Motorcoach Collision With Combination Vehicle After Traffic Break

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

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

• Truck
  • Driver minor injuries
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
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- Gwynne O’Reagan  Report Editor
- Christy Spangler  Graphics
- Matthew Fox, PhD  Materials Laboratory
- 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)
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
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
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
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)
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
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
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.
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
Truck and Motorcoach Driver Performance

Kenny Bragg
Overview

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

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

• Truck driver likely fell asleep
• Truck driver had adequate opportunity for sleep
• Stopped truck was visible
• Motorcoach driver likely fatigued
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
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
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
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
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
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
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
Oversight of Commercial Vehicle Drivers and Carriers

Shawn Currie
Overview

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

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

• Carrier used safety consultant to verify compliance

• Safety consultant checked hours of service against fuel receipts
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
Emergency Egress

Thomas Barth, PhD
Overview

• Motorcoach Emergency Egress
  • Evacuation postcrash event
  • Emergency response
  • Motorcoach design
Survival Factors

Injuries:

Red: Fatal   Yellow: Serious   Grey: Minor

Figure not to scale
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
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
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
Summary

• Passenger evacuation and extrication challenges
• Secondary service doors can expedite evacuation and improve responder access
• Can also improve injury outcomes
Collision Avoidance Systems

Jerome Cantrell
Overview

• Mechanical systems inspection of motorcoach

• Collision avoidance systems
Exclusions

• Mechanical systems
  • Steering
  • Suspension
  • Brake
  • Electrical
  • Drivetrain
  • Tires & wheels
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
Making transportation safer.

YESTERDAY * TODAY * TOMORROW