National Transportation Safety Board

Motorcoach Roadway Departure and Overturn
Interstate Highway 95 Northbound
Milepost 103.5
Doswell, Virginia
May 31, 2011, 4:55 a.m. EDT

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Doswell, Virginia Introduction

Pete Kotowski

Location

NTSB

Animation

- Accident sequence
  - Lane departure
  - Cable barrier impact
  - Overturn
- Initial speed

Animation

National
Transportation
Safety Board
Animation of Accident Reconstruction
Motorcoach Overturn
Doswell, Virginia
May31, 2011
HWY11MH010

Scene Photo

Scene Photo

Scene Photo

NTSB

Scene Photo

Injuries

- 58 Passengers
  - 4 fatal
  - 14 serious
  - 35 minor
  - 5 unknown
- Driver
  - minor

Safety Issues

- Driver fatigue
- Motorcoach roof structure and occupant protection
- FMCSA oversight

On-Scene Investigative Staff

- Member Weener – Member On-Scene
- Suzanne Rohde – Special Assistant
- Tom Zoeller – NTSB Executive Officer
- Don Karol – Director, Office Highway Safety
- Dave Rayburn – Highway Factors
- Dennis Collins – Human Performance Factors
- Jana Price – Human Performance Factors
- Gary Van Etten – Motor Carrier Factors
- Ivan Chung – RE/Motor Carrier Factors

On-Scene Investigative Staff

- Ron Kaminski – Survival Factors
- Tom Barth – Survival Factors
- Kristin Poland – Biomechanics
- Steve Prouty – Vehicle Factors
- Jennifer Morrison – Vehicle Factors
- Ben Xu – Vehicle Recorders
- Shane Lack – Simulations
- Elias Kontanis – Transportation Disaster Assistance
- Eric Emery – Transportation Disaster Assistance

On-Scene Investigative Staff

- Nick Worrell – Public Affairs
- Antion Downs – Public Affairs
- Terry Williams – Public Affairs
- John Whitener – Information Office
- Deb Bruce – Project Manager
- Pete Kotowski – Investigator-in-Charge

Report Development Staff

- Deb Bruce – Project Manager
- Gwynne O'Reagan – Editor
- Alice Park – Computer Simulation
- Christy Spangler – Computer Simulation
- Julie Perrot – Safety Recommendations
- Elisa Braver – Statistical Analysis
- Rob Molloy – Chief, Report Development

Parties to the Investigation

- Virginia State Police
- Virginia Department of Transportation
- FMCSA
- NHTSA
- Setra NA

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Human Performance

Dennis Collins

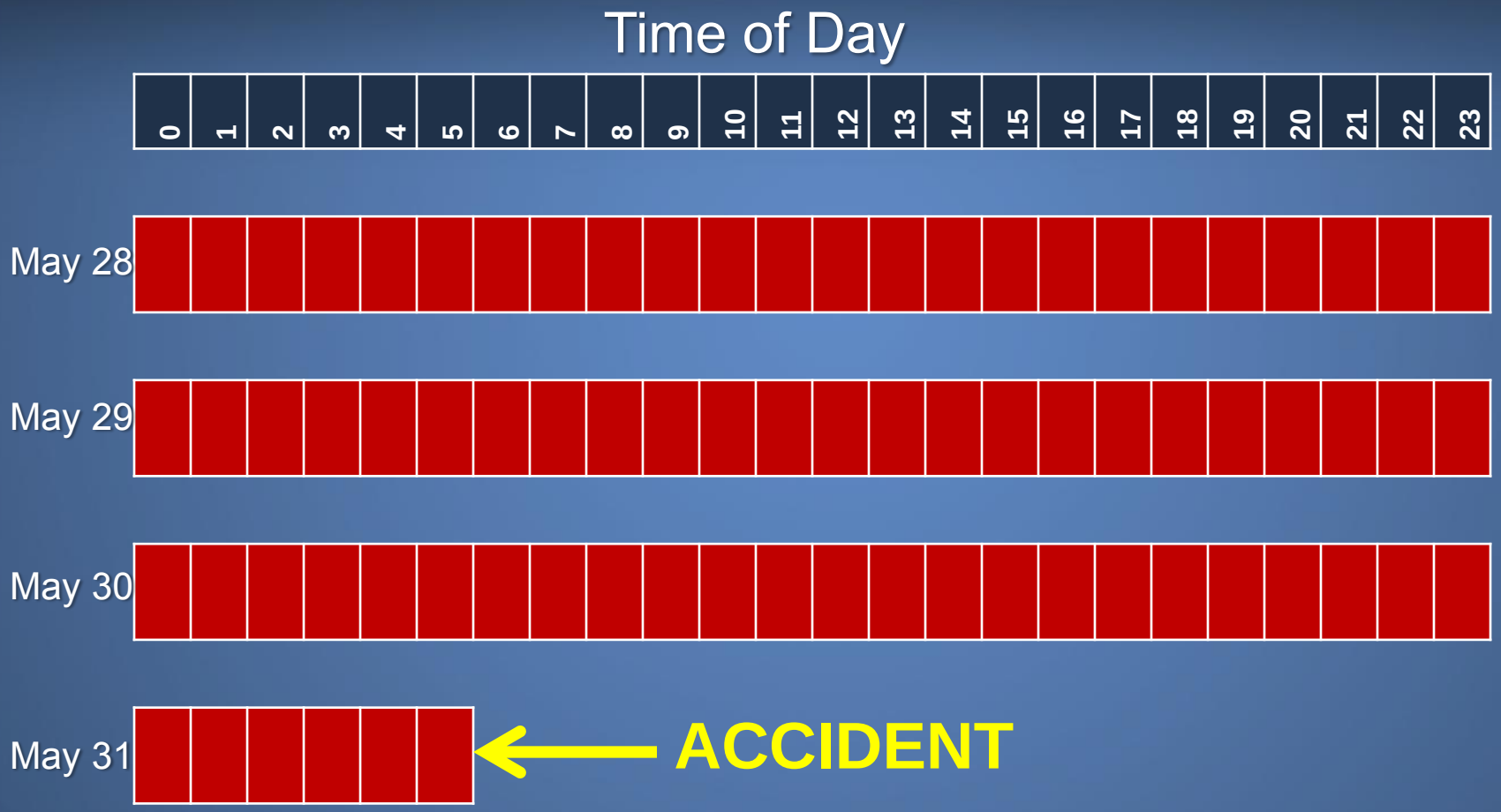
Overview

- Driver fatigue
  - Sleep opportunities
  - Other factors indicating fatigue
  - Driver performance
- Fatigue management programs

Driver's Sleep Opportunities

- Driver's logbook
- Cell phone records
- On-scene statement
- In total, indicate limited opportunities for quality, restorative sleep

Driver Sleep Opportunities



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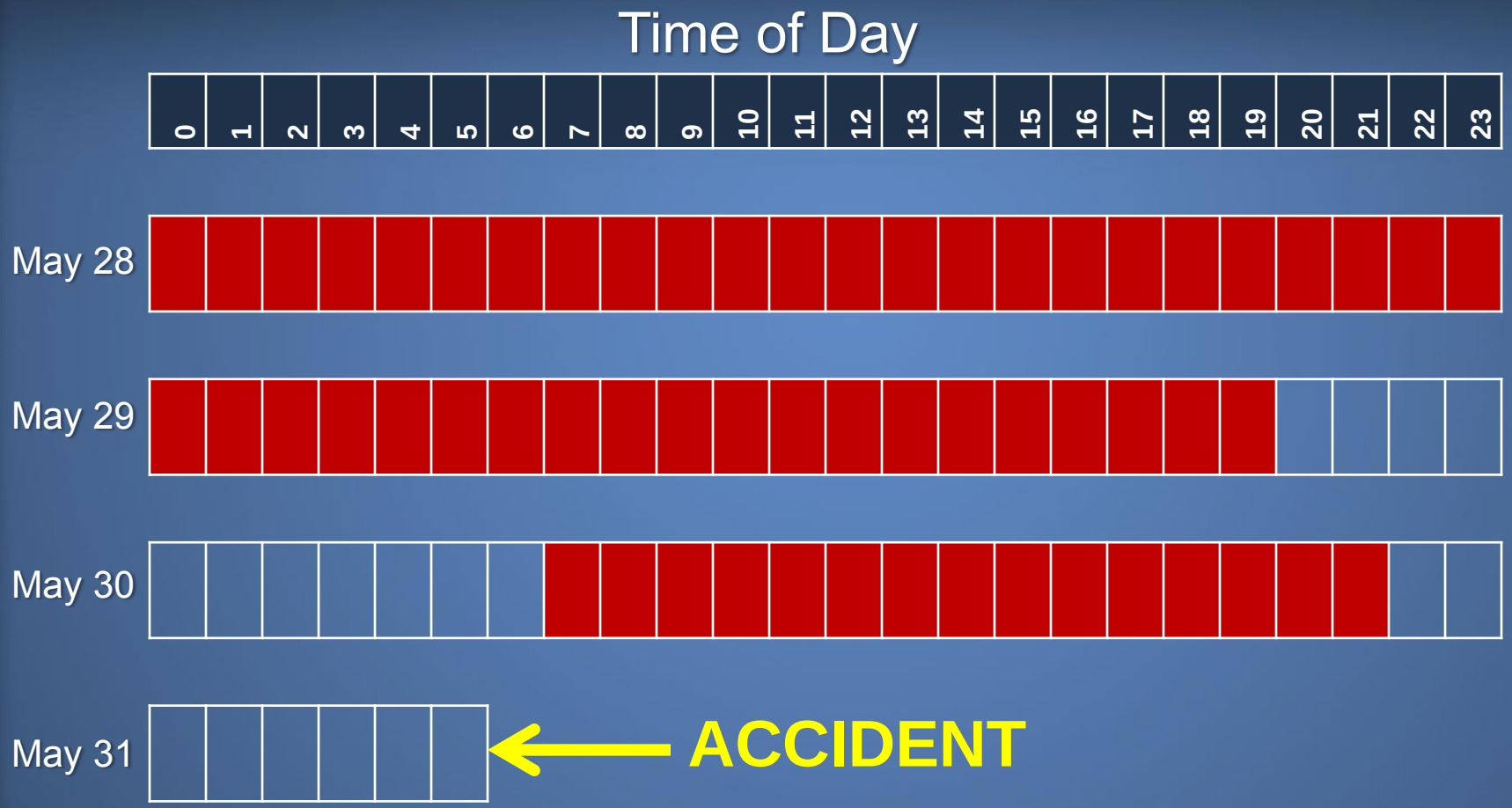
Driver Sleep Opportunities



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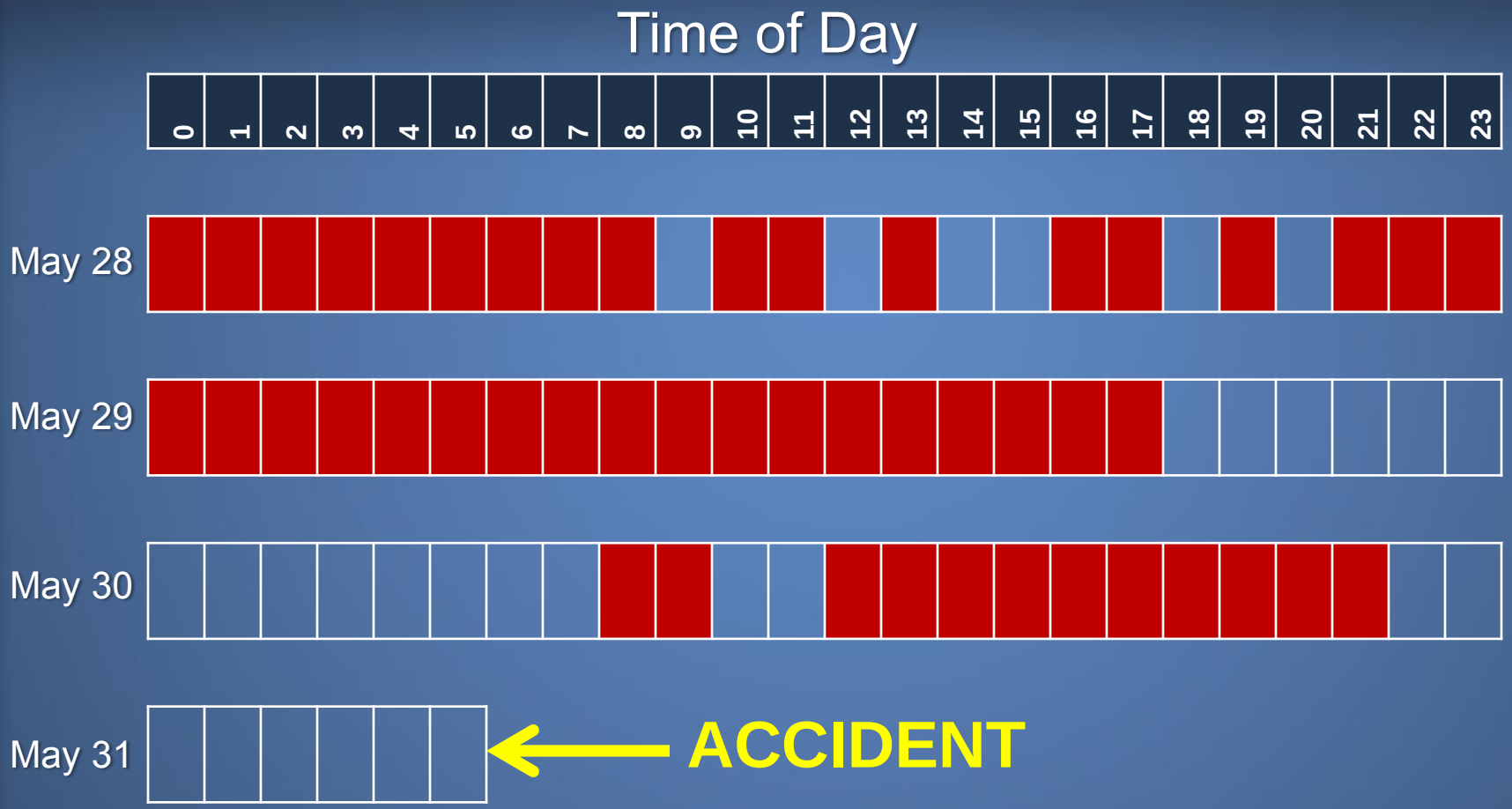
Driver Sleep Opportunities



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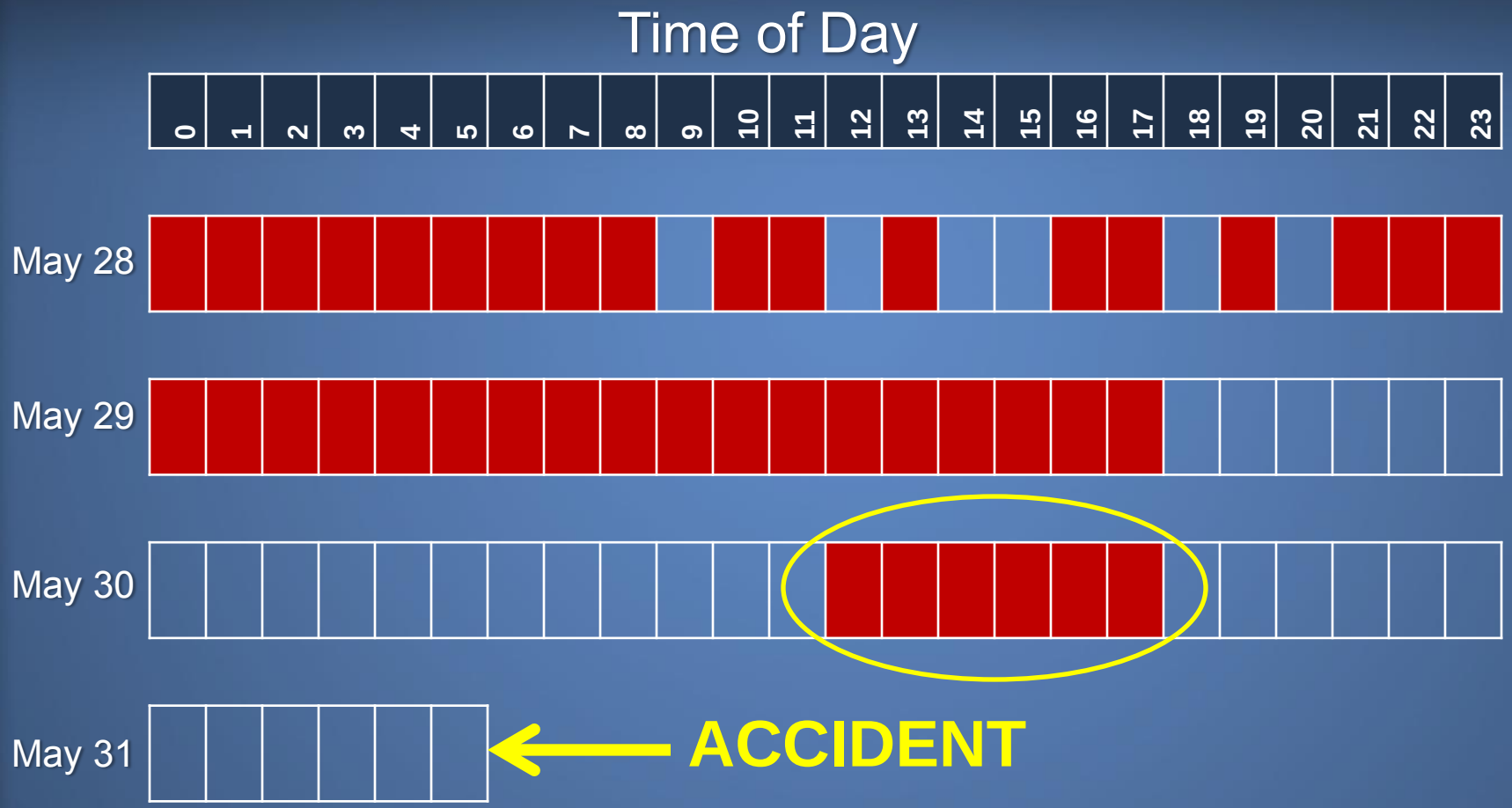
Driver Sleep Opportunities



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Fatigue Factors

- Inverted sleep schedule
  - Poor sleep quality
  - Short sleep lengths
  - Degraded performance
- Time of day (circadian rhythms)
  - Accident in lowest ebb
  - Lowest point = highest risk

Driver Performance

- Swerving / poor lane keeping
- Possible microsleep
- Cell conversation
- Caffeine consumption
- Angle of departure

Fatigue Management Programs

- Many ways to address fatigue; some not effective in this case
- Good carriers will voluntarily adopt; bad carriers will not
- Accident demonstrates need for monitoring

Overnight Driving Fatigue

- Overnight fatigue in multiple investigations
- FMCSA has begun research for passenger-carrying hours-of-service rules

Summary

- Driver was fatigued and fell asleep
  - Restricted sleep opportunity
  - Inverted schedule
  - Circadian low
- Proposals on fatigue management and hours-of-service

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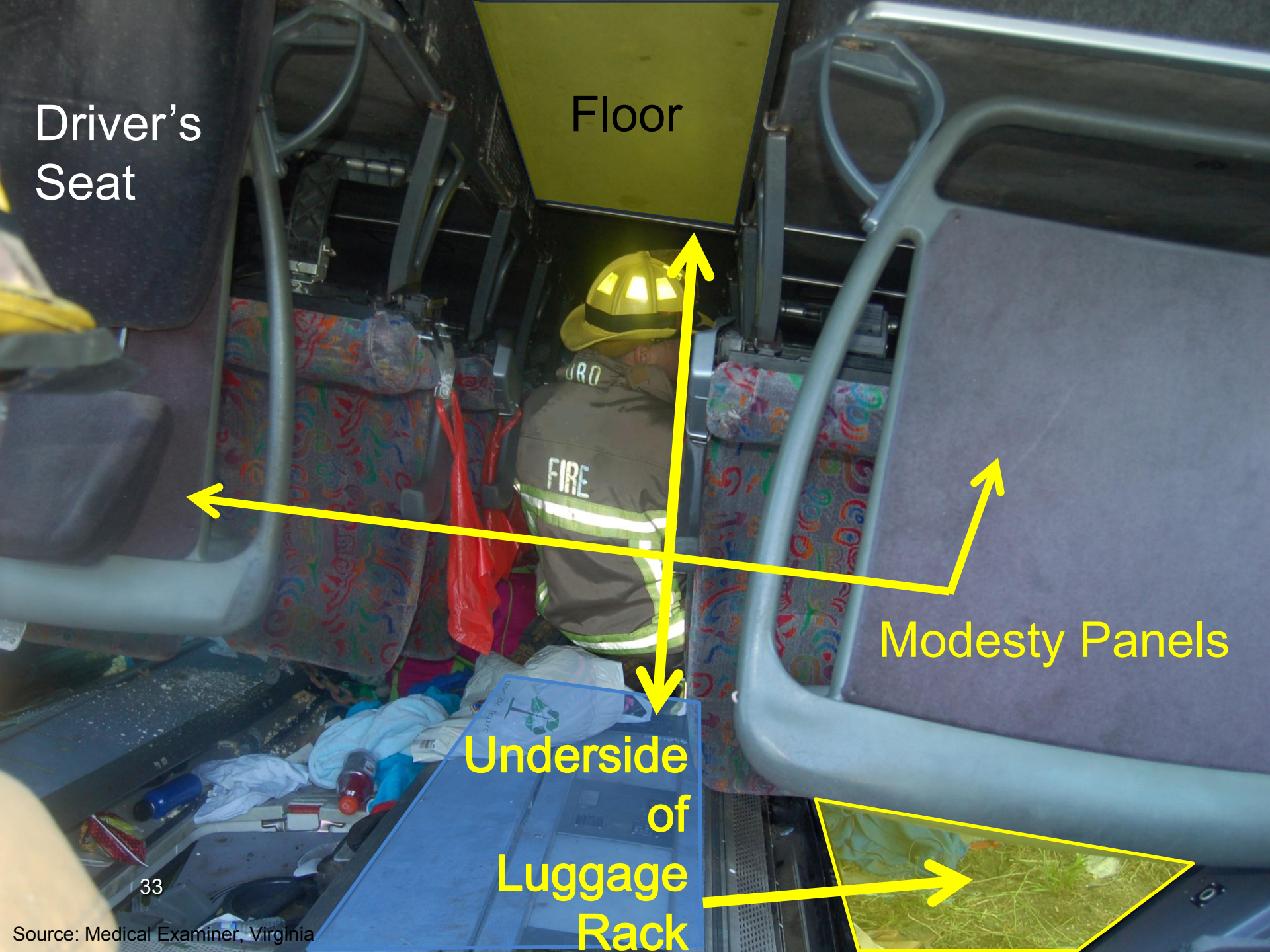
Crashworthiness and Occupant Protection

Kristin Poland, Ph.D.
Ronald Kaminski

Injury Information

- Motorcoach occupants
  - 58 passengers
    - 4 fatalities
    - 14 serious injuries
    - 35 minor injuries
    - 5 unknown injury status
  - Driver – minor injuries



Source: Medical Examiner, Virginia

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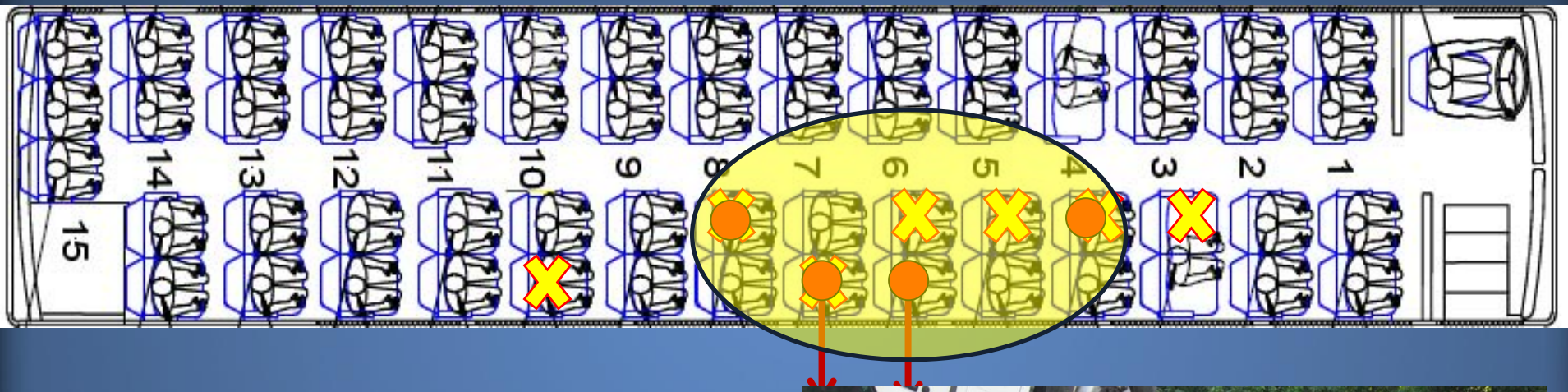
Damage to Seatbacks

Seating Chart

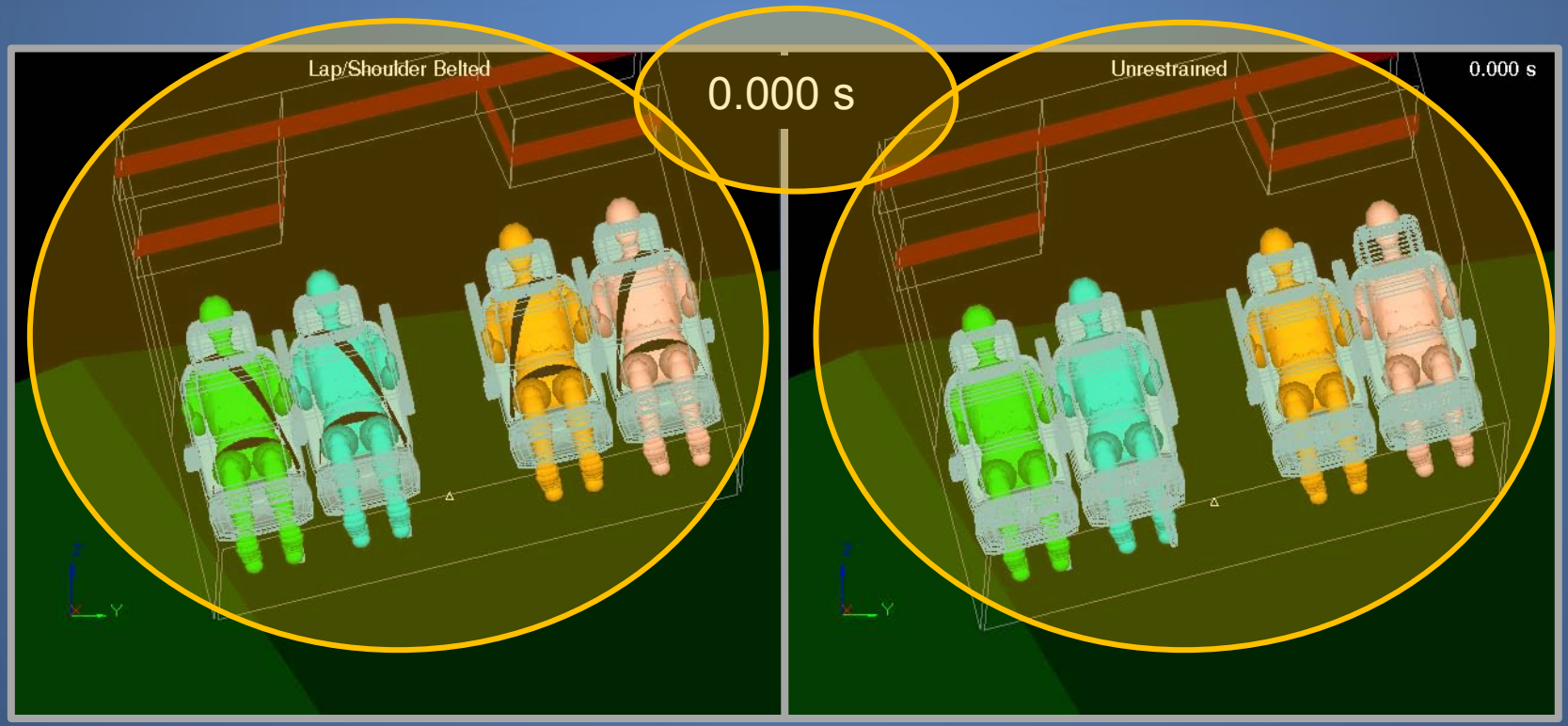


Occupant Protection

- NHTSA published a Notice of Proposed Rulemaking
  - Require passenger lap/shoulder belts in new motorcoaches
- Vertical intrusion on lap/shoulder-belted occupants?

Occupant Kinematics Simulation

- Representing area of maximum vertical roof crush



Occupant Kinematics Simulation

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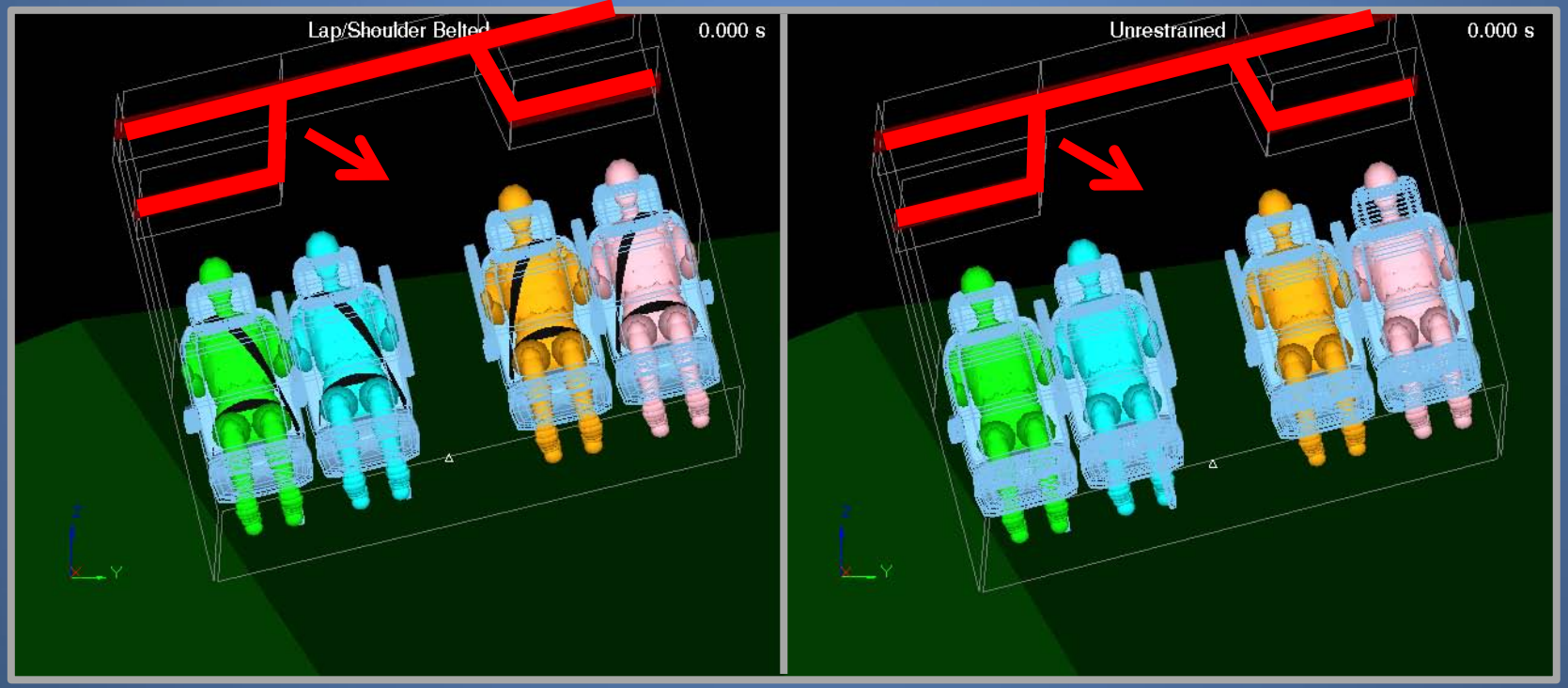

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Occupant Kinematics Simulation

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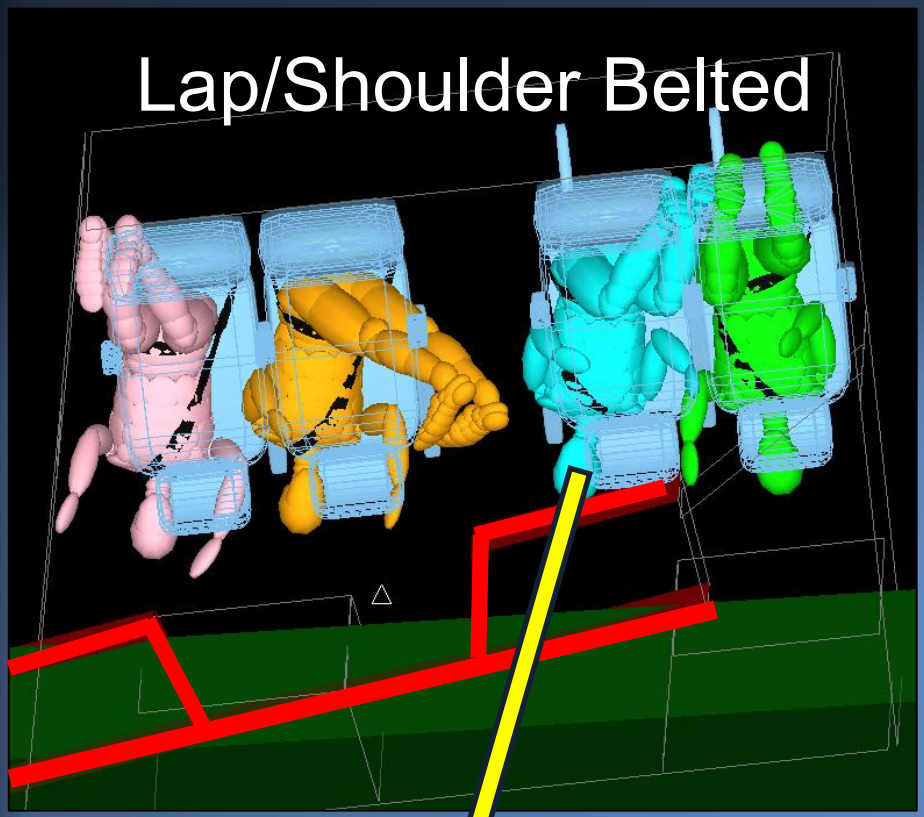

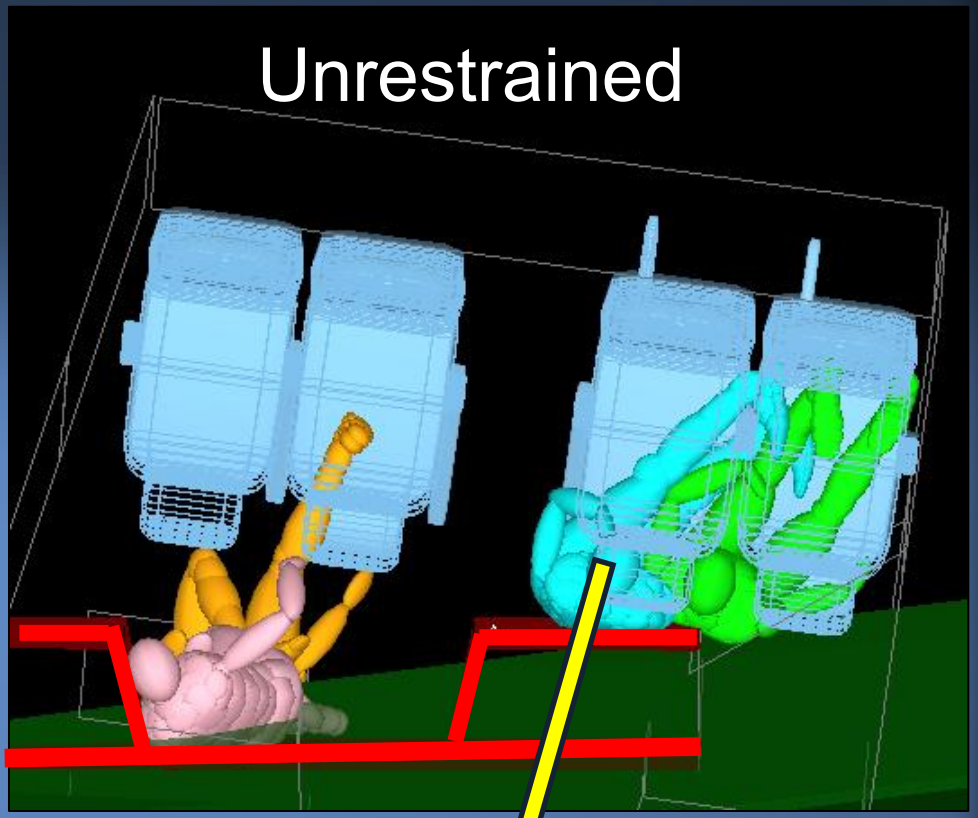

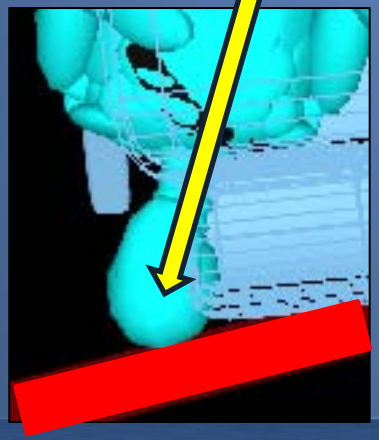

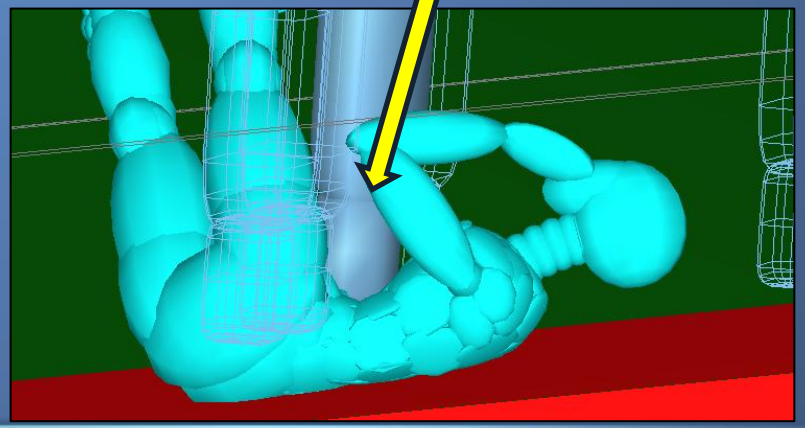

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Summary

- Four fatalities resulted from crushing injuries due to roof collapse
- Loss of window glazing contributed to fatalities
- Survivors were injured due to lack of restraint system
- Combination of restraint system and roof strength are needed

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Motor Carrier Factors

Gary Van Etten

Overview

- Operational History of Sky Express
- FMCSA Oversight and safety rating methodology
- Need for improvement in New Entrant Safety Audit program

Sky Express History

- Began operations in April 2005
- Sky Express failed to schedule a new entrant safety audit until February 2007

Sky Express History

- The audit revealed weaknesses
  - Driver qualification files
  - Driving/employment histories
  - Vehicle maintenance
- Permanent registration March 11, 2008

FMCSA Oversight

- Between 2007 and 2011
  - 2008 – satisfactory
  - 2009 – unsatisfactory upgraded to conditional
  - 2010 – satisfactory
  - April 2011 – unsatisfactory
  - May 2011 – not-rated

FMCSA Oversight

- 2009 and 2011 Sky Express hired consultants to assist in submitting a safety improvement plan.
- Record indicated continued adverse conditions in Factor 2 – Driver and Factor 4 -Vehicle

FMCSA Safety Rating Methodology

- 49 CFR Part 385 Appendix B - compliance review methodology
  - Acute
  - Critical
  - Crash rate
  - OOS vehicle inspection rate over 34%

FMCSA Safety Rating Methodology

- All the Sky Express compliance reviews noted
  - No safety management system
  - Lax recording keeping
  - Haphazard HOS monitoring
  - No in-service training
- No long term program to comply with the safety regulations
- None of these factors affect a carrier's safety rating

FMCSA New Entrant Safety Audit

- 49 CFR Part 385.309
  - Provide educational and technical assistance
  - Make an assessment of the new entrant's basic safety management controls
- Patterned after the compliance review using acute and critical violations
- FMCSA Safety Management Cycle

Summary

- The lack of a corporate safety culture and adequate safety controls
- The reviews by the FMCSA did not address these weaknesses

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