

Reflectorization of Rail Freight Rolling Stock on Auto-Rail Crossing Accidents



AN ANALYSIS OF THE EFFECT OF IMPLEMENTATION OF
49 CFR PART 224

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Typical Reflectorization Application Using Yellow Material



Typical Reflectorization Application Using White Material



Regulations: Purpose



- November 8, 2005: FRA published 49 CFR part 224, “Reflectorization of Rail Freight Rolling Stock.”
- Purpose:
 - Save lives.
 - Reduce accidents and incidents at road crossings at night and during times of limited visibility.
 - By providing motorists with an opportunity to react and avoid a road crossing accident.
- **§ 224.1 Purpose and Scope.**

The purpose of this part is to reduce highway-rail grade crossing accidents and deaths, injuries, and property damage resulting from those accidents, by enhancing the conspicuity of rail freight rolling stock so as to increase its detectability by motor vehicle operators at night and under conditions of poor visibility.

Regulations: Applicability



- **§ 224.3 Applicability**

This part applies to all railroad freight cars and locomotives that operate over a public or private highway rail grade crossing and are used for revenue or work train service, except: (a) Freight rolling stock that operates only on track inside an installation that is not part of the general railroad system of transportation; (b) Rapid transit operations in an urban area that are not connected to the general railroad system of transportation; (c) Locomotives and passenger cars used exclusively in passenger service; or (d) Freight rolling stock that is subject to a reflectorization requirement promulgated by another Federal agency.

Regulations: Requirements



- All cars and locomotives to have retroreflective material.
- Devise schedule for completion.
 - Rail equipment in 10 years or by November 28, 2015.
 - Locomotives in 7 years or by November 28, 2012.
- Transport Canada adopted a similar companion rule.

Defining Retroreflection



- Dr. Paul Carlson, Texas A&M Transportation Institute, “Traffic Sign Retroreflectivity, July 24, 2013:
 - A ratio of the amount of light returned from a sign versus the amount hitting the sign.
 - A way to measure the efficiency of the material,

$$\frac{\text{Light out of sign}}{\text{Light into sign}} = \textit{Retroreflectivity}$$

AAR Response



- Updated Field Manual
 - Incorporated FRA's reflectorization rule in AAR Rule 66 Reflective Sheeting
- Emphasis on reflectorization has reduced highway-rail grade crossing accidents.

AAR Progress



Discrepancies between data within UMLER and that supplied to FRA.

Fleet Size, Cars, and Locomotives*

Equipment	Ownership	Completed	Percent
Locomotives	37,127	ALL	100%
Cars	1,027,776	991,034	96.4%

* Includes only the equipment reported to FRA. Source: FRA.

AAR Ownership Fleet Size**

Equipment	Ownership
Locomotives	24,707
Cars	1,316,185

** Data taken from AAR 2013 Edition of Railroad Facts.

AAR Progress

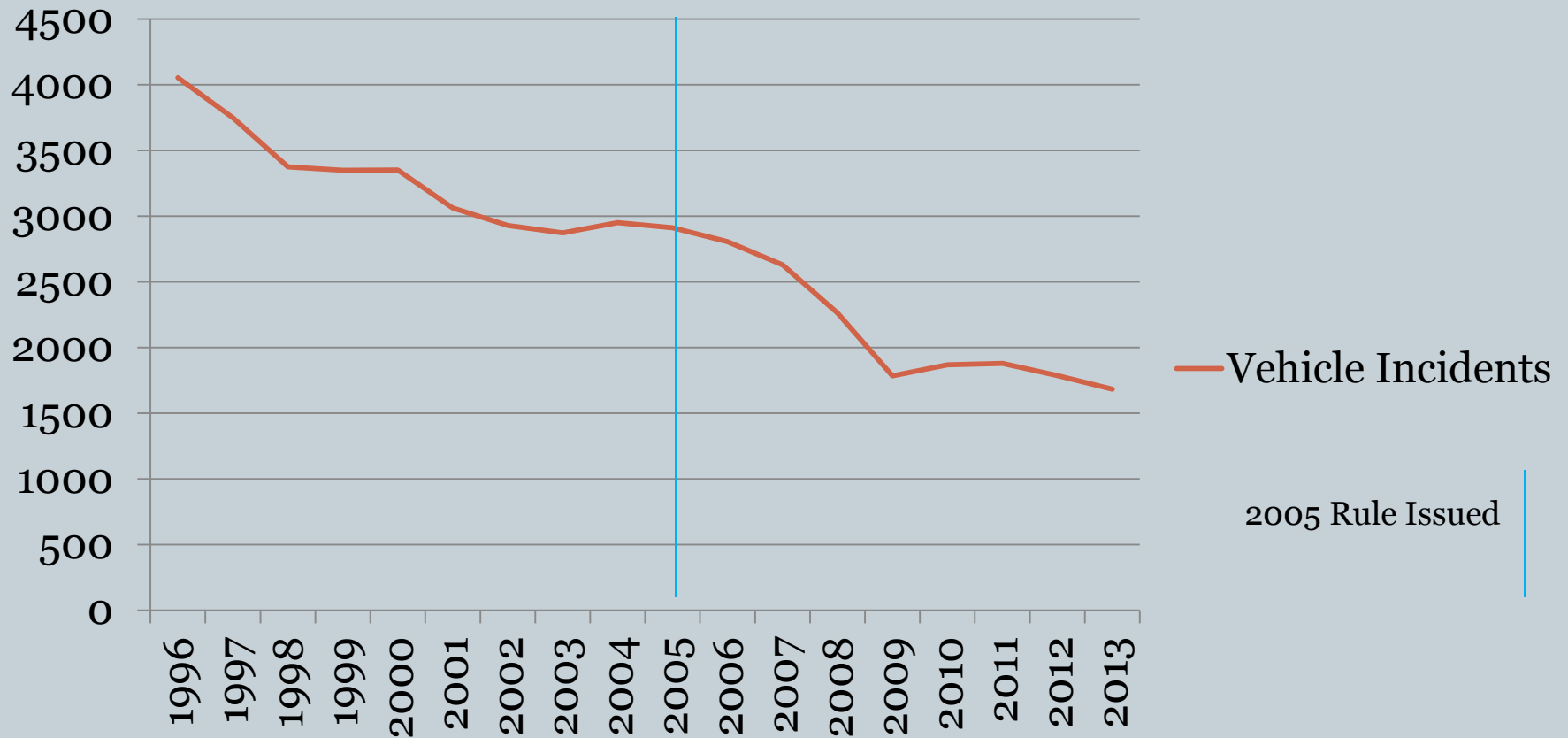


- These data would indicate a good industry response to the application of the retroreflective material.
- However, the FRA database does not include all equipment reported as some owners opted to apply the material per Tables 3 and 4 of §224.107.
- The AAR is now evaluating retroreflective materials to determine an expected “life cycle” for the rail industry as opposed to the current 10 year replacement required in 49 CFR Part 224.

Vehicle Incidents: 1996 - 2013



Vehicle Incidents

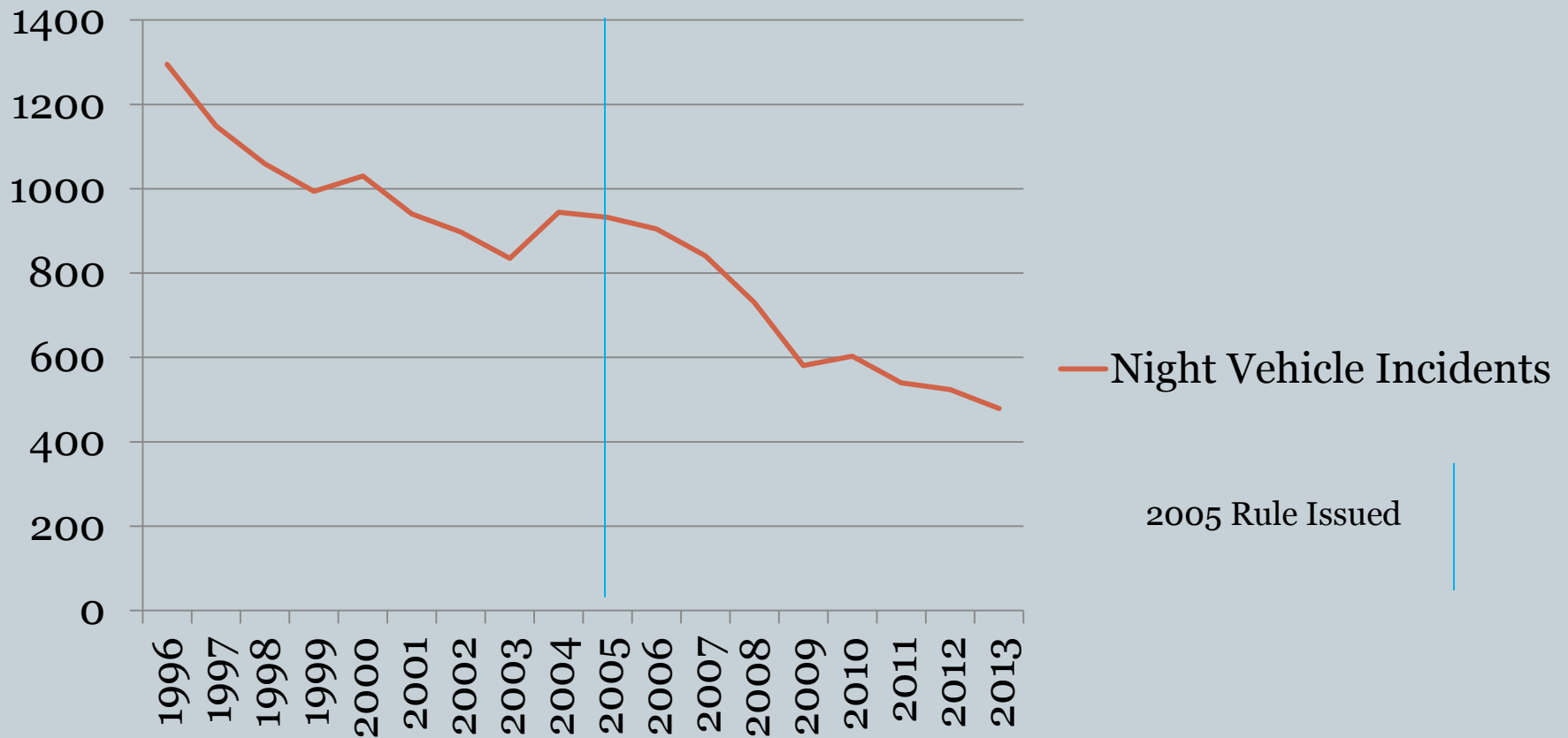


Vehicle only at dark or limited visibility. Source: FRA.

Night Vehicle Incidents: 1996 - 2013



Night Vehicle Incidents

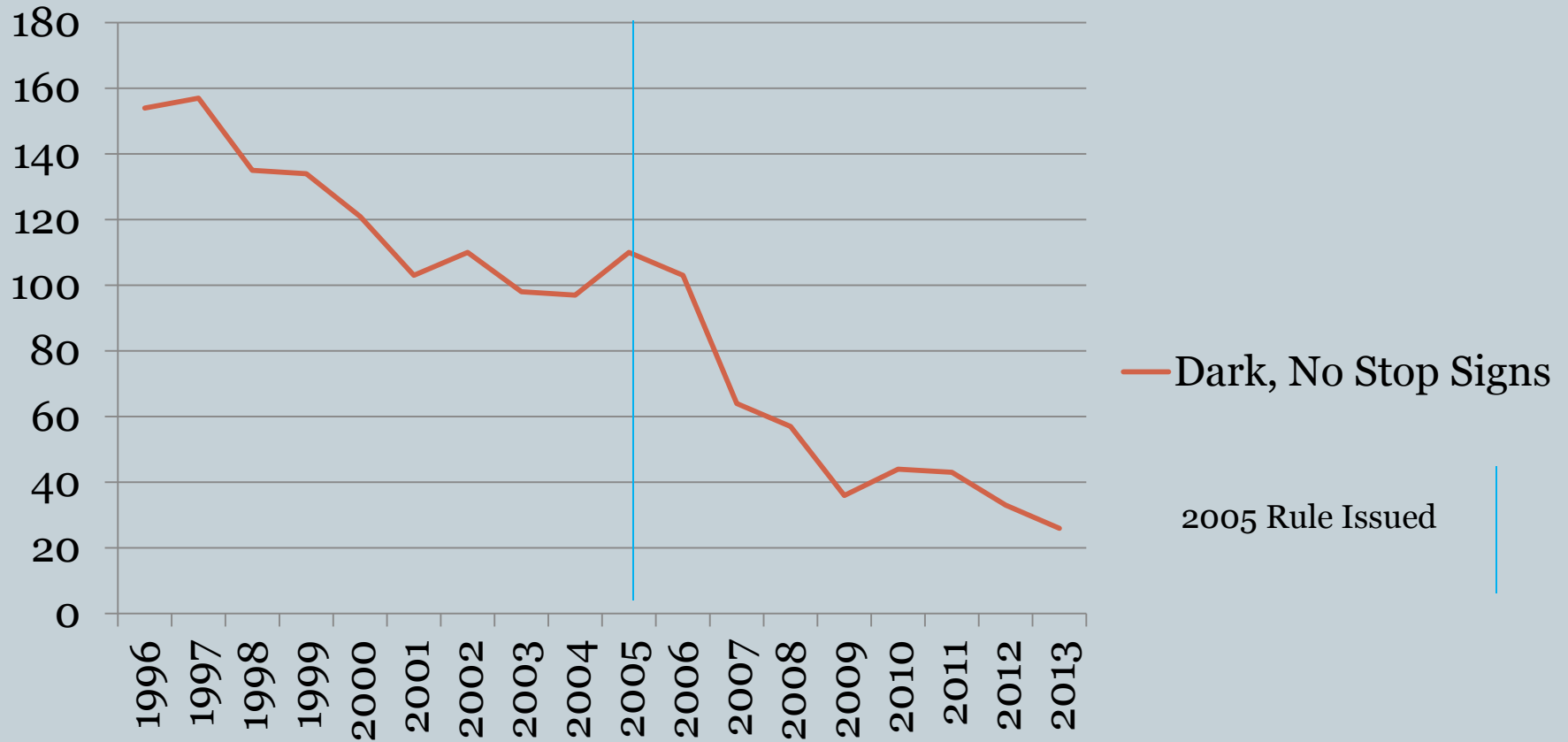


Only cross bucks, stop signs, or no signal (does not include, gates, wig-wags, signals, watchmen, or flagged by crew). Source: FRA.

Dark, No Stop Signals: 1996 - 2013



Dark, No Stop Signs



Only cross bucks or No signal. Source: FRA.

Conclusion



- Questions?