

Railroad Human Factor Safety Issues

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Presented to the Nuclear Waste
Technical Review Board

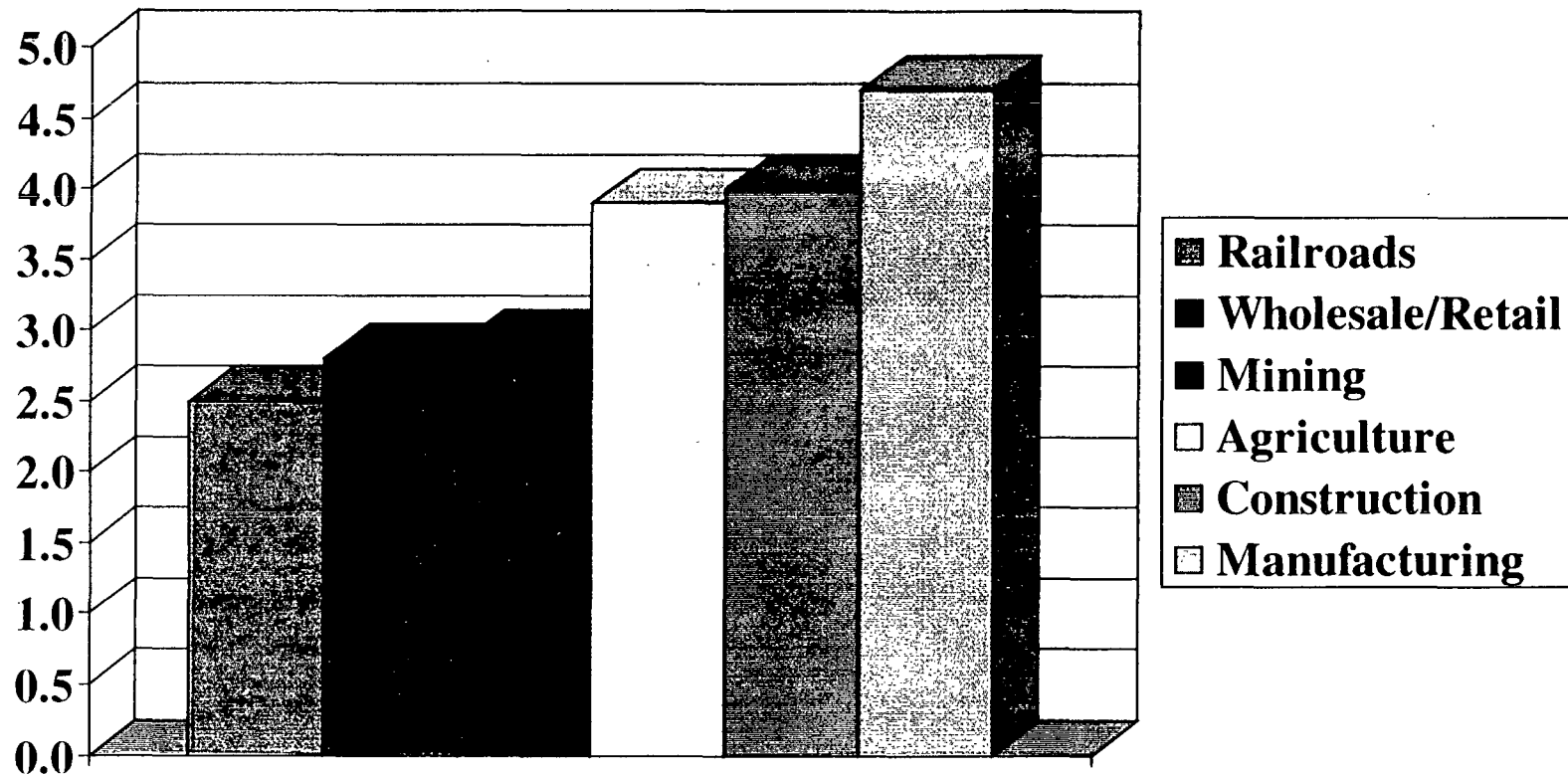
July 10, 2000

Railroad Human Factor Issues

- Current State of Railroad Safety
- Fatigue
- Crew Change Requirements
- Crew Resource Management

Employee Injury Rates vs. Other Industries

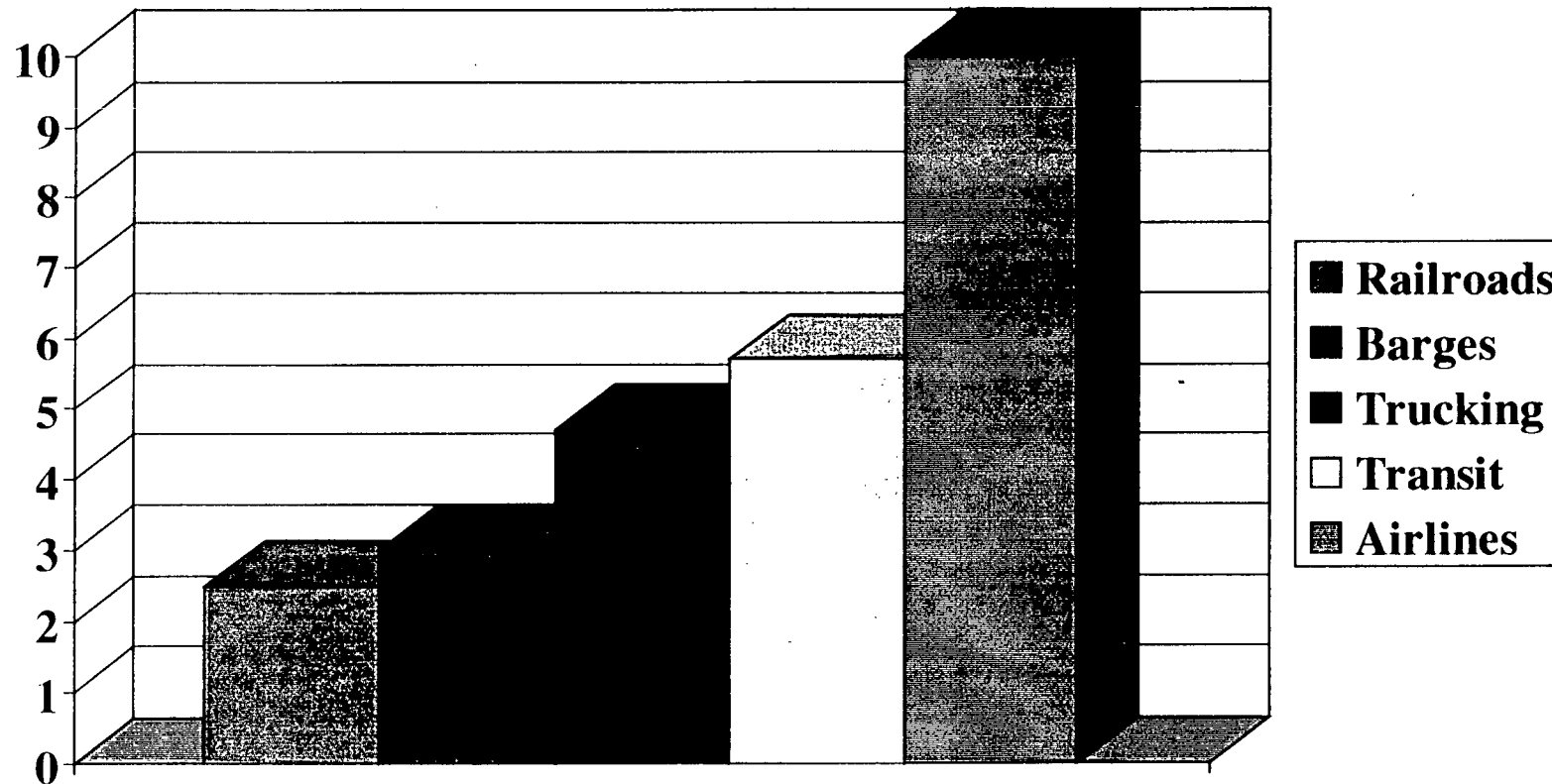
(Lost Workday Injuries per 100 Fulltime Employees, 1998)



Source: U.S. Bureau of Labor Statistics, <http://stats.bls.gov/os/ostb0759.pdf>

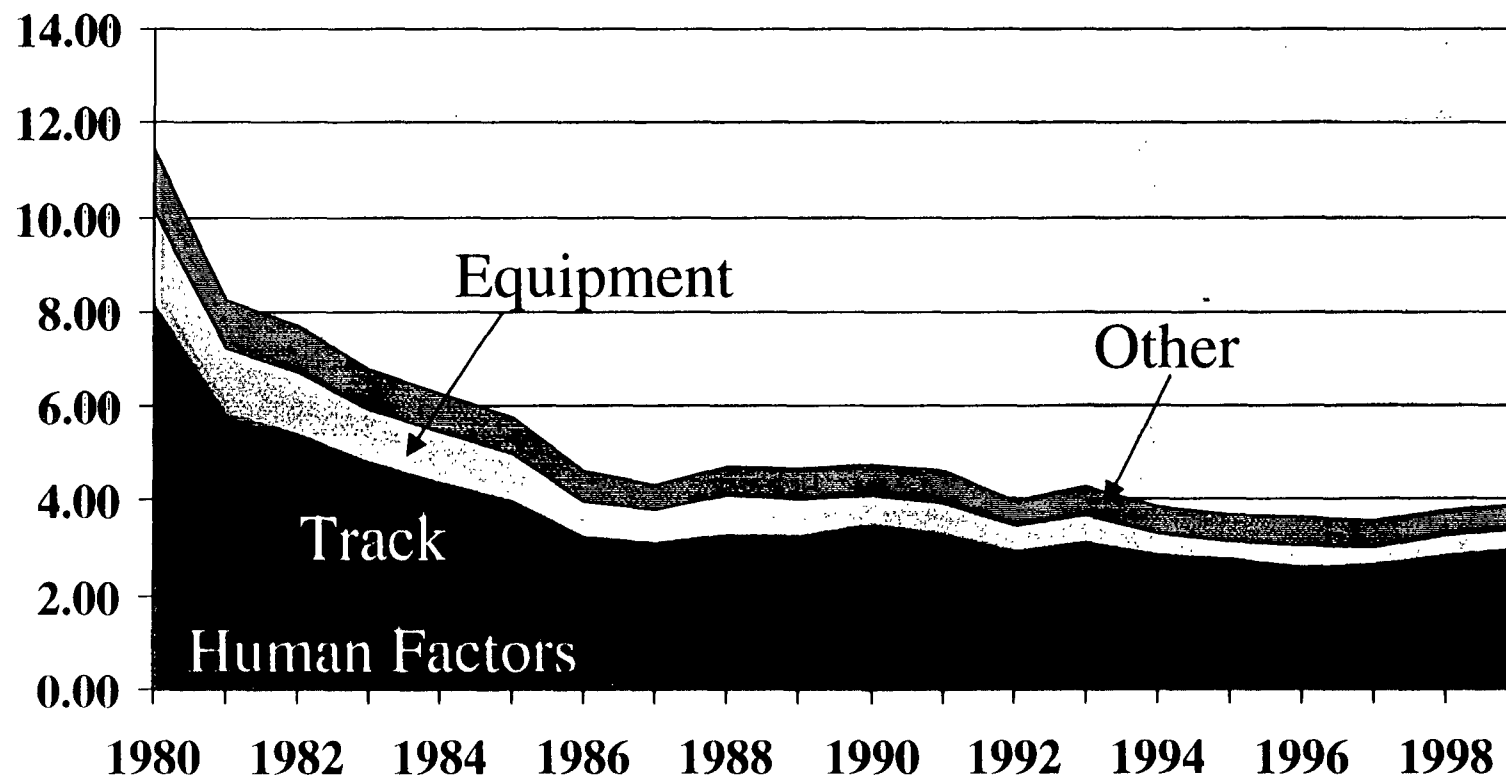
Employee Injury Rates in Transportation

(Lost Workday Injuries per 100 Fulltime Employees, 1998)



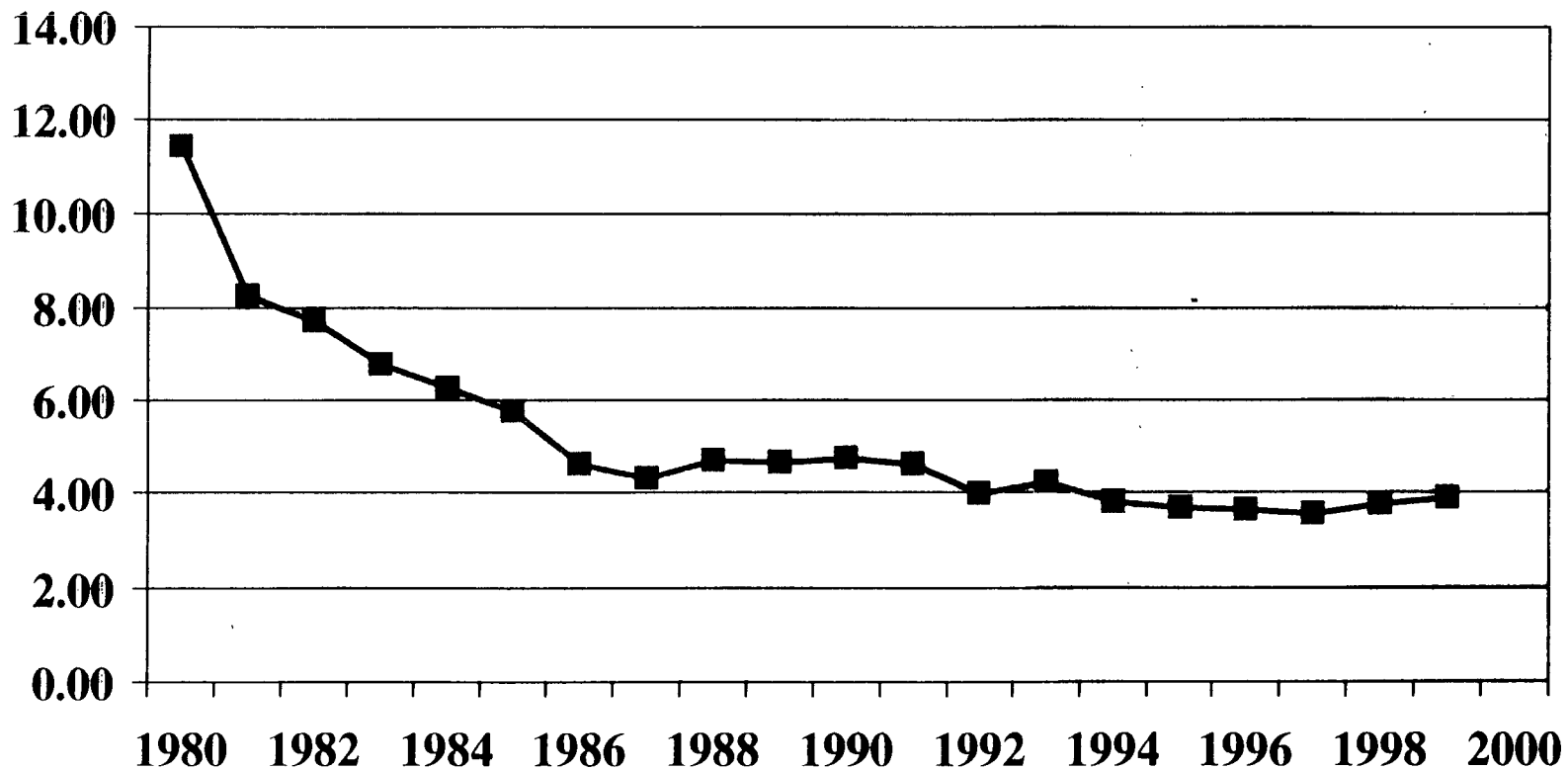
Source: U.S. Bureau of Labor Statistics, <http://stats.bls.gov/os/ostb0759.pdf>

Train Accidents per Million Train Miles by Cause Type



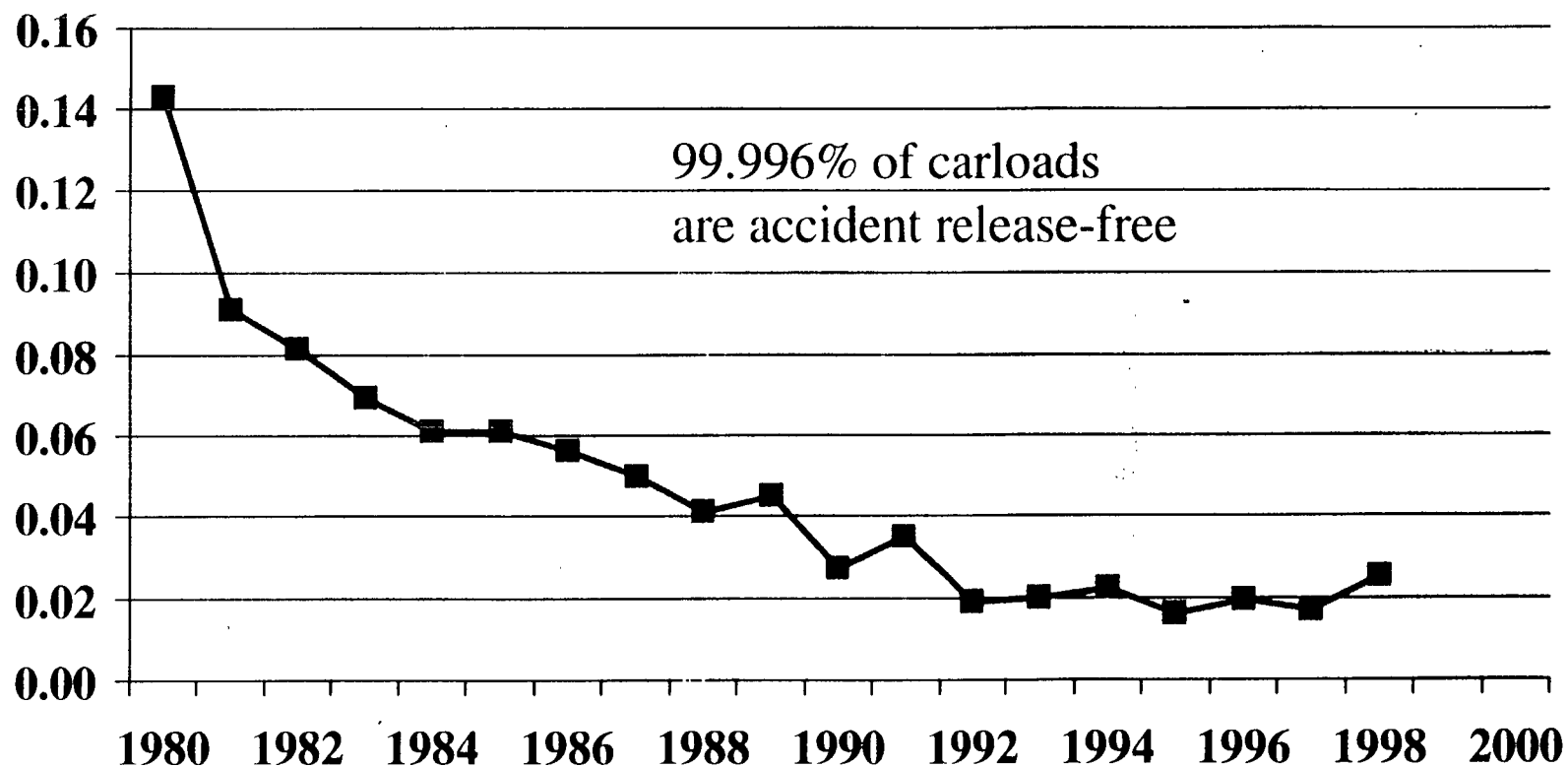
Sources: FRA, Accident/Incident Bulletins, Tables 19, 36;
FRA, Railroad Safety Statistics Annual Report, Tables 1-1, 1-2.

Train Accidents per Million Train Miles



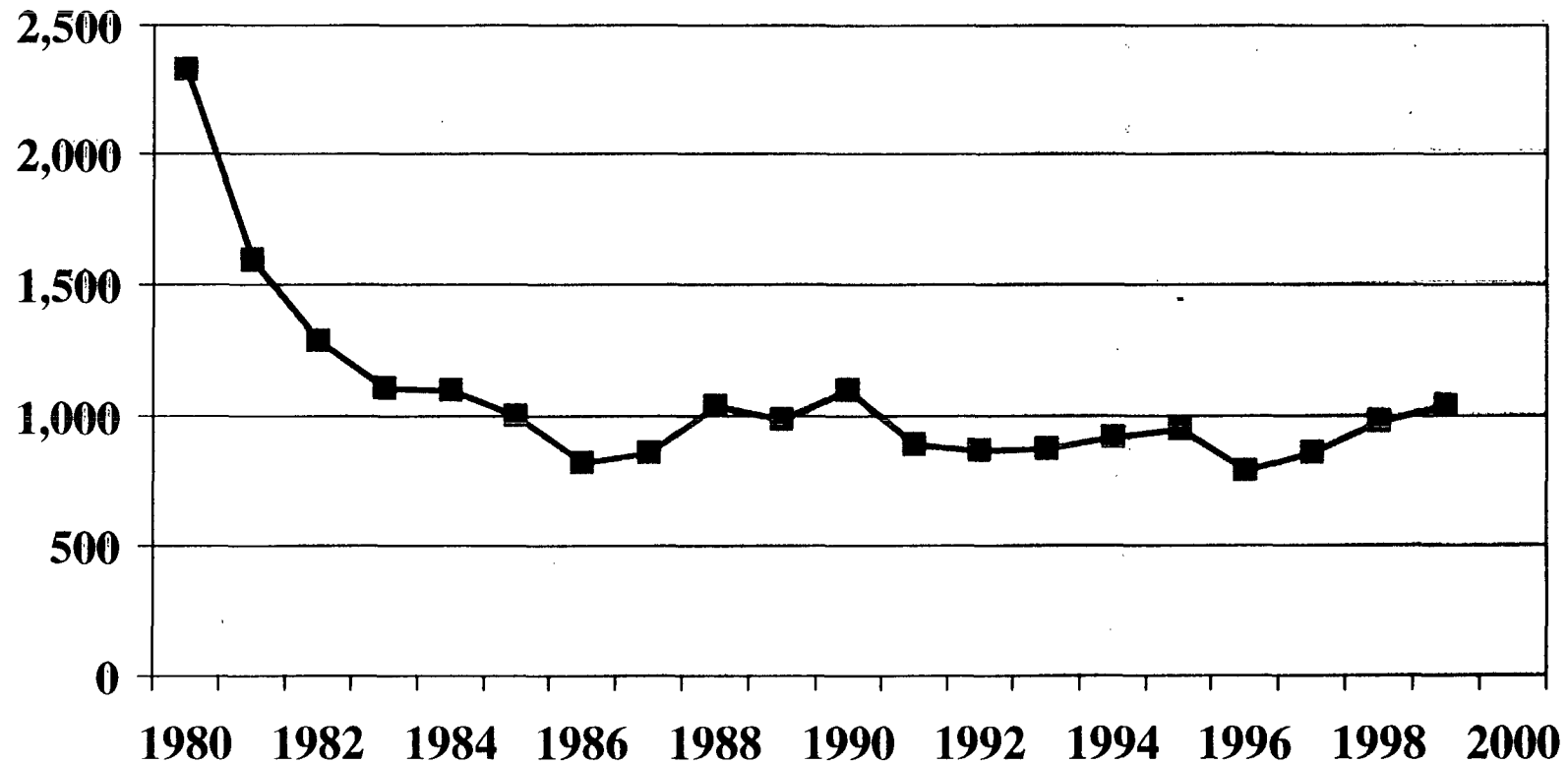
Sources: FRA, Accident/Incident Bulletins, Tables 19, 36;
FRA, Railroad Safety Statistics Annual Report, Tables 1-1, 1-2.

Hazmat Train Accidents with a Release per Thousand Hazmat Carloadings



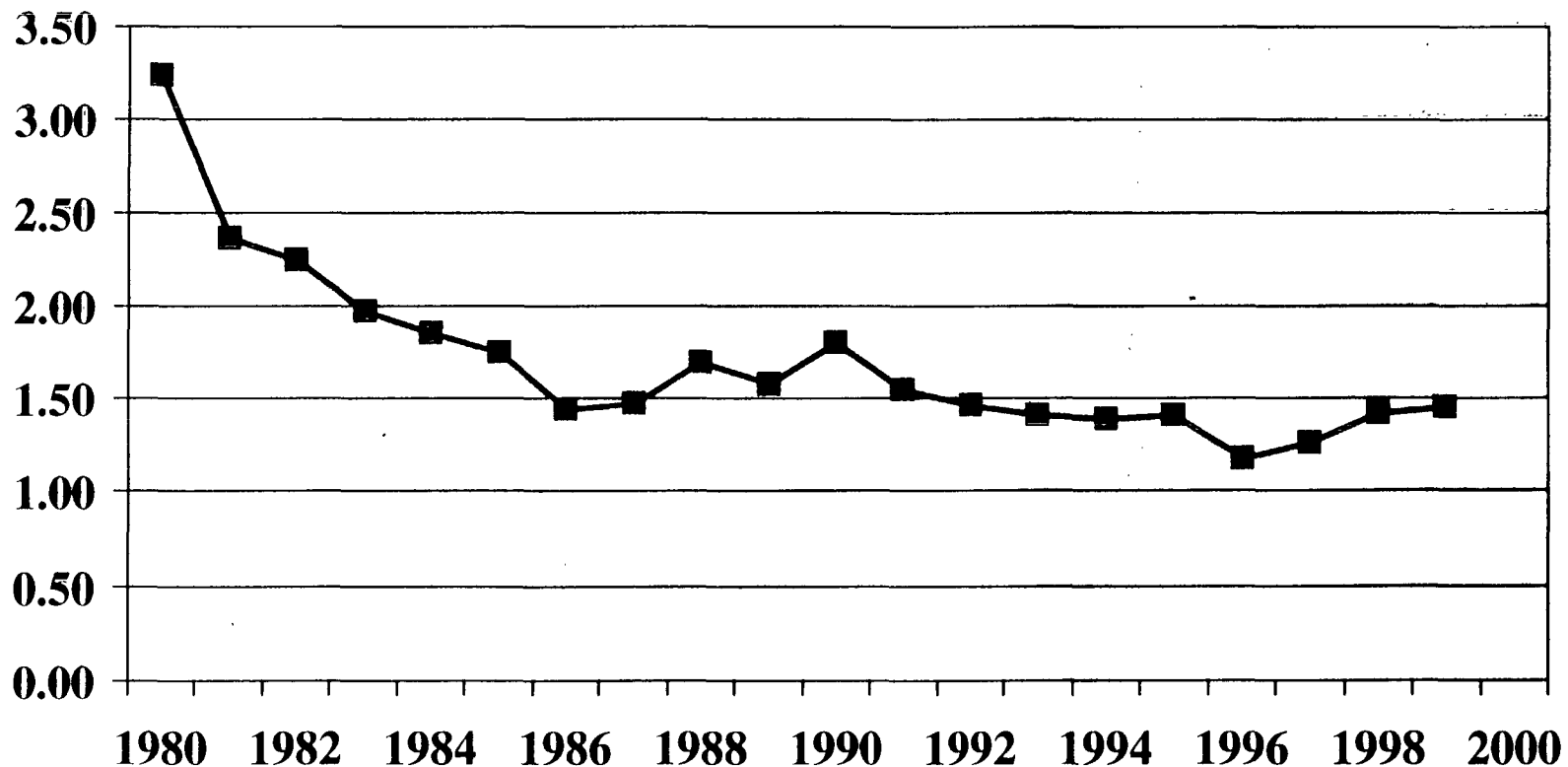
Sources: FRA, Accident/Incident Bulletins, Tables 26; ICC/STB Waybill Sample;
FRA, Railroad Safety Statistics Annual Report, Tables 6-1.

Human Factors-Caused Train Accidents



Sources: FRA, Accident/Incident Bulletins, Tables 19, 36;
FRA, Railroad Safety Statistics Annual Report, Tables 1-1, 1-2.

Human Factors-Caused Train Accidents per Million Train Miles



Sources: FRA, Accident/Incident Bulletins, Tables 19, 36;
FRA, Railroad Safety Statistics Annual Report, Tables 1-1, 1-2.

RR Industry Efforts to Address Fatigue

- AAR Work/Rest Task Force (since 1992)
 - Railroads, BLE, UTU
 - Review of extensive crew start data
- UTU/BLE National Agreements
 - Work/Rest Committees on Each Railroad
- Research on Indivi. RRs: e.g. CANALERT
- North America Rail Alertness Partnership
 - FRA, RRs, Labor, NTSB, Transport Canada

Fatigue Research Findings

- Accident potential increases when:
 - crew has been on duty more than nine hours, and it is between midnight and 6AM,
 - employee has worked 5 consecutive permissible shifts with avg. shift length > 10 hrs, or
 - > 6 consecutive permissible shifts in 7 days.
- But no one size fits all.

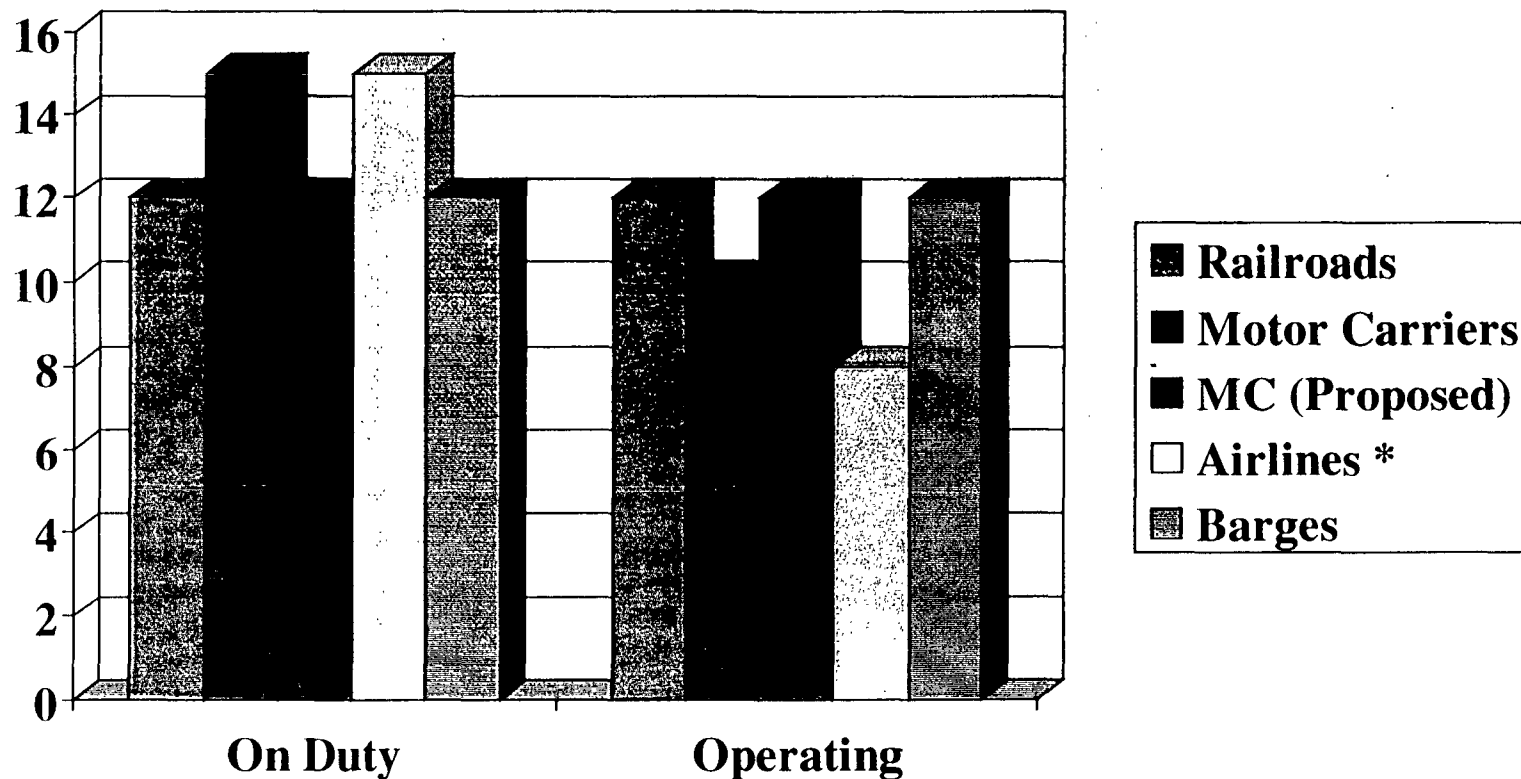
Examples of Fatigue Counter-measures Adopted on Indivi. RRs

- Assigned work and rest days
- Minimum of 8 hours undisturbed rest
- 7 AM markups after 72+ hours leave
- Increased assigned service
- Prompt relief after 12 hours
- Standards for lodging facilities
- Improved accuracy of line ups

Examples of Fatigue Counter-measures (continued)

- Time pools
- Sleep disorder screening
- Napping/Employee empowerment
- On-going committee review, modification of measures based on effectiveness

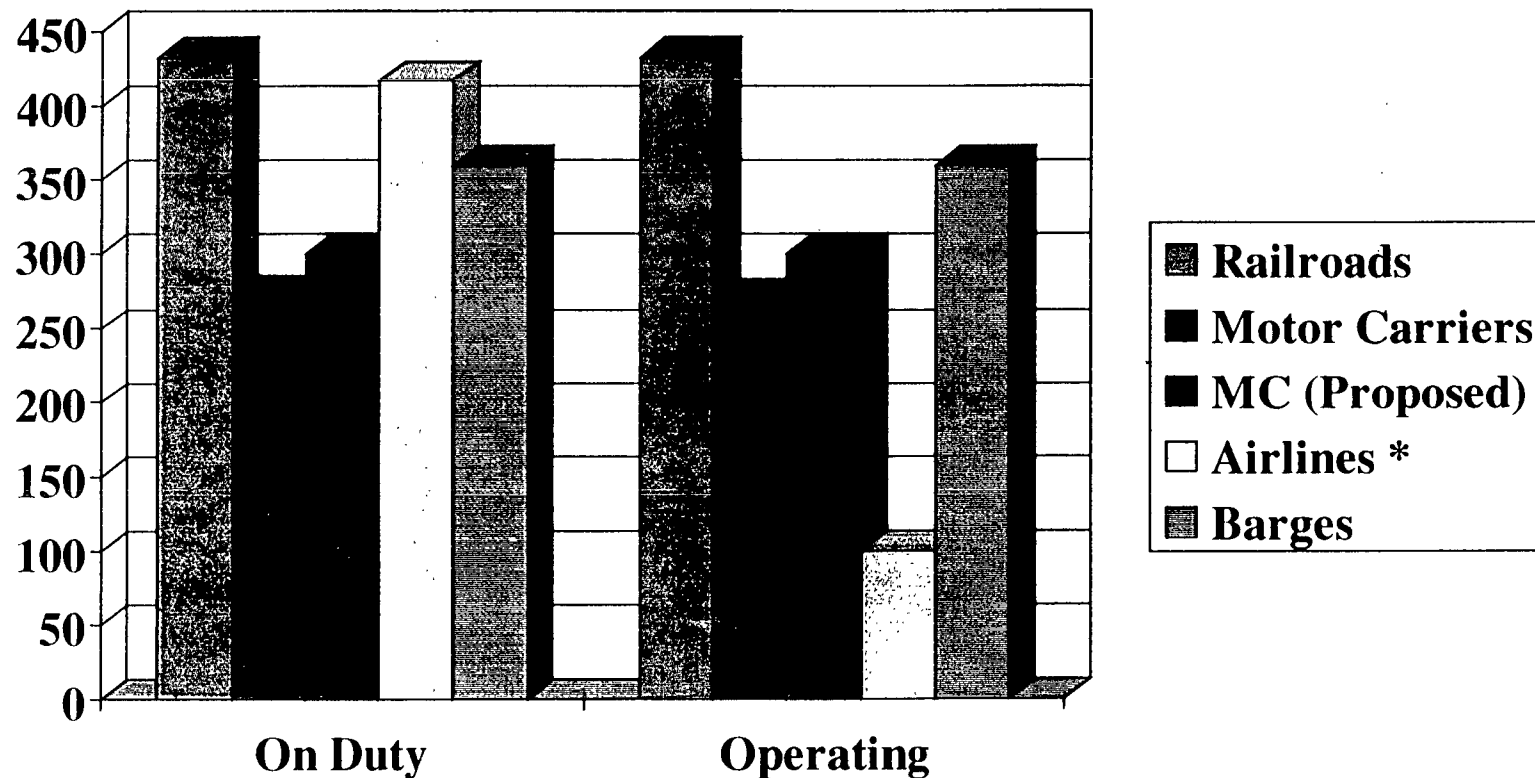
Crew Change Requirements: Maximum Hours per Shift



Note: * Airline time is scheduled, not actual time.

Sources: 49 USC 20102 to 21304; 49 CFR 228; 49 CFR 395.3; 49 USC 31133, 31136, 31502; 14 CFR 121.471(a), (b); 46 USC 8104 (a), (b), (d), (g), and (n).

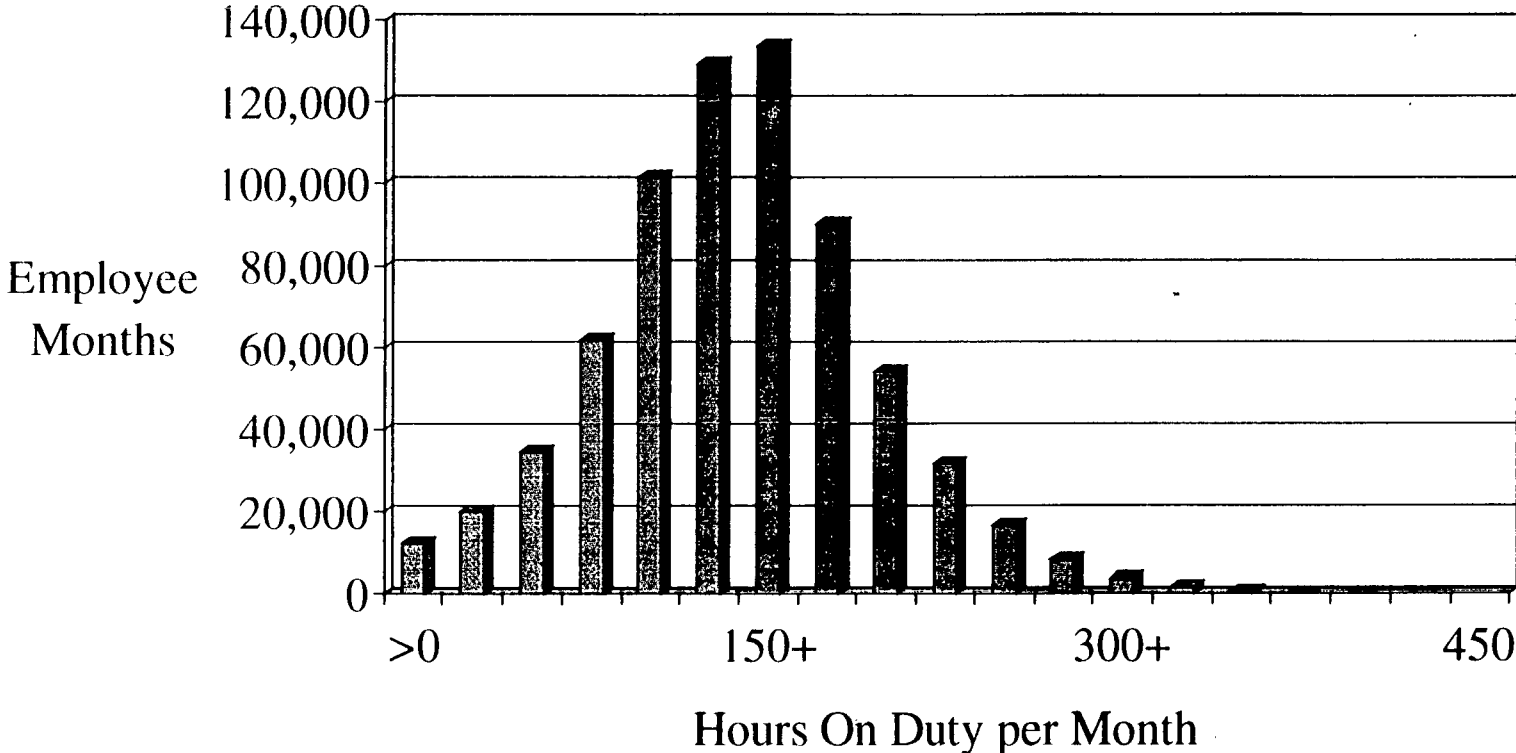
Crew Change Requirements: Theoretical Maximum Hours/Month



Note: * Airline time is scheduled, not actual time.

Sources: 49 USC 20102 to 21304; 49 CFR 228; 49 CFR 395.3; 49 USC 31133, 31136, 31502;
14 CFR 121.471(a), (b); 46 USC 8104 (a), (b), (d), (g), and (n).

Actual TE&Y Hours On Duty/Month: 4 Major U.S. RRs, 12-Mo., 1998-1999



Source: AAR analysis of railroad data.

Crew Resource Management

- NTSB Recommendation R99-27, following NS-CR fatal train collision at Butler, Indiana on March 25, 1998, to “develop, for all train crewmembers, crew resource management training that addresses:
 - Crewmember proficiency
 - Situational awareness
 - Effective communication and teamwork, and
 - Strategies for appropriately challenging and questioning authority.”

Crew Resource Management

- Developed and now widely practiced in the military and in the aviation industry.
- Includes well-developed, structured training exercises, performance measures, and feedback mechanisms.
- Results: 8% to 20% more teamwork behaviors by cockpit crews that have been trained than by crews not trained.

Crew Resource Management

- Current status in the railroad industry:
 - Published Crew Resource Management Manual
 - Produced video for wide distribution
 - Begun training of train crews
 - Working closely with FRA, BLE, UTU, short lines, and others.

Other RR Human Factors Measures to Improve Train Safety

- Massive Safety Programs (All Employees)
- T&E Crews, Signal, Train Dispatchers:
 - random & post accident alcohol/drug testing
 - operating rules training

Conclusions

- Our safety record is very good, and striving for continuous improvement.
- North American railroads are in the forefront of industrial research on fatigue.
- Science and flexible application, not regulation, should guide fatigue countermeasures. No one size fits all.
- We are willing to learn from others (e.g. crew resource management).