

As a result, FRA has adhered to the corridor approach in this interim final rule, so use of the risk index is specified to be at the corridor (quiet zone) level. The basic logic of the method is as follows:

- Estimate the probability of injuries or fatalities at each crossing using the APF formulas;
- Aggregate the risk from all crossings in the proposed quiet zone; and
- Divide the risk by the number of crossings,
- Yielding a risk estimate for the proposed quiet zone.

This approach must be adjusted if the proposed quiet zone was not subject to an historical whistle ban, since the effect of silencing the train horn would be to drive up risk. As more fully explained below, with limited exceptions the adjustments necessarily rely on national averages of train horn effectiveness.

This risk index approach permits an objective comparison of the situations in various communities, taking into account the actual accident experience to date. FRA is aware that there are limitations to the method. For instance, (i) the APF does not take into consideration every possible factor relevant to risk, (ii) data driving the predictions are largely from the great majority of crossings where the horn is used, (iii) a significant component of risk inherent in the formula outputs is not as relevant to evaluation of train horn risk (*i.e.*, pedestrian casualties), and (iv) adjustments to the index based on excess risk associated with silencing the horn will understate risk in some cases and overstate risk in other cases. However, FRA is not aware of a more useful methodology for evaluating comparative risks at grade crossings, and none of the limitations appears to substantially vitiate its value for this purpose.

In examining options for this interim final rule, FRA applied this methodology to known whistle ban crossings, grouping them by railroad and political jurisdiction pairs, with some segmentation to recognize that more than one rail line was present or that operational characteristics of the railroad changed markedly (*e.g.*, at a junction). As reported in more detail below, the results show that there are material differences in corridor risk among the existing "whistle ban jurisdictions" (on an average per-crossing basis).

FRA then performed the same calculation for all train horn crossings in the nation that are equipped with flashing lights and gates and derived an average for those crossings, which is

referred to in this rule as the Nationwide Significant Risk Threshold. This measure provides a statistical tipping point by which crossings nationwide can be compared to determine the significance of the risk present. FRA's rationale for selecting this threshold as a basis of comparison was that if certain proposed quiet zones pose less risk (even when adjusted for the absence of the train horn) than the average corridor where the train horn is sounded, then the risk of not sounding the train horn in those locations might reasonably be characterized as insignificant.

During the public comment cycle, FRA also heard repeatedly from existing whistle ban communities where, it was reported, there had been no accidents for many years (or none likely attributable to the absence of an audible warning). FRA recognized that, since highway-rail crossing accidents are rare events, the absence of accidents within a period of a few years might say little about underlying risk. At the same time, FRA was aware that some communities have made a real effort to stress law enforcement and public awareness; and it seemed desirable to provide some additional flexibility to communities that have not experienced a recent accident of the kind relevant to the circumstances addressed in this rulemaking. So FRA posited that it should be reasonable to subject accident-free existing whistle ban jurisdictions to a test that might be a multiple of the Nationwide Significant Risk Threshold (NSRT). A multiple of two was selected for analysis.

In order to determine the implications of this methodology, including the two proposed thresholds, FRA applied the risk index method to existing whistle ban jurisdictions (WBJs) retrospectively. Employing accident data for 1990 through 1994 and grade crossing inventory information as of January 1, 1995, FRA categorized these WBJs by Crossing Corridor Risk Indices (CCRI) relative to the two thresholds: (1) CCRI less than NSRT, (2) CCRI greater than the NSRT with relevant collisions between 1990 and 1994, (3) CCRI between the product of one and two times the NSRT and no relevant collisions between 1990 and 1994, (4) CCRI greater than the product of two times the NSRT and no relevant collisions between 1990 and 1994. FRA posited that jurisdictions above the relevant thresholds (*i.e.*, those above the Nationwide Significant Risk Threshold with relevant collisions in the preceding five years, or with no relevant collisions but above twice the Nationwide Significant Risk Threshold) would be

required to make investments to abate risk, while those below would not. To simulate the safety impacts of this approach, FRA analyzed the effect based on an artificial rule issuance date of January 1, 1995, with an effective date of January 1, 1996. FRA then analyzed actual collision history for the crossings in each category for the period 1996 through 2000.

The results (reported in detail below and on the FRA Web site) were then compared with the Nationwide Significant Risk Threshold and a value equal to two times the Nationwide Significant Risk Threshold (2xNSRT) (determined as of January 1, 1996) to evaluate the distribution of potential quiet zones derived from existing bans. FRA posited that jurisdictions above the relevant thresholds (*i.e.*, those above the Nationwide Significant Risk Threshold with relevant collisions in the preceding five years, or with no relevant collisions but above twice the Nationwide Significant Risk Threshold) would be required to make investments in SSMs or ASMs in order to abate excess risk, while those below the thresholds would not.

The analysis effectively validated the risk assessment method, demonstrating that for the subject period it would have focused public resources on whistle ban corridors where the investments would have been well spent (with resulting reductions in injuries and fatalities). It showed that in the five-year period that would have followed implementation of the rule, as of January 1, 1996, 69 percent of the casualties resulting from the relevant collisions that occurred at whistle ban crossings would have occurred in quiet zones that initially would have had to make safety improvements to retain the whistle bans (*see table below*). Those safety improvements would have substantially mitigated the casualties at those crossings.

By the end of the five-year period, the communities where 24 collisions resulting in 16 casualties occurred would have had to implement safety measures to reduce their corridor crossing risk indexes to permissible levels in order to retain their whistle bans. By the end of this five-year period, only 32 percent of the relevant collisions and 21 percent of the casualties would have occurred in communities that would not have had to implement safety measures.

Injuries resulting from collisions involving trains traveling at speeds of 25 mph or less are on average moderate compared to the critical nature of injuries that tend to result when train speeds are higher. By the end of the