

similar crossings nationally. Westat found, that in Wisconsin, due to the relatively small sample sizes, estimates for ban effects were not statistically significant at the conventional 5 percent level, with one exception. The accident rate for passively marked whistle ban crossings in Wisconsin was 84 percent higher than for passively marked crossings nationwide (excluding Florida and the Chicago Region) where train horns were sounded. This result was statistically significant. However, model fit was determined to be poor.

In reviewing the data for the Chicago Region, Westat found several unexpected results. Comparisons of Chicago train horn and "whistle ban"<sup>4</sup> crossings within Chicago indicated higher accident rates at crossings where the train horn was used, but the data did not fit the model well (with the upper confidence limits for two of warning types well into the positive range).

When Chicago Region "whistle ban" crossings were compared with similar crossings in the Nation where train horns sound, results for passive and flashing lights categories again showed lower accident rates at ban crossings; however, estimates for the effects of no-whistle policies were not statistically significant at the conventional 5 percent level. The accident rate for gated whistle ban crossings in the Chicago Region was 34 percent higher than for gated crossings nationwide (excluding Florida and the Chicago Region) where train horns are sounded, and this result was statistically significant.

With respect to the gated crossing estimate for Chicago, Westat stated that the weight of this evidence was weakened by the fact that the model did not fit the data well. Specifically, in the Shapiro-Wilks test for normality of deviance residuals, the normal hypothesis was rejected for gates based on comparisons with the Continental U.S., Florida and Chicago Region Excluded.

#### Westat—2003 (Final Study)

FRA found the results of the 2002 Westat study appeared to reinforce inferences FRA was deriving from other information related to the Chicago picture that may explain the Chicago data. In particular, FRA had noted that significant "discretionary selection" had occurred in the Chicago Region with respect to the crossings at which "no whistle" policies would be implemented. That is, horns were being silenced primarily at crossings that were

inherently safer than others. Further, FRA noted that a growing body of information supported the conclusion that several hundred crossings initially believed to be impacted by a no-whistle policy either had never been in that status or had not been for several years. (How this occurred is more fully discussed under "Chicago Region" below.) Accordingly, FRA commissioned Westat to do further work, resulting in the final study on the impact of train horn bans (Zador, Paul H., June 2003). The design for this study differed in three important respects from the earlier work:

1. The set of Chicago Region "no whistle" crossings was corrected to a much lower number based upon docket filings from the Illinois Commerce Commission, the AAR and Metra.
2. The study period was brought forward to address the most recent complete accident data contemporaneous with known crossing status (1997–2001).

3. Rather than simply employing the previous FRA method with refinements, Westat was asked to apply whatever statistical techniques it thought appropriate to derive the most valid results.

FRA received the Westat final report in May of 2003. In an attempt to determine the most meaningful explanation of the data, Westat applied four distinct statistical methods, with certain variations within the methods:

- The first method divided the crossings into two groups: one group with whistle bans and the other without. FRA's basic Accident Prediction Formula (APF) was applied to each crossing and then each group was sorted by the results of the APF. Then each group was stratified into ten categories with each stratum having the same accident count for the 1997–2001 study period. Finally, using both Poisson and Poisson-Normal regressions, the two groups were compared and the effect of the whistle ban was estimated.

- The second method is the same as the first except six strata were used instead of ten.

- The third method did not divide the data into two groups and stratify them. Instead, a Poisson regression analysis was applied to the entire data set. The regression included all the variables used by the APF plus others including a  $\frac{1}{10}$  flag for whistle bans. The regression coefficient for the whistle ban was used to estimate the effect.

- For the fourth method, a Poisson regression analysis was applied to the entire data set in a manner similar to the third method except the  $\frac{1}{10}$  flag for

whistle bans was not included. This regression yielded a revised version of the APF. Then, the crossings were divided into two groups (with and without whistle bans), and each group was divided into ten strata using the revised version of the APF. Finally, using Poisson-Normal regressions, the two groups were compared and the effect of the whistle ban was estimated.

On a nation-wide basis, the third method produced the most precise estimates for the effect of the whistle ban, so FRA has selected this method as the basis for its evaluation.

Once again, all three classifications of warning devices experienced a higher accident rate in whistle ban areas as follows (National data excluding Florida only and excluding Florida and the Chicago Region):

Warning device class	Percent difference	
	(with Chicago)	(excluding Chicago)
Passive .....	71.6	74.9
Flashing Lights	21.7	30.9
Gates .....	43.4	66.8

The results for the Nation without Chicago provided the most reliable data. The results for passive and gated crossings were statistically significant well below the conventional 5 percent level. The model offered less confidence for crossings with flashing lights (Prob > [t] = 0.08), but the estimate is consistent with the results of FRA studies for the earlier period and represents the best information available regarding the effect of bans on the accident rate. Accordingly, FRA has employed the results for the Nation excluding Chicago as the national estimates of effectiveness for crafting this interim final rule.

The 2003 Westat report also attempted to derive results for the State of Wisconsin. Results differed substantially between intra-State and Wisconsin-to-national comparisons, even though all values showed a positive effect from the train horn and two of the three warning device categories had significant results in each of the analyses. FRA sees no basis for deviating from the national averages for the warning device categories without a better qualitative understanding of any underlying differences in risk profiles.

The Chicago Region results are briefly summarized here and then discussed in full context and at greater length below. The no-whistle crossing set provided to Westat included only 21 crossings with flashing lights and 21 passively signed crossings. As Westat noted, that is too few crossings from which to derive

<sup>4</sup> As noted below, this is really a misnomer. There are no train horn bans in the Chicago Region, only exemptions that railroads may utilize if they wish.