TRANSPORTATION

OIL TRAIN ANGST

Are proposed regulations on oil rail shipments good policy?

BY FELER BOSE

Since the mid-2000s, energy companies using technology including fracking and horizontal drilling have increased oil production in the Bakken formation in North Dakota. Because of the lack of pipelines, the oil is moved to refineries primarily by rail.

In 2013, a major rail accident occurred in the town of Lac-Mégantic, Quebec. Following this, the Pipeline and Hazardous Materials Safety Administration (PHMSA) of the U.S. Department of Transportation (DOT) proposed new regulation for the transportation of flammable liquids by rail.

The proposed PHMSA regulation recommends new requirements for trains transporting large amounts of "Class 3" flammable liquids (mostly ethanol and Bakken crude) to reduce the number of train accidents and the consequences that follow when trains carrying flammable liquids spill their contents. The regulation focuses on six areas:

- rail routing restrictions
- tank car integrity
- speed restrictions
- braking systems
- proper classification and characterization of mined liquid and gas
- notification to State Emergency Response Commissions

The agency's Regulatory Impact Analysis (RIA) estimates the 20-year costs and benefits of the individual and combined provisions of the proposed rule.

The PHMSA fails to demonstrate that the proposed regulations create net benefits for four reasons. First, it does not demonstrate that the accident rate is increasing and needs "fixing" through regulation. Second, it uses incomplete data and questionable assumptions to provide an economic justification for the regulation. Third, it claims that a market failure exists and that regulation to address that failure would create net benefits, but existing insurance provides coverage for all but the most extreme events and so the costs of spills are already largely internalized. Fourth, it fails to consider alternatives such as pipelines or changes in legal liability that might be safer and cheaper than the proposed regulations.

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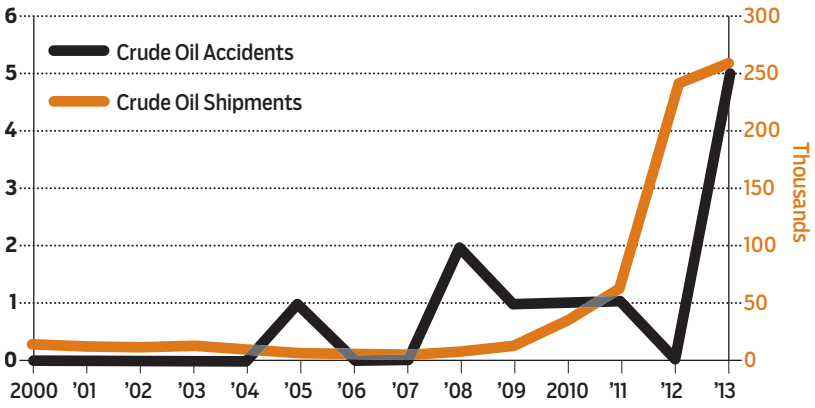
ARE RAIL ACCIDENTS INCREASING?

The PHMSA claims that the number of accidents occurring with rail cars is increasing and that regulation is needed to reduce it. Figure 1 reproduces the data from the draft Notice of Proposed Rulemaking (NPRM) and RIA. From 2009 to 2013, the number of accidents increased from one to five. Over that same time, shipping volume increased from 10,800 to 434,000 rail cars of crude. Thus a more than 3,900 percent increase in the volume of crude oil shipped by rail was accompanied by only a 400 percent increase in accidents. Per rail car shipped, the accident rate actually declined by nearly 88 percent. (See Table 1.) The number of accidents increased to five in 2013 because much more crude was shipped by rail, not because rail transport became less safe.

FIGURE 1

CRUDE OIL CARLOADS AND RAIL ACCIDENTS

2000–2013, Mainline derailments



Source: STB Waybill Sample and PHMSA Incident Report Database

CURTIS TATE/MCT/GETTY IMAGES

In addition, it seems that one or possibly two of the cited rail accidents occurred in Canada. If the PHMSA wants to include Canadian accidents in its analysis, it should also include Canadian crude oil shipment numbers. If Canadian data are excluded, then rail safety improves and the "need" for this regulation is further reduced.

The safety numbers would look even better if we used 2008 as the starting year. There were two accidents that year and only 9,500 rail cars used to transport crude, as also noted in Figure 1. From 2008 to 2013 the accident rate declined almost 95 percent.

According to the agency's own RIA, the forecast derailment rate for ethanol and crude oil will decline over time, as shown in Table 2. In the last column of Table 2, I estimate that mainline derailments will decline from 1.6 per 100,000 carloads in 2015 to 0.68 per 100,000 carloads in 2034 (a decline of over 57 percent) in the absence of the proposed regulation. Why is the regulation needed if the accident rate is predicted to fall?

QUESTIONABLE ASSUMPTIONS AND INCOMPLETE DATA

To this point, my analysis accepts the data presented by the PHMSA. But the data are incomplete and fail to support the proposed regulation. Since February 2011, eight of the 10 accidents have causes "yet to be determined," according to the RIA's Table 1. Once those causes are determined, they may be the result of factors unaffected by the proposed rule or for which cheaper solutions exist. In one study highlighted in the NPRM, more than 88 percent of derailments from 2001 to 2010 occurred because of broken rails or welds. Would it not be cheaper to remedy that problem by fixing the rails rather than mandating new spill-resistant rail cars? While this NPRM does not deal with inspection and track maintenance, the PHMSA states that "existing regulations and ongoing rulemaking efforts," together with features in this NPRM, are sufficient for now.

The economic justification for rail car regulation depends on

the one high-consequence accident (with more than $1 billion in damages) that occurred in Quebec in 2013. No accident of such consequence has ever occurred in the United States. This one foreign event leads the PHMSA to estimate that in the next 20 years the United States will experience as many as 10 high-consequence events, including one possible "super" event that causes damages of more than $6 billion.

Table 3 reproduces the cost and benefit calculations of the PHMSA regarding the proposed rules. In nearly all the cases, the costs exceed the benefits (costs avoided by spill prevention). Only the second and third proposals show possible positive net benefits, and that is only because the benefit calculation assumes that 10 high-consequence events (one of them a super event) will occur in the next 20 years. A one-time event in a foreign country has been transformed into a systemic event in the United States.

The PHMSA calculation of property and environmental damages is also questionable. The PHMSA uses $300 per gallon spilled for low-consequence events. However, that number is derived from the high-consequence Quebec accident and inflates the benefit calculation for low-consequence events.

Table 1

ACCIDENTS PER RAIL CAR SHIPPED 2009–2013

	RAIL CARS OF CRUDE TRANSPORTED	ACCIDENTS	ACCIDENTS MINUS QUEBEC	ACCIDENTS PER 10,000 CARS	ACCIDENTS MINUS QUEBEC PER 10,000 CARS
2008	9,500	2	2	2.11	2.11
2009	10,800	1	1	0.93	0.93
2013	434,000	5	4	0.12	0.09
% change, 2008–2013	4468%	150%	100%	-94.53%	-95.62%
% change, 2009–2013	3919%	400%	300%	-87.56%	-90.05%

Source: Frittelli et al., "U.S. Rail Transportation of Crude Oil," Congressional Research Service, 2014.

Table 2

PROJECTED ETHANOL AND CRUDE MAINLINE DERAILMENTS AND DERAILMENT RATE 2015–2034

	CARLOADS	MAIN LINE DERAILMENTS	MAIN LINE DERAILMENTS PER 100,000 CARLOADS
2015	898,500	14.36	1.60
2016	924,707	14.34	1.55
2017	937,808	14.09	1.50
2018	949,434	13.80	1.45
2019	962,470	13.53	1.41
2020	971,605	13.19	1.36
2021	969,195	12.69	1.31
2022	965,957	12.18	1.26
2023	956,047	11.60	1.21
2024	948,974	11.05	1.16
2025	934,230	10.43	1.12
2026	909,673	9.72	1.07
2027	892,919	9.11	1.02
2028	873,274	8.49	0.97
2029	851,981	7.87	0.92
2030	829,771	7.26	0.87
2031	810,028	6.70	0.83
2032	790,030	6.15	0.78
2033	772,230	5.64	0.73
2034	755,613	5.16	0.68
2015–2034 Total		207.36	

Source: RIA p. 24

WHAT IS THE MARKET FAILURE?

The RIA states that the PHMSA must act because of market failure as a result of shippers and railroads not insuring "against full liability of the consequences involving hazardous materials. As a result, these events impose externalities." Most Class I railroads carry a self-insured retention of between $25 million and $50 million and maintain between $750 million and $1 billion in coverage. The PHMSA asserts that even if rail carriers have large amounts of insurance, the coverage will be less than the cost of a super event.

How much insurance should a firm purchase? The 40 U.S. mainline derailments since 2006 have resulted in total damages of about $47 million ($14.13 per gallon released), or $1.18 million per derailment. Even if we use the PHMSA's preferred damage estimate of $300 per gallon released, the damages would be only $25 million per derailment. Railroads appear to purchase sufficient insurance and are more than able to cover their expected damages from a typical low-consequence event. And at the upper end, their insurance almost covers the damages of another Quebec accident. They do not have enough insurance, however, to cover a $6 billion super event. Is that a problem?

The optimal amount of insurance depends on the governing tort regime. Under a strict liability regime, the defendant is liable for harm to the plaintiff regardless of whether the defendant took reasonable precautions. Under a negligence regime, in contrast, the defendant is liable for the plaintiff's harm only if the plaintiff can establish that the defendant was negli-

gent. Under strict liability, risk-averse firms should purchase insurance that covers the costs of all accidents. Under negligence, both firms and consumers should purchase coverage.

The PHMSA could certainly argue on firm ground that a market failure exists when injurers "do not have assets sufficient to pay fully for the losses they cause"—that is, when potential damages exceed net worth. The PHMSA should examine the current liability system and determine if railroads and crude oil shippers have sufficient assets or insurance to pay for potential damages. If not, changes in tort or insurance requirements might be more cost-effective than the proposed rules from the PHMSA.

Standard law and economics analysis holds that strict liability is the appropriate tort regime for hazardous materials because defendants (usually railroads) are the least-cost avoiders—that is, they can avoid accidents at the lowest cost. Under a strict liability tort regime, railroads would seek to indemnify themselves with more insurance coverage. In turn, insurance companies would require railroads to take additional cost-effective precautions in return for lower premiums. Thus, market forces make insurance companies the regulators rather than the PHMSA itself.

The stated goal of the PHMSA proposed rules is "reducing the risks posed by [High Hazard Flammable Trains], ... taking action to prevent accidents from occurring, and ... mitigat[ing] the consequences when accidents do occur." One obvious solution would be to transport crude oil through pipelines, although some commentators argue that pipelines are not safer. But pipelines as well as barges, tanker ships, and tanker trucks should all be analyzed. The U.S. State Department's January 2014 Final Supplemental Environmental Impact Statement for the proposed Keystone XL pipeline estimates that crude oil transported via the pipeline would spill 518 barrels a year, while the same amount transported by rail would spill 1,335 barrels per year at minimum. (However, a brochure from the Association of American Railroads states that the spill rate for crude oil transported by rail is 0.38 gallons per million barrel miles moved as opposed to 0.88 gallons per million barrel miles moved by pipeline.) And transporting oil by pipeline is safer in terms of injuries. If regulations are inhibiting the construction of pipelines in the Bakken region, then eliminating those regulations—rather than adding tank car regulation—should be analyzed.

Table 3

TWENTY-YEAR COSTS AND BENEFITS OF COMBINATIONS OF PROPOSED REGULATORY AMENDMENTS 2015–2034

PROPOSAL	BENEFIT RANGE (MILLIONS)	COST (MILLIONS)
PHMSA and FRA design standard + 40 MPH system wide, 7% discount rate	$1436–$4386	$5,820
PHMSA and FRA design standard + 40 MPH in 100K, 7% discount rate	$1,292–$3,836	$3,380
PHMSA and FRA design standard + 40 MPH in HTUA, 7% discount rate	$1,269–$3,747	$3,163
AAR 2014 standard + 40 MPH system wide, 7% discount rate	$794–$3,034	$5,272
AAR 2014 standard + 40 MPH in 100K, 7% discount rate	$641–$2,449	$2,831
AAR 2014 standard + 40 MPH in HTUA, 7% discount rate	$616–$2,354	$2,614
CPC 1232 standard + 40 MPH system wide, 7% discount rate	$584–$2,232	$4,741
CPC 1232 standard + 40 MPH in 100K, 7% discount rate	$426–$1,626	$2,300
CPC 1232 standard + 40 MPH in HTUA, 7% discount rate	$400–$1,527	$2,083

Source: PHMSA, RIA, 6.

CONCLUSION

According to the Office of Management and Budget, a good regulatory analysis should have three elements:

- a statement of the need for the proposed action
- an examination of alternative approaches
- an evaluation of the benefits and costs—quantitative and qualitative—of the proposed action and the main alternatives identified by the analysis.

The PHMSA regulatory analysis as shown in the RIA and NPRM falls short of this standard. The accident data used to justify the regulation show that the accident rate would decline without regulation. Second, the data used to calculate the benefits are based on an event that has never occurred in the United States. Third, the proposal has no serious discussion of alternatives such as using pipeline or other methods to transport crude and fails to discuss the role of torts in managing the damages created by crude oil spills. Given those failings, the analysis needs to be redone. *R*

READINGS

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