

TRANSPORTATION

Rail Safety Policy After East Palestine

The proposed Rail Safety Act would be marginally effective at best and result in more goods traveling by other, more dangerous modes.

BY MICHAEL F. GORMAN

In early 2023, a Norfolk Southern train carrying the hazardous material vinyl chloride derailed near the town of East Palestine, OH. Five cars carrying the chemical were breached, forcing the evacuation of several hundred homes for nearly a week.

The incident received a great deal of attention and prompted U.S. transportation secretary Pete Buttigieg to pledge that the federal government would consider new regulations to prevent similar incidents in the future. It also prompted the introduction of the Railway Safety Act (RSA) of 2023, with significant bipartisan support, that would impose an array of new requirements on railroads.

However, there is little that either the federal Department of Transportation or Congress has proposed that would improve the safety of transporting hazardous chemicals in a way that would be anything close to cost-effective. The likely outcome of making railroads spend billions of dollars with little purpose would be to expose U.S. residents to a greater risk of being affected by accidents involving the increased transport of hazardous materials by trucks.

WHY NOW?

The East Palestine derailment resulted in 11 of the 20 tanker cars carrying vinyl chloride and other chemicals coming off the track. After the accident, officials chose to breach the five cars to conduct a controlled burn. The burn caused hydrogen chloride and phosgene gases to escape into the air, prompting the evacuation of 2,500 residents.

While the incident upended the lives of the residents and put them into a potentially health-threatening environment,

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no injuries resulted from the accident, there is no evidence the derailment affected the drinking water of nearby communities, and the ongoing remediation efforts—completely funded by the railroad—should remove the possibility of any long-term risk to the nearby communities from any chemical exposure.

However, such a conspicuous and well-publicized event scared many people—both near East Palestine as well as people elsewhere who live or work close to a rail line—over the safety of rail-based transportation. Several members of Congress responded by introducing the RSA. At the time this article is written, the legislation contains four primary components:

- Enhance safety procedures for trains carrying hazardous materials.
- Prevent wheel bearing failures through more frequent monitoring.
- Make rail carriers pay higher penalties for derailments.
- Require two-person crews.

WILL THE RSA HELP?

Congress rarely creates legislation with the specificity that the RSA contains, and for good reason: lawmakers generally lack the inherent knowledge necessary to author detailed prescriptions for an agency to take. The RSA demonstrates this. None of the four components seem likely to reduce the risk of a serious accident involving the transport of hazardous material and, taken together, they likely will result in an outcome inferior to the status quo.

Hazmat safety procedures / The legislation calls for increased oversight, individualized emergency procedures, and town-by-town notification of the passage of trains carrying hazardous



materials (hazmat). Those proposals may sound sensible, but they are not actionable.

Because of the broad categorization of “hazardous” materials, everyday roughly 30 percent of U.S. trains carry materials that fit the definition. There are thousands of freight trains traveling in the United States at any one time, every day of the year, and each one passes through scores of cities and towns. No town can effectively “be on alert”—increasing staffing or awareness—when that many trains carry hazardous materials every day and nearly always without incident. Being on constant alert means there is no such thing as an alert.

It should be possible to substantially reduce the scope of such alerts by narrowing the definition of hazardous material. There are four major categories: ignitable, reactive, corrosive, and toxic. The categories show the wide variation in these materials; not all hazardous materials are created equal.

For example, asphalt, medicines, pesticides, and adhesives are deemed hazardous, but an accident that resulted in some sort of spillage of any of them would pose little if any risk to nearby res-

idents. Excluding them from the category of hazardous material would result in many fewer alerts—a necessity for this proposal to be made effective in any way—but doing this may be politically impossible. As a result, this policy would bury municipalities in messages and warnings when only a tiny fraction of that information would be useful. Hazmat on a train is not dangerous unless and until there is a spill, and even then most spills do not pose any danger. This provision will neither reduce the risk of a hazmat spill nor speed up the response to a disaster.

What is useful is readily available information in a time of crisis about the contents of a train and how they should be handled. Freight railroads have already responded to this demand: in 2014 they created the website AskRail.us, which provides on-demand information to first responders on an as-needed basis.

Detecting wheel bearing failures / The East Palestine derailment is believed to be the result of a wheel bearing “seizing up” from a loss of lubricant. Hot bearing detectors placed along the tracks can indicate if a bearing is likely to fail. There are some 6,000 of

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these sensors already in place on the U.S. rail network. They are generally spaced about 25 miles apart, although this varies by railroad and location.

The RSA would significantly increase the number of sensors, spacing them about 10 miles apart. The idea is that more frequent testing might catch a bad bearing sooner, allowing the affected train to stop before it derails. The estimated cost to the rail industry to meet this requirement would be \$1.1–\$2.2 billion.

That would not be the only cost of this measure. The more-than-doubling of detectors would increase false positive readings in which the detector indicates a problem but there is none, slowing rail service. A 2018 working paper by C. Tarawneh and J. Montalvo found that from 2001 to 2007, 40 percent of bearings flagged by these detectors were false positive, or “non-verified,” meaning the train was needlessly stopped, a rail car set out, later inspected, and no problem was found, all because of a faulty reader.

Moreover, an increased number of hot bearing detectors would have only a small effect on derailments. Bearing failures caused only 5.9 percent of all derailments, according to a 2012 *Transportation Research Record* article by Xiang Liu et al. A 2015 article by Liu, also in the *Transportation Research Record*, found bearing failures were the fastest decreasing cause of derailment and that track-related derailments occur at four times the rate. It is doubtful the expansion of hot bearing sensors would pass a reasonable cost–benefit test.

While some safety advocates may insist that safety is too important to worry about cost, the reality is that cost-ineffective regulations can be counterproductive. In this instance, the outcome of imposing a non-cost-effective rule on railroads would increase rail shipping rates because the additional hot bearing detectors would not save railroads any money on net and thus increase the net cost of shipping by rail. The increase in costs would push more goods onto trucks, which constitutes an inferior outcome because shipping goods via truck poses decidedly higher social costs.

In a 2008 journal article, I documented that trucks cause more accidents, more greenhouse gas and particulate matter emissions, more noise, and more social costs in the form of roadway deterioration paid for by the U.S. public. By penalizing and regulating rail—a more environmentally friendly mode of transport—regulators are demanding an inferior and less safe mode while penalizing the socially optimal one.

Such a cost-unproductive safety mandate also might reduce other, more productive track maintenance investments that would do more to reduce derailments. For instance, track conditions are by far the most common cause of derailments; an expensive investment in detectors could induce railroads to scale back their existing—and costly—rail maintenance and upgrade programs that are currently in place and have contributed to steady diminution of

derailments for the last 20 years. Federal Railroad Administration (FRA) data indicate a 44 percent drop in derailments since 2000.

It’s also worth noting that not all rail safety experts are supporters of expanding this particular technology. Many see these sensors as outdated and favor other approaches for reducing this risk. For instance, railroads have begun to consider the use of telematics, in which battery-operated on-car sensors can read near-real-time temperature, load, and vibration of bearings. If a forced investment of \$2 billion in hot bearing detectors results in technology lock-in or just delays the adoption of what looks to be a superior technology, it could result in an inferior long-term safety outcome. Having Congress prescribe the implementation of a particular technology makes little sense.

Liability/ The RSA also calls for the establishment of higher fines for derailed trains that would go above and beyond the railroads having to pay for the cost of any damage done to public or private

Increasing rail costs because of new safety measures would push more goods onto trucks, and that would have decidedly higher social costs.

property. While increasing the cost of anything should result in less of it, there is a very real possibility that such a step could be socially counterproductive.

For starters, railroads already pay a significant economic cost when they have a derailment. Carriers bear the cost of damaged rail equipment and damaged or lost goods, and they must pay for the incident clean-up and any environmental damage. They must also indemnify any private property owner or government affected by a derailment. In 2021 the average hazmat incident cost the responsible railroad over \$100,000. As a result, railroads go to great lengths to prevent them to the extent that is cost-effective.

Beyond damages, tort law is specifically intended to allow those damaged by an accident resulting from negligence to get compensation for their losses as well as an additional payment specifically intended to change the cost–benefit calculus to deter future negligence of the sort that contributed to the original accident. Norfolk Southern is already facing lawsuits for the inconvenience caused and the health threat imposed on the people of New Palestine.

The railroad recently estimated that the East Palestine derailment would cost it \$400 million, and experts believe that figure will likely rise. Increased penalties mandated by the federal government will have little or no marginal effect relative to very real

costs that incentivize railroads to take additional steps to deter future derailments, nor will the money necessarily help those in the communities where the incidents occur.

However, if the additional fines cause higher rail shipping costs—a likely outcome—then the result would be a reduction in freight being transported by rail and an increase in freight traveling by truck. Given that trucks are much more likely to be in an accident, and their accidents are more likely to affect citizens than a train derailment, this would be an unambiguously worse outcome.

Two-person crews / No U.S. freight railroads on main lines currently operate with less than a two-person crew, so the RSA provision mandating two-person crews on all rail lines may seem like a costless requirement. It may also seem useless; the East Palestine train was operating with a *three*-person crew.

Crew fatigue—the ostensible reason given by advocates of the mandate—is not something the FRA currently worries about. It already has strict rules about how long an engineer can operate a train. There is little evidence supporting the notion that fatigue contributes to derailments; the FRA does not even have a “case code” for fatigue in its list of possible derailment causes. There is no evidence that reducing to a one-person crew—a common practice in other countries, including Europe—will increase derailments or reduce safety.

However, U.S. labor unions that represent train engineers and operators have been loud advocates of such a provision, and these efforts have taken on some urgency with the prospect of autonomous train operations reducing the number of available jobs. (See “Understanding the Railroads–Unions Fight,” Spring 2023.) Trains are better candidates than other modes (e.g., trucks) for autonomous operations: trains operate on a closed system with no automobiles changing lanes or any other “windshield” decisions that onboard operators need to make, no steering wheel, and much of a train’s operation is already centrally controlled. So, it is baffling why policymakers would think trains need more operators.

Increased inspections / At the time of this writing, lawmakers are considering adding a fifth provision to the RSA legislation: an increase in the frequency of locomotive inspections by qualified mechanical employees. As a result of the success of prediction-based equipment performance technologies, the FRA itself has extended—not reduced—the time between required inspections. The improvement in such technology and identifying potential problems has caused a 21 percent decrease in equipment-related incidents in the last two decades.

THE RSA WOULD YIELD LITTLE SAFETY BENEFIT

While the government wants to do more to prevent derailments like the one in New Palestine, the legislation currently being debated does not address the causes of derailments nor propose reasonable or cost-effective solutions. It would likely do more harm than good.

The proposed legislation errantly focuses on an already safe and improving mode of transportation. It offers facile prescriptions in response to a single incident. The FRA itself calls U.S. freight rail the safest in the world; taking steps that would effectively reduce the proportion of goods that travel by rail would be a disastrous outcome. A policy change should address a specific problem; this legislation fails to do so.

Far worse, the RSA’s passage would not result in an improvement in safety, but it would reduce the quality of rail service and increase rail shipping costs. That, in turn, is likely to push more goods onto trucks. Because truck transport is considerably more expensive than rail, this would increase costs to shippers and consumers.

Trucks are also far more polluting than rail. In terms of particulate matter and greenhouse gas generation, trucks have five times worse emissions by gross ton-mile. From a societal standpoint, the federal government should be taking steps to move more freight *onto* rail, but in the last two years Congress and the Biden administration have pursued numerous directives that would each serve to reduce freight rail capacity in the United States. The RSA is merely the latest of these efforts.

Perhaps less realized is that trucks are decidedly more dangerous than rail. Rail incidents are larger and more likely to receive national attention, but truck incidents are so common (and smaller, individually) that they hardly draw attention. The U.S. Bureau of Transportation Statistics reports that while train derailments involving hazmat have fallen 49 percent in the last decade, hazmat-related accidents involving trucks increased nearly 75 percent in the last decade. Trucks carry twice as much hazardous materials as trains in the United States, but truck-related hazmat incidents caused 16 times more fatalities between 1975 and 2021, adjusting for gross ton-miles. The difference is more pronounced in the last decade, when trucks carrying hazardous materials caused 83 fatalities while none were attributed to rail. Trucks create more injuries and property damage per gross ton-mile as well.

Any legislation prescribing specific safety regulations for trains will almost invariably result in higher rail shipping costs and more goods traveling by truck. That would be a decidedly inferior outcome for society. R

READINGS

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