



# National Transportation Safety Board

## Chicago Transit Authority Train Collides with Bumping Post and Escalator at O'Hare Station

Chicago, Illinois

March 24, 2014

DCA14FR007

# NTSB Team On Scene

- Ted Turpin IIC/Report Writer
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# NTSB Team

- Deborah Tedford Editor
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- Alice Park Animation
- Matthew Ballon Animation/Graphics
- Vincent Harris Graphics



# Parties

- Federal Transit Administration
- Regional Transit Authority
- Chicago Transit Authority

# Investigation

- No mechanical issues
- No operator familiarity issues
- No use of a personal electronic device while operating train
- No Illegal drug/alcohol use

# Safety Issues

- Operator fatigue
- Transmission based train control
- Standardized event recorders



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Stephen M. Jenner, Ph.D.  
Human Performance Investigator

# Operator Fatigue

## Factors

- Time of day (window of circadian low)
- Adjusting to an irregular nighttime shift
- Missed opportunity for sleep
  - Played sports (slept less than one hour)
  - Challenges of sleeping during day

# Hours of Service

- NTSB previously recommended development of scientifically based Hours of Service (HOS)
- No FTA HOS regulations
- Proposed HOS recommendation to FTA

# Work Schedulers

- No formal training
- Scheduling one of many responsibilities
- Often no fatigue training or background
  - Proposed recommendation to FTA
- Need to identify and require additional training
  - Proposed recommendation to FTA

# Improving Work Scheduling

- Based on fatigue science
- Scheduling tools (biomathematical models of fatigue)
- Currently used by commuter and passenger service
- Proposed recommendation to FTA



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# Investigation

- The Blue Line is signalized the entire length of the line.
- If an operator passes a red signal, emergency braking is applied.



# Investigation

- At the O'Hare Terminal, the center pocket track was signaled for 25 MPH.
- In advance of the fixed trip, the cab signal reduces the train speed command from 25 MPH to 0 MPH.
- The center pocket track has a fixed track trip by the red signal in advance of the bumping post



# Investigation

- The signal system was displaying the proper signals for movements into the station.
- The CTA signal system was working as designed, however the design of the system did not prevent this accident.



# Safety Issues

- As designed, the CTA signal system did not stop trains before they reached a stop signal even when a track trip was added.
- A train can strike an obstruction or another train before coming to a stop after passing a red signal.



# Actions Taken Since the Accident

- CTA signal personnel changed the speed command from 25 MPH to 15 MPH through the O'Hare Interlocking to the O'Hare Station.
- CTA then implemented more restrictive measures included setting the cab speed in the center pocket track to 0 MPH.



# Actions Taken Since the Accident

- Track 1 and Track 2 improvements included the reconfiguration of the block signals to act as timed signals.
- The timed signals allow trains to approach the station stop under 15 MPH.



# Transmission Based Train Control

A fully implemented Transmission Based Train Control system would have prevented this accident by applying the train's brakes and stopping the train before the train passed the red stop signal.





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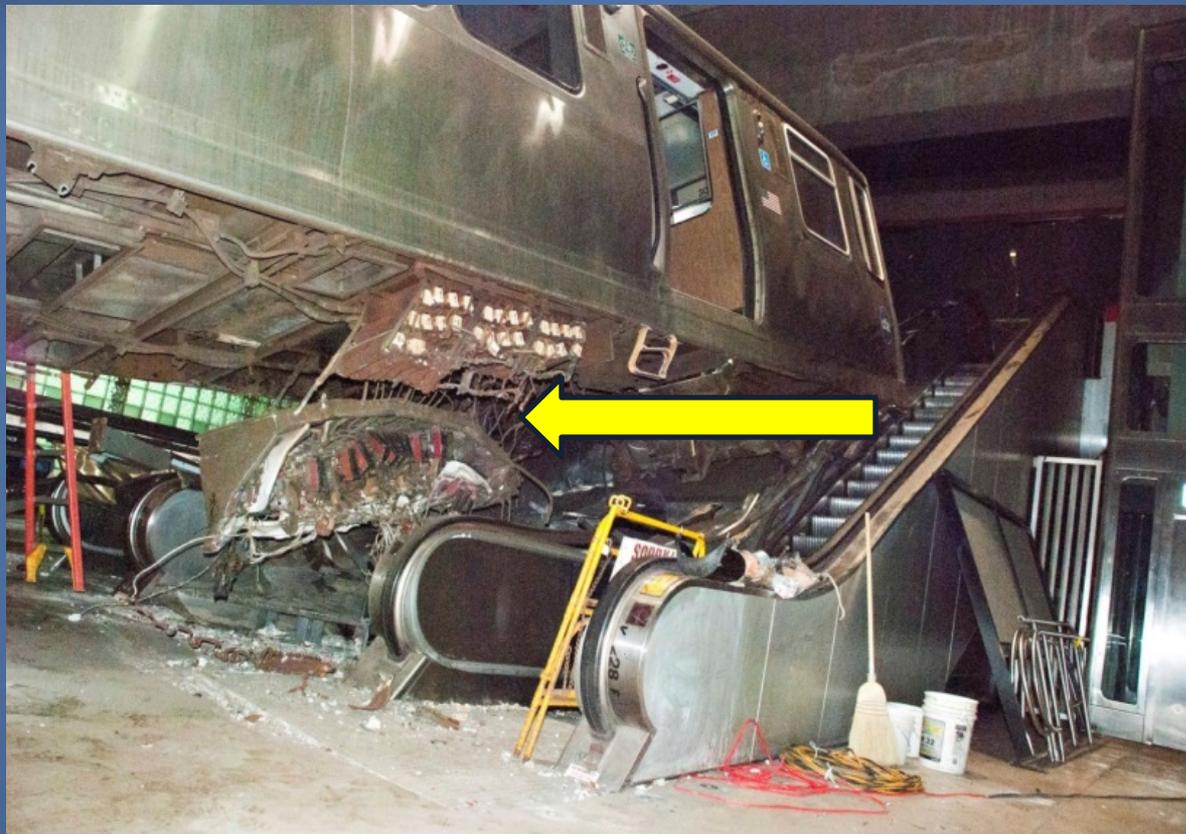
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# Fault Loggers

- Are not event recorders
- Collect data only after an event
- Limited amount of data
- May not be protected

# Location of Fault Logger



# Recovered Fault Logger



# CTA New Cars

- All equipped with event recorders
- Record broad spectrum of data
- Located in protected area of car
- Other transit properties are not required to install event recorders



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