APPENDIX C: MODELING INCIDENTS AT "WHISTLE-BAN" CROSSINGS

Introduction

The Federal Railroad Administration has developed models to forecast incidents at grade crossings to support the analysis of this rule.

Purpose

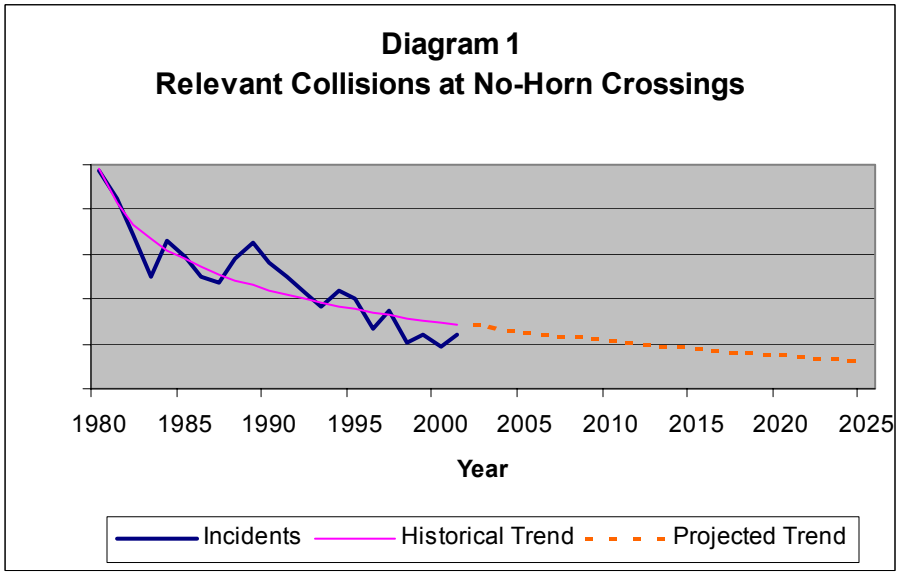
The purpose of the models is to support the economic analysis of the interim final rule. To assess the benefit of the rule, the economic analysis needs to forecast how incidents at grade crossings will behave in the future without the rule. The grade crossings of interest are those where train horns are not sounded (no-horn crossings).

Key Assumptions

1. There is an underlying process of safety improvement at grade crossings and that this process will continue in the future even in the absence of a train horn rule.
2. This process can be adequately characterized by linear regression.
3. Crossings where the train horn is currently sounded will be unaffected by the rule with one exception. The exception is for crossings nominated to become no-horn crossings. These will be affected by the rule.

Approach

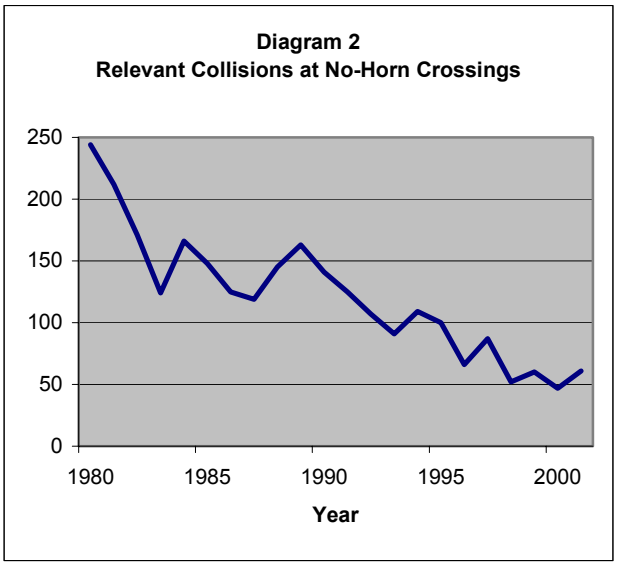
Diagram 1 is a notional illustration of how crossings affected by the rule would behave under the above assumptions, if the rule is not adopted. Note the historic trend simply continues. The analysis will present a model projecting the trend for no-horn crossings, based on historical incidents.



Model for No-Horn Crossings

Table 1: Incidents at No-Horn Crossings	
Year	**Incidents**
1980	244
1981	212
1982	171
1983	124
1984	166
1985	148
1986	125
1987	119
1988	145
1989	163
1990	141
1991	125
1992	107
1993	91
1994	109
1995	100
1996	66
1997	87
1998	52
1999	60
2000	47
2001	61

Table 1 presents the incident counts for 1,979 no-horn crossings. Note the declining trend in incidents. The analysis assumes an underlying process of safety improvements and this decline will continue even in the absence of a train horn rule. Linear regression is used to model this trend. Diagram 2 presents a graph of this data. It is clear from this graph, the trend is non-linear and the yearly declines are occurring in smaller and smaller increments.



Using only years as an explanatory variable, the following model was fit to the data:

Incidents = 246 - 56.7 * ln(Year-1979)

Key statistics: F – 98.82; R^2 - .832; CV – 17.8%. These are good results given only one variable was used in the regression to account for the variability in the data.

This analysis assumes the trend represented by the model will continue until 2025 even in the absence of a train horn rule. Table 2 shows estimates produced by the model and Diagram 3 shows a graph.

Table 2: Estimated Incidents at No-Horn Crossings						
Year	Actual Incidents	Estimated Incidents	Annual % Change for Estimated Incidents	Year	Estimated Incidents	Annual % Change for Estimated Incidents
1980	244	246		2002	68	-3.5%
1981	212	207	-16.0%	2003	66	-3.5%
1982	171	184	-11.1%	2004	63	-3.5%
1983	124	167	-8.9%	2005	61	-3.5%
1984	166	155	-7.6%	2006	59	-3.5%
1985	148	144	-6.7%	2007	57	-3.5%
1986	125	136	-6.1%	2008	55	-3.5%
1987	119	128	-5.6%	2009	53	-3.5%
1988	145	121	-5.2%	2010	51	-3.5%
1989	163	115	-4.9%	2011	49	-3.5%
1990	141	110	-4.7%	2012	48	-3.5%
1991	125	105	-4.5%	2013	46	-3.5%
1992	107	101	-4.3%	2014	44	-3.6%
1993	91	96	-4.2%	2015	43	-3.6%
1994	109	92	-4.1%	2016	41	-3.6%
1995	100	89	-4.0%	2017	40	-3.7%
1996	66	85	-3.9%	2018	38	-3.7%
1997	87	82	-3.8%	2019	37	-3.8%
1998	52	79	-3.7%	2020	35	-3.8%
1999	60	76	-3.7%	2021	34	-3.9%
2000	47	73	-3.6%	2022	33	-3.9%
2001	61	71	-3.6%	2023	31	-4.0%
				2024	30	-4.1%
				2025	29	-4.1%

Diagram 3
Relevant Collisions at No-Horn Crossings
Estimate: 246 - 56.7 * ln(Year-1979)