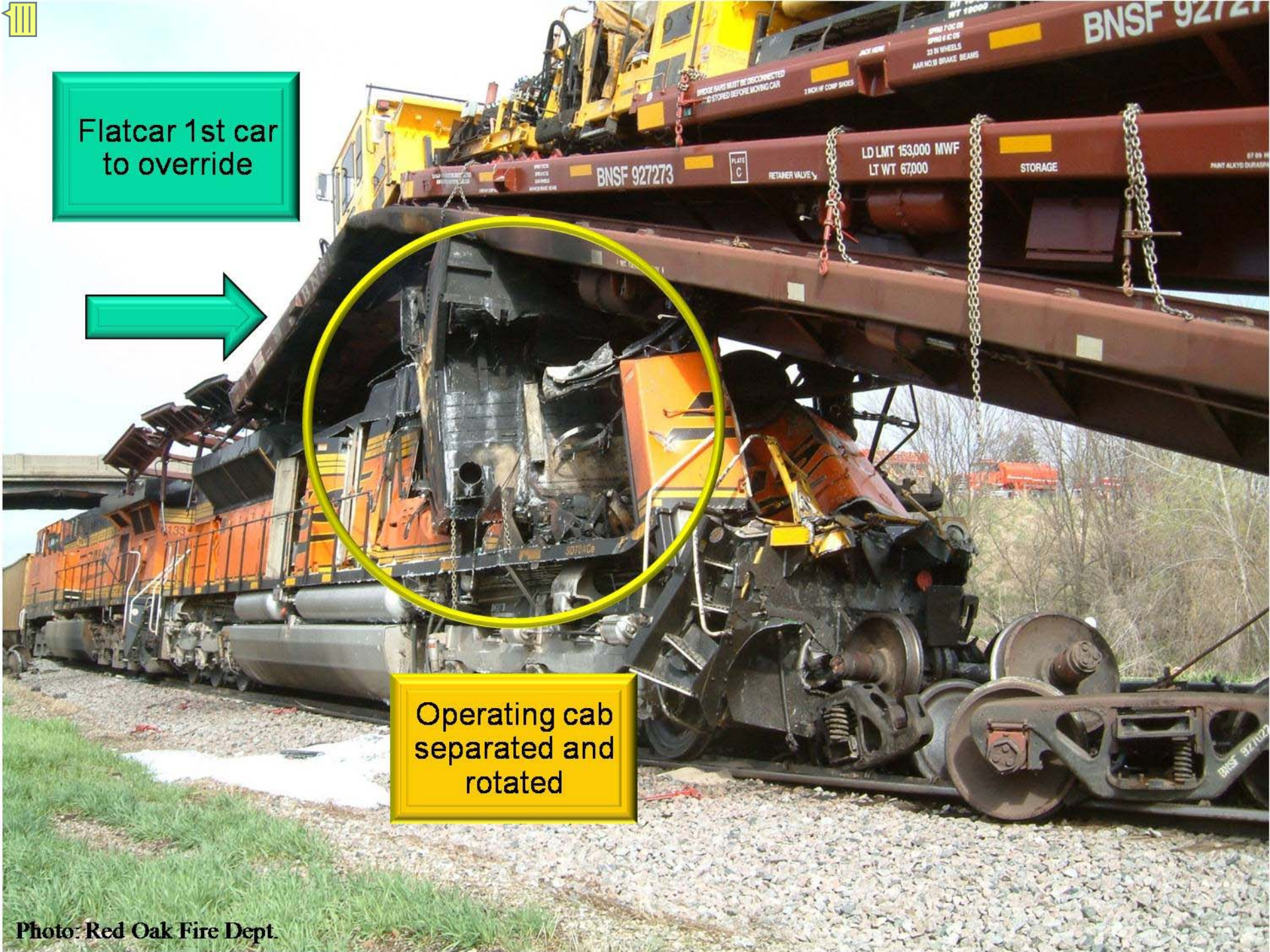
National Transportation Safety Board

Locomotive Crashworthiness

Michael E. Hiller


Flatcar 1st car to override
Operating cab separated and rotated
BNSF 927273
LD LMT 153,000 MWF
LT WT 67,000
STORAGE
Photo: Red Oak Fire Dept.

The Locomotive

NTSB

Isolated Cab Design

NTSB

Isolated Cab Design

NTSB

Isolated Cab Design

NTSB

Isolated Cab Design

NTSB

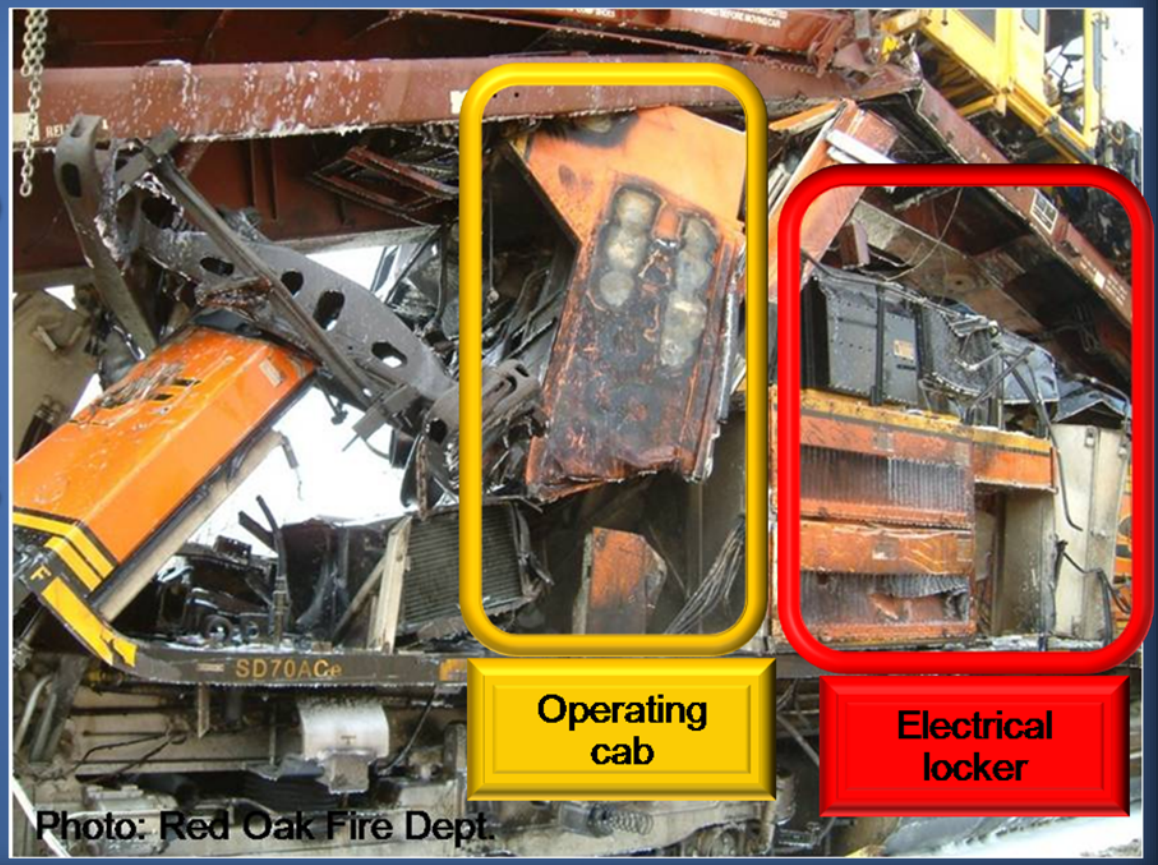
Failure Observations

- 1st struck car was crushed and pushed off the tracks, leaving wreckage in striking train's snowplow
- 2nd struck car overrode locomotive and collided with operating cab

NTSB

Failure Observations

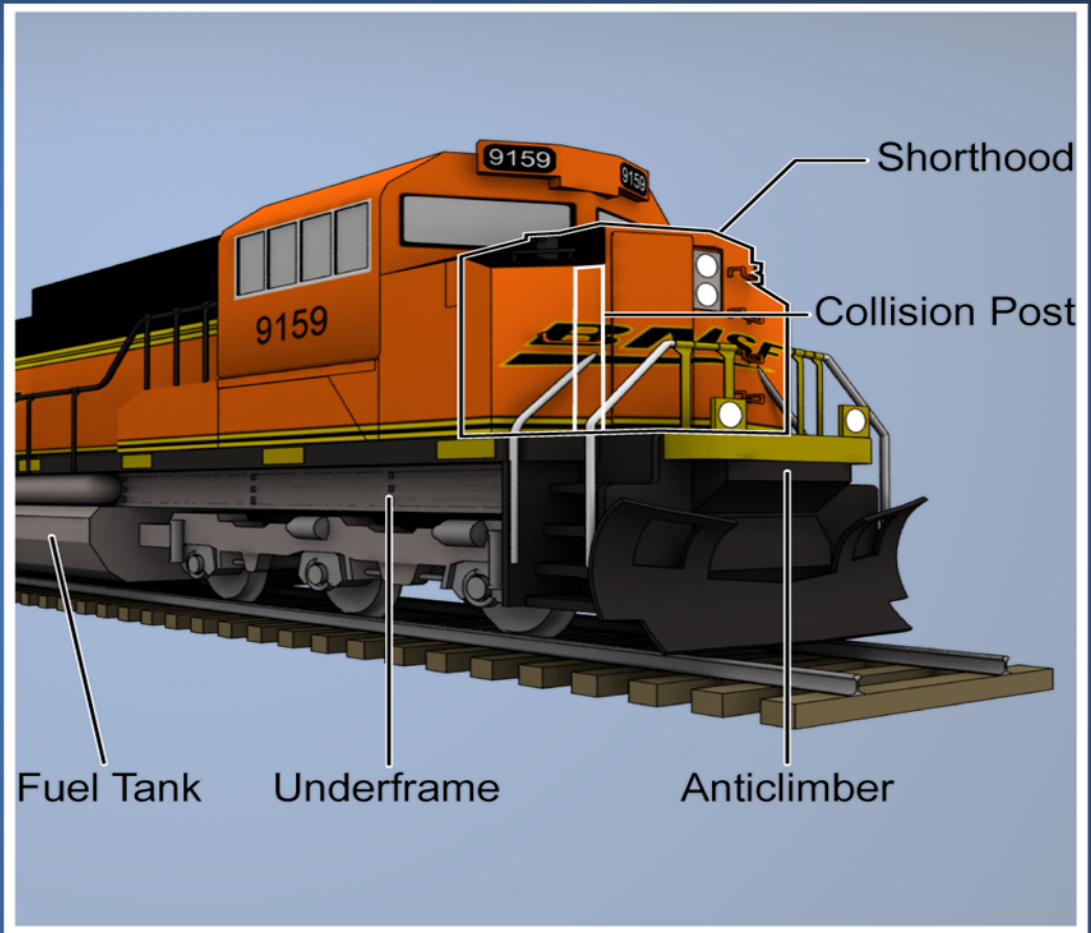
- Operating cab's front lower shear pins failed and cab rotated upward and rearward
- Operating cab was crushed at rooftop and severely burned



NTSB

Crashworthiness Standards

- Title 49 CFR 229.141
- 49 CFR 229.141 incorporates AAR S-580
- Anti-climber strength
- Short hood strength
- Collision post strength
- Underframe strength
- Requirements for fuel tanks



NTSB

Staff Assessment of Standard

- Current standard does not include criteria for isolated cabs
- Current standard's provision to validate alternative crashworthiness designs was not effective

National Transportation Safety Board