

U.S. Railroad Safety Statistics and Trends

Robert E. Fronczak, P.E.

Assistant VP- Environment & Hazmat

Association of American Railroads

**Transportation External Coordination
Working Group Meeting**

September 21, 2005



Railroad Safety: Topics

- ◆ Safety Statistics & Trends
 - Train Safety (Train Accidents)
 - Employee Safety
 - Hazardous Materials Safety



ASSOCIATION OF
AMERICAN RAILROADS

TOMORROW. ARRIVING BY TRAIN.



U.S. Railroad Safety Statistics: Main Themes

- ◆ Railroads have dramatically improved safety over the last two and a half decades.
- ◆ Railroads compare favorably with other industries & transportation modes.
- ◆ The most troubling railroad safety problems arise from factors largely outside railroad control.
- ◆ Railroads have implemented numerous and effective technological improvements and company-wide safety programs.



U.S. Railroad Safety Statistics

In 2003, U.S. railroads achieved their safest year to date for the following measures:

- ◆ Total Fatalities and Total Injuries
- ◆ Employee On-Duty Fatalities (19), Injuries, & Associated Rates
- ◆ Grade Crossing Collisions & Rates
- ◆ Grade Crossing Fatalities & Rates
- ◆ Hazmat Accidents/Incidents & Rates

Sources of Data: FRA website: <http://safetydata.fra.dot.gov/Prelim/2003/r01.htm> (preliminary 2003 data)

FRA, Railroad Safety Statistics Annual Report, 2003, Tables 1-1, 1-2.

FRA, Accident/Incident Bulletin, 1975-1996, Tables 1, 51.



U.S. Railroad Safety Statistics

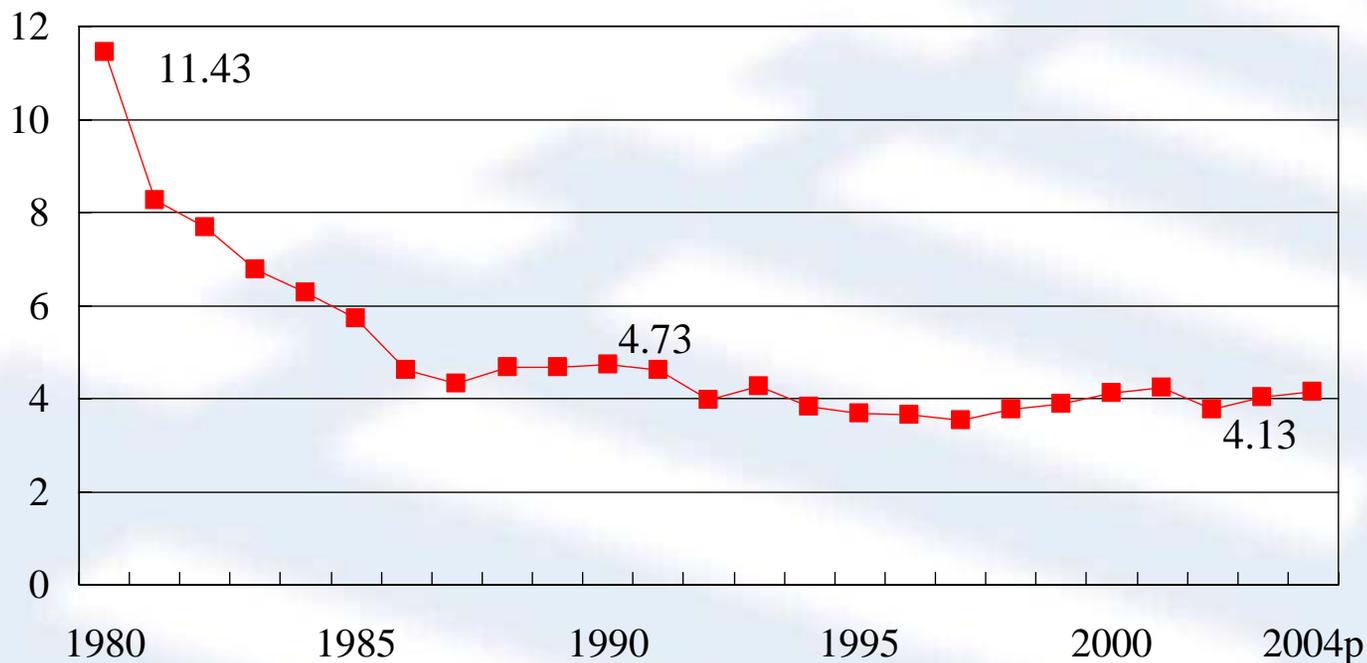
In 2004, U.S. railroads achieved their safest year ever for the following measures:

- ◆ Total Non-Fatal Injuries
- ◆ Employee On-Duty Injuries & Injury Rates
- ◆ Grade Crossing Collision Rates
- ◆ Trespasser Fatalities and Injuries per Million Train Miles

Sources of Data: FRA website: <http://safetydata.fra.dot.gov/Prelim/2004/r01.htm> (preliminary 2004 data)
FRA, Railroad Safety Statistics Annual Report, 2003, Tables 1-1, 1-2.
FRA, Accident/Incident Bulletin, 1975-1996, Tables 1, 51.



Train Accidents Per Million Train-Miles Have Dropped 64% Since 1980 And 13% Since 1990



Sources: FRA, Railroad Safety Statistics Annual Report 2003, Tables 1-1, 1-2.

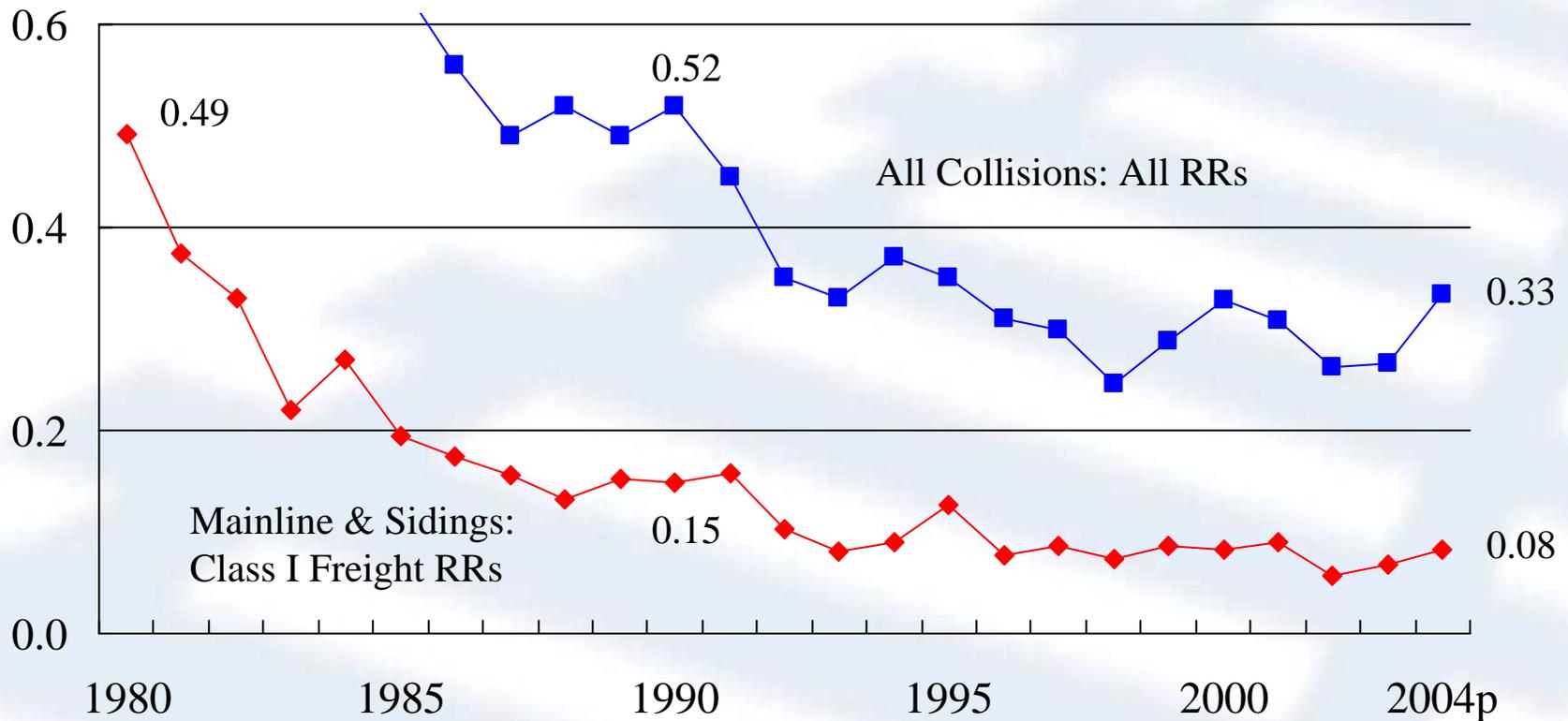
FRA, Accident/Incident Bulletin, 1980-1996, Tables 19, 36.

FRA website: <http://safetydata.fra.dot.gov/Prelim/2004/r01.htm> (preliminary 2004 data)

Note: Excludes grade crossing accidents.



Mainline Train Collisions Per Million Train-Miles On Class I Freight Railroads Have Dropped 83% Since 1980 And 44% Since 1990



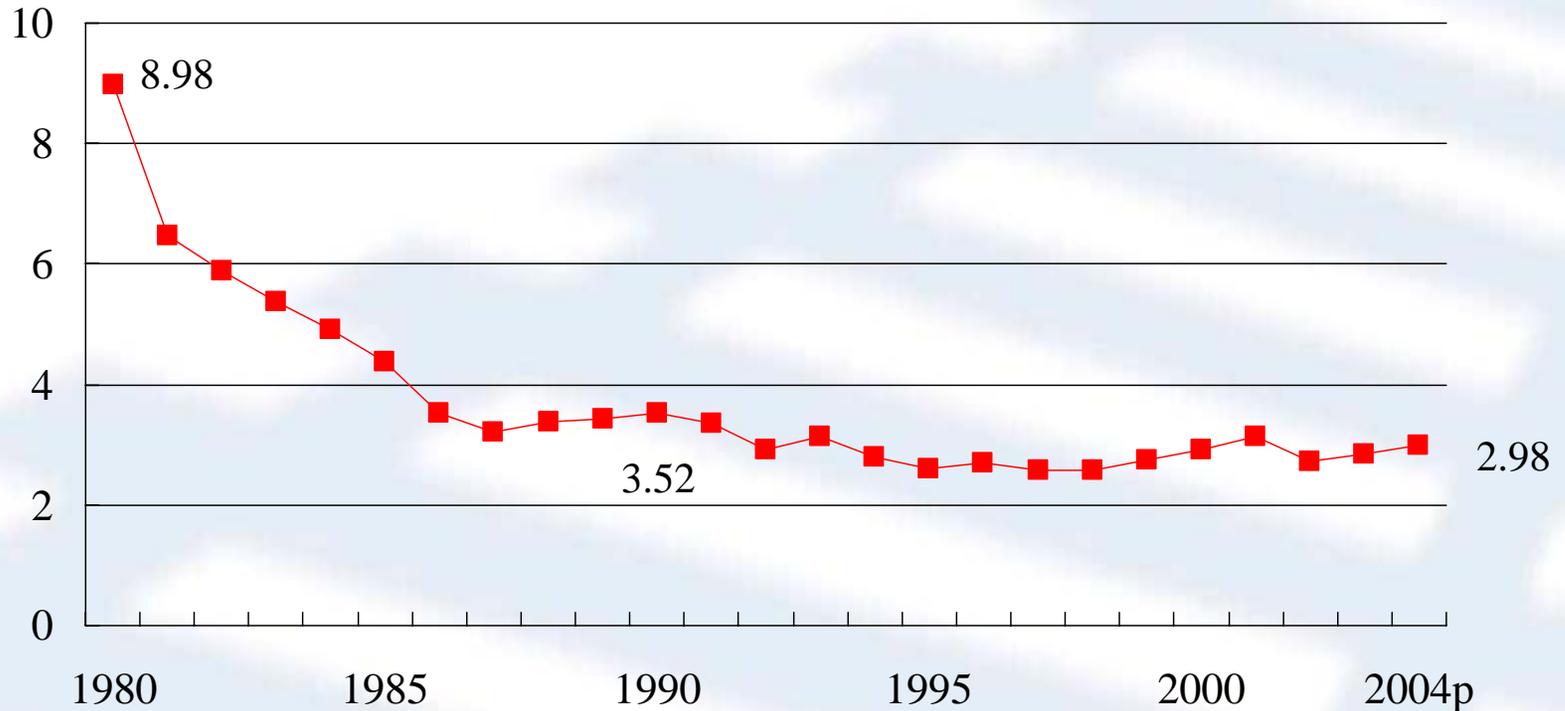
Sources: FRA, Railroad Safety Statistics Annual Report 2003, Tables 1-1, 5-6; Accident/Incident Bulletin, 1980-1996, Tables 19, 36. AAR Analysis of FRA train accident database through 2004.

FRA website: <http://safetydata.fra.dot.gov/Prelim/2004/r01.htm> (preliminary 2004 data)

Note: Excludes grade crossing accidents. Includes passenger train collisions on Class I freight railroads.



Derailments Per Million Train-Miles Have Dropped 67% Since 1980 And 15% Since 1990



Sources: FRA, Railroad Safety Statistics Annual Report 2003, Tables 1-1, 5-6.

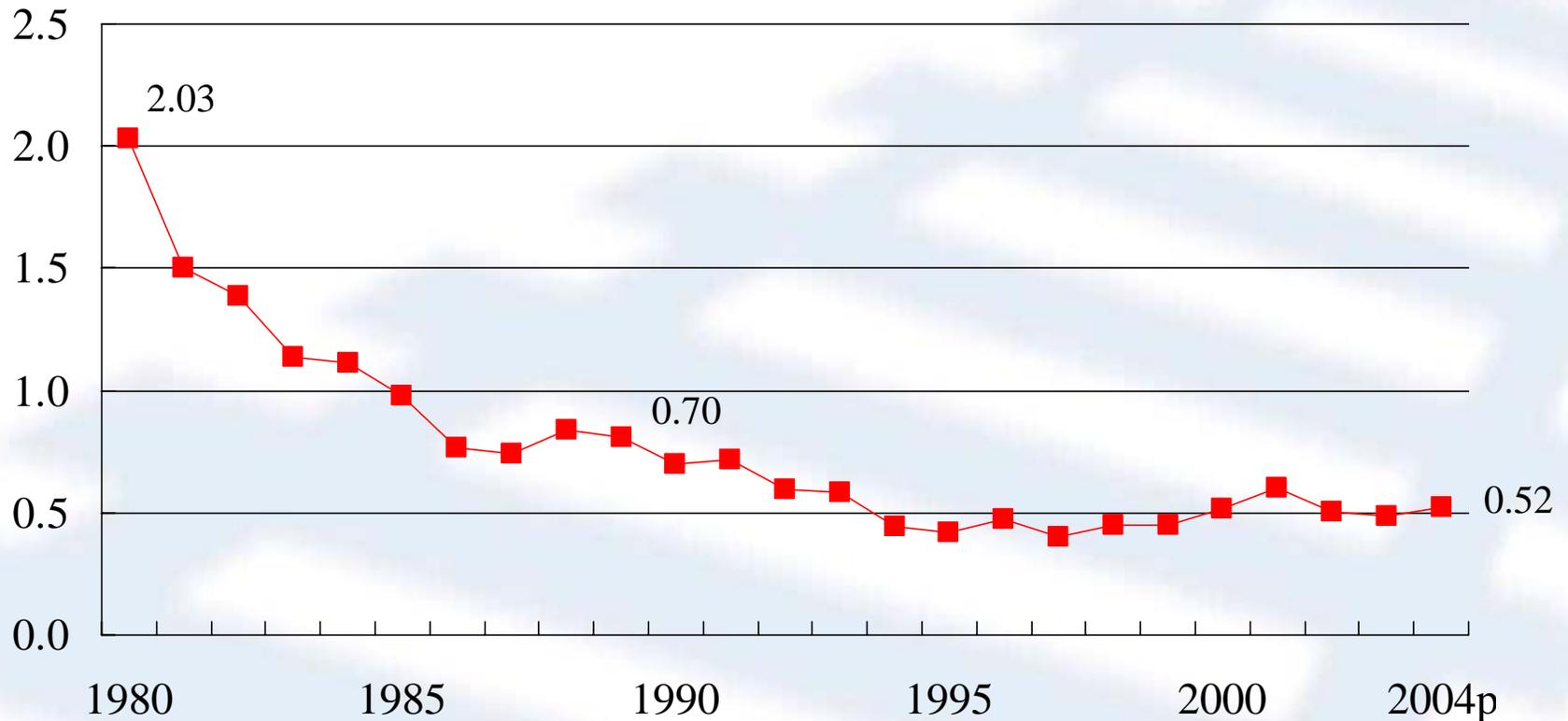
FRA, Accident/Incident Bulletin, 1980-1996, Tables 19, 36.

FRA website: <http://safetydata.fra.dot.gov/Prelim/2004/r01.htm> & [r02.htm](http://safetydata.fra.dot.gov/Prelim/2004/r02.htm) (preliminary 2004 data)

Note: Excludes grade crossing accidents.



Equipment-Caused Accidents Per Million Train-Miles Have Dropped 74% Since 1980 And 25% Since 1990



Sources: FRA, Railroad Safety Statistics Annual Report 2003, Tables 1-1, 5-6.

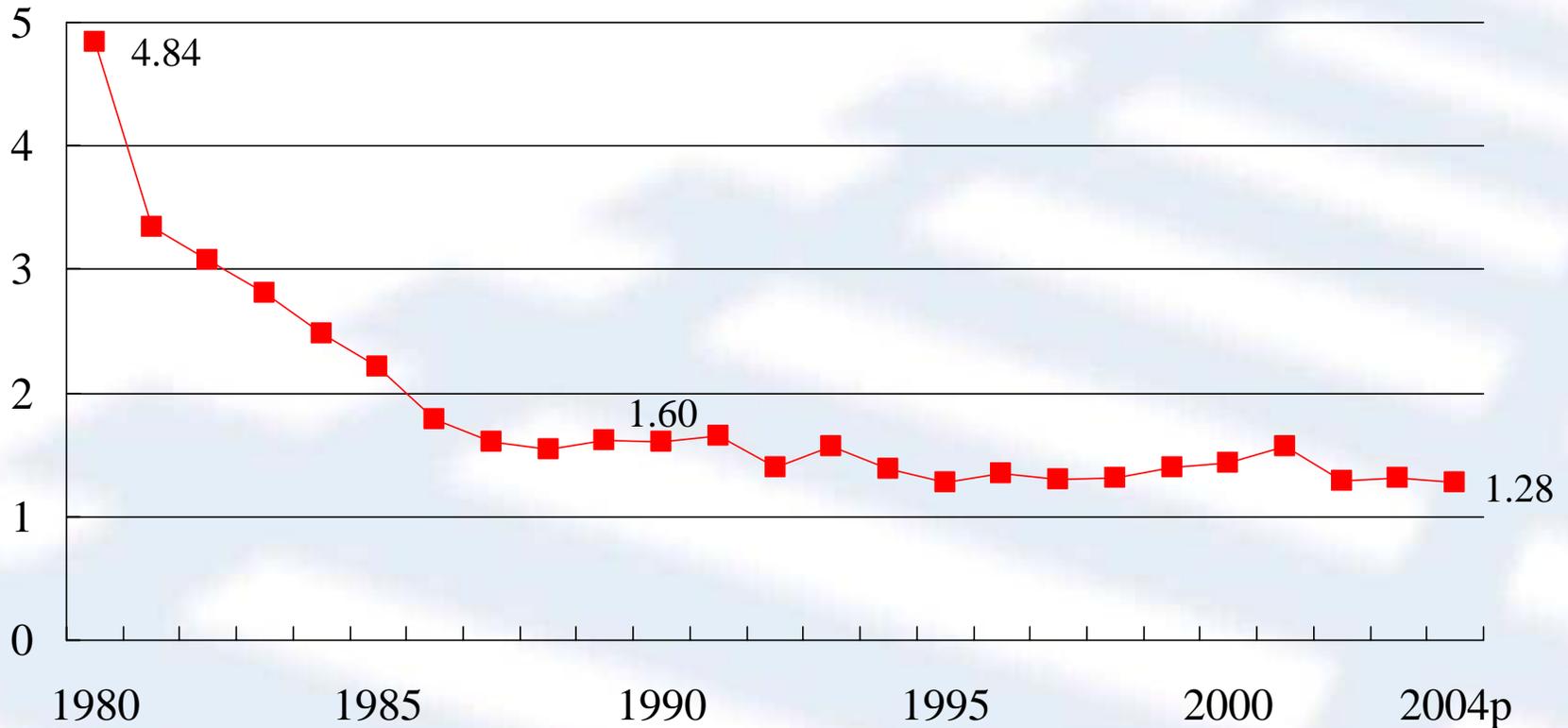
FRA, Accident/Incident Bulletin, 1980-1996, Tables 19, 36.

FRA website: <http://safetydata.fra.dot.gov/Prelim/2004/r01.htm> & [r02.htm](http://safetydata.fra.dot.gov/Prelim/2004/r02.htm) (preliminary 2004 data)

Note: Excludes grade crossing accidents.



Track-Caused Accidents Per Million Train-Miles Have Dropped 74% Since 1980 And 20% Since 1990



Sources: FRA, Railroad Safety Statistics Annual Report 2003, Tables 1-1, 5-6.

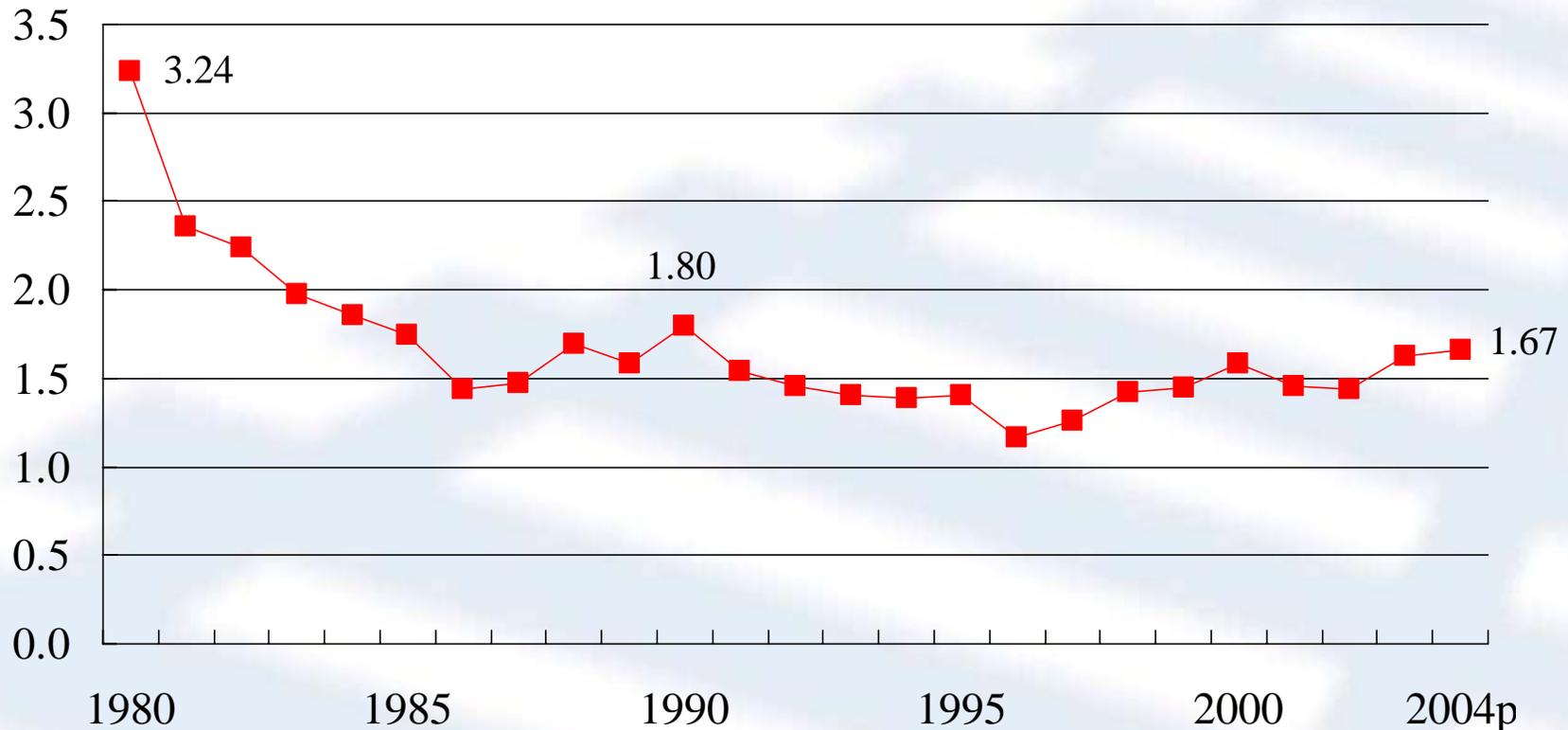
FRA, Accident/Incident Bulletin, 1980-1996, Tables 19, 36.

FRA website: <http://safetydata.fra.dot.gov/Prelim/2004/r01.htm> & [r02.htm](http://safetydata.fra.dot.gov/Prelim/2004/r02.htm) (preliminary 2004 data)

Note: Excludes grade crossing accidents.



Human Factors-Caused Accidents Per Million Train-Miles Have Dropped 48% Since 1980 and 7% Since 1990



Sources: FRA, Railroad Safety Statistics Annual Report 2003, Tables 1-1, 5-6.

FRA, Accident/Incident Bulletin, 1980-1996, Tables 19, 36.

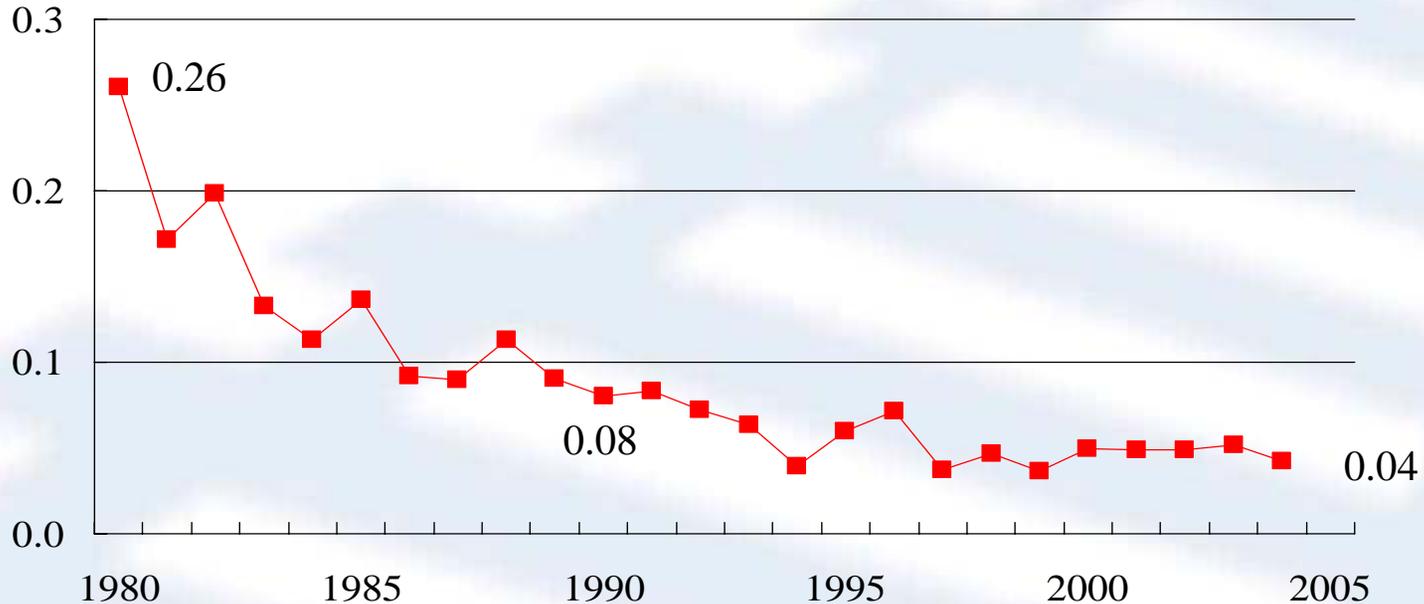
FRA website: <http://safetydata.fra.dot.gov/Prelim/2004/r01.htm> & [r02.htm](http://safetydata.fra.dot.gov/Prelim/2004/r02.htm) (preliminary 2004 data)

Note: Excludes grade crossing accidents.



Brake Equipment-Related Train Accident Rates Have Dropped 84% Since 1980 And 48% Since 1990

Accidents per Million Train-Miles



Sources: FRA, Railroad Safety Statistics Annual Report, 1997-2003, Table 1-1, 5-7.

FRA Accident/Incident Bulletin, 1980-1996, Table 19, 36.

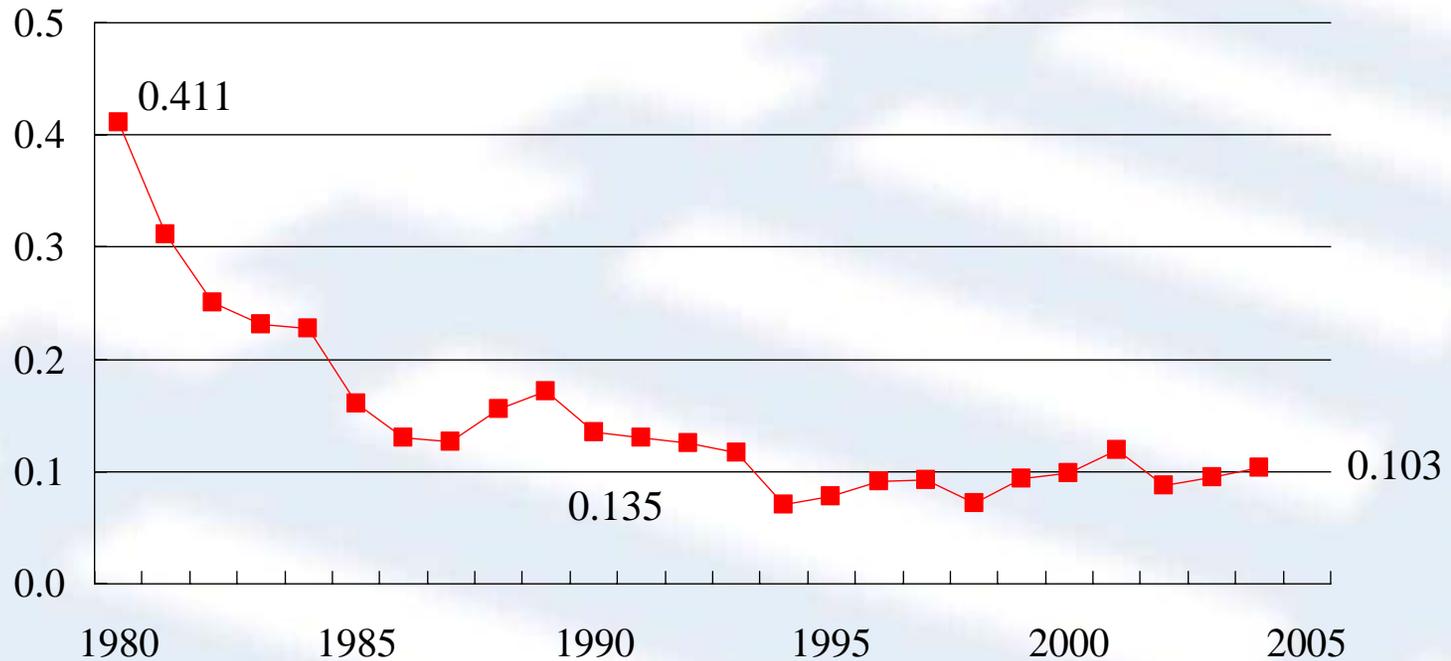
AAR Analysis of FRA Train Accident Database through 2004.

Note: Includes accidents due to locomotive brake defects.



Wheel Equipment-Related Train Accident Rates Have Dropped 75% Since 1980 And 24% Since 1990

Accidents per Million Train-Miles



Sources: FRA, Railroad Safety Statistics Annual Report, 1997-2003, Table 1-1, 5-7.

FRA Accident/Incident Bulletin, 1980-1996, Table 19, 36.

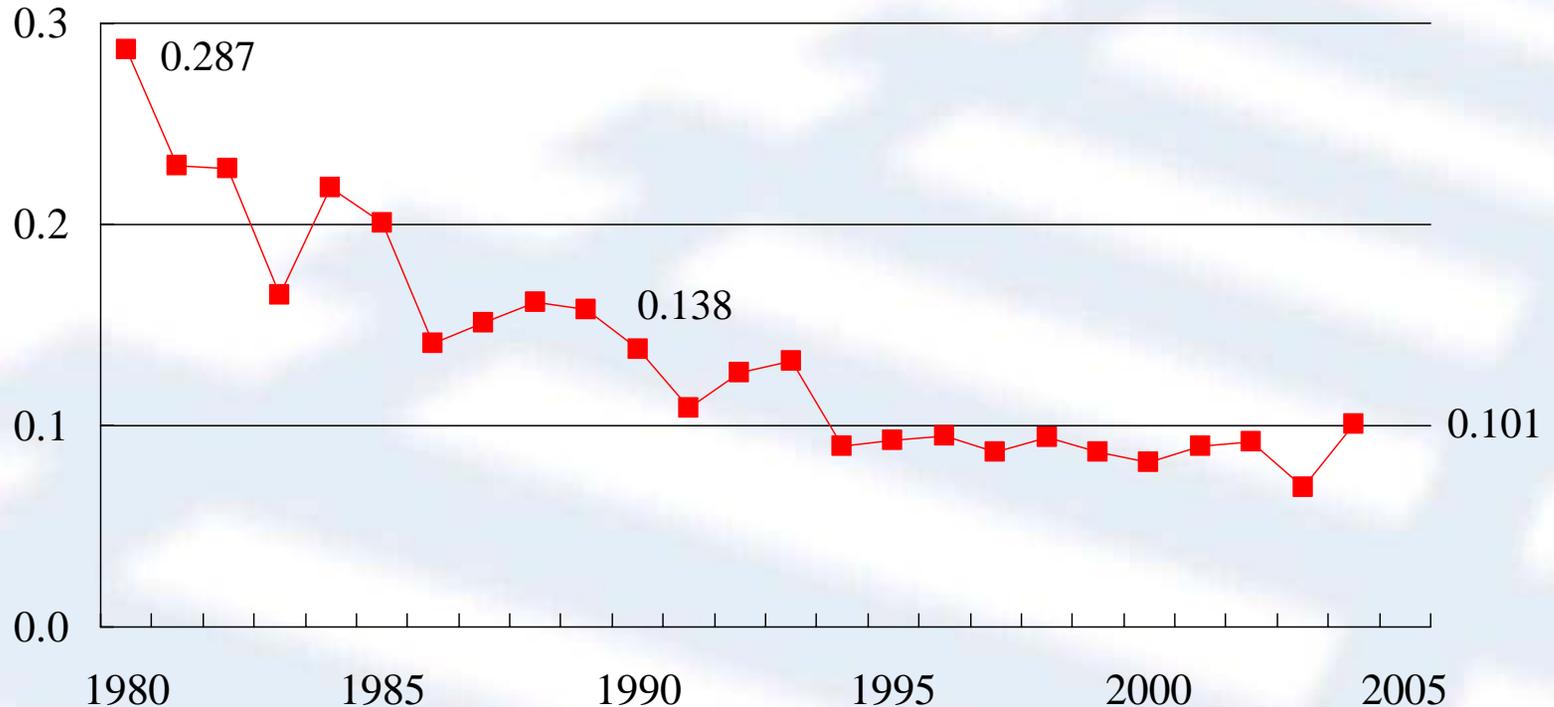
AAR Analysis of FRA Train Accident Database through 2004.

Note: Includes accidents due to locomotive wheel defects.



Axle And Bearings-Related Train Accident Rates Have Dropped 65% Since 1980 And 26% Since 1990

Accidents per Million Train-Miles



Sources: FRA, Railroad Safety Statistics Annual Report, 1997-2003, Table 1-1, 5-7.

FRA Accident/Incident Bulletin, 1980-1996, Table 19, 36.

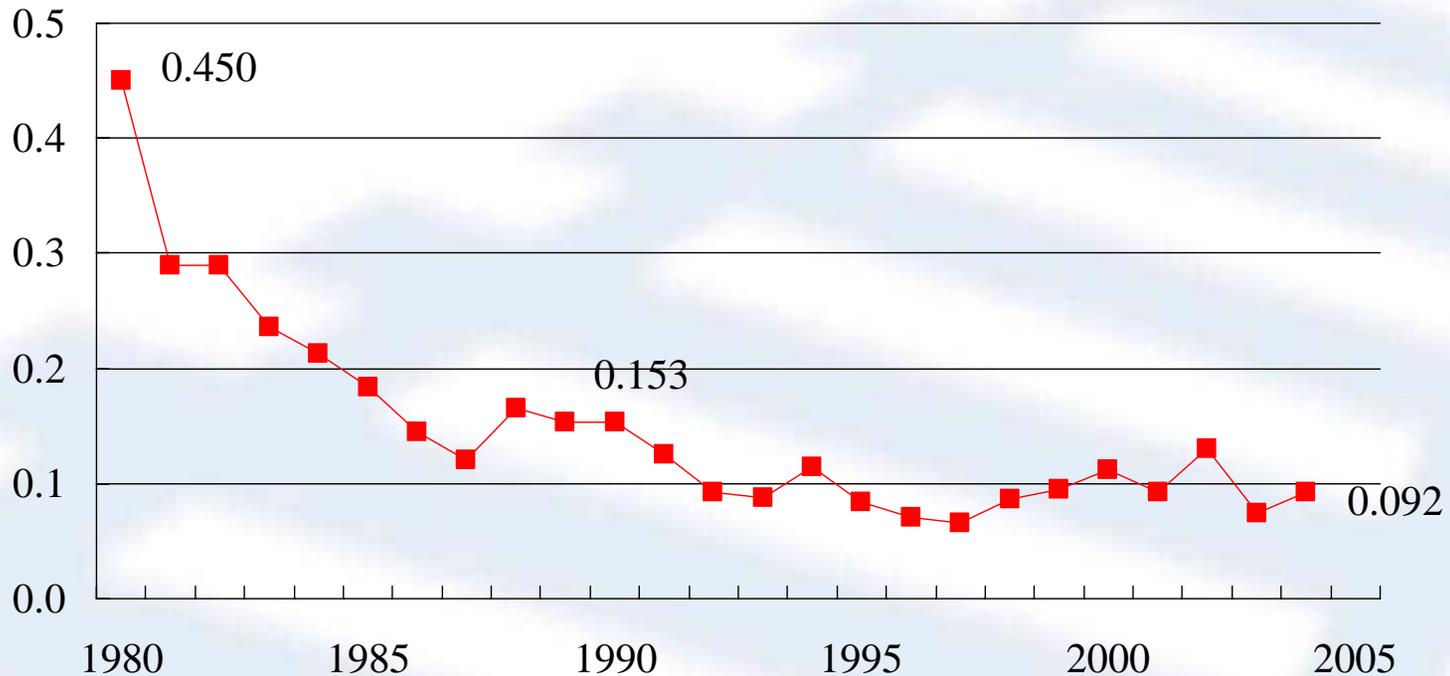
AAR Analysis of FRA Train Accident Database through 2004.

Note: Includes accidents due to locomotive axle or bearing defects.



Truck Component-Related Train Accident Rates Have Dropped 79% Since 1980 And 40% Since 1990

Accidents per Million Train-Miles



Sources: FRA, Railroad Safety Statistics Annual Report, 1997-2003, Table 1-1, 5-7.

FRA Accident/Incident Bulletin, 1980-1996, Table 19, 36.

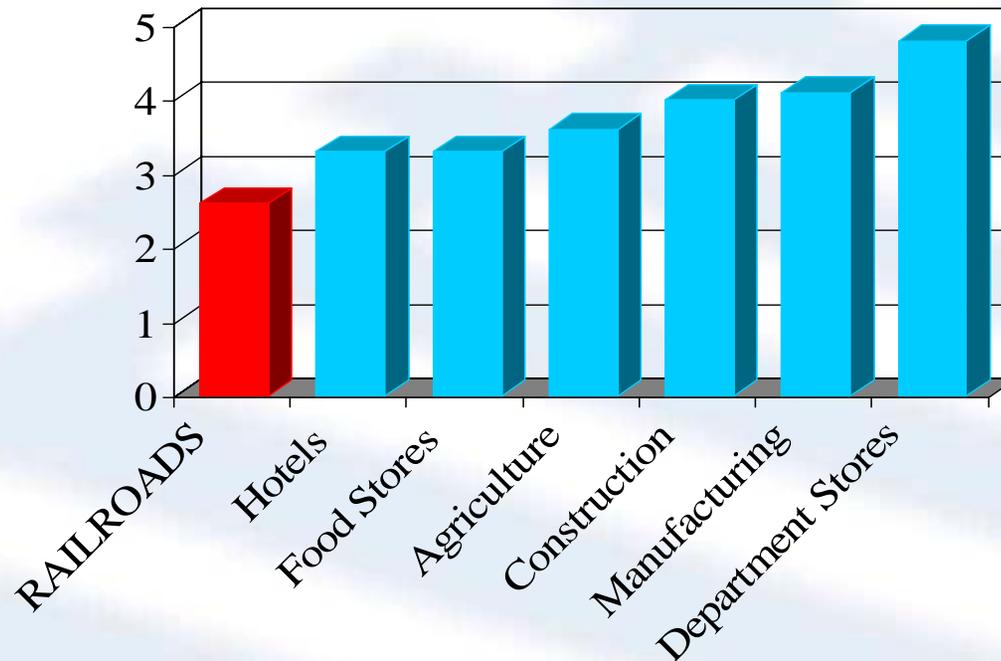
AAR Analysis of FRA Train Accident Database through 2004.

Note: Includes accidents due to locomotive truck component defects.



Railroads Have Lower Employee Injury Rates Than Do Other Major Industry Groups

Lost Workday Injuries & Illnesses per 100 Full Time Employees, 2001

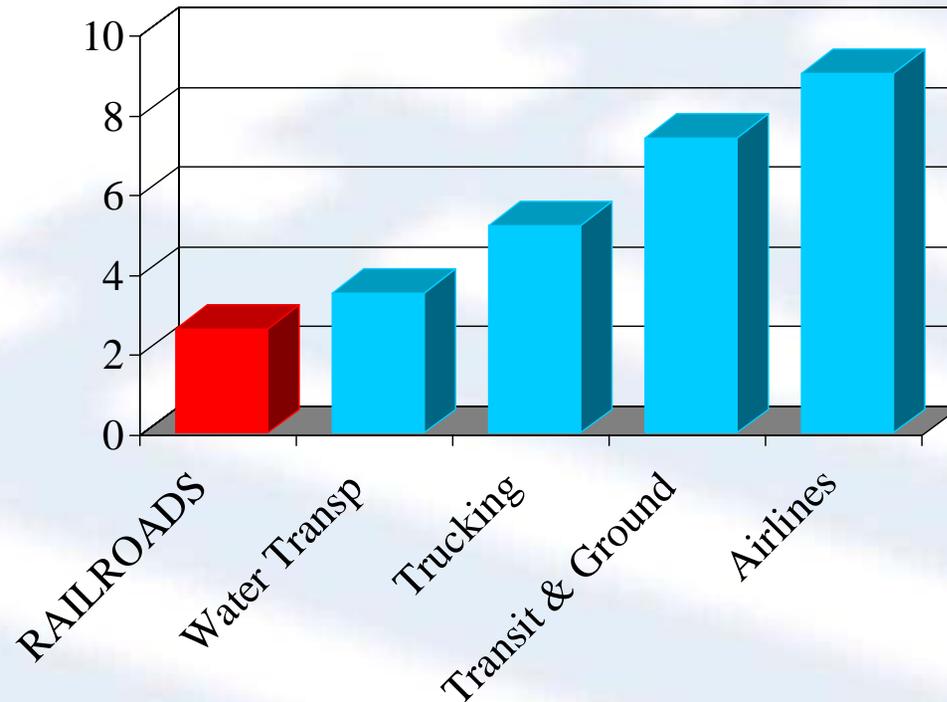


Source: Bureau of Labor Statistics, <http://www.bls.gov/iif/oshwc/osh/os/ostb1129.pdf>
(before the Occupational Safety & Health Administration (OSHA) changed its recordkeeping requirements effective January 1, 2002)



Railroads Have Lower Employee Injury Rates Than Do Other Transportation Modes

Lost Workday Injuries & Illnesses per 100 Full Time Employees, 2001

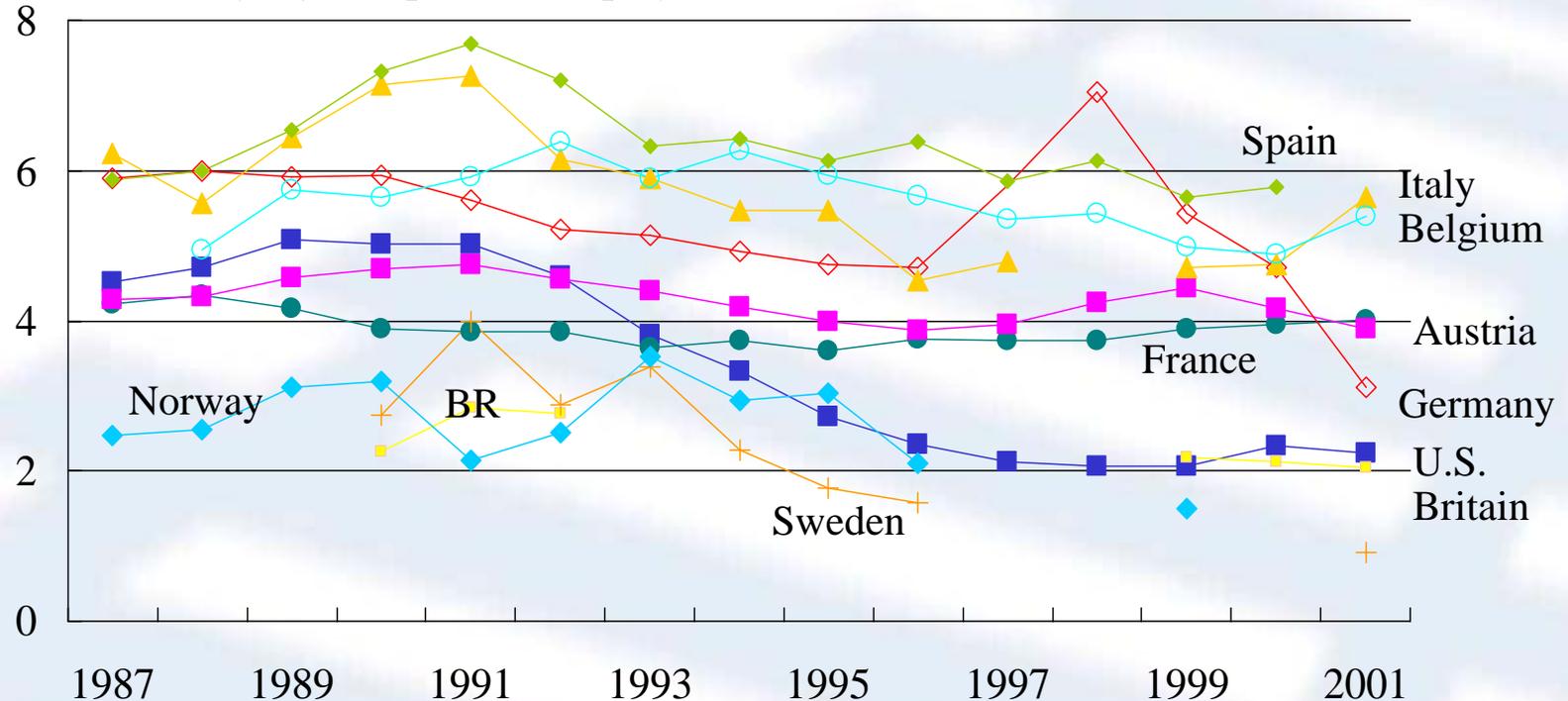


Source: Bureau of Labor Statistics, <http://www.bls.gov/iif/oshwc/osh/os/ostb1129.pdf>
(before the Occupational Safety & Health Administration (OSHA) changed its recordkeeping requirements effective January 1, 2002)



U.S. Railroads Have Had Lower Employee Injury Rates Than Have Most Major European Railroads

Lost Workday Injuries per 100 Employees

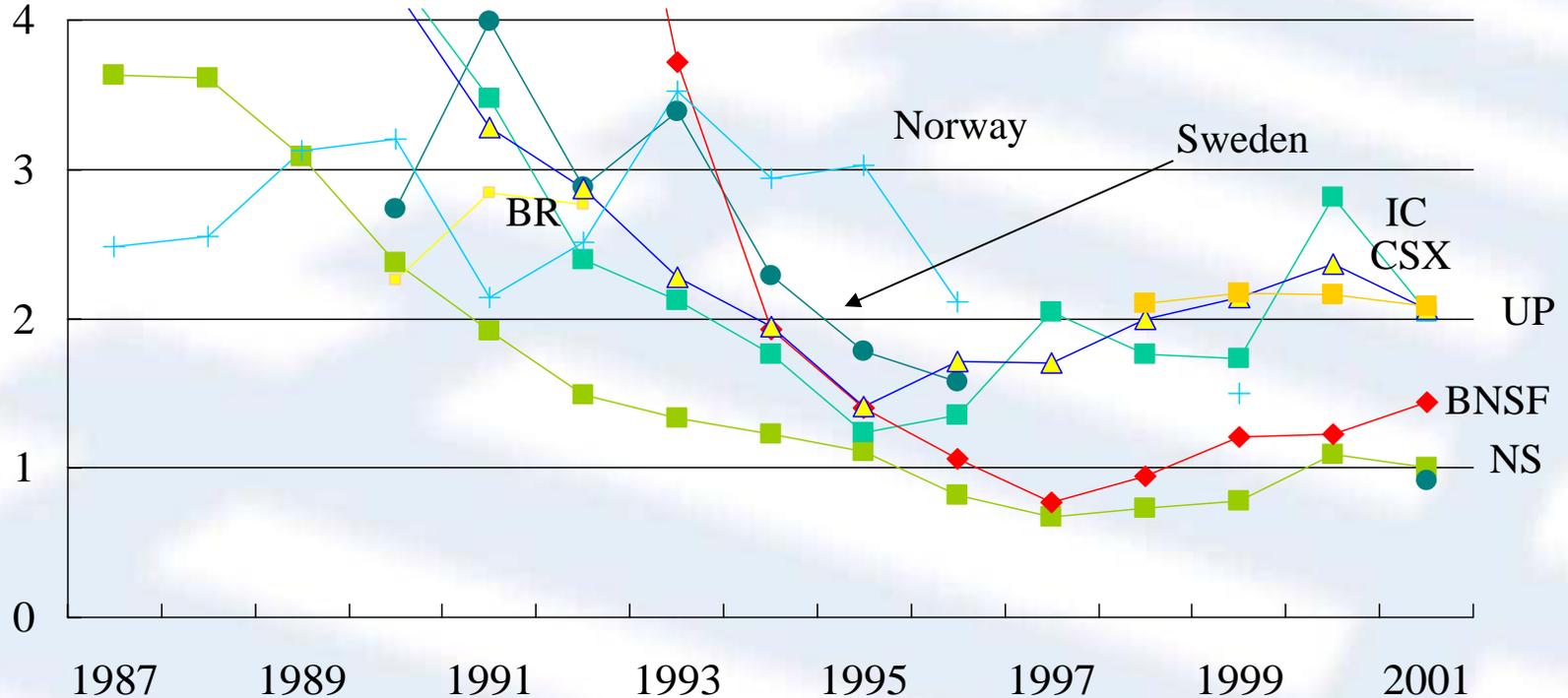


Sources: UIC, Statistics on Accidents at Work, 1993-2001. FRA, Accident/Incident Bulletin, Tables 43, 45, 46. FRA, Railroad Safety Statistics Annual Reports, 1997-2001, Tables 4-1, 1-1. UIC discontinued these stats after 2001. Notes: Excludes occupational illnesses. Excludes injuries with no days away from work. Includes fatal injuries. Data for Sweden & Norway (1993-96) and for U.S. (all years) is per 200,000 hours actually worked, hence higher.



The Safest U.S. RRs Have Had Lower Employee Injury Rates Than Have The Safest European RRs

Lost Workday Injuries per 100 Employees

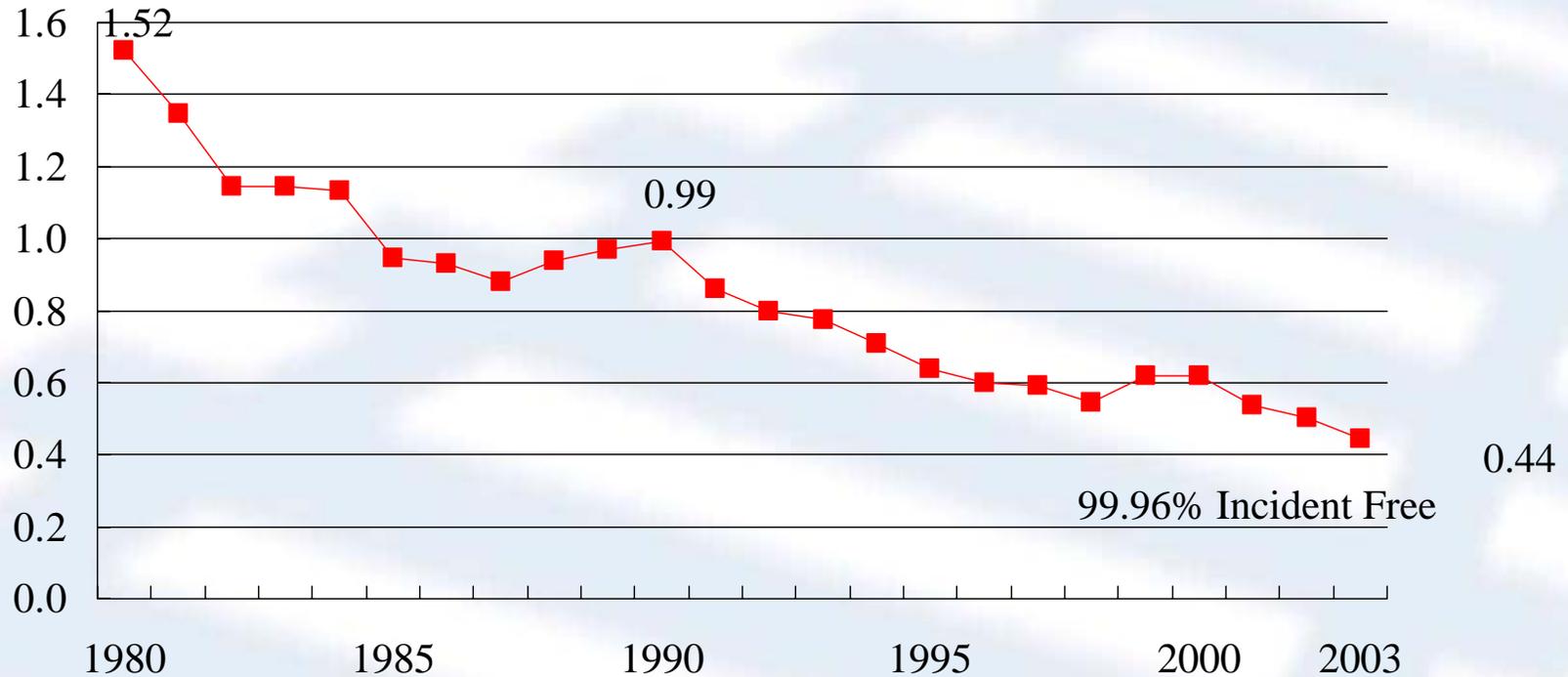


Sources: UIC, Statistics on Accidents at Work, 1993-2001. FRA, Accident/Incident Bulletin, Tables 43, 45, 46. FRA, Railroad Safety Statistics Annual Reports, 1997-2001, Tables 4-1, 1-1. UIC discontinued these stats after 2001. Notes: Excludes occupational illnesses. Excludes injuries with no days away from work. Includes fatal injuries. Data for Sweden & Norway (1993-96) and for U.S. (all years) is per 200,000 hours actually worked, hence higher.



Hazmat Incident Release Rates Have Declined 71% Since 1980 And 56% Since 1990

Incidents per Thousand Carloads

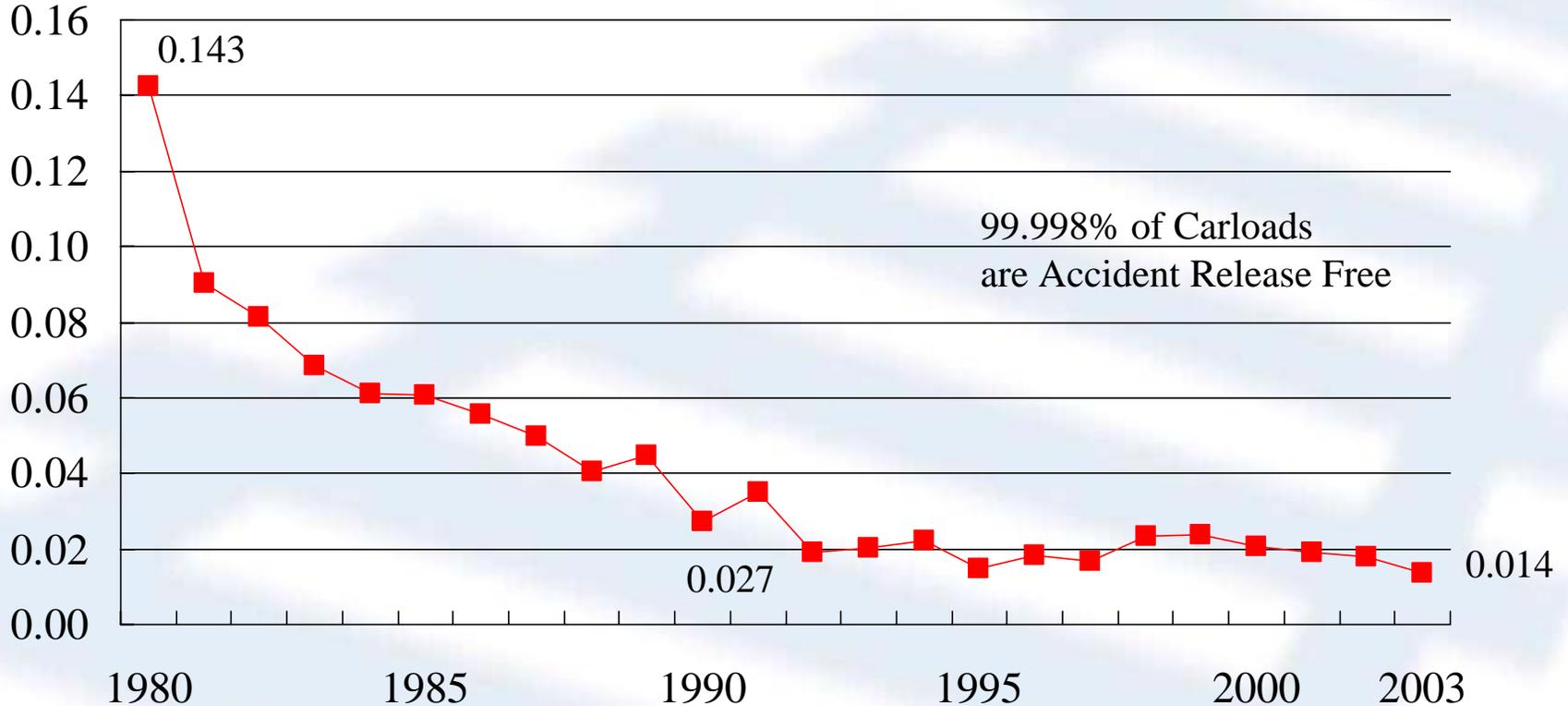


Sources: USDOT, Pipeline & Hazardous Materials Safety Administration, Hazardous Materials Incidents by Year & Mode. <http://hazmat.dot.gov/files/hazmat/10year/10yearfrm.htm> for 1995-2004. Includes releases in train accidents as well as non-accident releases. ICC/STB Waybill Sample. 1995-2003. Carloadings adjusted to counter known hazmat carloadings underreporting.



Hazmat Accident Rates Have Declined 90% Since 1980 And 49% Since 1990

Train Accidents with a Release per Thousand Carloads

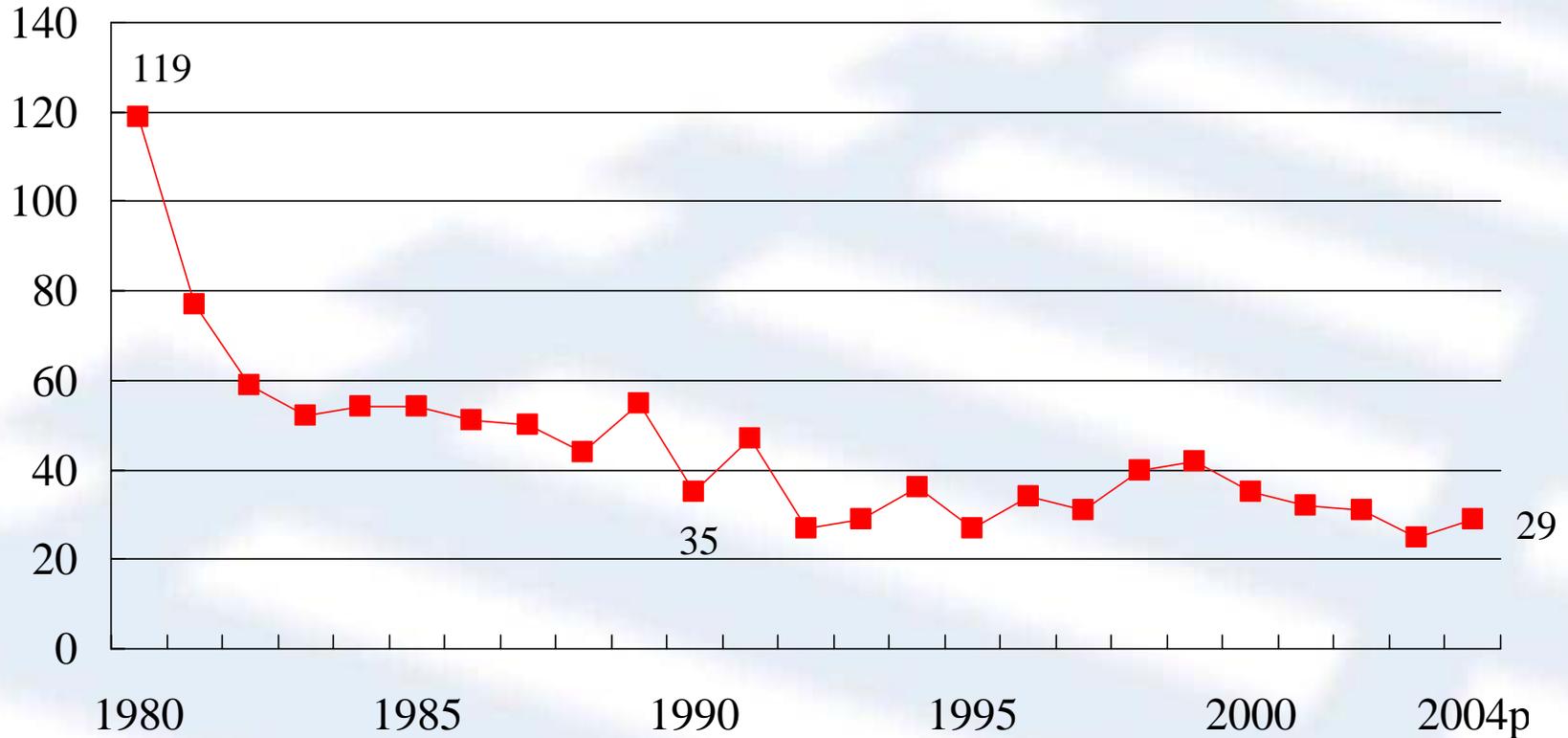


Sources: FRA, Accident/Incident Bulletin, Table 26. FRA, RR Safety Statistics Annual Reports, 1997-2003, Tables 6-1. ICC/STB Waybill Sample. 1995-2003. Carloadings adjusted to counter known hazmat underreporting.
Note: An accident may involve releases from more than one car.



Accidents With A Hazmat Release Have Declined 76% Since 1980 And 17% Since 1990

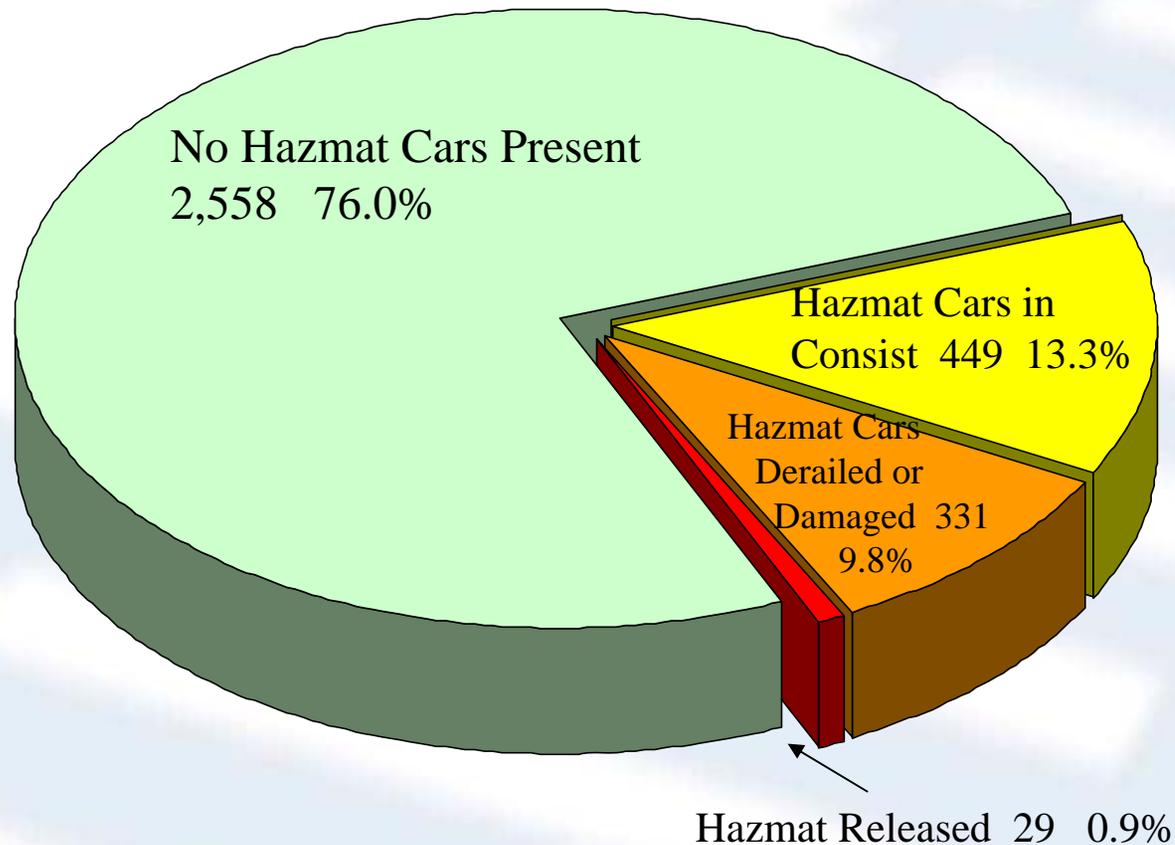
Train Accidents with a Hazmat Release



Sources: FRA, Accident/Incident Bulletin, Table 26. FRA, RR Safety Statistics Annual Reports, 1997-2003, Tables 6-1. Note: An accident may involve releases from more than one car.
AAR Analysis of FRA Train Accident Database for 2004.



About 1% Of Train Accidents Result In A Release Of Hazardous Materials

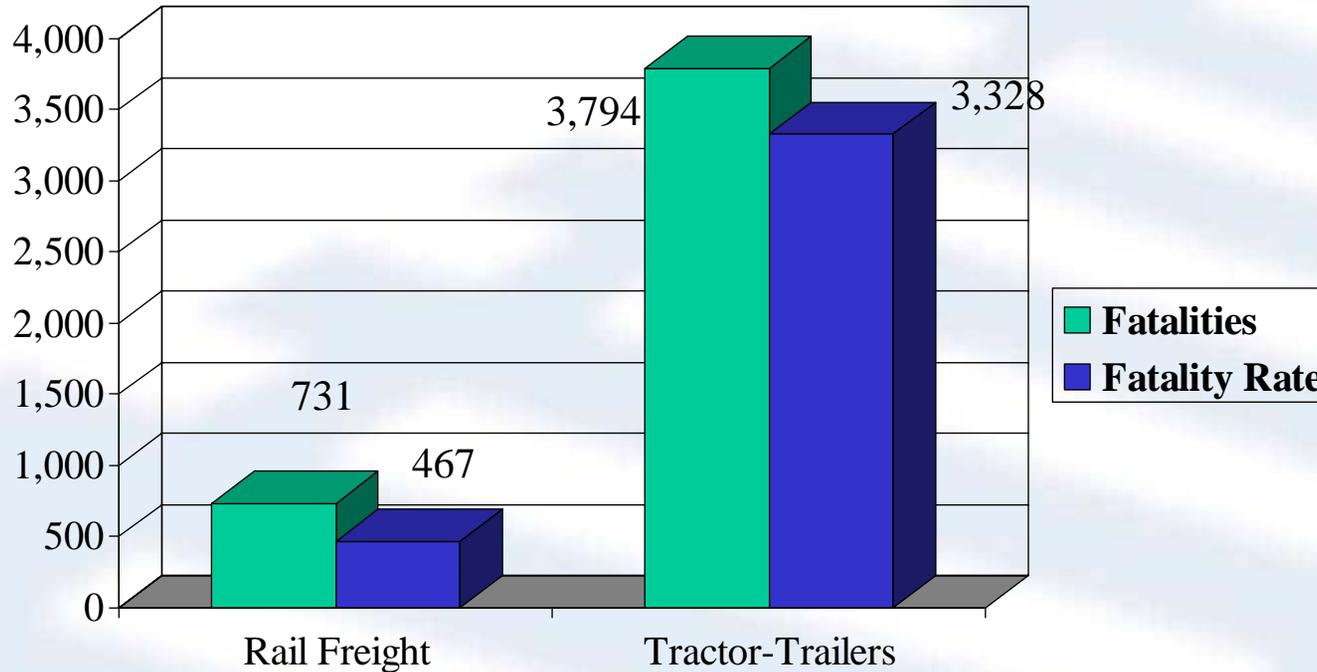


Source: AAR Analysis of Year 2004 FRA Train Accident Database.

Note: Includes grade crossing train accidents meeting dollar threshold.



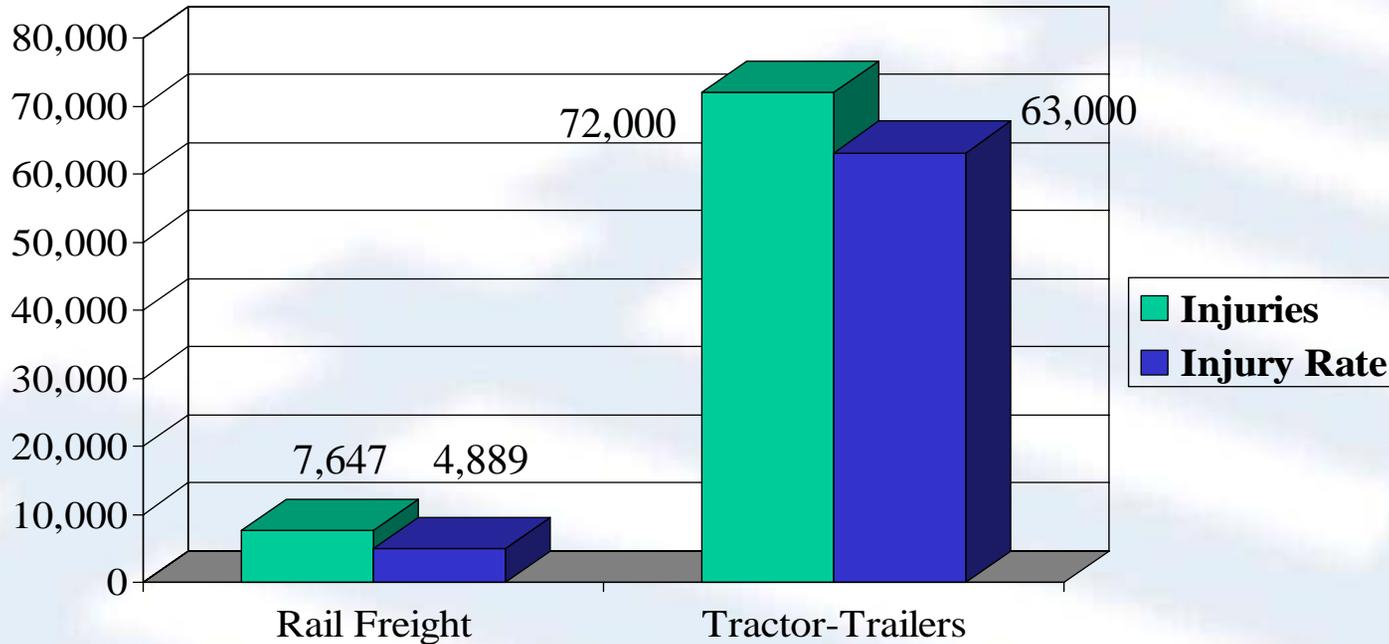
Rail Freight Transport Incurs About 14% Of The Fatalities That Trucks Do Per Trillion Ton-Miles



Sources: FRA, RR Safety Statistics Annual Report 2002, Table 1-4. Rail Ton-Miles in 2002 from RR Facts, 2003 Ed., p. 32, Eno Foundation. USDOT, FMCSA, Large Truck Crash Facts, 2002, Table 13, <http://ai.volpe.dot.gov/CarrierResearchResults/HTML/2002Crashfacts/02Table13.htm>
Tractor-trailer net ton-miles in 2002 estimated at 1.14 trillion from 2002 USDOC, Vehicle Inventory & Use Survey (VIUS).



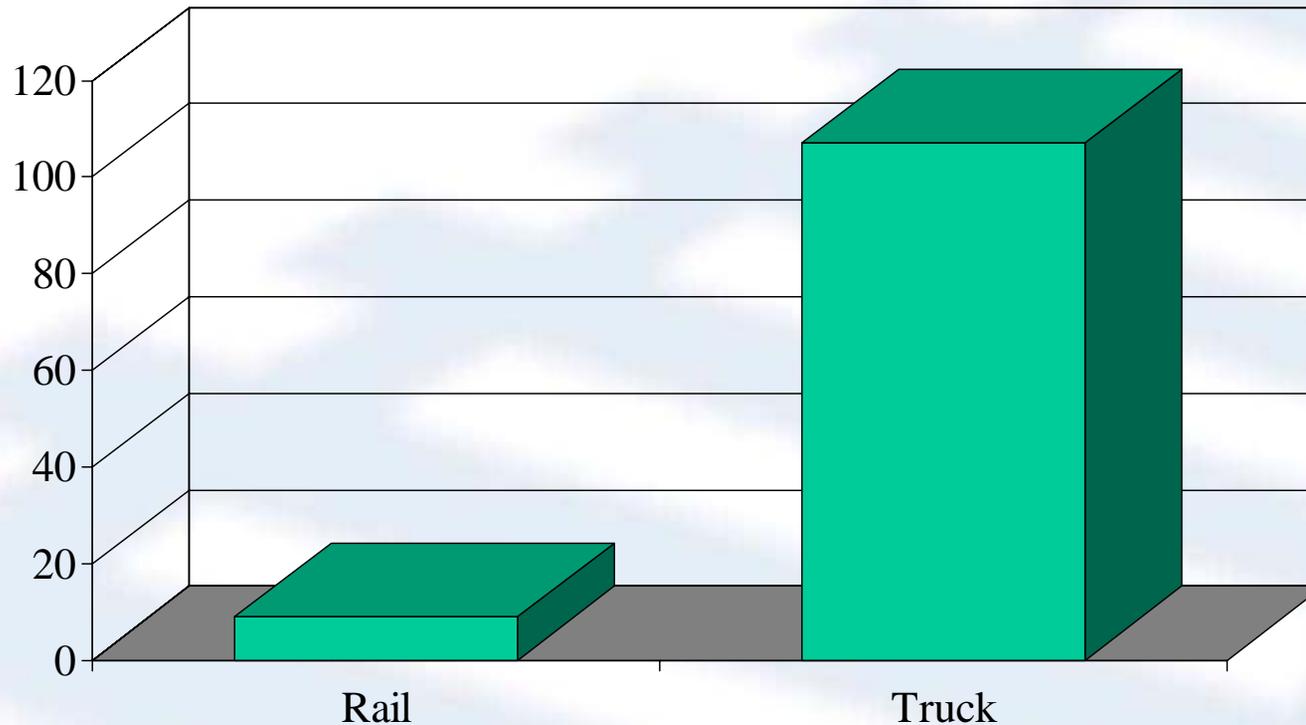
Rail Freight Transport Incurs About 8% Of The Injuries That Trucks Do Per Trillion Ton-Miles



Sources: FRA, RR Safety Statistics Annual Report 2002, Table 1-4. Rail Ton-Miles in 2002 from RR Facts, 2003 Ed., p. 32, Eno Foundation. USDOT, FMCSA, Large Truck Crash Facts, 2002, Table 15, <http://ai.volpe.dot.gov/CarrierResearchResults/HTML/2002Crashfacts/02Table15.htm>
Tractor-trailer net ton-miles in 2002 estimated at 1.14 trillion from 2002 USDOC Vehicle Inventory & Use Survey (VIUS).



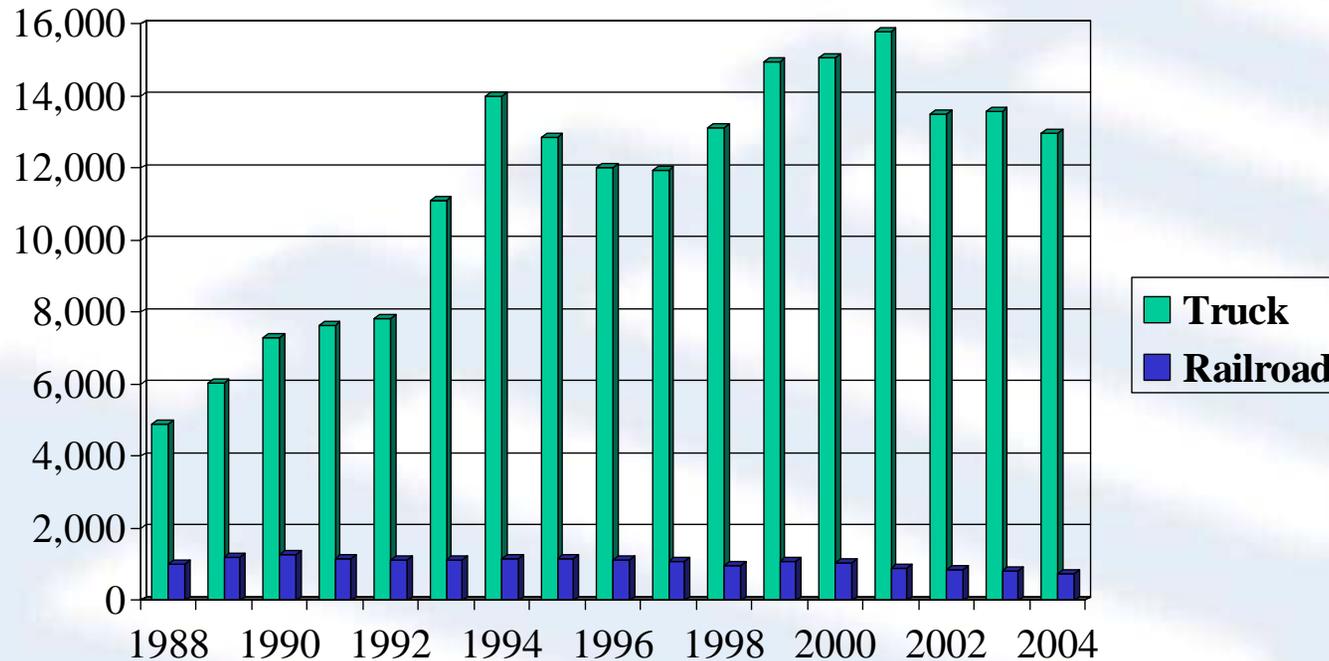
Railroads Incurred 9 Fatalities In The Last 10 Years Due To Hazmat While Trucks Incurred 107



Source: USDOT, Pipeline & Hazardous Materials Safety Administration, Hazardous Materials Incidents by Year & Mode, from <http://hazmat.dot.gov/pubs/inc/data/10yearfrm.htm> for 1995 through 2004, as of 5/9/2005.



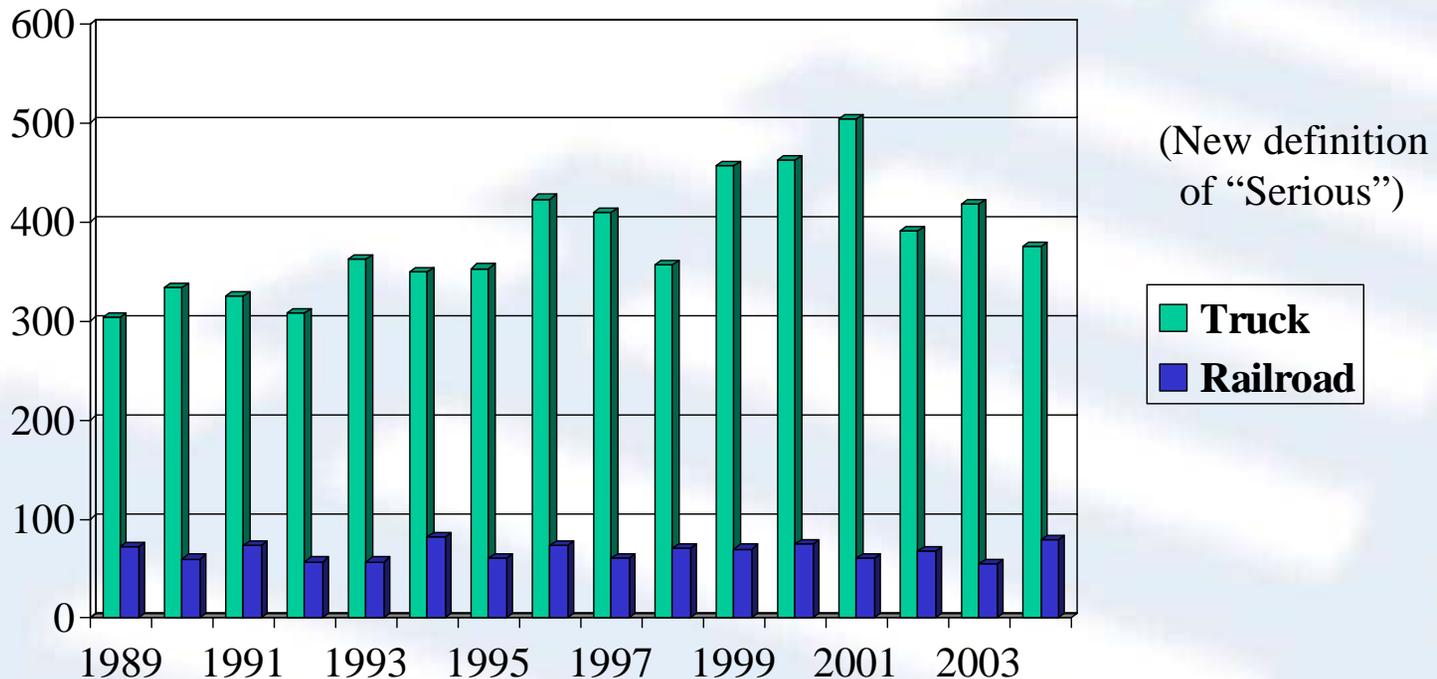
Railroads Now Have Less Than 6% Of The Hazmat Incidents That Trucks Have, Despite Roughly Equal Hazmat Ton-Mileage



Sources: USDOT, Pipeline & Hazardous Materials Safety Administration, Hazardous Materials Incidents By Year & Mode, from <http://hazmat.dot.gov/pubs/inc/data/10yearfrm.htm> for 1995 through 2004. USDOT, 2002 Commodity Flow Survey (CFS), Table 1a, for truck ton-mi. FHWA [Highway Statistics](#). ICC/STB Waybill Sample for rail ton-miles. In 2003, trucks hauled an estimated 110 billion ton-miles of hazmat, while railroads also hauled an estimated 110 billion ton-miles of hazmat.



Railroads Now Have 21% Of The Serious Hazmat Incidents That Trucks Have, Despite Roughly Equal Hazmat Ton-Mileage



Sources: USDOT, Pipeline & Hazardous Materials Safety Administration, Hazardous Materials Incidents by Year & Mode, from <http://hazmat.dot.gov/pubs/inc/data/10yearfrm.htm>. PHMSA's new definition, applied to 1994 through 2003, defines serious incidents as those involving a fatality or serious injury due to a hazmat release or evacuation of 25 or more people as the result of a hazmat release or fire. In 2003, trucks hauled an estimated 110 billion ton-miles of hazmat, while railroads also hauled an estimated 110 billion ton-miles of hazmat.



Technological Improvements to Railroad Safety: Track & Equipment

Improved Track

- ◆ Rail steels
- ◆ Welded rail
- ◆ Fasteners
- ◆ Detection of flaws, weak spots

Improved Equipment

- ◆ Heat treated curved plate wheels
- ◆ Hot box detectors, roller bearings, acoustic detection systems
- ◆ Air brake control valves & air brake tests



Technological Improvements to Railroad Safety: Tank Cars and SNF

- ◆ Head shields and shelf couplers
- ◆ Thermal insulation
- ◆ Bottom outlet protection
- ◆ Enhanced safety requirements of hazmat tank cars >263,000 lbs or carrying environmentally sensitive chemicals
- ◆ Enhanced standard for cars carrying spent nuclear fuel and high level radioactive waste.



Railroad Industry Safety Programs: Hazardous Materials

- ◆ OT-55
- ◆ AAR North American Non-Accident Release (NAR) Program
- ◆ Transportation & Community Awareness & Emergency Response (TRANSCAER)
- ◆ ACC Responsible Care
- ◆ Operation Respond
- ◆ TTCI's Emergency Response Training Center
- ◆ TTCI's BOE Hazmat Inspections
- ◆ TTCI's BOE Hazmat Safety Information



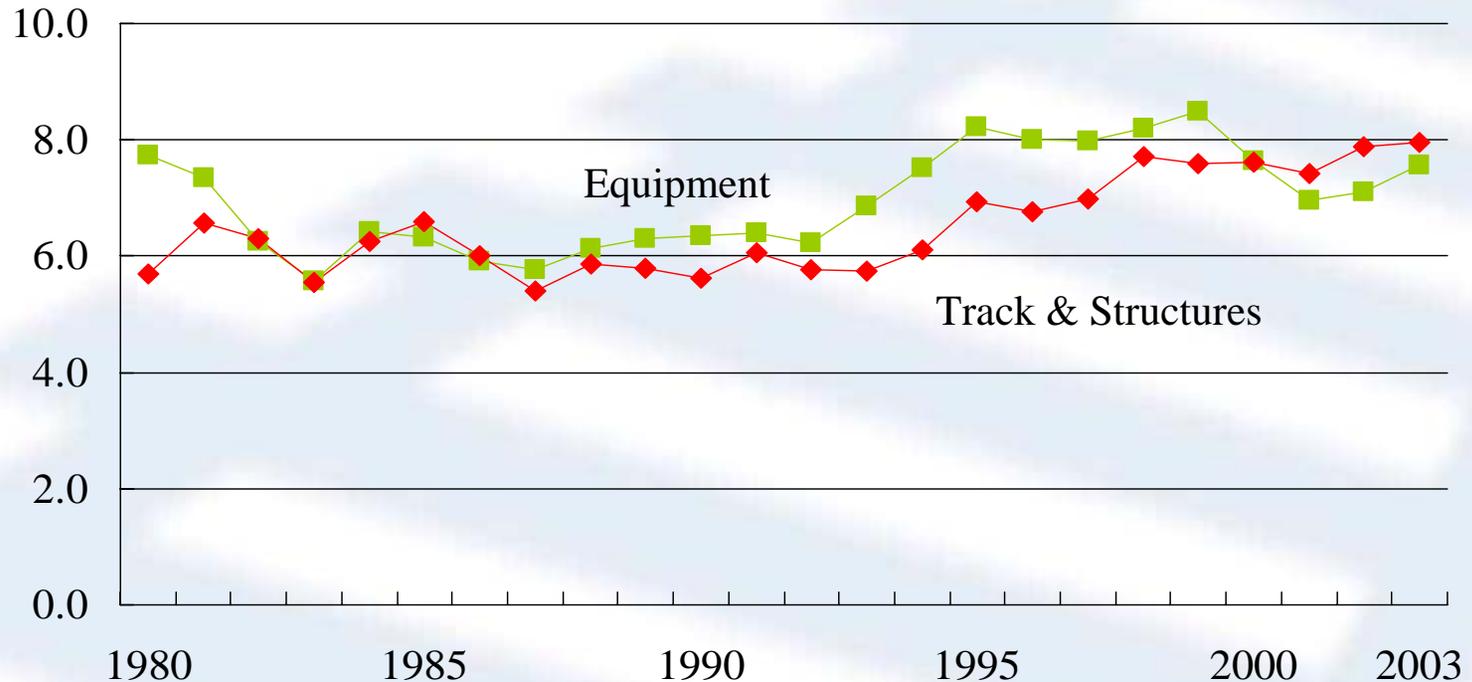
Railroad Industry Safety Programs: Operations, Training, Crossings

- ◆ Individual Railroad Employee Safety Programs
- ◆ Crew Resource Management (CRM)
- ◆ Remote Control Operations
- ◆ Full-motion Computerized Train Simulators
- ◆ Interactive Video Individual Training
- ◆ Operation Lifesaver
- ◆ Grade Crossing Upgrade (Section 130) Program



Since 1980, U.S. Class I Railroads Have Spent \$323 Billion On Track And Equipment

Capital Expenditures and Maintenance Expenses, Excluding Depreciation, in Billions of Dollars

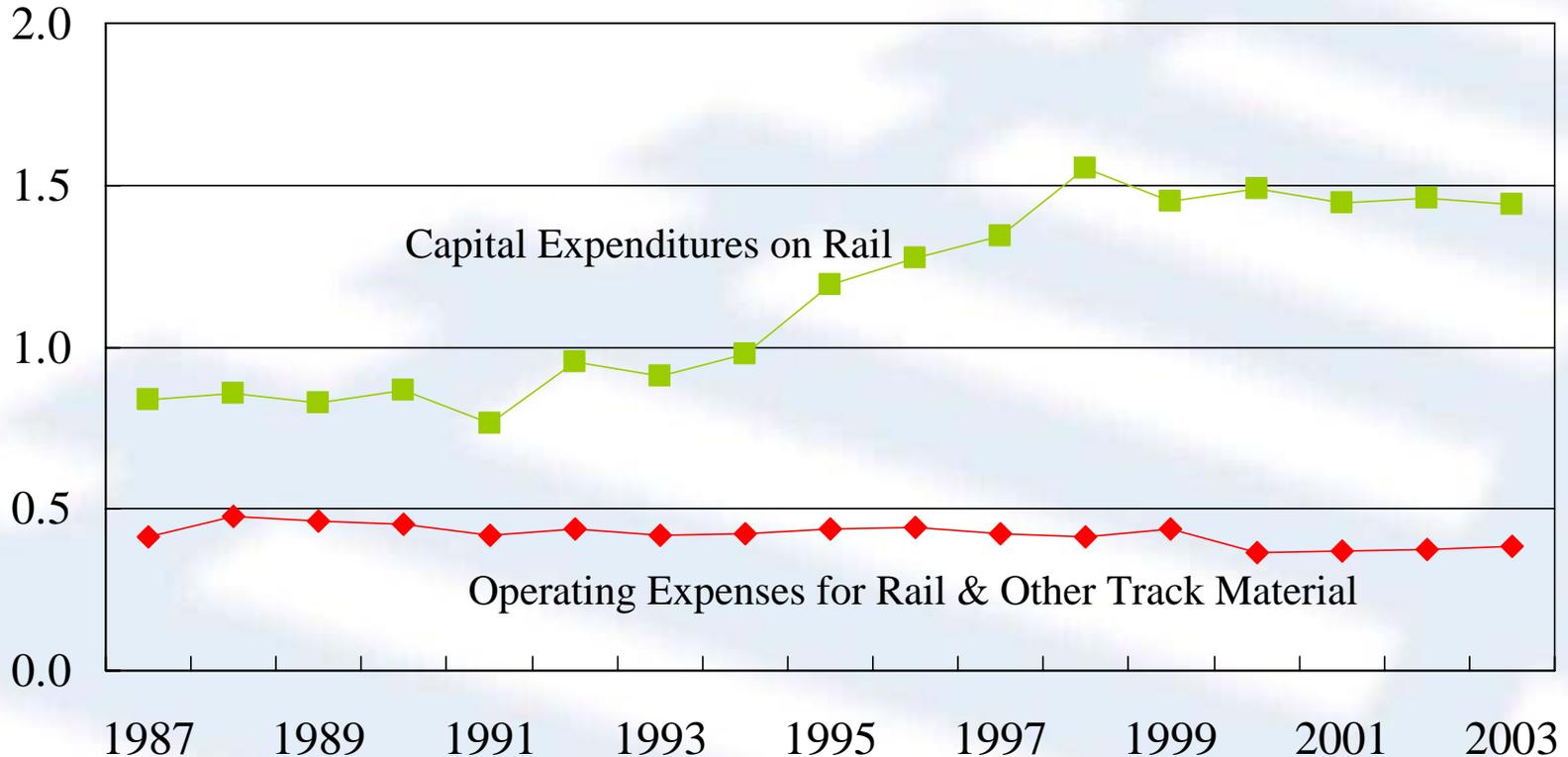


Sources: AAR, Analysis of Class I Railroads, 1980 - 2003, based on R-1 Reports submitted by each Class I railroad to the ICC/STB. Equipment: Lines 382+158-151-154-157. Track: Lines 378+149-147. Current year dollars.



Since 1991, U.S. Class I Railroads Have Accelerated Capital Spending On New Rail

Billions of Current Dollars

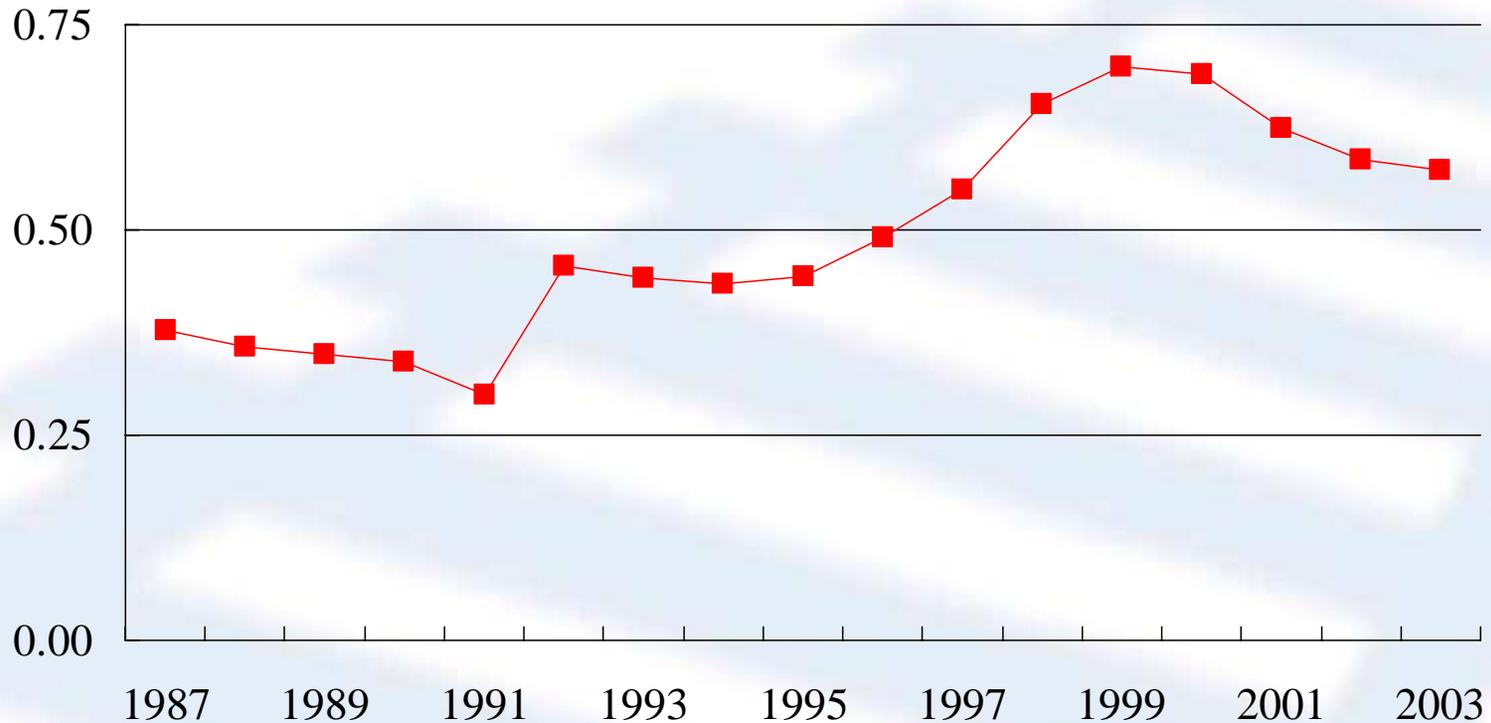


Source: R-1 Reports submitted by each Class I railroad to the ICC/STB, 1987-2003.
Schedule 330, line 8, column e; Schedule 410, lines 1, 14, and 15, column h.



In The Last 10 Years, U.S. Class I Railroads Have Laid 5.7 Million Tons Of New Rail

Million Tons of New Rail Laid



Note: Includes new rail laid in replacement and in addition, excludes relay rail.

Sources: AAR, Analysis of Class I Railroads, 1980 – 2003, Lines 366+369+371, based on R-1 Reports submitted by each Class I railroad to the ICC/STB.



TTCI Strategic Research

- ◆ 2005
 - ◆ Core program \$9.5 Million
 - ◆ Accelerated Projects \$2.99 Million
 - ◆ Total Research \$12.49 Million



Key Projects

- ◆ Rail Flaw Inspection
- ◆ Cracked Wheel Detection
- ◆ HAL Axle Design
- ◆ FAST/HAL Operations
- ◆ HAL Effects on IJs
- ◆ Car Inspection
- ◆ Cracked Axle Detection

