NTSB Team On Scene

- Robert Sumwalt  Board Member
- T. Bella Dinh-Zarr  Vice Chairman
- Mike Flanigon  IIC On-Scene
- Ted Turpin  IIC
- Tim DePaepe  Signals
- Steve Jenner  Human Performance
- Mike Hiller  Mechanical
- Dave Bucher  Operations
- Cy Gura  Track and Engineering
- Kristen Poland  Scanning Group
- Dana Sanzo  Crashworthiness and Survival Factors
NTSB Team On Scene

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NTSB Team

- Karen Bury  Report Writer
- Donald Kramer  Materials Laboratory
- Dennis Crider  Technical Assistance
- Kevin Renze  Technical Assistance
- Deborah Tedford  Editor
- Christy Spangler  Graphics
- Alice Park  Animation
- Mike Hamilton  Recommendations
Parties

- Federal Railroad Administration
- Amtrak
- Brotherhood of Locomotive Engineers and Trainmen
- International Association of Sheet Metal, Air, Rail and Transportation Workers
- Brotherhood of Maintenance of Way Employes Division
- Philadelphia Police Department
- Philadelphia Fire Department
- Philadelphia Office of Emergency Management
Non Contributory Factors

- Equipment passed inspections
- Records showed no defects
- No report of the window being struck
- Negative toxicological tests
- No medical condition with engineer
- No evidence of cell phone use
- On/off duty cycle provided adequate time to rest
Northeast Corridor - PTC System
Data Current as of May 12, 2015
Source: Amtrak

Only operational on the two inside tracks in a four track territory

Legend:
- Cities
- PTC in Use
- No PTC

not to scale
Northeast Corridor - PTC System

Source: Amtrak

Legend
- Cities
- PTC in Use
- No PTC

not to scale
Presentation Topics

• Performance of the Amtrak engineer
• Passenger railcar occupant protection
• Emergency medical response
Human Performance Investigation

Stephen M. Jenner, Ph.D.
Performance of the Amtrak Engineer

- Engineer could not remember events minutes before the accident
- Investigation focused on factors that may have diverted his attention
Emergency Situation with Another Train

- SEPTA commuter train emergency
- Six-minute radio communication between SEPTA engineer and train dispatcher
The Effect of the SEPTA Situation on the Amtrak Engineer

• Amtrak engineer’s attention to SEPTA situation

• Engineer’s loss of Situational Awareness
Loss of Situational Awareness

Train 188 Accident Route

- 9:13:11 start radio broadcast
- 9:19:13 end radio broadcast
- 30th Street Station
- Diamond Street Bridge
- North Philadelphia Station
- Frankford Junction derailment site
- Train speed 106 mph
- Stopped SEPTA train

Time: EST hour:minute:second
- radio broadcast between SEPTA engineer and dispatcher
- allowable speed (miles per hour)

not to scale
Forgetting about Future Operations

- Prospective memory
- Interruptions and forgetting
- Engineer may have forgotten his next task: To operate at 80 mph and slow for curve at Frankford Jct.
Summary

• Engineer’s loss of situational awareness, likely due to his attention being diverted to a SEPTA train emergency
• Positive Train Control
• Proposed Recommendations
  - Education
  - Simulator Training
  - Technology
Survival Factors

Dana Sanzo
Survival Factors Investigator
Overview

• Derailment sequence
• Passenger railcar windows
• Occupant protection
Derailment Sequence

Frankford Junction
point of derailment
Derailment Sequence
Derailment Sequence
Passenger Car Four

Window Strip
December 2013
Previous NTSB Recommendation

R-14-74 to FRA

• Develop a window performance standard to ensure that windows are retained

• Require that passenger railcars meet this standard
Serious Injuries

- Forty-six people were seriously injured
- The majority sustained torso or chest injuries
Occupant Protection

Current requirements

- 49 CFR 238
- Minimize collision force effects
- Preserve occupant space
- Secure interior fittings
Occupant Protection

Standards should:

• Protect occupants from lateral motion
• Prevent occupants from being struck by loose objects
Emergency Medical Response

Mary Pat McKay, MD, MPH
Mass Casualty Incident (MCI)

- Number and severity of injuries overwhelm available medical resources

- Philadelphia Fire Department
  - Level I Mass Casualty Disaster
  - 253 occupants; 186 transported
Ten Area Hospitals

Six Level I/II Trauma Centers

- Staffing
- Resources
- Expertise
- Treat complex life threatening injuries
Patient Priority (Triage) in an MCI

Separate injured survivors

- Emergent (red)
- Urgent (yellow)
- Less injured (green)

Indicates:

- Transport priority, type of hospital, and hospital resources
EMS Transport Coordinator

- Identified within incident command structure
- Coordinates with hospitals to distribute injured without overwhelming hospital resources
Philadelphia Emergency Responders

Fire Department

Office of Emergency Management

Police Department

- Fire
- EMS
- FCC

- Police
- Police Radio
Philadelphia Police Department

- Routinely transports injured patients to hospitals in police vehicles
  - Penetrating trauma
  - Police choose destination
- Equivalent survival rates
Midnight – 2:30 hours after the accident

- Designated trauma center
- Non-trauma hospital

- Time Since Accident: 2:30

- Serious, Minor, None
Following the Accident

• New Fire Dept. Procedure
  • No victim will be transported by police unless OK’d by the transport coordinator

• Draft Citywide Mass Casualty Plan

• No Police Dept. Procedure changes
Novel Emergency Medical Response Issues

- Non-ambulance transportation
- Coordination and integration
- May be a reasonable use of resources in an MCI