

For the TRB  
Committee on  
Safety of LNG  
Transportation by Rail

John Tunna



1976 – British Rail Research

RAILTRACK

1994 – Railtrack, UK



ASSOCIATION  
OF AMERICAN  
RAILROADS

2000 – Transportation Technology  
Center, Inc.



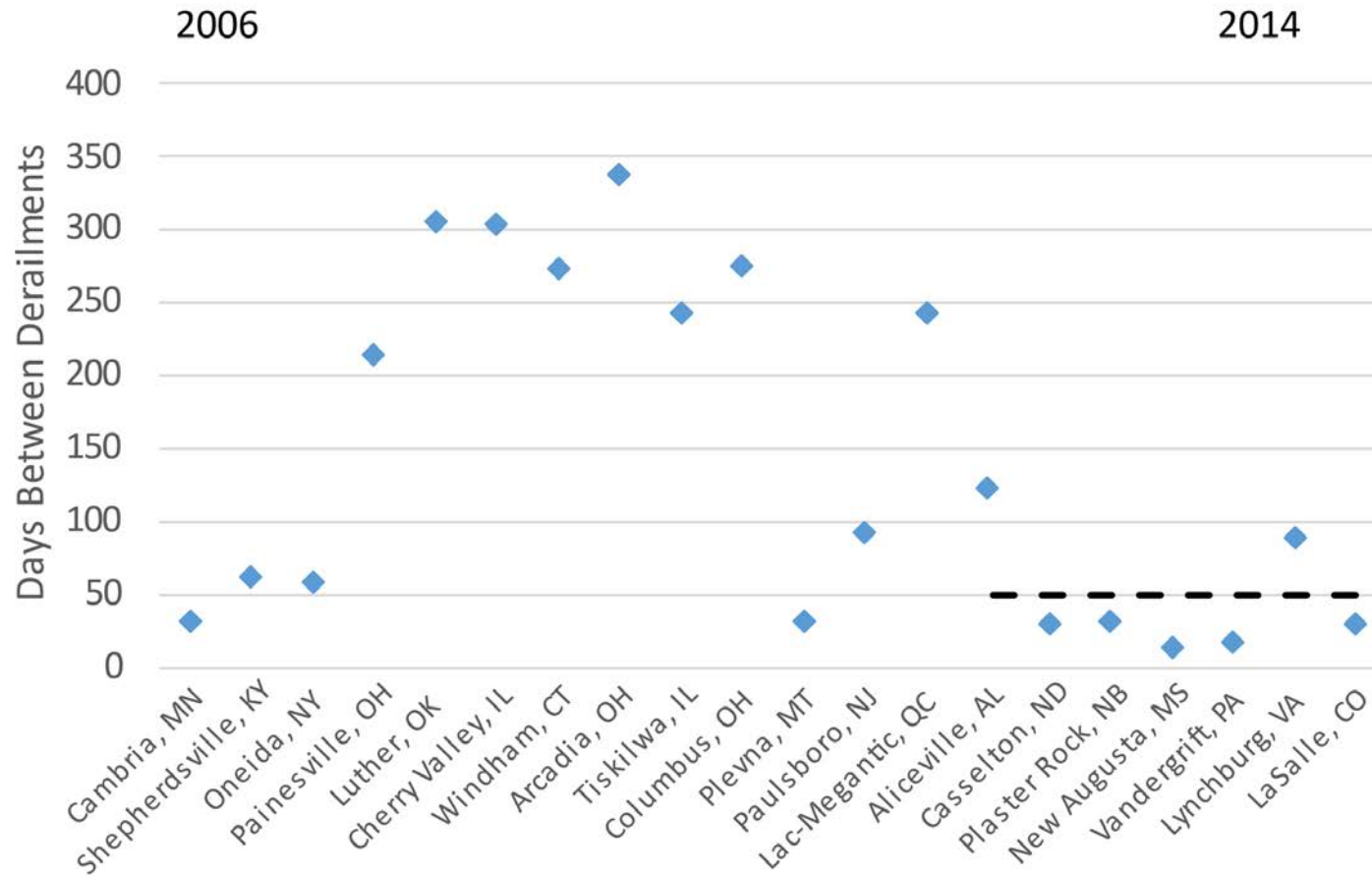
2010 - Director of FRA's Office of  
Research, Development &  
Technology

2016 - Retired

## From the committee's statement of task

- ...
- What is known about the effectiveness of special regulatory and industry measures intended to assure the safe transportation of other relevant bulk rail shipments of hazardous materials, especially any routing, speed, and other operational controls applied to high-hazard flammable trains and accompanying enhanced track inspection regimes;
- ...

By 2014 there was a HAZMAT derailment every 50 days



Source: DOT/FRA/ORD-18/36

# A series of regulations followed

May 2015	<b>Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains – HM-251</b>	49 CFR Parts 171, et al	PHMSA
August 2015	<b>Securement of Unattended Equipment</b>	49 CFR Part 232	FRA
November 2015	<b>Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains</b>	49 CFR Parts 171, et al	PHMSA
August 2016	<b>FAST Act Requirements for Flammable Liquids and Rail Tank Cars</b>	49 CFR Parts 173 and 179	PHMSA
October 2017	<b>Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains</b>	49 CFR Part 174	PHMSA
September 2018	<b>Removal of Electronically Controlled Pneumatic Brake System Requirements for High Hazard Flammable Unit Trains</b>	49 CFR Parts 174 and 179	PHMSA
February 2019	<b>Oil Spill Response Plans and Information Sharing for High-Hazard Flammable Trains</b>	49 CFR Part 107 et al	PHMSA
February 2020	<b>Risk Reduction Program</b>	49 CFR Part 271	FRA

# Key parts of HM-251

HHFT definition

Specification DOT-117  
and retrofit deadlines



Enhanced braking

Routing risk assessment

Speed restrictions


# Train accidents can be simulated accurately

Derailment at 40 mph



Source: DOT/FRA/ORD-18/36

# Full-scale impact tests verify computer simulations

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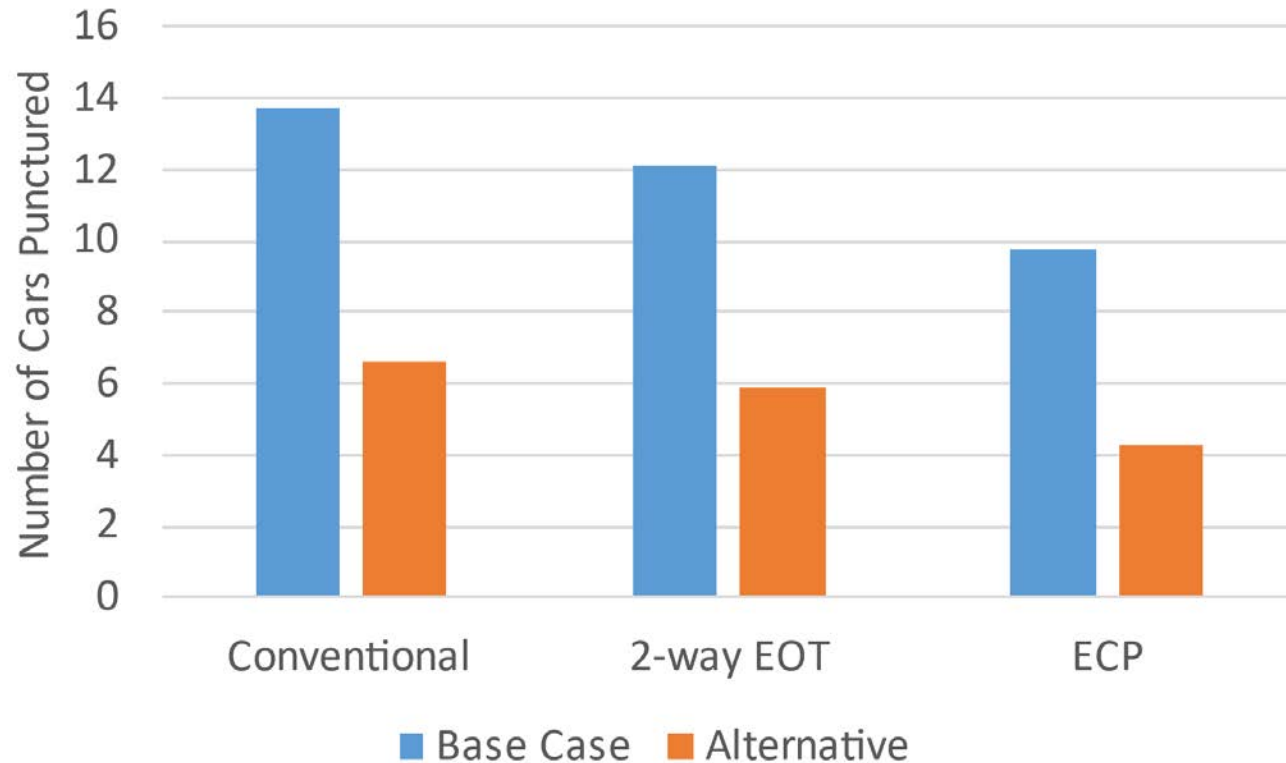
Shell thickness  
(inches)

DOT-112     $\sim 5/8$

DOT-111     $7/16$

Sources: FRA 14-30 and 19-03

# Benefits can be calculated and used to justify regulations



Base Case: 7/16" A516-70,  
No Jacket, No Head Shield

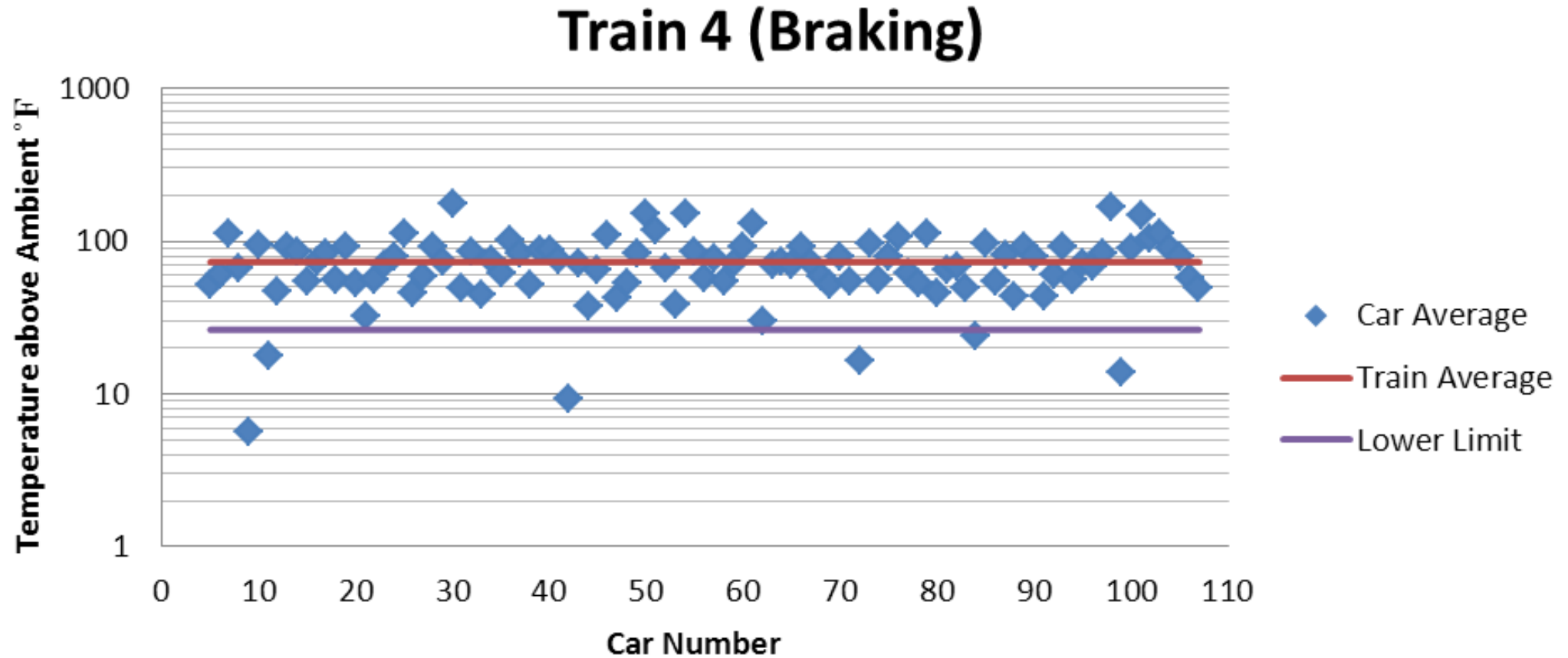
Alternative: 9/16" TC128B,  
11 Gauge Jacket, 1/2"  
Head Shield



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# Cold wheel detectors can find braking problems

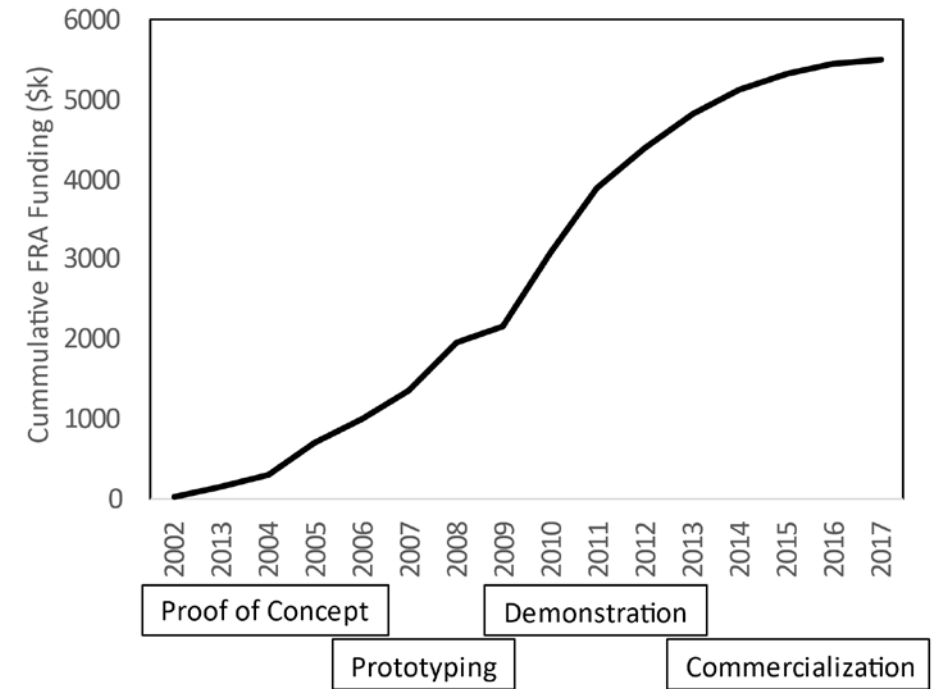


Sources: DOT/FRA/ORD-13/50 and “An Implementation Guide for Wayside Detector Systems,” FRA, May 2019

# Autonomous Track Geometry Measurement System gives real-time monitoring

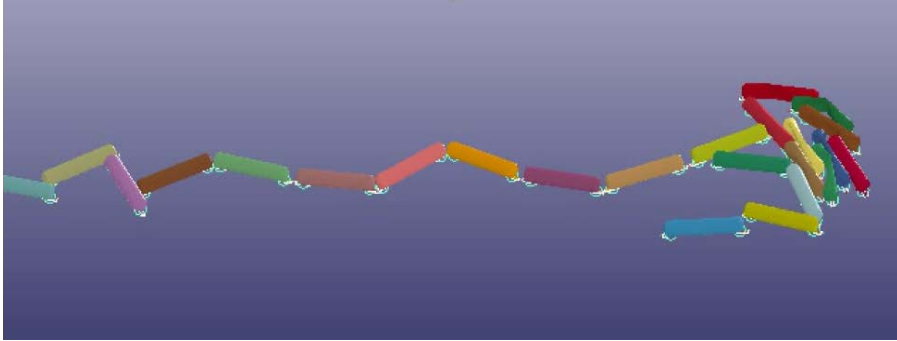


Source: DOT/FRA/ORD-18/06



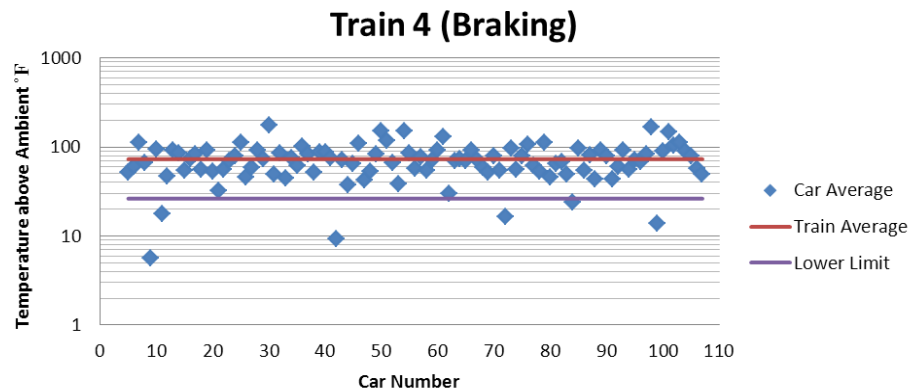
Source: FRA RD&T Strategic Plan 2020-2024

# In summary there are 3 key topics for other HAZMAT



Validation of accident modeling

Routing risk assessment



Strategy for wayside and on-board monitoring