NTSB National Transportation Safety Board

Enhancing Motorcoach Safety: Issues and Opportunities

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United Motorcoach Association
Safety Management Seminar
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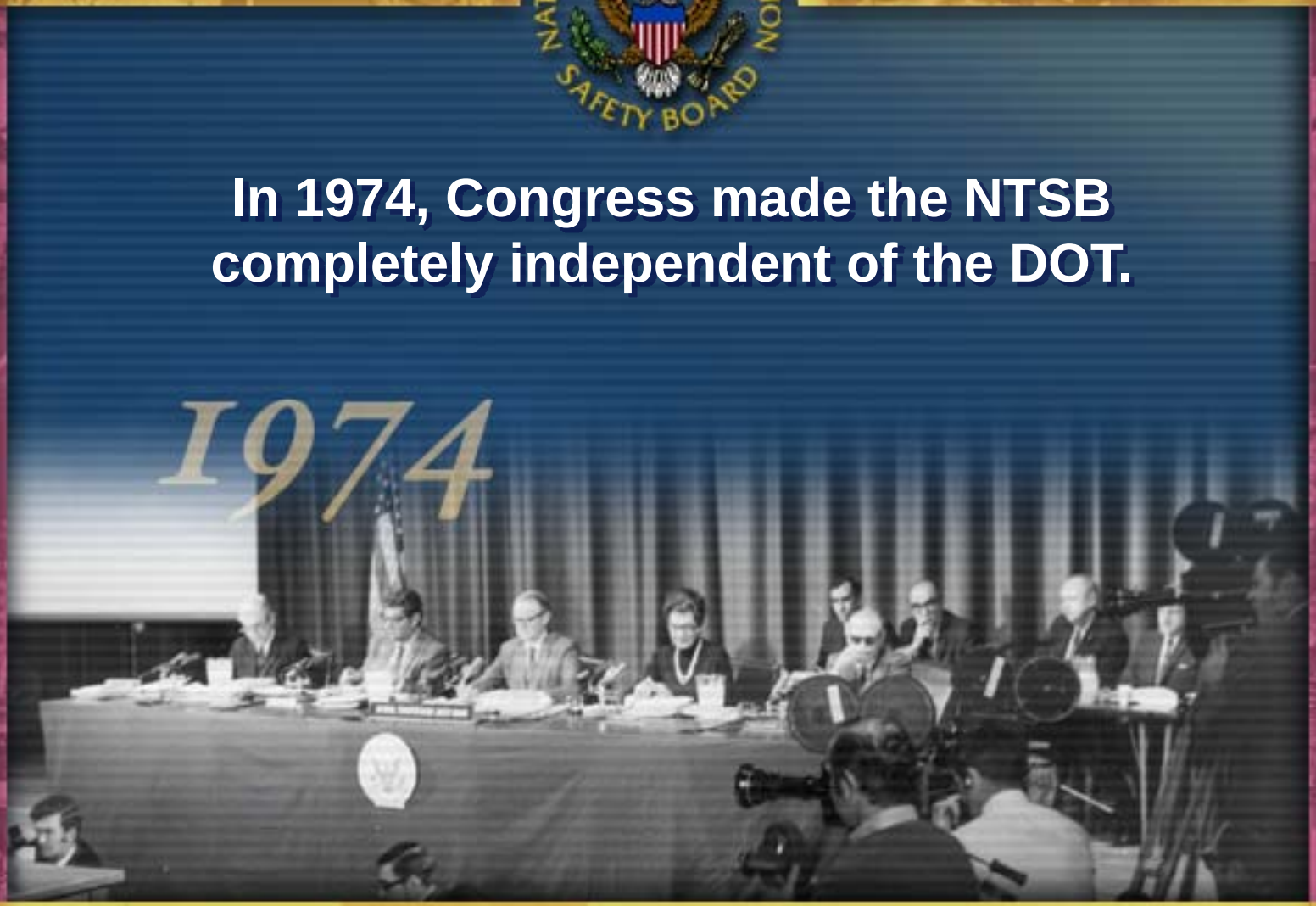
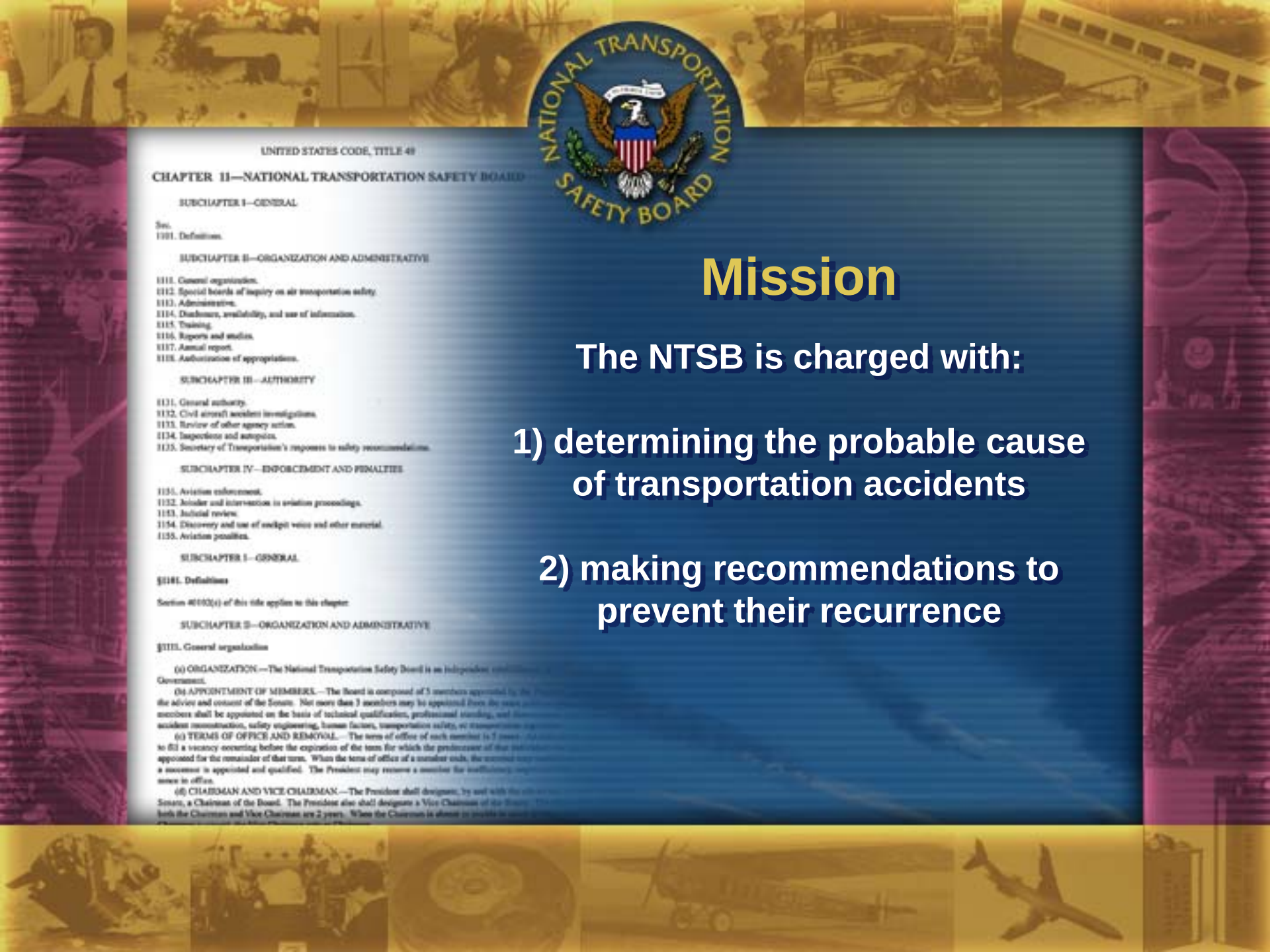
In 1967, the Congress created an independent NTSB within the newly formed Department of Transportation (DOT); expanded the NTSB's authority to include all modes of transportation.

In 1974, Congress made the NTSB completely independent of the DOT.





Mission

The NTSB is charged with:

1) determining the probable cause of transportation accidents

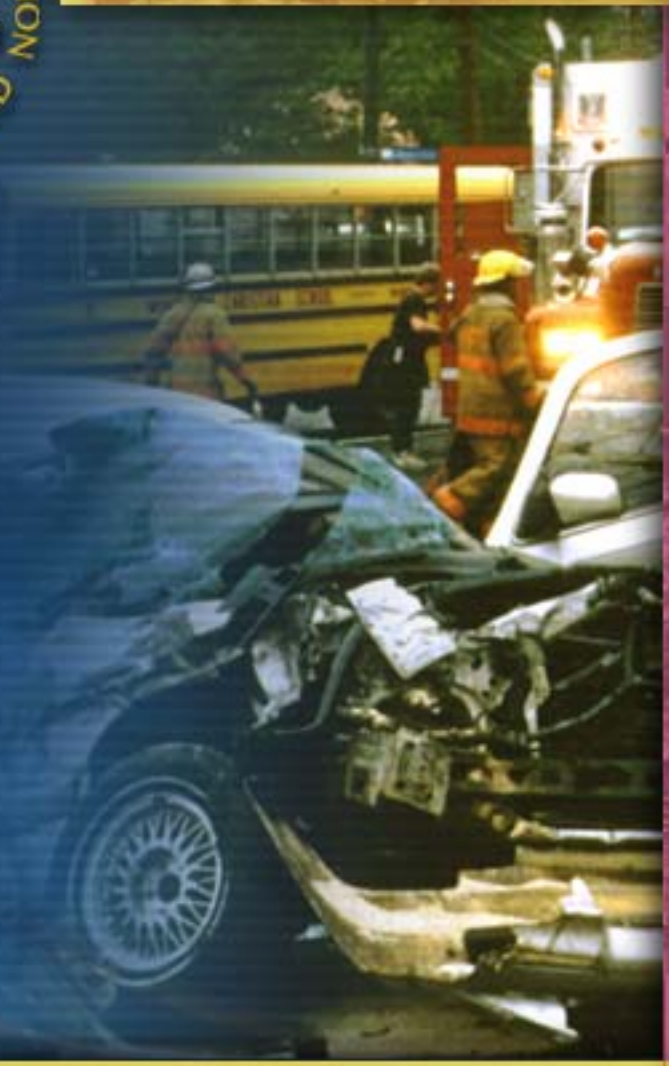
2) making recommendations to prevent their recurrence

The NTSB is Responsible for Investigating:

- Aviation, highway, rail, marine, pipeline, and hazardous material accidents

Major product:
safety recommendations

Moral compass and
industry conscience



- 130,000+ accident investigations
- 13,000+ safety recommendations
- 82% acceptance rate

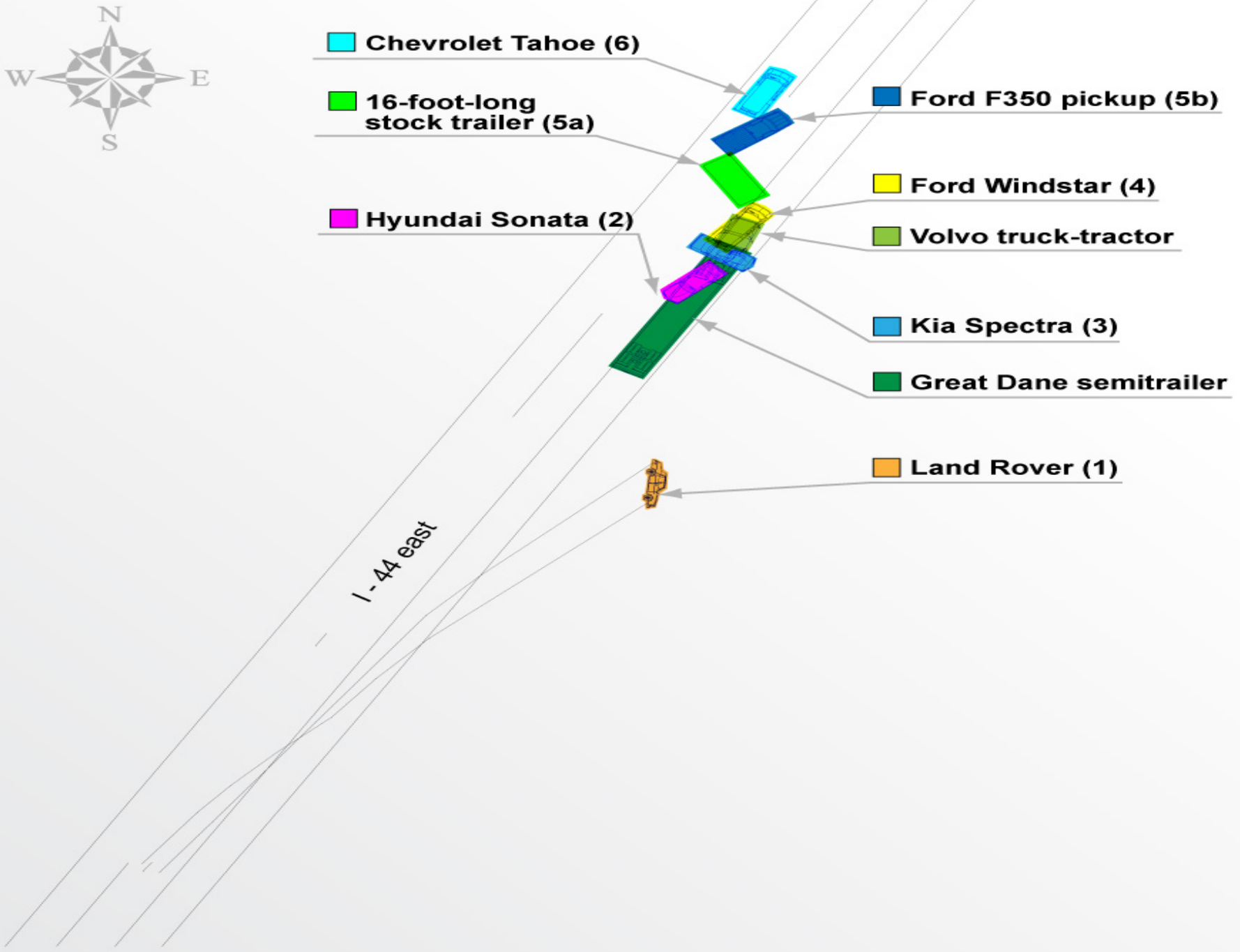
Enhancing Motorcoach Safety: Issues and Opportunities

- Driver fatigue
- Crashworthiness/Occupant protection
- Crash avoidance technologies

Miami, Oklahoma (June 26, 2009)

- Initial minor accident (~1:13 pm)
  - blocked eastbound I-44

- 2008 Volvo truck-tractor (~1:19 pm)
  - refrigerated semitrailer
  - traveling eastbound on I-44
  - 69 mph with cruise control engaged
  - without slowing or braking collided into queue of slowing & stopped vehicles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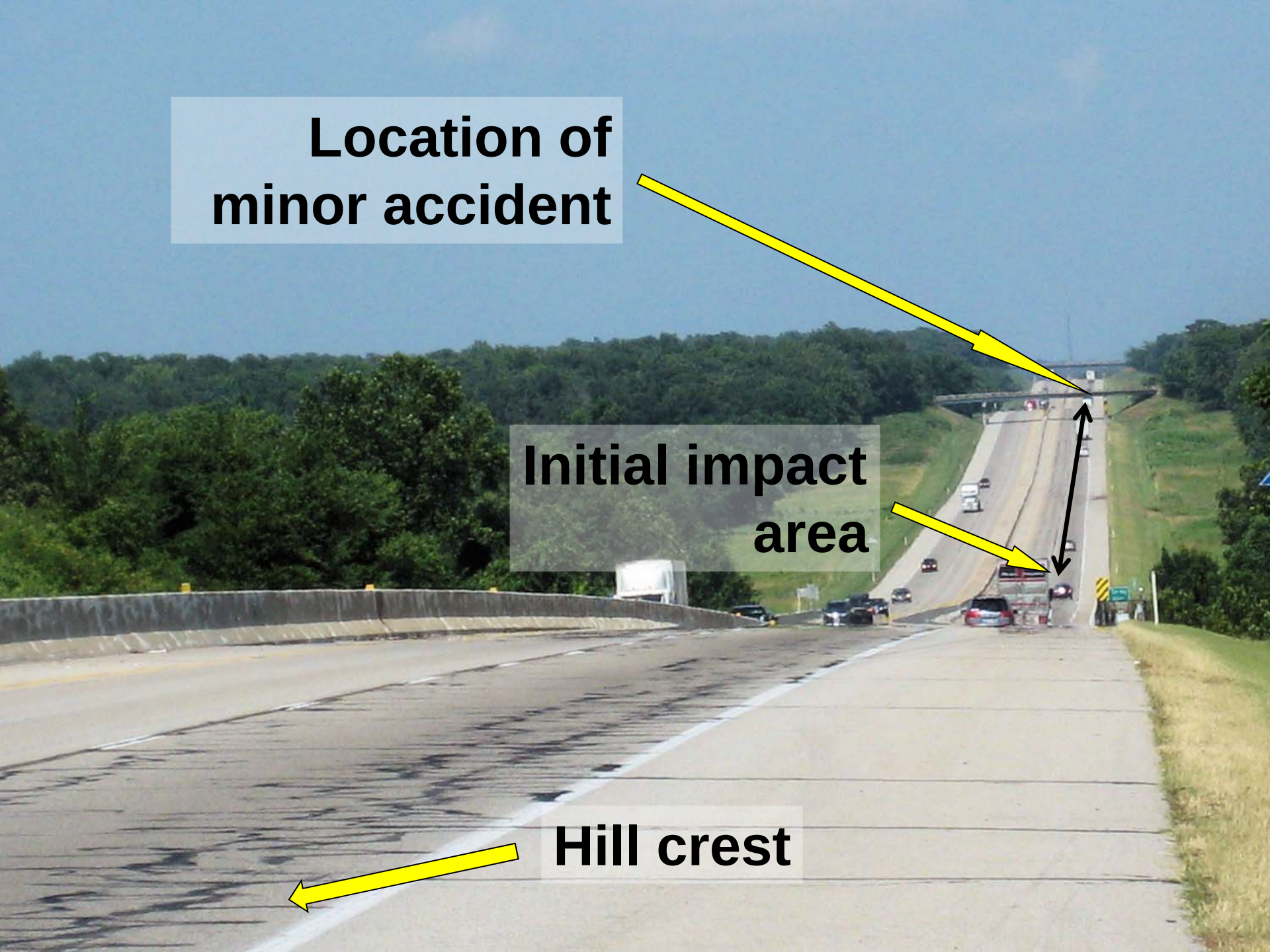
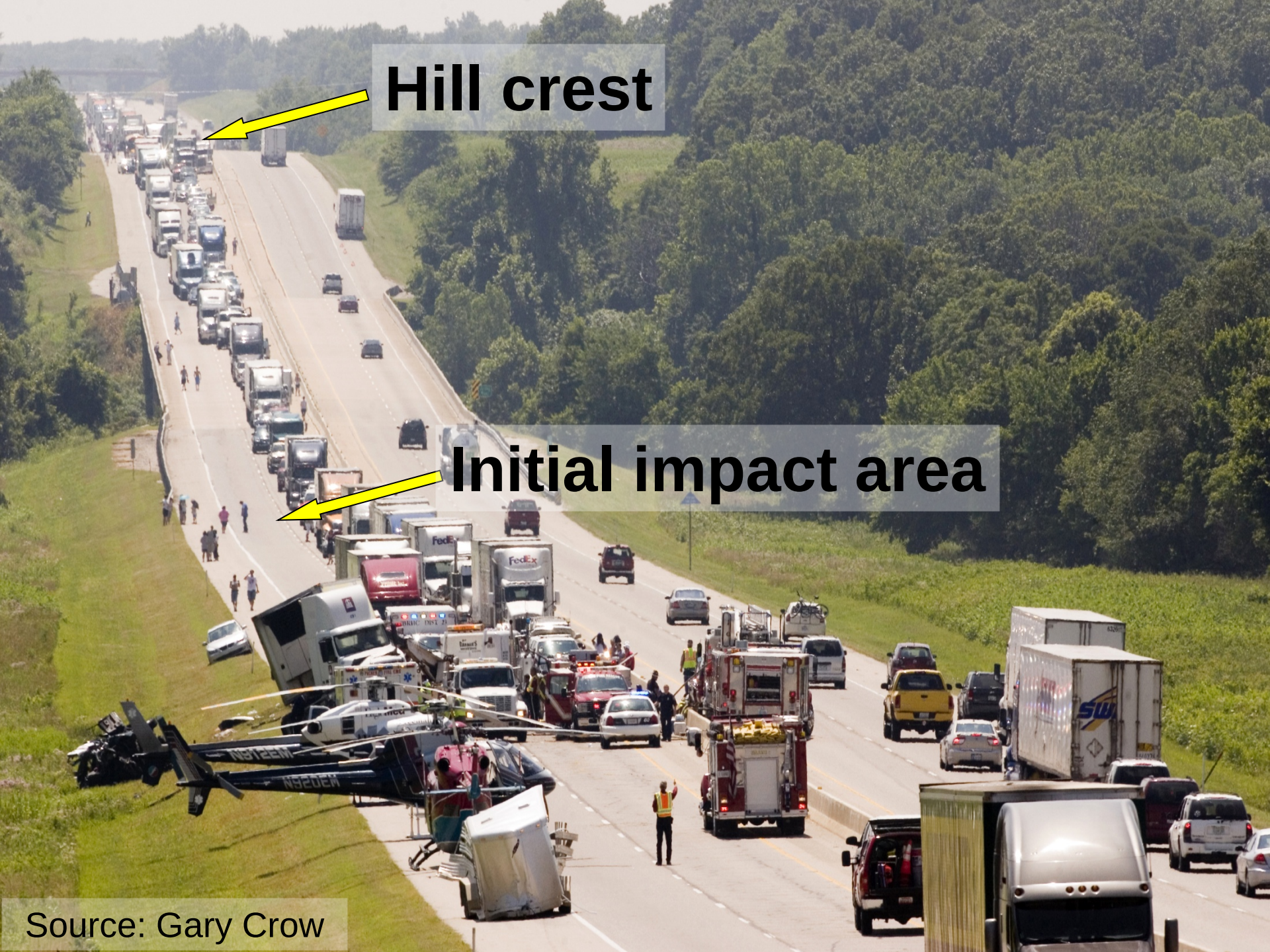
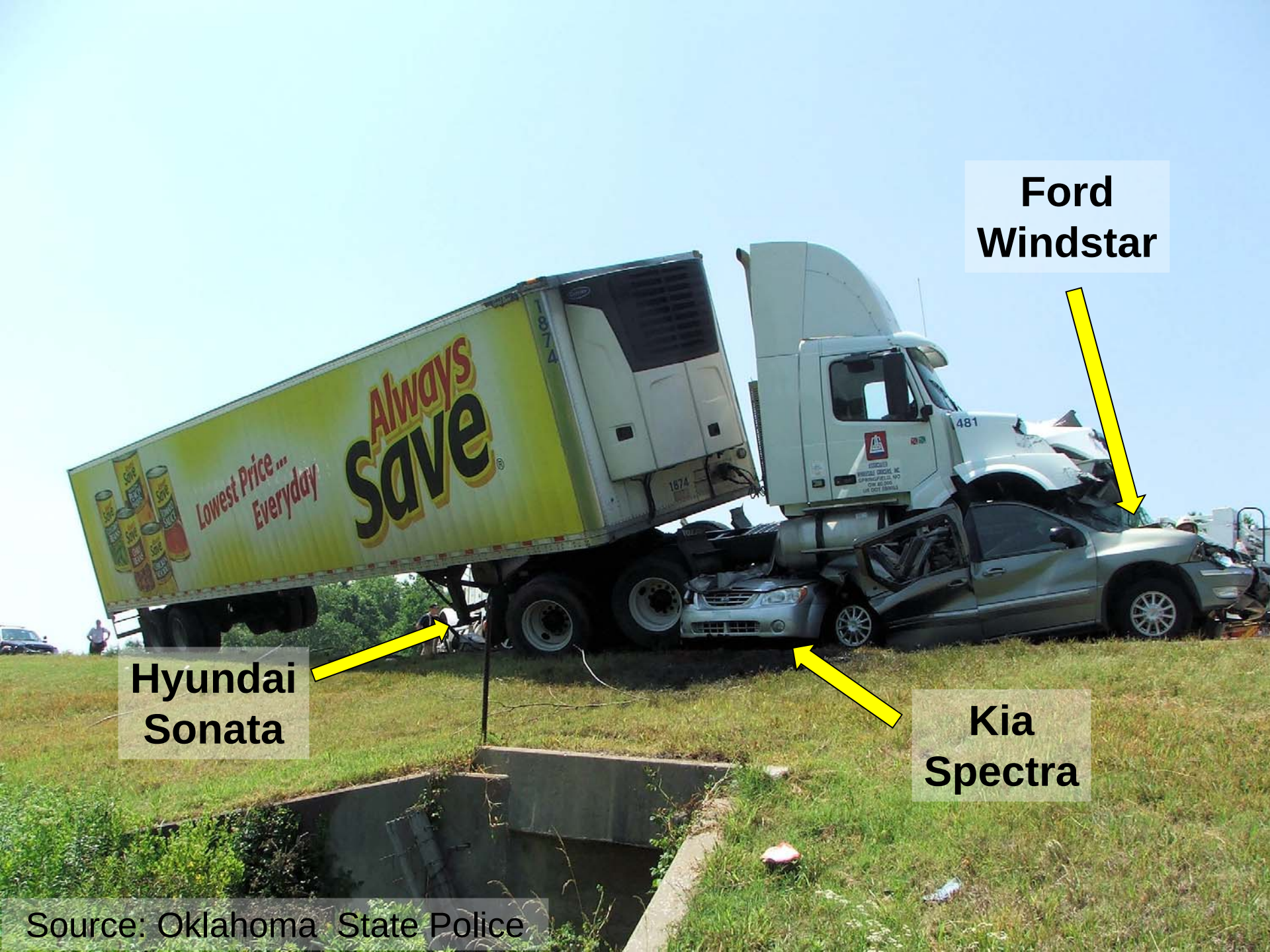
W
E
S
Chevrolet Tahoe (6)
16-foot-long stock trailer (5a)
Hyundai Sonata (2)
Ford F350 pickup (5b)
Ford Windstar (4)
Volvo truck-tractor
Kia Spectra (3)
Great Dane semitrailer
Land Rover (1)
I - 44 east


Location of minor accident
Initial impact area
Hill crest



Source: Gary Crow



Source: Oklahoma State Police

Fatalities/Injuries

- Passenger Vehicle Occupants
  - 10 fatalities
  - 3 serious injuries
  - 2 minor injuries
  - 5 no injuries
- Truck Driver
  - Seriously injured

Fatigue Factors

- Off work for 3 weeks
- Kept day active/night sleep schedule when off
- Had one work day prior to accident
- 3am to 3pm shift work/drive schedule (since 1997)
- Obtained min 3 hrs/max 5 hrs sleep prior to accident
- Early bedtime (2 hr phase advance in sleep time)
- Subsequently diagnosed with mild sleep apnea

Probable Cause (fatigue)

". . . driver's fatigue, caused by the combined effects of acute sleep loss, circadian disruption associated with his shift work schedule, and mild sleep apnea, which resulted in the driver's failure to react to slowing and stopped traffic ahead by applying the brakes or performing any evasive maneuver to avoid colliding with the traffic queue. . . ."

NTSB Fatigue Investigations/Studies

- 30 highway accident investigations
- 2 Safety Studies
  - Fatigue, Alcohol, Other Drugs and Medical Factors in Fatal-To-The Driver Heavy Truck Crashes (31% fatigue; > drugs and alcohol)
  - Factors that Affect Fatigue in Heavy Truck Accidents (last sleep duration, total sleep in 24 hrs, split sleep)

NTSB Recommendations

- MOST WANTED since 1990
- 150+ fatigue recommendations
- 60+ in highway

Highway Fatigue Recommendations

- Scheduling Policies and Practices
- Education
- Organizational Strategies
- Raising Awareness
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation

Scheduling Policies and Practices

- Day sleep, night drive, ~ 4 am WOCL

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Scheduling Policies and Practices

- Establish scientifically based hours of service regulations
- When possible, address:
  - schedule inversion
  - day sleep/night work
  - rotating schedules
  - extended duty days
  - opportunity for 8 hrs uninterrupted sleep

Education

- Education vs. awareness
- Foundation for any fatigue efforts
- Address broad/applied content:
  - how fatigue affects performance
  - how to minimize fatigue risks
  - countermeasures to combat fatigue
  - policies to support tired drivers

Organizational Strategies

- Improve drivers' rest facilities
- Review logbook violations (driver safety assessments)
- Non-punitive fatigue call-in policy
- Provide a backup driver when needed

Healthy Sleep

- 360 rollover, 50/53 ejected, 9 fatalities, OSA (-CPAP)

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Healthy Sleep

- Disseminate guidance for identifying and treating obstructive sleep apnea
- Ensure drivers with apnea are effectively treated before granting unrestricted medical certification
- Have a written contingency plan to accommodate drivers impaired by fatigue or illness

Vehicle and Environmental Factors

- Rumble strips
- In-vehicle technologies to reduce fatigue related accidents
  - EOBRs
  - Lane detection systems
  - Collision avoidance systems

Fatigue Management Programs

- Comprehensive approach
- Multiple components
- Science based
- Continuously evaluated and updated
- Complements HOS regulations

Fatigue Management Program

- North American Fatigue Management Program (NAFMP)
  - (FMCSA, Transport Canada, carriers, many others)
- Three initial projects:
  - improved sleep/wake behavior
  - less absenteeism
  - fewer critical events
  - high prevalence of sleep apnea
- Phase IV (2 year target for completion)
  - industry-wide availability
  - scalable (small to large carriers)
  - web-based
- Industries moving to required FMP's

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Crashworthiness/ Occupant Protection

Dolan Springs, AZ (Jan. 30, 2009)

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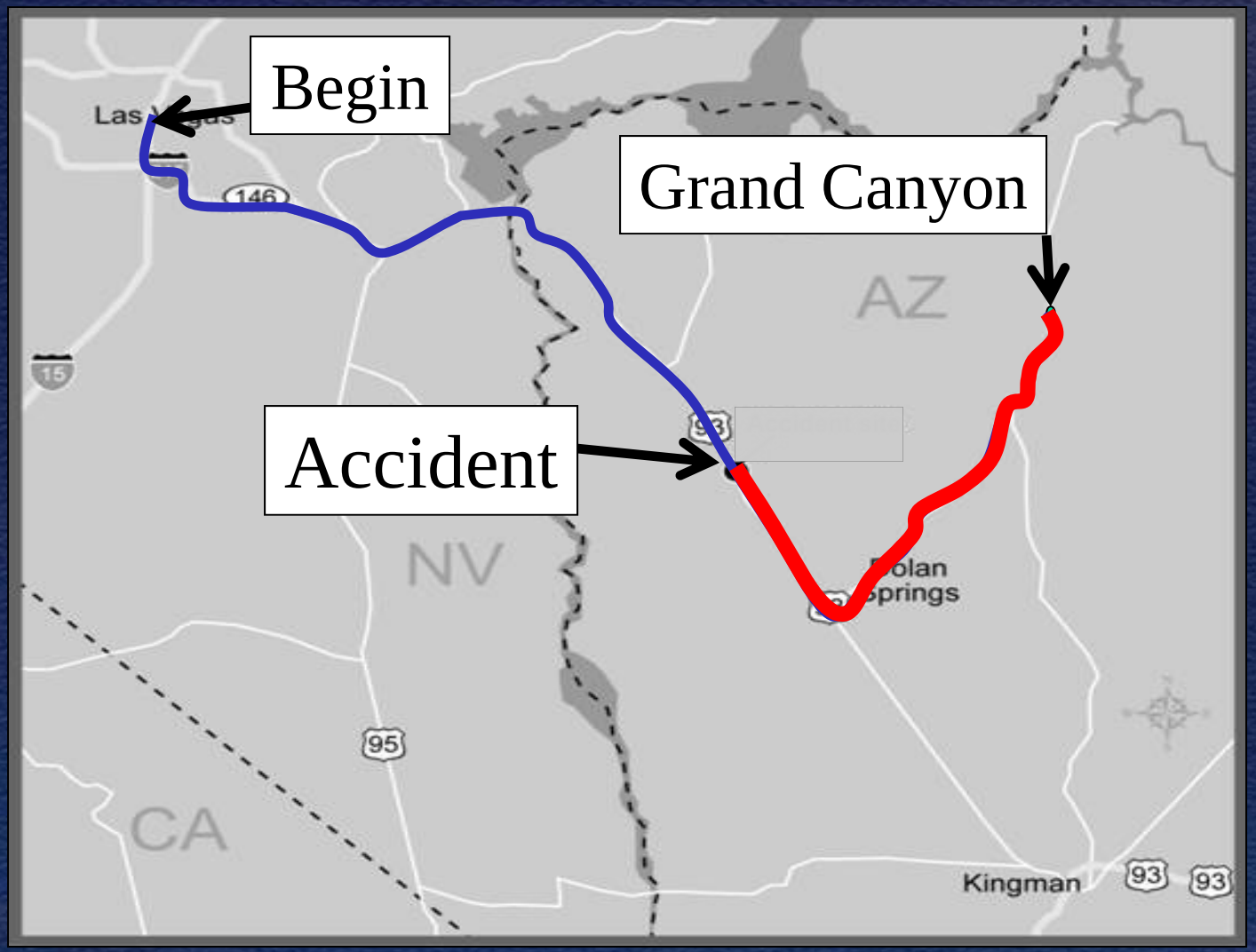
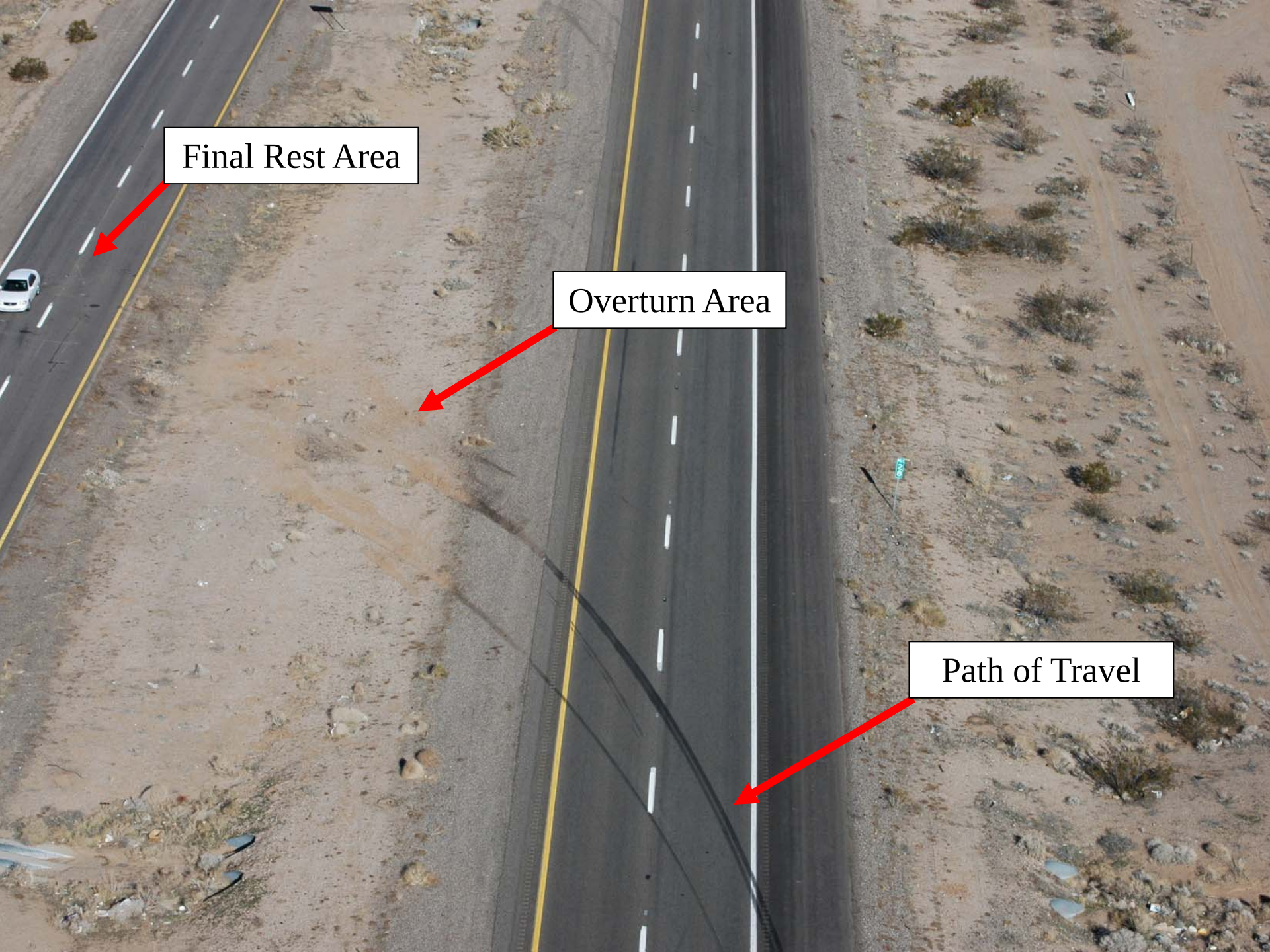
Accident Trip




Right Shoulder
R V
PARK
HERE !
ONLY


Final Rest Area
Overturn Area
Path of Travel


D W TOUR

- 17 passengers; 7 fatalities; others minor – serious injuries

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Bus Crashworthiness Issues

- Roof strength
- Passenger retention

Exterior Deformation

- Front fenders, hood, skirts, front roof, loading door
- 9/10 windows broken
- Minimal roof damage

Crashworthiness

- roof crush minimal; 15 passengers ejected

Crashworthiness

- Lake Placid, Florida (Feb., 2010)

- 180 degree roll; 8 passengers ejected; 3 fatalities

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NTSB Most Wanted List (2000)

- *H-99-47 (NHTSA): Issued November 2, 1999*
  Status: Open—Unacceptable Response
  In 2 years, develop performance standards for motorcoach occupant protection systems that account for frontal impact collisions, side impact collisions, rear impact collisions, and rollovers.

- *H-99-50 (NHTSA): Issued November 2, 1999*
  Status: Open—Unacceptable Response
  In 2 years, develop performance standards for motorcoach roof strength that provide maximum survival space for all seating positions and that take into account current typical motorcoach window dimensions

Motorcoach Safety Action Plan

U.S. Department of Transportation

Motorcoach Safety Action Plan

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Motorcoaches vs. smaller buses

- Cutaway buses: 10,200 – 13,600 (2009)
- Motorcoaches: 1,600 (2009)
- Growing trend: high revenues, lower retail cost (vs. motorcoach), passenger capacity
- Economic downturn: smaller groups, traveling shorter distances

NTSB Recommendation: Enhanced Occupant Protection

To NHTSA:

In your rulemaking to improve motorcoach roof strength, occupant protection, and window glazing standards, include all buses with a gross vehicle weight rating above 10,000 pounds, other than school buses. (H-10-3)

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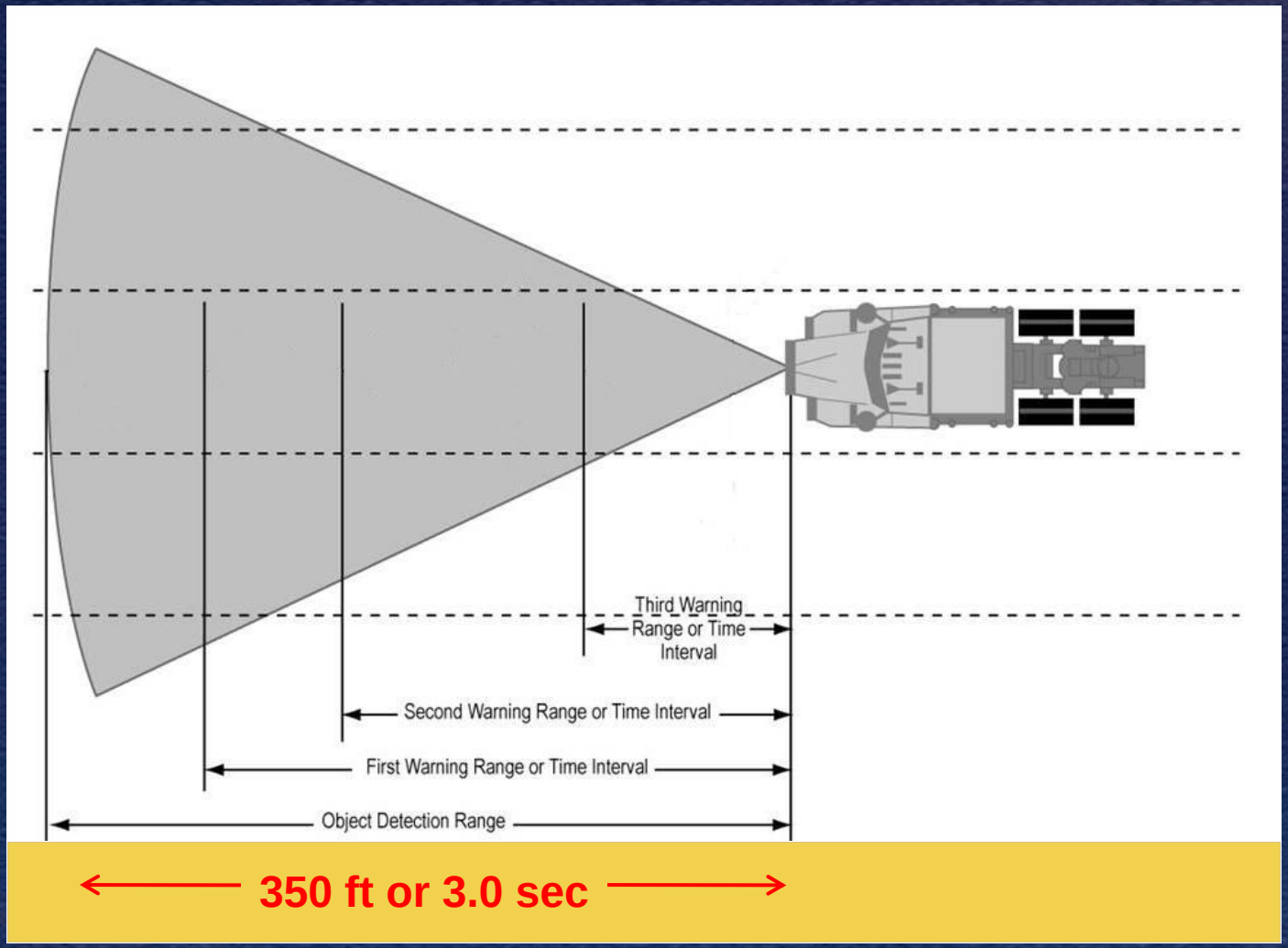
Crash Avoidance Technologies

Forward Collision Warning



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Forward Collision Warning

- Adaptive cruise control/active braking
- $1,000 - $2,000 OEM/aftermarket option
- FCWA + ACC = greater benefits
- No federal regulations for collision warning systems
- Government/Industry Research (FCWS)
  - 21% rear-end crash reduction
  - would prevent: 4,700 crashes/yr
    2,500 injuries/yr
    96 fatalities/year

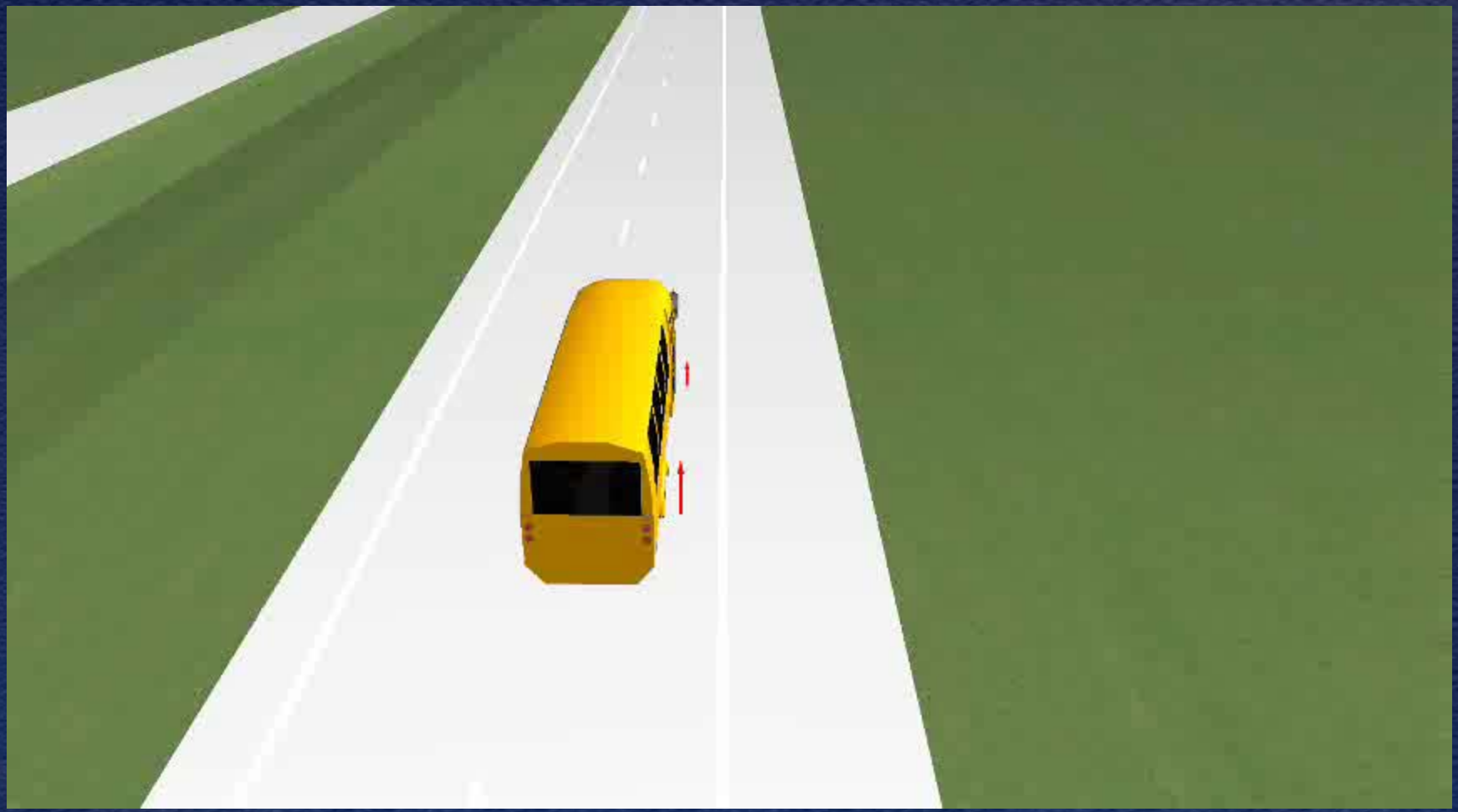
NTSB and FCWS

- First collision warning recommendation in 1995
- 2001 special investigation, 9 accidents (1999-2000), 20 fatalities and 181 injuries; recommendations made
- Since 2001, investigated 11 more accidents, 45 fatalities and 190 injuries (rear end/head on)
- FCWS on NTSB Most Wanted List (2007)

Stability Control Systems

- Required on all passenger vehicles by the 2012 model year
- Two types: roll and yaw stability control
- Implementation in passenger vehicles estimated to save 5,300-9,600 lives/yr
- Implementation estimated to prevent 156,000 – 238,000 injuries/yr

Stability Control vs No Stability Control



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Continued Needs and Efforts

- DOT currently researching benefits of stability control for heavy trucks and motorcoaches
- Research does not currently include all bus types (cutaway buses; 26,000 GVWR)
- Will benefits extend to large commercial vehicles?
- Development of systems and performance standards for cutaway buses lagging

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