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Motorcoach Collision With Combination Vehicle After Traffic Break

Interstate Highway 10 Westbound
Palm Springs, CA
October 23, 2016

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Opening Statement

Robert Accetta

Investigator-In-Charge

Crash Sequence

- California Highway Patrol (CHP) — 5:07
  - Initiated traffic break
- International truck-tractor and Utility semitrailer — 5:12
  - Stopped at traffic queue
- Traffic released — 5:14
  - Combination vehicle remained stopped
- Motor Coach Industries (MCI) — 5:16
  - 47-passenger motorcoach

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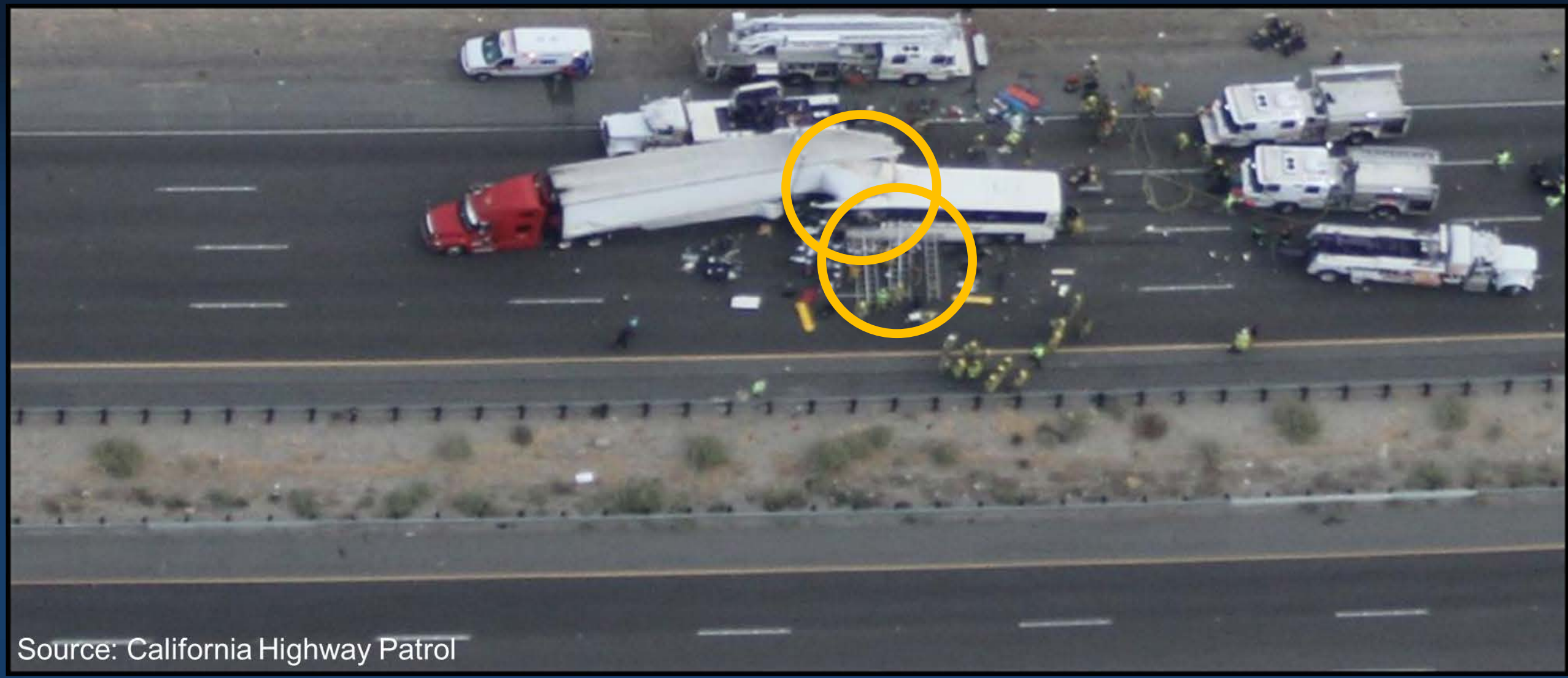
Source: California Highway Patrol

Injuries

- Motorcoach
  - Driver fatality
  - 12 passenger fatalities
  - 30 passengers serious-to-minor injuries
- Truck
  - Driver minor injuries

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Video Evidence and Data Recording Systems

- Surveillance camera videos
- CHP in-car videos
- Truck engine control module
- Truck telematics

NTSB On-Scene Staff

• Earl Weener, PhD	Board Member
• Kristen Shea	Special Assistant
• Robert Accetta	Investigator-in-Charge
• Kenny Bragg	Human Performance Factors
• Shawn Currie	Motor Carrier Factors
• Jerome Cantrell	Vehicle Factors
• Dan Walsh, PE	Highway Factors
• Thomas Barth, PhD	Survival Factors

NTSB On-Scene Staff (continued)

• Don Karol	National Resource Specialist
• Bob Squire	Technical Reconstruction
• Jane Foster	Vehicle Recorder Specialist
• Keith Holloway	Media Relations
• Eric Weiss	Media Relations
• Mike Crook	TDA
• Kimberly Frierson	TDA
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• Dan Horak, PhD	Video Analysis
• Mary Pat McKay, MD, MPH	Medical Officer
• Julie Perrot	Safety Recommendations

Parties to Investigation

- Federal Motor Carrier Safety Administration (FMCSA)
- California Department of Transportation (Caltrans)
- California Highway Patrol (CHP)

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Safety Issues

- Traffic break policies
- Obstructive sleep apnea and diabetes in commercial vehicle drivers
- Oversight of commercial vehicle drivers and carriers
- Emergency egress
- Collision avoidance systems

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Traffic Break Policies

Dan Walsh

Overview

- Traffic break performed by CHP in support of utility work
- Safety policies for temporary work zones
- Caltrans implementation of traffic breaks
  - Prevalence of traffic breaks performed in other states
- Postcrash actions implemented by Caltrans

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Utility Work – Southern California Edison

- Consisted of transferring 6 transmission lines
- Stage 1 – transferring top 3 lines
- Stage 2 – transferring bottom 3 lines
- Stage 3 – removing wood H-frame structure

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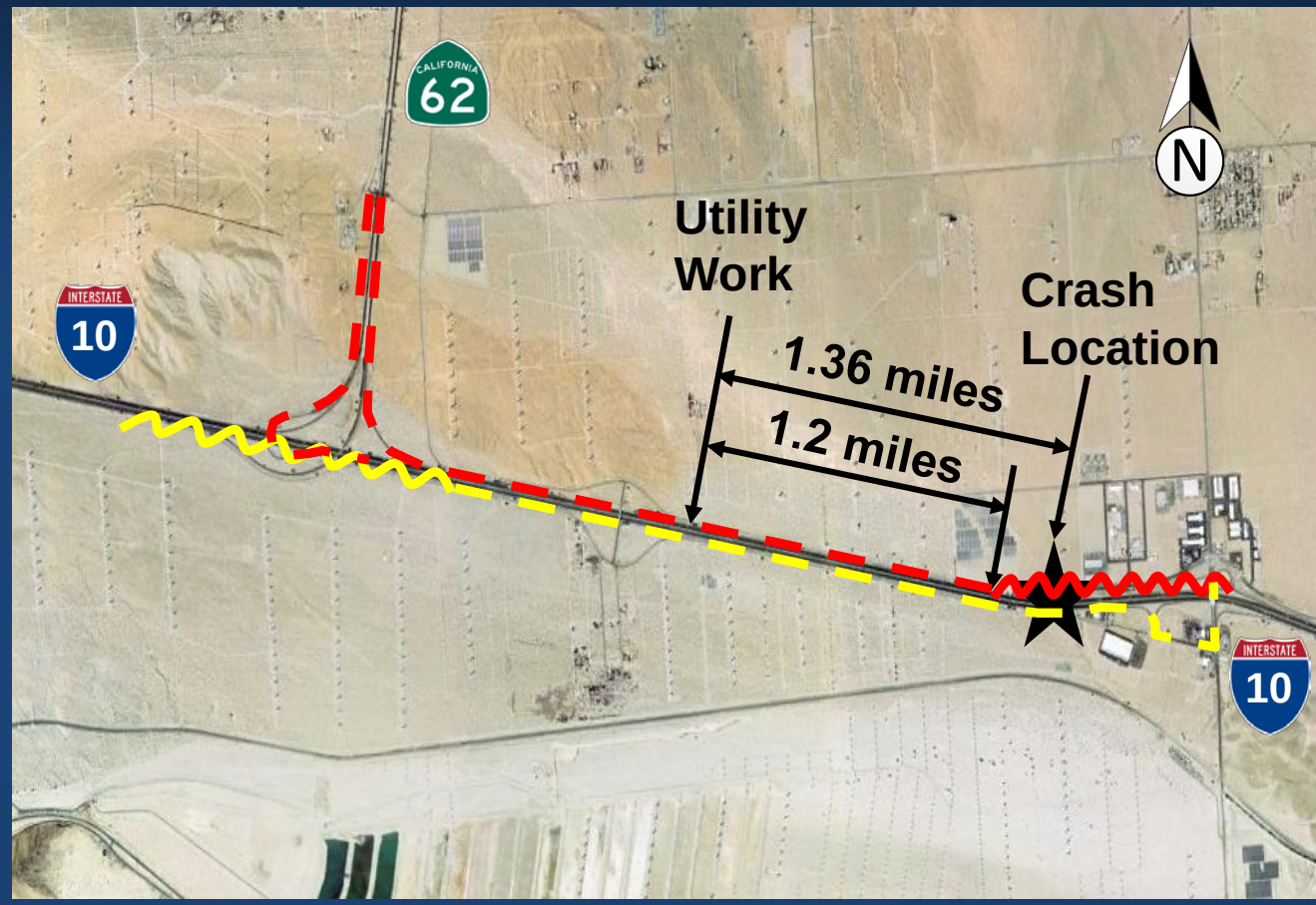
Traffic Break Performed by CHP

- Traffic break in eastbound and westbound directions
- A serpentine maneuver across all 4 travel lanes
- Only traffic break performed before the crash
- No portable changeable message signs (PCMS)



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Safety Policies for Temporary Work Zones

- FHWA and Caltrans regulate temporary work zones
- Criteria for significant project
  - FHWA Rule on Work Zone Safety and Mobility – more than 3 days
  - Caltrans – more than 30 minutes
- Traffic stoppage – planned for 5 minutes
  - Considered a nonsignificant project

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Caltrans Implementation of Traffic Breaks

- Issued 461 permits for traffic breaks in 2014-2015
- Did not require the use of advance warning devices
- Warning devices may have modified the motorcoach driver's expectations
- Additional law enforcement vehicle
  - Provide warning to approaching vehicles
  - Monitor dispersal of traffic queue

Traffic Breaks in Other States

- FHWA inquiry with Divisional Offices
  - More than 40% of responding states do not have standard policies
- 3 states with standard policies
  - All 3 states use PCMS
  - 2 states use an additional law enforcement vehicle on the shoulder

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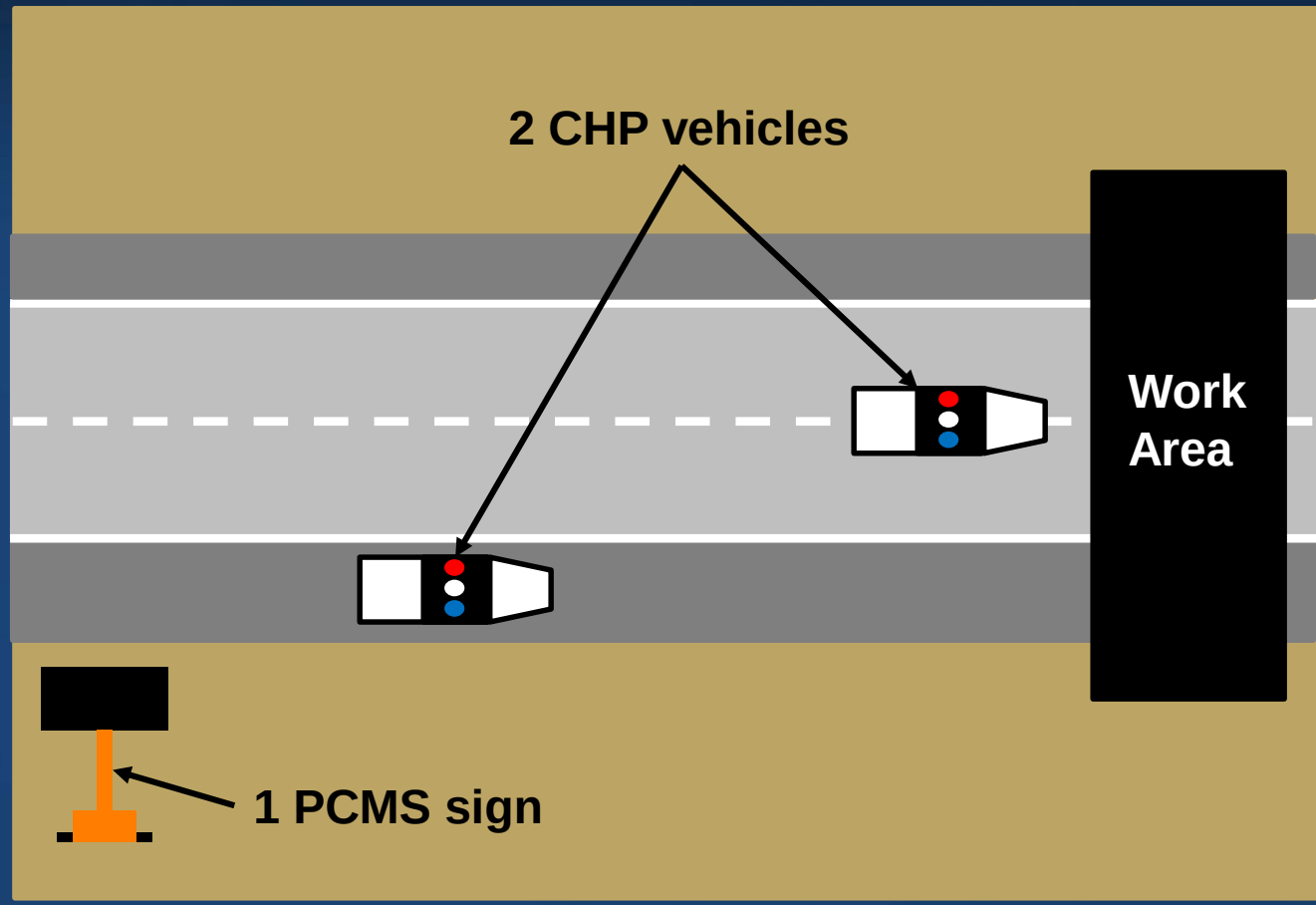
Postcrash Actions Implemented by Caltrans

1. Minimum of 2 CHP vehicles in each direction
2. At least 1 PCMS
3. Meeting 2 weeks prior to start of work
4. Scheduled for Sunday mornings from daylight to 10 a.m.



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Summary

- Caltrans did not have a policy for conducting traffic breaks
- Caltrans made improvements after the crash
  - Includes advance warning devices and multiple law enforcement vehicles
- FHWA plays a key role in urging states to adopt policies through uniform guidance
- Informing local law enforcement agencies

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Truck and Motorcoach Driver Performance

Kenny Bragg

Overview

- Truck driver performance
  - Fatigue
- Motorcoach driver performance
  - Fatigue
  - Visibility

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Exclusions

- Alcohol or other drugs
- Licensing/experience
- Cell phone distraction
- Weather

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Truck Driver Performance

- Traffic stopped about 7 minutes
- Truck stopped about 650 feet from beginning of the traffic break
- Truck stopped about 4 minutes
  - Was stopped for 2-3 minutes after traffic was released

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Truck Driver Performance (continued)

- Did not move the truck when traffic was released
- Stated he had been stopped 25-30 minutes
  - Actual time was about 4 minutes
- Likely asleep when the crash occurred

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Truck Driver Fatigue

- Could not remember the time and the amount of sleep he obtained
- Examination of GPS data and phone records
  - 11-hour sleep opportunity each of the 3 nights leading up to the crash
  - Had adequate opportunity for sleep

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Truck Visibility and Motorcoach Driver Perception

- Truck visibility
  - Retroreflective rear of the trailer
  - Tail and marker lights, no hazard lights
  - Visible for 20 seconds
- Diminished perceptual cues indicating the stopped truck

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Motorcoach Driver Expectations and Performance

- Expectations
  - No advance notice of stopped traffic
  - Traffic flowed normally around the stopped truck
- Precrash actions
  - No precrash brake application
  - Lack of adequate steering response

Motorcoach Driver Fatigue

- Worked the night of October 21-22
  - Two nights before the crash
- 3 hours of sleep in the afternoon of October 22
  - 1 day before the crash
- 1 hour of sleep before leaving the casino
- In the 35 hours before the crash, the driver obtained about 4 hours of sleep

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Summary

- Truck driver likely fell asleep
- Truck driver had adequate opportunity for sleep
- Stopped truck was visible
- Motorcoach driver likely fatigued

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Obstructive Sleep Apnea and Diabetes in Commercial Vehicle Drivers

Mary Pat McKay, MD, MPH

Overview

- Truck driver
  - Likely moderate-to-severe obstructive sleep apnea (OSA)
- Motorcoach driver
  - Poorly controlled, likely undiagnosed diabetes

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Truck Driver

- 50-year-old male, 6 feet 2 inches tall
- Weight variously recorded as 350 – 390 pounds
  - BMI: 44.9 – 50.0 kg/m^2
  - Extreme obesity
- Received commercial driver's license (CDL) medical certification in January 2015
- Reported no medical conditions or medications

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Truck Driver and OSA

- Risk factors: older age, male gender, obesity
  - No OSA screening by healthcare providers
- Moderate-to-severe OSA and obesity
  - 56% of patients with a BMI between 40 and 50 kg/m^2
  - 80% of patients with a BMI between 50 and 60 kg/m^2
- Truck driver likely had moderate-to-severe OSA
  - Fell asleep during the traffic break

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OSA: NTSB and FMCSA History

- 2009 NTSB recommendations
  - Develop and require OSA screening protocols
- March 2016: FMCSA and FRA release advance notice of proposed rulemaking (ANPRM)
- August 2016: Medical Review Board (MRB) developed OSA recommendations

OSA: FMCSA Actions

- MRB guidance
  - Would have recommended a sleep study
  - OSA diagnosis established and treatment administered
- MRB guidance is not required or publicized
- August 2017: FMCSA and FRA withdrew the ANPRM

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Motorcoach Driver

- 59-year-old male
- Received CDL medical certification in July 2016
  - Certified medical examiner (CME) was a chiropractor
  - Urine dip test was positive for glucose
  - Driver asked to return
    - Urine dip test negative the next day
  - Certified for 2 years

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Motorcoach Driver: Postcrash Testing

- Hemoglobin A1C: 11.4%
  - > 6.4% indicates diabetes
  - > 9% indicates poorly controlled diabetes
- Poorly controlled diabetes
- Effect of the driver's diabetes on the safety of his driving is unknown

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FMCSA and Diabetes Guidance

- CME missed an opportunity to diagnose and treat the motorcoach driver's diabetes
- CMEs include healthcare providers without experience in diagnosing or treating diabetes
- FMCSA does not provide guidance on interpretation of urine dip tests

Summary

- Truck Driver: undiagnosed, untreated moderate-to-severe OSA
- Motorcoach Driver: undiagnosed, poorly controlled diabetes
- Ensuring Fitness for Duty remains on the NTSB Most Wanted List

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Oversight of Commercial Vehicle Drivers and Carriers

Shawn Currie

Overview

- Tri-State Collision
  - FMCSA carrier oversight
  - Hours-of-service (HOS) oversight

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FMCSA Carrier Oversight

- May 2011 - New entrant audit
- October 2011 - Notice of failure
- November 2011 - Corrective action plan approved

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FMCSA Carrier Oversight (continued)

- HOS alerts
  - August 2013 to present
- No intervention until postcrash compliance review
  - NTSB recommendation H-14-27 on conducting compliance review after failed new entrant audit

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HOS Compliance

- Carrier used safety consultant to verify compliance
- Safety consultant checked hours of service against fuel receipts

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HOS Compliance (continued)

- Truck-tractor was equipped with GPS
- A review of the GPS data revealed violations and false entries
- Violations of the 11-, 14-, and 70-hour rules were noted from October 15 until the crash
- Oversight of paper logbooks would have been insufficient to detect HOS violations

Summary

- FMCSA had no intervention with the carrier after the failed new entrant audit
- Carrier did not utilize all of the technology available to validate its drivers' logbooks

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Emergency Egress

Thomas Barth, PhD

Overview

- Motorcoach Emergency Egress
  - Evacuation postcrash event
  - Emergency response
  - Motorcoach design

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Survival Factors

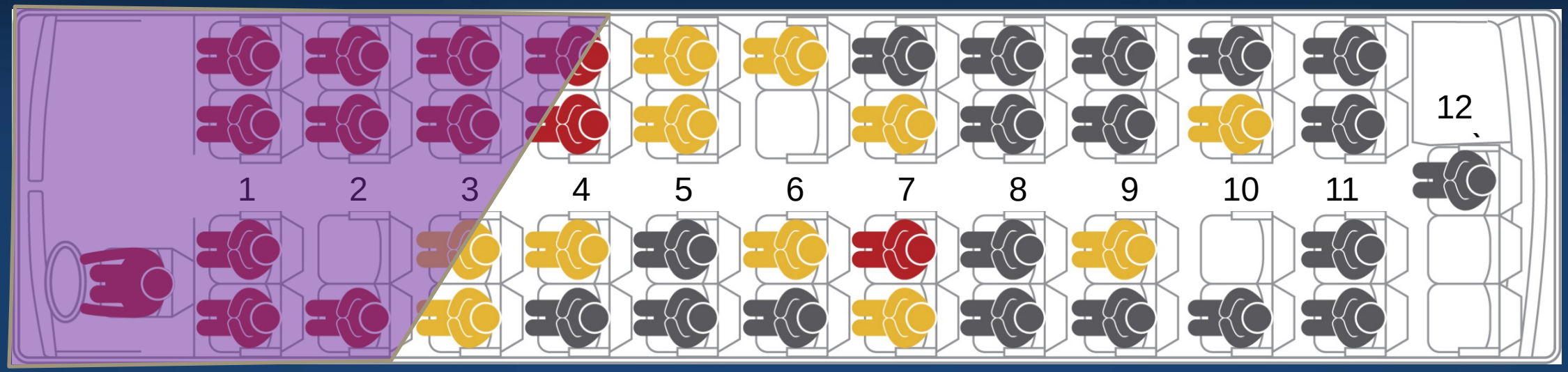

Figure not to scale

Injuries:

Red: Fatal Yellow: Serious Grey: Minor

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Emergency Egress

- Intrusion of the semitrailer
  - Reduced evacuation points of egress
  - Limited evacuation space
- Emergency exit window challenges
  - Retaining opening for victims and responders
  - Height of windows inside and outside motorcoach

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Emergency Response

- Fire/Rescue
  - Arrived quickly
  - Made proper use of tools
- Evacuation challenges
  - Cut “doors” in the sides of the motorcoach
  - Required > 2.5 hours for all victim extrication and transport

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Motorcoach Design

- Secondary service door
  - Applications exist for handicap access and in Europe
  - Permitted under FMVSS
- Use of secondary door for emergency egress
  - Mitigate evacuation challenges
  - NTSB recommendation H-15-13

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Summary

- Passenger evacuation and extrication challenges
- Secondary service doors can expedite evacuation and improve responder access
- Can also improve injury outcomes

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Collision Avoidance Systems

Jerome Cantrell

Overview

- Mechanical systems inspection of motorcoach
- Collision avoidance systems

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Exclusions

- Mechanical systems
  - Steering
  - Suspension
  - Brake
  - Electrical
  - Drivetrain
  - Tires & wheels

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Commercial Vehicle Collision Avoidance Systems

- Motorcoach not equipped with collision avoidance system
- Collision avoidance systems
  - No performance standards
  - Not required

Recommendation History

- NTSB has advocated for collision avoidance technologies for more than 20 years
- 2015 Special Investigation Report
  - Development of performance standards and installation as standard equipment
  - NTSB recommendations H-15-5, -8, and -9
- NTSB Most Wanted List

Summary

- Collision avoidance technologies
  - Designed for rear-end crashes
  - Alert the driver
  - Mitigate crash severity

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