



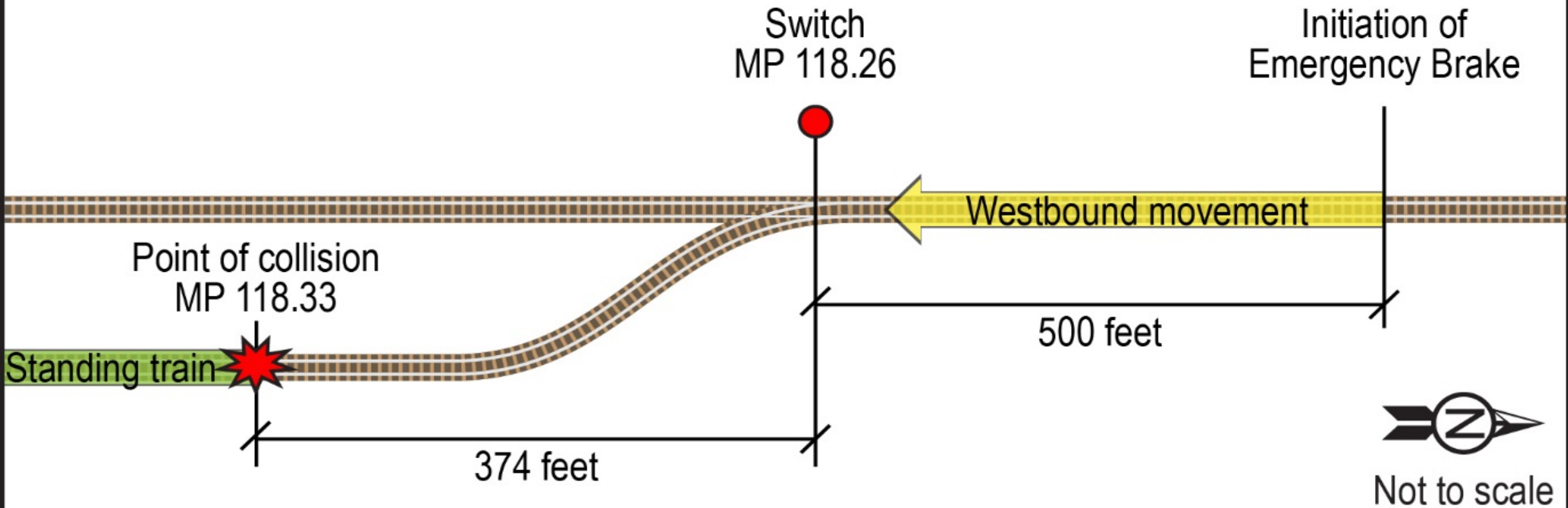
National Transportation Safety Board

Southwestern Railroad Collision
Roswell, New Mexico
April 28, 2015

Ted Turpin



Time table direction
Westbound ↔ Eastbound



Parties to the Investigation

- Federal Railroad Administration
- Southwestern Railroad (No longer operating)
- New Mexico Public Regulation Commission

Safety Issues

- Switches in nonsignaled territory
- Monitoring inappropriate crew behaviors

Switches in Nonsignaled Territory

1. Returning the switch to proper position

Currently - only procedures

2. Warning for approaching trains

Small target or sign on switch

Drug Use - Striking Train Crew

- Engineer was positive for marijuana
- Conductor was positive for oxycodone
- Railroad could not monitor behaviors



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Title slide with NTSB 50th
Anniversary Commemorative
Emblem-Making
Transportation Safer
Yesterday, Today, Tomorrow.
National Transportation Safety
Board.

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Bob Beaton, Ph.D., CPE

Behavior of Striking Train Crew

Event recorder data shows the crew:

- Activated horn appropriately at highway-railroad grade crossings
- Maintained train steadily below track speed

Crew notified that switch was aligned to main line

Behavior of Striking Train Crew

On approach to switch:

- Initiated emergency braking 500 feet before switch
- Diverted into siding at 40 mph

Behavior of Striking Train Crew

On approach to standing train:

- Train traveled 374 feet and slowed to 32 mph at impact (6-8 sec)
- Crew jumped from locomotive before collision

Analysis of Striking Train Crew

- No inward-facing cameras
- Timely and appropriate actions to unexpected situation
- No behavioral signs of impairment

Ineffective Safety Devices

Switch banner is ineffective warning

- Passive flag is small visual target
- Similar issue in Bettendorf and Graniteville accidents

Behavior of Standing Train Crew

Work shift:

- Switched industry railcars
- Moved train into Chisum siding; no incidents
- Engineer set hand brakes on head-end locomotive
- Conductor collected end-of-train device

Behavior of Standing Train Crew

Conductor:

- Saw fuel truck
- Conversed with driver
- Picked up engineer
- Drove to hotel
- Failed to align switch as intended

Behavioral Analysis of Standing Train Crew

- Nature of human errors, such as errors of omission, are well-studied in human factors literature
- Routine procedural tasks are susceptible to error when people are interrupted – failure to resume procedure at proper step

Switch Alignment Failures

Failure to align manual switches is high-risk hazard in railroads:

- From 2008 to 2017, human caused accidents accounted for 37% of FRA reportable events, and failure to align switch accounted for 13% of those accidents
- Number 1 cause of FRA-reportable events (ex-grade crossings)



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FRA Post-accident Testing Positive Rate

