NTSB 2017–2018

MOST WANTED LIST OF TRANSPORTATION SAFETY IMPROVEMENTS

Ensure the Safe Shipment of Hazardous Materials

RAIL

MWL
MOST WANTED LIST

What is the issue?

Changes to the North American energy landscape have pressed railroads into service as never before. According to the Association of American Railroads, in 2009, Class 1 railroads shipped about 9,500 tank cars of crude oil. In 2014, that number increased to nearly 500,000. The recent declines in rail shipments of energy products have been incremental pull-backs after an exponential increase.

Crude oil is used to make the gasoline or diesel fuel that powers your car and the fuel oil that heats your home. The ethanol that is blended with your gasoline is predominantly transported by rail, too; in 2013, more than 300,000 tank cars transported ethanol. Producers often ship crude oil and ethanol in mile-long "unit trains" that travel alongside highways, residences, and sensitive environmental areas.

These changes to the North American energy landscape have increased the risk that if such a train derails, one or more tank cars might be punctured, release cargo, and, in some cases, result in a fireball. When such a derailment involves a crude oil or ethanol unit train, multiple tank cars might spill their contents, fueling large pool fires.

We have investigated several train derailments and have identified a number of crashworthiness vulnerabilities in the common DOT-111 tank car design with respect to tank heads, shells, and fittings. Transporting flammable liquids by rail demands rail cars designed with better puncture resistance as well as resistance to thermal failures and energetic fireball releases. The new DOT 117 standard is specifically designed to reduce these vulnerabilities.

Congress has mandated that the industry change over to a new DOT-117 tank car standard to transport flammable liquids by rail. However, although different phase-out deadlines apply to the various DOT 111 designs and to various types of cargo, there are no intermediate milestones on the way to these deadlines. Consequently, tank car fleet owners must choose when to retrofit or to replace their flammable liquids tank cars based on several factors, such as market conditions, cost benefit considerations, available capital, and the feasibility of assigning less-robust tank cars to other nonflammable liquids service.

According to the Pipeline and Hazardous Materials Safety Administration, at the peak of crude by-rail transportation volumes in 2013, nearly 1.5 million gallons of crude oil were spilled in railroad transportation; more crude oil spilled in US railroad incidents than was spilled in the previous 37 years combined. This disturbing trend has drawn significant public attention, as have our investigations into derailment accidents involving flammable liquids releases from DOT-111 tank cars, such as the April 2014 petroleum crude oil train

The old DOT-111 and CPC-1232 tank cars must be replaced as quickly as possible with the new DOT-117 design.

DOT-117 SPECIFATIONS:
Full head shield
Tank jacket
Thermal protection
Top fittings protection
Tank material 9/16 inch
Valve operation handle

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derailment in Lynchburg, Virginia, and the February 2015 crude oil train derailment in Mount Carbon, West Virginia. As a result of these accidents and new Congressional deadlines, we held a public rail tank car roundtable in July 2016 to further study the issue. We learned that currently, crude-oil-by-rail traffic, tank car utilization, and tank car lease rates are declining. These developments may encourage tank car owners to delay placing new or retrofitted tank cars into service.

For the timely attainment of a safer, DOT-117-compliant fleet of tank cars, regulators and industry must work together to ensure continuous retrofit and phase-out progress. In the interim, we will likely continue to investigate fiery railroad accidents. In such cases, we will identify those organizations that have not made sufficient progress in upgrading their existing tank car fleets.

According to Association of American Railroads statistics for August 2016, there are a total of about 99,000 DOT-111 and CPC-1232 tank cars that require retrofitting or replacement by 2029, or an average of about 7,700 tank cars per year. As of August 2016, about 1,400 existing tank cars have been retrofitted to the DOT-117 standard. About 10,839 new DOT-117 cars have been built, but fewer than half have been deployed in flammable liquids service.

Prior to new rules being issued, industry had argued that shop capacity could not support large numbers of tank car retrofits. Industry built additional shops and retrofit capacity in anticipation of steady business, but the numbers suggest they are not being used near full capacity. Meanwhile, we are continuing to see fiery derailments, like the one in Mosier.

Full transparency will help maintain progress toward the deadline to retrofit or replace the DOT 111 cars and avoid a last-minute safety-or-service ultimatum, such as we experienced with positive train control implementation. However, industry can reach full compliance before the Congressional deadline. The faster industry upgrades the fleet to the DOT-117 tank car, the safer flammable liquids transportation will be.

What can be done?

Rail tank car replacement, improved railroad operating practices, and robust emergency responses can help solve this problem. All have been painstakingly developed but are far from being fully implemented. Preventing tragedies from train derailments of major flammable liquids will require a systems approach that strives to improve methods for addressing track and equipment flaws to keep trains from derailing, especially in sensitive areas, and preserves tank car integrity if a derailment occurs. Adequate emergency preparedness is also crucial.

The old DOT-111 and CPC-1232 tank cars must be replaced as quickly as possible with the new DOT-117 design. The deadline for replacing less-robust tank cars extends more than 13 years, from 2018 to 2025 for crude and ethanol, and to 2029 for all other Class 3 flammable materials.

In the absence of mandated implementation milestones, scheduling upgrades to the existing fleet of DOT-111 and CPC-1232 tank cars is left entirely to fleet owners and may be influenced by market factors rather than by safety improvements. The end result could be that many existing hazardous materials tank cars that are prone to catastrophic failure in a derailment could remain in service for upwards of 15 years.

Regulators, industry, and emergency responders must aggressively work together to improve flammable liquids transportation safety. Using the same tank cars that carry food products to carry flammable liquids endangers the public and the environment. ■

The NTSB Most Wanted List highlights safety issues identified from the NTSB's accident investigations to increase awareness about the issues and promote recommended safety solutions.

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation – railroad, highway, marine and pipeline. The NTSB determines the probable cause of the accidents and issues safety recommendations aimed at preventing future accidents. In addition, the NTSB carries out special studies concerning transportation safety and coordinates the resources of the federal government and other organizations to provide assistance to victims and their family members impacted by major transportation disasters.

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Related Accidents*

Date	Location	Accident ID
April 30, 2014	Lynchburg, VA	DCA14FR008
February 16, 2015	Mount Carbon, WV	DCA15FR005

*For detailed accident reports visit **www.ntsb.gov**

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Critical changes needed to reduce transportation accidents and save lives.