

crossings subject to whistle bans and study collision information for those crossings. The Association of American Railroads (AAR) joined the FRA in that effort.

The AAR surveyed the rail industry and found 2,122 public grade crossings subject to whistle bans for some period of time between January 1988 and June 30, 1994. This total did not include the 511 public crossings that were subject to whistle bans in Florida that FRA had already studied.¹ The study also did not include crossings on small, short line railroads, and certain regional railroads which did not report to the AAR. The nationwide survey found whistle bans in 27 States that affected 17 railroads. FRA studied collisions occurring between January 1988, and June 30, 1994.

Two thousand and four of the crossings were subject to 24-hour whistle bans. Another 118 grade crossings were subject to nighttime-only bans. The States with the largest number of whistle ban crossings were Illinois, Wisconsin, Kentucky, New York, and Minnesota. More than half of the crossings were on three railroads: CSX, Consolidated Rail Corporation (Conrail), and Soo Line. A report covering the nationwide study was issued in April 1995. FRA found that whistle ban crossings averaged 84 percent more collisions than similar crossings with no bans. There were 948 collisions at whistle ban crossings during the period studied. Sixty-two people died in those collisions and 308 were injured. Collisions occurred on every railroad with crossings subject to whistle bans, and in 25 of the 27 States where bans were in effect.

Since the 1995 study, FRA continued to analyze relevant data. Over the period of 1992–1996, there were 793 collisions at 2,366 crossings subject to whistle bans. These collisions resulted in the fatalities and injuries displayed in Table 1, as well as more than \$2 million in motor vehicle damages.

TABLE 1.—COLLISION INJURIES AND FATALITIES BY TYPE OF PERSON INVOLVED

Type of person involved	Injuries	Fatalities
Motorist	258	56
Pedestrian	17	41
Railroad employee	56	0

The types of collisions which took place at whistle ban crossings and the resulting casualties are shown in Table 2 (casualty figures in this table exclude casualties to railroad employees). It is interesting to note that the mean train speed (train speed is positively correlated with fatalities) varies by type of collision. Of the injuries and fatalities shown in Table 2, 11 injuries and 5 deaths occurred when the vehicle was hit by a second train.

TABLE 2.—TYPE OF COLLISION

Type of collision	Injuries	Fatalities	Mean train speed
Motor vehicle struck train	51	8	15.5
Train struck motor vehicle	224	89	25.4

The driver was killed in the collision in 42 instances (5.3 percent of collisions), the remaining 55 fatalities were either passengers or pedestrians. The driver passed standing vehicles to go over the crossing in 37 of the collisions (4.7 percent). The driver was more likely to be killed when moving over the crossing at the time of the collision (35 of the driver fatalities), rather than when the vehicle was stopped or stalled at the crossing, and in most of the collisions (69.9 percent) at whistle-ban crossings the driver was moving over the crossing. Additionally, in almost every collision (97 percent), a warning device (either active or passive) was located on the vehicle's side of the crossing. This supports the theory that the warning given by the train horn could deter the motorist from entering the crossing.

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

information by the horn about the proximity, speed, and direction of the train.

FRA's study indicated that the installation of automatic traffic gates at crossings with whistle bans was more than twice the national average. Forty percent of the whistle ban crossings had gates compared to 17 percent nationally.

FRA found 831 crossings where whistle sounding had at one time been in effect, but where the practice had changed during the January 1988 through June 1994 study period. In 87 percent of the cases, bans were no longer in effect. A "before-and-after" analysis comparing collision rates showed an average of 38 percent fewer collisions when whistles were sounded indicating that resuming use of the whistles had a .38 effectiveness rate in reducing collisions. This finding paralleled the Florida experience.

FRA also rated whistle ban grade crossings according to an "Accident Prediction Formula." The formula predicts the statistical likelihood of having a collision at a given highway-rail grade crossing. The physical characteristics of each crossing were considered in the formula, including the number of tracks and highway lanes, types of warning devices, urban or rural location, and whether the roadway was paved. Also considered were operational aspects, such as, the number of highway vehicles, and the number, type, time of day, and maximum speed of trains using the crossing. The formula was developed using data from thousands of collisions spanning many years. FRA then ranked the 167,000 public crossings in the national inventory at that time in an identical manner. Both the whistle ban crossings and the national inventory crossings were then placed into one of ten groups ranging from low-risk to high-risk.

FRA compared the number of collisions occurring within each of the ten groups of crossings, over a five year period from 1989 through 1993, and found that for nine out of the ten risk groups, the whistle ban crossings had significantly higher collision rates than the crossings with no whistle bans. On average, the risk of a collision was found to be 84 percent greater at crossings where train horns were silenced. Another way to interpret this difference would be to say that locomotive horns had a .46 effectiveness rate in reducing the rate of collisions.

FRA was concerned about the higher risk disclosed by the nationwide study. From its vantage point, FRA was able to see the elevated risk associated with whistle bans, which might not be apparent to local communities. While

¹ The FEC crossings comprised virtually all of the whistle ban crossings in Florida. For simplicity, FRA elected to remove all Florida crossings from the national study. Since it became apparent from this initial national review that the FEC experience represented the high end of ban impacts, and since those impacts had been mitigated by E.O. 15 with respect to the later study period, FRA continued to remove both Florida ban crossings and Florida train horn crossings from all subsequent studies. Florida public crossings represent 2.6 percent of public crossings, so this omission should not materially affect the national analysis.