	1	
	Fort Lauderdale	28	
	Dania	2	
	Hollywood	3	
	Hallandale	2	
			70
Dade	Miami	13	
	Miami Beach	3	
	Miami Shores	3	
	North Miami	6	
	North Miami Beach	1	
	Hialeah	56	
	Medley	3	
			85
Duval	Jacksonville	3	
	Greenland	1	
			4
Flagler	Bunnell	1	
			1

<u>County</u>	<u>City</u>	<u>Accidents</u>	<u>Total</u>
Indian River	Roseland	1	
	Wabasso	1	
	Gifford	1	
	Vero Beach	3	
	Oslo	1	
			7
Martin	Jensen Beach	2	
	Stuart	1	
	Port Salerno	1	
	Salerno	1	
			5
Palm Beach	Belle Glade	1	
	Monet	6	
	Jupiter	5	
	Lake Park	6	
	Riviera Beach	13	
	West Palm Beach	26	
	Lake Worth	15	
	Lantana	1	
	Hypoluxo	1	
	Delray Beach	6	
	Boca Raton	6	
			86
St Johns	St Augustine	1	
			1
St Lucie	Indrio	1	
	Ft Pierce	5	
			6
Volusia	Holly Hill	1	
	Daytona Beach	3	
	Port Orange	1	
	New Smyrna Beach	2	
	Edgewater	1	
	Ormond Beach	1	
			<u>9</u>
TOTAL			<u>302</u>

APPENDIX P

The Honorable Ileana Ros-Lehtinen
House of Representatives
Washington, D.C. 20515

[January 30, 1992]

Dear Ms. Ros-Lehtinen:

Thank you for your December 11, 1991 letter on behalf of Mr. John A. Cavalier, Jr., of Miami Springs, Florida. Mr. Cavalier is concerned about the Federal Railroad Administration's (FRA) preemption of whistle bans on the Florida East Coast Railway's corridor.

The FRA and a number of appellants, including Mr. Cavalier, are in the midst of an extended pre-litigation conference period regarding the FRA preemption. At a December 20 meeting in Coral Gables, which Mr. Cavalier attended, the FRA reviewed many of Mr. Cavalier's and Professor Horn's points. We also discussed alternate measures, similar to what Mr. Cavalier has suggested, which may be undertaken by local and state highway authorities. I am enclosing a copy of our "Conference Notice No. 3", which was provided to all appellants prior to the meeting. Remedial actions are discussed beginning on page 15. Also enclosed is a point by point review of the issues raised by Professor Horn in his October 5, 1990 letter.

I hope this information is helpful.

Sincerely yours,

[SIGNED]

Gilbert E. Carmichael
Administrator

Enclosures

Letter of Professor Kevin Horn
Transportation and Logistics
University of North Florida
Dated: October 5, 1990

Subject: Florida's Train Whistle Ban

Professor Horn has raised and expanded on a series of points, which question FRA's original report's conclusions and suggests avenues for further research. These include:

- (1) "The report does not indicate how changes in traffic volumes and changes in train operations have contributed to increased nighttime accidents."

FRA's inquiries did not disclose any significant changes in traffic volumes or train operations. We did look at traffic and accident counts in Florida and in Florida's eleven east coast counties and found nothing even approaching the magnitude nor the demarcation of the post ordinance increase in crossing accidents. See graphics labeled Tables 4-7 attached to "Conference Notice No. 3," also enclosed.

- (2) "The increase in average annual engine miles noted in the report, 22.3 percent, on page 8, is not a reliable indication of increased train operations, unless the locomotive fleet has remained stable in number of active units."

The use of the term "average annual locomotive miles" on page 8 of the original report may be misleading. As well, the 22.3 percent figure is wrong, on the high side. Total train/locomotive miles reported by the FEC has gone up between 10 and 15 percent in the last decade, as indicated on the graphic labeled Table 8 of "Conference Notice No. 3." This figure is a reliable indicator of train operations. The definition of a "train mile" is "[t]he movement of a train for a distance of one mile. Mileage is not to be increased because of the presence of multiple locomotives in the train." In a docket submission on this subject, the FEC reports "that its operations have kept pace with its increase in traffic and that the 10 to 11 percent increase in locomotive miles reflects it (sic) overall traffic patterns."

- (3) "The report provides no indication of the magnitude of FEC's increased traffic as it impacted the number of trains operated or the timing of the trains, that is day versus night."

See comment re (2) above. There is no reasonable way to gather or generate more specific data. Definitions are a problem. The first question which arises is, when was the whistle ban established? The answer is different depending on what crossings are being discussed. The problem is compounded

when one considers that many trains are enroute at the bewitching hours of 10:00 p.m. and 6:00 a.m. when the bans become effective and ineffective, respectively. How should these trains be counted? However, FEC's submission to this docket indicates once again that "the number of trains increased slightly during the period between 10:00 p.m. and 6:00 a.m., but did not begin to approach the increase in accident rate discovered by FRA."

- (4) "The report provides no information on the extent of CSX train operation and changes during the comparison period."

This is correct, and the CSX control group is probably the weakest of the control groups cited. Even locomotive miles can not be used because the FRA has no means of isolating reported CSX miles to just those accumulated in Florida. Alternative to the CSX control group, the reviewer should consider the report's experience at the same crossings, and non-impacted FEC crossings. See comment re (5) following.

- (5) "The report does not substantiate that FEC and CSX have similar operations with respect to the number and scheduling of trains over impacted crossings. Furthermore, except for the area south of West Palm Beach, CSX and FEC operate in different segments of whistle ordinance counties."

First, CSX has no "impacted" crossings. Second, the sole intent of including the CSX control group was to determine if such a precipitous accident rate change has occurred at CSX gate-equipped crossings. None was found. Pursuant to Professor Horn's suggestion, we have accomplished a county by county breakdown of CSX nighttime (10:00 p.m. - 6:00 a.m.) crossing accidents. In the three southern counties (Broward, Dade and Palm Beach), where operations are essentially parallel and in reasonably close proximity, CSX experienced 19 accidents in the five years ending in 1984 versus FEC's 50 in the same period, and 21 accidents in the five years beginning 1985 versus FEC's 106. The dichotomy remains striking! CSX accidents increased 10 percent. FEC's went up 110 percent. (The reported 67 percent increase in CSX accidents noted in the original report occurred largely in Duval County which went from 9 to 26 accidents in the same five year periods.)

- (6) "To link all accidents to whistles is fallacious."

We found "including all accidents" to be the conservative approach and allowed us to avoid making what are often subjective decisions about which accidents to include and which to exclude. By including all accidents, we hoped to avoid accusations to bias. However, to address Professor Horn's concern, the following is offered: A total of 35 accidents were included in our original July 1990 report where the railroad had reported that the motor vehicle was stopped or stalled on the crossing. Whistles would probably not have prevented these accidents. In the Even-History analysis,

18 of these accidents were included in the pre-ban period and 17 were included in the post-ban period. When these are excluded from consideration, the number of accidents in the pre-ban period changes from 39 to 21, and the number of accidents in the post-ban period decreases from 115 to 98. Comparing a total of 21 accidents in the pre-ban period to 98 accidents in the post-ban period yields a 367 percent increase (compared to the 195 percent increase cited in our original report)! In our original analysis, we opted for a more conservative approach and included for consideration all accidents which occurred within the study period.

Similarly, if instances where the motor vehicle hit the side of the train are excluded (nine in the pre-ban period and 26 in the post-ban period), the pre-ban accident count would have become 30 versus 89 in the post-ban period. The increase in accidents attributable to the whistles remains at 196 percent! However, consideration of some other numbers may convince the objective observer that this latter category, where vehicles strike the train, should not be excluded from consideration. Our data noted that the average position of the train car struck by the nine vehicles which ran into the side of a train in the pre-ban period was number 37 in line. The average position of the train car struck by the 26 vehicles which hit the train in the post-ban period was number 12. Does this indicate that those cars approaching as the front of the train, with whistle sounding, is approaching or just passing the crossing are hearing the whistle and stopping, while those approaching a few seconds or minutes later, when the locomotive and whistle have moved well up the line are then hitting the train at the 37th car? This would be consistent with the findings in the post-ban period when the same driver who stopped earlier on hearing the whistle up ahead does not now hear it and hits the train much further forward, i.e., at the 12th car, on average. Although this is intuitively acceptable, the numbers appear to be too small and variable for real statistical confidence. Consistent with our conservative approach to this analysis, we retained all these accidents within the pool for consideration.

Finally, the question of including accidents involving a second train: FRA believes the whistle is particularly pertinent in a second-train-coming situation. Consider the circumstance. The driver's view is blocked by the first train. The impatient driver, once the decision is made to go around the down gate, is totally dependent upon hearing the second train, whether realizing it or not. The whistle serves that purpose admirably. The number of accidents stemming from this scenario reported for the pre-ban period was zero, while four were reported for the post-ban period. We would disagree with dropping these reports from consideration. However the overall impact would be small. One appellant suggested that accidents, which occur at crossings with a history of being blocked by frequent train movements should be excluded from consideration. Though we can appreciate a driver's frustration when faced with such a situation, we do not understand the rationale for excluding such an accident from consideration.

The whistle may very well provide the driver (and the flagman in the case cited) the realization that another train is approaching the crossing.

- (7) "The report also makes no allowances for changing patterns of vehicle operations at the crossings, particularly during the evenings when other issues of driver behavior are subject to change."

We don't understand what "other issues of driver behavior are subject to change." And particularly, would these "issues" have changed concurrent with the establishment of bans? We recognize that traffic patterns and volumes are different at night than they are during the day. This is not the change which is relevant. Rather, we are interested in what changed in 1984-1985 to make the nighttime accident rate increase as markedly as it did, while the daytime accident rate remained constant. Further, this change was manifest only at crossings impacted by the bans, and not at other FEC crossings, which were not impacted by the bans.

- (8) "To illustrate the possible interaction of increased trains and increased vehicle traffic, consider the following: ..."
Professor Horn then provides an example of "compound interaction of increased train frequency and increased number of vehicles," which is based on linear relationships between train and/or vehicle counts and accident frequency.

The relationship between vehicle traffic, train frequency and accident occurrence has been well studied and documented. The data bases were national versus being restricted to just Florida. But the underlying correlations would not be expected to change remarkably. The relationships are not linear. See *Rail-Highway Crossing Resource Allocation Procedure, User's Guide, Third Edition, FRA, August 1987*. In fact, in order to triple the probability of an accident, given a constant level of about 20 trains per day, it would be necessary to increase highway traffic nearly 40 fold.

- (9) "The report provides no evidence that FEC's increase in nighttime accidents is a function of the interaction of increased trains and increased vehicles."

See comments regarding (1), (2), and (3) above.

- (10) "The report is silent on whether other factors affecting nighttime accidents, such as alcohol impairment, would be primary or secondary to whistle blowing."

Is it relevant whether impairment is primary or secondary to whistle blowing as long as the whistle might have avoided the accident? It may be that a train whistle is just the stimulus which will "reach" the impaired driver. The empirical evidence would tend to support this theory.

Professor Horn suggests that:

- (1) "... this issue be studied with proper controls to ensure that traffic conditions (such as vehicle highway counts, stratified by time of day) and train operations by time of day (available from dispatcher's sheets) are controlled."

See comment re (3) above.

- (2) "Comparisons between CSX and FEC should only be done where the operating conditions are similar in terms of crossing locations and driver behavior."

See comment re (5) above.

- (3) CSX and FEC be compared where their lines "are reasonably parallel to each other, south of West Palm Beach."

See comment re (5) above.

- (4) "...some criterion for "accident" ... be established to embrace accidents, which can be reasonably attributable to lack of whistles. Stalled cars, impaired operators, or other accidents, which no whistle could prevent should be excluded."

See comment re (6) above.

Professor Horn concludes that:

- (1) "... the report's findings are reasonable..."

Thank you.

- (2) From the report findings, it is reasonable to presume that "... whistle blowing ordinances may have resulted in an increase in crossing accidents."

We agree.

- (3) "The data and analysis certainly does not warrant any conclusions to this effect."

We disagree. The report's findings could not be ignored. These findings, along with the lack of any explanation or mitigating action from concerned Florida jurisdictions, and the continued accumulation of accidents and casualties at the increased post-ban rate, left FRA no alternative but to exercise its public and rail safety powers to preempt the only identifiable

cause of the accident increase. To have done otherwise would have been an abrogation of FRA's mission and responsibility.

- (4) "... a rebuttable presumption exists that whistle ordinances are positively correlated with accidents. The report does not prove this...."

It may be rebuttable, but no one, including Professor Horn, has provided a rebuttal, which has stood up to scrutiny.

- (5) "... no basis exists for the conclusions on page 10."

We disagree.

6 January 1992.

APPENDIX Q

UNITED STATES DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

Office of Chief Counsel
400 Seventh Street, S.W.
Washington, D.C. 20590

Conference Notice No. 7

The Federal Railroad Administration (FRA) agreed on December 20, 1991 to provide performance specifications for full highway-rail crossing barriers, traffic divisional islands and temporary crossing closures.

Implementing these measures might justify relief from the Order requiring that locomotive horns be sounded at highway-rail grade crossings. After a careful review of the data available to FRA and consultations with Federal and State highway officials, FRA has prepared draft performance specifications for these three remedial measures. The proposed standards are attached to this notice.

The information provided by the petitioners has contributed significantly to FRA's preparation of the draft specifications. Before issuing these standards in final form, FRA requests the comments of the parties to this proceeding. Once these comments are received, FRA will review the submissions, make any necessary adjustments and issue final specifications as an amendment to the Emergency Order.

FRA must receive comments by December 15, 1992. If no submissions are received, or no adjustments are needed, FRA will issue the draft standards as final performance specifications.

Once the standards are final, any jurisdiction impacted by Emergency Order No. 15 may obtain relief from the requirement that whistles be sounded at impacted crossings by providing the required certification to the Florida Department of Transportation and written notification to the railroad.

The specifications offer four means of ensuring safety at affected crossings as acceptable alternatives to the warning provided by the locomotive horn. The most obvious means of accomplishing this end is permanent closure of the crossing. FRA strongly recommends permanent closure of unnecessary highway-rail crossings. In many settings, this option would be the most desirable, and would have the lowest capital cost of all remedial measures discussed.

Nighttime closures and installation of median barriers or four-quadrant gates should promote a high degree of safety. FRA is concerned, however, that a patchwork of enhanced and conventional crossings will reduce safety as a result of excess demand on the Florida East Coast Railway's (FEC) locomotive engineers to remember the status of the hundreds of crossings, distracting the engineer from important train handling responsibilities. Piecemeal phase-in of crossing enhancements could create confusion as to which restrictions exist at which locations. However, if enhancements are provided to consecutive crossings in "quiet zones", they will be more easily learned as a part of the engineer's normal operating territory.

Accordingly, where the alternative selected is short of permanent closure, the specifications propose that the railroad be relieved of the requirement to sound the horn in advance of a crossing only if the crossing is a part of a segment of railroad of not less than one-half mile (2,640 feet) in length on which all at-grade crossings are, in keeping with these specifications, closed during nighttime hours (10:00 p.m. to 6:00 a.m.), equipped with four quadrant gates, or equipped with gates with median barriers.

A quiet zone of at least one-half mile is believed to be the minimum distance for which meaningful reduction in noise can be achieved. Comment is requested regarding the issues associated with this proposed condition.

Once again, in the interest of an expeditious conference process, FRA encourages joint submissions. Please direct any questions or comments to Mr. Kyle M. Mulhall, of my staff, at (202) 366-0635.

[NOVEMBER 3, 1992]

[SIGNED]

Daniel C. Smith
Acting Assistant Chief Counsel
for Safety

**FRA Emergency Order No. 15: Specifications
For Remedial Measures at Highway-Rail Crossings**

The Federal Railroad Administration (FRA) will relieve the Florida East Coast Railway (FEC) of its obligation to sound train borne audible warning devices at any crossing for which the responsible highway authority has certified to the Florida Department of Transportation (FDOT) that one of the four remedial measures specified below is implemented and has notified the FEC in writing that the certification has been filed.

FRA further believes it is necessary to create "quiet zones" of consecutively enhanced crossings in order to achieve noise reduction and increase safety. In addition, this restriction reflects the practical reality of the use of locomotive horns for safety. Common practice in the railroad industry dictates that locomotive horns be sounded approximately 15-20 seconds prior to the train's occupying a crossing and until the locomotive clears that crossing. At approximately 45-60 miles per hour (typical track speeds on the FEC line) this requires that the horn be initially sounded between 1,000 and 1,760 feet (1/3 mile) prior to the particular crossing for which the warning is intended. (Florida law refers to sounding the horn at a distance of 1,500 feet without regard to train speed.) At many locations on the FEC line, there are several crossings within this distance. As a result, the perception of persons along the right-of-way may be that the horn is sounded almost continuously as the train passes through the neighborhood.

Responses that seek to eliminate this source of noise must contend with this reality. For instance, should consecutive crossings be closed or equipped with enhanced safety systems for a distance of one-third of a mile, and should non-improved crossings remain only one city block north and one city block south of the attempted "quiet zone," residents would experience essentially no relief from locomotive horn noise. This is true because engineers traveling north at track speed would have to sound the horn for more than 1,000 feet within the quiet zone in order to warn motorists at the first crossing to the north. The same condition would occur southbound. The result would be virtually no relief from noise within the zone.

Creating unrealistically short quiet zones will also fragment the territory over which locomotive engineers must operate, increasing the possibility that the horn will not be sounded for those crossings where it is required. The shorter and more numerous the attempted quiet zones, the more numerous will be individual crossings in between for which sounding the horn is essential to safety.

It is clear that the demands of railroad safety and realistic planning to limit noise dictate that closures and improvements be planned on a corridor basis with the objective of creating quiet zones of maximum possible length. Conversely, a fragmented approach must be avoided. Accordingly, FRA proposes to relieve the railroad of the obligation to sound the horn for crossings within a zone only where the length of the zone between non-enhanced at grade crossings is at least one-half mile (2,640 feet).

DEFINITIONS

The following definitions pertain to these specifications:

Low Traffic Volume Streets: Any street carrying less than 2,000 vehicles per day. (This is relative. In smaller communities, an average daily traffic of 2,000 vehicles would be considered moderate volume.)

Major intersection: Any intersection where traffic volume justifies the use of turn lanes.

Median barrier: Any device designed to prevent the intentional or accidental incursion of a vehicle into a median, e.g., a Jersey Barrier.

Median curb: A curb, either mountable or non-mountable, which defines a median.

Minor intersection: An intersection where traffic volumes do not require the use of turn lanes.

MUTCD: Manual on Uniform Traffic Control Devices (1988 Edition), Federal Highway Administration, U.S. Department of Transportation.

Non-mountable (barrier) curb: A steep-faced curb 9-12 inches high intended to prevent intentional incursion by a vehicle into a defined area.

Quiet zone: A segment of railroad of not less than one-half mile (2,640 feet) in length on which all at-grade crossings are, in keeping with these specifications, closed during nighttime hours (10:00 p.m. to 6:00 a.m.), equipped with four quadrant gates, or equipped with gates with median barriers.

Traffic separator: A traffic island or median designed to guide traffic around an obstacle or to direct traffic in a particular direction.

SPECIFICATIONS

1. PERMANENT CLOSURE OF THE HIGHWAY-RAIL CROSSING: Eliminate the at-grade crossing through permanent closure of the street or highway or through grade separation (overpass or underpass).
2. NIGHTTIME CLOSURE OF THE HIGHWAY-RAIL CROSSING: Close the crossing to highway traffic during nighttime hours subject to the following conditions:
 - a. The closure system must completely block highway traffic from entering the crossing.
 - b. Activation and deactivation of the system will be the responsibility of the county or municipality responsible for the street or highway, which must undertake to reliably discharge this duty such that the crossing is closed continuously during the hours of 10:00 p.m. to 6:00 a.m.
 - c. The crossing must be part of a quiet zone, as defined in these specifications.
 - d. The system must be reasonably tamper and vandal proof.
 - e. MUTCD standards must be met for any barricades and signing used in the nighttime closure of the facility.
3. FOUR QUADRANT GATE SYSTEM: Install sufficient gates at a crossing to fully block highway traffic from entering a crossing when the gates are lowered, subject to the following conditions:
 - a. Approaches on both sides of the highway-rail crossing will be separated with medians with non-mountable curbs or traffic separators. Such median construction will include energy dissipaters and median striping as required by MUTCD.
 - b. Any median construction will extend at least 200 feet or to a major intersection, whichever is less. All major intersections must be a minimum of 100 feet from the highway-rail crossing. Any minor intersections within 200 feet of the crossing will be closed to crossing traffic.
 - c. At low traffic volume streets, median curbs with vertical delineators (rubber pipes and low curbing) between opposing lanes may be used in place of non-mountable curbs or traffic separator.
 - d. The maximum length of a gate arm will not exceed 40 feet.

- e. Gate timing for full closure systems should be based on these suggested times:

<u>step</u>	<u>Inc.</u>	<u>Time</u>
Lights start flashing	0	sec.
Entrance gates start down	3-5	"
Entrance gates fully lowered	9-15	"
Exit gates start down	4-6	"
Exit gates fully lowered	9-15	"

- f. The gap between the end of a lowered gate and the median will be less than one foot.
 - g. Four quadrant gates will not be an option where traffic signal pre-emption exists.
 - h. The crossing must be part of a quiet zone, as defined in these specifications.
 - i. The system must be reasonably tamper and vandal proof.
 - j. General principles of the AASHTO Roadside Design Guide regarding median barrier construction will be adopted where applicable.
4. GATES WITH MEDIAN BARRIERS: Install median barriers at a crossing which prevent highway traffic from driving around lowered gates subject to the following conditions:
- a. Approaches on both sides of the highway-rail crossing will be separated with median barriers. Any barrier so constructed will include energy dissipaters and median striping as required by the MUTCD.
 - b. Median barriers will extend at least 200 feet or to a major intersection, whichever is less distant. All major intersections must be a minimum of 100 feet from the highway-rail crossing. Any minor intersections within 200 feet of the crossing will be closed to crossing traffic.
 - c. The maximum length of a gate arm will not exceed 40 feet.
 - d. The gap between the end of a lowered gate and the median barrier will be less than one foot.
 - e. The crossing must be part of a quiet zone, as defined in these specifications.

- f. The system must be reasonably tamper and vandal proof.
- g. General principles of the AASHTO Roadside Design Guide regarding median barrier construction will be adopted where applicable.

Implementation Notes:

The following statements reflect the desire and intent of parties to the conference with respect to application of the above specifications:

1. In regard to the full closure of highway-rail crossings, the FDOT and the FEC have expressed a willingness to provide financial assistance to close any highway-rail crossing impacted by this Emergency Order.
2. If a crossing is selected for nighttime closing, alternate highway traffic routes should be identified, and signs erected in accordance with the MUTCD and applicable FDOT and local standards informing the motoring public that the streets will be closed from 10:00 pm until 6:00 am and that alternate routes must be used.
3. Any crossing equipped with a four quadrant gate system or with gates and median barriers should also be equipped with constant warning time devices.
4. All gate arms should be equipped with strobe lights located on the centerline of each driving lane when the gates are lowered.
5. Illumination (street lighting) of these highway-rail crossings is encouraged.

APPENDIX R

UNITED STATES DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

[Emergency Order No. 15, Notice No. 4]

Amendment of Emergency Order No. 15

The Federal Railroad Administration (FRA) issues this notice to amend Emergency Order No. 15 (Order) in response to comments received from petitioners who have requested an administrative review of the Order and FRA's further study of alternative remedial measures.

The Emergency Order was issued July 26, 1991, published in the Federal Register on July 31, and required that trains operated by the Florida East Coast Railway Company sound train-borne audible warning devices when approaching public highway-rail grade crossings.

On August 6, FRA received the first petition requesting review of the Order and began an informal conference process with effected parties. That process permitted petitioners to submit arguments for modification or withdrawal of the order. See 49 CFR 211.47. As part of that process, FRA provided petitioners a set of proposed remedial options, which, if implemented, would result in exemption from the requirements of the Order. The comment period on those options ended on January 15, 1993. Issuance of this notice concludes the conference process.

After review of the comments, FRA has decided to amend the performance specifications for various of the proposed remedial options in certain respects. This notice explains how FRA is responding to the comments offered by petitioners and amends the "Relief" section of the Order accordingly.

I. DISCUSSION OF COMMENTS

In September of 1992, FRA issued draft performance specifications for full highway-rail grade crossing barriers, traffic divisional islands, and temporary crossing closures. FRA announced its intention that, once the specifications were finalized, compliance with these standards would exempt a grade crossing from the requirements of the Order.

By the end of the comment period on January 15, 1993, FRA had received responses from eight petitioners: the cities of Hollywood, Jupiter, North Miami Beach and West Palm Beach; Martin County; Project

Whistle Stop (PWS); John A. Cavalier, Jr.; and the Florida East Coast Railway (FEC).

Funding

The most common concern among the petitioners was funding the remedial measures. Four groups raised this issue. Martin County estimated that the cost per crossing would be approximately \$85,000. As a result of this expense, they argued the "...proposed restrictions are too severe and do not represent the stated intent of providing an avenue for relief...." FRA consulted with Federal and State highway officials when it prepared the specifications. Retaining the level of safety afforded by the use of train horns was the central issue discussed. Protecting lives was given more consideration than cost. FRA hoped that less expensive alternatives would be available, and is still hopeful that less costly means of implementing these measures will develop as experience is gained.

Other petitioners addressed the question of who should pay. Hollywood rejected the remedial measures "until such time as the FRA identifies a proper and acceptable funding source other than the City of Hollywood and other affected cities...."

West Palm Beach mistakenly interpreted Federal and State statutes as requiring that such improvements "... be paid from federal and state funds." Federal statutes do not require that highway-rail crossing safety improvements be paid with Federal or State funds. Whether Federal highway safety or other State funds are used is a decision to be made by the Florida Department of Transportation. The use of Federal highway safety funds would require the concurrence of the Federal Highway Administration (FHWA).

Similarly, the Town of Jupiter argued that Federal law requires that the Federal government "significantly participate with the costs for upgrading crossings." FRA is not familiar with such a requirement. FRA has no funds which could be used for such purposes.

Jupiter suggested that FEC participate in the funding of necessary remedial measures other than closings. This is a decision which can only be made by FEC.

Quiet Zones

The issue of "quiet zones" was addressed by two petitioners, FEC and PWS. FEC opposes quiet zones, asserting it would be too complicated for locomotive engineers to keep track of zone limits. However, one reason FRA proposed quiet zones was a concern for the difficulty engineers would have if exemptions to the Emergency Order

were granted by individual crossing. As explained in Conference Notice No. Seven, a zone of sufficient length would assure that the locality would in fact realize an absence of train horns. Conversely, to establish quiet zones only at political boundaries, as FEC proposed, would unnecessarily impact crossings where train horns are not a problem, for example, in rural locations. We believe the half mile minimum to be a compromise between what is reasonable and what is practical. It is not reasonable to require more, nor is it practical to settle for less.

PWS stated that quiet zones were not needed, but provided no rationale. PWS went on to state that some jurisdictions are so small they would not have control over a track segment long enough to establish a zone. FRA recognizes that jurisdictions may need to coordinate to create zones, but sees no other option.

Finally, PWS argued that if quiet zones are established the use of train horns should be banned for the full day, and not just 10 P.M. to 6 A.M. The concept of a 24-hour ban in designated zones is reasonable. If the remedial measures are properly implemented for four quadrant gates, median barriers or one-way streets fully gated, FRA believes that a 24-hour ban could be consistent with the intent of the Emergency Order. FRA notes, however, that there may need to be a change in Florida law before local jurisdictions have the authority to establish 24-hour bans.

Four Quadrant Gates

PWS and FEC also opposed four quadrant gates. The addition of exit gates is designed to prevent circumvention of the entrance gates by impatient or misinformed motorists.

PWS questioned the need for a median barrier if four quadrant gates are to be used. Medians are specified to deter attempts to circumvent the entrance gates before the descent of the exit gates. The exit gates are delayed to allow motorists on the crossing to move clear before all the gates descend. FRA agrees that four quadrant gates are unnecessary if the standard gates with medians, as detailed in the attachment containing performance specifications FRA is adopting, are installed.

PWS has suggested leaving unpaved the space between opposing highway lanes over the tracks to prevent motorists from driving around downed gates. FRA is not convinced it would be any less costly to remove the pavement between lanes than to erect median barriers. In addition, this space is often too narrow to serve as a barrier to deter motorists from driving around the gate. Since an unpaved gap would also not be as easy to see as a median barrier, it could trap

motorists if the gap was inadvertently entered.

The FEC opposed four quadrant gates as an alternative to train horns, because they believed that "without the intimidation factor provided by an audible warning device, they [intoxicated or speeding motorists] are much more likely to crash through them [lowered gates] and into the path of an oncoming train." Available data do not support the FEC's statement. FRA reviewed 82 reports prepared by Florida law enforcement officers regarding FEC nighttime crossing accidents, including 63 cases where the driver either drove around or through the gates. Five of the 50 accidents (10 percent) occurred when the motorist drove through a gate while bans were in effect. In the remaining 45 cases the driver drove around the gates. Of the 13 no-ban incidents, three (23 percent) resulted from the driver going through a gate. The percentage of drivers involved in accidents going through gates, versus around them, did not increase during the ban period. Most drivers who have had accidents at crossings have slowed sufficiently to negotiate the crossing without going through the gates. The percentage of drivers failing to stop, or oblivious to the gates, did not increase. FRA therefore believes that additional gates with a median barrier would prevent the vast majority of motorists from attempting to beat the train.

In a related communication, the Florida Department of Transportation has suggested that "loop detectors" be used to preclude the closure of exit gates if a highway vehicle is present in the exit lanes. The FRA concurs in this suggestion and the specification for Alternative Remedial Measure #3 was therefore rewritten.

Longer Gate Arms

One petitioner proposed "that where there is a two lane road ... that the two gates be extended, no more than forty feet, which would have the effect of completely blocking traffic from entering the crossing." The petitioner suggested that, "[t]his would have the same effect as a four quadrant crossing ... and would be far less expensive." Engineering personnel worry that that approach could trap motorists on the tracks when gates close. Four quadrant gates are designed to close the entrance lane(s), and then, after a delay allowing motorists on the crossing to exit, to close the exit lane(s).

In a related suggestion, PWS proposes that "the street should be made one way and the arm long enough to prevent vehicles from going around from the incoming side." This is a valid suggestion. The FRA and the Florida Department of Transportation have prepared a set of specifications, similar to those already presented in Conference Notice #7, addressing this additional option. See the Performance Specification.

Terminating Rail Service

PWS suggested another remedial measure, i.e., shutting down rail operations on tracks where less than seven trains per week operate. However, no alternatives for moving freight were offered. Under most circumstances, rail transport is safer and more economical than moving freight over our nation's highways. Increased highway congestion would also put added wear on public roads. Further, by definition, this measure would eliminate train horns at a particular crossing less than once per day, obviously not the problem which these proceedings are attempting to address. Lastly, 80 percent of the FEC highway-rail crossings which were impacted by whistle bans in 1989 were on the FEC mainline with considerably more than one train per day. Substantially more than half of the remaining 20 percent, though not mainline, have more than one train per day. The impact of this alternative on the "whistle problem" would be minimal. The legal, logistical and transportation problems it would create would be out of proportion.

Pedestrian Traffic

FEC recommends that "any signs indicating ... closure should clearly indicate that the crossing is closed to **both** vehicular and pedestrian traffic." FRA agrees and will accordingly modify Note #2 the Implementation Notes. See Performance Specifications.

FEC also recommends that "the specifications should ensure adequate safeguards to prevent pedestrians ... from entering the railroad's right of way." FEC offers no suggestion as to what would be "adequate." FRA would have no objection to the establishment of further safeguards for pedestrians. However, it appears that current arrangements are adequate. All potential whistle ban crossings on the FEC are equipped with gates, lights and a bell. The bell is intended to warn pedestrians of the impending presence of a train. From 1980 through 1992, the FEC reported 19 pedestrian incidents at highway-rail crossings. Of these, six occurred while bans were effective. (Three of the six resulted in a death.) The following table shows the number of such incidents, by year.

'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92
1	4	1	0	1	1*	1	2*	1/1*	1/1*	1*	1	2

* ban in effect (1/1* indicates one with ban in effect, one without)

These data neither support nor refute the effectiveness of train horns as a pedestrian warning device. Pedestrian incidents have occurred before, during and after the whistle bans. The use of a

second audible warning device (a train's horn), has not made an appreciable difference for pedestrians. The bell, flashing lights and gates, provide adequate warning for pedestrians.

Signs

One individual recommends that signs be placed at each crossing notifying motorists of the \$1,500 fine for violating a state statute by going around lowered gates. The FRA supports this concept, though we will not require such a sign in the revised specifications. This should remain a local option. We would caution that any traffic control sign is of little value unless the statute is enforced. If it is enforced, experience shows word will spread quickly.

Whistle Boards

PWS recommends that the FEC "install ground markers for the engineer to know when to blow the train horn." Such markers are commonly referred to as "whistle boards," and in Florida, because of State statutes, would be installed 1,500 feet from each crossing on each approach to the crossing. It has not been alleged that FEC locomotive engineers are forgetting to sound their trains' horns. Should this become a problem, this option would remain open to the FEC.

Excess Use of Train Horn

PWS has implied that locomotive engineers continue to sound the horn even after the locomotive has entered upon the highway-rail crossing, and that this practice should be curtailed, unless "the engineer thinks it will do some good." Most railroad operating rules, and FRA's Order, require that the last sounding of the train's horn for each crossing be "prolonged until the lead locomotive has passed through the crossing." This practice was established, and is continued, in an effort to reduce the number of incidents in which a highway motor vehicle runs into the side of the train. (More than a quarter of all crossing collisions occur when the highway user strikes the train.) In most of these, 67 percent, the lead unit (usually the locomotive) is struck. Overlooked in PWS's assertion is that many FEC crossings are closer together than 1,500 feet. As an engineer crosses over one crossing, he frequently is already sounding the horn for the next. Closing crossings is the best solution to this problem.

Highway Intersection, defined

PWS has suggested that the definition of an intersection, whether major or minor, be predicated on the number of traffic lanes. The proposed specifications distinguished intersections based on the presence or absence of turn lanes. PWS provided no rationale for its recommended change. FRA defers to the State and Federal engineering personnel with whom we consulted in preparing those specifications and retains the original definitions.

The Manual on Uniform Traffic Control Devices (MUTCD)

PWS recommends that the MUTCD "develop plans for placement of gates at all types of crossings." The MUTCD, in accordance with Part 1A-2 of the MUTCD:

- sets forth the basic principles that govern the design and usage of traffic control devices.
- The Manual presents traffic control device standards for all streets and highways open to public travel regardless of type or class or the governmental agency having jurisdiction.

However, the Manual specifically leaves design and placement to local engineering personnel:

The responsibility for the design, placement, operation and maintenance of traffic control devices rests with the governmental body or official having jurisdiction. 1A-3

Traffic control devices shall be placed only by the authority of a public body or official having jurisdiction, for the purpose of regulating, warning, or guiding traffic.
1A-3.1

The decision to use a particular device at a particular location should be made on the basis of an engineering study of the location. Thus, while this Manual provides standards for design and application of traffic control devices, the Manual is not a substitute for engineering judgement. 1A-4

The MUTCD is not a design manual. The PWS recommendation that the MUTCD predefine all possible scenarios and site plans is not within the scope of the MUTCD, nor is it realistic.

Implementation Not Always Possible

PWS accurately observes that some highway-rail grade crossings are configured in ways that make it impossible to implement the provisions of the proposed specifications, short of crossing closure. This is especially true when the road and track closely parallel, resulting in a short entrance road into the crossing. Certainly, prohibiting use of a train's horn would only exacerbate an already dangerous situation.

Exceptions

One individual requested that exception criteria be defined which would allow "local authorities to resolve problems with certain crossings that require special measures." This is too vague and open-ended to include in the specifications or remedial options. However, FRA will remain open to requests for exceptions which are forwarded with the positive endorsement of the Florida Department of Transportation.

Low Highway Traffic

Another commenter requested that exceptions be granted for crossings with low highway traffic. In most cases, such a crossing should be closed. However, the FRA will remain open to requests for exceptions which are forwarded with the positive endorsement of the Florida Department of Transportation.

Automated Horn System (AHS)

Two cities have expressed an interest in installing automated horns at grade crossings. A mid-west firm known as Railroad Consulting Services, Inc. is experimenting with a prototype Automated Horn System. It is presently working with the Union Pacific Railroad and the city of Gering, Nebraska. The AHS consists of horns permanently mounted at the crossing facing each direction of highway approach. The horns are activated by trains as they enter upon track circuits, as are flashing lights and gates, and continue to sound a set pattern until the train reaches the highway.

The effort underway in Nebraska is innovative and experimental. FRA has encouraged this initiative and is formally monitoring progress, though no FRA sanction is needed. There are some technical difficulties with the devices and some questions still remain unanswered, in the opinion of the FRA, but none so far appear insurmountable.

FRA is not yet prepared to endorse the use of the AHS along the

FEC right-of-way until further results have been received from the Nebraska experiment.

Availability of Data

One commenter stated that they have not been able to obtain the data used in FRA's analysis. All the data used in the original analysis and in subsequent reviews are available to the public on request. We are aware of no unfilled requests for data. Summary data were made available during and immediately following the opening meeting of the conference process, September 13, 1991. Subsequent publications, e.g., Conference Notice #3, Florida's Train Whistle Ban, 2nd Edition, September 1992, included a variety of summary and detail data. Other requesters, including some of those responding to Conference Notice #7, have received massive listings of data from FRA's accident files. Requests for specific data should be addressed to the Federal Railroad Administration, RRS-23, 400 7th Street S.W., Washington, D.C. 20590. There may be a nominal fee. It is recommended that a requester call, (202) 366-0533, to discuss a request prior to writing.

Indemnification

FEC has stated their opposition "to the substitution of audible warning devices with unproven alternatives. ... FRA should not permit the substitution of any alternative unless it is shown through adequate study to be equally effective." FEC's comments are without force; the proffered alternatives are adaptations of measures whose effectiveness is well known. Indeed, most of the alternatives will improve crossing safety during daytime and evening operations, as well as during the night.

Regarding the proposed alternative of nighttime closure of a crossing, the community would assume the responsibility for closing each crossing so configured each evening. FEC locomotive engineers would have to assume from 10 P.M. to 6 A.M. that each crossing was closed. FEC has requested that communities "be required to **indemnify** FEC for **any** liability resulting from accidents at such crossings during the hours in question." Such an action by FRA would be well beyond the safety mission of this agency and the scope of this proceeding.

Unrelated Issues

PWS raised a myriad of rail related issues, that are not affected by, nor do they impact on, whistle bans. These included the adequacy of current crossing installations, speed of trains, blockage of crossings by trains, rail car covers and hazardous materials

shipments. We have not responded to these concerns. PWS may address them separately to the FRA outside the confines of this proceeding.

Also, a few groups, including PWS, have again challenged original data and arguments, which were addressed in the FRA's original report, the Order, Conference Notices #3 and #7, and the 2nd Edition. The FRA is not willing to reargue these points.

Two commenters cited a newspaper story which purports a rise in crossing-related accident statistics of 28 percent since the bans were lifted. The FRA is not aware of the basis for this number. This number does not reconcile with information available to the FRA. In fact, in the year prior to the Order, the FEC reported 23 nighttime accidents at "impacted" crossings. In the year following, through July 25, 1992, FEC experienced only 10 nighttime accidents at the same crossings. This is a reduction of 57 percent.

Preliminary data for the State of Florida indicates that the state enjoyed a reduction of 16.4 percent in accidents and 74 percent in fatalities in 1992 versus 1991. This reduction is largely attributable to the gains achieved along the FEC right-of-way.

A Technical Meeting

Two commenters, have requested that a technical representative of the FRA attend an "informational hearing." The purpose would be to have "an open discussion of the alternative remedial measures" so that "residents" will develop a better understanding of "the technicalities involved in order to stop whistle blowing...."

The FRA believes that the remedial measures are sufficiently detailed. The sort of discussion proposed would more appropriately involve State, County and City transportation planners and engineering personnel.

II. AMENDMENT TO EMERGENCY ORDER NO. 15

The "Relief" section of Emergency Order No. 15 is amended as follows:

Relief

The FEC has indicated that it does not intend to seek relief from this Order. However, the local jurisdictions impacted by the Order have indicated that they desire a mechanism whereby they can take action that would ensure that the Order's effectiveness would be lifted with regard to particular crossing where certain alternate

measures are adopted. Some of those jurisdictions petitioned for review of the Order, which triggered a conference process under 49 CFR 211.47. As a result of that conference process, FRA has decided that a local jurisdiction may obtain relief from the impact of this Order by properly adopting one or more remedial measures (as set forth in the specifications below) at a highway-rail crossing or, where required, at a number of highway-rail crossings in a "quiet zone," and so notifying the Florida Department of Transportation (FDOT)¹ and the FEC in writing. FDOT must then certify whether the requirements of the relevant performance specifications have been met. Fourteen days after written notification has been sent from FDOT to the Docket Clerk, FRA, and to FEC, the impacted crossings may be considered exempt from the requirements of this Order

PERFORMANCE SPECIFICATIONS FOR ALTERNATIVE REMEDIAL MEASURES

DEFINITIONS

The following definitions pertain to these specifications:

Low Traffic Volume Streets: Any street carrying less than 2,000 vehicles per day.

Major intersection: Any intersection where traffic volume justifies the use of separate turn lanes.

Median barrier: Any device designed to prevent the intentional or accidental incursion of a vehicle into opposing lanes, e.g., a Jersey Barrier.

Median curb: A curb, either mountable or non-mountable, which defines a median.

Minor intersection: An intersection where traffic volumes do not require the use of separate turn lanes.

MUTCD: Manual on Uniform Traffic Control Devices (1988 Edition), Federal Highway Administration, U.S. Department of

¹ Notification to FDOT should be sent to: Manager, Rail Office, Florida Department of Transportation, 605 Suwannee St., Tallahassee, Fl., 32399-0450. Notification to the FEC should be sent to: Vice President-Transportation, Florida East Coast Railway Co., P.O. Drawer 1048, St. Augustine, Fl., 32084. Notification to FRA's docket clerk should be sent to: Docket Clerk, Federal Railroad Administration, 400 Seventh St., S.W., Room 8201, Washington, D.C., 20590.

Transportation.

Non-mountable (barrier) curb: A steep-faced curb 9-12 inches high intended to prevent intentional incursion by a vehicle into a defined area.

Quiet zone: A segment of railroad of not less than one-half mile (2,640 feet) in length on which all at-grade crossings are, in keeping with these specifications, closed during nighttime hours (10:00 p.m. to 6:00 a.m.), equipped with four quadrant gates, or equipped with gates with median barriers.

Traffic separator: A traffic island or median designed to guide traffic around an obstacle or to direct traffic in a particular direction.

SPECIFICATIONS

1. PERMANENT CLOSURE OF THE HIGHWAY-RAIL CROSSING: Eliminate the at-grade crossing through permanent closure of the street or highway or through grade separation (overpass or underpass).
2. NIGHTTIME CLOSURE OF THE HIGHWAY-RAIL CROSSING: Close the crossing to highway traffic during nighttime hours subject to the following conditions:
 - a. The closure system must completely block highway traffic from entering the crossing.
 - b. Activation and deactivation of the system will be the responsibility of the county or municipality responsible for the street or highway, which must undertake to reliably discharge this duty such that the crossing is closed continuously during the hours of 10:00 p.m. to 6:00 a.m.
 - c. The crossing must be part of a quiet zone, as defined in these specifications.
 - d. The system must be reasonably tamper and vandal proof.
 - e. MUTCD standards must be met for any barricades and signing used in the nighttime closure of the facility. Signing for alternate routes must also be included.
3. FOUR QUADRANT GATE SYSTEM: Install sufficient gates at a crossing to fully block highway traffic from entering a crossing when the gates are lowered, subject to the following conditions:

- a. Approaches on both sides of the highway-rail crossing will be separated with medians with non-mountable curbs or traffic separators. Such median construction will include energy dissipaters and median striping as required by MUTCD.
- b. Any median construction will extend at least 200 feet or to a major intersection, whichever is less. All major intersections must be a minimum of 100 feet from the highway-rail crossing. Any minor intersections within 200 feet of the crossing will be closed to crossing traffic.
- c. At low traffic volume streets, median curbs with vertical delineators (rubber pipes and low curbing) between opposing lanes may be used in place of non-mountable curbs or traffic separator.
- d. The maximum length of a gate arm will not exceed 40 feet.
- e. Gate timing for full closure systems should be based on these suggested times:

<u>step</u>	<u>Inc.</u>	<u>Time</u>
Lights start flashing	0	sec.
Entrance gates start down	3-5	"
Entrance gates fully lowered	9-15	"
Exit gates start down	4-6	"
Exit gates fully lowered	9-15	"

Exit gates will be equipped with a presence detection loop located between the outside track and the exit gate arm. This loop will raise or prevent the lowering of the exit gate arm if an automobile is detected within the loop. The loop or loops will be of sufficient size and number to detect an automobile in all exit lanes.

- f. The gap between the end of a lowered gate and the median will be less than one foot.
- g. Four quadrant gates will not be an option where traffic signal pre-emption exists.
- h. The crossing must be part of a quiet zone, as defined in these specifications.
- i. The system must be reasonably tamper and vandal proof.
- j. General principles of the AASHTO Roadside Design Guide

regarding median barrier construction will be adopted where applicable.

4. GATES WITH MEDIAN BARRIERS: Install median barriers at a crossing which prevent highway traffic from driving around lowered gates subject to the following conditions:
 - a. Approaches on both sides of the highway-rail crossing will be separated with median barriers. Any barrier so constructed will include markers as required by the MUTCD, and also energy dissipaters.
 - b. Median barriers will extend at least 200 feet or to a major intersection, whichever is less. All major intersections must be a minimum of 100 feet from the highway-rail crossing. Any minor intersections within 200 feet of the crossing will be closed to crossing traffic.
 - c. The maximum length of a gate arm will not exceed 40 feet.
 - d. The gap between the end of a lowered gate and the median barrier will be less than one foot.
 - e. The crossing must be part of a quiet zone, as defined in these specifications.
 - f. The system must be reasonably tamper and vandal proof.
 - g. General principles of the AASHTO Roadside Design Guide regarding median barrier construction will be adopted where applicable.
5. ONE WAY PAIRING OF ADJACENT STREETS: Adjacent streets would be made into one-way pairs and gates modified or relocated to completely block the approaching lanes of traffic, subject to the following conditions:
 - a. Streets to be made into one-way pairs should ideally be no more than one city block (300'-500') apart. Cross streets connecting the one-way pairs should be no more than one city block from each side of the crossings in Central Business Districts, nor more than one-quarter mile from each side of the crossings in suburban areas.
 - b. Lane capacities of both streets should be approximately the same.
 - c. Preferably, the gate arms on the approach side of the

crossings should be extended to within one foot of the left edge of pavement. The left edge of the pavement on the approach side in this configuration will include a non-mountable curb extending at least 200 feet or to a major intersection, whichever is less. Alternatively, the gate mechanisms on the far side of the crossings may be relocated to the left side of the approach lanes, and the gate arms sized to provide a maximum of one foot between the tips of the gate arms when in the lowered position.

- d. The maximum length of a gate arm will not exceed 40 feet.
- e. Two two-lane roadways one-way in the same direction may be paired with a single intervening multi-lane undivided roadway in the opposite direction provided all other conditions are met.
- f. Both crossings of a one-way pair must be part of a quiet zone, as defined in these specifications.
- g. Signing for one-way streets shall be in conformance with the MUTCD.

Implementation Notes:

The following statements reflect the desire and intent of parties to the conference with respect to application of the above specifications:

1. In regard to the full closure of highway-rail crossings, the FDOT and the FEC have expressed a willingness to discuss financial assistance for closing any highway-rail crossing impacted by this Emergency Order.
2. If a crossing is selected for nighttime closing, alternate highway traffic routes should be identified, and signs erected in accordance with the MUTCD and applicable FDOT and local standards informing pedestrians and the motoring public that the streets will be closed from 10:00 pm until 6:00 am and that alternate routes must be used.
3. Any crossing equipped with a four quadrant gate system or with gates and median barriers should also be equipped with constant warning time devices.
4. All gate arms should be equipped with strobe lights located on the centerline of each driving lane when the gates are lowered. The strobe lights will be activated when the gates begin to

lower. Florida DOT and the local jurisdictions should carefully monitor the effect of these strobe lights on vehicle drivers after the gates have been lowered.

5. Illumination (street lighting) of these highway-rail crossings is encouraged.

This amendment is effective from the date of issue of this notice.

Issued in Washington, D.C., on August 31, 1993.

[SIGNED]
Jolene M. Molitoris
Administrator

APPENDIX S

FRA CRITERIA FOR ALLOWING WHISTLE BANS

1. PERMANENT CLOSURE OF THE HIGHWAY-RAIL CROSSING:

Eliminate the at-grade crossing through permanent closure of the street or highway or through grade separation (overpass or underpass).

2. NIGHTTIME CLOSURE OF THE HIGHWAY-RAIL CROSSING:

Close the crossing to highway traffic during nighttime hours subject to the following conditions:

- a. The closure system must completely block highway traffic from entering the crossing.
- b. Activation and deactivation of the system will be the responsibility of the county or municipality responsible for the street or highway, which must undertake to reliably discharge this duty such that the crossing is closed continuously during the hours of 10:00 p.m. to 6:00 a.m.
- c. The crossing must be part of a quiet zone, as defined in these specifications.
- d. The system must be reasonably tamper and vandal proof.
- e. The Manual on Uniform Traffic Control Devices (MUTCD) standards must be met for any barricades and signing used in the nighttime closure of the facility. Signing for alternate routes must also be included.

3. FOUR-QUADRANT GATE SYSTEM:

Install sufficient gates at a crossing to fully block highway traffic from entering a crossing when the gates are lowered, subject to the following conditions:

- a. Approaches on both sides of the highway-rail crossing will be separated with medians with non-mountable curbs or traffic separators. Such median construction will include energy dissipaters and median striping as required by MUTCD.
- b. Any median construction will extend at least 200 feet or to a major intersection, whichever is less. All major intersections must be a minimum of 100 feet from the highway-rail crossing.

Any minor intersections within 200 feet of the crossing will be closed to crossing traffic.

- c. At low traffic volume streets, median curbs with vertical delineators (rubber pipes and low curbing) between opposing lanes may be used in place of non-mountable curbs or traffic separator.
- d. The maximum length of a gate arm will not exceed 40 feet.
- e. Gate timing for full closure systems should be based on these suggested times:

<u>Step</u>	<u>Inc. Time</u>	
Lights start flashing	0	sec.
Entrance gates start down	3-5	"
Entrance gates fully lowered	9-15	"
Exit gates start down	4-6	"
Exit gates fully lowered	9-15	"

Exit gates will be equipped with a presence detection loop located between the outside track and the exit gate arm. This loop will raise or prevent the lowering of the exit gate arm if an automobile is detected within the loop. The loop or loops will be of sufficient size and number to detect an automobile in all exit lanes.

- f. The gap between the end of a lowered gate and the median will be less than one foot.
- g. Four-quadrant gates will not be an option where traffic signal pre-emption exists.
- h. The crossing must be part of a quiet zone, as defined in these specifications.
- i. The system must be reasonably tamper and vandal proof.
- j. General principles of the AASHTO Roadside Design Guide regarding median barrier construction will be adopted where applicable.

4. GATES WITH MEDIAN BARRIERS:

Install median barriers at a crossing which prevent highway traffic from driving around lowered gates subject to the following conditions:

- a. Approaches on both sides of the highway-rail crossing will be

separated with median barriers. Any barrier so constructed will include markers as required by the MUTCD, and also energy dissipaters.

- b. Median barriers will extend at least 200 feet or to a major intersection, whichever is less. All major intersections must be a minimum of 100 feet from the highway-rail crossing. Any minor intersections within 200 feet of the crossing will be closed to crossing traffic.
- c. The maximum length of a gate arm will not exceed 40 feet.
- d. The gap between the end of a lowered gate and the median barrier will be less than one foot.
- e. The crossing must be part of a quiet zone, as defined in these specifications.
- f. The system must be reasonably tamper and vandal proof.
- g. General principles of the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide regarding median barrier construction will be adopted where applicable.

5. ONE-WAY PAIRING OF ADJACENT STREETS:

Adjacent streets would be made into one-way pairs and gates modified or relocated to completely block the approaching lanes of traffic, subject to the following conditions:

- a. Streets to be made into one-way pairs should ideally be no more than one city block (300'-500') apart. Cross streets connecting the one-way pairs should be no more than one city block from each side of the crossings in Central Business Districts, nor more than one-quarter mile from each side of the crossings in suburban areas.
- b. Lane capacities of both streets should be approximately the same.
- c. Preferably, the gate arms on the approach side of the crossings should be extended to within one foot of the left edge of pavement. The left edge of the pavement on the approach side in this configuration will include a non-mountable curb extending at least 200 feet or to a major intersection, which ever is less. Alternatively, the gate mechanisms on the far side of the crossings may be relocated to the left side of the approach lanes, and the gate arms sized to provide a maximum of one foot

between the tips of the gate arms when in the lowered position.

- d. The maximum length of a gate arm will not exceed 40 feet.
- e. Both crossings of a one-way pair must be part of a quiet zone, as defined in these specifications.
- f. Two two-lane roadways one-way in the same direction may be paired with a single intervening multi-lane undivided roadway in the opposite direction provided all other conditions are met.
- g. Signing for one-way streets shall be in conformance with the MUTCD.

Implementation Notes:

- 1. In regard to the full closure of highway-rail crossings, the FDOT and the FEC have expressed a willingness to discuss financial assistance for closing any highway-rail crossing impacted by FRA Emergency Order No. 15.
- 2. If a crossing is selected for nighttime closing, alternate highway traffic routes should be identified, and signs erected in accordance with the MUTCD and applicable FDOT and local standards informing pedestrians and the motoring public that the streets will be closed from 10:00 p.m. until 6:00 a.m. and that alternate routes must be used.
- 3. Any crossing equipped with a four-quadrant gate system or with gates and median barriers should also be equipped with constant warning time devices.
- 4. All gate arms should be equipped with strobe lights located on the centerline of each driving lane when the gates are lowered. The strobe lights will be activated when the gates begin to lower. Florida DOT and the local jurisdictions should carefully monitor the effect of these strobe lights on vehicle drivers after the gates have been lowered.
- 5. Illumination (street lighting) of these highway-rail crossings is encouraged.