



# National Transportation Safety Board

## Hazardous Materials Safety Issues

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# Hazardous Materials Safety Issues

- Accident performance of DOT-111 tank cars used to transport flammable liquids
- Use of buffer cars to protect train crews from released hazardous materials

# DOT-111 Tank Car Performance

- Derailed 20 DOT-111 tank cars loaded with crude oil
- 18 tank cars breached
- 476,437 gallons crude oil released
- Pool fire and energetic fire ball releases

# Tank Car Damages



- Head and shell punctures
- Breached valves and fittings
- Thermal shell tears

# Safety Recommendations

Cherry Valley, Illinois, June 2009

Improved tank car crashworthiness needed for flammable liquids in unit trains

- Puncture resistance for heads and shells
- Top Fittings protection
- Bottom outlet closure

# Safety Recommendations

Lac-Mégantic, Quebec, July, 2013

Railroad operations actions needed for flammable liquids

- Route planning and selection
- Spill response plans
- Hazardous materials classification



# Safety Recommendations

Mount Carbon, West Virginia, February 2015

Protection needed against thermally induced tank shell tears with fireball eruptions

- Thermal protection systems and pressure relief
- Retrofit or replace existing tank cars
- Intermediate milestones and public reporting

# NTSB Rail Safety Forum

April 2014, Rail Transportation of Crude Oil and Ethanol

- Tank car design
- Railroad operations
- Recommended practices
- Emergency response



# NTSB Roundtable Discussion

## July 2016, Next Steps in Rail Tank Car Safety


- Shift away from DOT-111 tank cars
- Legacy DOT-111 unlikely to be retrofitted to 117R
- Crude oil tank car fleet makeup:

Tank Car Type	Number Used (Q1 and Q2 2016)*
DOT-111	763
CPC-1232	19,017
DOT-117	2,666

\*Source: Association of American Railroads


# NTSB Most Wanted List

Tank car safety featured on 2015 – 2018 NTSB Most Wanted Lists of Transportation Safety Improvements



**IMPROVE RAIL TANK  
CAR SAFETY**

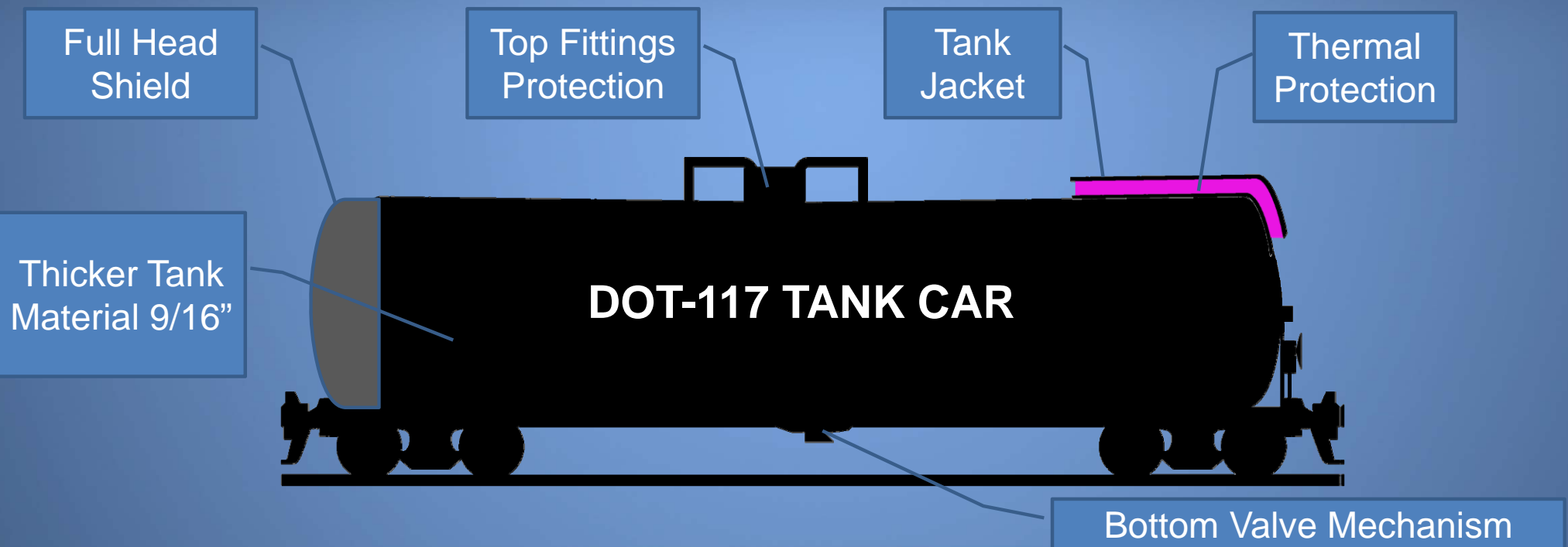
NTSB Most Wanted List 2015



More crude oil and ethanol than ever is moving across America's rails. But accidents demonstrate that the tank cars moving these flammable liquids are not up to the task. It's crucial to strengthen existing rail tank cars and new rail tank car regulatory requirements.

[www.nts.gov/mostwanted](http://www.nts.gov/mostwanted)

# New Requirements for Tank Cars in Flammable Liquids Service



# Protecting Train Crews from Hazardous Materials Releases



Buffer cars separate the train crew from hazardous materials should a release occur

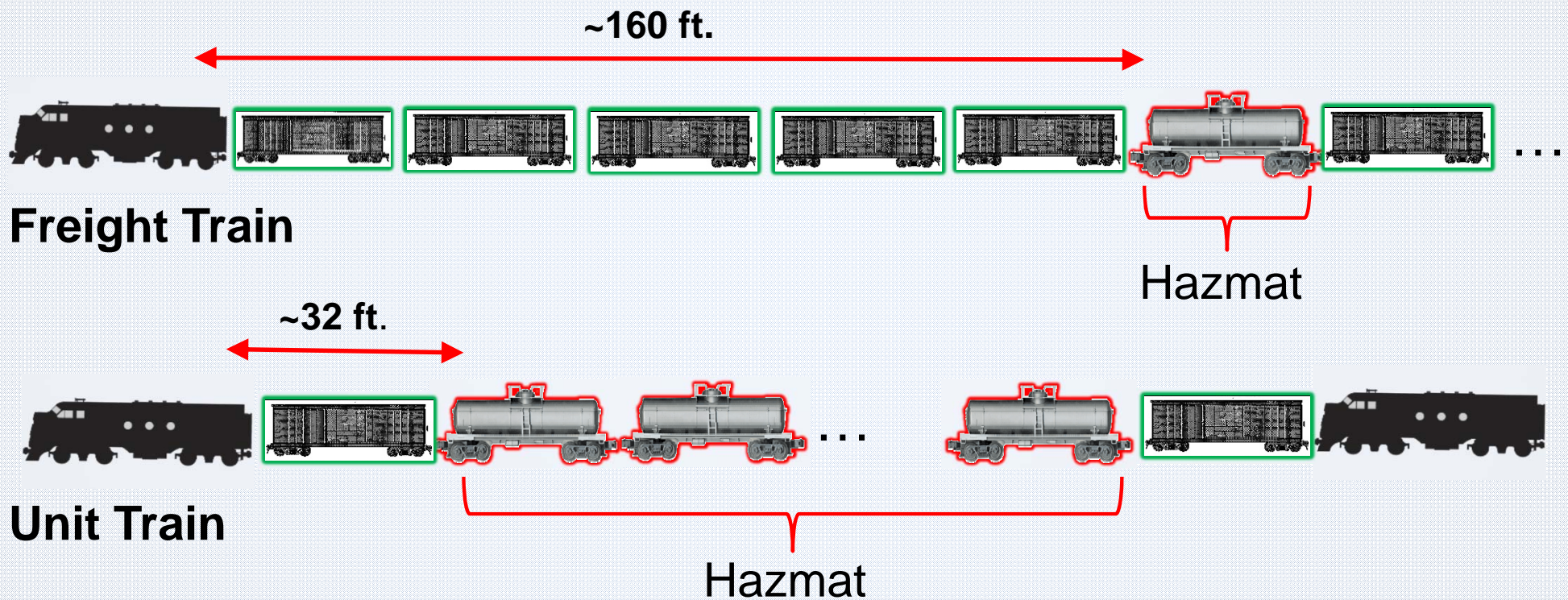
# Energetic Fireball Release



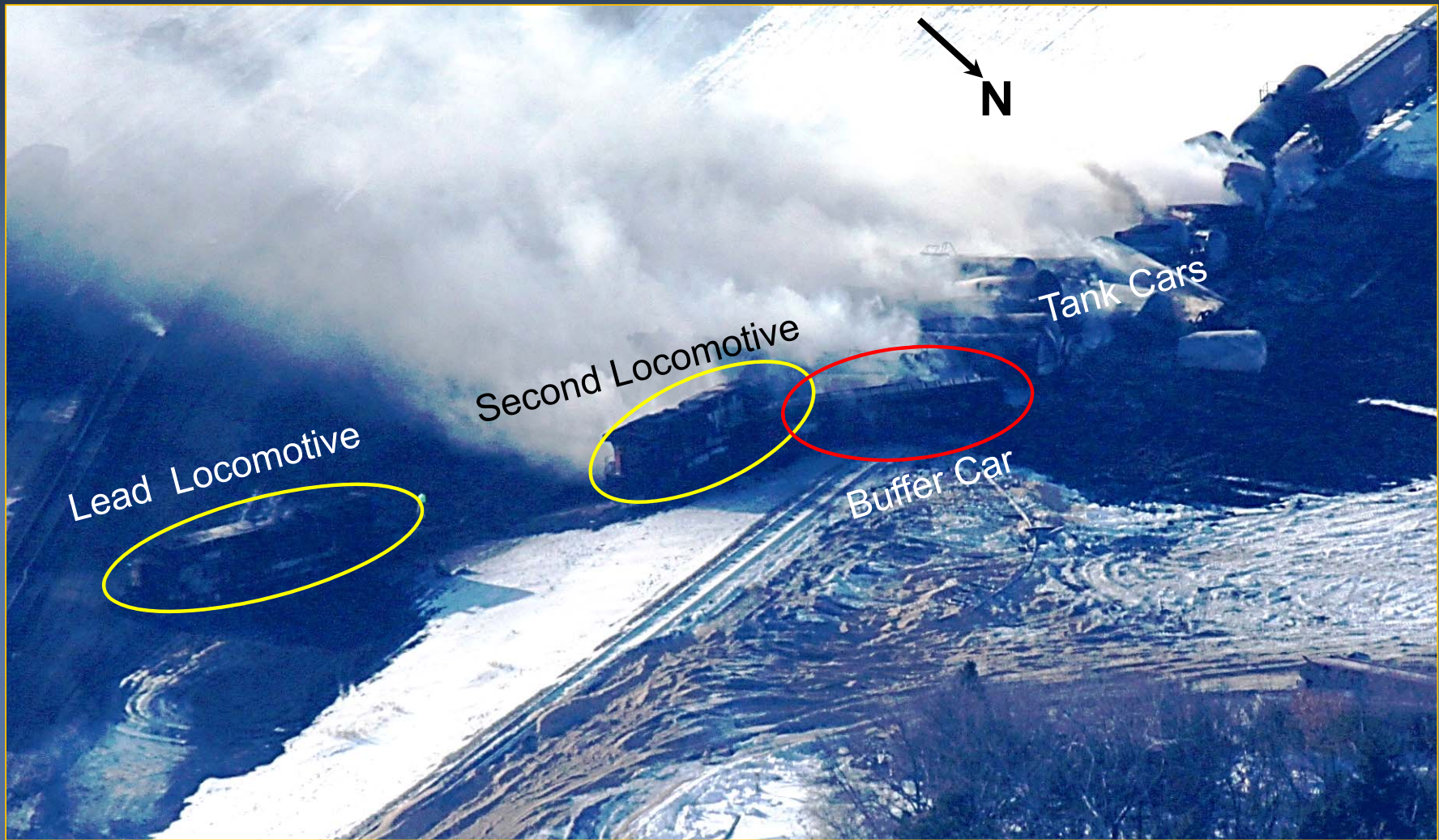
Courtesy KFGO, Fargo, ND



# Buffer Car Requirements







# Train Crew Hazmat Exposure



Closest tank car to the lead locomotive breached and released hazardous materials



# BNSF Train Crew Evacuation



Oil Train Lead Locomotive

# Previous NTSB Buffer Car Action

Safety Recommendations R-08-12 and -13 to PHMSA and FRA:

- Evaluate risks posed to train crews
- Determine optimum separation requirements
- Revise 49 CFR 174.85 accordingly

# Summary

- Interpretation of regulations that allow use of one buffer car create different levels of protection for unit train and general freight train crews
- Additional separation would provide greater protection in the event of an accident



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