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Multivehicle Crash Near Mt. Pleasant Township, Pennsylvania

Virtual Board Meeting Staff Participants

Brian Curtis	Deputy Managing Director (MD-2)
Robert Molloy, PhD	Director, Office of Highway Safety (HS-1)
Robert Accetta	Investigator-in-Charge (HS-21)
Julie Kang, PhD	Project Manager (HS-30)
Bob Squire	Technical Reconstructionist (HS-21)
Shawn Currie	Motor Carrier Factors (HS-21)
Kenny Bragg	Human Performance (HS-21)
Dan Walsh	Highway Factors (HS-21)
Jerome Cantrell	Vehicle Factors (HS-21)
Ensar Becic, PhD	Collision Avoidance Systems (HS-30)
Thomas Barth, PhD	Survival Factors (HS-22)
Mary Pat McKay, MD	Chief Medical Officer (RE-10)
Nathan Doble	Transportation Research Analyst (RE-10)

Virtual Board Meeting Staff Participants

Sarah McComb	Senior Technical Advisor (RE-1)
Kathleen Silbaugh	General Counsel (GC-1)
Kathryn Catania	Acting Director, Office of Safety Recommendations and Communications (SRC-1)
Barbara Czech	Deputy Director, Office of Research and Engineering (RE-1)
Michele Beckjord	Chief, Multidisciplinary Investigation Branch (HS-21)
Lisandra Garay-Vega, PhD	Chief, Report Development (HS-30)
Julie Perrot	Transportation Specialist (SRC-50)
Monica Mitchell	Writer-Editor (HS-30)

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Multivehicle Crash Near Mt. Pleasant Township, Pennsylvania, January 5, 2020

Robert Accetta
Investigator-in-Charge

Staff Who Supported the Investigation

Kristin Poland, PhD	Deputy Director, Office of Highway Safety (HS-1)
Mark Bagnard	Chief, Investigations (HS-20)
Shane Lack	Simulations (RE-60)
Kyle Garner	Recorders (RE-40)
Dan Horak	Video Study (RE-60)
Donald Eick	Meteorology (AS-30)
Stephanie Matonek	Transportation Disaster Assistance (MD-6)
Eric Weiss	Media Relations (SRC-10)
Aaron Sauer	UAS-RPIC (AS-CEN)

Staff Who Supported the Investigation

Gwynne O'Reagan	Writer-Editor (HS-30)
Don Karol	National Resource Specialist (HS-1)
Jennifer Bishop	Senior Advisor for Investigative Products (MD-21)
Jesús Cudemus	Graphics (SRC-60)
Michael Bauer	UAS-RPIC (No longer at agency)
Katy Chisom	Transportation Disaster Assistance (No longer at agency)
Charlotte Cox	Writer-Editor (No longer at agency)

Staff Who Produced Virtual Board Meeting

James Anderson	Audio Visual Production (SRC-60)
Deidra Esters	Management Support Specialist (AD-10)
Kelley Romeo	Enterprise Architect (CIO-60)
Rahiq Syed	Enterprise Architect (CIO-60)
Carl Perkins	Management Information Specialist (AD-10)

Parties to the Investigation

Federal Motor Carrier Safety Administration (FMCSA)

Pennsylvania State Police (PSP)

Pennsylvania Turnpike Commission (PTC)

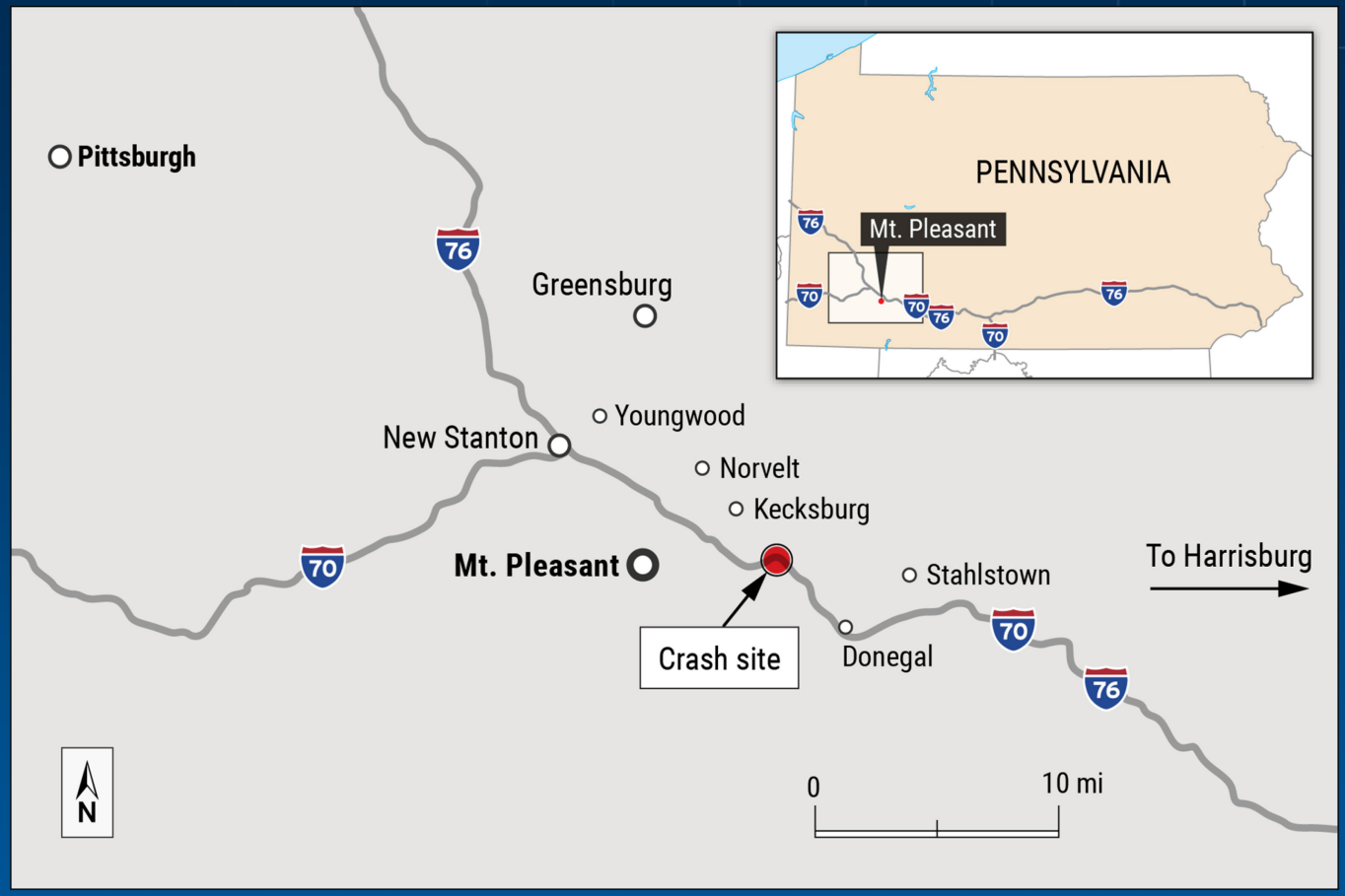
United Parcel Service, Inc. (UPS)

FedEx Ground Package System, Inc. (FedEx)

Daimler Trucks North America

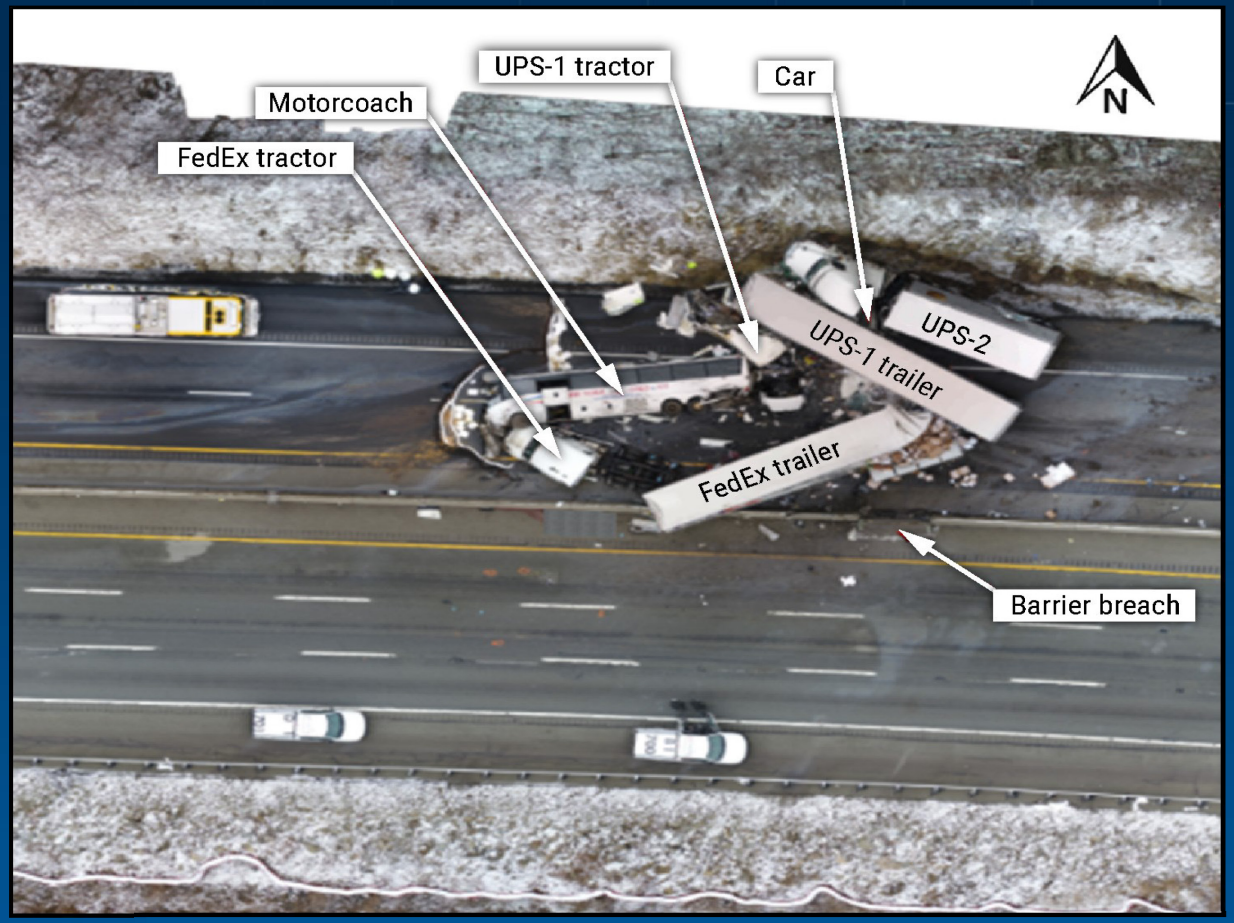
Crash Information and Location

- Interstate 70/76
  - Pennsylvania Turnpike
  - Curving mountainous section
  - 36 miles southeast of Pittsburgh
  - Mt. Pleasant Township



Crash Vehicles

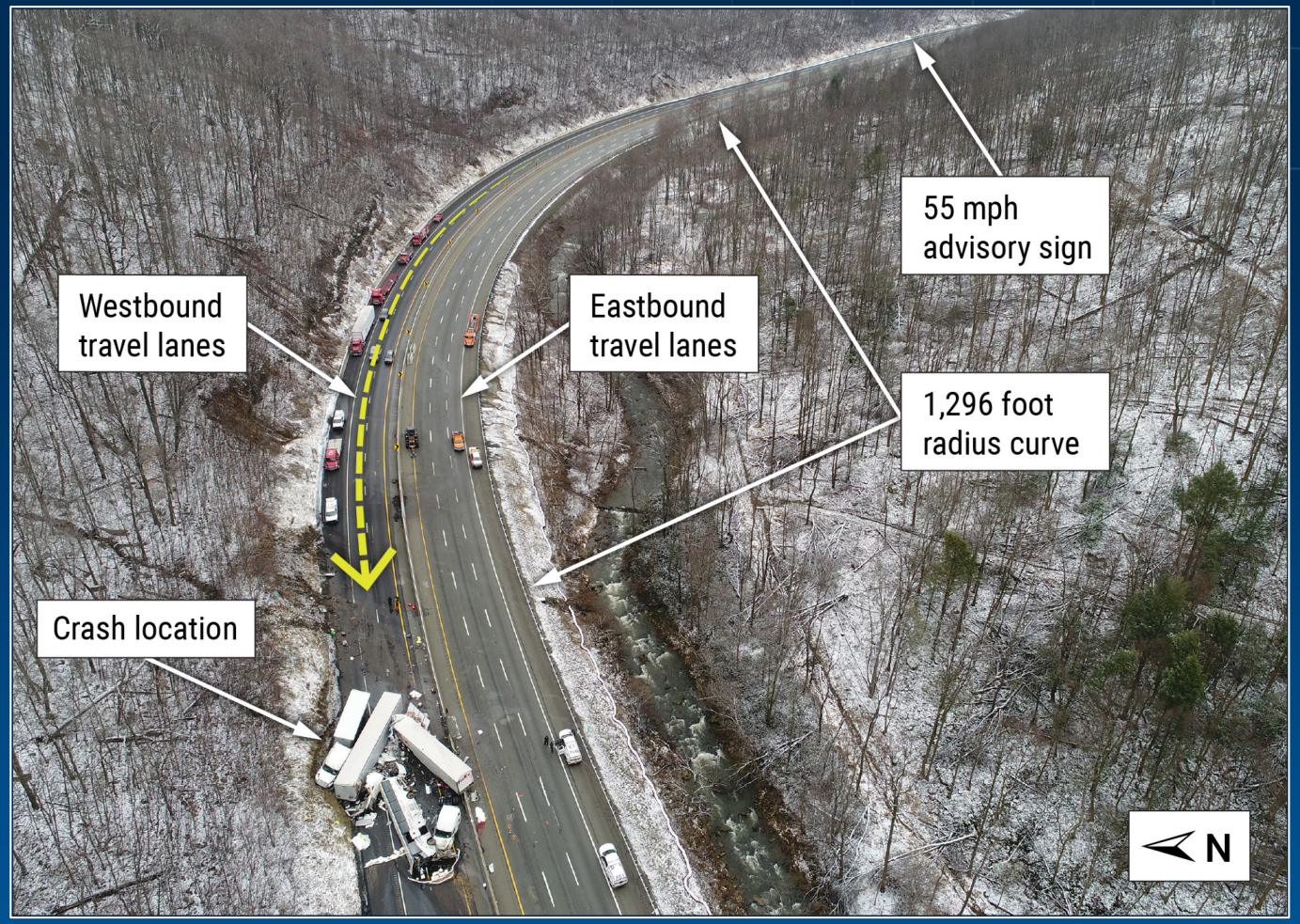
- Final rest positions of vehicles
  - Motorcoach
  - FedEx tractor & trailer
  - UPS-1 tractor & trailer
  - Passenger car
  - UPS-2 tractor & trailer



Source: Pennsylvania State Police – NTSB overlay

Crash Scene

- Vehicles at final rest
- Left-hand curve
- East and westbound lanes
- 55-mph warning sign



Source: Pennsylvania State Police – NTSB overlay

Injury Table

Occupants	Fatal	Injured	None	Unknown	Total
Motorcoach driver	1	--	--	--	1
Motorcoach passengers	2	49	2	6	59
FedEx driver	--	--	1	--	1
FedEx codriver	--	1	--	--	1
UPS-1 driver	1	--	--	--	1
UPS-1 codriver	1	--	--	--	1
UPS-2 driver	--	--	1	--	1
UPS-2 codriver	--	--	1	--	1
Car driver	--	--	1	--	1
Car passengers	--	--	2	--	2
TOTAL	5	50	8	6	69

Exclusions

- Motorcoach driver
  - Driver qualifications
  - Use of alcohol or other drugs
  - Cell phone use
  - Insufficient evidence of motorcoach driver fatigue
- Emergency response was timely and effective
- Mechanical condition of motorcoach
- Pavement condition
- Roadway salt treatment addressing freezing conditions

Safety Issues

- Commercial drivers' speeds while driving in wet conditions
- Forward collision avoidance systems and connected vehicle technology
- Onboard video event recorder systems

Staff Presentations

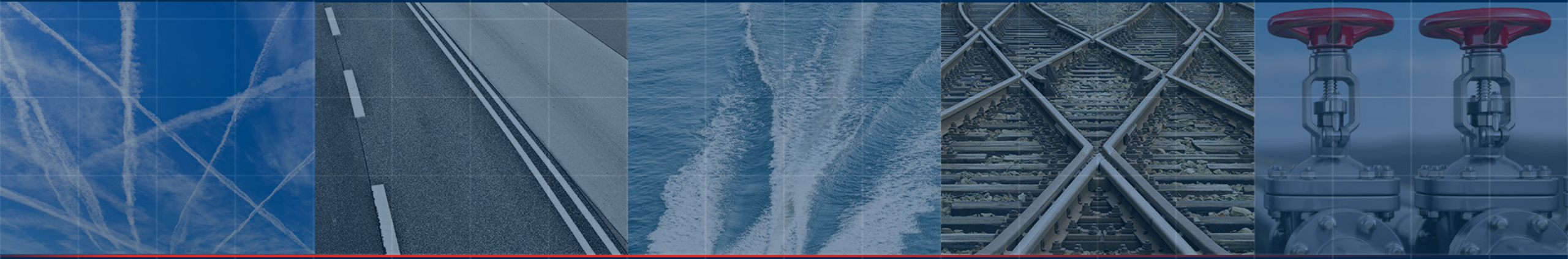
Bob Squire – collision sequence

Kenny Bragg – driver performance

Dan Walsh – highway factors

Shawn Currie – motor carrier factors

Jerome Cantrell – vehicle factors



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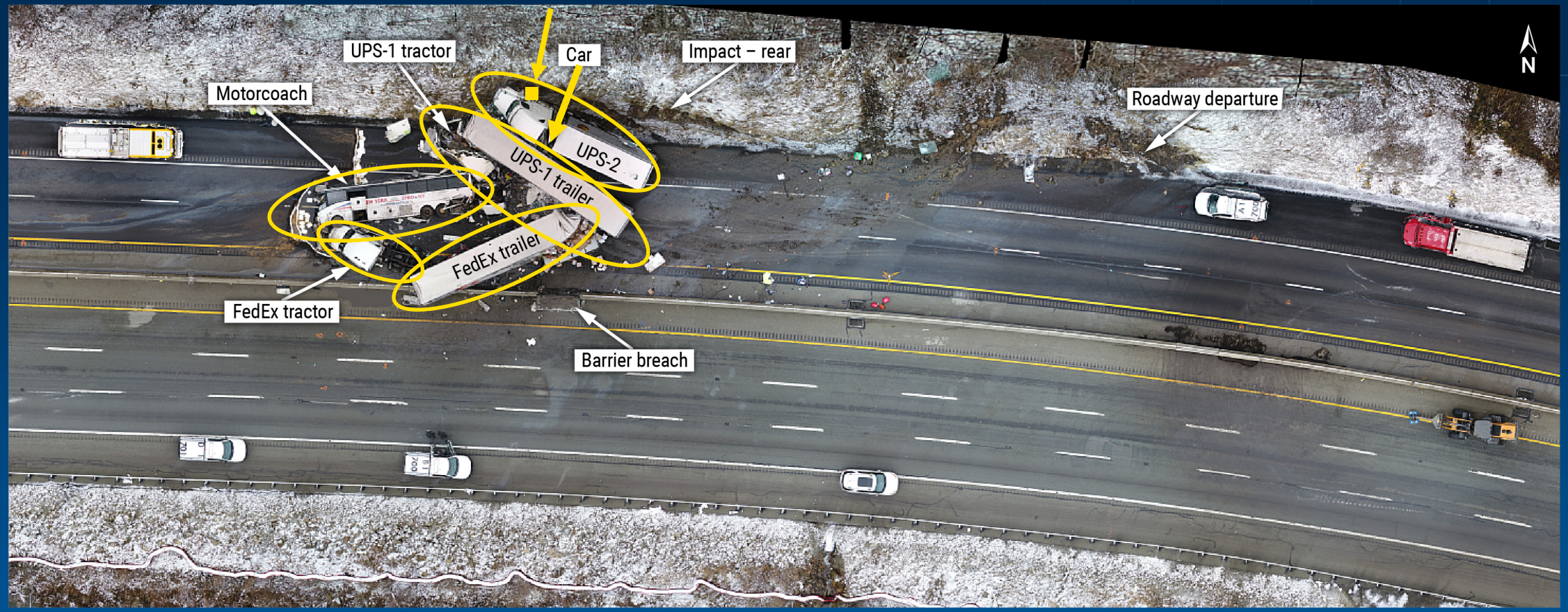
Collision Sequence and Video Event Recorder Systems

Robert Squire
Technical Reconstruction

Vehicle Positions at Final Rest



Source: Pennsylvania State Police

2005 Van Hool c2045 Motorcoach

Overturned Motorcoach

Source: FedEx forward-facing video, annotated by NTSB

- Initial position of rest was blocking both travel lanes and shoulders
- Entered curve at 77 mph
- Light braking upon entering curve decreased speed to 70 mph
- After brakes released vehicle speed changes not associated with braking or throttle occurred
- Speed changes consistent with vehicle yawing from excessive steering inputs
- Sufficient roadway traction existed for normal travel

FedEx Combination Unit

2018 Freightliner Cascadia

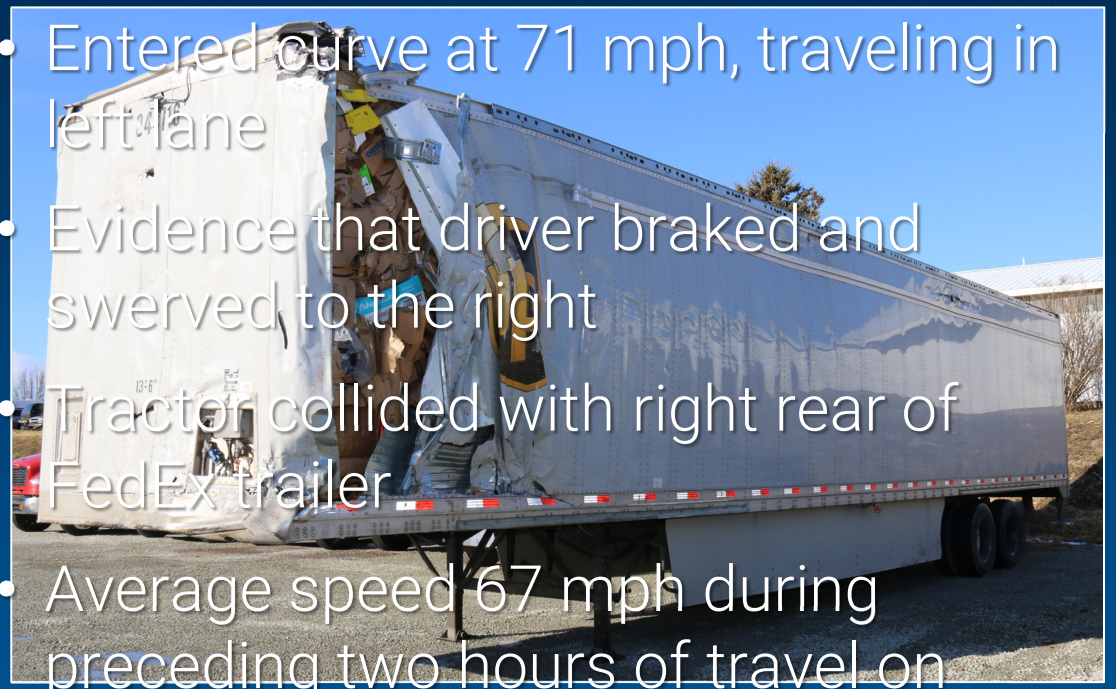
2019 53’ Hyundai Translead semitrailer

- Traveling through curve at 53 mph in right lane
- Had been passed by motorcoach 79 seconds before the two collided
- Driver responded about 5 seconds before impact
- Driver steered left and braked, impacted motorcoach at about 21 mph

UPS-1 Combination Unit

2018 Freightliner Cascadia

2018 53’ Stoughton semitrailer



- Entered curve at 71 mph, traveling in left lane
- Evidence that driver braked and swerved to the right
- Tractor collided with right rear of FedEx trailer
- Average speed 67 mph during preceding two hours of travel on turnpike

2007 Mercedes Benz C280

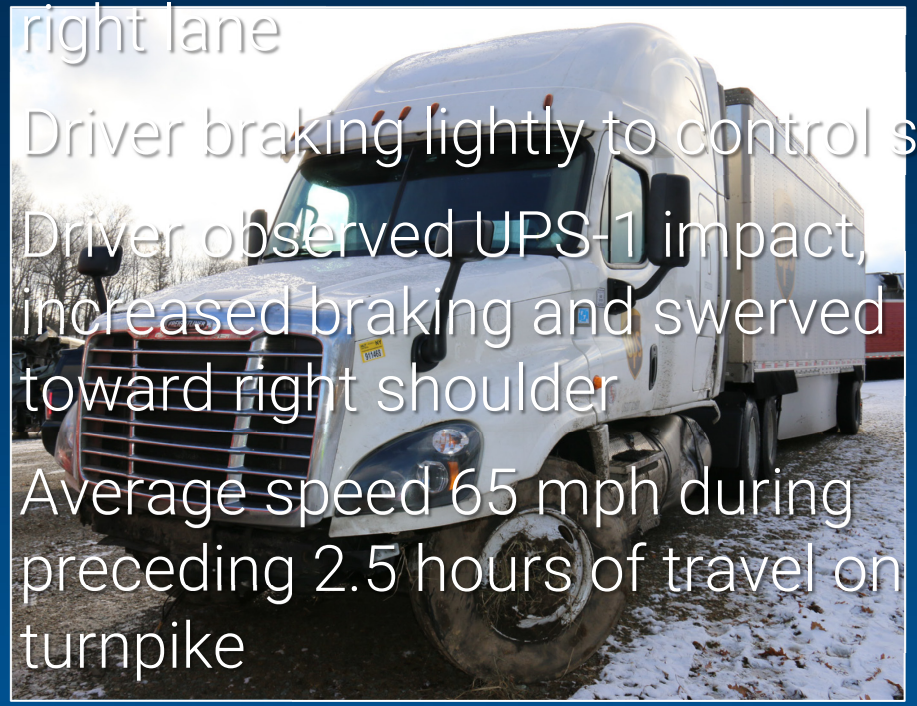
Source: Pennsylvania State Police

UPS-2 Combination Unit

2018 Freightliner Cascadia

2020 28.5’ Stoughton semitrailer

- Entered curve at 69 mph, traveling in right lane
- Driver braking lightly to control speed
- Driver observed UPS-1 impact, increased braking and swerved toward right shoulder
- Average speed 65 mph during preceding 2.5 hours of travel on turnpike



Onboard Video Event Recorders

- FedEx truck video system provided key information:
  - Motorcoach speed and lane position when passing
  - Position and visibility of overturned motorcoach on roadway
  - FedEx driver reacted quickly to hazard
  - FedEx truck speed and crash severity

Source: FedEx forward-facing video

Lack of Data on Motorcoach

- Cause of motorcoach initial loss of control
- Driver performance including steering inputs and fatigue
- Engagement of engine brake

NTSB History of Video Recording Systems

- Crashes with vehicle equipped with onboard video recorders
  - 2008 crash in Mexican Hat, Utah
  - 2012 crash in Kearney, Nebraska
  - 2013 crash in Port Saint Lucie, Florida
- 2015 report *Commercial Vehicle Onboard Video Systems*
- 2009 crash in Miami, Oklahoma

What We Found: *Onboard Video Event Recorders*

- Forward- and inward-facing video event recorder system on the FedEx truck provided valuable information
- Video event recorder systems can provide key safety information about crash circumstances
- Video event recorder systems can be proactively used to improve driver performance
- What we propose:
  - One recommendation to the National Highway Traffic Safety Administration
  - One recommendation to the Federal Motor Carrier Safety Administration
  - One reiteration to the American Bus Association, United Motorcoach Association

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Human Performance

Kenny Bragg
Human Performance Group Chairman

Overview

- Crash trip (motorcoach)
- Driving in adverse weather conditions
- Motorcoach driver background
- Truck drivers' performance in crash sequence

Motorcoach Crash Trip

- Departed NYC at 10:00 p.m.
- Scheduled arrival 4:15 a.m.
- 10 miles from destination
- Driving for 7 hours
- Unable to determine sleep

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Environmental Conditions

Source: Pennsylvania State Police

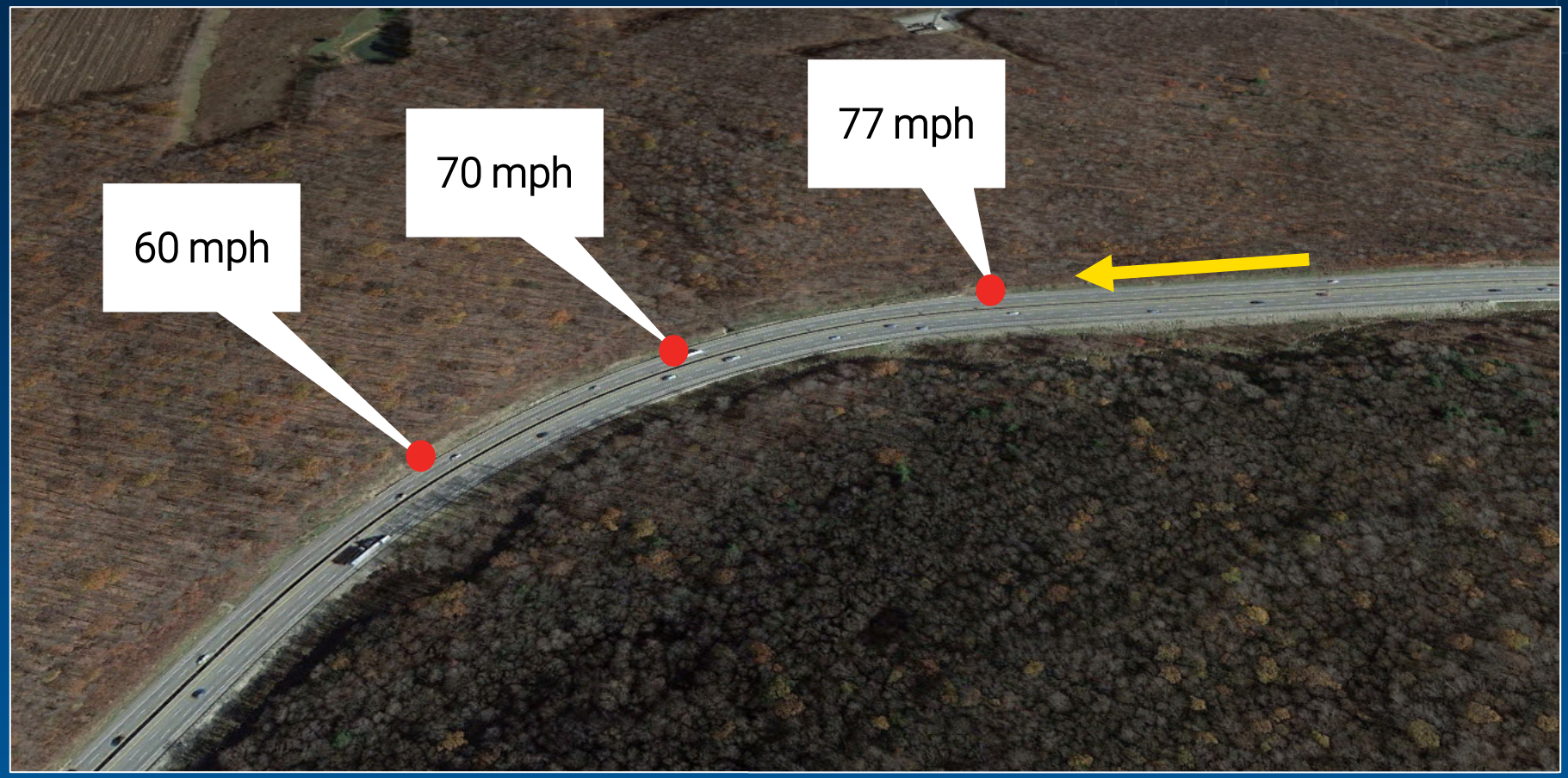
Driving in Adverse Weather Conditions

- 25% of speeding-related large-truck fatalities occurred in adverse weather (FARS)
- Adjust speed to safely match weather conditions
- Increase following distance
- Take curves at slower speeds and do not brake while in curves
- Avoid using engine brakes

Motorcoach Driver Background

- Experienced and properly licensed
  - 11 years of commercial driving experience
  - Class “A” commercial license, passenger endorsement, no restrictions
  - 2-year medical certification
- Previous excessive speed citation (September 2019)
- 2 previous minor crashes

Motorcoach Driver



Source: Google Maps, annotated by NTSB

What We Found: *Motorcoach Driver*

- Traveling at excessive speed on wet roadway in descending curve
- Excessive speed, roadway conditions contributed to loss of control
- Driver likely made excessive steering inputs
- Likely use of engine brake contributed to loss of traction
- What we propose:
  - One recommendation to American Bus Association (ABA)
  - One recommendation to United Motorcoach Association (UMA)

FedEx Driver Response

- FedEx truck entered curve at 53 mph
- Driver steered to left, applied brake
- Driver reacted within 0.3 seconds
- FedEx truck slowed to 21 mph

Source: FedEx truck forward-facing video, annotated by NTSB

UPS-1 Driver Response

- UPS-1 entered curve at 71 mph
- FedEx truck had begun slowing
- Driver applied brakes, steered right
- UPS-1 collision occurred at 56 mph

Source: Pennsylvania State Police, annotated by NTSB

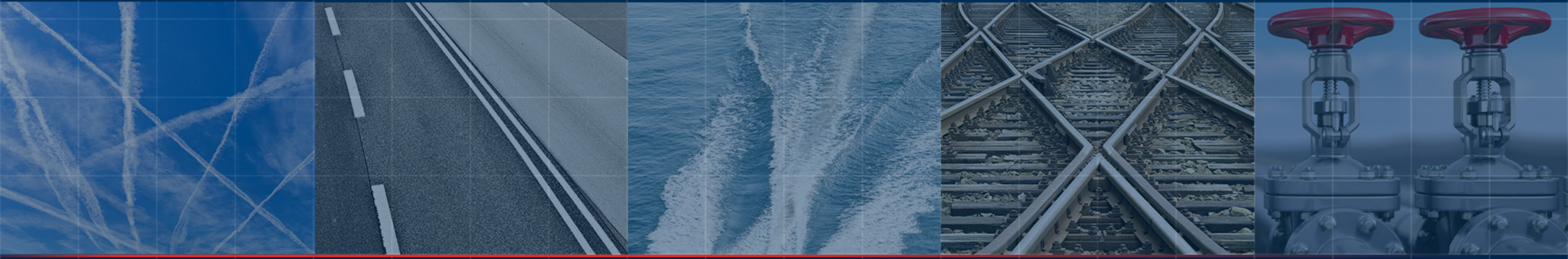
UPS-2 Driver Response

- UPS-2 entered curve at 69 mph
- UPS-2 3–5 seconds behind UPS-1
- Driver observed UPS-1 collision
- Driver applied brakes, steered right
- UPS-2 came to rest next to sedan

Source: Pennsylvania State Police, annotated by NTSB

What We Found: *FedEx and UPS Drivers' Responses*

- FedEx driver reduced speed on wet roadway, reduced crash severity
- UPS-1 driver's initial speed too fast for wet roadway conditions
  - Driver's braking attempt failed to reduce speed before impact
  - Contributed to severity of crash from impact speed
- UPS-2 driver had visual cues to warn of collisions ahead



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Highway Factors

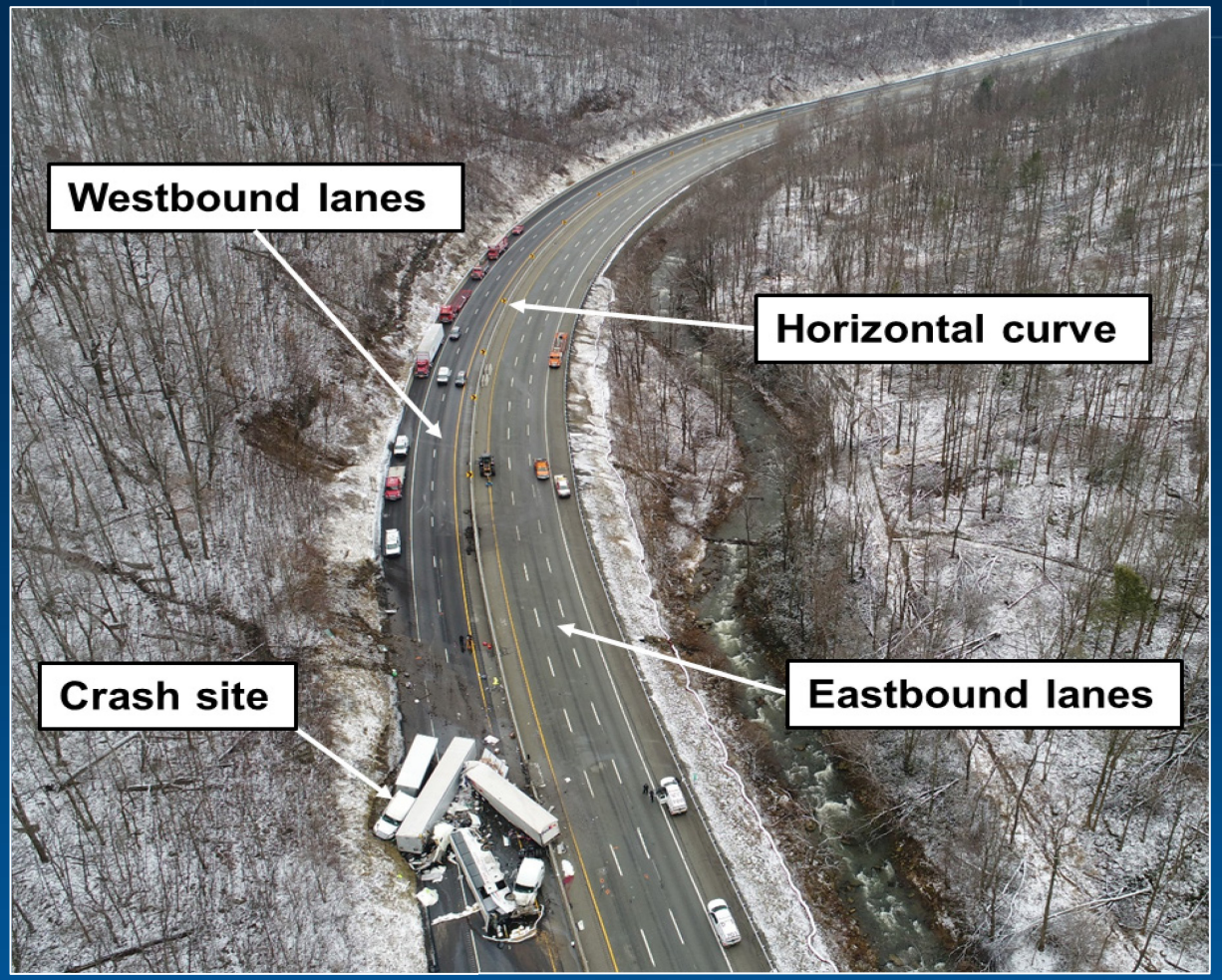
Dan Walsh, P.E.
Highway Factors Group Chairman

Overview

- Highway characteristics and signage on the Pennsylvania Turnpike
- Speed limits and the results of speed studies performed by the Pennsylvania Turnpike Commission
- Variable speed limit signs
  - How they could have prevented or mitigated the crash
- Speed safety cameras
  - Countermeasure to reduce speeding and speeding-related crashes

Highway Characteristics

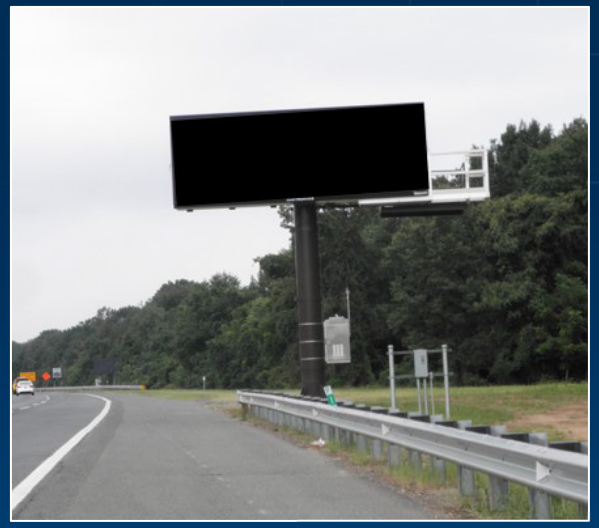
- Turnpike
  - Built in 1940
  - Numerous horizontal curves
  - Crash occurred in westbound lanes
- Horizontal curve
  - Downgrade slope of 3 percent
- Grooved rumble strips
- Resurfaced in September 2019



Source: Pennsylvania State Police

Signage

- 38 signs installed along westbound lanes
- 5 dynamic message signs
- “Curves ahead” advisory speed sign with flashing beacons
  - Warn motorists to reduce speed to 55 mph, particularly at night
- Connected vehicle technology
  - Harrisburg Connected Project



Source: PTC

Source: PTC

Speed Limits

- Regulatory 70 mph speed limit
  - Maximum speed on highway section, established by law, and is enforceable
  - 1,054 miles of straight sections
- Advisory 55 mph speed sign
  - Recommended safe speed for all vehicles, not enforceable
  - 150 horizontal curves (51 miles) for advisory speeds of 55, 60, 65 mph

Chronology of Speed Limits

- Regulatory speed limit has fluctuated over the years
  - Before May 2016, regulatory speed limit was 65 mph
  - Today, regulatory speed limit is 70 mph
- Commission assessed safety of the curves
  - Design speed is the maximum safe speed that vehicles can travel
  - Curve preceding the crash location was computed at 62 mph
- Advisory speed signs installed at all curves where the design speed was less than the 70 mph speed limit

85th Percentile Speed

- FHWA encourages 2 expert systems tools to establish appropriate speed limits
  - USLIMITS2
  - NCHRP 966
- 85th percentile speed (input variable) in both
  - Outdated form of obtaining speed study results
  - Been in use since the 1940s
- De-emphasize use of 85th percentile speed

Commission Speed Study

- Speed study at curve ahead of crash location, 2 other curves in westbound lanes
- Tests conducted under 2 conditions
  - Advised motorists about ongoing speed study
  - Did not advise motorists about speed study
- Speed study revealed only slight differences in each condition
  - Motorists traveling 10 to 25 mph above advisory 55 mph speed
  - Motorists traveling 0 to 18 mph above design speed

NTSB Investigations of Speeding-Relates Crashes

- Long history of investigating crashes involving speeding
  - 2003 motorcoach crash in Hewitt, Texas
  - 2017 safety study *Reducing Speeding-Related Crashes Involving Passenger Vehicles*
- NTSB's Most Wanted List
  - Critical safety issue since 2019
- Safe System Approach
  - Infrastructure solutions, behavioral solutions, vehicle-based solutions, and advanced technological solutions

What We Found: *Variable Speed Limit Signs*

- Effective countermeasure to speeding
  - Dynamically resetting regulatory speed limit
  - Response to changing roadway conditions
  - Speed limit is enforceable
- PDOT installed variable speed limit signs on I-76
- May have prevented the crash

Source: Pennsylvania Department of Transportation

What We Found: *Excessive Speeding*

- Excessive speeding near horizontal curves
- Variable speed limit signs are consistent with safe system approach of providing safe speeds
- What we propose:
  - One recommendation to the Pennsylvania Turnpike Commission
- De-emphasize 85th percentile speed used in FHWA's tools, USLIMITS2 and NCHRP 966, to set appropriate speed limits
- What we propose:
  - One recommendation to the Federal Highway Administration

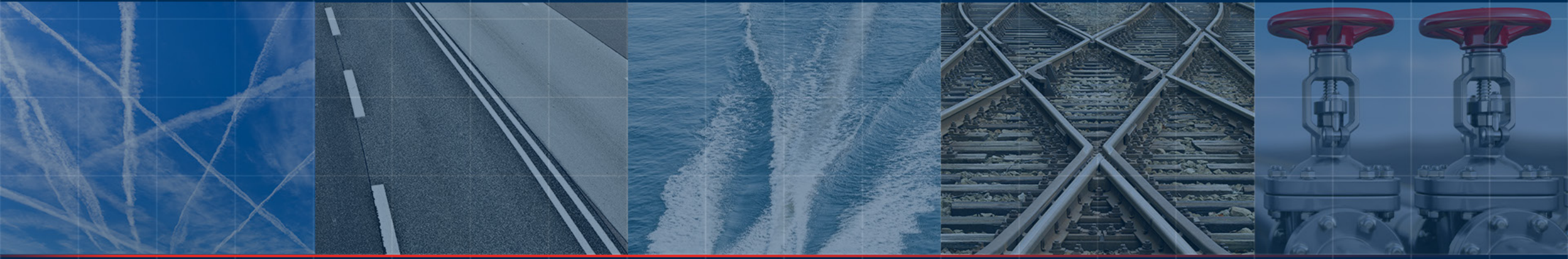
Speed Safety Cameras

- Effective countermeasure to reduce speeding
  - Photographic evidence of vehicle speeding
- Commission use on Turnpike
  - Only in active work zones
  - Lowered speeds by 5–8 mph on average
- Pennsylvania General Assembly
  - Legislation needed for speed safety cameras in broader use

Source: FHWA

What We Found: *Speed Safety Cameras*

- Effective countermeasure to reduce speeding
- 2018 legislation enacted to permit automated speed enforcement in work zones
- Helped Commission to lower speeds in active work zones
- What we propose:
  - One recommendation to the Commonwealth of Pennsylvania
  - Reiteration of H-17-32 to the Commonwealth of Pennsylvania



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Motor Carrier Factors

Shawn Currie
Motor Carrier Factors Group Chairman

Z&D Tour Inc. (USDOT 2313334)

- Rockaway, New Jersey
- Owned 8 motorcoaches, employed 8 drivers
- No alerts in Behavior Analysis and Safety Improvement Categories (BASICs)
- 58-year-old male driver, Class A New York CDL

FedEx Ground Package System Inc. (USDOT 265752)

- Moon Township, Pennsylvania
- Leases about 66,500 vehicles, 91,800 drivers
- Sioux Trucking
  - 35-year-old male, California Class A CDL
- Alerts in BASICs for Hours of Service and Driver Fitness

United Parcel Service Inc. (USDOT 21800)

- Atlanta, Georgia
- About 126,000 trucks, 118,000 drivers
- UPS-1 Driver: 52-year-old male, Pennsylvania Class A CDL
- UPS-2 Driver: 62-year-old male, New Jersey Class A CDL

Maintenance Issues

- UPS Truck 1 – misaligned radar sensor
- Error code and warning since June 2019
  - Detected by Penske in July 2019
  - Noted several times on maintenance records
  - No Driver Vehicle Inspection Report (DVIR) entry by driver

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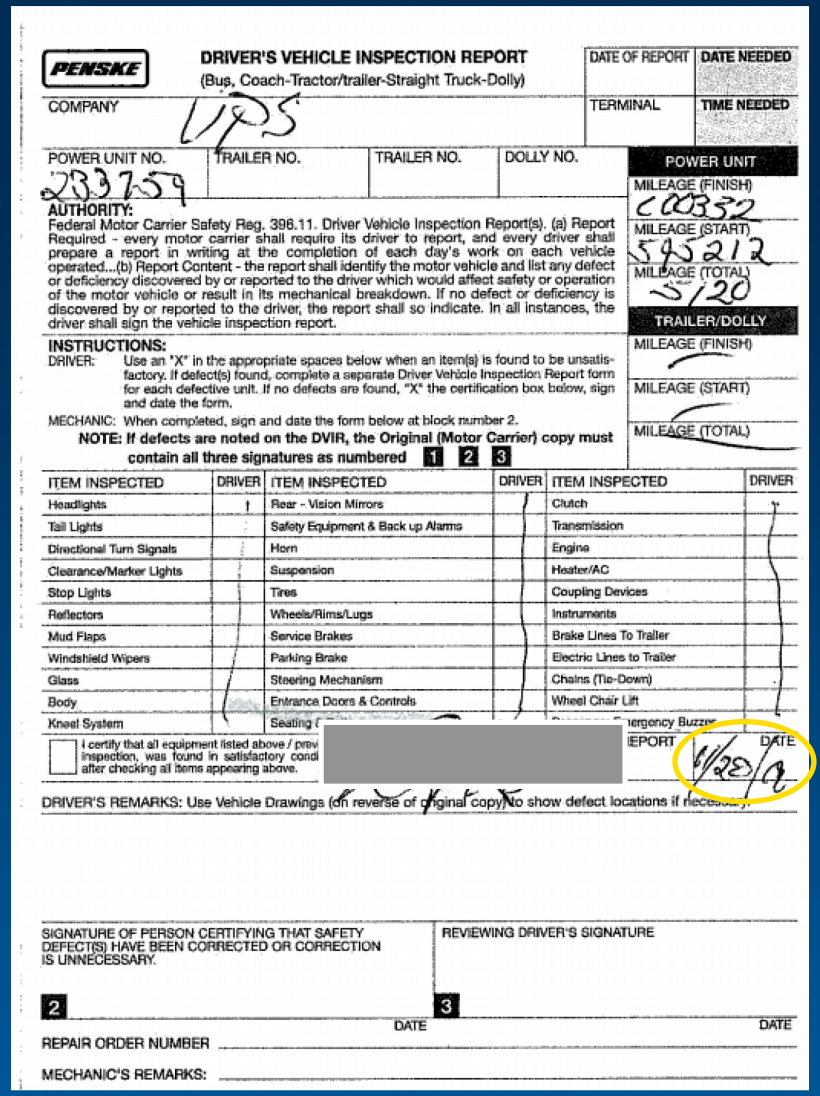
Driver Vehicle Inspection Reports from UPS Truck 1



PENSKE

DRIVER'S VEHICLE INSPECTION REPORT
(Bus, Coach-Tractor/trailer-Straight Truck-Dolly)

DATE OF REPORT | DATE NEEDED

COMPANY: UPS | TERMINAL | TIME NEEDED

POWER UNIT NO.	TRAILER NO.	TRAILER NO.	DOLLY NO.
233759			

POWER UNIT
MILEAGE (FINISH): 600352
MILEAGE (START): 595212
MILEAGE (TOTAL): 5120

TRAILER/DOLLY
MILEAGE (FINISH):
MILEAGE (START):
MILEAGE (TOTAL):

AUTHORITY:
Federal Motor Carrier Safety Reg. 396.11. Driver Vehicle Inspection Report(s). (a) Report Required - every motor carrier shall require its driver to report, and every driver shall prepare a report in writing at the completion of each day's work on each vehicle operated....(b) Report Content - the report shall identify the motor vehicle and list any defect or deficiency discovered by or reported to the driver which would affect safety or operation of the motor vehicle or result in its mechanical breakdown. If no defect or deficiency is discovered by or reported to the driver, the report shall so indicate. In all instances, the driver shall sign the vehicle inspection report.

INSTRUCTIONS:
DRIVER: Use an 'X' in the appropriate spaces below when an item(s) is found to be unsatisfactory. If defect(s) found, complete a separate Driver Vehicle Inspection Report form for each defective unit. If no defects are found, "X" the certification box below, sign and date the form.
MECHANIC: When completed, sign and date the form below at block number 2.
NOTE: If defects are noted on the DVIR, the Original (Motor Carrier) copy must contain all three signatures as numbered 1 2 3

ITEM INSPECTED	DRIVER	ITEM INSPECTED	DRIVER	ITEM INSPECTED	DRIVER
Headlights	✓	Rear - Vision Mirrors		Clutch	✓
Tail Lights		Safety Equipment & Back up Alarms		Transmission	
Directional Turn Signals		Horn		Engine	
Clearance/Marker Lights		Suspension		Heater/AC	
Stop Lights		Tires		Coupling Devices	
Reflectors		Wheels/Rims/Lugs		Instruments	
Mud Flaps		Service Brakes		Brake Lines To Trailer	
Windshield Wipers		Parking Brake		Electric Lines to Trailer	
Glass		Steering Mechanism		Chains (Tie-Down)	
Body		Entrance Doors & Controls		Wheel Chair Lift	
Kneel System		Seating [illegible]		[illegible]ergency Buzzer	

☐ I certify that all equipment listed above / prev[illegible] inspection, was found in satisfactory condi[illegible] after checking all items appearing above.

[redacted] [illegible]EPORT DATE 4/28/19

DRIVER'S REMARKS: Use Vehicle Drawings (on reverse of original copy) to show defect locations if [illegible]

SIGNATURE OF PERSON CERTIFYING THAT SAFETY DEFECT(S) HAVE BEEN CORRECTED OR CORRECTION IS UNNECESSARY.

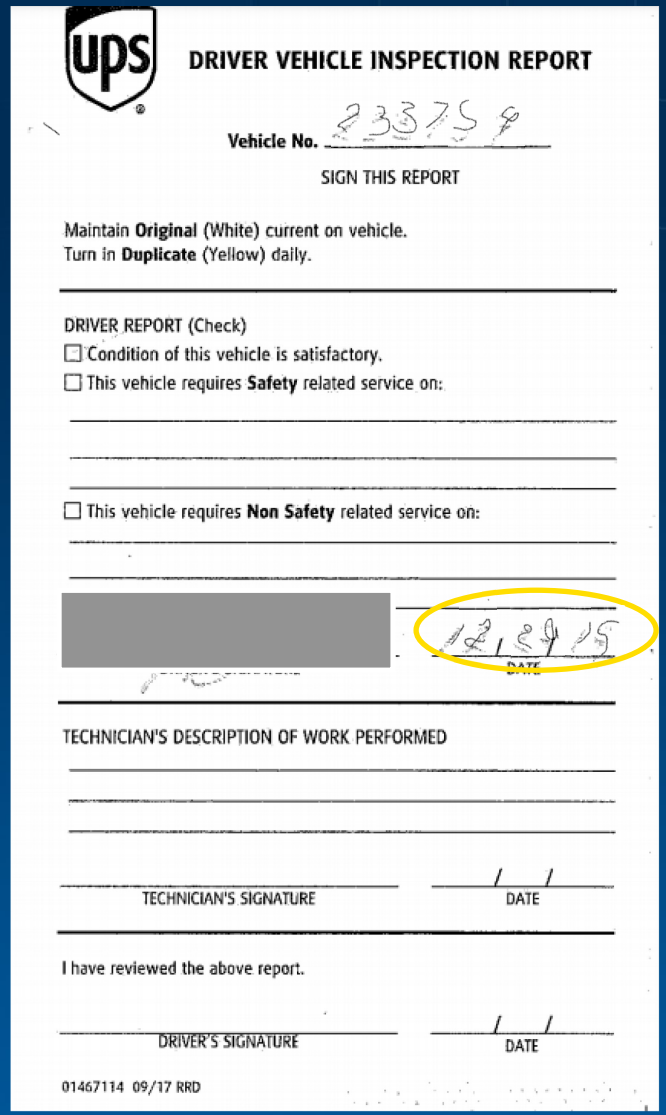
2 _____ DATE

REVIEWING DRIVER'S SIGNATURE

3 _____ DATE

REPAIR ORDER NUMBER _____

MECHANIC'S REMARKS: _____



ups

DRIVER VEHICLE INSPECTION REPORT

Vehicle No. 233759

SIGN THIS REPORT

Maintain **Original** (White) current on vehicle.
Turn in **Duplicate** (Yellow) daily.

DRIVER REPORT (Check)

☐ Condition of this vehicle is satisfactory.

☐ This vehicle requires **Safety** related service on:

☐ This vehicle requires **Non Safety** related service on:

[redacted] 4/28/19
DRIVER'S SIGNATURE DATE

TECHNICIAN'S DESCRIPTION OF WORK PERFORMED

TECHNICIAN'S SIGNATURE / / DATE

I have reviewed the above report.

DRIVER'S SIGNATURE / / DATE

01467114 09/17 RRD

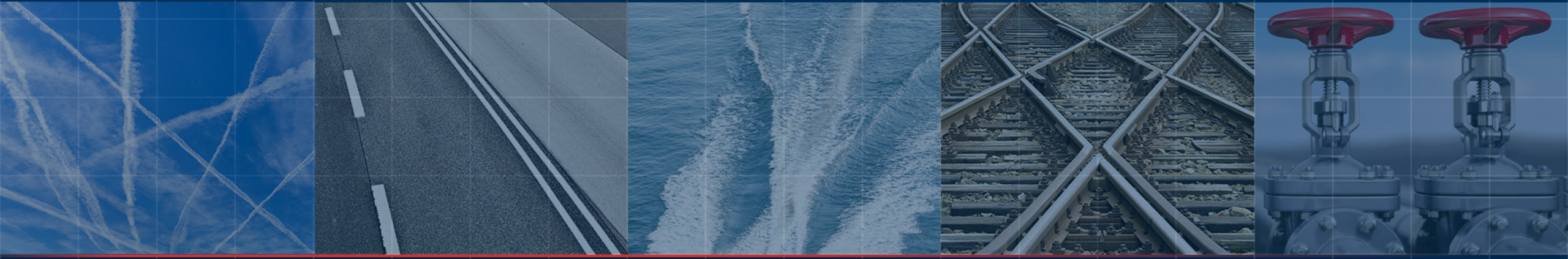
Postcrash Actions

- Penske
  - Places vehicle with Forward Collision Avoidance System defects out of service
  - Lessor receives notification email
  - Between May 2020 and December 2021, over 6,300 vehicles affected

- UPS
  - Changed driver training
  - Changed check ride form to account for advanced safety systems

What We Found: *Reporting Nonfunctional Safety Systems*

- Maintaining the full functionality of installed collision avoidance systems is critical to vehicle safety
- If drivers report defects or faults in collision avoidance system, repairs can be made more readily, improving safety
- What we propose:
  - One recommendation to the Federal Motor Carrier Safety Administration
  - One recommendation to the American Trucking Associations, Owner-Operator Independent Drivers Association, Commercial Vehicle Safety Alliance, American Bus Association, United Motorcoach Association, Transport Workers Union, Amalgamated Transit Union and the International Brotherhood of Teamsters
  - One recommendation to FedEx and UPS



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Vehicle Safety Technologies

Jerome Cantrell
Vehicle Factors Group Chairman

Overview

- Heavy Vehicle Speed Limiters
- Forward Collision Avoidance Systems (CAS)
- Connected Vehicle Technology (V2X)

Heavy Vehicle Speed Limiters

- Motorcoach did not have a speed limiter
- Passive speed limiters
  - Maximum vehicle speed is pre-set, mechanically or electronically
- Advanced speed limiters (intelligent speed assistance)
  - Relies on cameras and GPS to read and verify roadway speed limit
  - Adjusts vehicle maximum speed in real time

Previous NTSB Recommendations

- Safety recommendations issued in 2012 to NHTSA:
  - Develop performance standards for advanced speed-limiting technologies for heavy vehicles (H-12-20)
  - Mandate advanced speed limiters in heavy vehicles (H-12-21)
- Lack of progress on recommendation by NHTSA
  - Classification is “Open—Unacceptable Response”

What We Found: *Heavy Vehicle Speed Limiters*

- Speed contributed to both the cause and severity of this crash
- Speed limiters help drivers avoid exceeding regulatory, advisory, and variable speed limits
- What we propose:
  - Reiterate Safety Recommendations H-12-20 and -21 to NHTSA

Forward Collision Avoidance Systems (CAS)

- Three Freightliner truck-tractors were equipped with forward CAS
  - Not functioning on UPS-1
  - FedEx and UPS-2 did not activate precrash
- CAS: audible warning, automatic emergency braking (AEB)
- Designed to mitigate or prevent rear-end crashes
- Performance affected by
  - Generational capabilities
  - Roadway and crash parameters

Forward CAS: Standards and Testing

- No federal performance standards for CAS in heavy vehicles
- NHTSA proposed testing protocols in 2019
  - No pass/fail criteria
  - Maximum tested speed of 45 mph
  - Straight roadway, clear weather
  - Rear of a passenger vehicle as the only target
- Parameters of this crash were likely beyond NHTSA's proposed testing protocols

Previous NTSB Recommendations

- More than 25 recommendations, starting in 1995 through 2015
- In 2015, issued Safety Recommendation H-15-5 to NHTSA:
  - Complete development and application of performance standards and protocols for the assessment of forward CAS in commercial vehicles
  - Classification remains “Open—Acceptable Response”

What We Found: *Collision Avoidance Systems*

- Parameters in the Mt. Pleasant Township crash beyond proposed system capabilities and proposed federal test procedures
- Voluntary installation and use of forward CAS and AEB in heavy vehicles by manufacturers and operators
- What we propose:
  - Reiterate Safety Recommendation H-15-5 to NHTSA

Connected Vehicle Technology

- V2X enables vehicles to communicate with:
  - Other vehicles or roadway users
  - Infrastructure
- Communication identifies vehicle's speed, location, direction of travel
- Not impacted by:
  - roadway geometry or weather
  - does not require line of sight
  - vehicle speeds or positioning in roadway

Previous NTSB Recommendations

- Connected vehicle technology complement to forward CAS
- In 2013, issued safety recommendations to NHTSA:
  - Develop performance standards (H-13-30)
  - Mandate connected vehicle technology in all highway vehicles (H-13-31)
- V2X technology has matured since 2013
- NHTSA has taken no regulatory action

What We Found: *Connected Vehicle Technology*

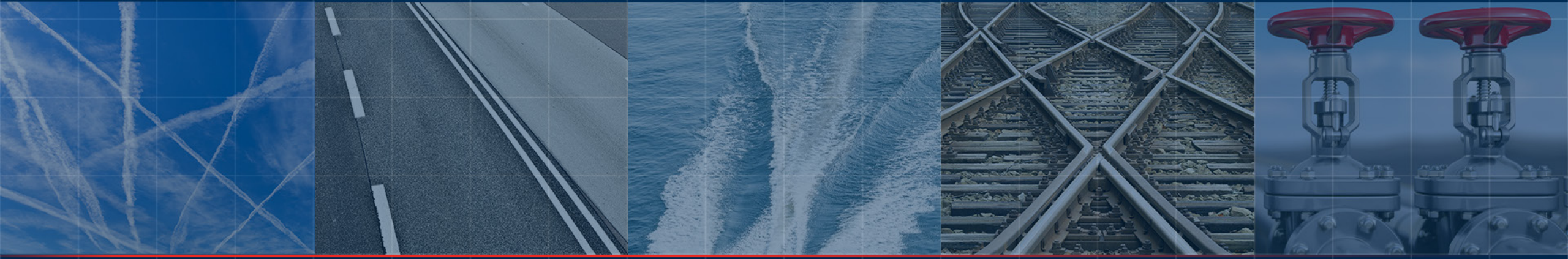
- V2X technology provides alerts earlier than camera or radar systems
- In the Mt. Pleasant Township crash, connected vehicle technology:
  - Might have prevented or mitigated vehicle collisions
  - Might have reduced injury severity
- What we propose:
  - Reiterating H-13-30 and -31 to NHTSA

FCC Ruling to Reduce the Safety Spectrum

- In 2021, FCC final rule:
  - Reduced safety spectrum to 30 MHz
  - Allocated remaining bandwidth to unlicensed devices
- Interference from unlicensed devices, such as those using wi-fi, negatively impacts performance of connected vehicle devices
- FCC actions have an adverse impact on deployment of:
  - Near-term and long-term connected vehicle technologies
  - State DOT vehicle-to-infrastructure technology

What We Found: *Connected Vehicle Technology*

- Challenges to V2X deployment resulting from FCC final rule potentially detrimental to future advancement of V2X
- V2X critical to mitigation and prevention of crashes
- FCC provision of sufficient spectrum without interference needed
- US DOT to ensure nationwide deployment needed
- What we propose:
  - One recommendation to the Federal Communications Commission
  - One recommendation to the US Department of Transportation



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